SONNE-Berichte

Thermal versus compositional causes of bathymetric highs: The Madagascar Ridge (MADAGASCAR)

Deep-Sea benthic biodiversity of the Madagascar and South-West Indian Ridge (MADAGASCAR-BIO)

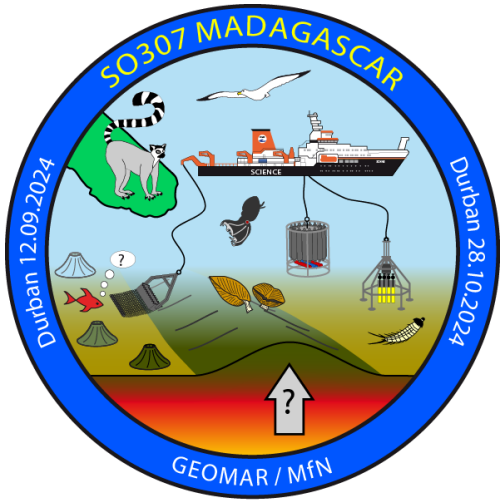
Composition, production and recycling of recalcitrant organic matter in the bathypelagic Indian Ocean (INDICOM)

Cruise No. SO307

12.09.2024 – 28.10.2024,

Durban (South Africa) – Durban (South Africa)

MADAGASCAR



Jörg Geldmacher, Christian Timm, Carsten Lüter, Benjamin Pontiller, Maxim Portnyagin, Mariana Andrade, Alberto González-Casarrubios, Anja Conventz, Peter Davidson, Levi Dethlefs, Ruth Flerus, Julia Finke, Josefine Karnatz, Tania Klüver, Nathalie Koberwein, Kevin Krohne, Jakob Lang, Pilar Madrigal, Doris Maicher, Birger Neuhaus, Denise Pöhnl, Naveenkumar Parameswaran, Johanna Schenk, Anna Völkert, Clara Winguth, Anja Engel, Kaj Hoernle

Chief Scientist: Jörg Geldmacher

GEOMAR Helmholtz Centre for Ocean Research Kiel

2024

Table of Contents

1 Cruise Summary

1.1 Summary in English

During expedition SO307, scientific work was carried out for the geological main project (MADAGASCAR), a biological oceanography sub-project (INDICOM) and a biological sub-project (MADAGASCAR-BIO). The Madagascar Ridge is ideal for exploring the cause(s) of seafloor bathymetric anomalies, because it formed during the breakup of Gondwana but the actual process behind its emplacement is controversial. During expedition SO307 bathymetric data and rock samples were collected to determine lithology, age, geochemistry, and origin of the ridge and thus will deliver ground-truthing evidence for its formation and the general understanding of bathymetric anomalies in the world's oceans. In total 116 dredge hauls were carried out covering all regions of the Madagascar Ridge and presumably different stratigraphic levels. Nearly 7,700 km of high-resolution multibeam mapping was conducted, providing, among other results, valuable data of the fracture zone fabric in the southern working area. The biological oceanography studied the water column above the Madagascar Ridge to investigate the origin and fate of dissolved and particulate organic matter in the deep sea. In total, 34 individual CTD casts were caried out and ~ 8,000 liters sea water were processed. First experiments regarding the role of gel particles for deep sea bacteria were already conducted on board. The biological investigations focused on the benthic fauna. The aims were to register and describe the diversity of selected benthic groups including cryptic species to test the hypothesis about the function of bathymetric highs, like the Madagascar Ridge, and their parallel-running currents as corridors for the larval dispersal. In total, 15 multicorer (MUC) deployments were conducted, retrieving sediment samples from 1393 to 5391 m water depths. In addition, any biological growth on the surfaces of all rock samples recovered by chain bag dredge hauls was carefully collected.

1.2 Zusammenfassung

Während Expedition SO307 wurden wissenschaftliche Arbeiten für das geologische Hauptprojekt (MADAGASCAR), ein biologisches Teilprojekt (MADAGASCAR-BIO) sowie ein Teilprojekt aus der biologischen Ozeanographie (INDICOM) durchgeführt. Der Madagaskar-Rücken ist ideal zur Erforschung der Entstehung von bathymetrischen Anomalien am Ozeanbodens, da er während des Aufbruchs von Gondwana entstand und für seine Bildung verschiedene Modelle vorgeschlagen wurden. Die während SO307 durchgeführten Kartierungen und Gesteinsbeprobungen liefern Aufschlüsse über Lithologie, Alter, Geochemie und Ursprung des Madagaskar-Rückens und damit zum besseren Verständnis der Entstehung bathymetrischer Anomalien in den Weltozeanen. Insgesamt wurden 116 Dredgezüge durchgeführt, die alle Regionen des Rückens abdecken und voraussichtlich auch seine verschiedenen stratigraphischen Ebenen. Es wurden fast 7.700 km Fächerecholotkartierungen durchgeführt, die unter anderem wertvolle Daten über das tektonische Netz der Störungs-Zonen im südlichen Arbeitsgebiet lieferten. Die biologische Ozeanographie untersuchte die Herkunft und den Verbleib von gelösten und partikulären organischen Stoffen in der Tiefsee. Insgesamt wurden während SO307, 34 CTD-Profile durchgeführt und etwa 8.000 Liter Meerwasser verarbeitet. Erste Experimente zur Rolle von Gelpartikel für Tiefseebakterien wurden bereits an Bord durchgeführt. Die biologischen Untersuchungen konzentrierten sich dagegen auf den benthischen Lebensraum. Ziel war es, die Vielfalt ausgewählter benthischer Gruppen wie Brachiopoda, Kinorhyncha und fissurellide Gastropoda, einschließlich kryptischer Arten, zu erfassen und zu beschreiben, um unter anderem die Hypothese über die Funktion ozeanischer Erhebungen wie des Madagascar-Rückens und ihre parallel verlaufenden Strömungen als Korridore für die Ausbreitung von Larvalstadien zu testen. Insgesamt wurden 15 Multicorer- (MUC-)Einsätze gefahren und dabei Sedimentproben aus 1393 bis 5391 m Wassertiefe gewonnen. Weiterhin wurde der biologische Aufwuchs auf allen Oberflächen der mit den Dredgezügen geborgenen Gesteinsproben sorgfältig abgesammelt.

2 Participants

2.1 Principal Investigators

Name	Institution
Hoernle, Kaj, Prof. Dr. (Project MADAGASCAR)	GEOMAR
Engel, Anja, Prof. Dr. (Project INDICOM)	GEOMAR
Pontiller, Benjamin, Dr. (Project INDICOM)	GEOMAR
Lüter, Carsten, Prof. Dr. (Project MADAGASCAR-BIO)	Museum f. Naturkunde

2.2 Scientific Party

Name	Discipline	Institution
Geldmacher, Jörg, PD Dr.	Chief Scientist	GEOMAR
Timm, Christian, Dr.	Shift Leader Geology/Exp. Manager	GEOMAR
Maicher, Doris, PhD	Shift Leader Geology	GEOMAR
Portnyagin, Maxim, Dr.	Shift Leader Geology	GEOMAR
Conventz, Anja	Geology	GEOMAR
Davidson, Peter, PhD	Geology	GEOMAR
Finke, Julia	Geology	GEOMAR
Krohne, Kevin	Geology	GEOMAR
Lang, Jakob	Geology	GEOMAR
Madrigal Quesada, María del Pilar, Dr.	Geology	GEOMAR
Mariana, d. A. F. Queiroz de Andrade, Dr.	Geology	GEOMAR
Naveenkumar, Parameswaran	Geology	GEOMAR
Schenk, Johanna	Geology	GEOMAR
Völkert, Anna	Geology	GEOMAR
Pontiller, Benjamin, Dr.	Shift Leader Biol. Oceanography	GEOMAR
Flerus, Ruth	Biological Oceanography	GEOMAR
Karnatz, Josefine	Biological Oceanography	GEOMAR
Klüver, Tania	Biological Oceanography	GEOMAR
Koberwein, Nathalie	Biological Oceanography	GEOMAR
Pöhnl, Denise	Biological Oceanography	GEOMAR
Winguth, Clara	Biological Oceanography	GEOMAR
Lüter, Carsten, Prof. Dr.	Shift Leader Biology	Mus. Nat.
Neuhaus, Birger, Dr.	Co-Shift Leader Biology	Mus. Nat.
González-Casarrubios, Alberto,	Biology	Mus. Nat. & UCM
Dethlefs, Levi	Biology	Mus. Nat.

2.3 Participating Institutions

GEOMAR	Helmholtz-Zentrum für Ozeanforschung Kiel (Germany)
Museum für Naturkunde	Museum für Naturkunde Berlin (Germany)
UCM	Complutense University of Madrid (Spain)

The SO307 scientific party

3 Research Program

3.1 Description of the Work Area

3.1.1 General Introduction into the main project MADAGASCAR

A fundamental question in Earth sciences concerns the origin of seafloor bathymetric anomalies. Are these anomalies primarily volcanic in origin reflecting elevated mantle temperatures and thus excess magma production and crustal thickening (e.g. Morgan, 1971; Schilling, 1973; Klein and Langmuir, 1987; Langmuir et al., 1992; McKenzie and Bickle, 1988) or do they reflect compositional variations, i.e. presence of lower density material, in the upper mantle causing uplift of the seafloor (e.g. O'Hara, 1975; Presnall and Helsley, 1982; Niu and O'Hara, 2008; Zhou and Dick, 2013)?

A commonly held view is that the depth below sea level of mid ocean ridges (MOR) is a function of the thickness of the magmatic portion of the ocean crust, such that shallow depths of spreading centers are a result of being situated on thick crust. Based on the assumption that the composition of the upper mantle is roughly homogeneous, temperature of the ambient mantle upwelling beneath the spreading center is generally believed to control the degree of mantle melting and thus melt productivity and crustal thickness, as proposed in the landmark paper by Klein and Langmuir (1987). In summary, regionally higher mantle temperature should result in a higher degree of melting and a deeper onset of melting beneath the ridge and thus more magma production (longer melting interval/column) and therefore thicker oceanic crust. A prime variable controlling mantle temperature beneath MORs are nearby hot spots or mantle plumes as is proposed for Iceland and the Azores in the Atlantic, which follow the systematics mentioned above

(Langmuir et al. 1992). In a recent Nature article, Zhou and Dick (2013), however, challenge the model of a primarily thermal origin of MOR depth variation and of other seafloor bathymetric highs by reporting observations from the Marion Rise, an elevated area of seafloor along the southwest Indian Ocean ridge (SWIR) between 32.32° – 63.34°E. The authors point out that a high frequency of upper mantle rocks, peridotite, is exposed on the ocean floor, associated with little to no volcanic and intrusive rocks. They argue that this observation implies that the upper mantle is directly exposed along long extents of the SWIR and that little or no magmatic ocean crust is present, thus almost no melt was produced in this area. Due to the absence of evidence for thick crust, they attribute the positive bathymetric and geoid anomalies associated with the Marion Rise, and related highs to both sides of the spreading axis, such as the Madagascar Ridge to the north, to the presence of unusual light upper mantle that experienced earlier melt depletion. According to this model, the oceanic crust to the north and south of the Marion Rise and possible large parts of the Madagascar Ridge must be formed by mantle peridotite (as opposed to volcanic basalt), which can easily be tested by the planned dredging during SO307. Even if it is formed by volcanic basalts but from melts from such a previously depleted source, the geochemical composition of the recovered lavas can be used to distinguish between the two confronting models (e.g., by comparing indicators of degree of melting versus source depletion). Alternatively, the Madagascar Ridge might, at least partially, consist of thinned and stretched continental crust as a relic after the breakup of Gondwana (Reeves, 2014) as has been demonstrated for a small part of the neighboring Mozambique Ridge, for example (Jaques et al. 2019). In this case, rocks of continental crustal composition (granites, gneiss, shists etc.) should be recovered.

3.1.2 The Madagascar Ridge and its southern extension to the Southwest Indian Ridge

The southwest Indian Ocean between Madagascar and Antarctica contains several prominent bathymetric highs, forming the Marion Rise. These include 1) the north-south-trending Madagascar Ridge, extending southwards from Madagascar to the southwest Indian Ridge (SWIR), 2) an elevated portion of the SWIR between ~32 - 53°E with prominent oblique fracture zones, 3) an east-west oriented bathymetric high in the center of the Marion Rise, extending from Marion Island in the west to the Del Cano Rise and Crozet Bank in the east (Fig. 3.1), and 4) the Conrad Rise further to the south, similar in size and orientation to the central Marion bathymetric high. The origin of the Marion Rise and associated bathymetric highs are controversial. It is commonly accepted that oceanic plateaus are formed by strong volcanism caused by mantle plumes impinging on the base of the oceanic lithosphere (Morgan, 1972). Recently, however, Zhou and Dick (2013) have challenged this model proposing that the Marion Rise, and possibly many other oceanic rises and bathymetric highs, result from compositional differences in the upper mantle (see section 3.1.1 above). Expedition SO307 (and the geological MADAGASCAR project), therefore focuses on the Madagascar Ridge (including its extension to the SWIR in the south) and its relationship to the SWIR and Marion Rise.

The Madagascar Ridge is an elongated plateau with dimensions of ~1,100 km in the N-S direction and up to 600 km in the E-W direction. It is bounded to the east by the Madagascar Basin and to the west

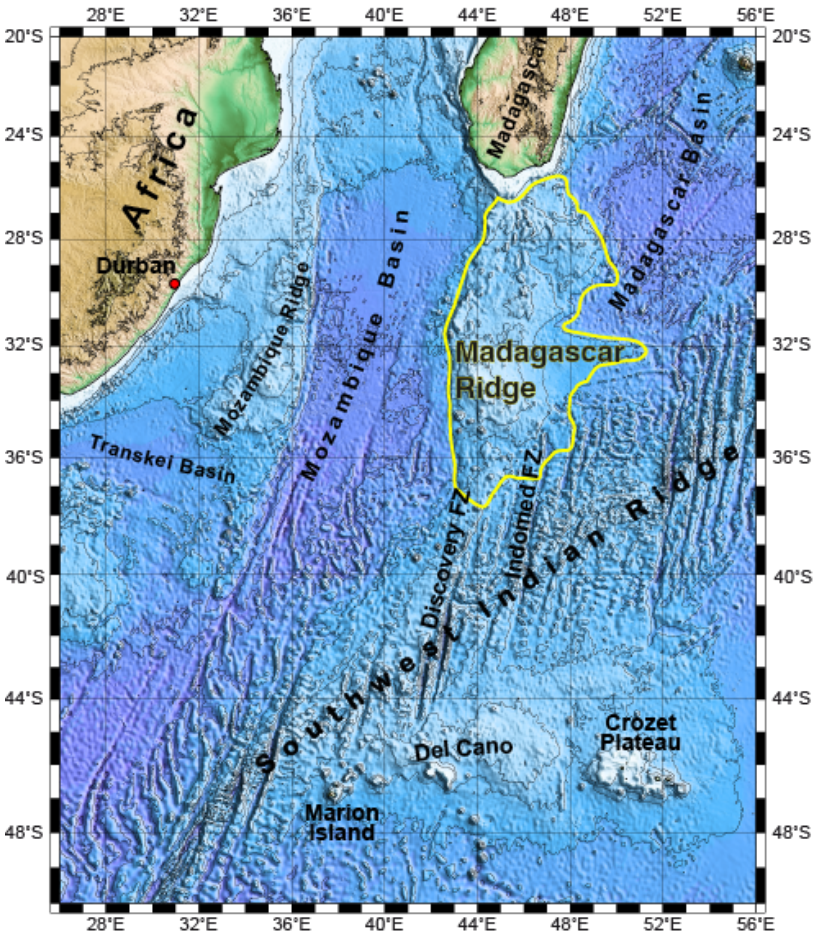


Fig. 3.1 Bathymetric map of the Southwest Indian Ocean with the Madagascar Ridge and other bathymetric anomalies and the course of the Southwest Indian Ridge spreading center. (Gebco_08 Grid, http//www.gebco.net).

by the Mozambique Basin. While the eastern flank facing the Madagascar Basin shows a gentle slope, the western flank to the Mozambique Basin is generally much steeper. No previous studies have identified any magnetic isochrons on the ridge but according to plate tectonic reconstructions by Zhang et al. (2011) the northern part of the ridge was emplaced at 80 Ma. Formation of the Madagascar Ridge was initially thought to be related to the breakup of Gondwana; i.e. the separation of Madagascar from SW India and Antarctica. Based on the results of DSDP Leg 25, it was proposed that the Madagascar Ridge may be a block of continental crust (Coffin and Eldholm, 1994), but neither of the drilled sites actually reached basement. Although not conclusive, it was later proposed that the ridge based on seismic data was more likely to be igneous and thus most likely formed through Cretaceous hotspot activity (Goslin et al., 1980, 1981; Sinha et al., 1981) or by interaction of a hotspot with the SWIR (e.g. Zhang et al. 2011; Sato et al., 2021).

