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Helmholtz-Zentrum für Ozeanforschung Kiel

RV SONNE Fahrtbericht / Cruise Report SO267

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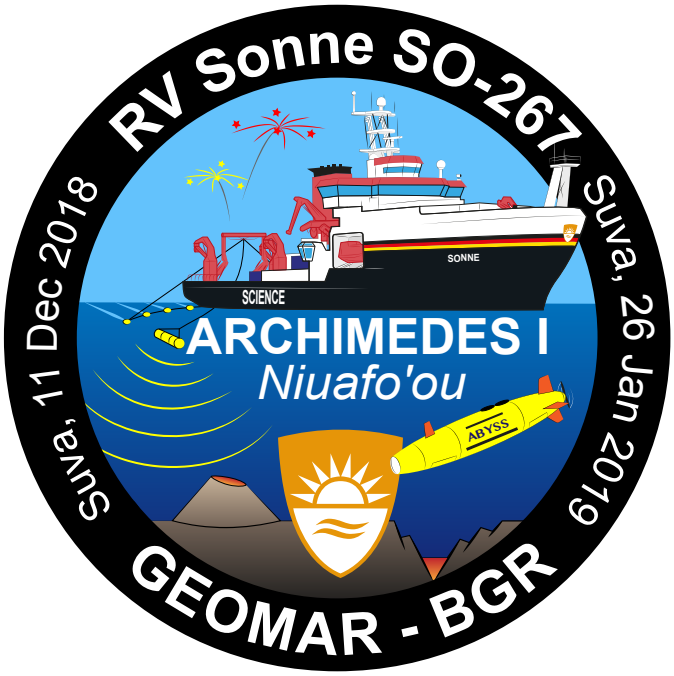
Suva (Fiji) – Suva (Fiji)
11.12.2018 – 26.01.2019



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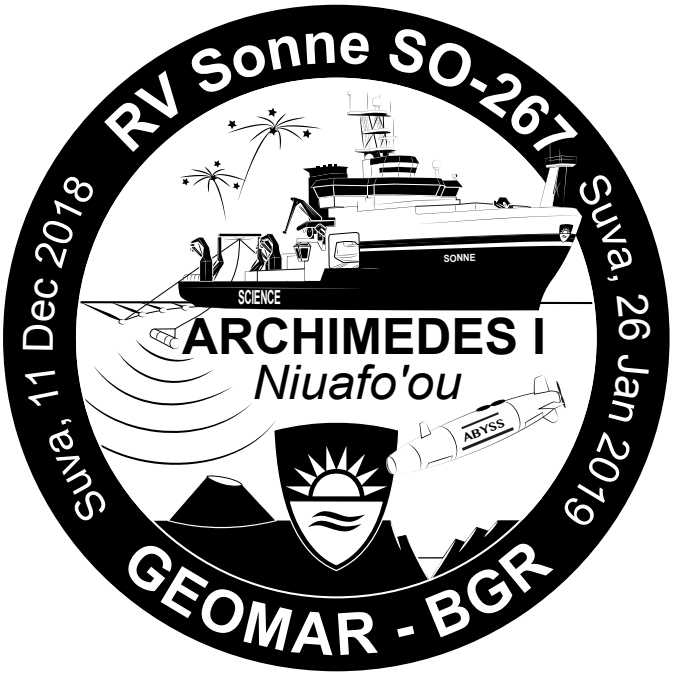

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1 Cruise Summary

1.1 Summary in English

Over half of the world´s presently exploited metal deposits were formed during major episodes of crustal growth related to subduction and microplate tectonics. These processes are observed today along the entire margin of the Western Pacific, where complex microplate mosaics offer unique opportunities to study accretion and the emergence of new continental crust. The focus of SO267 was a series of crustal cross-sections at the outer edge of the Indo-Australian Plate, in the largely uncharted waters of the Kingdom of Tonga. The project, entitled "Arc Rifting, Metallogeny and Microplate Evolution – An Integrated Geodynamic, Magmatic and Hydrothermal Study of the Fonualei Rift System", was designed to document the geological evolution of an emerging microplate mosaic in the NE Lau Basin, a region with some of the fastest growing crust on Earth, and to better understand the sequence of events that cause arc rifting and related magmatic-hydrothermal activity. Using a coordinated approach of high-resolution 2D seismics, electromagnetics and sampling, ARCHIMEDES I imaged the deep structure of the Fonualei Rift system and adjoining back-arc crust of the Niuafo'ou microplate. The goal was to address a major unsolved question concerning crustal growth in complex arc-backarc systems: at what stage in the structural and thermal evolution of the crust does arc rifting occur and seafloor spreading initiate? Planned operations included large-scale reflection and refraction seismic surveys, and a dense program of gravity, magnetics, heat flow, bathymetric mapping and sidescan imaging using the AUV ABYSS and ship-based multibeam systems. This ambitious program was made possible by a close collaboration between GEOMAR and BGR scientists, bringing together diverse expertise and state-of-the-art technologies. To understand the large-scale tectonic processes, we studied 6 different locations within an area of 300 km x 300 km: i) the southern Fonualei Rift Spreading Center (S-FRSC), ii) the region between the S-FRSC and the Eastern Lau Spreading Center (FRSC-ELSC Transfer Zone), iii) the northern tip of the Eastern Lau Spreading Center (ELSC), iv) the northern tip of the Fonualei Rift system (N-FRSC), v) the Mangatolu Triple Junction (MTJ), and vi) the southward propagating Northeast Lau Spreading centre (NELSC). The combined data represent one of the most comprehensive records of microplate formation from the modern oceans.

1.2 Zusammenfassung

Mehr als die Hälfte der heutzutage an Land abgebauten Metall-Lagerstätten entstanden in Zeiten von erhöhtem Krustenwachstum im Zusammenhang mit Subduktion und Mikroplattentektonik. Entsprechende Prozesse werden heute entlang der Grenzen des westlichen Pazifiks beobachtet, wo ein komplexes Mosaik an Mikroplatten die einzigartige Möglichkeit bietet, die Bildung neuer kontinentaler Kruste zu beobachten. Der Fokus der Ausfahrt SO267 lag auf der Durchführung einer Reihe von Krustenprofilen in den weitgehend unerforschten Gebieten vor Tonga am Rand der Indo-Australischen Platte. Das Projekt mit dem Titel "Arc Rifting, Metallogenese und Entstehung von Mikroplatten - Eine integrative Studie von Geodynamik, Magmatismus und Hydrothermalismus des Fonualei Rift-Systems" wurde geplant, um die geologische Entwicklung des entstehenden Mikroplattenmosaiks im

nordöstlichen Lau Becken, der Region mit der schnellsten Krustenbildung der Erde, zu dokumentieren. Dadurch sollte die Abfolge von Ereignissen/Prozessen, die zum Zerbrechen von Inselbögen und damit verbundener hydrothermaler Aktivität führt, besser verstanden werden. ARCHIMEDES I hat mit seinem integrativen Ansatz aus 2D Seismik, mariner Magnetotellurik und Probennahme die tiefen Strukturen des Fonualei Rifts und der benachbarten Inselbogenkruste der Niuafo'ou Mikroplatte abgebildet. Das Ziel war es, eine wichtige bisher ungelöste Frage hinsichtlich der Krustenbildung in Inselbogen-Systemen anzugehen: In welchem Stadium der strukturellen und thermischen Entwicklung des Inselbogens bricht die Inselbogenkruste auseinander und wann setzt die Meeresbodenspreizung ein? Das umfangreiche Arbeitsprogramm beinhaltete großräumige reflexions- und refraktionsseismische Profile sowie ein dichtes Netz aus Messungen des Schwerefeldes, Magnetik, Wärmestrom sowie akustischen Kartierungen des schiffsgestützten Multibeam und Messungen mit dem Seitensichtsonar des autonomen Unterwasserfahrzeugs (AUV) ABYSS. Dieses ehrgeizige Programm wurde durch eine enge Zusammenarbeit zwischen Wissenschaftlern von GEOMAR und BGR und durch die Nutzung ihrer Expertise und hochmoderner Technologien möglich gemacht. Um die großräumigen tektonischen Prozesse zu verstehen, wurden 6 verschiedene Areale innerhalb eines 300 km x 300 km großen Gebietes untersucht: i) das südliche Fonualei Rift Spreading Center (S-FRCS), ii) die Region zwischen S-FRSC und dem Eastern Lau Spreading Center (FRSC-ELSC Transfer Zone), iii) die nördliche Spitze des Eastern Lau Spreading Center (ELSC), iv) die nördliche Spitze des Fonualei Rift system (N-FRSC), v) die Mangatolu Triple Junction (MTJ), und vi) das südwärts propagierende Northeast Lau Spreading centre (NELSC). Die gesammelten Daten stellen einen der bisher umfangreichsten Datensätze zur Bildung von Mikroplatten in rezenten Ozeanen dar.

2 Participants

2.1 Principal Investigators

Prof. Dr. Mark Hannington, GEOMAR
Prof. Dr. Heidrun Kopp, GEOMAR
Dr. Michael Schnabel, BGR
Prof. Dr. Colin Devey, GEOMAR
Dr. Sven Petersen, GEOMAR

2.2 Scientific Party

Name	Discipline	Institution
Hannington, Mark, Prof.	Chief Scientist	GEOMAR
Kopp, Heidrun, Prof.	Co-chief Scientist	GEOMAR
Devey, Colin, Prof.	Volcanology, Bathymetry	GEOMAR
Werner, Reinhard, Dr.	Petrology	GEOMAR
Brandl, Philipp, Dr.	Petrology	GEOMAR
Rahmsdorf, Charlotte	Petrology	GEOMAR
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Petersen, Sven, Dr.	Hydrothermalism, Bathymetry	GEOMAR
Schnabel, Michael, Dr.	Seismics	BGR
Barckhausen, Udo, Dr.	Magnetics/Gravity	BGR
Heyde, Ingo, Dr.	Magnetics/Gravity	BGR
Hagedorn, Dennis	Magnetics/Gravity	BGR
Ebert, Timo	Streamer, Air Guns	BGR
Engels, Martin, Dr.	Streamer	BGR
Steinborn, Peter	Streamer	BGR
Demir, Uemit	Streamer	BGR
Beeck, Florian	Air Guns	GEOMAR
Schroeder, Patrick	Air Guns	GEOMAR
Dannowski, Anke, Dr.	OBS	GEOMAR
Schmid, Florian, Dr.	OBS	GEOMAR
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Beniest, Anouk, Dr.	OBS	VU
Petersen, Florian	OBS	GEOMAR
Schramm, Bettina	OBS	GEOMAR
Hampel, Fabian	OBS	GEOMAR
Hartmann, Robert	OBS	GEOMAR
Jegen, Anna	OBS	GEOMAR
Wollatz-Vogt, Martin	Magnetotellurics	GEOMAR
Riedel, Michael, Dr.	Heat Flow	GEOMAR

Klaucke, Ingo, Dr.	Bathymetry, Side Scan Sonar	GEOMAR
Augustin, Nico, Dr.	Bathymetry	GEOMAR
Martins, Sofia, Dr.	Gravity Coring	GEOMAR
Lange, Sabine	Gravity Coring	GEOMAR
Rothenbeck, Marcel	AUV	GEOMAR
Diller, Nikolaj	AUV	GEOMAR
Kurbjuhn, Torge	AUV	GEOMAR
Parianos, John	Sediment Sampler, Observer	Nautilus
Fangatua, Tevita	Tongan Observer	MLNR

2.3 Participating Institutions

GEOMAR	Helmholtz-Zentrum für Ozeanforschung Kiel, Germany
BGR	Bundesanstalt für Geowissenschaften und Rohstoffe, Hannover, Germany
GFZ	GeoForschungsZentrum Potsdam, Germany
UO	University of Ottawa, Metal Earth Project, Canada
NRCan	Geological Survey of Canada
VU	Vrije Universiteit Amsterdam, The Netherlands
Nautilus	Nautilus Minerals, Australia
MLNR	Ministry of Lands and Natural Resources, Kingdom of Tonga

2.4 Crew

Name	Rank
Meyer, Oliver	Master
Aden, Nils	Chief mate
Buechele, Ulrich	2. Nautical Officer
Hoffsommer, Lars	2. Nautical Officer
Brinckmann, Ferdinand	Ship's Doctor
Leppin, Joerg	Chief Electronics Engineer
Meinecke, Stefan	System Manager
Pregler, Hermann	Electronics Engineer
Kraft, Juergen	Bosun
Heibeck, Frank	MPC / A.B.
Ross, Rene	MPC / A.B.
Kruszona, Torsten	MPC / A.B.
Papke, Rene	MPC / A.B.
Ernst, Arnold	MPC / A.B.
Fricke, Ingo	MPC / A.B.
Zeigert, Michael	MPC / A.B.
Hermesmeyer, Dieter	Chief Engineer
Horsel, Roman	2. Engineer
Stegmann, Tim	2. Engineer

Ulbricht, Martin	Electrician
Schlieker, Philipp	Electrician
Blohm Volker	Fitter
Blaurock, Andre	Motorman
Hoffmann, Georg	Motorman
Yaylaguel, Denis	Motorman
Garnitz, Andre	1. Cook
Wienekamp, Frank	2. Cook
Vogt, Alex	Chief Steward
Manuel, Chris	Steward
Kroeger, Sven	Steward
Yan, Jinghao	Steward

3 Research Program

3.1 Aims of the Cruise

The major scientific objective of SO267 was a systematic multiparameter geological and geophysical survey of the Fonualei rift system in the NE Lau Basin using joint reflection/refraction profiling and supported by potential field data, mapping, and rock sampling. The focus of the study was on arc rifting and the transition to seafloor spreading, which are key processes in the growth of juvenile continental crust. Questions concerning arc evolution, the emergence of microplates, and the controls on magmatic and hydrothermal activity at a regional scale were addressed. With the data collected, we aim to test a number of hypotheses related to crustal growth in nascent arc-backarc systems:

(1) The nature of the arc crust just prior to rifting determines how rift propagation proceeds and where new plate boundaries are formed. We mapped the very tips of the Fonualei Rift Spreading Centre (FRSC) where there is a sudden change from mostly fractured arc crust into deep (>3,000 m) rift basins. Crudely organized faulting at the southern termination of the FRSC represents the early pre-rift stage, which was imaged using multibeam bathymetry (morphotectonics), seismic reflection and refraction, high-resolution AUV sidescan, and detailed sampling of the youngest volcanism, providing an unprecedented view of the rifting process. The progression from rifting to the very earliest stages of spreading is marked by the widespread emplacement of subvolcanic intrusions into the fractured arc crust. Data from the multichannel seismics, velocity profiles, volcanic and sedimentary stratigraphy and melt compositions from volcanic rock geochemistry will be combined into a comprehensive model of the events leading to rifting and spreading.

(2) The location of rifting and the different styles of faulting and seafloor volcanism are influenced by pre-existing basement structures. Preliminary modelling of the opening of the rift basin, based on high-resolution seismic and magnetic data, suggests that the present arc rift may have migrated over a former spreading center that had already weakened the crust. The deepest and most active faults bounding the FRSC were clearly imaged and their relationship to pre-existing basement structure is suggested by analysis of the mapping data and pre-processed seismic images. Possible failed rifts within the Niuafo'ou microplate,

adjacent to the FRSC, appear to record an episodic history of rifting and spreading, which has occurred by repeated thinning of the crust, then faulting, subsidence, and intrusion. The highly asymmetric basins are bound by steep normal faults in the east and lower-angle faults (tilted blocks) in the west. In the southern FRSC basin, extension is marked by several en echelon dike complexes and cones that are oriented obliquely to the rift-bounding faults, recording a highly variable stress regime. Several candidates for basement faults influencing the FRSC can be traced across seismic lines P3-P5 and should be revealed by additional processing. These likely determine both the wider segmentation of the rift (including its sharp termination in the south) and the distribution of magmatic and hydrothermal activity. We anticipate that further processing of the seismic data, coupled with magnetics and gravity, will reveal the deep lithospheric structures that control the current rifting.

(3) There is an optimal thickness of the arc crust to initiate rifting, intrusion of melt, and eventual seafloor spreading. We measured the total crustal thickness in 3 transects across the FRSC. Preliminary results of velocity-depth modelling are consistent with the current model of very thin crust (~4-5 km) in the transition from the arc rift to the adjoining Niuafo'ou back-arc crust formed at the Eastern Lau Spreading Centre and Central Lau Spreading Centre (ELSC and CLSC, respectively). The OBS data suggest thinning of arc crust under the entire arc-to-backarc transition, with the active FRSC located at the easternmost extent of a broad upwarping of the crust-mantle boundary (probable asthenospheric upwelling?). We expect that further processing of the data will provide a much clearer picture of the arc crust just prior to rifting than has been possible in much older data sets (e.g., Crawford et al., 2003).

(4) Variable magmatic productivity, from high rates of extrusion at axial volcanoes to little or no volcanism between rift segments, reflects a complex subvolcanic intrusive system. We mapped and sampled extensive areas with high-resolution acoustic backscatter to determine the morphology, sediment cover, and composition of the dominant volcanic features. The extent of intrusive activity also was determined from the seismic profiles. The magmatic productivity is mainly related to: i) major dike complexes in the rift, ii) leaky faults and fissure eruptions at the rift tip, with many isolated or non-interacting fissures, and iii) inflated inner arc crust at the southern end of the FRSC. Estimated opening rates suggest volcanism has been ongoing for several hundred thousand years, ranging from large sedimented caldera volcanoes on the inner arc high (oldest), more recent cone volcanoes and dike complexes in the rift (younger), and isolated cinder cones or scoria cones mainly fractured arc crust in advance of the rift (youngest). This pattern is seen at both the northern and southern terminations of the FRSC. Geochemical analyses of the sampled rocks will reveal the melt sources, but it is already clear from seismic sections that many small intrusions (<2 km sills and dikes) are present in the upper crust, including under the arc, beneath the rift, and in the adjacent back-arc crust. Preliminary observations from more than 41 dredges reveal a complex assemblage of arc basalts and andesites, rare dacite, and more primitive back-arc basalts. Strain localization of small batches of magma at the rift tips may explain how different melt compositions can be so closely juxtaposed.

(5) Highly asymmetric rifting strongly influences the bulk composition and the structure of the adjacent microplate. Because of the highly asymmetric rifting there appears to be extensive arc crust stranded in the back-arc region of the Niuafo'ou microplate.

The remarkable heterogeneity of the plate, in terms of structure and composition, in some places with no clear boundary between the arc and backarc, may be a fundamental characteristic of crustal growth in juvenile arc-backarc systems with rapidly migrating plate boundaries.

(6) A number of magmatic and tectonic precursors indicate the location of the emerging boundaries of the Niuafo´ou microplate. We imaged two different styles of emerging triple junctions at the northeast and southeast corners of the Niuafo'ou microplate. In the south, where the FRSC is propagating into older arc crust, the rift is notably bent towards the arc in the direction of Fonuaeli Island in the SE. At the same time fractures are developing to the SW in a broad zone of deformation (50-60 km wide) that extends across the inner arc high and into the back-arc. The SE arm of this emerging triple junction may eventually connect with the Fonualei Discontinuity (FD), whereas the faults in the SW are clearly advancing toward the large volcanic field on the inner arc high. The SW arm may eventually connect with structures in the west related to the easternmost CLSC and northern termination of the ELSC. In the north, the FRSC overlaps with the eastern arm of the Mangatolu Triple Junction (MTJ), and a new triple junction appears to be forming with the Northeast Lau Spreading Centre (NELSC). Very fresh volcanic rocks were dredged at the intersection between the three rifts. Further processing of the seismic profiles across all of these boundaries are expected to reveal the subseafloor architecture more clearly. The different scenarios for the emergence of the triple junctions have implications for mantle flow, the composition of the growing microplate crust, and the magmatic and hydrothermal budget. For example, termination of rifting against the FD could end magmatism at its current location in the rift, diverting melt to the opposing arm that could eventually connect with the CLSC or northern ELSC.

(7) Strong deformation of the Niuafo'ou microplate is contributing to the enhanced hydrothermal activity of the NE Lau Basin. We conducted a high-resolution plume mapping program with the AUV ABYSS to determine the extent and continuity of hydrothermal activity at the eastern and northern boundary of the Niuafo'ou microplate. All of the currently known high-temperature hydrothermal activity is associated with the fissure volcanoes and axial volcanic ridges. Multiple rifting and spreading segments contribute to the high regional hydrothermal budget documented. However, low heat flow values suggest that pervasive fracturing of the arc and back-arc crust, which accommodates most of the opening of the basin, could be responsible for strong "cooling" in areas away from a direct magmatic input. A new survey in the MTJ also showed abundant hydrothermal activity associated with slow-to-ultraslow spreading. We will analyze the AUV data together with the geological mapping results to determine how the distribution of hydrothermal activity compares to similar slow-spreading environments on ridges.

3.2 Agenda of the Cruise

An intensive 43-day program was carried out, including more than 1,000 km of multichannel reflection seismics (MCS) using BGR's 4-km long streamer and recording system (SEAL 428), towed magnetometer, and gravimeter, together with GEOMAR's G-gun cluster. We also conducted 130 deployments of ocean bottom seismometers (OBS) for deep refraction

profiling on three of the profiles. Eighteen ocean bottom magnetotelluric sensors (OBMTs) were also deployed to measure deep crustal resistivity. The geophysical program was complemented by dredging, heat flow measurements, and high-resolution sidescan imaging and plume detection with the AUV ABYSS. A cruise plan and station map showing the main working areas and the route of the ship are provided in **Fig. 3.1** and **Fig. 3.2**. A compilation of the regional bathymetry is shown in **Fig. 3.3**. The ship's station log is in **Appendix 1**.

Measures to ensure responsible marine research and mitigation procedures are described in section 5.1.1.4. Nearly all of the scientific objectives of the cruise were achieved or exceeded. One day was lost due to cyclone "Mona" on 05 January, and one-half day responding to a ship's distress call on 12 January. These delays did not interfere with achieving the science objectives. A complete coring and heat flow program could not be carried out, owing to nature of the sediment in the targeted basins, which prevented the penetration of the corer and heat flow lance. However, several important heat flow observations were made, and more than 30 sediment samples were recovered in the core catchers and in the sediment traps included on the dredge.

Seismic Reflection and Refraction: We conducted six 2D seismic reflection profiles and 3 refraction profiles with OBS to get representative crustal sections. GEOMAR's 6 G-Gun clusters, totaling 84 L, were used for shooting at a speed of 4-4.5 kn on all profiles. Shot points were at 60s intervals on the refraction lines and 25s on the reflection profiles with the BGR streamer deployed on reflection lines.

Profile P1 (MTJ-NELSC Transfer Zone, BGR18-201) was a short ~100-km line crossing the parallel rift basins of the Mangatolu Triple Junction (MTJ) and the tip of the NELSC, which is propagating toward the north end of the FRSC. The line imaged the basement on which the NELSC and northern FRSC are forming and showed that the NELSC is propagating toward the southwest, while the north arm of the MTJ is spreading very slowly.

Profile P2 (FRSC-MTJ Transfer Zone, BGR18-2R2, BGR18-202) was a ~150-km line that crossed the thinning arc crust at the northern termination of the FRSC where it overlaps with the east arm of the MTJ. The seismic section revealed that there is no seafloor spreading in the northern FRSC, as in the south, and only a weak spreading fabric and positive magnetization is observed in the southern arm of the MTJ. However, the intervening area between the NELSC, MTJ and N-FRSC shows the possible intrusive origin of a new triple junction emerging at this location.

Profile P3 (FRSC-LETZ, BGR18-2R3, BGR18-203) was the longest profile, with a total length of ~300 km, extending from the active volcanic front of the Tofua arc, across the deepest part of the southern FRSC (maximum depth of 3050 m), and into back-arc crust as far west as the Lau Extensional Transform Zone (LETZ). Together with magnetics and gravity data, the seismics revealed the structure of the thickened arc crust adjacent to the FRSC, significant crustal thinning beneath the FRSC, and a complex region of failed pull-apart basins and abandoned rifts(?) between the FRSC and LETZ. The western part of the section comprises old back-arc crust that must have originated at an early spreading center related to the opening of the Lau Basin. Large areas with well-developed spreading fabric have been abandoned by the overlapping spreading segments of the CLSC producing deep sub-basins (nodal basins?) at the locations of the overlap. Remnants of the spreading crust can still be seen in the transfer zone between the arc and back-arc crust (corresponding to bands of higher

magnetization), but the eastern part is clearly intruded by a series of NS-trending, right-stepping dike complexes that are possibly part of the emerging Niuafo'ou plate boundary. Sixteen instruments were re-deployed on the line to detect any passive seismicity related to active faulting in the FRSC.

Profile P4 (southern FRSC, BGR18-204) was a short ~100-km line across the complex fault structures at the southern termination of the FRSC. It revealed the complexity of the thinning arc crust as it is being rifted, including the two arms of the FRSC rift: one SE-trending fault network bending toward the arc front and another SW-trending fault network that crosses a failed block of arc crust on the rift flank and cuts the inner arc high. These two rifting directions are thought to be the earliest manifestations of the emerging triple junction at the southern tip of the FRSC.

Profile P5 (FRSC-ELSC Transfer Zone, BGR18-2R5, BGR18-205) had a total length of ~200 km, crossing the inner arc high south of the FRSC and the northern termination of the ELSC. Intrusions in the inflated inner arc crust are linked to large caldera volcanoes and a broad area of younger volcanic cones toward which the western arm of the FRSC is now propagating. Farther west, P5 crossed the transition between the arc and back-arc in a narrow transfer zone about 50 km wide. Preliminary interpretations are that this is the location of the missing strain along the southern boundary of the Niuafo'ou microplate (Conder and Wiens, 2011).

Profile P6 (northern ELSC, BGR18-206) is a ~150 km line that crossed the buried ridges north and east of the ELSC, ending in a pull-apart basin at northern termination of the ELSC. This section revealed the origin of the anomalous "spreading" fabric (tilted blocks of back-arc crust) and the distinct positive magnetic anomalies (intrusions) in the sediment-filled basin between the FRSC and ELSC in the south. At this location there appears to be a sharp boundary between the arc and back-arc crust with fewer intrusions, marking the southern limit of the Niuafo'ou plate.

The seismic data will be integrated with gravity, magnetics, and geological sampling to create fully constrained sections of the arc-to-backarc transition. The study area is one of the few locations in today's oceans where the transition from arc rifting to seafloor spreading and the emergence of a new microplate can be studied in its entirety, and so the data are expected to provide an unprecedented view of the associated crustal growth and deformation. Results of the seismic and magnetic data are already being prepared for presentation at DGG (Barckhausen et al., 2019; Schmid et al., 2019).

Marine magnetotellurics: 18 OBMTs were deployed on the eastern half of profile P3 (60 nm) to image possible melt lenses and/or deep fluid upflow beneath the FRSC. The OBMTs remained on the seafloor to the end of the cruise, measuring passive eletromagnetic signals to determine variations in crustal resistivity. The data from these deployments will provide independent and complementary information to the seismic data, especially for imaging challenging targets such as regions of melting (e.g., a strong decrease in electrical resistivity).

High-resolution EM122 multibeam, PARASOUND, towed magnetics, and gravity: Towed magnetics and continuous gravity measurements were collected on all seismic lines. The magnetometer was also deployed on most east-west transits. The emphasis of the mapping and magnetometer surveys was in 5 areas: the southern tip of the FRSC, the transition from rifted arc crust to the back-arc spreading centers in the west, across the

northern termination of the ELSC and the southern margin of the Niuafo'ou microplate, and the transfer zone between the MTJ and NELSC. The cumulative mapping project covered 46,000 km^2, with 4,200 km of towed magnetics, more than doubling the area of existing multibeam and high-resolution magnetics in this part of the NE Lau Basin. The new magnetic data resolve the spreading and intrusive history of the microplate and its relationship to the FRSC, including the age of the oldest crust. Most of the microplate is composed of poorly magnetized material with discrete zones of strongly magnetized material corresponding to intrusions observed in seismic sections. The magnetic data are consistent with broadly distributed but highly asymmetric opening of the basin and lateral migration of the arc and arc rifts. The data are inconsistent with spreading isochrons that originate only in the west of the basin. The basin has been characterized by a complicated pattern of seafloor spreading, crustal extension, and magmatism, with the original magnetic record heavily overprinted. By combining these data with the seismic data, gravity, and high-resolution mapping, we expect to be able to resolve the opening history of the basin in much greater detail and precision than in previous studies.

Heat flow and sediment coring: Heat flow and gravity coring stations on each of the MCS reflection and refraction profiles had mixed success owing to the abundant volcaniclastc material in the basins. The seismic sections and PARASOUND showed that basins in the west of the study area have become important depocenters for volcaniclastic material from the distant arc front. Two successful heat flow deployment revealed background values of ~62 mW/m^2, similar to previous measurements in the west of the basin. These results are interpreted to reflect the mainly tectonic rifting and early-stage crustal thinning. We were unable to correlate any temperature anomalies with particular faults (or buried intrusions) despite the abundance of fresh volcanic rocks on the faults at the rift tip. This may indicate highly localized sources for the melts.

AUV sidescan surveys and plume mapping: High-resolution sidescan surveys with the AUV ABYSS were conducted to image the surface traces of buried faults at the southern tip of the FRSC. In sidescan mode, ABYSS flew at heights of 60-70 m with a swath width of 600 m, revealing the fine structure of the faulting, the relationship of the faults to early stage volcanism (small cones and dikes), and the manner in which the faults interact and link to form larger structures. Three long-range AUV near-bottom plume surveys (100 km each) were also conducted in the FRSC and MTJ to better establish the density and spacing of hydrothermal vents and their relationship to imaged structures. For plume-surveying, ABYSS flew at constant altitude (100-120 m) above the seafloor and employed a variety of sensors, including Eh, turbidity, temperature, and magnetics. Previously known CTD anomalies were relocated in the C-FRSC, two new Eh anomalies were found in the N-FRSC and three previously unkown Eh anomalies on the axial magmatic high of the northern MTJ. The MTJ anomalies were targeted for mapping in a second dive, revealing the fine structure of the slow spreading center in the vicinity of the vent fields. Altogether 8 AUV dives were carried out: 4 with sidescan and 4 in plume-hunting mode.

Rock sampling: 41 dredges were conducted in the central and eastern parts of the Niuafo'ou microplate, providing the first comprehensive data on the composition and relative ages of the arc and backarc lithosphere away from the active spreading centers. A complete range of young and old arc and back-arc volcanic rocks was found across the study area,

confirming the strongly heterogeneous nature of plate accretion. Very recent eruptions were sampled at numerous small volcanic centers at the southern tip of the FRSC and between the N-FRSC and NELSC, marking the locations of the emerging triple junctions. Several large inner arc caldera volcanoes south of the FRSC and partially buried volcanic ridges close to the arc yielded notably older basalts, suggesting that they are part of the early history of crustal growth. Major fault scarps, some with vertical reliefs of as much as 1 km, yielded rocks from the lower extrusive sequences in the rifted arc and the back-arc. Comprehensive whole-rock geochemistry, isotopic analyses and geochronology of the volcanic rocks are expected to reveal the fine-scale magmatic evolution and accretion history of the microplate.

3.3 Description of the Working Area

The NE Lau Basin is one of the most magmatically and hydrothermally active places in the oceans, with more spreading centers and active rifts than any other arc-backarc system. The enhanced magmatism is a product of the microplate "breakout" triggered by the Miocene collision of the Melanesian Border plateaus with the Indo-Australian plate. Subduction reversals and arc splitting that affected the mantle wedge over tens of millions of years have produced a complex microplate mosaic that contains the building blocks of continental crust. SO267 focused on the origin and evolution of the newly defined Niuafo'ou microplate, including its active eastern boundary represented by the Fonualei Rift. The working area was within (lat./long.) 14°S to 20°S / 169°W to 178°W, at water depths ranging from 650 m to 3000 m. The main survey area between P1 and P6 was roughly 100 km wide and 375 km long. Here, arc rifting and the transition to back-arc accretion dominate the recent history of the microplate. However, little is known about the structure or composition of the two dominant crustal domains that make up the plate: namely, the rifted arc crust and adjacent back-arc crust. They are often portrayed as products of distinctly different melt sources, but the boundaries between them are poorly defined. The recent history of the Lau Basin started with the separation of the Tonga Ridge from the now inactive Lau Ridge at ~6 Ma. The V-shaped opening of the basin has since propagated about 700 km south in response to asymmetric rollback of the Pacific plate. Although the current phase of arc magmatism along the Tofua started only about 1 m.y. ago, already the arc is beginning to rift again in the NE.

Prior to the 1980s, only one major backarc-spreading system was recognized in the Lau Basin. Now, as many as 11 different spreading centers and zones of active rifting have been identified, each about 200 km long. The main spreading centers in the north are the Eastern Lau Spreading Center (northern termination of the ELSC), the Central Lau Spreading Center (CLSC), and the Lau Extensional Transform Zone (LETZ), with a short relay zone (Intermediate Lau Spreading Center, ILSC) between the CLSC and ELSC. A former transform fault (Peggy Ridge, PR) is evolving into an extensional transform where it merges with the LETZ. Three additional spreading centers or nascent rift zones of different ages are recognized: the Mangatolu Triple Junction (MTJ), the Northeast Lau Spreading Center (NELSC), and the Fonualei Rift Spreading Center (FRSC). The Northwest Lau Spreading Center (NWLSC), the Rochambeau Ridge (RR or Niuafo'ou Spreading Center), and the Futuna Spreading Center (FSC) also have been identified further west. Recent seismicity shows that extensional faulting is occurring at both the northern and southern terminations of

each segment and all are actively propagating, but their relative ages, structural evolution and contributions to crustal growth are poorly known.

The presently emerging crust of the Niuafo'ou microplate has formed at 10 of the currently active rift zones and spreading segments. However, the details of the plate boundaries are based on limited mapping and coarse magnetic data, with large gaps in the regional data sets. In particular, a clear plate boundary has not yet been defined between the southern tip of the FRSC and the ELSC, where much of the strain related to the opening of the basin should be accommodated. The most recent extension deformation appears to be reoccupying a position close to the FRSC. However, legacy data from two shallow seismic lines from the 1980s provide little clarity regarding the opening of the basin. Abrupt changes in the crustal thickness were hinted by a single 1995 refraction line with very widely spaced OBSs (Crawford et al., 2003), but the cause of the arc rifting in its present location, rather than at the volcanic front of the arc was not resolved.

Hydrothermal activity and mineralization are widespread, including on Peggy Ridge, the north arm of the MTJ, on all three segments of the ELSC, and on the CLSC. In the last decade, more than 30 plumes and high-temperature vent sites were located along the spreading centers of the NE Lau Basin. However, only 10 have been traced to their sources and most sites have not been mapped or sampled. Four widely-spaced water-column anomalies along the FRSC led to the discovery of active high-temperature venting and sulfide deposits in the Central and Southern segments, but the intervening areas have not been tested.

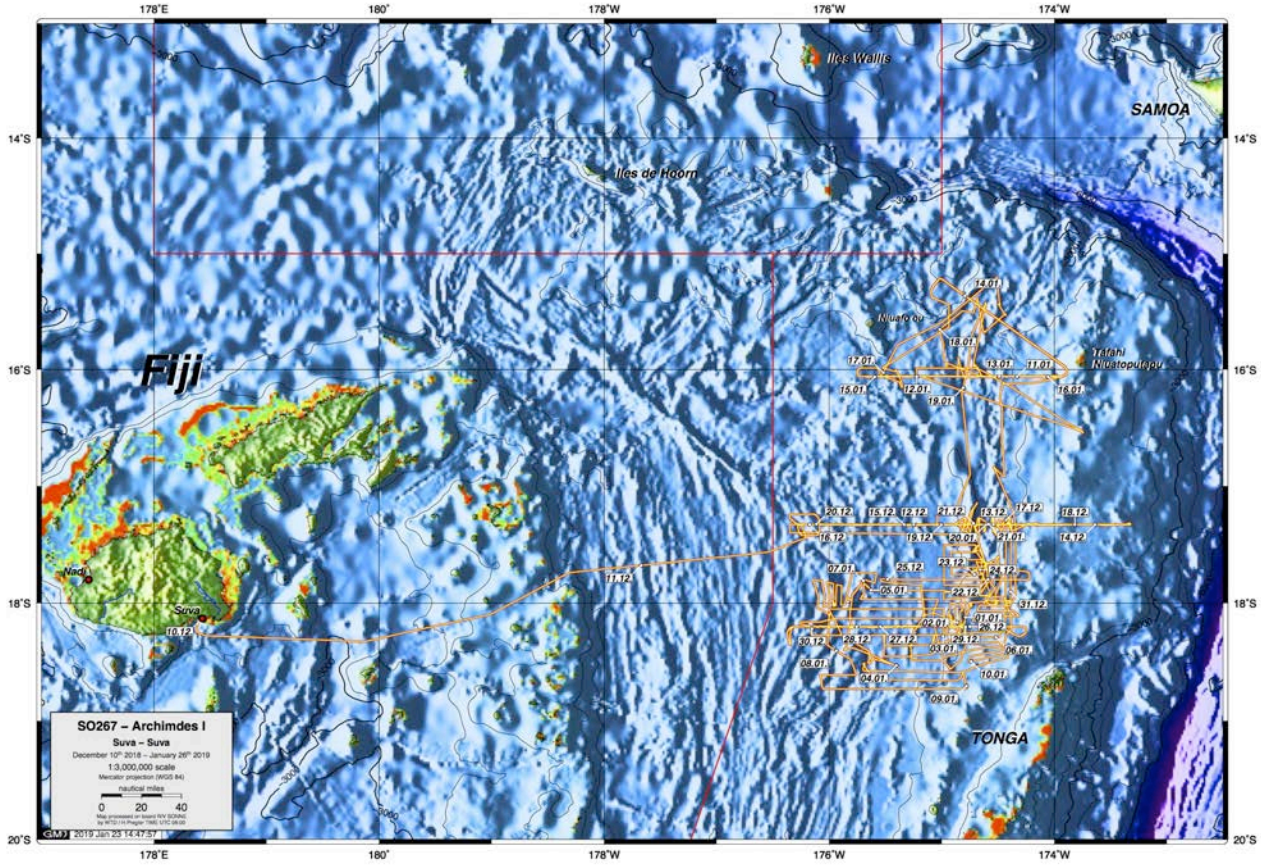

Fig. 3.1 Track chart of R/V SONNE Cruise SO267 in the territorial waters of Tonga, showing the main working area and transits to and from the port of Suva, Fiji.

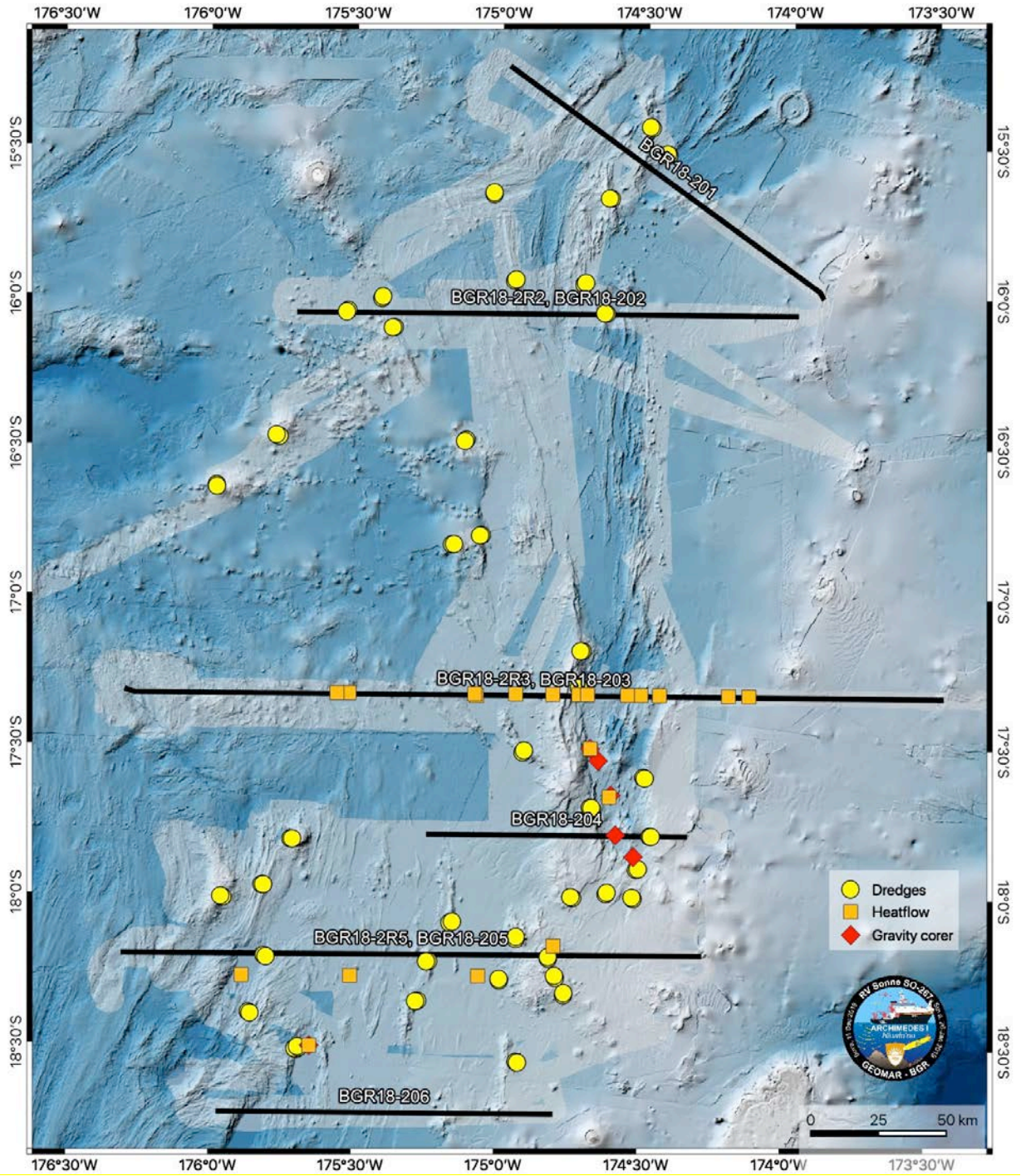

Fig. 3.2 Overview of the working areas targeted during SO267. Shaded cruise track shows the coverage of EM122 multibeam (46,000 km^2 mapped), backscatter, and continuous gravity and towed magnetics (4,200 line-km).

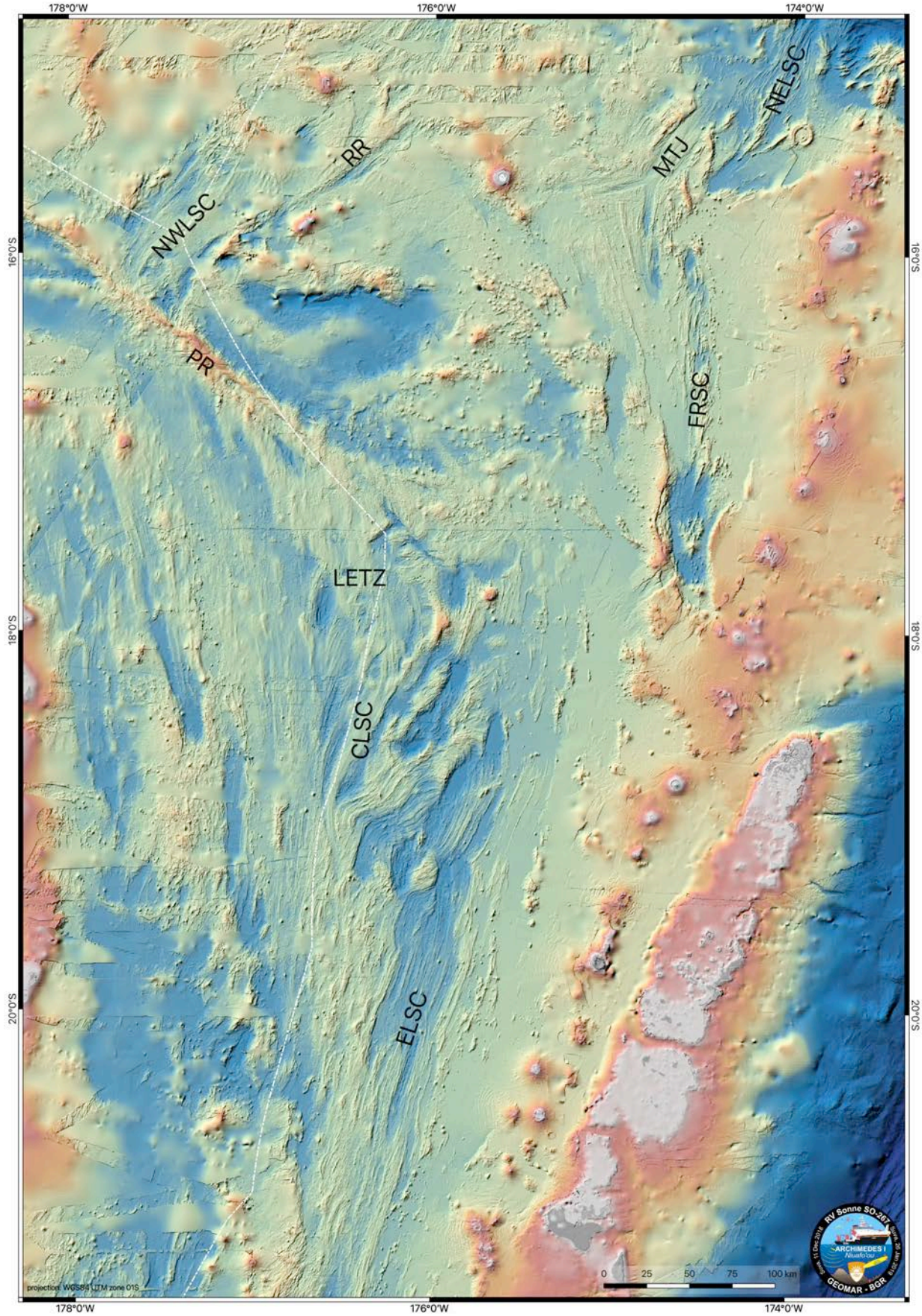

Fig. 3.3 Overview of the Lau Basin showing the locations of the FRSC= Fonualei Rift and Spreading Centre; ELSC= Eastern Lau Spreading Centre , CLSC=Central Lau Spreading Centre; LETZ=Lau Extensional Transform Zone, MTJ=Mangatolu Triple Junction, PR=Peggy Ridge, and RR=Rochambeau Ridge.

4 Narrative of the Cruise

On Monday, December 10, 39 scientists from GEOMAR, BGR, and partner institutions joined RV SONNE in Suva, Fiji. A total of 14 containers of equipment, some already on board and some recently arrived in Suva, were unpacked and loaded, and the vessel left port in the late afternoon of Tuesday, 11 December. We arrived on station and commenced operations at 19:00 on Wednesday, 12 December, after a transit of 360 nm. The first operations were testing of the releasers for the 50 OBS instruments to be deployed on seismic line P3 (160 nm). A total of 66 instruments, including 16 of our 19 OBMTs, were deployed between midnight on December 12 and the morning of December 15. EM122 multibeam mapping and sub-bottom profiling were conducted along the line, and continuous high-resolution towed magnetics and ship-based gravity were recorded simultaneously. Twelve heat flow stations were attempted between the OBS and OBMT deployments. On the morning of December 15, GEOMAR's two large G-gun arrays were deployed for shooting of the OBSs on P3. A daylight watch was established before commencing operations with the air guns, and the ramp-up procedure was followed to allow any mammals to depart the area before shooting started. Shooting of the line continued until Sunday evening, December 16. In the early morning of Monday 17 December, BGR's 4-km streamer (3900 m of active length and 200 m lead) was deployed for the MCS. After a brief interruption to repair 4 guns that were not firing on the starboard array, the MCS was completed on Tuesday evening. Preliminary assessment of the reflection and refraction data was very encouraging, with only one out of 50 instruments failing to record. After the MCS, several sub-basins between the Fonualei Rift (FRSC) and northern end of the Eastern Lau Spreading Centre (ELSC) were targeted for heat flow and gravity coring. Measurements were made in 3 of the basins, with partial penetration at 2 stations and one up to 1.8 m with a successful heat pulse.

On Wednesday and Thursday, 19 and 20 December, the OBSs were recovered from P3. Three instruments were left on the line and 16 additional instruments were redeployed north and south of the line to measure minor earthquakes on bounding faults of the FRSC. Two additional refurbished OBMTs were also deployed to supplement the 16 already at the seafloor (one of the 19 instruments was incompletely assembled and could not be deployed). The 33 recovered OBSs were prepared for re-deployment on P5, and on Friday morning, 21 December, the program shifted to mapping and sampling of the southern tip of the FRSC. Multibeam and magnetic data were collected parallel to P3 en route to the sampling area. In the morning of Saturday 22 December, the first dredging was done on the western wall of the southern FRSC, with successful recovery of arc dacites from the upper wall (1500-1300 m) and arc basalt from base of the wall (2300 m). We also launched the AUV Abyss (Dive 308) to map the southern propagating tip of the FRSC in two areas inferred to be the partially buried extensions of the rift bounding faults. Both areas were flown at an altitude of 60-80 m in sidescan mode and with an onboard magnetometer. During the dive, heat flow stations and gravity coring were carried out in the rift valley. Additional weight was added to the heat flow probe to improve penetration into the sediment, and 2 deployments recorded temperature data; however, attempts to collect sediment cores in the rift basin were unsuccessful. Gravel, fresh-looking glass shards, and dark grey clay-rich mud were recovered in the core catcher at several stations; otherwise it appears that the substrate was mostly coarse volcaniclastics, which could not be penetrated with the 3-m corer. We also tested an autonomous sediment sampler belonging to Nautilus Minerals,

but the device did not resurface after 18 hours and is presumed lost. In the afternoon of Sunday 23 December, we recovered the AUV and commenced the second part of the dredging program in the area south of the rift.

A highlight of the week was a magnitude 6.4 earthquake immediately beneath the study area on 24 December (85 km north of Nuku'alofa and 100 km deep), presenting an opportunity to use the energy from the earthquake for imaging of the Fonualei crust. A second event (Mw 5.8) occurred close to the OBSs on Wednesday 26 December. Very little is known about such events, and the chance to measure them directly provided an opportunity to improve the picture of deep subduction-zone earthquakes in this region. Christmas Eve was celebrated with a toast by the Captain and Chief Scientist and an exchange of gifts, during which a large-scale multibeam, magnetics, and gravity survey of the west of the FRSC was completed. The AUV ABYSS (Dive 309) spent Christmas in the water surveying the southwest arm of the "rift tip". After retrieving the AUV on Christmas Day we proceeded to profile P4 to conduct MCS across the southernmost extent of the FRSC and the adjacent back-arc. The MCS survey was completed in 12 hours, after which we transited to our next OBS deployment on line P5. P5 is the second longest of the seismic lines in the program (108 nm), crossing the transfer zone between the southern tip of the FRSC and the actively spreading Central Lau Spreading Centre (CLSC). 34 OBSs were deployed on P5 before commencing shooting at mid-day on Thursday 27 December. The MCS was completed late on Friday 28 December and, after recovering the streamer, we repeated the line in the opposite direction with the shotpoint distance adjusted for the OBSs. The refraction profile was completed in the evening of Saturday 29 December. Recovery of the OBSs on P5 commenced on Sunday morning 30 December and continued until New Year's Eve. Week 4 ushered in the New Year and, unfortunately, bad weather. The first tropical depression passed through the working area on New Year's Eve with periods of heavy wind and rain almost every day thereafter. The heavy weather and poor visibility slowed the recovery of the OBSs from P5, and on Tuesday and Wednesday, 01 to 02 January, operations were limited mostly to mapping, with no chance for a planned AUV launch. Gales typically lasted a number of hours with only minor interruptions in the program until 06 January and the arrival of cyclone "Mona", which delayed work by another 24 hrs.

Having completed most of our seismic profiles in the southern part of the study area (P3, P4, and P5), we began a week-long intensive sampling program in the complex transfer zone between the Fonualei Rift (FRSC) and the Central Lau Spreading Center (CLSC). The purpose was to determine where (and when) rifting and then back-arc spreading may have started in relation to the emergence of the Niuafo'ou microplate, and in particular the nature of the magmatism associated with the different stages of opening of the basin. The sampling targeted i) small volcanic cones in the area of intense fracturing at the southern tip of the FRSC, ii) larger inner-arc volcanoes in the area of inflated arc crust south of the FRSC, iii) north-south-trending volcanic ridges southwest of the FRSC, iv) intraplate cones in the back-arc region, v) major fault scarps and horst blocks among the failed rift basins in the easternmost CLSC, and vi) areas of high backscatter (new volcanism) along the northeast arm of the CLSC. With these dredges a nearly complete history was obtained of the fossil and more recent magmatism in the transfer zone between the FRSC and CLSC. Of note was the range of lithologies sampled, including in just 4 dredges: i) dacite from a small mound in a heavily sedimented portion of the rift, ii) young arc-like basalt from a small cone on a rift bounding fault, iii) very fresh, glassy,

non-vesicular basalt from a ridge of small volcanoes (presumed fissure eruptions) on the inflated portion of the inner arc, and iv) older Mn-encrusted basalt from a much larger caldera volcano at the edge of the inner arc. Heat flow and gravity coring continued to be a challenge. Only 3 heat flow measurements were possible, and sediment was recovered only from one deep (>3,000 m) basin nearest the CLSC in the west. An important development was the decision to attach a small GoPro camera in a pressure housing (rated to 2600 m) under the head of the heat flow probe. This provided clear images of the seafloor where the probe landed and showed the penetration of the lance into the sediment. Despite sub-bottom profiles indicating thick sediment fill in all of the basins, even those far from the arc contain abundant coarse volcaniclastic material, which could not be penetrated.

On Thursday 03 January, we were finally able to launch the AUV (Dive 310) for a sidescan survey of the young volcanoes lining a fissure at the southernmost tip of the FRSC. The ridge of volcanoes was flown twice, at different heights, to create a mosaic of sidescan images of the steeper slopes and pinnacles. Very youthful volcanic "landforms" were mapped, including scoria cones and "breadcrust" volcanoes, typical of fissure zones in mafic volcanic terrains on land. On Friday 04 January, we interrupted the dredging and AUV program to try heat flow and gravity coring in the deep basins near the CLSC. After one successful penetration and one (30 cm) gravity core in the westernmost basin, dredging of the westernmost sub-basin on P5 resumed and continued into Sunday 06 January. On Monday 07 January, we completed our work in the area south of the FRSC, and the next days were spent mapping and sampling two arc-like volcanoes adjacent to Peggy Ridge and at the northeast arm of the CLSC. Both volcanoes showed high backscatter, suggesting that they are relatively young expressions of the CLSC volcanism. On Tuesday 08 January, we launched the AUV (Dive 311) on a 100-km mission to determine if the CLSC extension is hydrothermally active; this was the first survey for hydrothermal plumes in the area. Despite the very fresh appearance of dredged volcanic material, there was no evidence of hydrothermal activity. Dredging in the deepest basins of the CLSC recovered fresh basalt but also strongly altered rocks, indicating past hydrothermal activity associated with the lowermost exposed back-arc crust. A break in the weather finally came on Wednesday 09 January, after cyclone Mona passed the working area, and we experienced our first full day of sunshine since December 28. Daytime temperatures quickly rose to 28°C on deck, with the humidity making it feel like 40°C. The last operation in the southern working area was MCS on line P6. The BGR streamer, air guns, and magnetometer were deployed on Wednesday afternoon, and the MCS was completed overnight. This line was chosen to image the buried ridges and failed rifts at the northern end of the ELSC where it approaches the Niuafo'ou plate boundary. Late on Thursday 10 January, we recovered the guns and streamer near the island of Late and departed the area.

The second part of SO267 explored the northern boundary of the Niuafo'ou microplate, beginning with OBS deployments on line P2, 170 nm north of P6. Profile P2 crosses the thinning arc crust at the northern termination of the FRSC where it overlaps with the east arm of the Mangatolu Triple Junction (MTJ). The seismic line was intended to reveal what part of the MTJ-FRSC overlapper is currently active or might be abandoned, creating a new northern boundary of the Niuafo'ou microplate. In transit to P2 we had our first night-time launch of the AUV (Dive 312), which followed the vessel along the axis of the FRSC, searching for evidence of hydrothermal activity along the way. The AUV survey was the most comprehensive search

for hydrothermal activity in the rift, employing temperature, redox, and magnetics from a "flight height" of 100-120 m above bottom. The dive continued while we deployed 20 of our 30 OBSs planned for P2. Operations were interrupted at 18:00 on Saturday 12 January, when the vessel received notice from the Rescue Coordination Centre in NZ of a distress signal 90 nm SE, and we were dispatched to investigate. The AUV was left to continue its dive, as it was not scheduled to leave the bottom for another 6 hours and would be safe floating at the surface until it could be recovered. After ~13 hrs locating a disabled fishing vessel, we returned to P2 to recover the AUV on early Sunday morning, 13 January, and resume the deployment of the OBSs. The MCS survey was completed on Monday, 14 January, and preparations were made to move to line P1, the northernmost of our profiles. However, all operations were suspended after the mammal watch reported sighting a whale. After 2 hours and no additional sightings, we performed a slow ramp-up of the air guns and commenced MCS on line P1, which continued until Tuesday afternoon, 15 January. Profile P1 is a short ~100-km line crossing the southern tip of the Northeast Lau Spreading Centre (NELSC) and the actively spreading north arm of the MTJ, aimed at determining the more active of these two boundaries. Late on Tuesday evening and overnight, we conducted the first dredging program in the northern study area, within the Central Volcanic Field (CVF) of the Niuafo'ou microplate.

On Wednesday morning, 16 January, we redeployed the air guns to shoot the OBSs on line P2. Recovery of the OBSs commenced on Thursday morning and lasted until Friday, 18 January. During a pause in the recovery of the instruments, we transited to the central part of the MTJ to deploy the AUV (Dive 313) on a plume mapping mission along its northern arm. The AUV was recovered late Friday afternoon, and on Friday night until Saturday, 19 January, we continued the sampling of volcanic rocks between the NELSC, MTJ and N-FRSC. These dredges recovered samples of the earliest formations of the back-arc crust in the rifts. We also sampled volcanic rocks from very recent eruptions along the ridge separating the NELSC from the MTJ, previously considered to be old crust stranded by the triple junction. Instead it may be the start of a new triple junction in the transfer zone between the NELSC, the N-FRSC and the MTJ. During the dredging we deployed the AUV (Dive 314) on a sidescan survey over the location of several new hydrothermal sites discovered in the northern MTJ spreading center.

Early on Sunday, 20 January, we returned to profile P3 to begin the long process of recovering the OBMTs that had been deployed there 5 weeks earlier. A final AUV Dive (315) to map plumes in the S-FRSC was completed during the OBMT recovery. After recovery of the last OBMT instrument on Tuesday, 22 January, we returned to the northern working area to finish the dredging and mapping program there. On Thursday 24 January, we departed the working area for Suva and arrived on 26 January at 8 am. We docked at 08:00 and commenced unloading of equipment bound for Germany, Hawaii, and Korea.

Over 7 weeks, the entire scientific crew of 39 participated around-the-clock in the seismic experiments, including building and tear-down of the OBSs and OBMTs, deployment of the instruments, continuous 24-hour monitoring and maintenance of the operating equipment, mammal watches, data acquisition and analysis. 110 stations were completed, with an average of 10 hrs each. The seismic program included 9 profiles (1,065 km of MCS and 673 km of refraction seismics), with more than 25,000 shot points. The surveys involved more than 130 OBS and OBMT deployments. The seismic program was complemented by 8 AUV dives with 910 km travelled, 41 dredges, and 21 heat flow and 6 gravity corer stations. The work was

supported by more than 46,600 km2 of high-resolution multibeam, backscatter, and sub-bottom profiling, and more than 4,200 km of towed magnetics. With more than 40 days of continuous seismic imaging, mapping, sampling, and even earthquake monitoring, the survey was one of the most comprehensive studies of an emerging microplate boundary in the oceans.

5 Preliminary Results

5.1 Reflection and Refraction Seismic Survey

(M. Schnabel, H. Kopp and Shipboard Scientific Party)

5.1.1 Instrumentation and Data Acquisition

5.1.1.1 Reflection seismic equipment

A *SEAL* digital streamer consisting of 26 Sentinel Solid Active Sections (*SSAS-RD*, group interval 12.5 m) with 312 channels (active length of 3.900 m) was used to record the reflected seismic signals at the sea surface. It has a flexible architecture with redundant data transmission modes, i.e. data transmission may be reconfigured on-line in case of a failure. Each channel has an individual 24 bit, Sigma Delta A/D converter. The active streamer sections have a diameter of 55 mm. The data was recorded using a *SEAL 428* data acquisition system. The data were sampled at 2 ms, the record length was set to 15 s, and the shot point interval was 50 m. During profiling, the data quality is checked in real time (QC). Three main windows are used for quality control: (i) the normal display window shows the latest incoming SEGD shot record, displaying the traces in the time/offset domain, (ii) the single trace window shows the data of one selected channel from the streamer, (iii) the auxiliary channel recording the waterbreak hydrophone.

The positioning controlling system *DigiCOURSE System 3 (ION)* was used to control the vertical streamer position (depth) and to measure the heading along the cable by compass birds. In total 13 depth control units (birds) have been attached to the streamer. Further on, a recovery system which has a self-triggering mechanism at a depth of 50 m was attached to the streamer. We operated the cable at a depth of 12 m. The tail buoy was equipped with a GPS sensor (*Seatrack 220, Kongsberg Seatex AS*). The received GPS signals are transmitted via UHF radio to the vessel. There, the control unit (*Seatrack VCU 230*) calculates the relative position of the tail buoy with respect to the vessel.

For managing all types of navigation data and in order to control all systems for seismic data acquisition we used the software package *Spectra* (*ION Concept Systems*). This software has four main tasks: (i) collection of all kinds of sensor positioning data with accurate timing including input/output trigger signals, (ii) calculating online network solutions (position of the ship and all sensors), (iii) real-time visualization of predicted and past shot locations, (iv) generation of P1/90 and P2/94 navigation files.

5.1.1.2 Ocean Bottom Seismometers (OBS)

A total of 50 short-period Ocean Bottom Seismometer (OBS) instruments provided by the GEOMAR pool were available for deployment during cruise SO267. The GEOMAR Ocean Bottom Seismometer 2002 (OBS-2002) is a design based on experience gained with the GEOMAR Ocean Bottom Hydrophone (OBH; Flueh and Bialas 1996) and the GEOMAR Ocean Bottom Seismometer (OBS, Bialas and Flueh, 1999). The basic system is constructed to

carry a hydrophone and a small seismometer for higher frequency active-seismic profiling. However, due to the modular design of the front end it can be adapted to different seismometers and hydrophones or pressure sensors. The sensors are *HTI-01-PCA* hydrophones from High Tech Inc. The sensitive seismometer is clamped between the anchor and the OBS frame, which allows for optimal coupling with the sea floor. The three-component seismometer (K.U.M), usually used for active seismic profiling, is housed in a titanium tube, modified from a package built by Tim Owen (Cambridge) earlier. Geophones of 4.5 Hz natural frequency were used during SO267. The recording devices were GEOLOG loggers developed at GEOMAR or 6D6 recorders of K.U.M., sampling at 250 Hz. The recorders require a reduced power consumption with increased bandwidth for the hydrophone component and an autonomous time signal based on an atomic clock. The unit's floatation is made of syntactic foam and is rated, as are all other components of the system, for a water depth of 6000 m.

While deployed at the seafloor the entire system rests horizontally on the anchor frame. The instrument is attached to the anchor with a release transponder. The release transponder is the *K/MT562* made by K.U.M GmbH. Communication with the instrument for release and range is possible through a transducer hydrophone, which is lowered ~20 m into the water. Release and range commands are successful up to ranges of 5 miles. After releasing its anchor weight of approximately 60 kg the instrument turns 90° into the vertical and ascends to the surface with the floatation on top. This ensures a maximally reduced system height and water current sensibility at the ground (during measurement). On the other hand the sensors are well protected against damage during recovery and the transponder is kept under water, allowing permanent ranging, while the instrument floats to the surface.

5.1.1.3 Seismic sources

During cruise SO267 multichannel reflection seismic data were acquired at 50 m shot spacing and wide-angle refraction data were shot at 150 m spacing (Table 5.1). The source was G-Gun array manufactured by Sercel Marine Sources Division (former SODERA) and Seismograph Services Inc. and consisted of 2 sub-arrays. Six guns were set up in 3 clusters. Each cluster comprises G-Guns of 4x8 liters and in the middle either 2x6 liters or 2x4 liters. The cluster arrangement provides a good primary-to-bubble signal ratio. Operating all twelve guns simultaneously provides a total volume of 84 liters (5440 cu.in.). Airgun-deployment rails mounted on RV SONNE were used to deploy G-Gun sub-arrays on aft port and starboard sides of the ship. The arrays were towed 40 meters behind the ship's stern and 8 meters below the sea-surface. All guns were shot at 170-208 bar. The guns worked very reliably during the entire cruise. See **Appendix 2** for vessel-airgun geometry.

5.1.1.4 Mammal Mitigation Procedures

In order to protect marine wildlife during the seismic survey we used airgun ramp-up and visual observation procedures. Ramp-up means the gradual increase in emitted sound levels by systematically turning on the full complement of the array's air guns over a period of time. The intent of ramp-up is to allow sufficient time for animals to leave the immediate vicinity. Visual monitoring of an exclusion zone and adjacent waters is intended to establish and maintain a zone around the sound source that is clear of affected species thereby reducing or eliminating the potential for interference. Exclusion zone means the area of the sea surface within a radius of 750 m surrounding the center of the air gun array. Measures prior to data acquisition

included visual monitoring of the exclusion zone and adjacent waters for the absence of sensitive wildlife for at least 60 minutes before initiating ramp-up procedures. Ramp-up was exclusively initiated when visual monitoring of the exclusion zone was possible (i.e. at least 750 m visibility and always during daylight hours). The initial shot interval during ramp-up was 4 minutes during which the smallest air gun in terms of energy output (dB) and volume (in^3) was active. Additional air guns were gradually activated over a period of at least 20 minutes but no longer than 40 minutes until the desired operating level of the air gun array was obtained. The shot interval was then gradually adjusted to 50 m for reflection acquisition and 150 m for refraction profiles (except BGR2018-4R2, where a 170 m shot interval was chosen to record large offset phases). During acquisition of BGR2018-4R2 we experienced an interruption in air gun shooting at 05:31 UTC on Jan. 14, 2019 due to a sighting of a sperm whale approximately 500 m off the ship's track. The animal was sighted again at 05:38 UTC and 05:55 UTC, but then started to dive. At 06:35 UTC we re-initiated shooting after ramp-up procedures.

Table 5.1 Profile list of all multichannel reflection (MCS) and refraction (RS) lines.

Line number	SP	Date	Time UTC	Latitude	Longitude	Course	M=magnetics G=gravity B=bathymetry RS=refract. seis MCS=refl. seis.	Profile km
BGR18-2R3	2960	14.12.18	20:32:12	17°19.799 S	173°27.743 W		M,G,B,RS	P3
	1000	16.12.18	10:05:54	17°19.820 S	176°13.692 W	270°		293.68 km
BGR18-203	828	16.12.18	21:15:50	17°18.615 S	176°18.360 W		M,G,B,MCS	P3
	6874	18.12.18	13:59:49	17°19.794 S	173°27.726 W	90°		299.95 km
BGR18-204	1096	25.12.18	06:02:16	17°47.970 S	174°19.553 W		M,G,B,MCS	P4
	3028	25.12.18	18:38:08	17°47.980 S	175°14.220 W	270°		96.49 km
BGR18-205	803	27.12.18	05:12:49	18°11.909 S	174°16.512 W		M,G,B,MCS	P5
	5086	28.12.18	08:51:10	18°12.000 S	176°17.947 W	270°		213.85 km
BGR18-2R5	2380	28.12.18	14:50:49	18°12.206 S	176°19.291 W		G,B,RS	P5
	1001	29.12.18	15:37:16	18°12.023 S	174°21.968 W	90°		206.76 km
BGR18-206	995	09.01.19	05:27:26	18°43.809 S	175°58.905 W		M,G,B,MCS	P6
	3483	09.01.19	21:59:42	18°43.799 S	174°48.130 W	90°		124.25 km
BGR18-202	733	13.01.19	05:51:37	16°03.583 S	175°42.852 W		M,G,B,MCS	P2
	4436	14.01.19	05:33:16	16°03.583 S	173°59.032 W	90°		184.94 km
BGR18-201	930	14.01.19	07:12:41	16°00.967 S	173°53.228 W		M,G,B,MCS	P1
	3821	15.01.19	01:49:15	15°14.364 S	174°58.272 W	305°		145.41 km
BGR18-2R2	1001	16.01.19	00:43:38	16°03.598 S	175°35.338 W		M,G,B,RS	P2
	2014	16.01.19	21:02:09	16°03.598 S	173°58.774 W	90°		171.99 km
							sum RS	**672.43 km**
							sum MCS	**1064.89 km**

5.1.2 Reflection Seismic Processing and Preliminary Data Sections

To allow for an initial, preliminary interpretation of the reflection seismic data as well as for QC purposes we performed a standardized onboard processing using the software package *SeisSpace*. This included the following processing steps:

(1) Geometry application: The coordinates of source and receiver are assigned to each trace. After that, the data set could be sorted to the common-midpoint domain.
(2) Source-signal designature: The far-field signal from the airguns has been recorded in the front of the streamer (in the waterbreak). The designature process was done on a shot-by-shot basis – this eliminated the effect a changing source wavelets between different shots and resulted in a comparable zero-phase wavelet for the whole profile.
(3) Bandpass filtering: due to the energy spectrum of the seismic sources, the bandwidth of the data was filtered to between 8 to 80 Hz.
(4) Velocity analysis: The velocity analysis was done in two steps: First, velocities were analyzed every 6 km. In a second iteration, the velocity field was refined in areas of rapid changes in bathymetry.
(5) Stacking: to improve the signal-to-noise ratio, all traces within one CMP were summed up to one single trace.
(6) Migration: we performed a post-stack Kirchhoff time migration.

All profiles were exported to SEG-Y and loaded to an interpretation software. Further on, all sections were printed to paper as basis for a joint interpretation. An overview of all sections is given in **Figure 5.1** and **Figure 5.2**.

A couple of issues were encountered during processing, and the data need to be re-processed after the cruise. The designature process worked fairly well, but it introduced very strong ringing for parts of the data. We tried to suppress multiples using the SRME (surface related multiple elimination) approach. This worked very well for the seafloor multiple but was unsuccessful for the diffuse reflectivity of shallow crust. To account for the strong lateral variations along the lines, a prestack migration in combination with a detailed migration velocity analysis needs to be applied.

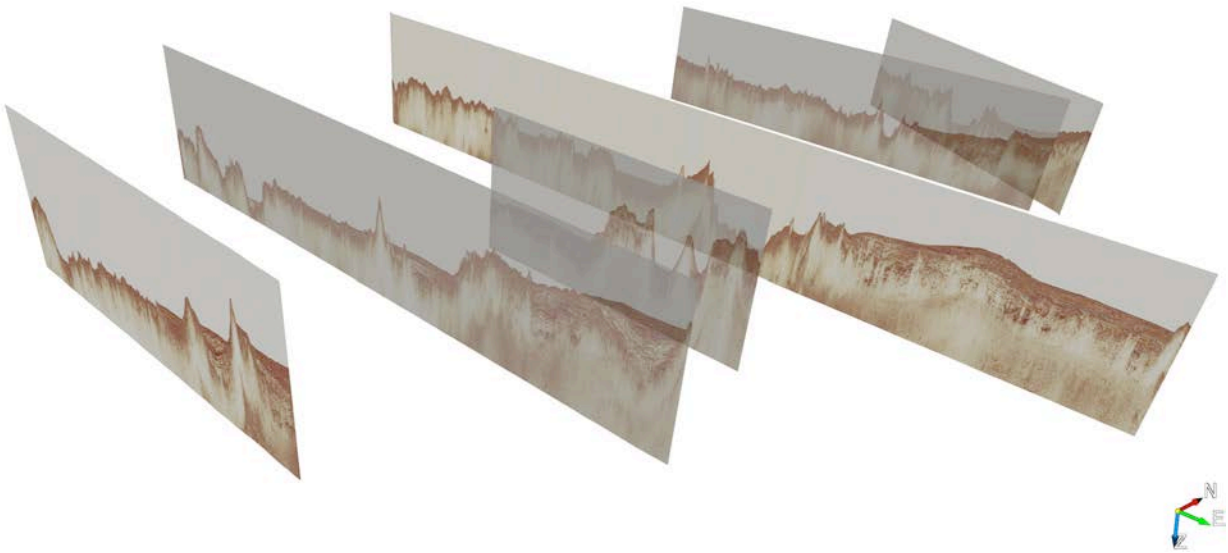

Fig. 5.1 3D projection of seismic lines BGR18-201 (in the North) to BGR18-206 (in the South) (Table 5.1). All profiles described in the cruise proposal could be measured.

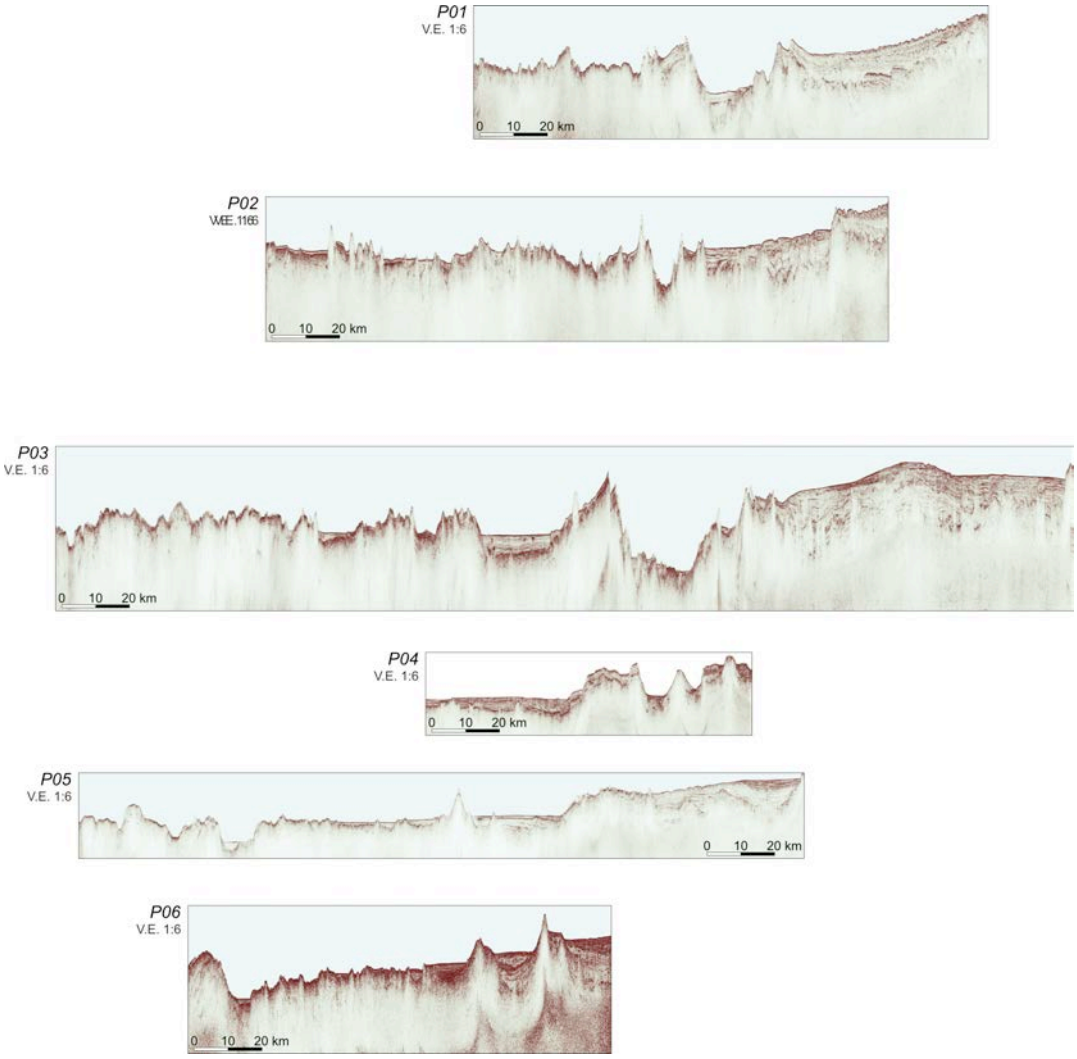

Fig. 5.2 Seismic lines BGR18-201 (in the North) to BGR18-206 (in the South). All profiles described in the cruise proposal could be measured. The total line length was about 1065 km (Table 5.1).

5.1.3 Preliminary Velocity-Depth Modeling

Forward modeling using Rayinvr (Zelt and Smith, 1992) was conducted for two refraction profiles (**Fig. 5.3**). Arrivals were picked using PasteUp (Fujie et al., 2008). Ray coverage of both profiles was dense and homogeneous along the lines. Both models indicate the thick island arc crust towards the East, thinning toward the FRSC. Further modeling and tomographic inversion of the data will yield the detailed geometry and velocities of the sedimentary and crustal layers as well as the upper mantle. Mantle phases are present on all profiles and will allow verification of the Moho depth. 47 OBS were deployed along the 161 nm long profile BGR18-2R3; 34 OBS were placed along the 108 nm long profile BGR18-3R5 and 30 OBS were deployed along BGR18-4R2 with a length of 88 nm.

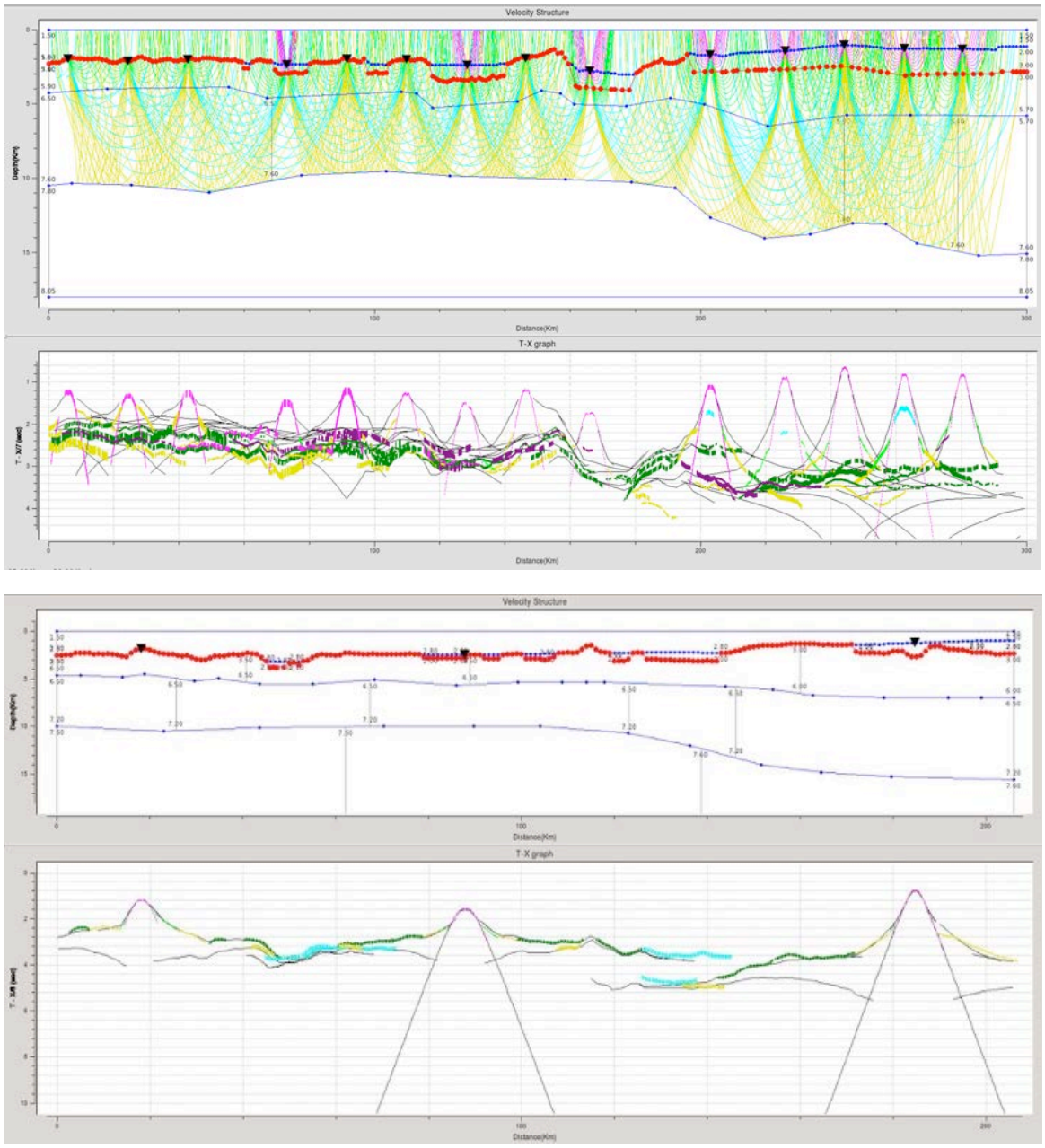

Fig. 5.3 Preliminary forward models of profiles BGR18-2R3 (top) and BGR18-3R5 (bottom). Upper panels show velocity-depth model; lower panels show data fit of calculated phases.

5.2 Microseismicity Network

(H. Kopp and Shipboard Scientific Party)

A network of 16 short-period OBS stations was deployed around the central part of profile BGR2018-2R3 from 19 December 2018 until 20 January 2019 (**Fig. 5.4**). The network is expected to have recorded hundreds of local and regional scale earthquakes in the backarc crust and the underlying slab of the Pacific plate. Due to its proximity to profile BGR2018-2R3 (which includes refraction and reflection seismics as well as magnetotellurics) the local seismicity recorded by this network will lead to a profound and integrated view of the active tectonic and magmatic processes at the southern end of the Fonualei Rift and Spreading Centre.

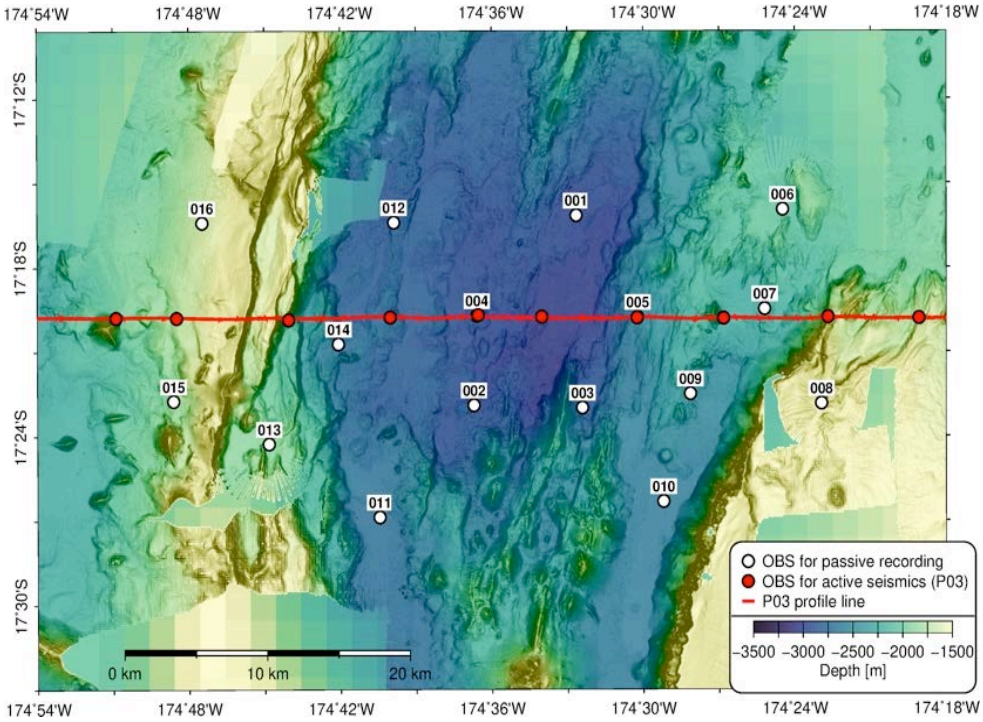

Fig. 5.4 Deployment locations of Ocean Bottom seismometers (OBS; white circles) intended for passive seismic recording at the southern end of the Fonualei Rift and Spreading Centre (FRSC). Stations for refraction seismics (red circles) on profile BGR13-2R3 (red line) are shown as well.

5.3 Ocean Bottom Magnetotellurics (OBMT)

(H. Kopp and Shipboard Scientific Party)

Magnetotellurics is a passive electromagnetic geophysical method for imaging the electrical resistivity structure (reciprocal to conductivity) of the subsurface. Electrical resistivity varies strongly due to temperature and presence of fluids, such that this type of measurement is of great interest in the investigation of spreading and rift systems. The method is based on the observation that naturally occurring fluctuations of the Earth's magnetic external field induce electric currents whose strength and distribution depend on the subsurface resistivity. Variations of the horizontal electric and three-component magnetic fields are recorded on the ocean bottom to derive a spectral, complex-valued impedance tensor Z given by Z Hh = Eh where Eh and Hh denote the frequency-dependent horizontal electric (Eh) and magnetic (Hh)

field vectors. In a homogenous half-space, the so-called skin depth d is a crude estimate of detection depth with d = sqrt (r T) in kilometers, (where T is the period in seconds and r is the bulk resistivity). At periods shorter than approximately 1 s, seafloor electromagnetic signals are very small. This is due to the high conductivity of the sea water above, which causes attenuation according to skin depth and thus reduces the resolvability of shallower sea-bottom features. Eighteen OBMT stations were deployed during cruise SO267 for a period of 41 days.

5.4 Magnetics

(U. Barckhausen)

In the 1980s and 1990s, a number of scientific cruises collected magnetic data in the Lau Basin, among them one cruise that was dedicated to mapping the seafloor spreading anomalies in the Central Lau Basin. Despite a good data coverage, the authors of several papers dealing with these data could not identify seafloor spreading anomalies on the individual profiles and fit them to a forward model. Instead, they created a map of seafloor magnetization and tentatively assigned magnetic Chrons to larger areas of positive magnetization (e.g. Zellmer and Taylor, 2001). In this effort they were guided by the geodetically determined opening rates of the Lau Basin which required relatively high spreading rates.

The magnetic data collected on more than 20 profiles totaling more than 3500 km in the Central Lau Basin during cruise SO267 were the basis for a first attempt to identify seafloor spreading anomalies on individual survey lines. High resolution bathymetry clearly shows that the basin has undergone crustal extension and has been affected by post spreading magmatic activity in many places, obscuring the magnetic seafloor spreading anomalies. However, in the newly compiled dataset we find sections of profiles and in some cases even complete profiles which can be correlated with magnetic seafloor spreading anomalies from a forward model in an age range from 0 to ~5.2 m.y. With these tie points it is possible to correlate magnetic anomalies across profiles even where the magnetic record has been heavily overprinted by crustal rifting and later volcanism (**Fig. 5.5**). It turns out, that in the Central Lau Basin in addition to the known Central Lau Spreading Center a southward propagating spreading center was active at the eastern side of the basin just behind the volcanic arc until recent times. At this spreading axis, much of the present crust of the Central Lau Basin was formed likely in a highly asymmetric fashion with crustal accretion almost entirely on its western flank. We speculate that the volcanic arc moved in western direction over time in response to the erosion of the upper plate at the subduction zone and shut down this spreading in relatively recent times. Since then, a new spreading system has formed at the Fonualei Rift which is propagating on southern direction. Details of the magnetics surveys, operations and data report are included in **Appendix 3**.

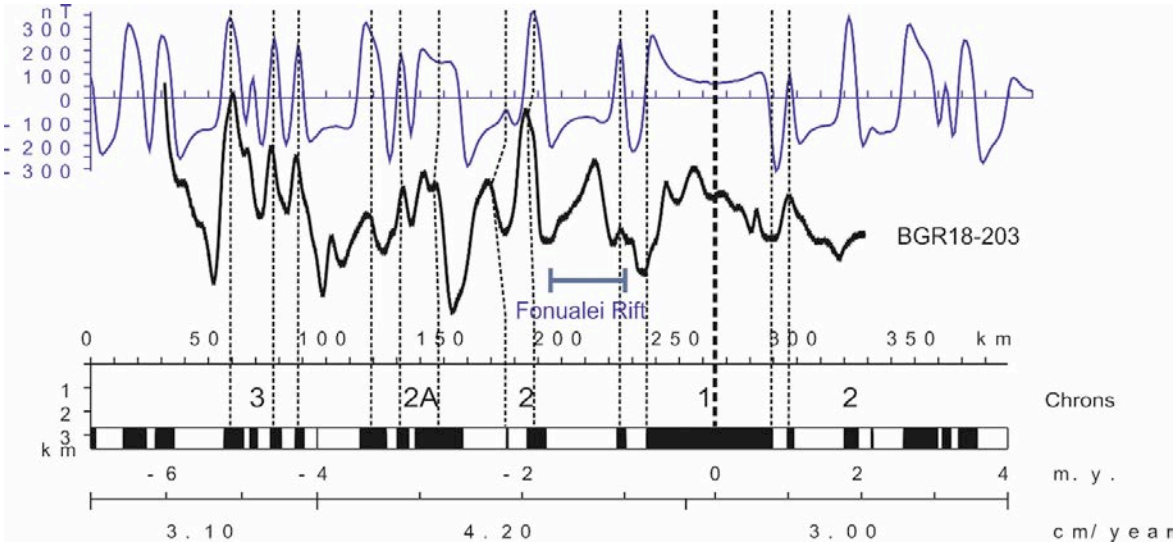

Fig. 5.5 Magnetic data of Profile 3 and forward model. Lower panel shows crustal ages and spreading rates. Note that the magnetic anomalies of Chron 3 can clearly be identified in the western part of P 3.

5.5 Gravity

(I. Heyde)

Gravity measurements were carried out continuously during the complete cruise. However, the data acquisition was running only in the EEZ of Tonga. Thus gravity data along all survey and transit profiles with a total length of about 5,500 km were measured. The details of the survey profiles including the numeration and location are listed in Appendix 4. Though the coverage of the survey area is relatively sparse, a map of the free-air gravity anomalies was prepared. Figure 5.6 shows the map based on a 1 x 1 (arc-)minutes grid together with the survey tracks. The map is drawn up to a distance of 10 kilometres from the survey track.

The SO-267 gravity data served as a reference for two gravity data compilations derived from satellite altimetry. The comparison showed that the differences between shipboard and satellite gravity data amounted up to a maximum of +/- 16 mGal. However, the differences along most profiles were about +/- 6 mGal. As the standard deviation of differences for the dataset of Sandwell and Smith (2009, version 24.1) was smaller, these data were used to get a complete overview of the gravity field in the survey area. However, for detailed investigations e.g. along the seismic profiles only the shipboard gravity measurements should be used.

The anomalies of the combined free-air gravity anomaly map in the survey area range from -120 mGal in the Tonga Trench to +240 mGal around the island of Vava'u on the Tonga Ridge. The anomalies along the SO-267 profiles range from 0 mGal to +160 mGal on the Tofua Volcanic Arc at the Eastern end of BGR18-203. Westward the southern part of the Fonualei Rift and Spreading Center (FRSC) is characterized by a NS trending gravity minima zone. The northward continuation of the FRSC can be followed by narrow less distinct gravity minima zones. In the North the run of the FRSC is more prominently marked by a minimum. The Mangatolo Triple Junction (MTJ) is characterized by less pronounced gravity minima. In the Southwest, however, the run of the Central Lau Spreading Center (CLSC) and its parallel rift basins is marked by distinct elongated gravity minima. Elevated ridges and volcanic edifices are characterized by positive gravity anomalies.

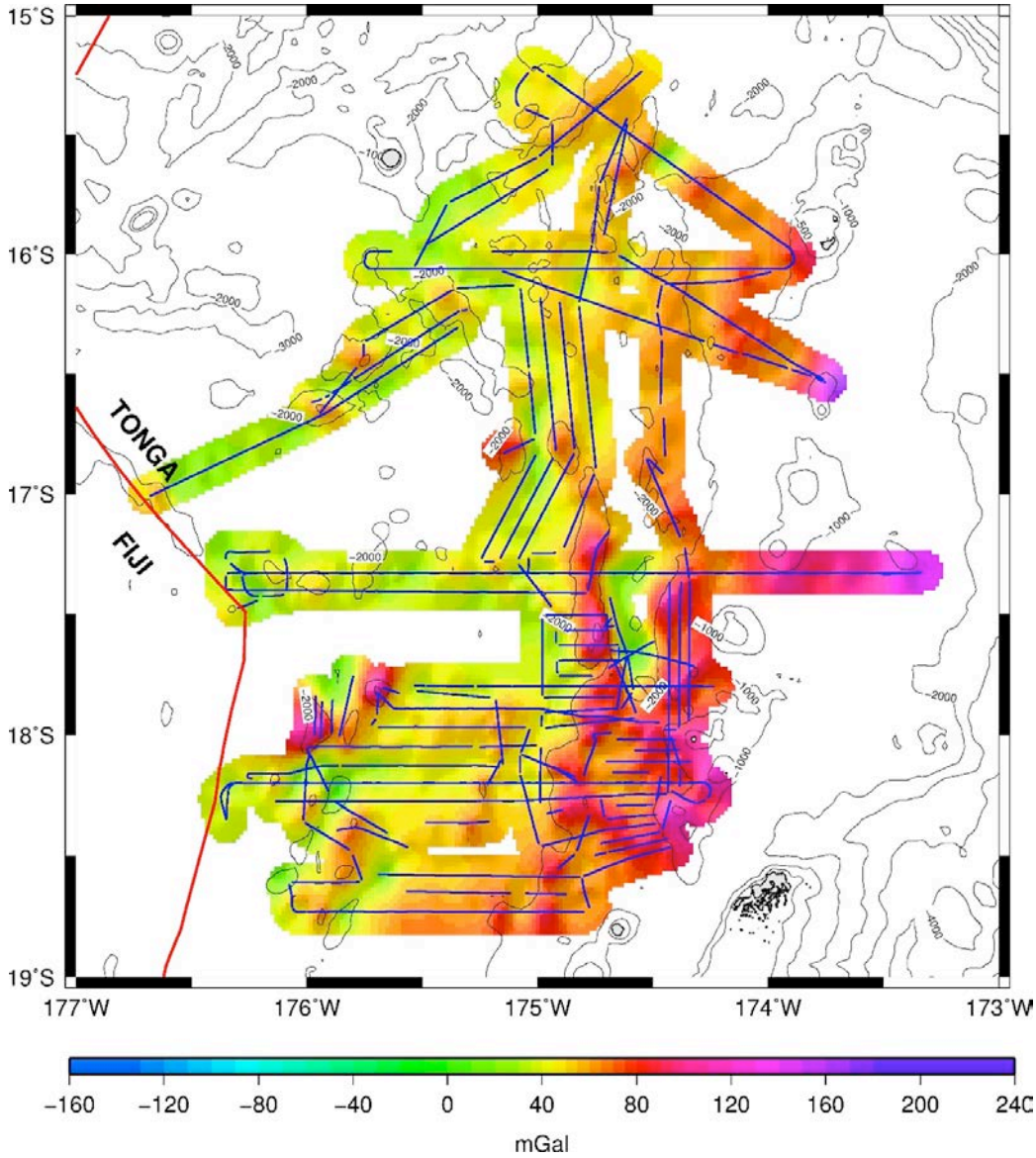

Fig. 5.6 Map of the free-air gravity anomalies acquired during cruise SO267 ARCHIMEDES in the working area in Tongan waters. The map is drawn up to a distance of 10 kilometers from the tracks. The map is based on a 1 x 1 (arc-)minutes grid and is underlain by the bathymetry of Sandwell and Smith (2009, version 18.1).

A Bouguer gravity anomaly map was also compiled by merging the shipboard gravity observations and gravity data derived from satellite altimetry. The water depth values were taken from the ship's multibeam system after the onboard processing by the bathymetry group and from the global bathymetry data set (Sandwell and Smith, 2009, version 18.1) when shipborne data was not available. The reduction density was 1.64 g/cm³. The anomalies of the combined Bouguer gravity anomaly map in the survey area range from +130 mGal at areas on the Tofua Volcanic Arc to +340 mGal East of the island of Vava'u on the Tonga Ridge. The anomalies along the SO-267 profiles range from +140 mGal to +260 mGal in the Southwest near the CLSC. The lowest values are found near the island of Niuatoputapu at the Northeastern end of the Tofua Volcanic Arc. The southern FRSC shows positive anomalies of up to +230 mGal. Whereas the anomaly amplitudes are rather low in the northern part of the working area, the southwest part is characterized by more distinct anomalies.

The mostly elongated structure of the free-air gravity anomalies in N-S direction in the working area suggests that the forward modeling of the free-air anomalies can be carried out as a two-dimensionally. 2D density models represent first approaches to explain the observed free-air gravity anomalies and form the basis of a comprehensive 3D density model which will be produced after the cruise. The corresponding results of the seismic interpretation (either MCS data or refraction data or both) were of course taken into account. The created velocity-depth models from the refraction seismics of profile P03 were used directly for the gravity modeling to constrain the geometry of boundaries.

5.6 Multibeam Bathymetry and Backscatter

(I. Klaucke, N. Augustin, C.W. Devey)

During cruise SO267 the hull-mounted Kongsberg Maritime Simrad EM122 multibeam echo sounder of RV SONNE was used throughout the entire cruise to record both bathymetric and backscatter data. The system operates at 12 kHz and covers water depths from 20 m below the transducers up to full ocean depth. Data acquisition was set to equidistant and multi-ping mode with the FM (chirp modulated) pulse enabled. Swath width was slightly reduced to 140° total swath, except for the few occasions when the full 150° swath was required. The Simrad EM122 system produces 432 beams, regardless of the swath width. A sound velocity profile was obtained at the beginning of the cruise using a Valeport sound velocity probe and additional sound velocity profiles were acquired during AUV dives. However, water masses appeared to be stable throughout the working area and cruise duration. Data quality was good to excellent despite several days of high waves producing some bad pings, and typical problems with the bottom detect algorithm on steep flanks facing away from the ship. The signal amplitude is also stored and preprocessed automatically by the Kongsberg acquisition software SIS. This preprocessing includes altitude processing and the application of time and angle varying gain functions. Water column data were not recorded during the cruise. A total of 46,000 km² (7% of the Tongan EEZ) was mapped during the cruise (**Fig. 5.7**). Data processing has been carried out onboard using two different software packages (Qimera and mainly Caraibes). Within Caraibes version 3.9 a triangulation filter was used to clean the data and eliminate outliers during 3 iterations. The filter was complemented by manual editing. The edited soundings were then exported as xyz-data and gridded with GMT using a near neighbor gridding algorithm that requires 1 out of 4 filled sectors and uses a 90 m search radius for a 50 m grid cell size. An additional grid with grid cell size of 30 metres and 60 metres search radius was also calculated using a similar algorithm. The backscatter data were processed using FMGeocoder, where radiometric corrections, angle-varying gain and anti-aliasing filters are applied, and a georeferenced mosaic is produced (see also **Fig. 5.8**). Overall the processing of the bathymetric data was finished during the cruise and the data are fully available for post-cruise work for all participants.

The main purpose of the SO267 multibeam surveys were to obtain maps along the seismic profiles (P1-P6: lines BGR18-201 to BGR18-206, Table 5.1) as well as the detailed mapping of the southern Fonualei Rift and Spreading Centre (FRSC), its propagation towards the Tonga Arc and back-arc (rift) structures east of the FRSC (**Fig. 5.7**). Thus, a large amount of time was spent carrying out swath mapping in the southern part of the working area. We mapped the

southern FRSC in detail and detected formerly unknown geomorphological structures. Most prominent are two rift zones at the southern end of the FRSC. One is breaking out of the main rift towards the west and a second one continues southwards into the arc, bending west and terminating against an area scattered with volcanic cones and larger arc volcanoes. The west bound of the FRSC appears very tectonized on bathymetric maps while the morphology changes into a rather smooth plain behind the elevated rim of the FRSC, occasionally interrupted by longer volcanic ridges, tectonized blocks of arc crust and small, mostly round to oval volcanic cones. Further to the east the fabric of the Central Lau Spreading Centre (CLSC) - with volcanic and tectonic ridges, scattered volcanic cones and some larger volcanic edifices - becomes apparent in the bathymetric maps. Mapping in the northern part of the working area was focused on the seismic profiles P1 and P2, mapping out the western arm of the Mangatolu Triple Junction (MTJ) and further closing some gaps in the available bathymetric data from previous third-party expeditions.

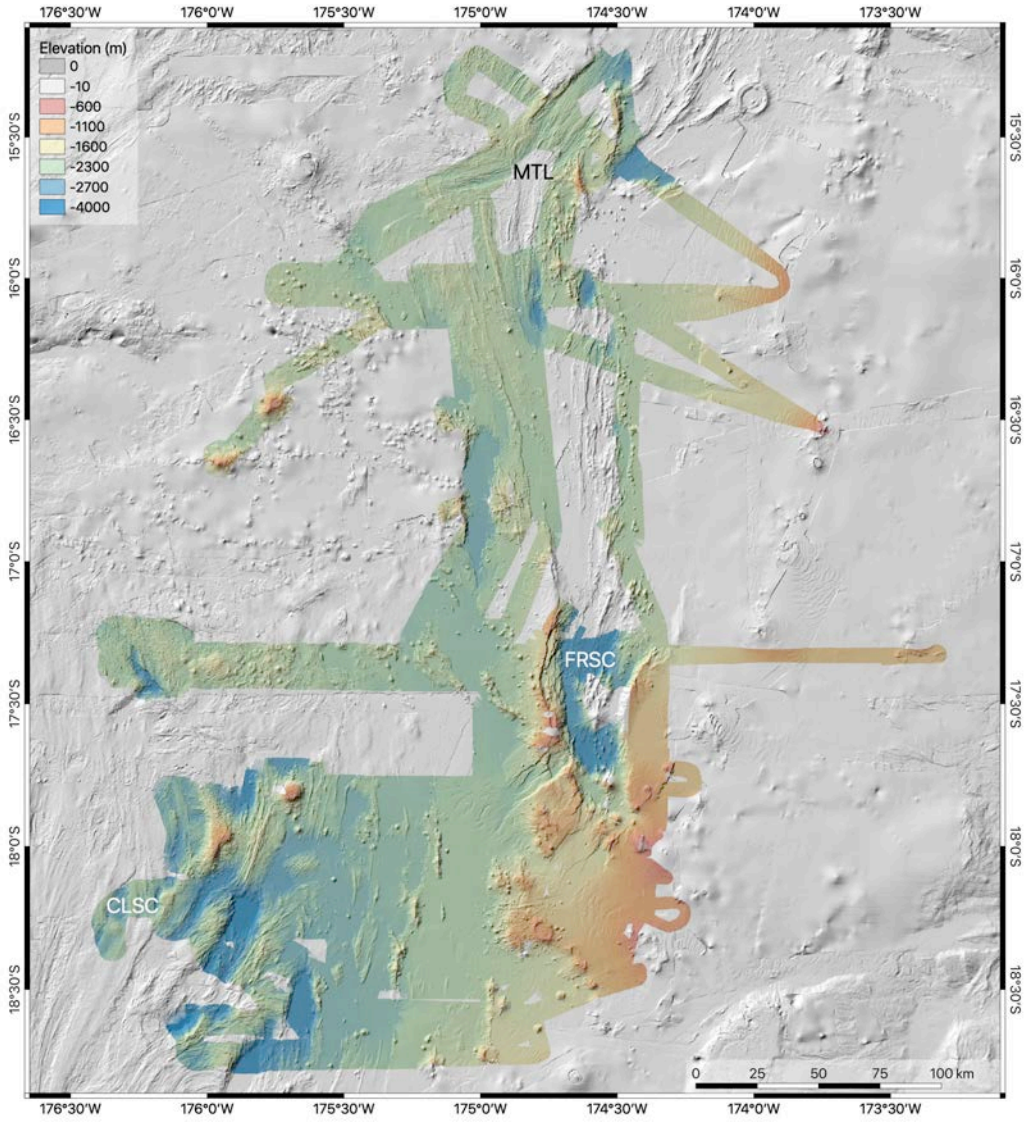

Fig. 5.7 Overview map of the total area that was covered by ship multibeam mapping during ship's operations (color coded). The background shaded relief is from the Marine Geoscience Data System (GMRT). FRSC= Fonualei Rift and Spreading Centre; CLSC=Central Lau Spreading Centre; MTL=Mangatolu Triple Junction.

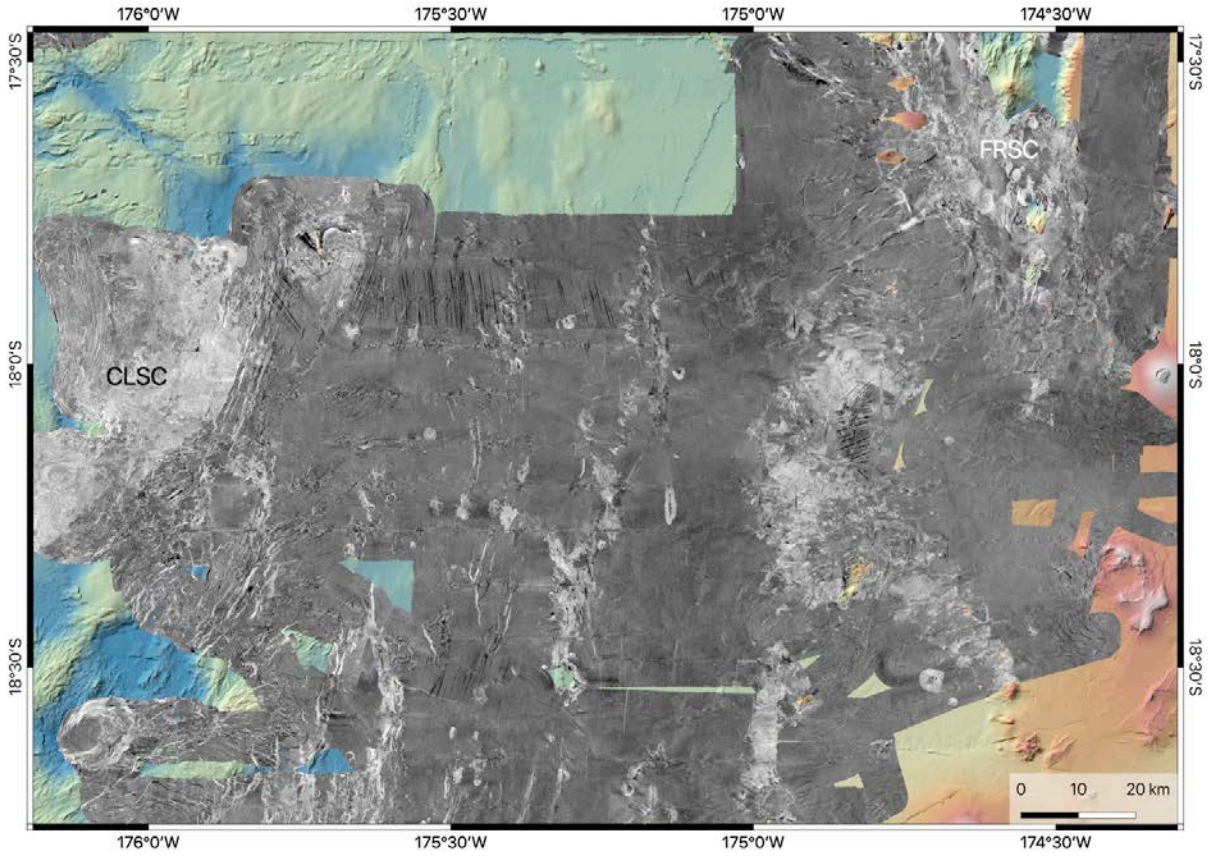

Fig. 5.8 Multibeam backscatter mosaic of the southern part of the working area, including the FRSC in the NE corner and the CLSC at the western side. The backscatter data was used for geological interpretation in combination with the geomorphological information and ground truthing. (darker greys = lower backscatter). FRSC= Fonualei Rift and Spreading Centre; CLSC=Central Lau Spreading Centre

The detailed interpretation of the bathymetric data will be done in the home labs taking into account all available data collected during this cruise e.g. refraction and reflection seismics, magnetic measurements and seafloor sampling.

5.7 PARASOUND

(M. Riedel)

The PARASOUND system was used almost continuously throughout expedition SO267 simultaneously with multibeam data acquisition. Data were acquired along all ship tracks within the permitted study area (**Fig. 5.9**). Exceptions were made for those tracks, during which the OBS instruments were recovered, when all echo-sounder systems were shut off, to not interfere with the acoustic release commands sent from the vessel.

The PARASOUND data are of excellent quality overall and allowed imaging of the upper 80 – 100 m of sediments below seafloor. Two examples are shown below (**Fig. 5.10** and **Fig 5.11**). Imaging was best within deep sedimentary basins with low seafloor relief. In water depth >1000 m, imaging is challenging at steep slopes and hard bottom, making sub-seafloor penetration of the acoustic signals impossible. Details of the data acquisition and methodology are provided in **Appendix 5**.

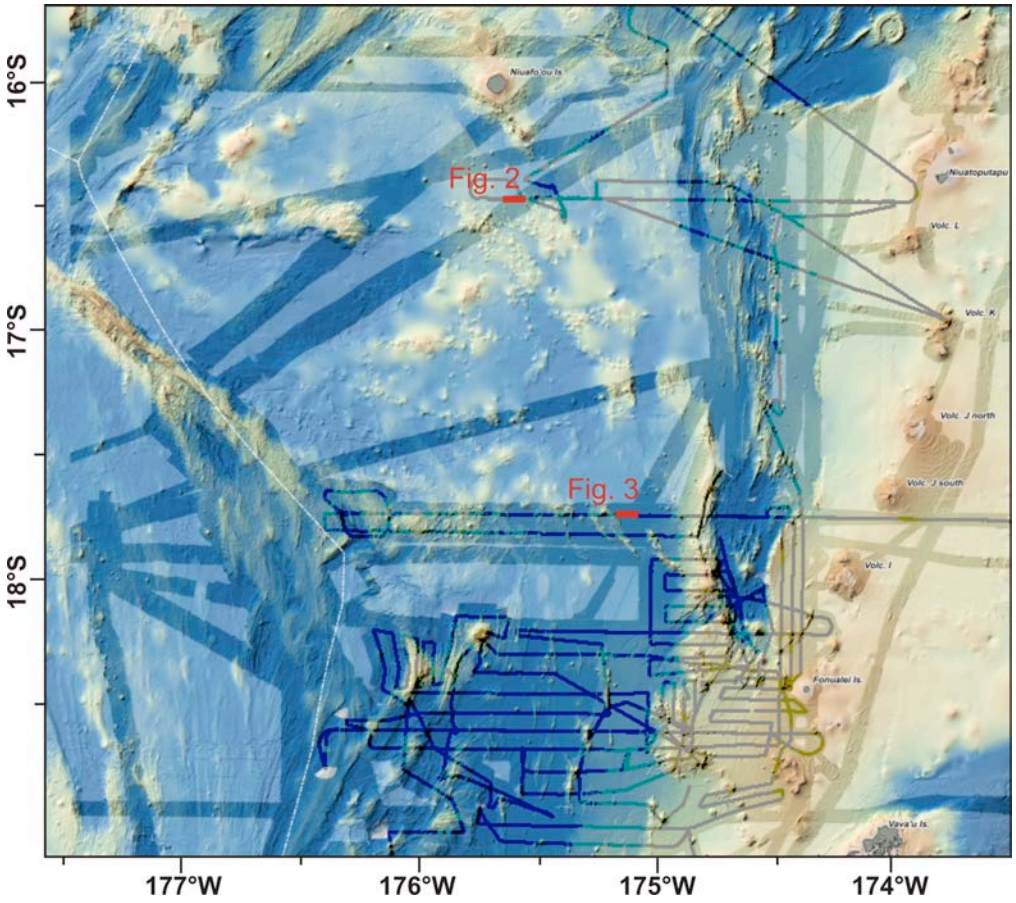

Fig. 5.9 Map showing the entire region of study area with line-tracks with PARASOUND data as black solid lines. Two examples shown below are highlighted in red.

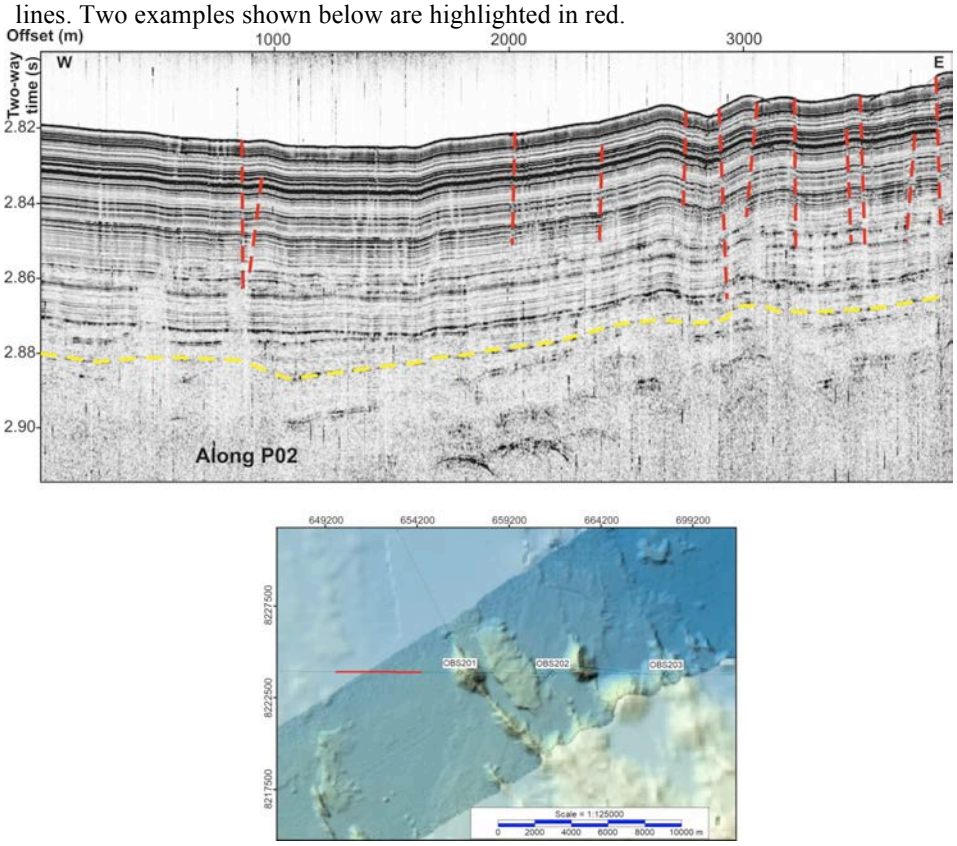

Fig. 5.10 Example of a PARASOUND section acquired along profile P02 (label Fig. 2 on 5.9). Upper panel shows the acoustic data (displayed using seismic attribute envelop with an automatic gain control

window length of 50 ms) imaging the upper 80 ms of sub-seafloor sediments, equivalent to a penetration of ~65 m. Lower panel shows the location map of the displayed line along P02 as a red line. The sediments are characterized by a 60 ms (~48 m) thick veneer of seafloor-parallel strata with abundant faulting (shown as red dashed lines). These upper strata overly a sedimentary unit which is characterized by several layers of acoustic turbidity without internal reflections. The lower sedimentary unit is not affected by the faulting.

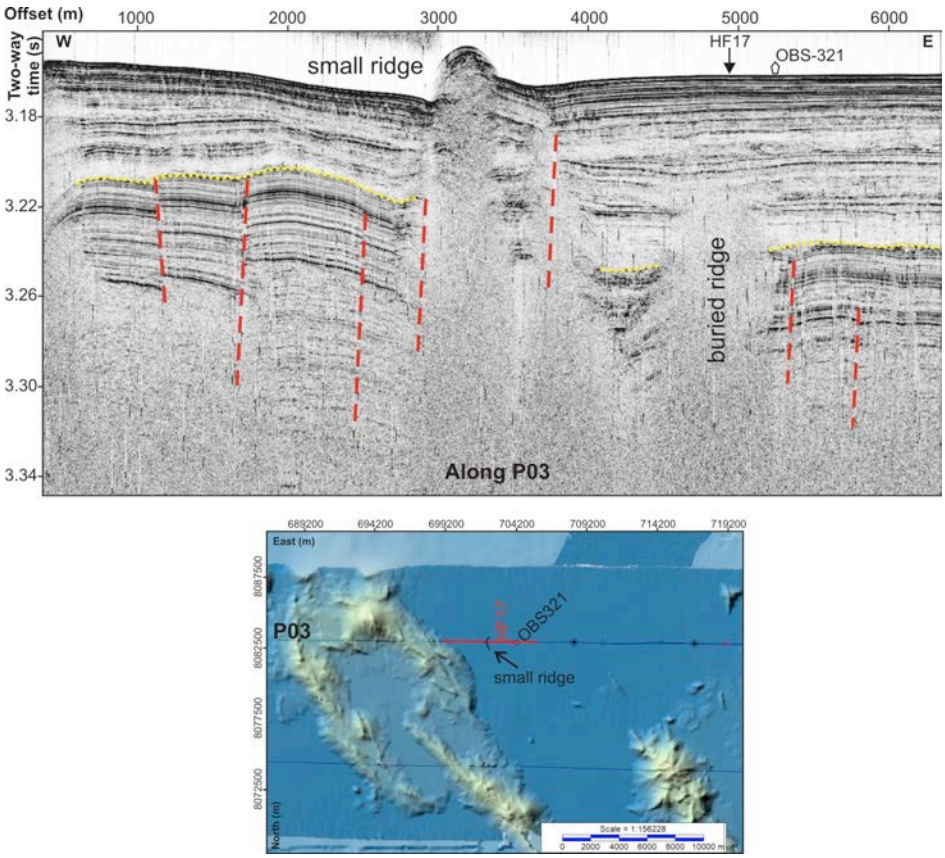

Fig. 5.11 Example of a PARASOUND section acquired along profile P03 (label Fig. 3 on 5.9). Upper panel shows the acoustic data (displayed using seismic attribute envelop with an automatic gain control window length of 50 ms) imaging the upper 80ms of sub-seafloor sediments, equivalent to a penetration of ~65 m. Lower panel shows the location map of the displayed line along P03 as a red line. Two distinct sedimentary units can be distinguished. The lower unit shows a package of faulted sediment blocks (faults are shown as red dashed lines). At an unconformity (identified as yellow dotted line) seafloor-parallel layers are seen, which are not affected by the faulting.

5.8 AUV ABYSS

(M. Rothenbeck, T. Kurbjuhn, N. Diller, S. Petersen)

During cruise SO267, 8 missions were flown successfully by the Autonomous Underwater Vehicle AUV ABYSS (**Table 5.2** and **Fig. 5.12**). The missions were done using exclusively the multibeam configuration of the vehicle. The AUV ABYSS was equipped with a turbidity sensor, a REDOX potential sensor, a CTD, a magnetometer and four self-potential probes. These sensors acquired data continuously during the missions. Four sidescan dives were flown: 24AUV (#308), 38AUV (#309), 55AUV (#310), and 93AUV (#314). That means the sidescan sonar was enabled and the vehicle track was prepared for this sensor. The AUV dived at a fixed

altitude of 70 meters. The settings can be seen in **Appendix 6** of this cruise report. The dives were to map selected areas of the Southern FRSC and the MTJ spreading center. During dives 72AUV (#311), 79AUV (#312), 88AUV (#313) and 100AUV (#315) the REDOX sensor (Eh) was the primary sensor in order to detect hydrothermal plume signals in the water column. The sidecan sonar was disabled and the vehicle followed the seafloor with a fixed altitude of 120 meters above bottom. Dive #310 had a magnetometer calibration phase at 500 m depth before the descent phase. During #314 a reduced magnetometer calibration with just a figure eight procedure was performed. There was a technical problem in the Magson data logger (magnetometer/self-potential) during the first two dives during SO267 and no magnetometer data could be recorded.

Long baseline (LBL) transponder navigation was not used during SO267. So the vehicle started the surveys without a position update after the descent phase. A positioning offset of between 100 and 400 meters needs to be considered for all the data. The AUV missions that acquired sidescan sonar data will be re-navigated after the cruise. All data contains a time stamp and is related to a position of the vehicle. Please consider that those positions are the original and not navigation adjusted positions. The data itself is provided inside several text files as specified in the appendix. A general description of all AUV sensors is located in **Appendix 6** (AUV-Abyss sensor description).

During two sidescan sonar dives at the southern tip of the FRSC the onset of rifting with the associated faults and young volcanic cones were mapped (**Fig. 5.13**). One dive was devoted to mapping a row of small recent volcanoes crosscutting parts of the arc. The plume hunting missions along the FRSC (dives #312, #315) and the MTJ (dive #313) found a number of plume signals along the neovolcanic zone (**Fig. 5.14**). The distribution of hydrothermal activity at MTJ was mapped in more detail during the sidescan sonar mission #314 that also looked at the association of venting with different volcanic terrains.

Table 5.2 Mission statistics of AUV Abyss for SO267

Station	Area	Dive	Date	Survey time	Mission time	Distance travelled	Sensors (Comments)
SO267-24-1 AUV	S-FRSC	308	22.12.2018	18.57	19.82	110.9	SSS120
SO267-38-1 AUV	S-FRSC	309	23.12.2018	19.15	20.98	116.5	SSS120
SO267-55-1 AUV	S-FRSC	310	02.01.2019	18.23	19.95	110.2	SSS120
SO267-72-1 AUV	C-LSC	311	07.01.2019	20.37	21.33	118.0	Eh
SO267-79-1 AUV	N-FRSC	312	11.01.2019	20.58	21.70	120.5	Eh
SO267-88-1 AUV	MTJ	313	17.01.2019	16.05	16.67	91.9	Eh
SO267-93-1 AUV	MTJ	314	18.01.2019	18.97	20.75	110.3	SSS120
SO267-100-1 AUV	S-FRSC	315	21.01.2019	21.17	22.83	117.9	Eh
			Total:	**153.08 h**	**164.03 h**	**909.5 km**	

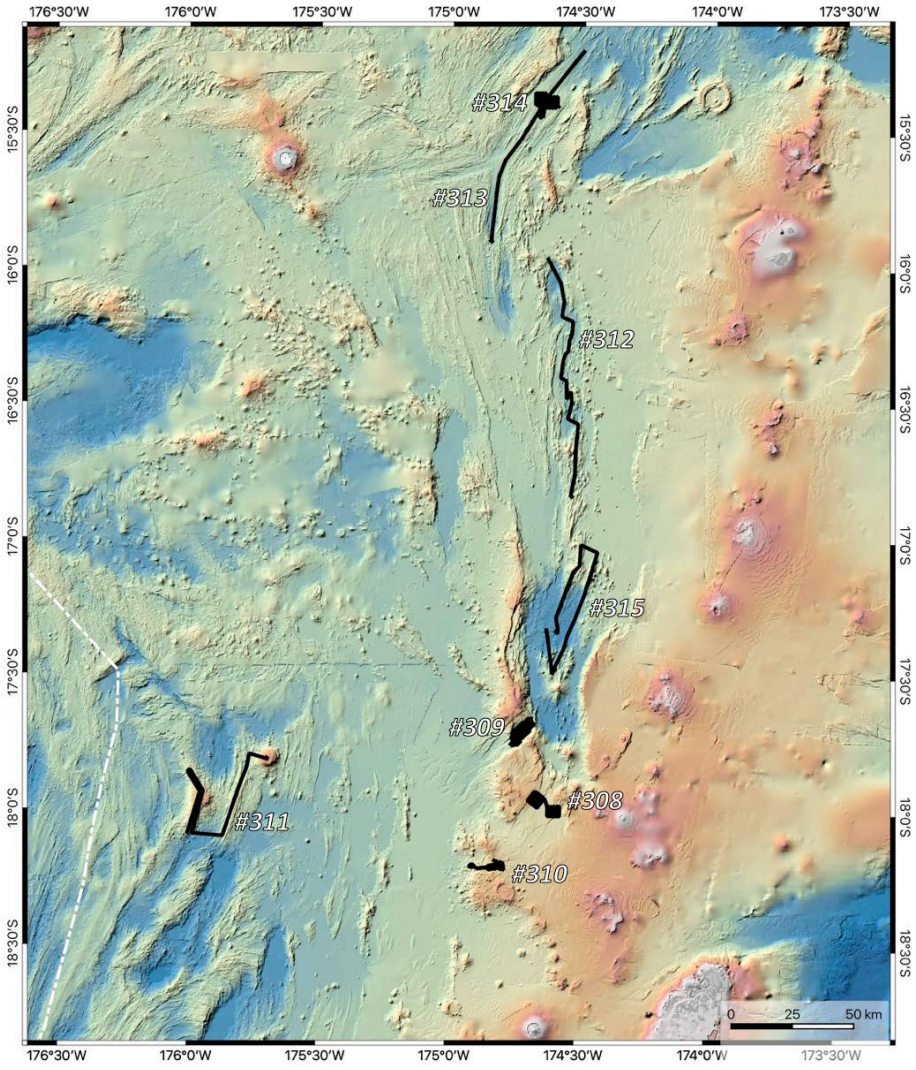

Fig. 5.12 Location of AUV dives in the working area.

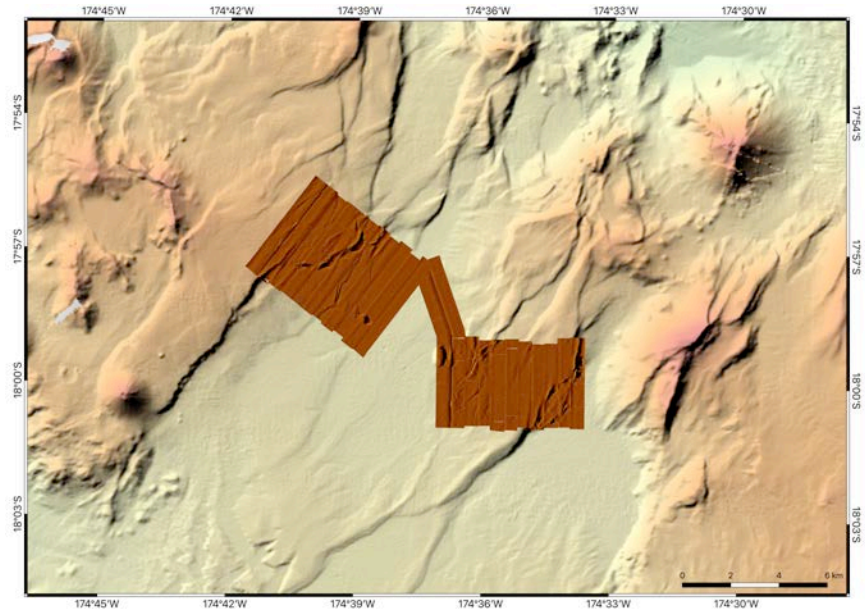

Fig. 5.13: Sidescan sonar mission mapping the onset of rifting and associated small volcanic cones at the southern tip of the Fonualei Rift.