South of the Madagascar Ridge lies a broad zone of elevated seafloor with rough bathymetry (including E-W-trending abyssal hill fabric) that gradually merges into the flank of the SWIR (Fig. 3.1). This alleged extension of the Madagascar Ridge to the SWIR is aligned in the NNE-SSW direction has a length of ~600 km and a width of ~200 km. It is segmented by several prominent, roughly N-S striking fracture zones (FZ) of which the Discovery and Indomed FZ run approximately in extension of the western and eastern flanks of the MR, respectively. The area in between these fracture zones was coined Discovery-Indomed Segment (DI) by Sato et al. (2022), which will be used in the following.

Several studies have proposed that the Madagascar Ridge and its extension to the SWIR were formed by the Marion hotspot now located ~400 km south of the spreading center beneath Marion Island (Georgen et al., 2001; Duncan and Richards, 1991; Zhang et al., 2011) (Fig. 3.1). The Marion hotspot, together with

the Crozet hotspot, presently located beneath the Crozet bank, is commonly considered to be also the cause of the Marion Rise (e.g. Zhang et al., 2011). The most recent plate reconstruction by Zhang et al. (2011) using available geophysical data (predicted bathymetry, magnetics and compiled sediment thickness data) shows that the Marion and Crozet hotspots and possibly a separate, short lived Conrad melting anomaly could indeed account for the large excess in residual bathymetry on the ocean floor in this region. Based on this reconstruction, the Marion hotspot at 90 Ma was located beneath the southeastern edge of Madagascar, creating the subaerial Androy basalt-rhyolite massif during separation of Madagascar from SW India (Storey et al., 1995) and eventually the northern part of the Madagascar Ridge. The Rodriguez Triple Junction (RTJ), which was located south of Madagascar at this time, moved northeastward from c. 80 Ma onwards and became eventually located above the Marion hotspot. The interaction of the triple junction and the plume then lead to formation of the central Madagascar Ridge. At c. 68 Ma the SWIR arm of the RTJ was located above the Marion hotspot causing excess volcanism on both sides of the SWIR that created the southern Madagascar Ridge and the Del Cano Rise. The extension of the Madagascar Ridge to the current SWIR must have also formed during this time period or shortly thereafter although the details are not clear. With time the SWIR moved gradually away from the Marion Hotspot to the north so that the hotpot became eventually located to the south of the spreading center (and presently beneath Marion Island). Accordingly, the Marion hotspot plays the dominant role in generating the large off axis bathymetric anomalies north and south of the SWIR. Following Zhang et al. (2011), the magnitude of melt excess produced by the Marion plume is directly related to the proximity of the RTJ and SWIR leading to distinct magmatic pulses when the plume was close or underneath the ridges forming the Madagascar Ridge and Del Cano Rise. In contrast, the hypothesis of Zhou and Dick (2013) predicts that less dense mantle material creates sufficient buoyancy to explain the dimensions of the Marion Rise. They also argue that the potential of the weak (and currently off-axis) Marion hotspot to supply hot mantle to and along the SWIR is limited by the frequent transform faults along the SWIR which can act as barriers for the flow of plume material (Georgen et al., 2001). On the other hand, the frequent occurrence of serpentinized periditotite and rareness of magmatic crust (as used by Zhou and Dick (2013) as their main argument) is not unusual for slow-spreading ridges. This can be explained by the slow mantle upwelling which causes adiabatic cooling to an extent that does not allow the mantle to cross its solidus and melt. Ultimately mantle rock will then form the igneous portion of the ocean floor. In conclusion the common exposure of mantle at the SWIR crossing the northeastern margin Marion Plateau could be the combined effects of ultraslow spreading and depleted, less dense mantle underlying the center of the Marion Rise. Still the key observation of Zhou and Dick (2013) of shallow axial depth and frequent mantle exposures along the SWIR of the Marion Plateau are consistent with a compositional driven bathymetric anomaly. The major goal of the MADAGASCAR project proposed here is to obtain basement samples from the Madagascar Rise and its southern extension towards the SWIR.

3.2 Aims of the Cruise

Project MADAGASCAR: In this project we will investigate the role of the Madagascar Ridge during Gondwana breakup and explore the competing roles of thermally versus compositionally driven mantle melting and crustal uplift. With the planned mapping and sampling survey of the Madagascar Ridge we want to contribute to the following overarching scientific questions:

- What is the composition (basaltic, peridotitic, continental crust) of the basement of the Madagascar Ridge? How far does continental crust reach south of Madagascar Island? Does the geochemical composition of the igneous basement vary along and across the ridge reflecting zonation, variable source origins, or varying proximity to the SWIR through time? How do the igneous rocks compare compositionally with the onshore flood basalts on Madagascar Island and today's volcanic Marion Island lavas?
- Do the magmatic rocks of the Madagascar Ridge originate from a shallow or deep mantle source?
- Is there an age progression along the ridge? If so, is the progression of basement ages in accordance with plate motion models derived from magnetic spreading anomalies? How much younger is the Madagascar Ridge with respect to the underlying ocean crust and how far away from the spreading center did it form?
- In the case that abyssal peridotites are encountered, how frequent do they occur and if present what is their relation to associated magmatic rocks? Significant occurrences of mantle rocks in the basement of the Madagascar Ridge would support the model of mantle buoyancy by earlier melt depletion and manifest a new class of aseismic ridge formation.
- What is the nature of the southern extension of the Madagascar Ridge connecting it with the SWIR? Is it a low volume aseismic ridge? If so, how did Marion Plume material transgressed northward across the SWIR? Does the oceanic crust south of the Madagascar Ridge (as exposed along the fracture zones i.e. Indomed and Discovery) consists of mantle peridotite or igneous rock (basalt)?

Project MADAGASCAR-Bio: The investigations aimed at (1) recording and describing the diversity of selected groups of the benthic communities of the Madagascar Ridge which has not been studied before in this respect. The focus was on the groups Brachiopoda, Kinorhyncha, and fissurellid Gastropoda, which represent sessile filter feeders (Brachiopoda), mobile detriti-/bacteriovores (Gastropoda), or belong to the holobenthic meiofauna (Kinorhyncha); (2) Uncovering cryptic species, e. g., in the globally distributed brachiopod genus *Eucalathis* with the help of genetic studies and unveiling the biogeographical distribution pattern of this deep-see taxon (molecular markers include 12S, 16S, 18S, and 28S rRNAs); (3) Testing the hypothesis about the role of oceanic ridges and their parallel-running currents as corridors for the dispersal of benthic species. In this respect, the suggested animal groups are particularly significant, as comprehensive biogeographical data from previous deep-sea expeditions is already available; and (4) Studying the availability of nutrients into the study area by sediment analyses ('total carbon', TC and 'total organic carbon', TOC). This may characterize another parameter influencing the abundance of the benthic meio- and macrofauna on the Madagascar Plateau.
Concerning the distribution of the brachiopod genus *Eucalathis*, it was planned to compare already existing samples from this species with new samples from the Madagascar Ridge to test the hypothesis of an interoceanic connection of these brachiopods through the ambient water current systems (see above). However, brachiopods were very scarce in the samples and no specimens of *Eucalathis* were found. The same applies to fissurelid gastropods which were also absent altogether (for details see chapter 5.4). In addition, the comparative study of meiofauna from MUC sediment sampling from several stations on top of the Madagascar Ridge and off its margin on

both sides and to the south of it in the abyssal basins should provide the data to answer the following questions:

- Does the Madagascar Ridge act as a barrier for the dispersal of holobenthic meiofaunal groups?
- Does the Deep Western Boundary Current influence the species composition of the meiofauna in the Madagascar Basin?
- Does potential nutrient input by the Intermediate Water Current across the Madagascar Ridge at about 30°S or by the near-surface South Equatorial Current from the East Indian Pacific result in a higher abundance of meiofaunal organisms including a difference in density from North to South?

Project INDICOM: The overall aim of INDICOM during cruise SO307 was to investigate biological and biogeochemical processes that affect the turnover of organic matter in the deep Indian Ocean. Phytoplankton converts carbon dioxide into organic carbon in the sunlit surface ocean. This freshly produced organic matter is largely remineralized on short timescales of days to months, and only a small fraction is exported to the dark ocean, where it is turned over at substantially slower rates. Particulate organic matter exported to the bathypelagic ocean is, however, thought to represent a long-term loss of carbon from the surface layers when it is transformed into refractory dissolved organic carbon or when being buried in sediments. However, little is known about aggregation and disaggregation processes, particle size-frequency distributions, and the bacterial colonization and degradation of sinking particles. Additionally, little is known about the chemical composition, production, and removal processes of dissolved organic matter (DOM) in the deep ocean.

3.3 Agenda of the Cruise

To achieve the scientific goals of the MADAGASCAR research project, area-wide as well as more targeted multi-beam mapping and sediment echo sounding, and rock sampling by means of chain bag dredging was carried out during SO307. None of the targeted structures have been mapped or sampled before. Regarding specific working areas, the following structural features were selected for closer investigation/sampling:

- Main plateau of the Madagascar Ridge including it steep bordering flanks,
- Solitary seamounts and isolated structures off the plateau in the abyssal plains of the Mozambique and Madagascar Basins,
- Prominent fracture zones (i.e. Indomed and Discovery FZ) south of the Madagascar Ridge (and the abyssal hill fabric in between) linking the plateau with the SWIR.

The agenda of the subproject MADAGASCAR-BIO project focused on monitoring the biodiversity in the deep sea. Sampling followed two approaches: (1) Collection of biological overgrowth on rocks collected with the chain bag dredge and of soft sediment taken up with the sediment traps attached to the dredge; and (2) Targeted sampling of soft sediment and larger biological structures with the MUC and the TV-Grab, respectively. However, both MUC and TV-grab were only partly or not functional at all. This had a severe impact on the number of collected biological samples (see chapters 4. and 5.4 for further details) Since these sampling procedures

were interconnected with and integrated into the geological work schedule of the MADAGASCAR project, sampling stations were preferably positioned along the cruise track given by the geology programme, but included slight detours to reach suitable seafloor conditions (soft bottom, flat seafloor). Echosounding systems, such as PARASOUND and EM122 were permanently deployed by the geology team and were used simultaneously to guide the biological sampling. The following sampling was carried out or was planned:

- Recovery of encrusting and adhering organisms from rock dredging to be fixed for (a) genetic and morphological analyses, and (b) long term storage in the collection of the Museum für Naturkunde Berlin.
- Sampling of soft bottom meiofauna from sediment traps of the dredge and with a TV-MUC in order to recover enough individuals for the description of new species and to trace more rare species or animal groups of meio- and macrofauna. The TV-guidance allows to check whether or not the bottom is covered locally with sufficient sediment for sampling (see chapter 5.4).
- Targeted collection of individual specimens of the macrofauna with help of a TV-grab (but see chapters 4 and 5.4).

The work of subproject INDICOM focuses on the investigation of biological and biogeochemical processes that control the turnover of organic carbon in the deep sea. For this purpose, processes driven by heterotrophic bacteria will be investigated closely coupled with a detailed chemical analysis of organic matter. Special emphasis is put on the investigation of gel particles that bridge the gap between the dissolved and the particulate organic matter phases. It has been shown that carbohydrate- and protein-rich gels are abundant in the meso- and bathypelagic Indian Ocean but their role in deep-sea organic matter turnover is unknown. Testing mechanisms that potentially regulate the bacterial reworking of organic matter, including gel particles, will help to better understand and quantify carbon fluxes in the deep ocean. Molecular measurements will be combined with heterotrophic rate measurements. Besides an extensive water sampling program, the first experimental studies were already conducted on board to test the hypotheses that

- the chemical composition of organic matter in the deep ocean co-determines the efficiency of heterotrophic turnover,
- deep-sea heterotrophic bacterial communities are responsive to labile and semi-labile organic matter and are not inherently limited by missing metabolic capabilities,
- dilute concentrations of organic compounds hamper heterotrophic metabolization, while enrichment of specific naturally occurring organic substances facilitates bacterial consumption and remineralization.

All three projects are committed to the OSPAR Code of Conduct for Responsible Marine Research in the Deep Seas. Accordingly, the working program was planned to minimize transits to and within the study area. Care was taken to minimize the impact of our research activity on the marine environment (e.g. by keeping dredge tracks as short as possible) and to reduce the number of samples to the necessary minimum.

4 Narrative of the Cruise

(J. Geldmacher)

All 25 members of the scientific party arrived in Durban (ZA) in the afternoon/evening of Sept. 10 and boarded the vessel the next morning on Sept. 11. The four equipment containers were already loaded and secured on the working deck. Unpacking started in the afternoon with lifting the heavy tools (TV-Grab and MUC) out of the open top container. The vessel left the port of Durban on the following day, Sept. 12 at 13:00, to start its almost 3 days transit through choppy seas to the working area on the Madagascar Ridge.

The transit time was used to further unpack the containers, set up the laboratories, test the instruments, and to conduct other preparations for the cruise (including safety drills, science meetings and rehearsals of the respective lab workflows). After leaving the Exclusively Economic Zone (EEZ) of South Africa in the late evening of Sept. 13, the ships echo sounder systems (EM 122 multibeam and PARASOUND sediment echo sounder) were switched on.

While passing through the Mozambique Basin, we stopped for the first CTD/water sampling station in the early morning of Sept. 15. Three casts of the probe with the ROSETTE water sampler and attached UVP were successfully conducted and retrieved data and water samples from 10 to 4,500 meter below sea level (mbsl). Subsequently, the vessel continued its transit. In the afternoon, a TV-MUC deployment recovered sediment samples from the sea bed of the Mozambique Basin from 4600 m depth before we slowly approached the foot of the Madagascar Ridge slope. The night to the 16th and the following days were spent with bathymetric mapping in search for a suitable dredge station along the western slope of the MR. Dredge stations DR5 and DR6 (in almost 4000 m water depths) returned empty but DR7 (located further up the slope at 2800 m) recovered some consolidated sediments and one small piece of volcanic rock, the first ever basement sample from the Madagascar Ridge.

The following day, Sept. 16 and the night to Sept. 17 were spent alternating mapping and dredging at the western edge of the MR only interrupted by CTD deployments on the evening of Sept. 16 (CTD 8 to 11). The plan to run a TV-grab on the summit of a flat seamount near the site of DR 13 had to be abandoned due to technical issues with the device (the grab could no longer be opened after the closing test on deck). A careful examination by the ship's engineers and WTD personal during the upcoming days revealed that the instrument needs major repairs, which could not be performed on board due to the lack of spare parts and specific hydraulic oil. Alternatively, we conducted a TV-MUC station 10 miles further east on flat ground (MUC 14). Dredging of a small summit that stands out from the relatively flat summit plain of the northern Madagascar Ridge plateau yielded relatively well-preserved volcanic rocks covered by >10 cm thick manganese crusts (DR16). On the early morning of Sept.18, we arrived at the northern edifice of a pair of two prominent guyot-like seamounts that dominate the northern part of our working area. Dredge haul DR 18 at the lower eastern flank of the northern guyot recovered several well-preserved volcanic rocks that can be grouped into dense, olivine basalt (with olivine replaced by red secondary minerals) and vesicular aphyric basalt. An additional dredge haul conducted at the uppermost flank (DR19), at the very steep edge of the summit plateau recovered one piece of carbonate crust (including small volcanic clasts), indicating that these guyots might be covered by

a thick carbonate platform. After a CTD station (CTD 21, 21) dredging at the flanks of the northern guyot continued in the evening and early morning of Sept. 19. Dredge haul DR 24, conducted at the lower southern slope retrieved well-preserved igneous rocks, but two more attempts returned empty. On Sept. 19, dredging started on the southern guyot after multibeam mapping its entire western and southern flank. Dredge hauls DR 26, 27, 29 and 31 successfully returned many igneous rocks. Note that although the two guyots possess plateaus about 30-40 km wide, each of them has a conical peak in the southeast, which could indicate a possible late submarine phase of volcanism, built up after the summit plateaus had already sunk well below sea level. Dredge hauls DR26 to DR29 were successfully conducted near these edifices. After a successful TV-MUC deployment on the flat seafloor to the east of the two guyots at 2200 m water depths, the ship started a mapping transit to the steep eastern flank of the Madagascar Ridge, where it arrived in the afternoon of Sept. 20. Dredge hauls DR33 to DR38 were conducted between Sept. 20 and 22 along this slope between 27°50' and 28°30'S at different depths levels. Most of them returned suitable igneous rocks (sometimes in large quantities) except for dredge hauls conducted at the lowermost foot of the steep slope (which presumably should represent the oldest phase of the plateau volcanism). The last dredge at this location was conducted at the uppermost part of the slope (near its transition to the summit plateau and yielded, besides well-preserved volcanic rocks, also carbonate crusts containing fragments of Inoceramus shells (see section 5.2.2).

On Sept. 20, the ship's crew discovered a serious failure of the bearings of the large friction winch (FW1), which was used to run the steel cable for dredging operations. Since this issue could not be fixed at sea, and considering that dredging was the main method applied during SO307, the decision was made to use the second friction winch (FW2) for dredging operations from now on. The downside was that the fiber-optic cable (LWL), for which this second winch was normally meant, could no longer be used, which in turns meant that the MUC would need to be run on the normal steel cable and therefore without video control. Regular MUC deployments (without video control), however, were still possible.

After carrying out two shallow CTD runs (CTD 39, 40) near the edge of the plateau, the vessel left the Madagascar Ridge in the early evening of Sept. 22 and steamed eastwards to reach the deep abyssal plain of the Madagascar Basin. There, CTD and MUC deployments (CTD 41, 42, MUC 43, 44) were conducted at especially deep water-depths (5500 mbsl). During the day of Sept. 23, dredging operations started at a small conical seamount located just a few miles to the west of the CTD/MUC station, but the recovered igneous rocks are probably too altered for most geochemical applications (DR45, DR46). After returning back to the eastern margin of the Madagascar Ridge on Sept. 24, many well-preserved igneous rocks, including fresh volcanic glass, were dredged (DR47, 48, 51, 52). CTD stations 49 and 50 were also conducted in this area. On Sept. 25, the vessel started a second excursion into the Madagascar Basin to reach a prominent seamount located about 120 nm east of Madagascar Ridge at 30°45'S, 51°10'E. A MUC station (MUC 53), three dredge hauls (two of them, DR54 and DR56, very successful by returning well-preserved igneous rocks including fresh volcanic glass), and a deep water CTD station (CTD 57, 58) were carried out at/near of this seamount.

In order to take advantage of the predicted favorable weather conditions for the planned work in the southern part of the SO307 working area (between the Madagascar Ridge and the

SWIR), we began an almost two-day transit to the south on September 26. During the trip, CTD runs (CTD59, 60, 61) and a MUC station (MUC62) were carried out in the abyssal plain of the Madagascar Basin. Subsequently, the Bergfest (hump day party) was celebrated as the long transit meant that no station work was required that night anyway.

On Sept. 28, the northern border of the wide region between the southern end of the Madagascar Ridge and the SWIR was reached. This area is dominated by several prominent, north-south striking fracture zones that cut through the seafloor. Due to the vertical offset of the seabed along the zones and a pronounced, transverse striking abyssal hill fabric, oceanic crust of different ages is well exposed and can be sampled with the dredge. For time constraints, sampling efforts were limited to the Indomed fracture zone in the east and the Discovery fracture zone in the west and the area in between, the so-called Discovery-Indomet (DI) segment. First dredge hauls at the northern termination of the Indomed FZ (DR 63, 64, 65) retrieved ample volcanic rocks including some samples, which appear to be metamorphically overprinted and which were tentatively described as greenshist facies metabasalts. The ships track then followed the western wall of the Indomed FZ to the south with another CTD station (66, 67) on Sept. 29 and further dredging at 37° latitude. Although Dredge hauls DR68 returned empty, hauls DR69 and DR70 delivered plenty of only moderately altered volcanic rocks including fragments of pillow basalts with glassy margins.

For several days, the pulley at the end of the sliding beam (over which the dredge and MUC were run) had been making squeaking noises, which indicated a technical problem. Despite all the efforts of the ship's crew, the pulley was increasingly causing problems, which finally became so serious on the morning of September 30th that Dredge Station DR71 (located c. 50 nm miles further south but still along the western wall of the Indomed FZ) had to be aborted before the dredge even reached the ground. The decision was made to redirect the wire to the rear of the ship and operate dredges and MUC over the large A-frame from then on. Although this would further restrict the possible dredge directions, the scientists were happy to continue with the dredging program in the evening of Sept. 30. At first, the previously abandoned dredge haul (DR71) was repeated (as number DR72). However, four attempts to recover rocks from this latitude of the Indomed FZ failed (DR 71, 72, 73 and 74 returned empty).

To take advantage of still calm wind/sea conditions on the 1st of October, we brought forward the MUC station, which was planned for the DI working area anyway. For this, the vessel moved a few nm eastward in order to land the MUC on flat seafloor at almost 4700 m depth (MUC 76). Although a thin sediment cover seemed to be indicated in the PARASOUND data, the MUC returned nearly empty. It was concluded that the high swell made coring difficult and therefore no second attempt was made here. Afterwards, we returned to the western wall of the Indomed FZ to try once more to obtain igneous rocks from this latitude but DR 77and DR78 returned empty. The decision was made to move on to the western side of the DI segment to work along the Discovery FZ. On its way to the west, on Oct. 2, one dredge haul (DR79) was carried out at a slope of an abyssal hill near 45°E but we were again not successful. After arriving at the Discovery FZ on Oct. 3, the first two hauls conducted at its steep western wall finally returned well-preserved igneous rocks (DR80 and DR81). Unfortunately, the weather deteriorated significantly over the course of the day (with swells of over 5 m and wind forces of 7-8 beaufort), so that we had to stop all deck

work and used the time until the next day for a detailed mapping of the next section of the Discovery FZ further north. On the afternoon of October 4, we were able to take advantage of a brief moment of calm weather in the afternoon to carry out two successful dredge hauls in the area that had newly been mapped (DR 82, DR83). Over the next four days, from Oct. 4 to 7, we worked our way north along the steep western wall of the FZ with 10 out of 15 dredges (DR82 to DR98) being successful. A water sampling station (CTD 85) and a MUC (92) were conducted as well. The multi-corer failed again to deliver any sediment despite the sealing caps of the sediment tubes being closed and the tension meter had clearly indicated that the device had landed on the seafloor. It became obvious now that since the change of the ships wire routing over the stern, we no longer got any sediments with the MUC. For the next MUC run we have even more carefully selected the sampling site (based on the PARASOUND data) down to a few meters resolution to provide optimal conditions but again the MUC99 returned with closed sealing caps but no sediment inside. After receiving advise from shore (from the MUC technician) it was concluded that the high and not compensated heave at the rear of the ship causes a premature triggering of the locking mechanism before the MUC landed on the seafloor. The advice was given to use rubber band to make the trigger mechanism more sluggish. This method was tested at MUC 113, but without success. Another opinion was that it's failure might also be due to unsuitable seabed (without sufficiently soft sediments).

In the meantime, we had returned to the northern working area. On Oct. 8 we arrived near the junction of the northern tip of the Indomed FZ and the SE edge of the Madagascar Plateau. Five dredge hauls (DR100 to 104) were conducted in this transitional zone but only DR100 and DR103 delivered igneous rocks (but of good quality). Here, CTD runs 105 to 107 (up to 4000 m depths) were also carried out. Subsequently, we worked our way along the southern slope of the Madagascar Plateau in a western direction (DR108, 109, 110, 111, 112) with very good results. On Oct. 11, we shifted slightly northward to the next higher step of the southwestern edge of the Madagascar Ridge plateau and again worked our way along this edge in westerly direction mainly dredging seamount-like heights that are aligned along this edge (DR114, 115, 116, 117, 118) but with poor results. While DR114 delivered suitable igneous rocks, the other dredges returned with only Fe-Mn crusts or empty. On Oct 12, we arrived at the first of a cluster of four large guyot-like seamounts which are located in front of the southwestern corner of Madagascar Ridge. After CTD run 119, three dredge hauls were conducted that all delivered igneous rocks (DR120, 121, 122). From the following 6 dredge hauls (DR123, 124, 125, 126, 127, 129) conducted on the seamounts of this cluster, however, only two returned igneous rocks.

On Oct. 13, while transiting to the next of these guyot-shaped seamounts, the engine crew noticed a problem with the backboard main drive shaft. Closer examination revealed that a bearing must have been broken. As a result, the maximum speed for the remainder of the expedition (including the transit to Durban) was reduced to 7 knots.

On Oct. 15 a storm front passed through the working area so that only a CTD station could be carried out in the morning (CTD 130, 131). Afterwards the ship steamed 40 nm towards the shallowest point on Madagascar Ridge, Walters Shoal, a large flat-topped mountain dominating the southeast part of the plateau. The plan was to test if weather conditions there would allow us to conduct a dredge in shallow water at a scarp structure mapped in 2017 by the French research

vessel Marion Dufresne (Bouchet et al., 2017). Although we found the scarp and spotted a very promising site for dredging, the sea state did not allow a stable positioning of the vessel for dredging. Nor was it possible to alter the course for further mapping in that area. Therefore, with a heavy heart, we had to steam away without having achieved anything. By the time mapping and eventually dredging was possible again, we had already arrived near the northwestern edge of the working area where we were planning to work anyway, albeit not so early.

On the morning of Oct. 17, the swell had eased enough so that deck work could be resumed. During the next two days eight dredge hauls were carried out in a jagged area of seamounts and ridges around 30°10' latitude (DR 132, 133, 134, 135, 136, 137, 138, 139) with 5 of them delivering igneous rocks (partly in large quantities and good quality). In addition, we often got various biological by-catch (including deep-water corrals) for the biologists, who had not been spoiled by a large yield of macrofauna on this expedition so far.

In the late evening on Oct. 18, we arrived at the western rim of the Madagascar Ridge, where the slope appeared to be promising based on the predicted bathymetric maps. After just a few hours of multi-beam mapping however, we realized that the slope only rises at a maximum of 30 degrees and, according to the low reflectivity shown by the back-scatter data, appears to be quite laden with soft sediments. Nevertheless, five attempts were carried out at different sites of the slope (DR140 to DR144) and one of them yielded suitable volcanic samples (DR140). The night between October 19 and 20 was then spent dredging a small seamount lying approximately 10 nm east of the Madagascar Ridge rim in the Mozambique Basin at 30°40' S. Three dredge hauls returned volcanic rocks and a large amount of Fe-Mn crusts (DR145, DR146, DR147). Afterwards the transit back to the western slope the Madagascar Ridge was used to conduct a CTD station (CTD148, 149, 150) in very deep water (4000 m). Shortly after we begun that short transit, a very steep step was seen in the multibeam data which turned out to be the toe of the slope. Deep dredge haul DR151 returned well-preserved pillow lavas, potentially representing one of the earliest expressions of Madagascar Ridge volcanism that we have sampled so far, and potentially the oldest at the western side of the ridge. The search for further suitable dredge sites along the slope was unsuccessful (DR152 recovered carbonate rocks only) but the MUC station on the top of a regional summit, which was operated via the small CTD winch from the Hangar, and therefore with less heave, was finally successful (MUC154). Afterwards, we continued the search for suitable dredge positions along the western slope but without finding a convincing site. Therefore, we moved on to a large seamount located in front of the slope at 31°40'S. Here, three hauls (DR155, 156, 157) only yielded unsuitable material (one badly altered volcanic rock in DR155). The last MUC of this expedition (MUC 158) was successfully conducted on top of the seamount in shallow water (1400 m) and the last two CTD runs (CTD159, 160) were carried out in deep water (3800 mbsl) on the way to the next seamount. On October 22, we arrived at that seamount (lying approximately 61 km off the western rim of the Madagascar Ridge) and conducted five dredge hauls in total (DR161, 162, 163, 164, 165). After completing the last dredge haul, DR165, of the expedition, the vessel started its four days transit back to Durban through choppy waters in the late evening on Oct. 23. On Oct. 25, shortly before entering the EEZ of South Africa, the ships echo sounder systems were switched off.

In the evening of Oct. 28 the SONNE entered the port of Durban and expedition SO307 officially ended. The next day all scientists disembarked the vessel. In total, 116 dredge hauls (in water depths of up to 4,600 m), with 61 of them (53%) returning igneous rocks, a good success rate for an ancient volcanic plateau, were carried out (Fig. 4.1). Approximately 7,700 km of seabed were mapped in high resolution with the multibeam echo sounder. The MUC was deployed 15 times. And 15 CTD- (conductivity, temperature, depth) stations with 34 individual deployments were carried out with the attached Underwarter Vision Profiler (UVP) and the ROSETTE water sampler (depth range 10 m – 5000 m) and 8,000 liter of seawater were sampled and processed in the ships laboratories. No device was lost or seriously damaged during the deployment.

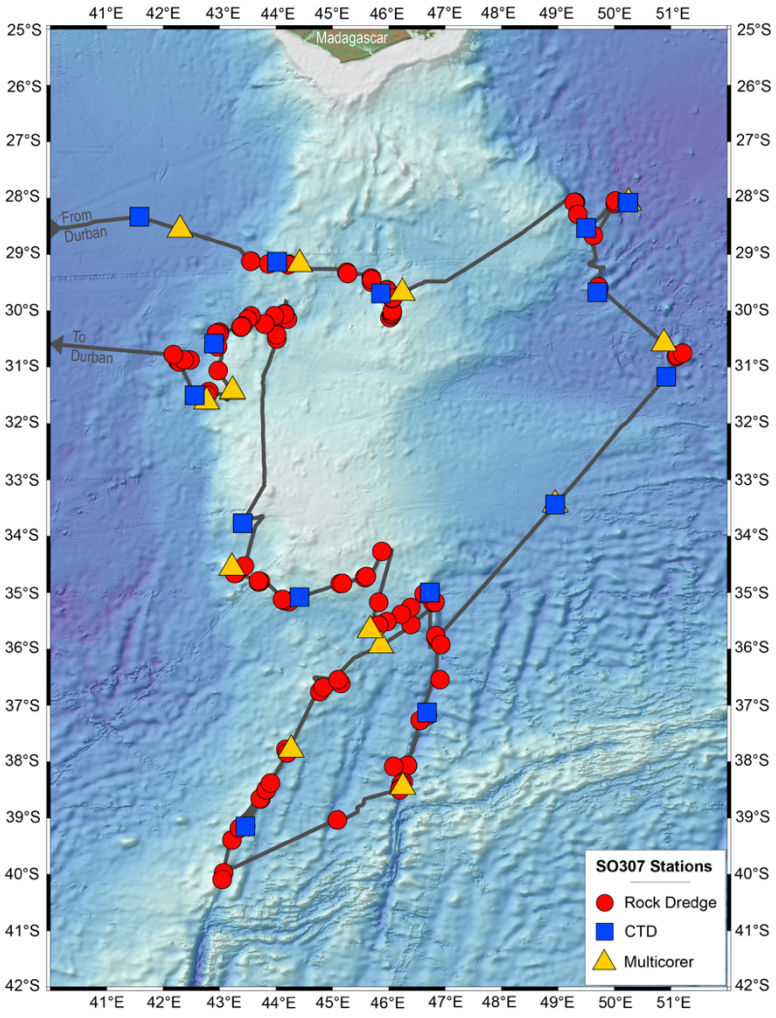


Fig. 4.1 SO307 ships track and sampling stations

Outreach activities included 6 blog publications and two live broadcasts from the ship to GEOMAR and to schools throughout Germany (initiated and moderated on the ship by Dr. Christian Timm and organized by Dr. Joachim Deng on the GEOMAR side). No fewer than 72 schools from all over Germany joined in, meaning that the broadcast was seen by around 1,400 pupils from 5th to 13th grade.

5 Preliminary Results

5.1 Bathymetric Mapping and Hydroacoustics

(C. Timm, J. Geldmacher)

5.1.1 System Overview and Data Processing

a) Multibeam echosounder

R/V SONNE is equipped with Kongsberg Maritime EM122 deep-water and EM710 shallow-water multi-beam echo sounder systems for continuous mapping of the seafloor. The systems consist of

several units. A transmitter/receiver transducer array is fixed in a mills cross below the keel of the vessel. A preamplifier unit contains the preamplifiers for the received signals. The transceiver unit contains the transmitter, receiver electronics, and processors for beam-forming and control of all parameters with respect to gain, ping rate and transmit angles. The system has serial interfaces for vessel motion sensors, such as roll, pitch and heave, external clock and vessel position. The system also includes high performance PC workstations. The operator software is the Seafloor Information System (SIS) running under Windows, which processes the collected data, applying corrections, displays the results and logs the data to internal or external disks.

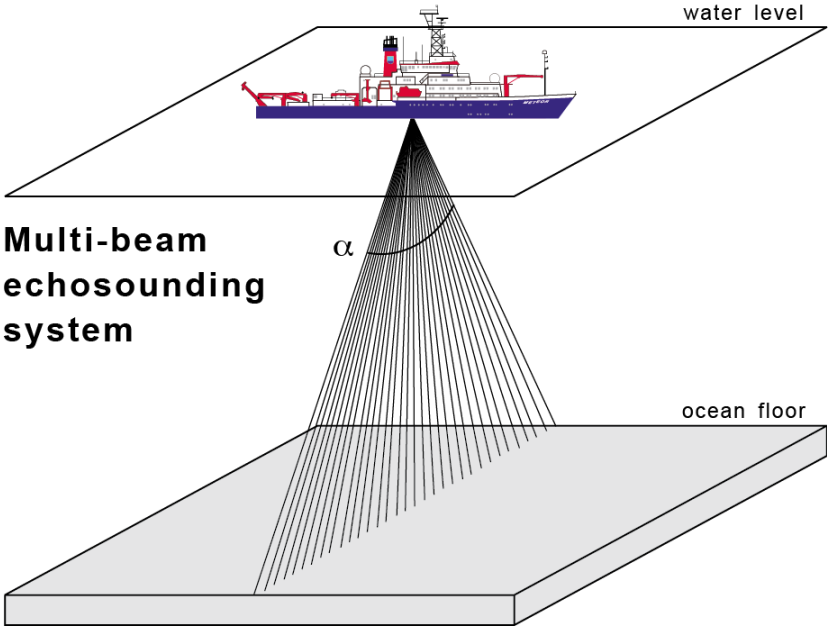


Fig. 5.1 Schematic sketch illustrating the principal mode of operation of multi-beam echo-sounding systems. The whole angular coverage sector (α) of the KONGSBERG EM 122 system is up to 150°.