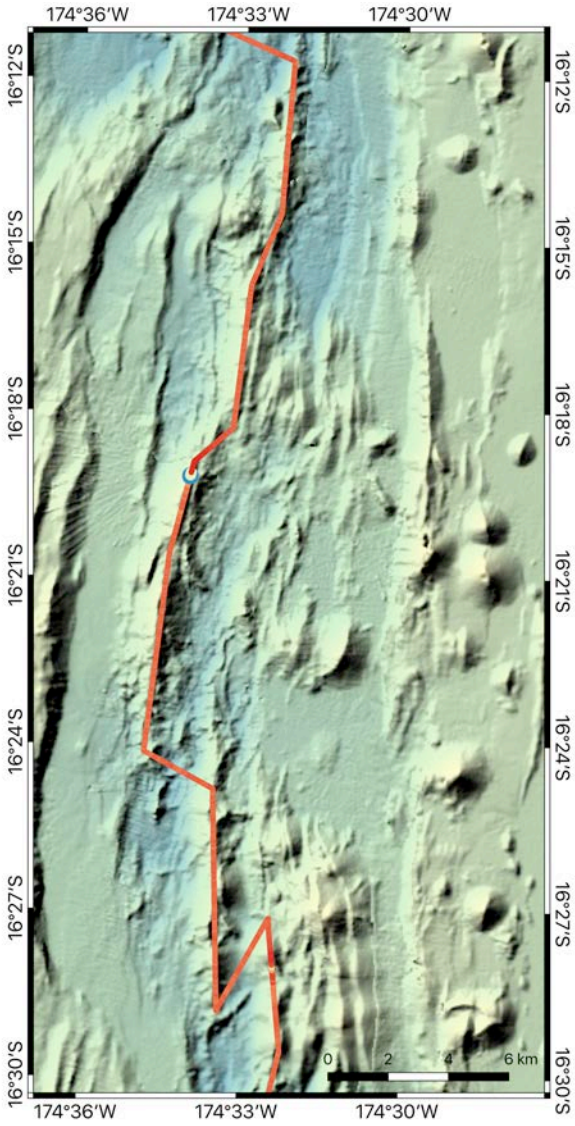

Fig. 5.14: Central part of the trackline of dive #312 with a plume signal (here Eh; blue color indicates the presence of reduced fluids) above an elongated volcanic ridge in the Fonualei Rift.

5.9 Heat Flow

(M. Riedel, S. Petersen)

A total of 18 stations were visited during SO267 to define the geothermal gradients (**Appendix 7**). However, only at four stations the probe penetrated deep enough into the seafloor so that a thermal heat pulse was generated and estimates of a thermal gradient and sediment thermal conductivity were possible. Most of the time, the probe was unable to penetrate into the sediments, bounced at the seafloor and fell over. At three stations (52HF, 53HF, 54HF) shallower than 2600 m water depth, we also attached a GoPro camera to the bottom of the weight-stand of the heat-probe together with a light-source. This allowed verification of the probes inability to penetrate the sediment and the characteristics of the seafloor. Station 18HF did yield the deepest penetration of the tool up to 1.8 m and results of the data analyses are shown in **Figures 5.15 to 5.18**. The geothermal gradient is ~83°C/km and with average thermal conductivities being below 1.0 W/mK, the resulting heat flow is only ~62 mW/m^2.

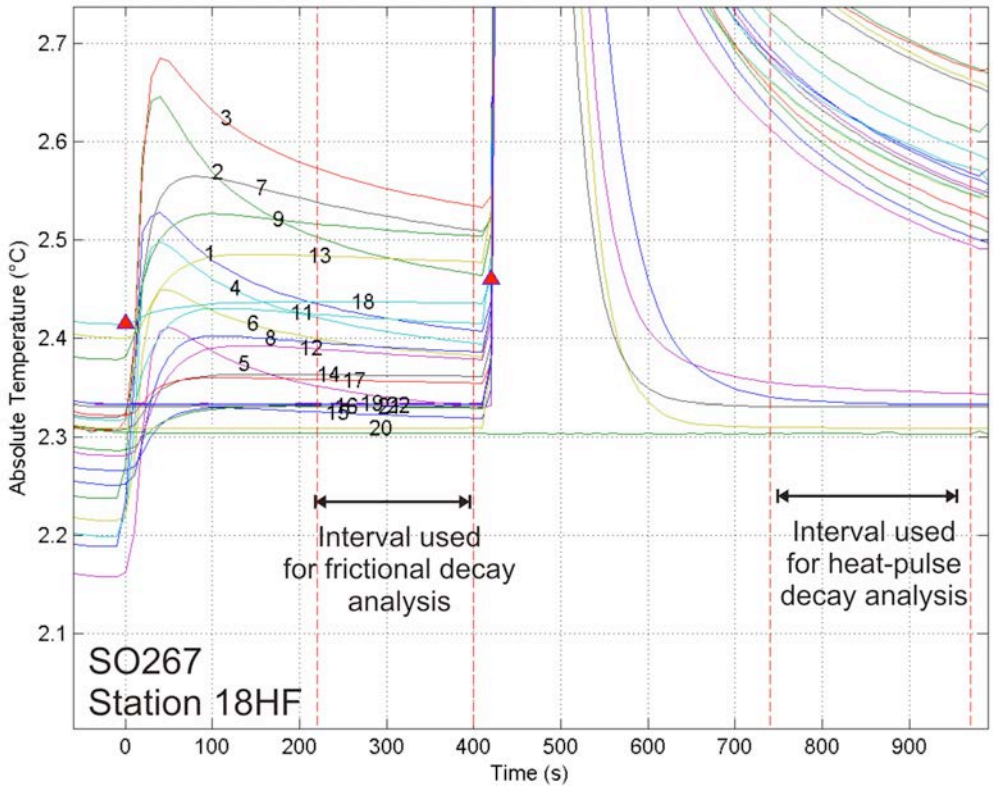

Fig. 5.15 Temperature (uncorrected raw values of the sensors) during Station 18HF showing the initial frictional heating from tool penetration into the sediment, and the heat-pulse (at around 410 s) followed by the decline in temperature.

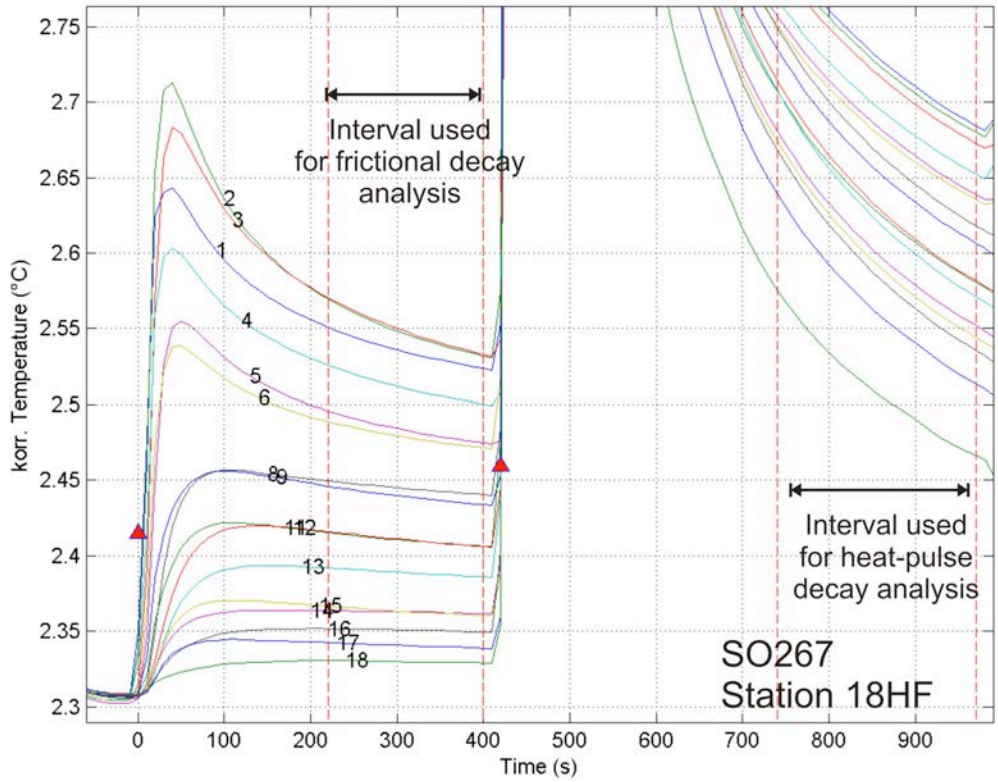

Fig. 5.16 Temperature (corrected after applying the calibration values for all sensors) during Station 18HF. Seafloor temperature is 2.31°C.

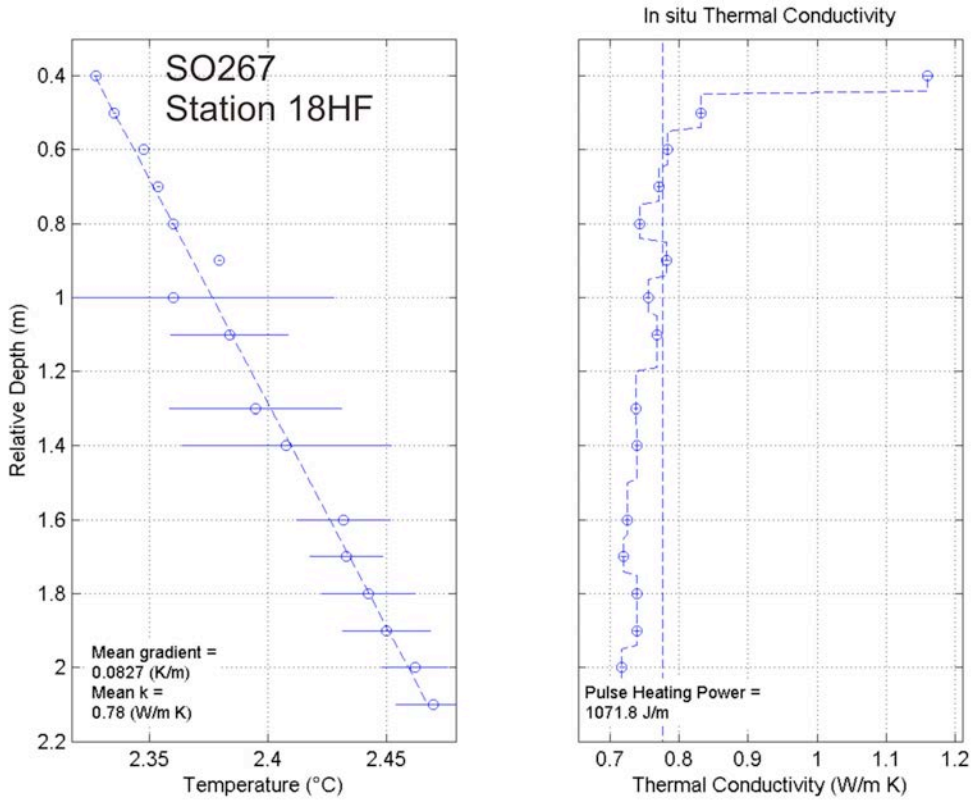

Fig. 5.17 Left: geothermal gradient determined from in situ temperature estimates for Station 18HF. Right: Derived in situ thermal conductivity of the sediments, with a mean value of ~0.78 W/mK.

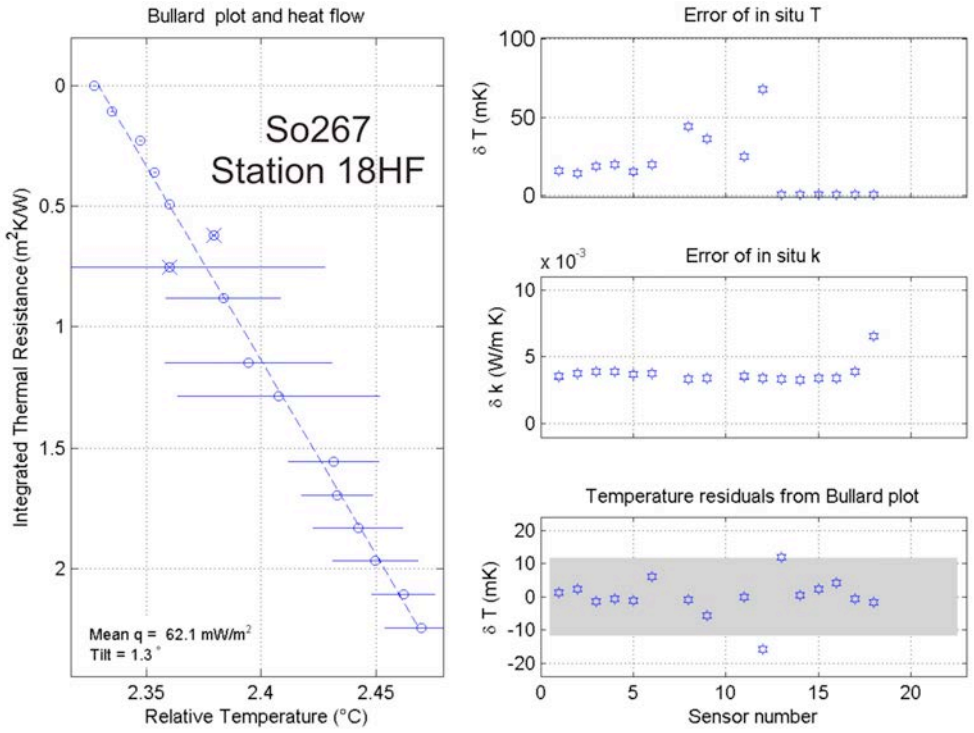

Fig. 5.18 Resulting Bullard plot to define average heat flow (here around 62 mW/m^2) and results of the error analysis of temperature and thermal conductivity estimation for all sensors not excluded in the analyses (#10: broken, 19 – 22: in water column above seafloor).

5.10 Sediment Sampling

(S. Martins, S. Lange)

During SO267 a total of 6 gravity core stations were accomplished with a total of about 40 cm of sediment collected. Three core catcher samples were also retrieved (see **Appendix 8**). The difficulty in a successful recovery is probably due to the coarse nature of the sediment, low sediment coverage or due to the lithified/hardened nature of the substrate.

A total of 34 sediment samples were recovered from the dredge sediment traps and 3 on the heat flow probe (trapped between the weights and recovered upon arrival on deck). A complete list and brief description of the sediment samples is provided in Appendix 8.

Major and trace element geochemistry will be acquired on the sediment samples retrieved.

With specific permission from the Tongan government, the Nautilus Observer brought a prototype autonomous seabed sediment sampler for testing during the cruise. The instrument is described in Appendix 8.

5.11 Rock Sampling

(P. Brandl, F. Hampel, P. Mercier-Langevin, C. Rahmsdorf, M. Stewart, R. Werner)

R/V SONNE cruise SO267 has achieved the major goals of its dredge program;the regional island arc lithosphere and adjacent back-arc basins were systematically sampled for the first time. A total of 41 dredge hauls at an average water depth of 1,850 m has been carried out. Of these, 37 (= 91.4% success rate) delivered in situ samples. Locations, depths, and a brief description of all SO267 dredge hauls are given in **Appendix 9**, together with the detailed sample list.

Massive magmatic rocks were obtained from 35 sampling sites, volcaniclastic rocks were obtained in 18 sites, and 13 dredges returned sedimentary rocks. No equipment was lost or seriously damaged. Pillow and sheet flow lava fragments dominate among the dredged rocks, but various types of volcaniclastic rocks are also common, some of them show textures or structures which may point to subaerial or shallow water volcanic activity and/or deposition. Some dredges also yielded sedimentary rocks comprising mainly limestone, silt- and sandstones, and polymict epiclastic breccias. Dredge sampling did not yield plutonic or subvolcanic intrusive rocks. The overall degree of alteration of the recovered rocks varies from strongly altered to fresh. Fresh glass rims and glassy lapilli are preserved in several samples. Although alteration is a well-known problem for geochemical analysis and dating of dredged magmatic rocks due to their extended exposure in a submarine environment, we are confident that SO267 yielded a comprehensive set of samples being suitable for shore-based analyses including advanced methods like isotope analyses and radiometric dating. Alteration is in many cases due to seafloor weathering, but some possibly samples exhibit evidences of hydrothermal alteration, which could potentially be correlated with plume mapping undertaken in SO267.

Rock dredging of SO267 focused on the steep inner walls of the FRSC, the area southwest of the FRSC, the FRSC-ELSC transfer zone, and the CVF to the west of the FRSC. The objectives were to collect information on the geology of the seafloor (”ground-truthing”) in areas of poor coverage, provide material to document the magmatic evolution of arc-backarc systems in both time and space, and better constrain interpretations made from hydroacoustic or

seismic data. Thus, off-axis and intraplate structures and volcanic features were specifically targeted, complementing previous cruises that were largely restrained to spreading or rift axes.

Preliminary petrographic descriptions and sample characterization informed geological mapping and aided in the preliminary interpretation of seismic profiles. Lithological assemblages or types indicative for the main geological entities have the following general characteristics:

(1) Rifted arc crust: Altered vesicular basalts, andesites and dacites, hyaloclastites, volcaniclastic sediments (altered tuff, lapilli-tuff), semi-consolidated sediments; Representative dredges: DR22 (**Fig. 5.19a**), DR23, DR37, and DR90
(2) Volcanic cones on rifted arc crust: Ol-Plag or Ol-Cpx phyric vesicular basalt, glomeroporphyritic un- to moderately-altered vesicular basaltic andesite or andesite, possibly pumice, hyaloclastites, scoria w/ bombs; Representative dredges: DR33, DR34 (**Fig. 5.19b**), DR60
(3) Volcanic ridges on sedimented rifted arc crust: Vesicular basalt often associated with altered volcaniclastic sediments, common hyaloclastites, polymict volcaniclastic breccias, pillow fragments as well as scoria/bombs; Representative dredges: DR56 to DR58 (DR57: **Fig. 5.19c**), DR92
(4) Rift floor volcanism: Olivine-plagioclase phyric vesicular basalt or basaltic andesite commonly erupted as pillow lava or lava tubes (fragments recovered); Representative dredges: DR59 (**Fig. 5.19d**), DR66, DR68, DR94
(5) Back-arc crust (formed at a spreading centre): Massive basalt with low vesicularity; Representative dredge: DR73

Detailed petrographic and geochemical analyses will be performed post-cruise and require onshore laboratory facilities. Planned analyses include major and trace element (including critical trace metals and metalloids) and radiogenic Sr-Nd-Pb-Hf isotope analyses, as well as Ar-Ar age dating of key samples. These studies will be instrumental in unravelling the temporal and compositional evolution from arc rifting to back-arc spreading, a key objective of SO267.

Fig. 5.19a: Representative sample of altered vesicular dacite from DR22 (1,330-1,830 m b.s.l.). Scale bar is 10 cm.

Fig. 5.19b: Representative sample of feldspar-glomeroporphyritic basaltic andesite from DR34 (730-1,060 m b.s.l.). Scale bar is 10 cm.

Fig. 5.19c: Representative sample of scoria bomb (vesicular basalt) from DR57 (1,500-1,830 m b.s.l.). Scale bar is 10 cm.

Fig. 5.19d: Representative sample of olivine and feldspar-phyric, vesicular basalt from DR59 (1,140-1,400 m b.s.l.). Scale bar is 10 cm.

6 Ship's Meteorological Station

Not Applicable

7 Station List

Station No.		Date	Gear	Time	Latitude	Longitude	Water Depth	Remarks/Recovery
SONNE	GEOMAR BGR	2018 / 2019		[UTC]			[m]	
SO267_1-1		12.12.	Cage	5:32	-17.44422	-176.20798	2872	Releaser Test
SO267_1-2		12.12.	Cage	7:58	-17.44420	-176.20797		Releaser Test
SO267_2-1	50 OBS 16 MT	12.12.	OBS OBMT	13:57	-17.33000	-176.22568	2269	OBS/OBMT Deployment (P3)
SO267_3-1		12.12.	Cage	14:49	-17.32943	-176.13098	1929	Releaser Test
SO267_4-1		13.12.	Cage	0:13	-17.32990	-175.13553	2067	Releaser Test
SO267_5-1	05 HF	13.12.	Heat Flow	3:31	-17.33592	-175.07523	2360	No penetration
SO267_6-1	06 HF	13.12.	Heat Flow	7:38	-17.32972	-174.93885	2363	No penetration
SO267_7-1	07 HF	13.12.	Heat Flow	11:09	-17.32968	-174.81007	1725	Temp, Gradient, HP
SO267_8-1	08 HF	13.12.	Heat Flow	14:44	-17.32973	-174.72015	2348	No penetration
SO267_9-1	09 HF	13.12.	Heat Flow	17:15	-17.32957	-174.68925	2794	Temp, Gradient, HP
SO267_10-2	10 HF	14.12.	Heat Flow	3:23	-17.32967	-174.50410	2518	Temp
SO267_11-1	11 HF	14.12.	Heat Flow	6:42	-17.32985	-174.43982	2210	No penetration
SO267_12-1	12 HF	14.12.	Heat Flow	11:28	-17.32972	-174.12985	1463	Temp
SO267_13-1	BGR18-2R3	14.12.	AG/ Magnetometer	18:30	-17.33197	-173.32623	1208	Refraction Seismics (P3)
SO267_14-1	BGR18-203	16.12.	Streamer/AG/ Magnetometer	12:00	-17.37220	-176.27460	2289	Reflection Seismics (P3)
SO267_15-1	43 OBS	18.12.	OBS	18:19	-17.33693	-173.53183	1317	OBS Recovery (P3)
SO267_16-1	11 OBS 2 MT	19.12.	OBS OBMT	3:43	-17.32903	-174.16863		OBS/OBMT Re-deployment (P3)
SO267_17-1	17-1 HF	20.12.	Heat Flow	1:19	-17.33033	-175.08108	2367	No penetration
SO267_17-2	17-2 HF	20.12.	Heat Flow	1:45	-17.33033	-175.08108	2368	Temp
SO267_18-1	18 HF	20.12.	Heat Flow	9:59	-17.33005	-175.51708	2329	Temp, Gradient, HP
SO267_19-1	19 HF	20.12.	Heat Flow	12:59	-17.33028	-175.55910	2325	Temp
SO267_20-1	2 OBS	20.12.	OBS	22:02	-17.32723	-176.05665		OBS Recovery (P3) (continued)
SO267_21-1	BGR18-207	21.12.	Magnetometer	1:03	-17.32515	-176.23683	2305	Transit and mapping

Station No.		Date	Gear	Time	Latitude	Longitude	Water Depth	Remarks/Recovery
SONNE	GEOMAR BGR	2018 / 2019		[UTC]			[m]	
SO267_22-1	22DR	21.12.	Dredge	16:13	-17.18520	-174.71028	1803	1/4 Full
SO267_23-1	23DR	21.12.	Dredge	20:00	-17.30785	-174.71372	2626	1/5 Full
SO267_24-1	# 308	22.12.	AUV	4:00	-17.93453	-174.66748	1199	AUV 1
SO267_25-2	25 HF	22.12.	Heat Flow	7:35	-17.67013	-174.61013	2954	Temp
SO267_26-1	Nautilus	22.12.	Jumper	10:07	-17.54248	-174.70730	1415	Not recovered
SO267_27-1	27 HF	22.12.	Heat Flow	11:39	-17.50988	-174.67820	2689	Temp
SO267_28-1	28GC	22.12.	3m Corer	14:09	-17.50995	-174.67827	2781	Empty
SO267_29-1	29GC	22.12.	3m Corer	17:13	-17.55008	-174.65020	2654	Core Catcher Sample
SO267_30-1	30GC	22.12.	3m Corer	20:09	-17.66503	-174.60503	2955	Core Catcher Sample
SO267_31-1	31GC	22.12.	3m Corer	23:13	-17.79705	-174.58722	2218	Core Catcher Sample
SO267_32-1	32GC	23.12.	3m Corer	1:43	-17.86905	-174.52425	2032	Empty
SO267_33-1	33DR	23.12.	Dredge	5:29	-18.00938	-174.52385	1214	1/2 Full
SO267_34-1	34DR	23.12.	Dredge	8:22	-17.90932	-174.51338	1061	1/4 Full
SO267_35-1	35DR	23.12.	Dredge	11:16	-17.80033	-174.46843	1708	3 rocks
SO267_36-1	36DR	23.12.	Dredge	14:54	-17.60507	-174.49293	2332	1/6 Full
SO267_37-1	37DR	23.12.	Dredge	19:35	-17.70623	-174.67748	1951	Few rocks
SO267_38-1	# 309	23.12.	AUV	23:47	-17.75272	-174.75583	1972	AUV 2
SO267_39-1	BGR18-208	24.12.	Magnetometer	0:09	-17.75703	-174.76325	1994	Transit and Mapping
SO267_40-1	BGR18-204	25.12.	Streamer/AG/ Magnetometer	2:35	-17.72720	-174.28667	1297	Reflection Seismics (P4)
SO267_41-1	Multibeam	26.12.	EM122	1:32	-17.85020	-175.18060	2436	Transit and Mapping
SO267_42-1	34 OBS	26.12.	OBS	12:17	-18.20013	-176.15148	1876	OBS Deployment (P5)
SO267_43-1	BGR18-205	27.12.	Streamer/AG/ Magnetometer	1:28	-18.22083	-174.43502	1000	Reflection Seismics (P5)
SO267_44-1	BGR18-2R5	28.12.	AG	12:21	-18.34987	-176.34352	2427	Refraction Seismics (P5)
SO267_45-1	34 OBS	29.12.	OBS	16:57	-18.20180	-174.43833	1015	OBS Recovery (P5)
SO267_46-2	BGR18-209	30.12.	Magnetometer	23:04	-18.22193	-176.15457	1959	Transit and Mapping
SO267_47-1	47DR	01.01.	Dredge	1:41	-17.99443	-174.61777	1560	2 rocks
SO267_48-1	48DR	01.01.	Dredge	5:28	-18.00840	-174.73422	1056	Full
SO267_49-1	49DR	01.01.	Dredge	9:33	-18.21205	-174.81558	1350	1 rock
SO267_50-1	50DR	01.01.	Dredge	13:21	-18.14767	-174.93045	1720	1/4 Full
SO267_51-1	Multibeam	01.01.	EM122	15:57	-18.13972	-174.92968	1322	Transit and Mapping
SO267_52-1	52 HF	02.01.	Heat-Flow	0:45	-18.16948	-174.79908	1354	No penetration
SO267_53-1	53 HF	02.01.	Heat-Flow	6:21	-18.27182	-175.06080	2219	No penetration
SO267_54-1	54 HF	02.01.	Heat-Flow	13:20	-18.27350	-175.50763	2471	No penetration
SO267_55-1	# 310	02.01.	AUV	22:07	-18.18232	-174.81477	1352	AUV 3
SO267_56-1	56DR	03.01.	Dredge	0:57	-18.09653	-175.16155	2162	Few rocks
SO267_57-1	57DR	03.01.	Dredge	4:43	-18.22312	-175.23385	1787	2/3 Full
SO267_58-1	58DR	03.01.	Dredge	8:27	-18.35537	-175.27018	2100	1/4 Full
SO267_59-1	59DR	03.01.	Dredge	14:18	-18.55467	-174.92717	1403	Few rocks
SO267_60-1	60DR	03.01.	Dredge	20:58	-18.28533	-174.98735	2204	1/4 Full
SO267_61-1	BGR18-210	03.01.	Magnetometer	23:34	-18.27385	-174.98825	2222	Transit and Mapping
SO267_62-1	62 HF	04.01.	Heat-Flow	9:32	-18.27330	-175.88628	3169	Temp
SO267_63-1	63 HF	04.01.	Heat-Flow	14:43	-18.50730	-175.64843	2934	No penetration
SO267_64-1	64GC	04.01.	3 m Corer	17:11	-18.50733	-175.64822	2939	40 cm Sample
SO267_65-1	65DR	05.01.	Dredge	3:50	-18.39767	-175.86410	2495	1/5 Full
SO267_66-1	66DR	05.01.	Dredge	8:48	-18.20707	-175.80843	3079	1/4 Full
SO267_67-1	BGR18-211, 212	05.01.	Magnetometer	12:37	-18.21220	-175.80037	2697	Transit and Mapping
SO267_68-1	68DR	05.01.	Dredge	14:57	-17.96993	-175.81742	1817	Few rocks
SO267_69-1	69DR	05.01.	Dredge	19:27	-17.81747	-175.71725	1006	1/5 Full
SO267_70-1	70DR	07.01.	Dredge	2:19	-18.27582	-174.79153	944	1/8 Full
SO267_71-1	71DR	07.01.	Dredge	5:57	-18.33232	-174.76292	994	1/4 Full
SO267_72-1	# 311	07.01.	AUV	22:31	-17.81047	-175.69627	915	AUV 4
SO267_73-1	73DR	08.01.	Dredge	8:24	-18.01392	-175.95288	1697	Few rocks
SO267_74-1	BGR18-	08.01.	Magnetometer	20:45	-18.08568	-175.99168	2230	Transit and Mapping

Station No.		Date	Gear	Time	Latitude	Longitude	Water Depth	Remarks/Recovery
SONNE	GEOMAR BGR	2018 / 2019		[UTC]			[m]	
	213							
SO267_75-1	BGR18-206	09.01.	Streamer/AG/ Magnetometer	2:42	-18.62805	-176.07513	2955	Reflection Seismics (P6)
SO267_76-1	BGR18-214-218	10.01.	Magnetometer	1:26	-18.59588	-174.80712	1768	Transit and Mapping
SO267_77-1	77DR	10.01.	Dredge	7:49	-18.52110	-175.69325	2651	Few rocks
SO267_78-1	78DR	10.01.	Dredge	11:02	-18.51495	-175.68462	2939	1/6 Full
SO267_79-1	# 312	11.01.	AUV	9:58	-16.83770	-174.53660		AUV 5
SO267_80-1	30 OBS	11.01.	OBS	20:00	-16.06002	-174.03582	1393	OBS Deployment (P2)
SO267_81-1	BGR18-202, 201	13.01.	Streamer/AG/ Magnetometer	2:28	-15.98710	-175.59315	2160	Reflection Seismics (P1 and P2)
SO267_82-1	BGR18-219	15.01.	Magnetometer	5:48	-15.38325	-175.07592	2065	Transit and Mapping
SO267_83-1	83DR	15.01.	Dredge	12:15	-16.01217	-175.41298		Few rocks
SO267_84-1	84DR	15.01.	Dredge	16:17	-16.10863	-175.36803	2194	Few rocks
SO267_85-1	85DR	15.01.	Dredge	19:56	-16.05378	-175.52958	2020	Few rocks
SO267_86-1	BGR18-2R2	15.01.	AG/ Magnetometer	23:34	-16.06020	-175.66983	2021	Refraction Seismics (P2)
SO267_87-1	30 OBS	16.01.	OBS	22:06	-16.06675	-173.98368	1202	OBS Recovery (P2)
SO267_88-1	# 313	17.01.	AUV	10:45	-15.90085	-174.85125		AUV 6
SO267_89-1	BGR18-220	17.01.	Magnetometer	22:36	-16.05615	-175.53553		Transit and Mapping
SO267_90-1	90DR	18.01.	Dredge	8:17	-15.43683	-174.48755	1865	1/2 Full
SO267_91-1	91DR	18.01.	Dredge	11:48	-15.52812	-174.43060	2507	Full
SO267_92-1	92DR	18.01.	Dredge	16:09	-15.67443	-174.62468	1259	Full
SO267_93-1	# 314	18.01.	AUV	20:00	-15.38378	-174.68138	2077	AUV 7
SO267_94-1	94DR	18.01.	Dredge	23:17	-15.66277	-175.02888	2375	1/5 Full
SO267_95-1	95DR	19.01.	Dredge	4:05	-15.95160	-174.95560	2083	Few rocks
SO267_96-1	96DR	19.01.	Dredge	8:30	-16.05795	-174.63822	2500	1/4 Full
SO267_97-1	97DR	19.01.	Dredge	12:42	-15.96253	-174.71613	1487	Full
SO267_98-1	BGR18-221	19.01.	Magnetometer	19:00	-15.43377	-174.61390	2041	Transit and Mapping
SO267_99-1	16 OBS 18 MT	20.01.	OBS OBMT	5:44	-17.28367	-175.03880	2363	OBS/OBMT Recovery (P3)
SO267_100-1	# 315	20.01.	AUV	23:44	-17.33562	-174.58705	2965	AUV 8
SO267_101-1	HF 101	21.01.	Heat Flow	16:59	-17.32978	-174.20050	1535	No penetration
SO267_102-1	HF 102	21.01.	Heat Flow	21:19	-17.32988	-174.55100	3034	No Penetration
SO267_103-1	103DR	22.01.	Dredge	2:07	-17.52402	-174.91272	1818	1/2 Full
SO267_104-1	BGR18-222	22.01.	Magnetometer	5:06	-17.51437	-174.90572	1569	Transit and Mapping
SO267_105-1	105DR	22.01.	Dredge	23:15	-16.80063	-175.06272	1612	Empty
SO267_106-1	106DR	23.01.	Dredge	2:32	-16.83240	-175.16480	2002	2 rocks
SO267_107-1	107DR	23.01.	Dredge	8:51	-16.48265	-175.11810	2122	Few rocks
SO267_108-1	108DR	23.01.	Dredge	19:37	-16.47523	-175.76577	1112	1/3 Full
SO267_109-1	109DR	23.01.	Dredge	0:13	-16.63822	-175.98035	1402	Few rocks
SO267_110-1	BGR18-223	23.01.	Magnetometer	3:28	-16.63807	-175.98132	1317	Transit

See Stationbook (**Appendix 1**) for OBS and OBMT instrument numbers. EM122 and PARASOUND were operating on all transits. AG= Airguns, HP= heat pulse

8 Data and Sample Storage and Availability

All hydroacoustic data collected during SO267 are stored in facilities of GEOMAR Helmholtz-Zentrum für Ozeanforschung Kiel and the Bundesanstalt für Geowissenschaften und Rohstoffe (BGR) Hannover. Metadata of the onboard DSHIP-System will be uploaded to the World Data

Center PANGAEA which provides a long-term archive and access to the data (contacts: see below). Multibeam field data are stored at the bathymetric data centre of the Bundesamt für Seeschiffahrt und Hydrografie. The petrological samples are available at GEOMAR Helmholtz-Zentrum für Ozeanforschung Kiel. The petrological and geochemical data will be published in peer-reviewed journals and will be available in international databases such as GEOROC and PetDB. Sediment and rock samples will be stored at the Core and Rock Repository at GEOMAR in Kiel (responsible Prof. Dr. Mark Hannington).

Table 8.1 Overview of data availability

Type	Database	Available	Free Access	Contact
MCS Data	BGR	April 2019	April 2021	michael.schnabel@bgr.de
OBS Data	GEOMAR	April 2019	April 2021	hkopp@geomar.de
Magnetic Data	BGR	April 2019	April 2021	udo.barckhausen@bgr.de
Gravity Data	BGR	April 2019	April 2021	ingo.heyde@bgr.de
OBMT Data	GEOMAR	April 2019	April 2021	mjegen@geomar.de
Heat Flow Data	GEOMAR	April 2019	April 2021	mhannington@geomar.de
Sample Data	GEOMAR	April 2019	April 2021	mhannington@geomar.de
AUV Data	GEOMAR	April 2019	April 2021	mhannington@geomar.de
Multibeam Data	BFSH, PANGAEA	February 2019	April 2021	mhannington@geomar.de
PARASOUND	GEOMAR	February 2019	April 2021	mhannington@geomar.de
CTD, ADCP	PANGAEA	February 2019	February 2019	
Ship's Metadata	BFSH, PANGAEA	February 2019	February 2019	

9 Acknowledgements

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personnel and for their skillful execution of a complex scientific program. They contributed especially to a very pleasant and professional atmosphere on RV SONNE. The cruise was financed by the Bundesministerium für Bildung und Forschung (BMBF) with additional logistical support and use of large-scale equipment from GEOMAR and BGR. This report includes contributions from Metal Earth Project No. MERC-ME-2019-167.

10 References Cited in this Report

Barckhausen, U., Heyde, I., Kopp, H. & Hannington, M. (2019), Seafloor ages of the Central and Northern Lau Basin from magnetic data, 79. Jahrestagung DGG, MG-P.09, S. 131-132, Braunschweig, ISSN 0344-7251. (Poster abstract).

Bialas, J., Flueh, E. R., 1999. Ocean bottom seismometers. Sea Technology, 40, 4, 41-46.

Conder, J., Wiens, D., 2011. Shallow seismicity and tectonics of the central and northern Lau Basin, Earth Planet. Sci. Lett., 304, 538–546.

Crawford, W., Hildebrand, J., Dorman, L., et al., 2003. Tonga Ridge and Lau Basin crustal structure from seismic refraction data, J. Geophys. Res., 108, p. 2195.

Flueh, E.R., Bialas, J., 1996. A digital, high data capacity ocean bottom recorder for seismic investigations. Int. Underwater Systems Design, 18, 3, 18-20.

Fujie, G., Kasahara, J., Murase, K., Mochizuki, K., Kaneda, Y., 2008. Interactive analysis tools for the wide-angle seismic data for crustal structure study (Technical Report). Geophysical Exploration (BUTSURI-TANSA), 61, 1, 26-33.

Sandwell, D. T., Smith, W.H.F., 2009. Global marine gravity from retracked Geosat and ERS-1 altimetry: Ridge segmentation versus spreading rate. Journal of Geophysical Research 114, B01411.

chmid, F., Dannowski, A., Kopp, H., Petersen, F., Schnabel, M., Barckhausen, U., Schramm, B., Riedel, M., Beniest, A., Brandl, P., Weber, M.,

Hannington, M. & SO267 Shipboard Scientific Party (2019), Formation and Rifting of backarc crust in the Lau Basin First results of a recent seismic experiment, 79. Jahrestagung DGG, MG-P.04, S. 127-128, Braunschweig, ISSN 0344-7251. (Poster abstract)

Zellmer, K., Taylor, B., 2001. A three-plate kinematic model for Lau Basin opening, Geochem. Geophys. Geosys., 2, 1020, doi:10.1029/2000GC000106.

Zelt, C., Smith, R. 1992. Seismic traveltime inversion for 2-D crustal velocity structure. Geophys. J. Int., 108, 16-34.

11 Abbreviations

AUV	Autonomous Underwater Vehicle
BGR	Bundesanstalt für Geowissenschaften und Rohstoffe
CTD	Conductivity, Temperature, Depth
EEZ	Exclusiv Economic Zone
EM	Multibeam Echosounder
FM	Frequency Modulation
GC	Gravity Corer
GFZ	GeoForschungsZentrum Potsdam, Germany
GMT	Generic Mapping Tools

GPS	Global Positioning System
HF	Heat Flow
MCS	Multichannel reflection seismic
MLNR	Ministry of Lands and Natural Resources, Kingdom of Tonga
Nautilus	Nautilus Minerals Inc.
NRCan	Natural Resources Canada
OBH	Ocean Bottom Hydrophone
OBMT	Ocean Bottom Magnetotelluric
OBS	Ocean Bottom Seismometer
P	Profile, e.g. profile 1
QC	Quality Control
RV	Research Vessel
SEAL	Sentinel Solid Active Sections
UHF	Ultra-High Frequency
UO	University of Ottawa
UTC	Universal Time Coordinated
VU	Vrije Universiteit Amsterdam

Appendix 1: Ship's Stationbook

Abkürzungen / Abbreviation

z.W	zu Wasser / into water
a.D.	an Deck / on deck
Slmax	(maximale) Seillänge / max. rope-length
LT	Lottiefe nach EM 122 / Depth of EM 122
W ...	eingesetzte Winde / Winch used
nm	Seemeilen / nautical miles
EM/PS	SIMRAD Multibeam / Parasound
rwk / COG:	Rechtweisender Kurs / true course
d:	Distanz / distance
v:	Geschwindigkeit in Knoten / SOG in knots
SL:	Seillänge / rope-length
SZ:	Seilzug / rope tension

Eingesetzte Geräte / Equiopment used — **Einsätze / tasks**

Releasertest	4
Auslage OBS / OBMT	143
Aufnahme OBS / OBMT	143
Seismikprofile (mit/ohne Streamer; mit Magnetometer)	8
Magnetometerprofile	9
EM122-Profile	5
Dredge	41
Schwerelot	6
Wärmestromlanze	20
Jumper	1
AUV	8

Geräteverluste / lost Equipment: 1 Jumper **Σ** 388

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
Station - Device	date time	Device	Code	Action	Comment (Station)	Comment (Device Opera	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Vind Dir	ind Speed (m	Course
SO267_1-1	12.12.2018 05:32:33	CTD	CTD	station start		Releaserteststation		started	17° 26.653' S	176° 12.479' W	2872.4	0.8	123.0	4.2	105.8
SO267_1-1	12.12.2018 05:35:57	CTD	CTD	in the water		Releaserteststation		started	17° 26.655' S	176° 12.479' W	0.0	0.5	109.8	5.6	280.8
SO267_1-1	12.12.2018 06:11:04	CTD	CTD	max depth/on ground		Releaserteststation	auf Tiefe, SL: 1000m	started	17° 26.652' S	176° 12.483' W	0.0	0.2	114.2	5.6	162.0
SO267_1-1	12.12.2018 06:20:36	CTD	CTD	information		Releaserteststation	Beg. Releasertest	started	17° 26.654' S	176° 12.475' W	0.0	0.2	106.4	6.4	160.3
SO267_1-1	12.12.2018 07:24:33	CTD	CTD	hoisting		Releaserteststation		started	17° 26.659' S	176° 12.482' W	0.0	0.7	99.9	6.6	35.9
SO267_1-1	12.12.2018 07:53:32	CTD	CTD	on deck		Releaserteststation		started	17° 26.657' S	176° 12.482' W	0.0	0.4	113.6	6.6	55.2
SO267_1-1	12.12.2018 07:57:12	CTD	CTD	station end		Releaserteststation		started	17° 26.652' S	176° 12.479' W	0.0	0.1	95.7	6.1	88.1
SO267_1-2	12.12.2018 07:58:49	CTD	CTD	station start				started	17° 26.652' S	176° 12.478' W	0.0	0.4	101.5	7.8	47.4
SO267_1-2	12.12.2018 08:04:06	CTD	CTD	in the water				started	17° 26.657' S	176° 12.478' W	0.0	0.4	88.3	6.9	94.1
SO267_1-2	12.12.2018 08:09:42	CTD	CTD	in the water			Bei SL:30 m 1 x Transponder	started	17° 26.660' S	176° 12.477' W	0.0	0.7	98.9	6.3	186.6
SO267_1-2	12.12.2018 09:14:16	CTD	CTD	max depth/on ground			SLmax: 2500 m, SZ: 13 kN	started	17° 26.656' S	176° 12.472' W	0.0	0.1	98.1	4.7	306.6
SO267_1-2	12.12.2018 09:15:21	CTD	CTD	information			Start Releaser-Test	started	17° 26.657' S	176° 12.471' W	0.0	0.1	106.7	6.2	84.5
SO267_1-2	12.12.2018 09:16:52	CTD	CTD	in the water			Hydrophon z. W.	started	17° 26.656' S	176° 12.471' W	0.0	0.3	96.4	6.2	3.5
SO267_1-2	12.12.2018 09:34:39	CTD	CTD	hoisting			Hieven bis SL: 50 m	started	17° 26.656' S	176° 12.478' W	0.0	0.6	93.9	6.9	217.0
SO267_1-2	12.12.2018 09:36:47	CTD	CTD	information			Hydrophon a. D.	started	17° 26.658' S	176° 12.478' W	0.0	0.3	83.0	6.6	24.2
SO267_1-2	12.12.2018 10:35:24	CTD	CTD	information			Bei SL: 50 m 1 x Transponder a.	started	17° 26.654' S	176° 12.483' W	0.0	0.4	90.4	7.7	215.6
SO267_1-2	12.12.2018 10:37:01	CTD	CTD	lowering			Releaser fieren bis SL: 1000 m	started	17° 26.655' S	176° 12.484' W	0.0	0.3	86.2	7.7	64.1
SO267_1-2	12.12.2018 10:38:34	CTD	CTD	information			Bei SL: 188 m / Winde stopp: Hydroph	started	17° 26.656' S	176° 12.484' W	0.0	0.8	91.1	6.7	37.1
SO267_1-2	12.12.2018 10:43:22	CTD	CTD	information			EL2 hieven, Hydrophon a. D.	started	17° 26.655' S	176° 12.477' W	0.0	0.2	83.4	8.0	316.1
SO267_1-2	12.12.2018 10:54:38	CTD	CTD	on deck				started	17° 26.658' S	176° 12.482' W	0.0	0.1	86.5	6.6	99.3
SO267_1-2	12.12.2018 11:03:04	CTD	CTD	in the water			EL 2	started	17° 26.658' S	176° 12.479' W	0.0	0.2	90.3	7.0	190.2
SO267_1-2	12.12.2018 11:37:51	CTD	CTD	max depth/on ground			auf Tiefe, SLmax: 1000m	started	17° 26.652' S	176° 12.476' W	0.0	0.5	95.7	7.8	359.8
SO267_1-2	12.12.2018 11:39:02	CTD	CTD	information			Hydrophon zu Wasser	started	17° 26.651' S	176° 12.476' W	0.0	0.0	96.7	7.5	216.9
SO267_1-2	12.12.2018 11:40:17	CTD	CTD	information			Start Releaser-Test	started	17° 26.650' S	176° 12.477' W	0.0	0.5	104.9	5.9	222.8
SO267_1-2	12.12.2018 12:19:29	CTD	CTD	information			Releaser Test beendet	started	17° 26.660' S	176° 12.479' W	0.0	0.4	73.6	6.6	108.4
SO267_1-2	12.12.2018 12:19:49	CTD	CTD	information			Hydrophon an Deck	started	17° 26.660' S	176° 12.479' W	0.0	0.2	78.5	7.3	256.1
SO267_1-2	12.12.2018 12:21:13	CTD	CTD	hoisting			Beginn hieven, SZmax: 7,4kN	started	17° 26.662' S	176° 12.480' W	0.0	0.2	73.1	7.5	346.6
SO267_1-2	12.12.2018 12:49:50	CTD	CTD	on deck				started	17° 26.657' S	176° 12.479' W	0.0	0.7	87.3	6.3	205.7
SO267_1-2	12.12.2018 12:50:45	CTD	CTD	station end				started	17° 26.656' S	176° 12.479' W	0.0	0.1	80.8	7.9	50.7
SO267_2-1	12.12.2018 13:53:57	Seismic Ocean Bottom Recei	SEISOBR	station start			OBS # 01	started	17° 19.802' S	176° 13.548' W	2913.2	1.8	89.7	7.3	108.4
SO267_2-1	12.12.2018 13:57:06	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed				started	17° 19.800' S	176° 13.541' W	2269.0	0.6	84.1	7.2	9.3
SO267_2-2	12.12.2018 14:27:35	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed		OBS #02		started	17° 19.836' S	176° 10.113' W	1891.2	1.3	78.5	6.4	82.6

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO267_3-1	12.12.2018 14:49:20	CTD	CTD	station start		Releaser Test # 3	Hydrophon zu Wasser	started	17° 19.766' S	176° 07.859' W	1929.1	0.3	93.9	7.2	188.5
SO267_3-1	12.12.2018 14:55:34	CTD	CTD	in the water		Releaser Test # 3	er in der Box gehen zu Wasse	started	17° 19.772' S	176° 07.866' W	0.0	0.3	82.1	8.0	35.9
SO267_3-1	12.12.2018 14:57:46	CTD	CTD	information		Releaser Test # 3	Hydrophon an Deck	started	17° 19.773' S	176° 07.868' W	0.0	0.8	73.4	7.7	350.9
SO267_3-1	12.12.2018 15:24:15	CTD	CTD	max depth/on ground		Releaser Test # 3	auf Tiefe, maxSL: 800m	started	17° 19.766' S	176° 07.864' W	0.0	0.2	76.0	7.9	339.8
SO267_3-1	12.12.2018 15:25:20	CTD	CTD	information		Releaser Test # 3	Beg. Releasertest	started	17° 19.765' S	176° 07.864' W	0.0	0.1	81.1	7.9	183.1
SO267_3-1	12.12.2018 15:47:49	CTD	CTD	hoisting		Releaser Test # 3	Ende Relrasertest, Beg. hiever	started	17° 19.765' S	176° 07.869' W	0.0	0.4	66.5	7.9	25.8
SO267_3-1	12.12.2018 16:10:47	CTD	CTD	on deck		Releaser Test # 3		started	17° 19.771' S	176° 07.860' W	0.0	1.1	80.7	6.8	211.2
SO267_3-1	12.12.2018 16:15:05	CTD	CTD	station end		Releaser Test # 3		started	17° 19.773' S	176° 07.858' W	0.0	1.4	78.6	6.5	184.3
SO267_2-3	12.12.2018 16:32:04	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed		OBS # 03	OBS # 03	started	17° 19.798' S	176° 06.639' W	1986.4	0.8	90.2	7.1	9.9
SO267_2-4	12.12.2018 16:58:41	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 04	started	17° 19.809' S	176° 03.238' W	2127.1	1.2	94.1	6.6	129.3
SO267_2-5	12.12.2018 17:23:00	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 05	started	17° 19.822' S	175° 59.778' W	2128.7	1.2	92.1	4.9	140.0
SO267_2-6	12.12.2018 17:47:48	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 06	started	17° 19.803' S	175° 56.336' W	1959.8	0.7	138.9	5.1	77.5
SO267_2-7	12.12.2018 18:11:28	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 07	started	17° 19.802' S	175° 52.881' W	1953.5	1.4	132.5	4.5	70.7
SO267_2-8	12.12.2018 18:34:47	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 08	started	17° 19.793' S	175° 49.461' W	1955.5	1.3	137.9	6.4	96.5
SO267_2-9	12.12.2018 18:59:39	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 09	started	17° 19.809' S	175° 46.055' W	1925.6	0.7	84.1	8.3	75.3
SO267_2-10	12.12.2018 19:25:03	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 10	started	17° 19.797' S	175° 42.552' W	2050.2	1.0	87.0	6.6	65.9
SO267_2-11	12.12.2018 19:51:10	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 11	started	17° 19.799' S	175° 39.095' W	2296.2	1.5	82.8	8.5	106.7
SO267_2-12	12.12.2018 20:17:49	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 12	started	17° 19.787' S	175° 35.659' W	2093.0	1.2	90.8	8.3	64.8
SO267_2-13	12.12.2018 20:43:53	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 13	started	17° 19.804' S	175° 32.237' W	2330.3	1.4	112.6	8.6	59.1
SO267_2-14	12.12.2018 21:09:13	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 14	started	17° 19.766' S	175° 28.784' W	2315.5	1.0	132.3	8.2	41.2
SO267_2-15	12.12.2018 21:36:14	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 15	started	17° 19.824' S	175° 25.338' W	2227.8	1.3	88.0	7.0	117.3
SO267_2-16	12.12.2018 22:03:51	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 16	started	17° 19.801' S	175° 21.879' W	1949.7	1.8	77.9	4.6	95.4
SO267_2-17	12.12.2018 22:30:00	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 17	started	17° 19.803' S	175° 18.446' W	2039.5	1.5	24.2	1.5	93.4
SO267_2-18	12.12.2018 22:54:45	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed				started	17° 19.794' S	175° 14.997' W	2364.7	1.4	327.1	2.7	150.2
SO267_2-19	12.12.2018 23:25:06	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed		OBS # 19		started	17° 19.822' S	175° 11.627' W	1991.0	0.6	354.1	6.4	157.4
SO267_2-20	13.12.2018 00:11:38	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed		OBS # 20		started	17° 19.793' S	175° 08.132' W	2066.6	0.4	309.9	5.4	150.3
SO267_4-1	13.12.2018 00:13:16	CTD	CTD	station start		Releaser-Test # 04		started	17° 19.794' S	175° 08.132' W	2066.6	0.2	326.1	6.2	339.8
SO267_4-1	13.12.2018 00:28:17	CTD	CTD	in the water		Releaser-Test # 04	EL2	started	17° 19.793' S	175° 08.126' W	0.0	0.2	315.4	5.8	6.8
SO267_4-1	13.12.2018 00:52:46	CTD	CTD	max depth/on ground		Releaser-Test # 04	auf Tiefe, SLmax: 500m	started	17° 19.799' S	175° 08.128' W	0.0	0.6	315.4	5.1	142.7
SO267_4-1	13.12.2018 00:54:29	CTD	CTD	information		Releaser-Test # 04	Hydrophon geht zu Wasser	started	17° 19.799' S	175° 08.127' W	0.0	0.4	325.6	6.4	142.1
SO267_4-1	13.12.2018 01:03:29	CTD	CTD	information		Releaser-Test # 04	Beginn Releaser-Test	started	17° 19.793' S	175° 08.128' W	0.0	0.2	318.4	5.2	359.6
SO267_4-1	13.12.2018 01:10:39	CTD	CTD	information		Releaser-Test # 04	Releaser-Test beendet	started	17° 19.794' S	175° 08.129' W	0.0	0.5	306.7	5.0	167.7
SO267_4-1	13.12.2018 01:11:07	CTD	CTD	information		Releaser-Test # 04	Hydrophon an Deck	started	17° 19.793' S	175° 08.129' W	0.0	0.5	306.9	5.2	154.2
SO267_4-1	13.12.2018 01:11:17	CTD	CTD	hoisting		Releaser-Test # 04	SZmax: 4,2kN	started	17° 19.793' S	175° 08.129' W	0.0	0.3	310.5	4.7	182.8
SO267_4-1	13.12.2018 01:27:32	CTD	CTD	on deck		Releaser-Test # 04		started	17° 19.807' S	175° 08.125' W	2067.1	0.7	317.6	6.6	159.3
SO267_4-1	13.12.2018 01:29:09	CTD	CTD	station end		Releaser-Test # 04		started	17° 19.807' S	175° 08.125' W	2060.9	0.1	310.4	8.1	120.1
SO267_2-21	13.12.2018 01:56:12	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed		OBS #21		started	17° 19.829' S	175° 04.692' W	2366.6	1.6	331.6	7.7	114.5
SO267_5-1	13.12.2018 02:31:44	Heat-Flow probe	HF	station start				started	17° 20.162' S	175° 04.528' W	2360.0	0.2	354.5	7.7	109.6
SO267_5-1	13.12.2018 02:36:45	Heat-Flow probe	HF	in the water			FW2/SPW2	started	17° 20.159' S	175° 04.536' W	2359.3	0.2	355.9	7.5	178.7
SO267_5-1	13.12.2018 02:39:56	Heat-Flow probe	HF	information			Bei SL: 50m Transponder am Dr	started	17° 20.160' S	175° 04.538' W	2360.2	0.3	344.6	5.5	137.6
SO267_5-1	13.12.2018 03:31:59	Heat-Flow probe	HF	max depth/on ground			Boko, maxSL: 2386m	started	17° 20.169' S	175° 04.527' W	2359.2	0.4	339.4	8.7	307.5
SO267_5-1	13.12.2018 03:46:49	Heat-Flow probe	HF	hoisting			hieven, maxSZ: 27,6kN	started	17° 20.166' S	175° 04.535' W	2359.9	0.3	330.7	11.8	248.4
SO267_5-1	13.12.2018 04:38:42	Heat-Flow probe	HF	on deck				started	17° 20.163' S	175° 04.537' W	2367.6	0.2	356.6	11.0	71.0
SO267_5-1	13.12.2018 04:40:14	Heat-Flow probe	HF	station end				started	17° 20.166' S	175° 04.534' W	2367.4	0.1	349.5	10.2	20.2
SO267_2-22	13.12.2018 05:05:32	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBMT # 01	started	17° 19.828' S	175° 02.299' W	2370.0	0.4	0.9	12.4	214.7
SO267_2-23	13.12.2018 05:20:52	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 22	started	17° 19.811' S	175° 01.209' W	2370.7	2.0	331.9	12.8	127.8
SO267_2-24	13.12.2018 05:43:49	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 23	started	17° 19.758' S	174° 58.939' W	2367.1	1.8	332.9	14.5	127.9
SO267_2-25	13.12.2018 06:24:47	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBMT # 02	started	17° 19.877' S	174° 57.628' W	2356.5	1.1	345.6	11.3	50.1
SO267_6-1	13.12.2018 06:43:02	Heat-Flow probe	HF	station start				started	17° 19.801' S	174° 56.323' W	2360.4	0.5	332.2	12.9	106.5

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO267_6-1	13.12.2018 06:50:47	Heat-Flow probe	HF	in the water			Transponder bei SL: 50m	started	17° 19.799' S	174° 56.335' W	2361.3	0.2	338.0	8.5	94.2
SO267_6-1	13.12.2018 07:38:47	Heat-Flow probe	HF	max depth/on ground			SL: 2377 m, SZ: 17 kN	started	17° 19.799' S	174° 56.324' W	2363.9	0.2	318.1	10.5	66.7
SO267_6-1	13.12.2018 07:54:46	Heat-Flow probe	HF	hoisting				started	17° 19.795' S	174° 56.332' W	2362.9	0.2	330.9	9.5	168.7
SO267_6-1	13.12.2018 08:38:19	Heat-Flow probe	HF	on deck			Bei SL: 50 m 1 x Transponder a.	started	17° 19.795' S	174° 56.325' W	2358.5	0.2	338.6	9.0	62.0
SO267_6-1	13.12.2018 08:47:10	Heat-Flow probe	HF	on deck			HF a. D.	started	17° 19.798' S	174° 56.318' W	2363.0	0.2	340.7	9.7	240.3
SO267_6-1	13.12.2018 08:48:01	Heat-Flow probe	HF	station end				started	17° 19.799' S	174° 56.318' W	2360.8	0.2	344.3	9.4	80.8
SO267_2-26	13.12.2018 09:11:37	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 24	started	17° 19.799' S	174° 55.053' W	2315.5	1.8	331.7	10.4	82.9
SO267_2-27	13.12.2018 09:37:21	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBMT # 03	started	17° 19.802' S	174° 53.399' W	2251.4	0.2	326.8	9.7	190.0
SO267_2-28	13.12.2018 10:01:01	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 25	started	17° 19.791' S	174° 50.909' W	1909.4	0.9	328.9	10.0	108.4
SO267_7-1	13.12.2018 10:30:01	Heat-Flow probe	HF	station start			HF # 34	started	17° 19.805' S	174° 48.608' W	1725.0	0.7	322.4	8.8	45.0
SO267_7-1	13.12.2018 10:33:38	Heat-Flow probe	HF	in the water				started	17° 19.800' S	174° 48.599' W	1722.4	0.4	329.9	9.2	44.5
SO267_7-1	13.12.2018 10:37:43	Heat-Flow probe	HF	in the water			Bei SL: 50 m 1 x Transponder z.	started	17° 19.799' S	174° 48.600' W	1724.4	0.2	330.5	8.6	239.3
SO267_7-1	13.12.2018 11:09:40	Heat-Flow probe	HF	max depth/on ground			Boko, SLmax: 1739m	started	17° 19.799' S	174° 48.596' W	1721.5	0.4	327.1	9.7	67.5
SO267_7-1	13.12.2018 11:25:01	Heat-Flow probe	HF	hoisting			Beginn hieven, SZmax: 24,8kN	started	17° 19.794' S	174° 48.594' W	1721.5	0.2	320.2	9.3	175.3
SO267_7-1	13.12.2018 12:00:04	Heat-Flow probe	HF	information			Transponder an Deck	started	17° 19.795' S	174° 48.598' W	1721.0	0.4	328.7	9.2	253.0
SO267_7-1	13.12.2018 12:10:23	Heat-Flow probe	HF	on deck				started	17° 19.805' S	174° 48.593' W	1723.7	0.1	317.3	7.9	209.9
SO267_7-1	13.12.2018 12:12:22	Heat-Flow probe	HF	station end				started	17° 19.801' S	174° 48.595' W	1724.0	0.4	328.9	9.8	301.8
SO267_2-29	13.12.2018 12:42:23	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed		OBS # 26		started	17° 19.800' S	174° 48.457' W	1709.9	0.3	321.4	8.3	188.4
SO267_2-30	13.12.2018 13:06:54	Seismic Ocean Bottom Recei	SEISOBR	OBC deployed		OBS #26	sser, oberer Kommentar (OBS	started	17° 19.767' S	174° 47.409' W	1563.7	0.4	332.8	2.9	178.9
SO267_2-31	13.12.2018 13:33:55	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed		OBS # 27	OBS # 27	started	17° 19.866' S	174° 44.035' W	1919.1	2.0	316.4	9.0	113.9
SO267_8-1	13.12.2018 13:48:34	Heat-Flow probe	HF	station start		HF #33	HF # 33	started	17° 19.823' S	174° 43.204' W	2348.3	0.5	328.1	10.3	6.6
SO267_8-1	13.12.2018 13:58:43	Heat-Flow probe	HF	in the water		HF #33	FW2/SPW2	started	17° 19.793' S	174° 43.195' W	2335.5	0.2	324.2	8.6	287.6
SO267_8-1	13.12.2018 14:02:30	Heat-Flow probe	HF	information		HF #33	i SL: 50m Transponder am Dr	started	17° 19.795' S	174° 43.198' W	2344.7	0.2	323.0	8.3	27.8
SO267_8-1	13.12.2018 14:45:00	Heat-Flow probe	HF	max depth/on ground		HF #33	Boko, SLmax: 2373m	started	17° 19.802' S	174° 43.201' W	2345.5	0.3	343.0	8.4	180.3
SO267_8-1	13.12.2018 15:00:00	Heat-Flow probe	HF	hoisting		HF #33	SZmax: 26,0kN	started	17° 19.802' S	174° 43.195' W	2345.9	0.6	332.5	9.7	10.1
SO267_8-1	13.12.2018 15:51:41	Heat-Flow probe	HF	on deck		HF #33		started	17° 19.793' S	174° 43.186' W	2337.3	0.2	312.0	9.4	178.8
SO267_8-1	13.12.2018 15:54:55	Heat-Flow probe	HF	station end		HF #33		started	17° 19.794' S	174° 43.188' W	2342.5	0.1	NaN	NaN	239.5
SO267_9-1	13.12.2018 16:17:10	Heat-Flow probe	HF	station start				started	17° 19.813' S	174° 41.337' W	2792.2	0.5	316.5	7.5	32.8
SO267_9-1	13.12.2018 16:20:59	Heat-Flow probe	HF	in the water			Transponder bei SL: 50m	started	17° 19.805' S	174° 41.339' W	2793.4	0.6	338.7	7.2	5.1
SO267_9-1	13.12.2018 17:15:38	Heat-Flow probe	HF	max depth/on ground			Boko, maxSL: 2815m	started	17° 19.792' S	174° 41.348' W	2792.8	0.5	351.3	4.2	230.0
SO267_9-1	13.12.2018 17:30:54	Heat-Flow probe	HF	hoisting			maxSZ: 34,3kN	started	17° 19.797' S	174° 41.344' W	2793.2	0.4	339.8	5.4	249.7
SO267_9-1	13.12.2018 18:31:03	Heat-Flow probe	HF	on deck				started	17° 19.799' S	174° 41.349' W	2794.0	0.2	3.9	6.5	109.5
SO267_9-1	13.12.2018 18:32:08	Heat-Flow probe	HF	station end				started	17° 19.799' S	174° 41.351' W	2793.3	0.3	0.8	6.8	70.3
SO267_2-32	13.12.2018 18:44:04	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBMT # 05	started	17° 19.813' S	174° 40.757' W	2728.2	1.1	352.4	6.8	108.7
SO267_2-33	13.12.2018 18:53:54	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 28	started	17° 19.773' S	174° 39.919' W	2673.2	1.5	1.5	8.0	78.5
SO267_2-34	13.12.2018 19:18:23	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBMT # 06	started	17° 19.800' S	174° 38.999' W	2811.8	0.2	9.7	5.4	179.7
SO267_2-35	13.12.2018 19:40:51	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBMT # 07	started	17° 19.799' S	174° 38.397' W	2771.7	0.3	5.8	5.5	34.2
SO267_2-36	13.12.2018 20:05:50	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBTM # 08	started	17° 19.802' S	174° 37.199' W	2910.9	0.5	33.4	4.2	33.7
SO267_2-37	13.12.2018 20:22:07	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 29	started	17° 19.782' S	174° 36.610' W	2915.5	1.8	21.7	4.5	115.9
SO267_2-38	13.12.2018 20:53:14	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 48	started	17° 22.877' S	174° 36.702' W	2883.9	1.4	7.2	2.3	206.8
SO267_2-39	13.12.2018 21:25:29	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBMT # 09	started	17° 19.787' S	174° 35.982' W	2969.7	0.4	2.2	5.8	170.7
SO267_2-40	13.12.2018 21:50:09	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBMT # 10	started	17° 19.801' S	174° 34.802' W	2984.6	0.6	1.3	4.3	66.8
SO267_2-41	13.12.2018 22:05:29	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 30	started	17° 19.764' S	174° 34.057' W	3027.7	1.4	316.1	1.7	164.7
SO267_2-42	13.12.2018 22:38:30	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBMT # 11	started	17° 19.807' S	174° 33.597' W	3039.1	0.3	335.7	7.1	137.8
SO267_2-43	13.12.2018 23:16:34	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBMT # 12	started	17° 19.804' S	174° 32.408' W	3030.0	0.5	7.3	7.5	103.6
SO267_2-44	14.12.2018 00:08:13	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed		MT #13	MT #13 zu Wasser	started	17° 20.399' S	174° 31.791' W	2988.0	0.0	21.5	8.2	193.0
SO267_2-45	14.12.2018 00:44:42	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 49	started	17° 23.069' S	174° 32.385' W	2839.2	0.5	26.4	6.4	306.7
SO267_2-46	14.12.2018 01:30:38	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 50	started	17° 16.210' S	174° 32.643' W	2958.7	0.7	34.3	7.3	19.6
SO267_10-1	14.12.2018 02:30:16	Heat-Flow probe	HF	station start				started	17° 19.801' S	174° 30.263' W	2522.6	0.5	24.5	9.9	83.4

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO267_10-1	14.12.2018 02:34:35	Heat-Flow probe	HF	in the water			FW2/SPW2	started	17° 19.800' S	174° 30.252' W	2520.4	0.2	31.3	8.2	161.8
SO267_10-1	14.12.2018 02:38:08	Heat-Flow probe	HF	information			Bei SL: 50m Transponder am Dr	started	17° 19.806' S	174° 30.254' W	2519.1	0.5	25.8	8.8	290.1
SO267_10-1	14.12.2018 03:23:24	Heat-Flow probe	HF	max depth/on ground			Boko, maxSL: 2547m	started	17° 19.799' S	174° 30.253' W	2519.7	0.1	9.5	6.7	309.2
SO267_10-1	14.12.2018 03:38:33	Heat-Flow probe	HF	hoisting			maxSZ: 29,6kN	started	17° 19.796' S	174° 30.263' W	2519.0	0.3	27.5	7.3	108.6
SO267_10-1	14.12.2018 04:32:39	Heat-Flow probe	HF	on deck				started	17° 19.801' S	174° 30.246' W	2516.6	0.4	327.5	6.1	74.5
SO267_10-1	14.12.2018 04:34:05	Heat-Flow probe	HF	station end				started	17° 19.797' S	174° 30.248' W	2519.4	0.1	340.9	5.7	352.2
SO267_2-47	14.12.2018 04:37:33	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 31	started	17° 19.793' S	174° 30.249' W	2516.3	0.5	351.6	6.0	89.7
SO267_2-48	14.12.2018 05:07:52	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBMT # 14	started	17° 20.424' S	174° 30.004' W	2508.3	0.7	34.4	9.4	85.8
SO267_2-49	14.12.2018 05:30:07	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBMT # 15	started	17° 19.820' S	174° 28.201' W	2186.3	1.9	34.9	9.6	142.7
SO267_2-50	14.12.2018 05:45:29	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 32	started	17° 19.812' S	174° 26.822' W	2202.8	1.4	38.6	8.2	87.4
SO267_11-1	14.12.2018 05:54:26	Heat-Flow probe	HF	station start				started	17° 19.810' S	174° 26.374' W	2213.6	0.5	39.4	7.3	125.0
SO267_11-1	14.12.2018 05:57:35	Heat-Flow probe	HF	in the water			Transponder bei SL: 50m	started	17° 19.807' S	174° 26.377' W	2213.9	0.3	31.8	7.0	314.9
SO267_11-1	14.12.2018 06:42:18	Heat-Flow probe	HF	max depth/on ground			Boko, maxSL: 2236m	started	17° 19.807' S	174° 26.399' W	2211.0	0.4	44.7	9.4	316.7
SO267_11-1	14.12.2018 06:58:12	Heat-Flow probe	HF	hoisting			maxSZ: 26,9kN	started	17° 19.800' S	174° 26.400' W	2213.6	0.7	29.7	9.0	316.9
SO267_11-1	14.12.2018 07:40:20	Heat-Flow probe	HF	on deck			Bei SL: 50 m 1 x Transponder a	started	17° 19.801' S	174° 26.398' W	2213.3	0.3	42.1	7.9	172.0
SO267_11-1	14.12.2018 07:47:45	Heat-Flow probe	HF	on deck			HF a. D.	started	17° 19.801' S	174° 26.396' W	2211.9	0.3	30.5	7.4	117.2
SO267_11-1	14.12.2018 07:49:37	Heat-Flow probe	HF	station end				started	17° 19.801' S	174° 26.396' W	2212.7	0.2	26.9	6.9	222.0
SO267_2-51	14.12.2018 08:25:39	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBMT # 16	started	17° 19.199' S	174° 23.998' W	2118.8	0.2	28.6	7.5	6.8
SO267_2-52	14.12.2018 08:46:02	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 33	started	17° 19.771' S	174° 22.671' W	1526.2	1.6	28.6	9.0	135.4
SO267_2-53	14.12.2018 09:12:36	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 34	started	17° 19.809' S	174° 19.099' W	1694.3	0.5	32.9	7.1	36.9
SO267_2-54	14.12.2018 09:35:31	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 35	started	17° 19.811' S	174° 16.482' W	1778.9	1.5	32.3	6.5	117.4
SO267_2-55	14.12.2018 10:02:20	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 36	started	17° 19.807' S	174° 13.048' W	1555.8	2.0	28.8	6.7	103.1
SO267_2-56	14.12.2018 10:32:25	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 37	started	17° 19.791' S	174° 08.862' W	1483.9	0.5	15.9	6.8	115.5
SO267_12-1	14.12.2018 10:52:40	Heat-Flow probe	HF	station start				started	17° 19.802' S	174° 07.801' W	1464.6	0.3	32.8	6.4	291.4
SO267_12-1	14.12.2018 10:56:08	Heat-Flow probe	HF	in the water			HF z. W.	started	17° 19.799' S	174° 07.799' W	1463.7	0.1	32.1	6.6	22.7
SO267_12-1	14.12.2018 10:59:28	Heat-Flow probe	HF	in the water			Bei SL: 50 m 1 x Transponder z.	started	17° 19.800' S	174° 07.798' W	1462.2	0.9	35.3	6.3	323.1
SO267_12-1	14.12.2018 11:28:18	Heat-Flow probe	HF	max depth/on ground			Boko, SLmax: 1485m	started	17° 19.799' S	174° 07.801' W	1463.7	0.2	43.6	6.3	351.2
SO267_12-1	14.12.2018 11:44:54	Heat-Flow probe	HF	hoisting			Beginn hieven, SZmax: 18,9kN	started	17° 19.797' S	174° 07.803' W	1466.7	0.2	56.3	7.6	308.7
SO267_12-1	14.12.2018 12:15:05	Heat-Flow probe	HF	information			Transponder an Deck	started	17° 19.801' S	174° 07.799' W	1464.0	0.1	50.2	8.6	0.5
SO267_12-1	14.12.2018 12:24:15	Heat-Flow probe	HF	on deck				started	17° 19.799' S	174° 07.804' W	1464.7	0.3	55.3	8.0	110.0
SO267_12-1	14.12.2018 12:25:04	Heat-Flow probe	HF	station end				started	17° 19.800' S	174° 07.804' W	1464.6	1.0	48.1	8.7	303.2
SO267_2-57	14.12.2018 12:46:00	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 38	started	17° 19.876' S	174° 06.178' W	1434.8	1.7	48.6	6.6	130.8
SO267_2-58	14.12.2018 13:11:49	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 39	started	17° 19.830' S	174° 02.850' W	1314.3	0.1	63.4	9.4	307.6
SO267_2-59	14.12.2018 13:38:48	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 40	started	17° 19.854' S	173° 59.368' W	1159.4	0.6	67.8	8.3	78.2
SO267_2-60	14.12.2018 14:04:52	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 41	started	17° 19.863' S	173° 55.911' W	1049.3	1.4	57.2	7.1	124.9
SO267_2-61	14.12.2018 14:29:15	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 42	started	17° 19.786' S	173° 52.487' W	1102.9	1.1	63.6	6.2	78.4
SO267_2-62	14.12.2018 14:54:03	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 43	started	17° 19.828' S	173° 49.083' W	1226.1	1.1	62.1	6.3	89.5
SO267_2-63	14.12.2018 15:18:49	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 44	started	17° 19.811' S	173° 45.523' W	1285.6	1.8	51.1	6.6	118.8
SO267_2-64	14.12.2018 15:42:33	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 45	started	17° 19.812' S	173° 42.069' W	1272.6	1.8	47.4	6.9	92.8
SO267_2-65	14.12.2018 16:06:36	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 46	started	17° 19.800' S	173° 38.602' W	1279.8	2.0	59.4	6.4	72.1
SO267_2-66	14.12.2018 16:30:22	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 47	started	17° 19.809' S	173° 35.259' W	1302.5	1.8	47.1	7.5	69.5
SO267_13-1	14.12.2018 18:30:15	Seismic Source	SEISSRC	station start			Profil BGR2018-2R3	started	17° 19.918' S	173° 19.574' W	1208.0	5.2	63.1	4.5	253.0
SO267_13-1	14.12.2018 18:36:27	Seismic Source	SEISSRC	information			1. Magnetometer zu Wasser	started	17° 19.916' S	173° 20.052' W	1211.4	4.1	69.5	5.7	274.5
SO267_13-1	14.12.2018 18:39:27	Seismic Source	SEISSRC	information			2. Magnetometer zu Wasser	started	17° 19.913' S	173° 20.251' W	1225.2	3.6	77.6	7.7	268.6
SO267_13-1	14.12.2018 18:44:33	Seismic Source	SEISSRC	information			3. Magnetometer zu Wasser	started	17° 19.905' S	173° 20.619' W	1280.4	4.4	77.5	7.4	270.0
SO267_13-1	14.12.2018 19:02:57	Seismic Source	SEISSRC	information			Magnetik z. W., SL= 800 m	started	17° 19.831' S	173° 22.076' W	1269.1	4.4	76.6	7.5	270.4
SO267_13-1	14.12.2018 19:19:01	Seismic Source	SEISSRC	Airgun in water			4 x STB Airgun	started	17° 19.801' S	173° 22.968' W	1193.8	3.0	108.6	3.2	274.0
SO267_13-1	14.12.2018 19:36:10	Seismic Source	SEISSRC	Airgun in water			4 x BB Airgun z. W.	started	17° 19.798' S	173° 23.878' W	1148.9	2.9	65.2	7.1	253.8
SO267_13-1	14.12.2018 19:44:20	Seismic Source	SEISSRC	information			Magnetikkabel SLmax= 900 m	started	17° 19.804' S	173° 24.376' W	1258.1	4.0	71.8	5.6	277.0

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO267_13-1	14.12.2018 19:48:31	Seismic Source	SEISSRC	information			Seismik 1. Schuss	started	17° 19.793' S	173° 24.669' W	1208.8	4.3	81.9	5.3	277.5
SO267_13-1	14.12.2018 20:32:32	Seismic Source	SEISSRC	information			Info von Wiss.: "1. Schuss"	started	17° 19.800' S	173° 27.766' W	1141.0	3.9	80.2	6.4	267.9
SO267_13-1	14.12.2018 20:47:57	Seismic Source	SEISSRC	profile start				started	17° 19.815' S	173° 28.867' W	1185.7	4.0	74.3	7.2	262.6
SO267_13-1	16.12.2018 10:05:00	Seismic Source	SEISSRC	profile end				started	17° 19.818' S	176° 13.612' W	2376.8	5.0	348.8	9.5	263.3
SO267_13-1	16.12.2018 10:33:02	Seismic Source	SEISSRC	on deck			STB Airgun-Array a. D.	started	17° 19.930' S	176° 14.994' W	2275.2	2.2	350.8	9.9	267.4
SO267_13-1	16.12.2018 10:49:09	Seismic Source	SEISSRC	on deck			3. Magnetometer a. D.	started	17° 20.013' S	176° 15.655' W	2590.3	2.9	348.6	9.1	263.7
SO267_13-1	16.12.2018 10:51:37	Seismic Source	SEISSRC	on deck			2. Magnetometer a. D.	started	17° 20.014' S	176° 15.779' W	2605.8	3.3	346.6	8.3	251.6
SO267_13-1	16.12.2018 10:55:34	Seismic Source	SEISSRC	on deck			1. Magnetometer a. D. / Magnetik kom	started	17° 20.023' S	176° 15.960' W	2585.4	2.3	359.0	9.0	282.0
SO267_13-1	16.12.2018 11:17:29	Seismic Source	SEISSRC	on deck			Bb Airgun-Array a. D.	started	17° 20.182' S	176° 16.497' W	2514.7	1.5	NaN	NaN	245.9
SO267_13-1	16.12.2018 11:18:05	Seismic Source	SEISSRC	station end				started	17° 20.186' S	176° 16.510' W	2513.9	1.8	359.1	7.8	224.1
SO267_14-1	16.12.2018 12:00:12	Seismic Source	SEISSRC	station start			Kopfboje geht zu Wasser	started	17° 22.332' S	176° 16.476' W	2289.0	4.0	3.7	3.7	170.7
SO267_14-1	16.12.2018 12:01:56	Seismic Source	SEISSRC	information			Kopfboje zu Wasser	started	17° 22.440' S	176° 16.451' W	2269.1	3.9	341.3	7.6	161.9
SO267_14-1	16.12.2018 12:05:51	Seismic Source	SEISSRC	information			1. Bird zu Wasser	started	17° 22.675' S	176° 16.396' W	2326.2	3.9	341.6	6.6	166.4
SO267_14-1	16.12.2018 12:26:48	Seismic Source	SEISSRC	information			2. Bird zu Wasser	started	17° 24.022' S	176° 15.855' W	2384.8	4.7	323.0	4.0	136.7
SO267_14-1	16.12.2018 12:54:35	Seismic Source	SEISSRC	information			3. Bird zu Wasser	started	17° 25.336' S	176° 14.334' W	2441.5	3.9	342.7	7.3	115.2
SO267_14-1	16.12.2018 13:10:18	Seismic Source	SEISSRC	information			4. Bird zu Wasser	started	17° 25.475' S	176° 13.090' W	2706.1	4.5	316.2	7.4	98.7
SO267_14-1	16.12.2018 13:31:04	Seismic Source	SEISSRC	information			5. Bird zu Wasser	started	17° 25.488' S	176° 11.490' W	2848.0	4.9	321.2	8.8	90.3
SO267_14-1	16.12.2018 13:52:15	Seismic Source	SEISSRC	information			6. Bird zu Wasser	started	17° 25.435' S	176° 09.793' W	2303.1	4.6	316.9	9.8	77.4
SO267_14-1	16.12.2018 14:13:09	Seismic Source	SEISSRC	information			7. Bird zu Wasser	started	17° 25.379' S	176° 08.228' W	1933.1	3.9	328.0	7.4	87.2
SO267_14-1	16.12.2018 14:34:48	Seismic Source	SEISSRC	information			8. Bird zu Wasser	started	17° 25.282' S	176° 06.641' W	2190.6	4.1	314.3	6.4	80.7
SO267_14-1	16.12.2018 15:02:16	Seismic Source	SEISSRC	information			9. Bird zu Wasser	started	17° 24.101' S	176° 05.415' W	2186.1	3.4	313.4	8.1	7.8
SO267_14-1	16.12.2018 15:13:29	Seismic Source	SEISSRC	information			10. Bird zu Wasser	started	17° 23.431' S	176° 05.268' W	2157.1	4.0	344.5	5.7	5.9
SO267_14-1	16.12.2018 15:24:09	Seismic Source	SEISSRC	information			11. Bird zu Wasser	started	17° 22.793' S	176° 05.182' W	2166.5	3.9	323.8	6.7	8.3
SO267_14-1	16.12.2018 15:25:55	Seismic Source	SEISSRC	information			12. Bird zu Wasser	started	17° 22.684' S	176° 05.170' W	2164.7	3.6	333.3	6.3	0.5
SO267_14-1	16.12.2018 15:46:19	Seismic Source	SEISSRC	information			Streamer ausgesteckt (4042,5n	started	17° 21.499' S	176° 05.102' W	1942.1	3.7	334.5	5.7	356.5
SO267_14-1	16.12.2018 19:43:04	Seismic Source	SEISSRC	information			1. Magnetometer z. W.	started	17° 14.395' S	176° 19.927' W	2259.7	4.0	0.7	9.0	266.2
SO267_14-1	16.12.2018 19:46:56	Seismic Source	SEISSRC	information			2. Magnetometer z. W.	started	17° 14.428' S	176° 20.189' W	2286.6	4.0	8.6	9.0	254.9
SO267_14-1	16.12.2018 19:50:23	Seismic Source	SEISSRC	information			3. Magnetometer z. W.	started	17° 14.511' S	176° 20.413' W	2326.1	4.3	2.3	8.7	235.3
SO267_14-1	16.12.2018 19:51:09	Seismic Source	SEISSRC	information			Magnetik z. W., SL: 250 m	started	17° 14.535' S	176° 20.460' W	2325.1	4.1	0.3	9.3	243.5
SO267_14-1	16.12.2018 20:11:34	Seismic Source	SEISSRC	Airgun in water			STB-Airgun-Array z. W.	started	17° 15.425' S	176° 21.101' W	2355.6	3.2	357.6	7.6	184.2
SO267_14-1	16.12.2018 20:25:33	Seismic Source	SEISSRC	Airgun in water			BB-Airgun-Array z. W.	started	17° 16.065' S	176° 21.039' W	2307.4	2.7	352.4	4.5	155.1
SO267_14-1	16.12.2018 20:43:49	Seismic Source	SEISSRC	information			Magnetikkabel SLmax: 900 m	started	17° 17.096' S	176° 20.294' W	2162.6	4.2	350.2	8.5	131.8
SO267_14-1	16.12.2018 21:00:27	Seismic Source	SEISSRC	information			Airguns 1. Schuß	started	17° 17.881' S	176° 19.295' W	2159.3	4.6	352.7	7.2	139.3
SO267_14-1	16.12.2018 21:15:26	Seismic Source	SEISSRC	information			1. offizieller (Wiss.) Airgun-Schu	started	17° 18.595' S	176° 18.384' W	2193.5	4.3	355.4	7.6	126.9
SO267_14-1	16.12.2018 21:50:16	Seismic Source	SEISSRC	alter course			rwK: 090°, d: 161 sm	started	17° 19.808' S	176° 15.958' W	2581.7	4.7	326.6	12.2	92.0
SO267_14-1	16.12.2018 22:19:30	Seismic Source	SEISSRC	profile start			Passieren Profil-WP 01	started	17° 19.810' S	176° 13.549' W	2463.1	4.7	337.2	9.6	86.6
SO267_14-1	17.12.2018 21:15:02	Seismic Source	SEISSRC	information			Unterbrechung Profil, rwK: 090°, Drehkre	started	17° 19.830' S	174° 25.210' W	2249.8	4.7	344.5	7.8	86.4
SO267_14-1	17.12.2018 22:14:54	Seismic Source	SEISSRC	information			Start hieven STB-Airgun-Array	started	17° 17.674' S	174° 24.122' W	2090.5	2.7	13.9	6.0	321.8
SO267_14-1	17.12.2018 23:00:09	Seismic Source	SEISSRC	on deck			STB-Airgun-Array a. D.	started	17° 17.435' S	174° 25.641' W	2089.5	2.9	15.7	8.4	240.6
SO267_14-1	17.12.2018 23:59:01	Seismic Source	SEISSRC	information			Beginn aussetzen Stb. Airgun-Ar	started	17° 17.515' S	174° 28.291' W	2201.1	2.2	355.7	8.1	272.8
SO267_14-1	18.12.2018 00:09:05	Seismic Source	SEISSRC	information			Stb. Airgun-Array zu Wasser	started	17° 17.568' S	174° 28.646' W	2185.2	2.7	NaN	NaN	264.7
SO267_14-1	18.12.2018 00:12:05	Seismic Source	SEISSRC	information			Magnetometer wieder voll ausgesteckt, beide Kano	started	17° 17.557' S	174° 28.807' W	2134.8	3.4	356.5	8.6	276.1
SO267_14-1	18.12.2018 01:03:01	Seismic Source	SEISSRC	information			fortsetzen des Profil, rwK: 090	started	17° 19.789' S	174° 28.960' W	2349.2	4.6	331.4	7.5	105.1
SO267_14-1	18.12.2018 01:26:27	Seismic Source	SEISSRC	information			1. Schuss auf neuem Profil	started	17° 19.798' S	174° 27.089' W	2062.3	4.5	322.8	7.2	94.0
SO267_14-1	18.12.2018 13:59:12	Seismic Source	SEISSRC	profile end			Letzter Schuss	started	17° 19.795' S	173° 27.773' W	1144.0	4.4	336.8	4.2	92.1
SO267_14-1	18.12.2018 14:11:52	Seismic Source	SEISSRC	information			Beginn einholen des Magnetome	started	17° 19.803' S	173° 26.804' W	1243.5	4.6	340.3	4.7	89.3
SO267_14-1	18.12.2018 14:15:58	Seismic Source	SEISSRC	information			Airguns aus	started	17° 19.808' S	173° 26.489' W	1203.8	4.4	337.8	4.8	85.6
SO267_14-1	18.12.2018 14:28:50	Seismic Source	SEISSRC	on deck			Stb. Airgun-Array an Deck	started	17° 19.802' S	173° 25.796' W	1270.7	2.5	330.6	5.0	85.4
SO267_14-1	18.12.2018 14:47:58	Seismic Source	SEISSRC	on deck			Bb. Airgun-Array an Deck	started	17° 19.788' S	173° 24.878' W	1197.8	2.9	320.2	4.5	87.2

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO267_14-1	18.12.2018 14:54:18	Seismic Source	SEISSRC	on deck			1. Fisch an Deck	started	17° 19.783' S	173° 24.594' W	1221.9	2.5	327.3	4.3	79.9
SO267_14-1	18.12.2018 14:57:55	Seismic Source	SEISSRC	on deck			2. Fisch an Deck	started	17° 19.782' S	173° 24.444' W	1246.7	2.2	325.6	5.1	82.2
SO267_14-1	18.12.2018 15:01:42	Seismic Source	SEISSRC	on deck			3. Fisch an Deck	started	17° 19.779' S	173° 24.292' W	1208.0	2.3	325.4	4.6	93.7
SO267_14-1	18.12.2018 15:09:50	Seismic Source	SEISSRC	information			Beg. hieven Streamer	started	17° 19.778' S	173° 23.990' W	1180.9	2.0	329.7	4.9	88.4
SO267_14-1	18.12.2018 15:20:12	Seismic Source	SEISSRC	information			Bird # 12 an Deck	started	17° 19.776' S	173° 23.612' W	1129.9	1.9	335.3	4.2	74.7
SO267_14-1	18.12.2018 15:21:30	Seismic Source	SEISSRC	information			Bird # 11 an Deck	started	17° 19.774' S	173° 23.566' W	1136.1	2.0	333.5	4.8	76.3
SO267_14-1	18.12.2018 15:47:17	Seismic Source	SEISSRC	information			Bird # 10 an Deck	started	17° 19.759' S	173° 22.649' W	1162.0	1.8	344.0	5.3	88.9
SO267_14-1	18.12.2018 15:50:27	Seismic Source	SEISSRC	information			Bird # 9 an Deck	started	17° 19.759' S	173° 22.544' W	1183.6	1.8	339.9	4.5	94.2
SO267_14-1	18.12.2018 15:53:31	Seismic Source	SEISSRC	information			Bird # 8 an Deck	started	17° 19.755' S	173° 22.445' W	1206.3	1.8	343.4	5.1	89.8
SO267_14-1	18.12.2018 16:01:53	Seismic Source	SEISSRC	information			Bird # 7 an Deck	started	17° 19.747' S	173° 22.174' W	1255.9	2.0	351.6	3.9	92.4
SO267_14-1	18.12.2018 16:14:47	Seismic Source	SEISSRC	information			Bird # 6 an Deck	started	17° 19.727' S	173° 21.763' W	1299.6	2.3	359.0	4.0	91.7
SO267_14-1	18.12.2018 16:22:27	Seismic Source	SEISSRC	information			Bird # 5 an Deck	started	17° 19.705' S	173° 21.453' W	1303.1	2.4	347.7	4.3	73.7
SO267_14-1	18.12.2018 16:29:03	Seismic Source	SEISSRC	information			Bird # 4 an Deck	started	17° 19.685' S	173° 21.176' W	1300.8	2.5	354.1	3.5	94.2
SO267_14-1	18.12.2018 16:38:38	Seismic Source	SEISSRC	information			Bird # 3 an Deck	started	17° 19.652' S	173° 20.751' W	1273.5	2.4	350.2	3.9	81.5
SO267_14-1	18.12.2018 16:44:24	Seismic Source	SEISSRC	information			Bird # 2 an Deck	started	17° 19.636' S	173° 20.495' W	1185.4	2.3	345.7	3.1	97.7
SO267_14-1	18.12.2018 16:50:43	Seismic Source	SEISSRC	information			Bird # 1 an Deck	started	17° 19.619' S	173° 20.218' W	1162.3	2.3	353.2	4.5	89.6
SO267_14-1	18.12.2018 16:56:13	Seismic Source	SEISSRC	information			Endboye an Deck	started	17° 19.608' S	173° 19.967' W	1159.7	2.8	6.2	4.4	84.0
SO267_14-1	18.12.2018 16:57:47	Seismic Source	SEISSRC	station end				started	17° 19.603' S	173° 19.887' W	1158.7	3.6	6.5	4.7	88.2
SO267_15-1	18.12.2018 18:19:06	Seismic Ocean Bottom Recei	SEISOBR	station start			OBS/OBMT recovery	started	17° 20.216' S	173° 31.910' W	1317.0	5.4	20.5	6.0	265.9
SO267_15-1	18.12.2018 18:20:55	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 47	started	17° 20.226' S	173° 32.075' W	1316.1	5.1	19.8	5.4	264.6
SO267_15-1	18.12.2018 19:12:31	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 47	started	17° 20.035' S	173° 35.109' W	0.0	0.1	18.4	4.3	117.2
SO267_15-1	18.12.2018 19:25:38	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 47	started	17° 19.797' S	173° 35.171' W	0.0	0.4	27.0	5.1	69.8
SO267_15-2	18.12.2018 19:30:08	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 346	started	17° 19.803' S	173° 35.174' W	0.0	0.5	34.5	5.2	45.9
SO267_15-2	18.12.2018 19:55:00	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 346	started	17° 19.798' S	173° 36.819' W	0.0	7.0	17.8	4.8	269.0
SO267_15-2	18.12.2018 20:15:42	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 346	started	17° 19.776' S	173° 38.348' W	0.0	0.1	26.7	5.0	28.6
SO267_15-3	18.12.2018 20:18:46	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 345	started	17° 19.775' S	173° 38.351' W	0.0	0.2	29.5	4.6	314.8
SO267_15-3	18.12.2018 20:37:23	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 345	started	17° 19.776' S	173° 39.460' W	0.0	7.7	19.1	6.2	267.8
SO267_15-3	18.12.2018 21:03:00	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 345	started	17° 19.810' S	173° 41.920' W	0.0	0.1	26.6	5.2	340.6
SO267_15-4	18.12.2018 21:05:31	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 344 (ohne Rückantwort	started	17° 19.810' S	173° 41.922' W	0.0	0.1	17.2	5.1	255.2
SO267_15-4	18.12.2018 21:28:20	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 344	started	17° 19.838' S	173° 42.643' W	0.0	7.5	12.0	5.8	269.1
SO267_15-4	18.12.2018 21:59:29	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 344	started	17° 19.864' S	173° 45.579' W	0.0	0.6	26.0	5.4	195.2
SO267_15-5	18.12.2018 22:04:13	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 343	started	17° 19.865' S	173° 45.576' W	0.0	0.3	29.8	5.0	134.0
SO267_15-5	18.12.2018 22:23:33	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 343	started	17° 19.925' S	173° 47.074' W	0.0	8.4	22.9	7.0	271.1
SO267_15-5	18.12.2018 22:50:21	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS 343 a. D.	started	17° 19.896' S	173° 49.005' W	0.0	0.1	18.3	4.5	289.3
SO267_15-6	18.12.2018 22:52:20	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 342	started	17° 19.896' S	173° 49.006' W	0.0	0.3	17.1	4.7	257.0
SO267_15-6	18.12.2018 23:06:38	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 342	started	17° 19.739' S	173° 49.329' W	0.0	5.6	24.9	7.2	267.4
SO267_15-6	18.12.2018 23:44:33	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 342	started	17° 19.899' S	173° 52.337' W	0.0	0.5	32.1	4.5	105.5
SO267_15-7	18.12.2018 23:45:41	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 341	started	17° 19.906' S	173° 52.334' W	0.0	0.6	42.5	4.9	167.7
SO267_15-7	19.12.2018 00:02:42	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 341	started	17° 19.895' S	173° 53.340' W	0.0	8.0	20.3	5.8	266.7
SO267_15-7	19.12.2018 00:38:42	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 341	started	17° 20.166' S	173° 55.647' W	0.0	1.4	26.5	6.0	144.0
SO267_15-8	19.12.2018 00:40:28	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 340	started	17° 20.188' S	173° 55.624' W	0.0	1.2	14.9	5.3	138.8
SO267_15-8	19.12.2018 00:55:49	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 340	started	17° 20.107' S	173° 56.383' W	0.0	8.3	22.1	7.1	265.4
SO267_15-8	19.12.2018 01:21:29	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 340	started	17° 20.103' S	173° 59.032' W	0.0	0.9	29.1	5.5	168.2
SO267_15-9	19.12.2018 01:22:47	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 339	started	17° 20.105' S	173° 59.031' W	0.0	0.3	28.4	5.6	271.7
SO267_15-9	19.12.2018 01:38:51	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 339	started	17° 20.063' S	173° 59.791' W	0.0	7.8	9.7	7.1	269.2
SO267_15-9	19.12.2018 02:07:28	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 339	started	17° 20.019' S	174° 02.464' W	0.0	0.6	30.2	5.3	100.7
SO267_15-10	19.12.2018 02:10:23	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 338	started	17° 20.017' S	174° 02.467' W	0.0	0.2	26.8	4.3	268.8
SO267_15-10	19.12.2018 02:27:48	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 338	started	17° 20.096' S	174° 04.067' W	0.0	9.1	15.2	6.0	268.0
SO267_15-10	19.12.2018 02:51:30	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 338	started	17° 20.047' S	174° 05.921' W	0.0	0.7	29.5	5.4	112.9

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO267_15-11	19.12.2018 02:52:01	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 337	started	17° 20.049' S	174° 05.918' W	0.0	0.3	30.6	5.8	89.2
SO267_15-11	19.12.2018 03:12:36	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 337	started	17° 20.124' S	174° 08.368' W	0.0	9.3	26.3	5.7	268.4
SO267_15-11	19.12.2018 03:26:23	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 337	started	17° 19.872' S	174° 08.773' W	0.0	1.0	36.8	4.9	80.4
SO267_16-1	19.12.2018 03:43:41	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBMT # 19	started	17° 19.742' S	174° 10.118' W	0.0	0.7	27.1	9.8	229.6
SO267_15-12	19.12.2018 03:48:05	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 336	started	17° 19.813' S	174° 10.101' W	0.0	1.6	18.0	9.9	153.9
SO267_15-12	19.12.2018 04:04:20	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 336	started	17° 19.956' S	174° 11.717' W	0.0	9.5	18.8	9.2	268.5
SO267_15-12	19.12.2018 04:19:53	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 336	started	17° 20.042' S	174° 13.008' W	0.0	1.1	9.3	5.6	75.9
SO267_16-2	19.12.2018 04:40:43	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBMT # 18	started	17° 19.811' S	174° 14.961' W	0.0	0.6	8.7	5.1	37.8
SO267_15-13	19.12.2018 04:45:03	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 335	started	17° 19.827' S	174° 14.963' W	0.0	0.4	359.9	5.6	95.9
SO267_15-13	19.12.2018 05:11:42	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 335	started	17° 19.964' S	174° 16.495' W	0.0	1.3	329.3	8.0	88.9
SO267_15-13	19.12.2018 05:21:14	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 335	started	17° 19.938' S	174° 16.462' W	0.0	0.9	302.2	5.3	88.3
SO267_15-14	19.12.2018 05:26:45	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 334	started	17° 19.964' S	174° 16.374' W	0.0	1.3	298.3	5.7	108.2
SO267_15-14	19.12.2018 05:49:13	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 334	started	17° 20.029' S	174° 18.681' W	0.0	6.4	301.3	3.4	270.5
SO267_15-14	19.12.2018 05:58:06	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 334	started	17° 19.903' S	174° 19.056' W	0.0	0.6	278.3	2.5	91.3
SO267_15-15	19.12.2018 06:00:43	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 333	started	17° 19.906' S	174° 19.023' W	0.0	0.7	304.6	0.8	101.7
SO267_15-15	19.12.2018 07:08:26	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 333	started	17° 19.800' S	174° 22.493' W	0.0	0.9	NaN	NaN	161.6
SO267_15-15	19.12.2018 07:24:37	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 333	started	17° 19.788' S	174° 22.550' W	1525.7	0.6	200.5	2.0	66.7
SO267_16-3	19.12.2018 07:57:17	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 008	started	17° 22.841' S	174° 22.937' W	1465.2	0.9	219.5	5.7	202.4
SO267_16-4	19.12.2018 08:49:02	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 006	started	17° 15.937' S	174° 24.473' W	2041.1	1.2	256.7	3.5	327.5
SO267_16-5	19.12.2018 09:22:50	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 007	started	17° 19.478' S	174° 25.189' W	0.0	0.8	185.8	3.4	208.8
SO267_15-16	19.12.2018 09:27:14	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 332	started	17° 19.504' S	174° 25.209' W	0.0	0.0	177.6	3.8	356.4
SO267_15-16	19.12.2018 09:55:15	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 332	started	17° 19.849' S	174° 26.462' W	0.0	0.2	159.2	3.3	196.0
SO267_15-16	19.12.2018 10:32:34	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 332	started	17° 19.665' S	174° 26.541' W	0.0	0.3	132.1	4.4	309.6
SO267_16-6	19.12.2018 11:07:24	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 009	started	17° 22.474' S	174° 28.109' W	2435.9	0.7	92.5	1.6	219.2
SO267_16-7	19.12.2018 11:36:33	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 010	started	17° 26.188' S	174° 29.155' W	2592.6	1.6	61.4	3.9	190.1
SO267_15-17	19.12.2018 11:39:32	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 330	started	17° 26.245' S	174° 29.160' W	2596.1	1.1	55.1	2.7	168.3
SO267_15-17	19.12.2018 13:07:07	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 330	started	17° 19.794' S	174° 33.962' W	0.0	0.5	104.3	2.1	100.2
SO267_15-17	19.12.2018 13:27:05	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 330	started	17° 19.938' S	174° 34.095' W	0.0	0.6	78.2	1.3	143.8
SO267_16-8	19.12.2018 14:12:48	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 012	started	17° 16.448' S	174° 39.783' W	2795.0	1.3	112.9	1.4	286.3
SO267_15-18	19.12.2018 14:14:28	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 328	started	17° 16.441' S	174° 39.804' W	2796.5	0.4	93.6	1.0	235.0
SO267_15-18	19.12.2018 14:50:37	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 328	started	17° 19.567' S	174° 39.904' W	0.0	2.1	147.7	2.4	195.0
SO267_15-18	19.12.2018 15:01:13	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 328	started	17° 19.752' S	174° 40.111' W	0.0	0.4	135.8	0.6	76.6
SO267_16-9	19.12.2018 15:47:55	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 011	started	17° 26.887' S	174° 40.422' W	2679.9	1.7	182.8	2.7	208.2
SO267_16-10	19.12.2018 16:32:33	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 014	started	17° 20.745' S	174° 42.058' W	2617.3	1.0	160.9	1.7	321.3
SO267_15-19	19.12.2018 16:37:38	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 327	started	17° 20.718' S	174° 42.128' W	0.0	0.7	134.1	2.3	249.1
SO267_15-19	19.12.2018 17:06:12	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 327	started	17° 19.860' S	174° 44.027' W	0.0	1.1	168.8	2.9	186.5
SO267_15-19	19.12.2018 17:19:14	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 327	started	17° 20.020' S	174° 44.130' W	0.0	1.7	147.6	3.1	183.6
SO267_16-11	19.12.2018 17:59:54	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 013	started	17° 24.305' S	174° 44.816' W	1862.9	1.5	134.3	3.5	19.1
SO267_16-12	19.12.2018 18:52:32	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 016	started	17° 16.454' S	174° 47.443' W	1627.3	1.1	118.6	3.5	343.1
SO267_15-20	19.12.2018 18:54:28	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 326	started	17° 16.430' S	174° 47.450' W	1626.1	0.7	124.6	4.3	8.5
SO267_15-20	19.12.2018 19:15:31	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 326	started	17° 17.918' S	174° 47.514' W	1623.9	11.5	120.4	4.8	195.1
SO267_15-20	19.12.2018 19:48:00	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 326	started	17° 19.860' S	174° 48.368' W	1698.9	1.6	133.3	5.3	63.0
SO267_16-13	19.12.2018 20:20:01	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 015	started	17° 22.754' S	174° 48.601' W	1829.0	1.5	NaN	NaN	187.9
SO267_15-21	19.12.2018 20:22:15	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 325	started	17° 22.792' S	174° 48.606' W	0.0	1.0	104.7	4.5	179.6
SO267_15-21	19.12.2018 20:45:16	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 325	started	17° 21.115' S	174° 49.892' W	1969.8	10.8	101.8	4.5	326.2
SO267_15-21	19.12.2018 21:07:07	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 325	started	17° 19.768' S	174° 51.023' W	0.0	0.5	110.2	4.5	325.2
SO267_15-22	19.12.2018 21:09:34	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 324	started	17° 19.761' S	174° 51.021' W	0.0	0.1	98.0	5.5	150.9
SO267_15-22	19.12.2018 21:38:44	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 324	started	17° 19.854' S	174° 54.388' W	0.0	8.9	101.9	3.6	266.2
SO267_15-22	19.12.2018 21:54:34	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 324	started	17° 19.837' S	174° 55.423' W	0.0	0.2	99.0	2.4	84.3

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO267_15-23	19.12.2018 21:57:34	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 323	started	17° 19.838' S	174° 55.422' W	0.0	0.1	68.8	2.0	4.2
SO267_15-23	19.12.2018 22:26:32	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 323	started	17° 19.756' S	174° 58.190' W	0.0	9.8	54.9	5.5	272.1
SO267_15-23	19.12.2018 22:44:09	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 323	started	17° 19.766' S	174° 59.350' W	0.0	0.0	58.1	5.6	72.7
SO267_15-24	19.12.2018 22:46:23	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 322	started	17° 19.767' S	174° 59.352' W	0.0	0.6	66.5	4.2	171.3
SO267_15-24	19.12.2018 23:14:58	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 322	started	17° 19.911' S	175° 01.021' W	0.0	0.3	64.6	5.6	163.0
SO267_15-24	19.12.2018 23:30:04	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 322	started	17° 19.874' S	175° 01.641' W	0.0	0.2	68.1	4.4	229.9
SO267_15-25	19.12.2018 23:30:51	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 321	started	17° 19.877' S	175° 01.646' W	0.0	0.3	62.4	4.7	276.4
SO267_15-25	19.12.2018 23:59:52	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 321	started	17° 19.932' S	175° 04.148' W	0.0	5.8	67.1	5.3	279.9
SO267_15-25	20.12.2018 00:12:35	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 321	started	17° 19.878' S	175° 05.098' W	0.0	0.7	87.0	4.2	246.3
SO267_17-1	20.12.2018 00:28:22	Heat-Flow probe	HF	station start				started	17° 19.820' S	175° 04.928' W	0.0	0.7	68.5	4.5	85.7
SO267_17-1	20.12.2018 00:32:43	Heat-Flow probe	HF	in the water			FW2/SPW2	started	17° 19.815' S	175° 04.914' W	0.0	0.7	68.0	4.1	335.7
SO267_17-1	20.12.2018 00:35:54	Heat-Flow probe	HF	information			Bei SL: 50m Transponder am Dr	started	17° 19.811' S	175° 04.903' W	2365.7	0.3	63.8	3.7	71.4
SO267_17-1	20.12.2018 01:20:08	Heat-Flow probe	HF	max depth/on ground			Boko, SLmax: 2391m	started	17° 19.800' S	175° 04.851' W	2368.1	0.4	64.1	3.0	321.5
SO267_17-1	20.12.2018 01:35:22	Heat-Flow probe	HF	hoisting			Beginn hieven, SZmax: 27,3kN	started	17° 19.799' S	175° 04.855' W	2365.2	0.3	59.9	3.6	294.8
SO267_17-1	20.12.2018 01:42:45	Heat-Flow probe	HF	information			gehievt auf SL: 2200m, wieder mit 1,2m/s fi	started	17° 19.798' S	175° 04.851' W	2366.2	0.3	76.7	2.3	143.2
SO267_17-1	20.12.2018 01:45:51	Heat-Flow probe	HF	max depth/on ground			2. Boko, SLmax: 2394m	started	17° 19.799' S	175° 04.851' W	2368.2	0.1	82.4	3.0	290.7
SO267_17-1	20.12.2018 02:00:29	Heat-Flow probe	HF	hoisting			Beginn hieven, SZmax: 28,0kN	started	17° 19.801' S	175° 04.851' W	2367.3	0.2	65.4	2.7	338.3
SO267_17-1	20.12.2018 02:45:32	Heat-Flow probe	HF	information			Transponder an Deck	started	17° 19.795' S	175° 04.851' W	2368.2	0.1	91.7	2.0	295.7
SO267_17-1	20.12.2018 02:51:51	Heat-Flow probe	HF	on deck				started	17° 19.795' S	175° 04.853' W	2366.9	0.1	103.9	3.4	200.9
SO267_17-1	20.12.2018 02:52:45	Heat-Flow probe	HF	station end				started	17° 19.795' S	175° 04.854' W	2364.5	0.0	106.1	2.6	144.5
SO267_15-26	20.12.2018 02:52:52	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 320	started	17° 19.796' S	175° 04.854' W	2366.4	0.1	96.5	2.2	324.4
SO267_15-26	20.12.2018 03:20:19	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 320	started	17° 19.970' S	175° 08.086' W	0.0	4.7	128.4	1.4	274.8
SO267_15-26	20.12.2018 03:27:23	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 320	started	17° 19.911' S	175° 08.442' W	0.0	0.9	111.0	1.1	253.1
SO267_15-27	20.12.2018 03:29:48	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 319	started	17° 19.927' S	175° 08.482' W	0.0	0.7	92.7	1.3	275.9
SO267_15-27	20.12.2018 03:58:37	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 319	started	17° 19.991' S	175° 11.646' W	0.0	1.0	91.4	2.5	12.1
SO267_15-27	20.12.2018 04:09:36	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 319	started	17° 20.046' S	175° 11.962' W	0.0	0.8	102.3	2.3	224.9
SO267_15-28	20.12.2018 04:11:27	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 318	started	17° 20.062' S	175° 11.985' W	0.0	1.0	95.5	2.7	235.9
SO267_15-28	20.12.2018 04:42:32	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 318	started	17° 20.210' S	175° 15.301' W	0.0	3.2	97.2	1.8	300.1
SO267_15-28	20.12.2018 04:57:56	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 318	started	17° 20.027' S	175° 15.292' W	0.0	1.3	137.1	1.8	224.4
SO267_15-29	20.12.2018 05:01:43	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 317	started	17° 20.045' S	175° 15.337' W	0.0	0.9	106.6	1.8	236.7
SO267_15-29	20.12.2018 05:29:20	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 317	started	17° 20.207' S	175° 18.521' W	0.0	3.3	101.7	1.7	302.9
SO267_15-29	20.12.2018 05:38:05	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 317	started	17° 19.943' S	175° 18.768' W	0.0	0.8	131.1	2.8	313.1
SO267_15-30	20.12.2018 05:42:27	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 316	started	17° 19.928' S	175° 18.796' W	0.0	0.1	145.5	2.7	126.7
SO267_15-30	20.12.2018 06:11:38	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 316	started	17° 20.078' S	175° 21.945' W	0.0	4.0	109.4	1.8	275.7
SO267_15-30	20.12.2018 06:21:04	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 316	started	17° 19.881' S	175° 22.200' W	0.0	0.7	115.9	2.6	288.7
SO267_15-31	20.12.2018 06:25:19	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 315	started	17° 19.894' S	175° 22.249' W	0.0	0.6	116.9	2.7	238.3
SO267_15-31	20.12.2018 06:54:39	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 315	started	17° 20.100' S	175° 25.510' W	0.0	2.4	98.2	2.0	305.9
SO267_15-31	20.12.2018 07:05:35	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 315	started	17° 19.963' S	175° 25.629' W	0.0	0.4	110.2	2.4	231.2
SO267_15-32	20.12.2018 07:08:43	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 314	started	17° 19.973' S	175° 25.650' W	0.0	0.1	99.8	3.5	292.5
SO267_15-32	20.12.2018 08:20:08	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 314	started	17° 20.066' S	175° 28.676' W	0.0	0.4	68.7	6.1	21.7
SO267_15-32	20.12.2018 08:39:47	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 314	started	17° 19.938' S	175° 29.221' W	0.0	0.7	77.2	4.9	276.3
SO267_18-1	20.12.2018 09:10:54	Heat-Flow probe	HF	station start			HF-H	started	17° 19.835' S	175° 31.078' W	0.0	0.4	69.5	4.0	77.6
SO267_18-1	20.12.2018 09:14:33	Heat-Flow probe	HF	in the water				started	17° 19.818' S	175° 31.051' W	0.0	0.7	78.1	4.3	34.3
SO267_18-1	20.12.2018 09:17:37	Heat-Flow probe	HF	information			Bei SL: 50 m 1 x Transponder	started	17° 19.805' S	175° 31.028' W	2328.1	0.6	85.3	4.2	79.0
SO267_18-1	20.12.2018 10:00:16	Heat-Flow probe	HF	max depth/on ground			SL: 2349 m, SZ: 24/18 kN	started	17° 19.799' S	175° 31.015' W	2329.1	0.7	103.2	1.6	182.5
SO267_18-1	20.12.2018 10:15:21	Heat-Flow probe	HF	hoisting			SZmax: 31 kN bei 2340 m	started	17° 19.806' S	175° 31.023' W	2328.6	0.5	95.0	2.7	175.7
SO267_18-1	20.12.2018 10:58:36	Heat-Flow probe	HF	information			Bei SL: 50 m 1 x Transponder a.	started	17° 19.803' S	175° 31.011' W	0.0	0.3	88.7	2.4	193.9
SO267_18-1	20.12.2018 11:05:54	Heat-Flow probe	HF	on deck			HF a. D.	started	17° 19.800' S	175° 31.011' W	0.0	0.6	68.5	1.6	6.8
SO267_18-1	20.12.2018 11:07:28	Heat-Flow probe	HF	station end				started	17° 19.801' S	175° 31.011' W	0.0	0.3	64.0	1.2	287.2

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO267_15-33	20.12.2018 11:08:26	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 313	started	17° 19.801' S	175° 31.011' W	0.0	0.1	64.8	1.4	96.9
SO267_15-33	20.12.2018 11:36:04	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 313	started	17° 19.880' S	175° 32.167' W	2327.4	0.3	41.6	1.9	352.6
SO267_15-33	20.12.2018 11:50:01	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 313	started	17° 19.940' S	175° 32.627' W	2329.3	0.5	47.6	3.4	273.8
SO267_19-1	20.12.2018 12:07:07	Heat-Flow probe	HF	station start				started	17° 19.833' S	175° 33.526' W	2326.4	0.5	39.8	4.8	351.6
SO267_19-1	20.12.2018 12:13:17	Heat-Flow probe	HF	in the water			FW2/SPW2	started	17° 19.799' S	175° 33.537' W	2324.3	0.6	42.0	4.1	122.5
SO267_19-1	20.12.2018 12:17:02	Heat-Flow probe	HF	information			Bei SL: 50m Transponder am Dr	started	17° 19.796' S	175° 33.536' W	2325.4	0.2	40.9	3.8	57.8
SO267_19-1	20.12.2018 13:00:01	Heat-Flow probe	HF	max depth/on ground			Boko, SLmax: 2349m	started	17° 19.806' S	175° 33.538' W	2322.7	0.1	11.0	3.8	99.4
SO267_19-1	20.12.2018 13:15:38	Heat-Flow probe	HF	hoisting			Beginn hieven, SZmax: 29,3kN	started	17° 19.795' S	175° 33.543' W	2324.8	0.4	20.2	4.0	333.1
SO267_19-1	20.12.2018 14:00:18	Heat-Flow probe	HF	information			Transponder an Deck	started	17° 19.807' S	175° 33.538' W	0.0	0.1	10.3	3.1	138.1
SO267_19-1	20.12.2018 14:07:32	Heat-Flow probe	HF	on deck				started	17° 19.806' S	175° 33.535' W	0.0	0.3	8.9	2.6	122.6
SO267_19-1	20.12.2018 14:08:20	Heat-Flow probe	HF	station end				started	17° 19.806' S	175° 33.535' W	0.0	0.2	5.1	3.2	53.5
SO267_15-34	20.12.2018 14:09:34	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 312	started	17° 19.806' S	175° 33.534' W	0.0	0.1	16.8	3.4	37.1
SO267_15-34	20.12.2018 14:38:50	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 312	started	17° 19.873' S	175° 35.315' W	0.0	2.1	44.9	2.0	267.9
SO267_15-34	20.12.2018 14:52:07	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 312	started	17° 19.888' S	175° 35.989' W	0.0	1.1	29.8	1.4	227.2
SO267_15-35	20.12.2018 14:53:33	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 311	started	17° 19.896' S	175° 36.010' W	0.0	0.7	27.5	1.6	277.1
SO267_15-35	20.12.2018 15:25:37	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 311	started	17° 20.122' S	175° 39.163' W	0.0	3.6	27.1	2.0	259.3
SO267_15-35	20.12.2018 15:36:20	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 311	started	17° 19.891' S	175° 39.414' W	0.0	0.5	70.9	2.6	23.3
SO267_15-36	20.12.2018 16:06:56	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 309	started	17° 19.746' S	175° 42.922' W	0.0	0.3	311.9	1.8	149.9
SO267_15-36	20.12.2018 16:34:59	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 309	started	17° 19.873' S	175° 45.946' W	0.0	5.2	355.8	1.3	269.2
SO267_15-36	20.12.2018 16:43:25	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 309	started	17° 19.872' S	175° 46.385' W	0.0	1.2	14.9	1.4	306.7
SO267_15-37	20.12.2018 16:48:11	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 310	started	17° 19.840' S	175° 46.471' W	0.0	0.9	36.7	1.3	329.6
SO267_15-37	20.12.2018 17:14:50	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 310	started	17° 19.908' S	175° 43.660' W	0.0	8.3	45.6	1.2	87.5
SO267_15-37	20.12.2018 17:27:51	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 310	started	17° 19.933' S	175° 42.818' W	0.0	1.0	79.8	1.0	111.4
SO267_15-38	20.12.2018 17:30:34	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 308	started	17° 19.945' S	175° 42.785' W	0.0	0.8	96.9	1.3	124.7
SO267_15-38	20.12.2018 18:40:41	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 308	started	17° 19.865' S	175° 49.586' W	0.0	1.5	124.5	1.4	39.8
SO267_15-38	20.12.2018 18:53:30	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 308	started	17° 19.761' S	175° 49.693' W	0.0	0.6	163.9	2.0	27.6
SO267_15-39	20.12.2018 18:56:19	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 307	started	17° 19.752' S	175° 49.679' W	0.0	0.4	167.2	1.9	85.9
SO267_15-39	20.12.2018 19:26:43	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 307	started	17° 19.891' S	175° 52.634' W	0.0	3.6	76.7	2.3	268.6
SO267_15-39	20.12.2018 19:39:19	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 307	started	17° 19.742' S	175° 53.075' W	0.0	0.4	83.3	3.5	42.2
SO267_15-40	20.12.2018 19:40:03	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 306	started	17° 19.741' S	175° 53.075' W	0.0	0.8	87.7	3.4	42.0
SO267_15-40	20.12.2018 20:05:06	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 306	started	17° 19.858' S	175° 55.829' W	0.0	6.2	83.2	4.5	268.2
SO267_15-40	20.12.2018 20:30:12	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 306	started	17° 19.678' S	175° 56.389' W	0.0	0.5	60.8	5.5	114.9
SO267_15-41	20.12.2018 20:32:10	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 305	started	17° 19.681' S	175° 56.379' W	0.0	0.8	64.3	5.1	159.8
SO267_15-41	20.12.2018 20:58:05	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 305	started	17° 19.959' S	175° 59.177' W	0.0	6.5	80.4	4.5	268.1
SO267_15-41	20.12.2018 21:13:43	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 305	started	17° 19.675' S	175° 59.911' W	0.0	0.5	70.4	6.3	233.8
SO267_15-42	20.12.2018 21:17:51	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 304	started	17° 19.678' S	175° 59.911' W	0.0	0.2	70.3	6.6	230.8
SO267_15-42	20.12.2018 21:45:45	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS #304	started	17° 19.837' S	176° 02.786' W	0.0	2.5	66.3	6.4	287.3
SO267_15-42	20.12.2018 22:01:42	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 304	started	17° 19.630' S	176° 03.401' W	0.0	0.5	67.5	6.1	78.8
SO267_20-1	20.12.2018 22:02:36	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 303	started	17° 19.634' S	176° 03.399' W	0.0	0.7	65.5	5.9	52.9
SO267_20-1	20.12.2018 22:31:01	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 303	started	17° 19.844' S	176° 05.488' W	0.0	11.4	40.1	5.1	260.1
SO267_20-1	20.12.2018 22:48:32	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 303	started	17° 19.591' S	176° 06.688' W	0.0	0.4	30.5	4.0	141.5
SO267_20-2	20.12.2018 22:49:00	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 302	started	17° 19.591' S	176° 06.687' W	0.0	0.6	27.6	4.8	61.8
SO267_20-2	20.12.2018 23:26:40	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 302	started	17° 19.876' S	176° 09.892' W	0.0	0.3	51.3	3.6	16.9
SO267_20-2	20.12.2018 23:50:28	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 302	started	17° 19.882' S	176° 09.891' W	0.0	1.0	37.7	4.3	11.7
SO267_20-2	21.12.2018 00:05:04	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 302	started	17° 19.593' S	176° 10.337' W	0.0	0.1	63.8	3.3	285.2
SO267_15-43	21.12.2018 00:06:25	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 301	started	17° 19.591' S	176° 10.336' W	0.0	0.6	65.3	3.9	9.4
SO267_15-43	21.12.2018 00:38:41	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 301	started	17° 19.792' S	176° 13.436' W	2245.2	1.6	54.0	2.8	277.0
SO267_15-43	21.12.2018 00:50:50	Seismic Ocean Bottom Recei	SEISOBR	on deck				started	17° 19.533' S	176° 13.628' W	2236.7	0.6	57.5	1.6	268.3
SO267_21-1	21.12.2018 01:03:51	Magnetometer	MAG	station start			Beginn aussetzen des Magnetom	started	17° 19.509' S	176° 14.210' W	2305.6	4.1	66.6	3.3	267.1

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO267_21-1	21.12.2018 01:46:22	Magnetometer	MAG	in the water			Magnetometer voll ausgesteckt auf	started	17° 19.790' S	176° 19.771' W	2140.8	8.7	190.6	1.3	263.9
SO267_21-1	21.12.2018 01:53:48	Magnetometer	MAG	profile start			Beginn Profil, ändern Kurs auf rwK:	started	17° 19.833' S	176° 20.919' W	2109.1	8.9	40.4	0.6	272.5
SO267_21-1	21.12.2018 02:22:14	Magnetometer	MAG	alter course			auf rwK: 090°	started	17° 23.872' S	176° 21.028' W	2180.2	8.0	176.1	4.1	163.1
SO267_21-1	21.12.2018 13:15:04	Magnetometer	MAG	alter course			auf rwK: 012°	started	17° 24.770' S	174° 47.245' W	1326.9	7.7	113.2	10.5	86.7
SO267_21-1	21.12.2018 13:57:07	Magnetometer	MAG	profile end			Beginn einholen des Magnetome	started	17° 19.342' S	174° 45.877' W	1246.5	7.9	102.4	10.7	14.1
SO267_21-1	21.12.2018 14:25:39	Magnetometer	MAG	on deck			Magnetometer an Deck	started	17° 17.416' S	174° 45.542' W	1371.8	3.6	111.4	11.3	17.3
SO267_21-1	21.12.2018 14:26:06	Magnetometer	MAG	station end				started	17° 17.390' S	174° 45.536' W	1394.2	3.6	115.1	12.2	16.3
SO267_22-1	21.12.2018 16:13:29	Dredge	DRG	station start				started	17° 11.112' S	174° 42.617' W	1803.4	0.5	108.8	9.7	192.8
SO267_22-1	21.12.2018 16:15:35	Dredge	DRG	in the water				started	17° 11.109' S	174° 42.615' W	1793.6	0.4	102.5	9.2	11.2
SO267_22-1	21.12.2018 16:49:03	Dredge	DRG	max depth/on ground			Boko, SL: 1812m	started	17° 11.061' S	174° 42.557' W	1850.8	0.2	100.5	10.6	233.9
SO267_22-1	21.12.2018 16:51:48	Dredge	DRG	profile start			rwk: 270°, d: 0,33sm	started	17° 11.064' S	174° 42.562' W	1845.1	1.0	94.2	10.0	245.7
SO267_22-1	21.12.2018 17:13:19	Dredge	DRG	hoisting			Beg. Dredgen, maxSL: 2100m	started	17° 11.060' S	174° 42.921' W	1354.3	0.2	106.2	11.3	27.3
SO267_22-1	21.12.2018 17:56:45	Dredge	DRG	hoisting			Dredge frei vom Grund, SL: 1360m, max	started	17° 11.054' S	174° 42.920' W	1371.4	0.2	110.3	9.3	165.6
SO267_22-1	21.12.2018 18:27:13	Dredge	DRG	on deck				started	17° 11.062' S	174° 42.919' W	1360.7	0.2	108.2	10.1	273.3
SO267_22-1	21.12.2018 18:35:38	Dredge	DRG	station end				started	17° 11.052' S	174° 42.921' W	1372.9	0.1	116.7	10.6	299.3
SO267_23-1	21.12.2018 20:00:01	Dredge	DRG	station start				started	17° 18.471' S	174° 42.823' W	2626.7	0.8	106.2	8.4	103.6
SO267_23-1	21.12.2018 20:05:12	Dredge	DRG	in the water				started	17° 18.461' S	174° 42.779' W	2653.9	0.3	109.2	8.4	147.3
SO267_23-1	21.12.2018 20:48:37	Dredge	DRG	max depth/on ground			Boko, SL: 2549 m, SZ: 23 kN	started	17° 18.458' S	174° 42.777' W	2552.2	0.7	106.7	8.3	179.5
SO267_23-1	21.12.2018 20:49:45	Dredge	DRG	profile start			rwK: 277°, d: 0,4 sm, FüG: 1,0 l	started	17° 18.458' S	174° 42.777' W	2590.1	0.5	106.6	9.1	175.8
SO267_23-1	21.12.2018 21:17:49	Dredge	DRG	profile end			SLmax: 2850 m, SZ: 22 kN	started	17° 18.409' S	174° 43.179' W	2118.6	0.1	107.5	7.7	18.7
SO267_23-1	21.12.2018 21:18:21	Dredge	DRG	information			Beginn dredgen	started	17° 18.408' S	174° 43.178' W	2116.9	0.2	107.1	7.9	358.2
SO267_23-1	21.12.2018 22:00:07	Dredge	DRG	information			Dredge frei vom Grund, SL: 2120 m, S	started	17° 18.412' S	174° 43.186' W	2119.3	0.0	100.6	8.1	186.4
SO267_23-1	21.12.2018 22:01:16	Dredge	DRG	hoisting				started	17° 18.412' S	174° 43.186' W	2124.9	0.5	101.4	7.1	15.2
SO267_23-1	21.12.2018 22:40:13	Dredge	DRG	on deck				started	17° 18.408' S	174° 43.181' W	2194.5	0.1	103.4	8.7	87.1
SO267_23-1	21.12.2018 22:48:30	Dredge	DRG	station end				started	17° 18.414' S	174° 43.182' W	2192.3	0.2	92.3	8.1	46.2
SO267_24-1	22.12.2018 04:00:32	Autonomous Underwater Veh	AUV	station start			AUV Dive 1	started	17° 56.072' S	174° 40.049' W	1199.4	0.7	135.7	10.3	61.8
SO267_24-1	22.12.2018 04:07:39	Autonomous Underwater Veh	AUV	deployed				started	17° 56.083' S	174° 40.061' W	1195.0	0.3	124.9	8.7	123.6
SO267_24-1	22.12.2018 04:15:01	Autonomous Underwater Veh	AUV	information			AUV abgetaucht, Beg. Missior	started	17° 56.090' S	174° 40.047' W	0.0	0.3	124.9	8.5	129.1
SO267_24-1	22.12.2018 04:50:52	Autonomous Underwater Veh	AUV	information			AUV auf Tiefe und im Programı	started	17° 56.099' S	174° 40.037' W	0.0	0.2	124.8	8.4	39.6
SO267_24-1	23.12.2018 03:37:46	Autonomous Underwater Veh	AUV	information			gesichtet	started	17° 58.630' S	174° 36.079' W	1465.0	5.6	113.0	14.0	246.7
SO267_24-1	23.12.2018 03:57:06	Autonomous Underwater Veh	AUV	on deck				started	17° 58.590' S	174° 36.499' W	1505.9	0.9	108.5	12.3	255.7
SO267_24-1	23.12.2018 04:09:10	Autonomous Underwater Veh	AUV	station end				started	17° 58.833' S	174° 36.571' W	1539.3	4.9	113.4	9.5	149.6
SO267_25-2	22.12.2018 06:32:07	Heat-Flow probe	HF	station start				started	17° 40.225' S	174° 36.604' W	2955.2	2.0	107.8	9.6	106.0
SO267_25-2	22.12.2018 06:39:59	Heat-Flow probe	HF	in the water			Transponder bei SL: 50m	started	17° 40.201' S	174° 36.598' W	2954.2	0.4	116.0	9.5	23.5
SO267_25-2	22.12.2018 07:35:40	Heat-Flow probe	HF	max depth/on ground			SLmax: 2980 m, SZ: 33/22 kN	started	17° 40.194' S	174° 36.601' W	2953.3	0.5	111.2	10.0	285.9
SO267_25-2	22.12.2018 07:51:44	Heat-Flow probe	HF	hoisting			SZmax: 37 kN bei SL: 2968 m	started	17° 40.195' S	174° 36.600' W	2953.6	0.2	114.3	9.7	117.1
SO267_25-2	22.12.2018 08:42:20	Heat-Flow probe	HF	information			Bei SL: 50 m 1 x Transponder a.	started	17° 40.201' S	174° 36.605' W	2952.7	0.2	100.5	9.9	345.2
SO267_25-2	22.12.2018 08:49:01	Heat-Flow probe	HF	on deck			HF a. D.	started	17° 40.197' S	174° 36.600' W	2953.4	0.2	105.5	9.5	297.8
SO267_25-2	22.12.2018 08:51:17	Heat-Flow probe	HF	station end				started	17° 40.198' S	174° 36.602' W	2953.9	0.6	112.5	9.6	194.9
SO267_26-1	22.12.2018 10:07:00	LANDER (generic)	LANDER	station start		JUMPER	JUMPER	started	17° 32.549' S	174° 42.438' W	1415.0	0.9	119.3	9.4	14.7
SO267_26-1	22.12.2018 10:08:51	LANDER (generic)	LANDER	in the water		JUMPER	t sich nicht. Wird als verloren	started	17° 32.540' S	174° 42.445' W	1418.0	0.9	131.6	8.9	298.5
SO267_27-1	22.12.2018 10:42:47	Heat-Flow probe	HF	station start				started	17° 30.593' S	174° 40.734' W	2688.5	0.7	120.8	9.1	95.4
SO267_27-1	22.12.2018 10:47:09	Heat-Flow probe	HF	in the water			HF z. W.	started	17° 30.600' S	174° 40.680' W	2688.2	0.2	121.6	8.7	47.5
SO267_27-1	22.12.2018 10:50:55	Heat-Flow probe	HF	information			Bei SL: 50 m 1 x Transponder z.	started	17° 30.602' S	174° 40.685' W	2691.4	0.5	131.4	8.5	221.4
SO267_27-1	22.12.2018 11:40:06	Heat-Flow probe	HF	max depth/on ground			Boko, SLmax: 2718m	started	17° 30.603' S	174° 40.676' W	2688.4	0.5	115.9	8.7	168.4
SO267_27-1	22.12.2018 11:56:04	Heat-Flow probe	HF	hoisting			SZmax: 34,3kN	started	17° 30.600' S	174° 40.676' W	2687.9	0.0	120.8	9.3	60.5
SO267_27-1	22.12.2018 12:48:19	Heat-Flow probe	HF	information			Transponder an Deck	started	17° 30.600' S	174° 40.676' W	2688.3	0.1	121.2	9.2	117.5
SO267_27-1	22.12.2018 13:02:25	Heat-Flow probe	HF	on deck				started	17° 30.600' S	174° 40.676' W	2689.0	0.3	122.4	11.3	340.8
SO267_27-1	22.12.2018 13:08:31	Heat-Flow probe	HF	station end				started	17° 30.597' S	174° 40.677' W	2688.3	0.4	114.2	9.5	4.6