The EM122 system uses a frequency of about 12 KHz with a whole angular coverage sector of up to 150° (75° per port-/starboard side, Fig 5.1). The depth range amounts to 20 - 11,000 m. The system has up to 288 beams and 432 soundings, respectively, per swath with pointing angles automatically adjusted according to achievable coverage or operator defined limits. The ping-rate depends on the water depth and the runtime of the signal through the water column. The variation of angular coverage sector and beam pointing angles was set automatically. This optimizes the number of usable beams. During a survey the transmitter fan is split into individual sectors with independent active steering according to vessel roll, pitch and yaw. This forces all soundings on a line perpendicular to the survey line and enables a continuous sampling with a complete coverage. Pitch and yaw movements within ±10 degrees and roll movements within ±15 degrees are automatically compensated by the software. Thus, the EM122 system can map the seafloor with a swath width about up to six times the water depth (to approximately 30 km). The geometric resolution depends on the water depth and the used angular coverage sector and is less than 10 m at depths of 2,000 - 3,000 m.

The accuracy of the depth data obtained from the system is usually critically dependent upon weather conditions and the use of a correct sound velocity profile. Sound profiles were determined using data from most CTD Stations. For bathymetric data obtained during the transit from Durban

to the first CTD station, sound velocity profiles recorded on the previous cruise SO206 in the northern Mozambique Basin have been used. Shortly before entering the main working area on the Madagascar Ridge the first CTD during SO307 was conducted in the central Mozambique Basin (CTD1) and its data applied to the EM122 data. During the course of the expedition further sound velocity profiles from the following CTD station were successively applied: CTD 41, 58, 60, 67, 106, 130, 160 (see 6. Station List for coordinates).

For a first assessment of the data and for the selection of dredge positions the QPS software Fledermaus (version 7) was used allowing 3D visualization.

b) Data Cleaning and Processing

The data cleaning procedure of selected areas was accomplished by the QPS Qimera v. 1.7.0 software. After loading the raw data (.all files) from the EM122 and the correct sound velocity profile, a first filtering of failed beams has been conducted. Subsequently a dynamic surface has been created showing the ship´s track and the raw data (Fig. 5.2).

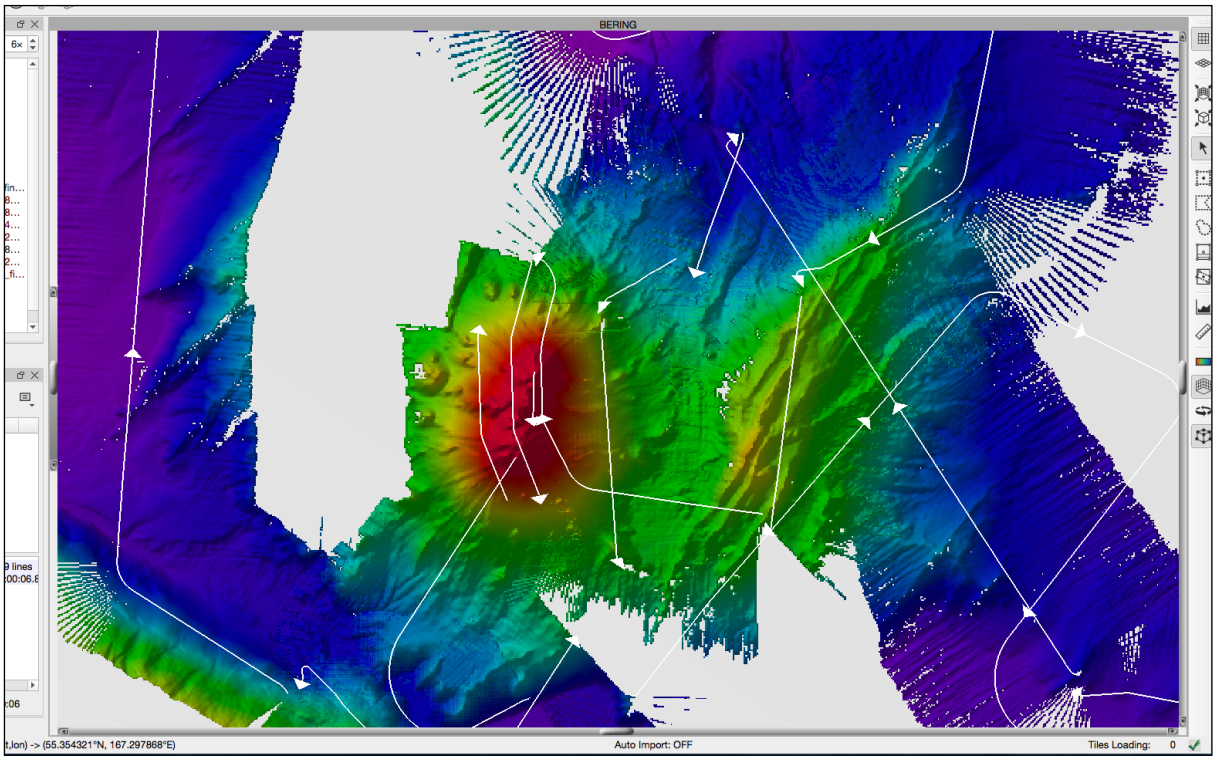


Fig. 5.2 Dynamic surface created with the Qimera software showing the raw data and the ship´s track (Example from the East Pacific).

Qimera allows an automatic elimination of major erratic data points using a spine filter. Furthermore, there are several tools for detailed elimination of erratic data points, for example a swatch editor, a 2D editor or a 3D editor (Fig.5.3) which all enable the operator to process each single beam stepwise. All editors display not only the cleaned data but also, if desired, the rejected data points and offer a variety of visualizations of the data (according to files, depth, intensity etc.).

After data cleaning a static surface has been generated from the dynamic surface, creating a .sd file which can be loaded in the QPS Fledermaus software, allowing 3D visualization of the

cleaned data. Furthermore the data can be exported in an ASCII x,y,z file format with header information for assembling, gridding and contouring with the GMT (Wessel and Smith 1995) or QGIS software.

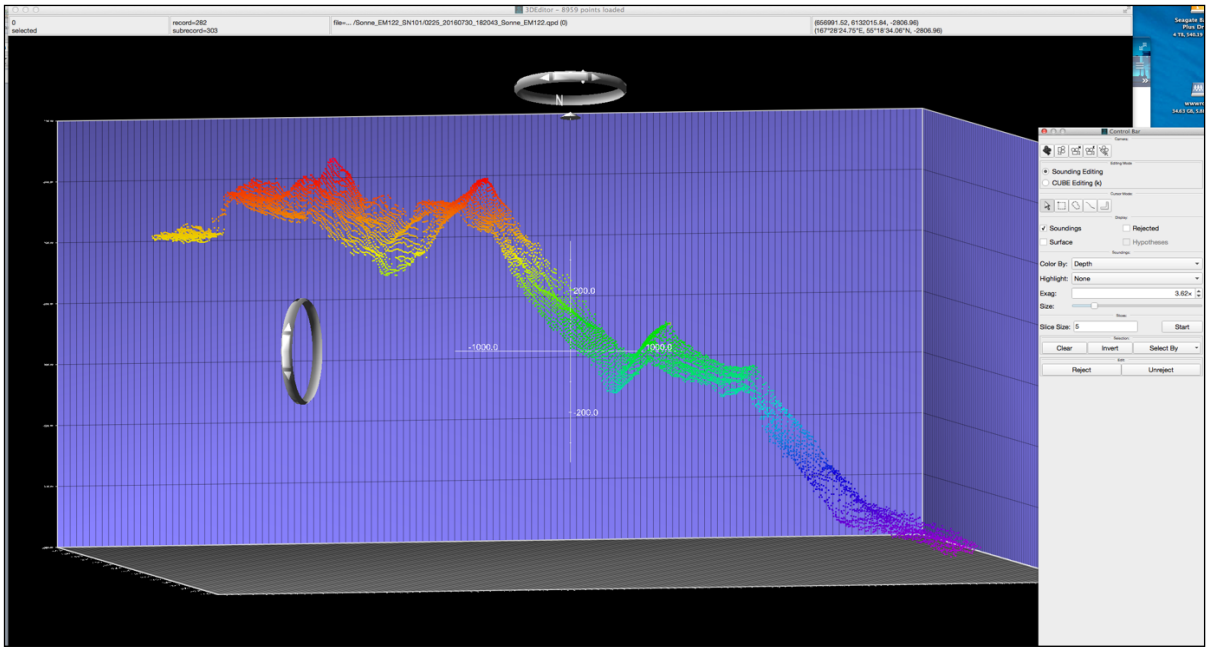


Fig. 5.3 3D editor of Qimera.

c) Sediment Echo-Sounding (Atlas PARASOUND P70)

Sub-bottom profilers (or sediment echo-sounding systems) are used to display sub-seafloor geological structures as, for example, marine sediment successions. The ATLAS PARASOUND sub-bottom profiler acts as a low-frequency sediment echo-sounder and as high-frequency narrow-beam sounder to determine the water depth. The sub-bottom profiler is based on the parametric effect, which is produced by additional frequencies through nonlinear acoustic interaction of finite amplitude waves. In principle, if two sound waves of similar frequencies (18 kHz and e.g. 22 kHz) are emitted simultaneously, a signal of the difference frequency (e.g. Secondary Low Frequency of 4 kHz) is generated for sufficiently high primary amplitudes. This new component is traveling within the emission cone of the original high frequency waves, which are limited to an angle of only 4.5° for the equipment used (Fig. 5.4). The resulting footprint size of only 7% of the water depth is much smaller than for conventional systems and both vertical and lateral resolution is significantly improved.

The ATLAS PARASOUND system is permanently installed on R/V SONNE. The hull-mounted transducer array has 128 elements within an area of 1 m2. It requires up to 70 kW of electric power due to the low degree of efficiency of the parametric effect. The PARASOUND sub-bottom profiler on R/V SONNE is equipped with the digital data acquisition software from ATLAS Hydrographic, which is subdivided in ATLAS Parastore and ATLAS Hydromap Control. ATLAS Parastore allows the buffering, transfer and storage as well as the visualization of the digital echograms at very high repetition rates. ATLAS Hydromap Control is responsible for user defined modifications of the system (e.g. pulse rate or mode) and supports the operator in running the system properly.

PARASOUND data have been recorded during most bathymetric surveys on SO307 which covered more or less plain ocean floor and on all transits. The data acquisition included PHF and SLF data. All data have been copied on an external hard disk and sorted by the operator into folders according to data type (PHF, SLF / ASD, PS3, SEGY). The entire PARASOUND data set will be transferred to international data banks and may be used by specialists for further shore-based processing and analyses.

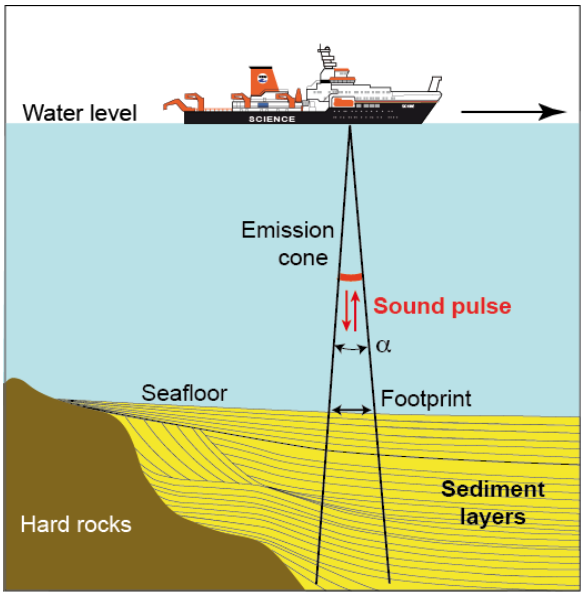


Fig. 5.4 Schematic sketch illustrating the principal mode of operation of sub-bottom profilers. The extremely narrowed beam of the ATLAS PARASOUND system of 4.5° (α) allows to resolve even small-scale bottom structures and offers a deeper penetration of up to ~200 m into the seafloor.

5.1.2 Preliminary Results Bathymetry and Subbottom Profiling

a) Multibeam echosounder

A total of 7,700 km of multibeam echosounder profile data were acquired during SO307 (Fig. 5.5). The data are generally of good quality.

b) Sediment echo-sounding

The PARASOUND P70 shows overall good penetration into the subsurface, except for areas where coarse-grained sediments, bedrock, or steep slopes scatter the transmitted energy and distort the proper imaging of the subsurface. Overall, a little less then 7,700 km PARASOUND profiles have been acquired during SO307. These data provided useful information to identify sediment covered areas as opposed to exposed hard-ground sea floor surfaces, which was important for selecting the MUC sampling sites.

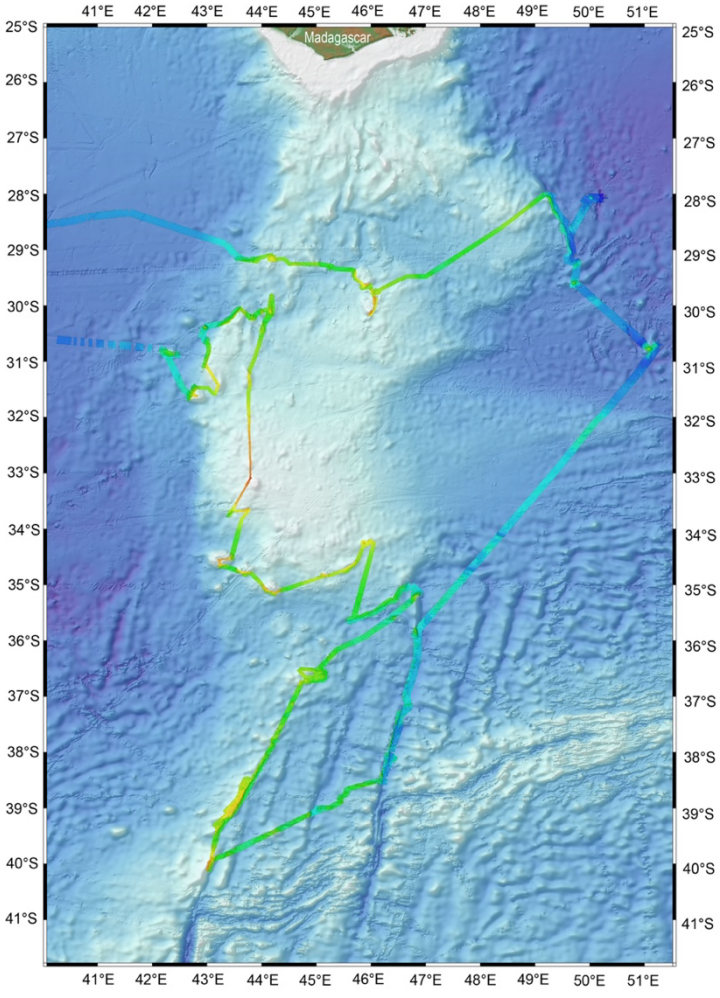


Fig. 5.5 Multibeam bathymetric data obtained by the ship's EM122 system during SO307 plotted above the Gebco satellite altimetry data.

5.2 Dredging

5.2.1 Methods, Shipboard Procedure and Shore-based Analyses

(J. Geldmacher)

Fig. 5.6 Deployment of a GEOMAR chain bag dredge during SO307. Photo: J.G.

The search for potential dredge sites was guided by predicted bathymetry and our own multibeam mapping (see Chapter 5.1) Final positioning of the vessel at each dredge station also included considerations of wind, swell and drift conditions. During SO307, conducted at relatively high southern latitudes and in the southern spring, the often strong winds and high swell limited our flexibility in dredge track directions, particular in the southern part of the working area (near 40°S) and when storm fronts passing through. 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 to avoid thick sediment cover.

Rock sampling on cruise SO307 was carried out using rectangular chain bag dredges (Fig. 5.6). Chain bag dredges are essentially large buckets with a chain bag attached to their bottom and steel teeth at their openings, which are dragged along the ideally sediment-free ocean floor by the ship's winch.

If volcanic rocks (or other rocks which appeared worthwhile sampling) were obtained, they were sorted and selected for further processing. First, these 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 volcanic samples have an unaltered groundmass, empty vesicles, glassy rims (ideally), and -if applicable- well-preserved phenocrysts. If suitable samples are present, the ship moved to the next station. If they were not, then the importance of obtaining samples from the respective site was weighed against the required time commitment for repeating a dredge haul.

Fresh blocks of representative (igneous) 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 volcanic glass (if present). Each of these sub-samples,

together with any remaining bulk sample, was described, labelled, photographed, and finally sealed in plastic bags for transportation to GEOMAR.

Igneous rocks sampled during SO307 will be analysed post-cruise 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 source(s) and thus serve as tracers to identify mantle domains and possible crustal contamination (e.g., related to the breakup of Gondwana). Morphological and volcanological studies will constrain eruption processes, eruption environment and evolution of the volcanic structures

Representative non-magmatic rocks i.e., Mn- or carbonate crusts or limestone samples from carbonate platform were also collected and can be transferred to co-operating specialists for further shore-based analyses.

5.2.2 Preliminary Results Dredging

(J. Geldmacher, M. Portnyagin, J. Schenk, M. Andrade, A. Conventz, P. Davidson, J. Finke, K. Krohne, J. Lang, P. Madrigal, D. Maicher, N. Parameswaran, C. Timm, A. Völkert)

Madagascar Ridge and associated seamount structures along its edges

The dredging program covered most parts of the Madagascar Ridge. Because of the lack of steep slopes suitable for dredging, however, the central part of the ridge is underrepresented. Since the Republic of Madagascar did not grant us permission to work in their EEZ, we could only work south of c. 28°S. In total, 77 dredge hauls were carried out between 28°S and c. 36°S, covering all sides of the main Madagascar Ridge and associated seamounts near its flanks. Of these, 40 returned volcanic rocks (Fig. 5.7).

Almost all samples appear to be of basaltic composition with many of them identified as fragments of pillow lava. At some sites, multiple lithologies could be distinguished. In general, no obvious stratigraphic (e.g., if we get a certain type always from the upper/lower slope of any given

edifice) or spatial (e.g., eastern versus western rim of Madagascar Ridge etc.) systematics was recognized. Locally, however, we do see such relationships.

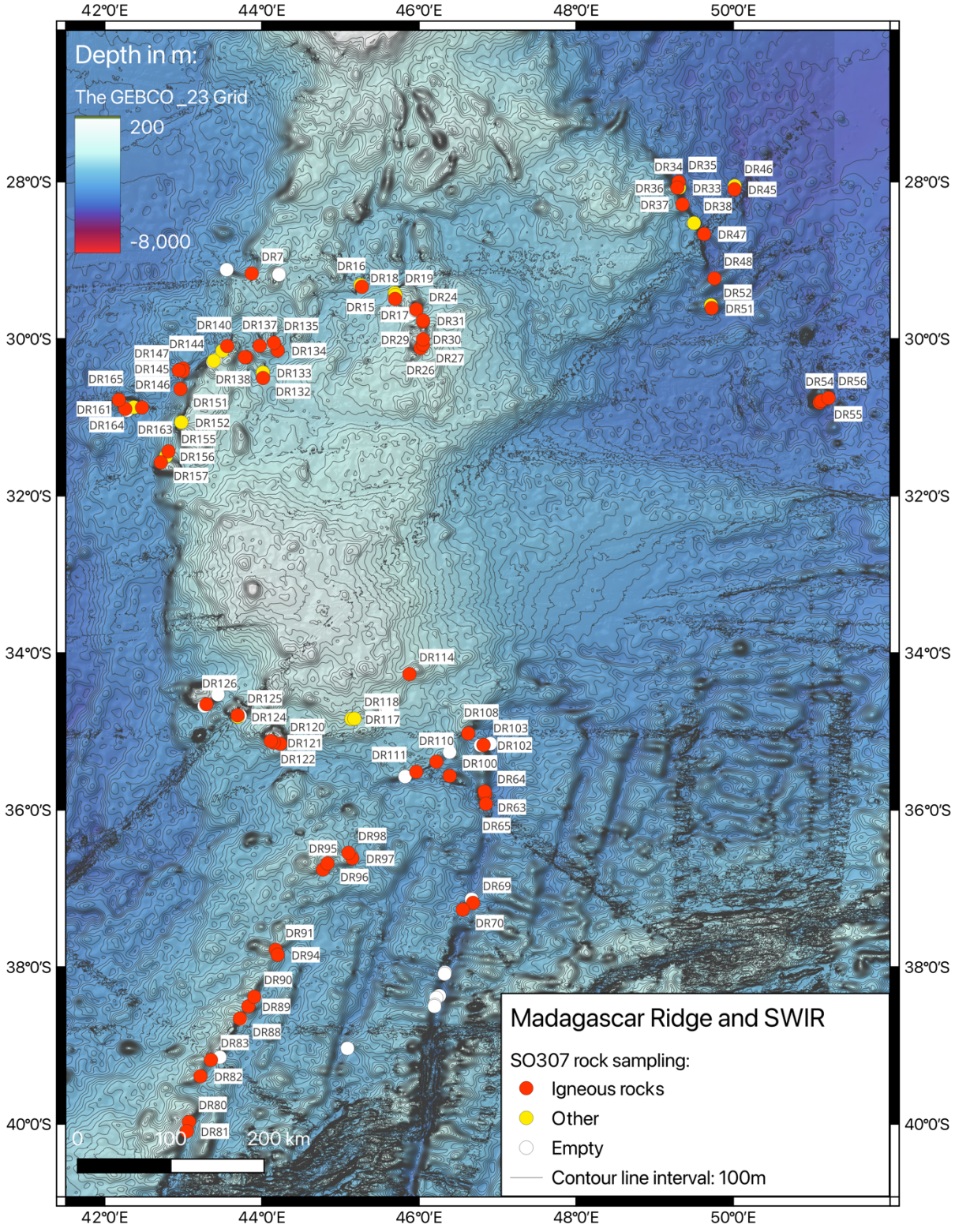


Fig.5.7 Location and recovery of all dredge stations carried out during SO307.

For example, this is documented at the two large, neighbouring guyot-like seamounts (with about 30-40 km wide plateaus) that dominate the northern part of our working area. Dredge haul DR 18 at the lower eastern flank of the northern guyot recovered several well-preserved volcanic rocks that can be grouped into massive, olivine-phyric lava (olivine replaced by secondary minerals) and highly vesicular aphyric lava. It can be speculated if these two groups represent an earlier tholeiitic shield stage and a later, more alkalic (and stratigraphically upper) stage of this large seamount. An additional dredge haul conducted at the uppermost flank of this seamount (DR19), at the very edge of the summit plateau recovered only one piece of carbonate crust (including small volcanic clasts), indicating that these guyots might be covered by a thick carbonate platform that formed when their summits were near the sea surface. Although these two guyots possess relatively flat plateaus, each of them has a conical peak in their southeastern parts, which could indicate a possible late submarine phase of volcanism, built up after the summit plateaus had already sunk well below sea level. Dredge hauls DR26 to DR29 were successfully conducted near these edifices and returned olivine-phyric pillow basalts and plagioclase-phyric lava fragments.

Another example was found at the northeastern edge of the Madagascar Ridge. Dredge hauls DR33 to DR38 were conducted along its slope between 27°50’S and 28°30’S at different depth (stratigraphic?) levels. Most of them returned suitable igneous rocks (sometimes in large quantities) except for dredge hauls conducted at the lowermost foot of the steep slope (which presumably should represent the oldest phase of the plateau volcanism). DR36 was carried out at the upper part of the slope in 3300 to 3000 m water depth near its transition to the summit plateau. The haul returned olivine-phyric lavas with variable groundmass grain sizes (olivine replaced by secondary phases) and plagioclase-phyric lavas with microcrystalline but oxidized matrix. These latter rocks possess various amounts of vesicles and one could speculate if these represent subaerial lava flows. The dredge haul also delivered volcanoclastic sediments with the shapes of the fragments indicating a pyroclastic origin, which would support a subaerial or shallow marine eruption scenario. Also in the haul were light-coloured carbonate crusts presumably collected from the top of the plateau. These crusts contain fragments of *Inoceramus* shells (Fig. 5.8). Because this bivalve genus went extinct at the end of the Cretaceous, the volcanic layers lying beneath must be more than 65 million years old, consistent with the postulated Late Cretaceous age (c. 80 Ma) for the main phase of the northern Madagascar Ridge plateau volcanism (Zhang et al., 2011). Additional dredge hauls carried out further south of this margin returned many well-preserved,

mainly plagioclase-phyric lavas, including hyaloclastics with abundant fresh volcanic glass (DR47, 48, 51, 52).

A petrological peculiarity was recovered from the southern rim of the Madagascar Ridge. There, a cluster of four large guyot-like seamounts which are located in front of the southwestern corner of the plateau slope. Three dredge hauls were conducted that all delivered igneous rocks (DR120, 121, 122). The rocks of DR121, however, appear to be metamorphic and composed of needle-shaped grey-green minerals (actinolite and chlorite?) which show an oriented texture. All rocks bear up to 5 mm Fe-Mn-coating and can therefore not represent ice-rafted debris (see below). This material encloses rounded (absorbed?) volcanic fragments, which could be of basaltic or andesitic composition. The fragments are only slightly altered and slightly vesicular with phenocrysts that were identified as green hornblende (up to 5%) and oxidized olivine (1%). Such a mineral assemblages is very uncommon for oceanic rocks but rather known from arc rocks where the magma source is volatile- (water) rich to form amphiboles even at primitive magma composition (as indicated by the presence of olivine phenocrysts). Material of this type was only encountered at DR121 during this expedition, with all four recovered rock pieces of this dredge being exclusively composed of this type.

Fig. 5.8 Calcareous sediment recovered by DR36 containing fossil shell fragments (white rectangles) of the extinct bivalve genus Inoceramus.

Our ambition to get volcanic rocks suitable for geochemistry and possible dating from the lower layers of the Madagascar Ridge and particular at its northern part, the region of alleged initiation of plateau formation that would represent the oldest stage of volcanism, was achieved. Good samples were recovered from the deepest level of the northeastern edge of the Madagascar Ridge, (DR 35, 37, 47, in 3600 to 4300 mbsl). Obtained rocks from DR47 (4320 mbsl) include fairly fresh plagioclase-phyric lavas, aphyric pillow lava fragments with a well-preserved matrix and fresh glass rims as well as abundant volcaniclastic breccias (hyaloclastite) also containing

fresh glass fragments. On the western side of the plateau, we achieved only one successful dredge haul in a comparable deep and northern setting, DR151 (3541 mbsl), but it retrieved moderately-altered plagioclase-olivine-phyric pillow basalts with plagioclase in the matrix that appears suitable for Ar/Ar dating.

Isolated seamount at 51°E in the Madagascar Basin

This unnamed seamount rises up to 2270 m from the >5200 m deep sea plain of the Madagascar Basin roughly 120 nm east of the MR border (Fig. 5.7). The seamount appears to be formed by several coalesced edifices. The three successful dredge hauls carried out at its southern flank (DR54, DR55 and DR56) returned a large number of moderately altered pillow basalts and volcaniclastic breccias. Some of these breccias are hyaloclastites composed of quenched margins of pillow basalt containing still abundant fresh volcanic glass. The lava rocks can be divided in two lithologies: slightly plagioclase-phyric and olivine-plagioclase-phyric. Sample DR56-7 is described as tuffaceus.

Discovery-Indomed segment

The wide area between the Madagascar Ridge and the SWIR that is bounded by the Discovery and the Indomed fracture zones (DI segment) was a particular target of this expedition to test if the seafloor basement is made up of mantle rocks as implied by the frequent occurrence of (serpentinized) peridotite and the rareness of magmatic crust along the spreading center axis at this segment (Zhou and Dick, 2013). Because of the vertical offset at the fracture zones walls and their steep slopes (preventing significant sedimentary overburden) different levels of the oceanic crust should be well exposed. Therefore, dredging focused on the steeper western walls of the respective fracture zones.

Along the Indomed fracture zone, dredge hauls were conducted between 35°10’ and 38°30’S latitude (over a distance of 370 km) corresponding to a crustal age of approximately 65 to 20 Ma (Zhang et al., 2011). Despite suitable steep slopes (often >35°) only six out of 16 dredge hauls returned igneous rocks (DR63, DR64, DR65, DR69, DR70, DR100, DR103). Most recovered rocks are fragments of ol-plag-phyric or ol-phyric pillow basalts (with all olivine completely altered though). Many of them display chilled margins partly with preserved fresh volcanic glass. Dredge hauls DR63 conducted near the northern end of the Indomed fracture zone yielded rocks that were tentatively described as metabasalts that experienced green-shist facies conditions. The next haul carried out just 2 nm to the south delivered exclusively basalts with coarse-grained,

doleritic texture. Therefore, the material of these two hauls most likely represents rocks from the extrusive/intrusive transition of the deeper parts of the oceanic crust ("sheeted dike complex").

To the west, 18 dredge sites can be clearly associated with the Discovery fracture zone (Fig. 5.7). Here, dredge hauls were conducted between 35°10'S and 40°05'S (over a distance of 410 km) corresponding to a crustal age of 60 to 10 Ma (Zhang et al., 2011). Most of the hauls were carried out at its steep western flank (DR63 to DR65, DR80 to DR94) and 12 of those delivered igneous rocks. Many of these are fragments of pillow basalts composed of olivine-plagioclase-phyric or olivine-phyric lavas partly possessing glassy rims. At DR82 massive, apparently intrusive dolorites but also clearly extrusive pillow basalts were recovered by a single dredge haul. These results confirm the expected vertical displacements along the fracture zone resulting in exposure of both layer 2 (extrusive layer, made up of sheet flows and pillow lavas) and layer 3 ("sheeted dikes" composed of dolerites) of oceanic crust according to the classical Penrose model (Penrose Conference Participants, 1972).

At 36°40'S we discovered a cluster of volcanic edifices that apparently sit at the intersection of the SSW-NNE-trending Discovery fracture zone and the E-W trending abyssal hill fabric of the SWIR (Fig. 5.9). Several larger volcanic edifices are surrounded by smaller satellite cones. Four dredge hauls were carried out in this area (DR95 to DR98, see white markers in Fig.) and volcanic rocks were recovered from all of them. DR95 returned volcaniclastic breccia and volcanic lavas that are olivine-clinopyroxene-phyric and highly vesicular, resembling alkali basalts. DR97 returned pillow basalt fragments with fresh volcanic glass and at DR98 plagioclase-phyric volcanic clasts were found inside volcanoclastic sediments. The dredge track DR96 at a pancake-shaped edifice dominating the western part of the cluster sampled the shallowest depth level (from 2000 to 1900 m water depth) and delivered well-rounded volcanic boulders, cemented by limestone and Fe-Mn crusts. Such boulders can be formed by wave erosion in shallow water and in the beach area and could indicate that this knoll once formed an island, which erosion products can now be found in the former shallow shore area.

It is important to emphasize that none of our dredge hauls recovered any mantle rocks (peridotite or its hydrated product serpentinite) even at the southernmost dredge sites of DR80 and DR81that are located in only 100 km distance from the SWIR ridge axis at 43°E, an area where Zhou and Dick (2013) reported a particular dominance of peridotitic mantle rocks along the neovolcanic zone and along the transform fault at 42°30'S. The hypothesis that the bathymetric

heigh north of the SWIR and perhaps even large parts of the Madagascar Ridge is largely formed by buoyant mantle rock is therefore not supported by our dredge results.