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO267_28-1	22.12.2018 13:10:12	Gravity Corer	GC	station start				started	17° 30.597' S	174° 40.677' W	2688.7	0.3	120.2	10.1	61.9
SO267_28-1	22.12.2018 13:14:47	Gravity Corer	GC	in the water			FW2/SPW2	started	17° 30.598' S	174° 40.679' W	2686.5	0.1	119.7	9.4	332.0
SO267_28-1	22.12.2018 13:18:53	Gravity Corer	GC	information			Bei SL: 50m Transponder am Dr	started	17° 30.599' S	174° 40.676' W	2689.4	0.1	131.7	11.9	279.7
SO267_28-1	22.12.2018 14:09:27	Gravity Corer	GC	max depth/on ground			Boko, SLmax: 2722m	started	17° 30.598' S	174° 40.683' W	2781.1	0.1	129.2	11.9	246.8
SO267_28-1	22.12.2018 14:09:43	Gravity Corer	GC	hoisting			Beginn hieven, SZmax: 39,1kN	started	17° 30.598' S	174° 40.683' W	2686.8	0.2	130.9	12.7	168.2
SO267_28-1	22.12.2018 15:07:37	Gravity Corer	GC	on deck				started	17° 30.606' S	174° 40.680' W	2687.7	0.2	114.5	9.3	272.3
SO267_28-1	22.12.2018 15:10:34	Gravity Corer	GC	station end				started	17° 30.604' S	174° 40.681' W	2690.0	0.3	119.6	10.9	21.8
SO267_29-1	22.12.2018 16:17:48	Gravity Corer	GC	station start			GC 6m	started	17° 33.010' S	174° 39.062' W	2658.6	0.9	129.1	12.5	34.8
SO267_29-1	22.12.2018 16:23:33	Gravity Corer	GC	in the water			Transponder bei SL: 50m	started	17° 32.997' S	174° 39.040' W	2662.1	0.0	116.1	11.3	174.5
SO267_29-1	22.12.2018 17:12:46	Gravity Corer	GC	max depth/on ground			Boko, maxSL: 2697m	started	17° 32.996' S	174° 38.998' W	2654.9	0.2	NaN	NaN	20.8
SO267_29-1	22.12.2018 17:13:54	Gravity Corer	GC	hoisting			maxSZ: 35,6kN	started	17° 32.996' S	174° 38.996' W	2654.4	0.4	120.4	10.5	218.9
SO267_29-1	22.12.2018 18:10:04	Gravity Corer	GC	on deck				started	17° 33.003' S	174° 38.997' W	2657.5	0.3	126.0	10.9	140.4
SO267_29-1	22.12.2018 18:12:32	Gravity Corer	GC	station end				started	17° 33.000' S	174° 38.998' W	2656.5	0.3	120.4	11.7	9.8
SO267_30-1	22.12.2018 19:11:29	Gravity Corer	GC	station start			GC 6m	started	17° 39.875' S	174° 36.366' W	2952.7	1.1	115.6	10.4	117.7
SO267_30-1	22.12.2018 19:13:34	Gravity Corer	GC	in the water				started	17° 39.886' S	174° 36.332' W	2955.0	1.1	115.8	10.8	96.5
SO267_30-1	22.12.2018 19:17:32	Gravity Corer	GC	information			Bei SL: 50 m 1 x Transponder	started	17° 39.895' S	174° 36.303' W	2955.2	0.4	117.5	12.1	316.5
SO267_30-1	22.12.2018 20:09:18	Gravity Corer	GC	max depth/on ground			SLmax: 2998 m, SZ: 33 / 24 m	started	17° 39.902' S	174° 36.302' W	2955.9	0.2	110.1	11.4	163.8
SO267_30-1	22.12.2018 20:11:38	Gravity Corer	GC	hoisting			SZmax: 39 kN bei SL: 2971 m	started	17° 39.900' S	174° 36.300' W	2954.5	0.3	107.1	10.0	48.6
SO267_30-1	22.12.2018 21:05:13	Gravity Corer	GC	information			Bei SL: 50 m 1 x Transponder a.	started	17° 39.897' S	174° 36.297' W	2952.9	0.2	114.2	10.6	210.1
SO267_30-1	22.12.2018 21:10:13	Gravity Corer	GC	on deck				started	17° 39.901' S	174° 36.300' W	2951.9	0.5	114.1	11.5	5.3
SO267_30-1	22.12.2018 21:28:41	Gravity Corer	GC	station end				started	17° 39.897' S	174° 36.297' W	2954.9	1.4	117.9	10.8	161.5
SO267_31-1	22.12.2018 22:23:37	Gravity Corer	GC	station start				started	17° 47.838' S	174° 35.207' W	2220.9	1.0	114.7	10.0	180.3
SO267_31-1	22.12.2018 22:28:09	Gravity Corer	GC	in the water				started	17° 47.820' S	174° 35.219' W	2218.8	0.9	118.6	11.2	193.3
SO267_31-1	22.12.2018 22:32:03	Gravity Corer	GC	information			Bei SL: 50 m 1 x Transponder z.	started	17° 47.820' S	174° 35.224' W	2217.4	0.5	105.1	10.6	7.1
SO267_31-1	22.12.2018 23:13:25	Gravity Corer	GC	max depth/on ground			Boko, SLmax: 2254m	started	17° 47.826' S	174° 35.218' W	2218.3	0.2	108.2	9.9	4.1
SO267_31-1	22.12.2018 23:14:24	Gravity Corer	GC	hoisting			Beginn hieven, SZmax: 33,0kN	started	17° 47.826' S	174° 35.218' W	2219.4	0.2	105.6	9.2	56.4
SO267_31-1	22.12.2018 23:57:16	Gravity Corer	GC	information			Transponder an Deck	started	17° 47.815' S	174° 35.217' W	2217.9	0.5	114.2	11.4	10.7
SO267_31-1	23.12.2018 00:04:16	Gravity Corer	GC	on deck				started	17° 47.814' S	174° 35.216' W	2218.3	0.3	118.6	9.4	302.7
SO267_31-1	23.12.2018 00:05:57	Gravity Corer	GC	station end				started	17° 47.814' S	174° 35.217' W	2218.0	0.5	114.2	9.6	24.8
SO267_32-1	23.12.2018 00:55:48	Gravity Corer	GC	station start				started	17° 52.102' S	174° 31.548' W	2032.9	0.6	117.8	12.4	116.5
SO267_32-1	23.12.2018 00:59:49	Gravity Corer	GC	in the water			FW2/SPW2	started	17° 52.111' S	174° 31.524' W	2034.0	0.4	112.0	9.6	175.6
SO267_32-1	23.12.2018 01:04:23	Gravity Corer	GC	information			Bei SL: 50m Transponder am Dr	started	17° 52.118' S	174° 31.500' W	2034.9	0.4	111.5	11.1	114.5
SO267_32-1	23.12.2018 01:43:01	Gravity Corer	GC	max depth/on ground			Boko, SLmax: 2075m	started	17° 52.141' S	174° 31.435' W	2032.9	0.0	118.3	11.5	139.8
SO267_32-1	23.12.2018 01:44:10	Gravity Corer	GC	hoisting			Beginn hieven, SZmax: 30,4kN	started	17° 52.139' S	174° 31.435' W	2035.0	0.3	114.8	11.9	94.1
SO267_32-1	23.12.2018 02:26:15	Gravity Corer	GC	information			Transponder an Deck	started	17° 52.138' S	174° 31.439' W	2035.3	0.1	119.2	9.7	121.1
SO267_32-1	23.12.2018 02:32:17	Gravity Corer	GC	on deck				started	17° 52.143' S	174° 31.445' W	2034.4	0.4	109.0	12.2	147.7
SO267_32-1	23.12.2018 02:34:18	Gravity Corer	GC	station end				started	17° 52.146' S	174° 31.441' W	2033.6	0.3	110.0	13.1	10.4
SO267_33-1	23.12.2018 05:29:06	Dredge	DRG	station start				started	18° 00.563' S	174° 31.431' W	1214.6	1.1	112.8	11.1	224.8
SO267_33-1	23.12.2018 05:31:29	Dredge	DRG	in the water				started	18° 00.572' S	174° 31.435' W	1221.6	0.3	116.3	10.6	83.8
SO267_33-1	23.12.2018 05:56:23	Dredge	DRG	max depth/on ground			Boko, SL: 1229m	started	18° 00.553' S	174° 31.413' W	1209.4	0.3	117.5	9.1	71.7
SO267_33-1	23.12.2018 05:57:28	Dredge	DRG	profile start			Beg Auslegen, rwk: 317°, d: 0,35	started	18° 00.553' S	174° 31.411' W	1216.4	0.3	116.2	10.3	184.4
SO267_33-1	23.12.2018 06:20:33	Dredge	DRG	hoisting			Beg. dredgen, maxSL: 1500m	started	18° 00.291' S	174° 31.660' W	822.3	0.2	109.0	11.1	311.7
SO267_33-1	23.12.2018 07:07:13	Dredge	DRG	information			Dredge frei vom Grund, SL: 810 m, S	started	18° 00.286' S	174° 31.661' W	823.0	0.4	98.0	9.4	57.3
SO267_33-1	23.12.2018 07:27:40	Dredge	DRG	on deck				started	18° 00.291' S	174° 31.667' W	823.1	0.1	105.4	10.5	202.1
SO267_33-1	23.12.2018 07:34:02	Dredge	DRG	station end				started	18° 00.290' S	174° 31.660' W	822.3	0.2	99.2	12.0	224.9
SO267_34-1	23.12.2018 08:22:00	Dredge	DRG	station start				started	17° 54.559' S	174° 30.803' W	1061.3	1.9	109.6	8.9	51.8
SO267_34-1	23.12.2018 08:25:36	Dredge	DRG	in the water				started	17° 54.561' S	174° 30.788' W	1039.8	0.3	102.6	8.2	168.0
SO267_34-1	23.12.2018 08:47:14	Dredge	DRG	max depth/on ground			SLmax: 1077 m, SZ: 6 kN	started	17° 54.564' S	174° 30.788' W	1039.3	0.2	99.4	8.8	209.6
SO267_34-1	23.12.2018 08:48:23	Dredge	DRG	profile start			rwK: 081°, d: 0,3 sm	started	17° 54.563' S	174° 30.791' W	1041.3	0.3	101.4	8.7	285.8

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO267_34-1	23.12.2018 09:10:05	Dredge	DRG	profile end			SLmax: 1400 m, SZ: 8 kN	started	17° 54.508' S	174° 30.448' W	711.1	0.7	107.8	8.4	188.0
SO267_34-1	23.12.2018 09:11:23	Dredge	DRG	information			Beginn dredgen, SZmax: kN	started	17° 54.510' S	174° 30.450' W	708.9	0.3	96.3	8.8	47.9
SO267_34-1	23.12.2018 09:52:25	Dredge	DRG	hoisting			Dredge frei vom Grund, SL: 708 m, S	started	17° 54.510' S	174° 30.450' W	709.6	0.2	101.0	9.2	182.1
SO267_34-1	23.12.2018 10:11:04	Dredge	DRG	on deck				started	17° 54.510' S	174° 30.449' W	712.8	0.2	105.2	9.7	244.8
SO267_34-1	23.12.2018 10:14:21	Dredge	DRG	station end				started	17° 54.509' S	174° 30.448' W	708.5	0.4	105.2	8.9	73.2
SO267_35-1	23.12.2018 11:16:43	Dredge	DRG	station start				started	17° 48.020' S	174° 28.106' W	1708.0	0.3	108.8	8.1	63.6
SO267_35-1	23.12.2018 11:19:01	Dredge	DRG	in the water			FW2/SPW2	started	17° 48.019' S	174° 28.100' W	1688.8	0.3	99.5	9.4	48.3
SO267_35-1	23.12.2018 11:52:41	Dredge	DRG	max depth/on ground			Boko, SL: 1717m, beginn auslegen, rwK: 0	started	17° 48.025' S	174° 28.099' W	1693.9	0.2	105.5	9.8	297.5
SO267_35-1	23.12.2018 12:10:55	Dredge	DRG	hoisting			Eingeparkt, beginn hieven, SLmax:	started	17° 48.050' S	174° 27.808' W	1236.0	0.3	102.0	11.4	115.9
SO267_35-1	23.12.2018 12:51:18	Dredge	DRG	information			frei vom Grund, SZmax: 31,0kN	started	17° 48.049' S	174° 27.803' W	1215.3	0.7	112.5	10.1	218.0
SO267_35-1	23.12.2018 13:21:31	Dredge	DRG	on deck				started	17° 48.047' S	174° 27.806' W	1240.2	0.2	114.1	7.2	349.3
SO267_35-1	23.12.2018 13:24:45	Dredge	DRG	station end				started	17° 48.047' S	174° 27.804' W	1234.5	0.3	116.8	6.4	205.0
SO267_36-1	23.12.2018 14:54:21	Dredge	DRG	station start				started	17° 36.304' S	174° 29.576' W	2332.6	0.8	118.7	10.7	87.1
SO267_36-1	23.12.2018 14:55:52	Dredge	DRG	in the water			FW2/SPW2	started	17° 36.309' S	174° 29.552' W	2289.6	0.7	112.6	10.0	107.9
SO267_36-1	23.12.2018 15:39:19	Dredge	DRG	max depth/on ground			Boko, SL: 2351m	started	17° 36.307' S	174° 29.552' W	2289.2	0.5	111.7	12.9	252.8
SO267_36-1	23.12.2018 15:41:28	Dredge	DRG	profile start			Beg. auslegen, rwk: 110°, d: 0,27	started	17° 36.309' S	174° 29.550' W	2283.4	0.8	116.5	12.4	147.4
SO267_36-1	23.12.2018 15:59:25	Dredge	DRG	hoisting			Beg. dredgen, maxSL: 2500m	started	17° 36.410' S	174° 29.270' W	1807.7	0.2	121.7	11.4	315.2
SO267_36-1	23.12.2018 16:40:05	Dredge	DRG	hoisting			Dredge frei vom Grund, SL: 1800m, max	started	17° 36.413' S	174° 29.270' W	1805.0	0.1	113.5	13.0	255.2
SO267_36-1	23.12.2018 17:19:24	Dredge	DRG	on deck				started	17° 36.412' S	174° 29.273' W	1838.6	0.2	115.6	15.5	282.4
SO267_36-1	23.12.2018 17:26:29	Dredge	DRG	station end				started	17° 36.417' S	174° 29.265' W	1805.3	0.3	114.1	13.7	325.5
SO267_37-1	23.12.2018 19:35:32	Dredge	DRG	station start				started	17° 42.374' S	174° 40.649' W	1951.9	0.8	117.8	13.0	99.9
SO267_37-1	23.12.2018 19:38:08	Dredge	DRG	in the water				started	17° 42.376' S	174° 40.650' W	1987.0	0.4	118.3	13.6	193.2
SO267_37-1	23.12.2018 20:12:28	Dredge	DRG	max depth/on ground			Dredge Boko, SL: 2007 m, SZ: 19/	started	17° 42.380' S	174° 40.643' W	1983.7	0.5	113.3	11.4	207.0
SO267_37-1	23.12.2018 20:15:08	Dredge	DRG	profile start			Auslegen Draht, rwK: 100°, d: 0,3 sm, F	started	17° 42.379' S	174° 40.644' W	1983.4	0.2	109.5	11.9	149.1
SO267_37-1	23.12.2018 20:41:03	Dredge	DRG	profile end			SLmax: 2250 m, SZ: 15 kN	started	17° 42.440' S	174° 40.298' W	1598.6	0.1	109.7	10.5	226.2
SO267_37-1	23.12.2018 20:42:12	Dredge	DRG	information			Beginn dredgen, SZmax: kN	started	17° 42.441' S	174° 40.299' W	1598.9	0.2	109.7	12.0	225.6
SO267_37-1	23.12.2018 21:23:28	Dredge	DRG	hoisting			Dredge frei vom Grund, SL: 1588 m, S	started	17° 42.435' S	174° 40.294' W	1593.5	0.3	124.8	12.7	90.0
SO267_37-1	23.12.2018 21:54:50	Dredge	DRG	on deck				started	17° 42.440' S	174° 40.300' W	1602.7	0.5	114.2	11.1	321.0
SO267_37-1	23.12.2018 22:00:19	Dredge	DRG	station end				started	17° 42.440' S	174° 40.294' W	1594.5	0.1	107.1	12.0	68.3
SO267_38-1	23.12.2018 23:47:23	Autonomous Underwater Veh	AUV	station start				started	17° 45.163' S	174° 45.350' W	1971.5	0.7	104.9	11.2	334.2
SO267_38-1	23.12.2018 23:51:30	Autonomous Underwater Veh	AUV	in the water				started	17° 45.163' S	174° 45.357' W	1968.9	0.8	102.5	9.9	203.4
SO267_38-1	23.12.2018 23:54:06	Autonomous Underwater Veh	AUV	information			abgetaucht	started	17° 45.165' S	174° 45.355' W	1969.9	0.8	108.8	11.3	192.0
SO267_38-1	24.12.2018 23:28:12	Autonomous Underwater Veh	AUV	at surface				started	17° 39.325' S	174° 41.240' W	1667.7	4.9	114.5	12.3	351.3
SO267_38-1	24.12.2018 23:53:43	Autonomous Underwater Veh	AUV	on deck				started	17° 38.790' S	174° 41.402' W	1598.3	1.6	110.0	13.6	210.6
SO267_38-1	24.12.2018 23:55:16	Autonomous Underwater Veh	AUV	station end				started	17° 38.836' S	174° 41.439' W	1580.3	3.1	92.5	12.5	219.8
SO267_39-1	24.12.2018 00:09:46	Magnetometer	MAG	station start			Beginn ausstecken Magnetome	started	17° 45.422' S	174° 45.795' W	1993.5	4.0	107.3	9.1	267.4
SO267_39-1	24.12.2018 00:17:51	Magnetometer	MAG	in the water			Magnetometer mit 2 Aale ausgest	started	17° 45.402' S	174° 46.317' W	2032.7	3.7	114.5	10.9	268.3
SO267_39-1	24.12.2018 00:32:49	Magnetometer	MAG	in the water			Magnetometer auf 825m ausgest	started	17° 45.331' S	174° 47.752' W	2253.0	8.2	116.0	11.9	272.0
SO267_39-1	24.12.2018 01:21:49	Magnetometer	MAG	alter course			ä/K auf rwK: 000°, d: 3,7nm	started	17° 45.331' S	174° 54.645' W	2302.4	8.0	112.1	10.2	277.0
SO267_39-1	24.12.2018 01:51:00	Magnetometer	MAG	alter course			ä/K auf rwK: 090°, d: 15,0nm	started	17° 41.762' S	174° 54.980' W	2366.2	7.9	119.6	13.4	20.9
SO267_39-1	24.12.2018 03:48:15	Magnetometer	MAG	alter course			ä/K auf rwK: 000°, d: 3,7nm	started	17° 41.227' S	174° 38.875' W	2557.5	7.9	101.1	14.5	27.0
SO267_39-1	24.12.2018 04:13:53	Magnetometer	MAG	alter course			rwk: 270°, d: 15,0sm	started	17° 37.910' S	174° 38.880' W	2878.3	8.0	97.7	10.6	330.2
SO267_39-1	24.12.2018 06:09:26	Magnetometer	MAG	alter course			rwk: 000°, d: 3,7sm	started	17° 37.709' S	174° 54.915' W	2378.3	7.9	95.7	12.6	303.6
SO267_39-1	24.12.2018 06:38:46	Magnetometer	MAG	alter course			rwk: 090°, d: 12,2sm	started	17° 34.000' S	174° 55.024' W	2375.1	8.0	105.9	12.7	47.1
SO267_39-1	24.12.2018 08:11:19	Magnetometer	MAG	alter course			rwK: 360°, d: 4 sm	started	17° 33.913' S	174° 42.036' W	1502.2	7.9	106.4	12.4	66.0
SO267_39-1	24.12.2018 08:36:25	Magnetometer	MAG	alter course			rwK: 270°, d: 16 sm	started	17° 30.610' S	174° 41.810' W	2071.6	7.9	105.8	11.2	343.5
SO267_39-1	24.12.2018 10:35:05	Magnetometer	MAG	alter course			rwK: 180°, d: 20 sm	started	17° 30.268' S	174° 58.202' W	2377.6	7.9	111.8	10.7	268.9
SO267_39-1	24.12.2018 13:12:47	Magnetometer	MAG	alter course			rwK: 090°, d: 18,6nm	started	17° 50.368' S	174° 58.778' W	2243.1	7.2	109.0	9.7	181.0
SO267_39-1	24.12.2018 15:35:39	Magnetometer	MAG	alter course			rwk: 180°, d: 2,7sm	started	17° 51.018' S	174° 39.151' W	1177.7	7.5	106.6	12.0	160.1

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO267_39-1	24.12.2018 15:54:32	Magnetometer	MAG	alter course			rwk: 267°, d: 18,7sm	started	17° 53.437' S	174° 39.381' W	1269.2	8.2	107.4	11.4	235.8
SO267_39-1	24.12.2018 18:13:04	Magnetometer	MAG	alter course			rwk: 180°, d: 3,7sm	started	17° 54.611' S	174° 58.603' W	2255.6	7.7	102.1	10.2	232.6
SO267_39-1	24.12.2018 18:41:04	Magnetometer	MAG	alter course			rwk: 084°, d: 21,8sm	started	17° 58.257' S	174° 58.836' W	2242.7	6.7	110.1	9.8	134.9
SO267_39-1	24.12.2018 19:15:15	Magnetometer	MAG	alter course			rwK: xxx°, d: xx sm	started	17° 57.859' S	174° 54.459' W	2222.6	7.8	117.5	12.4	77.6
SO267_39-1	24.12.2018 21:20:11	Magnetometer	MAG	recording end				started	17° 56.074' S	174° 36.734' W	1553.4	8.1	111.4	10.5	83.1
SO267_39-1	24.12.2018 21:32:26	Magnetometer	MAG	information			Bird # 02 a. D.	started	17° 55.899' S	174° 35.586' W	1449.9	5.1	105.0	10.4	79.1
SO267_39-1	24.12.2018 21:34:34	Magnetometer	MAG	information			Bird # 01 a. D.	started	17° 55.876' S	174° 35.398' W	1434.2	4.7	110.4	9.8	79.9
SO267_39-1	24.12.2018 21:35:43	Magnetometer	MAG	on deck			Magnetik komplett a. D.	started	17° 55.865' S	174° 35.298' W	1434.2	5.0	101.4	9.9	77.4
SO267_39-1	24.12.2018 21:41:14	Magnetometer	MAG	station end				started	17° 55.803' S	174° 34.848' W	1365.2	4.9	102.0	10.0	84.2
SO267_40-1	25.12.2018 02:35:53	Seismic Source	SEISSRC	station start			Beginn aussetzen der Kopfboje	started	17° 43.632' S	174° 17.200' W	1296.6	3.1	116.9	12.8	96.7
SO267_40-1	25.12.2018 02:37:33	Seismic Source	SEISSRC	information			Kopfboje zu Wasser	started	17° 43.631' S	174° 17.101' W	1300.6	3.1	115.3	10.9	91.4
SO267_40-1	25.12.2018 02:41:15	Seismic Source	SEISSRC	information			1. Bird zu Wasser	started	17° 43.619' S	174° 16.916' W	1299.0	3.7	116.9	13.1	86.5
SO267_40-1	25.12.2018 03:02:35	Seismic Source	SEISSRC	information			2. Bird zu Wasser	started	17° 43.751' S	174° 15.559' W	1315.2	3.5	116.4	10.0	103.2
SO267_40-1	25.12.2018 03:19:10	Seismic Source	SEISSRC	information			3. Bird zu Wasser	started	17° 43.987' S	174° 14.591' W	1330.1	3.8	115.3	12.7	109.0
SO267_40-1	25.12.2018 03:29:07	Seismic Source	SEISSRC	information			4. Bird zu Wasser	started	17° 44.250' S	174° 13.985' W	1331.6	3.9	115.1	11.9	120.2
SO267_40-1	25.12.2018 03:36:54	Seismic Source	SEISSRC	information			5. Bird zu Wasser	started	17° 44.544' S	174° 13.643' W	1335.5	3.0	100.6	11.0	149.8
SO267_40-1	25.12.2018 03:44:36	Seismic Source	SEISSRC	information			6. Bird zu Wasser	started	17° 44.960' S	174° 13.389' W	1331.8	3.9	102.7	12.9	166.7
SO267_40-1	25.12.2018 03:53:58	Seismic Source	SEISSRC	information			7. Bird zu Wasser	started	17° 45.571' S	174° 13.156' W	1330.7	4.2	100.6	15.4	165.2
SO267_40-1	25.12.2018 04:03:28	Seismic Source	SEISSRC	information			8. Bird zu Wasser	started	17° 46.204' S	174° 13.094' W	1332.0	3.9	111.1	14.5	175.0
SO267_40-1	25.12.2018 04:14:06	Seismic Source	SEISSRC	information			9. Bird zu Wasser	started	17° 46.930' S	174° 13.181' W	1329.7	4.4	105.4	14.1	192.1
SO267_40-1	25.12.2018 04:18:02	Seismic Source	SEISSRC	information			10. Bird zu Wasser	started	17° 47.198' S	174° 13.253' W	1328.1	4.1	108.1	14.9	203.1
SO267_40-1	25.12.2018 04:22:06	Seismic Source	SEISSRC	information			11. Bird zu Wasser	started	17° 47.428' S	174° 13.361' W	1328.9	3.0	113.0	12.9	207.4
SO267_40-1	25.12.2018 04:23:06	Seismic Source	SEISSRC	information			12. Bird zu Wasser	started	17° 47.477' S	174° 13.392' W	1330.8	3.7	103.8	12.2	210.3
SO267_40-1	25.12.2018 04:28:12	Seismic Source	SEISSRC	information			Streamer ausgesteckt 4321m	started	17° 47.744' S	174° 13.615' W	1326.5	4.0	101.1	11.7	233.5
SO267_40-1	25.12.2018 04:38:46	Seismic Source	SEISSRC	information			1. Magnetometer zu Wasser	started	17° 48.041' S	174° 14.221' W	1322.8	3.9	119.3	13.4	263.9
SO267_40-1	25.12.2018 04:42:49	Seismic Source	SEISSRC	information			2. Magnetometer zu Wasser	started	17° 48.066' S	174° 14.492' W	1312.9	3.6	122.6	9.3	275.3
SO267_40-1	25.12.2018 04:48:50	Seismic Source	SEISSRC	information			3. Magnetometer zu Wasser	started	17° 48.067' S	174° 14.837' W	1309.3	3.2	121.8	11.1	269.7
SO267_40-1	25.12.2018 05:14:12	Seismic Source	SEISSRC	Airgun in water			Stb-Airguns zu Wasser	started	17° 48.064' S	174° 16.243' W	1279.0	2.7	128.1	9.9	270.9
SO267_40-1	25.12.2018 05:28:36	Seismic Source	SEISSRC	Airgun in water			Bb-Airguns zu Wasser	started	17° 48.043' S	174° 16.935' W	1259.3	2.7	101.4	5.0	273.4
SO267_40-1	25.12.2018 05:35:49	Seismic Source	SEISSRC	information			1. Schuß	started	17° 48.009' S	174° 17.455' W	1254.2	4.5	108.2	8.4	268.7
SO267_40-1	25.12.2018 05:37:40	Seismic Source	SEISSRC	information			Magnetometer ausgesteckt (SL: 9	started	17° 48.000' S	174° 17.602' W	1243.1	4.6	110.5	8.6	274.1
SO267_40-1	25.12.2018 05:45:33	Seismic Source	SEISSRC	profile start			Beg. Seismik-Profil BGR2018-2	started	17° 47.975' S	174° 18.222' W	1239.7	4.7	111.0	10.1	276.7
SO267_40-1	25.12.2018 18:42:26	Seismic Source	SEISSRC	profile end				started	17° 47.974' S	175° 14.537' W	2362.3	4.1	113.4	5.5	270.6
SO267_40-1	25.12.2018 18:50:32	Seismic Source	SEISSRC	information			Beg. hieven Magnetometer	started	17° 47.963' S	175° 15.129' W	2364.8	4.1	76.3	4.7	272.0
SO267_40-1	25.12.2018 19:10:04	Seismic Source	SEISSRC	on deck			BB Airgun-Array a. D.	started	17° 47.960' S	175° 16.366' W	2363.4	3.2	107.8	5.4	272.9
SO267_40-1	25.12.2018 19:23:10	Seismic Source	SEISSRC	on deck			STB Airgun-Array a. D.	started	17° 47.957' S	175° 17.003' W	2371.2	2.9	NaN	NaN	276.3
SO267_40-1	25.12.2018 19:32:22	Seismic Source	SEISSRC	information			02. Mag. Bird a. D.	started	17° 47.949' S	175° 17.489' W	2373.6	2.8	107.4	5.3	282.4
SO267_40-1	25.12.2018 19:36:01	Seismic Source	SEISSRC	information			01. Mag. Bird / Magnetik komplett	started	17° 47.944' S	175° 17.674' W	2373.5	2.9	115.2	6.9	276.7
SO267_40-1	25.12.2018 19:40:33	Seismic Source	SEISSRC	information			Beginn hieven Streamer	started	17° 47.941' S	175° 17.903' W	2373.5	3.0	103.7	5.0	271.3
SO267_40-1	25.12.2018 19:56:44	Seismic Source	SEISSRC	information			12. Streamer-Bird a. D.	started	17° 47.938' S	175° 18.702' W	2372.3	2.8	126.1	6.5	273.9
SO267_40-1	25.12.2018 19:58:12	Seismic Source	SEISSRC	information			11. Streamer-Bird a. D.	started	17° 47.938' S	175° 18.775' W	2414.6	3.0	124.3	5.8	273.7
SO267_40-1	25.12.2018 20:13:34	Seismic Source	SEISSRC	information			10. Streamer-Bird a. D.	started	17° 47.931' S	175° 19.588' W	2370.2	3.2	113.6	6.1	270.4
SO267_40-1	25.12.2018 20:22:31	Seismic Source	SEISSRC	information			09. Streamer-Bird a. D.	started	17° 47.929' S	175° 20.057' W	2371.6	2.9	107.5	4.7	259.7
SO267_40-1	25.12.2018 20:52:10	Seismic Source	SEISSRC	information			08. Streamer-Bird a. D.	started	17° 47.953' S	175° 21.578' W	2370.8	2.8	119.8	2.2	270.1
SO267_40-1	25.12.2018 21:07:47	Seismic Source	SEISSRC	information			07. Streamer-Bird a. D.	started	17° 47.952' S	175° 22.407' W	2364.8	3.1	119.3	5.6	259.7
SO267_40-1	25.12.2018 21:19:15	Seismic Source	SEISSRC	information			06. Streamer-Bird a. D.	started	17° 47.931' S	175° 23.028' W	2342.6	3.3	115.3	5.9	271.4
SO267_40-1	25.12.2018 22:53:30	Seismic Source	SEISSRC	information			05. Streamer-Bird a. D.	started	17° 47.841' S	175° 28.524' W	2453.9	3.4	124.6	6.7	273.6
SO267_40-1	25.12.2018 23:04:07	Seismic Source	SEISSRC	information			04. Streamer-Bird a. D.	started	17° 47.817' S	175° 29.209' W	2305.6	4.7	119.8	6.6	272.7
SO267_40-1	25.12.2018 23:11:40	Seismic Source	SEISSRC	information			03. Streamer-Bird a.D.	started	17° 47.798' S	175° 29.798' W	2345.4	4.2	117.3	6.4	271.1

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO267_40-1	25.12.2018 23:22:26	Seismic Source	SEISSRC	information			02. Streamer-Bird a. D.	started	17° 47.768' S	175° 30.622' W	2428.7	4.5	113.8	4.2	274.2
SO267_40-1	25.12.2018 23:30:03	Seismic Source	SEISSRC	information			01. Streamer-Bird a. D.	started	17° 47.748' S	175° 31.206' W	2397.4	4.3	132.7	5.1	270.4
SO267_40-1	25.12.2018 23:35:05	Seismic Source	SEISSRC	on deck			Kopfboje an Deck	started	17° 47.743' S	175° 31.599' W	2336.7	4.5	128.5	6.0	273.6
SO267_40-1	25.12.2018 23:38:21	Seismic Source	SEISSRC	station end				started	17° 47.742' S	175° 31.856' W	2320.1	4.4	125.1	5.8	273.0
SO267_41-1	26.12.2018 01:32:00	KONGSBERG EM122	EM122	profile start			rwK: 173°, d: 16,5nm	started	17° 51.012' S	175° 10.836' W	2436.0	8.4	113.2	8.3	180.4
SO267_41-1	26.12.2018 03:38:50	KONGSBERG EM122	EM122	alter course			rwK: 270°, d: 45,5nm	started	18° 07.997' S	175° 09.252' W	2256.6	8.7	107.4	7.3	240.2
SO267_41-1	26.12.2018 09:15:01	KONGSBERG EM122	EM122	alter course			rwK: 256°, d: 8 sm	started	18° 07.789' S	175° 56.599' W	2836.4	7.9	120.4	10.4	260.3
SO267_41-1	26.12.2018 10:14:15	KONGSBERG EM122	EM122	alter course			rwK: 270°, d: 10 sm	started	18° 09.622' S	176° 04.548' W	2449.9	7.8	119.5	9.2	262.9
SO267_41-1	26.12.2018 11:25:40	KONGSBERG EM122	EM122	profile end				started	18° 09.648' S	176° 14.678' W	2323.7	8.4	118.5	9.1	267.1
SO267_42-1	26.12.2018 12:17:57	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 501	started	18° 12.008' S	176° 09.089' W	1876.4	0.3	115.5	9.5	139.4
SO267_42-2	26.12.2018 12:42:06	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 502	started	18° 12.038' S	176° 06.017' W	2383.9	1.2	128.6	7.9	113.9
SO267_42-3	26.12.2018 13:07:02	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 503	started	18° 12.001' S	176° 02.923' W	2768.0	1.1	117.0	8.6	83.4
SO267_42-4	26.12.2018 13:32:00	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 504	started	18° 12.010' S	175° 59.925' W	2639.4	1.6	103.0	10.1	98.6
SO267_42-5	26.12.2018 13:55:48	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 505	started	18° 12.014' S	175° 56.842' W	2469.5	2.1	111.8	8.0	103.9
SO267_42-6	26.12.2018 14:19:58	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 506	started	18° 12.004' S	175° 53.803' W	3178.1	1.2	106.7	10.2	111.7
SO267_42-7	26.12.2018 14:43:54	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 507	started	18° 11.978' S	175° 50.759' W	3171.1	1.8	109.9	8.8	86.6
SO267_42-8	26.12.2018 15:08:16	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 508	started	18° 11.998' S	175° 47.704' W	2934.6	1.1	92.9	8.4	75.9
SO267_42-9	26.12.2018 15:31:33	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 509	started	18° 12.000' S	175° 44.645' W	2439.8	1.4	111.9	8.2	79.6
SO267_42-10	26.12.2018 15:54:32	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 510	started	18° 11.992' S	175° 41.586' W	2426.8	1.3	97.0	7.8	80.5
SO267_42-11	26.12.2018 16:17:08	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 511	started	18° 11.998' S	175° 38.544' W	2394.0	1.6	106.6	7.6	105.3
SO267_42-12	26.12.2018 16:40:28	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 512	started	18° 11.995' S	175° 35.487' W	2439.3	1.3	89.1	8.8	100.6
SO267_42-13	26.12.2018 17:03:17	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 513	started	18° 12.006' S	175° 32.430' W	2482.8	1.6	72.8	8.4	92.5
SO267_42-14	26.12.2018 17:25:22	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 514	started	18° 11.995' S	175° 29.387' W	2481.9	1.7	93.2	8.4	67.0
SO267_42-15	26.12.2018 17:47:53	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 515	started	18° 11.998' S	175° 26.307' W	2482.1	1.4	95.1	6.9	80.9
SO267_42-16	26.12.2018 18:10:02	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 516	started	18° 12.001' S	175° 23.290' W	2332.5	1.5	79.0	8.6	87.5
SO267_42-17	26.12.2018 18:32:33	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 517	started	18° 12.004' S	175° 20.217' W	2390.1	0.8	91.9	7.2	91.4
SO267_42-18	26.12.2018 18:55:16	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 518	started	18° 12.005' S	175° 17.198' W	2265.5	1.1	91.1	6.4	103.4
SO267_42-19	26.12.2018 19:17:42	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 519	started	18° 12.004' S	175° 14.105' W	1449.3	2.0	91.4	6.7	78.7
SO267_42-20	26.12.2018 19:40:10	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 520	started	18° 12.002' S	175° 11.046' W	2272.6	2.5	88.8	7.7	108.2
SO267_42-21	26.12.2018 20:03:15	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 521	started	18° 12.005' S	175° 08.034' W	2261.4	2.3	102.4	6.3	94.2
SO267_42-22	26.12.2018 20:26:17	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 522	started	18° 12.006' S	175° 04.985' W	2242.3	2.4	86.8	6.2	78.6
SO267_42-23	26.12.2018 20:50:17	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 523	started	18° 12.006' S	175° 01.936' W	2249.6	2.8	93.3	7.0	70.0
SO267_42-24	26.12.2018 21:13:28	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 524	started	18° 12.004' S	174° 58.887' W	2260.8	3.0	89.2	6.3	99.9
SO267_42-25	26.12.2018 21:36:17	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 525	started	18° 12.004' S	174° 55.839' W	1996.5	2.7	94.1	5.5	96.6
SO267_42-26	26.12.2018 22:00:19	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 526	started	18° 12.012' S	174° 52.792' W	1495.9	3.1	104.5	6.8	98.8
SO267_42-27	26.12.2018 22:24:08	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 527	started	18° 12.001' S	174° 49.742' W	1337.6	3.3	89.3	6.4	87.4
SO267_42-28	26.12.2018 22:46:18	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 528	started	18° 12.003' S	174° 46.692' W	1344.7	3.7	88.3	7.0	102.3
SO267_42-29	26.12.2018 23:11:15	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 529	started	18° 12.035' S	174° 43.722' W	1465.0	1.3	91.4	7.2	124.7
SO267_42-30	26.12.2018 23:34:36	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 530	started	18° 12.015' S	174° 40.663' W	1479.5	1.2	89.1	7.9	87.7
SO267_42-31	26.12.2018 23:58:28	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 531	started	18° 12.033' S	174° 37.575' W	1341.1	1.6	90.8	6.7	133.5
SO267_42-32	27.12.2018 00:21:31	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 532	started	18° 12.006' S	174° 34.513' W	1224.3	1.4	98.4	6.0	102.3
SO267_42-33	27.12.2018 00:45:25	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 533	started	18° 11.977' S	174° 31.468' W	1173.9	1.9	94.0	7.2	103.3
SO267_42-34	27.12.2018 01:07:56	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 534	started	18° 12.002' S	174° 28.555' W	1088.5	1.2	94.3	6.3	77.7
SO267_43-1	27.12.2018 01:28:55	Seismic Source	SEISSRC	station start			Beginn aussetzen der Kopfboj	started	18° 13.250' S	174° 26.101' W	1000.1	3.9	78.5	8.3	125.3
SO267_43-1	27.12.2018 01:30:00	Seismic Source	SEISSRC	information			Kopfboje zu Wasser	started	18° 13.285' S	174° 26.046' W	1003.7	3.4	82.7	8.3	119.6
SO267_43-1	27.12.2018 01:33:55	Seismic Source	SEISSRC	information			1. Bird zu Wasser	started	18° 13.393' S	174° 25.893' W	1002.6	2.6	83.2	9.1	135.1
SO267_43-1	27.12.2018 01:47:49	Seismic Source	SEISSRC	information			2. Bird zu Wasser	started	18° 13.850' S	174° 25.234' W	1003.8	3.9	92.0	8.0	121.9
SO267_43-1	27.12.2018 02:03:42	Seismic Source	SEISSRC	information			3. Bird zu Wasser	started	18° 14.411' S	174° 24.287' W	981.4	3.9	94.9	7.5	121.1
SO267_43-1	27.12.2018 02:13:29	Seismic Source	SEISSRC	information			4. Bird zu Wasser	started	18° 14.747' S	174° 23.689' W	970.3	3.9	99.6	5.8	122.5

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO267_43-1	27.12.2018 02:22:46	Seismic Source	SEISSRC	information			5. Bird zu Wasser	started	18° 15.075' S	174° 23.113' W	948.5	3.9	104.8	7.5	127.6
SO267_43-1	27.12.2018 02:30:50	Seismic Source	SEISSRC	information			6. Bird zu Wasser	started	18° 15.369' S	174° 22.626' W	927.4	4.0	88.2	7.1	120.7
SO267_43-1	27.12.2018 02:39:07	Seismic Source	SEISSRC	information			7. Bird zu Wasser	started	18° 15.674' S	174° 22.111' W	925.1	4.2	80.0	8.4	118.4
SO267_43-1	27.12.2018 02:48:20	Seismic Source	SEISSRC	information			8. Bird zu Wasser	started	18° 15.974' S	174° 21.494' W	904.1	4.5	84.4	7.3	110.7
SO267_43-1	27.12.2018 02:57:43	Seismic Source	SEISSRC	information			9. Bird zu Wasser	started	18° 16.239' S	174° 20.828' W	882.4	4.2	93.0	6.5	111.5
SO267_43-1	27.12.2018 03:01:40	Seismic Source	SEISSRC	information			10. Bird zu Wasser	started	18° 16.342' S	174° 20.550' W	900.2	4.4	90.5	7.2	107.3
SO267_43-1	27.12.2018 03:05:09	Seismic Source	SEISSRC	information			11. Bird zu Wasser	started	18° 16.433' S	174° 20.297' W	903.6	4.4	93.9	6.2	106.3
SO267_43-1	27.12.2018 03:06:40	Seismic Source	SEISSRC	information			12. Bird zu Wasser	started	18° 16.471' S	174° 20.187' W	904.1	4.5	92.4	6.6	112.0
SO267_43-1	27.12.2018 03:13:09	Seismic Source	SEISSRC	information			Streamer ausgesteckt (4123m	started	18° 16.632' S	174° 19.743' W	890.1	4.1	92.6	7.1	111.1
SO267_43-1	27.12.2018 03:17:35	Seismic Source	SEISSRC	information			1. Magnetometer zu Wasser	started	18° 16.737' S	174° 19.441' W	889.6	4.1	94.5	7.3	108.2
SO267_43-1	27.12.2018 03:22:40	Seismic Source	SEISSRC	information			2. Magnetometer zu Wasser	started	18° 16.857' S	174° 19.104' W	879.7	3.9	84.3	6.9	109.9
SO267_43-1	27.12.2018 03:39:33	Seismic Source	SEISSRC	Airgun in water			Stb-Airguns zu Wasser	started	18° 16.841' S	174° 17.987' W	882.3	3.3	101.8	6.9	70.2
SO267_43-1	27.12.2018 03:50:53	Seismic Source	SEISSRC	Airgun in water			Bb-Airguns zu Wasser	started	18° 16.606' S	174° 17.330' W	923.2	3.4	113.0	6.9	65.2
SO267_43-1	27.12.2018 03:56:49	Seismic Source	SEISSRC	information			1. Schuß	started	18° 16.423' S	174° 16.934' W	898.7	4.9	104.0	7.8	64.0
SO267_43-1	27.12.2018 03:58:12	Seismic Source	SEISSRC	information			Magnetometer ausgesteckt (900	started	18° 16.374' S	174° 16.829' W	889.5	5.1	104.0	8.1	65.5
SO267_43-1	27.12.2018 05:13:09	Seismic Source	SEISSRC	profile start			BGR2018-205 & BGR2018-206; rwk: 270	started	18° 11.904' S	174° 16.537' W	826.7	4.6	95.3	4.5	279.1
SO267_43-1	28.12.2018 08:50:17	Seismic Source	SEISSRC	profile end			Letzter Schuss	started	18° 12.001' S	176° 17.880' W	2514.4	4.4	107.0	4.8	267.5
SO267_43-1	28.12.2018 09:15:11	Seismic Source	SEISSRC	on deck			BB-Airgun-Array a. D.	started	18° 12.041' S	176° 19.305' W	2499.8	3.3	110.3	4.7	281.2
SO267_43-1	28.12.2018 09:23:31	Seismic Source	SEISSRC	on deck			Magnetometer a. D., Inkl. 2 x Bir	started	18° 12.096' S	176° 19.780' W	2477.9	3.3	104.4	4.7	248.7
SO267_43-1	28.12.2018 09:55:50	Seismic Source	SEISSRC	information			Streamer-Bird # 03 a. D.	started	18° 13.235' S	176° 21.314' W	2545.9	3.6	102.6	8.4	217.7
SO267_43-1	28.12.2018 10:06:06	Seismic Source	SEISSRC	information			Streamer-Bird # 04 a. D.	started	18° 13.704' S	176° 21.694' W	2545.6	3.7	98.0	8.9	220.8
SO267_43-1	28.12.2018 10:31:09	Seismic Source	SEISSRC	information			Streamer-Bird # 05 a. D.	started	18° 14.995' S	176° 22.284' W	2392.7	3.3	104.6	9.8	202.6
SO267_43-1	28.12.2018 10:56:26	Seismic Source	SEISSRC	information			Streamer-Bird # 06 a. D.	started	18° 16.456' S	176° 22.204' W	2369.0	2.7	101.1	9.6	162.4
SO267_43-1	28.12.2018 11:12:13	Seismic Source	SEISSRC	information			Streamer-Bird # 07 a. D.	started	18° 17.282' S	176° 22.070' W	2362.0	4.2	101.6	11.1	160.7
SO267_43-1	28.12.2018 11:22:33	Seismic Source	SEISSRC	information			Streamer-Bird # 08 a. D.	started	18° 17.949' S	176° 21.858' W	2350.1	4.0	98.4	10.3	163.2
SO267_43-1	28.12.2018 11:32:31	Seismic Source	SEISSRC	information			Streamer-Bird # 09 a. D.	started	18° 18.616' S	176° 21.664' W	2396.6	4.3	95.9	11.6	171.5
SO267_43-1	28.12.2018 11:50:04	Seismic Source	SEISSRC	information			Streamer-Bird # 11 a. D.	started	18° 19.821' S	176° 21.300' W	2487.6	4.3	93.8	10.3	159.6
SO267_43-1	28.12.2018 11:58:12	Seismic Source	SEISSRC	information			Streamer-Bird #12 a. D.	started	18° 20.375' S	176° 21.140' W	2515.3	4.0	112.4	10.3	163.8
SO267_43-1	28.12.2018 12:05:20	Seismic Source	SEISSRC	on deck			Kopfboje an Deck	started	18° 20.848' S	176° 20.992' W	2453.4	4.2	137.1	10.7	166.8
SO267_43-1	28.12.2018 12:08:04	Seismic Source	SEISSRC	station end				started	18° 21.027' S	176° 20.932' W	2431.1	3.9	107.5	10.3	161.2
SO267_44-1	28.12.2018 12:21:04	Seismic Source	SEISSRC	station start				started	18° 20.992' S	176° 20.611' W	2427.3	3.4	111.8	10.5	341.7
SO267_44-1	28.12.2018 12:31:46	Seismic Source	SEISSRC	Airgun in water			Bb. Airgun-Array zu Wasser	started	18° 20.556' S	176° 20.776' W	2453.8	2.0	116.1	10.1	340.2
SO267_44-1	28.12.2018 12:36:54	Seismic Source	SEISSRC	information			Beginn Schießen	started	18° 20.307' S	176° 20.821' W	2497.7	3.6	114.0	10.5	350.0
SO267_44-1	28.12.2018 15:11:29	Seismic Source	SEISSRC	profile start			Profil BGR2018-3R5; rwk: 090°, d: 1	started	18° 11.920' S	176° 17.917' W	2506.5	4.2	114.7	9.7	97.6
SO267_44-1	29.12.2018 00:55:52	Seismic Source	SEISSRC	information			Ausfall stb.-Airgun, Beginn einholen de	started	18° 12.001' S	175° 36.470' W	2349.1	3.9	28.7	7.3	88.3
SO267_44-1	29.12.2018 01:14:03	Seismic Source	SEISSRC	information			Stb.-Airgun Array an Deck	started	18° 12.036' S	175° 35.490' W	2440.7	2.4	30.6	7.2	105.3
SO267_44-1	29.12.2018 02:26:19	Seismic Source	SEISSRC	information			Beginn aussetzen Stb.-Airgun Ar	started	18° 12.000' S	175° 29.849' W	2483.6	3.6	29.6	4.0	95.4
SO267_44-1	29.12.2018 02:35:15	Seismic Source	SEISSRC	information			Stb.-Airgun Array zu Wasser	started	18° 12.000' S	175° 29.371' W	2482.9	2.8	23.2	7.1	94.8
SO267_44-1	29.12.2018 15:37:40	Seismic Source	SEISSRC	profile end				started	18° 12.023' S	174° 21.935' W	1009.8	4.8	337.9	8.7	93.4
SO267_44-1	29.12.2018 15:55:04	Seismic Source	SEISSRC	on deck			Stb-Airgunarrey	started	18° 11.999' S	174° 20.634' W	1002.6	4.6	328.3	10.9	81.4
SO267_44-1	29.12.2018 16:07:42	Seismic Source	SEISSRC	on deck			Bb-Airgunarrey	started	18° 11.941' S	174° 19.671' W	992.2	4.3	328.6	10.8	84.2
SO267_44-1	29.12.2018 16:09:58	Seismic Source	SEISSRC	station end				started	18° 11.931' S	174° 19.508' W	989.2	3.1	355.6	10.4	57.8
SO267_45-1	29.12.2018 16:57:03	Seismic Ocean Bottom Recei	SEISOBR	station start				started	18° 12.108' S	174° 26.300' W	1014.7	5.0	346.8	9.7	274.3
SO267_45-1	29.12.2018 16:58:26	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 534	started	18° 12.114' S	174° 26.412' W	1013.4	4.3	347.4	7.2	267.0
SO267_45-1	29.12.2018 17:15:37	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 534	started	18° 12.214' S	174° 27.988' W	0.0	6.0	322.1	8.4	266.8
SO267_45-1	29.12.2018 17:27:47	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 534	started	18° 11.921' S	174° 28.331' W	0.0	2.1	305.3	5.8	56.0
SO267_45-2	29.12.2018 17:29:02	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 533	started	18° 11.874' S	174° 28.280' W	0.0	3.0	313.3	7.9	18.5
SO267_45-2	29.12.2018 17:46:35	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 533	started	18° 11.979' S	174° 30.028' W	0.0	5.9	336.1	6.9	260.0
SO267_45-2	29.12.2018 18:05:35	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 533	started	18° 11.909' S	174° 31.227' W	0.0	2.0	317.9	5.7	101.9

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO267_45-3	29.12.2018 18:04:26	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 532	started	18° 11.916' S	174° 31.259' W	0.0	2.2	324.2	6.3	82.2
SO267_45-3	29.12.2018 18:26:16	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 532	started	18° 11.933' S	174° 32.994' W	0.0	6.6	358.6	6.0	262.9
SO267_45-3	29.12.2018 18:44:51	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 532	started	18° 11.860' S	174° 34.185' W	0.0	2.1	19.1	11.9	92.4
SO267_45-4	29.12.2018 18:45:50	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 531	started	18° 11.851' S	174° 34.132' W	0.0	3.2	21.7	9.5	64.0
SO267_45-4	29.12.2018 19:21:43	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 531	started	18° 11.983' S	174° 37.255' W	0.0	0.5	328.0	3.4	339.5
SO267_45-4	29.12.2018 19:33:07	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 531	started	18° 11.790' S	174° 37.183' W	0.0	0.4	30.4	5.8	48.3
SO267_45-5	29.12.2018 20:09:40	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 530	started	18° 12.079' S	174° 39.974' W	0.0	0.2	301.6	7.5	230.8
SO267_45-5	29.12.2018 20:15:12	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 530	started	18° 12.079' S	174° 40.097' W	0.0	2.9	326.2	9.0	266.7
SO267_45-5	29.12.2018 20:42:18	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 530	started	18° 11.937' S	174° 40.207' W	0.0	1.1	14.0	8.4	95.2
SO267_45-6	29.12.2018 20:44:38	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 529	started	18° 11.931' S	174° 40.215' W	0.0	0.2	19.4	6.2	206.4
SO267_45-6	29.12.2018 21:13:02	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 529	started	18° 12.053' S	174° 42.382' W	0.0	6.6	10.4	11.2	268.0
SO267_45-6	29.12.2018 21:43:29	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 529	started	18° 12.113' S	174° 43.302' W	0.0	1.3	354.4	13.1	130.6
SO267_45-7	29.12.2018 21:44:45	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 528	started	18° 12.128' S	174° 43.287' W	0.0	0.9	348.3	13.5	144.8
SO267_45-7	29.12.2018 22:04:12	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 528	started	18° 12.207' S	174° 44.814' W	0.0	6.2	2.7	13.6	258.8
SO267_45-7	29.12.2018 22:42:25	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 528	started	18° 11.945' S	174° 46.223' W	0.0	0.6	351.1	13.0	179.8
SO267_45-8	29.12.2018 22:43:49	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 527	started	18° 11.946' S	174° 46.226' W	0.0	0.3	352.2	12.3	274.5
SO267_45-8	29.12.2018 23:04:50	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 527	started	18° 12.135' S	174° 47.795' W	0.0	6.2	343.4	11.3	263.7
SO267_45-8	29.12.2018 23:31:19	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 527	started	18° 12.059' S	174° 49.653' W	0.0	0.8	325.4	4.6	125.4
SO267_45-9	29.12.2018 23:33:49	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 526	started	18° 12.095' S	174° 49.611' W	0.0	1.3	333.7	6.0	98.9
SO267_45-9	29.12.2018 23:51:25	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS# 526	started	18° 12.125' S	174° 50.874' W	0.0	6.7	341.7	13.5	262.9
SO267_45-9	30.12.2018 00:27:07	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 526	started	18° 12.173' S	174° 52.498' W	0.0	2.1	309.3	13.3	93.3
SO267_45-10	30.12.2018 00:27:56	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 525	started	18° 12.172' S	174° 52.466' W	0.0	2.2	308.0	12.2	80.6
SO267_45-10	30.12.2018 01:00:38	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 525	started	18° 12.373' S	174° 55.204' W	0.0	5.6	330.7	17.0	276.1
SO267_45-10	30.12.2018 01:42:50	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 525	started	18° 12.160' S	174° 55.200' W	0.0	2.7	327.5	13.4	123.9
SO267_45-11	30.12.2018 01:43:46	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 524	started	18° 12.177' S	174° 55.166' W	0.0	3.2	316.2	15.7	123.1
SO267_45-11	30.12.2018 02:12:01	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 524	started	18° 12.299' S	174° 56.784' W	0.0	4.0	339.3	15.8	267.5
SO267_45-11	30.12.2018 02:42:38	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 524	started	18° 12.241' S	174° 58.401' W	0.0	2.2	341.9	11.5	136.6
SO267_45-12	30.12.2018 02:43:00	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 523	started	18° 12.248' S	174° 58.392' W	0.0	1.1	339.6	10.6	129.5
SO267_45-12	30.12.2018 03:12:18	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 523	started	18° 12.227' S	175° 00.716' W	0.0	6.5	152.1	15.6	275.4
SO267_45-12	30.12.2018 04:17:36	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 523	started	18° 11.716' S	175° 01.657' W	0.0	1.1	109.6	12.5	229.9
SO267_45-13	30.12.2018 04:18:27	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 522	started	18° 11.728' S	175° 01.667' W	0.0	2.1	110.8	10.5	221.7
SO267_45-13	30.12.2018 04:53:16	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 522	started	18° 11.761' S	175° 04.794' W	0.0	2.3	133.0	2.3	265.3
SO267_45-13	30.12.2018 05:06:55	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 522	started	18° 12.062' S	175° 05.112' W	0.0	1.1	87.5	11.2	330.5
SO267_45-14	30.12.2018 05:10:44	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 521	started	18° 12.073' S	175° 05.341' W	0.0	6.2	87.8	4.7	274.4
SO267_45-14	30.12.2018 05:40:13	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 521	started	18° 11.664' S	175° 07.881' W	0.0	2.9	84.3	11.9	238.9
SO267_45-14	30.12.2018 05:51:37	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 521	started	18° 12.070' S	175° 08.330' W	0.0	1.7	69.6	12.7	232.8
SO267_45-15	30.12.2018 05:55:31	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 520	started	18° 12.165' S	175° 08.590' W	0.0	6.7	66.6	10.3	275.6
SO267_45-15	30.12.2018 06:25:04	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 520	started	18° 11.589' S	175° 11.067' W	0.0	3.3	76.2	9.4	298.5
SO267_45-15	30.12.2018 06:36:05	Seismic Ocean Bottom Recei	SEISOBR	on deck				started	18° 11.994' S	175° 11.331' W	0.0	1.6	72.4	6.6	263.0
SO267_45-16	30.12.2018 06:39:34	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 519	started	18° 12.085' S	175° 11.460' W	0.0	4.7	45.0	1.7	271.8
SO267_45-16	30.12.2018 07:33:12	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 519	started	18° 11.528' S	175° 14.413' W	0.0	0.1	66.1	5.7	231.3
SO267_45-16	30.12.2018 07:53:36	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 519	started	18° 12.011' S	175° 14.373' W	0.0	0.6	67.0	6.9	182.7
SO267_45-17	30.12.2018 07:56:04	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 518	started	18° 12.029' S	175° 14.392' W	0.0	1.1	60.9	7.6	234.8
SO267_45-17	30.12.2018 08:24:24	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 518	started	18° 11.562' S	175° 16.276' W	0.0	5.0	67.7	6.9	276.5
SO267_45-17	30.12.2018 09:00:05	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 318	started	18° 12.203' S	175° 17.769' W	0.0	0.7	54.5	5.1	245.6
SO267_45-18	30.12.2018 09:01:08	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 517	started	18° 12.213' S	175° 17.781' W	0.0	0.9	47.2	5.5	257.8
SO267_45-18	30.12.2018 09:32:01	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 517	started	18° 11.535' S	175° 19.975' W	0.0	3.6	31.6	4.2	279.4
SO267_45-18	30.12.2018 09:55:45	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 517	started	18° 12.272' S	175° 20.704' W	0.0	0.5	41.9	5.2	286.7
SO267_45-19	30.12.2018 09:56:33	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 516	started	18° 12.274' S	175° 20.718' W	0.0	0.6	44.6	4.5	250.3

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO267_45-19	30.12.2018 10:29:47	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 516	started	18° 11.478' S	175° 23.195' W	0.0	4.0	36.1	1.6	278.4
SO267_45-19	30.12.2018 10:53:02	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 516	started	18° 12.352' S	175° 23.749' W	0.0	1.3	41.7	2.7	206.1
SO267_45-20	30.12.2018 10:54:06	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 515	started	18° 12.365' S	175° 23.762' W	0.0	0.9	37.5	2.8	223.2
SO267_45-20	30.12.2018 11:30:04	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 515	started	18° 12.198' S	175° 26.306' W	0.0	1.7	50.2	2.0	295.0
SO267_45-20	30.12.2018 11:47:16	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 515	started	18° 12.137' S	175° 26.557' W	0.0	1.2	7.0	2.1	161.8
SO267_45-21	30.12.2018 11:48:45	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 514	started	18° 12.160' S	175° 26.539' W	0.0	1.9	15.4	1.8	163.1
SO267_45-21	30.12.2018 12:19:14	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 514	started	18° 12.371' S	175° 28.663' W	0.0	4.4	33.7	3.0	272.8
SO267_45-21	30.12.2018 12:41:34	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 514	started	18° 12.338' S	175° 29.668' W	0.0	0.6	245.2	1.0	161.4
SO267_45-22	30.12.2018 12:42:41	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 513	started	18° 12.349' S	175° 29.663' W	0.0	1.2	327.7	0.4	168.4
SO267_45-22	30.12.2018 13:12:44	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 513	started	18° 12.455' S	175° 32.223' W	0.0	3.4	226.2	0.8	272.0
SO267_45-22	30.12.2018 13:30:01	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 513	started	18° 12.083' S	175° 32.645' W	0.0	1.1	212.9	1.7	287.8
SO267_45-23	30.12.2018 13:30:55	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 512	started	18° 12.075' S	175° 32.653' W	0.0	0.6	207.9	2.8	288.2
SO267_45-23	30.12.2018 14:06:11	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 512	started	18° 12.369' S	175° 35.347' W	0.0	1.9	213.9	3.9	259.6
SO267_45-23	30.12.2018 14:27:10	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 512	started	18° 12.199' S	175° 35.661' W	0.0	0.7	228.4	4.5	173.3
SO267_45-24	30.12.2018 14:27:05	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 511	started	18° 12.197' S	175° 35.661' W	0.0	1.1	242.0	3.4	208.5
SO267_45-24	30.12.2018 15:13:49	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 511	started	18° 12.502' S	175° 38.537' W	0.0	0.5	163.4	1.4	287.1
SO267_45-24	30.12.2018 15:28:28	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 511	started	18° 12.155' S	175° 38.777' W	0.0	0.9	178.3	3.8	184.4
SO267_45-25	30.12.2018 15:19:55	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 510	started	18° 12.329' S	175° 38.699' W	0.0	3.5	104.5	1.4	338.4
SO267_45-25	30.12.2018 15:54:15	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 510	started	18° 12.202' S	175° 40.668' W	0.0	4.2	153.5	3.9	264.8
SO267_45-25	30.12.2018 16:13:11	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 510	started	18° 12.093' S	175° 41.840' W	0.0	2.2	120.7	2.2	217.2
SO267_45-26	30.12.2018 15:57:23	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 509	started	18° 12.178' S	175° 40.922' W	0.0	5.2	169.6	3.7	283.4
SO267_45-26	30.12.2018 16:35:49	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 509	started	18° 12.093' S	175° 44.140' W	0.0	5.1	151.3	3.8	259.9
SO267_45-26	30.12.2018 16:48:06	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 509	started	18° 12.051' S	175° 44.751' W	0.0	0.6	98.4	1.5	276.8
SO267_45-27	30.12.2018 16:37:02	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 508	started	18° 12.093' S	175° 44.242' W	0.0	4.7	168.3	3.0	289.6
SO267_45-27	30.12.2018 17:16:00	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 508	started	18° 12.181' S	175° 47.540' W	0.0	2.6	80.0	3.1	274.6
SO267_45-27	30.12.2018 17:26:00	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 508	started	18° 12.171' S	175° 47.635' W	0.0	0.5	102.0	6.5	146.4
SO267_45-28	30.12.2018 17:17:55	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 507	started	18° 12.179' S	175° 47.605' W	0.0	0.9	75.9	5.6	319.0
SO267_45-28	30.12.2018 17:58:41	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 507	started	18° 12.089' S	175° 50.616' W	0.0	2.6	82.2	3.4	304.1
SO267_45-28	30.12.2018 18:05:11	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 507	started	18° 12.026' S	175° 50.844' W	0.0	1.0	69.8	3.8	291.4
SO267_45-29	30.12.2018 18:00:17	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 506	started	18° 12.064' S	175° 50.705' W	0.0	4.2	80.8	4.0	284.1
SO267_45-29	30.12.2018 18:47:43	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 506	started	18° 12.089' S	175° 53.724' W	0.0	2.0	122.5	1.9	312.2
SO267_45-29	30.12.2018 18:53:45	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 506	started	18° 11.941' S	175° 53.775' W	3181.9	0.9	135.8	5.1	99.0
SO267_45-30	30.12.2018 18:49:58	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 505	started	18° 12.011' S	175° 53.788' W	0.0	2.8	107.7	4.0	353.2
SO267_45-30	30.12.2018 19:21:13	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 505	started	18° 11.841' S	175° 55.804' W	0.0	5.3	77.3	4.5	264.3
SO267_45-30	30.12.2018 19:39:07	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 505	started	18° 12.218' S	175° 56.960' W	0.0	1.6	71.3	5.8	245.4
SO267_45-31	30.12.2018 19:32:30	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 504	started	18° 12.066' S	175° 56.740' W	0.0	3.8	81.9	5.3	228.3
SO267_45-31	30.12.2018 20:11:38	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 304	started	18° 11.862' S	175° 59.690' W	0.0	3.6	31.9	9.9	235.7
SO267_45-31	30.12.2018 20:24:38	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 504	started	18° 12.375' S	176° 00.004' W	0.0	1.2	39.8	2.2	236.7
SO267_45-32	30.12.2018 20:17:30	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 503	started	18° 12.072' S	175° 59.901' W	0.0	2.8	40.4	6.9	196.3
SO267_45-32	30.12.2018 20:55:51	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 503	started	18° 11.795' S	176° 02.252' W	0.0	4.3	79.4	1.6	231.9
SO267_45-32	30.12.2018 21:12:12	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 503	started	18° 12.286' S	176° 02.950' W	0.0	1.1	111.9	0.6	253.3
SO267_45-33	30.12.2018 21:13:58	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 502	started	18° 12.314' S	176° 02.982' W	0.0	2.4	108.4	1.5	249.0
SO267_45-33	30.12.2018 21:41:11	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 502	started	18° 11.869' S	176° 05.497' W	0.0	4.0	100.7	4.1	233.4
SO267_45-33	30.12.2018 21:55:01	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 502	started	18° 12.282' S	176° 06.013' W	0.0	1.0	86.5	3.1	225.7
SO267_45-34	30.12.2018 21:41:57	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 501	started	18° 11.893' S	176° 05.539' W	0.0	3.0	93.6	2.9	235.0
SO267_45-34	30.12.2018 22:13:26	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 501	started	18° 12.010' S	176° 07.035' W	0.0	7.0	94.5	3.5	293.0
SO267_45-34	30.12.2018 22:42:00	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 501	started	18° 12.398' S	176° 09.092' W	0.0	1.0	53.5	3.3	257.8
SO267_45-34	30.12.2018 22:43:12	Seismic Ocean Bottom Recei	SEISOBR	station end				started	18° 12.400' S	176° 09.104' W	0.0	0.6	57.3	3.3	263.3
SO267_46-2	30.12.2018 23:04:38	Magnetometer	MAG	station start		Beginn aussetzen Magnetometer, 1. Fisch		started	18° 13.316' S	176° 09.274' W	1959.3	3.6	52.5	3.1	187.8

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO267_46-2	30.12.2018 23:12:48	Magnetometer	MAG	information			2. Fisch zu Wasser	started	18° 13.895' S	176° 09.390' W	1977.1	5.3	47.3	3.2	188.5
SO267_46-2	30.12.2018 23:19:38	Magnetometer	MAG	in the water			Magnetometer ausgesteckt auf 9(	started	18° 14.721' S	176° 09.572' W	2153.3	8.3	59.7	2.8	194.9
SO267_46-2	30.12.2018 23:39:27	Magnetometer	MAG	profile start			rwK: 090°, d: 58,1nm	started	18° 16.445' S	176° 08.176' W	2530.5	8.2	49.7	1.5	88.2
SO267_46-2	31.12.2018 06:51:28	Magnetometer	MAG	alter course			rwk: 087, d:10,6sm	started	18° 16.434' S	175° 07.097' W	2235.9	8.0	99.3	3.5	88.1
SO267_46-2	31.12.2018 08:12:09	Magnetometer	MAG	information			Passieren Profil-WP 03, rwK: 087°, d	started	18° 15.853' S	174° 55.909' W	1936.1	8.1	88.5	3.3	83.6
SO267_46-2	31.12.2018 10:47:46	Magnetometer	MAG	alter course			rwK: 090°, d: 08 sm	started	18° 14.816' S	174° 34.315' W	1254.1	8.0	35.5	4.2	93.1
SO267_46-2	31.12.2018 11:44:46	Magnetometer	MAG	alter course			rwK: 360°, d: 53 sm	started	18° 14.821' S	174° 26.244' W	957.8	7.8	69.8	4.7	84.9
SO267_46-2	31.12.2018 17:00:56	Magnetometer	MAG	information				started	17° 33.131' S	174° 25.707' W	1345.3	8.4	343.7	9.9	359.7
SO267_46-2	31.12.2018 18:28:29	Magnetometer	MAG	alter course			rwk: 090°, d: 2,4sm	started	17° 21.513' S	174° 25.588' W	2218.4	7.4	353.9	10.3	16.4
SO267_46-2	31.12.2018 18:49:19	Magnetometer	MAG	alter course			rwk: 180°, d: 37sm	started	17° 21.124' S	174° 22.883' W	1349.5	7.8	336.7	7.0	103.2
SO267_46-2	31.12.2018 23:30:53	Magnetometer	MAG	alter course			rwK: 270°, d: 12 sm	started	17° 58.374' S	174° 23.257' W	818.3	8.4	109.4	4.5	191.9
SO267_46-2	01.01.2019 00:42:02	Magnetometer	MAG	profile end			Beginn einholen des Magnetome	started	17° 58.737' S	174° 33.085' W	1458.8	6.1	81.7	3.6	266.3
SO267_46-2	01.01.2019 00:55:19	Magnetometer	MAG	information			1. Fisch an Deck	started	17° 58.741' S	174° 34.106' W	1230.0	3.3	105.9	3.5	267.0
SO267_46-2	01.01.2019 00:59:28	Magnetometer	MAG	station end			2. Fisch an Deck, Magnetometer an	started	17° 58.743' S	174° 34.389' W	1250.7	3.6	102.3	3.6	270.6
SO267_47-1	01.01.2019 01:41:13	Dredge	DRG	station start				started	17° 59.666' S	174° 37.066' W	1560.1	0.4	110.1	6.1	241.7
SO267_47-1	01.01.2019 01:43:34	Dredge	DRG	in the water			FW2/SPW2	started	17° 59.659' S	174° 37.074' W	1561.6	0.5	106.7	5.5	326.6
SO267_47-1	01.01.2019 02:13:19	Dredge	DRG	max depth/on ground			Boko, Beginn auslegen, rwK: 016°, d: 0,28n	started	17° 59.650' S	174° 37.071' W	1559.2	0.3	111.1	4.3	293.6
SO267_47-1	01.01.2019 02:33:30	Dredge	DRG	hoisting			Beginn hieven, SLmax: 1850m	started	17° 59.380' S	174° 36.990' W	1379.2	0.5	110.8	5.7	218.4
SO267_47-1	01.01.2019 03:02:14	Dredge	DRG	hoisting			SL: 1375m, frei vom Grund, SZmax:	started	17° 59.383' S	174° 36.994' W	1383.2	0.4	123.3	5.1	195.1
SO267_47-1	01.01.2019 03:32:06	Dredge	DRG	on deck				started	17° 59.379' S	174° 36.993' W	1382.7	0.6	115.1	5.1	54.2
SO267_47-1	01.01.2019 03:43:02	Dredge	DRG	station end				started	17° 59.382' S	174° 36.996' W	1379.8	0.1	125.9	6.1	69.8
SO267_48-1	01.01.2019 05:28:13	Dredge	DRG	station start				started	18° 00.504' S	174° 44.053' W	1056.3	0.6	124.0	5.6	7.8
SO267_48-1	01.01.2019 05:30:14	Dredge	DRG	in the water				started	18° 00.503' S	174° 44.052' W	1055.1	0.3	74.6	7.4	60.5
SO267_48-1	01.01.2019 05:51:17	Dredge	DRG	max depth/on ground			Boko, SL: 1078m	started	18° 00.505' S	174° 44.073' W	1036.9	0.4	15.9	3.9	149.9
SO267_48-1	01.01.2019 05:53:09	Dredge	DRG	profile start			rwk: 301°, d: 0,4sm	started	18° 00.500' S	174° 44.074' W	1044.2	0.6	14.3	3.9	352.7
SO267_48-1	01.01.2019 06:18:27	Dredge	DRG	hoisting			Schiff gestoppt, Beg. Dredgen, maxSL	started	18° 00.300' S	174° 44.421' W	739.1	0.4	2.9	6.7	312.2
SO267_48-1	01.01.2019 07:00:00	Dredge	DRG	hoisting			Dredge frei vom Grund, SL: 738 m, S	started	18° 00.303' S	174° 44.424' W	748.7	0.6	6.8	5.2	218.8
SO267_48-1	01.01.2019 07:20:34	Dredge	DRG	on deck				started	18° 00.293' S	174° 44.418' W	736.8	0.1	0.8	3.2	16.9
SO267_48-1	01.01.2019 07:50:00	Dredge	DRG	station end				started	18° 00.296' S	174° 44.421' W	733.7	0.3	291.5	1.6	216.0
SO267_49-1	01.01.2019 09:33:44	Dredge	DRG	station start			Dredge # 49	started	18° 12.723' S	174° 48.935' W	1350.0	1.6	179.9	6.2	299.7
SO267_49-1	01.01.2019 09:34:41	Dredge	DRG	in the water				started	18° 12.718' S	174° 48.951' W	1345.6	1.0	180.9	5.7	274.1
SO267_49-1	01.01.2019 09:59:48	Dredge	DRG	max depth/on ground			Dredge Boko, SL: 1355 m, SZ: 9	started	18° 12.699' S	174° 48.991' W	1338.4	0.2	143.1	2.5	146.7
SO267_49-1	01.01.2019 10:00:48	Dredge	DRG	profile start			rwK: 335°, d: 0,34 sm, FüG: 1,0	started	18° 12.699' S	174° 48.990' W	1339.8	0.3	182.4	4.9	102.4
SO267_49-1	01.01.2019 10:23:41	Dredge	DRG	profile end			SLmax: 1650 m, SZ: 8 kN	started	18° 12.359' S	174° 49.030' W	1073.5	0.7	196.3	3.6	263.6
SO267_49-1	01.01.2019 10:24:47	Dredge	DRG	information			Beginn dredgen, (SZmax: kN)	started	18° 12.359' S	174° 49.030' W	1071.4	0.3	206.4	4.9	321.0
SO267_49-1	01.01.2019 10:53:12	Dredge	DRG	hoisting			Dredge frei vom Grund, SL: 1067 m, S	started	18° 12.358' S	174° 49.031' W	1068.9	0.2	204.9	2.2	330.8
SO267_49-1	01.01.2019 11:20:53	Dredge	DRG	on deck				started	18° 12.359' S	174° 49.031' W	1073.0	0.2	158.2	1.6	251.2
SO267_49-1	01.01.2019 11:27:48	Dredge	DRG	station end				started	18° 12.359' S	174° 49.031' W	1071.3	0.8	300.0	0.2	266.0
SO267_50-1	01.01.2019 13:21:24	Dredge	DRG	station start				started	18° 08.860' S	174° 55.827' W	1720.2	0.4	355.3	10.5	39.5
SO267_50-1	01.01.2019 13:25:12	Dredge	DRG	in the water			FW2/SPW2	started	18° 08.839' S	174° 55.829' W	1709.2	0.6	350.3	9.7	16.9
SO267_50-1	01.01.2019 13:58:58	Dredge	DRG	max depth/on ground			Boko, SL: 1728m, Beginn auslegen, rwK: 0(	started	18° 08.803' S	174° 55.825' W	1691.8	0.7	325.2	5.1	337.7
SO267_50-1	01.01.2019 14:27:45	Dredge	DRG	hoisting			Beginn hieven, SLmax: 2050m	started	18° 08.381' S	174° 55.781' W	1322.4	0.2	332.7	1.5	214.8
SO267_50-1	01.01.2019 15:16:16	Dredge	DRG	hoisting			frei vom Grund, SL. 1320m, SZmax:	started	18° 08.378' S	174° 55.778' W	1319.8	0.2	5.9	5.8	96.1
SO267_50-1	01.01.2019 15:46:19	Dredge	DRG	on deck				started	18° 08.380' S	174° 55.777' W	1321.9	0.5	353.8	6.0	37.5
SO267_50-1	01.01.2019 15:56:49	Dredge	DRG	station end				started	18° 08.387' S	174° 55.781' W	1328.1	0.6	359.7	10.1	280.6
SO267_51-1	01.01.2019 15:57:41	KONGSBERG EM122	EM122	profile start			rwk: 000°, d: 8,0sm	started	18° 08.383' S	174° 55.781' W	1322.4	1.3	356.0	11.6	11.1
SO267_51-1	01.01.2019 17:11:02	KONGSBERG EM122	EM122	alter course			rwk: 090°, d: 2,4sm	started	18° 00.150' S	174° 55.343' W	2211.9	7.5	337.2	22.2	43.8
SO267_51-1	01.01.2019 17:29:52	KONGSBERG EM122	EM122	alter course			rwk: 180°, d: 9,8sm	started	18° 00.221' S	174° 52.695' W	2167.6	7.6	351.5	11.6	141.1
SO267_51-1	01.01.2019 18:41:06	KONGSBERG EM122	EM122	alter course			rwk: 090°, d: 2,5sm	started	18° 09.813' S	174° 52.741' W	1638.9	8.5	340.1	14.4	131.9

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO267_51-1	01.01.2019 18:58:38	KONGSBERG EM122	EM122	alter course			rwk:000°, d:10,3sm	started	18° 10.034' S	174° 50.328' W	1369.2	6.6	327.4	20.3	84.1
SO267_51-1	01.01.2019 21:38:37	KONGSBERG EM122	EM122	alter course			rwK: 090°, d: 03 sm	started	17° 59.800' S	174° 50.023' W	2075.6	7.4	195.7	9.7	13.5
SO267_51-1	01.01.2019 21:56:06	KONGSBERG EM122	EM122	alter course			rwK: 180°, d: 23 sm	started	17° 59.569' S	174° 47.710' W	1414.6	7.7	207.1	8.8	89.6
SO267_51-1	01.01.2019 23:05:02	KONGSBERG EM122	EM122	information		(Unterbrechung Profil wegen HF-St		started	18° 07.933' S	174° 47.401' W	1481.3	7.5	180.5	8.7	182.1
SO267_51-1	02.01.2019 01:49:44	KONGSBERG EM122	EM122	information		Fortsetzen des Profils, rwK: 180°, d:		started	18° 10.564' S	174° 47.897' W	1359.1	6.3	146.5	9.1	170.0
SO267_51-1	02.01.2019 02:46:28	KONGSBERG EM122	EM122	alter course			rwK: 268°, d: 4,4nm	started	18° 17.953' S	174° 48.111' W	965.5	7.8	149.8	11.7	187.0
SO267_51-1	02.01.2019 03:20:38	KONGSBERG EM122	EM122	alter course			rwk: 257°, d: 11,6sm	started	18° 18.528' S	174° 52.963' W	1082.4	8.1	145.2	11.2	266.0
SO267_51-1	02.01.2019 04:45:09	KONGSBERG EM122	EM122	information		Unterbrechung Profil; Anfahrt HF-S		started	18° 21.190' S	175° 04.720' W	2223.5	8.2	151.0	5.4	252.9
SO267_51-1	02.01.2019 08:24:04	KONGSBERG EM122	EM122	information		Fortsetzung Profil, rwK: 267°, d: 1		started	18° 21.114' S	175° 04.626' W	2221.3	8.1	106.7	6.0	248.1
SO267_51-1	02.01.2019 10:00:00	KONGSBERG EM122	EM122	alter course			rwK: 270°, d: 12 sm	started	18° 21.852' S	175° 18.048' W	1629.0	8.4	132.7	7.6	261.2
SO267_51-1	02.01.2019 11:27:28	KONGSBERG EM122	EM122	alter course			rwK: 360°, d: 5 sm	started	18° 21.794' S	175° 30.309' W	2474.0	8.3	122.4	6.0	272.8
SO267_51-1	02.01.2019 12:12:39	KONGSBERG EM122	EM122	information		Unterbrechung Profil, Anfahrt HF-S		started	18° 16.620' S	175° 31.103' W	2465.5	4.2	106.3	6.0	2.7
SO267_51-1	02.01.2019 14:37:20	KONGSBERG EM122	EM122	information		Fortsetzung Profil, rwK: 180°, d: 10		started	18° 16.413' S	175° 30.433' W	2471.4	0.2	108.9	4.9	96.0
SO267_51-1	02.01.2019 16:00:57	KONGSBERG EM122	EM122	alter course			rwk: 090°, 12,2sm	started	18° 27.100' S	175° 30.789' W	2244.3	6.8	108.1	7.0	130.0
SO267_51-1	02.01.2019 17:32:51	KONGSBERG EM122	EM122	alter course			rwk: 084°, d: 12,5sm	started	18° 27.208' S	175° 17.889' W	2293.6	8.4	115.1	8.5	91.5
SO267_51-1	02.01.2019 19:06:08	KONGSBERG EM122	EM122	alter course			rwk: 067°, d: 12 sm	started	18° 26.014' S	175° 04.790' W	2187.8	7.7	132.6	8.5	76.4
SO267_51-1	02.01.2019 20:43:10	KONGSBERG EM122	EM122	station end				started	18° 21.164' S	174° 52.663' W	1450.5	8.3	82.8	8.5	64.5
SO267_52-1	02.01.2019 00:03:36	Heat-Flow probe	HF	station start				started	18° 10.172' S	174° 47.906' W	1354.5	0.4	175.8	8.0	41.4
SO267_52-1	02.01.2019 00:15:45	Heat-Flow probe	HF	in the water			FW2/SPW2	started	18° 10.178' S	174° 47.932' W	1354.8	0.3	166.4	9.7	35.0
SO267_52-1	02.01.2019 00:19:29	Heat-Flow probe	HF	information		Bei SL: 50m Transponder am Dr		started	18° 10.178' S	174° 47.932' W	1354.4	0.5	167.3	7.8	343.5
SO267_52-1	02.01.2019 00:45:48	Heat-Flow probe	HF	max depth/on ground			Boko, SLmax: 1381m	started	18° 10.174' S	174° 47.926' W	1354.4	0.2	150.7	11.6	164.5
SO267_52-1	02.01.2019 01:00:25	Heat-Flow probe	HF	hoisting			Beginn hieven, SZmax: 26,0kN	started	18° 10.181' S	174° 47.924' W	1356.3	0.6	165.5	8.8	40.9
SO267_52-1	02.01.2019 01:29:36	Heat-Flow probe	HF	information			Transponder an Deck	started	18° 10.181' S	174° 47.926' W	1356.4	0.3	161.9	10.1	117.2
SO267_52-1	02.01.2019 01:39:35	Heat-Flow probe	HF	on deck				started	18° 10.184' S	174° 47.924' W	1355.5	0.1	161.1	8.4	47.2
SO267_52-1	02.01.2019 01:41:07	Heat-Flow probe	HF	station end				started	18° 10.184' S	174° 47.927' W	1360.3	0.3	145.7	8.5	36.0
SO267_53-1	02.01.2019 05:28:51	Heat-Flow probe	HF	station start				started	18° 16.338' S	175° 03.650' W	2221.4	0.4	122.0	5.8	180.6
SO267_53-1	02.01.2019 05:36:10	Heat-Flow probe	HF	in the water			Transponder bei SL: 50m	started	18° 16.314' S	175° 03.635' W	2218.8	0.2	130.0	7.8	128.1
SO267_53-1	02.01.2019 06:21:07	Heat-Flow probe	HF	max depth/on ground			Boko, maxSL: 2247m	started	18° 16.308' S	175° 03.635' W	2218.6	0.7	122.3	6.8	77.6
SO267_53-1	02.01.2019 06:36:11	Heat-Flow probe	HF	hoisting			maxSZ: 32,7kN	started	18° 16.317' S	175° 03.640' W	2221.5	0.3	113.7	7.1	68.5
SO267_53-1	02.01.2019 07:19:14	Heat-Flow probe	HF	information		Bei SL: 50 m 1 x Transponder a.		started	18° 16.318' S	175° 03.640' W	2221.7	0.6	104.7	7.0	27.7
SO267_53-1	02.01.2019 07:26:41	Heat-Flow probe	HF	on deck				started	18° 16.319' S	175° 03.638' W	2220.2	0.7	118.4	5.0	348.6
SO267_53-1	02.01.2019 07:36:45	Heat-Flow probe	HF	station end				started	18° 16.313' S	175° 03.639' W	2218.5	0.4	116.6	5.4	13.6
SO267_54-1	02.01.2019 12:27:22	Heat-Flow probe	HF	station start				started	18° 16.372' S	175° 30.609' W	2469.9	0.9	88.4	6.2	151.8
SO267_54-1	02.01.2019 12:31:40	Heat-Flow probe	HF	in the water			FW2/SPW2	started	18° 16.379' S	175° 30.577' W	2470.6	0.3	96.6	5.5	38.1
SO267_54-1	02.01.2019 12:35:22	Heat-Flow probe	HF	information		Bei SL: 50m Transponder am Dr		started	18° 16.386' S	175° 30.541' W	2697.9	0.7	97.9	7.2	170.6
SO267_54-1	02.01.2019 13:20:31	Heat-Flow probe	HF	max depth/on ground			Boko, SLmax: 2502m	started	18° 16.407' S	175° 30.441' W	2471.4	0.8	84.0	6.3	195.5
SO267_54-1	02.01.2019 13:35:33	Heat-Flow probe	HF	hoisting			Beginn hieven, SZmax: 34,1kN	started	18° 16.409' S	175° 30.437' W	2474.5	0.1	113.2	4.8	239.4
SO267_54-1	02.01.2019 14:24:28	Heat-Flow probe	HF	information			Transponder an Deck	started	18° 16.411' S	175° 30.435' W	2469.1	0.4	110.8	4.0	246.6
SO267_54-1	02.01.2019 14:34:30	Heat-Flow probe	HF	on deck				started	18° 16.411' S	175° 30.436' W	2472.5	0.3	109.0	5.0	164.3
SO267_54-1	02.01.2019 14:35:52	Heat-Flow probe	HF	station end				started	18° 16.413' S	175° 30.434' W	2472.7	0.5	116.3	3.5	140.0
SO267_55-1	02.01.2019 22:07:18	Autonomous Underwater Veh	AUV	station start				started	18° 10.939' S	174° 48.886' W	1352.2	0.1	55.3	7.0	271.2
SO267_55-1	02.01.2019 22:16:15	Autonomous Underwater Veh	AUV	in the water			AUV z. W.	started	18° 10.941' S	174° 48.882' W	1351.0	0.3	NaN	NaN	285.5
SO267_55-1	02.01.2019 22:30:49	Autonomous Underwater Veh	AUV	information			AUV abgetaucht	started	18° 10.945' S	174° 48.888' W	0.0	0.5	51.2	6.2	132.3
SO267_55-1	03.01.2019 19:06:38	Autonomous Underwater Veh	AUV	at surface			AUV aufgetaucht	started	18° 11.528' S	174° 54.269' W	1693.6	3.7	99.1	4.1	6.9
SO267_55-1	03.01.2019 19:44:08	Autonomous Underwater Veh	AUV	on deck				started	18° 10.478' S	174° 54.324' W	1798.4	0.2	103.0	4.3	150.4
SO267_55-1	03.01.2019 19:52:02	Autonomous Underwater Veh	AUV	station end				started	18° 10.426' S	174° 54.347' W	1796.3	1.7	111.4	4.2	326.1
SO267_56-1	03.01.2019 00:57:29	Dredge	DRG	station start				started	18° 05.792' S	175° 09.693' W	2162.1	0.6	48.1	5.4	95.5
SO267_56-1	03.01.2019 00:59:02	Dredge	DRG	in the water			FW2/SPW2	started	18° 05.796' S	175° 09.684' W	2139.4	1.1	48.4	5.1	346.7
SO267_56-1	03.01.2019 01:38:33	Dredge	DRG	max depth/on ground		SL: 2113m, Beginn auslegen, rwK: 068°,		started	18° 05.663' S	175° 09.647' W	1851.4	0.3	66.7	3.3	146.8

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO267_56-1	03.01.2019 02:12:00	Dredge	DRG	hoisting			Beginn hieven	started	18° 05.481' S	175° 09.153' W	1690.6	0.7	NaN	NaN	157.4
SO267_56-1	03.01.2019 02:56:50	Dredge	DRG	information			Frei vom Grund, SZmax: 64,2k	started	18° 05.480' S	175° 09.149' W	1698.7	1.1	NaN	NaN	159.0
SO267_56-1	03.01.2019 03:34:39	Dredge	DRG	on deck				started	18° 05.478' S	175° 09.151' W	1675.8	0.3	202.6	0.9	253.4
SO267_56-1	03.01.2019 03:40:31	Dredge	DRG	station end				started	18° 05.497' S	175° 09.094' W	1736.8	0.6	230.3	1.5	328.4
SO267_57-1	03.01.2019 04:43:30	Dredge	DRG	station start				started	18° 13.387' S	175° 14.031' W	1786.5	0.4	73.2	1.1	278.9
SO267_57-1	03.01.2019 04:48:04	Dredge	DRG	in the water				started	18° 13.407' S	175° 14.050' W	1768.3	0.6	139.6	2.2	194.4
SO267_57-1	03.01.2019 05:22:07	Dredge	DRG	max depth/on ground			Boko, SL: 1807m	started	18° 13.411' S	175° 14.050' W	1773.3	0.3	179.7	1.4	354.5
SO267_57-1	03.01.2019 05:24:27	Dredge	DRG	profile start			Beg. auslegen, rwk: 264°, d: 0,41	started	18° 13.411' S	175° 14.053' W	1766.2	1.1	149.6	0.8	238.4
SO267_57-1	03.01.2019 05:50:09	Dredge	DRG	hoisting			Schiff gestoppt, Beg. dredgen, maxSL	started	18° 13.450' S	175° 14.478' W	1508.1	0.5	36.4	4.1	170.2
SO267_57-1	03.01.2019 06:31:06	Dredge	DRG	hoisting			Dredge frei vom Grund, SL: 1500m, max	started	18° 13.454' S	175° 14.475' W	1504.4	0.3	29.8	5.0	343.5
SO267_57-1	03.01.2019 07:04:28	Dredge	DRG	on deck				started	18° 13.448' S	175° 14.478' W	1507.0	0.4	49.6	1.7	302.3
SO267_57-1	03.01.2019 07:20:18	Dredge	DRG	station end				started	18° 13.452' S	175° 14.475' W	1506.8	0.3	291.4	1.9	108.4
SO267_58-1	03.01.2019 08:27:16	Dredge	DRG	station start				started	18° 21.322' S	175° 16.211' W	2100.1	1.4	265.2	1.6	197.1
SO267_58-1	03.01.2019 08:29:25	Dredge	DRG	in the water				started	18° 21.343' S	175° 16.242' W	2070.7	0.8	259.2	2.3	158.7
SO267_58-1	03.01.2019 09:07:32	Dredge	DRG	max depth/on ground			SL: m, SZ: kN	started	18° 21.358' S	175° 16.252' W	2057.0	0.4	241.7	2.9	144.9
SO267_58-1	03.01.2019 09:08:35	Dredge	DRG	profile start			RWk. 261°, d: 0,4 sm, FüG: 1,0	started	18° 21.356' S	175° 16.251' W	2058.8	0.4	255.4	3.0	137.9
SO267_58-1	03.01.2019 09:38:48	Dredge	DRG	profile end			SLmax: 2450 m, SZ: 15 kN	started	18° 21.429' S	175° 16.699' W	1584.4	1.4	281.2	3.7	170.6
SO267_58-1	03.01.2019 09:39:41	Dredge	DRG	information			Beginn dredgen, (SZmax: 48 kN	started	18° 21.430' S	175° 16.700' W	1590.5	0.2	289.4	4.0	329.6
SO267_58-1	03.01.2019 10:32:19	Dredge	DRG	hoisting			Dredge frei vom Grund, SL: 1606 m, S	started	18° 21.429' S	175° 16.696' W	1589.8	0.5	218.9	1.3	262.7
SO267_58-1	03.01.2019 11:11:33	Dredge	DRG	on deck				started	18° 21.423' S	175° 16.697' W	1590.3	0.5	170.6	4.7	82.1
SO267_58-1	03.01.2019 11:20:36	Dredge	DRG	station end				started	18° 21.425' S	175° 16.697' W	1588.4	0.3	173.4	4.3	231.0
SO267_59-1	03.01.2019 14:18:37	Dredge	DRG	station start				started	18° 33.280' S	174° 55.630' W	1402.6	0.5	124.1	10.5	162.7
SO267_59-1	03.01.2019 14:19:51	Dredge	DRG	in the water			FW2/SPW2	started	18° 33.286' S	174° 55.627' W	1405.7	0.6	121.6	10.0	129.6
SO267_59-1	03.01.2019 14:47:31	Dredge	DRG	max depth/on ground			Boko, SL: 1418m, Beginn auslegen, rwK: 11	started	18° 33.391' S	174° 55.534' W	1400.3	0.5	140.5	9.7	3.5
SO267_59-1	03.01.2019 15:10:55	Dredge	DRG	hoisting			Schiff gestoppt, Beg. dredgen, maxSL	started	18° 33.540' S	174° 55.217' W	1156.9	0.3	134.6	6.6	260.8
SO267_59-1	03.01.2019 15:46:43	Dredge	DRG	hoisting			Dredge frei vom Grund, SL: 1140m, max	started	18° 33.536' S	174° 55.214' W	1161.0	0.8	145.1	6.7	228.4
SO267_59-1	03.01.2019 16:13:41	Dredge	DRG	on deck				started	18° 33.540' S	174° 55.224' W	1156.7	0.4	127.7	7.6	280.5
SO267_59-1	03.01.2019 16:28:01	Dredge	DRG	station end				started	18° 33.532' S	174° 55.216' W	1152.6	0.3	139.9	6.3	1.2
SO267_60-1	03.01.2019 20:58:24	Dredge	DRG	station start				started	18° 17.120' S	174° 59.241' W	2203.7	1.3	135.3	1.8	132.6
SO267_60-1	03.01.2019 21:00:44	Dredge	DRG	in the water				started	18° 17.134' S	174° 59.235' W	2206.8	0.7	122.6	2.2	120.2
SO267_60-1	03.01.2019 21:41:08	Dredge	DRG	max depth/on ground			SL: 2240 m, SZ: 17 kN	started	18° 17.160' S	174° 59.219' W	2219.8	0.5	180.6	2.1	219.9
SO267_60-1	03.01.2019 21:42:13	Dredge	DRG	profile start			Beginn auslegen Draht, rwk. 353°, d: 0,3 sn	started	18° 17.160' S	174° 59.220' W	2222.2	0.4	191.4	1.9	188.3
SO267_60-1	03.01.2019 22:03:02	Dredge	DRG	profile end			SL: 2500 m, SZ: 16 kN	started	18° 16.840' S	174° 59.260' W	1926.6	0.4	156.0	1.6	261.3
SO267_60-1	03.01.2019 22:04:14	Dredge	DRG	information			Beginn dredgen, (SZmax: 44 kN	started	18° 16.840' S	174° 59.259' W	1917.0	0.6	140.5	2.2	46.9
SO267_60-1	03.01.2019 22:34:33	Dredge	DRG	hoisting			Dredge frei vom Grund, SL: 1931 m, S	started	18° 16.844' S	174° 59.262' W	1896.2	0.2	111.4	2.2	306.4
SO267_60-1	03.01.2019 23:15:39	Dredge	DRG	on deck				started	18° 16.840' S	174° 59.263' W	1912.6	0.1	161.5	1.9	49.5
SO267_60-1	03.01.2019 23:24:45	Dredge	DRG	station end				started	18° 16.840' S	174° 59.261' W	1906.3	0.3	165.1	2.2	318.5
SO267_61-1	03.01.2019 23:34:16	Magnetometer	MAG	station start				started	18° 16.431' S	174° 59.295' W	2221.5	4.5	176.0	2.6	355.2
SO267_61-1	03.01.2019 23:35:12	Magnetometer	MAG	information			1. Fisch zu Wasser	started	18° 16.362' S	174° 59.299' W	2221.0	4.5	163.6	2.5	1.1
SO267_61-1	03.01.2019 23:39:31	Magnetometer	MAG	information			2. Fisch zu Wasser	started	18° 16.026' S	174° 59.323' W	2222.0	5.3	185.0	2.3	352.8
SO267_61-1	03.01.2019 23:54:38	Magnetometer	MAG	in the water			Magnetometer auf 900m ausgest	started	18° 14.393' S	174° 59.386' W	2239.4	6.9	213.9	3.4	2.4
SO267_61-1	04.01.2019 01:04:43	Magnetometer	MAG	profile start			rwK: 269°, d: 13,4nm	started	18° 02.864' S	174° 59.097' W	2252.8	9.4	167.2	3.8	347.5
SO267_61-1	04.01.2019 02:25:43	Magnetometer	MAG	alter course			rwK: 270°, d: 44,5nm	started	18° 03.011' S	175° 13.222' W	2401.4	10.6	146.4	7.5	268.9
SO267_61-1	04.01.2019 02:30:11	Magnetometer	MAG	information			Magnetometer Probleme, Beginn einholen M	started	18° 03.030' S	175° 14.007' W	2397.5	10.1	141.0	8.4	263.3
SO267_61-1	04.01.2019 02:41:47	Magnetometer	MAG	information			1. Fisch an Deck	started	18° 03.038' S	175° 15.906' W	2402.7	6.3	138.7	6.6	270.7
SO267_61-1	04.01.2019 02:47:18	Magnetometer	MAG	on deck			2. Fisch an Deck, Magnetometer an	started	18° 03.033' S	175° 16.424' W	2401.6	4.5	126.0	6.5	275.2
SO267_61-1	04.01.2019 02:48:59	Magnetometer	MAG	station end				started	18° 03.029' S	175° 16.562' W	2400.7	5.4	131.4	7.2	283.6
SO267_62-1	04.01.2019 08:28:37	Heat-Flow probe	HF	station start				started	18° 16.378' S	175° 53.204' W	3168.3	1.1	118.7	9.8	149.5
SO267_62-1	04.01.2019 08:32:31	Heat-Flow probe	HF	in the water			HF z. W.	started	18° 16.399' S	175° 53.165' W	3167.9	0.3	116.4	11.7	151.1

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO267_62-1	04.01.2019 08:37:04	Heat-Flow probe	HF	information			Bei SL: 50 m 1 x Transponder z.	started	18° 16.400' S	175° 53.170' W	3169.1	0.6	111.0	11.4	148.4
SO267_62-1	04.01.2019 09:32:34	Heat-Flow probe	HF	max depth/on ground			SLmax: 3201 m, SZ: 37/25 kN	started	18° 16.396' S	175° 53.165' W	3169.1	0.2	123.9	11.9	320.9
SO267_62-1	04.01.2019 09:47:23	Heat-Flow probe	HF	hoisting			SZmax: 40 kN bei SL: 3186 m	started	18° 16.398' S	175° 53.164' W	3171.4	0.1	116.5	11.9	148.8
SO267_62-1	04.01.2019 10:46:42	Heat-Flow probe	HF	information			Bei SL: 50 m 1 x Transponder a.	started	18° 16.401' S	175° 53.165' W	3172.8	0.6	123.1	12.8	55.7
SO267_62-1	04.01.2019 10:53:36	Heat-Flow probe	HF	on deck			HF a. D.	started	18° 16.393' S	175° 53.161' W	3167.8	0.3	122.9	12.1	350.9
SO267_62-1	04.01.2019 10:58:20	Heat-Flow probe	HF	station end				started	18° 16.395' S	175° 53.160' W	3351.9	0.5	125.8	11.3	205.0
SO267_63-1	04.01.2019 13:31:45	Heat-Flow probe	HF	station start				started	18° 30.369' S	175° 38.961' W	2931.9	0.6	120.6	13.2	91.3
SO267_63-1	04.01.2019 13:37:02	Heat-Flow probe	HF	in the water			FW2/SPW2	started	18° 30.406' S	175° 38.926' W	2933.7	0.4	123.9	10.5	215.5
SO267_63-1	04.01.2019 13:41:35	Heat-Flow probe	HF	information			Bei SL: 50m Transponder am Dr	started	18° 30.433' S	175° 38.896' W	2930.6	0.6	126.6	13.7	116.3
SO267_63-1	04.01.2019 14:43:04	Heat-Flow probe	HF	max depth/on ground			Boko, SLmax: 2972m	started	18° 30.431' S	175° 38.888' W	2934.3	0.9	109.1	12.4	7.3
SO267_63-1	04.01.2019 14:57:44	Heat-Flow probe	HF	hoisting			Beginn hieven, SZmax: 40,0kN	started	18° 30.437' S	175° 38.890' W	2937.3	0.8	99.8	13.9	341.9
SO267_63-1	04.01.2019 16:03:43	Heat-Flow probe	HF	on deck				started	18° 30.433' S	175° 38.887' W	2932.3	0.5	114.4	11.6	127.2
SO267_63-1	04.01.2019 16:06:29	Heat-Flow probe	HF	station end				started	18° 30.436' S	175° 38.890' W	2932.9	0.2	115.3	13.0	89.3
SO267_64-1	04.01.2019 16:07:21	Gravity Corer	GC	station start			GC 6m	started	18° 30.438' S	175° 38.892' W	2931.0	0.1	110.8	13.7	153.7
SO267_64-1	04.01.2019 16:13:23	Gravity Corer	GC	in the water			Transponder bei SL: 50m	started	18° 30.443' S	175° 38.890' W	2934.0	0.5	118.7	14.5	2.4
SO267_64-1	04.01.2019 17:11:01	Gravity Corer	GC	max depth/on ground			Boko, maxSL: 2987m	started	18° 30.440' S	175° 38.893' W	2938.9	0.4	94.4	15.4	33.6
SO267_64-1	04.01.2019 17:12:07	Gravity Corer	GC	hoisting			Hieven, maxSZ: 41,2kN	started	18° 30.437' S	175° 38.891' W	2941.3	0.6	92.4	15.0	350.1
SO267_64-1	04.01.2019 18:12:36	Gravity Corer	GC	on deck				started	18° 30.442' S	175° 38.892' W	2936.0	0.3	115.1	13.7	321.9
SO267_64-1	04.01.2019 18:14:51	Gravity Corer	GC	station end				started	18° 30.442' S	175° 38.890' W	2936.3	0.8	103.0	15.2	330.2
SO267_65-1	05.01.2019 03:50:35	Dredge	DRG	station start				started	18° 23.860' S	175° 51.846' W	2495.4	0.3	111.0	15.1	12.4
SO267_65-1	05.01.2019 04:09:57	Dredge	DRG	in the water				started	18° 23.764' S	175° 51.769' W	2541.4	0.7	123.2	14.2	332.2
SO267_65-1	05.01.2019 04:56:06	Dredge	DRG	max depth/on ground			Boko, SL: 2564m	started	18° 23.752' S	175° 51.761' W	2545.1	1.0	111.4	14.9	6.5
SO267_65-1	05.01.2019 04:58:22	Dredge	DRG	profile start			Beg. auslegen, rwk: 122°, d: 0,41	started	18° 23.760' S	175° 51.743' W	2539.2	1.1	106.1	16.5	128.0
SO267_65-1	05.01.2019 05:25:13	Dredge	DRG	hoisting			Schiff aufgestoppt, Beg. dredgen, maxS	started	18° 23.970' S	175° 51.391' W	2166.3	0.4	119.8	18.5	59.1
SO267_65-1	05.01.2019 06:12:48	Dredge	DRG	hoisting			Dredge frei vom Grund, SL: 2150m, max	started	18° 23.962' S	175° 51.399' W	2176.8	0.4	117.8	16.4	194.0
SO267_65-1	05.01.2019 06:55:03	Dredge	DRG	on deck				started	18° 23.943' S	175° 51.505' W	2194.4	0.6	105.7	14.6	258.8
SO267_65-1	05.01.2019 07:10:17	Dredge	DRG	station end				started	18° 23.943' S	175° 51.507' W	2193.9	0.1	98.0	15.9	339.1
SO267_66-1	05.01.2019 08:48:38	Dredge	DRG	station start				started	18° 12.424' S	175° 48.506' W	3078.8	0.2	108.9	17.0	66.7
SO267_66-1	05.01.2019 09:00:18	Dredge	DRG	in the water				started	18° 12.448' S	175° 48.491' W	3058.6	0.6	110.5	17.2	60.6
SO267_66-1	05.01.2019 09:56:45	Dredge	DRG	max depth/on ground			SL: 3109 m, SZ: 24 kN	started	18° 12.447' S	175° 48.501' W	3064.9	0.3	88.0	15.3	65.9
SO267_66-1	05.01.2019 09:57:20	Dredge	DRG	profile start			Beginn auslegen Drahr, rwK: 123°, d: 0,4 sm	started	18° 12.447' S	175° 48.498' W	3079.9	1.1	104.2	17.2	88.5
SO267_66-1	05.01.2019 10:39:46	Dredge	DRG	station end			SLmax: 3450 m, SZ: 25 kN	started	18° 12.677' S	175° 48.116' W	2720.6	0.2	98.8	14.4	135.1
SO267_66-1	05.01.2019 10:40:03	Dredge	DRG	information			Beginn dredgen, (SZmax: kN)	started	18° 12.676' S	175° 48.117' W	2722.9	0.4	97.9	13.9	193.0
SO267_66-1	05.01.2019 11:19:08	Dredge	DRG	information			Frei vom Grund, SZmax: 34,9k	started	18° 12.676' S	175° 48.109' W	2718.5	0.4	106.4	14.4	161.3
SO267_66-1	05.01.2019 12:15:49	Dredge	DRG	on deck				started	18° 12.805' S	175° 48.152' W	2784.6	0.4	103.5	16.8	205.7
SO267_66-1	05.01.2019 12:31:36	Dredge	DRG	station end				started	18° 12.828' S	175° 48.158' W	2801.1	0.6	107.8	13.6	240.9
SO267_67-1	05.01.2019 12:37:41	KONGSBERG EM122	EM122	profile start			rwK: 357°, d: 7,5nm	started	18° 12.732' S	175° 48.022' W	2696.5	3.6	103.1	14.4	97.6
SO267_67-1	05.01.2019 13:30:00	KONGSBERG EM122	EM122	alter course			rwK: 008°, d: 9nm	started	18° 05.206' S	175° 48.917' W	2376.3	9.9	109.3	20.0	13.0
SO267_67-1	05.01.2019 14:11:27	KONGSBERG EM122	EM122	information			Unterbrechung Profil, Anfahr Dre	started	17° 58.710' S	175° 47.971' W	1814.6	10.2	120.1	19.1	9.4
SO267_67-1	05.01.2019 17:33:45	KONGSBERG EM122	EM122	information			Fortsetzung Profil, rwk: 008°, d: 2,	started	17° 58.191' S	175° 47.895' W	1797.2	7.3	118.2	18.3	14.4
SO267_67-1	05.01.2019 17:47:36	KONGSBERG EM122	EM122	alter course			rwk: 037°, d: 8,4sm	started	17° 56.275' S	175° 47.614' W	1652.0	9.0	127.4	18.7	5.9
SO267_67-1	05.01.2019 19:00:28	KONGSBERG EM122	EM122	information			Unterbrechung Profil, Anf. Dred	started	17° 49.217' S	175° 43.121' W	1119.9	5.7	121.7	20.5	326.0
SO267_67-1	05.01.2019 23:00:00	KONGSBERG EM122	EM122	information			Fortsetzung Profil, rwK: 090°, d: 3	started	17° 53.306' S	175° 37.645' W	2348.4	3.9	98.8	18.1	128.6
SO267_67-1	06.01.2019 08:07:58	KONGSBERG EM122	EM122	alter course			rwk: 100°, d: 10,5sm	started	17° 55.532' S	174° 47.686' W	1229.5	7.5	77.2	8.9	97.2
SO267_67-1	06.01.2019 08:08:33	KONGSBERG EM122	EM122	alter course			rwK: 089°, d: 05 sm	started	17° 55.537' S	174° 47.612' W	1216.6	6.5	70.1	10.2	86.1
SO267_67-1	06.01.2019 08:48:49	KONGSBERG EM122	EM122	alter course			rwK: 099°, d: 08 sm	started	17° 55.436' S	174° 42.406' W	1161.9	7.3	70.1	10.7	89.3
SO267_67-1	06.01.2019 09:54:15	KONGSBERG EM122	EM122	alter course			rwK: 092°, d: 06 sm	started	17° 56.800' S	174° 33.715' W	1133.3	8.0	87.5	10.4	98.1
SO267_67-1	06.01.2019 10:40:43	KONGSBERG EM122	EM122	alter course			rwK: 148°, d: 03 sm	started	17° 56.986' S	174° 27.001' W	1087.6	8.8	76.9	10.5	95.4
SO267_67-1	06.01.2019 11:00:28	KONGSBERG EM122	EM122	alter course			rwK: 090°, d: 02 sm	started	17° 59.053' S	174° 25.500' W	372.4	7.8	77.4	12.5	148.6

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO267_67-1	06.01.2019 11:18:50	KONGSBERG EM122	EM122	alter course			rwK: 183°, d: 1,9nm	started	17° 59.251' S	174° 23.351' W	644.0	7.4	75.7	9.6	92.9
SO267_67-1	06.01.2019 11:33:49	KONGSBERG EM122	EM122	alter course			rwK: 270°, d: 15,7nm	started	18° 01.036' S	174° 23.226' W	671.9	7.6	66.8	10.6	186.3
SO267_67-1	06.01.2019 13:33:33	KONGSBERG EM122	EM122	alter course			rwK: 204°, d: 2,9nm	started	18° 01.101' S	174° 39.648' W	1547.6	8.2	94.6	9.2	269.7
SO267_67-1	06.01.2019 13:54:45	KONGSBERG EM122	EM122	alter course			rwK: 090°, d: 17,8nm	started	18° 03.613' S	174° 40.937' W	1510.4	7.8	89.4	11.2	210.2
SO267_67-1	06.01.2019 16:11:29	KONGSBERG EM122	EM122	alter course			rwk: 129°. d: 4,3sm	started	18° 03.836' S	174° 22.349' W	714.5	7.6	67.2	14.2	116.4
SO267_67-1	06.01.2019 16:44:26	KONGSBERG EM122	EM122	alter course			rwk: 270°, d: 22,5sm	started	18° 06.610' S	174° 18.943' W	759.5	6.4	66.2	14.6	208.0
SO267_67-1	06.01.2019 19:32:21	KONGSBERG EM122	EM122	alter course			rwK: 197°, d: 03 sm	started	18° 06.564' S	174° 42.418' W	1512.5	7.6	64.5	8.0	272.5
SO267_67-1	06.01.2019 19:52:31	KONGSBERG EM122	EM122	alter course			rwK: 090°. d: 15 sm	started	18° 08.941' S	174° 43.413' W	1478.4	7.9	62.8	12.0	184.4
SO267_67-1	06.01.2019 20:05:11	KONGSBERG EM122	EM122	information			Magnetik-Bird 01 z. W.	started	18° 09.310' S	174° 42.216' W	1503.2	6.0	67.1	14.5	91.3
SO267_67-1	06.01.2019 20:10:23	KONGSBERG EM122	EM122	information			Magnetik-Bird 02 z. W.	started	18° 09.316' S	174° 41.739' W	1520.1	5.3	61.0	15.3	90.3
SO267_67-1	06.01.2019 20:19:22	KONGSBERG EM122	EM122	information			Magnetik ausgesteckt, SL: 750	started	18° 09.287' S	174° 40.594' W	1506.5	8.3	58.5	13.4	91.9
SO267_67-1	06.01.2019 21:45:43	KONGSBERG EM122	EM122	alter course			rwK: 190°, d: 08 sm	started	18° 09.290' S	174° 28.484' W	1100.9	7.5	29.1	19.8	92.6
SO267_67-1	06.01.2019 22:46:02	KONGSBERG EM122	EM122	alter course			rwK: 269°, d: 13 sm	started	18° 16.992' S	174° 29.261' W	922.8	8.1	22.8	8.0	197.0
SO267_67-1	07.01.2019 00:03:12	KONGSBERG EM122	EM122	information			Beginn einholen des Magnetome	started	18° 17.581' S	174° 39.752' W	1319.6	5.9	22.7	13.0	264.5
SO267_67-1	07.01.2019 00:15:44	KONGSBERG EM122	EM122	information			1. Fisch an Deck	started	18° 17.641' S	174° 40.509' W	1351.5	3.3	21.6	10.4	249.8
SO267_67-1	07.01.2019 00:21:24	KONGSBERG EM122	EM122	information			2. Fisch, Magnetometer an Dec	started	18° 17.650' S	174° 40.982' W	1351.6	6.2	22.8	14.3	275.1
SO267_67-1	07.01.2019 00:32:05	KONGSBERG EM122	EM122	alter course			rwK: 214°, d: 3,8nm	started	18° 17.592' S	174° 42.299' W	1239.1	8.1	12.7	15.1	265.0
SO267_67-1	07.01.2019 01:01:31	KONGSBERG EM122	EM122	alter course			rwK: 342°, d: 0,8nm	started	18° 20.699' S	174° 44.630' W	1383.8	7.7	10.4	10.4	217.7
SO267_67-1	07.01.2019 01:09:48	KONGSBERG EM122	EM122	alter course			rwK: 019°, d: 2,8nm	started	18° 20.148' S	174° 45.033' W	1052.7	7.3	17.4	13.5	352.0
SO267_67-1	07.01.2019 01:32:02	KONGSBERG EM122	EM122	alter course			rwK: 288°, d: 3,4nm	started	18° 17.544' S	174° 44.108' W	1082.2	4.7	18.6	12.2	332.8
SO267_67-1	07.01.2019 02:11:39	KONGSBERG EM122	EM122	information			Unterbrechung Station wegen DR	started	18° 16.610' S	174° 47.577' W	947.4	1.2	13.5	9.9	92.0
SO267_67-1	07.01.2019 08:00:04	KONGSBERG EM122	EM122	information			Fortsetzung # 67 EM122 / Magne	started	18° 19.549' S	174° 45.698' W	629.3	0.4	31.1	7.3	111.8
SO267_67-1	07.01.2019 08:12:00	KONGSBERG EM122	EM122	information			Mag.-Bird # 01 z. W.	started	18° 19.272' S	174° 45.652' W	808.0	3.6	26.8	9.8	14.4
SO267_67-1	07.01.2019 08:16:32	KONGSBERG EM122	EM122	information			Mag.-Bird # 02 z. W.	started	18° 19.046' S	174° 45.580' W	895.4	3.3	30.3	7.4	12.0
SO267_67-1	07.01.2019 08:46:58	KONGSBERG EM122	EM122	alter course			rwK: 169°, d: 04 sm	started	18° 15.817' S	174° 44.710' W	1372.7	9.6	33.2	7.2	27.5
SO267_67-1	07.01.2019 08:47:15	KONGSBERG EM122	EM122	in the water			Magnetik z. W., SL: 900 m	started	18° 15.774' S	174° 44.694' W	1372.7	9.5	30.0	7.5	16.8
SO267_67-1	07.01.2019 09:00:00	KONGSBERG EM122	EM122	information			(Passieren Profil-WP 01) FüG: 10	started	18° 16.355' S	174° 43.494' W	1382.1	10.5	31.9	9.1	169.4
SO267_67-1	07.01.2019 09:25:00	KONGSBERG EM122	EM122	alter course			rwK: 085°, d: 13 sm	started	18° 20.855' S	174° 42.526' W	1285.5	9.7	25.1	9.4	147.4
SO267_67-1	07.01.2019 10:43:36	KONGSBERG EM122	EM122	alter course			rwK: 180°, d: 02 sm	started	18° 19.790' S	174° 28.875' W	920.9	9.9	29.5	9.9	105.1
SO267_67-1	07.01.2019 10:51:42	KONGSBERG EM122	EM122	alter course			rwK: 263°, d: 13 sm	started	18° 20.951' S	174° 28.446' W	904.0	10.8	42.1	8.5	181.3
SO267_67-1	07.01.2019 12:15:00	KONGSBERG EM122	EM122	alter course			rwK: 256°, d: 16,6nm	started	18° 23.631' S	174° 42.493' W	1659.0	10.0	28.3	8.7	261.8
SO267_67-1	07.01.2019 13:51:57	KONGSBERG EM122	EM122	alter course			rwK: 345°, d: 18,6nm	started	18° 27.670' S	174° 59.105' W	2117.2	9.8	33.0	8.1	256.9
SO267_67-1	07.01.2019 15:48:14	KONGSBERG EM122	EM122	alter course			rwk: 359°, d: 4,7sm	started	18° 09.713' S	175° 04.531' W	2242.8	10.5	5.4	6.5	0.9
SO267_67-1	07.01.2019 16:16:40	KONGSBERG EM122	EM122	alter course			rwk: 021°, d: 7,5sm	started	18° 04.903' S	175° 04.549' W	2247.3	10.7	9.1	5.8	10.7
SO267_67-1	07.01.2019 16:59:34	KONGSBERG EM122	EM122	alter course			rwk: 270°, d: 39,5sm	started	17° 58.099' S	175° 02.105' W	2240.3	9.6	10.9	9.2	290.7
SO267_67-1	07.01.2019 20:56:49	KONGSBERG EM122	EM122	alter course			rwK: 038°, d: 03 sm	started	17° 58.080' S	175° 42.843' W	2430.7	8.0	356.5	7.6	268.0
SO267_67-1	07.01.2019 21:04:15	KONGSBERG EM122	EM122	information			Beginn einholen Magnetik	started	17° 57.497' S	175° 43.165' W	2180.8	6.1	355.0	7.2	37.3
SO267_67-1	07.01.2019 21:16:40	KONGSBERG EM122	EM122	information			Mag.-Bird # 02 a. D.	started	17° 56.843' S	175° 42.647' W	2433.6	3.2	1.0	6.4	39.0
SO267_67-1	07.01.2019 21:20:31	KONGSBERG EM122	EM122	information			Mag.-Bird # 01 / Magnetik komplett	started	17° 56.680' S	175° 42.516' W	2473.2	3.2	9.3	5.6	21.0
SO267_67-1	07.01.2019 21:32:37	KONGSBERG EM122	EM122	alter course			rwK: 003°, d: 06 sm	started	17° 55.613' S	175° 41.727' W	2468.1	7.5	357.4	5.2	9.7
SO267_67-1	07.01.2019 22:18:07	KONGSBERG EM122	EM122	station end			Unterbrechung Profil # 67 wegen "Ausse	started	17° 49.154' S	175° 41.504' W	896.5	7.3	355.1	7.4	317.5
SO267_67-1	07.01.2019 23:00:39	KONGSBERG EM122	EM122	information			Fortsetzung Profil, rwK: 360°, d: 0	started	17° 48.590' S	175° 41.754' W	911.6	2.5	329.7	7.3	5.2
SO267_67-1	07.01.2019 23:10:37	KONGSBERG EM122	EM122	alter course			rwK: 109°, d: 5,6nm	started	17° 47.908' S	175° 41.361' W	902.2	8.3	345.8	8.3	118.9
SO267_67-1	07.01.2019 23:49:08	KONGSBERG EM122	EM122	alter course			rwK: 010°, d: 5,0nm	started	17° 49.730' S	175° 35.872' W	2277.9	8.5	346.2	7.7	110.4
SO267_67-1	08.01.2019 00:29:33	KONGSBERG EM122	EM122	alter course			rwK: 271°, d: 12,5nm	started	17° 44.798' S	175° 34.717' W	2231.1	6.7	336.2	8.4	348.3
SO267_67-1	08.01.2019 02:01:13	KONGSBERG EM122	EM122	alter course			rwK: 193°, d: 16,7nm	started	17° 44.419' S	175° 47.618' W	2384.4	8.1	353.3	7.8	272.1
SO267_67-1	08.01.2019 04:08:05	KONGSBERG EM122	EM122	alter course			rwk: 269°, d: 1,9sm	started	18° 00.762' S	175° 51.811' W	2189.4	6.4	358.1	10.1	261.5
SO267_67-1	08.01.2019 04:23:13	KONGSBERG EM122	EM122	alter course			rwk: 002°, d: 9,7sm	started	18° 00.635' S	175° 53.737' W	2076.0	8.0	6.2	7.4	349.4
SO267_67-1	08.01.2019 05:36:08	KONGSBERG EM122	EM122	alter course			rwk: 278°, d: 2,5sm	started	17° 51.002' S	175° 53.451' W	2922.0	7.0	357.4	10.3	315.7