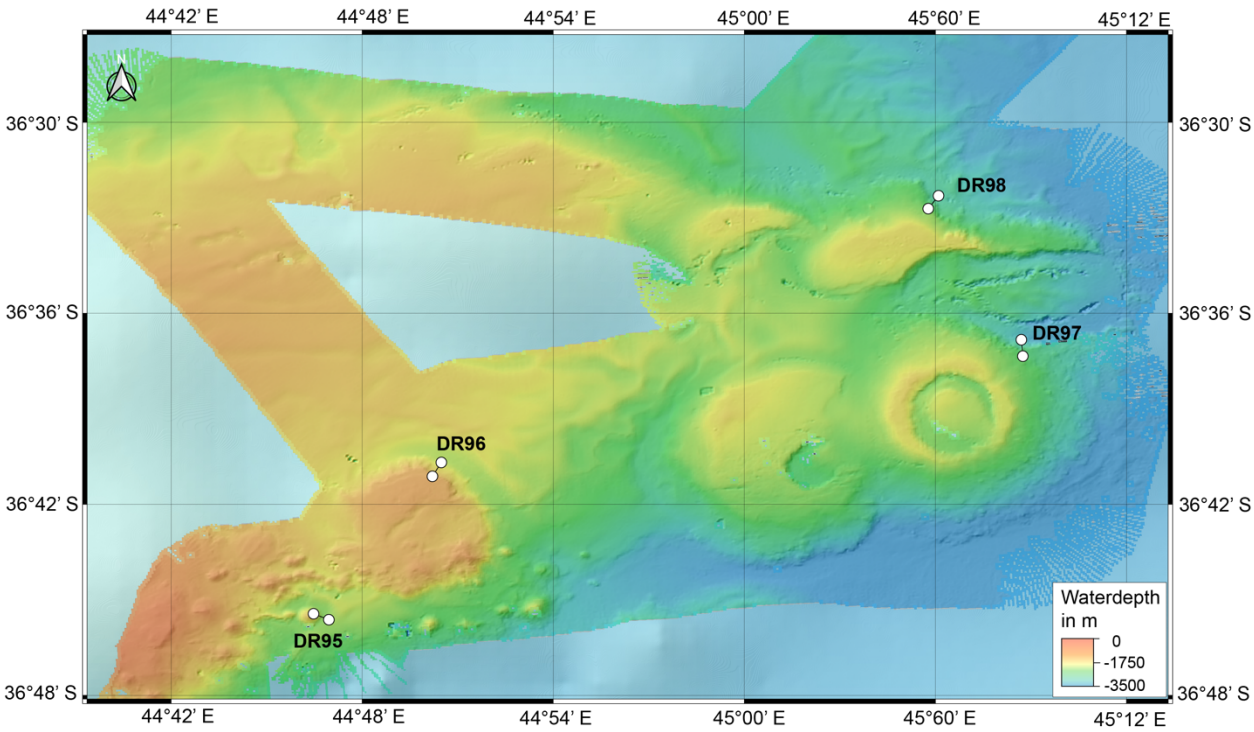


Fig. 5.9 Bathymetric map of a group of volcanic cones in 2 to 3 km water depth in the transition area from the Discovery fracture zone (in the southwest) to the Madagascar Ridge (just north of the map section), created with the ship's multibeam echo sounder. The cones at the right edge of the image show clear depressions (craters or calderas) at the summit (diameter of the craters is 2 km (left cone) and 3.4 km (right cone)). The small white dots mark the start and end points of the dredge hauls DR95 to DR98.

It is further noteworthy that even in this southernmost part of the working area no obvious ice-rafted debris ("dropstones") were recognized in our dredge yields although modelled icebergs trajectories for the late glacial maximum and even for pre-industrial times reach up to 35°S in the working area (Starr et al., 2021).

5.3 Biological Oceanography

(B. Pontiller, J. Karnatz, D. Pöhnl, C. Winguth, N. Koberwein, R. Flerus, T. Klüver, A. Engel (not on board))

5.3.1 Methods, Shipboard Procedure and Shore-based Analyses

CTD-System

During SO307, a total of 15 CTD stations and 34 vertical profiles (casts) of conductivity (C), temperature (T), pressure (P), and oxygen (O) were recorded. In addition, a chlorophyll/turbidity sensor, a photosynthetically active radiation sensor (PAR), and an altimeter system were attached to the CTD frame, the latter was used for measuring the bottom distance. Furthermore, an underwater vision profiler (UVP) was mounted on the CTD frame. The CTD profiles ranged from the surface to 5,000 m depth. We used the ship's CTD system attached to the water sampler rosette and SBE Seasave software (version: 7.26.1.8) for processing the CTD data. The CTD/Rosette water sampler was operated with the same sensor configuration as outlined in Appendix Table 10.2 throughout the entire duration of the expedition. The accuracy of the conductivity, temperature, and oxygen sensor readings was monitored by taking the difference between the values of the primary and secondary sensors (secondary minus primary). The CTD system and the UVP performed without major problems (see summary of sampling stations in Appendix Table 10.3).

Discrete Seawater Sampling with the CTD Rosette

A diverse suite of discrete water samples was collected during the cruise from vertical CTD/RO casts for later analysis on shore. Chemical and biological parameters associated with organic matter composition and microbial activity were sampled to investigate the processes affecting organic matter turnover in the deep Indian Ocean (Fig. 5.10).

At each CTD/RO station, water samples were collected for: (i) organic matter analysis including total and dissolved organic carbon (T/DOC), total dissolved nitrogen (TDN), total and dissolved combined carbohydrates (T/DCCHO), total and dissolved amino acids (T/DHAA), and colored and fluorescent dissolved organic matter (CDOM/fDOM); (ii) particulate organic matter components, such as transparent exopolymer particles (TEP) and Coomassie stainable particles (CSP) following the procedures described in Alldredge et al. (1993) and Long and Azam (1996); (iii) chlorophyll *a* and lipid compositions; (iv) microbiome structure and function using 16S rRNA gene amplicon sequencing, metagenomics, and metatranscriptomics; (v) analysis of the

abundance, distribution, and community structure of pico- and nano phytoplankton as well as bacteria and viruses using flow cytometry; (vi) microbial process rates including heterotrophic biomass production and extracellular enzymatic activity measurements. Additionally, dissolved inorganic nutrient samples were taken. For each station, we collected samples for all organic matter and microbiological parameters, as well as for flow cytometry and inorganic nutrients, depending on the water column depth, between five to ten depths, covering the entire water column (Table 10.3).

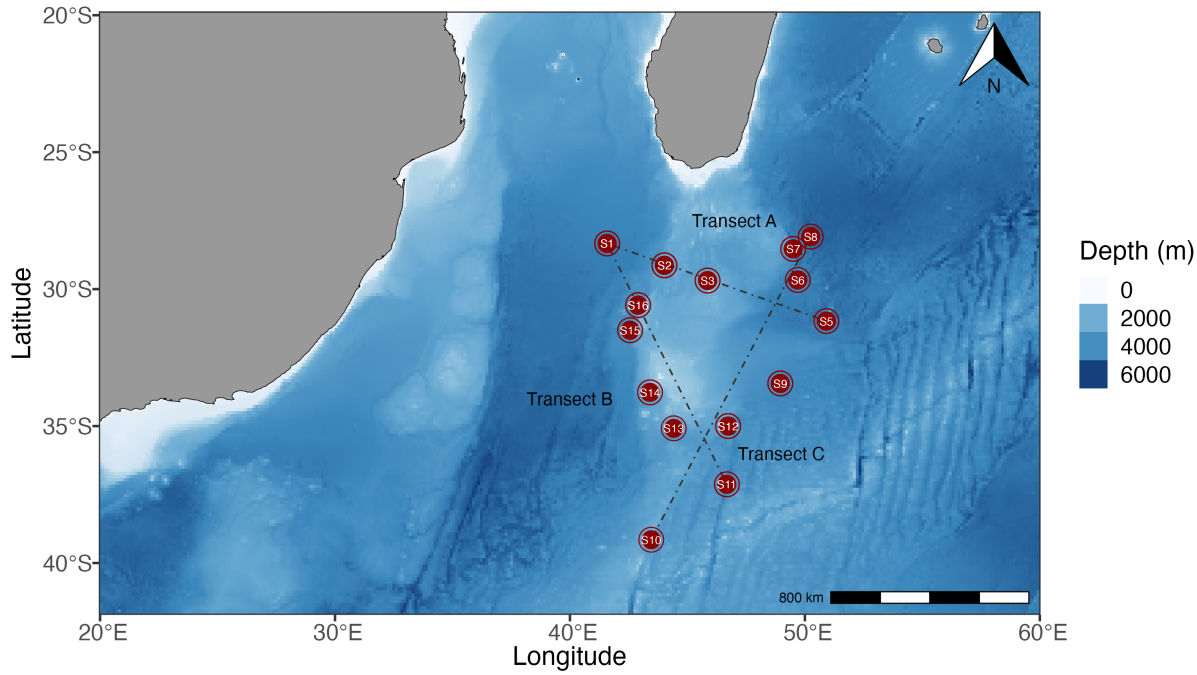


Figure 5.10 Overview of CTD/RO deployments during SO307 (with internal station numbers) and transects A, B, and C (dashed lines) used for cross-section plots in Section 5.3.2 and location of stations from where samples for biological and microbiological analyses were collected. For a detailed list of the individual CTD/RO deployments see Appendix Table 10.3.

All organic matter, and flow cytometry samples were shipped cooled or frozen to the home laboratory for further analysis at GEOMAR, while microbial process rates and extracellular enzymatic activity were measured on board. To determine microbial heterotrophic biomass production, we conducted the tritium-leucine incubation method (Kirchman et al. 1985, Smith and Azam 1992). Extracellular enzymatic activity of the bulk microbial community was measured using fluorogenic substrate analogues, to determine the hydrolysis rates of five different enzymes, including alpha- and beta-glucosidase, N-acetyl-β-d-glucosaminidase, leucine aminopeptidase, and alkaline phosphatase, according to Hoppe (1983) as described in Baltar et al. (2016) and Riemann et al. (2002).

Optical Observations with an Underwater vision profiler (UVP5)

An Underwater Vision Profiler UVP5 (Picheral et al. 2010) was used to study the composition and distribution of plankton and marine particles (e.g., marine snow aggregates). The UVP was mounted to the CTD/RO to take images during every CTD/RO cast. The UVP5 system uses computerized optical technology with custom lighting to acquire digital images in situ to a maximum depth of 6000 m. The camera captures images (greyscale) of plankton particles within a size spectrum from a few µm to several cm (Fig. 5.11). The UVP5 data (particle abundance binned in different size classes as well as image data) will be aligned to calibrated CTD/RO profiles and stored and sorted into taxonomic categories using Ecotaxa (https://ecotaxa.obs-vlfr.fr/).

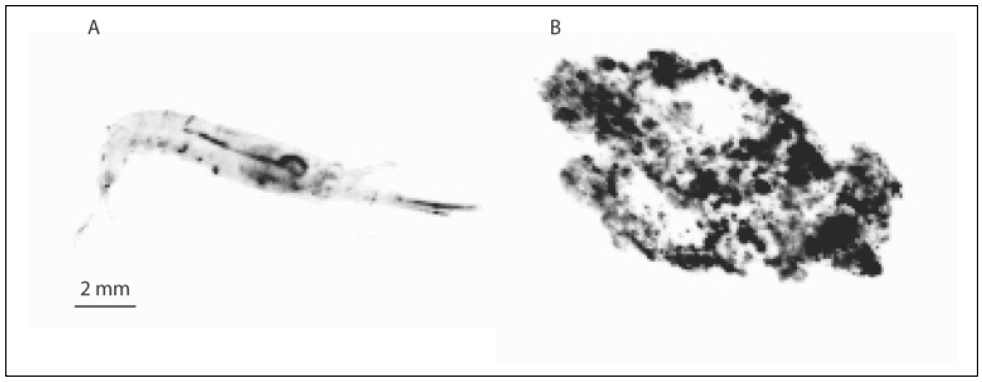


Fig. 5.11 Example of plankton (A) and marine snow (B), images taken with the UVP5 during SO307.

Onboard Incubation Experiments with Deep-Sea Bacteria

Particulate organic matter has been identified as a major source of reactive substances for deep-sea microbial communities. However, most studies only analyze solid particles and aggregates made in the laboratory from pure cultures, while the role of carbon-rich marine gels reaching the meso- and the bathypelagic ocean is rather unknown. Therefore, we carried out onboard experiments, to test the potential of gel particles generated from naturally occurring dissolved organic matter to stimulate heterotrophic bacterial activity in the deep ocean. We artificially generated gel particles by adding alginic acid as a binding agent to dissolved organic matter concentrated from surface waters (~ 300 L) obtained via ultrafiltration (details below). Gel formation was confirmed via light microscopy. Thereafter, concentrated gels were resuspended in deep-ocean water (2,000 m depth, most likely Antarctic Intermediate Water and North Atlantic Deep Water – AAIW + NADW) to study the response of deep-sea bacterial communities to the organic matter supply derived from

gels (HMW-DOM + alginic acid). In total, ~1 m^3 deep sea water (2,000 m depth) was collected for these experiments. Samples for the composition of dissolved organic matter, the activity of microbes, nutrients as well as gel particle concentrations (see above for types of analysis) were collected at the start of the experiment and thereafter every second day (except the last time point which was incubated for another two weeks, in total ten sampling points) from duplicate 1 L serum glass bottles.

Additionally, the same experiment was set up in triplicate 20 L Politainers, for a detailed assessment of microbiological parameters such as community composition (16S rRNA gene), metagenomics, and metatranscriptomics. Besides detailed quantification of gel concentration (i.e., TEP and CSP), samples for lipidomics and for visualization and quantification of bacterial cells attached to gel particles after staining with fluorescent probes were collected for confocal laser scanning microscopy (CLSM). Due to the large water volume requirement of these parameters, samples were taken at three sampling points (at the start of the experiment, after four days, and after nine days). Both experiments (1 L serum bottles and 20 L Politainers) were incubated at in situ temperature (~ 2.5 °C) and at ~ 6.5 °C in the ship's climate labs to determine the effect of ocean warming on P/DOM turnover. The temperature in both labs was regularly measured and documented.

A third experiment, also with water from 2,000 m depth and the same HMW-DOM stock as used previously, was conducted to test the effect of different gel particle concentrations (i.e., 10, 100, and 500 µg L^{-1} alginic acid + HMW-DOM concentrate) on the activity of deep-sea microbes. This experiment simulated different export fluxes of POM/TEP to the deep sea and was carried out in duplicate 1L serum bottles incubated at in situ temperature (2.5 °C). Samples were taken for the same parameters as mentioned above at the start of the experiment, after four and seven days.

All incubation experiments with assembled gel particles were finished during the expedition SO307.

Collection of water for additional enrichment experiments with dissolved organic matter at GEOMAR

Water from the surface (collected with the ship's surface water intake system and membrane pump) and deep-sea water (collected with the CTD/RO) were used for experimental studies on board and additional experiments at GEOMAR, respectively. From the respective water source, dissolved organic macromolecules were concentrated in <0.2 µm pre-filtered (Sartobran P Midicaps, 0.45 + 0.2 µm, Satorius) seawater by ultrafiltration (Centramate LV holder and cassettes, Pall Life Science). The ultrafiltration technique separates compounds according to their molecular weight through a semipermeable membrane. Five cassettes were used with a molecular weight cut-off of 1 kDa (Centramate Cassette, Pall Life Science). Solutes of higher molecular weight are retained in the retentate, while lower molecular weight solutes pass through the cassettes in the permeate. After enrichment of the organic compounds (< 0.2 µm, > 1 kDa), viruses were removed from the retentate using a second filtration step through two 30 kDa cassettes (Centramate Cassette, Pall Life Science), and the permeate (< 30 kDa, > 1 kDa) was incubated in pre-filtered (Sartopure PP3, MidiCap, 3 µm, Satorius) deep-ocean water from 2000 m depth, collected with the CTD/RO containing the natural bacterial communities.

In addition, the two sources of HMW-DOM enrichments (concentrate of surface water and deep water) together with 1.2 m^3 of deep-sea water were shipped frozen (-20 °C) and cooled (4 °C) to GEOMAR, respectively. With these HMW-DOM experiments, we will investigate the effect of source, lability, composition, and concentration of organic matter on microbial processes relevant to organic matter turnover in the deep ocean. In particular, we will run long-term experiments to test whether the dilute concentrations of organic compounds in deep waters hamper the bacterial consumption of molecules that would be reactive when present in higher concentrations. The setup of the experiment will also test the impact of the source of organic matter (i.e., surface versus deep ocean) and temperature on the ability of the deep-ocean bacterial community to degrade organic matter.

Underway measurements

During SO307, continuous oceanographic underway measurements were recorded using a Thermosalinograph (TSG). In addition, discrete water samples were taken almost daily between 24.09.2024 and 24.10.2024 (in total 24 samples) from the keel water inlet for subsequent analysis at GEOMAR to validate the TSG data.

5.3.2 Preliminary Results Biological Oceanography

CTD

The CTD casts sampled the different water masses in the southwestern Indian Ocean at and around the Madagascar ridge (Fig. 5.10). The main water masses in the study area are the Subtropical Surface Water (SSW) in the upper water column, the Subantarctic Mode Water (SAMW) between 500 m and 1,000 m depth, the Antarctic Intermediate Water (AAIW) between 1,000 m and 2,000 m depth, and the North Atlantic Deep Water (NADW) below 2,000 m depth.

Transect A

Chlorophyll *a* (Chl-*a*) fluorescence, here considered a proxy for phytoplankton biomass, showed pronounced variability along the transect A (Fig. 5.10 and Fig. 5.12.A), ranging from S1 (28° 20,000' S and 041° 35,004' E) to S5 (31° 10,078' S and 050° 54,956' E). In the upper 100 m of the water column, Chl-*a* ranged between 0.3 and 1.4 mg m^{-3}, peaking at station S2 at ~35 m depth (~44°E). Maximum near-surface temperatures ranged between 16.4 °C and 23.4°C, decreasing to ~2.6°C at 2000 m depth (Fig. 5.12.B). Salinity peaked at 35.64 in the surface and reached a minimum of 34.67 at depth (Fig. 5.12.C). Oxygen concentrations decreased with depth, ranging from 6.6 to 7.7 mg L^{-1} in the surface to 5.5 mg L^{-1} at 2,000 m depth (Fig. 5.12.A and D).