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO267_67-1	08.01.2019 05:54:51	KONGSBERG EM122	EM122	alter course			rwk: 182°, d: 10,7sm	started	17° 50.729' S	175° 56.009' W	2577.6	8.2	352.5	11.7	234.8
SO267_67-1	08.01.2019 07:13:47	KONGSBERG EM122	EM122	alter course			rwK: 256°, d: 01 sm	started	18° 01.345' S	175° 56.504' W	1974.9	6.6	352.9	10.6	229.6
SO267_67-1	08.01.2019 07:23:29	KONGSBERG EM122	EM122	alter course			rwK: 001°, d: 12 sm	started	18° 01.640' S	175° 57.598' W	1631.2	6.4	2.4	11.1	284.2
SO267_67-1	08.01.2019 07:56:17	KONGSBERG EM122	EM122	information		Unterbrechung Station # 67 Profil wege		started	17° 59.569' S	175° 57.966' W	1026.9	4.8	359.7	9.1	352.7
SO267_67-1	08.01.2019 11:11:08	KONGSBERG EM122	EM122	information		Fortsetzung Profil, rwK: 001°, d: 10		started	18° 00.189' S	175° 57.906' W	971.6	6.6	337.5	6.3	8.1
SO267_67-1	08.01.2019 12:25:44	KONGSBERG EM122	EM122	alter course			rwK: 281°, d: 3,2nm	started	17° 50.173' S	175° 57.743' W	2397.3	8.3	342.7	10.5	3.1
SO267_67-1	08.01.2019 12:50:29	KONGSBERG EM122	EM122	alter course			rwK: 169°, d: 8,1nm	started	17° 49.331' S	176° 00.977' W	2134.3	7.8	355.5	9.8	269.1
SO267_67-1	08.01.2019 13:51:38	KONGSBERG EM122	EM122	alter course			rwK: 191°, d: 4,6nm	started	17° 57.229' S	175° 59.558' W	1846.3	7.2	358.8	6.3	166.9
SO267_67-1	08.01.2019 14:24:54	KONGSBERG EM122	EM122	alter course			rwK: 266°, d: 2,4nm	started	18° 01.568' S	176° 00.385' W	1696.4	7.9	355.9	8.9	189.6
SO267_67-1	08.01.2019 14:44:48	KONGSBERG EM122	EM122	alter course			rwK: 009°, d: 4,6nm	started	18° 01.889' S	176° 02.799' W	2466.2	8.2	6.1	9.9	262.8
SO267_67-1	08.01.2019 15:22:45	KONGSBERG EM122	EM122	alter course			rwk: 349°, d: 8,6sm	started	17° 57.049' S	176° 02.248' W	2379.0	8.1	354.0	8.2	356.4
SO267_67-1	08.01.2019 16:26:24	KONGSBERG EM122	EM122	alter course			rwk: 280°, d: 4,4sm	started	17° 48.743' S	176° 03.940' W	2514.0	7.2	356.5	8.6	318.5
SO267_67-1	08.01.2019 17:01:13	KONGSBERG EM122	EM122	alter course			rwk: 163°, d: 9,8sm	started	17° 48.125' S	176° 08.695' W	2384.2	8.4	347.9	8.4	199.2
SO267_67-1	08.01.2019 18:13:19	KONGSBERG EM122	EM122	alter course			rwk: 189°, d: 4,6sm	started	17° 57.265' S	176° 05.679' W	2605.2	7.7	350.8	4.9	175.2
SO267_67-1	08.01.2019 18:48:24	KONGSBERG EM122	EM122	profile end				started	18° 01.906' S	176° 06.367' W	2628.2	9.3	358.6	6.8	189.5
SO267_68-1	05.01.2019 14:57:44	Dredge	DRG	station start				started	17° 58.196' S	175° 49.045' W	1817.3	0.7	120.2	14.0	237.2
SO267_68-1	05.01.2019 15:02:26	Dredge	DRG	in the water			FW2/SPW2	started	17° 58.212' S	175° 49.046' W	1815.8	0.5	118.5	15.6	121.7
SO267_68-1	05.01.2019 15:36:14	Dredge	DRG	max depth/on ground			Boko, SL: 1821m	started	17° 58.211' S	175° 49.039' W	1817.7	0.8	106.6	17.0	207.3
SO267_68-1	05.01.2019 15:38:54	Dredge	DRG	profile start			Beg. auslegen, rwk: 099°, d: 0,32	started	17° 58.212' S	175° 49.040' W	1812.6	0.8	108.0	19.0	102.7
SO267_68-1	05.01.2019 16:01:46	Dredge	DRG	hoisting			Schiff gestoppt, Beg. dredgen, maxSL	started	17° 58.260' S	175° 48.706' W	1567.1	0.1	118.0	17.3	171.3
SO267_68-1	05.01.2019 16:33:00	Dredge	DRG	hoisting			Dredge frei vom Grund, SL: 1560m, max	started	17° 58.259' S	175° 48.710' W	1570.9	0.4	111.8	19.0	68.9
SO267_68-1	05.01.2019 17:06:11	Dredge	DRG	on deck				started	17° 58.259' S	175° 48.703' W	1571.0	0.2	114.8	12.7	254.7
SO267_68-1	05.01.2019 17:18:45	Dredge	DRG	station end				started	17° 58.269' S	175° 48.709' W	1572.9	0.1	113.5	18.4	132.0
SO267_69-1	05.01.2019 19:27:01	Dredge	DRG	station start				started	17° 49.048' S	175° 43.035' W	1006.0	0.9	106.7	13.1	250.0
SO267_69-1	05.01.2019 19:30:38	Dredge	DRG	in the water				started	17° 49.044' S	175° 43.036' W	1005.8	0.9	105.9	16.0	228.2
SO267_69-1	05.01.2019 19:50:54	Dredge	DRG	max depth/on ground			SL: 1040 m, SZ: 6 kN	started	17° 49.058' S	175° 43.037' W	1002.8	0.3	102.7	15.5	46.8
SO267_69-1	05.01.2019 19:51:01	Dredge	DRG	profile start				started	17° 49.057' S	175° 43.037' W	1002.6	0.3	106.8	15.6	56.9
SO267_69-1	05.01.2019 20:18:41	Dredge	DRG	profile end			SLmax: 1280 m, SZ: 6 kN	started	17° 49.060' S	175° 42.713' W	712.3	0.2	108.3	17.7	264.6
SO267_69-1	05.01.2019 20:19:31	Dredge	DRG	information			Beginn dredgen, (SZmax: kN)	started	17° 49.061' S	175° 42.715' W	713.4	0.2	106.3	17.8	50.9
SO267_69-1	05.01.2019 20:49:19	Dredge	DRG	hoisting			Dredfe frei vom Grund, SL: 717 m, S	started	17° 49.064' S	175° 42.706' W	729.6	0.8	107.1	16.5	44.5
SO267_69-1	05.01.2019 21:08:44	Dredge	DRG	on deck				started	17° 49.063' S	175° 42.713' W	705.1	0.1	108.5	18.2	283.2
SO267_69-1	05.01.2019 21:18:00	Dredge	DRG	station end				started	17° 49.066' S	175° 42.708' W	711.6	0.5	99.0	13.6	202.1
SO267_70-1	07.01.2019 02:19:15	Dredge	DRG	station start				started	18° 16.549' S	174° 47.492' W	943.6	0.9	14.3	10.2	116.7
SO267_70-1	07.01.2019 02:22:00	Dredge	DRG	in the water			FW2/SPW2	started	18° 16.550' S	174° 47.488' W	942.9	0.1	19.5	10.5	149.4
SO267_70-1	07.01.2019 02:41:33	Dredge	DRG	max depth/on ground			Boko, SL: 979m, Beginn auslegen, rwK: 33	started	18° 16.547' S	174° 47.483' W	944.2	0.7	11.9	10.4	163.9
SO267_70-1	07.01.2019 03:13:59	Dredge	DRG	hoisting			Schiff aufgestoppt, Beg. hieven, SLma	started	18° 16.110' S	174° 47.669' W	717.7	0.3	32.3	7.8	124.7
SO267_70-1	07.01.2019 03:57:24	Dredge	DRG	information			Dredge hackt, SL: 895m, maxSZ: 9	started	18° 16.138' S	174° 47.655' W	717.5	0.2	7.7	8.9	306.0
SO267_70-1	07.01.2019 04:35:07	Dredge	DRG	hoisting			Dredge frei vom Grund, SL: 775m, maxS	started	18° 16.257' S	174° 47.575' W	774.3	1.1	11.5	7.2	95.6
SO267_70-1	07.01.2019 04:56:29	Dredge	DRG	on deck				started	18° 16.261' S	174° 47.584' W	776.5	1.1	12.8	9.1	292.0
SO267_70-1	07.01.2019 05:12:41	Dredge	DRG	station end				started	18° 16.264' S	174° 47.577' W	777.8	0.3	12.3	8.7	28.1
SO267_71-1	07.01.2019 05:57:31	Dredge	DRG	station start				started	18° 19.939' S	174° 45.775' W	994.3	0.3	22.5	8.3	153.4
SO267_71-1	07.01.2019 05:58:41	Dredge	DRG	in the water				started	18° 19.941' S	174° 45.779' W	996.1	1.2	22.9	7.8	293.1
SO267_71-1	07.01.2019 06:19:29	Dredge	DRG	max depth/on ground			Boko, SL: 1035m	started	18° 19.940' S	174° 45.715' W	982.0	0.5	28.8	8.8	128.7
SO267_71-1	07.01.2019 06:21:36	Dredge	DRG	profile start			Beg. auslegen, rwk: 003°, d: 0,40	started	18° 19.941' S	174° 45.713' W	984.2	0.3	25.0	7.9	8.5
SO267_71-1	07.01.2019 06:47:53	Dredge	DRG	hoisting			Schiff aufgestoppt, Beg. dredgen, maxS	started	18° 19.551' S	174° 45.701' W	636.9	0.7	28.6	9.2	137.1
SO267_71-1	07.01.2019 07:30:10	Dredge	DRG	hoisting			Dredge frei vom Grund, SL: 648 m, S	started	18° 19.552' S	174° 45.701' W	633.2	0.6	30.7	9.4	348.7
SO267_71-1	07.01.2019 07:50:20	Dredge	DRG	on deck				started	18° 19.549' S	174° 45.696' W	621.3	0.2	28.6	9.8	77.8
SO267_71-1	07.01.2019 07:59:36	Dredge	DRG	station end				started	18° 19.548' S	174° 45.698' W	625.0	1.1	38.3	7.0	127.0
SO267_72-1	07.01.2019 22:31:08	Autonomous Underwater Veh	AUV	station start				started	17° 48.628' S	175° 41.776' W	914.8	0.2	346.5	5.8	329.6

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO267_72-1	07.01.2019 22:36:36	Autonomous Underwater Veh	AUV	in the water		AUV z. W. / Frei von Schiff & Le		started	17° 48.620' S	175° 41.778' W	914.3	0.4	335.3	5.1	125.1
SO267_72-1	07.01.2019 22:40:07	Autonomous Underwater Veh	AUV	information		AUV abgetaucht, frei vom Schi		started	17° 48.631' S	175° 41.778' W	915.9	1.0	330.9	5.5	276.9
SO267_72-1	08.01.2019 20:02:18	Autonomous Underwater Veh	AUV	at surface				started	18° 06.232' S	175° 59.961' W	2578.5	0.6	351.6	6.1	21.5
SO267_72-1	08.01.2019 20:30:37	Autonomous Underwater Veh	AUV	on deck				started	18° 05.479' S	175° 59.272' W	2438.8	0.3	342.9	5.3	266.8
SO267_72-1	08.01.2019 20:31:41	Autonomous Underwater Veh	AUV	station end				started	18° 05.480' S	175° 59.273' W	2437.7	0.4	340.9	5.1	200.0
SO267_73-1	08.01.2019 08:24:08	Dredge	DRG	station start				started	18° 00.835' S	175° 57.173' W	1697.0	1.5	353.2	8.7	34.2
SO267_73-1	08.01.2019 08:29:13	Dredge	DRG	in the water				started	18° 00.804' S	175° 57.187' W	1683.6	0.6	352.5	8.5	12.1
SO267_73-1	08.01.2019 09:02:11	Dredge	DRG	max depth/on ground			SL: 1711 m, SZ: 11 kN	started	18° 00.800' S	175° 57.184' W	1681.4	0.5	346.7	8.7	58.0
SO267_73-1	08.01.2019 09:03:42	Dredge	DRG	profile start		Beginn auslegen Draht, rwK: 300°, d: 0,4 sn		started	18° 00.799' S	175° 57.184' W	1675.8	0.6	342.1	6.9	269.7
SO267_73-1	08.01.2019 09:36:50	Dredge	DRG	profile end			SLmax: 2100 m, SZ: 10 kN	started	18° 00.561' S	175° 57.629' W	1123.5	0.2	343.9	9.3	222.1
SO267_73-1	08.01.2019 09:37:04	Dredge	DRG	information		Beginn dredgen, (SZmax: 60 kN		started	18° 00.560' S	175° 57.629' W	1126.7	0.1	343.1	8.6	187.0
SO267_73-1	08.01.2019 10:29:50	Dredge	DRG	hoisting		Dredge frei vom Grund, SL: 1100 m, S		started	18° 00.556' S	175° 57.624' W	1122.3	0.5	335.2	7.3	31.3
SO267_73-1	08.01.2019 10:54:38	Dredge	DRG	on deck				started	18° 00.556' S	175° 57.628' W	1127.7	0.3	334.6	7.0	337.3
SO267_73-1	08.01.2019 11:00:18	Dredge	DRG	station end				started	18° 00.558' S	175° 57.628' W	1123.7	1.0	336.5	6.9	226.7
SO267_74-1	08.01.2019 20:45:51	Magnetometer	MAG	station start				started	18° 05.141' S	175° 59.501' W	2229.9	4.4	355.9	5.2	195.0
SO267_74-1	08.01.2019 20:48:06	Magnetometer	MAG	information			Mag.- Bird # 01 z. W.	started	18° 05.309' S	175° 59.515' W	2332.5	4.5	354.4	3.6	176.8
SO267_74-1	08.01.2019 20:53:17	Magnetometer	MAG	information			Mag.- Bird # 02 z. W.	started	18° 05.713' S	175° 59.542' W	2484.5	4.2	351.0	5.4	185.3
SO267_74-1	08.01.2019 21:00:00	Magnetometer	MAG	in the water		Magnetik komplett z. W., SL: 900 m, FüG: 10,0 kn		started	18° 06.280' S	175° 59.708' W	2706.9	6.9	348.2	6.1	198.7
SO267_74-1	08.01.2019 22:30:08	Magnetometer	MAG	alter course			rwK: 121°, d: 14 sm	started	18° 21.441' S	176° 00.918' W	2159.3	9.8	352.5	5.3	156.3
SO267_74-1	08.01.2019 23:48:16	Magnetometer	MAG	alter course			rwK: 160°, d: 8,3nm	started	18° 28.587' S	175° 48.843' W	2406.8	10.8	355.4	5.5	120.3
SO267_74-1	09.01.2019 00:37:23	Magnetometer	MAG	alter course			rwK: 270°, d: 18,1nm	started	18° 36.187' S	175° 45.609' W	2569.5	10.2	349.3	4.2	160.1
SO267_74-1	09.01.2019 02:28:07	Magnetometer	MAG	profile end		Beginn vorhieven des Magnetometer, ä/K a		started	18° 36.670' S	176° 04.373' W	3507.6	9.7	339.0	4.8	266.5
SO267_74-1	09.01.2019 02:41:26	Magnetometer	MAG	station end				started	18° 37.638' S	176° 04.521' W	2981.4	4.9	328.4	3.5	167.7
SO267_75-1	09.01.2019 02:42:01	Seismic Source	SEISSRC	station start		Magnetometer im Wasser und vorgehievt bis		started	18° 37.683' S	176° 04.508' W	2955.4	4.7	332.9	3.1	159.7
SO267_75-1	09.01.2019 02:47:54	Seismic Source	SEISSRC	information		Beginn aussetzen Streamer, Kopfboje z		started	18° 38.094' S	176° 04.381' W	2758.5	4.1	324.6	3.3	166.9
SO267_75-1	09.01.2019 02:52:04	Seismic Source	SEISSRC	information			1. Bird zu Wasser	started	18° 38.335' S	176° 04.316' W	2556.0	3.6	336.8	2.9	168.8
SO267_75-1	09.01.2019 03:06:15	Seismic Source	SEISSRC	information			2. Bird zu Wasser	started	18° 39.206' S	176° 04.095' W	2062.2	3.7	322.3	3.3	156.5
SO267_75-1	09.01.2019 03:22:29	Seismic Source	SEISSRC	information			3. Bird zu Wasser	started	18° 40.147' S	176° 03.940' W	1794.5	3.9	311.2	3.0	176.6
SO267_75-1	09.01.2019 03:32:48	Seismic Source	SEISSRC	information			4. Bird zu Wasser	started	18° 40.763' S	176° 03.903' W	1952.3	4.0	311.0	3.0	178.6
SO267_75-1	09.01.2019 03:45:14	Seismic Source	SEISSRC	information			5. Bird zu Wasser	started	18° 41.505' S	176° 03.871' W	2075.8	3.5	324.6	3.2	176.6
SO267_75-1	09.01.2019 03:53:31	Seismic Source	SEISSRC	information			6. Bird zu Wasser	started	18° 41.994' S	176° 03.851' W	2448.9	3.6	336.4	3.4	177.9
SO267_75-1	09.01.2019 04:02:03	Seismic Source	SEISSRC	information			7. Bird zu Wasser	started	18° 42.500' S	176° 03.829' W	2438.6	3.8	342.5	3.1	172.8
SO267_75-1	09.01.2019 04:10:38	Seismic Source	SEISSRC	information			8. Bird zu Wasser	started	18° 43.019' S	176° 03.704' W	2520.0	3.7	351.8	2.9	151.3
SO267_75-1	09.01.2019 04:20:37	Seismic Source	SEISSRC	information			9. Bird zu Wasser	started	18° 43.525' S	176° 03.305' W	2500.1	3.8	340.2	2.8	125.5
SO267_75-1	09.01.2019 04:24:17	Seismic Source	SEISSRC	information			10. Bird zu Wasser	started	18° 43.667' S	176° 03.087' W	2526.7	4.6	340.1	3.2	127.7
SO267_75-1	09.01.2019 04:27:48	Seismic Source	SEISSRC	information			11. Bird zu Wasser	started	18° 43.771' S	176° 02.848' W	2503.3	4.1	333.6	3.6	106.5
SO267_75-1	09.01.2019 04:29:00	Seismic Source	SEISSRC	information			12. Bird zu Wasser	started	18° 43.797' S	176° 02.761' W	2508.2	4.1	346.0	3.8	112.6
SO267_75-1	09.01.2019 04:45:21	Seismic Source	SEISSRC	information		Streamer ausgesteckt (4133,1n		started	18° 43.839' S	176° 01.580' W	2545.3	3.5	336.0	3.5	92.1
SO267_75-1	09.01.2019 04:57:21	Seismic Source	SEISSRC	Airgun in water			Stb-Array	started	18° 43.831' S	176° 00.907' W	2560.6	3.1	342.1	3.5	79.7
SO267_75-1	09.01.2019 05:09:37	Seismic Source	SEISSRC	Airgun in water			Bb-Array	started	18° 43.813' S	176° 00.252' W	2543.1	3.0	329.8	3.1	87.4
SO267_75-1	09.01.2019 05:13:56	Seismic Source	SEISSRC	information			Beg. Softstart Airguns	started	18° 43.817' S	175° 59.979' W	2512.6	4.4	328.1	3.8	95.1
SO267_75-1	09.01.2019 05:21:13	Seismic Source	SEISSRC	information		Magnetometer ausgesteckt (825		started	18° 43.812' S	175° 59.384' W	2377.0	4.2	316.6	3.4	88.0
SO267_75-1	09.01.2019 05:29:26	Seismic Source	SEISSRC	profile start			rwk: 090°, d: 61sm	started	18° 43.807' S	175° 58.749' W	2264.1	4.5	321.7	3.4	90.3
SO267_75-1	09.01.2019 20:25:17	Seismic Source	SEISSRC	information		Passieren WP 05 (Ende Profil); rwK: 090		started	18° 43.784' S	174° 54.591' W	1606.9	4.1	344.2	7.2	100.1
SO267_75-1	09.01.2019 21:25:30	Seismic Source	SEISSRC	information		Passieren "WP 06 End_of_Shoot		started	18° 43.808' S	174° 50.396' W	1567.3	4.0	355.1	8.8	97.7
SO267_75-1	09.01.2019 22:00:22	Seismic Source	SEISSRC	profile end		Ende Profil nach Vorgabe Wissens		started	18° 43.798' S	174° 48.086' W	1510.3	3.9	351.8	9.3	91.0
SO267_75-1	09.01.2019 22:14:52	Seismic Source	SEISSRC	on deck			STB-Airgun-Array a. D.	started	18° 43.592' S	174° 47.443' W	1529.4	2.8	352.4	9.0	62.9
SO267_75-1	09.01.2019 22:16:41	Seismic Source	SEISSRC	information		Magnetometer vorgehievt, SL: ca. 1		started	18° 43.553' S	174° 47.364' W	1525.9	2.7	350.1	9.7	69.0
SO267_75-1	09.01.2019 22:26:28	Seismic Source	SEISSRC	on deck			BB-Airgun-Array a. D.	started	18° 43.362' S	174° 46.949' W	1491.3	2.4	349.1	9.5	74.2

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO267_75-1	09.01.2019 22:30:10	Seismic Source	SEISSRC	information			Beginn einholen Streamer, rwK: 3	started	18° 43.314' S	174° 46.801' W	1485.7	2.5	345.1	10.9	75.0
SO267_75-1	09.01.2019 23:03:22	Seismic Source	SEISSRC	information			1. Bird # 12 a.D.	started	18° 42.077' S	174° 46.809' W	1544.5	2.6	341.5	8.5	334.9
SO267_75-1	09.01.2019 23:04:36	Seismic Source	SEISSRC	information			2. Bird # 11 a.D.	started	18° 42.024' S	174° 46.827' W	1545.1	2.4	343.8	7.7	342.1
SO267_75-1	09.01.2019 23:12:36	Seismic Source	SEISSRC	information			3. Bird # 10 a.D.	started	18° 41.673' S	174° 46.947' W	1587.6	2.7	335.0	8.3	341.8
SO267_75-1	09.01.2019 23:23:09	Seismic Source	SEISSRC	information			4. Bird # 09 a.D.	started	18° 41.236' S	174° 47.092' W	1605.9	2.5	336.2	7.3	341.2
SO267_75-1	09.01.2019 23:52:19	Seismic Source	SEISSRC	information			5. Bird # 08 a.D.	started	18° 39.972' S	174° 47.539' W	1641.3	2.3	NaN	NaN	337.7
SO267_75-1	10.01.2019 00:06:50	Seismic Source	SEISSRC	information			6. Bird # 07 a.D.	started	18° 39.432' S	174° 47.707' W	1675.2	3.0	343.1	6.9	352.9
SO267_75-1	10.01.2019 00:17:40	Seismic Source	SEISSRC	information			7. Bird # 06 a.D.	started	18° 38.935' S	174° 47.839' W	1630.5	2.9	342.9	6.0	343.7
SO267_75-1	10.01.2019 00:34:30	Seismic Source	SEISSRC	information			8. Bird # 05 a.D.	started	18° 38.240' S	174° 47.998' W	1570.0	2.5	322.2	7.2	355.8
SO267_75-1	10.01.2019 00:45:35	Seismic Source	SEISSRC	information			9. Bird # 04 a.D.	started	18° 37.788' S	174° 48.070' W	1623.6	2.4	340.3	7.2	352.1
SO267_75-1	10.01.2019 00:55:15	Seismic Source	SEISSRC	information			10. Bird # 03 a.D.	started	18° 37.349' S	174° 48.145' W	1750.2	3.5	340.0	6.5	355.0
SO267_75-1	10.01.2019 01:10:19	Seismic Source	SEISSRC	information			11. Bird # 02 a.D.	started	18° 36.641' S	174° 48.282' W	1761.3	3.2	348.2	5.6	350.0
SO267_75-1	10.01.2019 01:17:29	Seismic Source	SEISSRC	information			12. Bird # 01 a.D.	started	18° 36.254' S	174° 48.349' W	1767.2	3.2	358.4	5.2	354.8
SO267_75-1	10.01.2019 01:24:03	Seismic Source	SEISSRC	on deck			Endboje an Deck	started	18° 35.887' S	174° 48.407' W	1768.7	3.1	356.0	5.4	2.4
SO267_75-1	10.01.2019 01:24:52	Seismic Source	SEISSRC	station end				started	18° 35.846' S	174° 48.413' W	1769.6	3.2	346.6	6.2	352.1
SO267_76-1	10.01.2019 01:26:35	KONGSBERG EM122	EM122	station start			Magnetometer vorgehievt im Was	started	18° 35.753' S	174° 48.427' W	1767.5	3.2	345.6	4.9	349.4
SO267_76-1	10.01.2019 01:31:50	KONGSBERG EM122	EM122	information			Beginn ausstecken des Magneton	started	18° 35.708' S	174° 48.582' W	1771.5	4.0	349.8	5.5	207.5
SO267_76-1	10.01.2019 01:38:32	KONGSBERG EM122	EM122	information			Magnetometer ausgesteck auf 90	started	18° 36.523' S	174° 49.021' W	1774.6	10.6	352.2	6.4	205.4
SO267_76-1	10.01.2019 02:09:23	KONGSBERG EM122	EM122	profile start			rwK: 271°, d: 39,3nm	started	18° 39.515' S	174° 53.005' W	1707.0	9.8	351.9	7.3	269.7
SO267_76-1	10.01.2019 06:28:49	KONGSBERG EM122	EM122	profile end			Unterbrechung Profil	started	18° 38.863' S	175° 34.523' W	2474.2	9.3	336.8	5.3	272.2
SO267_76-1	10.01.2019 06:31:08	KONGSBERG EM122	EM122	information			Beg. einholen Magnetometer	started	18° 38.862' S	175° 34.842' W	2429.0	6.5	341.2	5.4	273.1
SO267_76-1	10.01.2019 06:44:07	KONGSBERG EM122	EM122	information			1. Magnetometer an Deck	started	18° 38.638' S	175° 35.846' W	2421.4	4.1	332.2	5.0	285.7
SO267_76-1	10.01.2019 06:49:57	KONGSBERG EM122	EM122	information			2. Magnetometer an Deck	started	18° 38.482' S	175° 36.230' W	2510.7	3.6	346.5	4.4	297.6
SO267_76-1	10.01.2019 14:28:04	KONGSBERG EM122	EM122	information			Beginn auslegen Magnetometer, 1. Fisch	started	18° 31.561' S	175° 41.357' W	2796.3	2.1	350.1	9.0	187.7
SO267_76-1	10.01.2019 14:37:27	KONGSBERG EM122	EM122	information			2. Fisch zu Wasser	started	18° 32.076' S	175° 41.477' W	2785.4	3.8	351.9	9.7	197.6
SO267_76-1	10.01.2019 14:50:53	KONGSBERG EM122	EM122	in the water			Magnetometer auf 900m ausgest	started	18° 33.634' S	175° 41.967' W	2733.0	9.5	350.8	9.1	191.4
SO267_76-1	10.01.2019 14:56:06	KONGSBERG EM122	EM122	profile start			Fortsetzung Profil, rwK: 091°, d: 50	started	18° 34.460' S	175° 41.750' W	2937.8	11.0	350.1	8.4	120.7
SO267_76-1	10.01.2019 19:07:30	KONGSBERG EM122	EM122	alter course			rwK: 069°, d: 12 sm	started	18° 35.293' S	174° 48.819' W	1776.7	11.4	30.6	3.8	83.6
SO267_76-1	10.01.2019 20:10:50	KONGSBERG EM122	EM122	alter course			rwK: 075°, d: 12 sm	started	18° 30.878' S	174° 36.792' W	1608.2	11.3	73.2	3.8	73.4
SO267_76-1	10.01.2019 21:13:26	KONGSBERG EM122	EM122	alter course			rwK: 360°, d: 02 sm	started	18° 27.570' S	174° 24.836' W	978.4	10.8	85.8	6.1	34.3
SO267_76-1	10.01.2019 21:23:00	KONGSBERG EM122	EM122	alter course			rwK: 257°, d: 21 sm	started	18° 25.827' S	174° 24.758' W	929.5	10.9	83.5	5.5	340.4
SO267_76-1	10.01.2019 23:04:31	KONGSBERG EM122	EM122	alter course			rwK: 025°, d: 3,2nm	started	18° 29.951' S	174° 45.221' W	1796.1	12.1	82.9	6.3	263.5
SO267_76-1	10.01.2019 23:22:19	KONGSBERG EM122	EM122	alter course			rwK: 079°, 16,3nm	started	18° 27.394' S	174° 44.568' W	1781.7	10.6	96.9	9.5	47.0
SO267_76-1	11.01.2019 00:48:30	KONGSBERG EM122	EM122	alter course			rwK: 016°, d: 8,7nm	started	18° 24.116' S	174° 27.954' W	1023.5	11.5	78.8	5.7	80.3
SO267_76-1	11.01.2019 01:35:11	KONGSBERG EM122	EM122	alter course			rwK: 047°, d: 2,9nm	started	18° 15.851' S	174° 25.269' W	911.5	11.1	95.1	5.9	17.2
SO267_76-1	11.01.2019 01:51:00	KONGSBERG EM122	EM122	alter course			rwK: 001°, d: 5,8nm	started	18° 13.761' S	174° 23.122' W	1009.6	11.3	111.7	6.8	45.9
SO267_76-1	11.01.2019 02:20:51	KONGSBERG EM122	EM122	alter course			rwK: 343°, d: 7,9nm	started	18° 08.121' S	174° 22.908' W	925.9	11.5	100.1	6.1	2.4
SO267_76-1	11.01.2019 02:27:11	KONGSBERG EM122	EM122	information			Beginn einholen Magnetomete	started	18° 07.120' S	174° 23.175' W	882.4	7.0	110.4	6.4	341.5
SO267_76-1	11.01.2019 02:40:55	KONGSBERG EM122	EM122	information			1. Fisch an Deck	started	18° 06.032' S	174° 23.542' W	853.9	4.8	106.3	6.6	346.8
SO267_76-1	11.01.2019 02:44:52	KONGSBERG EM122	EM122	information			2. Fisch a.D. Magnetometer an D	started	18° 05.705' S	174° 23.653' W	852.8	5.2	113.7	6.1	340.6
SO267_76-1	11.01.2019 03:16:29	KONGSBERG EM122	EM122	alter course			rwk: 085°, d: 1,8nm	started	18° 00.234' S	174° 25.323' W	402.5	10.8	114.8	7.6	26.9
SO267_76-1	11.01.2019 03:26:05	KONGSBERG EM122	EM122	alter course			rwk: 044°, d: 3,8sm	started	17° 59.980' S	174° 23.608' W	403.9	10.8	123.0	6.2	65.4
SO267_76-1	11.01.2019 03:46:01	KONGSBERG EM122	EM122	alter course			rwk: 001°, d: 20,1sm	started	17° 57.274' S	174° 20.815' W	788.1	10.9	109.3	5.9	15.1
SO267_76-1	11.01.2019 05:30:33	KONGSBERG EM122	EM122	alter course			rwk: 000°, d: 15,4sm	started	17° 37.105' S	174° 20.567' W	1362.6	11.5	120.2	6.6	1.6
SO267_76-1	11.01.2019 06:50:18	KONGSBERG EM122	EM122	alter course			rwk: 351°, d: 8,4sm	started	17° 21.620' S	174° 20.507' W	1430.4	12.0	127.0	6.2	356.3
SO267_76-1	11.01.2019 07:35:08	KONGSBERG EM122	EM122	alter course			rwK: 336°, d: 24 sm	started	17° 13.154' S	174° 21.745' W	2022.2	10.8	117.5	7.7	347.1
SO267_76-1	11.01.2019 09:46:33	KONGSBERG EM122	EM122	information			Unterbrechung Profil wegen aussetz	started	16° 50.675' S	174° 32.138' W	1826.3	6.9	117.4	6.4	317.3
SO267_76-1	11.01.2019 10:16:05	KONGSBERG EM122	EM122	information			Fortsetzung Profil, rwK: 133°, d: 0	started	16° 50.266' S	174° 32.156' W	1825.1	0.1	123.1	5.5	356.8
SO267_76-1	11.01.2019 10:25:23	KONGSBERG EM122	EM122	alter course			rwK: 358°, d: 14 sm, passieren W	started	16° 50.567' S	174° 31.953' W	1880.7	5.9	114.8	5.9	136.0

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO267_76-1	11.01.2019 12:28:30	KONGSBERG EM122	EM122	alter course			rwK: 345°, d: 2,9nm	started	16° 40.747' S	174° 27.221' W	1989.3	10.7	102.9	5.3	357.5
SO267_76-1	11.01.2019 12:44:00	KONGSBERG EM122	EM122	alter course			rwK: 001°, d: 16,8nm	started	16° 37.998' S	174° 28.059' W	2303.5	11.5	125.2	4.2	346.6
SO267_76-1	11.01.2019 14:22:39	KONGSBERG EM122	EM122	alter course			rwK: 349°, d: 6,9nm	started	16° 21.132' S	174° 27.608' W	2097.2	9.8	117.6	5.8	0.7
SO267_76-1	11.01.2019 15:05:00	KONGSBERG EM122	EM122	alter course			rwK: 011°, d: 6,7nm	started	16° 14.239' S	174° 28.965' W	2147.2	9.9	163.8	4.1	353.3
SO267_76-1	11.01.2019 15:51:09	KONGSBERG EM122	EM122	alter course			rwK: 088°, d: 16,6nm	started	16° 07.662' S	174° 27.634' W	2099.0	8.3	135.0	5.8	15.7
SO267_76-1	11.01.2019 17:54:10	KONGSBERG EM122	EM122	alter course			rwK: 078°; d: 11,4nm	started	16° 06.880' S	174° 10.841' W	1744.7	8.1	138.9	4.7	90.5
SO267_76-1	11.01.2019 19:22:09	KONGSBERG EM122	EM122	alter course			rwK: 359°; d: 1nm	started	16° 04.472' S	173° 59.099' W	1193.4	8.2	140.4	4.8	79.0
SO267_76-1	11.01.2019 19:31:11	KONGSBERG EM122	EM122	profile end			Anfahrt OBS-Auslage: rwK: 267	started	16° 03.471' S	173° 58.893' W	1203.5	7.9	130.7	5.3	358.8
SO267_77-1	10.01.2019 07:49:48	Dredge	DRG	station start				started	18° 31.266' S	175° 41.595' W	2651.1	0.2	331.6	5.4	339.4
SO267_77-1	10.01.2019 07:51:50	Dredge	DRG	in the water				started	18° 31.252' S	175° 41.597' W	2643.2	0.7	327.5	5.4	33.7
SO267_77-1	10.01.2019 08:40:08	Dredge	DRG	max depth/on ground			SL: 2690 m, SZ: 21 kN	started	18° 31.248' S	175° 41.595' W	2646.8	0.7	331.8	4.3	13.6
SO267_77-1	10.01.2019 08:41:15	Dredge	DRG	profile start			rwK: 301°, d: 0,3 sm, FüG: 1,0 k	started	18° 31.246' S	175° 41.595' W	2648.1	0.3	326.7	4.1	228.2
SO267_77-1	10.01.2019 09:05:37	Dredge	DRG	profile end			SLmax: 2970 m, SZ: 22 kN	started	18° 31.070' S	175° 41.910' W	2349.5	0.3	291.5	6.0	11.3
SO267_77-1	10.01.2019 09:06:05	Dredge	DRG	information			Beginn dredgen, SZmax: 40 kN	started	18° 31.071' S	175° 41.911' W	2353.5	0.4	287.9	5.2	168.7
SO267_77-1	10.01.2019 09:42:07	Dredge	DRG	hoisting			Dredge frei vom Grund, SL: 2356 m, S	started	18° 31.074' S	175° 41.914' W	2352.6	0.4	321.1	4.6	14.7
SO267_77-1	10.01.2019 10:30:51	Dredge	DRG	on deck				started	18° 31.068' S	175° 41.905' W	2353.6	0.1	334.4	1.8	237.0
SO267_77-1	10.01.2019 10:38:00	Dredge	DRG	station end				started	18° 31.068' S	175° 41.905' W	2353.1	0.4	334.8	1.5	11.2
SO267_78-1	10.01.2019 11:02:18	Dredge	DRG	station start				started	18° 30.897' S	175° 41.077' W	2939.0	1.0	353.2	3.4	35.2
SO267_78-1	10.01.2019 11:05:37	Dredge	DRG	in the water			FW2/SPW2	started	18° 30.889' S	175° 41.102' W	2938.5	0.5	330.7	2.2	17.1
SO267_78-1	10.01.2019 11:58:13	Dredge	DRG	max depth/on ground			Boko, SL: 2960m, Beginn auslegen, rwK: 31	started	18° 30.882' S	175° 41.100' W	2936.8	0.1	14.3	1.3	19.5
SO267_78-1	10.01.2019 12:21:16	Dredge	DRG	hoisting			Beginn hieven, SLmax: 3230m	started	18° 30.671' S	175° 41.380' W	2608.3	0.7	11.3	2.7	314.7
SO267_78-1	10.01.2019 13:01:00	Dredge	DRG	information			Frei vom Grund, SZmax: 36,5k	started	18° 30.671' S	175° 41.374' W	2602.5	0.4	338.8	2.3	8.5
SO267_78-1	10.01.2019 13:55:36	Dredge	DRG	on deck				started	18° 30.665' S	175° 41.378' W	2608.3	0.2	336.3	3.2	95.3
SO267_78-1	10.01.2019 14:04:55	Dredge	DRG	station end				started	18° 30.663' S	175° 41.381' W	2607.5	0.4	343.7	3.0	213.0
SO267_79-1	11.01.2019 09:58:38	Autonomous Underwater Veh	AUV	station start				started	16° 50.262' S	174° 32.196' W	0.0	1.2	127.3	6.1	108.4
SO267_79-1	11.01.2019 10:07:44	Autonomous Underwater Veh	AUV	in the water			AUV z. W. & frei vom Schiff	started	16° 50.266' S	174° 32.161' W	0.0	0.2	123.1	5.7	80.0
SO267_79-1	11.01.2019 10:15:22	Autonomous Underwater Veh	AUV	information			AUV abgetaucht	started	16° 50.266' S	174° 32.155' W	0.0	0.2	125.8	6.1	290.1
SO267_79-1	12.01.2019 18:49:55	Autonomous Underwater Veh	AUV	at surface			AUV gesichtet	started	15° 59.644' S	174° 41.118' W	2011.8	4.7	133.0	7.2	327.8
SO267_79-1	12.01.2019 19:20:07	Autonomous Underwater Veh	AUV	on deck				started	15° 59.214' S	174° 40.593' W	0.0	0.3	84.1	12.9	223.0
SO267_79-1	12.01.2019 19:22:18	Autonomous Underwater Veh	AUV	station end				started	15° 59.227' S	174° 40.599' W	0.0	2.0	74.2	13.0	204.9
SO267_80-1	11.01.2019 20:00:14	Seismic Ocean Bottom Recei	SEISOBR	station start			OBS-Auslage	started	16° 03.601' S	174° 02.149' W	1392.8	0.8	131.7	4.8	177.2
SO267_80-1	11.01.2019 20:00:21	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS #230	started	16° 03.604' S	174° 02.150' W	1392.7	1.7	132.5	4.2	216.7
SO267_80-2	11.01.2019 20:25:30	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 229	started	16° 03.603' S	174° 04.545' W	1387.4	0.8	119.9	5.6	248.3
SO267_80-3	11.01.2019 20:57:18	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 228	started	16° 03.597' S	174° 07.654' W	1374.2	2.0	128.0	5.4	236.6
SO267_80-4	11.01.2019 21:26:30	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 227	started	16° 03.592' S	174° 10.795' W	1727.0	1.5	129.2	5.8	228.0
SO267_80-5	11.01.2019 21:58:07	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 226	started	16° 03.603' S	174° 13.928' W	1839.7	1.6	128.4	5.9	223.6
SO267_80-6	11.01.2019 22:26:51	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 225	started	16° 03.598' S	174° 16.984' W	1867.2	1.5	118.3	6.1	244.9
SO267_80-7	11.01.2019 22:55:48	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 224	started	16° 03.601' S	174° 19.685' W	1930.6	2.1	126.4	5.0	254.7
SO267_80-8	11.01.2019 23:26:40	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 223	started	16° 03.597' S	174° 23.159' W	2040.8	2.5	120.2	4.2	277.8
SO267_80-9	11.01.2019 23:54:24	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 222	started	16° 03.603' S	174° 26.242' W	2051.2	3.2	123.6	4.4	274.4
SO267_80-10	12.01.2019 00:23:00	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 221	started	16° 03.594' S	174° 29.117' W	2062.6	1.4	146.7	2.6	263.9
SO267_80-11	12.01.2019 00:51:27	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 220	started	16° 03.606' S	174° 32.465' W	2089.3	1.8	120.3	5.5	272.8
SO267_80-12	12.01.2019 01:17:16	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 219	started	16° 03.604' S	174° 35.417' W	2684.2	1.7	116.3	5.3	280.6
SO267_80-13	12.01.2019 01:38:13	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 218	started	16° 03.606' S	174° 37.543' W	2631.9	1.7	133.8	2.8	287.3
SO267_80-14	12.01.2019 02:13:13	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 217	started	16° 03.602' S	174° 42.057' W	2149.2	1.4	139.5	3.1	287.4
SO267_80-15	12.01.2019 02:42:00	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 216	started	16° 03.604' S	174° 45.161' W	2188.8	1.5	132.9	4.5	279.7
SO267_80-16	12.01.2019 03:09:19	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 215	started	16° 03.603' S	174° 48.794' W	2382.1	1.4	124.2	5.6	241.8
SO267_80-17	12.01.2019 03:30:02	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 214	started	16° 03.618' S	174° 51.477' W	2401.8	1.9	124.3	4.0	245.4
SO267_80-18	12.01.2019 03:52:20	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 213	started	16° 03.603' S	174° 54.576' W	2076.4	1.3	133.0	4.7	283.8

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO267_80-19	12.01.2019 04:15:50	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 212	started	16° 03.592' S	174° 57.699' W	2042.5	1.3	120.4	4.9	247.8
SO267_80-20	12.01.2019 04:38:21	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 211	started	16° 03.612' S	175° 00.853' W	1902.3	1.7	128.6	3.6	235.2
SO267_80-21	12.01.2019 05:00:24	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 210	started	16° 03.603' S	175° 03.979' W	2129.8	1.4	124.3	4.8	280.9
SO267_80-22	12.01.2019 05:22:40	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 209	started	16° 03.604' S	175° 07.096' W	1895.2	1.6	114.3	4.1	293.8
SO267_80-23	12.01.2019 05:44:49	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 208	started	16° 03.604' S	175° 10.254' W	2179.8	1.8	119.5	4.7	258.1
SO267_80-23	12.01.2019 05:47:13	Seismic Ocean Bottom Recei	SEISOBR	information			Unterbrechung	started	16° 03.630' S	175° 10.332' W	2180.7	2.8	117.0	7.2	222.7
SO267_80-24	12.01.2019 22:57:22	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 207 z. W., (Fortsetzung Static	started	16° 03.591' S	175° 13.379' W	2279.5	0.9	216.4	10.1	152.1
SO267_80-25	12.01.2019 23:27:25	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 206	started	16° 03.593' S	175° 16.519' W	2272.5	1.4	186.2	9.7	209.7
SO267_80-26	13.01.2019 00:01:47	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 205	started	16° 03.596' S	175° 20.515' W	2237.3	2.9	152.3	9.3	187.6
SO267_80-27	13.01.2019 00:26:44	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 204	started	16° 03.522' S	175° 22.785' W	2253.9	1.2	143.1	12.3	258.2
SO267_80-28	13.01.2019 00:54:31	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 203	started	16° 03.510' S	175° 25.936' W	2091.0	1.2	110.7	11.1	206.3
SO267_80-29	13.01.2019 01:22:32	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 202	started	16° 03.521' S	175° 29.397' W	2124.4	1.9	109.5	13.8	210.0
SO267_80-30	13.01.2019 01:49:00	Seismic Ocean Bottom Recei	SEISOBR	OBS deployed			OBS # 201	started	16° 03.541' S	175° 32.273' W	1804.2	0.8	111.7	9.8	58.8
SO267_80-30	13.01.2019 01:50:09	Seismic Ocean Bottom Recei	SEISOBR	station end				started	16° 03.533' S	175° 32.265' W	1786.1	1.3	115.6	12.8	12.3
SO267_81-1	13.01.2019 02:28:35	Seismic Source	SEISSRC	station start			Beginn aussetzen Kopfboje	started	15° 59.226' S	175° 35.589' W	2159.5	4.2	114.9	6.7	267.6
SO267_81-1	13.01.2019 02:29:36	Seismic Source	SEISSRC	information			Kopfboje zu Wasser	started	15° 59.226' S	175° 35.660' W	2158.9	4.0	123.4	6.2	254.5
SO267_81-1	13.01.2019 02:33:19	Seismic Source	SEISSRC	information			1. Bird zu Wasser	started	15° 59.224' S	175° 35.899' W	2151.5	3.9	119.8	6.3	267.5
SO267_81-1	13.01.2019 02:47:34	Seismic Source	SEISSRC	information			2. Bird zu Wasser	started	15° 59.201' S	175° 37.035' W	2141.5	4.1	119.6	7.0	259.9
SO267_81-1	13.01.2019 03:00:55	Seismic Source	SEISSRC	information			3. Bird zu Wasser	started	15° 59.209' S	175° 38.045' W	2126.8	4.8	114.5	6.5	268.9
SO267_81-1	13.01.2019 03:04:14	Seismic Source	SEISSRC	information			4. Bird zu Wasser	started	15° 59.206' S	175° 38.308' W	2115.5	4.5	114.6	5.4	268.9
SO267_81-1	13.01.2019 03:14:40	Seismic Source	SEISSRC	information			5. Bird zu Wasser	started	15° 59.211' S	175° 39.146' W	2102.9	4.7	99.9	3.8	272.3
SO267_81-1	13.01.2019 03:27:36	Seismic Source	SEISSRC	information			6. Bird zu Wasser	started	15° 59.218' S	175° 40.209' W	2096.1	5.1	107.2	6.5	271.4
SO267_81-1	13.01.2019 03:35:51	Seismic Source	SEISSRC	information			7. Bird zu Wasser	started	15° 59.221' S	175° 40.897' W	2071.9	4.8	113.7	4.6	274.7
SO267_81-1	13.01.2019 03:44:22	Seismic Source	SEISSRC	information			8. Bird zu Wasser	started	15° 59.228' S	175° 41.603' W	2030.6	4.5	96.3	3.6	274.2
SO267_81-1	13.01.2019 03:53:34	Seismic Source	SEISSRC	information			9. Bird zu Wasser	started	15° 59.232' S	175° 42.364' W	2021.1	4.9	108.1	5.4	268.1
SO267_81-1	13.01.2019 04:03:26	Seismic Source	SEISSRC	information			10. Bird zu Wasser	started	15° 59.240' S	175° 43.177' W	2017.2	4.7	123.2	4.6	265.2
SO267_81-1	13.01.2019 04:07:17	Seismic Source	SEISSRC	information			11. Bird zu Wasser	started	15° 59.282' S	175° 43.480' W	2006.8	4.6	120.7	4.7	260.6
SO267_81-1	13.01.2019 04:10:28	Seismic Source	SEISSRC	information			12. Bird zu Wasser	started	15° 59.352' S	175° 43.712' W	2023.1	4.3	118.1	6.1	248.1
SO267_81-1	13.01.2019 04:11:22	Seismic Source	SEISSRC	information			13. Bird zu Wasser	started	15° 59.377' S	175° 43.773' W	2021.9	4.4	114.6	5.6	252.5
SO267_81-1	13.01.2019 04:17:19	Seismic Source	SEISSRC	information			Streamer ausgesteckt (4133m	started	15° 59.606' S	175° 44.151' W	2017.8	4.3	114.4	4.9	237.7
SO267_81-1	13.01.2019 04:36:30	Seismic Source	SEISSRC	Airgun in water			Stb Airgunarray	started	16° 00.456' S	175° 44.745' W	1986.3	2.8	78.2	6.0	209.5
SO267_81-1	13.01.2019 04:40:34	Seismic Source	SEISSRC	information			1. Magnetometer zu Wasser	started	16° 00.621' S	175° 44.794' W	1972.0	2.6	76.0	5.7	192.6
SO267_81-1	13.01.2019 04:44:32	Seismic Source	SEISSRC	information			2. Magnetometer zu Wasser	started	16° 00.855' S	175° 44.817' W	1910.2	4.2	100.9	5.1	186.9
SO267_81-1	13.01.2019 04:59:46	Seismic Source	SEISSRC	Airgun in water			Bb Airgunarray	started	16° 01.603' S	175° 44.985' W	1964.4	3.0	117.5	9.0	197.9
SO267_81-1	13.01.2019 05:07:21	Seismic Source	SEISSRC	information			Magnetometer ausgesteckt (800	started	16° 02.097' S	175° 45.005' W	1991.2	4.0	68.0	8.0	164.4
SO267_81-1	13.01.2019 07:48:51	Seismic Source	SEISSRC	profile start			rwk: 090°, d: 96,3sm	started	16° 03.602' S	175° 35.478' W	2113.3	3.9	100.8	9.8	94.4
SO267_81-1	14.01.2019 05:37:29	Seismic Source	SEISSRC	information			Airguns "AUS", Wale in geringer Entf	started	16° 03.600' S	173° 58.703' W	1215.9	4.4	13.2	2.7	91.8
SO267_81-1	14.01.2019 06:24:23	Seismic Source	SEISSRC	profile end			Beg. drehen über Bb	started	16° 03.495' S	173° 55.248' W	1031.5	4.2	34.4	3.7	77.0
SO267_81-1	14.01.2019 06:30:02	Seismic Source	SEISSRC	information			Beg. Softstart	started	16° 03.331' S	173° 54.868' W	1025.3	4.2	25.3	3.9	67.8
SO267_81-1	14.01.2019 07:47:40	Seismic Source	SEISSRC	profile start			Profil "P1", rwk: 305°, d: 71,0sr	started	15° 58.793' S	173° 54.132' W	975.6	3.8	53.7	3.9	321.5
SO267_81-1	15.01.2019 00:40:18	Seismic Source	SEISSRC	profile end			ä/K auf rwK: 306°, d: 5,1nm	started	15° 17.461' S	174° 53.924' W	2132.1	4.2	17.8	7.0	302.2
SO267_81-1	15.01.2019 01:49:43	Seismic Source	SEISSRC	information			Ende schießen, Beginn einholen der Airguns, Beginn v	started	15° 14.342' S	174° 58.303' W	2130.6	4.6	13.6	7.3	309.1
SO267_81-1	15.01.2019 02:07:23	Seismic Source	SEISSRC	information			Stb.Airgun an Deck	started	15° 13.716' S	174° 59.203' W	2091.1	3.4	11.4	6.3	309.5
SO267_81-1	15.01.2019 02:21:52	Seismic Source	SEISSRC	information			Bb.Airgun an Deck, Magnetometer vo	started	15° 13.230' S	174° 59.887' W	2040.3	3.5	16.9	5.8	308.2
SO267_81-1	15.01.2019 02:24:47	Seismic Source	SEISSRC	alter course			rwK: 221°, d: 66nm	started	15° 13.131' S	175° 00.028' W	1971.8	3.5	4.1	6.0	298.4
SO267_81-1	15.01.2019 02:46:31	Seismic Source	SEISSRC	information			Beginn hieven Streamer	started	15° 13.307' S	175° 01.432' W	2073.8	3.8	6.9	6.0	221.4
SO267_81-1	15.01.2019 03:05:04	Seismic Source	SEISSRC	on deck			1. Bird an Deck	started	15° 14.170' S	175° 02.198' W	1957.0	3.6	358.1	6.3	209.5
SO267_81-1	15.01.2019 03:06:29	Seismic Source	SEISSRC	on deck			2. Bird an Deck	started	15° 14.235' S	175° 02.257' W	1958.9	3.7	354.1	6.2	221.8
SO267_81-1	15.01.2019 03:15:32	Seismic Source	SEISSRC	on deck			3. Bird an Deck	started	15° 14.652' S	175° 02.631' W	1883.0	3.7	358.6	5.8	212.1

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO267_81-1	15.01.2019 03:26:45	Seismic Source	SEISSRC	on deck			4. Bird an Deck	started	15° 15.179' S	175° 03.098' W	2009.7	3.9	359.5	6.6	217.7
SO267_81-1	15.01.2019 03:56:40	Seismic Source	SEISSRC	on deck			5. Bird an Deck	started	15° 16.620' S	175° 04.259' W	2262.8	3.6	5.7	6.0	216.9
SO267_81-1	15.01.2019 04:28:37	Seismic Source	SEISSRC	on deck			6. Bird an Deck	started	15° 18.229' S	175° 05.264' W	2269.8	3.5	14.5	3.2	197.1
SO267_81-1	15.01.2019 04:41:25	Seismic Source	SEISSRC	on deck			7. Bird an Deck	started	15° 18.928' S	175° 05.500' W	2198.4	3.6	14.2	2.5	184.6
SO267_81-1	15.01.2019 04:52:04	Seismic Source	SEISSRC	on deck			8. Bird an Deck	started	15° 19.476' S	175° 05.628' W	2199.9	3.2	23.8	4.8	180.9
SO267_81-1	15.01.2019 05:04:02	Seismic Source	SEISSRC	on deck			9. Bird an Deck	started	15° 20.328' S	175° 05.685' W	2124.3	4.6	13.8	4.0	183.7
SO267_81-1	15.01.2019 05:12:57	Seismic Source	SEISSRC	on deck			10. Bird an Deck	started	15° 20.934' S	175° 05.660' W	2067.0	3.9	359.3	4.8	175.6
SO267_81-1	15.01.2019 05:15:30	Seismic Source	SEISSRC	on deck			11. Bird an Deck	started	15° 21.097' S	175° 05.637' W	2110.3	4.0	8.0	4.0	174.5
SO267_81-1	15.01.2019 05:23:29	Seismic Source	SEISSRC	on deck			12. Bird an Deck	started	15° 21.623' S	175° 05.508' W	2102.7	4.0	9.0	3.8	162.7
SO267_81-1	15.01.2019 05:30:50	Seismic Source	SEISSRC	on deck			13. Bird an Deck	started	15° 22.084' S	175° 05.313' W	2077.5	4.1	344.4	3.9	158.2
SO267_81-1	15.01.2019 05:37:11	Seismic Source	SEISSRC	on deck			Endboye an Deck	started	15° 22.453' S	175° 05.096' W	2073.6	4.2	353.3	4.1	153.5
SO267_81-1	15.01.2019 05:38:58	Seismic Source	SEISSRC	station end				started	15° 22.556' S	175° 05.029' W	2113.7	4.2	12.0	5.3	145.4
SO267_82-1	15.01.2019 05:48:01	Magnetometer	MAG	station start				started	15° 22.995' S	175° 04.555' W	2065.1	4.8	358.0	6.6	121.5
SO267_82-1	15.01.2019 05:57:39	Magnetometer	MAG	information			Magnetometer ausgesteckt	started	15° 23.344' S	175° 03.710' W	2003.2	4.2	356.0	6.4	110.4
SO267_82-1	15.01.2019 05:58:58	Magnetometer	MAG	profile start		Magnetik und EM-Profil, rwk: 113°, d		started	15° 23.377' S	175° 03.626' W	2008.3	4.0	357.3	6.0	106.6
SO267_82-1	15.01.2019 06:49:29	Magnetometer	MAG	alter course			rwk: 180°, d: 11,5sm	started	15° 26.518' S	174° 56.194' W	2048.5	11.0	1.2	3.6	155.0
SO267_82-1	15.01.2019 07:47:33	Magnetometer	MAG	alter course			rwk: 239°, d: 40,6sm	started	15° 38.042' S	174° 56.181' W	2332.7	11.8	26.4	5.7	207.9
SO267_82-1	15.01.2019 10:54:48	Magnetometer	MAG	profile end				started	15° 57.667' S	175° 29.162' W	2231.3	11.0	15.2	5.4	241.6
SO267_82-1	15.01.2019 11:00:50	Magnetometer	MAG	hoisting		Beginn hieven Magnetometerkab		started	15° 58.041' S	175° 29.913' W	2269.2	6.7	24.2	5.5	238.4
SO267_82-1	15.01.2019 11:09:34	Magnetometer	MAG	information			1. Bird # 02 a. D.	started	15° 58.442' S	175° 30.611' W	2248.2	4.7	24.2	6.0	241.6
SO267_82-1	15.01.2019 11:14:45	Magnetometer	MAG	on deck		2. Bird # 01 & Magnetik komplett a		started	15° 58.659' S	175° 30.965' W	2239.5	4.8	34.8	6.0	237.3
SO267_82-1	15.01.2019 11:16:49	Magnetometer	MAG	station end				started	15° 58.745' S	175° 31.108' W	2242.3	4.6	39.5	4.7	243.4
SO267_83-1	15.01.2019 12:15:25	Dredge	DRG	station start				started	16° 00.730' S	175° 24.779' W	0.0	0.5	25.2	5.5	42.8
SO267_83-1	15.01.2019 12:17:55	Dredge	DRG	in the water			FW2/SPW2	started	16° 00.731' S	175° 24.779' W	2340.0	0.5	19.7	5.1	296.3
SO267_83-1	15.01.2019 12:59:21	Dredge	DRG	max depth/on ground		Boko, SL: 2360m, Beginn auslegen, rwK: 02		started	16° 00.729' S	175° 24.780' W	2339.3	0.1	18.6	5.5	114.6
SO267_83-1	15.01.2019 13:23:43	Dredge	DRG	hoisting		Beginn hieven, SLmax: 2750m		started	16° 00.398' S	175° 24.589' W	2337.8	0.3	15.3	5.8	310.5
SO267_83-1	15.01.2019 13:49:15	Dredge	DRG	information		Frei vom Grund, SZmax: 27,3k		started	16° 00.398' S	175° 24.591' W	2336.2	0.3	20.2	5.8	295.3
SO267_83-1	15.01.2019 14:38:26	Dredge	DRG	on deck				started	16° 00.398' S	175° 24.583' W	2337.0	0.2	41.5	3.9	32.5
SO267_83-1	15.01.2019 14:43:40	Dredge	DRG	station end				started	16° 00.399' S	175° 24.583' W	2336.6	0.6	43.7	4.8	109.2
SO267_84-1	15.01.2019 16:17:53	Dredge	DRG	station start				started	16° 06.518' S	175° 22.082' W	2194.0	0.5	13.7	5.1	164.3
SO267_84-1	15.01.2019 16:22:43	Dredge	DRG	in the water				started	16° 06.529' S	175° 22.093' W	2194.1	0.5	17.8	4.6	284.6
SO267_84-1	15.01.2019 17:02:23	Dredge	DRG	max depth/on ground			Boko, SL: 2146m	started	16° 06.543' S	175° 22.153' W	2108.1	0.4	41.5	6.3	2.1
SO267_84-1	15.01.2019 17:04:29	Dredge	DRG	profile start		Beg. auslegen, rwk: 262°, d: 0,36		started	16° 06.538' S	175° 22.155' W	2142.5	0.5	38.9	6.0	254.9
SO267_84-1	15.01.2019 17:29:15	Dredge	DRG	hoisting		Schiff gestoppt, Beg. Dredgen. maxSL		started	16° 06.590' S	175° 22.519' W	1832.7	0.3	34.6	6.6	279.9
SO267_84-1	15.01.2019 18:11:05	Dredge	DRG	hoisting		Dredge frei vom Grund, SL: 1830m, max		started	16° 06.592' S	175° 22.512' W	1832.8	0.2	21.6	5.5	180.4
SO267_84-1	15.01.2019 18:50:08	Dredge	DRG	on deck				started	16° 06.588' S	175° 22.512' W	1839.7	0.3	28.1	4.9	310.5
SO267_84-1	15.01.2019 18:54:40	Dredge	DRG	station end				started	16° 06.589' S	175° 22.512' W	1835.2	0.2	31.1	5.4	84.0
SO267_85-1	15.01.2019 19:56:02	Dredge	DRG	station start				started	16° 03.227' S	175° 31.775' W	2020.1	0.9	15.1	5.5	264.9
SO267_85-1	15.01.2019 19:57:57	Dredge	DRG	in the water				started	16° 03.223' S	175° 31.774' W	2007.8	0.2	22.9	5.4	15.7
SO267_85-1	15.01.2019 20:36:27	Dredge	DRG	max depth/on ground			SL: 2022 m, SZ: 16 kN	started	16° 03.202' S	175° 31.767' W	2024.6	0.3	38.5	5.9	346.4
SO267_85-1	15.01.2019 20:37:06	Dredge	DRG	profile start		Beginn auslegen Draht, rwK: 229°, d: 0,4 sr		started	16° 03.202' S	175° 31.767' W	2019.1	0.3	37.4	4.9	136.8
SO267_85-1	15.01.2019 21:05:07	Dredge	DRG	profile end			SLmax: 2350 m, SZ: 14 kN	started	16° 03.460' S	175° 32.071' W	1675.8	0.9	30.0	5.4	283.0
SO267_85-1	15.01.2019 21:06:22	Dredge	DRG	information		Beginn dredgen, (SZmax: 25 kN		started	16° 03.460' S	175° 32.071' W	1671.3	0.9	28.0	5.1	282.3
SO267_85-1	15.01.2019 21:45:10	Dredge	DRG	hoisting		Dredge frei vom Grund, SL: 1678 m, S		started	16° 03.465' S	175° 32.075' W	1673.0	0.3	45.4	6.0	142.7
SO267_85-1	15.01.2019 22:22:16	Dredge	DRG	on deck				started	16° 03.465' S	175° 32.070' W	1673.1	0.9	50.5	5.7	90.1
SO267_85-1	15.01.2019 22:30:00	Dredge	DRG	station end				started	16° 03.461' S	175° 32.070' W	1676.4	0.5	41.7	6.5	131.9
SO267_86-1	15.01.2019 23:34:03	Seismic Source	SEISSRC	station start				started	16° 03.612' S	175° 40.190' W	2021.3	3.8	31.7	7.2	91.5
SO267_86-1	15.01.2019 23:43:13	Seismic Source	SEISSRC	Airgun in water			STB Airgun-Array z. W.	started	16° 03.614' S	175° 39.637' W	2005.9	3.5	33.6	6.8	91.0
SO267_86-1	15.01.2019 23:51:30	Seismic Source	SEISSRC	information		Start aussetzen Magnetik, 1. Bird a		started	16° 03.614' S	175° 39.172' W	2035.2	3.2	23.1	7.3	80.0

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO267_86-1	15.01.2019 23:57:07	Seismic Source	SEISSRC	information			2. Mag. Bird z. W.	started	16° 03.607' S	175° 38.816' W	2068.8	3.2	34.6	5.5	96.5
SO267_86-1	16.01.2019 00:08:14	Seismic Source	SEISSRC	Airgun in water			BB Airgun-Array z. W.	started	16° 03.609' S	175° 38.148' W	2100.0	3.6	31.2	6.5	82.2
SO267_86-1	16.01.2019 00:15:57	Seismic Source	SEISSRC	information			Magnetometer auf 825m ausgest	started	16° 03.607' S	175° 37.652' W	2103.3	4.6	28.5	6.9	89.2
SO267_86-1	16.01.2019 00:19:58	Seismic Source	SEISSRC	information			Beginn schießen	started	16° 03.598' S	175° 37.307' W	2079.8	4.8	37.2	8.1	84.0
SO267_86-1	16.01.2019 00:42:43	Seismic Source	SEISSRC	profile start			rwK: 090°, d: 93nm	started	16° 03.597' S	175° 35.416' W	2114.1	5.3	33.1	6.4	92.6
SO267_86-1	16.01.2019 21:02:03	Seismic Source	SEISSRC	profile end				started	16° 03.598' S	173° 58.781' W	1207.3	3.8	324.5	5.3	78.0
SO267_86-1	16.01.2019 21:18:17	Seismic Source	SEISSRC	on deck			STB Airgun-Array a. D.	started	16° 03.606' S	173° 57.865' W	1188.7	3.1	322.3	4.8	75.1
SO267_86-1	16.01.2019 21:30:28	Seismic Source	SEISSRC	on deck			BB Airgun-Array a. D.	started	16° 03.596' S	173° 57.200' W	1163.3	3.3	335.5	4.4	88.8
SO267_86-1	16.01.2019 21:33:18	Seismic Source	SEISSRC	information			1. Mag.-Bird # 02 a. D.	started	16° 03.597' S	173° 57.048' W	1143.9	3.2	334.6	4.2	84.7
SO267_86-1	16.01.2019 21:36:30	Seismic Source	SEISSRC	on deck			1. Mag.-Bird # 02 a. D., Magnetik komp	started	16° 03.596' S	173° 56.872' W	1139.7	3.4	329.7	3.6	84.5
SO267_86-1	16.01.2019 21:41:04	Seismic Source	SEISSRC	station end				started	16° 03.598' S	173° 56.621' W	1085.8	3.2	315.0	3.5	88.5
SO267_87-1	16.01.2019 22:06:16	Seismic Ocean Bottom Recei	SEISOBR	station start				started	16° 04.005' S	173° 59.021' W	1202.4	3.0	336.8	4.0	293.1
SO267_87-1	16.01.2019 22:10:06	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 230	started	16° 03.880' S	173° 59.132' W	0.0	3.6	313.4	4.1	320.1
SO267_87-1	16.01.2019 22:29:20	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 230	started	16° 03.933' S	174° 01.086' W	0.0	6.1	335.1	3.1	267.7
SO267_87-1	16.01.2019 22:44:44	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 230	started	16° 03.640' S	174° 02.132' W	0.0	1.0	317.5	3.5	22.4
SO267_87-2	16.01.2019 22:47:26	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 229	started	16° 03.592' S	174° 02.106' W	0.0	1.2	319.7	3.3	10.1
SO267_87-2	16.01.2019 23:03:39	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 229	started	16° 03.780' S	174° 03.654' W	0.0	5.3	333.6	4.1	265.5
SO267_87-2	16.01.2019 23:20:09	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 229	started	16° 03.627' S	174° 04.505' W	0.0	1.3	309.3	4.0	95.2
SO267_87-3	16.01.2019 23:20:26	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 228	started	16° 03.627' S	174° 04.499' W	0.0	1.7	311.1	4.2	105.7
SO267_87-3	16.01.2019 23:38:34	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 228	started	16° 03.921' S	174° 05.426' W	0.0	7.2	339.3	3.3	272.6
SO267_87-3	17.01.2019 00:03:17	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 228	started	16° 03.647' S	174° 07.612' W	0.0	0.5	331.9	4.0	45.8
SO267_87-4	17.01.2019 00:03:59	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 227	started	16° 03.638' S	174° 07.613' W	0.0	1.4	323.3	3.8	328.8
SO267_87-4	17.01.2019 00:27:47	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 227	started	16° 03.772' S	174° 09.804' W	0.0	6.9	323.0	3.5	257.8
SO267_87-4	17.01.2019 00:47:44	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 227	started	16° 03.750' S	174° 10.612' W	0.0	1.2	291.9	6.0	33.3
SO267_87-5	17.01.2019 00:47:48	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 226	started	16° 03.750' S	174° 10.610' W	0.0	1.4	288.4	5.8	61.6
SO267_87-5	17.01.2019 01:11:06	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 226	started	16° 03.804' S	174° 12.850' W	0.0	7.3	323.6	3.9	267.3
SO267_87-6	17.01.2019 01:25:11	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 225	started	16° 03.673' S	174° 13.782' W	0.0	1.5	316.5	4.7	67.1
SO267_87-5	17.01.2019 01:26:35	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 226	started	16° 03.662' S	174° 13.750' W	0.0	1.4	320.7	4.6	49.0
SO267_87-6	17.01.2019 01:49:59	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 225	started	16° 03.745' S	174° 15.676' W	0.0	7.2	335.6	5.5	263.8
SO267_87-6	17.01.2019 02:08:35	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 225	started	16° 03.677' S	174° 16.798' W	0.0	1.2	347.9	3.7	2.4
SO267_87-7	17.01.2019 02:08:50	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 224	started	16° 03.670' S	174° 16.796' W	0.0	1.7	351.0	4.4	356.3
SO267_87-7	17.01.2019 02:34:51	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 224	started	16° 03.818' S	174° 19.224' W	0.0	4.1	335.5	5.0	266.5
SO267_87-8	17.01.2019 02:49:39	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 223	started	16° 03.532' S	174° 19.537' W	0.0	1.4	326.4	4.1	95.4
SO267_87-7	17.01.2019 02:49:58	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 224	started	16° 03.531' S	174° 19.528' W	0.0	1.9	326.0	3.7	68.4
SO267_87-8	17.01.2019 03:14:47	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 223	started	16° 03.712' S	174° 21.777' W	0.0	6.7	326.3	3.6	262.9
SO267_87-9	17.01.2019 03:32:27	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 222	started	16° 03.651' S	174° 23.019' W	0.0	1.3	322.6	3.8	56.5
SO267_87-8	17.01.2019 03:34:04	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 223	started	16° 03.629' S	174° 22.996' W	0.0	1.2	320.6	3.5	14.2
SO267_87-9	17.01.2019 04:03:12	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 222	started	16° 03.872' S	174° 25.796' W	0.0	4.6	346.7	5.0	265.9
SO267_87-10	17.01.2019 04:05:29	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 221	started	16° 03.866' S	174° 25.950' W	0.0	3.4	345.2	4.4	300.0
SO267_87-9	17.01.2019 04:18:16	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 222	started	16° 03.752' S	174° 26.039' W	0.0	1.3	324.6	5.0	141.2
SO267_87-10	17.01.2019 04:37:22	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 221	started	16° 03.858' S	174° 28.080' W	0.0	7.6	333.3	5.1	262.6
SO267_87-11	17.01.2019 04:38:27	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 220	started	16° 03.876' S	174° 28.223' W	0.0	7.7	331.5	5.1	262.2
SO267_87-10	17.01.2019 04:51:27	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 221	started	16° 03.735' S	174° 28.889' W	0.0	1.9	331.1	4.7	90.3
SO267_87-11	17.01.2019 05:12:43	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 220	started	16° 03.773' S	174° 30.950' W	0.0	7.4	342.1	5.0	260.9
SO267_87-12	17.01.2019 05:15:16	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 219	started	16° 03.809' S	174° 31.273' W	0.0	7.6	338.7	4.9	265.5
SO267_87-11	17.01.2019 05:31:13	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 220	started	16° 03.778' S	174° 32.119' W	0.0	2.1	335.4	4.3	21.7
SO267_87-12	17.01.2019 06:19:48	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 219	started	16° 03.723' S	174° 35.402' W	0.0	0.2	331.7	5.1	68.2
SO267_87-13	17.01.2019 06:20:48	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 218	started	16° 03.723' S	174° 35.399' W	0.0	0.1	5.7	4.5	343.2
SO267_87-12	17.01.2019 06:29:48	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 219	started	16° 03.600' S	174° 35.243' W	0.0	0.9	349.5	4.4	78.6

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO267_87-13	17.01.2019 07:04:44	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 218	started	16° 03.832' S	174° 37.535' W	0.0	0.4	296.5	4.5	319.1
SO267_87-14	17.01.2019 07:06:54	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 217	started	16° 03.830' S	174° 37.541' W	0.0	0.7	292.2	3.8	351.5
SO267_87-13	17.01.2019 07:15:46	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 218	started	16° 03.582' S	174° 37.361' W	0.0	1.1	338.9	8.0	84.0
SO267_87-14	17.01.2019 07:37:21	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 217	started	16° 03.647' S	174° 39.452' W	0.0	7.3	335.7	6.5	261.9
SO267_87-15	17.01.2019 07:42:08	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 216	started	16° 03.725' S	174° 40.069' W	0.0	7.6	348.0	5.6	264.3
SO267_87-14	17.01.2019 08:04:20	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 217	started	16° 03.780' S	174° 41.823' W	0.0	1.0	1.7	5.5	142.8
SO267_87-15	17.01.2019 08:22:23	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 216	started	16° 03.969' S	174° 43.246' W	0.0	6.3	340.0	5.8	264.9
SO267_87-16	17.01.2019 08:23:13	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 215	started	16° 03.960' S	174° 43.335' W	0.0	6.2	347.0	5.6	263.8
SO267_87-15	17.01.2019 08:43:36	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 216	started	16° 03.653' S	174° 44.784' W	0.0	1.0	345.8	4.6	14.7
SO267_87-16	17.01.2019 08:55:48	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 215	started	16° 03.772' S	174° 45.634' W	0.0	7.1	335.2	5.5	259.4
SO267_87-16	17.01.2019 09:27:53	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 215	started	16° 03.637' S	174° 48.517' W	0.0	1.6	348.4	4.7	51.8
SO267_87-17	17.01.2019 11:54:45	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 214	started	16° 00.142' S	174° 51.334' W	0.0	5.7	9.7	2.7	184.4
SO267_87-17	17.01.2019 12:26:16	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 214	started	16° 03.289' S	174° 51.399' W	0.0	2.2	359.1	2.9	192.7
SO267_87-18	17.01.2019 12:28:00	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 213	started	16° 03.348' S	174° 51.391' W	0.0	1.9	13.5	3.4	172.5
SO267_87-17	17.01.2019 12:37:19	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 214	started	16° 03.528' S	174° 51.417' W	0.0	0.5	15.8	4.5	213.0
SO267_87-18	17.01.2019 12:53:52	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 213	started	16° 03.676' S	174° 52.881' W	0.0	7.2	1.6	5.1	262.5
SO267_87-19	17.01.2019 13:01:25	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 212	started	16° 03.703' S	174° 53.795' W	0.0	6.5	12.0	5.2	265.1
SO267_87-18	17.01.2019 13:21:28	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 213	started	16° 03.599' S	174° 54.675' W	0.0	0.5	350.8	4.7	358.9
SO267_87-19	17.01.2019 13:28:40	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 212	started	16° 03.502' S	174° 54.994' W	0.0	5.9	14.5	5.6	261.6
SO267_87-20	17.01.2019 13:59:44	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 211	started	16° 03.525' S	174° 57.703' W	0.0	0.5	14.2	4.7	347.9
SO267_87-19	17.01.2019 14:01:32	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 212	started	16° 03.507' S	174° 57.704' W	0.0	0.5	12.5	4.8	322.6
SO267_87-20	17.01.2019 14:22:56	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 211	started	16° 03.585' S	174° 59.729' W	0.0	7.4	9.0	6.4	266.9
SO267_87-21	17.01.2019 14:35:56	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 210	started	16° 03.569' S	175° 00.855' W	0.0	2.3	28.6	5.7	307.7
SO267_87-20	17.01.2019 14:47:26	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 211	started	16° 03.511' S	175° 00.819' W	0.0	1.2	27.0	5.4	103.0
SO267_87-21	17.01.2019 15:04:58	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 210	started	16° 03.768' S	175° 02.091' W	0.0	7.6	15.7	7.3	268.8
SO267_87-22	17.01.2019 15:27:49	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 209	started	16° 03.607' S	175° 04.014' W	0.0	1.6	35.7	5.7	83.3
SO267_87-21	17.01.2019 15:30:00	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 210	started	16° 03.593' S	175° 03.981' W	0.0	1.3	8.2	6.6	74.2
SO267_87-22	17.01.2019 15:53:02	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 209	started	16° 03.604' S	175° 06.044' W	0.0	7.3	3.0	7.4	265.4
SO267_87-23	17.01.2019 16:14:10	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 208	started	16° 03.573' S	175° 07.138' W	0.0	0.8	11.1	7.0	349.9
SO267_87-22	17.01.2019 16:15:12	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 209	started	16° 03.566' S	175° 07.145' W	0.0	0.8	9.5	6.2	288.3
SO267_87-23	17.01.2019 17:01:19	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 208	started	16° 03.660' S	175° 10.318' W	0.0	0.6	9.9	6.1	66.8
SO267_87-24	17.01.2019 17:07:31	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 207	started	16° 03.592' S	175° 10.218' W	0.0	1.1	12.4	5.4	137.4
SO267_87-23	17.01.2019 17:09:05	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 208	started	16° 03.594' S	175° 10.210' W	0.0	0.5	24.9	6.5	22.5
SO267_87-24	17.01.2019 17:35:17	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 207	started	16° 03.687' S	175° 12.668' W	0.0	4.9	20.8	7.2	262.1
SO267_87-25	17.01.2019 17:41:00	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 206	started	16° 03.742' S	175° 13.263' W	0.0	6.0	23.5	7.5	281.7
SO267_87-24	17.01.2019 17:49:40	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 207	started	16° 03.574' S	175° 13.337' W	0.0	1.0	17.6	5.8	26.2
SO267_87-25	17.01.2019 18:11:03	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 206	started	16° 03.707' S	175° 15.628' W	0.0	7.5	6.4	6.3	267.8
SO267_87-26	17.01.2019 18:13:03	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 205	started	16° 03.729' S	175° 15.888' W	0.0	7.4	6.4	6.3	264.0
SO267_87-25	17.01.2019 18:25:19	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 206	started	16° 03.654' S	175° 16.469' W	0.0	1.7	10.4	6.3	132.1
SO267_87-26	17.01.2019 18:44:11	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 205	started	16° 03.901' S	175° 18.306' W	0.0	7.2	23.2	6.8	272.4
SO267_87-27	17.01.2019 18:49:22	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 204	started	16° 03.887' S	175° 18.949' W	0.0	7.5	11.8	5.6	268.8
SO267_87-26	17.01.2019 19:08:48	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 205	started	16° 03.635' S	175° 20.429' W	0.0	1.5	11.4	5.5	91.6
SO267_87-27	17.01.2019 19:19:37	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 204	started	16° 03.531' S	175° 21.036' W	0.0	9.7	11.3	6.9	260.3
SO267_87-28	17.01.2019 19:21:16	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 203	started	16° 03.574' S	175° 21.300' W	0.0	8.6	18.5	7.3	259.8
SO267_87-27	17.01.2019 19:39:50	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 204	started	16° 03.456' S	175° 22.698' W	0.0	1.6	6.3	7.1	152.2
SO267_87-28	17.01.2019 19:54:20	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 203	started	16° 03.665' S	175° 24.031' W	0.0	7.0	21.1	6.8	269.4
SO267_87-29	17.01.2019 19:59:47	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 202	started	16° 03.684' S	175° 24.685' W	0.0	6.9	25.8	6.9	266.8
SO267_87-28	17.01.2019 20:21:33	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 203	started	16° 03.450' S	175° 25.791' W	0.0	1.2	16.3	7.3	73.5
SO267_87-29	17.01.2019 20:50:55	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 202	started	16° 03.737' S	175° 28.379' W	0.0	5.5	17.0	6.7	266.7

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO267_87-30	17.01.2019 20:52:09	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 201	started	16° 03.742' S	175° 28.491' W	0.0	5.1	22.4	6.1	263.3
SO267_87-29	17.01.2019 21:10:01	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 202	started	16° 03.139' S	175° 29.114' W	0.0	1.4	16.4	4.7	91.6
SO267_87-30	17.01.2019 22:13:00	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 201	started	16° 04.113' S	175° 32.382' W	0.0	2.0	22.9	4.6	256.6
SO267_87-30	17.01.2019 22:33:04	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 201	started	16° 03.373' S	175° 32.185' W	0.0	1.1	18.4	5.7	60.5
SO267_87-30	17.01.2019 22:35:30	Seismic Ocean Bottom Recei	SEISOBR	station end				started	16° 03.369' S	175° 32.142' W	0.0	1.1	15.6	4.5	87.3
SO267_88-1	17.01.2019 10:45:37	Autonomous Underwater Veh	AUV	station start				started	15° 54.051' S	174° 51.075' W	0.0	1.1	0.5	3.6	349.9
SO267_88-1	17.01.2019 10:53:47	Autonomous Underwater Veh	AUV	in the water			AUV z. W., und frei vom Schif	started	15° 54.028' S	174° 51.080' W	0.0	0.3	9.3	3.9	314.4
SO267_88-1	17.01.2019 11:06:01	Autonomous Underwater Veh	AUV	information			AUV abgetaucht, Anfahrt Station # 87, OBS # 214,	started	15° 54.022' S	174° 51.077' W	0.0	0.5	350.4	2.8	219.7
SO267_88-1	18.01.2019 06:21:53	Autonomous Underwater Veh	AUV	at surface			AUV gesichtet	started	15° 12.506' S	174° 30.633' W	0.0	3.4	57.1	2.3	168.8
SO267_88-1	18.01.2019 06:45:55	Autonomous Underwater Veh	AUV	on deck				started	15° 12.645' S	174° 30.589' W	0.0	0.2	33.4	1.0	175.4
SO267_88-1	18.01.2019 06:48:03	Autonomous Underwater Veh	AUV	station end				started	15° 12.637' S	174° 30.577' W	0.0	2.2	66.6	1.0	86.1
SO267_89-1	17.01.2019 22:36:02	Magnetometer	MAG	station start				started	16° 03.369' S	175° 32.132' W	0.0	1.3	11.7	5.5	71.1
SO267_89-1	17.01.2019 22:44:00	Magnetometer	MAG	in the water			Mag. Bird # 01 z. W.	started	16° 03.042' S	175° 31.948' W	2052.1	4.2	25.3	4.8	31.1
SO267_89-1	17.01.2019 22:47:46	Magnetometer	MAG	information			Mag. Bird # 02 z. W.	started	16° 02.818' S	175° 31.821' W	2064.5	3.8	21.4	5.7	35.3
SO267_89-1	17.01.2019 22:56:02	Magnetometer	MAG	in the water			Magnetik komplett z. W., SL: 825 m, FüG: VV (	started	16° 02.181' S	175° 31.454' W	2118.6	8.5	16.0	5.2	28.8
SO267_89-1	18.01.2019 00:23:00	Magnetometer	MAG	alter course			rwK: 063°, d: 25 sm	started	15° 47.377' S	175° 23.505' W	2301.6	11.4	14.5	6.2	28.1
SO267_89-1	18.01.2019 02:31:40	Magnetometer	MAG	alter course			rwK: 051°, d: 35nm	started	15° 35.729' S	175° 00.182' W	2001.9	11.6	354.0	5.9	61.3
SO267_89-1	18.01.2019 05:31:25	Magnetometer	MAG	profile end				started	15° 13.573' S	174° 32.272' W	2486.5	8.1	10.0	2.4	54.4
SO267_89-1	18.01.2019 05:45:43	Magnetometer	MAG	information			1. Magnetometer an Deck	started	15° 12.710' S	174° 31.120' W	0.0	5.4	19.7	2.1	56.4
SO267_89-1	18.01.2019 05:49:34	Magnetometer	MAG	information			2. Magnetometer an Deck	started	15° 12.557' S	174° 30.802' W	0.0	4.7	6.0	2.0	66.5
SO267_89-1	18.01.2019 05:50:07	Magnetometer	MAG	station end				started	15° 12.540' S	174° 30.760' W	0.0	4.6	17.6	2.7	58.3
SO267_90-1	18.01.2019 08:17:15	Dredge	DRG	station start				started	15° 26.210' S	174° 29.253' W	1865.0	0.8	39.3	2.5	195.0
SO267_90-1	18.01.2019 08:19:22	Dredge	DRG	in the water				started	15° 26.238' S	174° 29.236' W	1889.6	1.0	21.3	3.3	314.7
SO267_90-1	18.01.2019 08:54:54	Dredge	DRG	max depth/on ground			SL: 1916 m, SZ: 15 kN	started	15° 26.214' S	174° 29.247' W	1869.0	0.7	73.2	2.9	25.7
SO267_90-1	18.01.2019 08:55:55	Dredge	DRG	profile start			rwK: 297°, d: 0,4 sm, FüG: 1,0 k	started	15° 26.214' S	174° 29.247' W	1869.5	0.4	83.8	2.8	191.0
SO267_90-1	18.01.2019 09:21:21	Dredge	DRG	profile end			SLmax: 2150 m, SZ: kN	started	15° 26.049' S	174° 29.590' W	1327.0	0.5	87.1	2.5	199.2
SO267_90-1	18.01.2019 09:22:15	Dredge	DRG	information			Start dredgen, (SZmax: 66 kN)	started	15° 26.050' S	174° 29.590' W	1333.0	0.4	84.5	2.7	196.5
SO267_90-1	18.01.2019 10:10:32	Dredge	DRG	hoisting			Dredge frei vom Grund, SL: 1347 m, S	started	15° 26.053' S	174° 29.587' W	1353.6	0.1	87.2	2.1	238.9
SO267_90-1	18.01.2019 10:43:02	Dredge	DRG	on deck				started	15° 26.055' S	174° 29.589' W	1348.2	0.1	95.8	1.5	335.4
SO267_90-1	18.01.2019 10:53:01	Dredge	DRG	station end				started	15° 26.054' S	174° 29.586' W	1342.4	0.5	77.7	0.9	69.8
SO267_91-1	18.01.2019 11:48:01	Dredge	DRG	station start				started	15° 31.687' S	174° 25.836' W	2507.0	0.5	127.5	3.9	2.1
SO267_91-1	18.01.2019 11:50:06	Dredge	DRG	in the water				started	15° 31.696' S	174° 25.816' W	2515.5	0.8	115.4	2.8	79.0
SO267_91-1	18.01.2019 12:37:02	Dredge	DRG	max depth/on ground			Boko, SL: 2556m, Beginn auslegen rwK: 31	started	15° 31.693' S	174° 25.810' W	2517.3	0.0	130.0	4.3	136.8
SO267_91-1	18.01.2019 13:00:50	Dredge	DRG	hoisting			Beginn dredgen, SLmax: 2850r	started	15° 31.442' S	174° 26.048' W	2210.0	0.1	134.3	3.4	292.6
SO267_91-1	18.01.2019 13:42:34	Dredge	DRG	information			Frei vom Grund, SZmax: 34,2k	started	15° 31.438' S	174° 26.056' W	2204.3	0.3	120.4	4.2	54.5
SO267_91-1	18.01.2019 14:30:13	Dredge	DRG	on deck				started	15° 31.438' S	174° 26.056' W	2204.6	0.1	128.8	4.3	263.5
SO267_91-1	18.01.2019 14:40:51	Dredge	DRG	station end				started	15° 31.439' S	174° 26.055' W	2206.2	0.2	125.8	3.8	68.0
SO267_92-1	18.01.2019 16:09:59	Dredge	DRG	station start				started	15° 40.466' S	174° 37.481' W	1259.3	0.4	107.4	5.0	12.1
SO267_92-1	18.01.2019 16:11:50	Dredge	DRG	in the water				started	15° 40.469' S	174° 37.488' W	1256.6	0.6	115.3	5.7	303.0
SO267_92-1	18.01.2019 16:35:35	Dredge	DRG	max depth/on ground			Boko, SL: 1239m	started	15° 40.445' S	174° 37.532' W	1211.6	0.2	120.4	6.1	229.2
SO267_92-1	18.01.2019 16:38:45	Dredge	DRG	profile start			Beg. auslegen, rwk: 275°, d: 0,35	started	15° 40.447' S	174° 37.542' W	1211.1	0.4	115.9	6.1	290.0
SO267_92-1	18.01.2019 17:01:17	Dredge	DRG	hoisting			Schiff gestoppt, Beg. dredgen, maxSL	started	15° 40.419' S	174° 37.890' W	850.6	0.4	114.3	6.4	261.7
SO267_92-1	18.01.2019 17:41:01	Dredge	DRG	hoisting			Dredge frei vom Grund, SL: 840m, maxS	started	15° 40.420' S	174° 37.890' W	844.8	0.1	95.7	6.5	144.9
SO267_92-1	18.01.2019 18:02:10	Dredge	DRG	on deck				started	15° 40.430' S	174° 37.894' W	852.2	0.1	111.8	6.6	7.2
SO267_92-1	18.01.2019 18:15:55	Dredge	DRG	station end				started	15° 40.429' S	174° 37.893' W	853.9	0.2	100.3	6.6	64.8
SO267_93-1	18.01.2019 20:00:22	Autonomous Underwater Veh	AUV	station start			AUV dive 7	started	15° 23.027' S	174° 40.883' W	2076.6	0.4	72.7	6.9	51.0
SO267_93-1	18.01.2019 20:06:13	Autonomous Underwater Veh	AUV	in the water			AUV z. W. und frei vom Schiff	started	15° 23.025' S	174° 40.890' W	2076.0	0.4	75.2	7.2	139.3
SO267_93-1	18.01.2019 20:14:24	Autonomous Underwater Veh	AUV	information			AUV abgetaucht	started	15° 23.020' S	174° 40.881' W	2076.5	0.2	70.3	6.2	46.0
SO267_93-1	19.01.2019 18:36:23	Autonomous Underwater Veh	AUV	at surface			AUV gesichtet	started	15° 25.530' S	174° 36.651' W	2035.6	3.1	53.1	8.1	337.3

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO267_93-1	19.01.2019 18:55:15	Autonomous Underwater Veh	AUV	on deck				started	15° 25.839' S	174° 36.746' W	2041.4	0.5	61.0	3.5	342.9
SO267_93-1	19.01.2019 18:59:28	Autonomous Underwater Veh	AUV	station end				started	15° 25.968' S	174° 36.810' W	2045.4	5.5	43.8	5.4	204.2
SO267_94-1	18.01.2019 23:17:46	Dredge	DRG	station start				started	15° 39.766' S	175° 01.733' W	2374.8	0.8	61.0	6.4	9.2
SO267_94-1	18.01.2019 23:18:43	Dredge	DRG	in the water				started	15° 39.763' S	175° 01.742' W	2374.7	1.0	61.3	6.9	229.2
SO267_94-1	19.01.2019 00:00:26	Dredge	DRG	max depth/on ground		SL: 2388m, Beginn auslegen, rwK: 000°		started	15° 39.749' S	175° 01.744' W	2374.1	0.5	63.4	5.9	148.2
SO267_94-1	19.01.2019 00:24:08	Dredge	DRG	hoisting		Beginn hieven, SLmax: 2650m		started	15° 39.420' S	175° 01.740' W	2231.4	0.5	59.4	5.5	359.7
SO267_94-1	19.01.2019 00:50:00	Dredge	DRG	information		Frei vom Grund, SZmax: 42,2k		started	15° 39.422' S	175° 01.744' W	2231.6	0.3	72.0	5.8	85.7
SO267_94-1	19.01.2019 01:37:11	Dredge	DRG	on deck				started	15° 39.420' S	175° 01.745' W	2229.7	0.3	70.3	5.3	304.8
SO267_94-1	19.01.2019 01:45:53	Dredge	DRG	station end				started	15° 39.420' S	175° 01.742' W	2230.5	0.4	62.7	4.8	60.5
SO267_95-1	19.01.2019 04:05:14	Dredge	DRG	station start				started	15° 57.096' S	174° 57.336' W	2082.5	0.6	89.4	5.5	6.7
SO267_95-1	19.01.2019 04:07:12	Dredge	DRG	in the water				started	15° 57.094' S	174° 57.338' W	2086.6	1.0	84.5	5.9	153.4
SO267_95-1	19.01.2019 04:45:42	Dredge	DRG	max depth/on ground			Boko, SL: 2102m	started	15° 57.060' S	174° 57.321' W	2078.7	0.4	85.3	6.1	282.2
SO267_95-1	19.01.2019 04:48:16	Dredge	DRG	profile start		Beg. auslegen, rwk: 043°, d: 0,37		started	15° 57.055' S	174° 57.315' W	2077.7	1.1	83.8	6.4	84.5
SO267_95-1	19.01.2019 05:10:48	Dredge	DRG	hoisting		Schiff gestoppt, Beg. dredgen, maxSL		started	15° 56.789' S	174° 57.061' W	1828.9	0.1	111.5	10.9	249.5
SO267_95-1	19.01.2019 05:45:14	Dredge	DRG	information		SL: 1847m; Dredge frei vom Grund; SZm		started	15° 56.793' S	174° 57.056' W	1829.8	0.6	69.1	5.1	354.3
SO267_95-1	19.01.2019 06:24:20	Dredge	DRG	on deck				started	15° 56.789' S	174° 57.061' W	1835.3	0.1	68.7	8.3	206.4
SO267_95-1	19.01.2019 06:31:42	Dredge	DRG	station end				started	15° 56.789' S	174° 57.066' W	1837.0	0.2	61.6	7.9	350.0
SO267_96-1	19.01.2019 08:30:08	Dredge	DRG	station start				started	16° 03.477' S	174° 38.293' W	2499.7	0.5	46.8	7.4	43.7
SO267_96-1	19.01.2019 08:31:32	Dredge	DRG	in the water				started	16° 03.470' S	174° 38.284' W	2501.2	0.9	43.3	6.3	353.3
SO267_96-1	19.01.2019 09:18:11	Dredge	DRG	max depth/on ground			SL: 2526 m, SZ: 20 kN	started	16° 03.465' S	174° 38.266' W	2515.9	0.4	31.4	8.0	113.2
SO267_96-1	19.01.2019 09:20:27	Dredge	DRG	profile start		Beginn auslegen Draht, rwK: 278°, d: 0,4 sm		started	16° 03.461' S	174° 38.268' W	2520.3	0.4	32.6	7.0	156.7
SO267_96-1	19.01.2019 09:45:52	Dredge	DRG	profile end			SLmax: 2700 m, SZ: 20 kN	started	16° 03.409' S	174° 38.630' W	2088.4	0.2	35.5	6.7	337.7
SO267_96-1	19.01.2019 09:46:26	Dredge	DRG	information		Beginn dredgen, (SZmax: kN)		started	16° 03.409' S	174° 38.630' W	2089.4	0.4	40.9	6.1	176.7
SO267_96-1	19.01.2019 10:22:16	Dredge	DRG	hoisting		Dredge frei vom Grund, SL: 2109 m, S		started	16° 03.406' S	174° 38.630' W	2090.6	0.2	40.0	6.6	264.5
SO267_96-1	19.01.2019 11:06:05	Dredge	DRG	on deck				started	16° 03.409' S	174° 38.635' W	2089.9	0.3	56.8	7.1	127.5
SO267_96-1	19.01.2019 11:22:44	Dredge	DRG	station end				started	16° 03.410' S	174° 38.630' W	2090.2	0.3	61.4	6.7	155.9
SO267_97-1	19.01.2019 12:42:45	Dredge	DRG	station start				started	15° 57.752' S	174° 42.968' W	1487.1	0.3	32.5	6.5	325.0
SO267_97-1	19.01.2019 12:44:17	Dredge	DRG	in the water			FW2/SPW2	started	15° 57.741' S	174° 42.971' W	1478.5	0.5	32.5	7.4	339.2
SO267_97-1	19.01.2019 13:13:14	Dredge	DRG	max depth/on ground		Boko, SL: 1492m, Beginn auslegen, rwK: 04		started	15° 57.697' S	174° 42.982' W	1456.4	0.4	16.7	5.1	310.9
SO267_97-1	19.01.2019 13:41:09	Dredge	DRG	hoisting		SLmax: 1800m, Beginn hiever		started	15° 57.395' S	174° 42.655' W	1260.5	0.3	20.3	6.3	115.4
SO267_97-1	19.01.2019 14:16:00	Dredge	DRG	information		Frei vom Grund, SZmax: 49,6k		started	15° 57.402' S	174° 42.655' W	1257.7	0.4	6.3	5.1	271.7
SO267_97-1	19.01.2019 14:46:52	Dredge	DRG	on deck				started	15° 57.397' S	174° 42.661' W	1245.6	0.3	23.4	5.9	329.4
SO267_97-1	19.01.2019 15:00:52	Dredge	DRG	station end				started	15° 57.395' S	174° 42.651' W	1257.9	0.3	40.2	4.6	49.1
SO267_98-1	19.01.2019 19:00:08	KONGSBERG EM122	EM122	profile start			rwk: 203°, d: 17,8sm	started	15° 26.026' S	174° 36.834' W	2041.9	5.8	50.0	5.9	196.4
SO267_98-1	19.01.2019 19:54:57	KONGSBERG EM122	EM122	information			1. Magnetometer zu Wasser	started	15° 35.748' S	174° 40.992' W	2085.7	5.7	34.5	5.8	200.1
SO267_98-1	19.01.2019 19:59:09	KONGSBERG EM122	EM122	information			2. Magnetometer zu Wasser	started	15° 36.135' S	174° 41.160' W	2081.8	6.6	38.6	5.3	203.7
SO267_98-1	19.01.2019 20:07:03	KONGSBERG EM122	EM122	information		Magnetik komplett z. W., SLmax: 8		started	15° 37.067' S	174° 41.570' W	1991.0	8.9	12.7	5.8	203.9
SO267_98-1	19.01.2019 20:36:46	KONGSBERG EM122	EM122	alter course			rwK: 187°, d: 15 sm	started	15° 42.520' S	174° 43.894' W	1786.2	12.2	1.7	6.8	184.0
SO267_98-1	19.01.2019 21:55:25	KONGSBERG EM122	EM122	alter course			rwK: 193°, d: 15 sm	started	15° 57.496' S	174° 45.800' W	1982.5	8.8	342.0	3.8	192.1
SO267_98-1	19.01.2019 23:14:42	KONGSBERG EM122	EM122	alter course			rwK: 174°, d: 42 sm	started	16° 12.325' S	174° 49.261' W	2482.2	11.1	326.4	1.3	180.4
SO267_98-1	20.01.2019 02:48:15	KONGSBERG EM122	EM122	alter course			rwK: 203°, d: 22,1nm	started	16° 53.860' S	174° 44.829' W	1925.3	11.1	45.8	2.1	173.1
SO267_98-1	20.01.2019 04:45:01	KONGSBERG EM122	EM122	alter course			rwk: 270°, d: 8,0sm	started	17° 14.647' S	174° 53.728' W	2171.9	11.2	36.2	4.0	229.7
SO267_98-1	20.01.2019 05:25:21	KONGSBERG EM122	EM122	alter course			rwk: 180°, d: 4,5sm	started	17° 14.932' S	175° 02.091' W	2365.6	11.4	36.9	4.0	227.8
SO267_98-1	20.01.2019 05:31:49	KONGSBERG EM122	EM122	information			Beg. hieven Magnetometer	started	17° 15.950' S	175° 02.314' W	2366.4	6.5	47.7	5.3	177.5
SO267_98-1	20.01.2019 05:43:08	KONGSBERG EM122	EM122	information			1. Magnetometer an Deck	started	17° 16.894' S	175° 02.326' W	2366.6	5.1	40.1	6.0	181.6
SO267_98-1	20.01.2019 05:47:40	KONGSBERG EM122	EM122	information			2. Magnetometer an Deck	started	17° 17.264' S	175° 02.329' W	0.0	4.8	41.5	4.8	181.3
SO267_98-1	20.01.2019 05:48:08	KONGSBERG EM122	EM122	profile end			Ende Profilfahrt	started	17° 17.301' S	175° 02.330' W	0.0	4.5	43.1	5.0	185.2
SO267_99-1	20.01.2019 05:44:39	Seismic Ocean Bottom Recei	SEISOBR	station start			P3 OBS/OBMT recovery	started	17° 17.020' S	175° 02.328' W	2363.4	4.8	44.2	5.8	179.7
SO267_99-1	20.01.2019 05:46:05	Seismic Ocean Bottom Recei	SEISOBR	released			OBMT # 01	started	17° 17.137' S	175° 02.329' W	0.0	4.7	39.0	5.0	183.2

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO267_99-1	20.01.2019 06:29:25	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBMT # 01	started	17° 20.129' S	175° 02.703' W	0.0	3.0	54.4	7.1	51.0
SO267_99-1	20.01.2019 06:45:50	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBMT # 01	started	17° 19.815' S	175° 02.451' W	0.0	0.1	66.7	7.8	151.9
SO267_99-2	20.01.2019 06:41:48	Seismic Ocean Bottom Recei	SEISOBR	released			OBMT # 02	started	17° 19.802' S	175° 02.458' W	0.0	1.0	60.4	8.0	80.4
SO267_99-2	20.01.2019 07:27:05	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBMT # 02	started	17° 19.914' S	174° 58.232' W	0.0	2.9	62.6	6.2	90.0
SO267_99-2	20.01.2019 07:38:24	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBMT # 02	started	17° 20.016' S	174° 57.897' W	0.0	1.3	56.9	7.6	128.4
SO267_99-3	20.01.2019 07:34:41	Seismic Ocean Bottom Recei	SEISOBR	released			OBMT # 03	started	17° 19.978' S	174° 57.934' W	0.0	1.3	59.3	6.4	110.1
SO267_99-3	20.01.2019 08:17:38	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBMT # 03	started	17° 19.919' S	174° 54.679' W	0.0	4.6	50.9	8.3	90.7
SO267_99-3	20.01.2019 08:43:20	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBMT # 03	started	17° 19.765' S	174° 53.538' W	0.0	1.0	51.9	7.2	156.9
SO267_99-4	20.01.2019 09:15:38	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 016	started	17° 18.178' S	174° 50.547' W	0.0	7.8	56.3	5.1	56.2
SO267_99-4	20.01.2019 09:39:06	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 016	started	17° 16.584' S	174° 48.027' W	0.0	5.4	64.8	2.9	57.4
SO267_99-4	20.01.2019 09:52:00	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 016	started	17° 16.457' S	174° 47.536' W	0.0	0.3	63.7	3.3	268.4
SO267_99-5	20.01.2019 09:51:49	Seismic Ocean Bottom Recei	SEISOBR	released			OBMT # 04	started	17° 16.456' S	174° 47.535' W	0.0	0.4	55.6	2.9	225.3
SO267_99-5	20.01.2019 10:21:09	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBMT # 04	started	17° 18.958' S	174° 47.769' W	0.0	6.7	60.1	5.5	181.4
SO267_99-5	20.01.2019 10:44:48	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBMT # 04	started	17° 19.885' S	174° 47.422' W	0.0	0.8	38.9	4.9	200.7
SO267_99-6	20.01.2019 10:26:11	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 015	started	17° 19.417' S	174° 47.638' W	0.0	4.5	52.4	5.2	151.2
SO267_99-6	20.01.2019 10:50:04	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 015	started	17° 20.079' S	174° 47.399' W	0.0	4.3	54.7	3.9	201.7
SO267_99-6	20.01.2019 11:48:17	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 015	started	17° 22.514' S	174° 49.106' W	0.0	0.8	43.3	5.8	205.2
SO267_99-7	20.01.2019 11:46:50	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 013	started	17° 22.501' S	174° 49.104' W	0.0	0.8	51.5	5.2	195.2
SO267_99-7	20.01.2019 12:17:15	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 013	started	17° 23.484' S	174° 46.830' W	0.0	6.4	40.5	6.4	112.0
SO267_99-7	20.01.2019 12:46:00	Seismic Ocean Bottom Recei	SEISOBR	on deck				started	17° 24.024' S	174° 45.187' W	0.0	0.7	37.2	4.5	330.3
SO267_99-8	20.01.2019 12:46:30	Seismic Ocean Bottom Recei	SEISOBR	information			Hydrophon zu Wasser	started	17° 24.022' S	174° 45.189' W	0.0	0.3	52.4	4.0	243.5
SO267_99-8	20.01.2019 12:53:28	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 011	started	17° 24.014' S	174° 45.261' W	0.0	1.1	35.2	4.8	237.2
SO267_99-8	20.01.2019 12:58:15	Seismic Ocean Bottom Recei	SEISOBR	information			Hydrophon an Deck	started	17° 24.014' S	174° 45.340' W	0.0	1.8	37.8	5.4	239.2
SO267_99-8	20.01.2019 13:29:02	Seismic Ocean Bottom Recei	SEISOBR	at surface				started	17° 25.473' S	174° 42.934' W	0.0	6.4	40.2	5.8	121.3
SO267_99-8	20.01.2019 14:00:07	Seismic Ocean Bottom Recei	SEISOBR	on deck				started	17° 26.682' S	174° 40.821' W	0.0	0.4	30.4	4.5	147.6
SO267_99-9	20.01.2019 14:00:49	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 014	started	17° 26.683' S	174° 40.817' W	0.0	0.1	36.4	5.2	2.0
SO267_99-9	20.01.2019 14:36:07	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 014	started	17° 23.193' S	174° 41.649' W	0.0	7.9	54.4	5.8	348.4
SO267_99-9	20.01.2019 15:06:58	Seismic Ocean Bottom Recei	SEISOBR	on deck				started	17° 20.448' S	174° 42.726' W	0.0	0.5	59.9	5.4	309.9
SO267_99-10	20.01.2019 14:41:05	Seismic Ocean Bottom Recei	SEISOBR	released			OBMT #05	started	17° 22.581' S	174° 41.854' W	0.0	8.0	57.8	4.8	338.7
SO267_99-10	20.01.2019 15:30:44	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBMT # 05	started	17° 20.037' S	174° 41.938' W	0.0	2.0	84.1	2.6	71.4
SO267_99-10	20.01.2019 15:53:10	Seismic Ocean Bottom Recei	SEISOBR	on deck				started	17° 20.473' S	174° 41.507' W	0.0	1.1	80.9	4.5	279.0
SO267_99-11	20.01.2019 15:42:03	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 012	started	17° 20.260' S	174° 41.446' W	0.0	4.4	91.0	4.1	136.8
SO267_99-11	20.01.2019 16:21:54	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 012	started	17° 17.674' S	174° 40.913' W	0.0	7.9	91.7	4.7	12.4
SO267_99-11	20.01.2019 16:42:13	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 012	started	17° 16.393' S	174° 40.403' W	0.0	0.6	86.9	4.0	247.9
SO267_99-12	20.01.2019 16:23:28	Seismic Ocean Bottom Recei	SEISOBR	released			OBMT # 06	started	17° 17.473' S	174° 40.880' W	0.0	7.4	91.1	4.6	6.5
SO267_99-12	20.01.2019 17:18:40	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBMT # 06	started	17° 19.711' S	174° 39.801' W	0.0	3.4	77.2	4.6	163.3
SO267_99-12	20.01.2019 17:38:08	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBMT # 06	started	17° 19.861' S	174° 39.709' W	0.0	1.3	82.4	5.3	236.9
SO267_99-13	20.01.2019 17:20:01	Seismic Ocean Bottom Recei	SEISOBR	released			OBMT # 07	started	17° 19.767' S	174° 39.765' W	0.0	2.6	81.8	4.6	152.9
SO267_99-13	20.01.2019 18:15:47	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBMT # 07	started	17° 19.824' S	174° 38.928' W	0.0	0.0	82.0	5.7	30.6
SO267_99-13	20.01.2019 18:52:09	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBMT # 07	started	17° 19.738' S	174° 38.752' W	0.0	1.9	88.1	4.6	63.1
SO267_99-14	20.01.2019 18:40:00	Seismic Ocean Bottom Recei	SEISOBR	released			OBMT # 08	started	17° 19.805' S	174° 38.653' W	0.0	1.2	75.9	5.0	72.4
SO267_99-14	20.01.2019 19:47:28	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBMT # 08	started	17° 19.841' S	174° 37.669' W	0.0	0.1	74.9	4.0	64.5
SO267_99-14	20.01.2019 19:53:35	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBMT # 08	started	17° 19.962' S	174° 37.706' W	0.0	1.4	70.8	5.8	211.7
SO267_99-15	20.01.2019 19:48:52	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 329	started	17° 19.852' S	174° 37.667' W	0.0	1.5	71.0	5.3	169.3
SO267_99-15	20.01.2019 20:26:51	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 329	started	17° 19.885' S	174° 37.249' W	0.0	0.5	72.7	5.8	210.0
SO267_99-15	20.01.2019 20:40:23	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 329	started	17° 19.961' S	174° 37.117' W	0.0	1.7	65.1	5.0	216.8
SO267_99-16	20.01.2019 20:41:34	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 048	started	17° 19.981' S	174° 37.138' W	0.0	1.5	71.7	5.5	211.2
SO267_99-16	20.01.2019 21:18:07	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 348	started	17° 22.999' S	174° 37.528' W	0.0	1.7	69.3	6.1	104.4
SO267_99-16	20.01.2019 21:30:06	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 348	started	17° 23.068' S	174° 37.141' W	0.0	2.3	59.2	8.1	209.3

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO267_99-17	20.01.2019 21:31:16	Seismic Ocean Bottom Recei	SEISOBR	released			OBMT # 09	started	17° 23.076' S	174° 37.159' W	0.0	1.8	34.9	10.6	215.4
SO267_99-17	20.01.2019 22:25:37	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBMT # 09	started	17° 19.953' S	174° 36.788' W	0.0	2.9	72.4	4.3	75.3
SO267_99-17	20.01.2019 22:38:38	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBMT # 09	started	17° 20.010' S	174° 36.549' W	0.0	1.3	57.0	5.2	226.8
SO267_99-18	20.01.2019 22:30:22	Seismic Ocean Bottom Recei	SEISOBR	released			OBMT # 010	started	17° 19.881' S	174° 36.592' W	0.0	1.8	60.5	3.6	85.4
SO267_99-18	20.01.2019 23:24:29	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBMT # 010	started	17° 19.945' S	174° 35.486' W	2956.9	1.0	37.7	5.6	73.0
SO267_99-18	20.01.2019 23:43:10	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBMT # 010, Unterbrechung Statio	started	17° 20.113' S	174° 35.207' W	2964.5	1.6	35.8	5.3	215.1
SO267_100-1	20.01.2019 23:44:11	Autonomous Underwater Veh	AUV	station start				started	17° 20.137' S	174° 35.223' W	2965.6	2.0	36.0	5.4	209.8
SO267_100-1	20.01.2019 23:49:03	Autonomous Underwater Veh	AUV	in the water				started	17° 20.219' S	174° 35.285' W	2965.0	0.3	33.5	7.0	207.8
SO267_100-1	21.01.2019 23:02:24	Autonomous Underwater Veh	AUV	at surface				started	17° 19.445' S	174° 35.495' W	2949.2	12.0	52.1	2.7	279.5
SO267_100-1	21.01.2019 23:39:35	Autonomous Underwater Veh	AUV	on deck				started	17° 19.081' S	174° 38.141' W	2807.5	0.8	47.0	3.1	323.7
SO267_100-1	21.01.2019 23:40:07	Autonomous Underwater Veh	AUV	station end				started	17° 19.077' S	174° 38.146' W	2816.0	0.9	48.4	3.3	320.0
SO267_99-19	21.01.2019 00:11:03	Seismic Ocean Bottom Recei	SEISOBR	released			OBMT # 011, Fortsetzung Station	started	17° 20.224' S	174° 35.282' W	2966.3	0.2	42.8	5.7	49.7
SO267_99-19	21.01.2019 01:07:20	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBMT # 011	started	17° 19.946' S	174° 34.282' W	3020.3	0.5	352.4	5.1	306.3
SO267_99-19	21.01.2019 01:24:26	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBMT # 011	started	17° 19.988' S	174° 33.993' W	3027.9	1.5	9.3	8.3	172.2
SO267_99-20	21.01.2019 01:15:25	Seismic Ocean Bottom Recei	SEISOBR	released			OBS350-002	started	17° 19.863' S	174° 34.086' W	3018.5	1.4	11.1	8.1	68.5
SO267_99-20	21.01.2019 02:00:27	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS350-002	started	17° 16.559' S	174° 33.321' W	2947.3	2.4	358.8	6.4	16.7
SO267_99-20	21.01.2019 02:15:39	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS350-002	started	17° 16.437' S	174° 32.801' W	2954.3	1.0	349.6	6.5	148.6
SO267_99-21	21.01.2019 02:03:23	Seismic Ocean Bottom Recei	SEISOBR	released			OBMT # 12	started	17° 16.472' S	174° 33.275' W	2945.4	3.0	356.2	6.8	44.5
SO267_99-21	21.01.2019 02:56:35	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBMT # 12	started	17° 19.680' S	174° 32.832' W	3026.5	2.1	9.4	6.0	180.7
SO267_99-21	21.01.2019 03:10:13	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBMT # 12	started	17° 20.049' S	174° 32.570' W	3028.2	1.5	359.2	7.6	174.4
SO267_99-22	21.01.2019 02:40:27	Seismic Ocean Bottom Recei	SEISOBR	released			OBMT # 13	started	17° 18.781' S	174° 32.785' W	3017.5	4.3	0.1	3.2	184.1
SO267_99-22	21.01.2019 03:53:21	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBMT # 13	started	17° 20.442' S	174° 32.329' W	2990.8	0.0	358.7	8.0	48.4
SO267_99-22	21.01.2019 04:07:32	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBMT # 13	started	17° 20.817' S	174° 31.946' W	2940.7	3.5	13.9	7.1	143.2
SO267_99-23	21.01.2019 03:55:00	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 349	started	17° 20.443' S	174° 32.329' W	2991.6	0.5	2.9	8.0	97.9
SO267_99-23	21.01.2019 04:32:04	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 349	started	17° 23.169' S	174° 32.652' W	2662.9	1.3	359.5	6.1	177.8
SO267_99-23	21.01.2019 04:39:48	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 349	started	17° 23.180' S	174° 32.447' W	2799.9	1.3	4.5	5.3	113.1
SO267_99-24	21.01.2019 04:39:07	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 010	started	17° 23.175' S	174° 32.461' W	2783.4	1.4	352.7	4.9	103.4
SO267_99-24	21.01.2019 05:16:24	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 010	started	17° 26.376' S	174° 29.906' W	2586.3	5.0	353.0	6.4	115.3
SO267_99-24	21.01.2019 05:29:25	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 010	started	17° 26.488' S	174° 29.192' W	2597.8	1.6	355.3	5.6	121.4
SO267_99-25	21.01.2019 05:18:25	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 009	started	17° 26.415' S	174° 29.714' W	2590.2	5.9	5.8	6.5	81.8
SO267_99-25	21.01.2019 05:57:12	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 009	started	17° 23.549' S	174° 28.624' W	2408.3	7.2	343.2	4.4	5.9
SO267_99-25	21.01.2019 06:13:55	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 009	started	17° 22.705' S	174° 28.038' W	2452.8	2.3	337.8	4.4	107.0
SO267_99-26	21.01.2019 06:03:49	Seismic Ocean Bottom Recei	SEISOBR	released			OBMT # 14	started	17° 22.864' S	174° 28.458' W	2318.0	4.9	347.5	4.4	22.9
SO267_99-26	21.01.2019 06:49:53	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBMT # 14	started	17° 20.455' S	174° 30.365' W	2608.0	2.2	1.1	3.6	48.6
SO267_99-26	21.01.2019 07:00:20	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBMT # 14	started	17° 20.583' S	174° 30.002' W	2508.9	3.6	357.1	3.3	143.7
SO267_99-27	21.01.2019 06:58:26	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 331	started	17° 20.546' S	174° 30.071' W	2529.6	1.7	350.4	3.9	118.8
SO267_99-27	21.01.2019 07:36:32	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 331	started	17° 19.982' S	174° 30.386' W	2556.3	0.3	341.8	2.4	92.8
SO267_99-27	21.01.2019 07:47:32	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 331	started	17° 19.816' S	174° 30.326' W	2524.1	1.3	346.9	2.9	163.6
SO267_99-28	21.01.2019 07:37:14	Seismic Ocean Bottom Recei	SEISOBR	released			OBMT # 15	started	17° 19.981' S	174° 30.386' W	2555.2	0.1	344.7	2.2	269.3
SO267_99-28	21.01.2019 08:29:27	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBMT # 15	started	17° 19.922' S	174° 28.539' W	2213.3	0.4	357.3	2.2	182.6
SO267_99-28	21.01.2019 08:46:14	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBMT # 015	started	17° 19.926' S	174° 28.201' W	2172.2	1.0	344.7	1.3	202.5
SO267_99-29	21.01.2019 08:47:21	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 006	started	17° 19.938' S	174° 28.206' W	2168.6	0.6	354.6	1.1	211.3
SO267_99-29	21.01.2019 09:00:47	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 006	started	17° 19.465' S	174° 27.689' W	2115.0	6.7	324.4	2.3	40.0
SO267_99-29	21.01.2019 09:10:38	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 006	started	17° 18.519' S	174° 26.871' W	2189.5	7.9	290.5	1.9	42.8
SO267_99-29	21.01.2019 10:11:36	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 006	started	17° 16.719' S	174° 23.451' W	1988.3	1.8	254.1	4.4	121.3
SO267_99-30	21.01.2019 09:54:28	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 007, 1. Versuch	started	17° 16.240' S	174° 24.221' W	2045.0	3.4	279.3	2.4	118.5
SO267_99-30	21.01.2019 10:45:04	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 007, (2. Versuch (mit Hydrop	started	17° 19.264' S	174° 24.998' W	2166.9	1.7	247.8	2.7	202.6
SO267_99-30	21.01.2019 11:38:29	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 007	started	17° 18.828' S	174° 23.466' W	2107.6	1.3	316.8	4.9	296.5
SO267_99-30	21.01.2019 12:05:29	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 007	started	17° 19.177' S	174° 24.710' W	2174.7	0.4	328.2	3.3	51.9

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO267_99-31	21.01.2019 10:25:34	Seismic Ocean Bottom Recei	SEISOBR	released			OBMT # 016	started	17° 17.412' S	174° 23.600' W	2080.2	7.4	255.2	4.8	217.0
SO267_99-31	21.01.2019 11:10:04	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBMT # 016	started	17° 19.480' S	174° 24.754' W	2196.5	4.6	274.0	4.1	49.0
SO267_99-31	21.01.2019 11:32:15	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBMT # 016	started	17° 18.873' S	174° 23.542' W	2130.2	0.9	298.5	5.4	101.4
SO267_99-32	21.01.2019 11:48:47	Seismic Ocean Bottom Recei	SEISOBR	released			OBS # 008	started	17° 19.146' S	174° 24.141' W	2176.4	3.7	320.8	6.9	248.9
SO267_99-32	21.01.2019 12:13:19	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBS # 008	started	17° 19.043' S	174° 24.504' W	2178.9	4.7	333.5	2.5	126.5
SO267_99-32	21.01.2019 12:57:43	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBS # 008	started	17° 22.915' S	174° 22.471' W	1412.9	0.7	274.3	1.8	98.8
SO267_99-33	21.01.2019 13:19:32	Seismic Ocean Bottom Recei	SEISOBR	released			OBMT # 18	started	17° 22.236' S	174° 20.327' W	1431.1	7.9	266.6	2.1	66.7
SO267_99-33	21.01.2019 13:51:20	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBMT # 18	started	17° 20.605' S	174° 16.532' W	1734.6	7.5	294.6	3.8	66.8
SO267_99-33	21.01.2019 14:21:41	Seismic Ocean Bottom Recei	SEISOBR	on deck			OBMT # 18	started	17° 19.502' S	174° 14.613' W	1631.5	0.7	248.4	1.9	26.3
SO267_99-34	21.01.2019 14:13:36	Seismic Ocean Bottom Recei	SEISOBR	released			OBMT # 19	started	17° 19.546' S	174° 14.724' W	1639.8	1.3	NaN	NaN	70.2
SO267_99-34	21.01.2019 14:39:34	Seismic Ocean Bottom Recei	SEISOBR	at surface			OBMT # 19	started	17° 19.387' S	174° 13.162' W	1568.1	7.3	202.5	7.1	99.1
SO267_99-34	21.01.2019 15:22:31	Seismic Ocean Bottom Recei	SEISOBR	on deck				started	17° 19.205' S	174° 09.320' W	1500.2	0.9	193.8	1.5	68.8
SO267_101-1	21.01.2019 15:58:50	Heat-Flow probe	HF	station start				started	17° 19.770' S	174° 11.897' W	1534.1	0.6	154.1	5.1	276.8
SO267_101-1	21.01.2019 16:03:34	Heat-Flow probe	HF	in the water			Transponder bei SL: 50m	started	17° 19.779' S	174° 11.925' W	1534.9	0.5	153.6	4.7	266.7
SO267_101-1	21.01.2019 16:36:52	Heat-Flow probe	HF	max depth/on ground			Boko, maxSL: 1557m	started	17° 19.800' S	174° 12.000' W	1535.4	0.3	NaN	NaN	168.8
SO267_101-1	21.01.2019 16:51:25	Heat-Flow probe	HF	hoisting			Beg. hieven auf SL: 1400m, maxSZ:	started	17° 19.794' S	174° 12.002' W	1536.1	0.2	146.5	4.4	14.3
SO267_101-1	21.01.2019 16:59:42	Heat-Flow probe	HF	max depth/on ground			Boko, maxSL: 1559m	started	17° 19.801' S	174° 12.001' W	1535.8	0.4	167.7	3.8	49.7
SO267_101-1	21.01.2019 17:14:51	Heat-Flow probe	HF	hoisting			Beg. hieven, maxSZ: 24,6kN	started	17° 19.803' S	174° 11.996' W	1536.4	0.0	159.8	1.0	95.9
SO267_101-1	21.01.2019 17:51:49	Heat-Flow probe	HF	on deck				started	17° 19.804' S	174° 12.004' W	1535.4	0.2	123.5	3.4	70.1
SO267_101-1	21.01.2019 17:53:25	Heat-Flow probe	HF	station end				started	17° 19.805' S	174° 12.004' W	1536.5	0.3	127.5	3.4	84.7
SO267_102-1	21.01.2019 19:49:16	Heat-Flow probe	HF	station start				started	17° 19.793' S	174° 33.071' W	3035.4	0.3	125.2	1.9	200.6
SO267_102-1	21.01.2019 19:52:13	Heat-Flow probe	HF	in the water			Transponder bei SL: 50m	started	17° 19.797' S	174° 33.061' W	3036.4	0.3	120.0	2.5	175.7
SO267_102-1	21.01.2019 20:54:23	Heat-Flow probe	HF	max depth/on ground			SL: 3063 m, SZ: 24 kN	started	17° 19.802' S	174° 33.052' W	3033.9	0.1	82.7	2.1	62.3
SO267_102-1	21.01.2019 21:08:05	Heat-Flow probe	HF	hoisting			SZmax: 40 kN	started	17° 19.803' S	174° 33.048' W	3035.5	0.1	79.0	3.1	254.9
SO267_102-1	21.01.2019 21:12:34	Heat-Flow probe	HF	information			Winde stopp bei SL: 2850 m, SZ: 3	started	17° 19.803' S	174° 33.048' W	3035.1	0.1	92.6	1.7	252.8
SO267_102-1	21.01.2019 21:16:20	Heat-Flow probe	HF	lowering				started	17° 19.800' S	174° 33.049' W	3034.2	0.1	107.0	2.6	259.5
SO267_102-1	21.01.2019 21:19:12	Heat-Flow probe	HF	max depth/on ground			SLmax: 3060 m, SZ: 25 kN	started	17° 19.801' S	174° 33.050' W	3034.4	0.1	103.5	2.3	47.8
SO267_102-1	21.01.2019 21:34:52	Heat-Flow probe	HF	hoisting			SZmax: 40 kN bei SL: 3046 m	started	17° 19.802' S	174° 33.051' W	3036.7	0.3	108.4	3.6	85.8
SO267_102-1	21.01.2019 22:37:31	Heat-Flow probe	HF	on deck				started	17° 19.801' S	174° 33.056' W	3033.6	0.4	66.4	4.8	66.7
SO267_102-1	21.01.2019 22:40:35	Heat-Flow probe	HF	station end				started	17° 19.803' S	174° 33.056' W	3033.5	0.3	65.7	3.3	229.7
SO267_103-1	22.01.2019 02:07:00	Dredge	DRG	station start				started	17° 31.441' S	174° 54.763' W	1818.2	0.5	354.6	1.9	77.3
SO267_103-1	22.01.2019 02:09:46	Dredge	DRG	in the water			FW2/SPW2	started	17° 31.441' S	174° 54.760' W	1797.7	0.3	352.3	2.0	32.9
SO267_103-1	22.01.2019 02:42:53	Dredge	DRG	max depth/on ground			Boko, SL: 1830m, Beginn auslegen, rwK: 03	started	17° 31.442' S	174° 54.767' W	1802.0	0.1	303.5	2.1	216.8
SO267_103-1	22.01.2019 03:15:04	Dredge	DRG	hoisting			Beginn hieven, SLmax: 2200m	started	17° 31.064' S	174° 54.491' W	1359.6	0.0	313.1	1.9	174.2
SO267_103-1	22.01.2019 03:38:40	Dredge	DRG	information			1. Haker, SL: 1853m, Winde fiert auf SL: 1900m	started	17° 31.059' S	174° 54.493' W	1358.7	0.2	310.6	2.0	144.0
SO267_103-1	22.01.2019 04:11:06	Dredge	DRG	hoisting			Frei vom Grund, SL: 1360m, SZmax:	started	17° 31.069' S	174° 54.492' W	1361.2	0.1	313.4	1.4	227.4
SO267_103-1	22.01.2019 04:43:21	Dredge	DRG	on deck				started	17° 31.068' S	174° 54.487' W	1360.0	0.3	257.1	1.0	20.7
SO267_103-1	22.01.2019 04:52:43	Dredge	DRG	station end				started	17° 31.062' S	174° 54.489' W	1359.6	0.7	241.8	3.1	207.2
SO267_104-1	22.01.2019 05:06:38	Magnetometer	MAG	station start			Magnetik und EM-Profil	started	17° 30.862' S	174° 54.343' W	1569.5	4.9	293.4	2.4	4.2
SO267_104-1	22.01.2019 05:08:13	Magnetometer	MAG	in the water			1. Magnetometer	started	17° 30.740' S	174° 54.347' W	1676.0	4.7	260.8	2.5	341.0
SO267_104-1	22.01.2019 05:11:48	Magnetometer	MAG	in the water			2. Magnetometer	started	17° 30.437' S	174° 54.528' W	1863.8	6.6	244.4	2.4	324.2
SO267_104-1	22.01.2019 05:18:56	Magnetometer	MAG	information			Magnetometer ausgesteckt (825	started	17° 29.649' S	174° 55.114' W	2122.2	8.7	267.2	1.9	323.2
SO267_104-1	22.01.2019 05:19:20	Magnetometer	MAG	profile start			rwk: 322°, d: 15,9sm	started	17° 29.603' S	174° 55.151' W	2177.5	8.5	245.8	1.6	322.6
SO267_104-1	22.01.2019 05:24:24	Magnetometer	MAG	information			Beg Kalibrierungskreis über Bb, D=	started	17° 29.057' S	174° 55.596' W	2226.9	8.0	259.0	1.8	324.0
SO267_104-1	22.01.2019 05:50:19	Magnetometer	MAG	information			Ende Kalibrierungskreis, Fortsetzung	started	17° 28.831' S	174° 55.874' W	2236.0	8.7	251.3	3.0	314.6
SO267_104-1	22.01.2019 07:02:19	Magnetometer	MAG	alter course			rwk: 028°, d: 31,0sm	started	17° 17.350' S	175° 05.165' W	2362.8	12.0	265.2	0.6	320.7
SO267_104-1	22.01.2019 09:53:16	Magnetometer	MAG	alter course			rwK: 354°, d: 38 sm	started	16° 49.820' S	174° 50.435' W	1934.7	10.7	10.0	0.9	27.8
SO267_104-1	22.01.2019 13:11:13	Magnetometer	MAG	alter course			rwK: 291°, d: 05 sm	started	16° 11.957' S	174° 54.239' W	2034.7	11.5	306.0	1.5	354.7
SO267_104-1	22.01.2019 13:34:42	Magnetometer	MAG	alter course			rwK: 174°, d: 40nm	started	16° 09.994' S	174° 58.516' W	2071.7	12.1	291.5	2.8	289.6

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO267_104-1	22.01.2019 16:50:11	Magnetometer	MAG	alter course			rwk: 208°, d: 30,7sm	started	16° 49.579' S	174° 55.214' W	1765.5	12.4	324.2	3.9	188.4
SO267_104-1	22.01.2019 19:20:21	Magnetometer	MAG	alter course			rwk: 270°, d: 4,0sm	started	17° 17.000' S	175° 10.361' W	2131.4	11.6	280.7	2.9	245.9
SO267_104-1	22.01.2019 19:41:37	Magnetometer	MAG	alter course			rwk: 028°, d: 30,3sm	started	17° 16.939' S	175° 14.646' W	2373.0	10.9	50.7	1.9	312.2
SO267_104-1	22.01.2019 22:18:30	Magnetometer	MAG	profile end				started	16° 50.425' S	175° 00.522' W	2520.6	6.7	109.3	1.2	29.0
SO267_104-1	22.01.2019 22:21:38	Magnetometer	MAG	hoisting			Start hieven Magnetik-Kabel	started	16° 50.164' S	175° 00.420' W	2519.5	4.4	96.1	1.1	0.2
SO267_104-1	22.01.2019 22:32:26	Magnetometer	MAG	information			1. Mag.-Bird # 02 a. D.	started	16° 49.653' S	175° 00.824' W	2502.8	4.5	104.5	0.5	290.9
SO267_104-1	22.01.2019 22:36:35	Magnetometer	MAG	on deck		1. Mag.-Bird # 02 a. D., Magnetik komp		started	16° 49.542' S	175° 01.128' W	2503.3	4.6	210.8	1.6	289.7
SO267_104-1	22.01.2019 22:38:45	Magnetometer	MAG	information		Unterbrechung Profil, Anfahrt # 105 DR, rwK:		started	16° 49.473' S	175° 01.294' W	2501.8	5.4	206.3	1.1	298.4
SO267_104-1	23.01.2019 06:03:35	Magnetometer	MAG	profile start		Fortsetzung Profil; rwK 354°; d: 16		started	16° 45.933' S	175° 00.535' W	2500.4	10.8	279.3	2.2	0.5
SO267_104-1	23.01.2019 07:27:02	Magnetometer	MAG	profile end		Unterbrechung Profil, Anf. Stat. # 107		started	16° 29.411' S	175° 02.208' W	2152.5	12.1	346.6	1.3	352.5
SO267_104-1	23.01.2019 11:44:13	Magnetometer	MAG	information		Fortsetzung Magnetik, rwK: 099°, d: 05 sm		started	16° 29.347' S	175° 07.225' W	1677.8	4.2	290.1	1.2	102.0
SO267_104-1	23.01.2019 11:45:01	Magnetometer	MAG	information			1. Mag.-Bird z. W.	started	16° 29.355' S	175° 07.162' W	1683.3	4.9	266.6	1.0	106.6
SO267_104-1	23.01.2019 11:51:43	Magnetometer	MAG	information			2. Mag.-Bird z. W.	started	16° 29.438' S	175° 06.568' W	1983.4	4.7	234.2	0.7	100.9
SO267_104-1	23.01.2019 12:02:57	Magnetometer	MAG	in the water		Magnetik komplett z. W., SL: 825		started	16° 29.611' S	175° 05.321' W	2282.1	11.2	252.9	0.7	98.0
SO267_104-1	23.01.2019 12:17:03	Magnetometer	MAG	alter course			auf rwK: 351°, d: 1,6nm	started	16° 29.989' S	175° 02.471' W	2039.5	11.6	8.8	1.7	92.5
SO267_104-1	23.01.2019 12:26:18	Magnetometer	MAG	alter course			auf rwK: 354°, d: 20,2nm	started	16° 28.384' S	175° 02.333' W	2188.3	12.7	273.3	1.9	351.7
SO267_104-1	23.01.2019 14:01:21	Magnetometer	MAG	alter course			auf rwK: 267°, d: 16,3nm	started	16° 08.294' S	175° 04.453' W	1970.5	12.9	172.0	0.8	356.1
SO267_104-1	23.01.2019 15:22:06	Magnetometer	MAG	alter course			auf rwK: 240°, d: 26,5nm	started	16° 08.513' S	175° 21.043' W	1946.8	12.1	238.8	1.5	268.3
SO267_104-1	23.01.2019 17:37:35	Magnetometer	MAG	profile end				started	16° 21.965' S	175° 45.024' W	1898.8	11.8	176.8	2.7	233.4
SO267_104-1	23.01.2019 17:41:14	Magnetometer	MAG	hoisting			Beg. hieven Magnetometer	started	16° 22.434' S	175° 45.225' W	1815.2	6.8	175.2	3.9	182.5
SO267_104-1	23.01.2019 17:53:40	Magnetometer	MAG	on deck			1. Magnetometer	started	16° 23.579' S	175° 45.248' W	1606.7	5.3	157.3	4.0	181.6
SO267_104-1	23.01.2019 17:58:23	Magnetometer	MAG	on deck			2. Magnetometer	started	16° 23.993' S	175° 45.251' W	1468.9	5.4	129.1	3.8	181.5
SO267_104-1	23.01.2019 17:58:43	Magnetometer	MAG	station end				started	16° 24.022' S	175° 45.251' W	1464.7	5.3	136.4	3.8	182.7
SO267_105-1	22.01.2019 23:15:34	Dredge	DRG	station start				started	16° 48.038' S	175° 03.763' W	1612.4	0.2	198.2	1.1	354.1
SO267_105-1	22.01.2019 23:17:18	Dredge	DRG	in the water				started	16° 48.046' S	175° 03.741' W	1621.6	0.3	203.1	1.0	121.3
SO267_105-1	22.01.2019 23:48:04	Dredge	DRG	max depth/on ground			SL: 1657 m, SZ: 15/11 kN	started	16° 48.036' S	175° 03.743' W	1556.4	0.2	188.7	1.5	181.9
SO267_105-1	22.01.2019 23:49:18	Dredge	DRG	profile start		Beginn auslegen DrahtrwK: 256°, d: 0,3 sm		started	16° 48.036' S	175° 03.743' W	1556.1	0.3	170.5	1.4	188.5
SO267_105-1	23.01.2019 00:11:47	Dredge	DRG	hoisting		Beginn hieven, SLmax: 1900m		started	16° 48.121' S	175° 04.072' W	1270.4	0.6	162.7	1.9	340.9
SO267_105-1	23.01.2019 00:51:31	Dredge	DRG	information		Frei vom Grund, SZmax: 41,9k		started	16° 48.121' S	175° 04.073' W	1282.2	0.2	233.1	1.5	246.7
SO267_105-1	23.01.2019 01:22:48	Dredge	DRG	on deck				started	16° 48.116' S	175° 04.065' W	1284.3	0.1	46.0	0.3	7.6
SO267_105-1	23.01.2019 01:27:38	Dredge	DRG	station end				started	16° 48.115' S	175° 04.066' W	1284.8	0.4	191.4	1.2	194.7
SO267_106-1	23.01.2019 02:32:04	Dredge	DRG	station start				started	16° 49.944' S	175° 09.888' W	2002.5	0.7	243.7	2.2	333.2
SO267_106-1	23.01.2019 02:33:34	Dredge	DRG	in the water			FW2/SPW2	started	16° 49.939' S	175° 09.887' W	2014.1	0.2	250.9	1.7	69.5
SO267_106-1	23.01.2019 03:14:46	Dredge	DRG	max depth/on ground		Boko, SL: 2025m, Beginn auslegen, rwK: 08		started	16° 49.938' S	175° 09.885' W	1989.2	0.5	240.4	1.4	219.9
SO267_106-1	23.01.2019 03:42:08	Dredge	DRG	hoisting		Beginn hieven, SLmax: 2330m		started	16° 49.870' S	175° 09.472' W	1549.4	0.2	207.8	2.1	157.7
SO267_106-1	23.01.2019 04:28:04	Dredge	DRG	hoisting		Frei vom grund, SL: 1540m, maxSZ:		started	16° 49.868' S	175° 09.466' W	1554.3	0.2	253.6	3.1	29.2
SO267_106-1	23.01.2019 05:02:28	Dredge	DRG	on deck				started	16° 49.868' S	175° 09.466' W	1562.0	0.1	245.2	4.6	298.6
SO267_106-1	23.01.2019 05:10:17	Dredge	DRG	station end				started	16° 49.864' S	175° 09.473' W	1564.1	0.1	225.8	4.3	89.9
SO267_107-1	23.01.2019 08:51:31	Dredge	DRG	station start				started	16° 28.959' S	175° 07.086' W	2122.5	0.4	30.7	2.7	258.0
SO267_107-1	23.01.2019 08:53:07	Dredge	DRG	in the water				started	16° 28.957' S	175° 07.090' W	2117.4	0.1	36.5	3.0	245.3
SO267_107-1	23.01.2019 09:33:28	Dredge	DRG	max depth/on ground			SL: 2165 m, SZ: 17 kN	started	16° 28.955' S	175° 07.089' W	2123.7	0.1	161.3	5.9	306.1
SO267_107-1	23.01.2019 09:34:13	Dredge	DRG	profile start		Beginn auslegen Draht, rwK: 225°, d: 0,4 sm		started	16° 28.954' S	175° 07.089' W	2123.3	0.2	153.6	5.2	356.9
SO267_107-1	23.01.2019 10:00:27	Dredge	DRG	profile end			SLmax: 2500 m, SZ: 16 kN	started	16° 29.230' S	175° 07.371' W	1702.2	0.2	160.6	7.4	137.9
SO267_107-1	23.01.2019 10:01:10	Dredge	DRG	information		Beginn dredgen, (SZmax: 62kN		started	16° 29.229' S	175° 07.371' W	1699.5	0.0	160.5	6.9	351.0
SO267_107-1	23.01.2019 10:51:27	Dredge	DRG	hoisting		Dredge frei vom Grund, SL: 1720 m, S		started	16° 29.234' S	175° 07.367' W	1699.6	0.3	199.8	0.7	154.4
SO267_107-1	23.01.2019 11:29:43	Dredge	DRG	on deck				started	16° 29.234' S	175° 07.371' W	1696.5	0.3	291.2	1.9	346.5
SO267_107-1	23.01.2019 11:36:42	Dredge	DRG	station end				started	16° 29.232' S	175° 07.366' W	1698.7	0.3	280.8	1.3	121.1
SO267_108-1	23.01.2019 19:37:39	Dredge	DRG	station start				started	16° 28.514' S	175° 45.946' W	1112.9	0.7	77.3	0.8	327.1
SO267_108-1	23.01.2019 19:39:35	Dredge	DRG	in the water				started	16° 28.507' S	175° 45.952' W	1107.9	0.6	88.4	1.5	71.4

Station	Date / Time UTC	Device	Device Abbreviation	Action	Comment (Station)	Comment (Device Op)	Comment (Action)	Expedition Fixed	Latitude	Longitude	Depth (m)	Speed (kn)	Wind Dir	Wind speed (m/s)	Course
SO267_108-1	23.01.2019 20:01:44	Dredge	DRG	max depth/on ground			SL: 1176 m, SZ: 8 kN	started	16° 28.467' S	175° 45.869' W	1116.9	0.1	128.0	1.5	41.3
SO267_108-1	23.01.2019 20:02:24	Dredge	DRG	profile start			Beginn auslegen Draht, rwK: 319°, d: 0,4 sm	started	16° 28.467' S	175° 45.869' W	1127.9	0.2	138.1	2.1	22.4
SO267_108-1	23.01.2019 20:30:17	Dredge	DRG	profile end			SLmax: 1500 m, SZ: 10 kN	started	16° 28.169' S	175° 46.140' W	888.1	0.4	100.0	1.5	173.8
SO267_108-1	23.01.2019 20:31:04	Dredge	DRG	information			Beginn dredgen, (SZmax: 70 kN	started	16° 28.169' S	175° 46.139' W	886.4	0.4	80.9	1.5	31.9
SO267_108-1	23.01.2019 21:07:04	Dredge	DRG	hoisting			Dredge frei vom Grund, SL: 870 m, S	started	16° 28.167' S	175° 46.141' W	824.1	0.2	90.6	1.1	43.8
SO267_108-1	23.01.2019 21:29:12	Dredge	DRG	on deck				started	16° 28.168' S	175° 46.144' W	885.8	0.5	68.0	2.4	29.7
SO267_108-1	23.01.2019 21:36:07	Dredge	DRG	station end				started	16° 28.170' S	175° 46.143' W	823.2	0.6	78.9	2.1	213.6
SO267_109-1	24.01.2019 00:13:30	Dredge	DRG	station start				started	16° 38.293' S	175° 58.821' W	1402.4	0.3	64.6	0.3	182.1
SO267_109-1	24.01.2019 00:15:10	Dredge	DRG	in the water			FW2/SPW2	started	16° 38.294' S	175° 58.821' W	1401.1	0.2	60.8	0.6	278.5
SO267_109-1	24.01.2019 00:42:36	Dredge	DRG	max depth/on ground			Boko, SL: 1427m, Beginn auslegen, rwK: 17	started	16° 38.297' S	175° 58.823' W	1403.2	0.4	6.8	2.5	202.3
SO267_109-1	24.01.2019 01:15:00	Dredge	DRG	hoisting			Beginn hieven, SLmax: 1830m	started	16° 38.783' S	175° 58.771' W	969.6	0.3	348.7	1.2	68.1
SO267_109-1	24.01.2019 01:49:21	Dredge	DRG	information			1. Harker, SZmax: 76,2kN, Winde Stop und fiert	started	16° 38.787' S	175° 58.768' W	972.3	0.2	333.7	1.7	280.2
SO267_109-1	24.01.2019 01:54:30	Dredge	DRG	information			2. Harker, SZ: 75,3kN, Winde Stop und fiert 5	started	16° 38.789' S	175° 58.771' W	965.8	0.3	175.8	0.4	75.0
SO267_109-1	24.01.2019 02:00:18	Dredge	DRG	information			3. Harker, SZmax: 77,0kN, Winde Stop und fiert 50m, SL	started	16° 38.788' S	175° 58.770' W	969.6	0.1	334.3	4.1	18.9
SO267_109-1	24.01.2019 02:32:07	Dredge	DRG	information			Frei vom Grund, SZmax: 77,0k	started	16° 38.543' S	175° 58.774' W	1170.8	0.3	329.8	3.4	151.6
SO267_109-1	24.01.2019 02:56:19	Dredge	DRG	on deck				started	16° 38.540' S	175° 58.777' W	1175.1	0.1	275.6	4.3	84.7
SO267_109-1	24.01.2019 03:08:00	Dredge	DRG	station end				started	16° 38.538' S	175° 58.781' W	1175.9	0.0	241.6	1.5	129.9
SO267_110-1	24.01.2019 03:28:04	Magnetometer	MAG	station start			1. Fisch geht zu Wasser	started	16° 38.284' S	175° 58.879' W	1316.7	4.4	220.7	1.0	357.8
SO267_110-1	24.01.2019 03:33:16	Magnetometer	MAG	information			2. Fisch zu Wasser	started	16° 37.866' S	175° 58.876' W	1576.6	4.8	165.4	1.5	0.5
SO267_110-1	24.01.2019 03:39:48	Magnetometer	MAG	in the water			Magnetometer komplett zu Wasser,	started	16° 37.376' S	175° 58.873' W	1762.9	4.3	220.3	1.1	13.3
SO267_110-1	24.01.2019 04:00:00	Magnetometer	MAG	profile start			rwK: 057°, d: 40,4nm	started	16° 36.187' S	175° 55.686' W	1953.1	11.0	304.1	1.1	53.0
SO267_110-1	24.01.2019 07:46:11	Magnetometer	MAG	alter course			rwk: 084°, d: 2,5sm	started	16° 14.129' S	175° 20.141' W	1723.8	10.9	241.5	7.2	82.0
SO267_110-1	24.01.2019 07:58:08	Magnetometer	MAG	alter course			rwk: 180°, d: 4,4sm	started	16° 13.906' S	175° 17.889' W	2104.2	11.0	236.6	8.2	101.3
SO267_110-1	24.01.2019 08:17:25	Magnetometer	MAG	alter course			rwK: 270°, d: 03 sm	started	16° 17.550' S	175° 17.443' W	1705.5	12.3	242.8	7.1	180.6
SO267_110-1	24.01.2019 08:31:13	Magnetometer	MAG	alter course			rwK: 237°, d: 41 sm	started	16° 18.088' S	175° 20.008' W	2057.0	12.3	254.1	3.5	267.3
SO267_110-1	24.01.2019 11:46:03	Magnetometer	MAG	alter course			rwK: 245°, d: 47 sm	started	16° 40.113' S	175° 55.604' W	1297.7	12.0	90.4	3.5	243.8
SO267_110-1	24.01.2019 15:39:26	Magnetometer	MAG	information			Beginn einholen Magnetometer	started	16° 59.731' S	176° 38.999' W	1626.8	4.8	123.4	8.5	241.1
SO267_110-1	24.01.2019 15:54:23	Magnetometer	MAG	information			1. Fisch an Deck	started	17° 00.285' S	176° 40.261' W	1868.0	6.0	112.6	7.8	246.7
SO267_110-1	24.01.2019 15:56:00	Magnetometer	MAG	information			Ende wissenschaftlicher Aufzeichnu	started	17° 00.353' S	176° 40.417' W	1924.4	6.2	111.5	7.0	244.2
SO267_110-1	24.01.2019 15:56:59	Magnetometer	MAG	on deck				started	17° 00.396' S	176° 40.512' W	1922.8	6.2	113.5	7.8	247.3
SO267_110-1	24.01.2019 15:57:17	Magnetometer	MAG	station end				started	17° 00.409' S	176° 40.541' W	1921.0	6.1	118.1	7.9	246.7

Appendix 2: Multichannel Seismics Operations and Equipment

(M. Schnabel, H. Kopp and Shipboard Scientific Party)

While the reflection seismic equipment, seismic processing and preliminary results are briefly described in chapter 5, this appendix provides more details of the streamer and navigation system setup, the seismic profile list and figures of each processed seismic reflection line.Table 1 lists surveying parameter applied for all lines. The Spectra online navigation system triggered space-equidistant shooting each 50 m for the reflection and 150 m for the refraction lines.