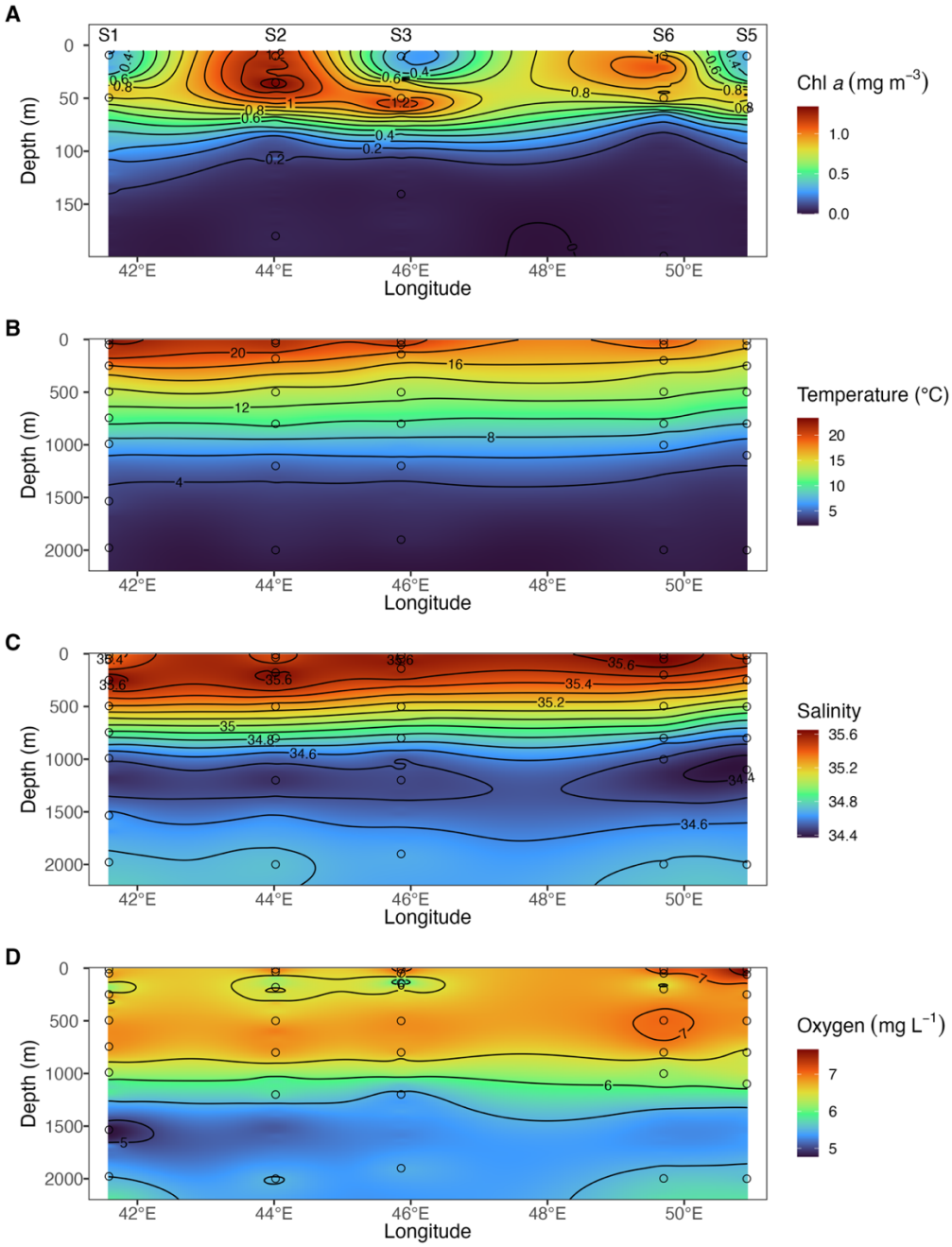


Fig. 5.12 Longitudinal cross-section plot showing the hydrographic properties of the water column down to 2,000 m depth along transect A: (A) chlorophyll a, (B) temperature, (C) salinity, and (D) oxygen. The depths where discrete water samples were collected are indicated with circles. Station names are shown above panel A. Note the different y-axis ranges for chlorophyll a. An overview of all sampled CTD stations is shown in Fig. 5.10).

Transect C

Transect C started at S8 (28° 04,941' S and 050° 14,909' E) in southwestern direction ending at the southernmost station S10 (39° 08,982' S and 043° 27,631' E). Chlorophyll *a* (Chl-*a*) fluorescence showed pronounced variability along the north-south transect C (Fig. 5.13.A),

ranging between 0.13 and 2.1 mg m^{-3} with a peak at 13 m depth at the southernmost station (S10). Overall, the highest Chl-*a* values were measured above 50 m depth, except at station S12 where relatively high values (~ 1 mg m^{-3}) down to 100 m depth were observed (Fig. 5.13.A). The near-surface temperature continuously decreased southward from 20.4 °C to 10.7 °C at S10 (Fig. 5.13.B). While salinity remained rather stable (~35.59), we noticed a pronounced drop in salinity to 34.37 at S10 and an altered halocline (Fig. 5.13.C) in conjunction with and 1.2-fold increase of oxygen concentrations peaking at 8.9 mg L^{-1} at the surface (Fig. 5.13.D). These observations indicate the influence of a different water mass (most likely AAIW) at the southernmost station S10 (~40°S).

Transect B

Along the transect B, ranging from S11 (37° 07,661' S and 046° 40,798' E) in northwestern direction ending at S1 (28° 20,000' S and 041° 35,004' E), Chl-*a* peaks were observed at S16, S13, and S11 (~ 1.2 mg m^{-3}). Interestingly, while the DCM layer along this transect was mostly located at or above 50 m depth, at station S15 the DCM extended down to ~100 m depth reaching ~ 1 mg m^{-3} Chl-*a* (Fig. 5.14.A). The near-surface temperature continuously decreased southward from 23.4 °C to 16.6 °C (Fig. 5.14.B). Salinity remained rather constant in the surface (~ 35.5) and decreased with depth reaching 34.4 at 1200 m depth (Fig. 5.14.C). In general, oxygen levels in the surface increased along the transect from 6.6 mg L^{-1} in the north (S1) to 7.6 mg L^{-1} at the southern station S11, showing and inverse relationship with near-surface temperature (Fig. 5.14.D).

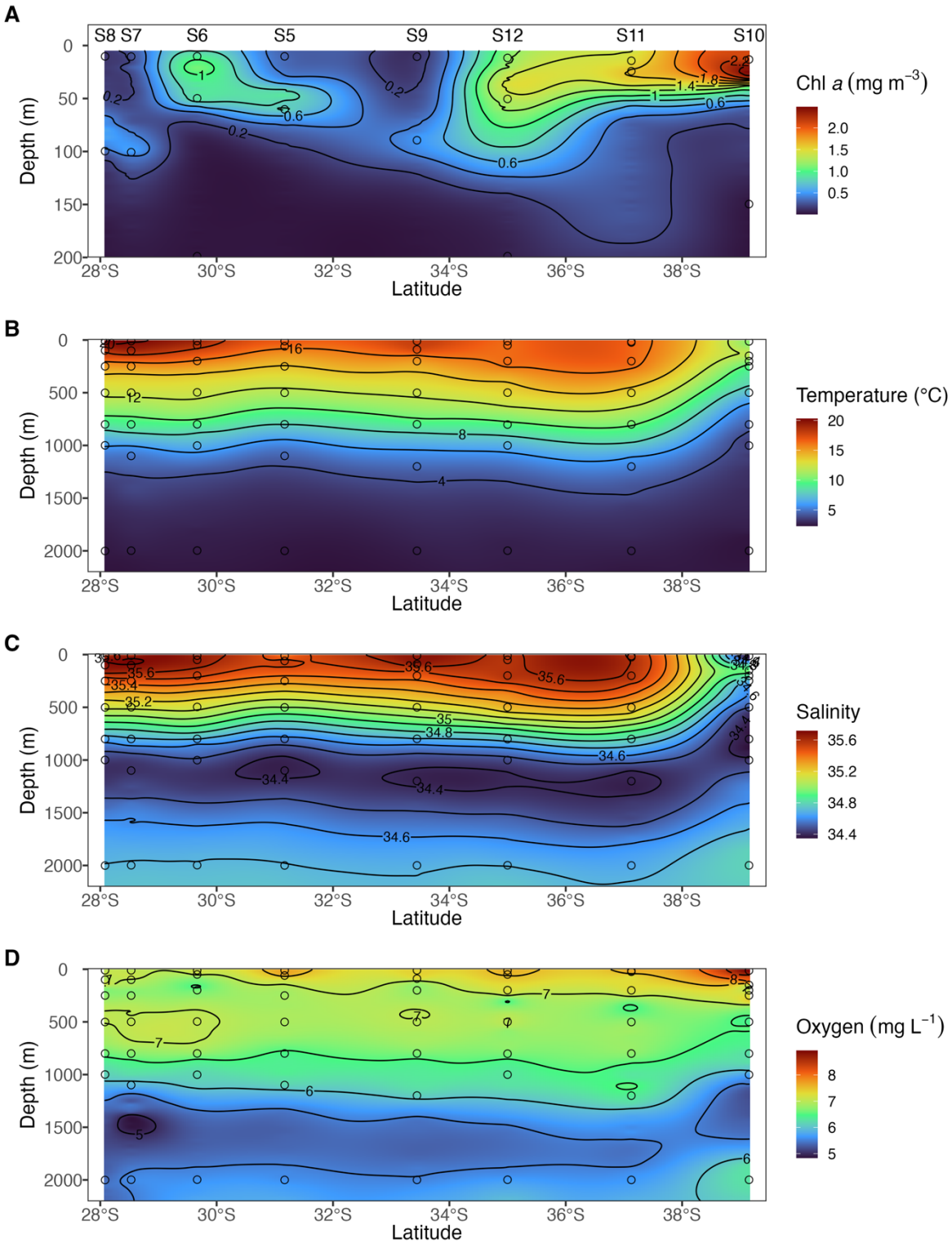


Figure 5.13 A latitudinal cross-section plot showing the hydrographic properties of the water column down to 2000 m depth along transect C: (A) chlorophyll a, (B) temperature, (C) salinity, and (D) oxygen. The depths where discrete water samples were collected are indicated with circles. Station names are shown above panel A. Note the different y-axis ranges for chlorophyll a. An overview of all sampled CTD stations is shown in Fig. 5.10).

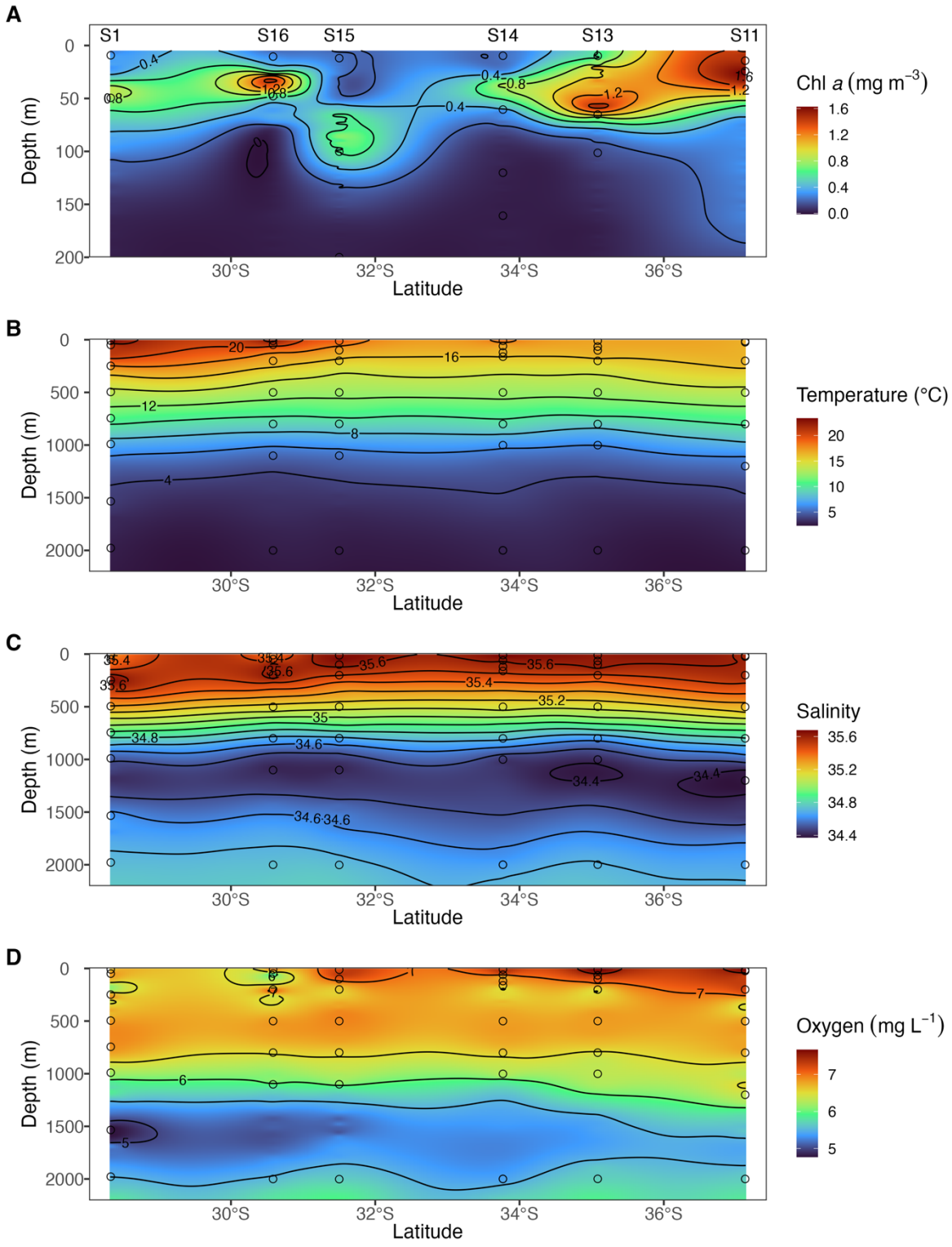


Fig. 5.14 A longitudinal cross-section plot showing the hydrographic properties of the water column down to 2000 m depth along transect B: (A) chlorophyll a, (B) temperature, (C) salinity, and (D) oxygen. The depths where discrete water samples were collected are indicated with circles. Station names are shown above panel A. Note the different y-axis ranges for chlorophyll a. An overview of all sampled CTD stations is shown in Fig.5.10).

Gel particles experiment

Preliminary analysis of bacterial production using tritium-leucine incorporation showed low biomass production, comparable to in situ conditions in controls and gel amendments at the beginning of the experiment. After roughly 4 to 6 days, bacterial growth increased especially in gel treatments at elevated temperatures (G+, 6.5 °C). This was also noticeable in controls at 6.5 °C (C+), while controls and treatments at in situ temperature showed lower bacterial production. At the end of the experiment (after ~ 3 weeks), bacterial production was substantially higher compared to controls in gel-treatments and at elevated temperature (G+) and although less pronounced also higher in gel-treatments at in situ temperature (G). These results indicate that i) deep-sea bacterial communities seem capable of metabolizing gel particles and do not lack the necessary metabolic capabilities, ii) gel-like particles have the potential to stimulate heterotrophic activity in the deep-sea and iii) a temperature increase of ~4 °C had a positive effect on bacterial biomass production and carbon turnover. Ongoing analysis of chemical and (micro)biological parameters will add valuable insight into the role of gel particles, the molecular mechanisms, and the effect of temperature on the turnover of organic matter (DOM and POM) by deep-sea microbes.

5.4 Biology

(*C. Lüter, B. Neuhaus, A. González Casarrubios, L. Dethlefs)*)

5.4.1 Methods, Shipboard Procedure and Shore-based Analyses

Biological material was collected with a geological chain bag dredge and a 12-tube multicorer (for the – intended - collection of macrofaunal animals with a TV grab: see below) (Fig. 5.15).

All boulders and rocks collected with the geological dredge were examined for encrusting benthic invertebrates. Additionally, four sediment trap tubes (length: 21 cm, diameter: 4 cm) were mounted on the dredge to collect disturbed sediment samples from each dredging site. 12 so-called biological stations were identified using maps of predicted bathymetry by Smith and Sandwell (1997) to collect undisturbed sediment samples and the inhabiting meiofaunal community with the MUC. Sampling sites were carefully selected using PARASOUND and EM 122 multibeam profiling to avoid damaging the MUC on hard grounds. The camera of the TV-MUC facilitated surveying its mechanical functionality and gave an overview of the surrounding sea floor. Additionally, the video sequences captured by the TV-MUC during its descent to the seabed allowed for observation of planktonic macrofauna. The footage showed relatively rich planktonic and some benthic communities. All video sequences were recorded using two shipboard LG HDD recorders (colour, with and without labelling) and subsequently transferred to a hard drive for analysis of the sediment structure and the nature of deep-sea plankton and benthos.