The Spectra navigation system is based on the streamer configuration (Fig. 1), reference points on RV SONNE (Fig. 2) and the outboard geometry concerning guns and streamer (Fig. 3). All interfaces provided by RV SONNE, gun controller (Longshot), seismic acquisition system (Seal 428), Kongsberg GPS (on the streamer end buoy) and compass birds (ION System 3) are collected by the Power RTNU, the real-time unit of the Spectra navigation system, which distributes all controlling triggers. The RV SONNE specific wiring and all interfaces are documented in Fig. 4.

A profile list of all reflection and refraction lines provides Table 2. For each of the six reflection lines mapped in Fig. 5, the onboard processed seismic sections are illustrated in Figs. 6 to 11. See chapter 5 for processing details.

Table A2.1 Survey parameter during cruise SO267.

Reflection Seismics Survey Parameter		
Speed along profile	4.5 kn	(2.31 m/s)
Shot point spacing	50 m	
Shot point interval	21.6 s	
Recording length	15 s	
Sampling rate	2 ms	(500 Hz; 250 Hz Nyquist)
Streamer:		
Active length	3900 m	(26 sections)
Nb. channels	312	(12.5 m channel interval)
CDP spacing	6.25 m	
CDP fold	39	
Streamer depth	12 m	(62.5 Hz receiver notch)
Max turn rate	5°/min	(36 min for half circle)
Min turn radius	1 nm	(1.852 km)
HP filter cut-off	2 Hz	(analog)
LP filter cut-off	200 Hz	(digital, 0.4 times sampling rate)
Guns:		
Gun volume	88.17 l	(12 G-guns in 2 arrays of 3 cluster each)
	5380 cuin	(8x 520 + 2x 360 + 2x 250)
Max air volume	48 m^3/min	(max volume by 4 compressors)
Max air pressure	208 bar	(max pressure, typically 180 bar applied)
Compressor time	21.6 s @ 196 bar	
Source depth	8 m	(93.75 Hz source notch)
Refraction Seismics Survey Parameter		
Speed along profile	4.5 kn	(2.31 m/s)
Shot point spacing	150 m	
Shot point interval	64.8 s	

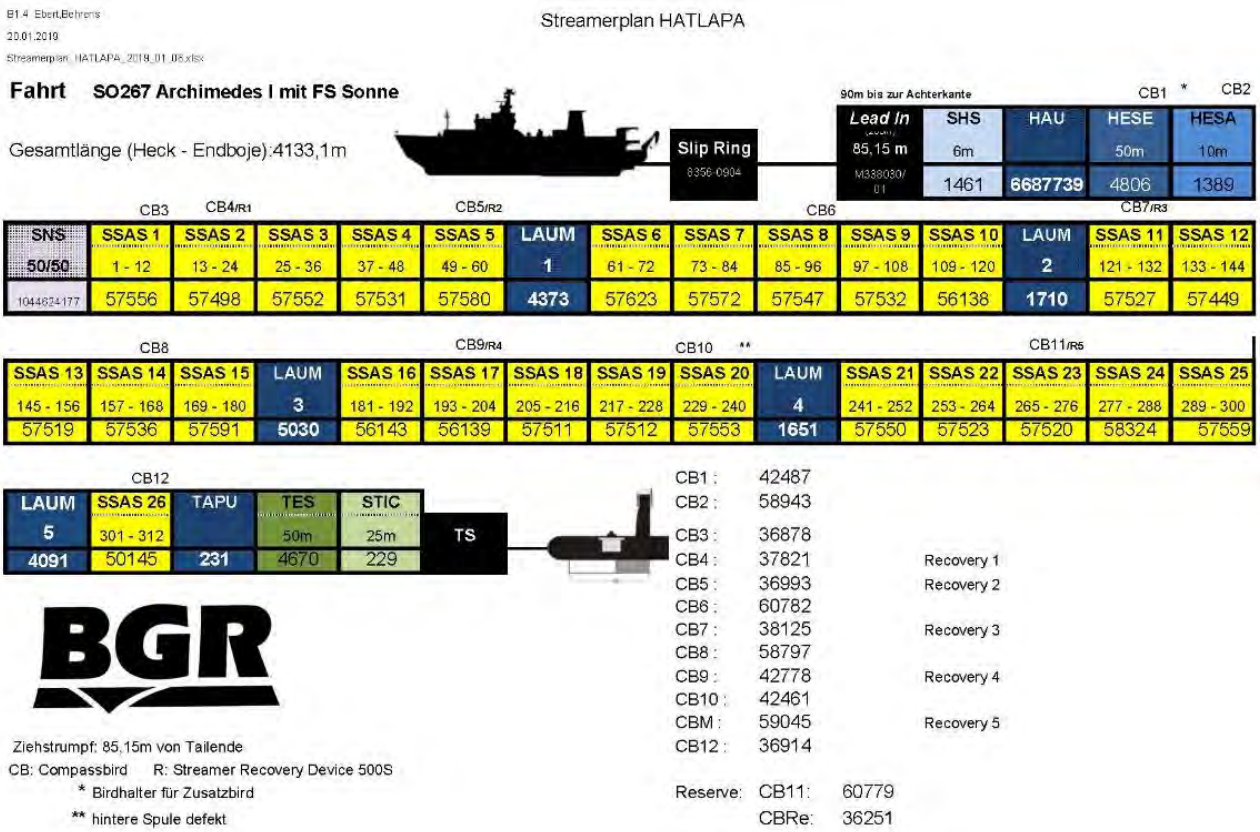

Fig. A2.1 Streamer configuration.

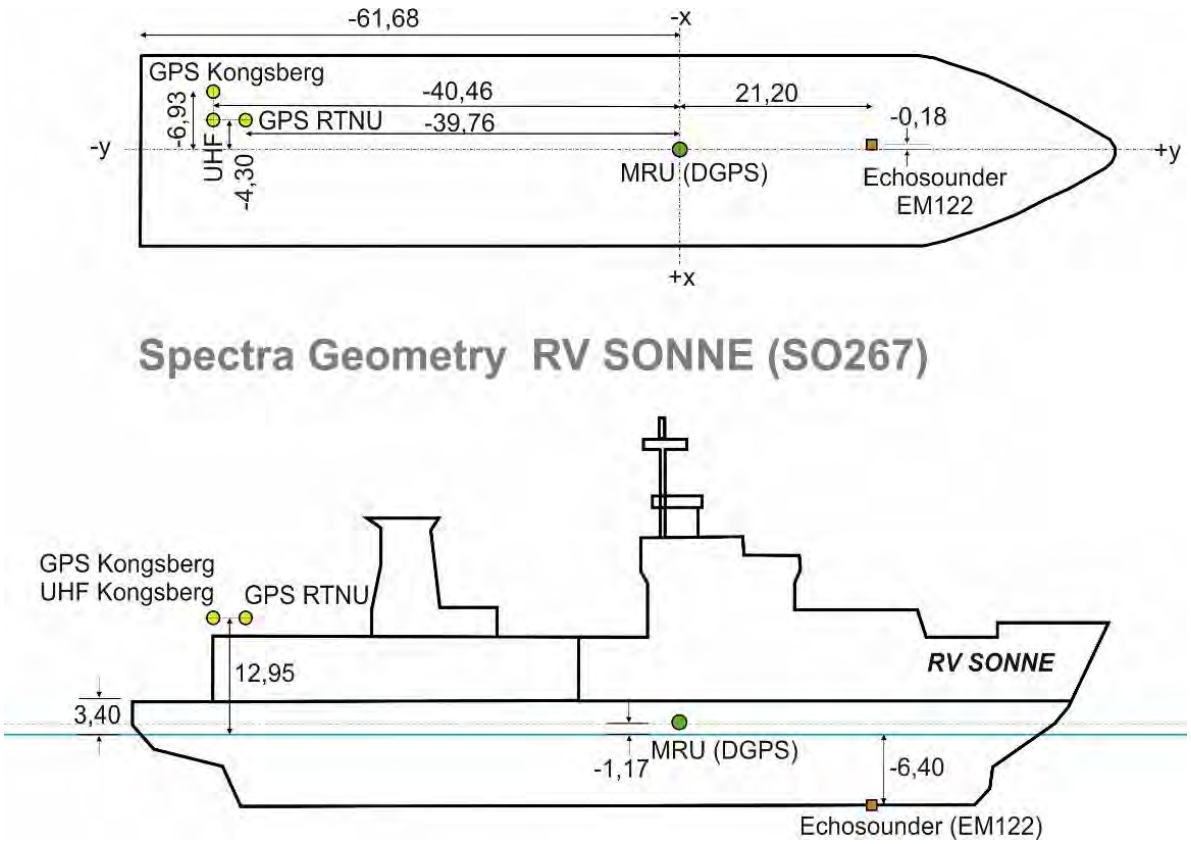

Fig. A2.2 Geometry of Spectra reference points on the RV SONNE.

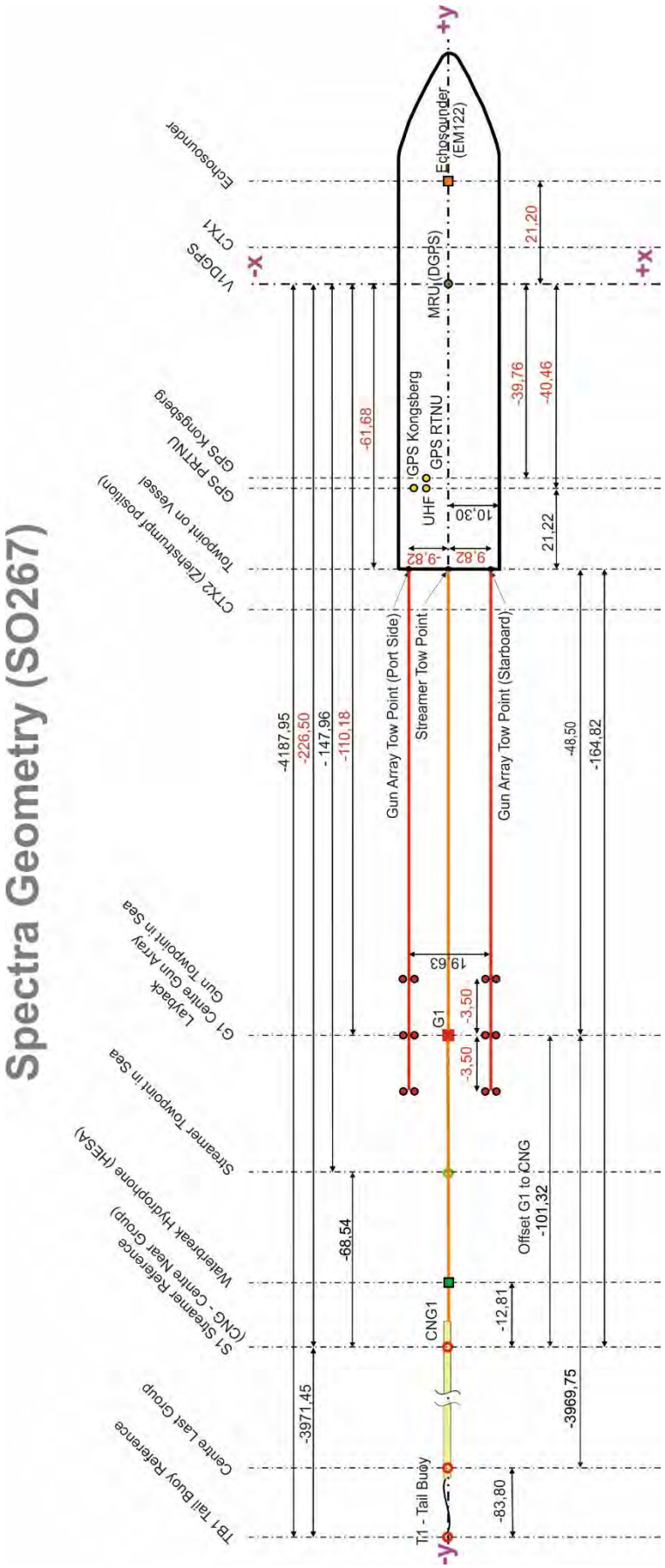

Fig. A2.3 Geometry of Spectra reference points in the water.

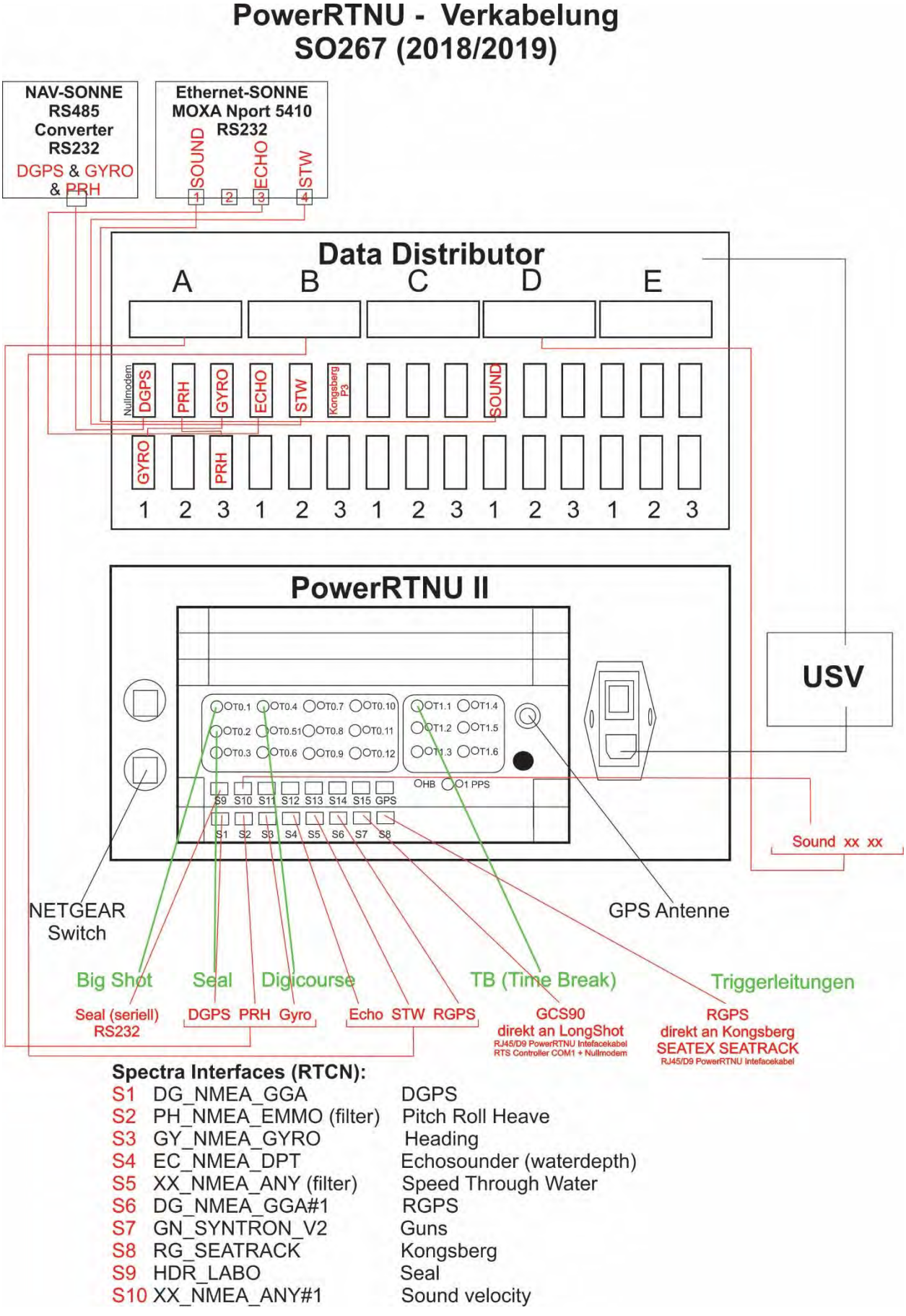

Fig. A2.4 Wiring and interfaces of Spectra's real-time system Power RTNU as configured for RV SONNE.

Table A2.2 Profile list of all multichannel reflection (MCS) and refraction (RS) lines.

Line number	SP	Date	Time UTC	Latitude	Longitude	Course	M=magnetics G=gravity B=bathymetry RS=refract. seis MCS=refl. seis.	Profile km
BGR18-2R3	2960	14.12.18	20:32:12	17°19.799 S	173°27.743 W		M,G,B,RS	
	1000	16.12.18	10:05:54	17°19.820 S	176°13.692 W	270°		293.68 km
BGR18-203	828	16.12.18	21:15:50	17°18.615 S	176°18.360 W		M,G,B,MCS	
	6874	18.12.18	13:59:49	17°19.794 S	173°27.726 W	90°		299.95 km
BGR18-204	1096	25.12.18	06:02:16	17°47.970 S	174°19.553 W		M,G,B,MCS	
	3028	25.12.18	18:38:08	17°47.980 S	175°14.220 W	270°		96.49 km
BGR18-205	803	27.12.18	05:12:49	18°11.909 S	174°16.512 W		M,G,B,MCS	
	5086	28.12.18	08:51:10	18°12.000 S	176°17.947 W	270°		213.85 km
BGR18-2R5	2380	28.12.18	14:50:49	18°12.206 S	176°19.291 W		G,B,RS	
	1001	29.12.18	15:37:16	18°12.023 S	174°21.968 W	90°		206.76 km
BGR18-206	995	09.01.19	05:27:26	18°43.809 S	175°58.905 W		M,G,B,MCS	
	3483	09.01.19	21:59:42	18°43.799 S	174°48.130 W	90°		124.25 km
BGR18-202	733	13.01.19	05:51:37	16°03.583 S	175°42.852 W		M,G,B,MCS	
	4436	14.01.19	05:33:16	16°03.583 S	173°59.032 W	90°		184.94 km
BGR18-201	930	14.01.19	07:12:41	16°00.967 S	173°53.228 W		M,G,B,MCS	
	3821	15.01.19	01:49:15	15°14.364 S	174°58.272 W	305°		145.41 km
BGR18-2R2	1001	16.01.19	00:43:38	16°03.598 S	175°35.338 W		M,G,B,RS	
	2014	16.01.19	21:02:09	16°03.598 S	173°58.774 W	90°		171.99 km
							sum RS	**672.43 km**
							sum MCS	**1064.89 km**

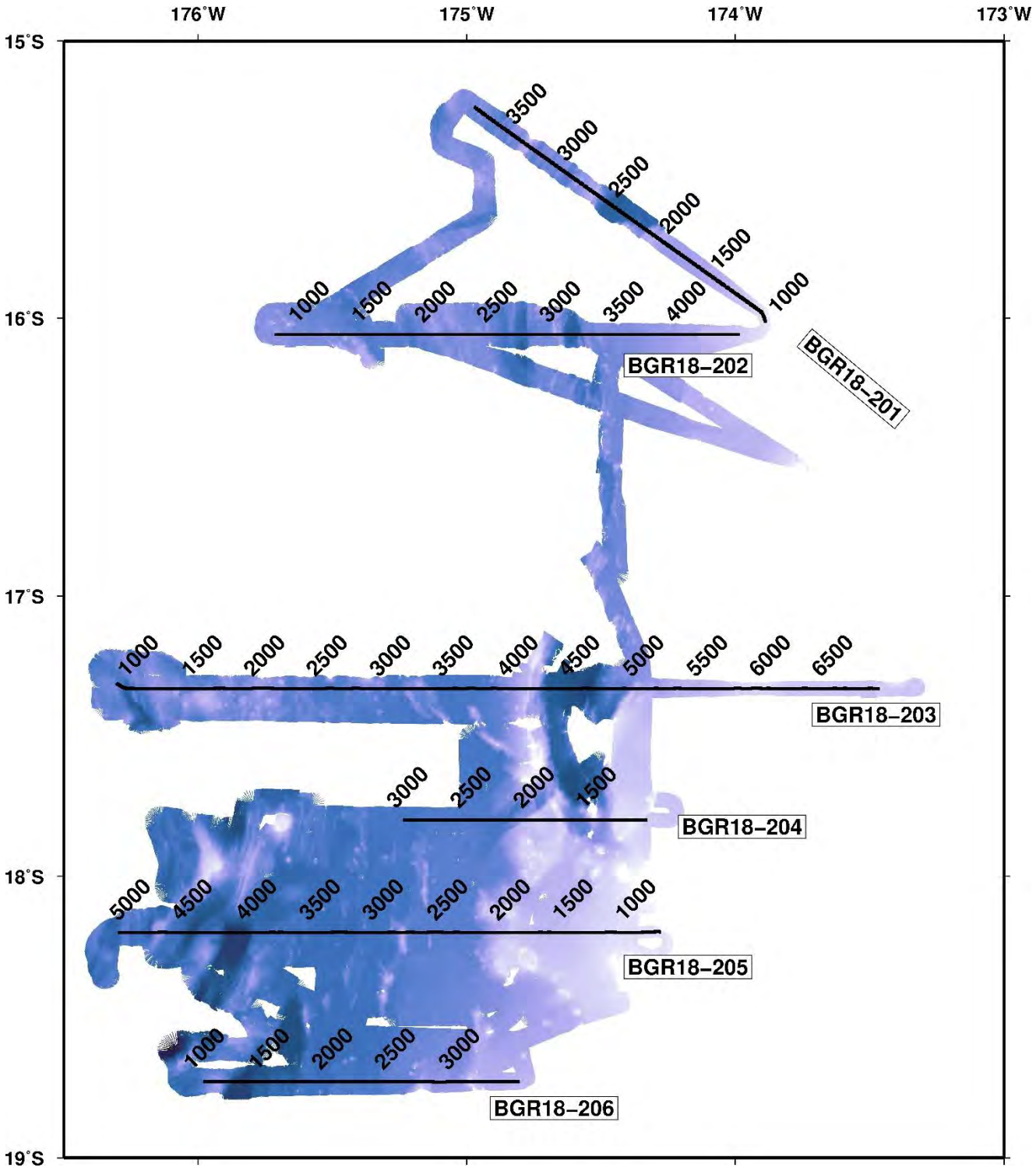

Fig. A2.5 Overview map of all six seismic lines with shot-point numbers annotated.

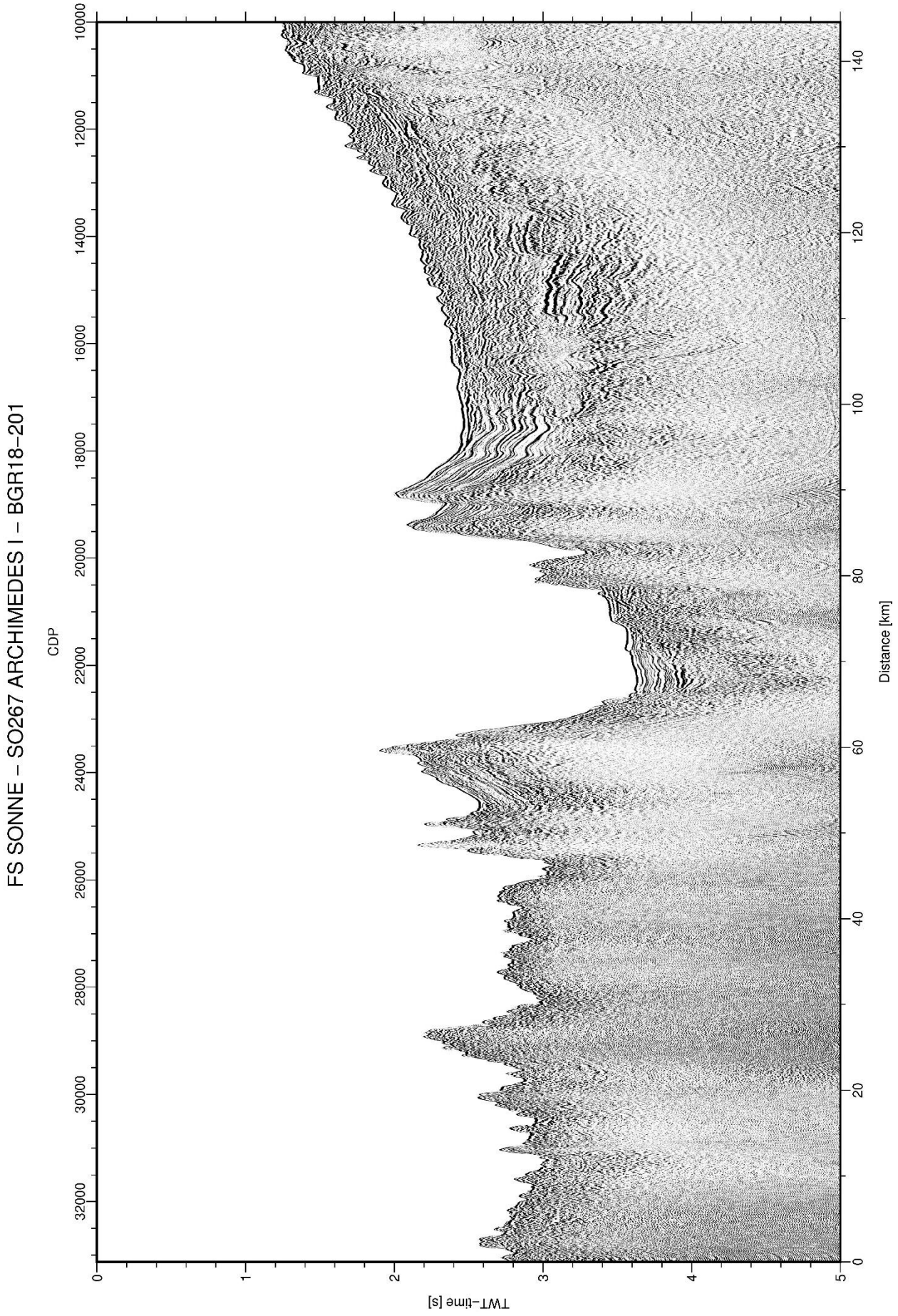

Fig. A2.6 Seismic section of profile BGR18-201 (P1).

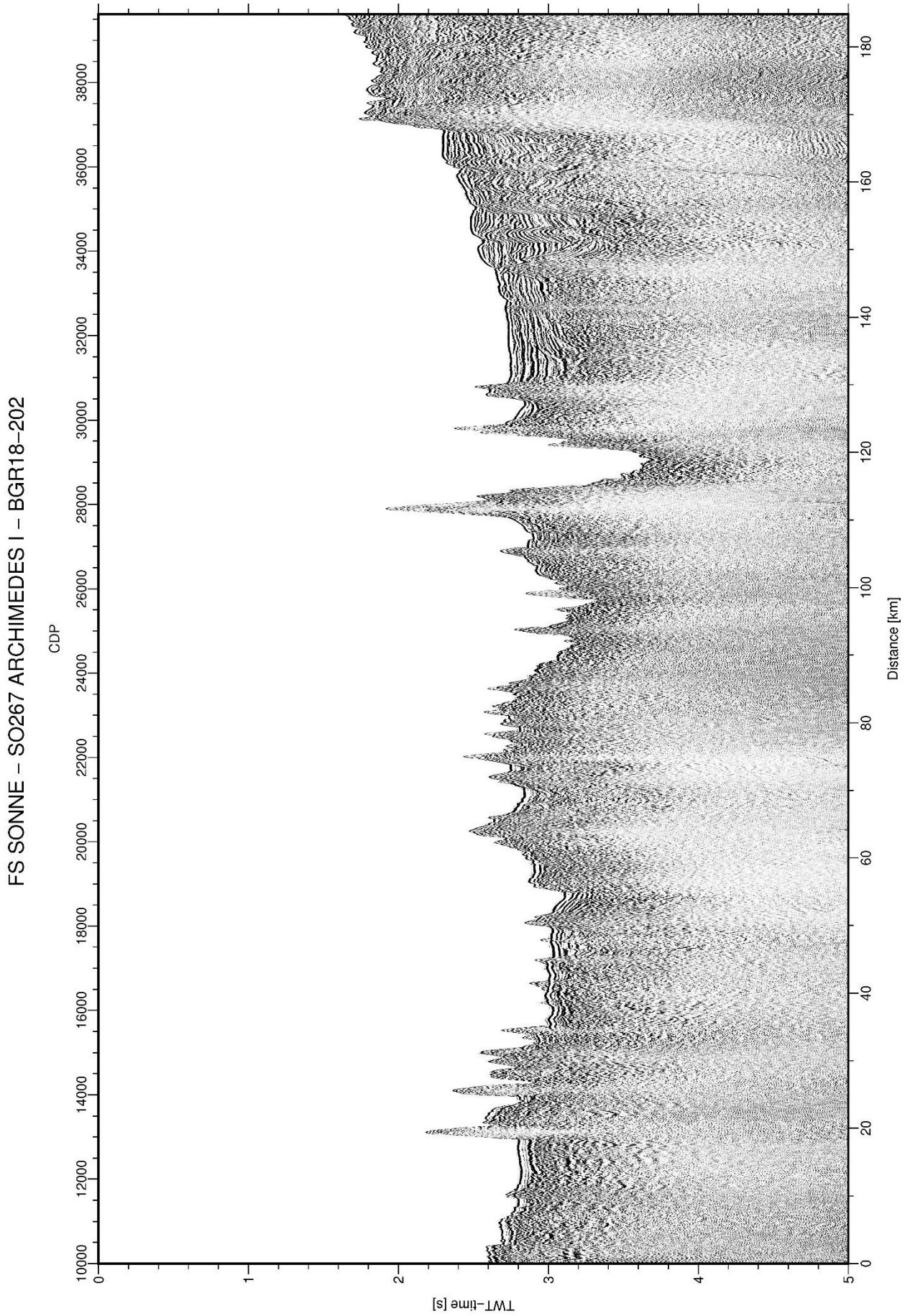

Fig. A2.7 Seismic section of profile BGR18-202 (P2).

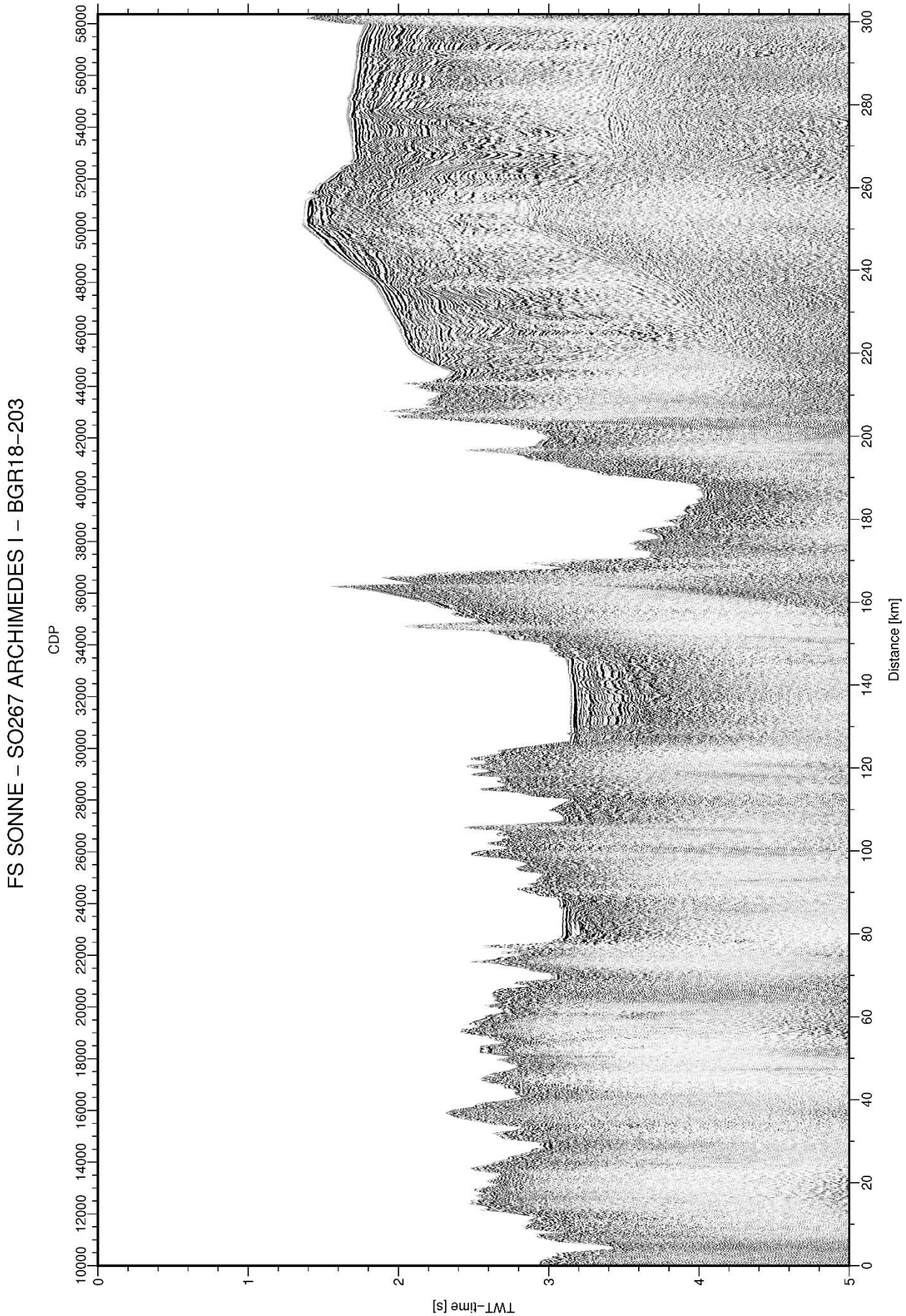

Fig. A2.8 Seismic section of profile BGR18-203 (P3).

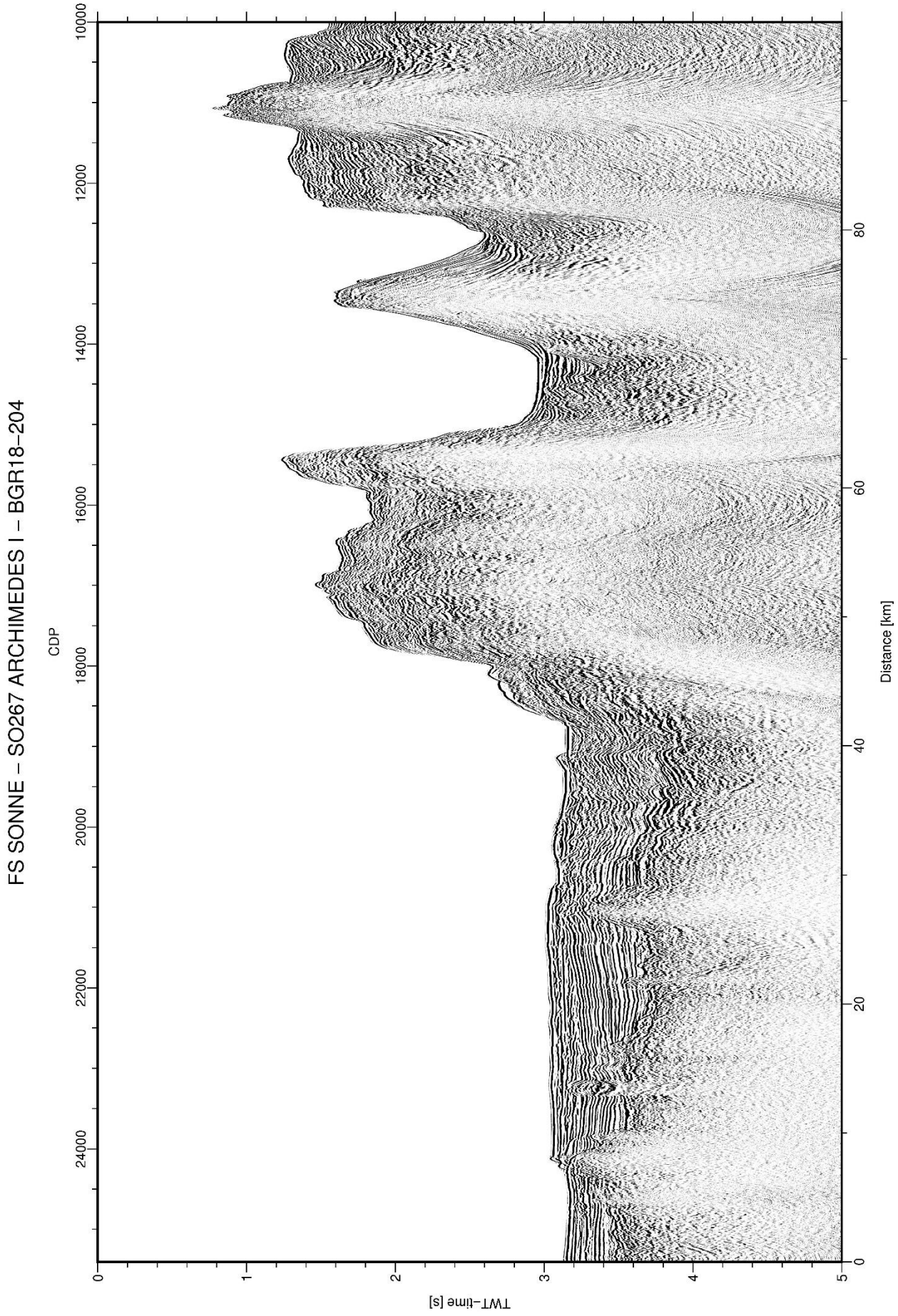

Fig. A2.9 Seismic section of profile BGR18-204 (P4).

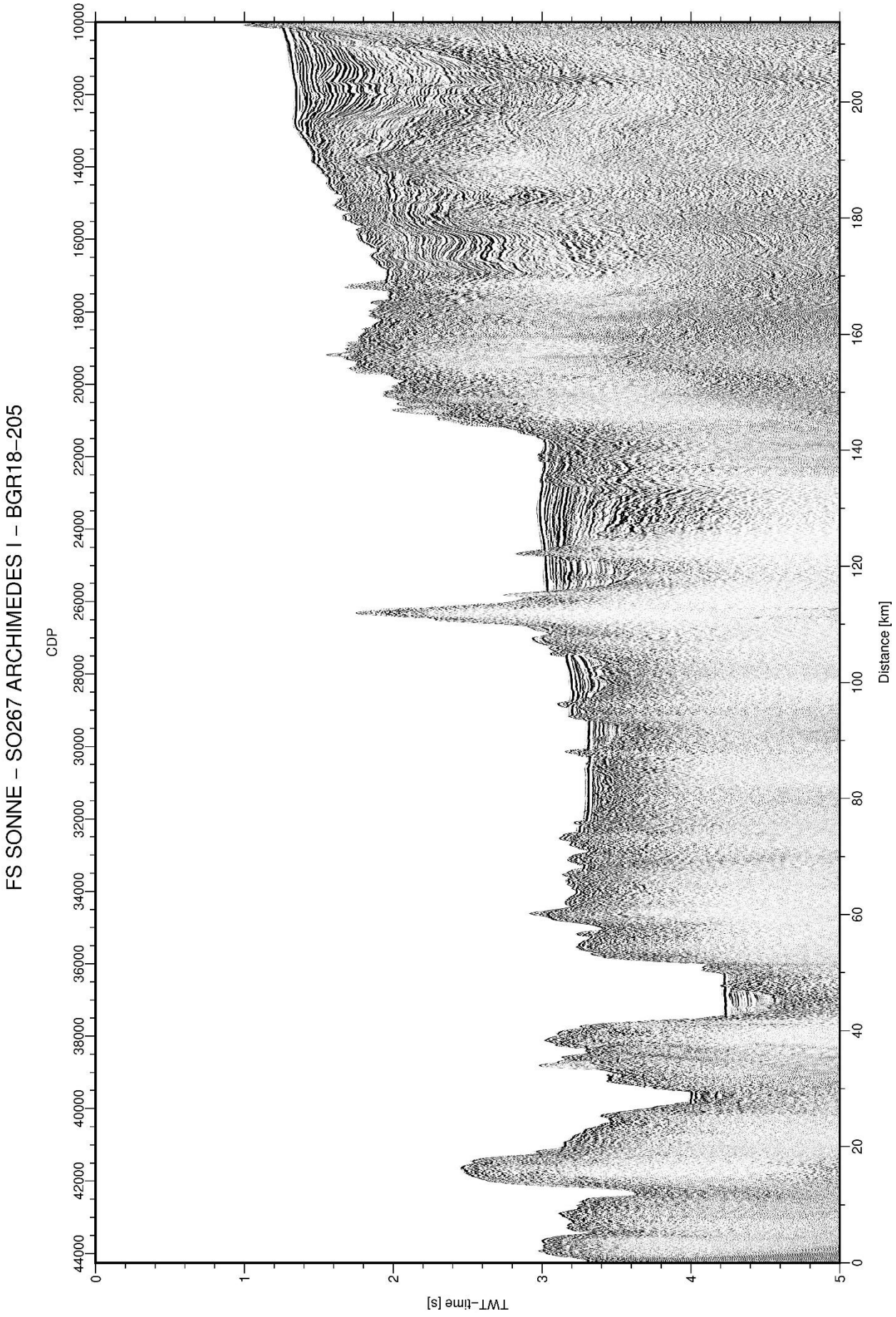

Fig. A2.10 Seismic section of profile BGR18-205 (P5).

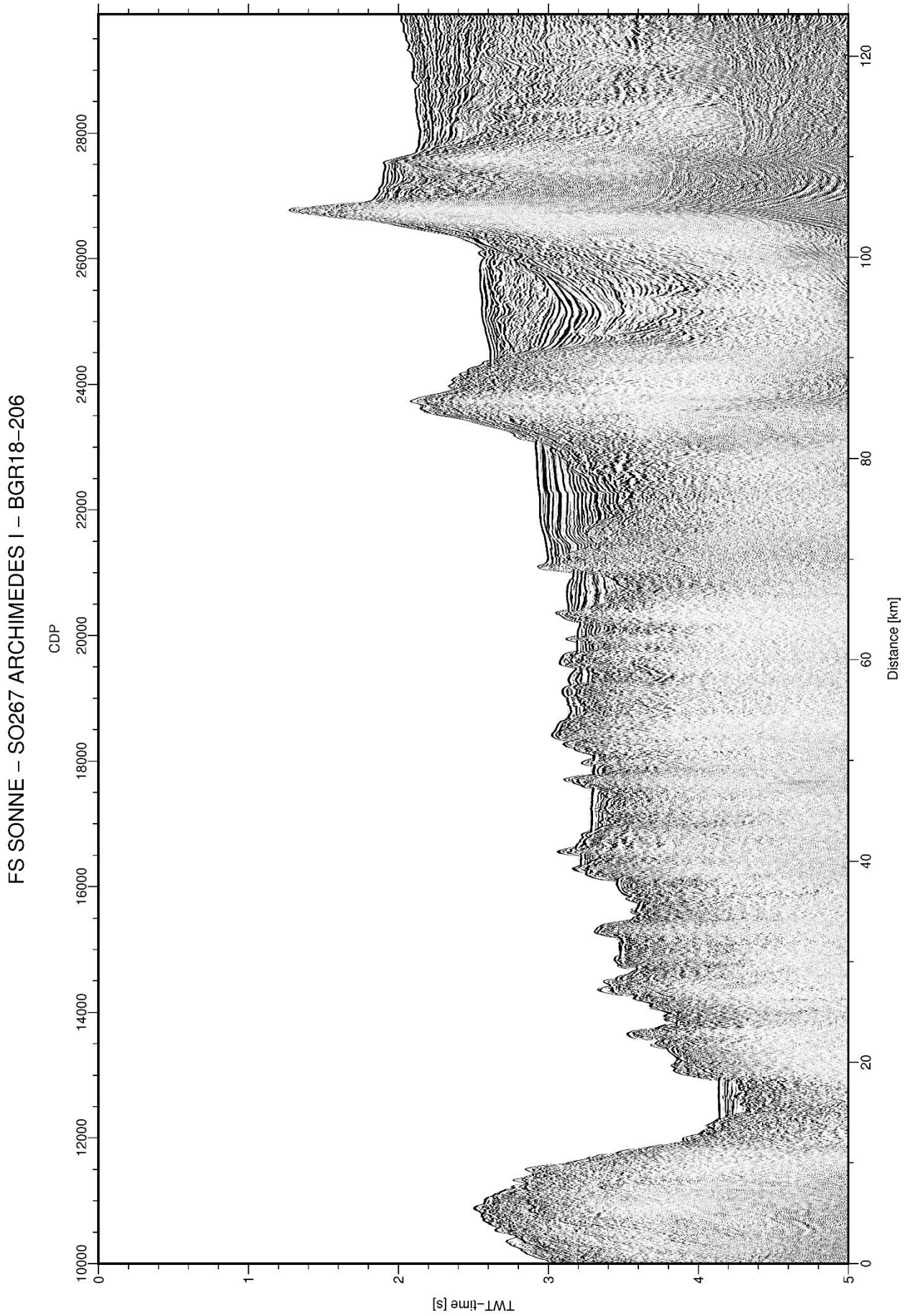

Fig. A2.11 Seismic section of profile BGR18-206 (P6).

Appendix 3: Magnetics Equipment and Data Report

(U. Barckhausen, I. Heyde, D. Hagedorn)

During cruise SO-267, magnetic measurements were carried out with a shipboard and a towed magnetometer system. With the shipboard system data were acquired continuously throughout the cruise while operating in the Tonga EEZ. The towed system was deployed during all seismic lines, during bathymetric mapping and for longer transits.

The shipboard magnetometer system consists of two separate waterproof housings that contain orthogonal digital ring core fluxgate sensors and two-axis inclinometers, a data acquisition box and a GPS mouse. The vector magnetometer data from the two sensors installed above the observation room of the ship do not suffer from the orientation problems of the towed vector magnetometers because the orientation sensors of the ship can be used. On the other hand, the measured vector components are heavily influenced by the induced and remanent magnetization of the ship. The ship's field can be determined against the values of a magnetic reference field during a calibration loop in order to obtain parameters allowing correction of the measured vector components of the ship based magnetometers for the field of the vessel.

The towed BGR magnetometer systems used during cruise SO-267 consisted of two different magnetometer types which were operated simultaneously on one cable:

(1) the SeaSpyII system with one or two Overhauser magnetometer sensors and

(2) an oriented Vector sensor equipped with a Magson fluxgate magnetometer.

Overhauser sensors measure the scalar absolute value of the total magnetic field while fluxgate magnetometers measure the magnetic field vector in its three components.

The SeaSpy™ Marine Gradiometer System manufactured by Marine Magnetics Corp. consists of two proton precession magnetometers, enhanced with the Overhauser effect. In the standard configuration, two exactly equivalent magnetometers are towed 150 meters apart as a longitudinal array 750 meters astern of the ship (Fig. A3.1). In the configuration used on this cruise, an oriented Vector magnetometer was added to the system between the two Overhausers in order to measure the magnetic field in its components. A total of 4196 km was measured with this system. Not on all lines three sensors could be deployed due to technical problems and operational considerations. However, at least one Overhauser and a Vector Magnetometer were operated on all lines surveyed with the towed magnetometer system. Magnetic data quality in general is very good, in parts thanks to low geomagnetic activity throughout the cruise.

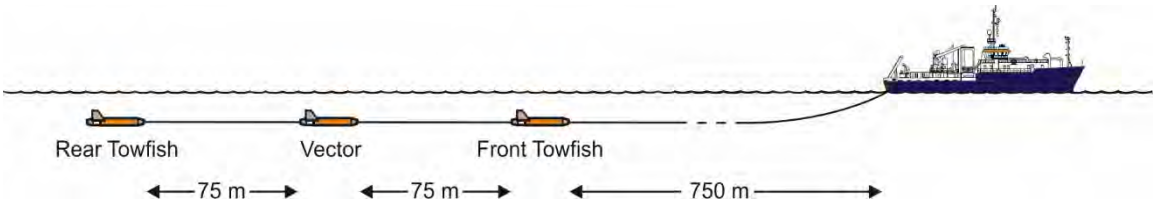

Fig. A3.1 Schematic sketch of the towed gradiometer system towed gradiometer system (front and rear Overhauser sensor) and one Vector fluxgate magnetometer towfish in-between.

A3.1 Marine Magnetics SeaSpyII Gradiometer

The SeaSpyII Marine Gradiometer System manufactured by Marine Magnetics Corp. normally consists of two proton precession magnetometers, enhanced with the Overhauser effect. In its standard configuration two exactly equivalent magnetometers are towed 150 meters apart as a longitudinal array 750 meters astern of the ship. Both sensors measure the total intensity of the magnetic field simultaneously. The difference between the two measurements is an approximation for the longitudinal gradient of the field in the direction of the profile line. Provided that the time variations are spatially constant over the sensor spacing, the differences are free from temporal variations and their integration restores the variation-free total intensity or magnetic anomaly (apart from a constant value).

A standard proton precession magnetometer uses a strong DC magnetic field to polarize itself before a reading can be taken. Overhauser sensors work similar to proton magnetometers with the exception that the excitement of the proton spin (polarization) is done by radio waves which excite the spin of the electrons in an organic fluid within the sensors. The electrons then transfer their spin to the protons in the fluid via a quantum mechanical process called Overhauser effect. Similar to every other proton magnetometer the relaxation frequency of the protons is a measure for the magnitude of the ambient magnetic field. The polarization power required is much smaller than that needed by normal proton magnetometer systems and the AC field may be left active while the sensor is producing a valid output signal. This allows the sensor to cycle much faster and to produce more precise results than a standard proton magnetometer. The signal is digitized by the electronics assembly within the tow fishes which then transmit digital data strings via a two conductor tow cable to the vessel. The tow cable is connected to a deck leader which is in turn connected to the power supply and the logging computer. As configured for this survey, the Overhauser sensors had a cycle time of one second. The sensors are specified with a noise level of 0.01 nT/√Hz, a resolution of 0.001 nT, and an absolute accuracy of 0.2 nT.

SeaSpy Vector Magnetometer.

As an additional option, Marine Magnetics offers a Vector Magnetometer consisting of a towfish equipped with a fluxgate magnetometer from Magson company in Berlin. The system consists of i) a digital 3-axis fluxgate magnetometer yielding excellent precision, ii) a two-axis tilt-meter, iii) a high-precision IMU device, capable of measuring 3-axis acceleration and gyro angle, and iv) sensors for temperature, pressure, and humidity. Fluxgate and inclinometers are mounted on a common platform. The data form the Vector sensor are transmitted via the same communication protocol to the ship over the tow cable.

The Magson fluxgate uses the principle of vector-compensating all three ring-core-sensors by means of three independent Helmholtz-coils. The internal feedback circuit, using digitally controlled DC-currents fed into the Helmholtz-coils maintains precise nulling of the field inside the ring-core. Thus the amplitude of this current can be used as a signal to measure the vector components of the magnetic field. A factory calibration is required to provide offset, scale factor and non-orthogonality angle for each axis. All electronic components are integrated on the board of the data acquisition microprocessor. The Magson fluxgate sensor is specified with a noise level of 0.02 nT/√Hz, a resolution of 0.008 nT and a long term stability < 10 nT/year.

A high precision of angle measurement is necessary to rotate the field components measured in the sensors coordinate system of the moving fluxgate towfish into the horizontal geomagnetic coordinate system. By Euler rotation it is possible to separate the vertical from the horizontal field

vector components. The accuracy of the vector data is limited by the accuracy of the rotation angles. For example, a 0.01° tilt deviation may result in up to 10 nT component error in the survey area. Without any yaw angle estimation, the orientation of the horizontal field vector (i.e. the north and east component) remains unknown. A crude approximation might be ship's course. Utilising magnetic heading from the fluxgates themselves removes seafloor anomalies by default, however, a numerical yaw approximation has been introduced by Engels et al. (2006), demonstrating the advantages of vector component data analysis.

A3.2 Magnetometer Array Configurations

All magnetometer array configurations which have been applied during cruise SO-267 are listed in Table A3.1 together with the details of all deployments. The sensor type is identified by a serial number. S/N 14097, S/N 14139, S/N 14140, and S/N 14141 are Overhauser sensors while S/N 24001 and S/N 24002 denote Vector sensors. Cruise SO-267 was the first time that the new SeaSpyII system was used by BGR and it turned out that some data communication problems exist when deploying three sensors at a time. For this reason and for operational constraints it was decided to deploy only two sensors (one Vector and one Overhauser) on many profiles. During the operations one sensor (S/N 14141) and one interfish towcable (150-N1) failed and one other sensor (S/N 24002) showed an unacceptably high noise level in the data.

Table A3.1 Details of towed magnetometer deployments during cruise SO-267.

Profile	Main towcable	S 1	Interfish cable 1	S 2	Interfish cable 2	S 3
BGR18-2R3	800-N1	14139	75-N3	24001	75-N4	14140
BGR18-203	800-N1	14141	75-N3	24001	75-N4	14140
BGR18-207	800-N1	14140	75-N3	24001	75-N4	14141
BGR18-208	800-N1	14139	150-N1	14140		
BGR18-204	800-N1	14139	75-N3	24001	75-N4	14140
BGR18-205 BGR18-209 BGR18-210	800-N1	24001	150-N1	14140		
BGR18-211	800-N1	24001	75-N3	14140		
BGR18-212	800-N1	24002	75-N3	14140		
BGR18-213 BGR18-206 BGR18-214 BGR18-215 BGR18-216 BGR18-217 BGR18-218 BGR18-202 BGR18-201 BGR18-219 BGR18-2R2	800-N1	24001	75-N3	14140		
BGR18-220	800-N1	24002	75-N3	14140		
BGR18-221	800-N1	24001	75-N3	14097		
BGR18-222 BGR18-223 BGR18-224	800-N1	24001	75-N3	14140		
Calibration circle: 22.01.19, 01:15 to 02:15						

A3.3 Shipboard Magson™ Fluxgate Magnetometer

Another vector magnetometer system was installed above the observation room of the vessel. It consists of two separate waterproof housings that contain orthogonal digital ring core fluxgate sensors and two-axis inclinometers, a data acquisition box and a GPS mouse. The system was built by MAGSON GmbH in Berlin for BGR and delivered January 2010 as an onboard system for research vessels. The electronics and software based on a Linux board is a new development compared to the older towed system described above. The sensors have a dynamic range of +/- 100000 nT and a long-term stability of <10 nT/year and were fixed to the railing on the port and starboard sides of the observation deck (Fig. A3.2). The data are recorded internally on a CF memory card and optionally online on a laptop. Two different types of data files are stored separately for each hour. The first file type (file extension M60) contains the values of the three orthogonal vector components and the inclination values together with UTC time marks. The sampling rate can be chosen between 1 and 20 Hz. On this cruise we used 10 Hz. The second file type (file extension S60) contains time marks and latitude and longitude from the GPS receiver and temperature values for both sensors. The sensors are internally heated to a selectable temperature, on our cruise to 35°C. Additionally we also recorded the values from the ship's motion reference units (heave, roll, pitch, and azimuth). Experience shows that roll and pitch values from the vessel sensors are much more reliable than the inclinometer values from the fluxgate sensors that are less precise due to dynamic accelerations.

The vector magnetometer data from the two sensors installed above the observation room of the ship do not suffer from the orientation problems of the towed vector magnetometers because the orientation sensors of the ship can be used. On the other hand, the measured vector components are heavily influenced by the induced and remanent magnetization of the ship which may also be time dependent. The three components of the remanent magnetic field of the ship and the nine matrix elements of the susceptibility tensor can be determined by a least squares fit of the measured magnetic field components against the values of a magnetic reference field during a calibration loop (Isezaki, 1986, König, 2006). After the determination of all 12 parameters that describe the magnetic field of the ship for all azimuthal directions, the measured vector components of the ship based magnetometers can be corrected for the field of the vessel.

A3.4 Data Processing and Calibration

The magnetic raw data recorded by the Overhauser and fluxgate magnetometers were processed in time domain in order to obtain high quality magnetic data which are essential for further data analyses. Processing of total magnetic field gradients results in reconstructed variation free total field values. Single sensor fluxgate data provide anomalies in vector components which may still contain a variation contribution. Further processing of the vector component data with time and spectral domain methods will be part of the post-cruise work.

Fig. A3.2 Fluxgate magnetometer installed above the observation room of RV Sonne, starboard side.

We use two standard processing sequences for total field magnetic data. The first one contains of a simple algorithm for cleaning erroneous data of one Overhauser sensor before the magnetic reference field (IGRF 2015) is removed. The resulting magnetic anomalies are stored using a 1 second sampling rate. Later in this chapter these values are used to display preliminary anomaly curves in several figures.

The second processing sequence is more sophisticated and uses the records of two Overhauser sensors and one towed Magson sensor. The philosophy is to pre-process raw data in the time domain in a comprehensive straight-forward and transparent way before gradiometer anomaly reconstruction and further component analysis. This processing will be applied to selected profiles during post-cruise data analysis and interpretation.

Fluxgate sensors require calibrations which are typically performed as loops (circles sailed by the ship for this purpose. However, sailing full circles while towing a seismic streamer is difficult and very time consuming. A calibration loop with two towed magnetometer sensors deployed was carried out on Jan. 22nd between 05:25 and 05:50. In addition, the ship was turned by 360° on the spot once for the purpose of calibration the onboard magnetometers before deployment of the towed system on Jan. 22nd, 2019, between 04:46 and 05:01.

A3.5 Data quality

The magnetic data observed during the cruise are in general of good quality. The instruments performed well during most of the cruise and the Earth magnetic activity was low to moderate during much the cruise while magnetic measurements have been carried out with the towed magnetometer system. Figure A3.3 shows the Earth magnetic activity represented by Kp values after Bartels (1957) for the time between October, 2018 and January, 2019. The red line shows the times when the towed magnetometer system was in use parallel to the acquisition of refraction seismic or reflection seismic data and during transits and bathymetric mapping. Two that were measured twice show differences of up to 30 nT in the total magnetic field with a wavelength of several hours, representing the daily variations of the Earth's magnetic field. Since these differences are smaller than the measured magnetic anomalies by more than an order of magnitude, they can be neglected for a first display and preliminary interpretation of the data.

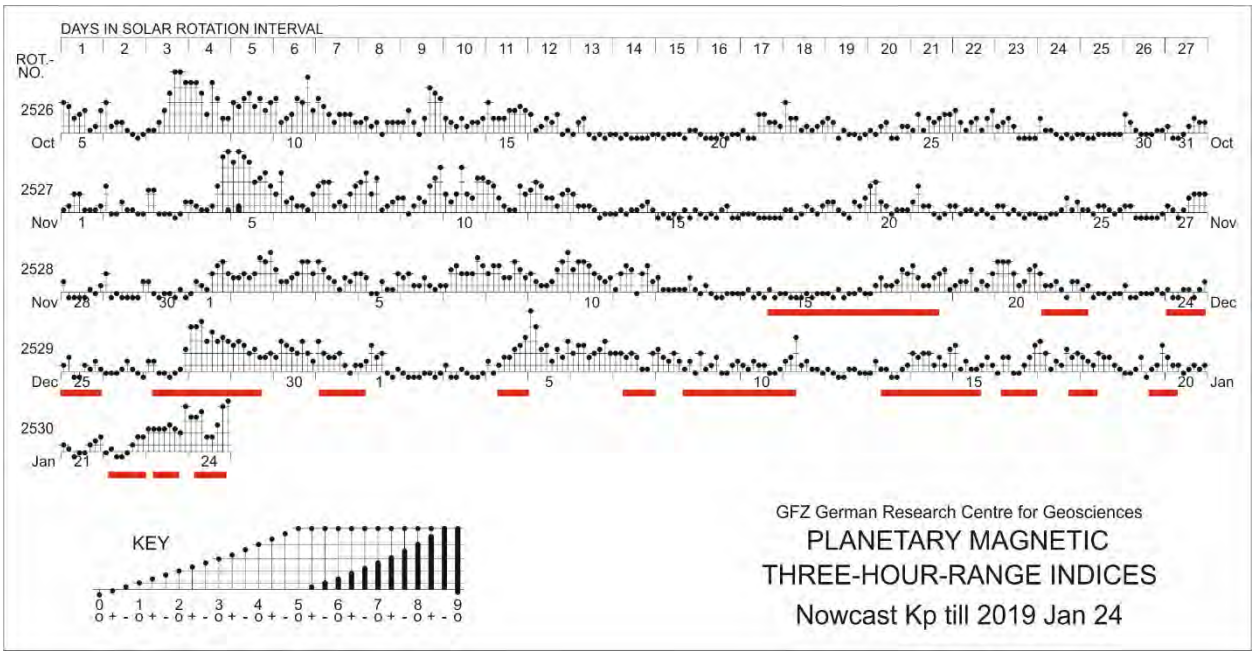

Fig. A3.3 Planetary magnetic three-hour-range indices for fall and winter of 2018-2019. Low indices indicate low Earth magnetic activity and thus only moderate disturbance of magnetic measurements. The time period of magnetic measurements with the towed magnetometer array during cruise SO-267 is shown by the red bar.

A3.6 Profile data

On the following pages, the magnetic anomalies on the long E-W profiles acquired during cruise SO-267 are displayed in the order of their acquisition.

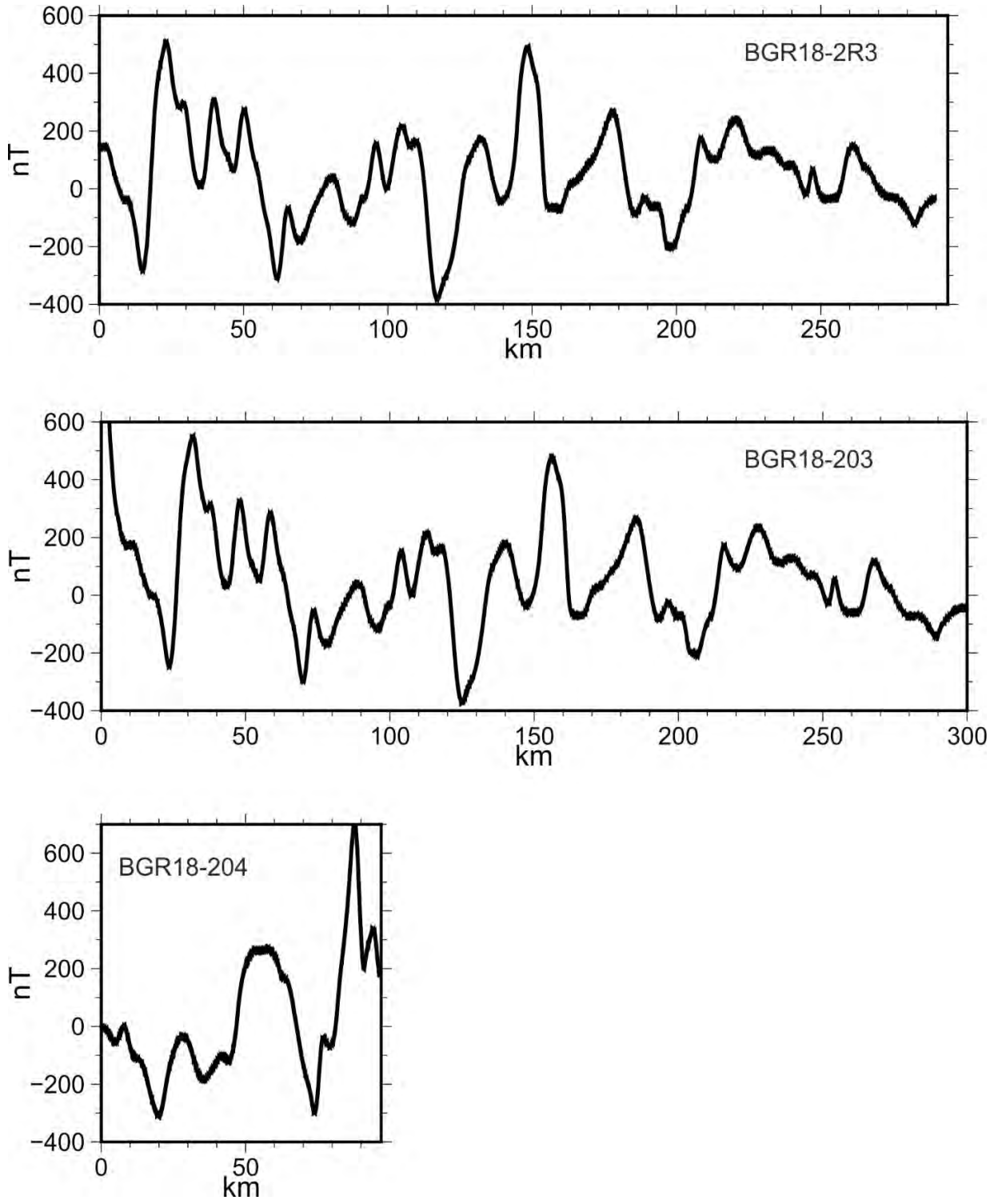

Fig. A3.4 Magnetic anomalies on Profiles BGR18-2R3, BGR18-203, and BGR18-204, all displayed W-E.

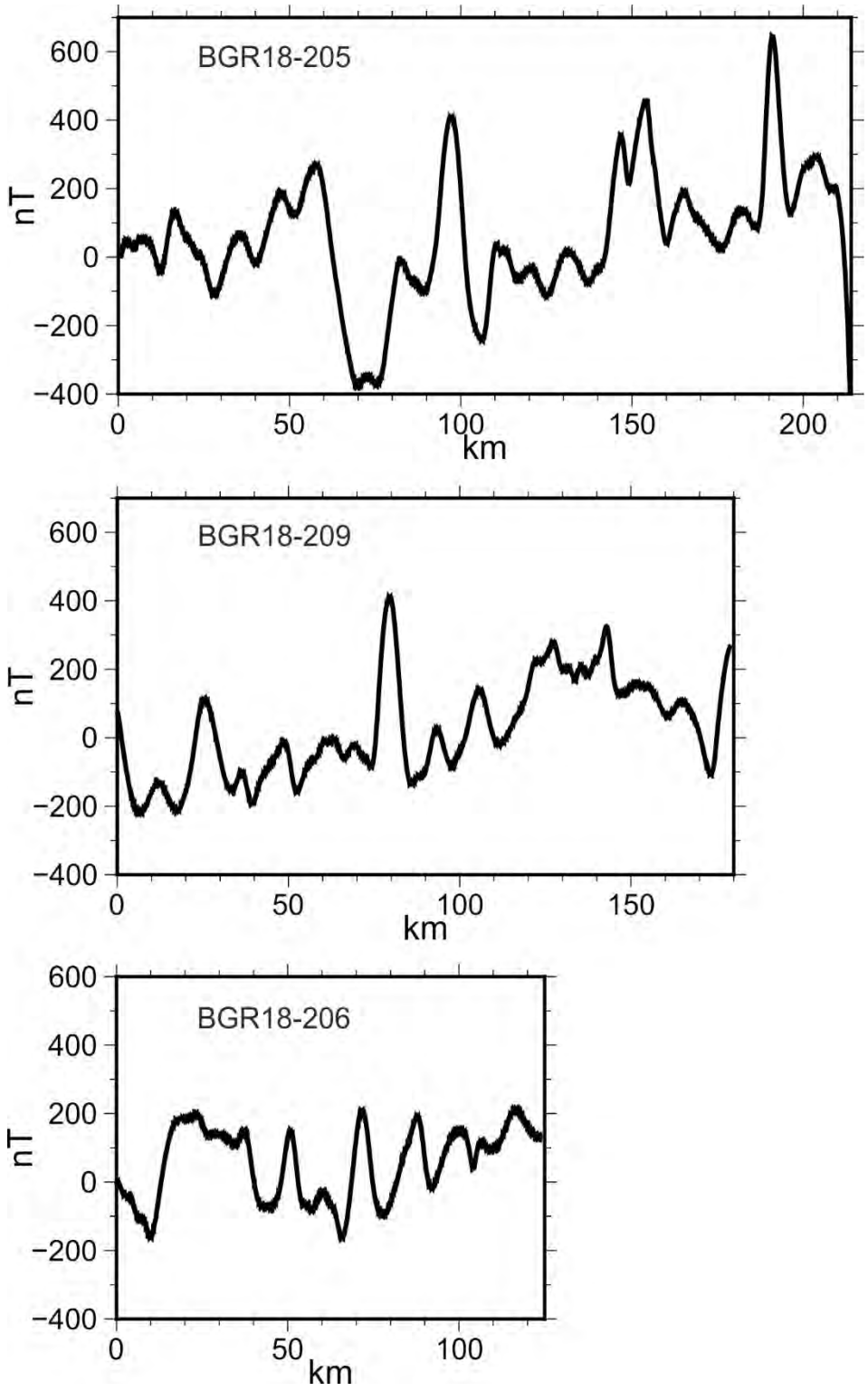

Fig. A3.5 Magnetic anomalies on Profiles BGR18-205, BGR18-209, and BGR18-206, all displayed W-E.

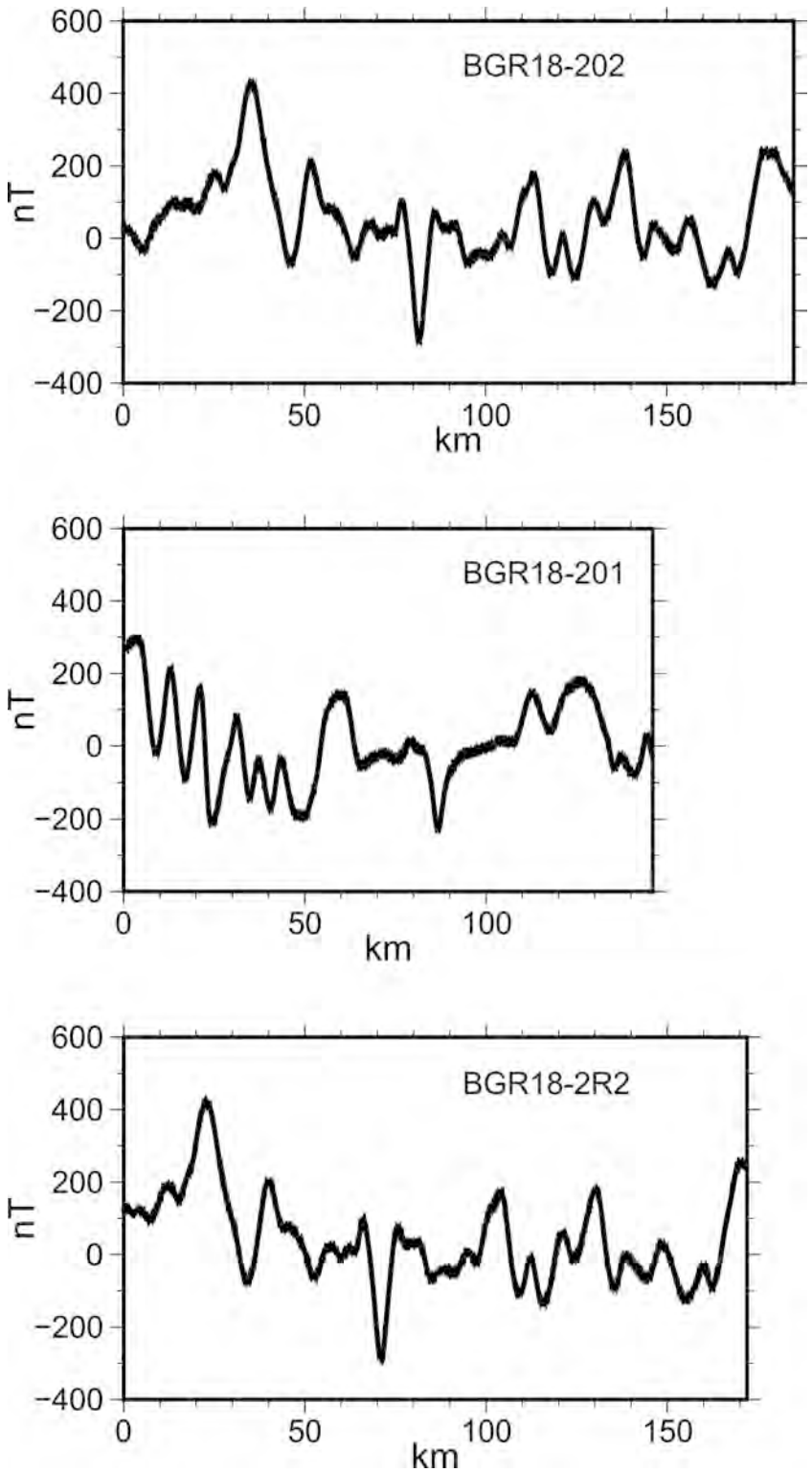

Fig. A3.6 Magnetic anomalies on Profiles BGR18-202, BGR18-201, and BGR18-2R2, all displayed W-E.

Table A3.2 Magnetic data acquisition during cruise SO-267.

line number	date	time UTC	Latitude	Longitude	course	M=magnetics G=gravity B=bathymetry RS=refract. seis MCS=refl. seis.	length (km)
BGR18-2R3	14.12.18	18:50:00	17° 19.886‘ S	173° 21.043‘ W		M,G,B,RS	
	16.12.18	10:40:00	17° 19.992’ S	176° 15.221‘ W	270°		307.87 km
BGR18-203	16.12.18	21:15:00	17° 18.575’ S	176° 18.410’ W		M,G,B,MCS	
	17.12.18	21:15:00	17° 19.830’ S	174° 25.215’ W	90°		200.11 km
BGR18-203	18.12.18	01:50:10	17° 19.809’S	174° 25.215’ W		M,G,B,MCS	
	18.12.18	14:06:00	17° 19.795‘ S	173° 27.258‘ W	90°		102.45 km
BGR18-207	21.12.18	02:23:00	17° 23.925’ S	176° 20.968‘ W		M,G,B	
	21.12.18	13:15:00	17° 24.761‘ S	174° 47.266‘ W	90°		165.57 km
BGR18-208	24.12.18	00:10:00	17° 45.422’ S	174° 45.811’ W		M,G,B	
	24.12.18	21:45:00	17° 55.674’ S	174° 34.408’ W	varia.		304.4 km
BGR18-204	25.12.18	04:40:00	17° 48.051’ S	174° 14.305’ W		M,G,B,MCS	
	25.12.18	19:44:00	17° 47.983’ S	174° 47.938’ W	270°		112.42 km
BGR18-205	27.12.18	05:14:00	18° 11.891’ S	174° 16.603’ W		M,G,B,MCS	
	28.12.18	09:03:00	18° 12.024’ S	176° 18.628’ W	270°		214.65 km
BGR18-2R5	28.12.18	14:50:00	18° 12.245’ S	176° 19.332’ W		G,B,RS	
	29.12.18	16:04:00	18° 11.962’ S	174° 19.949’ W	90°		210.00 km
BGR18-209	30.12.18	23:40:00	18° 26.445’S	176° 8.100’W		M,G,B	
	01.01.19	00:40:00	17° 58.738’S	174° 58.738’W	varia.		369.5 km
BGR18-210	04.01.19	01:08:00	18° 2.547’S	174° 59.452’W		(M),G,B	
	04.01.19	06:53:00	18° 3.038’S	175° 59.375’W	269°		105.50 km
BGR18-211	06.01.19	20:18:00	18° 9.289’S	174° 40.797’W		M,G,B	
	06.01.19	23:58:00	18° 17.567’S	174° 39.070’W	varia.		54.47 km
BGR18-212	07.01.19	09:00:00	18° 16.354’S	174° 43.493’W		M,G,B	
	07.01.19	20:57:00	17° 58.076’S	175° 42.864’W	varia.		109.83 km
BGR18-213	08.01.19	21:06:00	18° 6.994’S	175° 59.947’W		M,G,B	
	09.01.19	02:24:00	18° 36.655’S	176° 3.647’W	varia.		99.1 km
BGR18-206	09.01.19	05:20:00	18° 43.814’S	175° 59.482’W		MCS,M,G,B	
	09.01.19	22:05:00	18° 43.767’S	174° 47.838’W	270°		125.63 km
BGR18-214	10.01.19	02:03:00	18° 39.403’S	174° 51.922’W		M,G,B	
	10.01.19	06:28:00	18° 38.863’S	175° 34.381’W	271°		74.50 km
BGR18-215	10.01.19	14:56:00	18° 34.429’S	175° 41.751’W		M,G,B	
	10.01.19	19:06:00	18° 35.285’S	174° 49.132’W	91°		92.37 km
BGR18-216	10.01.19	19:08:00	18° 35.263’S	174° 48.723’W		M,G,B	
	10.01.19	21:14:00	18° 27.481’S	174° 24.789’W	71°		44.43 km
BGR18-217	10.01.19	21:24:00	18° 25.694’S	174° 24.878’W		M,G;B	
	10.01.19	23:05:00	18° 29.948’S	174° 45.320’W	258°		36.76 km
BGR18-218	10.01.19	23:22:00	18° 27.350’S	174° 44.604’W		M,G,B	
	11.01.19	02:21:00	18° 8.097’S	174° 22.917’W	varia.		61.7 km

line number	date	time UTC	Latitude	longitude	course	M=magnetics G=gravity B=bathymetry RS=refract. seis MCS=refl. seis.	length (km)
BGR18-202	13.01.19	05:51:00	16° 3.585'S	175° 42.884'W	90°	MCS,M,G,B	
	14.01.19	06:22:00	16° 3.542'S	173° 55.413'W			191.23 km
BGR18-201	14.01.19	07:46:54	15° 58.834'S	173° 54.099'W	305°	MCS,M,G,B	
	15.01.19	02:35:00	15° 12.952'S	175° 0.757'W			146.12 km
BGR18-219	15.01.19	06:07:00	15° 23.626'S	175° 3.029'W	varia.	M,G,B	
	15.01.19	10:51:00	15° 57.275'S	175° 28.499'W			102.4 km
BGR18-2R2	16.01.19	00:07:00	16° 3.609'S	175° 38.226'W	90°	RS,M,G,B	
	16.01.19	21:44:00	16° 3.615'S	173° 56.431'W			181.13 km
BGR18-220	17.01.19	22:47:00	16° 2.861'S	175° 31.847'W	49°	M,G,B	
	18.01.19	05:30:00	15° 13.708'S	174° 32.441'W			139.7 km
BGR18-221	19.01.19	20:00:15	15° 36.247'S	174° 41.208'W	varia.	M,G,B	
	20.01.19	05:25:15	17° 14.930'S	175° 2.065'W			202.4 km
BGR18-2CAL	22.01.19	05:19:30	17° 29.585'S	174° 55.165'W	varia.	M,G,B	
	22.01.19	05:56:00	17° 28.045'S	174° 56.505'W			9 km
BGR18-222	22.01.19	05:56:01	17° 28.042'S	174° 56.506'W	varia.	M,G,B	
	22.01.19	22:17:00	16° 50.597'S	175° 0.616'W			356.5 km
BGR18-223	23.01.19	12:17:00	16° 29.975'S	175° 2.482'W	varia.	M,G,B	
	23.01.19	17:37:00	16° 21.907'S	175° 44.919'W			120 km
BGR18-224	24.01.19	03:40:00	16° 37.362'S	175° 58.864'W	varia.	M,G,B	
	24.01.19	15:31:30	16° 59.449'S	176° 38.344'W			256.5 km
						Total length	4496.21 km
						Magnetics	4196.31 km
						MCS	1092.61 km
						Refraction	699.00 km

References

Bartels, J., 1957. The geomagnetic measures for the time-variations of solar corpuscular radiation, described for use in correlation studies in other geophysical fields. Ann. Intern. Geophys. 4, 227-236.

Engels, M., Barckhausen, U. and Gee, J.S., 2008. A new towed vector magnetometer: methods and results from a Central Pacific cruise. Geophys. J. Int., 172, 115-129.

Isezaki, N., 1986. A new shipboard three-component magnetometer. Geophysics, 51, 1992–1998.

König, M., 2006. Processing of shipborne magnetometer data and revision of the timing and geometry of the Mesozoic break-up of Gondwana. Berichte zur Polar- und Meeresforschung, 525, 137p.

Korenaga, J., 1995. Comprehensive analysis of marine magnetic vector anomalies, J. Geophys. Res., 100 (B1), 365-378.

Parker, R.L. and O'Brien, M.S., 1997. Spectral analysis of vector magnetic field profiles, J. Geophys. Res., 102 (B11), 24815-24824.

Appendix 4: Gravity Measurements and Data Report

(I. Heyde, U. Barckhausen, D. Hagedorn)

A4.1 The sea gravimeter system KSS32-M

During cruise SO-267 ARCHIMEDES a sea gravimeter system KSS32-M was installed in the Gravimeter Lab on Deck 02 one level below the main deck (Figs. A4.1 and A4.2). The gravimeter sensor was located approximately 1 m above in the vessel's nominal water line, 1.5 m to portside from the centerline, and about 61 m forward of the ship's stern. The KSS32-M (S/N 21) is owned by BGR and was installed on Dec., 8th when RV SONNE arrived in Suva and was still in the roads. The system was installed as early as possible to maximize the heating and running in time before leaving for the cruise.

The gravimeter system KSS32-M is a high performance instrument for marine gravity measurements, manufactured by the Bodenseewerk Geosystem GmbH. While the sensor is based on the Askania type GSS3 sea gravimeter designed by Prof. Graf in the 60ties, the development of the horizontal platform and the corresponding electronic devices took place at Bodenseewerk Geosystem in the beginning of the 1980ties. The system was completely modernized and modified in 2011 by the successor company BGGS (Bodensee Gravitymeter Geosystem GmbH, Meersburg). Before, the system consists of two main assemblies: the gyro-stabilized platform with the gravity sensor and a rack containing the control electronics, the data handling subsystem and the power supply. After the modernization the system electronics and the power supply are integrated in the platform. The system is controlled by a notebook (HP ProBook 6550B). The main software to operate the KSS32-M is DACQS developed by BGGS. It allows to change a number of settings (for example: parameters of the Bessel Filter applied to the measured data) and provides detailed information about the status of the system. The data acquisition is also managed by DACQS, whereby a wide range of values not only the gravity but also for example the attitude and horizontal accelerations of the platform could be recorded.

The gravity sensor GSS30 (Fig. A4.3) was not affected by the modernization. It consists of a tube-shaped mass that is suspended on a metal spring and guided frictionless by 5 threads. It is particularly designed to be insensitive to horizontal accelerations. This is achieved by limiting the motion of the mass to the vertical direction. Thus it is a straight line gravity meter avoiding cross coupling effects of beam type gravity meters. The main part of the total gravity acceleration is compensated by the mechanical spring, but gravity changes are compensated and detected by an electromagnetic system. The displacement of the spring-mass assembly with respect to the outer casing of the instrument is measured using a capacitance transducer.

The leveling subsystem consists of a platform stabilized in two axes by a vertical, electrically erected gyro. The stabilization during course changes is improved by providing the system with online navigation data. The stabilized platform will keep the sensor in an upright position with an accuracy of leveling in the order of 0.5 arc-minutes. This is particularly important as the sensor is very sensitive to tilting and the corresponding effects of horizontal accelerations. Vertical accelerations, however, cannot be eliminated. Luckily on a ship the vertical acceleration oscillates symmetrically with the ship's motion. The period of the oscillation is in the order of several seconds. This signal can be eliminated easily by means of low-pass filtering.

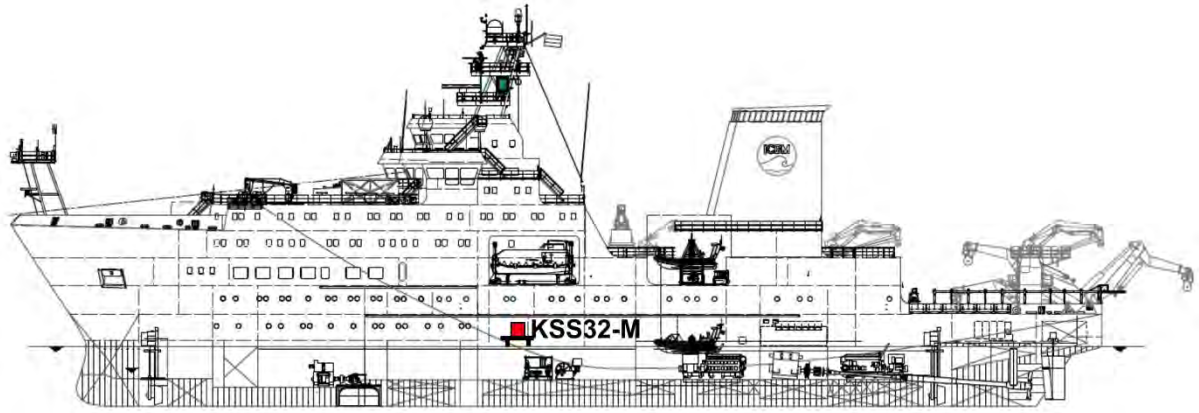

Fig. A4.1 Sketch of RV SONNE with the location of the sea gravimeter (red).

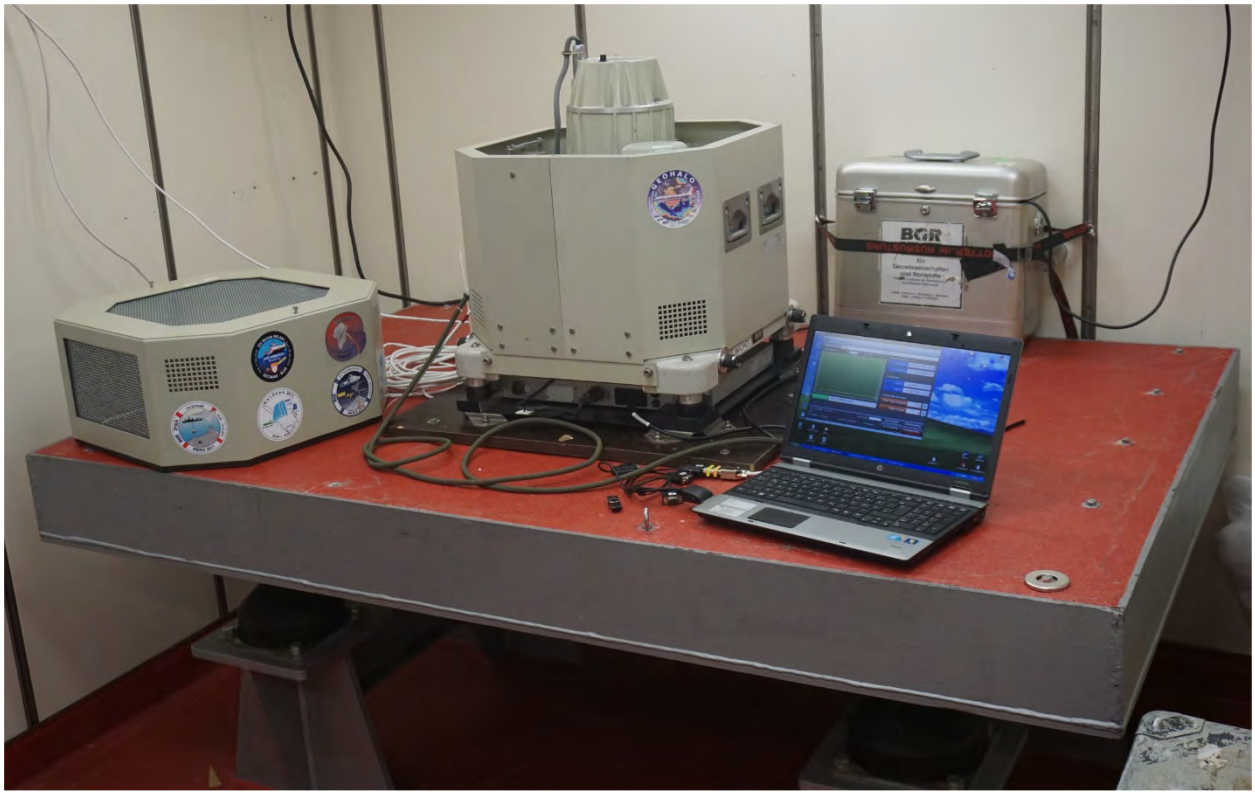

Fig. A4.2 KSS32-M gravimeter system mounted on the dedicated damped table in the Gravimeter Lab on RV SONNE.

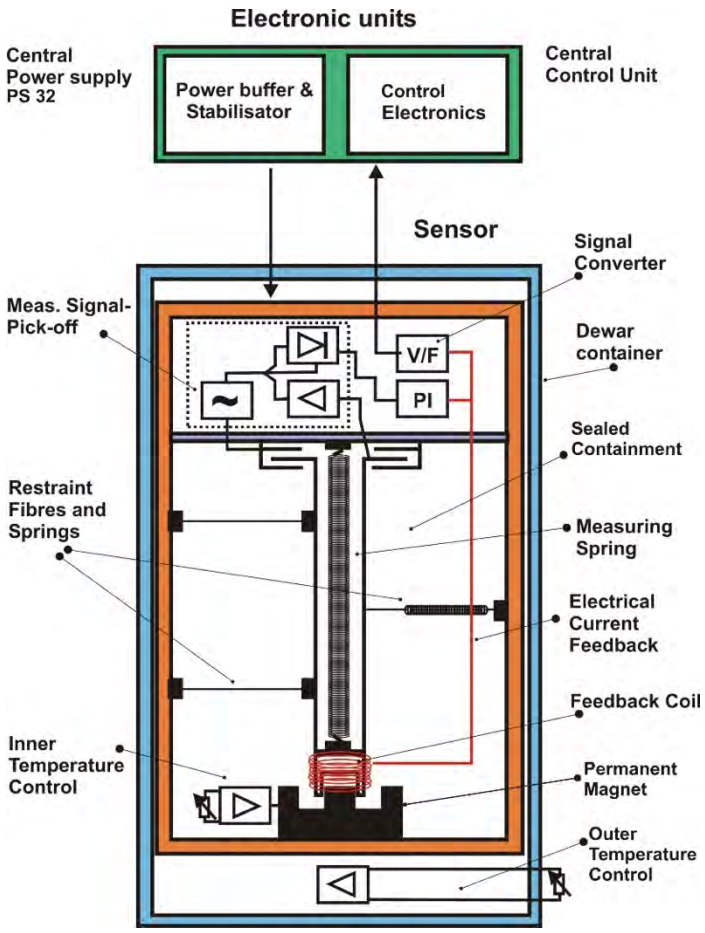

Fig. A4.3 Principle sketch of the gravity sensor GSS30 of the gravimeter system KSS32-M.

The data are transmitted via the notebook to the BGR data acquisition and processing system in Dry Lab I on the main deck and online navigation data from this system are sent with a rate of 1 Hz to support the stabilizing platform.

A4.2 Gravity ties to land stations

To compare the results of different gravity surveys the measured data have to be tied to a world-wide accepted reference system. This system is represented by the International Gravity Standardization Net IGSN71 (Morelli, 1974). Furthermore, the instrumental drift of the KSS32-M can be derived by the tie measurements at the beginning and the end of each cruise. The marine geophysical group of BGR uses a LaCoste&Romberg gravity meter, model G, no. 480 (LCR G480) for the gravity connections. Descriptions and absolute gravity values for reference stations in Suva, Fiji, were taken from the data base of the Bureau Gravimetrique International, Toulouse.

RV SONNE moored at the southern part of the King's Wharf in the harbour of Suva at point A (Fig. A4.4). Tie measurements on the pier at RV SONNE and at the reference station at the Mineral Resources Department 01 (BGI No. 107150) in the Meade Road (Fig. A4.5) were carried out on December 11th (December 10 according UTC) (Table A4.1). The absolute gravity at the sensor location one meter above the water level resulted to 978608.74 mGal. The reading of the KSS32-

M at the leaving time (December 11th, 04:40 UTC) with the same water level (-2.4 m) was -1317.99 mGal. The draught of the vessel was 6.3 m.

At the end of the cruise RV SONNE moored again at the Kings's Wharf in Suva at the same location (360 m marking) as before leaving. So no tie measurements were necessary. The draught of RV SONNE was also the same (6.3 m). However the water level with respect to the pier was considerable higher (-1.6 m vs. -2.4 m). So the absolute gravity value at the height of the KSS32-M sensor was 978608.53 mGal. The reading of the KSS32-M at the same time (Jan. 25th, 2019, 21:30 UTC) was -1313.52 mGal.

The instrumental drift for cruise SO-267 ARCHIMEDES can be derived from the readings in Suva to +4.68 mGal / 45.72 days or +0.102 mGal/day. This drift rate is relatively high but within the range we observed on previous cruises. The heating time before leaving was definitely long enough as no running in drift was observed anymore before leaving. Further analysis of the data will show whether the drift was linear. There are no hints for a sudden jump of the instrument.

Table A4.1 Observation report of the gravity tie measurements in Suva, Fiji.

Station	Observer	Date	Time UTC	Reading units	Gravity value [mGal]
A	H	10.12.18	13:06	2210.95	2244.269
A	H	10.12.18	13:10	2210.96	2244.279
A	H	10.12.18	13:12	2210.96	2244.279
01	H	10.12.18	13:35	2202.33	2235.508
01	H	10.12.18	13:40	2202.32	2235.498
01	H	10.12.18	13:42	2202.28	2235.457
01	H	10.12.18	13:45	2202.28	2235.457
A	H	10.12.18	14:10	2210.99	2244.310
A	H	10.12.18	14:14	2210.98	2244.300
Observer: H = Heyde. Gravity in mGal using LCR G480 scaling table.					

Reference Station:

01: Benchmark on ground floor of the Mineral Resources Department, Meade Road, Suva (Bureau Gravimetrique Station 107150, 18° 7'N, 178° 27.5' E, 178 m a.s.l.) — 978599.56 mGal (IGSN71)

Gravity station:

A: Suva Harbour, Kings Wharf, near bollard No.6 from the southern end and marking 360 (18° 8.0652'N, 178° 25.3992'E)

Differences between reference and gravity stations:

A – 01 = 8.796 mGal

01 – A = -8.825 mGal

mean value: 8.81 mGal

Absolute gravity at A: 978608.37 mGal

Absolute gravity for A (reduced to sensor level –1.4 m) 978608.74 mGal (IGSN71).
Reading of sea gravimeter KSS32M at leaving time 11.12.18 (04:40 UTC): -1317.99 mGal.

Absolute gravity for A (reduced to sensor level –0.6 m) 978608.53 mGal (IGSN71).r
Reading of sea gravimeter KSS32M at arrival time 25.01.19 (21:30 UTC): -1313.52 mGal.

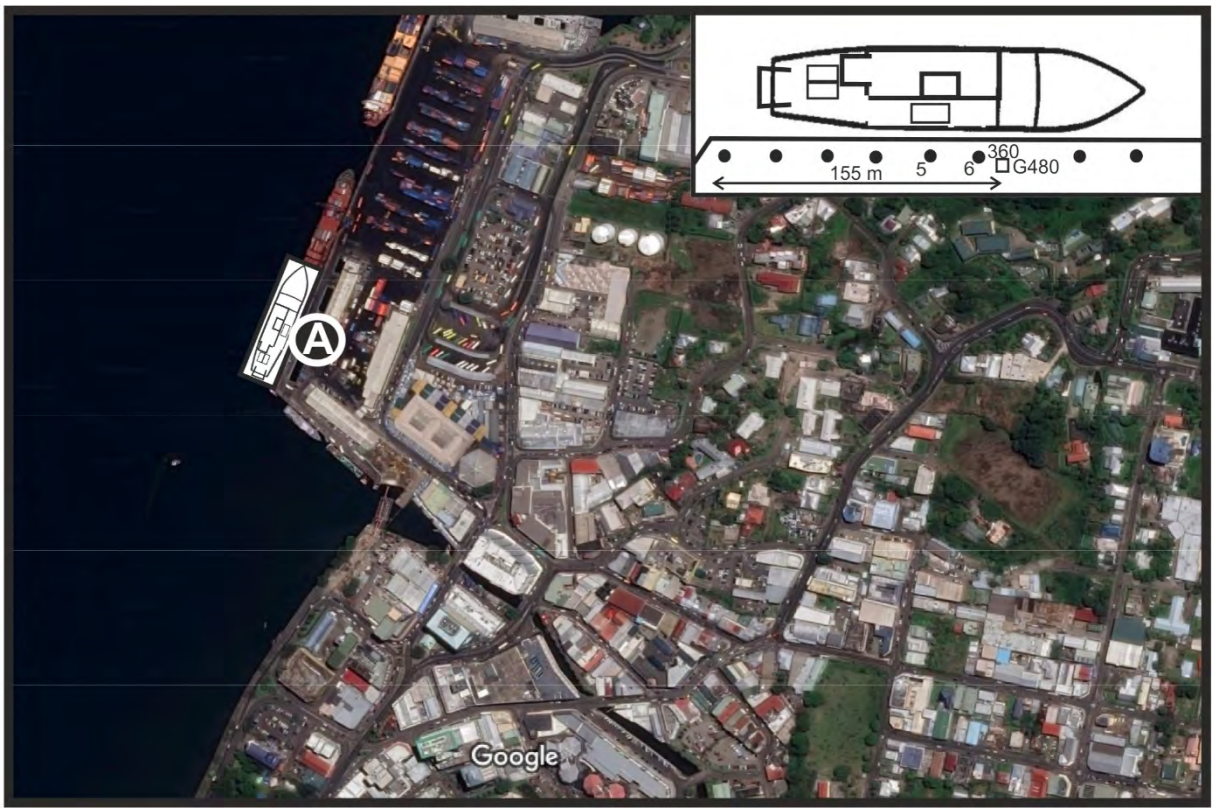

Fig. A4.4 Location of the mooring site of RV SONNE (A) at the King's Wharf of the harbour of Suva.

Fig. A4.5 Gravity reference station at the Mineral Resources Department (BGI No. 107150) in Suva, Fiji.

A4.3 Gravity data processing

Processing of the gravity data consists essentially of the following steps:

- a time shift of 76 seconds due to the overcritical damping of the sensor,
- conversion of the output from measured voltage to mGal by applying a conversion factor of 4.505 mGal/mV. This was done directly during data acquisition in the DACQS software from BGGS.
- connection of the harbour gravity value to the world gravity net IGSN 71,
- correction for the Eötvös effect using the navigation data,
- subtraction of the normal gravity (GRS80),
- correction for the instrumental drift (performed after completion of the cruise).

As a result, we get the so-called free-air gravity anomaly (FAA) which is in case of marine gravity simply the Eötvös-corrected, observed absolute gravity minus the normal gravity. Gravity values were recorded with a data rate of 1 Hz. This data rate is kept during data processing. The KSS32-M anomalies show short-wavelength oscillations in the order of 1-2 mGal especially while cruising with higher ship velocities (Fig. A4.6). Therefore a median filter with a length of 300 s was applied to the data. Infrequent outliers were removed manually in advance. Additionally, data recorded during sharp turns and rapid speed changes of the vessel show disturbed values and were removed manually. Tracks shorter than about 10 km were also omitted.

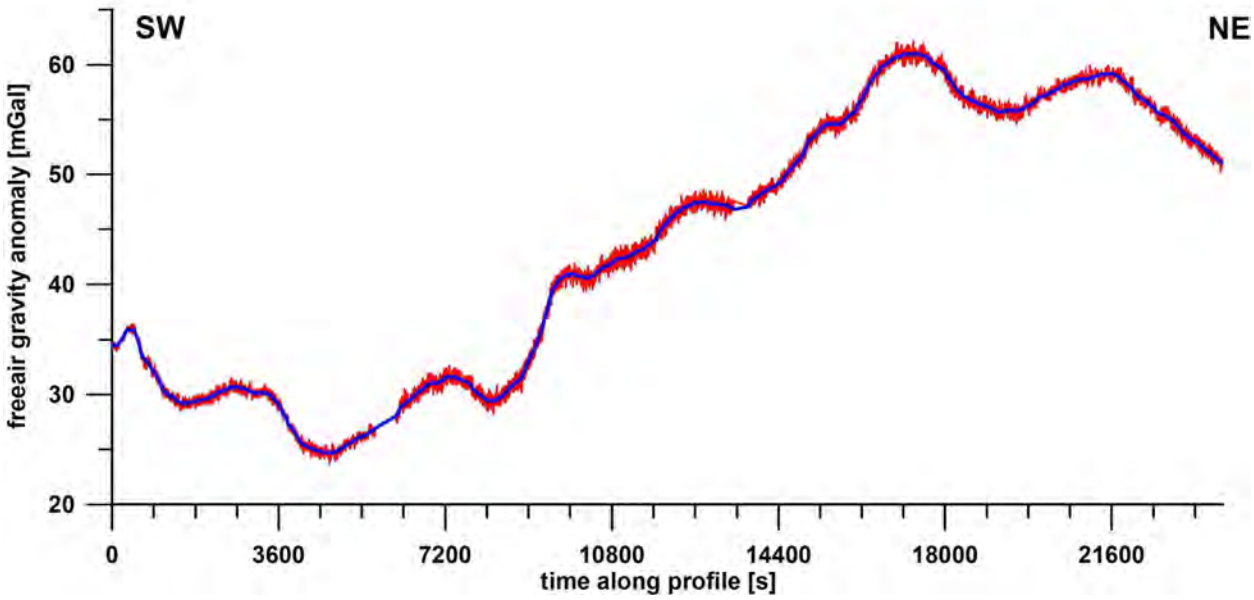

Fig. A4.6 Free-air gravity anomalies along a part of profile BGR18-220 before and after applying a 300 s median filter. The ship's velocity was about 12 kn and the profile directions changed at 5600 s and 14000 s.

A4.4 Data quality

In order to check the accuracy of the data quantitatively, the values along profiles measured repeatedly were compared. During the cruise gravity data along 3 profiles were measured twice. Fig. A4.7 shows exemplary the comparison for profiles BGR18-2R3 and BGR18-203. The analysis showed that the accuracy of the free-air gravity anomalies is better than 1 mGal.

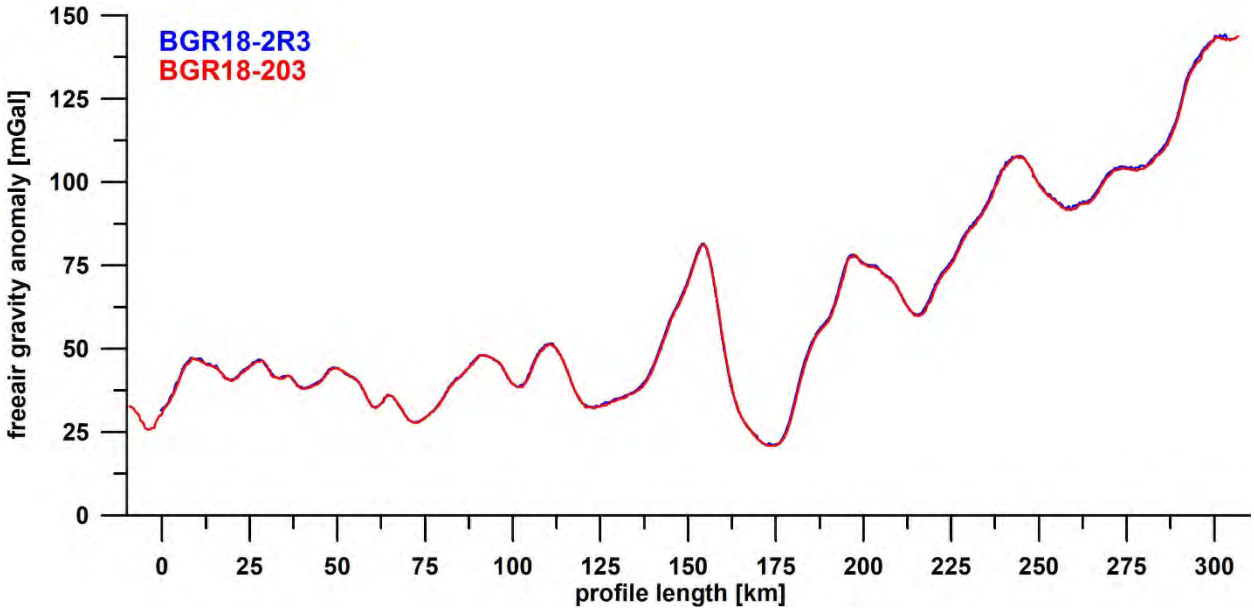

Fig. A4.7 Comparison of free-air gravity anomalies along profiles BGR18-2R3 and -203.

A4.5 Gravity database

Gravity measurements were carried out continuously during the complete cruise. However, the data acquisition started only at the 12.12.2018 (05:00 UTC) when the EEZ of Fiji was clearly left, respectively was stopped entering the EEZ of Fiji. Therefore gravity data along all survey profiles with a length of about 4500 km and along about 1000 km of transit profiles were measured (Figs. A4.8 and A4.9). The details of the survey profiles including the numeration and location are listed in Table A4.2.

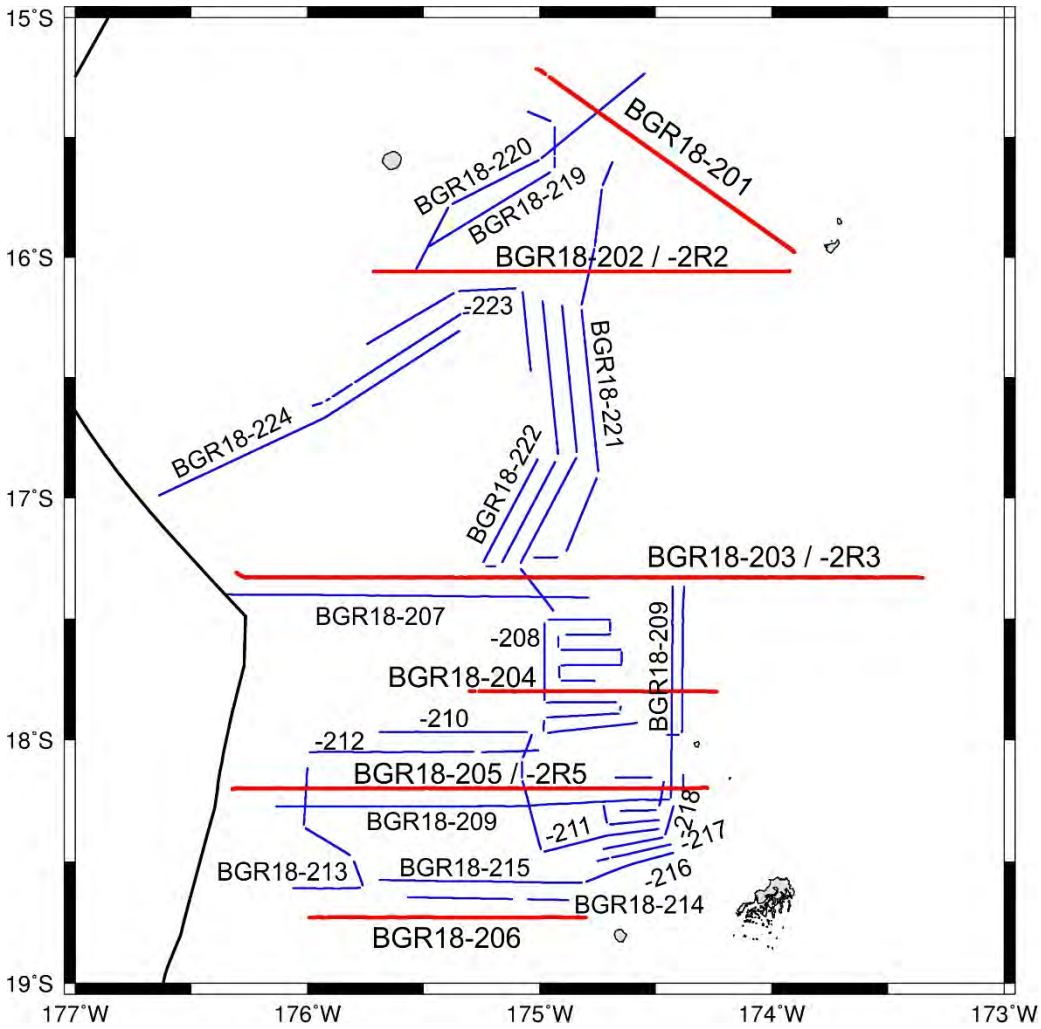

Fig. A4.8 Map of the profiles acquired during cruise SO267 ARCHIMEDES including the numeration. Profiles along which magnetic, gravity and bathymetry data were recorded are marked in blue. Profiles with additional seismic data acquisition in red.

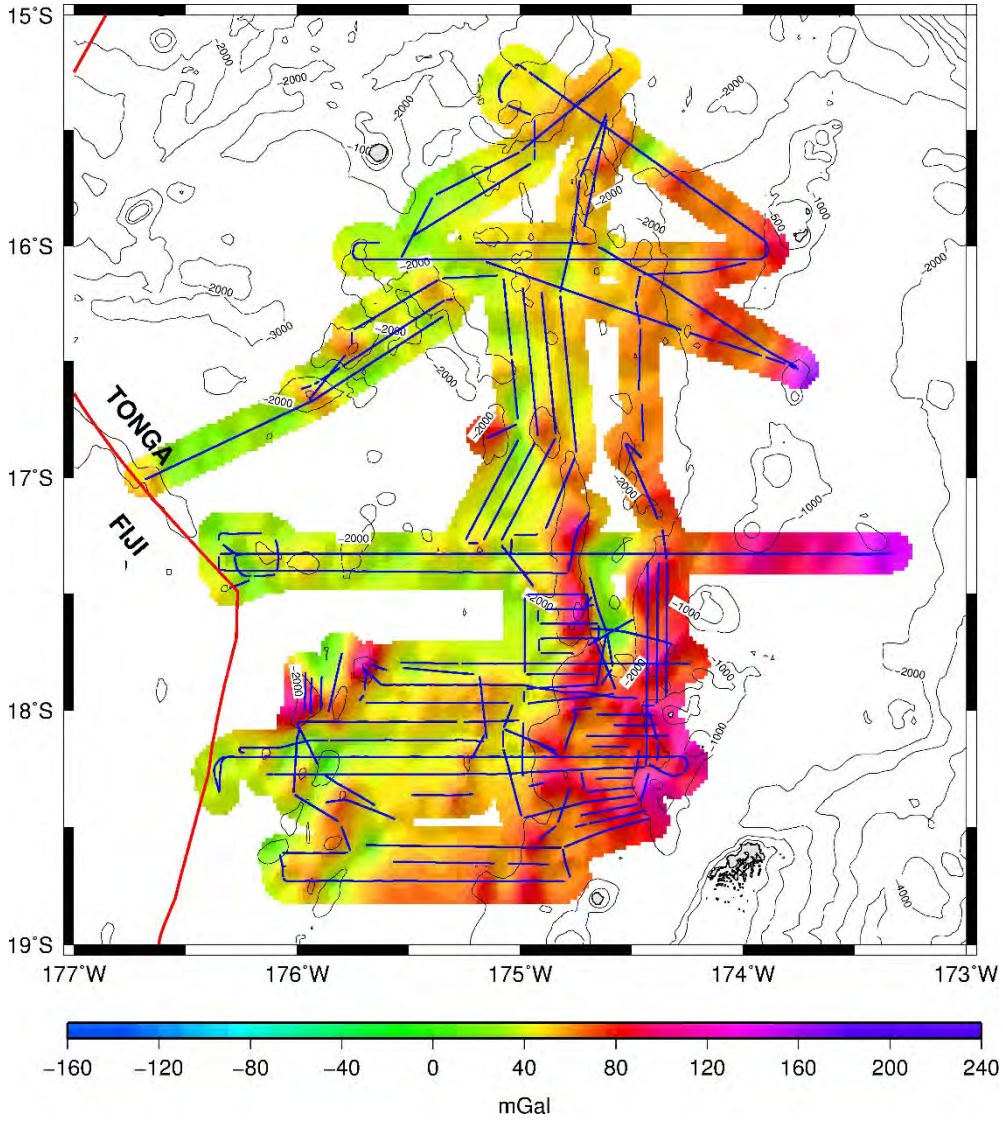

Fig. A4.9 Map of the free-air gravity anomalies acquired during cruise SO267 ARCHIMEDES in the working area in Tongan waters. The map is drawn up to a distance of 10 kilometers from the tracks. The map is based on a 1 x 1 (arc-)minutes grid and is underlain by the bathymetry of Sandwell and Smith (2009, version 18.1).

Table A4.2 Table of the survey profiles acquired during cruise SO-267 ARCHIMEDES.

line number	date	time UTC	latitude	longitude	course	M=magnetics G=gravity B=bathymetry RS=refract. seis MCS=refl. seis.	length (km)
BGR18-2R3	14.12.18	18:50:00	17° 19.886‘ S	173° 21.043‘ W		M,G,B,RS	
	16.12.18	10:40:00	17° 19.992’ S	176° 15.221‘ W	270°		307.87 km
BGR18-203	16.12.18	21:15:00	17° 18.575’ S	176° 18.410’ W		M,G,B,MCS	
	17.12.18	21:15:00	17° 19.830’ S	174° 25.215’ W	90°		200.11 km
BGR18-203	18.12.18	01:50:10	17° 19.809’S	174° 25.215’ W		M,G,B,MCS	
	18.12.18	14:06:00	17° 19.795‘ S	173° 27.258‘ W	90°		102.45 km
BGR18-207	21.12.18	02:23:00	17° 23.925’ S	176° 20.968‘ W		M,G,B	
	21.12.18	13:15:00	17° 24.761‘ S	174° 47.266‘ W	90°		165.57 km
BGR18-208	24.12.18	00:10:00	17° 45.422’ S	174° 45.811’ W		M,G,B	
	24.12.18	21:45:00	17° 55.674’ S	174° 34.408’ W	varia.		304.4 km
BGR18-204	25.12.18	04:40:00	17° 48.051’ S	174° 14.305’ W		M,G,B,MCS	
	25.12.18	19:44:00	17° 47.983’ S	174° 47.938’ W	270°		112.42 km
BGR18-205	27.12.18	05:14:00	18° 11.891’ S	174° 16.603’ W		M,G,B,MCS	
	28.12.18	09:03:00	18° 12.024’ S	176° 18.628’ W	270°		214.65 km
BGR18-2R5	28.12.18	14:50:00	18° 12.245’ S	176° 19.332’ W		G,B,RS	
	29.12.18	16:04:00	18° 11.962’ S	174° 19.949’ W	90°		210.00 km
BGR18-209	30.12.18	23:40:00	18° 26.445’S	176° 8.100’W		M,G,B	
	01.01.19	00:40:00	17° 58.738’S	174° 58.738’W	varia.		369.5 km
BGR18-210	04.01.19	01:08:00	18° 2.547’S	174° 59.452’W		(M),G,B	
	04.01.19	06:53:00	18° 3.038’S	175° 59.375’W	269°		105.50 km
BGR18-211	06.01.19	20:18:00	18° 9.289’S	174° 40.797’W		M,G,B	
	06.01.19	23:58:00	18° 17.567’S	174° 39.070’W	varia.		54.47 km
BGR18-212	07.01.19	09:00:00	18° 16.354’S	174° 43.493’W		M,G,B	
	07.01.19	20:57:00	17° 58.076’S	175° 42.864’W	varia.		109.83 km
BGR18-213	08.01.19	21:06:00	18° 6.994’S	175° 59.947’W		M,G,B	
	09.01.19	02:24:00	18° 36.655’S	176° 3.647’W	varia.		99.1 km
BGR18-206	09.01.19	05:20:00	18° 43.814’S	175° 59.482’W		MCS,M,G,B	
	09.01.19	22:05:00	18° 43.767’S	174° 47.838’W	270°		125.63 km
BGR18-214	10.01.19	02:03:00	18° 39.403’S	174° 51.922’W		M,G,B	
	10.01.19	06:28:00	18° 38.863’S	175° 34.381’W	271°		74.50 km
BGR18-215	10.01.19	14:56:00	18° 34.429’S	175° 41.751’W		M,G,B	
	10.01.19	19:06:00	18° 35.285’S	174° 49.132’W	91°		92.37 km

line number	date	time UTC	latitude	longitude	course	M=magnetics G=gravity B=bathymetry RS=refract. seis MCS=refl. seis.	length (km)
BGR18-216	10.01.19	19:08:00	18° 35.263'S	174° 48.723'W		M,G,B	
	10.01.19	21:14:00	18° 27.481'S	174° 24.789'W	71°		44.43 km
BGR18-217	10.01.19	21:24:00	18° 25.694'S	174° 24.878'W		M,G;B	
	10.01.19	23:05:00	18° 29.948'S	174° 45.320'W	258°		36.76 km
BGR18-218	10.01.19	23:22:00	18° 27.350'S	174° 44.604'W		M,G,B	
	11.01.19	02:21:00	18° 8.097'S	174° 22.917'W	varia.		61.7 km
BGR18-202	13.01.19	05:51:00	16° 3.585'S	175° 42.884'W	90°	MCS,M,G,B	
	14.01.19	06:22:00	16° 3.542'S	173° 55.413'W			191.23 km
BGR18-201	14.01.19	07:46:54	15° 58.834'S	173° 54.099'W	305°	MCS,M,G,B	
	15.01.19	02:35:00	15° 12.952'S	175° 0.757'W			146.12 km
BGR18-219	15.01.19	06:07:00	15° 23.626'S	175° 3.029'W	varia.	M,G,B	
	15.01.19	10:51:00	15° 57.275'S	175° 28.499'W			102.4 km
BGR18-2R2	16.01.19	00:07:00	16° 3.609'S	175° 38.226'W	90°	RS,M,G,B	
	16.01.19	21:44:00	16° 3.615'S	173° 56.431'W			181.13 km
BGR18-220	17.01.19	22:47:00	16° 2.861'S	175° 31.847'W	49°	M,G,B	
	18.01.19	05:30:00	15° 13.708'S	174° 32.441'W			139.7 km
BGR18-221	19.01.19	20:00:15	15° 36.247'S	174° 41.208'W	varia.	M,G,B	
	20.01.19	05:25:15	17° 14.930'S	175° 2.065'W			202.4 km
BGR18-2CAL	22.01.19	05:19:30	17° 29.585'S	174° 55.165'W	varia.	M,G,B	
	22.01.19	05:56:00	17° 28.045'S	174° 56.505'W			9 km
BGR18-222	22.01.19	05:56:01	17° 28.042'S	174° 56.506'W	varia.	M,G,B	
	22.01.19	22:17:00	16° 50.597'S	175° 0.616'W			356.5 km
BGR18-223	23.01.19	12:17:00	16° 29.975'S	175° 2.482'W	varia.	M,G,B	
	23.01.19	17:37:00	16° 21.907'S	175° 44.919'W			120 km
BGR18-224	24.01.19	03:40:00	16° 37.362'S	175° 58.864'W	varia.	M,G,B	
	24.01.19	15:31:30	16° 59.449'S	176° 38.344'W			256.5 km
						Total length	4496.21 km
						Magnetics	4196.31 km

A4.6 Comparison with gravity anomalies derived from satellite altimetry

The analysis of crossover errors of numerous research cruises shows that our gravity measurements are far more precise than alternate methods to measure the marine gravity field such as the calculation of free-air gravity anomalies from satellite altimeter measurements. A satellite altimeter uses a pulse-limited radar to measure the altitude of the satellite above the closest point to the sea surface. Global precise tracking coupled with dynamic orbit calculations provide an independent measurement of the height of the satellite above the ellipsoid. The difference between these two measurements is equal to the geoid height. In marine areas the free-air anomaly can be calculated from the slope of the geoid. Closely spaced satellite altimeter profiles collected during the GEOSAT Geodetic Mission (~ 6 km) and the ERS 1 Geodetic phase (~ 8 km) were used by different groups to calculate grids of the free-air gravity anomalies. Our data set can serve as a reference for the comparison of two different satellite gravity data compilations. The first is the one from Sandwell and Smith (2009), version 24.1, referred to as SDW24.1 in the following. The second data set is from the DTU Space Center, Copenhagen (Andersen, 2010) referred to as DTU13 here. Subtracting the 1 x 1 minute grid of the SDW24.1 and DTU13 data from the 1 x 1 minute grid of the shipboard data one obtains the maps of the differences in the working area shown in Figure A4.10. The maps are masked beyond a distance of 2 kilometers from the ship track. The differences of both datasets range between +16 and -16 mGal, but the differences are below ±6 mGal along most tracks. There is no pronounced areal distribution of the differences.

Satellite gravity anomalies along the complete track were additionally calculated with bicubic interpolation out of the 1 x 1 minute grids and subtracted from the shipboard data (Fig. A4.11). The mean differences of the DTU13 and SDW24.1 data are similar (-2.28 mGal vs. –2.18 mGal). However, the standard deviation is lower for the SDW24.1 data (3.88 mGal vs. 3.35 mGal). The offset of about 2 mGal might result from the inaccuracy of the absolute gravity value of the reference gravity station in Suva. But as we had only one reference gravity station this offset has to be accepted.

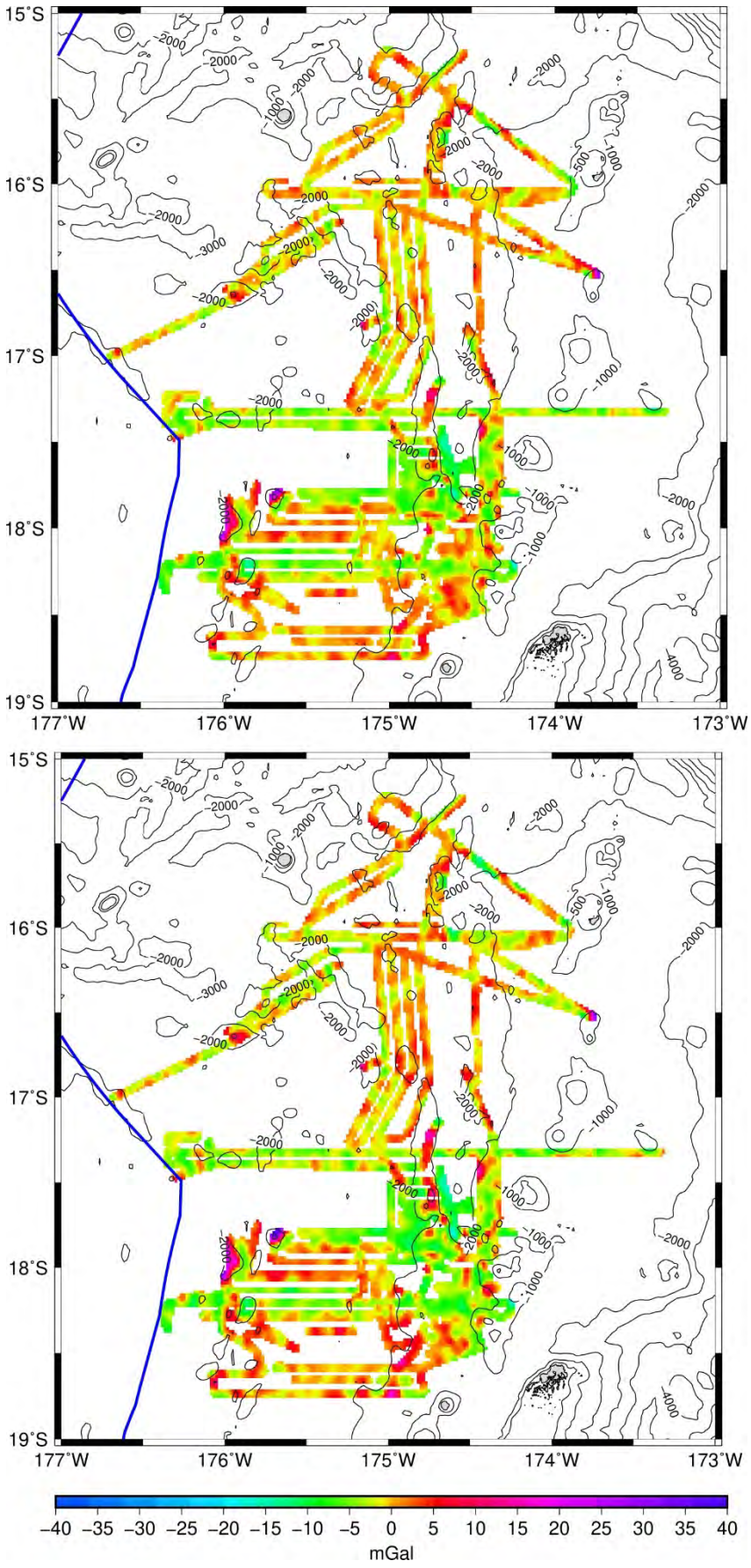

Fig. A4.10 Differences of the shipboard free-air gravity data and the gravity datasets derived from satellite altimetry (above: SDW24.1 Sandwell and Smith (2009), version 24.1.; below: DTU13, Andersen (2010)). The maps are underlain by the bathymetry of Sandwell and Smith (2009).

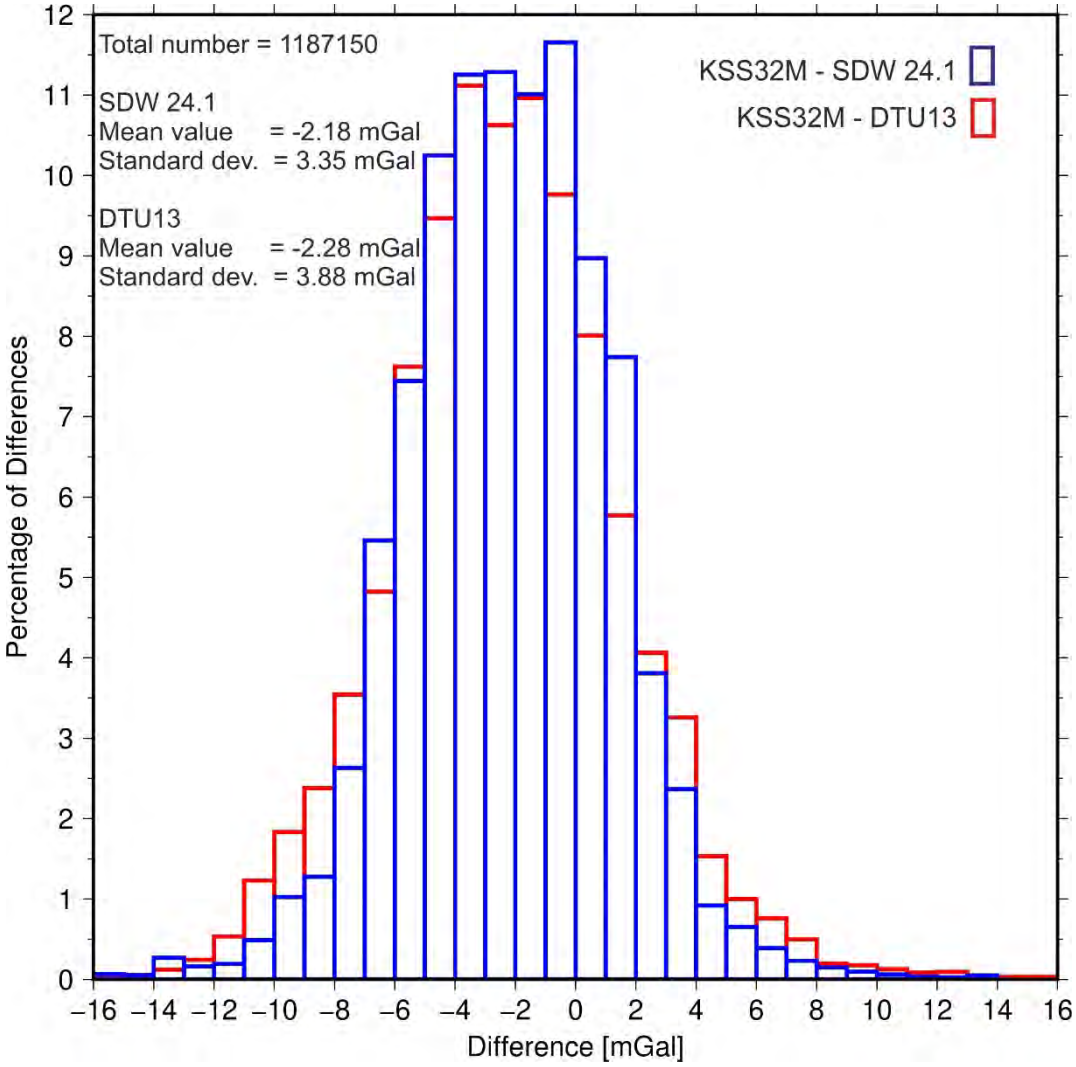

Fig. A4.11 Histogram of differences between shipboard KSS32-M free-air gravity anomalies and the corresponding gravity datasets derived from satellite altimetry.

To illustrate the differences between the data sets in detail, Figure A4.12 shows exemplary comparison along profiles BGR18-203. the wavelength range of satellite and shipboard anomalies is comparable whereby the shipboard data show higher amplitudes in the wavelength range below 20 km and with waterdepth below 1200 m. This demonstrates the limits in the resolution of the satellite derived datasets.

One can conclude that the free-air gravity anomalies derived from satellite altimetry are of great importance to get an overview of the gravity field in an oceanic area. For detailed investigations shipboard gravity measurements are indispensable.

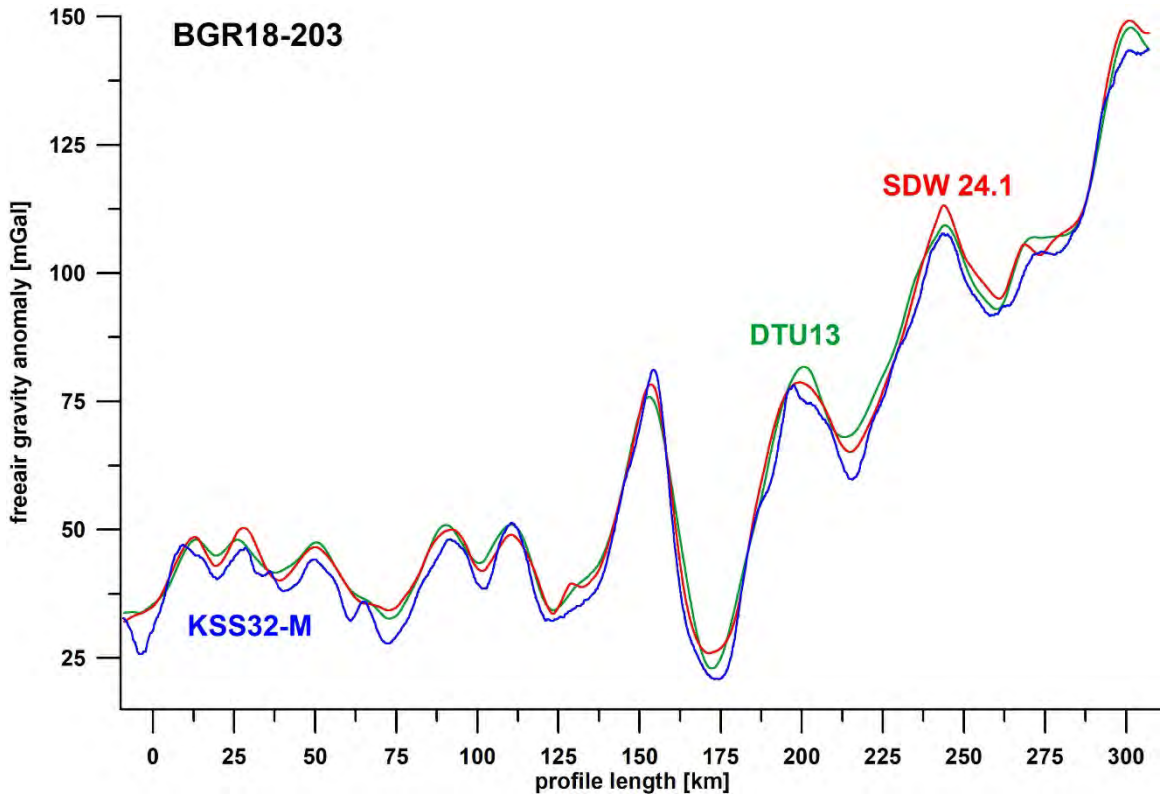

Fig. A4.12 Comparison of the ship-based KSS32-M and DTU13 and SDW24.1 satellite free-air gravity anomalies along profiles BGR18-203.

A4.7 Gravity anomaly maps

The map of the free-air gravity anomalies measured during SO-267 is shown in Fig. A4.13. The map is drawn up to a distance of 10 kilometers from the ship's track along which usable data were acquired.

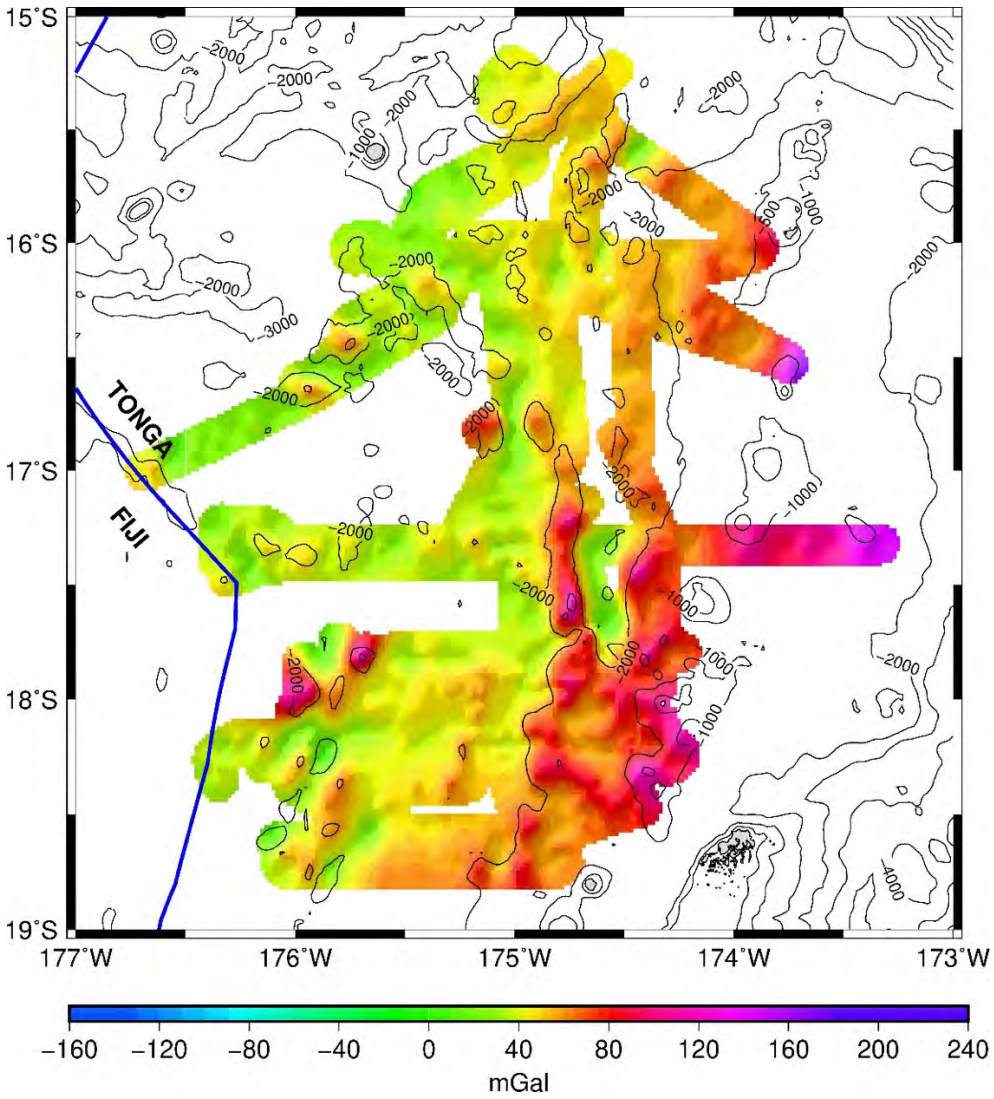

Fig. A4.13 Map of the free-air gravity anomalies acquired during cruise SO-267. The map is drawn up to a distance of 10 kilometers from the tracks. The map is based on a 1 x 1 (arc-)minutes grid and is underlain by the bathymetry of Sandwell and Smith (2009, version 18.1).

Combined free-air gravity anomaly map

In order to get a comprehensive idea of the gravity field in the survey area the SDW24.1 gravity data were included in areas with no shipboard data to get a complete overview of the gravity anomalies. The resulting free-air gravity anomaly map is shown in Figure A4.14. The anomalies of the combined free-air gravity anomaly map in the survey area range from -120 mGal in the Tonga Trench to +240 mGal around the island of Vava'u on the Tonga Ridge. The anomalies along the SO-267 profiles range from 0 mGal to +160 mGal on the Tofua Volcanic Arc at the Eastern end of BGR18-203. Westward the southern part of the Fonualei Rift and Spreading Center (FRSC) is characterized by a NS trending gravity minima zone. The northward continuation of the FRSC can be followed by narrow less distinct gravity minima zones. In the North the run of the FRSC is more prominently marked by a minimum. The Mangatolo Triple Junction (MTJ) is characterized by less pronounced gravity minima. In the Southwest, however, the run of the Central Lau Spreading Center (CLSC) and its parallel rift basins is marked by distinct elongated gravity minima. Elevated ridges and volcanic edifices are characterized by positive gravity anomalies.

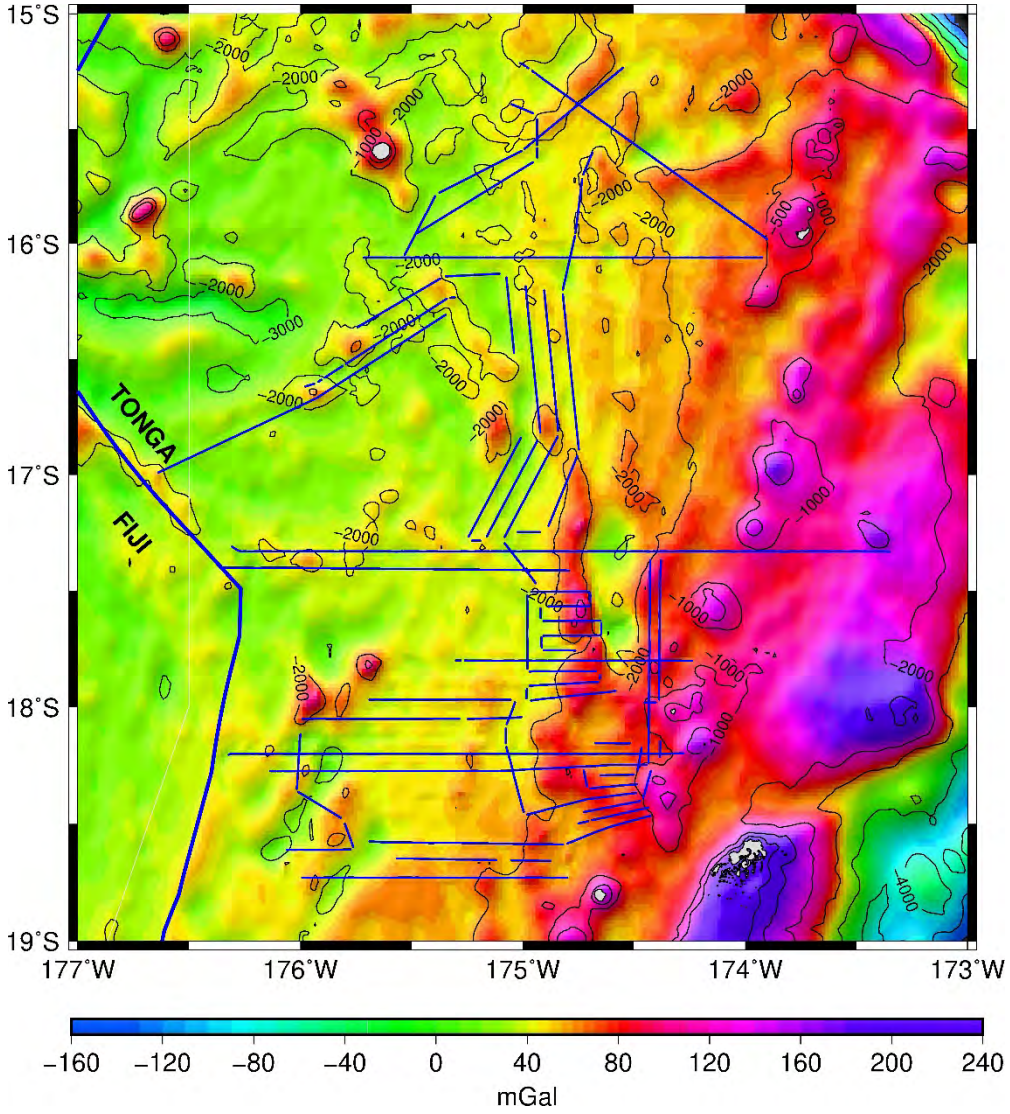

Fig. A4.14 Map of the free-air gravity anomalies. The underlying gravity grid was compiled by merging shipboard gravity observations and SDW24.1 gravity data derived from satellite altimetry. The map is based on a 1 x 1 (arc-) minutes grid and is underlain by the bathymetry of Sandwell and Smith (2009, version 18.1).

Bouguer gravity anomaly maps

The map of the Bouguer gravity anomalies of the SO-267 data is shown in Fig. A4.15. The water depth values were taken from the ship's echo sounding system after the onboard processing by the bathymetry group. The reduction density was 1.64 g/cm³ and an infinite horizontal slab was assumed. A topographic reduction was not performed.

A combined Bouguer gravity anomaly map was prepared for the survey area. The underlying grid of gravity was compiled by merging the shipboard gravity observations and SDW24.1 gravity data derived from satellite altimetry. The water depth values were taken from the ship's echo sounding system and from the global bathymetry data set (Sandwell and Smith, 2009, version 18.1) when shipborne data were not available. The reduction density was 1.64 g/cm³ and an infinite horizontal slab was assumed. A topographic reduction was not performed. Figure A4.16 shows the map of the Bouguer gravity anomalies together with the bathymetry.

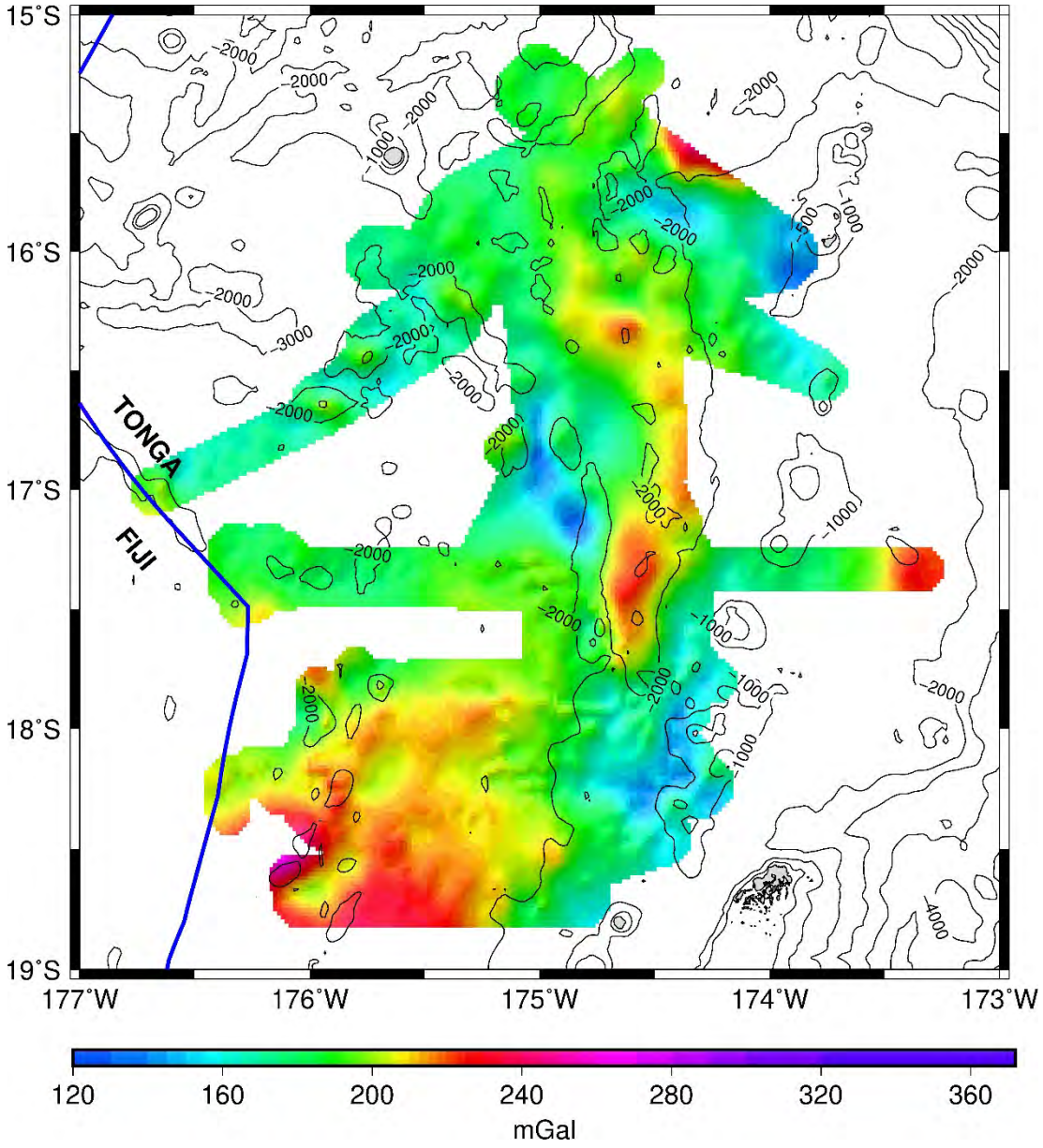

Fig. A4.15 Map of Bouguer gravity anomalies acquired during cruise SO-267. The reduction density was 1.64 g/cm³. Terrain corrections were not applied. The map is drawn up to a distance of 10 kilometers from the tracks. The map is based on a 1 x 1 (arc-)minutes grid and is underlain by the bathymetry of Sandwell and Smith (2009, version 18.1).

The anomalies in the survey area range from +130 mGal at areas on the Tofua Volcanic Arc to +340 mGal East of the island of Vava'u on the Tonga Ridge. The anomalies along the SO-267 profiles range from +140 mGal to +260 mGal at the ridge bordering the southern FRSC towards West. Whereas the anomaly amplitudes are rather low in the northern part of the working area, the southwest part is characterized by more distinct anomalies.

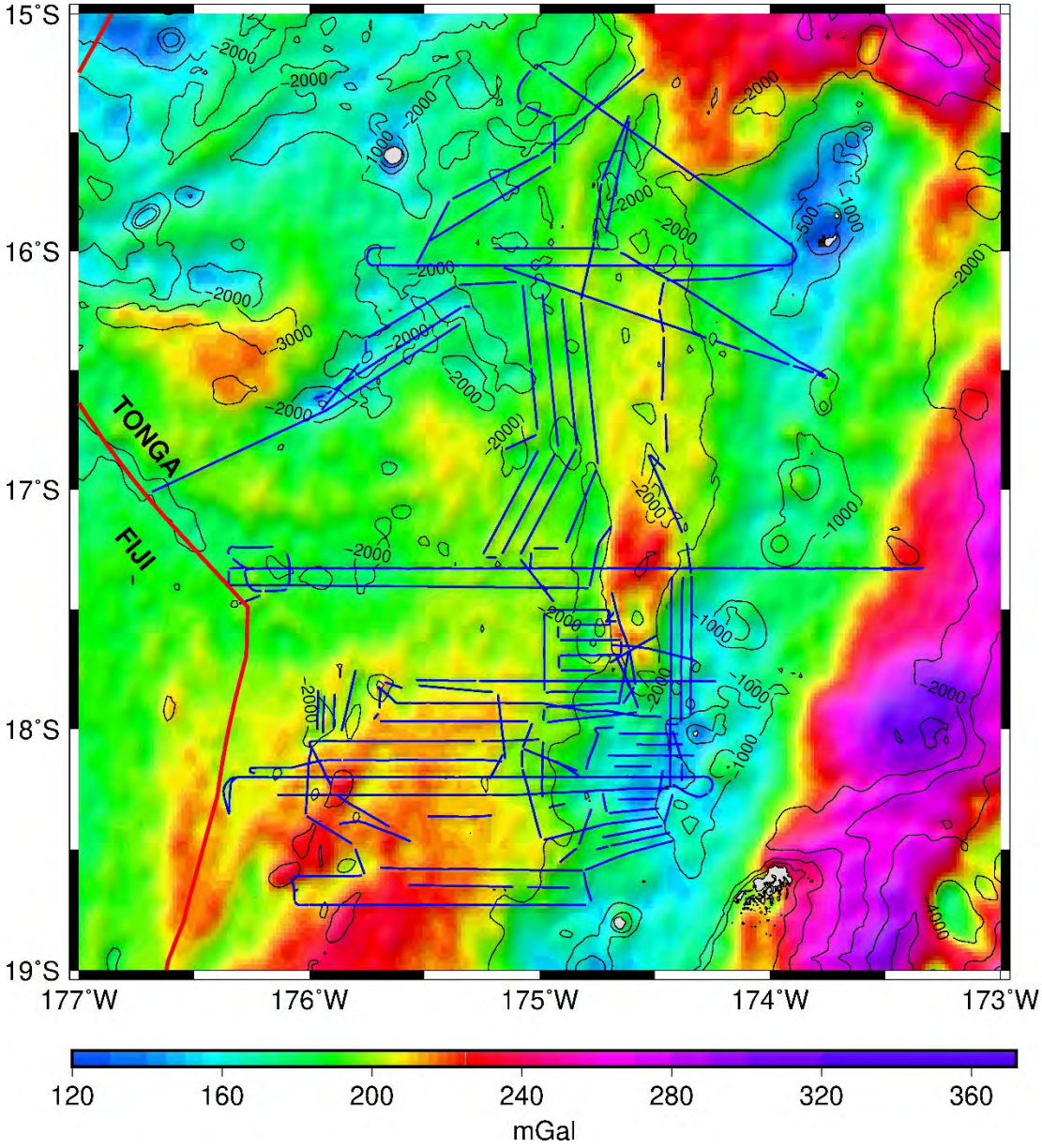

Fig. A4.16 Map of Bouguer gravity anomalies. The underlying gravity grid was compiled by merging shipboard gravity observations and SDW24.1 gravity data derived from satellite altimetry. The map is based on a 1 x 1 (arc-)minutes grid and is underlain by the bathymetry of Sandwell and Smith (2009, version 18.1). The reduction density was 1.64 g/cm³. Terrain corrections were not applied.

A4.8 Interpretation by forward modelling

The mostly elongated structure of the free-air gravity anomalies in N-S direction in the working area suggests that the forward modeling of the free-air anomalies can be carried out as a two-dimensionally. 2D density models represent first approaches to explain the observed free-air gravity anomalies. 2D forward modeling of the free-air gravity anomalies was carried out with the software GM-SYS (Northwest Geophysical Associates, Inc.). The corresponding results of the seismic interpretation (either MCS data or refraction data or both) were of course taken into account. The created velocity-depth models from the refraction seismics can be used directly for the gravity modeling to constrain the geometry of boundaries. Furthermore, the velocities can be converted to density with density-velocity relations such as the extended Nafe and Drake relation

(Ludwig et. al., 1970). The 2D models will be revised continuously with updated velocity models and MCS interpretation. They form thethe basis of a comprehensive 3D density model which will be developed subsequently.

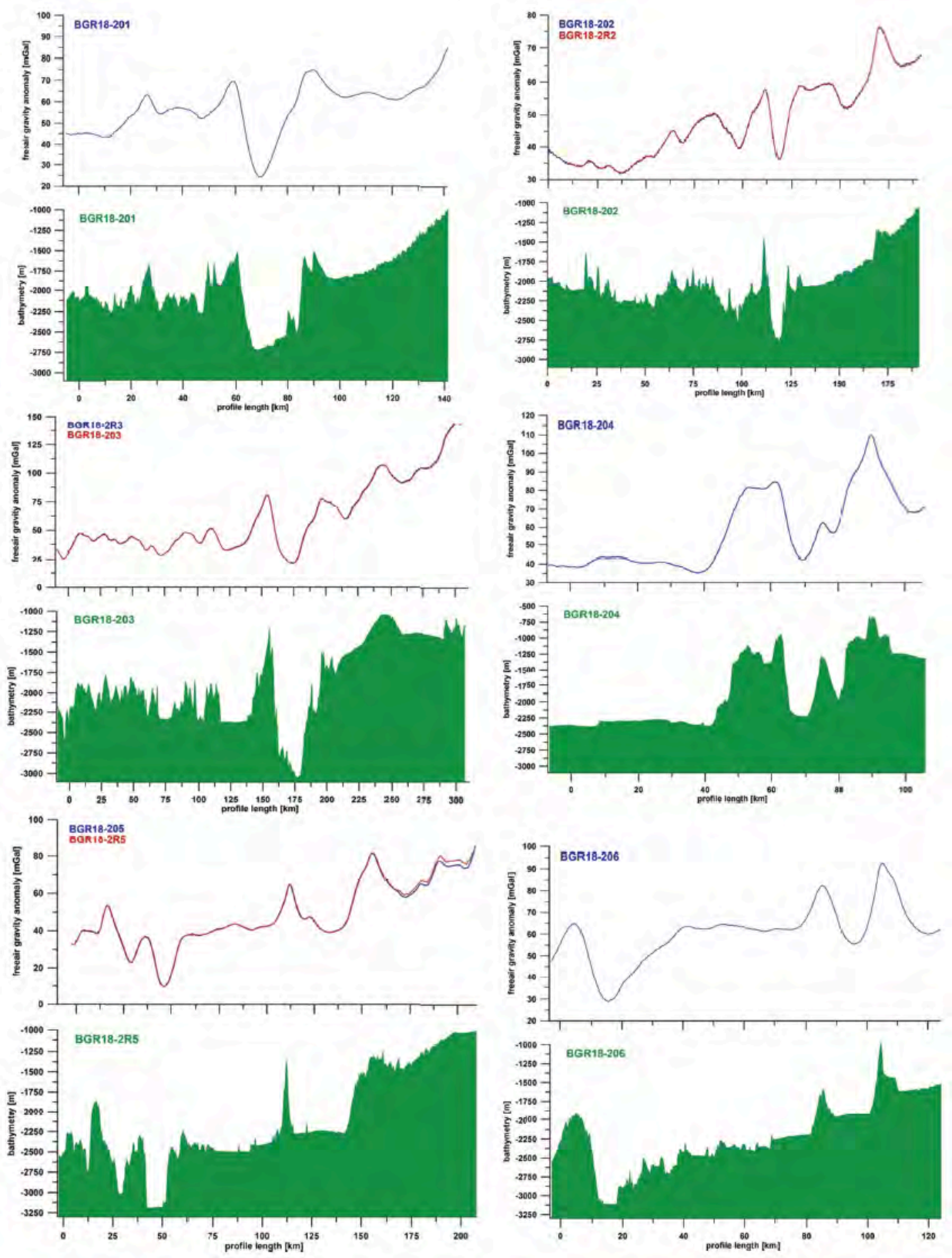

Fig. A4.17 Summary of free-air gravity anomalies along seismic profiles.

References

Andersen, O. B., Knudsen, P., Kenyon, S., & Holmes, S., 2014: Global and arctic marine gravity field from recent satellite altimetry (DTU13). In 76th European Association of Geoscientists and Engineers Conference and Exhibition 2014: Experience the Energy - Incorporating SPE EUROPEC 2014 (pp. 3049–3053).

Ludwig, J.W., Nafe, J.E., and Drake, C.L., 1970: Seismic refraction, in: A.E. Maxwell (Eds.), The Sea, Vol. 4, 53-84, Wiley, New York.

Morelli, C., 1974: The International Standardization Net 1971, International Association of Geodesy Special Publication 4, 194.

Sandwell, D. T., and W. H. F. Smith, 2009: Global marine gravity from retracked Geosat and ERS-1 altimetry: Ridge segmentation versus spreading rate, J. Geophys. Res., 114, B01411

Appendix 5: PARASOUND Sub-Bottom Profiler

(M. Riedel)

The hull-mounted ATLAS PARASOUND P70 system is a deep-sea parametric sub-bottom profiler which utilizes the parametric effect based on a non-linear relation of pressure and density during sonar propagation. Two different waves with frequencies of ~18-20 kHz (primary high frequency, PHF) and a ~22-24 kHz wave were used to create a so-called secondary high (about 40-42 kHz, SHF) and a secondary low frequency (SLF) of about 4 kHz. While the SLF is used for the sub-bottom profiling, the PHF signal can be recorded synchronously to image potential gas bubbles, plankton, fishes or nepheloid layers in the water column. The opening angle of the transducer array is 4° by 5°, which corresponds to a footprint size of about 7 % of the water depth. The ATLAS PARASTORE program is used for storing and displaying echograms, while the program ATLAS Hydromap Control (AHC) is used to set proper hydroacoustic settings during acquisition. During PARASOUND operations, data of the entire water column and sub-bottom are recorded and stored as vendor-specified *.asd files. Along with the raw files, so-called *.ps3 and auxiliary data files were recorded for a user-specified depth window. Water depth is hereby calculated from acoustic travel times using a constant sound speed of water of 1500 m/s. The obtained data (using the raw *.asd format) were replayed in PARASTORE, thereby defining a 500 m recording length and a over-sample ratio of 2 from the original raw data to improve signal quality for post-processing. The data were stored with amplitude and phase information in the more portable *.segy format, with ship's navigation stored in the SEGY-header words (X-coordinate: byte 73-76, Y-coordinate: byte 77-80, using a multiplier of 100). The UTM Coordinate system zone 1S was used to convert from Latitude/Longitude (degrees) to UTM (meters). After conversion to *.segy, the data were loaded into a KINGDOM™ Project for post-processing to instantaneous amplitude (also called envelope) and interpretation.

Appendix 6: AUV ABYSS Operations and Station Reports

(M. Rothenbeck, T. Kurbjuhn, N. Diller)

A6.1 AUV ABYSS Methods

The Autonomous Underwater Vehicle (AUV) Abyss (built by HYDROID Inc.) from GEOMAR can be operated in water depths up to 6000 m. The system comprises the AUV itself, a control and workshop container, and a mobile Launch and Recovery System (LARS) with a deployment frame that was installed at the afterdeck of RV SONNE. The self-contained LARS was developed by WHOI to support ship-based operations so that no Zodiac or crane is required for launch and recovery. The LARS is mounted on steel plates, which are screwed to the deck of the ship. The LARS is configured in a way that the AUV can be deployed over the stern or port/starboard side of the German medium and ocean-going research vessels. The AUV Abyss can be launched and recovered at weather conditions with a swell up to 2.5 m and wind speeds of up to 6 Beaufort. For the recovery the nose float pops off when triggered through an acoustic command. The float and the ca. 17 m recovery line drift away from the vehicle so that a grapnel hook can snag the line. The line is then connected to the LARS winch, and the vehicle is pulled up. Finally, the AUV is brought up on deck and secured in the LARS. The AUV missions were planned based on ships bathymetry.

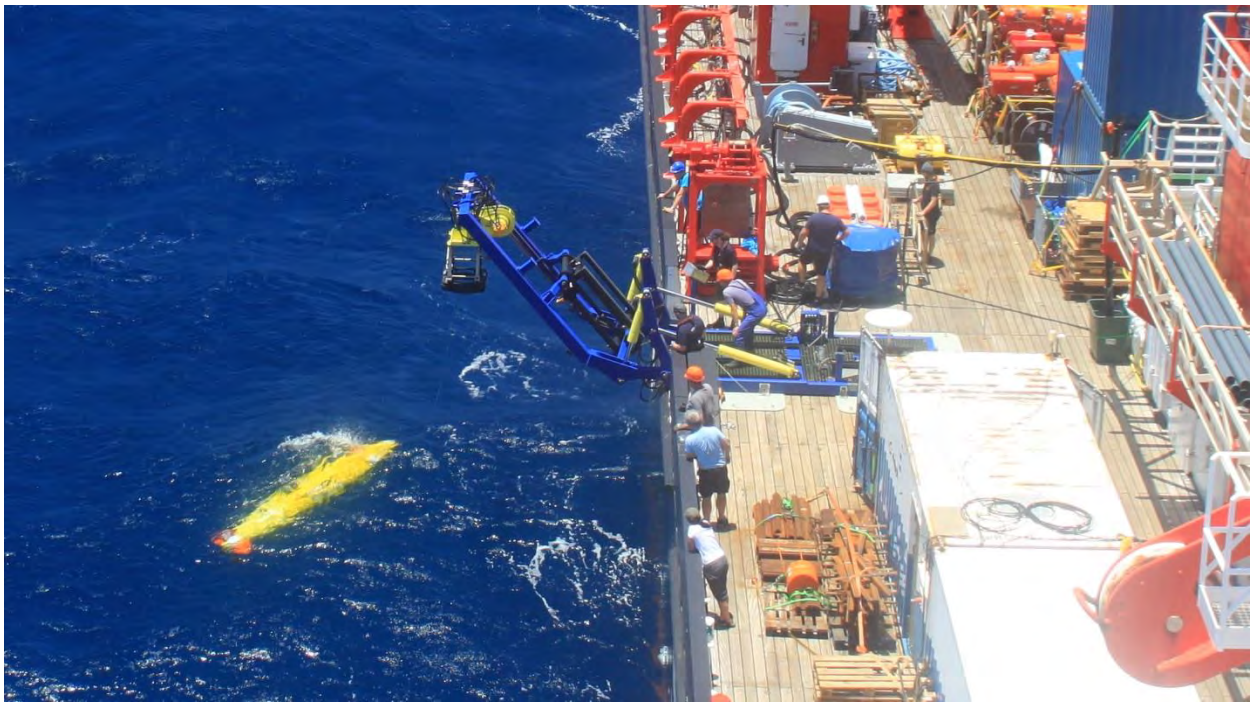

Fig. A6.1 AUV Set-Up on deck 3 of RV SONNE (credit: Florian Schmid)

The AUV ABYSS was equipped with an Edgtech sidescan sonar 2200-S 120/410 kHz, a turbidity sensor (WetLabs ECO FLNTU Fluorometer and Turbidity sensor; S/N FLNTURTD-939), the REDOX potential sensor (by Ko-ichi Nakamura), the CTD (Seabird SBE49 FastCAT; S/N 4948793-0168), an APS magnetometer and four Self Potential Probes.

A6.2 AUV ABYSS Sensors

Vendor	Edgetech
Typ	2200-M
Last calibration	September 2017
Exported data	.jsf
Unit	-
Frequency	120kHz & 410 kHz

Tab. 1 Sidescan Sonar

Vendor	RDI Teledyne
Typ	Model WHN300 S/N
Serial number	11436
Last calibration	
Exported data contains	• Latitude (degrees) • Longitude (degrees) • Altitude (meters) • Depth (meters) • Forward velocity over the bottom (meters/sec) • Starboard velocity over the bottom (meters/sec) • Error velocity • Temperature (degrees C) • Ensemble number • Heading (in degrees) • Stbd water velocity in mm/sec • Forward water velocity in mm/sec • Water velocity away from the transducer face (mm/sec) • Coordinate transform mode. The MSB (0x80) of this value indicates whether the water velocities are from the upward (set) or downward (cleared) looking beams.
Sample rate	-

Tab. 2 DVL (Doppler Velocity Log)

Vendor	Seabird
Typ	SBE 49 FastCAT
Serial number-[CTD1] or [CTD2]	4955482-[0198] or [0168]
Last calibration	03.07.2017
Exported data contains	latitude, longitude, mission_time, depth, conductivity, temperature, salinity, sound_speed
Unit	[deg],[deg],[HH.MM.SS.F],[m],[S/m],[°C],[psu],[m/s]
Sample rate	4Hz

Tab. 3 CTD-Sensor

Vendor	Wetlabs
Typ	FLNTU / 0712017
Serial number	FLNTURTD-939
Last calibration	-
Exported data contains	latitude, longitude, mission_time, depth, version, chl_ref(lambda), chl_sig, chlorophyll_a, turbidity_ref, turbidity_raw, turbidity
Unit	[deg],[deg],[HH.MM.SS.F],[m],[],[nm],[count],[µg/l],[nm],[count],[NTU]
Sample rate	1Hz

Tab. 4 ECO Sensor

Vendor	Advanced Industrial Science and Technology (AIST) / Ko.Ichi NAKAMURA
Typ	EH-Sensor
Serial number	VC15-006
Last calibration	October 2017
Exported data contains	latitude, longitude, mission_time, depth, REDOX,
Unit	[deg],[deg],[HH.MM.SS.F],[m],[mV]
Sample rate	1Hz

Tab. 5 REDOX Sensor

Vendor	Paroscintific
Typ	Digiquartz Intelligent Depth Sensor
Model	8BT7000-I
Range	7000m
PN	1537-001-0
Serial number	109773
Last calibration	-
Exported data contains	
Unit	
Sample rate	1Hz

Tab. 6 Pressure Sensor

The following three tables belong to the Magnetometer-self-potential-Set

Magnetometer	
Vendor	Applied Physics Systems
Typ	1540
Serial number	0685/0686
Last calibration	-
Exported data contains	Time, X, Y ,Z, Temp
Unit	[sec s. 1.1.1970],[Gauss],[Gauss],[Gauss],[°C]
Sample rate	1Hz

Tab. 7 Magnetometer

Self-potential Electrode	
Vendor	Silvion
Typ	TYPE CCS1 - PORT PORTABLE SEAWATER REFERENCE ELECTRODE

Tab. 8 Self-potential probes

Datalogger Magnetometer / Self-potential	
Vendor	Magson
Typ	CSEM / Self-potential Logger
Serial number	122
Last calibration	-
Exported data contains	Time, E-Field1, E-Field2, E-Field3,Magnetometer,
Unit	[sec s. 1.1.1970],[µV],[µV],[µV],[see Magnetometer Table]
Sample rate	1Hz
Notes	Data output is binary and has to be converted to the desired files

Tab. 9 Magson Data Logger

A6.3 AUV ABYSS Dive Data Sheets

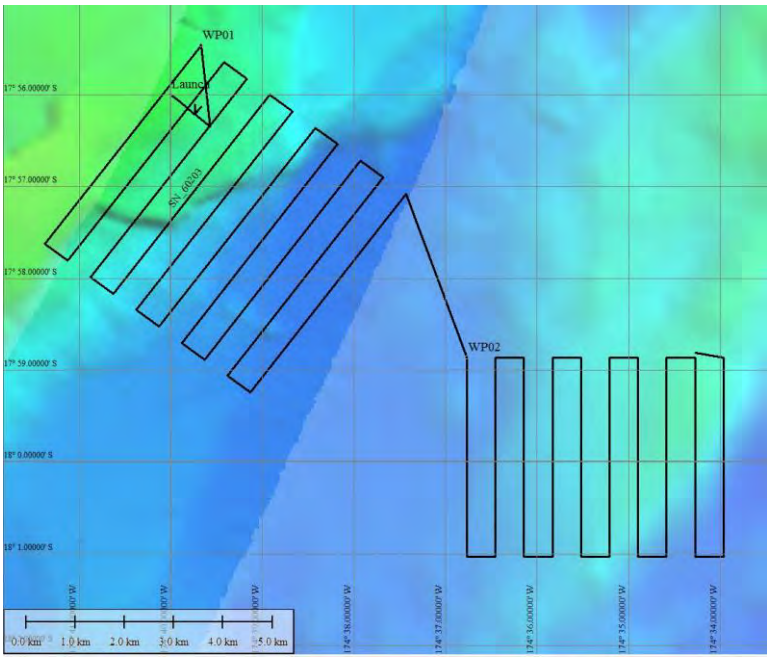

Fig. 1 Dive ABYSS0308

Cruise: SO267-24-1		**Dive: Abyss0308**		Datum: 22.12.2018	
Times UTC					
Launch 04:08	Mission Start 04:15	Survey Start 04:59	Survey Finished 23:33	Mission Finished 00:04	Recovery 03:57
Mission Statistics					
Main Sensor: Sidescan 120kHz	Line Spacing 5000/550m 4000/550m	Altitude 70m	Survey Depth 1070-1525m	Distance Travelled 110.89km	
Sensors					
Edgetech 2200-S Sidescan 120kHz		Total raw files 114 files (.jsf)/6.28GB		Areal Coverage 56.43km²	
Eh/REDOX Sensor		Total raw files 1 file/4.7MB		File name: Abyss0308_REDOX.txt	
Comments: - Sensor data positions are not shifted to the corrected vehicle track					
SeaBird SBE49 FastCAT CTD S/N: 4948793-0168		Total raw files 1 file/28.4MB		File name: Abyss0308_CTD.txt	
Comments: - Sensor data positions are not shifted to the corrected vehicle track					
Wetlabs ECO FLNTU S/N: FLNTURTD-939		Total raw files 1 file/5.4MB		File name: Abyss0308_ECO.txt	
Comments: - Sensor data positions are not shifted to the corrected vehicle track					
Magnetometer APS-1540 Self-potential Sensor		Total raw files 324 files (.B122)/12.9GB		File name: Abyss0308_Magnetometer.txt Abyss0308_SP.txt	
Comments: - Combined binary files include magnetometer and self-potential data - only self-potential data recorded for this dive, no magnetometer data					
Mission comments					
- No Transponders (Bottom lock at surface) - Bottom following					

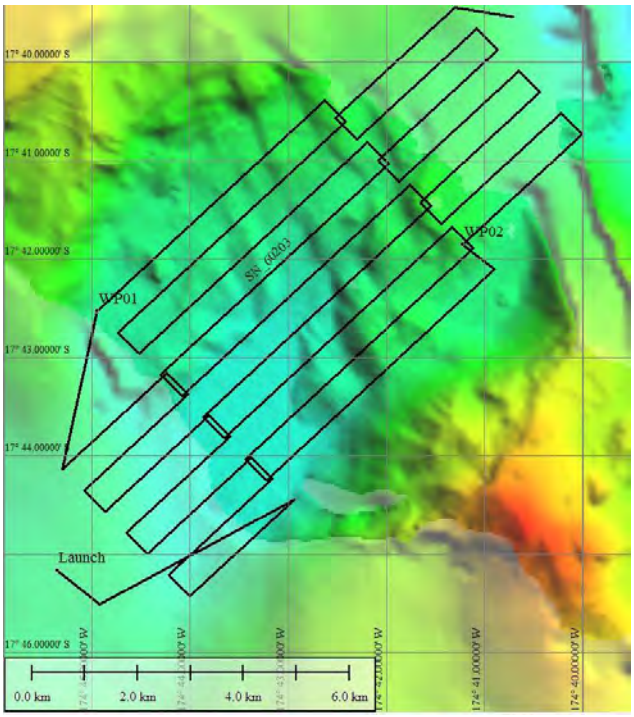

Fig. 2 Dive ABYSS0309

Cruise: SO267-38-1		Dive: Abyss0309		Datum: 23.12.2018	
Times UTC					
Launch 23:51	Mission Start 23:53	Survey Start 01:05	Survey Finished 20:14	Mission Finished 20:52	Recovery 23:53
Mission Statistics					
Main Sensor: Sidescan 120kHz	Line Spacing 2600/550m 5700/550m 3000/550m	Altitude 80m	Survey Depth 1600-2200m	Distance Travelled 116.50km	
Sensors					
Edgetech 2200-S Sidescan 120kHz		Total raw files 120 files (.jsf)/6.55GB		Areal Coverage 56.29km²	
Eh/REDOX Sensor		Total raw files 1 file/4.4MB		File name: Abyss0309_REDOX.txt	
Comments: - Sensor data positions are not shifted to the corrected vehicle track					
SeaBird SBE49 FastCAT CTD S/N: 4948793-0168		Total raw files 1 file/30MB		File name: Abyss0309_CTD.txt	
Comments: - Sensor data positions are not shifted to the corrected vehicle track					
Wetlabs ECO FLNTU S/N: FLNTURTD-939		Total raw files 1 file/4.9MB		File name: Abyss0309_ECO.txt	
Comments: - Sensor data positions are not shifted to the corrected vehicle track					
Magnetometer APS-1540 Self-potential Sensor		Total raw files 317 files (.B122)/12.7GB		File name: Abyss0309_Magnetometer.txt Abyss0309_SP.txt	
Comments: - Combined binary files include magnetometer and self-potential data - only self-potential data recorded for this dive, no Magnetometer Data					
Mission comments					
- No Transponders (Bottom lock at surface); - Bottom following					

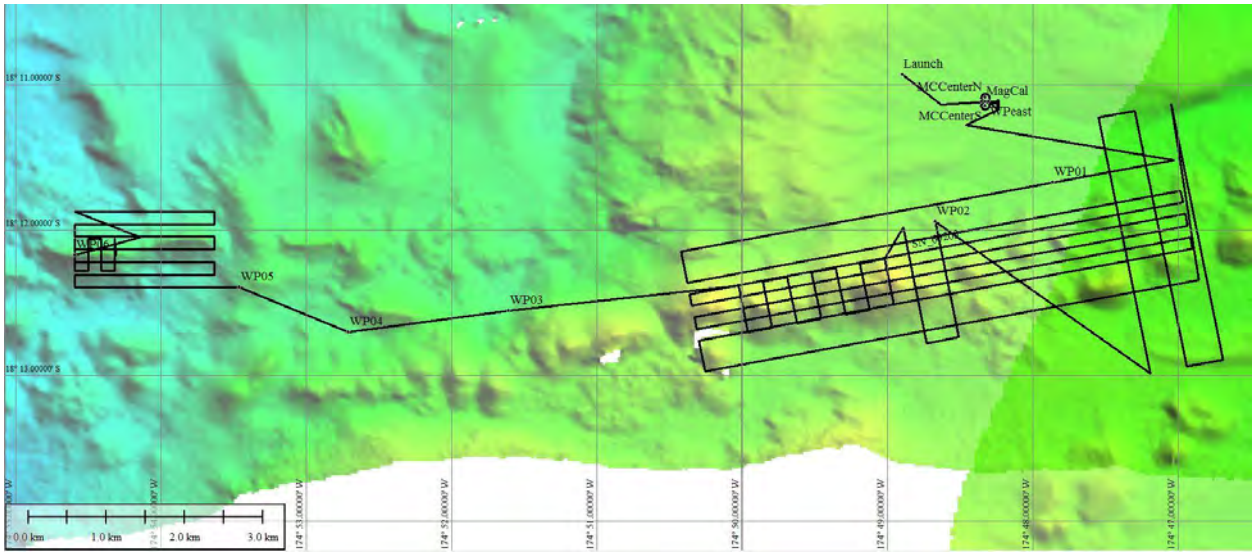

Fig. 3 Dive ABYSS0310

Cruise: SO267-55-1		Dive: Abyss0310		Datum: 02.01.2019	
Times UTC					
Launch 22:16	Mission Start 22:17	Survey Start 23:29	Survey Finished 17:43	Mission Finished 18:14	Recovery 19:44
Mission Statistics					
Main Sensor: Sidescan 120kHz	Line Spacing no	Altitude 80m	Survey Depth 1000-1700m	Distance Travelled 110.18km	
Sensors					
Edgetech 2200-S Sidescan 120kHz		Total raw files 107 files (.jsf)/5.84GB		Areal Coverage 30.43km²	
Eh/REDOX Sensor		Total raw files 1 file/4.7MB		File name: Abyss0310_REDOX.txt	
Comments: - Sensor data positions are not shifted to the corrected vehicle track					
SeaBird SBE49 FastCAT CTD S/N: 4948793-0168		Total raw files 1 file/25.8MB		File name: Abyss0310_CTD.txt	
Comments: - Sensor data positions are not shifted to the corrected vehicle track					
Wetlabs ECO FLNTU S/N: FLNTURTD-939		Total raw files 1 file/5.4MB		File name: Abyss0310_ECO.txt	
Comments: - Sensor data positions are not shifted to the corrected vehicle track					
Magnetometer APS-1540 Self-potential Sensor		Total raw files 289 files (.B122)/11.9GB		File name: Abyss0310_Magnetometer.txt Abyss0310_SP.txt	
Comments: - Combined binary files include magnetometer and self-potential data					
Mission comments					
- No Transponders (Bottom lock at surface); - Bottom following					

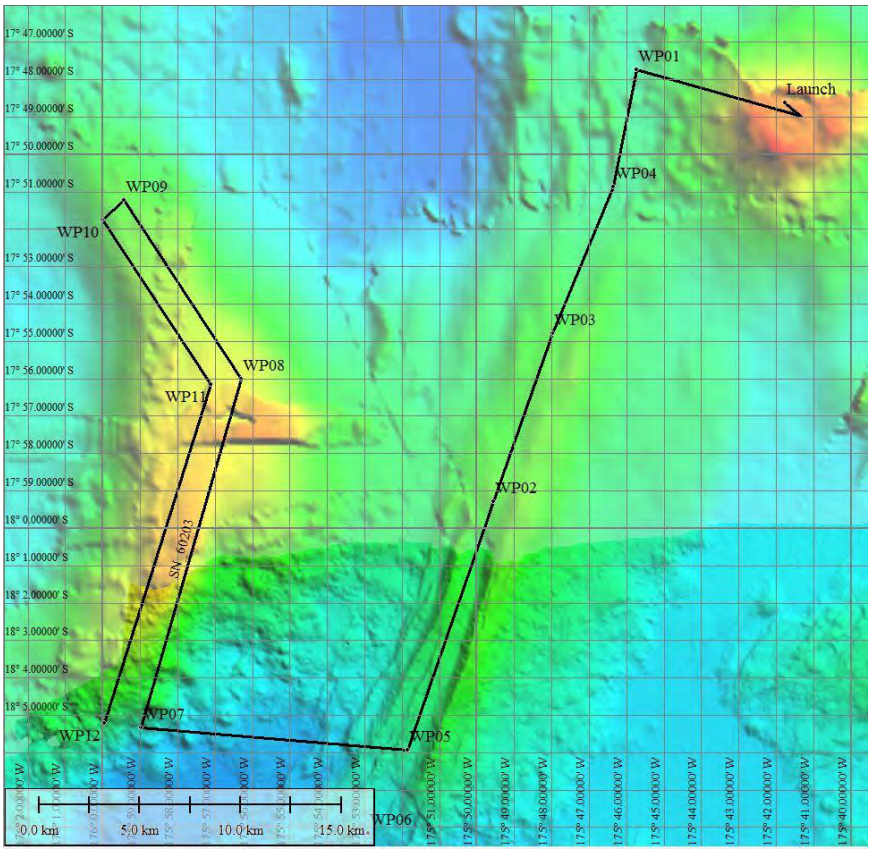

Fig. 4 Dive ABYSS0311

Cruise: SO267-72-1		Dive: Abyss0311		Datum: 07.01.2019	
Times UTC					
Launch 22:36	Mission Start 22:38	Survey Start 22:52	Survey Finished 19:14	Mission Finished 19:58	Recovery 20:30
Mission Statistics					
Main Sensor: Eh/REDOX	Line Spacing no	Altitude 120m	Survey Depth 750-2700m	Distance Travelled 117.96km	
Sensors					
Eh/REDOX Sensor		Total raw files 1 file/5.1MB		File name: Abyss0311_REDOX.txt	
Comments: - Sensor data positions are not shifted to the corrected vehicle track					
SeaBird SBE49 FastCAT CTD S/N: 4948793-0168		Total raw files 1 file/30.4MB		File name: Abyss0311_CTD.txt	
Comments: - Sensor data positions are not shifted to the corrected vehicle track					
Wetlabs ECO FLNTU S/N: FLNTURTD-939		Total raw files 1 file/5.7MB		File name: Abyss0311_ECO.txt	
Comments: - Sensor data positions are not shifted to the corrected vehicle track					
Magnetometer APS-1540 Self-potential Sensor		Total raw files 314 files (.B122)/12.4GB		File name: Abyss0311_Magnetometer.txt Abyss0311_SP.txt	
Comments: - Combined binary files include magnetometer and self-potential data					
Mission comments					
- No Transponders (Bottom lock at surface); - Bottom following					

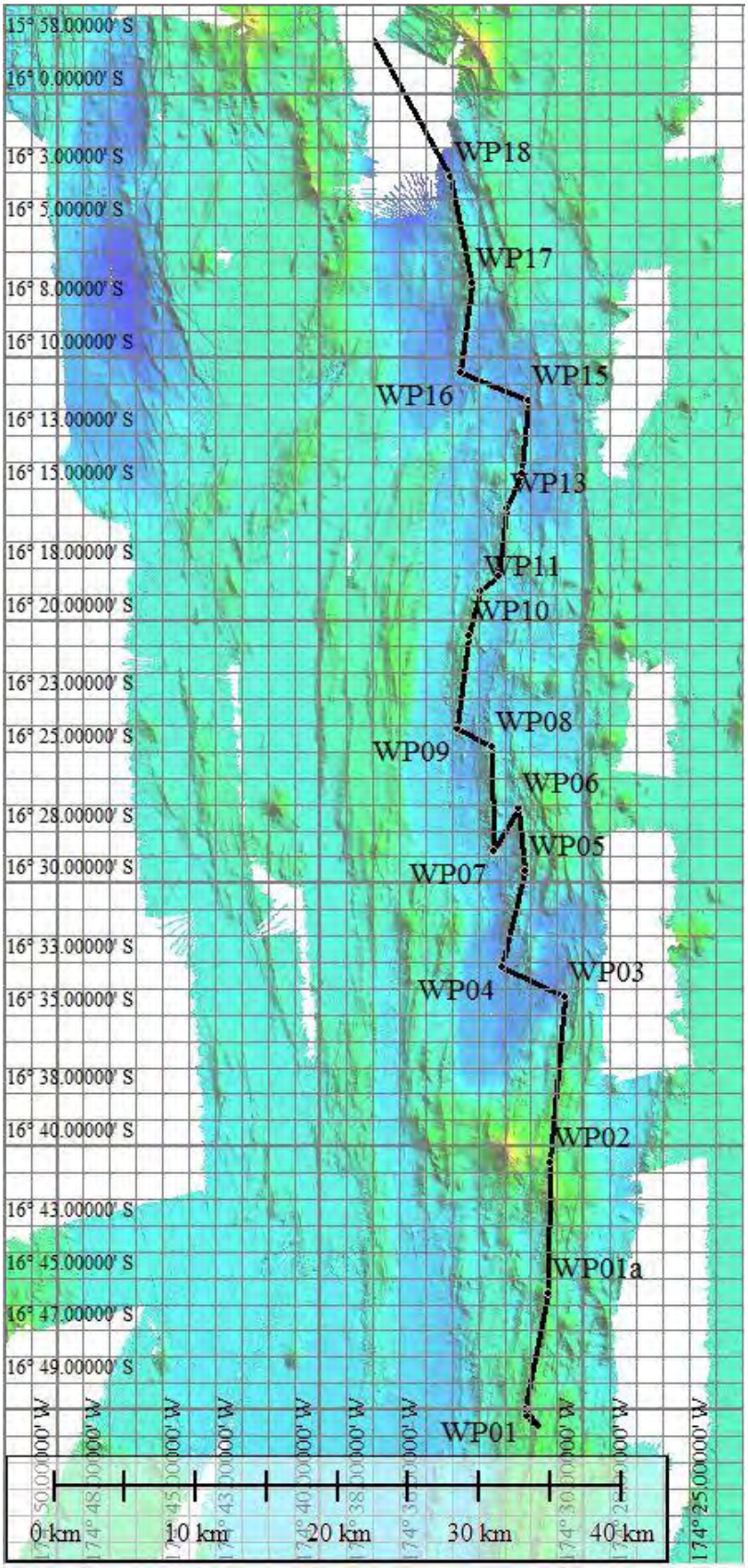

Fig. 5 Dive ABYSS0312

<table>
<tr><td colspan="2">Cruise: SO267-79-1</td><td colspan="2">Dive: Abyss0312</td><td colspan="2">Datum: 11.01.2019</td></tr>
<tr><td colspan="6">Times UTC</td></tr>
<tr><td>Launch
10:07</td><td>Mission Start
10:08</td><td>Survey
Start 10:35</td><td>Survey Finished
07:10</td><td>Mission Finished
07:50</td><td>Recovery
19:20</td></tr>
<tr><td colspan="6">Mission Statistics</td></tr>
<tr><td>Main Sensor:
Eh/REDOX</td><td>Line Spacing
no</td><td>Altitude
120m</td><td>Survey Depth
1300-2700m</td><td colspan="2">Distance Travelled
120.46km</td></tr>
<tr><td colspan="6">Sensors</td></tr>
<tr><td colspan="2">Eh/REDOX Sensor</td><td colspan="2">Total raw files
1 file/5.2MB</td><td colspan="2">File name:
Abyss0312_REDOX.txt</td></tr>
<tr><td colspan="6">Comments: - Sensor data positions are not shifted to the corrected vehicle track</td></tr>
<tr><td colspan="2">SeaBird SBE49 FastCAT CTD
S/N: 4948793-0168</td><td colspan="2">Total raw files
1 file/31MB</td><td colspan="2">File name:
Abyss0312_CTD.txt</td></tr>
<tr><td colspan="6">Comments: - Sensor data positions are not shifted to the corrected vehicle track</td></tr>
<tr><td colspan="2">Wetlabs ECO FLNTU
S/N: FLNTURTD-939</td><td colspan="2">Total raw files
1 file/5.9MB</td><td colspan="2">File name:
Abyss0312_ECO.txt</td></tr>
<tr><td colspan="6">Comments: - Sensor data positions are not shifted to the corrected vehicle track</td></tr>
<tr><td colspan="2">Magnetometer APS-1540
Self-potential Sensor</td><td colspan="2">Total raw files
431 files (.B122)/17.5GB</td><td colspan="2">File name:
Abyss0312_Magnetometer.txt
Abyss0312_SP.txt</td></tr>
<tr><td colspan="6">Comments: - Combined binary files include magnetometer and self-potential data</td></tr>
<tr><td colspan="6">Mission comments</td></tr>
<tr><td colspan="6">- No Transponders (Bottom lock at surface); - Bottom following</td></tr>
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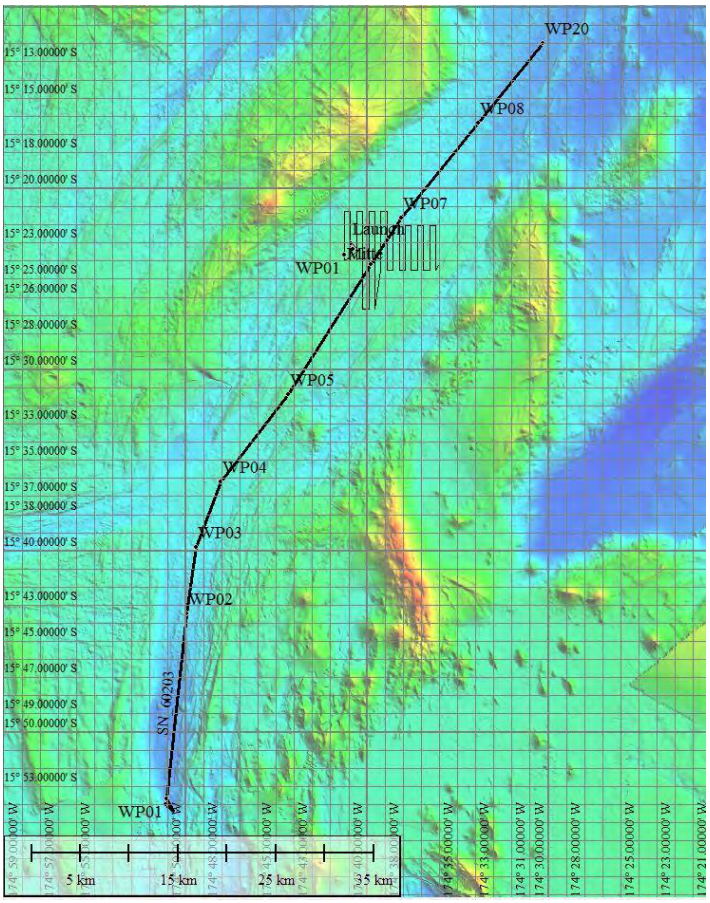


Fig. 6 Dive ABYSS0313

Cruise: SO267-88-1		Dive: Abyss0313		Datum: 02.01.2019	
Times UTC					
Launch 10:53	Mission Start 10:56	Survey Start 11:33	Survey Finished 03:36	Mission Finished 03:36	Recovery 06:45
Mission Statistics					
Main Sensor: Eh/REDOX	Line Spacing no	Altitude 120m	Survey Depth 2000-2650m	Distance Travelled 91.88km	
Sensors					
Eh/REDOX Sensor		Total raw files 1 file/4MB		File name: Abyss0313_REDOX.txt	
Comments: - Sensor data positions are not shifted to the corrected vehicle track					
SeaBird SBE49 FastCAT CTD S/N: 4948793-0168		Total raw files 1 file/23.8MB		File name: Abyss0313_CTD.txt	
Comments: - Sensor data positions are not shifted to the corrected vehicle track					
Wetlabs ECO FLNTU S/N: FLNTURTD-939		Total raw files 1 file/4.5MB		File name: Abyss0313_ECO.txt	
Comments: - Sensor data positions are not shifted to the corrected vehicle track					
Magnetometer APS-1540 Self-potential Sensor		Total raw files 230 files (.B122)/9.2GB		File name: Abyss0313_Magnetometer.txt Abyss0313_SP.txt	
Comments: - Combined binary files include magnetometer and self-potential data					
Mission comments					
- No Transponders (Bottom lock at surface); - Bottom following					

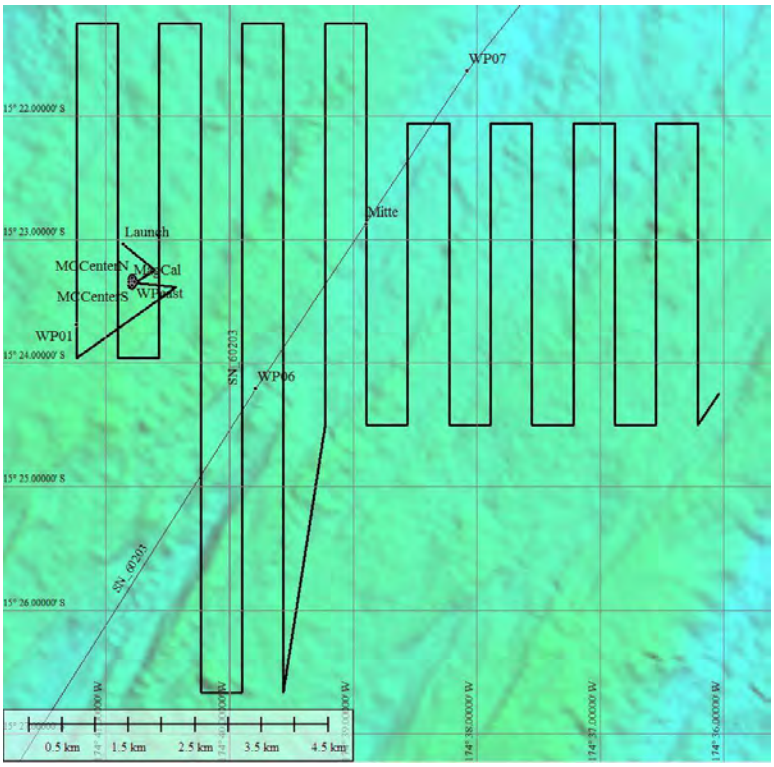


Fig. 7 Dive ABYSS0314

Cruise: SO267-93-1		Dive: Abyss0314		Datum: 18.01.2019	
Times UTC					
Launch 20:05	Mission Start 20:07	Survey Start 21:08	Survey Finished 16:06	Mission Finished 16:52	Recovery 18:54
Mission Statistics					
Main Sensor: Sidescan 120kHz	Line Spacing 5000/600 10000/600 4500/600	Altitude 70m	Survey Depth 2000-2250m	Distance Travelled 115.18km	
Sensors					
Edgetech 2200-S Sidescan 120kHz		Total raw files 114 files (.jsf)/6.26GB		Areal Coverage 60.03km²	
Eh/REDOX Sensor		Total raw files 1 file/4.9MB		File name: Abyss0314_REDOX.txt	
Comments: - Sensor data positions are not shifted to the corrected vehicle track					
SeaBird SBE49 FastCAT CTD S/N: 4948793-0168		Total raw files 1 file/29.7MB		File name: Abyss0314_CTD.txt	
Comments: - Sensor data positions are not shifted to the corrected vehicle track					
Wetlabs ECO FLNTU S/N: FLNTURTD-939		Total raw files 1 file/5.6MB		File name: Abyss0314_ECO.txt	
Comments: - Sensor data positions are not shifted to the corrected vehicle track					
Magnetometer APS-1540 Self-potential Sensor		Total raw files 313 files (.B122)/12.4GB		File name: Abyss0314_Magnetometer.txt Abyss0314_SP.txt	
Comments: - Combined binary files include magnetometer and self-potential data					
Mission comments					
- No Transponders (Bottom lock at surface); - Bottom following					

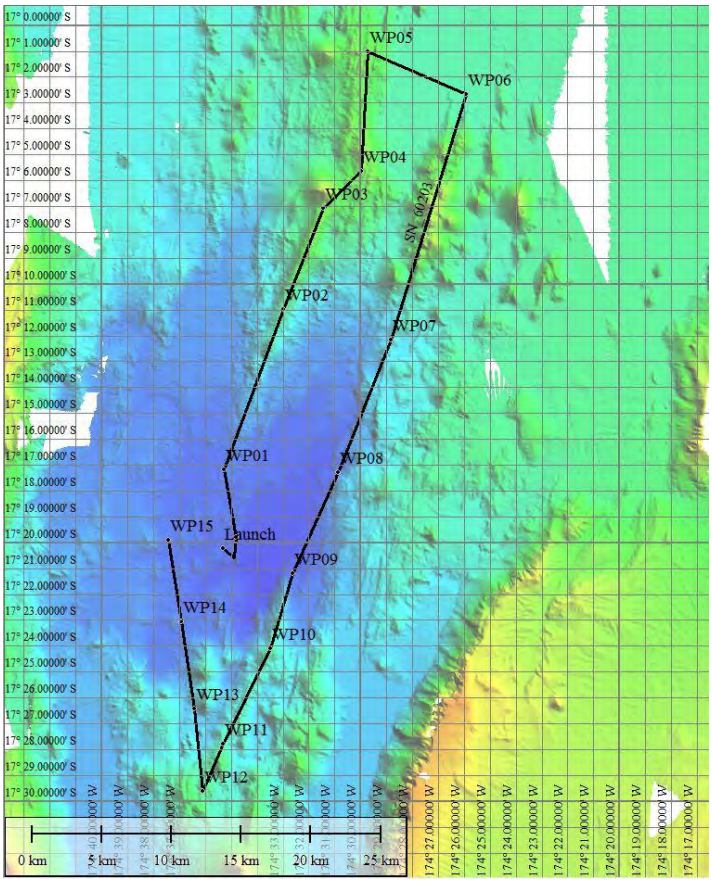


Fig. 8 Dive ABYSS0315

Cruise: SO267-100-1		Dive: Abyss0315		Datum: 21.01.2019	
Times UTC					
Launch 23:57	Mission Start 00:03	Survey Start 00:45	Survey Finished 21:55	Mission Finished 22:53	Recovery 23:39
Mission Statistics					
Main Sensor: Eh/REDOX	Line Spacing no	Altitude 120m	Survey Depth 1400-3000m	Distance Travelled 126.48km	
Sensors					
Eh/REDOX Sensor		Total raw files 1 file/5.4MB		File name: Abyss0315_REDOX.txt	
Comments: - Sensor data positions are not shifted to the corrected vehicle track					
SeaBird SBE49 FastCAT CTD S/N: 4948793-0168		Total raw files 1 file/32.6MB		File name: Abyss0315_CTD.txt	
Comments: - Sensor data positions are not shifted to the corrected vehicle track					
Wetlabs ECO FLNTU S/N: FLNTURTD-939		Total raw files 1 file/6.2MB		File name: Abyss0315_ECO.txt	
Comments: - Sensor data positions are not shifted to the corrected vehicle track					
Magnetometer APS-1540 Self-potential Sensor		Total raw files 314 files (.B122)/12.6GB		File name: Abyss0315_Magnetometer.txt Abyss0315_SP.txt	
Comments: - Combined binary files include magnetometer and self-potential data					
Mission comments					
- No Transponders (Bottom lock at surface); - Bottom following					

Appendix 7: Heat Flow Measurements and Data Report

(M. Riedel, S. Petersen)

The heat probe (Figure 1) is constructed in the classical 'violin bow' design (e.g. Hyndman et al., 1979), with 22 thermistors distributed over an active length of 2.2 m in 0.1 m intervals inside an outer small tube (diameter of 14 mm) attached to the strength member (steel pipe of 130 mm diameter). The sensor tube also contains a heater wire for the generation of high energy heat pulses of typically on the order of 800 J/m for in-situ thermal conductivity measurements according to the pulsed needle probe method (Lister, 1979). The data acquisition unit including power supply is housed in a single pressure case and mounted inside the probe's weight stand. A second pressure case for the power supply used to generate the heat pulses is added in a second slot on the probe's weight stand.

The signal of the temperature sensors is measured at a sample rate of 1 sec. A calibrated Pt100 seawater sensor on top of the weight stand allows to measure the bottom water temperature and to check the calibration of the sensor string in deep water with high accuracy. Tilt and acceleration of the probe is measured at a 1 sec sample rate to monitor the penetration process into the sediments and potential disturbances during the measurement time while the probe is in the sediment. The complete data set is stored in the probe data acquisition unit. After each measurement campaign, the probe was brought back to the vessel, and data were downloaded from the tool for post-processing.

The tool is deployed over the starboard side of the vessel using the main crane and the slide-bar support crane. After detaching the support-chain, the slide-bar crane lowers the tool to the seafloor. An acoustic pinger for positioning control (POSIDONIA) was always mounted on the wire 50 m above the probe. Winch speed for penetration of the heat probe was 1.0 m/s during ascent/descent through the water column, and 1.0 m/s to 1.2 m/s for penetration into the sediment. During descent of the tool to the seafloor, we monitored winch-tension as main parameter to judge successful penetration. Once the tool fully penetrated and maximum relaxation of wire-tension was reached, a few meters of extra wire-length were paid out, to prevent the tool from being accidentally pulled during swell. Upon recovery of the tool from the seafloor, we pulled at a speed of ~0.2 m/s until the probe cleared seafloor. Maximum tension (pullout force) was recorded as an indicator of probe penetration depths. We have chosen a time of 7 minutes for temperature decay after initial penetration (from frictional heating) and the time for heat pulse decay observations was set to another 7-8 minutes. The heat probe position on the seafloor (and during descent) was monitored using the positioning system available onboard the R/V SONNE. Penetration of the heat probe into the upper meters of the soft sediments generates a thermal disturbance due to frictional heating. However, the probe will not have fully equilibrated at the end of this time. Therefore, the temperature decay has to be fitted to a theoretical decay model. In-situ thermal conductivity is measured with the heat pulse method (Lister, 1979) where the sensor string is heated up for typically 10 s and the thermal conductivity is derived from the shape of the temperature decay. Since the probe was used in autonomous mode, the probe was pre-programmed using three criteria to define conditions for generation of the heat-pulse. The criteria were set that over a time period of 7 minutes after initial insertion into the sediment:

- tilt (in x- and y-direction) had to be less than 0.3°,

- acceleration (z-direction) had to be less than 0.003 g,
- pressure differential (i.e. height of instrument) had to be > 100 dbar from previous insertion

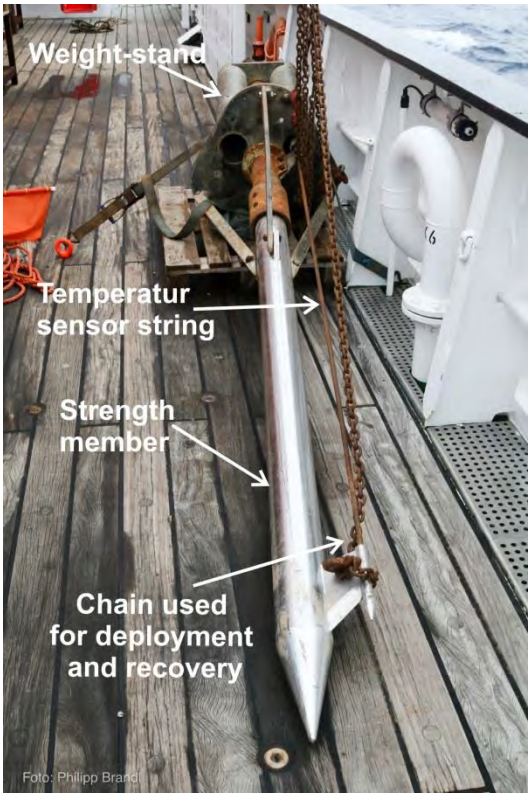


Fig A7.1 Photo of the heat-probe used during SO267 (photo credit: Philipp Brandl).

A7.1 Data processing sequence

The data stored on the acquisition unit is first downloaded and converted to ascii-format. The entire data set of the time from programming, deployment, until recovery is then loaded into Matlab® for further processing. The individual penetration times, assumed onset of heat pulse and times for clearing the seafloor are then used to split the data into individual 'pen-files' representing each one separate penetration. Within each 'pen-file' sequence, a portion of the temperature decay curves for each of the thermistors is used to find a best-fit temperature-decay curve. This modelled temperature decay curve then defines the equilibrium temperature. Onboard processing was done to generate initial thermal gradients and in situ thermal conductivity where the tool entered into the seafloor sufficiently deep to define a meaningful temperature gradient.

A7.2 Calibration of temperature probe

Prior to using the probe in the sediments, calibration of the 22 thermistors is required. This is best done using the probe in deep water with homogenous water-mass of uniform temperatures over the length of the probe (3 m). The location of the calibration was chosen in ~2000 m of water depth at first deployment with the average temperature of the water being around 2.4 °C. The calibration is made by comparing each of the 22 temperature measurements to the standard measurement at the head of the probe (Figure 2). The offsets of each sensor are stored in a separate file and applied during each data analysis procedure (Table 1).

Table A7.1 Calibration values for the Temperature probe acquired at the first deployment station.

Sensor	**S1**	**S2**	**S3**	**S4**	**S5**
T recorded (°C)	2.2867	2.3360	2.4048	2.2974	2.2583
ΔT (°C)	0.1163	0.067	0.0018	0.1056	0.1447
Sensor	**S6**	**S7**	**S8**	**S9**	**S10**
T recorded (°C)	2.3133	2.4186	2.3484	2.4728	Not functional
ΔT (°C)	0.0897	-0.0156	0.0546	-0.0698	
Sensor	**S11**	**S12**	**S13**	**S14**	**S15**
T recorded (°C)	2.4114	2.3754	2.4946	2.4020	2.3617
ΔT (°C)	-0.0084	0.0276	-0.0916	0.001	0.0413
Sensor	**S16**	**S17**	**S18**	**S19**	**S20**
T recorded (°C)	2.3825	2.4182	2.5094	2.4349	2.4085
ΔT (°C)	0.0205	-0.0152	-0.1064	-0.0319	-0.0055
Sensor	**S21**	**S22**	PT100 reference temperature: 2.4030 °C Tilt-X: 1.73° Tilt-Y: 0.90°		
T recorded (°C)	2.4289	2.4358			
ΔT (°C)	-0.0259	-0.0328			

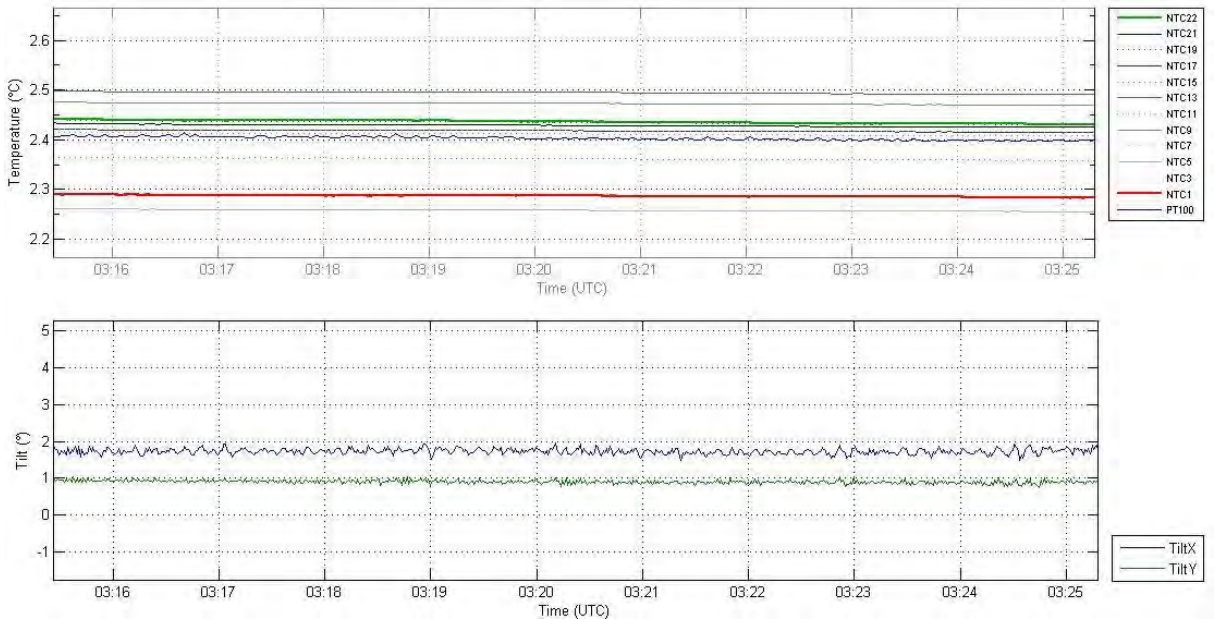


Fig. A7.2 Calibration period for temperature probe during first deployment at station 05HF (December 13, 2018, UTC). The time window from 03:16 to 03:24 was chosen to define average values for the reference PT100 sensor and the 22 thermistors.

References

Hyndman, R.D., Davis, E.E., Wright, J.A., 1979. The measurement of marine geothermal heat flow by a multi-penetration probe with digital acoustic telemetry and in situ thermal conductivity, Mar. Geophys. Res., 4: 181–205.

Lister, C.R.B., 1979. The pulse-probe method of conductivity measurement, Geophys. J. R. Astr. Soc., 57: 451–461.

Appendix 8: Sediment Sampling

(S. Martins, S. Lange)

A8.1 Sediment Sampling

The coring unit comprise a steel core barrel (3m long; diameter 12 cm), head weights (1200 kg), a replaceable/removable core liner (grey PVC tube) and a core catcher. This last device is fitted at the end of the core barrel to ensure sample retrieval and minimal loss during recovery.

During operations on SO267 the gravity core was deployed on the starboard side. After 50 m of cable released, the Posidonia was attached and the coring unit lowered at 1 m/s winch speed until 150-200 m above seafloor. It is then let to stabilize for 2 minutes and then lowered in free fall until bottom contact. The device is then heaved at 0.5 m/s a few hundred of meters and then brought to the surface at 1.0 to 1.2 m/s.

Sediment samples were also collected using the dredge. Inside the dredge box there are four cylindric sediment traps attached to the corners (Fig. ##). The cylinders are 22.5 cm long, with a diameter of 3.6 cm, rendering a total volume of about 45 cm^3 of sediment, for each.

Fig. A8.1 Sediment traps within the dredge box.

A summary of the gravity core stations is provided in Table A8.1. A summary of the sediment samples retrieved from the dredge and heat flow probe is provided in Table A8.2.

Table A8.1 Summary of gravity corer stations of SO267

Station	Date	USBL pos. at bottom contact				Remarks
		Lat.	Long.	Depth (m)	Time (UTC)	
SO267_28GC	22/12/2018	-17.5099	-174.6782	2691.2	15:07:00	Empty core
SO267_29GC	22/12/2018	-17.5501	-174.6502	2658.0	18:11:50	Empty core; Small grains in the CC collected as sample SO267_29GC_CC
SO267_30GC	22/12/2018	-17.6650	-174.6051	2956.0	21:23:00	Empty core; Dark grey clay behind the CC collected as sample SO267_30GC_CC
SO267_31GC	22/12/2018	-17.7970	-174.5872	2218.7	00:04:02	Empty core; Dark brown clay in the CC collected as sample SO267_31GC_CC
SO267_32GC	23/12/2018	-17.8690	-174.5242	2034.6	02:30:00	Empty core
SO267_64GC	04/01/2019	-18.5075	-175.6486	2937.2	18:14:21	Core with 40 cm of sediment with disturbed stratigraphy; samples (SO267_64GC) were recovered on bags and separated by color into bottom (greyish), top (dark brown) and middle (greyish brown).

Table A8.2 Summary of samples retrieved on the dredge and heat flow probe.

Station	Date	On the bottom (max depth)				Off bottom				Sample reference	Description
		Lat.	Long.	Depth (m)	Time (UTC)	Lat.	Long.	Depth (m)	Time (UTC)		
SO267_47-1 DRG	01/01/2019	-17.9942	-174.6178	1559.2	02:13:19	-17.9897	-174.6165	1383.2	03:02:14	SO267_47-1 DRG_001S	Dark brown sediment (10YR/3/3) ; clay with detrital silt size component (volcanic)
SO267_48-1 DRG	01/01/2019	-18.0084	-174.7345	1036.9	05:51:17	-18.0050	-174.7404	748.7	07:00:00	SO267_48-1 DRG_001S	Dark brown sediment (10YR/3/3); mixture of clay/silt with detrital sand to cobble size component (fragments of highly vesicular volcanic rock) and shell/shell fragments; (pteropods, equinoderm spines?); 50/50
SO267_49-1 DRG	01/01/2019	-18.2116	-174.8165	1338.4	09:59:48	-18.2059	-174.8171	1068.9	10:53:12	SO267_49-1 DRG_001S	Dark brown sediment (10YR/3/3); mixture of clay/silt with detrital sand/pebble size component (fragments of highly vesicular volcanic rock); 70/30
SO267_50-1 DRG	01/01/2019	-18.1467	-174.9304	1691.8	13:56:00	-18.1396	-174.9296	1319.8	15:16:16	SO267_50-1 DRG_001S	Dark brown sediment (10YR/3/3); mixture of clay/silt with detrital sand/pebble size component (fragments of highly vesicular volcanic rock); 80/20

SO267_54-1 HF	02/01/2019	-18.2735	-175.5076	2471.0	13:35:33	-	-	-	-	SO267_54-1 HF 001S	Dark brown sediment (10YR/4/3); mixture of clay/silt with detrital sand size component (volcanic); 80/20
SO267_56-1 DRG	03/01/2019	-18.0943	-175.1607	1851.4	00:59:02	-18.0908	-175.1524	1698.7	02:56:50	SO267_56-1 DRG_001S	Dark brown sediment (10YR/3/4); mixture of clay/silt with detrital sand/pebble size component (light and dark particles, maybe glass and pumic); 70/30
SO267_57-1 DRG	03/01/2019	-18.2240	-175.2341	1773.3	05:22:07	-18.2242	-175.2412	1504.4	06:31:06	SO267_57-1 DRG_001S	Sand to pebble fragments of volcanic rock, consolidated sediment (light brown), pumice?, shell fragments, oxidized fragments with MnO coating
SO267_58-1 DRG	03/01/2019	-18.3559	-175.2708	2057.0	09:07:32	-18.3571	-175.2782	1589.8	10.32:19	SO267_58-1 DRG_001S	Dark brown sediment (10YR/3/4); mixture of clay/silt with detrital sand/pebble size component (light and dark particles, maybe glass and pumice); 60/40
SO267_59-1 DRG	03/01/2019	-18.5565	-174.9255	1400.3	14:47:31	-18.5589	-174.9202	1161.0	15:46:43	SO267_59-1 DRG_001S	Dark brown sediment (10YR/3/4); mixture of clay/silt with detrital sand-pebble to cobble size component (fragments of highly vesicular volcanic rock) and shell/shell fragments; 50/50
SO267_60-1 DRG	03/01/2019	-18.2860	-174.9869	2219.8	21:48:08	-18.2807	-174.9877	1896.2	22:34:33	SO267_60-1 DRG_001S	Small sample, very watery, brown clay with detrital sand size volcanic component (light and dark particles, maybe glass and pumice)
SO267_63-1 HF	04/01/2019	-18.2739	-175.6484	2935.0	14:42:00	-	-	-	-	SO267_63-1 HF 001S	Dark brown sediment (10YR/4/3); mixture of clay/silt with detrital sand size component (light and dark volcanic particles, maybe pumice and glass); 80/20
SO267_65-1 DRG	05/01/2019	-18.3958	-175.8626	2545.1	04:56:06	-18.3993	-175.8566	2176.8	06:12:48	SO267_65-1 DRG_001S	Dark brown sediment (10YR/3/4); mixture of clay/silt with detrital sand/pebble size component; 90/10
SO267_66-1 DRG	05/01/2019	-18.2074	-175.8083	3064.9	09:56:45	-18.2112	-175.8018	2718.5	11:19:08	SO267_66-1 DRG_001S	Dark brown sediment (10YR/3/4); mixture of clay/silt with detrital sand/pebble size component (light and dark particles, maybe glass and pumic); 80/20
SO267_68-1 DRG	05/01/2019	-17.9702	-175.8173	1817.7	15:36:14	-17.9709	-175.8118	1570.9	16:33:00	SO267_68-1 DRG_001S	Sand to pebble fragments of volcanic rock (mafic and pumice) within dark brown clay enriched in detrital volcanic component (mafic and pumice)
SO267_69-1 DRG	05/01/2019	-17.8176	-175.7173	1002.8	19:50:54	-17.8117	-175.7067	729.6	20:49:19	SO267_69-1 DRG_001S	Sand to pebble fragments of volcanic rock, pumice and abundant shell fragments (pteropods, equinoderm spines, barnacles) within a sand size matrix with small shell fragment and microfossils (pelagic ooze)
SO267_70-1 DRG	07/01/2019	-18.2757	-174.7914	944.2	02:41:33	-18.2709	-174.7929	774.3	04:35:07	SO267_70-1 DRG_001S	Brown sediment (10YR/4/4); mixture of clay/silt with detrital sand/pebble size component ; 90/10
SO267_71-1	07/01/2019	-18.3323	-174.7619	982.0	06:19:02	-18.3258	-174.7616	633.2	07:30:10	SO267_71-1	Dark brown sediment (10YR/3/4); mixture

DRG										DRG_001S	of clay/silt with detrital sand/pebble size component ; 90/10
SO267_73-1 DRG	08/01/2019	-18.0133	-175.9530	1681.4	09:02:11	-18.0092	-175.9604	1122.3	10:29:50	SO267_73-1 DRG_001S	Dark brown sediment (10YR/5/4); mixture of clay/silt with detrital sand/pebble size component and shell fragments ; 70/30
SO267_77-1 DRG	10/01/2019	-18.5208	-175.6932	2646.8	08:40:08	-18.5179	-175.6985	2352.6	09:42:07	SO267_77-1 DRG_001S	Dark brown sediment (10YR/3/5); mixture of clay/silt with detrital sand/pebble size component ; 90/10
SO267_78-1 DRG	10/01/2019	-18.5147	-175.6850	2936.8	11:58:13	-18.5118	-175.6895	2602.5	13:01:00	SO267_78-1 DRG_001S	Dark brown sediment (10YR/3/5); mixture of clay/silt with detrital sand/pebble size component ; 90/10 (one coarse pebble)
SO267_83-1 DRG	15/01/2019	-16.0121	-175.4130	2339.3	12:59:21	-16.0063	-175.4098	2336.2	13:49:15	SO267_83-1 DRG_001S	Dark brown sediment (10YR/3/4); clay/silt with a small detrital component (10%)
SO267_84-1 DRG	15/01/2019	-16.1090	-175.3692	2108.1	17:02:23	-16.1098	-175.3752	1832.8	18:11:05	SO267_84-1 DRG_001S	Dark brown sediment (10YR/3/5); mixture of clay/silt with detrital sand/pebble size component (light and dark particles, maybe glass and pumice and reddish fragments; the light colored particles are abundant) ; 70/30
SO267_85-1 DRG	15/01/2019	-16.0166	-175.5294	2024.6	20:36:27	-16.0577	-175.5345	1673.0	21:45:10	SO267_85-1 DRG_001S	Dark brown sediment (10YR/3/5); mixture of clay/silt with detrital sand/pebble size component ; 90/10
SO267_90-1 DRG	18/01/2019	-15.4373	-174.4874	1869	08:54:54	-15.4342	-174°.4931	1353.6	10:10:32	SO267_90-1 DRG_001S	Dark brown sediment (10YR/3/4); mixture of clay/silt with detrital sand/pebble size component (light and dark particles, maybe glass and pumice and shell fragments); 80/20
SO267_91-1 DRG	18/01/2019	-15.5282	-174.4302	2517.3	12:37:02	-15.5239	-174.4342	2204.3	13:42:34	SO267_91-1 DRG_001S	Sand to pebble fragments of volcanic rock (mafic and pumice) within dark brown clay enriched in detrital volcanic component (mafic and pumice)
SO267_92-1 DRG	18/01/2019	-15.6741	-174.6255	1211.6	16:35:35	-15.6736	-174.6315	844.8	17:41:01	SO267_92-1 DRG_001S	Sand to pebble fragments of volcanic rock (mafic) with abundant shell fragment, equinoderm spicula within light brown clay enriched in detrital volcanic component (mafic and pumice)
SO267_94-1 DRG	18/01/2019	-15.6624	-175.0290	2383.3	23:23:45	-15.6570	-175.0290	2231.6	00:50:00	SO267_94-1 DRG_001S	Dark brown sediment (10YR/3/4); clay/silt with a small, sand size, detrital component (10%)
SO267_95-1 DRG	19/01/2019	-15.9510	-174.9553	2078.7	04:48:16	-15.9465	-174.9509	1829.8	05:45:14	SO267_95-1 DRG_001S	Brown sediment (10YR/4/4); mixture of clay/silt with detrital sand/pebble size component ; 90/10
SO267_96-1 DRG	19/01/2019	-16.0577	-174.6377	2515.9	09:18:11	-16.0567	-174.6438	2090.6	10:22:16	SO267_96-1 DRG_001S	Dark brown sediment (10YR/3/4); mixture of clay/silt with detrital sand/pebble size component (volcanic rock fragments); 80/20
SO267_97-1 DRG	19/01/2019	-15.9616	-174.7163	1456.4	13:13:14	-15.9567	-174.7109	1257.7	14:16:00	SO267_97-1 DRG_001S	Brown sediment (10YR/4/4); mixture of clay/silt with a high detrital sand/pebble

											size component (volcanic rock fragments up to 3 cm in the lenght); 50/50
										SO267_97-1 DRG_001B	Fragment of large shell
SO267_102-1 HF	22/01/2019	-17.3299	-174.5510	3034	20:53:00	-	-	-	-	SO267_102-1 HF 001S	Dark brown sediment (7.5YR/3/2); clay/silt with detrital silt size component (dark volcanic particles); 90/10
SO267_103-1 DRG	22/01/2019	-17.5240	-174.9127	1802	02:42:53	-17.5178	-174.9082	1361.2	04:11:06	SO267_103-1 DRG_001S	Brown sediment (10YR/5/4); mixture of clay/silt with a detrital sand/pebble size component; 90/10
SO267_105-1 DRG	22/01/2019	-16.8006	-175.0623	1556.4	23:48:04	-16.8020	-175.0678	1282.2	00:51:31	SO267_105-1 DRG_001S	Brown sediment (10YR/5/4); mixture of clay/silt with a detrital sand/pebble size component; 90/10
SO267_106-1 DRG	23/01/2019	-16.8323	-175.1647	1989.2	03:14:46	-16.8311	-175.1577	1554.3	04:28:04	SO267_106-1 DRG_001S	Brown sediment (10YR/5/5); mixture of clay/silt with a detrital sand size component (light and dark particles, probably glass and pumice); 80/20
SO267_107-1 DRG	23/01/2019	-16.4825	-175.1181	2123.7	09:33:28	-16.4872	-175.1227	1699.6	10:51:27	SO267_107-1 DRG_001S	Brown sediment (10YR/4/4); mixture of clay/silt with a high detrital sand size component (light and dark particles, probably glass and pumice); 50/50
SO267_108-1 DRG	23/01/2019	-16.4744	-175.8144	1116.9	20:01:44	-16.4778	-175.7690	824.1	21:07:04	SO267_108-1 DRG_001S	Light brown (10YR/6/3) sand (light and dark particles, maybe glass and pumice and reddish fragments; shell fragments)
SO267_109-1 DRG	24/01/2019	-16.6382	-175.9803	1403.2	00:42:36	-16.6423	-175.9795	1170.8	02:32:07	SO267_109-1 DRG_001S	Brown sediment (10YR/5/4); mixture of clay/silt with a high detrital sand size component (light and dark particles, probably glass and pumice; fragments of shells, coral?, equinoderm spicula); 50/50

A8.2 Jumper Test

(J. Parianos)

With specific permission from the Tongan government, the Nautilus Observer brought a prototype autonomous seabed sediment sampler for testing during the cruise. The machine was a second generation prototype based on a first generation machine tested offshore Nukualofa to ~1950 m in April 2018. The design is to: drop to the seafloor; collect a small quantity of sediment via bilge pump into a fine sieve; drop ballast; and return to the surface signaling for collection via Iridium beacon. The system is low cost (<$US5k), potentially allowing for multiple deployments at any one time, improving vessel efficiency. In case of system error or flooding system is designed to drop the ballast once the main battery is exhausted.

Early tests of the jumper were all positive including bench tests, bucket submerged test and a tethered static test of the chassis and control system to 2000 m (accompanying the OBS/OBMT acoustic releases). On deployment however (late evening of 22nd December 2018), the machine was lost. Deployment was made ~ 6 nm southwest from gravity core station #6. It was discovered after, that a conductivity switch had been incorrectly turned on in the Iridium beacon; meaning that the most likely reason for the loss was failure of the beacon to transmit on return to the surface (the beacon sits very low in the water). The prototype was too low in value to justify a surface search.

Fig. A8.2 Image of the Nautilus Jumper being deployed during SO267. The yellow tubes are connected to a small pump to recover loose sediment from rocky surfaces.

Appendix 9: Dredging Methods and Sample Report

(R. Werner, C. Rahmsdorf)

A9.1 Rock Sampling Methods, Site Selection, and Laboratory Work

Rock sampling on SO267 was carried out using rectangular chain bag dredges. Chain bag dredges are similar to large buckets with a chain bag attached to their bottom and steel teeth at their openings, which are dragged along the ocean floor by the ship´s winch.

General station areas were chosen on the basis of a number of existing datasets. These include predicted bathymetry, derived from gravity data and ship depth soundings (etopo by Smith and Sandwell [1997] and "The GEBCO_2014 Grid, version 20150318", http://www.gebco.net) as well as published data and maps, and profiles.

The pre-selection of dredge stations was partly based on multi-beam data recorded on previous cruises by RV SONNE (SO263), RV FALKOR (FK160320, FK171110), RV Southern Surveyor (SS2004-01, SS2008-07, SS2009-02), RV Roger Revelle (RR0916, RR1210, RR1211), RV Kilo Moana (KM0804, KM1024, KM1129), RV Marcus Langseth (MGL0901, MGL0902), and RV Mirai (MR09-01 Leg2). These data allowed us to forbear from doing extensive bathymetric surveys before dredging in those areas. Here, only the final positioning of the dredge tracks required short multi-beam mapping by RV SONNE. The selection of dredge sites in unmapped working areas, however, was critically dependent on detailed multi-beam echo-sounding surveys carried out at each site before dredging. Final positioning of the vessel at each dredge station was based on the bathymetric data including considerations of wind, swell and drift conditions. Dredge tracks were usually located - depending on the morphology of the structures - on steep slopes of scarps, canyon walls, fault zones, and the flanks of cones, ridges, and larger seamounts. This was mainly done to avoid areas of thick sediment cover.

A9.3 Shipboard Procedure

Once onboard, a selection of the rocks were cleaned and cut using a rock saw. They were then examined with a hand lens and binocular microscope, and grouped according to their lithologies and degree of submarine weathering. The immediate aim was to determine whether material suitable for geochemistry and radiometric age dating had been recovered. Best suitable samples have an unweathered and unaltered groundmass, empty vesicles, glassy rims (ideally), and any phenocrysts that are fresh. If suitable samples were present, the ship moved to the next station. If they were not, then the importance of obtaining samples from the respective site was weighted against the required time commitment.

Fresh blocks of representative samples were then cut for post-cruise thin section and microprobe preparation, geochemistry and further procedures to remove manganese and alteration products and/or to extract glass (if present). Each of these sub-samples, together with any remaining bulk sample, was described, labeled, and finally sealed in either plastic bags or bubble wrap for transportation to GEOMAR.

A9.4 Shore Based Analyses

Magmatic rocks sampled by R/V SONNE from the ocean floor will be analyzed using a variety of different geochemical methods:

Ages of suitable rock samples will be determined by $^{40}Ar/^{39}Ar$ laser step-heating dating. Major element geochemistry by X-ray fluorescence (XRF) and electron microprobe (EMP) will constrain magma chamber processes. Trace element data, obtained by inductively coupled plasma mass spectrometry (ICP-MS), will help to define the degree of mantle melting and help to characterize the chemical composition of the source. Phenocryst assemblages and compositions will be used to quantify magma evolution. Petrologic studies of the volcanic rocks will also help to constrain the conditions under which the melts crystallized. The composition of mafic basalts and basaltic glasses, as well as mafic melt inclusions, can be used to assess mantle temperatures at which melting took place, as well as pressures and degrees of melting. Sr, Nd, Hf and Pb (double spike) isotope ratios, determined by Thermal Ionization Mass Spectrometry (TIMS) and multi-collector ICP-MS, reflect the long-term evolution of the magma sources and thus serve as tracers to identify mantle domains and possibly recycled (crustal?) material. O-isotopes provide a powerful tool for evaluating the role of crustal material in the magma source. Non-magmatic rocks yielded by dredging can be transferred to co-operating specialists for further shore-based analyses.

A summary of the rock sampling is provided in Table A9.1. The complete sample descriptions are proved in Table A9.2.

SO267 Rock Sampling Summary

Type	Stat.	Location	total volume	Rec. DR	Station summary	start / on bottom lat °S	start / on bottom long °W	end / off bottom lat °S	end / off bottom long°W	depth (m) begin	depth (m) end	Rock sampling Mag	Rock sampling VC	Rock sampling Sed	Rock sampling Mn
DR	22	Fonualei Rift. central section, E-flank	1/4 full	x	lava fragments, volcaniclastic rocks	-17,184	-174,709	-17,184	-174,715	1850	1370	x	x		
DR	23	Fonualei Rift, central section, E-flank	1/5 full	x	lava fragments, sedimentary rocks	-17,308	-174,713	-17,307	-174,720	2549	2122	x		x	
DR	33	South of Fonualei Rift, fault	1/2 full	x	lava fragments, volcaniclastic and sedimentary rocks	-18,009	-174,524	-18,005	-174,528	1210	822	x	x	x	
DR	34	Fonualei Rift, southern tip, concial volcano	1/4 full	x	lava fragments	-17,909	-174,513	-17,909	-174,508	1042	709	x			
DR	35	Fonualei Rift, southern section, W-flank	3 rocks	x	consolidated sediments	-17,801	-174,468	-17,801	-174,464	1691	1245			x	
DR	36	Fonualei Rift, southern section, W-flank	1/6 full	x	lava fragments, volcaniclastic rocks	-17,605	-174,493	-17,607	-174,488	2286	1811	x	x		
DR	37	Fonualei Rift, crustal bloc (?)	few rocks	x	lava fragments	-17,706	-174,678	-17,707	-174,672	1984	1590	x			
DR	47	South of Fonualei Rift, cone	2 rocks	-	2 Mn-encrusted pumice fragments of unkown origin	-17,994	-174,618	-17,990	-174,617	1560	1380				
DR	48	SW of Fonualei Rift, cone	full	x	lava fragments	-18,009	-174,735	-18,005	-174,740	1040	746	x			
DR	49	SW of Fonualei Rift, chain of cones	1 rock	x	lava fragment	-18,212	-174,817	-18,206	-174,817	1342	1071	x			
DR	50	SW of Fonualei Rift, caldera volcano	1/4 full	x	lava fragments, sedimentary rocks	-18,147	-174,930	-18,140	-174,930	1680	1323	x		x	
DR	56	SW of Fonualei Rift, N-S-striking ridge	few rocks	x	lava fragments, sedimentary rocks	-18,094	-175,161	-18,091	-175,153	2070	1699	x		x	
DR	57	SW of Fonualei Rift, N-S-striking ridge	2/3 full	x	lava fragments, volcaniclastic rocks	-18,224	-175,234	-18,224	-175,241	1765	1507	x	x		
DR	58	SW of Fonualei Rift, N-S-striking ridge	1/4 full	x	lava fragments, volcaniclastic rocks	-18,356	-175,271	-18,357	-175,278	2058	1588	x	x		
DR	59	SW of Fonualei Rift, cone-shaped volcano	few rocks	x	lava fragments, volcaniclastic rocks (pumice)	-18,555	-174,927	-18,559	-174,920	1396	1160	x	x		
DR	60	SW of Fonualei Rift, small cone	1/4 full	x	lava fragments	-18,286	-174,987	-18,297	-174,988	2227	1912	x			
DR	65	SW of Fonualei Rift, flank of trough	1/5 full	x	lava fragments	-18,396	-175,863	-18,399	-175,857	2537	2175	x			
DR	66	SW of Fonualei Rift, flank of trough	1/4 full	x	lava fragm,, volcaniclastic (pumice) and sedimentary rocks	-18,207	-175,808	-18,211	-175,802	3073	2723	x	x	x	
DR	68	SW of Fonualei Rift, ridge	few rocks	x	lava fragm,, volcaniclastic (pumice) and sedimentary rocks	-17,970	-175,817	-17,971	-175,812	1819	1566	x	x	x	
DR	69	SW of Fonualei Rift, caldera volcano	1/5 full	x	lava fragments	-17,818	-175,717	-17,668	-175,729	1010	725	x			
DR	70	SW of Fonualei Rift, caldera volcano	1/8 full	x	volcaniclastic (pumice) and sedimentary (limestone) rocks	-18,276	-174,791	-18,271	-174,793	951	770		x	x	
DR	71	SW of Fonualei Rift, caldera volcano	1/4 full	x	lava fragments, volcaniclastic rocks	-18,332	-174,762	-18,326	-174,762	985	627	x	x		
DR	73	SW of Fonualei Rift, curved N-S ridge	few rocks	x	lava fragments (pillows)	-18,013	-175,953	-18,009	-175,960	1675	1127	x			
DR	77	SW of Fonualei Rift, flank of trough	few rocks	x	lava fragments	-18,521	-175,693	-18,518	-175,699	2646	2353	x			
DR	78	SW of Fonualei Rift, flank of trough	1/6 full	x	lava fragments	-18,515	-175,690	-18,511	-175,690	2925	2603	x			
DR	83	West of Fonualei Rift, potential lava flow	few rocks	-	pumice fragments of unkown origin	-16,012	-175,413	-16,007	-175,410	2338	2337				
DR	84	West of Fonualei Rift, NW-SE-striking ridge	few rocks	x	lava fragment, volcaniclastic and sedimentary rocks	-16,109	-175,369	-16,110	-175,375	2143	1833	x	x	x	
DR	85	West of Fonualei Rift, small volcano	few rocks	-	pumice fragments of unkown origin	-16,053	-175,530	-16,058	-175,539	2025	1671				
DR	90	North of Fonualei Rift, N-S striking ridge	1/2 full	x	lava fragments, volcaniclastic and sedimentary rocks	-15,437	-174,487	-15,434	-174,493	1869	1341	x	x	x	
DR	91	North of Fonualei Rift, N-S striking ridge	full	x	lava fragments, volcaniclastic rocks	-15,528	-174,430	-15,524	-174,434	2555	2223	x	x		
DR	92	North of Fonualei Rift, flank of trough	full	x	lava fragments, volcaniclastic rocks	-15,674	-174,626	-15,674	-174,632	1212	847	x	x		
DR	94	North of Fonualei Rift, fault zone	1/5 full	x	lava fragments	-15,663	-175,029	-15,657	-175,029	2380	2230	x			
DR	95	North of Fonualei Rift, narrow ridge	few rocks	x	lava fragments	-15,951	-174,955	-15,947	-174,618	2080	1830	x			
DR	96	Fonualei Rift, northern section, E-flank	1/4 full	x	lava fragments, volcaniclastic rocks	-16,058	-174,646	-16,057	-174,644	2516	2019	x			
DR	97	North of Fonualei Rift, cone on N-S-ridge	full	x	lava fragments, volcaniclastic rocks	-15,961	-174,716	-15,956	-174,711	1454	1260	x			
DR	103	West of Fonualei Rift, NW-SE-striking ridge	1/2 full	1	lava frag., volcaniclastic and sedimentary (carbonate) rocks	-17,524	-174,913	-17,518	-174,908	1802	1360	x	x	x	
DR	105	West of Fonualei Rift, N-S-striking ridge	empty	0		-16,801	-175,062	-16,802	-175,068	1635	1274				
DR	106	West of Fonualei Rift, N-S-striking ridge	two rocks	1	lava fragments, sedimentary rock (huge bloc)	-16,832	-175,165	-16,831	-175,158	1985	1554	x		x	
DR	107	West of Fonualei Rift, NW-SE-striking ridge	few rocks	1	lava fragments, volcaniclastic and sedimentary rocks	-16,483	-175,118	-16,487	-175,123	2123	1700	x	x	x	
DR	108	West of Fonualei Rift, large volcano	1/3 full	1	lava fragments, volcaniclastic rocks	-16,475	-175,765	-16,469	-175,774	1127	885	x	x		
DR	109	West of Fonualei Rift, large volcano	1/ full	1	lava fragments, volcaniclastic rocks (pumice), fossile corals	-16,638	-175,980	-16,642	-175,980	1406	1174	x	x		
				32	**dredges yielded magmatic and / or sed. rocks (90.2%)**							**35**	**18**	**13**	**0**
Dredge Stations (DR): 41				**4**	**dredges returned empty or yielded only soft sediment and / or pumice of unkown origin (9.8%)**										

Mag: magmatic rocks
VC: volcaniclastic rocks
Sed: sedimentary rocks
Mn: Mn-crusts. - nodules

Abbreviations in Table Header:

TS: thin section billet
CHEM: chemistry slab to prepare materials for geochemical analysis
Ar/Ar: estimate of sample quality for $^{40}Ar/^{39}Ar$ dating
GI/MIN: potential glass and / or mineral separates
SED: sediment
REF: reference sample for immediate transport to home institution after cruise

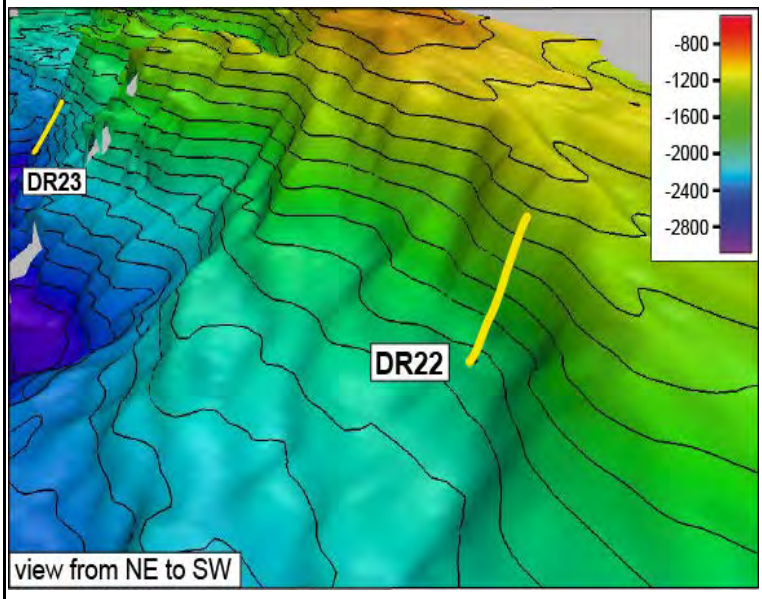
3D-maps:

All 3D-maps shown in this table are based on multi-beam data recorded on SO267 and have been generated using QPS Fledermaus 7.8.5 software (exaggeration: 2x; interval of contour lines: 100 m).

Abbreviations for Minerals and Materials:

Amph: Amphibole	MI: Melt Inclusions
Apt: Apatite	Mn: Mn-oxyhydroxides
Bi: Biotite	Mt: Magnetite
Cc: Calcite	Ol: Olivine
Chl: Chlorite	Opx: Orthopyroxene
Cpx: Clinopyroxene	Pl: Plagioclase
Fsp: Feldspar	Px: Pyroxene
Gm: Groundmass	Qz: Quartz
Ilm: Ilmenite	Zr: Zircon

SO267-DR22



Description of Location and Structure: central part of Fonualei Rift, central part of the western flank / fault scarp, dredge haul aimed to sample the upper section of the scarp (complementary to DR23 which targeted the lower slope).

Dredge on bottom UTC 21/12/18 16:49 hrs, lat 17°11.06'S, long 174°42.55´W, depth 1650 m
Dredge off bottom UTC 21/12/18 17:57 hrs, lat 17°11.05'S, long 174°42.92'E, depth 1370 m
total volume: 1/4 full
Comments: relatively homogenous, fresh, Qz-phyric dacitic (?) lava fragments and volcaniclastic rocks.

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR22-1	1. Rock Type: volcanic (dacitic lava?), largely fresh, only minor surface alteration 2. Size: c. 22x18x10 cm 3. Shape / Angularity: angular 4. Color of cut surface: light brownish - grey 5. Texture / Vesicularity: massive / moderatety vesicular (~10-15%), vesicles are open, some with secondary minerals (zeolites?) growing in the open space 6. Phenocrysts: fresh Qz (~5%, < 2 mm), Mt 7. Matrix: microcyrystalline 8. Secondary Minerals: tabular minerals (zeolites) in vugs 9. Encrustations: thin (< 2 mm) Mn-coating on outer surfaces	1	x					piece of bloc A (45x32x28cm)	
SO267-DR22-1X	further piece of bloc A, see description of sample DR22-1							archive sample	

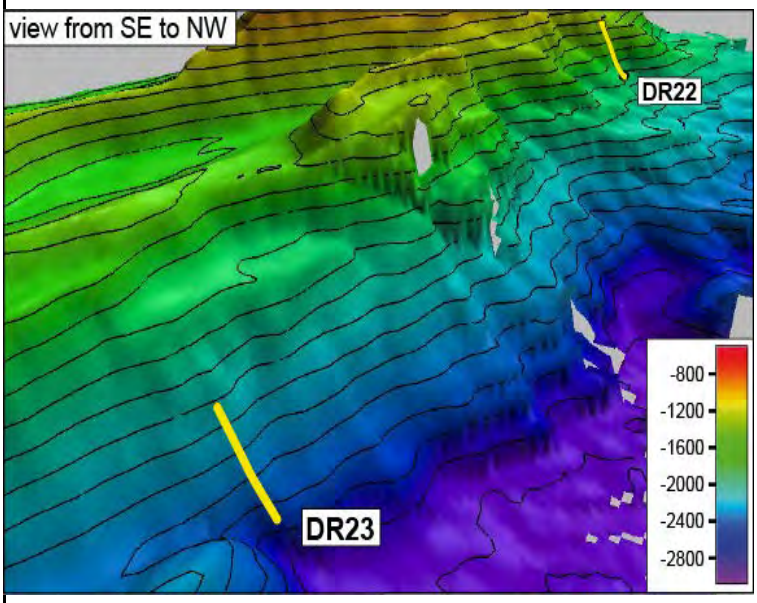
SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR22-2	1. Rock Type: volcanic (dacitic lava?), weakly altered 2. Size: c. 20x13x13cm 3. Shape / Angularity: angular 4. Color of cut surface: medium grey - beige 5. Texture / Vesicularity: massive / moderately vesicular (~10-15%), vesicles are open, some with secondary minerals (zeolites? phosphates?) growing in the open space 6. Phenocrysts: fresh Qz (< 5%, < 2 mm), disseminated Mt 7. Matrix: fine-grained, microcrystalline 8. Secondary Minerals: only in vesicles (see 5.) 9. Encrustations: thin (< 2 mm) Mn-coating on outer surfaces, weak oxidation 10. Comment: sample is a piece of bloc B							piece of bloc B (53x35x20cm)	
SO267-DR22-2X	further piece of bloc B, see description of sample DR22-2							archive sample	
SO267-DR22-3	1. Rock Type: volcanic (dacitic lava?), fresh 2. Size: 19x14x8 cm 3. Shape / Angularity: angular 4. Color of cut surface: medium grey 5. Texture / Vesicularity: massive / moderately vesicular (~15%, ≤ 10 mm), vesicles partly filled with bladed crystals 6. Phenocrysts: fresh Qz (~2%, < 1 mm), very tiny Mt (≤1%) 7. Matrix: micocrystalline 8. Secondary Minerals: only in vesicles (see 5.) 9. Encrustations: 5-6 mm Mn-coating on one half								
SO267-DR22-4	1. Rock Type: highly Qz-phyric volcanic rock (dacite?), surface alteration (FeMnOOH), some cracks with halo 2. Size: 18x12x8 mm 3. Shape / Angularity:angular 4. Color of cut surface: medium grey 5. Texture / Vesicularity: massive / slightly vesicular (~5%, ≤ 5 mm) 6. Phenocrysts: Qz (15%, ≤5 mm), accessory Mt 7. Matrix: microcrystalline 8. Secondary Minerals: only halos and FeMnOOH 9. Encrustations: ≤ 2 mm Mn coating	1	x						
SO267-DR22-5	1. Rock Type: moderately Qz-phyric volcanic rock (dacite?), fresh 2. Size: 17x11x9 cm 3. Shape / Angularity: subangular 4. Color of cut surface: light grey 5. Texture / Vesicularity: massive / moderately vesicular (~10%, ≤ 5 mm), angular, irregular shaped vesicles, pristine 6. Phenocrysts: subidiomorphic Qz (~5%, ≤ 1 mm), amphibole (?) (≤ 2 mm), Mt 7. Matrix: micro- to cryptocrystalline, massive 8. Secondary Minerals: none 9. Encrustations: < 1 mm Mn-coating								

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR22-6	1. Rock Type: moderately Qz-phyric volcanic rock (dacite?), fresh 2. Size: 21x10x9 cm 3. Shape / Angularity: angular 4. Color of cut surface: light to medium grey 5. Texture / Vesicularity: massive / moderately vesicular (~10%, ≤ 8 mm), subangular, irregular shaped vesicles, pristine 6. Phenocrysts: subidiomorphic Qz (~5%, ≤ 2 mm), accessory Mt 7. Matrix: cryptocrystalline 8. Secondary Minerals: none 9. Encrustations: < 1-2 mm Mn-coating	1	x						
SO267-DR22-7	1. Rock Type: volcanic (dacite?), fresh 2. Size:19x13x8 cm 3. Shape / Angularity: angular 4. Color of cut surface: medium grey to light brownish 5. Texture / Vesicularity: massive, homogeneous / moderately vesicular, elongated vesicles (~15%, ≤ 3 mm Ø but up to 20 mm long), not filled 6. Phenocrysts: Qz (~10%, ≤ 1.5 mm), accessory Mt 7. Matrix: cryptocrystalline 8. Secondary Minerals: none 9. Encrustations: intense but thin (< 2 mm) Mn-coating								
SO267-DR22-8	1. Rock Type: volcanic (dacite?), fresh 2. Size:18x11x7.5 cm 3. Shape / Angularity: angular 4. Color of cut surface: medium grey 5. Texture / Vesicularity: massive, homogeneous / silghtly vesicular (<5%, < 1 mm), subrounded, irregular vesicles 6. Phenocrysts: idiomorph to subidiomorph Qz (~5%, < 1 mm), accessory Mt, probably amphibole (?) 7. Matrix: cryptocrystalline 8. Secondary Minerals: none 9. Encrustations: < 1 mm Mn-coating	1	x						
SO267-DR22-9	1. Rock Type: volcanic (dacite?), fresh 2. Size:13x9x8 cm 3. Shape / Angularity: angular 4. Color of cut surface: pale grey, slightly greenish 5. Texture / Vesicularity: massive, microporphyritic / slightly vesicular (~1-2%, < 2 mm) 6. Phenocrysts: Qz (~8%, ≤ 3 mm), Fsp (< 5%, ≤ 1 mm), accessory Mt (~1%) 7. Matrix: fine-grained to microcrystalline 8. Secondary Minerals: none 9. Encrustations: minor oxidation on rock surface								
SO267-DR22-10	1. Rock Type: volcanic (dacite?), fresh 2. Size:11x10x8 cm 3. Shape / Angularity: angular 4. Color of cut surface: pale grey, slightly greenish 5. Texture / Vesicularity: massive, microporphyritic / sparsely vesicular (~1%, < 1 mm) 6. Phenocrysts: Qz (~8-10%, ≤ 2 mm), Fsp (< 2-3%, ≤ 1 mm), accessory Mt (~1%) and hematite 7. Matrix: fine-grained to microcrystalline 8. Secondary Minerals: ≤ 8 mm Qz-Fsp enclaves 9. Encrustations: minor oxidation on rock surface	2	x						

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR22-11	1. Rock Type: massive to brecciated volcanic rock, intermediate to felsic?, massive rock is fresh, moderate alteration of brecciated part 2. Size: 12x5x5 mm 3. Shape / Angularity: angular 4. Color of cut surface: dark grey to black 5. Texture / Vesicularity: massive to brecciated, microporphyritic / slightly vesicular (~3%, < 2 mm) 6. Phenocrysts: Qz (~7-10%, ≤ 2 mm), Fsp (≤ 5%, ≤ 2 mm) 7. Matrix: microcrystalline 8. Secondary Minerals: oxide crust between *in situ* clasts 9. Encrustations: oxidation on sample surface	1							
SO267-DR22-12	1. Rock Type: volcanic, intermediate?, almost fresh 2. Size: 11x6x3 cm 3. Shape / Angularity: angular 4. Color of cut surface: dark grey to brownish 5. Texture / Vesicularity: massive, microporphyritic, flow-banding? / almost dense 6. Phenocrysts: Qz (~5-8%, ≤ 2 mm), Fsp? (≤ 1%), accessory Mt 7. Matrix: microcrystalline, flow-banded 8. Secondary Minerals: none 9. Encrustations: ≤ 5 mm oxidized crust	1							
SO267-DR22-13	1. Rock Type: volcanic (dacite?), fresh 2. Size: 16x9x7 cm 3. Shape / Angularity: irregular, subangular 4. Color of cut surface:dark grey 5. Texture / Vesicularity: massive / moderately vesicular (~5-10%, ≤ 3 mm), subangular, irregular shaped vesicles, some alignment of vesicles -> flow bandig? 6. Phenocrysts: Qz (~1-2%, ≤ 1 mm) 7. Matrix: cryptocrystalline 8. Secondary Minerals: none 9. Encrustations: Mn surface staining	1	x						
SO267-DR22-14	1. Rock Type: volcanic (dacite?), fresh 2. Size: 18x14x8 cm 3. Shape / Angularity: angular 4. Color of cut surface: medium grey to grey-brownish 5. Texture / Vesicularity: massive / moderately vesicular (~10%, ≤ 15 mm), subrounded, elongated vesicles, some oxid fillings, random orientation of vesicles 6. Phenocrysts: Qz (~1-2%, ≤ 1.5 mm) 7. Matrix: cryptocrystalline 8. Secondary Minerals: none 9. Encrustations: surface staining, ≤ 2 mm Mn-crusts	1	x						
SO267-DR22-15	1. Rock Type: volcanic (dacite?), fresh 2. Size: 11x9x6 cm 3. Shape / Angularity: irregular, subrounded shape 4. Color of cut surface:medium grey to grey-reddish 5. Texture / Vesicularity: massive / moderately vesicular (~10%, ≤ 10 mm), irregular shape of vesicles, some are elongated, mostly pristine, minor zeolite fillings 6. Phenocrysts: Qz (~1%, ≤ 1 mm) 7. Matrix: cryptocrystalline 8. Secondary Minerals: zeolites in vugs 9. Encrustations: some surface staining	1	x						

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR22-16	1. Rock Type: volcanic (dacite?), fresh 2. Size: 7x5x4.5 cm 3. Shape / Angularity: subangular 4. Color of cut surface: medium grey to brownish 5. Texture / Vesicularity: massive / moderately vesicular (~5%, ≤ 10 mm), elongated vesicles, pristine 6. Phenocrysts: aphyric, accessory Qz? 7. Matrix: cryptocrystalline 8. Secondary Minerals: zeolites in vugs 9. Encrustations: some surface staining								
SO267-DR22-17	1. Rock Type: volcanic (dacite?), slightly altered 2. Size: 16x13x8 cm 3. Shape / Angularity: irregular, subrounded 4. Color of cut surface: light greenish to grey 5. Texture / Vesicularity: massive / slightly vesicular (< 1%), 6. Phenocrysts: hypidiomorph Qz (~5%, ≤ 2 mm) 7. Matrix: cryptocrystalline 8. Secondary Minerals: vugs filled with hematite (?), alteration halos 9. Encrustations: up to 3 cm reddish crust (Fe + carbonate?, goethite?)	1	x						
SO267-DR22-18	1. Rock Type: volcanic (dacite?), slightly altered, similar to -17 2. Size: 6x6x5 cm 9. Encrustations: staining and up to 2 cm crust (Fe + carbonate? Mn?)								
SO267-DR22-19	1. Rock Type: volcanic (dacite?), slightly altered, similar to -17 2. Size:8x8x4 cm								
SO267-DR22-20	1. Rock Type: volcaniclastic, slightly altered 2. Size: 5x6x3 cm 3. Shape / Angularity: subangular 4. Color of cut surface: greenish-grey to brownish 5. Texture / Vesicularity: massive, vuggy, open vugs, some graduation 6. Phenocrysts: none 7. Matrix: medium-grained (sand to silt) 8. Secondary Minerals: none 9. Encrustations: some Mn staining	1							

SO267-DR23



Description of Location and Structure: central part of Fonualei Rift, central part of the western flank / fault scarp, dredge haul aimed to sample the lower section of the scarp (complementary to DR22 which targeted the upper slope).

Dredge on bottom UTC 21/12/18 20:48 hrs, lat 17°18.46'S, long 174°42.78´W depth 2549 m
Dredge off bottom UTC 21/12/18 22:00 hrs, lat 17°18.41'S, long 174°43.19'W, depth 2122 m
total volume: 1/5 full
Comments: rock assemblage is generally more mafic as in DR22 (carried out at the upper section of the same slope) and comprises three major rock types: (1) various fresh or only slightly altered, mafic to intermediate lava fragments with none or only minor amounts of phenocrysts, (2) some volcaniclastic rocks, among them Glassy scoria, and (3) a broad spectrum of more or less consolidated /

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR23-1A	1. Rock Type: volcanic, mafic to intermediate, fresh 2. Size: 14x9x4 cm 3. Shape / Angularity: angular, slightly rounded edges 4. Color of cut surface: dark grey 5. Texture / Vesicularity: massive / slightly to sparsely vesiculated 6. Phenocrysts: Qz (≤ 2%, ≤ 1 mm), some Ol (≤ 1 mm) 7. Matrix: microcrystalline 8. Secondary Minerals: none 9. Encrustations: none	1	x						
SO267-DR23-1B	1. Rock Type: same as DR23-1A 2. Size: 9x7.5x4.5 cm	3	x						
SO267-DR23-1C	1. Rock Type: same as DR23-1A 2. Size: 10.5x9x7.5 cm	2	x						
SO267-DR23-1D	1. Rock Type: same as DR23-1A 2. Size: 12x7.5x5 cm								

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR23-1E	1. Rock Type: same as DR23-1A 2. Size: 9.5x6.5x5 cm								
SO267-DR23-1F	1. Rock Type: same as DR23-1A 2. Size: 14x10x7 cm	1	x						
SO267-DR23-1G	1. Rock Type: same as DR23-1A 2. Size: 10.5x9.5.5 cm								
SO267-DR23-2A	1. Rock Type: volcanic, mafic to intermediate, fresh 2. Size: 16x14x10 cm 3. Shape / Angularity: angular 4. Color of cut surface: medium to dark grey 5. Texture / Vesicularity: massive / sparsely vesiculated 6. Phenocrysts: Qz (≤ 1%, ≤ 1 mm) 7. Matrix: microcrystalline 8. Secondary Minerals: none 9. Encrustations: surface oxidation	1	x						
SO267-DR23-2B	1. Rock Type: same as DR23-2A 2. Size: 9.5x7x6.5 cm 9. Encrustations: none	1	x						
SO267-DR23-2C	1. Rock Type: same as DR23-2A 2. Size: 7.5x7x6 cm 9. Encrustations: none								
SO267-DR23-3	1. Rock Type: volcanic, mafic to intermediate, fresh 2. Size: 11x7.5x3.5 cm 3. Shape / Angularity: angular to subangular 4. Color of cut surface: medium to dark grey 5. Texture / Vesicularity: massive / moderately vesicular (~5-8%, ≤ 15 mm) 6. Phenocrysts: Qz (?) (1-2%) 7. Matrix: microcrystalline 8. Secondary Minerals: iron oxides 9. Encrustations: minor surface oxidation	1	x						

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR23-4A	1. Rock Type: volcanic (mafic), largely fresh 2. Size: 10x9.5x7 cm 3. Shape / Angularity: angular 4. Color of cut surface: dark grey 5. Texture / Vesicularity: massive, flow-banded / moderately vesicular (8-10%), streched / flattened vesicles 6. Phenocrysts: Ol (~1%, ≤ 2 mm) 7. Matrix: micro- to cryptocrystalline, flow foliation 8. Secondary Minerals: none 9. Encrustations: ≤ 1 mm thick crusts on surface	1	x						
SO267-DR23-4B	1. Rock Type: same as DR23-4A 2. Size: 11x9x7.5 cm	1	x						
SO267-DR23-4C	1. Rock Type: same as DR23-4A 2. Size: 10.5x9x5 cm								
SO267-DR23-5	1. Rock Type: volcanic, mafic to intermediate, weakly altered 2. Size: 11x8x7 cm 3. Shape / Angularity: angular 4. Color of cut surface: dark grey 5. Texture / Vesicularity: flow banded / sparsely vesicular, vesicles ≤ 1.5 mm Ø 6. Phenocrysts: Ol (3-4%, ≤ 1 mm), fresh 7. Matrix: micro- to cryptocrystalline 8. Secondary Minerals: none	1	x						
SO267-DR23-6	1. Rock Type: volcanic, mafic to intermediate?, largely fresh 2. Size: 12x9x7.5 cm 3. Shape / Angularity: angular 4. Color of cut surface: dark brown 5. Texture / Vesicularity: massive / moderately vesicular (~5-10%, ≤2 mm) 6. Phenocrysts: Fsp (?) microphenocrysts (5-8%) Ol (≤ 1.5 mm) 7. Matrix: microcrystalline 8. Secondary Minerals: none 9. Encrustations: blackish crust on surface (Mn?)	1	x						
SO267-DR23-7	1. Rock Type: volcanic, mafic, slightly altered 2. Size: 9x6.5x4.5 cm 3. Shape / Angularity: angular to subangular 4. Color of cut surface: medium grey 5. Texture / Vesicularity: massive / moderately vesicular (8-10%, < 6 mm) 6. Phenocrysts: traces of Fsp microphenocrysts 7. Matrix: microcrystalline 8. Secondary Minerals: none 9. Encrustations: none	1	x						

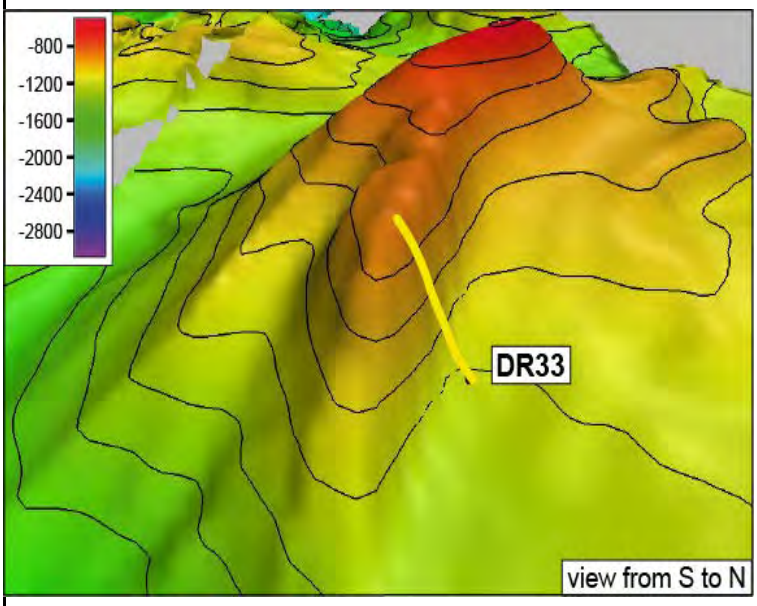
SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR23-8A	1. Rock Type: volcanic, mafic, slightly altered 2. Size: 14x9x4.5 cm 3. Shape / Angularity: subangular to subrounded 4. Color of cut surface: medium grey 5. Texture / Vesicularity: massive / moderately vesicular (≤ 10%, < 7 mm) 6. Phenocrysts: none 7. Matrix: micro- to cryptocrystalline 8. Secondary Minerals: none 9. Encrustations: none	1	x						
SO267-DR23-8B	1. Rock Type: same as DR23-8A 2. Size: 14x14x11.5 cm	1	x						
SO267-DR23-9A	1. Rock Type: volcanic, mafic, largely fresh 2. Size: 22x19.5x13.5 cm 3. Shape / Angularity: angular to subangular 4. Color of cut surface: medium greenish grey 5. Texture / Vesicularity: massive, lithophysae / moderately vesicular (~3-5%, < 20 mm) 6. Phenocrysts: none 7. Matrix: fine-grained 8. Secondary Minerals: none 9. Encrustations: none 10. Comment: rock is weakly magnetic	1	x						
SO267-DR23-9B	1. Rock Type: same as DR23-9A 2. Size: 12x9.5x8 cm	1	x						
SO267-DR23-10	1. Rock Type: volcanic, mafic (?), slightly altered 2. Size: 15x6.5x4 cm 3. Shape / Angularity: angular 4. Color of cut surface: pale grey green 5. Texture / Vesicularity: massive / sparsely vesicular (≤ 2 mm) 6. Phenocrysts: fine Mt (≤ 2%) 7. Matrix: fine-grained, microcrystalline 8. Secondary Minerals: none 9. Encrustations: none	1	x						
SO267-DR23-11A	1. Rock Type: volcaniclastic, scoria, fresh 2. Size: 13x10x6 cm 3. Shape / Angularity: angular, corrugated 4. Color of cut surface: black 5. Texture / Vesicularity: scoriaceous / highly vesicular, > 60% vesicles 6. Phenocrysts: white microphenocr. (~5%, << 1 mm) 7. Matrix: glassy 8. Secondary Minerals: none 9. Encrustations: none 10. Comment: rock contains / consists of fresh glass, but is too brittle to cut thin section or geochemistry slabs				GI				

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR23-11B	1. Rock Type: same as DR23-11A 2. Size: 13.5x15x9 cm				GI				
SO267-DR23-12	1. Rock Type: volcanic, intermediate to felsic (?), slightly to moderately altered 2. Size: 9.5x7x4.5 cm 3. Shape / Angularity: subangular 4. Color of cut surface: pale grey - beige 5. Texture / Vesicularity: massive to granular / sparsely to highly vesicular 6. Phenocrysts: traces of magnetite or ilmenite, altered 7. Matrix: microcrystalline 8. Secondary Minerals: none 9. Encrustations: none								
SO267-DR23-13	1. Rock Type: sedimentary, polymict (volcaniclastic?) 2. Size: 9x7x6 cm 3. Shape / Angularity: subangular 4. Color of cut surface: dark brown 5. Texture / Vesicularity: micro-conglomerate, small pebbles 6. Phenocrysts: relicts of Ol (?) 7. Matrix: fine-grained 8. Secondary Minerals: iron oxides 9. Encrustations: none 10. Comment: epiclastic rock, not totally consolidated, oxidized, probably polygenetic					x			
SO267-DR23-14	1. Rock Type: sedimentary 2. Size: 16.5x12x5 cm 3. Shape / Angularity: subangular to subrounded 4. Color of cut surface: medium brown to yellowish 5. Texture / Vesicularity: subangular to subrounded clasts 6. Phenocrysts: none 7. Matrix: fine-grained to sandy matrix 8. Secondary Minerals: iron oxides? 9. Encrustations: none 10. Comment: polygenetic rock					x			
SO267-DR23-15A	1. Rock Type: sedimentary (silt- / mudstone) 2. Size: 11x6x5 cm 3. Shape / Angularity: subrounded to rounded 4. Color of cut surface: pale grey to slightly greenish 5. Texture / Vesicularity: bioturbated? 6. Phenocrysts: none 7. Matrix: fine-grained (silt to clay) 8. Secondary Minerals: none 9. Encrustations: none 10. Comment: rock is not completely lithified					x			
SO267-DR23-15B	1. Rock Type: similar to DR23-15A 2. Size: 12.5x10x7 cm					x			

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR23-15C	1. Rock Type: similar to DR23-15A 2. Size: 8.5x8x3 cm					x			
SO267-DR23-15D	1. Rock Type: similar to DR23-15A 2. Size: 9x6.5x4.5 cm					x			
SO267-DR23-15E	1. Rock Type: similar to DR23-15A 2. Size: 8.5x7x3.5 cm					x			
SO267-DR23-16A	1. Rock Type: sedimentary (silt- / mudstone) 2. Size: 12.5x9.5x5.5 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: pale grey to slightly greenish 5. Texture / Vesicularity: heterogeneous, stained (alteration? bioturbation?) 6. Phenocrysts: none 7. Matrix: fine-grained (silt to clay) 8. Secondary Minerals: none 9. Encrustations: none 10. Comment: rock is not lithified					x			
SO267-DR23-16B	1. Rock Type: similar to DR23-16A 2. Size: 11x6x5.5 cm					x			
SO267-DR23-17	1. Rock Type: sedimentary (silt- / mudstone) 2. Size: 19x13x6 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: pale grey to beige 5. Texture / Vesicularity: heterogeneous, stained (alteration? bioturbation?) 6. Phenocrysts: none 7. Matrix: medium-grained (silt to sand), heterogeneous 8. Secondary Minerals: none 9. Encrustations: none 10. Comment: rock is not fully lithified					x			

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR23-18	1. Rock Type: sedimentary (siltstone) 2. Size: 10.5x8.5x7.5 cm 3. Shape / Angularity: subangular to subrounded 4. Color of cut surface: pale grey to beige 5. Texture / Vesicularity: bioturbated? 6. Phenocrysts: none 7. Matrix: fine-grained (silt) 8. Secondary Minerals: none 9. Encrustations: none 10. Comment: rock is not fully lithified					x			
SO267-DR23-19	1. Rock Type: sedimentary (silt- / sandstone) 2. Size: 10x6x5.5 cm 3. Shape / Angularity: subangular to subrounded 4. Color of cut surface: beige-brown, slightly orange tinge 5. Texture / Vesicularity: massive, epigranular 6. Phenocrysts: none 7. Matrix: medium-grained (silt to sand) 8. Secondary Minerals: some reddish-brown spotty staining (Fe-oxide?, hematite) 9. Encrustations: none 10. Comment: rock is not fully lithified					x			
SO267-DR23-20	1. Rock Type: sedimentary (mud- / siltstone) 2. Size: 14x13x7 cm 3. Shape / Angularity: subangular to subrounded 4. Color of cut surface: beige-brown, slightly greenish tinge 5. Texture / Vesicularity: finely bedded to laminated, possible concretions or bioturbation 6. Phenocrysts: none 7. Matrix: fine-grained (silt to clay) 8. Secondary Minerals: none 9. Encrustations: none 10. Comment: rock is not fully lithified					x			
SO267-DR23-21	1. Rock Type: sedimentary (silt- / sandstone) 2. Size: 13x8.5x6.5 cm 3. Shape / Angularity: subangular to subrounded 4. Color of cut surface: beige-brown 5. Texture / Vesicularity: matrix with round concretions? (~5-10%, 5 - 10 mm Ø) and round to subround white grains (~1-2%, < 1 mm) 6. Phenocrysts: none 7. Matrix: medium-grained (sand to silt) 8. Secondary Minerals: none 9. Encrustations: dark brown to orange, < 1 mm thick crust (Mn?) 10. Comment: rock is not fully lithified					x			

SO267-DR33



Description of Location and Structure: area south of Fonualei Rift, SW-NE-elongated volcanic (?) feature which appears to sit on a ± N-S-striking fault or volcanic rift, dredge haul has been conducted on the eastern slop of the southern arm of the N-S-fault / rift.

Dredge on bottom UTC 23/12/18 05:57 hrs, lat 18°00.55'S, long 174°31.41´W depth 1210 m
Dredge off bottom UTC 23/12/18 07:06 hrs, lat 18°00.27'S, long 174°31.66'W, depth 822 m
total volume: 1/2 full
Comments: parlly highly Pl-phyric, basaltic to basaltic-andesitic lava fragments, various volcaniclastic rocks, and (calcareous) sedimentary rocks. Some of the lavas have chillded Glassy margins and some of the volcaniclastics may contain spots of fresh glass.

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR33-1A	1. Rock Type: Pl-ultraphyric volcanic rock (basaltic andesite or basalt), only minor weathering 2. Size: 16x15x8 cm 3. Shape / Angularity: angular, blocky 4. Color of cut surface: medium grey 5. Texture / Vesicularity: porphyritic / non-vesicular 6. Phenocrysts: Pl glomerocrysts, pristine (20-25%, ≤ 5 mm), Ol, slightly altered (~1%, ≤ 1 mm) 7. Matrix: cryptocrystalline 8. Secondary Minerals: palagonite on surface 9. Encrustations: Fe staining 10. Comment: chilled margins, may contain fresh glass, 6 hand specimens of this lithology are taken as archive sample DR33-14X	1	x		G I				
SO267-DR33-1B	1. Rock Type: same as DR33-1A 2. Size: 21x15x9 cm				G I				
SO267-DR33-1C	1. Rock Type: same as DR33-1A 2. Size: 17x11x9 cm				G I				

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR33-1D	1. Rock Type: same as DR33-1A 2. Size: 11x10x7 cm	1	x		G I				
SO267-DR33-2A	1. Rock Type: Pl-ultraphyric volcanic rock (basaltic andesite or basalt), only minor weathering 2. Size: 10x10x9 cm 3. Shape / Angularity: subangular, blocky 4. Color of cut surface: medium grey 5. Texture / Vesicularity: porphyritic / moderately vesicular (5-10%, ≤ 20 mm), subrounded vesicles 6. Phenocrysts: Pl glomerocrysts, pristine (20-25%, ≤ 5 mm), Ol, slightly altered (~1%, ≤ 1 mm) 7. Matrix: cryptocrystalline 8. Secondary Minerals: palagonite on surface 9. Encrustations: Fe staining 10. Comment: chilled margins, may contain fresh glass - vesicular variety of DR33-1	1	x		G I				
SO267-DR33-2B	1. Rock Type: same as DR33-2A 2. Size: 10x10x9 cm				G I				
SO267-DR33-2C	1. Rock Type: same as DR33-2A 2. Size: 19x14x13 cm				G I				
SO267-DR33-2D	1. Rock Type: same as DR33-2A 2. Size: 11x10x7 cm	1	x		G I				
SO267-DR33-3A	1. Rock Type: Pl-phyric volcanic rock, only minor weathering 2. Size: 7x7x6 cm 3. Shape / Angularity: angular, blocky 4. Color of cut surface: medium grey 5. Texture / Vesicularity: porphyritic / highly vesicular (25-30%, ≤ 15 mm), elongated to round vesicles, unfilled 6. Phenocrysts: tabular Pl, pristine (10-15%, ≤ 7 mm), Ol, slightly altered (3-4%), possibly some accessory Px 7. Matrix: cryptocrystalline 8. Secondary Minerals: none 9. Encrustations: Fe staining 10. Comment: chilled margins, may contain fresh glass - vesicular variety of DR33-1	1	x		G I				

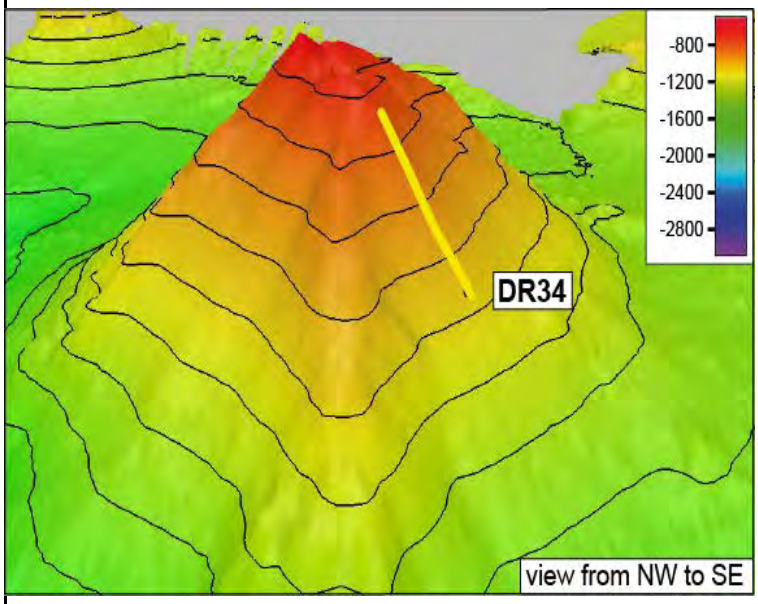
SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR33-3B	1. Rock Type: same as DR33-3A 2. Size: 8x7x5 cm								
SO267-DR33-4	1. Rock Type: volcaniclastic rock (lapilli tuff), slightly altered 2. Size: 9x7x6 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: dark brown to blackish-grey 7. Matrix: fine-grained, partly missing 10. Comment: main components of this lapilli tuff are clasts of DR33-1 through -3 and single crystals including Pl, Ol, and partially altered Mt	1							
SO267-DR33-5	1. Rock Type: porphyric volcanic rock, fresh 2. Size: 14x8x3 cm 3. Shape / Angularity: subrounded, blocky 4. Color of cut surface: reddish grey 5. Texture / Vesicularity: highly porphyritic / non vesicular 6. Phenocrysts: Pl (20-30%, ≤ 5 mm), possibly as glomerocrysts, fine-grained to microcrystalline Qz, accessory Px and Mt 7. Matrix: fine-grained, Qz-rich 8. Secondary Minerals: none 9. Encrustations: thin Mn-coating	1	x						
SO267-DR33-6A	1. Rock Type: Pl-phyric volcanic rock (andesite), fresh 2. Size: 20x13x11 cm 3. Shape / Angularity: angular boulder 4. Color of cut surface: dark grey 5. Texture / Vesicularity: porphyritic / highly vesicular (~25%, up to > 30 mm), rounded and elongated vesicles 6. Phenocrysts: Pl glomerocrysts (~15%, ≤ 10 mm) 7. Matrix: microcrytalline 8. Secondary Minerals: none 9. Encrustations: none 10. Comment: minor weathering at surface	1	x					piece of bloc D (34x22x20 cm)	
SO267-DR33-6B	1. Rock Type: same as DR33-6A								
SO267-DR33-6C	1. Rock Type: same as DR33-6A								no picture
SO267-DR33-6D	1. Rock Type: same as DR33-6A	1	x						

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR33-7	1. Rock Type: Pl-phyric volcanic rock (andesite), fresh, similar to DR33-6 2. Size: 13x9x7 cm 6. Phenocrysts: besides Pl glomerocrysts as in DR33-6 accessory Ol	1	x					piece of bloc C (22x21x18	
SO267-DR33-7X	2 additional hand specimens of bloc C from which sample DR33-7 has been taken, for description see DR33-7							archive sample	no picture
SO267-DR33-8A	1. Rock Type: sedimentary (breccia) 2. Size: 18x9x8 cm 3. Shape / Angularity: subrounded, elongated spherule 4. Color of cut surface: medium brown with black, green, and red components 5. Texture / Vesicularity: unsorted, contains, among others, variable altered fragments of andesitic lava, red components are alteration of magnetite-bearing rocks, components subrounded to subangular 7. Matrix: brownish, fine-grained (silt to clay) 9. Encrustations: minor Mn staining 10. Comment: polymict breccia, volcaniclastic (epiclastic)?	1				x			
SO267-DR33-8B	1. Rock Type: same as DR33-8A 2. Size: 15x11x8 cm					x			no picture
SO267-DR33-9	1. Rock Type: sedimentary, resedimented volcaniclastic? 2. Size: 16x14x9 cm 3. Shape / Angularity: subangular 4. Color of cut surface: brown matrix, clasts variable 5. Texture / Vesicularity: matrix-supported (borderline framework-supported, ~40% clasts, 3 clast sizes: a) 20 - 50 mm, b) 5 - 20 mm, and c) < 5 mm, clasts have variable compositions, dominately Fsp-porphyritic basalt (fresh and altered), minor scoria, small (< 20 mm) bright red clasts (jasper?), clasts are poorly sorted and subangular to subrounded 7. Matrix: brown to slightly orange, medium-grained (sand to silt) 9. Encrustations: patchy, thin (< 1 mm) black-brown coating (Mn?) 10. Comment: polymict epiclastic breccia	1				x			

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR33-10	1. Rock Type: volcaniclastic, lapilli tuff, flow breccia, clasts fresh, matrix appears partly altered 2. Size: 13x10x7 cm 3. Shape / Angularity: subangular 4. Color of cut surface: matrix is brown-orange with green tinge, clasts are black 5. Texture / Vesicularity: matrix-supported, ~30-35% clasts, two dominat clast sizes: a) 5-20 mm, b) 2-5 mm, clasts are all same composition (aphanitic, aphyric, glassy basalt), coarse bedding defined by clast size and concentration, beds are 5-30 mm thick (only 3 beds visible in hand specimen), some clasts have shard morphology (sharp, concave boundarys), clasts are angular to subangular 7. Matrix: medium-grained (sand to silt) (fine glass?) 8. Secondary Minerals: none visible, possibly some clay alteration of matrix 9. Encrustations: none 10. Comment: check for spots of fresh glass				may contain fresh Glass				
SO267-DR33-11A	1. Rock Type: volcaniclastic (resedimented), no visible pervasive alteration, possibly some altered clasts 2. Size: 18x9x8 cm 3. Shape / Angularity: subangular 4. Color of cut surface: matrix is dark brown with greenish tinge, clasts are dark grey or reddish-brown 5. Texture / Vesicularity: interior appears to be matrix supported but borderline is framework-supported, 2 dominat clast sizes: a) 2-5 mm, b) > 10 mm, clasts are dominantly FSP-porphyritic lava with variable vesicle content (some clasts are scoria), 1-2% of the clasts are reddish-brpwn (alteration?), may have some liberated crystals in matrix (?) but more likely to be Qz-Cc-filled amygdules at clast margins, clasts are subangular to subrounded 7. Matrix: medium grained (sand to silt) 9. Encrustations: none 10. Comment: check for spots of fresh glass				may contain fresh Glass				
SO267-DR33-11B	1. Rock Type: same as DR33-11A 2. Size: 10x9x6 cm				may contain fresh Glass				
SO267-DR33-12	1. Rock Type:volcanic (basalt to basaltic andesite) with some flow breccia, fresh 2. Size: 20x9x9 cm 3. Shape / Angularity: subangular 4. Color of cut surface: grey 5. Texture / Vesicularity: rock consists of 2 components: massive mafic lava and monolithic volcaniclastics, contact is transitional from massive to fractured to *in situ* brecciated with hyaloclastite (some clast rotation), clasts are 5 to 20 mm and angular to subangular; massive lava has 1-3% vesicles and Qz-Cc (?) filled amygdules 6. Phenocrysts: Pl (5-10%, 1-2 mm) 7. Matrix: fine- to medium grained, pl and mafic minerals too fine to see 9. Encrustations: <1 mm thick patchy brown-black coating	1	x						

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR33-13A	1. Rock Type: sedimentary (calcareous) 2. Size: 27x19x9 cm 3. Shape / Angularity: subangular 4. Color of cut surface: reddish-orange 5. Texture / Vesicularity: matrix-supported, framework components are pumice clasts (10-50 mm) and shell / coral fragments, shell fragments / calcareous material dominate rock 7. Matrix: coarse, ≤ 1mm lithics and shells, high porosity, effervesces readily under 10% HCl 8. Secondary Minerals: none visible 9. Encrustations: minor patches of brown-black, <1 mm coating (Mn?) 10. Comment: some clasts may contain spots of fresh glass				may contain fresh glass	x			
SO267-DR33-13B	1. Rock Type: same as DR33-13A 2. Size: 28x10x6 cm				may contain fresh glass	x			
SO267-DR33-14X	see description of sample DR33-1, 6 hand specimens with some glass of lithology -1				G l			archive sample	

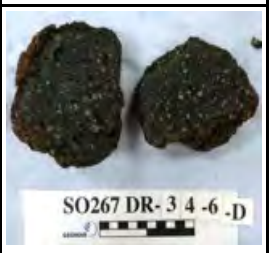
SO267-DR34



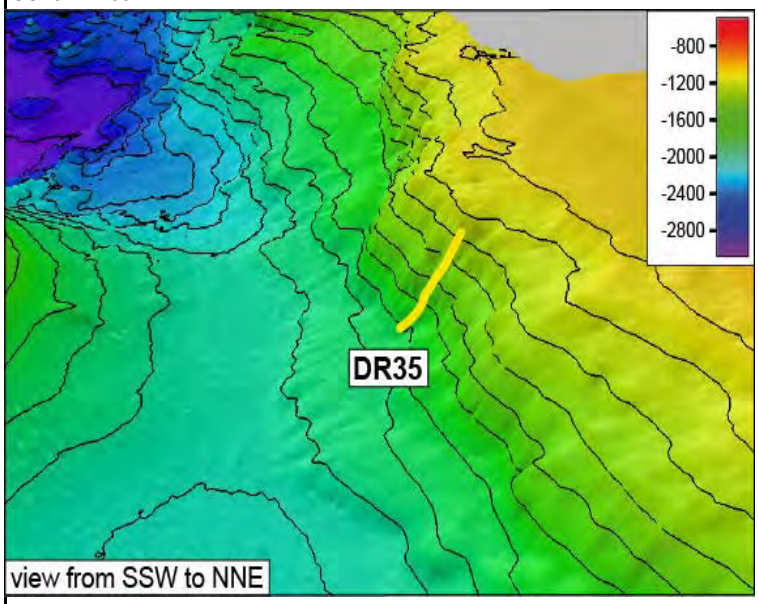
Description of Location and Structure: area south of Fonualei Rift, conical volcano at the southern tip of the rift, dredge haul along the central part of the western flank.

Dredge on bottom UTC 23/12/18 08:47 hrs, lat 17°54.56'S, long 174°30.79´W depth 1042 m
Dredge off bottom UTC 23/12/18 09:52 hrs, lat 17°54.51'S, long 174°30.45'W, depth 709 m
total volume: 1/4 full
Comments: dredge yiedled exclusively relatively homogeneous, Pl-phyric pillow and sheet flow fragments.

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR34-1	1. Rock Type: volcanic, basaltic-andesitic, fresh 2. Size: 11x8x8 cm 3. Shape / Angularity: angular 4. Color of cut surface: dark grey 5. Texture / Vesicularity: highly phyric, glomeroporphyritic / moderately vesicular (~15%, ≤ 20 mm), round and elongated vesicles 6. Phenocrysts: Pl (~10%, ≤ 7 mm), Ol (2-3%, < 2 mm) 7. Matrix: cryptocrystalline 8. Secondary Minerals: none 9. Encrustations: none	1	x						
SO267-DR34-2	1. Rock Type: volcanic, similar to DR34-1 2. Size: 20x18x11 cm 5. Texture / Vesicularity: lower than -1 (~7-8%), vesicles elongated (≤10 mm) or round (<2 mm) 6. Phenocrysts: more and larger Pl glomerocrysts than -1 (10-15%, ≤10 mm)	1	x						
SO267-DR34-3A	1. Rock Type: volcanic, basaltic-andesitic, probably a pillow, almost fresh 2. Size: c. 19x17x16 cm 3. Shape / Angularity: spherical, angular 4. Color of cut surface: dark grey 5. Texture / Vesicularity: moderately phyric, glomeroporphyritic / highly vesicular (30-35%, ≤30 mm), spherical round vesicles 6. Phenocrysts: Pl glomerocrysts (~15%, ≤ 10 mm), Ol (~2%) 7. Matrix: cryptocrystalline 8. Secondary Minerals: none 9. Encrustations: minor hydrothermal alteration 10. Comment: contains spots of fresh glass	1	x		G —			piece of bloc A (38x40x31 cm)	
SO267-DR34-3B	1. Rock Type: same as DR33-3A 2. Size: 21x15x10 cm								
SO267-DR34-4	1. Rock Type: volcanic, similar to DR34-3A but AA flow type, almost fresh 2. Size: 26x16x12 cm 3. Shape / Angularity: elongated, angular 4. Color of cut surface: dark grey 5. Texture / Vesicularity: moderately phyric, glomeroporphyritic / lower vesicularity than -3 (≤ 5%), spherical round vesicles 6. Phenocrysts: Pl glomerocrysts (~15%, ≤ 10 mm), Ol (~2%) 7. Matrix: cryptocrystalline 8. Secondary Minerals: none 9. Encrustations: minor hydrothermal alteration 10. Comment: glassy crust at chilled margins, glass sample taken	1	x		Gl (Glass slab taken)				

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR34-5A	1. Rock Type: same as DR33-3 but lower vesicularity 2. Size: 9x8x6 cm	1	x						
SO267-DR34-5B	1. Rock Type: same as DR33-5A 2. Size: 8x6x5 cm								
SO267-DR34-5C	1. Rock Type: same as DR33-5A 2. Size: 9x8x7 cm								
SO267-DR34-6A	1. Rock Type: same as DR34-2 but rock surface is more intensely altered 2. Size: 11x10x7 cm 9. Encrustations: Fe staining on the rock surface by hydrothermal alteration 10. Comment: rock is still pristine in the inside	1							
SO267-DR34-6B	1. Rock Type: same as DR34-6A 2. Size: 11x10x7 cm								
SO267-DR34-6C	1. Rock Type: same as DR34-6A 2. Size: 17x15x12 cm 10. Comment: this piece shows a nice flow top texture								
SO267-DR34-6D	1. Rock Type: same as DR34-6A 2. Size: 12x10x10 cm								

SO267-DR35

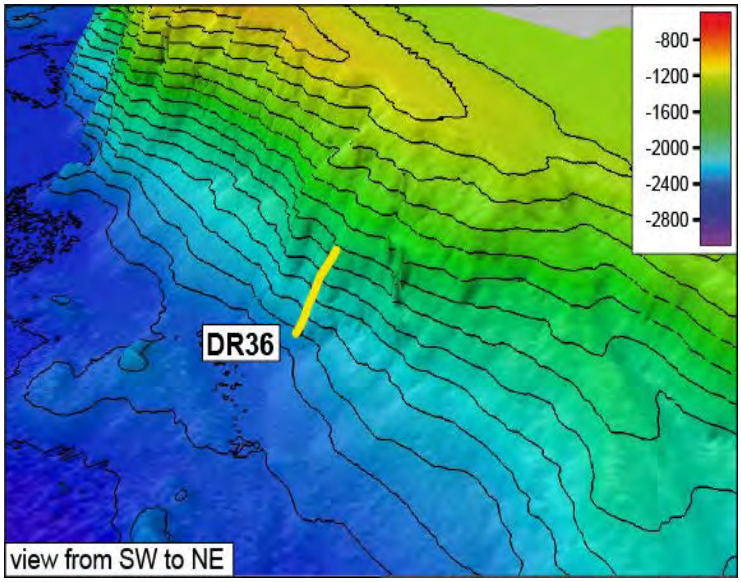


Description of Location and Structure: southern part of Fonualei Rift, dredge haul aimed to sample the uppermost section of the western scarp of the rift.

Dredge on bottom UTC 23/12/18 11:52 hrs, lat 17°48.03'S, long 174°28.10´W depth 1691 m
Dredge off bottom UTC 23/12/18 12:51 hrs, lat 17°48.05'S, long 174°27.81'W, depth 1245 m
total volume: 3 rocks
Comments: only semi-consolidated sediments; accordinGly the uppermost section of the western flank of the rift appears to consist of or is covered by sediments.

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR35-1	1. Rock Type: sedimentary 2. Size: 23x14x11 cm 3. Shape / Angularity: subangular 4. Color of cut surface: beige, brownish 5. Texture / Vesicularity: homogeneous, massive 7. Matrix: fine-grained 9. Encrustations: partly thin (< 1 mm) Mn encrustations 10. Comment: semi-consolidated					x		p. of bloc A (32x11x17 cm)	

SO267-DR36



Description of Location and Structure: southern part of Fonualei Rift, dredge haul aimed to sample the lowermost section of the western scarp of the rift, dredge haul was carried out 12 nm north of DR35 to avoid step-faulting.

Dredge on bottom UTC 23/12/18 15:39 hrs, lat 17°36.31'S, long 174°29.55´W depth 2286 m
Dredge off bottom UTC 23/12/18 16:40 hrs, lat 17°36.41'S, long 174°29.27'W, depth 1811 m
total volume: 1/6 full
Comments: lava fragments and a broad variety of volcaniclastic rocks (mostly lapilli tuff); dominant lithology among the lava are aphyric to sparsely Fsp-phyric, mafic to intermadiate lava fragments, Px-phyric and more altered almost aphyric lava fragments are

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR36-1	1. Rock Type: volcanic, mafic to intermediate, fresh 2. Size: 14x8x7 cm 3. Shape / Angularity: subangular 4. Color of cut surface: grey 5. Texture / Vesicularity: massive / sparsely vesiculated (1-5%) 6. Phenocrysts: sparse Fsp (~1.3%, 1-2 mm), possibly some pyroxene 7. Matrix: fine-grained, epigranular 8. Secondary Minerals: none 9. Encrustations: patchy, black-brown crust (< 1 mm, Mn?)	1	x						
SO267-DR36-2	1. Rock Type: volcanic, mafic to intermediate, weak green-grey alteration only on outer surface 2. Size: 9x7x6 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: dark grey 5. Texture / Vesicularity: massive / moderately vesicular (10-15%, 1-8 mm) 6. Phenocrysts: Pl (traces, < 1 mm) 7. Matrix: fine-grained, aphanitic 8. Secondary Minerals: clay (?) at outer rim 9. Encrustations: minor patchy, black encrustations (< 1 mm, Mn?)	1	x						
SO267-DR36-3A	1. Rock Type: volcanic, mafic to intermdediate, alteration only at sample rim 2. Size: 22x14x7 cm 3. Shape / Angularity: subangular 4. Color of cut surface: grey 5. Texture / Vesicularity: massive / almost dense, only rare vesicles (< 1 mm) filled with Qz, ± Cc, or zeolite (?) 6. Phenocrysts: none (aphyric) 7. Matrix: fine- to medium-grained, consists of Pl and fine-grained mafic minerals 8. Secondary Minerals: clay (?) at outer rim 9. Encrustations: patchy, black-brown encrustations (< 1 mm, Mn?) 10. Comment: samples have a 2-6 mm dark rim which appears to be an altered equivalent to the fresh center	1	x						
SO267-DR36-3B	1. Rock Type: same as DR36-3A 2. Size: 8x8x2 cm								
SO267-DR36-4A	1. Rock Type: volcanic, mafic to intermediate, weakly altered 2. Size: 22x18x14 cm 3. Shape / Angularity: subangular 4. Color of cut surface: grey 5. Texture / Vesicularity: massive, porphyritic / slightly vesicular (1-5%, < 1-5 mm) 6. Phenocrysts: Px (~5%, 1-7 mm), stubby, equant prisms 7. Matrix: fine- to medium-grained, consists of Pl and fine-grained mafic minerals 8. Secondary Minerals: possibly some clay alteration 9. Encrustations: patchy, black-brown encrustations (< 1	1	x						

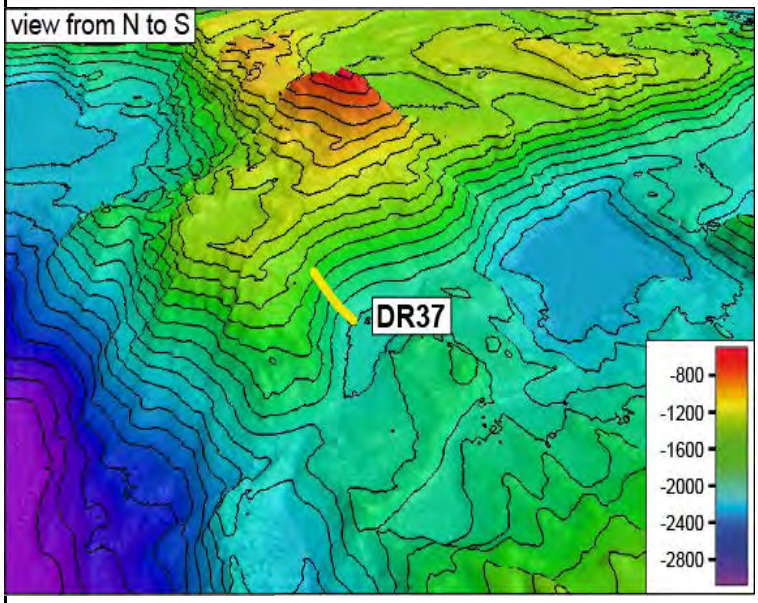
SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR36-4B	1. Rock Type: same as DR36-4A 2. Size: 11x7x4 cm								
SO267-DR36-4C	1. Rock Type: same as DR36-4A 2. Size: 15x7x7 cm 3. Comment: most altered sample of the DR33-4 lithology	1	x						
SO267-DR36-5A	1. Rock Type: volcaniclastic, lapilli tuff, weakly altered 2. Size: 12x9x6 cm 3. Shape / Angularity: subangular to sudrounded 4. Color of cut surface: greenish-grey 5. Texture / Vesicularity: massive, dense, components are glassy clasts (5-10%, 1-5 mm) and crystals (Ol?, 5-10%, 1-5 mm) 6. Phenocrysts: none 7. Matrix: fine- to medium-grained tuff matrix 8. Secondary Minerals: some weak alteration (clay?) 9. Encrustations: patchy, black-brown encrustations (< 1 mm, Mn?) 10. Comment: may contain spots of fresh glass	1	x		G I				
SO267-DR36-5B	1. Rock Type: same as DR36-5A 2. Size: 8x7x5 cm				G I				
SO267-DR36-5C	1. Rock Type: same as DR36-5A 2. Size: 8x5x4 cm 5. Texture / Vesicularity: sparsely vesicular (2-5%, 1-5 mm)				G I				
SO267-DR36-5D	1. Rock Type: same as DR36-5A 2. Size: 11x7x6 cm 5. Texture / Vesicularity: sparsely vesicular (2-5%, 1-5 mm)	1	x		G I				

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR36-6A	1. Rock Type: volcaniclastic, lapilli tuff, weakly altered 2. Size: 12x8x6 cm 3. Shape / Angularity: angular to subangular 4. Color of cut surface: greenish-brown 5. Texture / Vesicularity: coherent component in contact with *in situ* breccia, coherent material is vesicular (1-5%, 1-10 mm), has black flags (~5-10%, 1-5 mm, either glassy, lithics, or amphibole?) 6. Phenocrysts: possibly amphibole 7. Matrix: fine- to medium-grained matrix in coherent component, *in situ* breccia has minor fine-grained matrix 8. Secondary Minerals: minor alteration (clay?) 9. Encrustations: patchy, black-brown encrustations (< 1 mm, Mn?) 10. Comment: may contain spots of fresh glass	1			G I ?				
SO267-DR36-6B	1. Rock Type: same as DR36-6A 2. Size: 11x9x6 cm				G I ?				
SO267-DR36-7	1. Rock Type: volcanic, weak to moderate alteration 2. Size: 13x12x5 cm 3. Shape / Angularity: subangular 4. Color of cut surface: brown 5. Texture / Vesicularity: mostly massive with 5-10 mm chilled (?) margin at one edge / filled vesicles (1-2%, 1-5 mm) in massive part close to the chilled edge 6. Phenocrysts: anhedral white minerals (Pl?, 2-5%, 1-2 mm) 7. Matrix: fine-grained 8. Secondary Minerals: clay alteration of groundmass and chilled margin 9. Encrustations: patchy, black-brown encrustations (< 1 mm, Mn?)	1	x						
SO267-DR36-8	1. Rock Type: volcanic, weak to moderate alteration 2. Size: 9x9x5 cm 3. Shape / Angularity: subangular 4. Color of cut surface: light grey 5. Texture / Vesicularity: "frothy" appearence / highly vesicular (~20-30%, > 1-10 mm), some vesicles are coalesced, some have infilling (mostly zeolite?) 6. Phenocrysts: Px (~20-25%, 1-10 mm), subhedral to euhedral 7. Matrix: fine-grained 8. Secondary Minerals: rock has "bleached" altered appearence (clay or spillitization?) 9. Encrustations: minor patchy, black-brown encrustations (< 1 mm, Mn?)	1	x						
SO267-DR36-9A	1. Rock Type: volcaniclastic, lapilli tuff, moderately altered 2. Size: 12x9x5 cm 3. Shape / Angularity: subangular to subrounded 4. Color of cut surface: dark brown 5. Texture / Vesicularity: massive, unsorted, angular clasts up to 5 mm 7. Matrix: fine-grained 8. Secondary Minerals: iron oxides	1							

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR36-9B	1. Rock Type: same as DR36-9A 2. Size: 8x7x6 cm								
SO267-DR36-10	1. Rock Type: volcaniclastic, lapilli tuff, weakly altered 2. Size: 10x7x4 cm 3. Shape / Angularity: subangular 4. Color of cut surface: dark grey with pale clasts 5. Texture / Vesicularity: mainly matrix-supported, only in places clast-supported, angular clasts, contains irregular shaped fragments, among them scoriaceous clasts 7. Matrix: fine- to coarse-grained 8. Secondary Minerals: iron oxides and zeolites (?) in vesicles in clasts	1	x						
SO267-DR36-11	1. Rock Type: volcaniclastic, lapilli tuff, moderately altered 2. Size: 11x10x7 cm 3. Shape / Angularity: subangular 4. Color of cut surface: pale-brown to taw 5. Texture / Vesicularity: clast-supported, angular, irregular shaped, vesicular lapilli-sized clasts 6. Phenocrysts: Ol in some clasts 7. Matrix: medium- to coarse-grained 8. Secondary Minerals: Qz in vesicles (amygdules), iron oxides	1	x						
SO267-DR36-12A	1. Rock Type: volcaniclastic, *in situ* breccia, clasts partly fresh, the rest moderately to strongly (matrix!) altered 2. Size: 11x10x5 cm 3. Shape / Angularity: angular 4. Color of cut surface: medium to dark greenish-grey 5. Texture / Vesicularity: breccia with angular lapilli-sized clasts with < 1% vesicles 6. Phenocrysts: Ol in some clasts 7. Matrix: fine-grained altered matrix 8. Secondary Minerals: Qz and zeolites in vesicles	1							
SO267-DR36-12B	1. Rock Type: same as DR36-12A 2. Size: 18x14x6 cm	1							
SO267-DR36-13	1. Rock Type: layered / bedded rock, volcaniclastic or mafic layered rock, moderately altered 2. Size: 13x13x6 cm 3. Shape / Angularity: subangular to subrounded 4. Color of cut surface: dark green to blackish 5. Texture / Vesicularity: layered, crudely layered 6. Phenocrysts: none visible 7. Matrix: fine-grained	1	x						

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR36-14A	1. Rock Type: volcaniclastic / sedimentary, weakly altered 2. Size: 13x7x4 cm 3. Shape / Angularity: subangukar to subrounded 4. Color of cut surface: taw 5. Texture / Vesicularity: fine- to medium-grained graded beds (≤ 20 mm thick) 7. Matrix: fine- to medium-grained					x			
SO267-DR36-14B	1. Rock Type: same as DR36-14A 2. Size: 11x8x7 cm					x			
SO267-DR36-15	1. Rock Type: volcanic, fresh to moderately altered 2. Size: 12x8x7 cm 3. Shape / Angularity: angular to subangular 4. Color of cut surface: medium greenish grey to dark grey 5. Texture / Vesicularity: massive / sparsely to moderately vesiculated (< 5%, ≤ 5 mm) 6. Phenocrysts: very dark black hornblende (?) (~2%, ≤ 2 mm), accessory Px 7. Matrix: microcrystalline 8. Secondary Minerals: zeolites (?) 9. Encrustations: volcanic rock in contact with fine-grained sediments ("peperitic contact"?)	1	x						

SO267-DR37



Description of Location and Structure: southern part of Fonualei Rift, southern flank (steep scarp) of a fault zone emanating from the rift towards southwest, dredge haul has been conducted at the northeastern end of the scarp and aimed to sample the crustal bloc (?) south of the fault.

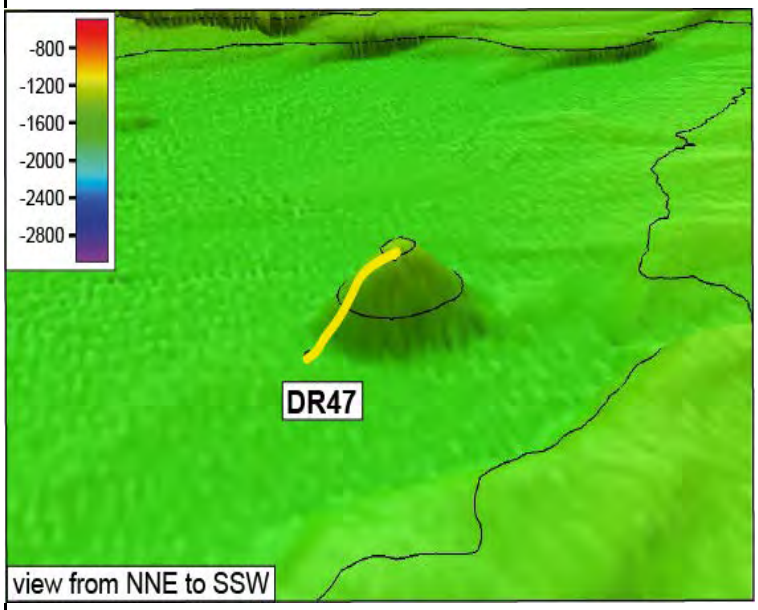
Dredge on bottom UTC 23/12/18 20:13 hrs, lat 17°42.38'S, long 174°40.65´W depth 1984 m
Dredge off bottom UTC 23/12/18 21:21 hrs, lat 17°42.43'S, long 174°40.30'W, depth 1590 m
total volume: few rocks
Comments: Ol- and Px-phyric lava fragments (boninite??) represent the dominant lithology in this dredge, slightly Fsp-phyric lavas which may also contain minor amounts of mostly small Ol, Px, Qz, and / or amphibole phenocrysts are minor lithologies.

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR37-1A	1. Rock Type: volcanic, basaltic-andesitic, slightly altered 2. Size: 13x13x18 cm 3. Shape / Angularity: subangukar 4. Color of cut surface: medium to dark grey 5. Texture / Vesicularity: porphyritic / slightly vesicular (~5%, < 3 mm), round vesicles 6. Phenocrysts: Ol (~5%, < 5 mm), Px (~5%, < 20 mm) 7. Matrix: fine-grained 8. Secondary Minerals: none 9. Encrustations: none 10. Comment: < 1 mm alteration rrim	1	x						
SO267-DR37-1B	1. Rock Type: same as DR37-1A 2. Size: 17x12x9 cm	1	x						
SO267-DR37-1C	1. Rock Type: same as DR37-1A 2. Size: 10x9x6 cm								
SO267-DR37-2	1. Rock Type: volcanic, basaltic-andesitic, fresh 2. Size: 20x13x8 cm 3. Shape / Angularity: subangukar 4. Color of cut surface: medium to dark grey 5. Texture / Vesicularity: porphyritic / highly vesicular (> 30%, < 6 mm) 6. Phenocrysts: Ol (~7%, < 6 mm), Px (~7%, < 2 mm), both fresh 7. Matrix: fine-grained 8. Secondary Minerals: none 9. Encrustations: none 10. Comment: < 1 mm alteration rrim	1	x						
SO267-DR37-3A	1. Rock Type: volcanic, similar to DR37-1 and -2 2. Size: 10x8x6 cm 3. Shape / Angularity: subangular 4. Color of cut surface: medium to dark grey 5. Texture / Vesicularity: porphyritic / highly vesicular (~30%, < 5 mm), round vesicles 6. Phenocrysts: Ol (~5%, < 1 mm), Px (~3%, < 1 mm) 7. Matrix: fine-grained 8. Secondary Minerals: none 9. Encrustations: none 10. Comment: < 1 mm alteration rrim	1	x						
SO267-DR37-3B	1. Rock Type: same as DR37-3A 2. Size: 6x5x4 cm	1	x						

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR37-4	1. Rock Type: volcanic, similar to DR37-1 through -3 2. Size: 13x9x8 cm 3. Shape / Angularity: subangular 4. Color of cut surface: medium to dark grey 5. Texture / Vesicularity: porphyritic / highly vesicular (~20%, < 2 mm), round, slightly deformed vesicles 6. Phenocrysts: Fsp (~4%, < 2 mm), Px (~3%, < 5 mm), Ol (~1%, < 1 mm) 7. Matrix: fine-grained 8. Secondary Minerals: none 9. Encrustations: none 10. Comment: up to 7 mm alteration halo	1	x						
SO267-DR37-5A	1. Rock Type: volcanic, moderately altered 2. Size: 19x10x5 cm 3. Shape / Angularity: angular to subangular 4. Color of cut surface: dark greenish grey 5. Texture / Vesicularity: massive / sparsely vesicular (≤ 1.5 mm) 6. Phenocrysts: brownish alterd Ol (10-15%, < 1 mm) 7. Matrix: microcrystalline 8. Secondary Minerals: rare zeolite in some vesicles 9. Encrustations: Mn-staining on surface	1	x						
SO267-DR37-5B	1. Rock Type: same as DR37-5A 2. Size: 13x10x6 cm	1	x						
SO267-DR37-6	1. Rock Type: volcanic, fresh 2. Size: 7x7x5 cm 3. Shape / Angularity: angular 4. Color of cut surface: black 5. Texture / Vesicularity: massive / moderately vesicular (3-8%, < 10 mm), irregular shaped and elongated vesicles 6. Phenocrysts: Fsp (~2-3%, ≤ 1.5 mm) 7. Matrix: cryptocrystalline 8. Secondary Minerals: none 9. Encrustations: 10. Comment: locally Mn-staining on surface	1	too small for GC slab						
SO267-DR37-7A	1. Rock Type: volcanic, slightly altered 2. Size: 21x14x13 cm 3. Shape / Angularity: angular with slightly rounded edges 4. Color of cut surface: pale olive green 5. Texture / Vesicularity: massive / non vesicular 6. Phenocrysts: Fsp (~3-5%, ≤ 4 mm), amphibole (~1-2%, ≤ 3 mm), Qz (~1-2%, < 3 mm) 7. Matrix: microcrystalline 8. Secondary Minerals: weak sericite-clay alteration (?) 9. Encrustations: surface staining	1	x					piece of bloc A (30x23x15 cm)	
SO267-DR37-7A-X	piece of bloc A from which sample DR37-7A has been taken, see description of DR37-7A							archive sample	no picture

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR37-7B	1. Rock Type: same as DR37-7A 2. Size: 9x6x5 cm								
SO267-DR37-7C	1. Rock Type: same as DR37-7A 2. Size: 11x8x5 cm	1	x						
SO267-DR37-8	1. Rock Type: volcanic, weak alteration 2. Size: 10x10x7 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: medium greenish grey 5. Texture / Vesicularity: massive, contains enclaves (≤ 15 mm) of fine-grained material 6. Phenocrysts: Fsp (≤ 5%, ≤ 2 mm), Qz? (1-3%, < 1 mm) 7. Matrix: microcrystalline, sericite altered 8. Secondary Minerals: weak sericite-clay alteration 9. Encrustations: none 10. Comment: surface oxidation	1	x						

SO267-DR47

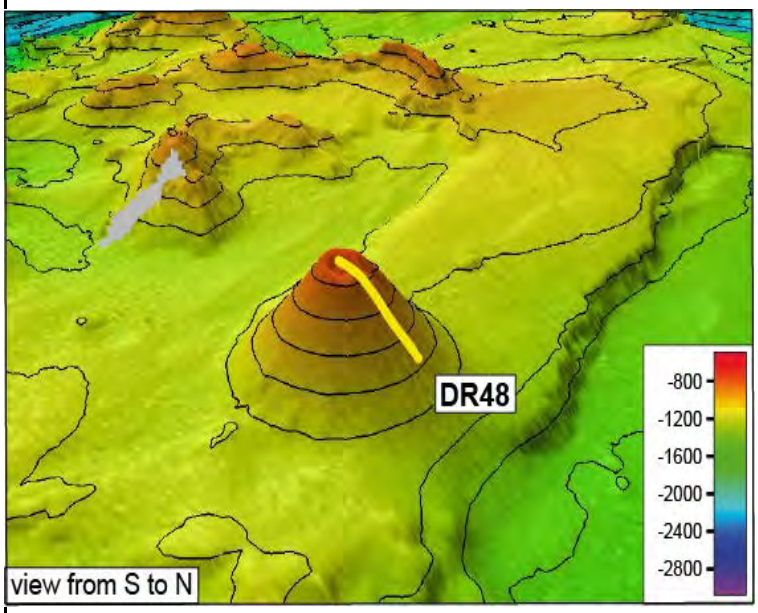


Description of Location and Structure:
area south of Fonualei Rift, small, 175 m high cone south of the southern tip of the rift, dredge haul across southwestern flank from the base over the top.

Dredge on bottom UTC 01/01/19 02:13 hrs, lat 17°59.65'S, long 174°37.07´W depth 1560 m
Dredge off bottom UTC 01/01/19 03:02 hrs, lat 17°59.38'S, long 174°36.99'W, depth 1380 m
total volume: 2 rocks
Comments: 2 pieces of pumice of unkown origin.

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR47-1A	1. Rock Type: pumice, fresh 2. Size: 12x8x7 cm 3. Shape / Angularity: subangular 4. Color of cut surface: light grey - beige 5. Texture / Vesicularity: vesicular (~15-20%, 1-10 mm), "wispy" texture visible in vesicle walls 6. Phenocrysts: Qz (1-3%, ≤ 2 mm), traces of Mt (< 1%, ≤ 1 mm) 7. Matrix: massive, siliceous, fine- to medium-grained, weak foliation (flow-banding?) 8. Secondary Minerals: none 9. Encrustations: patchy, black-brown crust (Mn?, < 1 mm thick) covers ~30% of the rock	1	x						
SO267-DR47-1B	1. Rock Type: same as DR47-1A 2. Size: 11x11x7 cm	1	x						

SO267-DR48



Description of Location and Structure: area southwest of Fonualei Rift, small conical volcano (~450 m high) southwest of the southern tip of the rift, dredge haul across southeastern flank from base over top.

Dredge on bottom UTC 01/01/19 05:51 hrs, lat 18°00.51'S, long 174°44.07´W depth 1040 m
Dredge off bottom UTC 01/01/19 07:00 hrs, lat 18°00.30'S, long 174°44.42'W, depth 746 m
total volume: full
Comments: relatively uniform Ol and Fsp-phyric scoria and lava fragments, some of the scoriaceous samples may contain fresh glass.

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR48-1A	1. Rock Type: volcanic, mafic, weakly altered 2. Size: 16x11x12 cm 3. Shape / Angularity: subangular to subrounded 4. Color of cut surface: dark grey to black 5. Texture / Vesicularity: massive / moderately vesicular (~8-10%, ≤ 2 mm) 6. Phenocrysts: Ol (5-8%, ≤ 4 mm), Fsp (~5%, ≤ 4 mm) 7. Matrix: cryptocrytalline 8. Secondary Minerals: none 9. Encrustations: weak surface oxidation	1							

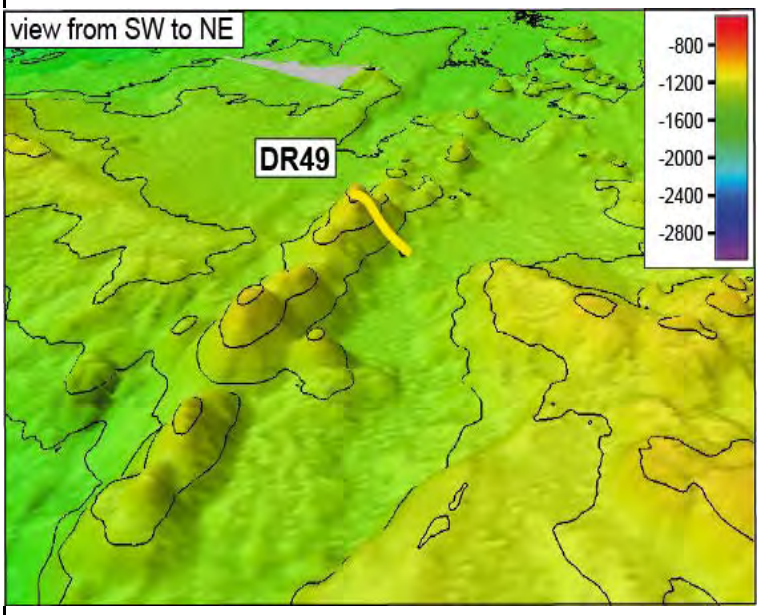
SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR48-1B	1. Rock Type: same as DR48-1A 2. Size: 19x11x13 cm	1	x						
SO267-DR48-2	1. Rock Type: volcanic, mafic, fresh 2. Size: 10x10x9 cm 3. Shape / Angularity: angular 4. Color of cut surface: black 5. Texture / Vesicularity: massive / highly vesicular (20-25%, ≤ 4 mm) 6. Phenocrysts: Ol (5-8%, ≤ 4 mm), Fsp (3-5%, ≤ 3 mm) 7. Matrix: cryptocrytalline 8. Secondary Minerals: none 9. Encrustations: none	1	x						
SO267-DR48-3A	1. Rock Type: volcanic, mafic, fresh 2. Size: 12x10x9 cm 3. Shape / Angularity: angular to subangular 4. Color of cut surface: dark grey to black 5. Texture / Vesicularity: massive / highly vesicular (~25%, ≤ 3 mm) 6. Phenocrysts: Ol (10-12%, ≤ 6 mm), Fsp (3-5%, ≤ 3 mm) 7. Matrix: cryptocrystalline 8. Secondary Minerals: none 9. Encrustations: weak surface oxidation	1	x						
SO267-DR48-3B	1. Rock Type: same as DR48-3A 2. Size: 13x12x10 cm	1	x						
SO267-DR48-3C	1. Rock Type: same as DR48-3A 2. Size: 19x14x8 cm	1							
SO267-DR48-4A	1. Rock Type: volcanic, mafic, weakly altered 2. Size: 13x11x6 cm 3. Shape / Angularity: irregular surface 4. Color of cut surface: dark grey to black 5. Texture / Vesicularity: massive / moderately vesicular (~15%, ≤ 3 mm) 6. Phenocrysts: Ol (5-8%, ≤ 5 mm), Fsp (~2%, ≤ 3 mm) 7. Matrix: cryptocrystalline 8. Secondary Minerals: none 9. Encrustations: weak alteration / oxidation crust	1	x						

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR48-4B	1. Rock Type: same as DR48-4A 2. Size: 10x9x6 cm	1							
SO267-DR48-4C	1. Rock Type: same as DR48-4A 2. Size: 14x11x8 cm	1	x						
SO267-DR48-5A	1. Rock Type: volcanic, mafic, fresh 2. Size: 18x10x10 cm 3. Shape / Angularity: angular, irregular surface 4. Color of cut surface: dark grey 5. Texture / Vesicularity: massive / moderately to highly vesicular (15-30%, ≤ 5 mm) 6. Phenocrysts: Ol (5-10%, ≤ 5 mm), Fsp (2-3%, ≤ 3 mm) 7. Matrix: cryptocrystalline 8. Secondary Minerals: none 9. Encrustations: weak alteration / oxidation crust	1	x						
SO267-DR48-5B	1. Rock Type: same as DR48-5A 2. Size: 19x12x11 cm	1	x						
SO267-DR48-5C	1. Rock Type: same as DR48-5A 2. Size: 17x13x9 cm	1	x						
SO267-DR48-5D	1. Rock Type: same as DR48-5A 2. Size: 12x11x7 cm	1							
SO267-DR48-5E	1. Rock Type: same as DR48-5A 2. Size: 12x9x8 cm								

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR48-6	1. Rock Type: volcanic, mafic, fresh 2. Size: 11x8x7 cm 3. Shape / Angularity: angular 4. Color of cut surface: dark grey to brownish 5. Texture / Vesicularity: scoriaceous / highly vesicular (> 50%), two types of vesicles (1-2 mm and ≥ 5 mm) 6. Phenocrysts: Ol (5%, ≤ 3 mm), Fsp (≤ 2%, ≤ 2 mm) 7. Matrix: glassy to cryptocrystalline 8. Secondary Minerals: none 9. Encrustations: weak surface oxidation 10. Comment: may contain fresh glass	1	x		G I ?				
SO267-DR48-7	1. Rock Type: volcanic, mafic, weakly altered 2. Size: 13x10x8 cm 3. Shape / Angularity: angular, irregular shape 4. Color of cut surface: dark grey to brownish 5. Texture / Vesicularity: scoriaceous / highly vesicular (40%, ≤ 15 mm) 6. Phenocrysts: Ol (10%, ≤ 5 mm), Fsp (2-3%, ≤ 2 mm) 7. Matrix: cryptocrystalline 8. Secondary Minerals: none 9. Encrustations: weak alteration of surface and around large vesicles	1	x						
SO267-DR48-8X	1. Rock Type: volcanic, mafic, fresh 2. Size: 18x18x15 cm 3. Shape / Angularity: angular, irregular shape 4. Color of cut surface: dark grey to black 5. Texture / Vesicularity: scoriaceous / highly vesicular (15-50%, ≤ 5 mm), more vesicular towards interior 6. Phenocrysts: Ol (~5-8%, ≤ 3 mm), Fsp (2-4%, ≤ 3 mm) 7. Matrix: cryptocrystalline 8. Secondary Minerals: none 9. Encrustations: weak oxidation of surface							archive sample	
SO267-DR48-9A	1. Rock Type: volcanic, mafic, weakly altered 2. Size: 9x7x6 cm 3. Shape / Angularity: angular to subrounded, irregular shape 4. Color of cut surface: dark grey to brownish (rusty) 5. Texture / Vesicularity: scoriaceous / moderately to highly vesicular (~15-25%, ≤ 20 mm) 6. Phenocrysts: Ol (5-10%, ≤ 4 mm), Fsp (3-4%, ≤ 2 mm) 7. Matrix: galssy to cryptocrytalline 8. Secondary Minerals: none 9. Encrustations: weak surface oxidation 10. Comment: may contain fresh glass				G I ?				
SO267-DR48-9B	1. Rock Type: same as DR48-9A 2. Size: 9x7x5 cm								
SO267-DR48-9C	1. Rock Type: same as DR48-9A 2. Size: 6x6x5 cm								

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR48-10A	1. Rock Type: volcanic, felsic, fresh 2. Size: 5x6x4 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: pale beige 5. Texture / Vesicularity: ~pumice / moderately to highly vesicular (up to 80%, ≤ 5 mm) 6. Phenocrysts: none 7. Matrix: glassy to cryptocrystalline 8. Secondary Minerals: none 9. Encrustations: none 10. Comment: ***probably a rock from the previous dredge haul DR47!***							***CAUTION - ROCKS MAY BE FROM PREVIOUS DREDGE***	
SO267-DR48-10B	1. Rock Type: same as DR48-10A 2. Size: 6x6x4 cm 10. Comment: ***probably a rock from the previous dredge haul DR47!***								
SO267-DR48-10C	1. Rock Type: same as DR48-10A 10. Comment: ***probably a rock from the previous dredge haul DR47!***								
SO267-DR48-11X	same as DR48-8X, one more archive sample							archive	no picture

SO267-DR49

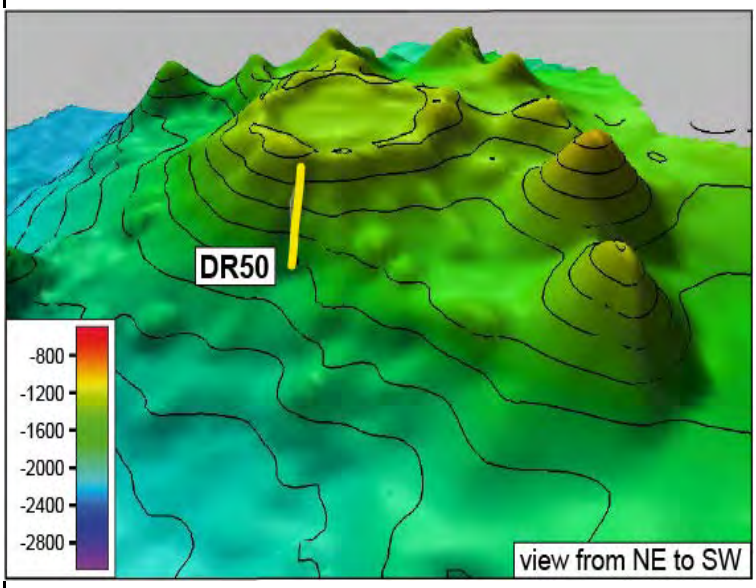


Description of Location and Structure:
area southwest of Fonualei Rift, E-W-trending chain of small (~100 - 250 m high) cones and ridges, dredge aims the largest cone in the center of the chain, southern flank from base to top.

Dredge on bottom UTC 01/01/19 10:00 hrs, lat 18°12.70'S, long 174°48.99´W depth 1342 m
Dredge off bottom UTC 01/01/19 10:53 hrs, lat 18°12.36'S, long 174°49.03'W, depth 1071 m
total volume: 1 rock
Comments: dredge yielded only one medium-sized fragment of slightly Fsp- and Ol-phyric lava.

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR49-1	1. Rock Type: volcanic, slightly altered 2. Size: 24x19x10 cm 3. Shape / Angularity: subangular 4. Color of cut surface: dark grey 5. Texture / Vesicularity: massive / moderately vesicular (5-10%, < 2 mm) 6. Phenocrysts: Ol? (~5%, < 1 mm), Fsp (1-2%, < 1 mm) 7. Matrix: fine-grained 8. Secondary Minerals: none 9. Encrustations: < 1 mm thick crust	1	x						

SO267-DR50



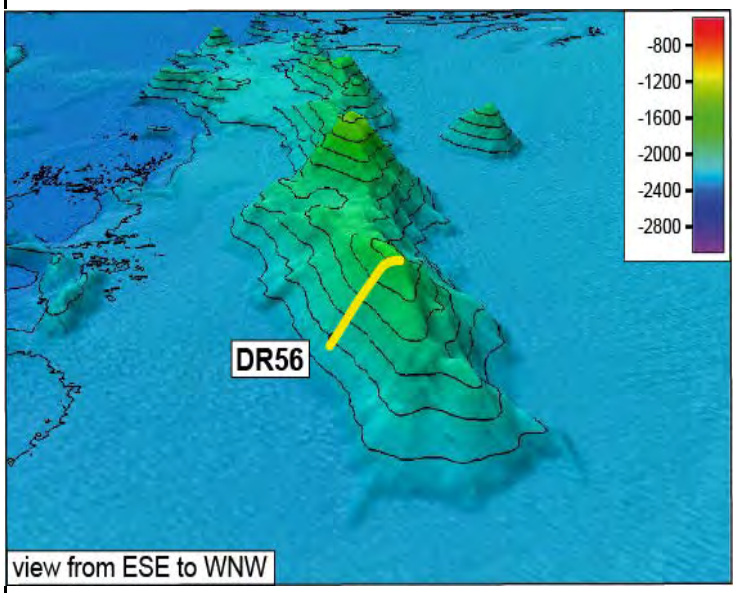
Description of Location and Structure:
area southwest of Fonualei Rift, large volcano with a collapse structure (caldera?) on top, central section of outer southern slope.

Dredge on bottom UTC 01/01/19 13:59 hrs, lat 18°08.80'S, long 174°55.82´W depth 1680 m
Dredge off bottom UTC 01/01/19 15:14 hrs, lat 18°08.38'S, long 174°55.78'W, depth 1323 m
total volume: 1/4 full
Comments: dredge yielded homogeneous, largely aphyric mafic lava fragments and calcareous sedimentary rocks. Note that the dredge may (also) have sampled the basement beneath the volcano at the lower section of the track.

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR50-1	1. Rock Type: volcanic, mafic, slightly altered 2. Size: 55x38x28 cm (bloc A), sample comprises two pieces of that bloc 3. Shape / Angularity: angular 4. Color of cut surface: dark grey 5. Texture / Vesicularity: massive, homogeneous / slightly vesicular (7-8%, < 1 - > 20 mm), spherical vesicles, partly filled 6. Phenocrysts: Pl-laths (1-2%, < 1 mm), accessory Ol 7. Matrix: cryptocrystalline 8. Secondary Minerals: ~1 cm thick alteration (oxidation) halo 9. Encrustations: some Mn-coating, sediment fillings (or Qz)	1	x					2 pieces of bloc A	
DR267-DR50-1X	10. Comment: large piece of bloc A (DR50-1) as archive sample							archive sample	

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR50-2	1. Rock Type: similar to DR50-1 2. Size: 19x15x12 cm	1	x						
SO267-DR50-3	1. Rock Type: similar to DR50-1 2. Size: 24x20x13 cm								
SO267-DR50-4	1. Rock Type: sedimentary rock, calcareous 2. Size: 23x16x14 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: light brown 5. Texture / Vesicularity: unsorted, biogenic sediments 9. Encrustations: minor Mn-staining					x			

SO267-DR56

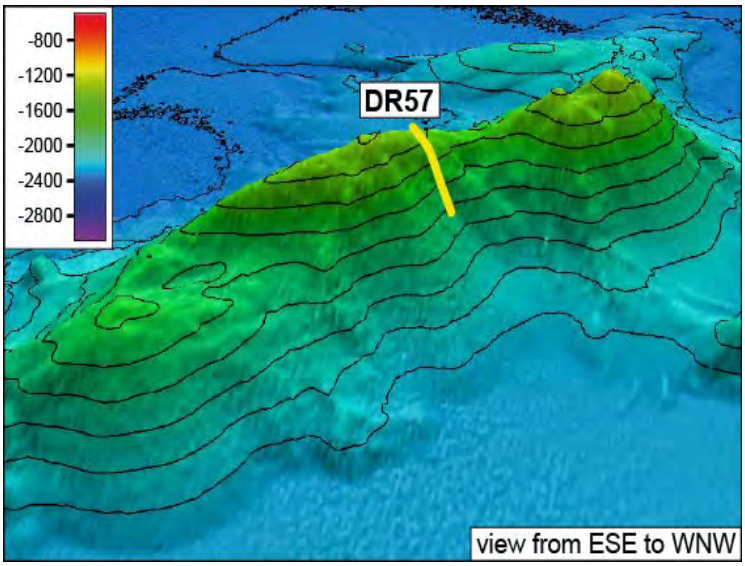


Description of Location and Structure:
area southwest of Fonualei Rift, southern tip of the northernmost of three E-W-striking ridges, dredge haul at western flank from lower section over top.

Dredge on bottom UTC 03/01/19 01:39 hrs, lat 18°05.66'S, long 175°09.65´W depth 2070 m
Dredge off bottom UTC 03/01/19 02:56 hrs, lat 18°05.48'S, long 175°09.15'W, depth 1699 m
total volume: few rocks
Comments: mainly fresh mafic lavafragments with hyaloclastite on top, the dredge sampled probably the surface of a lava flow.

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR56-1	1. Rock Type: volcanic, mafic, with hyaloclastite, rock is fresh, hyaloclastite is slightly altered 2. Size: 10x9x7 cm 3. Shape / Angularity: subangular 4. Color of cut surface: very dark brown to black 5. Texture / Vesicularity: massive with top hyaloclastite / highly vesicular (~25-30%, ≤ 2 mm), vesicle bands 6. Phenocrysts: none 7. Matrix: microcrystalline 8. Secondary Minerals: none 9. Encrustations: hyaloclastite crust is slightly oxidized 10. Comment: largest vesicles show glassy walls (?)	1	x		G I ?				
SO267-DR56-2	1. Rock Type: volcanic, mafic, with hyaloclastite, rock is fresh, hyaloclastite is altered 2. Size: 8x7x7 cm 3. Shape / Angularity: angular to subangular 4. Color of cut surface: dark grey 5. Texture / Vesicularity: massive with top hyaloclastite / moderately to highly vesicular (~15-30%, ≤ 3 mm) 6. Phenocrysts: none 7. Matrix: crypto- to microcrystalline 8. Secondary Minerals: none 9. Encrustations: hyaloclastite crust is altered to brownish-green soft material (smectite?) 10. Comment: largest vesicles show glassy walls (?)	1	x		G I ?				
SO267-DR56-3	1. Rock Type: sedimentary, contains an altered felsic volcanic clast 2. Size: 10x7x5 cm 3. Shape / Angularity: subrounded to rounded 4. Color of cut surface: sed.: pale beige, clast: greenish grey 5. Texture / Vesicularity: polymict sediment, microconglomerate 7. Matrix: fine to coarse-grained 9. Encrustations: oxidation 10. Comment: felsic clast clay altered?					x			

SO267-DR57



Description of Location and Structure:
area southwest of Fonualei Rift, middle section of the central of three E-W-striking ridges, dredge haul at eastern flank from lower section over top.

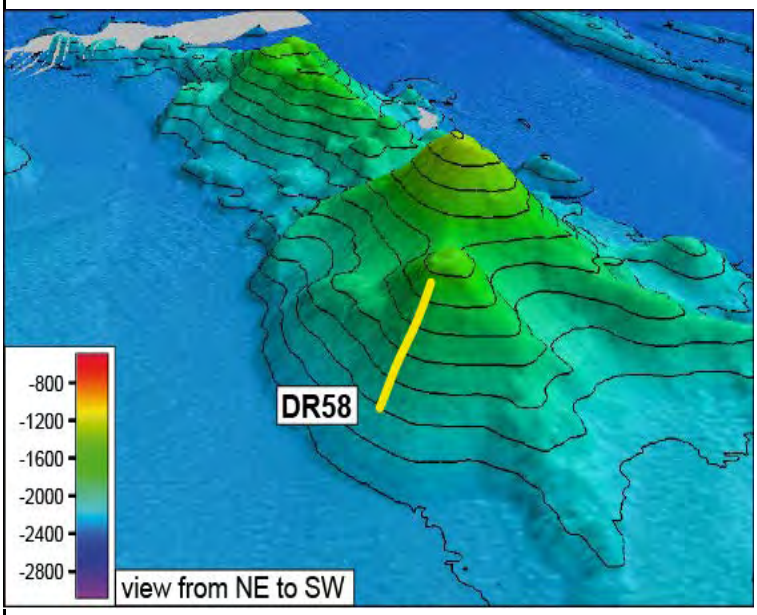
Dredge on bottom UTC 03/01/19 05:22 hrs, lat 18°13.41'S, long 175°14.05´W depth 1765 m
Dredge off bottom UTC 03/01/19 06:30 hrs, lat 18°13.45'S, long 175°14.48'W, depth 1507 m
total volume: 2/3 full
Comments: dredge recovered 10 large blocs and many smaller piece of relatively homogeneous, vesicular and slightly Ol- and Fsp-phyric lava and a few volcaniclastic rocks, the lava fragments are fresh, some have up to 1.5 cm thick glass crusts.

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR57-1	1. Rock Type: volcanic, mafic, fresh 2. Size: 15x15x11 cm 3. Shape / Angularity: subangular 4. Color of cut surface: dark grey to black 5. Texture / Vesicularity: massive / sparsely vesicular (~1-3%, ≤ 3 mm) 6. Phenocrysts: microphenocrysts Ol (3-4%, ≤ 1 mm), Fsp (~2-3%, ≤ 1 mm) 7. Matrix: microcrystalline, fine-grained 8. Secondary Minerals: none 9. Encrustations: patchy Mn-coating on some surfaces	1	x						
SO267-DR57-2A	1. Rock Type: volcanic, mafic, fresh 2. Size: 28x13x12 cm 3. Shape / Angularity: subangular to subrounded 4. Color of cut surface: dark grey 5. Texture / Vesicularity: massive / moderately vesicular (~15%, ≤ 15 mm) 6. Phenocrysts: Ol (3-5%, ≤ 2 mm), Fsp? (≤ 2%, ≤ 1 mm) 7. Matrix: microcrystalline 8. Secondary Minerals: carbonate in some vesicles (reaction to HCL) 9. Encrustations: surface staining	1	x						
SO267-DR57-2B	1. Rock Type: same as DR57-2A 2. Size: 16x12x73 cm								
SO267-DR57-2C	1. Rock Type: same as DR57-2A 2. Size: 8x6x5 cm								
SO267-DR57-3A	1. Rock Type: volcanic, mafic, weakly altered 2. Size: 11x9x6 cm 3. Shape / Angularity: subangular to subrounded 4. Color of cut surface: medium grey ± greenish to black 5. Texture / Vesicularity: massive with glass crust / moderately to highly vesicular (5-30%, ≤ 4 mm) 6. Phenocrysts: Ol? (3-5%, ≤ 1.5 mm) 7. Matrix: microcrystalline to cryptocrystalline 8. Secondary Minerals: carbonates in some vesicles 9. Encrustations: weak alteration of margins 10. Comment: sample for glass separation				G I			for glass slab	
SO267-DR57-3B	1. Rock Type: same as DR57-3A 2. Size: 8x8x7 cm 10. Comment: sample for glass separation				G I			for glass slab	

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR57-3C	1. Rock Type: same as DR57-3A 2. Size: 14x9x7 cm 10. Comment: sample for glass separation				GI			for glass slab	
SO267-DR57-3D	1. Rock Type: same as DR57-3A 2. Size: 8x7x5 cm 10. Comment: sample for glass separation				GI			for glass slab	
SO267-DR57-3E	1. Rock Type: same as DR57-3A 2. Size: 11x8x6 cm	1	x						
SO267-DR57-3F	1. Rock Type: same as DR57-3A 2. Size: 20x8x6 cm								
SO267-DR57-3G	1. Rock Type: same as DR57-3A 2. Size: 21x18x8 cm	1	x					piece of bloc A (55x38x34 cm)	
SO267-DR57-3H	1. Rock Type: same as DR57-3A 2. Size: 17x13x7 cm							piece of bloc G (34x22x20 cm)	
SO267-DR57-3I	1. Rock Type: same as DR57-3A 2. Size: 24x20x12 cm							piece of bloc B (47x39x28 cm)	

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR57-3J	1. Rock Type: same as DR57-3A 2. Size: 18x15x13 cm							piece of bloc J (32x27x24 cm)	
SO267-DR57-4A	1. Rock Type: volcanic, mafic, weakly altered 2. Size: 10x9x7 cm 3. Shape / Angularity: subangular to subrounded 4. Color of cut surface: medium grey, ± greenish 5. Texture / Vesicularity: massive with < 10 mm glass crust / highly vesicular (~25-30%, ≤ 2 mm) 6. Phenocrysts: Ol? (2-3%, ≤ 2 mm), Fsp (~2%, ≤ 2 mm) 7. Matrix: microcrystalline 8. Secondary Minerals: carbonates in some amygules 9. Encrustations: weak alteration, Mn staining on surface 10. Comment: sample contains fresh glass	1	x		G I				
SO267-DR57-4B	1. Rock Type: same as DR57-4A 2. Size: 11x9x5 cm 10. Comment: no glass crust								
SO267-DR57-5	1. Rock Type: volcaniclastic, moderately altered 2. Size: 16x13x10 cm 3. Shape / Angularity: angular to subangular 4. Color of cut surface: clasts black, matrix brown 5. Texture / Vesicularity: matrix supported, angular clasts of highly vesicular lava (partly pipe vesicles) in altered (?) matrix with fine basalt fragments 6. Phenocrysts: none 7. Matrix: probably altered fine-grained material (ash?) 8. Secondary Minerals: none 9. Encrustations: none	1							
SO267-DR57-6X	1. Rock Type: volcaniclastic, fresh 2. Size: 10x8x7 cm 3. Shape / Angularity: subangular (original shape) 4. Color of cut surface: dark grey to black 5. Texture / Vesicularity: amored lapilli, moderately vesicular (10-15%, ≤ 5 mm) 6. Phenocrysts: Ol (~3-4%, ≤ 2 mm), Fsp? (2%, ≤ 1 mm) 7. Matrix: cryptocrystalline 8. Secondary Minerals: carbonate in some vesicles 9. Encrustations: weak oxidation on surface 10. Comment: very nice amored rock, showpiece							archive sample (show piece)	

SO267-DR58



Description of Location and Structure:
area southwest of Fonualei Rift, southern of three E-W-striking ridges, cone attached to the northern end of the ridge, dredge aimed the central section of the eastern slope of the cone.

Dredge on bottom UTC 03/01/19 09:07 hrs, lat 18°21.36'S, long 175°16.25´W depth 2058 m
Dredge off bottom UTC 03/01/19 10:33 hrs, lat 18°21.43'S, long 175°16.69'W, depth 1588 m
total volume: 1/4 full (?)
Comments: dominant lithologies are mafic to intermediate, slightly Ol- und Fsp-phyric to largely aphyric vesicular lava and possibly hydrothemally altered volcaniclastic rocks, clasts of volcaniclastics have a similar appearance to the lava recovered by this dredge.

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR58-1A	1. Rock Type: volcanic, mafic, fresh 2. Size: 13x10x8 cm 3. Shape / Angularity: subangular, blocky 4. Color of cut surface: medium to dark grey 5. Texture / Vesicularity: massive, (glomero)phorphyritic / highly vesicular (~30%, ≤ 20 mm), sperical to slightly elongated, rounded vesicles, some filled with sediment 6. Phenocrysts: Ol (~2%, < 2 mm), Pl (~2%, < 2 mm) 7. Matrix: microcrystalline 8. Secondary Minerals: none 9. Encrustations: sedimented	1	x						
SO267-DR58-1B	1. Rock Type: same as DR58-1A 2. Size: 13x11x8 cm								
SO267-DR58-1C	1. Rock Type: same as DR58-1A 2. Size: 10x8x7 cm								
SO267-DR58-1D	1. Rock Type: same as DR58-1A 2. Size: 8x7x6 cm	1							

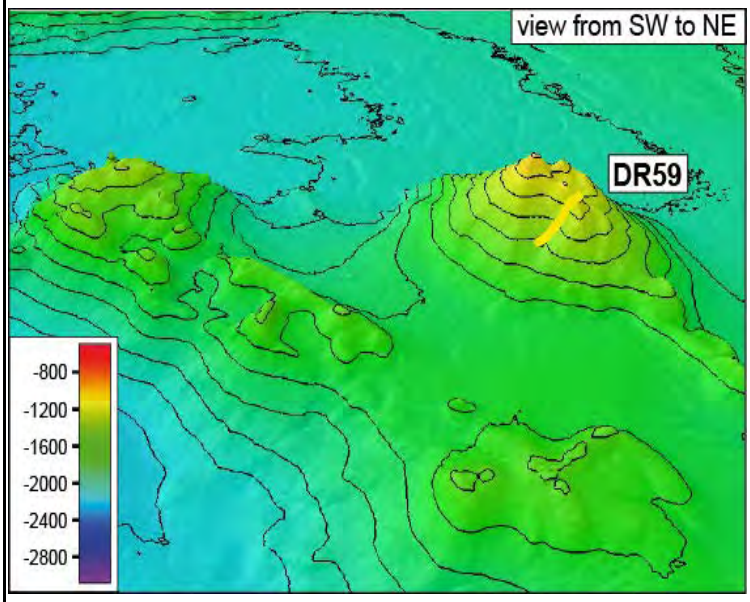
SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR58-1E	1. Rock Type: same as DR58-1A 2. Size: 11x8x6 cm								
SO267-DR58-2A	1. Rock Type: similar to DR58-1 but slightly higher degree of alteration 2. Size: 13x11x10 cm 5. Texture / Vesicularity: slightly smaller vesicles as DR58-1	1	x						
SO267-DR58-2B	1. Rock Type: same as DR58-2A 2. Size: 18x11x10 cm								
SO267-DR58-2C	1. Rock Type: same as DR58-2A 2. Size: 12x10x6 cm								
SO267-DR58-3	1. Rock Type: similar to DR58-2 but but 10-20 mm alteration halo (oxidation from the surface) 2. Size: 10x8x5 cm	1	x						
SO267-DR58-4	1. Rock Type: volcanic, mafic to intermediate, weak alteration 2. Size: 11x12x8 cm 3. Shape / Angularity: subangular, blocky 4. Color of cut surface: medium grey to greenish grey 5. Texture / Vesicularity: mingled (flow?) texture, sparsely porphyritic / moderately vesicular (~15%, ≤ 2 mm), enlongated, subangular vesicles 6. Phenocrysts: Ol (~2%, ≤ 2 mm), Pl? (~2%, ≤ 2 mm) 7. Matrix: microcrystalline 8. Secondary Minerals: none 9. Encrustations: minor Mn-oxide staining	1	x						

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR58-5	1. Rock Type: volcanic, mafic, moderate alteration throughout, rims strongly altered 2. Size: 11x7x7 cm 3. Shape / Angularity: subangular 4. Color of cut surface: variable, grey where least altered, greenish-brown were most altered 5. Texture / Vesicularity: massive / moderately vesicular (~10-15%, <1-2 mm), vesicles are distributed in bands defined by vesicle size and concentration, no vesicle infilling 6. Phenocrysts: traces of ≤ 1 mm white - colourless phenocrysts, anhedral, may be altered Pl or Qz 7. Matrix: massive, fine-grained 8. Secondary Minerals: green-brown alteration (clay?), concentrated around rim, alteration bands along one surface (flow banding?) 9. Encrustations: patchy, < 1 mm, black-brown coating covers most of the surface (Mn?)	1							
SO267-DR58-6A	1. Rock Type: volcanic, mafic, weak alteration along surface 2. Size: 19x17x10 cm 3. Shape / Angularity: subangular 4. Color of cut surface: dark grey, alteration is grey-green 5. Texture / Vesicularity: massive / highly vesicular (~20-25%, <1 mm), a few outsized vesicles ~10 mm with minor brown clay infilling, small vesicles have no infilling 6. Phenocrysts: traces of ≤ 1 mm white - colourless phenocrysts, anhedral, may be altered Pl or Qz 7. Matrix: massive, fine-grained 8. Secondary Minerals: grey-green alteration along upper surface at boundray between glassy / chilled top and massive interior 9. Encrustations: patchy, < 1 mm, black-brown coating covers most of the surface (Mn?) 10. Comment: small pillow pillow fragment with a glassy top, radial pipe vesicles, minor hyaloclastite along the base	1	x		G I				
SO267-DR58-6B	1. Rock Type: same as DR58-6A 2. Size: 11x9x6 cm 10. Comment: small pillow fragment with glassy top				G I				
SO267-DR58-6C	1. Rock Type: same as DR58-6A 2. Size: 9x7x8 cm 10. Comment: less glass than -6A and -6B				G I				
SO267-DR58-7	1. Rock Type: volcanic (pumice?), fresh 2. Size: 7x5x4 cm 3. Shape / Angularity: subangular 4. Color of cut surface: medium grey 5. Texture / Vesicularity: highly vesicular (~40%, < 1-10 mm), larger vesicles are infilled with beige clay, small vesicles have no infillings, vesicle walls have "wispy" texture 6. Phenocrysts: none 7. Matrix: massive, appears to be siliceous and / or glassy 8. Secondary Minerals: none 9. Encrustations: none								

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR58-8A	1. Rock Type: volcaniclastic, monolithic but clasts are variable altered 2. Size: 10x9x5 cm 3. Shape / Angularity: subangular to subrounded 4. Color of cut surface: dark grey-black, altered clasts are grey-green, matrix is orange-brown 5. Texture / Vesicularity: framework-supported (~80-90% clasts), clasts (2-70 mm) are angular, large clasts are highly vesicular (~20-25%, < 1 mm with some > 5 mm), smaller clasts have shard morphology 6. Phenocrysts: none 7. Matrix: fine- to medium-grained, not 100% consolidated 8. Secondary Minerals: matrix may be hydrothermally altered, larger clasts are partially to completely altered to clay?, Chl? 9. Encrustations: patchy, <1 mm, black brown (Mn?) 10. Comment: clasts have similar appearance to rocks in sample 6	1							
SO267-DR58-8B	1. Rock Type: same as DR58-8A 2. Size: 31x21x14 cm								
SO267-DR58-9A	1. Rock Type: volcaniclastic, polymict breccia 2. Size: 25x16x14 cm 3. Shape / Angularity: flat, crust-like" to blocky, subangular 4. Color of cut surface: light brown matrix, blackish-greenish to reddish clasts 5. Texture / Vesicularity: matrix supported, medium sorted, gradation on top (lower part matrix and big clasts, upper part graded bed of many smaller clasts) 6. Phenocrysts: none 7. Matrix: light brown carbonate matrix (clay fraction) 8. Secondary Minerals: not visible 9. Encrustations: none 10. Comment: most clasts are generally similar to the lavas at site DR58, possibly also some oríginally more felsic clasts								
SO267-DR58-9B	1. Rock Type: same as DR58-9A 2. Size: 12x11x6 cm								
SO267-DR58-9C	1. Rock Type: same as DR58-9A 2. Size: 11x8x7 cm 9. Encrustations: thin, ~5 mm thick Mn-crust								

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR58-9D	1. Rock Type: same as DR58-9A 2. Size: 15x10x4 cm								
SO267-DR58-9E	1. Rock Type: same as DR58-9A 2. Size: 15x10x4 cm (indeed same size as 10D)								

SO267-DR59



Description of Location and Structure:
area southwest of Fonualei Rift, western flank of a cone-shaped volcano, dredge haul was placed at the southern margin of a slumping structure from the central section of th slope over top (southernmost dredge of SO267).

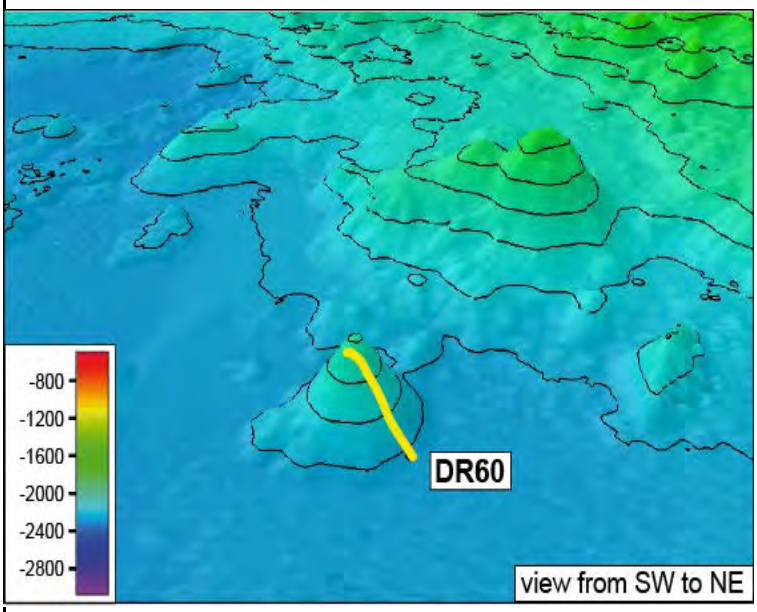
Dredge on bottom UTC 03/01/19 14:48 hrs, lat 18°33.29'S, long 174°55.63´W depth 1396 m
Dredge off bottom UTC 03/01/19 15:46 hrs, lat 18°33.53'S, long 174°55.21'W, depth 1160 m
total volume: few rocks
Comments: relatively homogeneous mafic to intermediate slightly Pl-phyric vesicular lava fragments with various degree of alteration (from fresh to moderate) and pumice.

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR59-1A	1. Rock Type: volcanic, mafic to intermediate, fresh 2. Size: 14x12x11 cm 3. Shape / Angularity: subangular 4. Color of cut surface: grey 5. Texture / Vesicularity: massive / highly vesicular (~15-25%, < 1-2 mm), vesicles are not infilled 6. Phenocrysts: subherdral Pl (~3-5%, < 1-2 mm), subhedral Ol? (~1-2%, 1-2 mm) 7. Matrix: massive, fine-grained 8. Secondary Minerals: none 9. Encrustations: brown-black, < 1 mm, covers entire rock (Mn?)	1	x						

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR59-1B	1. Rock Type: same as DR59-1A 2. Size: 14x9x5 cm								
SO267-DR59-2A	1. Rock Type: volcanic, mafic to intermediate, weak alteration 2. Size: 11x10x7 cm 3. Shape / Angularity: subangular 4. Color of cut surface: grey 5. Texture / Vesicularity: massive / slightly vesicular (~5%, << 1 mm), a few outsized vesicles (< 20 mm), vesicles are not infilled 6. Phenocrysts: subherdral Pl (~3-5%, < 1-2 mm), subhedral Ol? (~1-2%, 1-2 mm) 7. Matrix: massive, fine-grained 8. Secondary Minerals: greenish-beige hue (weak), suggestive of alteration (clay?) 9. Encrustations: brown-black, < 1 mm, covers entire rock	1	x						
SO267-DR59-2B	1. Rock Type: same as DR59-2A 2. Size: 14x9x7 cm 5. Texture / Vesicularity: banded (flow banding or cooling bands), bands defined by variable vesicle content and grain size 9. Encrustations: consolidated clay to sand on one surface (~15 mm thick)	1							
SO267-DR59-3A	1. Rock Type: volcanic, mafic to intermediate, weak to moderate alteration 2. Size: 17x13x6 cm 3. Shape / Angularity: subangular 4. Color of cut surface: light brownish-grey 5. Texture / Vesicularity: massive / moderately vesicular (~15-20%, < 1-3 mm), some with infilling of orange clay, vesicles form ~10 mm thick bands defined by vesicle size and concentration 6. Phenocrysts: subherdral Pl (~5-10%, < 1-3 mm), dark mineral, altered Ol? (~1-2%, 1-2 mm) 7. Matrix: massive, fine-grained 8. Secondary Minerals: greenish-beige hue (weak to moderate), clay alteration?, stronger than sample -2 9. Encrustations: brown-black, < 1 mm, covers majority of the rock (Mn?)	1	x						
SO267-DR59-3B	1. Rock Type: same as DR59-3A 2. Size: 10x8x7 cm 5. Texture / Vesicularity: no vesicle bands								

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR59-4	1. Rock Type: volcanic, mafic to intermediate, weak to moderate alteration 2. Size: 15x10x8 cm 3. Shape / Angularity: subangular 4. Color of cut surface: light brownish-grey 5. Texture / Vesicularity: massive / moderately vesicular (~10-15%, ≤ 1 mm), banded texture defined by size and content, bands ~5-10 mm thick, alternate with fine, orange-brown bands that appear to be altered glass (cooling bands?) 6. Phenocrysts: subherdral Pl (~5%, < 1-2 mm), traces of darker mineral (≤ 1 mm, Ol?) 7. Matrix: massive, fine-grained 8. Secondary Minerals: greenish-beige hue (moderate), clay alteration?, stronger than sample -3 9. Encrustations: brown-black, < 1 mm, covers 60%y of the	1	x						
SO267-DR59-5A	1. Rock Type: volcaniclastic (pumice), fresh 2. Size: 10x8x6 cm 3. Shape / Angularity: subangular to subrounded 4. Color of cut surface: light grey 5. Texture / Vesicularity: massive / highly vesicular (~45-55%, 1-15 mm), vesilce walls have "wispy" texture, some large vesicles with partial clay infilling 6. Phenocrysts: none 7. Matrix: massive, fine-grained, siliceous, glassy 8. Secondary Minerals: none 9. Encrustations: none								
SO267-DR59-5B	1. Rock Type: same as DR59-5A 2. Size: 8x6x3 cm								
SO267-DR59-5C	1. Rock Type: same as DR59-5A 2. Size: 7x6x5 cm								
SO267-DR59-5D	1. Rock Type: same as DR59-5A 2. Size: 6x5x5 cm								

SO267-DR60



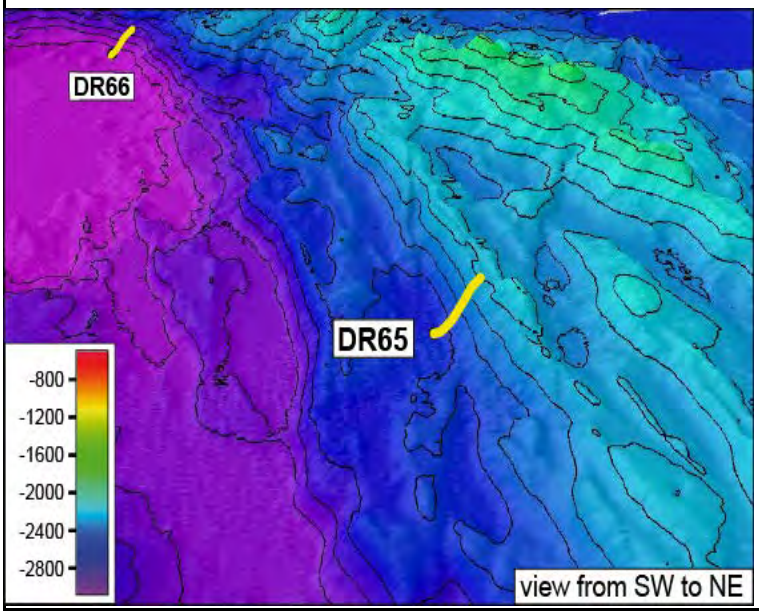
Description of Location and Structure:
area southwest of Fonualei Rift, small cone (Ø 1,2 km, 280 m high) SSW west of the "caldera" volcano sampled by DR50, dredge track across southern slope from base over top.

Dredge on bottom UTC 03/01/19 21:40 hrs, lat 18°17.16'S, long 174°59.22´W depth 2227 m
Dredge off bottom UTC 03/01/19 22:34 hrs, lat 18°17.84'S, long 174°59.26'W, depth 1912 m
total volume: 1/4 full
Comments: homogeneous, very fresh, Ol- and Fsp-phyric and vesicular lava fragments, cone is probably "monogenetic".

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR60-1A	1. Rock Type: volcanic, mafic, fresh 2. Size: 12x12x11 cm 3. Shape / Angularity: angular 4. Color of cut surface: dark grey to black 5. Texture / Vesicularity: massive / moderately vesicular (~10-15%, ≤ 2 mm) 6. Phenocrysts: Ol (~5-8%, ≤ 2 mm), Fsp (~3-5%, ≤ 2 mm) 7. Matrix: crypto- to microcrystalline 8. Secondary Minerals: none 9. Encrustations: minor surface oxidation on some samples								
SO267-DR60-1B	1. Rock Type: same as DR60-1A 2. Size: 11x8x9 cm	1	x						
SO267-DR60-1C	1. Rock Type: same as DR60-1A 2. Size: 20x18x13 cm								
SO267-DR60-1D	1. Rock Type: same as DR60-1A 2. Size: 14x9x8 cm	1	x						

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR60-1E	1. Rock Type: same as DR60-1A 2. Size: 17x8x7 cm								
SO267-DR60-1F	1. Rock Type: same as DR60-1A 2. Size: 13x8x7 cm	1	x						
SO267-DR60-1G	1. Rock Type: same as DR60-1A 2. Size: 23x18x14 cm							piece from bloc C (35x18x15 cm)	
SO267-DR60-1G-X	10. Comment: another piece of bloc C (DR60-1G) as archive sample							archive sample	

SO267-DR65



Description of Location and Structure:
area southwest of Fonualei Rift, northwestern trough, upper section of the central eastern flank of the trough, dredge haul aimed the upper of the crust but may have sampled also a younger, ridge-like volcanic feature extending along the edge of the trough.

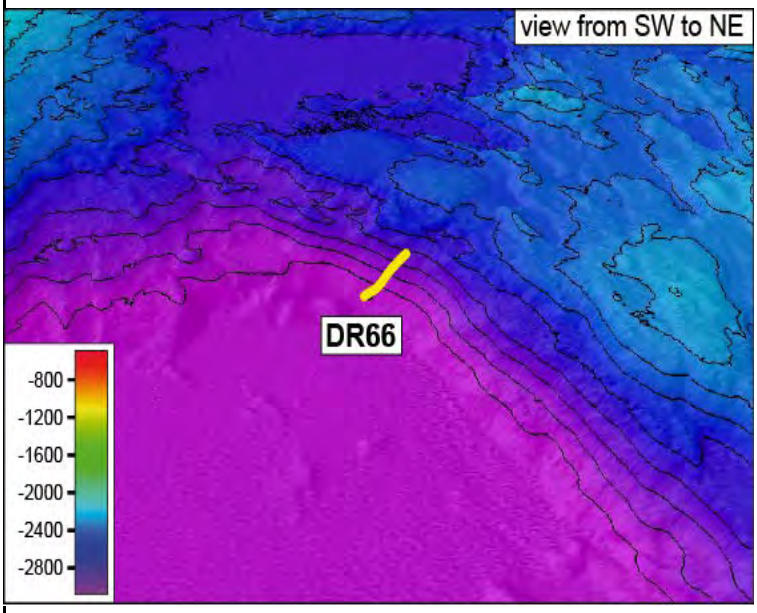
Dredge on bottom UTC 05/01/19 04:56 hrs, lat 18°23.75'S, long 175°51.76´W depth 2537 m
Dredge off bottom UTC 05/01/19 06:13 hrs, lat 18°23.90'S, long 175°51.40'W, depth 2175 m
total volume: 1/5 full
Comments: dredge recovered two major lithologies: porphyritic, slightly vesicular and weakly altered mafic lava and more strongly altered aphyric rocks with "gabbroic texture".

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR65-1A	1. Rock Type: volcanic, mafic, weakly altered 2. Size: 20x15x12 cm 3. Shape / Angularity: angular to subangular 4. Color of cut surface: medium to dark grey 5. Texture / Vesicularity: massive / slightly vesicular (1-2%, < 1 mm) 6. Phenocrysts: Ol (~5%, ≤ 5 mm), Fsp? (~5-8%, ≤ 3 mm), Amph or Px (~2%, ≤ 4 mm) 7. Matrix: microcrystalline 8. Secondary Minerals: none 9. Encrustations: surface alteration up to 10 mm thick along sample surfaces	1	x						
SO267-DR65-1B	1. Rock Type: same as DR65-1A 2. Size: 27x13x12 cm								
SO267-DR65-1C	1. Rock Type: same as DR65-1A 2. Size: 15x11x10 cm	1							
SO267-DR65-1D	1. Rock Type: same as DR65-1A 2. Size: 15x11x9 cm								
SO267-DR65-1E	1. Rock Type: same as DR65-1A 2. Size: 14x9x8 cm								
SO267-DR65-1F	1. Rock Type: same as DR65-1A 2. Size: 20x15x15 cm	1						piece from bloc B	
SO267-DR65-1G	1. Rock Type: same as DR65-1A 2. Size: 8.5x7.5x5 cm 10. Comment: may contain fresh glass	1			GI?				

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR65-2	1. Rock Type: volcanic, mafic, slightly altered 2. Size: 16x11x6 cm 3. Shape / Angularity: subangular 4. Color of cut surface: dark grey 5. Texture / Vesicularity: massive / moderately vesicular (~20%), most vesicles are very fine, a few are larger 6. Phenocrysts: Ol (~5%, ≤ 2 mm), Px (2-4%, < 1 mm) 7. Matrix: crypto- to microcrystalline 8. Secondary Minerals: iron oxides in some vesicles 9. Encrustations: none	1	x						
SO267-DR65-3A	1. Rock Type: volcanic (?), altered 2. Size: 29x11x13 cm 3. Shape / Angularity: angular to subangular 4. Color of cut surface: medium to drak yellowish-green 5. Texture / Vesicularity: "gabbroic texture" / sparsely vesicular (~5%, ≤ 2 mm) 6. Phenocrysts: none visible 7. Matrix: coarse-grained matrix of Ol/Px (?) with perhaps Amph and variable altered Fsp 8. Secondary Minerals: none visible 9. Encrustations: same faces are strongly oxidized (up to 5 cm thick)	1	x						
SO267-DR65-3B	1. Rock Type: same as DR65-3A 2. Size: 27x13x12 cm	1							
SO267-DR65-3C	1. Rock Type: same as DR65-3A 2. Size: 15x11x10 cm	1	x						
SO267-DR65-3D	1. Rock Type: same as DR65-3A 2. Size: 15x11x9 cm								
SO267-DR65-3E	1. Rock Type: same as DR65-3A 2. Size: 21.5x9x5.5 cm								

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR65-3F	1. Rock Type: same as DR65-3A 2. Size: 20x15x15 cm								
SO267-DR65-3G	1. Rock Type: same as DR65-3A 2. Size: 20x15x10 cm							piece from bloc A	
SO267-DR65-3G-X	addiotional archive sample from bloc A (c. 18x15x10 cm)							piece from bloc A (39x26x20 cm)	

SO267-DR66



Description of Location and Structure:
arae southwest of Fonualei Rift, northwestern trough, lower section of the eastern flank at the northern tip of the trough, dredge haul aimed deep crustal basement, complementary to DR65 which targeted the upper section of the slope.

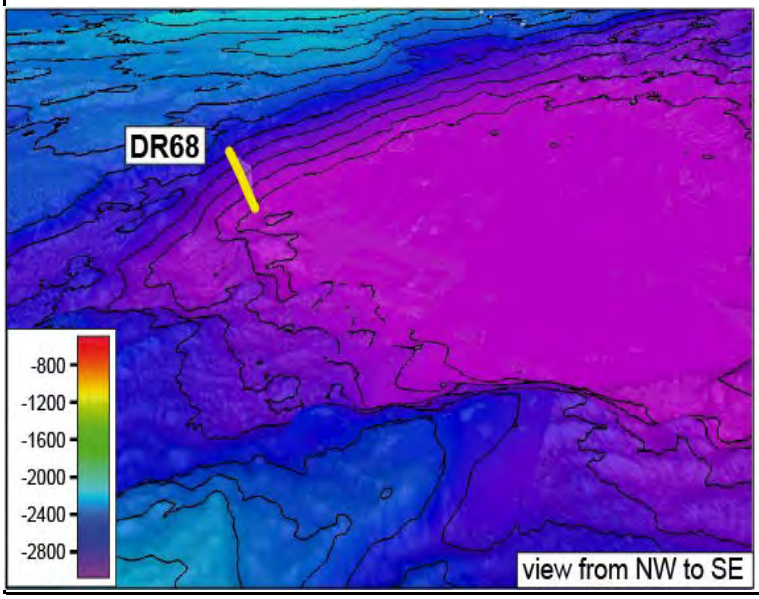
Dredge on bottom UTC 05/01/19 09:56 hrs, lat 18°12.44'S, long 175°48.50´W depth 3073 m
Dredge off bottom UTC 05/01/19 11:19 hrs, lat 18°12.67'S, long 175°48.11'W, depth 2723 m
total volume: 1/4 full
Comments: dredge yielded mainly aphyric, moderately vesicular and altered pillow fragments and a variety of pumice clasts of

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR66-1A	1. Rock Type: volcanic, mafic, moderately altered (pillow lava) 2. Size: 21x15x13 cm 3. Shape / Angularity: subangular 4. Color of cut surface: light grey with medium grey alteration rim 5. Texture / Vesicularity: massive, pillow / moderately vesicular (~15%, < 2 mm), some vesicles are filled 6. Phenocrysts: traces of altered Fsp (< 1 mm), white-colourless to greenish 7. Matrix: massive, fine-grained 8. Secondary Minerals: orange and greenish refillings 9. Encrustations: patchy brownish-black to beige surface 10. Comment: rock contains slightly altered glassy parts	1	x		G I					
SO267-DR66-1B	1. Rock Type: same as DR66-1A 2. Size: 16x10x10 cm	1							
SO267-DR66-1C	1. Rock Type: same as DR66-1A 2. Size: 13x12x9 cm	1	x		G I				
SO267-DR66-1D	1. Rock Type: same as DR66-1A 2. Size: 19x17x10 cm								
SO267-DR66-1E	1. Rock Type: same as DR66-1A 2. Size: 15x11x10 cm								

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR66-1F	1. Rock Type: same as DR66-1A 2. Size: 14x12x10 cm	1			GI				
SO267-DR66-1G	1. Rock Type: same as DR66-1A 2. Size: 10x9x7 cm								
SO267-DR66-1H	1. Rock Type: same as DR66-1A 2. Size: 17x16x11 cm	1							
SO267-DR66-1I-X	archive sample of lithology DR66-1 (18x18x14 cm)							archive sample	
SO267-DR66-2A	1. Rock Type: volcaniclastic (pumice), fresh 2. Size: 7x5x4 cm 3. Shape / Angularity: angular 4. Color of cut surface: light brown 5. Texture / Vesicularity: massive / highly vesicular (≤ 60%, ≤ 10 mm) 6. Phenocrysts: none 7. Matrix: fine-grained 8. Secondary Minerals: none 9. Encrustations: none								
SO267-DR66-2B	1. Rock Type: same as DR66-2A 2. Size: 7x5x4 cm 4. Color of cut surface: dark brown to medium brown, patchy 5. Texture / Vesicularity: highly porose (≤ 90%, ≤ 20 mm)								

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR66-2C	1. Rock Type: same as DR66-2A 2. Size: 9x4x5 cm 4. Color of cut surface: dark brown to medium brown, patchy 5. Texture / Vesicularity: highly porose (≤ 90%, ≤ 20 mm)								
SO267-DR66-2D	1. Rock Type: same as DR66-2A 2. Size: 8x8x4 cm 4. Color of cut surface: dark brown to medium brown, patchy 5. Texture / Vesicularity: highly porose (≤ 90%, ≤ 20 mm)								
SO267-DR66-2E	1. Rock Type: same as DR66-2A 2. Size: 6x5x4 cm 3. Shape / Angularity: subangular 4. Color of cut surface: medium brown								
SO267-DR66-2F	1. Rock Type: same as DR66-2A 2. Size: 7x5x3 cm 3. Shape / Angularity: subangular 4. Color of cut surface: medium brown								
SO267-DR66-3	1. Rock Type: sedimentary rock 2. Size: 12x10x4 cm 3. Shape / Angularity: rounded 4. Color of cut surface: beige-brown 7. Matrix: medium-grained 9. Encrustations: small dark brown-black patches (~2-3 cm, Mn?)					x			

SO267-DR68



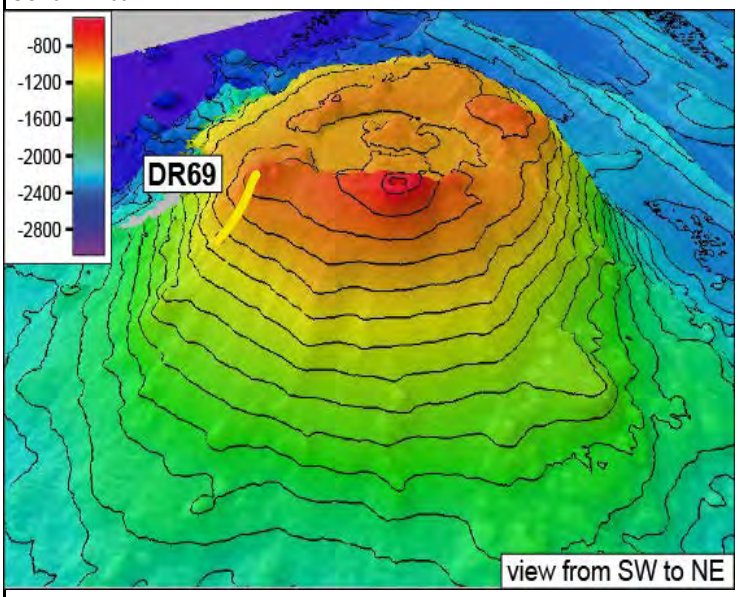
Description of Location and Structure:
area southwest of Fonualei Rift, SSW-NNE-striking ridge-like feature (most likely of tectonic origin), dredge sampled the western slope in the central part of the ridge from base to top.

Dredge on bottom UTC 05/01/19 15:36 hrs, lat 17°58.21'S, long 175°49.04´W depth 1819 m
Dredge off bottom UTC 05/01/18 16:33 hrs, lat 17°58.25'S, long 175°48.71'W, depth 1570 m
total volume: few rocks
Comments: dredge recovered homogeneous, aphyric, and fresh lava fragments with varing vesicularity, pumice, and sedimentary rocks (possibly volcaniclastic, with glassy clasts).

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR68-1A	1. Rock Type: volcanic, mafic to intermediate, fresh 2. Size: 21x19x13 cm 3. Shape / Angularity: subangular, blocky, columnar shape (cooling joints) 4. Color of cut surface: grey 5. Texture / Vesicularity: massive / sparsely vesicular (~3-5%, 2-20 mm), no fillings, flattend, elongated 6. Phenocrysts: none 7. Matrix: mssive, fine-grained 8. Secondary Minerals: none 9. Encrustations: 50% of the rock show patchy, brown-black cover (< 1 mm thick, Mn?)	1	x						
SO267-DR68-1B	1. Rock Type: same as DR68-1A 2. Size:12x11x6 cm 5. Texture / Vesicularity: moderately vesicular (~10-15%, 1-10 mm), no fillings 9. Encrustations: spare patches of brown-black cover (< 1 mm thick, Mn?)	1	x					piece of bloc A (33x23x22 cm)	
SO267-DR68-1B-X	another piece of bloc A as archive sample (21x16x16 cm)							archive sample	
SO267-DR68-1C	1. Rock Type: same as DR68-1A 2. Size:7x6x5 cm 5. Texture / Vesicularity: dense 9. Encrustations: spare patches of brown-black cover (< 1 mm thick, Mn?)								
SO267-DR68-2	1. Rock Type: volcaniclastic (pumice), fresh 2. Size: 13x11x8 cm 3. Shape / Angularity: subangular 4. Color of cut surface: brown-beige 5. Texture / Vesicularity: massive / highly vesicular (≤ 50%, 1-5 mm), "wispy" texture on vesicle walls 6. Phenocrysts: traces of Qz (1-2 mm) 7. Matrix: massive with weak foliation, highly porous 8. Secondary Minerals: none 9. Encrustations: minor (< 1% of surface area) patches of brown-black crust (< 1 mm thick, Mn?)	1							

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR68-3A	1. Rock Type: sedimentary (volcaniclastic?) 2. Size: 13x9x3 cm 3. Shape / Angularity: subround 4. Color of cut surface: brown 5. Texture / Vesicularity: massive, no visible bedding, rare clasts up to 20 mm, appears to be monolithic, clast are angular to subangular, some appear to be glass shards (hyaloclastite) 7. Matrix: coarse-grained, silt- to sand-sized grains 8. Secondary Minerals: none 9. Encrustations: brown-black, 1-2 mm thick crust on surface (Mn?)					x			
SO267-DR68-3B	1. Rock Type: same as DR68-3A 2. Size:15x12x10 cm 5. Texture / Vesicularity: glassy mafic clasts (1-2%, 1-10 mm) 9. Encrustations: none				GI?	x		piece from bloc B	

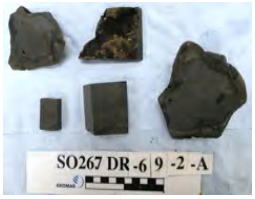
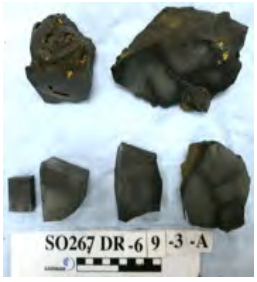
SO267-DR69



Description of Location and Structure:
area southwest of Fonualei Rift, medium-sized subcircular volcano (Ø ~12.5 km, ~1.900 m high) with collapse structure and two crater on top, dredge targeted the upper section of its western flank just beneath top.

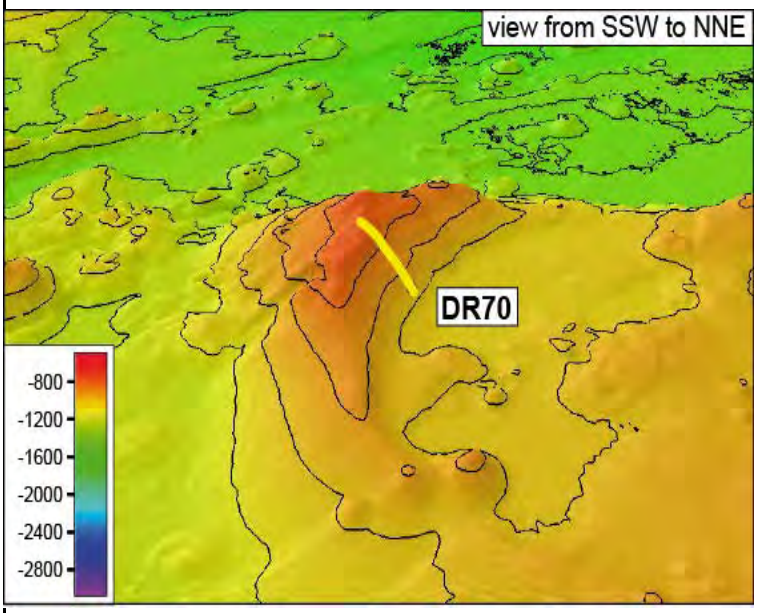
Dredge on bottom UTC 05/01/19 19:51 hrs, lat 17°49.06'S, long 175°43.04´W depth 1010 m
Dredge off bottom UTC 05/01/19 20:49 hrs, lat 17°49.06'S, long 175°43.71'W, depth 725 m
total volume: 1/5 full
Comments: mainly mafic to intermediate, moderately vesicular and partly Ol- and Fsp-phyric lava fragments with various degrees of

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR69-1A	1. Rock Type: volcanic, mafic to intermediate, weakly altered 2. Size: 23x18x11 cm 3. Shape / Angularity: subangular 4. Color of cut surface: medium grey 5. Texture / Vesicularity: massive / sparsely to moderately vesicular (~5-8%, ≤ 1.5 mm), vesicles have glassy walls 6. Phenocrysts: Fsp (~3-4%, ≤ 1.5 mm), Ol or Px (~2%, ≤ 2 mm) 7. Matrix: crypto- to microcrystalline 8. Secondary Minerals: clay in some fractures 9. Encrustations: Mn-staining on surface	1	x		G I				

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR69-1B	1. Rock Type: same as DR69-1A 2. Size: 17x14x10 cm	1	x						
SO267-DR69-1C	1. Rock Type: same as DR69-1A 2. Size: 19x17x13 cm	1	x						
SO267-DR69-1D	1. Rock Type: same as DR69-1A 2. Size: 11x10x8 cm								
SO267-DR69-2A	1. Rock Type: volcanic, mafic to intermediate, weakly altered 2. Size: 13x11x8 cm 3. Shape / Angularity: subangular 4. Color of cut surface: medium grey to greenish 5. Texture / Vesicularity: massive / sparsely to moderately vesicular (~5-10%, ≤ 2 mm) 6. Phenocrysts: Fsp? (<2%, ≤ 3 mm), Px? 7. Matrix: crypto- to microcrystalline 8. Secondary Minerals: none 9. Encrustations: alteration of the margins along edges and	1	x						
SO267-DR69-2B	1. Rock Type: same as DR69-2A 2. Size: 13x8x8 cm	1	x						
SO267-DR69-3A	1. Rock Type: volcanic, mafic to intermediate, weakly altered 2. Size: 16x14x10 cm 3. Shape / Angularity: angular 4. Color of cut surface: medium grey to greenish 5. Texture / Vesicularity: massive / moderately vesicular (~10-15%, ≤ 15 mm) 6. Phenocrysts: Ol? (2-3%, ≤ 2 mm), Fsp? (1-2%, ≤ 2 mm) 7. Matrix: crypto- to microcrystalline 8. Secondary Minerals: some clay in fractures, varies locally	1	x						
SO267-DR69-3B	1. Rock Type: same as DR69-3A 2. Size: 17x12x10 cm								

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR69-3C	1. Rock Type: same as DR69-3A 2. Size: 13x12x10 cm	1	x						
SO267-DR69-3D	1. Rock Type: same as DR69-3A 2. Size: 11x8x7 cm								
SO267-DR69-4	1. Rock Type: volcanic, altered 2. Size: 19x15x8 cm 3. Shape / Angularity: subangular to subrounded 4. Color of cut surface: light grey green 5. Texture / Vesicularity: massive / moderately vesicular (~15%, < 10 mm), streched vesicles 6. Phenocrysts: Ol (2%, ≤ 3 mm), Fsp (2%, ≤ 3 mm), partly altered 7. Matrix: microcrystalline to fine-grained 8. Secondary Minerals: iron oxides in some vesicles, smectite?, epidote? 9. Encrustations: black patches on surface (Mn?)	1	x						
SO267-DR69-5	1. Rock Type: same as sample -1 2. Size: 26x20x17 cm 10. Comment: big bloc A, to be kept as representative sample								

SO267-DR70



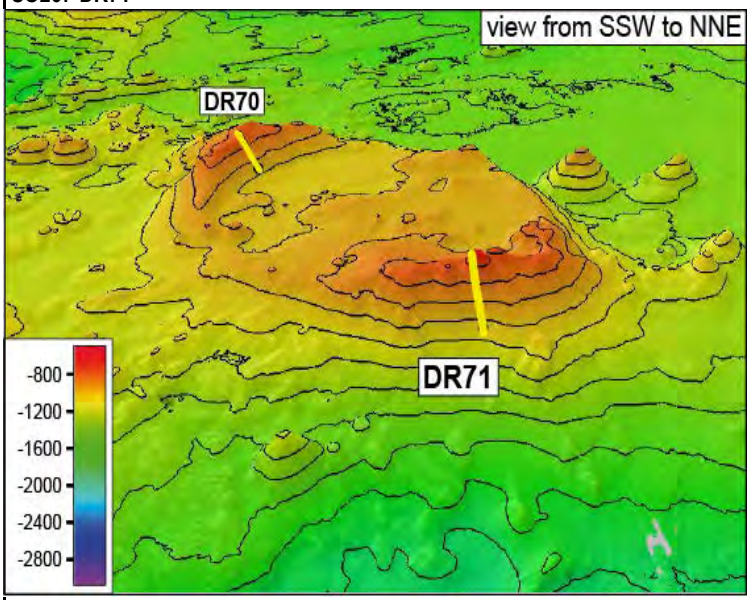
Description of Location and Structure:
area southwest of Fonualei Rift, oval-shaped volcano (13x9 km, ~700 m high) with relatively flat top surrounded by a sub-circular ridge-like feature, dredge aimed the northern inner wall of the sub-circular ridge.

Dredge on bottom UTC 07/01/19 02:42 hrs, lat 18°16.54'S, long 174°47.48´W depth 951 m
Dredge off bottom UTC 07/01/19 04:35 hrs, lat 18°16.25'S, long 174°47.57'W, depth 770 m
total volume: 1/8 full
Comments: dredge yielded only pumice of unkown origin and sedimentary rocks, among them limestone which may suggest to a drowned reef on top of this volcano.

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR70-1A	1. Rock Type: volcaniclastic (pumice), almost fresh 2. Size: 8x6x4 cm 3. Shape / Angularity: angular 4. Color of cut surface: light grey to reddish grey 5. Texture / Vesicularity: highly vesicular with elongated and rounded vesicles 6. Phenocrysts: none 7. Matrix: glassy 8. Secondary Minerals: none 9. Encrustations: minor Fe-staining								
SO267-DR70-1B	1. Rock Type: same as DR70-1A 2. Size: 7x6x4 cm								
SO267-DR70-1C	1. Rock Type: same as DR70-1A 2. Size: 9x8x6 cm								
SO267-DR70-1D	1. Rock Type: same as DR70-1A 2. Size: 6x6x3 cm								

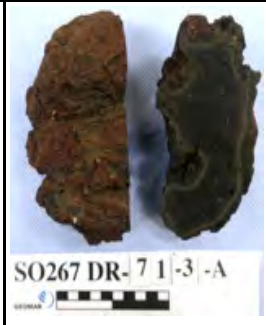
SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR70-1E	1. Rock Type: same as DR70-1A 2. Size: 7x6x3 cm								
SO267-DR70-2A	1. Rock Type: sedimentary rock (red limestone) 2. Size: 13x12x8 cm 3. Shape / Angularity: angular 4. Color of cut surface: brownish-orange-grey 5. Texture / Vesicularity: irregular 7. Matrix: carbonate ooze 9. Encrustations: Mn-coating					x			
SO267-DR70-2B	1. Rock Type: same as DR70-2A 2. Size: 23x18x9 cm					x			
SO267-DR70-3	1. Rock Type: clastic sedimentary rock 2. Size: 21x16x4 cm 3. Shape / Angularity: subangular to subrounded 4. Color of cut surface: light brown 5. Texture / Vesicularity: massive 7. Matrix: silt to fine-sand with some larger biogenic components 9. Encrustations: minor Mn-staining					x			

SO267-DR71



Description of Location and Structure:
area southwest of Fonualei Rift, same oval-shaped volcano as DR71, dredge track across the upper section of outer southern slope.

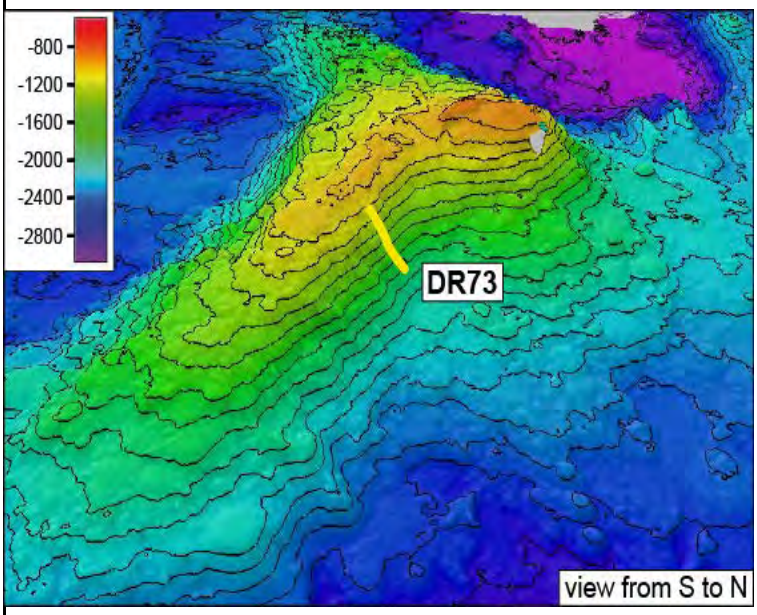
Dredge on bottom UTC 07/01/19 06:19 hrs, lat 18°19.94'S, long 174°45.71´W depth 985 m
Dredge off bottom UTC 07/01/19 07:30 hrs, lat 18°19.55'S, long 174°45.70'W, depth 627 m
total volume: 1/4 full
Comments: major lithology is mafic, Ol- and Px-porphyritic lava (ankaramite ?) showing partly the structural features of subaerial Aa lava, various volcaniclastic rocks and pumice are minor.

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR71-1A	1. Rock Type: volcanic, mafic, almost fresh 2. Size: 11x7x5 cm 3. Shape / Angularity: angular, blocky 4. Color of cut surface: dark grey 5. Texture / Vesicularity: massive, weak flow banding / sparsely vesicular (~2%, < 8 mm), subangular vesicles 6. Phenocrysts: fine-grained porphyritic, likely Pl, Ol, and possibly Px? 7. Matrix: cryptocrystalline 8. Secondary Minerals: none 9. Encrustations: none	1	x						
SO267-DR71-1B	1. Rock Type: same as DR71-1A 2. Size: 6x6x5 cm								
SO267-DR71-2A	1. Rock Type: volcanic, mafic, ankaramite?, weakly altered 2. Size: 10x6x5 cm 3. Shape / Angularity: subangular, blocky 4. Color of cut surface: dark grey 5. Texture / Vesicularity: massive, porphyritic / moderately vesicular (~5-6%, < 5 mm), spherical to slightly elongated vesicles 6. Phenocrysts: fresh Px (2-3%, < 4 mm), slightly oxidized Ol (2-3%, < 2 mm) 7. Matrix: cryptocrystalline 8. Secondary Minerals: none 9. Encrustations: minor Fe-staining								
SO267-DR71-2B	1. Rock Type: same as DR71-1A 2. Size: 12x10x8 cm 3. Shape / Angularity: angular	1	x						
SO267-DR71-3A	1. Rock Type: volcanic, mafic, ankaramite?, weakly altered, similar to DR71-2 2. Size: 14x13x6 cm 10. Comment: lots of striations, looks similar to subaerial blocky Aa lava flow, minor, up to 1 cm thick alteration halo (mainly oxidation)								
SO267-DR71-3B	1. Rock Type: same as DR71-3A 2. Size: 16x10x9 cm								

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR71-3C	1. Rock Type: same as DR71-3A 2. Size: 12x10x8 cm	1	x						
SO267-DR71-3D	1. Rock Type: same as DR71-3A 2. Size: 17x11x9 cm								
SO267-DR71-3E	1. Rock Type: same as DR71-3A 2. Size: 16x12x9 cm	1	x						
SO267-DR71-4A	1. Rock Type: volcanic, mafic, ankaramite?, moderately altered (interior fresh), similar to DR71-2 2. Size: 16x16x4 cm 5. Texture / Vesicularity: some vesicles sediment-filled 10. Comment: very flat, disk-like shape, blocky Aa lava flow, moderate, up to 1 cm thick alteration halo (oxidation), phenocrysts exposed at the surface due to weathering								
SO267-DR71-4B	1. Rock Type: same as DR71-4A 2. Size: 15x12x3 cm								
SO267-DR71-4C	1. Rock Type: same as DR71-4A 2. Size: 16x7x4 cm								

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR71-5A	1. Rock Type: volcaniclastic, monolithic, fresh 2. Size: 9x7x6 cm 3. Shape / Angularity: subangular to subround 4. Color of cut surface: dark grey to black 5. Texture / Vesicularity: *in situ* brecciated to clast rotated, clasts are 1-8 mm, mostly aphyric with some Ol and Px phenocrysts (1-2 mm) in larger clasts, framework-supported with 70-80% clasts, a few vesicles (< 1 mm) in clasts 6. Phenocrysts: trace of Ol and Px (1-2 mm) in larger clasts 7. Matrix: 20-30% fine-grained orange carbonate matrix 8. Secondary Minerals: none 9. Encrustations: minor patchy, brown-black, < 1 mm thick crust (Mn?), mostly on one surface of each sample								
SO267-DR71-5B	1. Rock Type: same as DR71-5A 2. Size: 9x7x4 cm 5. Texture / Vesicularity: fractured to *in situ* brecciated with only a few true clasts occurring on one side of the rock 6. Phenocrysts: Ol (1-2%, 1-2 mm), Px (3-5%, ≤ 1 mm) 7. Matrix: no true matrix	1							
SO267-DR71-6A	1. Rock Type: volcanicclastic (pumice), fresh 2. Size: 11x8x6 cm 3. Shape / Angularity: subangular to subround 4. Color of cut surface: beige-grey 5. Texture / Vesicularity: massive / highly vesicular (~30-40%, 1-20 mm) no infilling, "wispy" texture lining vesicle walls 6. Phenocrysts: none 7. Matrix: fine-grained to glassy 8. Secondary Minerals: none 9. Encrustations: none								
SO267-DR71-6B	1. Rock Type: same as DR71-6A 2. Size: 8x8x6 cm								
SO267-DR71-6C	1. Rock Type: same as DR71-6A 2. Size: 8x6x5 cm 4. Color of cut surface: dark grey 7. Matrix: darker than -6A and -6B, maybe slightly more mafic								
SO267-DR71-6D	1. Rock Type: same as DR71-6A 2. Size: 7x6x4 cm 4. Color of cut surface: dark grey 7. Matrix: darker than -6A and -6B, maybe slightly more mafic								

SO267-DR73



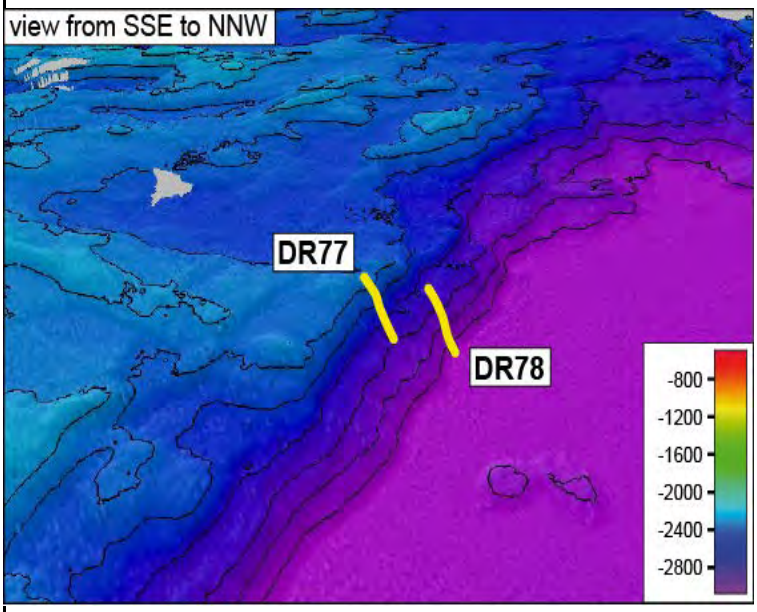
Description of Location and Structure:
area southwest of Fonualei Rift, curved ridge-like feature at the western termination of the working area, dredge targeted the upper eastern flank of the southern part of the ridge.

Dredge on bottom UTC 08/01/19 09:02 hrs, lat 18°00.79'S, long 175°57.18´W depth 1675 m
Dredge off bottom UTC 08/01/19 10:30 hrs, lat 18°00.55'S, long 175°57.62'W, depth 1127 m
total volume: few rocks
Comments: homogeneous, slightly vesicular, highly Pl-phyric pillow lava.

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR73-1A	1. Rock Type: volcanic, mafic (pillow fragment), slightly altered 2. Size: 23x22x17 cm 3. Shape / Angularity: angular 4. Color of cut surface: medium grey 5. Texture / Vesicularity: massive, porphyritic / slightly vesicular (≤ 1%, ≤ 4 mm), spherical vesicles, no infilling 6. Phenocrysts: Pl laths (~15%, < 1 mm), Ol? (~2-3%, << 1 mm) 7. Matrix: cryptocrystalline 8. Secondary Minerals: none 9. Encrustations: weak, < 1 cm thick oxidation halo 10. Comment: contains glass	1	x		G I				is bloc B	
SO267-DR73-1B	1. Rock Type: same as DR73-1A 2. Size:12x8x8 cm	1	x						
SO267-DR73-1C	1. Rock Type: same as DR73-1A 2. Size:10x7x6 cm								

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR73-1D	1. Rock Type: same as DR73-1A, but piece of bloc A (30x20x18 cm)							piece of bloc A	no picture
SO267-DR73-1D-X	rest of bloc A as archive sample							archive sample	

SO267-DR77



Description of Location and Structure:
area southwest of Fonualei Rift, western flank of eastern trough, dredge haul 77 targeted the upper part of the slope from the middle section to the edge of the trough (complementary to DR78 which aimed the lower section).

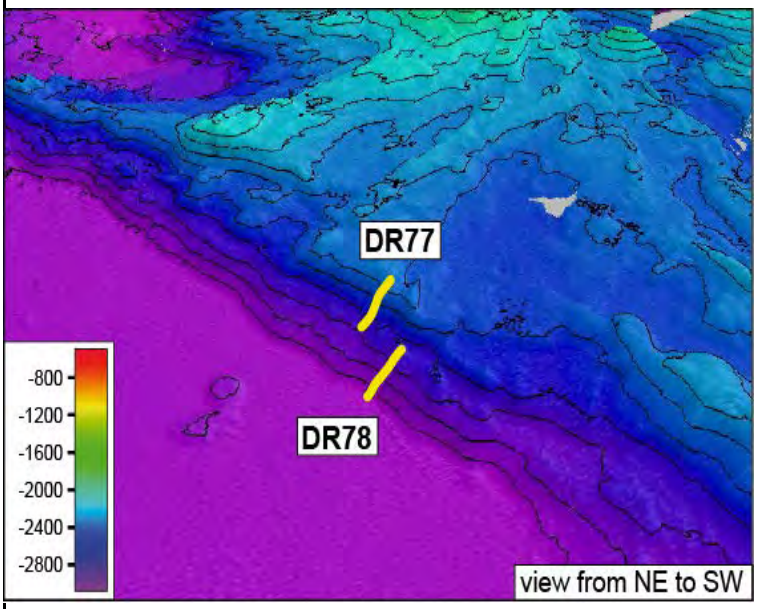
Dredge on bottom UTC 10/01/19 08:40 hrs, lat 18°31.25'S, long 175°41.60´W depth 2646 m
Dredge off bottom UTC 10/01/19 09:41 hrs, lat 18°31.07'S, long 175°41.91'W, depth 2353 m
total volume: few rocks
Comments: dredge recovered relatively inhomogeneous, mafic to intermediate lava fragments

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR77-1A	1. Rock Type: volcanic, mafic, fresh 2. Size: 12x11x10 cm 3. Shape / Angularity: angular 4. Color of cut surface: dark grey 5. Texture / Vesicularity: massive / moderately vesicular (~10-20%, ≤ 5 mm), few vesicles up to 1.5 cm 6. Phenocrysts: few Ol (≤ 2 mm) 7. Matrix: cryptocrystalline to microcrystalline 8. Secondary Minerals: none 9. Encrustations: weak surface alteration	1	x						

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR77-1B	1. Rock Type: same as DR77-1A 2. Size:12x11x4.5 cm	1							
SO267-DR77-2A	1. Rock Type: volcanic, mafic to intermediate, weakly altered 2. Size: 9x8x6.5 cm 3. Shape / Angularity: angular to subangular 4. Color of cut surface: medium greenish grey 5. Texture / Vesicularity: massive / moderately vesicular (~10-15%, ≤ 1 mm) 6. Phenocrysts: pale green Ol (≤ 5%, ≤ 2 mm) 7. Matrix: microcrystalline 8. Secondary Minerals: none	1	x						
SO267-DR77-2B	1. Rock Type: same as DR77-2A 2. Size: 9x7.5x5 cm	1							
SO267-DR77-3	1. Rock Type: volcanic, mafic, moderately altered 2. Size: 14.5x11x10 cm 3. Shape / Angularity: angular 4. Color of cut surface: medium greenish grey 5. Texture / Vesicularity: massive / moderately vesicular (~8-10%, ≤ 1 mm) 6. Phenocrysts: Ol (≤ 5%, ≤ 2 mm) 7. Matrix: microcrystalline 8. Secondary Minerals: none 9. Encrustations: none	1	x						
SO267-DR77-4A	1. Rock Type: volcanic, crystalline, altered 2. Size: 11x9.5x7 cm 3. Shape / Angularity: subangular 4. Color of cut surface: medium green 5. Texture / Vesicularity: massive, crystalline rock / sparsely vesicular (~2%, < 2 mm), tiny crystals in vesicles 6. Phenocrysts: none 7. Matrix: crystalline, medium grained matrix of Ol, Px, Fsp, ± Amph and Bi 8. Secondary Minerals: brown mineral (~8%, ≤ 2 mm), maybe altered Ol, maybe some sulfur in vesicles 9. Encrustations: none	1	x						

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR77-4B	1. Rock Type: same as DR77-4A 2. Size:17x14x14 cm								

SO267-DR78



Description of Location and Structure:
area southwest of Fonualei Rift, western flank of eastern trough, dredge haul 78 targeted the lower part of the slope from base to middle section (complementary to DR77 which aimed the upper section).

Dredge on bottom UTC 10/01/19 11:58 hrs, lat 18°30.88'S, long 175°41.10´W depth 2925 m
Dredge off bottom UTC 10/01/19 13:00 hrs, lat 18°30.67'S, long 175°41.37'W, depth 2603 m
total volume: 1/6 full
Comments: relatively homogeneous, sparsely to moderately vesicular, aphyric mafic lava (mostly fresh) dominates, altered mafic to intermediate lava fragments are minor.

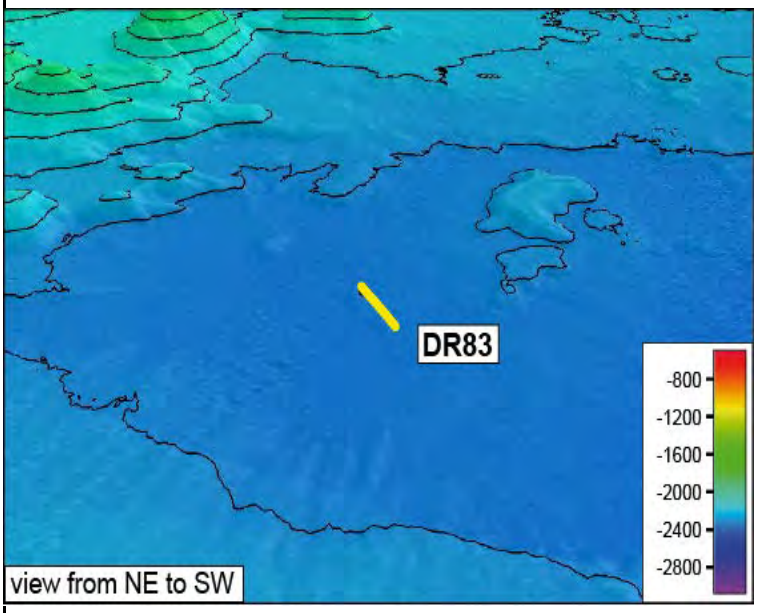
SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR78-1A	1. Rock Type: volcanic, mafic, fresh 2. Size: 16x10x8 cm 3. Shape / Angularity: angular 4. Color of cut surface: dark grey 5. Texture / Vesicularity: massive, flow-banded / sparsely vesicular (≤ 5%, ≤ 5 mm), streched vesicles 6. Phenocrysts: none 7. Matrix: crypto- to microcrystalline 8. Secondary Minerals: none 9. Encrustations: none	1	x						
SO267-DR78-1B	1. Rock Type: same as DR78-2A 2. Size:12x10x6 cm	1							

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR78-2	1. Rock Type: volcanic, mafic, fresh 2. Size: 12x9x8 cm 3. Shape / Angularity: angular 4. Color of cut surface: dark grey 5. Texture / Vesicularity: massive, weakly banded / sparsely to moderately vesicular (≤ 5%, ≤ 8 mm), streched vesicles 6. Phenocrysts: none 7. Matrix: crypto- to microcrystalline 8. Secondary Minerals: none 9. Encrustations: none	1	x						
SO267-DR78-3	1. Rock Type: volcanic, mafic, weakly altered 2. Size: 12x8x5 cm 3. Shape / Angularity: angular to subangular 4. Color of cut surface: greenish grey 5. Texture / Vesicularity: massive / moderately vesicular (~15-20%, ≤ 2 mm) 6. Phenocrysts: yellowish Ol (~5%, ≤ 2 mm) 7. Matrix: microcrystalline 8. Secondary Minerals: none 9. Encrustations: none	1	x						
SO267-DR78-4A	1. Rock Type: volcanic, mafic, fresh 2. Size: 11x8x6 cm 3. Shape / Angularity: angular to subangular 4. Color of cut surface: dark grey 5. Texture / Vesicularity: massive / moderately vesicular (~15%, ≤ 3 mm) 6. Phenocrysts: Ol microphenocrysts (~7-10%, ≤ 1 mm) 7. Matrix: microcrystalline 8. Secondary Minerals: none 9. Encrustations: none	1	x						
SO267-DR78-4B	1. Rock Type: same as DR78-4A 2. Size:16x9x7 cm								
SO267-DR78-5A	1. Rock Type: volcanic, mafic, fresh 2. Size: 14x10x9 cm 3. Shape / Angularity: angular 4. Color of cut surface: dark grey 5. Texture / Vesicularity: massive / moderately to highly vesicular (~15-25%, ≤ 7 mm) 6. Phenocrysts: none 7. Matrix: crypto- to microcrystalline 8. Secondary Minerals: none 9. Encrustations: none	1	x						
SO267-DR78-5B	1. Rock Type: same as DR78-5A 2. Size:16x9x7 cm								

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR78-6A	1. Rock Type: volcanic, mafic, fresh 2. Size: 7x5x4.5 cm 3. Shape / Angularity: angular to subangular 4. Color of cut surface: dark grey 5. Texture / Vesicularity: massive / moderately vesicular (~15%, ≤ 5 mm) 6. Phenocrysts: none 7. Matrix: crypto- to microcrystalline 8. Secondary Minerals: none 9. Encrustations: none 10. Comment: well preserved glass crust, 5 mm thick, glass slab taken				G I				
SO267-DR78-6B	1. Rock Type: same as DR78-6A 2. Size:16x9x7 cm 10. Comment: glass slab taken				G I				
SO267-DR78-7	1. Rock Type: volcanic, mafic to intermediate, altered 2. Size: 13x11.5x11 cm 3. Shape / Angularity: subangular to subrounded 4. Color of cut surface: medium greyish green 5. Texture / Vesicularity: massive / moderately vesicular (~5-8%, ≤ 2 mm) 6. Phenocrysts: none 7. Matrix: microcrystalline 8. Secondary Minerals: black waxy coating / filling in some vesilces, perhaps some iron oxide (reddish-brown when scratched), maybe some sulfur locally in some vesicles 9. Encrustations: thin, patchy Mn-crust	1	x					piece from bloc A (25x23x13 cm)	
SO267-DR78-7X	another piece of bloc A as archive sample							archive sample	
SO267-DR78-8A	1. Rock Type: volcaniclastic (pumice), felsic, fresh 2. Size: 8.5x7.5x4.5 cm 3. Shape / Angularity: rounded 4. Color of cut surface: beige 5. Texture / Vesicularity: massive / highly vesicular (~30%, < 6 mm) 6. Phenocrysts: none 7. Matrix: glassy 8. Secondary Minerals: none 9. Encrustations: none								

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR78-8B	1. Rock Type: volcaniclastic (pumice), intermediate?, fresh 2. Size: 6x5x4 cm 3. Shape / Angularity: rounded 4. Color of cut surface: dark-brown to black 5. Texture / Vesicularity: pumiceous / highly vesicular (~70-80%, ≤ 12 mm) 6. Phenocrysts: none 7. Matrix: glassy (bubble walls) 8. Secondary Minerals: none 9. Encrustations: none								

SO267-DR83

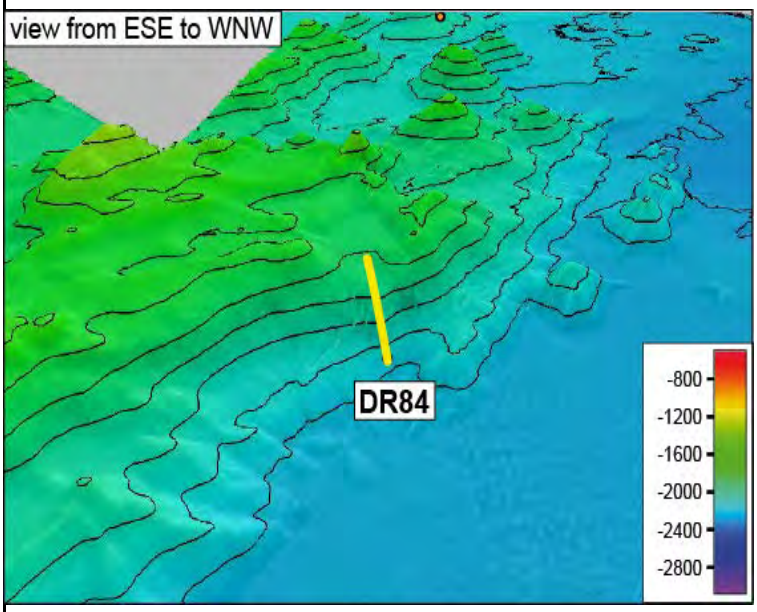


Description of Location and Structure:
central volcanic field (CVF) west of northern Fonualei Rift, circular region on plain ocean floor which appears white ion backscatter map and has been interpreted as potential young lava flow.

Dredge on bottom UTC 15/01/19 12:59 hrs, lat 16°00.73'S, long 175°24.78´W depth 2338 m
Dredge off bottom UTC 15/01/19 13:49 hrs, lat 16°00.40'S, long 175°24.59'W, depth 2337 m
total volume: few small rocks
Comments: dredge recovered only a few pumice fragments and soft sediment in the sediment traps, indicating that the potential lava flow does not exist or is covered by sediments.

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR83-1A	1. Rock Type: volcanic, felsic, pumice 2. Size: 7x7x6 cm 3. Shape / Angularity: blocky, subrounded 4. Color of cut surface: light yellowish grey 5. Texture / Vesicularity: pumiceous (glomerophorphyritic) / moderately to highly vesicular (mostly 20%) 6. Phenocrysts: Mt (1-2%), accessory Qz, both pristine 7. Matrix: glassy 8. Secondary Minerals: none 9. Encrustations: thin Mn-coating	1	x						
SO267-DR83-1B	1. Rock Type: same as 1A 2. Size: various small fragments								

SO267-DR84

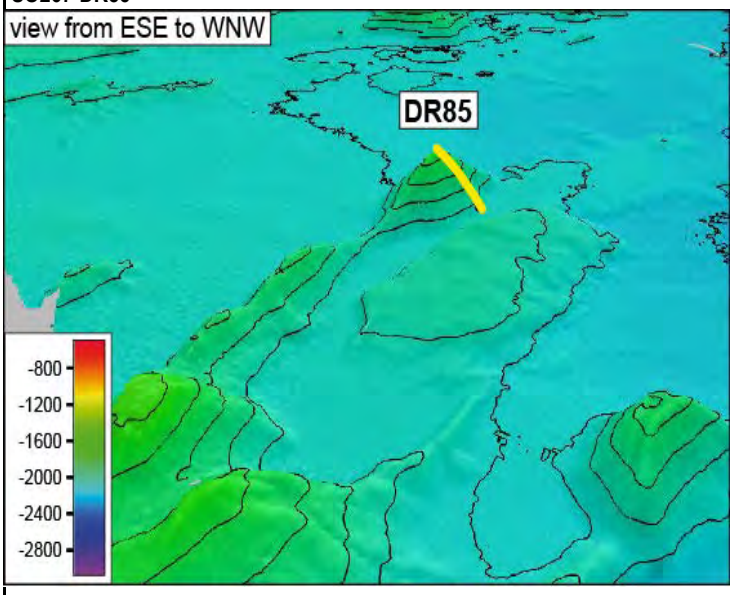


Description of Location and Structure:
central volcanic field (CVF) west of northern Fonualei Rift, NW-SE-trending ridge-like feature, dredge haul at eastern flank beneath small cone from base to top.

Dredge on bottom UTC 15/01/19 17:02 hrs, lat 16°06:54'S, long 175°22.15´W depth 2143 m
Dredge off bottom UTC 15/01/19 18:10 hrs, lat 16°06.59'S, long 175°22.51'W, depth 1833 m
total volume: few rocks
Comments: dredge recovered only two altered volcanic rocks (mafic? lava fragment and a volcaniclastic rock) and carbonaceous

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR84-1	1. Rock Type: volcaniclastic or greywacke?, altered 2. Size: 15x9x5 cm 3. Shape / Angularity: oval, elongated, subangular 4. Color of cut surface: dark greenish grey 5. Texture / Vesicularity: massive, dense (some clasts show vesicularity and may be of volcanic origin), poorly sorted 7. Matrix: Qz-matrix? (silica?) 9. Encrustations: minor Mn-crust on top surface	1				x ?			
SO267-DR84-2	1. Rock Type: volcanic, mafic?, altered 2. Size: 18x9x7 cm 3. Shape / Angularity: triangular, elongated, subrounded 4. Color of cut surface: dark greenish grey 5. Texture / Vesicularity: massive, porphyritic / sparsely vesicular (~1%), vesicles filled with calcite 6. Phenocrysts: Pl (~10-15%, < 2 mm), Px?, Ol? 7. Matrix: microcrystalline 8. Secondary Minerals: calcite in vesicles, amorphous silica?	2							
SO267-DR84-3A	1. Rock Type: carbonaceous sediment 2. Size: 16x10x6 cm 3. Shape / Angularity: irregular, subangular 4. Color of cut surface: beige 5. Texture / Vesicularity: massive with some vein-like structures 7. Matrix: carbonate ooze 9. Encrustations: 1-2 mm Mn-crust					x			
SO267-DR84-3B	1. Rock Type: same as DR84-3A 2. Size: 11x5x5 cm 5. Texture / Vesicularity: massive, showing sediment deformation (compaction?)					x			

SO267-DR85

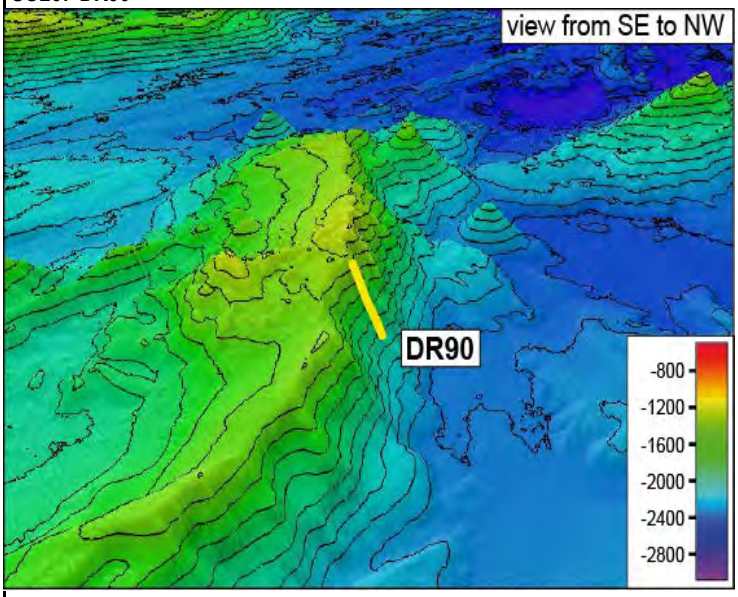


Description of Location and Structure:
central volcanic field (CVF) west of northern Fonualei Rift, small, ~440 m high NNE-SSW elongated volcano being located ~10 nm WNW of DR84, northeastern slope from base to top.

Dredge on bottom UTC 15/01/19 20:36 hrs, lat 16°03.20'S, long 175°31.77´W depth 2025 m
Dredge off bottom UTC 15/10/19 21:45 hrs, lat 16°03.46'S, long 175°32,32'W, depth 1671 m
total volume: few small rocks
Comments: dredge recovered only three small pumice fragments.

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR85-1	1. Rock Type: volcanic, felsic, pumice 2. Size: 7x7x4 cm, 5x4x3 cm, 3x3x2 cm 3. Shape / Angularity: angular 4. Color of cut surface: very pale grey to white 5. Texture / Vesicularity: highly vesicular, variable (~50-70%), vesicles streched 6. Phenocrysts: none 7. Matrix: glassy 8. Secondary Minerals: none 9. Encrustations: one fragment has staining on surface and is more brownish								

SO267-DR90



Description of Location and Structure:
area north of Fonualei Rift, N-S-trending, slightly curved ridge (tilted bloc?), dredge track at eastern slope from lower section to crest of the ridge.

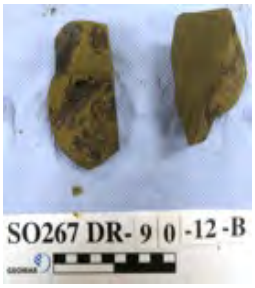
Dredge on bottom UTC 18/01/19 08:55 hrs, lat 15°26.21'S, long 174°29.24´W depth 1869 m
Dredge off bottom UTC 18/01/19 10:09 hrs, lat 15°26.06'S, long 174°29.59'W, depth 1341 m
total volume: 1/2 full
Comments: homogeneous, strongly alterd lava fragments and a broad variety of mostly altered sedimentary and volcaniclastic rocks.

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR90-1A	1. Rock Type: volcanic, strongly altered 2. Size: 20x16x9 cm 3. Shape / Angularity: subangular 4. Color of cut surface: medium green-grey 5. Texture / Vesicularity: massive / moderately vesicular (~5-10%, < 3 mm) 6. Phenocrysts: maybe sone relicts of altered phenocrysts (but unlikely) 7. Matrix: fine- to medium-grained - possibly due to alteration, soft 8. Secondary Minerals: soft matrix indicate pervasive alteration (clays?) 9. Encrustations: none 10. Comment: strongly altered basalt? andesite?	1	x						
SO267-DR90-1B	1. Rock Type: same as DR90-1A 2. Size: 13x11x7 cm								
SO267-DR90-1C	1. Rock Type: same as DR90-1A 2. Size: 13x8x6 cm	1	x						
SO267-DR90-1D	1. Rock Type: same as DR90-1A 2. Size: 11x9x7 cm								
SO267-DR90-2A	1. Rock Type: volcanic, strongly altered 2. Size: 10x7x6 cm 3. Shape / Angularity: subangular 4. Color of cut surface: pale brown 5. Texture / Vesicularity: massive / moderately to highly vesicular (~15-25%, < 2 mm) 6. Phenocrysts: Ol (~5%, ≤ 2 mm) 7. Matrix: fine-grained - possibly due to alteration, soft 8. Secondary Minerals: some vesicles are coated or completely filled by black mineral with waxy luster, especially near the edges of the sample - suggests alteration origin	1							

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR90-2B	1. Rock Type: same as DR90-2A 2. Size: 14x10x10 cm	1	x						
SO267-DR90-3A	1. Rock Type: partly consoildated sediment, highly altered (fine-grained volcaniclastic?) 2. Size: 16x11x7 cm 3. Shape / Angularity: subangular to subrounded 4. Color of cut surface: pistachio green to brownish 5. Texture / Vesicularity: massive 7. Matrix: fine- to medium-grained (siltstone or tuff) 8. Secondary Minerals: green color indicates alteration (smectite?) of ash (?) beds 9. Encrustations: none 10. Comment: not fully consolidated or lithified					x			
SO267-DR90-3B	1. Rock Type: same as DR90-3A 2. Size: 24x12x10 cm					x			
SO267-DR90-4	1. Rock Type: sedimentary rock or tuff 2. Size: 18x15x11 cm 3. Shape / Angularity: subangular to subrounded 4. Color of cut surface: pistachio green to pale grey 5. Texture / Vesicularity: massive, ≤ 1 cm thick veins, traces of bioturbation? 7. Matrix: fine-grained (siltstone or tuff) 8. Secondary Minerals: smectite? 9. Encrustations: brownish, ≤ 5 mm thick surface weathering 10. Comment: almost fully lithified					x		piece from bloc A (36x30x17 cm)	
SO267-DR90-4X	1. Rock Type: same as DR90-4 10. Comment: another piece of bloc A as archive sample					x		archive sample	
SO267-DR90-5	1. Rock Type: sedimentary or volcaniclastic rock, strongly altered 2. Size: 14x12x5 cm 3. Shape / Angularity: subangular 4. Color of cut surface: pistachio green to brownish 5. Texture / Vesicularity: gradded bedding (beds ≤ 10 cm thick) grains < 1 mm, ±sandstone to siltstone 7. Matrix: fine-grained (siltstone or tuff) 8. Secondary Minerals: pervasive greenish alteration (smectite?) 9. Encrustations: none					x		piece from bloc E (34x26x24 cm)	

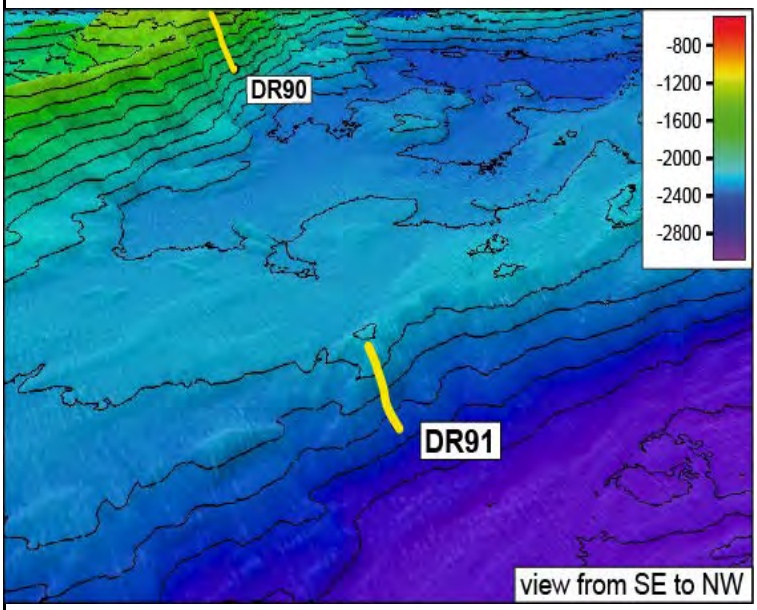
SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR90-5X	1. Rock Type: same as DR90-5 10. Comment: another piece of bloc E as archive sample					x		archive sample	
SO267-DR90-6	1. Rock Type: sedimentary rock, altered 2. Size: 14x11x8 cm 3. Shape / Angularity: subangular to subrounded 4. Color of cut surface: dark green to brown 5. Texture / Vesicularity: massive, homogeneous 7. Matrix: fine-grained, no bedding 8. Secondary Minerals: probably pervasive alteration of moderate intensity - chlorite? 9. Encrustations: none					x		piece from bloc C (40x26x25 cm)	
SO267-DR90-6X	1. Rock Type: same as DR90-5 10. Comment: another piece of bloc C as archive sample					x		archive sample	
SO267-DR90-7A	1. Rock Type: volcaniclastic, strongly altered 2. Size: 17x10x8 cm 3. Shape / Angularity: angular to subangular 4. Color of cut surface: greenish beige 5. Texture / Vesicularity: lapilli tuff, unsorted angular clasts, no bedding / sorting 7. Matrix: fine-grained, ash (?) 8. Secondary Minerals: pale beige material (sericite?) 9. Encrustations: the rock is pale, probably strongly clay - smectite altered 10. Comment: impossible to say if mafic, intermediate or felsic?	1							
SO267-DR90-7B	1. Rock Type: same as DR90-7A 2. Size:12x8x5 cm								

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR90-8A	1. Rock Type: volcaniclastic, strongly altered 2. Size: 17x9x7 cm 3. Shape / Angularity: angular 4. Color of cut surface: variable color, but overall greenish black 5. Texture / Vesicularity: lapilli tuff, some lapilli are vesicular, heterogeneous composition, angular clasts 7. Matrix: strongly altered by very dark, blackish material, the blackish material is also in vesicles / amygdules 8. Secondary Minerals: black, relatively soft alteration mineral in matrix and vesicles (epidote?), in some vesicles locally calcite 9. Encrustations: none								
SO267-DR90-8B	1. Rock Type: same as DR90-8A 2. Size: 9x8x6 cm								
SO267-DR90-8C	1. Rock Type: same as DR90-8A 2. Size: 22x10x9 cm							piece of bloc B (37x27x19 cm)	
SO267-DR90-8X	1. Rock Type: same as DR90-8A-C 10. Comment: another piece of bloc B as archive sample							archive sample	
SO267-DR90-9	1. Rock Type: sedimentary rock, altered 2. Size: 18x10x7 cm 3. Shape / Angularity: subangular 4. Color of cut surface: brown 5. Texture / Vesicularity: massive, unsorted 7. Matrix: medium- to coarse-grained (sandstone to micro-conglomerate) 8. Secondary Minerals: pervasive alteration 9. Encrustations: none					x			

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR90-10	1. Rock Type: sedimentary rock, altered 2. Size: 24x12x10 cm 3. Shape / Angularity: subangular 4. Color of cut surface: brown to greenish depending on beds 5. Texture / Vesicularity: bedded, graded beds ≤ 5 cm, traces of fragments of vesicular lava (> 2 mm) 6. Phenocrysts: fragments of altered Ol, Fsp ± others in fine-grained beds 7. Matrix: silt- to sand, altered 8. Secondary Minerals: very fine calcite in matrix 9. Encrustations: none 10. Comments: probably volcaniclastic origin					x			
SO267-DR90-11	1. Rock Type: volcaniclastic rock, strongly altered 2. Size: 23x11x6 cm 3. Shape / Angularity: subangular 4. Color of cut surface: dark brown 5. Texture / Vesicularity: massive, unsorted clastic beds, altered volcanic fragments (≤ 8 mm), polymict 6. Phenocrysts: relict Ol 7. Matrix: completely altered 8. Secondary Minerals: blackish, Mg-rich alteration? 9. Encrustations: none								
SO267-DR90-12A	1. Rock Type: sedimentary rock, weakly to moderately altered 2. Size: 26x9x5 cm 3. Shape / Angularity: subangular 4. Color of cut surface: dull green 5. Texture / Vesicularity: massive to laminated ("beds" ≤ 5 mm) 6. Phenocrysts: none 7. Matrix: fine-grained (siltstone) 8. Secondary Minerals: none 9. Encrustations: none					x			
SO267-DR90-12B	1. Rock Type: same as DR90-12A 2. Size: 11x8x5 cm					x			
SO267-DR90-13A	1. Rock Type: volcaniclastic, altered 2. Size: 10x5x6 cm 3. Shape / Angularity: black, angular 4. Color of cut surface: very dark greenish black 5. Texture / Vesicularity: massive / almost dense, some vesicularity preserved in altered clasts 6. Phenocrysts: none 7. Matrix: completey altered, soft matrix (scratched by fragments), probably talc or serpentine minerals (altered tuff?) 8. Secondary Minerals: calcite in amygdules, xenomorph (1-2%), idiomorphic Qz at surface (< 4 mm) 9. Encrustations: minor Fe staining	1							

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR90-13B	1. Rock Type: same as DR90-13A 2. Size: 17x12x8 cm								
SO267-DR90-14	1. Rock Type: sedimentary rock (siltstone), weakly altered 2. Size: 7x7x5 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: beige 5. Texture / Vesicularity: no grading / bedding, well sorted 7. Matrix: silt- to fine sand-grained 8. Secondary Minerals: none 9. Encrustations: minor Fe staining 10. Comment: one small vein (~1 mm), ~5 mm halo					x			

SO267-DR91



Description of Location and Structure:
area N of Fonualei Rift, northwestern flank of NE-SW-trending trough, probably representing the basement of the DR90 ridge, dredge targeted the northwestern flank from lower section to top.

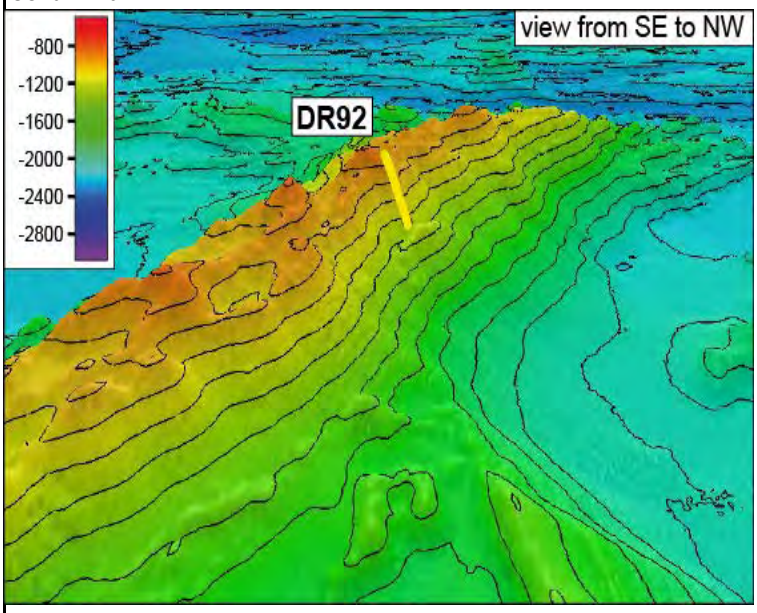
Dredge on bottom UTC 18/01/19 12:36 hrs, lat 15°31.69'S, long 174°25.81´W depth 2531 m
Dredge off bottom UTC 18/01/19 13:42 hrs, lat 15°31.44'S, long 174°26.06'W, depth 2205 m
total volume: full
Comments: relatively homogeneous, aphyric and variable vesicular lava fragments (basalt to basaltic andesite?) dominate in this dredge, various volcaniclastic and sedimentary rocks are minor.

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR91-1	1. Rock Type: volcanic, basalt to basaltic andesite?, fresh 2. Size: 16x11x8 cm 3. Shape / Angularity: subangular 4. Color of cut surface: grey 5. Texture / Vesicularity: massive / weakly vesicular (1-2%, < 1-5 mm), small, brown-grey patches (< 1-2 mm) occur where vesicles are most concentrated (same as in sample -2) -> possible alteration? porosity visible in hand lens 6. Phenocrysts: only one Px visible 7. Matrix: fine- to medium grained, phaneritic, contains Pl and mafic minerals 8. Secondary Minerals: brown-grey patches? 9. Encrustations: weak brown-green surface alteration	1	x						
SO267-DR91-2A	1. Rock Type: volcanic, basalt to basaltic andesite?, fresh 2. Size: 10x9x8 cm 3. Shape / Angularity: subangular 4. Color of cut surface: grey 5. Texture / Vesicularity: massive / moderately vesicular (5-10%, < 1-2 mm), small, brown-grey patches (< 1-10 mm) concentrated around vesicles, vesicles appear more concentrated within these patches -> possible alteration? 6. Phenocrysts: none 7. Matrix: fine- to medium grained, phaneritic, contains Pl and mafic minerals 8. Secondary Minerals: brown-grey patches? 9. Encrustations: brown-orange surface alteration (< 1 mm), clay?								
SO267-DR91-2B	1. Rock Type: same as DR91-2A 2. Size:16x10x9 cm	1	x						
SO267-DR91-2C	1. Rock Type: same as DR91-2A 2. Size:14x8x7 cm								
SO267-DR91-2D	1. Rock Type: same as DR91-2A 2. Size:14x13x10 cm	1	x						

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR91-3A	1. Rock Type: volcanic, basalt to basaltic andesite?, weakly altered 2. Size: 13x12x9 cm 3. Shape / Angularity: subangular 4. Color of cut surface: grey 5. Texture / Vesicularity: massive / moderately vesicular (5-10%, < 1-2 mm), small, brown-grey patches as in sample -1 and -2 but more concentrated (~10-15%, variable sizes), porosity visible in hand lens, ~5 mm thick glassy rim on upper surface 6. Phenocrysts: traces of green phenocrysts (< 1 mm), Px? 7. Matrix: fine- to medium grained, phaneritic, contains Pl and mafic minerals 8. Secondary Minerals: weak brownish alteration close to glassy surface (clay?) 9. Encrustations: some surface weathering	1	x		G I				
SO267-DR91-3B	1. Rock Type: same as DR91-3A 2. Size: 11x10x8 cm				G I				
SO267-DR91-3C	1. Rock Type: same as DR91-3A 2. Size: 12x8x8 cm	1	x		G I				
SO267-DR91-3D	1. Rock Type: same as DR91-3A 2. Size: 13x11x7 cm	1							
SO267-DR91-3E	1. Rock Type: same as DR91-3A 2. Size: 15x14x10 cm								

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR91-3F	1. Rock Type: same as DR91-3A 2. Size: 16x14x13 cm								
SO267-DR91-4	1. Rock Type: volcanic, basalt to basaltic andesite?, weakly altered 2. Size: 16x15x13 cm 3. Shape / Angularity: subangular 4. Color of cut surface: grey 5. Texture / Vesicularity: same as in DR91-3, but with ~5 cm thick layer of consolidated, brown-orange, silt to sand above the glassy surface, bedding and scour features visible in sedimentary crust, also contains sone glass fragments 6. Phenocrysts: traces of green phenocrysts (< 1 mm), Px? 7. Matrix: fine- to medium grained, phaneritic, contains Pl and mafic minerals 8. Secondary Minerals: same as DR91-3, but slightly stronger alteration 9. Encrustations: some surface weathering								
SO267-DR91-5	1. Rock Type: volcaniclastic (debris flow) 2. Size: 15x12x7 cm 3. Shape / Angularity: subangular 4. Color of cut surface: medium grey 5. Texture / Vesicularity: medium sorted, clasts comprise pumice, scoria, mafic glass, fresh crystals; 3 distinct layers defined by grain size: I. silt to coarse sand, II. sand to small pebbles, III. sand to medium-sized pebbles 7. Matrix: fine-grained matrix (altered tuff?)				GI?				
SO267-DR91-6A	1. Rock Type: clasitic sedimentary rock 2. Size: 21x11x8 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: yellowish-greenish grey 5. Texture / Vesicularity: homogeneous, avesicular 7. Matrix: siltstone 10. Comment: minor Fe staining					x			
SO267-DR91-6B	1. Rock Type: same as DR91-6A 2. Size: 14x12x9 cm 5. Texture / Vesicularity: autoclasts, soft sediment deformation 7. Matrix: siltstone with some coarse fragments of pumice and glass / scoria				GI?	x			
SO267-DR91-7	1. Rock Type: volcaniclastic (pumice) 2. Size: 6x5x4 cm 3. Shape / Angularity: angular 4. Color of cut surface: medium grey 5. Texture / Vesicularity: highly vesicular (~25%, ≤ 10 mm), spherical-rounded, porphyritic 6. Phenocrysts: Qz (~5%, < 1 mm), Mt (~1-2%, < 1 mm), Amph (accessoric, < 1 mm) 7. Matrix: glassy								

SO267-DR92



Description of Location and Structure:
area north of Fonualei Rift, N-S-striking volcanic ridge with cones on crest, dredge track at upper central eastern slope beneath a cone.

Dredge on bottom UTC 18/01/19 16:35 hrs, lat 15°40.44'S, long 174°37.53´W depth 1212 m
Dredge off bottom UTC 18/01/19 17:41 hrs, lat 15°40.42'S, long 174°37.89'W, depth 847 m
total volume: full
Comments: dredge mainly recovered vesicular, slightly porphyric and mostly fresh mafic lava fragments among scoria and bombs (basalt to basaltic andesite).

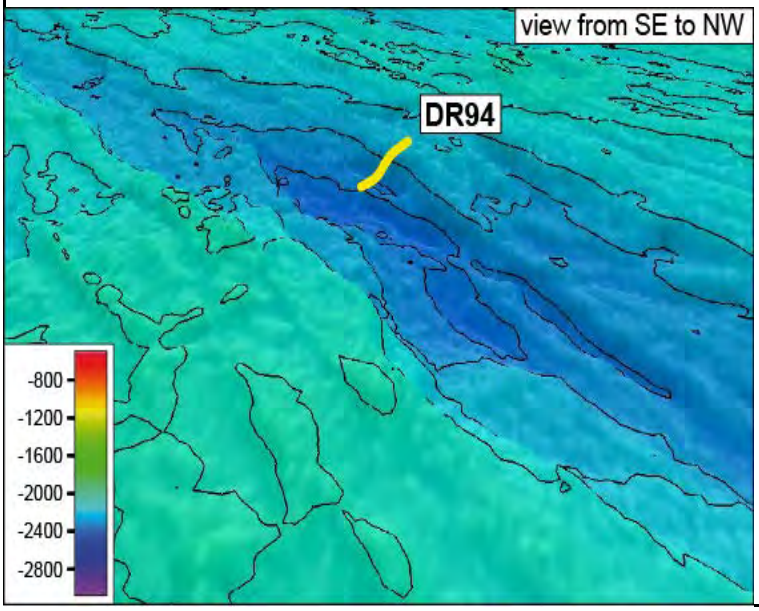
SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR92-1A	1. Rock Type: volcanic, basalt to basaltic andesite?, very weak alteration 2. Size: 12x10x10 cm 3. Shape / Angularity: subangular 4. Color of cut surface: grey 5. Texture / Vesicularity: massive / vesicular (~10-20%, < 1-2 mm), vesicle content is variable, some vesicles occur in bands 6. Phenocrysts: traces of Pl? (< 1 mm), rare yellow-green phenocrysts (1-2 mm, Ol?) 7. Matrix: massive, fine-grained, aphanitic 8. Secondary Minerals: some weak patchy pale grey alteration (clay?) 9. Encrustations: none								
SO267-DR92-1B	1. Rock Type: same as DR92-1A 2. Size: 19x10x7 cm	1	x						
SO267-DR92-1C	1. Rock Type: same as DR92-1A 2. Size: 11x7x6 cm								

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR92-1D	1. Rock Type: same as DR92-1A 2. Size: 16x13x9 cm	1	x						
SO267-DR92-1X	1. Rock Type: same as DR92-1A 2. Size: 17x17x13 cm 10. Comment: archive sample from bloc C (40x37x29 cm)							archive sample	
SO267-DR92-2A	1. Rock Type: volcanic (basalt to basaltic andesite?), fresh 2. Size: 18x14x9 cm 3. Shape / Angularity: subangular 4. Color of cut surface: grey 5. Texture / Vesicularity: massive / vesicular (~20-30%, < 1-2 mm), vesicles occur as bands defined by vesicle size and concentration 6. Phenocrysts: traces of Pl? (< 1 mm), rare yellow-green phenocrysts (1-2 mm, Ol?) 7. Matrix: massive, fine-grained, aphanitic 8. Secondary Minerals: none 9. Encrustations: none	1	x						
SO267-DR92-2B	1. Rock Type: same as DR92-2A 2. Size: 13x10x9 cm 5. Texture / Vesicularity: rough, "rubby" texture on upper surface, vesicles are concentrated at upper (?) surface and surround less vesicular amoeboid flow interior								
SO267-DR92-3A	1. Rock Type: volcanic, basalt to basaltic andesite?, fresh 2. Size: 18x11x9 cm 3. Shape / Angularity: subangular 4. Color of cut surface: grey 5. Texture / Vesicularity: massive / vesicular (~15-25%, < 1-2 mm but most are 2 mm), vesicles typically occur as bands defined by vesicle size and concentration 6. Phenocrysts: traces of Pl? (< 1 mm and Px? (< 1 mm), rare yellow-green phenocrysts (1-2 mm, Ol?) 7. Matrix: massive, fine-grained, aphanitic 8. Secondary Minerals: lighter appearence maybe due to alteration? 9. Encrustations: patchy, orange-brown surface alteration								
SO267-DR92-3B	1. Rock Type: same as DR92-3A 2. Size: 12x10x9 cm 9. Encrustations: none (by contrast to -A)	1	x						

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR92-3C	1. Rock Type: same as DR92-3A 2. Size: 10x10x6 cm 9. Encrustations: none (by contrast to -A)								
SO267-DR92-4	1. Rock Type: volcanic, basalt to basaltic andesite?, fresh 2. Size: 12x8x8 cm 3. Shape / Angularity: subangular 4. Color of cut surface: grey 5. Texture / Vesicularity: massive / vesicular (~15-20%, 1-5 mm), round vesicles, random vesicle distribution 6. Phenocrysts: traces of Ol (1-2 mm) and Px? (≤ 1 mm) 7. Matrix: massive, fine-grained, aphanitic 8. Secondary Minerals: none 9. Encrustations: none								
SO267-DR92-5A	1. Rock Type: volcanic, mafic (basalt), fresh 2. Size: 16x11x9 cm 3. Shape / Angularity: angular, blocky, Aa flow 4. Color of cut surface: dark grey 5. Texture / Vesicularity: porphyritic / moderately vesicular (~15%, ≤ 3 mm), rounded, spherical to elongated, flow banding defined by vesicles 6. Phenocrysts: Pl microlithes (~5%, ≤ 1 mm), ol (1-2%, ≤ 2 mm) 7. Matrix: micro- to crytocrystalline matrix 8. Secondary Minerals: none 9. Encrustations: minor Fe staining 10, Comment: contains some glass				GI				
SO267-DR92-5B	1. Rock Type: same as DR92-5A 2. Size: 14x10x7 cm				GI				
SO267-DR92-6A	1. Rock Type: volcaniclastic, mafic (basalt), scoria, fresh 2. Size: 10x9x8 cm 3. Shape / Angularity: angular 4. Color of cut surface: black 5. Texture / Vesicularity: scoriaceous, cooling rims at all sides / highly vesicular (30-40%, <5 mm), vesicles are rounded and spherical, no orientation 6. Phenocrysts: Pl microlithes (~5%, ≤ 1 mm), Ol (1-2%, ≤ 2 mm) 7. Matrix: glassy to cryptocrystalline 8. Secondary Minerals: none 9. Encrustations: minor Fe staining	1	x						
SO267-DR92-6B	1. Rock Type: same as DR92-6A 2. Size: 9x8x6 cm								

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR92-6C	1. Rock Type: same as DR92-6A 2. Size: 10x8x8 cm								
SO267-DR92-7A	1. Rock Type: volcaniclastic, mafic, bomb, fresh 2. Size: 17x12x9 cm 3. Shape / Angularity: sherical shape, subangular 4. Color of cut surface: dark grey to black 5. Texture / Vesicularity: irregular texture, reworked during eruption, spherical cooling rims along exterior, glassy at surface 6. Phenocrysts: Pl microlithes (~5%, ≤ 1 mm), ol (1-2%, ≤ 2 mm) 7. Matrix: glassy to cryptocrystalline 8. Secondary Minerals: none 9. Encrustations: minor Fe staining				G I?				
SO267-DR92-7B	1. Rock Type: same as DR92-7A 2. Size: 8x7x6 cm				G I?				
SO267-DR92-7C	1. Rock Type: same as DR92-7A 2. Size: 9x7x6 cm				G I?				

SO267-DR94



Description of Location and Structure:
area north of Fonualei Rift, WSW-ENE-striking valley / fault zone (?), dredge haul aimed small step (< 100 m high) at northern flank of the valley, step shows high backscatter signal.

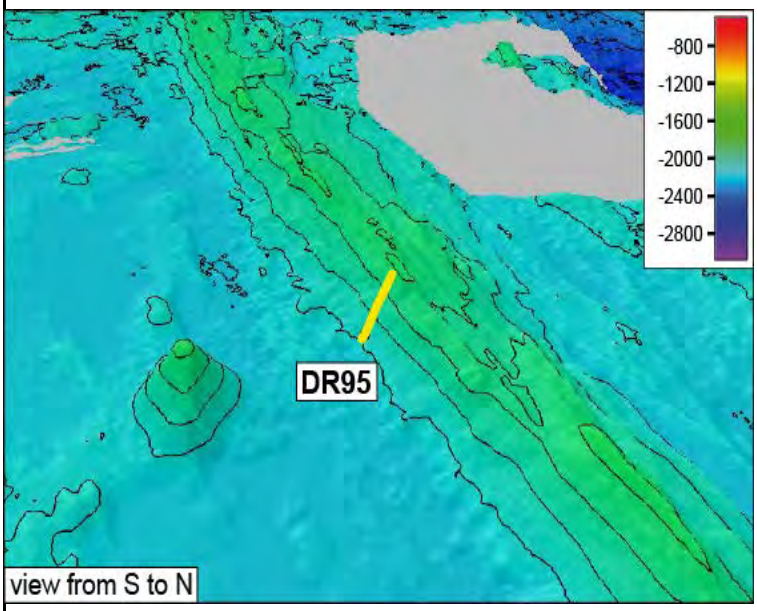
Dredge on bottom UTC 19/01/19 00:00 hrs, lat 15°39.75'S, long 175°00.74´W depth 2380 m
Dredge off bottom UTC 19/01/19 00:50 hrs, lat 15°39.42'S, long 175°01.74'W, depth 2230 m
total volume: 1/5 full
Comments: dredge yielded exclusively homogeneous, highly vesicular, slightly Ol-phyric and fresh mafic lava fragments.

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR94-1A	1. Rock Type: volcanic, mafic (basalt), fresh 2. Size: 17x12x6 cm 3. Shape / Angularity: angular to subangular 4. Color of cut surface: dark grey 5. Texture / Vesicularity: massive to scoriaceous / highly vesicular (> 20%, ≤ 1 mm), very tiny vesicles 6. Phenocrysts: Ol? (~5%, ≤ 2 mm) 7. Matrix: fine-grained matrix 8. Secondary Minerals: none 9. Encrustations: surface Mn staining and orange coating	1	x						
SO267-DR94-1B	1. Rock Type: same as DR94-1A 2. Size: 8x8x5 cm								
SO267-DR94-1C	1. Rock Type: same as DR94-1A 2. Size: 8x5x5 cm								
SO267-DR94-1D	1. Rock Type: same as DR94-1A 2. Size: 9x6x5 cm								
SO267-DR94-2A	1. Rock Type: volcanic, mafic (basalt), fresh 2. Size: 11x10x7 cm 3. Shape / Angularity: angular 4. Color of cut surface: dark grey 5. Texture / Vesicularity: massive, flow banding defined by very tiny trains of vesicles / moderately to ±highly vesicular (~15-20%, ≤ 3 mm) 6. Phenocrysts: rare Ol (≤ 1 mm) 7. Matrix: micro- to cryptocrystalline 8. Secondary Minerals: none 9. Encrustations: Mn staining on surface	1	x						
SO267-DR94-2B	1. Rock Type: same as DR94-2A 2. Size: 12x8x5 cm								

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR94-2C	1. Rock Type: same as DR94-2A 2. Size: 11x11x6 cm	1	x						
SO267-DR94-2D	1. Rock Type: same as DR94-2A 2. Size: 10x8x5 cm								
SO267-DR94-3A	1. Rock Type: volcanic, mafic (basalt), fresh 2. Size: 17x16x7 cm 3. Shape / Angularity: angular to subangular 4. Color of cut surface: dark grey 5. Texture / Vesicularity: massive / highly vesicular (~20-30%, ≤ 4 mm), rounded vesicles and pipe vesicles near margins of the sample 6. Phenocrysts: rare Ol (< 2%, ≤ 2 mm) 7. Matrix: micro- to cryptocrystalline 8. Secondary Minerals: none 9. Encrustations: none 10. Comment: ≤ 10 mm thick glassy crust	1	x		GI				
SO267-DR94-3B	1. Rock Type: same as DR94-3A 2. Size: 12x11x7 cm				GI				
SO267-DR94-3C	1. Rock Type: same as DR94-3A 2. Size: 13x10x8 cm	1	x		GI				
SO267-DR94-3D	1. Rock Type: same as DR94-3A 2. Size: 9x7x4 cm				GI				

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR94-3X	1. Rock Type: same as DR94-3A 2. Size:18x12x6 cm 10. Comment: archive sample, piece from bloc A (33x27x19 cm)							archive sample	
SO267-DR94-4	1. Rock Type: volcanic, mafic (basalt), fresh 2. Size: 9x7x5 cm 3. Shape / Angularity: angular 4. Color of cut surface: dark grey 5. Texture / Vesicularity: massive / highly vesicular (~30-35%, ≤ 3 mm) 6. Phenocrysts: none 7. Matrix: cryptocrystalline 8. Secondary Minerals: none 9. Encrustations: none	1							

SO267-DR95



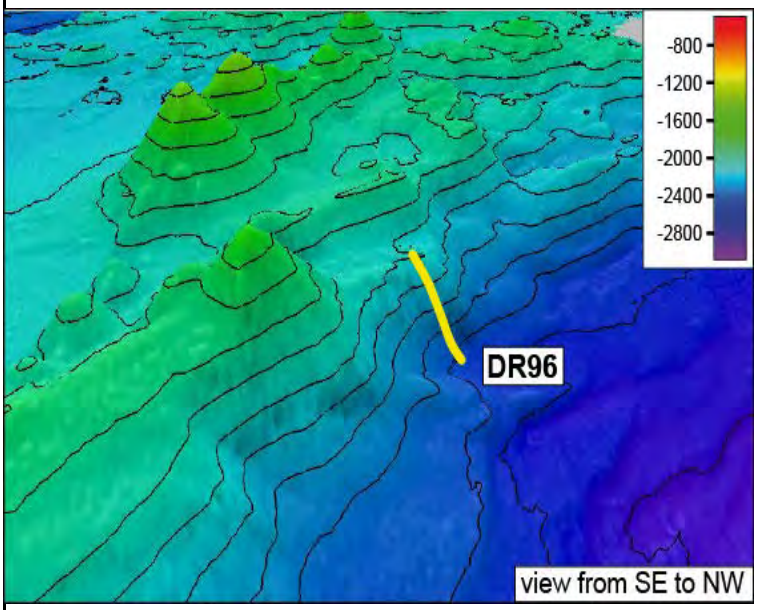
Description of Location and Structure:
area north of Fonualei Rift, narrow NNW-SSE-trending ridge, dredge haul at western slope from ±base to top, track was mainly based on high backscatter signal.

Dredge on bottom UTC 19/01/19 04:45 hrs, lat 15°57.06'S, long 174°57.32´W depth 2080 m
Dredge off bottom UTC 19/01/19 06:47 hrs, lat 15°56.79'S, long 174°57.06'W, depth 1830 m
total volume: few rocks
Comments: dredge returned only one relatively large, fresh mafic lava fragment and pumice clasts.

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR95-1	1. Rock Type: volcanic, mafic, fresh 2. Size: 23x17x12 cm 3. Shape / Angularity: subangular 4. Color of cut surface: dark grey 5. Texture / Vesicularity: massive / moderately vesicular (~5-10%, ≤ 4 mm) 6. Phenocrysts: none 7. Matrix: microcrystalline to fine-grained 8. Secondary Minerals: none 9. Encrustations: surface Mn staining	1	x						

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR95-2	1. Rock Type: volcaniclastic (pumice), felsic, fresh 2. Size: 21x20x16 cm 3. Shape / Angularity: angular 4. Color of cut surface: white 5. Texture / Vesicularity: pumiceous / highly vesicular (~50-70%, mm-range) 6. Phenocrysts: Qz (~2-3%, ≤ 2 mm) 7. Matrix: glassy 8. Secondary Minerals: none 9. Encrustations: none								
SO267-DR95-3	1. Rock Type: volcaniclastic (pumice), felsic, fresh 2. Size: 10x13x10 cm 3. Shape / Angularity: subangular 4. Color of cut surface: white 5. Texture / Vesicularity: pumiceous / highly vesicular (~50-70%, mm-range) 6. Phenocrysts: Qz (~2-3%, ≤ 2 mm) 7. Matrix: glassy 8. Secondary Minerals: none 9. Encrustations: none	2							
SO267-DR95-4	1. Rock Type: volcaniclastic (pumice), felsic, altered 2. Size: 13x10x7 cm 3. Shape / Angularity: subrounded to rounded 4. Color of cut surface: pale orange to pinkish 5. Texture / Vesicularity: pumiceous / highly vesicular (~30-40%, mm-range) 6. Phenocrysts: Qz (~5-8%, ≤ 3 mm) 7. Matrix: glassy 8. Secondary Minerals: none 9. Encrustations: weathering, Fe-oxide staining 10. Comment: this unique pumice clast looks much more altered (older?) than the other pumices								

SO267-DR96



Description of Location and Structure:
northern tip of Fonualei Rift, dredge track at western wall from lower section to top.

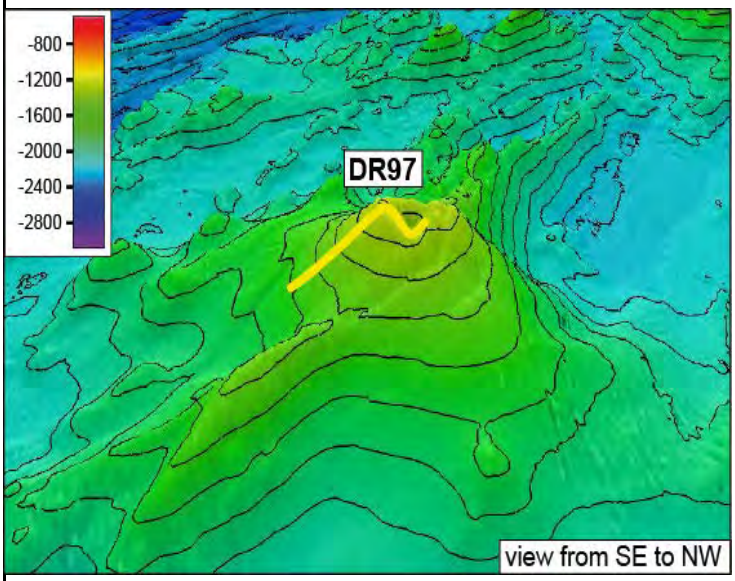
Dredge on bottom UTC 19/01/19 09:18 hrs, lat 16°03.46'S, long 174°38.27´W depth 2516 m
Dredge off bottom UTC 19/01/19 10:22 hrs, lat 16°03.40'S, long 174°38.04'W, depth 2091 m
total volume: one very big bloc and a few smaller rocks
Comments: dominant lithology is mafic to intermediate, fresh to weakly altered Ol- and partly Fsp-phyric lava with variable vesicularety, altered lapilli tuffs are minor.

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR96-1	1. Rock Type: volcanic, mafic to intermediate, fresh 2. Size: 16x12x10 cm 3. Shape / Angularity: angular 4. Color of cut surface: dark grey 5. Texture / Vesicularity: massive, some flow banding defined by vesicles / sparsely to moderately vesicular (~5-10%, ≤ 8 mm) 6. Phenocrysts: Ol (2-3%, ≤ 2 mm), ± small Fsp 7. Matrix: microcrystalline to fine-grained 8. Secondary Minerals: none 9. Encrustations: surface Mn staining	1	x					piece from bloc B (24x20x18cm)	
SO267-DR96-1X	1. Rock Type: same as DR96-1 10. Comment: rest of bloc C as archive sample							archive sample	
SO267-DR96-2A	1. Rock Type: volcanic, mafic to intermediate, fresh 2. Size: 14x12x9 cm 3. Shape / Angularity: angular to subangular 4. Color of cut surface: dark grey 5. Texture / Vesicularity: massive / moderately vesicular (~8-10%, ≤ 2 mm) 6. Phenocrysts: Fsp (3-4%, ≤ 1 mm), ± Ol (pale) 7. Matrix: microcrystalline with very tiny vesicles 8. Secondary Minerals: none 9. Encrustations: surface Mn staining 10. Comment: glassy rim	1	x		GI				
SO267-DR96-2B	1. Rock Type: same as DR96-2A 2. Size: 14x9x8 cm	1	x		GI				
SO267-DR96-2C	1. Rock Type: same as DR96-2C 2. Size: 13x10x7 cm								

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR96-3	1. Rock Type: volcanic, mafic (basalt), fresh 2. Size: 10x9x9 cm 3. Shape / Angularity: angular 4. Color of cut surface: dark grey 5. Texture / Vesicularity: massive, very tiny vesicles defining flow banding / moderately vesicular (~10-15%, 1-2 mm) 6. Phenocrysts: Ol (2-4%, ≤ 1 mm), ± Fsp (≤ 1 mm) 7. Matrix: micro- to cryptocrystalline 8. Secondary Minerals: none 9. Encrustations: surface Mn ± Fe staining 10. Comment: glassy rim	1	x		G I				
SO267-DR96-4	1. Rock Type: volcanic, mafic, fresh 2. Size: 14x8x7 cm 3. Shape / Angularity: angular to subangular 4. Color of cut surface: dark grey 5. Texture / Vesicularity: massive / highly vesicular (~20-25%, ≤ 6 mm) 6. Phenocrysts: Ol (5-8%, ≤ 2 mm) 7. Matrix: microcrystalline 8. Secondary Minerals: none 9. Encrustations: minor surface Mn staining	1	x						
SO267-DR96-5	1. Rock Type: volcanic, mafic, fresh 2. Size: 8x8x5 cm 3. Shape / Angularity: subangular 4. Color of cut surface: dark grey to black 5. Texture / Vesicularity: massive to scoriaceous / highly vesicular (~30-40%, ≤ 1.5 mm) 6. Phenocrysts: very small Ol (~5%, ≤ 1 mm) 7. Matrix: micro- to cryptocrystalline 8. Secondary Minerals: none 9. Encrustations: minor surface staining 10. Comment: glassy rim?	1	x		G I?				
SO267-DR96-6	1. Rock Type: volcanic, mafic to intermediate, weakly altered 2. Size: 16x10x11 cm 3. Shape / Angularity: angular 4. Color of cut surface: dark green 5. Texture / Vesicularity: massive, some flow (?) banding / moderately vesicular (~10-15%, ≤ 1.5 mm) 6. Phenocrysts: Ol (~2%, ≤ 1 mm) 7. Matrix: micro- to cryptocrystalline 8. Secondary Minerals: none 9. Encrustations: weakly pervasively altered, rock is paler	1	x					piece from bloc A (77x46x28 cm)	
SO267-DR96-6X	1. Rock Type: same as DR96-6 10. Comment: another piece of bloc A as archive sample							archive sample	

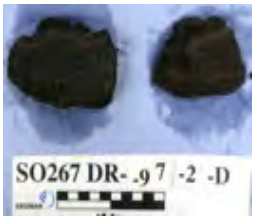
SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR96-7	1. Rock Type: volcaniclastic, mafic, altered 2. Size: 18x10x4 cm 3. Shape / Angularity: angular 4. Color of cut surface: dark green (matrix) and brown (clasts) 5. Texture / Vesicularity: lapilli tuff, matrix supported, clasts are angular to subangular and altered, probably mono-genetic / clasts are moderately vesicular (~10%, ≤ 1 mm) 6. Phenocrysts: small Ol in clasts 7. Matrix: fine-grained, soft, heterogeneous, altered (smectite - chorite?) 8. Secondary Minerals: none 9. Encrustations: minor Mn-staining on surface	1						piece from bloc C (30x20x20 cm)	
SO267-DR96-7X	1. Rock Type: same as DR96-7 10. Comment: another two pieces of bloc C as archive sample							archive sample	
SO267-DR96-8	1. Rock Type: volcaniclastic, altered 2. Size: 25x11x5 cm 3. Shape / Angularity: subangular 4. Color of cut surface: dark brown to red 5. Texture / Vesicularity: lapilli tuff, clasts are angular and variable altered / clasts are moderately to highly vesicular (~10-40%, ≤ 2 mm) 6. Phenocrysts: none 7. Matrix: fine-grained, altered (red colour) 8. Secondary Minerals: none 9. Encrustations: minor Mn staining 10. Comment: clasts are mostly mafic but there are a few felsic (Qz-phyric) as well	1							

SO267-DR97



Description of Location and Structure: area north of Fonualei Rift, relatively large cone with volcanic rifts (?) emanating from its base in northern and southern direction, dredge haul at upper southeastern slope over top.

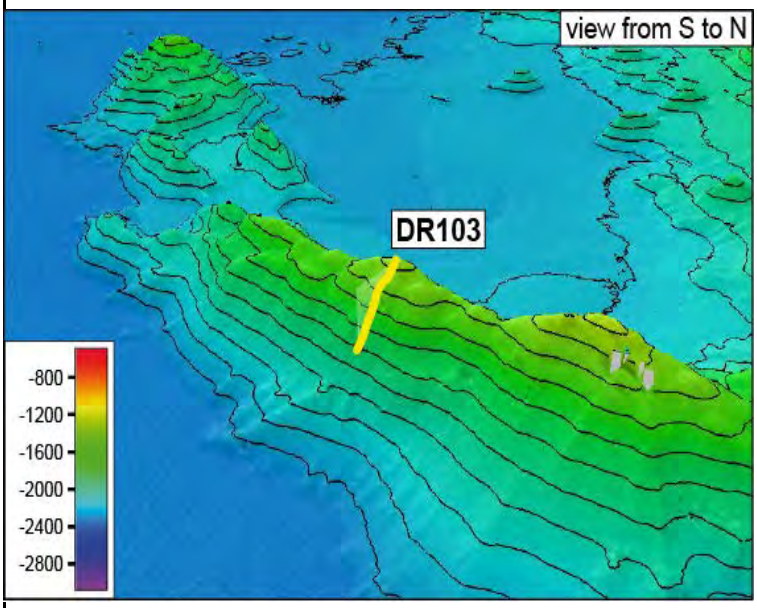
Dredge on bottom UTC 19/01/19 13:13 hrs, lat 15°57.68'S, long 174°42.97´W depth 1454 m
Dredge off bottom UTC 19/01/19 14:16 hrs, lat 15°57.38'S, long 174°42.64'W, depth 1260 m
total volume: full
Comments: dredge recovered (1) homogeneous, very fresh and highly vesicular, Ol-phyric mafic lava fragments, (2) completely altered lava fragments (most likely hydrothermal alteration), and (3) fresh pumice.

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR97-1A	1. Rock Type: volcanic, mafic, fresh 2. Size: 20x16x14 cm 3. Shape / Angularity: angular to subangular 4. Color of cut surface: dark grey 5. Texture / Vesicularity: massive / highly vesicular (~30-40%, ≤ 3 mm) 6. Phenocrysts: Ol (~5-8%, ≤ 1.5 mm) 7. Matrix: cryptocrystalline 8. Secondary Minerals: none 9. Encrustations: minor surface oxidation / weathering	1	x						
SO267-DR97-1B	1. Rock Type: same as DR97-1A 2. Size: 20x16x14 cm 10. Comment: minor glass preserved				GI?				
SO267-DR97-2A	1. Rock Type: volcanic, mafic, fresh 2. Size: 18x11x11 cm 3. Shape / Angularity: angular to subangular 4. Color of cut surface: medium to dark grey 5. Texture / Vesicularity: massive / highly vesicular (~30%, ≤ 5 mm), rounded vesicles in central part and larger pipe vesicles (≤ 15 mm long) along the edges 6. Phenocrysts: Ol (~5%, ≤ 1.5 mm) 7. Matrix: cryptocrystalline 8. Secondary Minerals: none 9. Encrustations: minor surface Fe ± Mn staining 10. Comment: ≤ 5 mm thick glassy rim	1	x		GI				
SO267-DR97-2B	1. Rock Type: same as DR97-2A 2. Size: 16x13x10 cm	1	x		GI				
SO267-DR97-2C	1. Rock Type: same as DR97-2A 2. Size: 14x13x9 cm				GI				
SO267-DR97-2D	1. Rock Type: same as DR97-2A 2. Size: 8x8x7 cm								
SO267-DR97-2E	1. Rock Type: same as DR97-2A 2. Size: 16x14x7 cm								

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR97-3A	1. Rock Type: volcanic, mafic, intensely hydrothermally (?) altered 2. Size: 15x13x8 cm 3. Shape / Angularity: angular 4. Color of cut surface: brick red to black 5. Texture / Vesicularity: massive? / probably vesicular, but too altered to estimate abundance 6. Phenocrysts: too altered to recognize 7. Matrix: intensely altered, clays, muddy, very soft 8. Secondary Minerals: mostly Fe-oxides 9. Encrustations: none 10. Comment: relict glassy rim?								
SO267-DR97-3B	1. Rock Type: same as DR97-3A 2. Size: 10x9x4 cm								
SO267-DR97-3C	1. Rock Type: same as DR97-3A 2. Size: 11x9x6 cm								
SO267-DR97-4A	1. Rock Type: volcaniclastic (pumice), felsic, fresh 2. Size: 12x7x7 cm 3. Shape / Angularity: angular to subrounded 4. Color of cut surface: white 5. Texture / Vesicularity: pumiceous / highly vesicular (> 20%, ≤ 10 mm), streched vesicles in some samples 6. Phenocrysts: Qz (~5-8%, ≤ 2 mm) 7. Matrix: glassy 8. Secondary Minerals: none 9. Encrustations: minor surface staining	1							
SO267-DR97-4B	1. Rock Type: same as DR97-4A 2. Size: 7x7x5 cm								
SO267-DR97-4C	1. Rock Type: same as DR97-4A 2. Size: 9x8x6 cm								

	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR97-4D	1. Rock Type: same as DR97-4A 2. Size: 9x6x6 cm								

SO267-DR103



Description of Location and Structure:
area west of Fonualei Rift, NW-SE-trending ridge emanating from the western flank of the rift, dredge haul at southwestern flank of the ridge from central part to top.

Dredge on bottom UTC 22/01/19 02:43 hrs, lat 17°31.44'S, long 174°54.76´W depth 1802 m
Dredge off bottom UTC 22/01/19 04:10 hrs, lat 17°31.07'S, long 174°54.49'W, depth 1360 m
total volume: 1/2 full

Comments: dredge recovered largely fresh, Px- and Ol-phyric, moderately vesicular mafic lava fragments, various volcaniclastic rocks (among them different varieties of pumice), and carbonate.

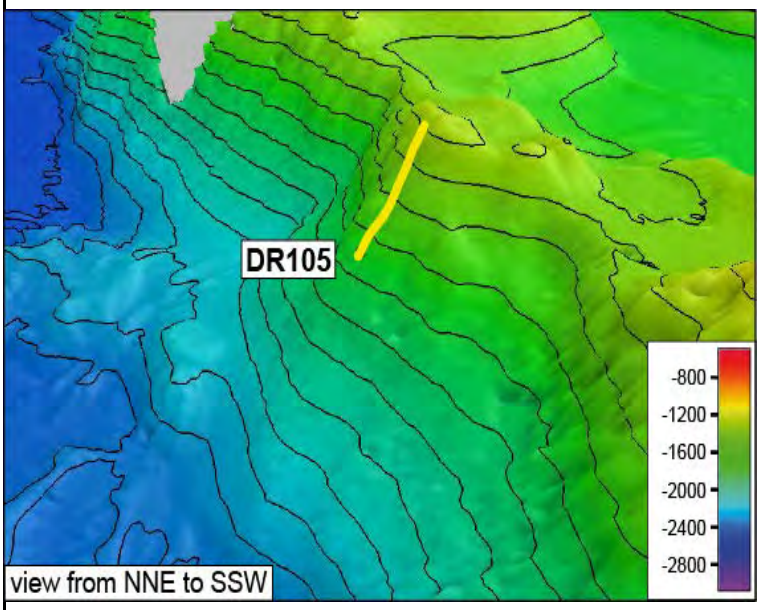
SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR103-1A	1. Rock Type: volcanic, mafic (basalt), largely fresh 2. Size: 16x11x9 cm 3. Shape / Angularity: subangular 4. Color of cut surface: black 5. Texture / Vesicularity: porphyritic to glomeroporphyritic / moderately vesicular (10-15%, ≤ 20 mm), spherical to slightly elongated vesicles, partly filled with sediment 6. Phenocrysts: Px (~7-8%, < 3 mm), Ol (1-2%, < 1 mm) 7. Matrix: microcrystalline 8. Secondary Minerals: none 9. Encrustations: some encrustations with sediment and Mn	1	x					piece from bloc A (26x21x19 cm)	
SO267-DR103-1B	1. Rock Type: same as DR103-1A 2. Size: 10x7x6 cm							piece from bloc A (26x21x19	

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR103-1C	1. Rock Type: same as DR103-1A 2. Size: 16x13x10 cm	1	x					piece from bloc B (35x29x23 cm)	
SO267-DR103-1D	1. Rock Type: same as DR103-1A 2. Size: 18x16x10 cm							piece from bloc B (35x29x23 cm)	
SO267-DR103-2	1. Rock Type: volcanic, mafic (basalt), weakly altered 2. Size: 11x8x6 cm 3. Shape / Angularity: angular, irregular 4. Color of cut surface: black 5. Texture / Vesicularity: porphyritic, faint flow texture near surface / moderately vesicular (10-20%, ≤ 8 mm), spherical to irregular elongated vesicles, upper section shows degassing (alignment of vesicles in vertical direction) 6. Phenocrysts: Px (~7-8%, < 1 mm), Ol (1-2%, < 1 mm) 7. Matrix: fine-grained 8. Secondary Minerals: none 9. Encrustations: some encrustations with sediment and Mn								
SO267-DR103-3	1. Rock Type: volcaniclastic (scoria), fresh 2. Size: 8x7x6 cm 3. Shape / Angularity: round shape, subrounded 4. Color of cut surface: black 5. Texture / Vesicularity: scoriaceous / highly vesicular (~30%, ≤ 12 mm), spherical to slightly elongated, subrounded 6. Phenocrysts: accessory Px? 7. Matrix: glassy 8. Secondary Minerals: none 9. Encrustations: minor Fe staining	1							
SO267-DR103-4A	1. Rock Type: volcaniclastic (pumice), largely fresh 2. Size: 6x4x3 cm 3. Shape / Angularity: angular, irregular 4. Color of cut surface: dark brownish grey 5. Texture / Vesicularity: flow texture ("wood-like") at exterior / moderately vesicular (~10%, ≤ 8 mm), subrounded vesicles 6. Phenocrysts: none 7. Matrix: glassy								
SO267-DR103-4B	1. Rock Type: same as DR103-4A 2. Size: 7x5x5 cm								

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR103-4C	1. Rock Type: same as DR103-4A 2. Size: 4x4x2 cm	1							
SO267-DR103-5A	1. Rock Type: volcaniclastic (pumice), felsic?, fresh 2. Size: 7x7x5 cm 3. Shape / Angularity: subangular to subround 4. Color of cut surface: grey with black bands, slightly orange tinge 5. Texture / Vesicularity: highly porous, rock is dominantely grey with thin (1 mm) bands of dark grey-black fine-grained material / highly vesicular (~15-25%, 1 - 10 mm), no infilling in vesicles, "wispy" texture lining vesicle walls 6. Phenocrysts: none 7. Matrix: fine-grained/ glassy 8. Secondary Minerals: none 9. Encrustations: none								
SO267-DR103-5B	1. Rock Type: same as DR103-5A 2. Size: 7x6x4 cm 10. Comment: contains a clast of dark pumice similar tp sample -4	1							
SO267-DR103-6A	1. Rock Type: volcaniclastic (pumice), felsic, fresh 2. Size: 8x4x4 cm 3. Shape / Angularity: subangular 4. Color of cut surface: grey 5. Texture / Vesicularity: highly porous / moderately vesicular (~10-15%, 1 - 10 mm), no infilling in vesicles, "wispy" texture lining vesicle walls 6. Phenocrysts: black minerals (~10-15%, < 1-5 mm), combination of Mt + Amph or (Px)? 7. Matrix: fine-grained/ glassy 8. Secondary Minerals: none 9. Encrustations: none								
SO267-DR103-6B	1. Rock Type: same as DR103-6A 2. Size: 9x7x6 cm	1	x						
SO267-DR103-7A	1. Rock Type: volcaniclastic (pumice), felsic, fresh 2. Size: 10x8x6 cm 3. Shape / Angularity: subangular to subround 4. Color of cut surface: brown-beige 5. Texture / Vesicularity: highly porous / moderately vesicular (~10-15%, 1 - 6 mm), some unconsolidated clay filling in vesicles 6. Phenocrysts: traces of Qz (≤ 1 mm) and Mt (< 1 mm), Mt sometimes within Qz 7. Matrix: fine-grained / glassy 8. Secondary Minerals: none 9. Encrustations: patchy, < 1 mm brown-black coating covering < 50% of the rock (Mn?)								

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR103-7B	1. Rock Type: same as DR103-7A 2. Size: 12x10x10 cm								
SO267-DR103-8A	1. Rock Type: volcaniclastic (pumice), felsic, fresh 2. Size: 13x12x7 cm 3. Shape / Angularity: subangular to subround 4. Color of cut surface: light grey 5. Texture / Vesicularity: highly porous / moderately vesicular (~10-15%, 1 - 10 mm), no infilling in vesicles, "wispy" texture lining vesicle walls 6. Phenocrysts: none 7. Matrix: fine-grained / glassy 8. Secondary Minerals: none 9. Encrustations: patchy orange clay covering some	1	x						
SO267-DR103-8B	1. Rock Type: same as DR103-8A 2. Size: 12x11x9 cm								
SO267-DR103-8C	1. Rock Type: same as DR103-8A 2. Size: 12x8x7 cm								
SO267-DR103-9	1. Rock Type: volcaniclastic rock, altered 2. Size: 20x16x10 cm 3. Shape / Angularity: irregular rounded 4. Color of cut surface: greyish brown 5. Texture / Vesicularity: massive, contains some altered pumice fragments up too large pebble size 6. Phenocrysts: none 7. Matrix: silt to fine sand, includes carbonate material (forams?) 8. Secondary Minerals: none 9. Encrustations: up to 5 mm Mn-crust							piece from large bloc C (43x38x25 cm)	
SO267-DR103-10	1. Rock Type: sedimentary rock (carbonate, ooze?) 2. Size: 23x11x7 cm 3. Shape / Angularity: elongated, subrounded 4. Color of cut surface: yellowish brown 5. Texture / Vesicularity: massive, homogeneous, some porosity beneath surface, borrowings, partially filled with Mn 7. Matrix: fine-grained 9. Encrustations: up to 5 mm Mn-crust					x			

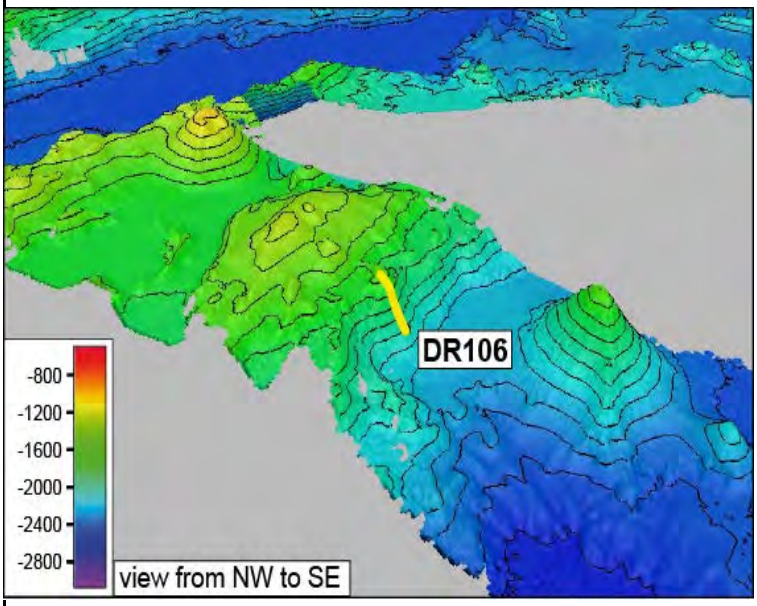
SO267-DR105



Description of Location and Structure:
area west of Fonualei Rift, N-S-striking ridge-like feature bordering a trough (failed rift?), dredge haul at upper section of eastern flank.

Dredge on bottom UTC 22/01/19 23:48 hrs, lat 16°48.04'S, long 175°03.74´W depth 1635 m
Dredge off bottom UTC 22/01/19 00:51 hrs, lat 16°48.12'S, long 175°04.07'W, depth 1274 m
total volume: empty
Comments:

SO267-DR106

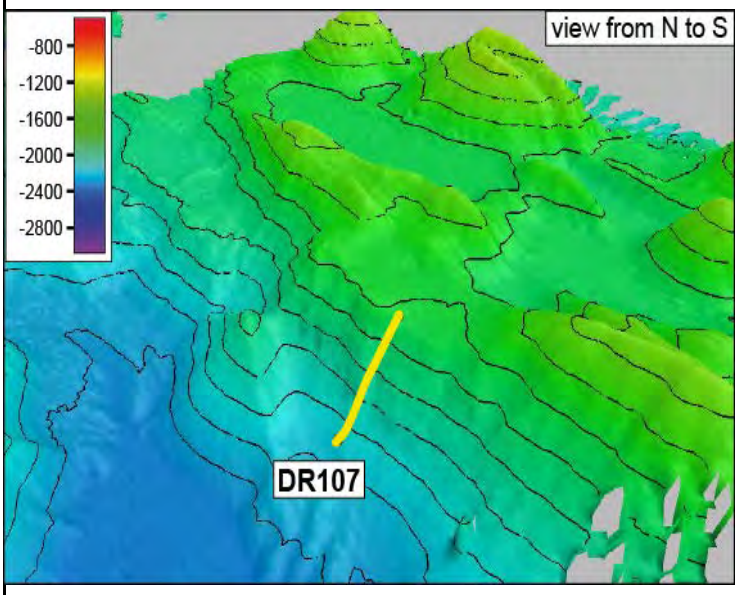


Description of Location and Structure:
area west of Fonualei Rift, same ridge-like feature as dredged by DR105, dredge targeted upper section of western flank.

Dredge on bottom UTC 23/01/19 03:14 hrs, lat 16°49.94'S, long 175°09.88´W depth 1985 m
Dredge off bottom UTC 23/01/19 04:28 hrs, lat 16°49.87'S, long 175°09.47'W, depth 1554 m
total volume: 2 rocks
Comments: dredge contained one huge bloc of a sedimentary breccia blocking the mouth of the dredge and one piece of weakly altered, Ol-phyric, highly vesicular lava with a partly preserved glassy rim.

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR106-1	1. Rock Type: volcanic, mafic, weakly altered 2. Size: 15x15x12 cm 3. Shape / Angularity: subangular 4. Color of cut surface: medium to dark grey 5. Texture / Vesicularity: massive / highly vesicular (~25-30%, ≤ 2 mm), mud infiltration in some vesicles 6. Phenocrysts: Ol (~10-15%, < 1mm), some partly altered 7. Matrix: microcrystalline to fine-grained 8. Secondary Minerals: none 9. Encrustations: none 10. Comment: partly preserved glassy and vesicular rim (≤ 10 mm)	1	x		G I				
SO267-DR106-2	1. Rock Type: isolated volcanic mafic clast in sedimentary breccia from bloc A 2. Size: 13x12x7 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: dark grey to brownish along edges 5. Texture / Vesicularity: massive / moderately vesicular (~20%, ≤ 1 mm) 6. Phenocrysts: Ol and Px? (~5-10%, ≤ 2 mm) 7. Matrix: microcrystalline 8. Secondary Minerals: none 9. Encrustations: alteration/weathering along edges, thin Mn-crust							piece from bloc A (100x75x45 cm)	
SO267-DR106-3	1. Rock Type: sedimentary rock (breccia), altered 2. Size: 10x10x6 cm 3. Shape / Angularity: angular 4. Color of cut surface: pale brown-beige 5. Texture / Vesicularity: heterogeneous breccia, unsorted, matrix-supported 7. Matrix: carbonate-rich muddy matrix (reaction to HCl) 8. Secondary Minerals: none 9. Encrustations: thin Mn-crust					x		p. from bloc A (100x75x45 cm)	

SO267-DR107

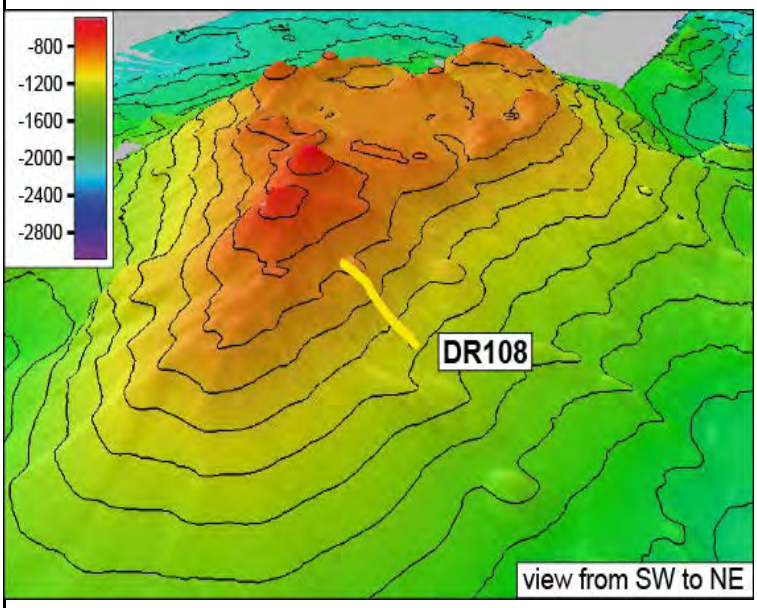


Description of Location and Structure:
area west of Fonualei Rift, NW-SE-trending ridge-like feature bordering a trough, dredge haul at its northeastern slope from base to top.

Dredge on bottom UTC 23/01/19 09:33 hrs, lat 16°28.95'S, long 175°07.09´W depth 2123 m
Dredge off bottom UTC 23/01/19 10:50 hrs, lat 16°29:23'S, long 175°07.37'W, depth 1700 m
total volume: 4 rocks
Comments: the four rocks are heterogeneous, comprising a wealkly altered slightly Fsp- and Ol-phyric and a fresh aphyric lava fragment, a volcanicclastic breccia and a massive sedimentary rock.

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR107-1	1. Rock Type: volcanic, mafic (basalt to andesite), weakly altered 2. Size: 19x12x11 cm 3. Shape / Angularity: angular 4. Color of cut surface: medium green to grey 5. Texture / Vesicularity: massive / moderately vesicular (~5-10%, ≤ 1.5 mm) 6. Phenocrysts: Fsp + Ol (~5%, ≤ 1 mm) 7. Matrix: microcrystalline 8. Secondary Minerals: none 9. Encrustations: thin (≤ 4 mm) Mn-crust 10. Comment: weak overall alteration	1	x					piece from bloc A (34x19x11 cm)	
SO267-DR107-2	1. Rock Type: volcanic, mafic, fresh 2. Size: 10x9x6 cm 3. Shape / Angularity: subangular 4. Color of cut surface: medium grey 5. Texture / Vesicularity: massive / moderately vesicular (~5-8%, ≤ 4 mm) 6. Phenocrysts: none 7. Matrix: cryptocrystalline 8. Secondary Minerals: none 9. Encrustations: surface Mn staining	1	x						
SO267-DR107-3	1. Rock Type: volcaniclastic (breccia), mafic, altered 2. Size: 9x7x5 cm 3. Shape / Angularity: subrounded but rugged surface 4. Color of cut surface: black (clasts) and brown (matrix) 5. Texture / Vesicularity: breccia with irregular mafic clasts (≤ 30 mm), matrix-supported, wide variability of altered clasts 6. Phenocrysts: none 7. Matrix: altered brown, fine-grained material (ash?) 8. Secondary Minerals: none	1							
SO267-DR107-4	1. Rock Type: sedimentary rock, altered 2. Size: 10x10x3 cm 3. Shape / Angularity: subrounded but rugged surface 4. Color of cut surface: black and brown 5. Texture / Vesicularity: massive, fine-grained, encrusted sediment 7. Matrix: slightly altered, fine to medium-grained material 8. Secondary Minerals: alteration / weathering of matrix minerals 9. Encrustations: ~5-8 mm thick Mn-crust (?)					x			

SO267-DR108



Description of Location and Structure:
aera west of Fonualei Rift, large oval shaped, NE-SW-elongated volcano, dredge haul across upper section of the southern slope to top.

Dredge on bottom UTC 23/01/19 20:01 hrs, lat 16°28.47'S, long 175°45.87´W depth 1127 m
Dredge off bottom UTC 23/01/19 21:06 hrs, lat 16°28.16'S, long 175°46.46'W, depth 885 m
total volume: 1/3 full

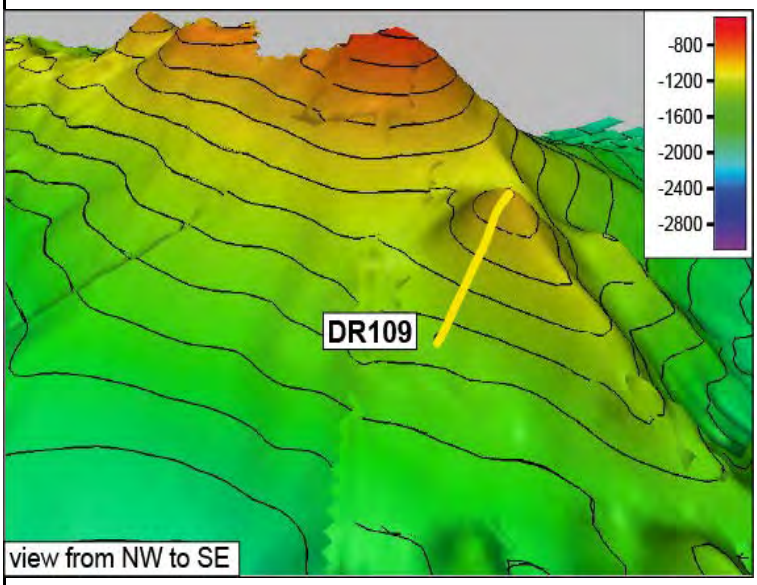
Comments: dredge haul yielded relatively homogeneous, moderately altered, Ol-phyric and moderately vesicular lava fragments among some volcaniclastic rocks (e.g. pumice).

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR108-1A	1. Rock Type: volcanic (basalt or andesite?), moderately altered 2. Size: 18x15x8 cm 3. Shape / Angularity: subangular to subrounded 4. Color of cut surface: medium greyish green 5. Texture / Vesicularity: massive / moderately vesicular (~8-15%, ≤ 4 mm), some mud in some vesicles 6. Phenocrysts: brownish Ol (~5-8%, ≤ 3 mm), partly altered 7. Matrix: microcrystalline to fine-grained 8. Secondary Minerals: none 9. Encrustations: ≤ 3 mm Mn-crust	1	x					piece from bloc C (34x34x20 cm)	
SO267-DR108-1B	1. Rock Type: same as DR108-1A 2. Size: 20x12x8 cm							piece from bloc A (66x44x27	
SO267-DR108-1C	1. Rock Type: same as DR108-1A 2. Size: 17x12x5 cm	1	x					piece from bloc E (28x20x14 cm)	

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR108-1X	1. Rock Type: same as DR108-1A-C 10. Comment: another piece (23x22x11 cm) from bloc A as archive sample							archive sample	
SO267-DR108-2A	1. Rock Type: volcanic (basalt or andesite?), moderately altered 2. Size: 20x16x9 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: medium dull green 5. Texture / Vesicularity: massive / sparsely to moderately vesicular (~8-15%, ≤ 2 mm), heterogeneously distributed 6. Phenocrysts: brownish Ol (~8-10%, ≤ 1.5 mm), partly altered 7. Matrix: microcrystalline 8. Secondary Minerals: none 9. Encrustations: 1-3 mm Mn-crust	1	x						
SO267-DR108-2B	1. Rock Type: same as DR108-2A 2. Size: 11x11x8 cm								
SO267-DR108-3A	1. Rock Type: volcanic, moderately altered 2. Size: 18x12x11 cm 3. Shape / Angularity: subangular to subrounded 4. Color of cut surface: medium dull green 5. Texture / Vesicularity: massive / moderately vesicular (~12-15%, ≤ 5 mm, rarely up to 20 mm), variable size and shape, rounded vesicles 6. Phenocrysts: Ol (~5-8%, ≤ 2 mm), partly altered 7. Matrix: microcrystalline to fine-grained with microvesicles 8. Secondary Minerals: some in some vesicles, among them carbonates (HCl reactive) 9. Encrustations: ≤ 5 mm thick Mn-crust 10. Comment: strong alteration / weathering along rock selvages, perhaps some pervasive hydrothermal alteration as well								
SO267-DR108-3B	1. Rock Type: same as DR108-3A 2. Size: 13x10x10 cm								

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR108-3C	1. Rock Type: same as DR108-3A 2. Size: 16x15x8 cm								
SO267-DR108-3D	1. Rock Type: same as DR108-3A 2. Size: 13x8x5 cm								
SO267-DR108-4A	1. Rock Type: volcaniclastic / sedimentary rock (breccia), altered 2. Size: 18x17x11 cm 3. Shape / Angularity: angular to subangular 4. Color of cut surface: beige to brick red 5. Texture / Vesicularity: heterogeneous breccia with irregular (shape and size) volcanic clasts in a carbonate-rich matrix (reaction to HCl) 6. Phenocrysts: altered Ol in mafic volcanic clasts 7. Matrix: heterogeneous carbonate "cement" 8. Secondary Minerals: Fe-Mn-oxides weathering 9. Encrustations: thin Mn-crust locally 10. Comment: semi-consolidated					x			
SO267-DR108-4B	1. Rock Type: same as DR108-4A 2. Size: 21x19x11 cm								
SO267-DR108-5	1. Rock Type: volcaniclastic (pumice), felsic, weathered 2. Size: 14x13x10 cm 3. Shape / Angularity: angular 4. Color of cut surface: pale brown (weathered) 5. Texture / Vesicularity: pumiceous / highly vesicular (> 60%, ≤ 20 mm), coalescing, mud in some vesicles 6. Phenocrysts: rare Qz (≤ 1 mm) 7. Matrix: glassy 9. Encrustations: Fe staining / weathering	1							

SO267-DR109



Description of Location and Structure:
area west of Fonualei Rift, another elongated (E-W) large volcano ~14 nm south of DR 108, dredge haul at northern flank of a satellite cone situated on the northwestern slope of the volcano.

Dredge on bottom UTC 24/01/19 00:42 hrs, lat 16°38.30'S, long 175°58.82´W depth 1406 m
Dredge off bottom UTC 24/01/19 02:32 hrs, lat 16°38.54'S, long 175°58.77'W, depth 1174 m
total volume: 1/2 full

Comments: dredge recovered slightly to strongly altered, vesicular and glomerophyric (Px ±Fsp and/or Ol) mafic lava fragments and different varieties of pumice.

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR109-1A	1. Rock Type: volcanic, mafic (basalt), slightly altered 2. Size: 14x8x7 cm 3. Shape / Angularity: angular, irregular 4. Color of cut surface: dark grey 5. Texture / Vesicularity: glomeroporphyritic / moderately vesicular (~15-10%, ≤ 5 mm), rounded, spherical, 1-2% filled with carbonate 6. Phenocrysts: Px (~7-8%, glomerocrysts < 50 mm), idiomorph, accessory Pl and Ol 7. Matrix: microcrystalline 8. Secondary Minerals: none 9. Encrustations: <1 mm Mn-crust	1	x					piece from bloc A (54x44x29 cm)	
SO267-DR1098-1B	1. Rock Type: same as DR109-1A 2. Size: 15x14x8 cm								
SO267-DR109-2	1. Rock Type: volcanic, mafic (basalt), moderately altered 2. Size: 17x11x10 cm 3. Shape / Angularity: irregular subangular 4. Color of cut surface: dark brownish grey 5. Texture / Vesicularity: massive, porphyritic / moderately vesicular (~8-10%, ≤ 3 mm),irregular, subrounded, aligned along flow (?) direction (flow bending), 1-2% filled with carbonate 6. Phenocrysts: Px (~10%, ≤ 3 mm), Pl (~5%, ≤ 3 mm), both idiomorphic 7. Matrix: microcrystalline 8. Secondary Minerals: none 9. Encrustations: 1-2 mm Mn-crust	1	x					piece from bloc B (30x21x21 cm)	

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR109-3A	1. Rock Type: volcanic, mafic (basalt), slightly altered 2. Size: 21x14x10 cm 3. Shape / Angularity: blocky, subangular 4. Color of cut surface: dark brownish grey 5. Texture / Vesicularity: (glomero)-porphyritic, massive / moderately vesicular (~10-15%, ≤ 12 mm) spherical to elongated, rounded, 10-20% filled with carbonate, increase in vesicle size from top to bottom and from exterior to center (alingment around center) 6. Phenocrysts: Px (~7-8%, < 5 mm), Pl (~1-2%, < 2 mm), both idiomorphic 7. Matrix: microcrystalline 8. Secondary Minerals: none 9. Encrustations: 5-6 mm Mn-crust	1	x					piece from bloc C (35x27x23 cm)	
SO267-DR109-3B	1. Rock Type: same as DR109-3A 2. Size: 19x14x8 cm								
SO267-DR109-4	1. Rock Type: volcanic, mafic (basalt), moderately altered, as clast in carbonate breccia 2. Size: 18x16x13 cm 3. Shape / Angularity: elongated, subrounded 4. Color of cut surface: beige (carbonate), dark grey (volcanic clast) 5. Texture / Vesicularity: glomeroporphyritic / highly vesicular (~60%, ≤ 3 mm), rounded, spherical, 90% filled with carbonate 6. Phenocrysts: Px (~7-8%, glomerocrysts < 50 mm), idiomorphic, accessory Pl and Ol 7. Matrix: microcrystalline 8. Secondary Minerals: none 9. Encrustations: 5-6 mm Mn-crust 10. Comment: breccia includes other volcanic und biogenic components							piece from bloc F (41x17x16 cm)	
SO267-DR109-5A	1. Rock Type: volcanic, mafic to intermediate, strongly altered 2. Size: 21x16x10 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: pale beige (vesicles) and green (matrix) 5. Texture / Vesicularity: massive / highly vesicular (~20-35%, ≤ 1.5 mm), some small lithophysae, mud and carbonates in vesicles (amygdules) 6. Phenocrysts: Ol+Px (~5-10%, ≤ 1.5 mm), Fsp (~1-4%, ≤ 1 mm) 7. Matrix: microcrystalline to fine-grained 8. Secondary Minerals: matrix seems chlorite altered 9. Encrustations: thick (≤ 10 mm) Mn-crust								

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	REF	NOTES	PICTURE
SO267-DR109-5B	1. Rock Type: same as DR109-5A 2. Size: 20x13x11 cm	1							
SO267-DR109-5C	1. Rock Type: same as DR109-5A 2. Size: 15x13x8 cm								
SO267-DR109-6A	1. Rock Type: volcaniclastic (pumice), felsic, weakly altered 2. Size: 11x8x7 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: white to greenish 5. Texture / Vesicularity: pumiceous / highly vesicular (~20-30%, ≤ 10 mm), streched vesicles 6. Phenocrysts: Qz (~5-8%, ≤ 1.5 mm) 7. Matrix: glassy 8. Secondary Minerals: none 9. Encrustations: surface weathering (oxidation), minor Mn staining								
SO267-DR109-6B	1. Rock Type: same as DR109-6A 2. Size: 8x7x5 cm	1							
SO267-DR109-7	1. Rock Type: volcaniclastic (pumice), felsic, weakly altered 2. Size: 16x13x11 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: pale orange 5. Texture / Vesicularity: pumiceous / highly vesicular (~50-60%, ≤ 10 mm) 6. Phenocrysts: Qz (~8-12%, ≤ 2 mm), Hbl (~5-8%, ≤ 3 mm) 7. Matrix: glassy 8. Secondary Minerals: none 9. Encrustations: weak weathering (Fe-oxides)	1							
SO267-DR109-8	1. Rock Type: volcaniclastic (pumice), felsic, altered 2. Size: 10x8x5 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: brick red 5. Texture / Vesicularity: pumiceous / moderately vesicular (~15-20%, ≤ 5 mm) 6. Phenocrysts: Qz (~5%, ≤ 1 mm) 7. Matrix: glassy? (weathered) 8. Secondary Minerals: Fe-oxides 9. Encrustations: Fe-oxide weathering, minor Mn staining	1							

Appendix 10: Tongan Observer's Report

(T. Fangatua, Ministry of Lands and Natural Resources)

Cruise SO267 is permitted in Tongan waters under MSR permit (Ministry of Lands dated 3rd December 2018 per note 96/2018). The Tongan government appreciates the opportunity to participate and observe in the cruise. We welcome the scientific interest in our land and development of Tongan waters are essential to our livelihood.
The observer participated in many aspects of the cruise, including deployment and recovery of equipment, attendance at scientific seminars and observation of most, if not all, of the wide range of activities mentioned in this cruise report. A presentation on the cruise has been prepared for meetings (Talanoa) back in Tonga, and a copy of the all data including representative rock samples has been promised by the cruise organizers.
General observations on SO267 follow:

- Operations at sea were orderly and respectful of the marine environment. On the one instance when a whale was spotted during seismic operations, the shoot was stopped until 30 minutes after the animal had left sight and then only progressively reintroduced.
- The vessel is commended for responding to an emergency regarding the Tongan fishing vessel F/V Nordic on 12th January 2019. Despite inconvenience to the ship's scientific schedule and the cost to respond, there was no hesitation from the crew or science team to try and help. Having a Tongan speaking observer on board to communicate with ships' captains and owner was key in reaching an effective resolution to the emergency.
- The range of scientific activities managed from the vessel was impressive with excellent learning for the observer. The interaction between the various scientists was also very cordial and often interesting.
- Conditions on the vessel were excellent in both good weather and bad. Comfort of facilities and friendliness of the crew/staff are appreciated.

We look forward to learning more of the final analysis of the scientific results of this cruise. R/V Sonne and the scientists of Geomar, BGR and Nautilus are welcome back to Tonga in the future.

T. Fangatua

GEOMAR
Helmholtz-Zentrum für Ozeanforschung Kiel

GEOMAR Reports

No.	Title
1	FS POSEIDON Fahrtbericht / Cruise Report POS421, 08. – 18.11.2011, Kiel - Las Palmas, Ed.: T.J. Müller, 26 pp, DOI: 10.3289/GEOMAR_REP_NS_1_2012
2	Nitrous Oxide Time Series Measurements off Peru – A Collaboration between SFB 754 and IMARPE –, Annual Report 2011, Eds.: Baustian, T., M. Graco, H.W. Bange, G. Flores, J. Ledesma, M. Sarmiento, V. Leon, C. Robles, O. Moron, 20 pp, DOI: 10.3289/GEOMAR_REP_NS_2_2012
3	FS POSEIDON Fahrtbericht / Cruise Report POS427 – Fluid emissions from mud volcanoes, cold seeps and fluid circulation at the Don-_Kuban deep sea fan (Kerch peninsula, Crimea, Black Sea) – 23.02. – 19.03.2012, Burgas, Bulgaria - Heraklion, Greece, Ed.: J. Bialas, 32 pp, DOI: 10.3289/GEOMAR_REP_NS_3_2012
4	RV CELTIC EXPLORER EUROFLEETS Cruise Report, CE12010 – ECO2@NorthSea, 20.07. – 06.08.2012, Bremerhaven – Hamburg, Eds.: P. Linke et al., 65 pp, DOI: 10.3289/GEOMAR_REP_NS_4_2012
5	RV PELAGIA Fahrtbericht / Cruise Report 64PE350/64PE351 – JEDDAH-TRANSECT -, 08.03. – 05.04.2012, Jeddah – Jeddah, 06.04 - 22.04.2012, Jeddah – Duba, Eds.: M. Schmidt, R. Al-Farawati, A. Al-Aidaroos, B. Kürten and the shipboard scientific party, 154 pp, DOI: 10.3289/GEOMAR_REP_NS_5_2013
6	RV SONNE Fahrtbericht / Cruise Report SO225 - MANIHIKI II Leg 2 The Manihiki Plateau - Origin, Structure and Effects of Oceanic Plateaus and Pleistocene Dynamic of the West Pacific Warm Water Pool, 19.11.2012 - 06.01.2013 Suva / Fiji – Auckland / New Zealand, Eds.: R. Werner, D. Nürnberg, and F. Hauff and the shipboard scientific party, 176 pp, DOI: 10.3289/GEOMAR_REP_NS_6_2013
7	RV SONNE Fahrtbericht / Cruise Report SO226 – CHRIMP CHatham RIse Methane Pockmarks, 07.01. - 06.02.2013 / Auckland – Lyttleton & 07.02. – 01.03.2013 / Lyttleton – Wellington, Eds.: Jörg Bialas / Ingo Klaucke / Jasmin Mögeltönder, 126 pp, DOI: 10.3289/GEOMAR_REP_NS_7_2013
8	The SUGAR Toolbox - A library of numerical algorithms and data for modelling of gas hydrate systems and marine environments, Eds.: Elke Kossel, Nikolaus Bigalke, Elena Piñero, Matthias Haeckel, 168 pp, DOI: 10.3289/GEOMAR_REP_NS_8_2013
9	RV ALKOR Fahrtbericht / Cruise Report AL412, 22.03.-08.04.2013, Kiel – Kiel. Eds: Peter Linke and the shipboard scientific party, 38 pp, DOI: 10.3289/GEOMAR_REP_NS_9_2013
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