Fig. 5.15 a) Charged multi-corer on its way down to the seabed using the small sliding beam (left). b) TV-grab fixed on pallet after revision by SONNE's scientific technical service (right). Photos: C. Lüter.

Meiofauna

Sediment sampled by four sediment trap tubes (length: 21 cm, diameter: 4 cm) inside the geological chain bag dredges and from MUC tubes was fixed immediately at room temperature in 6 % formaldehyde buffered with buffer tablets for haematology (Merck # 1.09468.10100, pH 7.2). Due to shortage in personnel (only four of six persons requested had been approved in the grant), the separation of meiofauna from the sediment by centrifugation had to be postponed to shore-based procedures upon return to Berlin.

Only the upper 5 cm of sediment of each sediment core (inner core diameter: 9.5 cm) of the MUC were preserved. Samples were split into two portions: The sediment of the upper 5 cm layer of all but one core (= 7-11 cores) of each deployment was fixed in 6 % formaldehyde. About 100 g of sediment from the surface of one core were dried on glass petri dishes in an oven at 90 °C for about two days and stored in plastic bags for later analysis of TOC (total organic carbon), TC (total carbon), and grain size.

Back in Berlin, the formaldehyde-preserved sediment will be carefully washed with tap water on a 40 µm-sieve and centrifuged (THERMO Heraeus Multifuge 3s) three times for 5 minutes with three to four times the amount of Levasil 200A/40 % at 4,000 rpm and a tea spoon of Kaolin in order to quantitatively extract the meiofauna. After rinsing with tap water on a 40 µm-sieve, specimens will be stored in 75 % ethanol. The entire MUC haul will be carefully checked for additional macrofaunal organisms buried in deeper layers of the sediment. Meiofaunal organisms will be sorted with a dissecting microscope.

Macrofauna

Macrofauna was quantitatively sampled from rocks dredged by the geology team and, when present, from sediment traps and MUC cores as well. Most samples were immediately fixed in pure ethanol. Large specimens (e. g. corals, actinians, fish) were preserved in 4 % formaldehyde buffered with buffer tablets for haematology (Merck # 1.09468.10100, pH 7.2) with dissected

pieces of them additionally thrown in ethanol for potential molecular analyses. Few specimens (brachiopods) were also fixed in RNAlater for transcriptomic analysis. Since taxa of key interest (brachiopods, echinoderms, and gastropods) were sparse, there was no material fixed in glutaraldehyde or paraformaldehyde for electron or confocal microscopy. After fixation, samples were identified to the lowest possible level, labelled accordingly and separated into vials from 2-1000 ml depending on the size of the specimens. Ethanol-preserved samples were stored at 4 °C in a fridge and will be carried in a reefer container to ensure constant temperatures at 4 °C throughout transportation. All other samples were stored at room temperature. A list of all macrofauna samples collected during the cruise can be found in Appendix Table 10.4.

Gear, site of deployment	# of stations used	# of stations successful	estimated kg of sediment	Notes
TV-grab	0	0	0	delivered TV-grab dysfunctional
Geological dredge			n. a.	for macrofauna on rocks
Sediment traps in geological dredge	116	75	31	for meiofauna in sediment
TV-MUC, via sliding beam	4	3	11	
MUC, via sliding beam	4	3	14	bearing of friction winch (LWL-cable) broke, dredge cable without heave compensation and TV control
MUC, via A-frame	4	0	0	pulley of sliding beam broke, dredge cable without heave compensation and TV control
MUC, via small CTD sliding beam	3	2	9	no TV control, no heave compensation, no transponder because of damaged electronics

Table 5.1 Gear available or intended for biological sampling. Abbreviations: MUC: multicorer; TV-MUC: TV-multicorer.

Limitation of shipboard procedures (see also Chapter 4)

Biological material could only be collected with the geological chain bag dredge and a 12-tube MUC. The originally intended deployment of a TV-grab (borrowed from GEOMAR) at 6 stations had to be cancelled altogether after its initial failure during a “dry test” on deck (Table 5.1) and subsequent analysis by the ship’s scientific technical service (WTD). A thorough investigation unveiled that the hydraulic oil contained water and precipitations, the hydraulic system showed rusted inner metal parts, and the batteries were dysfunctional. Additionally, a barrel of specific hydraulic oil purchased in 2020 did not make it from GEOMAR to the ship.

The MUC with the ship-based telemetry (TV-MUC with 9 tubes) could only be used for the first three hauls via the sliding beam, because of a broken bearing of the friction winch (Table 5.1). Thereafter, it was deployed (with 12 tubes) using the regular working (dredging) cable without signal transmission. The MUC’s position and distance from the bottom was therefore estimated with the help of a ship-based transponder mounted 50 m above the MUC during the first 11 hauls.

After a breakdown of the transponder's electronics, the remaining MUCs had to be deployed without it (Table 5.1). After breakage of the pulley bearing of the sliding beam, operations were shifted to the A-frame at the ship's stern (also for dredging), subsequently resulting in four unsuccessful deployments of the MUC. It was concluded that the considerably higher heave at the stern of the ship (where heave-compensation could not be provided) likely caused a premature release of the MUC's closing mechanism (Table 5.1). For the remaining MUC deployments, the small sliding beam of the CTD was used, but, due to its smaller winch, with restriction to depths not deeper than 1500 m.

5.4.2 Preliminary Results Biology

General Observations and Collecting Report

The benthic invertebrate fauna was dominated by sponges, octocorals and bryozoans. Most specimens were found on manganese crusts or manganese encrusted rocks. Also, the frequently found carbonates from shallower dredges were ideal settling grounds for benthic invertebrates due to their large and irregular surface providing small holes or crevices. In contrast, basaltic rocks (the prime target of the geology team), often have very smooth surfaces, which seem to be unsuitable for sessile invertebrates to settle on. Manganese crusts and carbonates were frequently covered with calcitic tubes of sedentary polychaetes (Serpulidae), but most of them were found empty. Sometimes macrofauna was also found in the sediment traps mounted in the dredges to collect disturbed sediment samples. All pagurid hermit crabs we collected during the cruise were found in these sediment traps. Unfortunately, weather conditions did not allow for dredging in the very shallow waters around the Walter's shoal, a seamount on the southwestern part of the Madagascar Ridge, the top of which rises to only 18 m below water surface. Walter's shoal and its surroundings have been extensively explored by several cruises of R/V Marion Dufresne and yielded a highly diverse invertebrate fauna (e.g., Bouchet et al., 2017, Herbert, 2024). This seamount has also been used as a prime example to discuss the protection of seamounts as biodiversity hotspots in international waters outside of the exclusive economic zones of nations (Marsac et al., 2020). These shallow regions around Walter's shoal and other shallow plateaus on the Madagascar Ridge would have been our prime target for deploying the TV-grab, which unfortunately could not be used during the trip (see above). Without the TV-grab, it was to be expected that the total number of benthic invertebrates collected during the cruise would be rather small. However, we were quite surprised to see that macrofaunal organisms were recovered at 58 out of 131 collecting stations (116 geological dredges, 15 MUCs, CTDs not included); 83 stations revealed sediment samples (75 stations where sediment traps were filled plus 8 out of 15 multicorer deployments) (Fig. 5.16). During the cruise, a total of about 65 kg of sediment was fixed. For a detailed list of the collected taxa and the number of specimens per taxon see Appendix Table 10.4.

Meiofauna

The sediment samples from dredges and MUC cores could not be extracted and sorted on board of R/V SONNE for reasons stated above. Extraction, sorting and identification of meiofaunal organisms from these samples can therefore only happen at the laboratory in Berlin. Thus, at the

time of this report no information is available about the organisms contained in the sediment samples.

Macrofauna

The most abundant group of animals found in the samples were **sponges** (Porifera). Usually, they are of very small size and were mostly found in the nooks and crannies of the manganese encrusted surfaces of dredged rocks. Preliminary identification during specimen sorting revealed two common taxa, hexactinellids (glass sponges) and lithisthids (stony sponges) and many unidentified Demospongia. A particularly interesting group also encountered in some samples are carnivorous cladorhizid sponges of the genus *Asbestopluma*. They passively catch prey (mainly crustaceans) with projections of their slim body. The typical aquiferous system which in other sponges is used for filter feeding is partly or completely reduced in this taxon (Hestetun et al. 2017). The next most obvious group found was **cnidarians** (Cnidaria). Of those, colourful Octocorallia and large black corals (Antipatharia) were the most remarkable specimens. We also dredged a substantial amount of fossil octocoral skeletons, which were not attached to rocks, but were collected by the chain back dredge as coral rubble from the seabed. These coral skeletons proved to be a preferred settling ground for other cnidarian groups, esp. sea anemones (Actiniaria).

Fig. 5.16 The deep sea anemone Phelliactis sp. (upper left). Fossil octocorals providing attachment sites for other invertebrate taxa (upper right). A fragile black coral with bright red polyps (lower left). Colourful pink octocoral, unfortunately broken in the chain bag dredge (lower right). Photos: Phelliactis sp. by B. Neuhaus, all others by C. Lüter.

In one of the first dredges (DR19) we discovered a large specimen of a hormathiid sea anemone of the genus *Phelliactis* (Fig. 5.16). This is an unsusual animal with a large oral disc resembling a venus fly trap when fully extended. The specimen once on board was fully contracted and – after careful examination – identified based on Li & Xu (2016). It was already portrayed in a post on oceanblogs (https://www.oceanblogs.org/so307/2024/10/02/aliens-from-the-deep). At one of the later MUC stations (MUC153) an unusual cnidarian was brought back on board. The metre-long orange tentacles of a giant deep sea siphonophore were found entangled in the MUC frame and were conserved for molecular analysis and subsequent identification (Dunn et al., 2005; Munro et al., 2018). While on station, but without being able to catch them, we also observed quite a few pelagic siphonophores on the ocean surface next to the ship, i.e., the Portuguese man-o'war (*Physalia* sp.) and many colonies of the sailing jelly (*Velella velella*).

The third dominating taxon on the dredged rocks were **moss animals** (Bryozoa). They form encrusting but also erect colonies and some have a peculiar architecture of their animal calcite housings (cystids). On one manganese encrusted sediment block we found many colonies of a particularly striking species forming colonies of up to 20 cm in height built by thousands of individuals. It will be interesting to study the bryozoan diversity found during this cruise as it might show similarities to the seamount bryozoan fauna of the South Atlantic (B. Berning, pers. comm.).

We also frequently encountered sedentary **polychaetes** which formed calcitic (Serpulidae) or sedimentary (Maldanidae and other taxa) tubes on the rock surface. The only free-living polychaetes found were two specimens of polynoid scale worms.

Unfortunately, one of our target animal groups – the **brachiopods** – were extremely rare in our samples. We've found a single specimen of the deep-sea species *Pelagodiscus atlanticus*, another single specimen of the terebratellid *Platidia anomioides*, and 8 specimens of a craniid which was preliminarily identified as *Valdiviathyris quenstedti*, an enigmatic craniid species, which has been described from a single specimen found during the Deutsche Tiefsee (Valdivia) Expedition near St. Paul Island in the Indian Ocean (Helmcke 1940). Robinson & Lee (2007) described new findings from New Zealand, but our samples would be the first to reveal molecular characters for the species. It is already planned that these 8 specimens will be the material basis for a BSc-thesis under supervision of C. Lüter.

Also, **molluscs** were rather sparse throughout the samples. No fissurelid gastropod was found among them, an outcome that was entirely unexpected. In the grant application we planned for a collaboration with a colleague from Harvard University to work on the findings of this particular taxon based on our experience in the previous cruise (SO 233) to the South Atlantic. Unfortunately, due to the lack of material, this collaboration will not come to fruition. Other molluscs found were some gastropods, few bivalves (Arcidae) and at least one individual of the enigmatic worm molluscs (Solenogastres). While on station during the night we could observe many red-coloured squids, some of substantial size, which were attracted by the ship's lights to hunt for prey organisms.

Other animal groups found were **crustaceans** (Crustacea), in particular amphipods, isopods and a few pagurid hermit crabs, and **echinoderms** (Echinodermata). The latter comprise a single six-armed sea star (Asteroidea), a few brittle stars (Ophiuroidea), including two specimens of the very rarely found Ophiohelidae, and, most notably, two small, bright yellow specimens of stalked crinoids (Fig. 5.17).

Fig. 5.17 Bright yellow stalked sea lilly (Crinoida) under the dissecting scope (left). Bright red brittle star (Ophiuroidea) which often have a commensal relationship to octocorals (right). Photos: C. Lüter.

Fig 5.18 Hermit crab (Crustacea, Paguridae) caught in a sediment trap (left). Deep sea fish Halosauropsis macrochir which got stuck in the chain bag of the dredge. Size of fish ca. 70 cm. Photos: C. Lüter

Although the project was primarily focused on invertebrate taxa, there were also some remarkable encounters with vertebrates during the cruise. The most peculiar one was probably the capture of a probable specimen of *Halosauropsis macrochir*, a halosaurid fish which managed to get stuck in the chain bag of the dredge - a find already most welcomed by the fish curator of the Museum für Naturkunde in Berlin (Fig. 5.18). According to the literature, halosaurids except one species, which looks entirely different to our specimen, have no swim bladder due to their "semibenthic" life style. However, we think that our specimen has a swim bladder, hence the preliminary species determination. Especially at the beginning we also observed many flying fish

(Exocoetidae) attracted to the lights of the ship at night. One specimen even flew on deck during the night and was found dead the next morning.

All scientists and crew were equally attracted by the many sightings of birds and especially whales during the cruise. The SONNE crossed the migrating routes of humpback whales on their way from the tropical mating regions to their summer feeding grounds in Antarctic waters and we had many curious whales inspecting the ship while on station, sometimes with only 10-20 m distance between us and these enormous animals. Telling from their larger spouts, we may have seen other whale species in the distance, but we were unable to identify them with confidence. Likewise, the ship was constantly followed by sea birds, in particular several species of albatrosses and storm petrels.

TV-Observation of the Water Column and Sea Floor

Recordings of the water column during TV-MUC deployment was only possible at the first three MUC stations (see above). The video streams have not yet been analysed in detail, but from what was seen in real time we can say that there was a rather rich planktonic community recorded by the telemetry. Lots of crustaceans, many deep-sea jellyfish – amongst them large siphonophores (see above) and also medusae of e.g. *Atolla* sp. - were observed during the live stream. A more detailed analyses of the footage in slow motion to better identify the encountered animals will happen later back in Berlin.

6 Station List SO307

Station No.	Device	Date	Time (start)	Time (end)	Latitude	Longitude	Water depth	Recovery
SO307-		2024	UTC	UTC	°S	°W	(m)	(dredge)
1-1	CTD	14.09.	23:27	00:17	28°19,998	41°34,997	800	n.a.
2-1	CTD	15.09.	01:45	04:38	28°19,998	41°34,997	4489	n.a.
3-1	CTD	15.09.	05:24	06:42	28°19,998	41°34,997	1989	n.a.
4-1	TV-MUC	15.09.	11:04	14:11	28°33,614	42°17,945	4609	n.a.
5-1	DR	16.09.	23:14	02:31	29°07,045	43°33,391	3933	empty
6-1	DR	16.09.	02:54	06:21	29°07,170	43°33,113	3987	empty
7-1	DR	16.09.	10:09	12:33	29°10,152	43°52,209	2802	ig+ o
8-1	CTD	16.09.	13:36	16:04	29°07,909	44°01.298	1983	n.a.
9-1	CTD	16.09.	16:16	16:47	29°07,911	44°01,298	2004	n.a.
10-1	CTD	16.09.	16:48	18:32	29°07,905	44°01,294	2005	n.a.
11-1	CTD	16.09.	18:32	19:12	29°07,907	44°01,299	801	n.a.
12-1	DR	16.09.	22:46	00:34	29°10,263	44°13,197	1659	empty
13-1	DR	17.09.	01:09	03:57	29°10,972	44°13,047	1802	empy
14-1	TV-MUC	17.09.	07:40	09:33	29°10.004	44°24,999	2407	n.a.
15-1	DR	17.09.	15:17	17:51	29°18,894	45°15.352	2829	o
16-1	DR	17.09.	18:46	21:49	29°20,313	45°16,397	2927	ig
17-1	DR	18.09.	01:16	03:43	29°25,075	45°41,457	2431	o
18-1	DR	18.09.	04:25	06:45	29°29,502	45°41,727	2317	ig
19-1	DR	18.09.	07:31	09:51	29°26,613	45°41.885	2128	o
20-1	CTD	18.09.	11:58	13:45	29°41,253	45°51,472	1904	n.a.
21-1	CTD	18.09.	13:46	14:35	29°41,252	45°51,478	803	n.a.
22-1	DR	18.09.	16:30	18:47	29°41,151	45°53,384	2090	empty
23-1	DR	18.09.	19:46	22:13	29°38,311	45°57,262	1994	empty
24-1	DR	18.09.	22:36	01:04	29°37,569	45°57,950	1807	ig
25-1	DR	19.09.	01:40	04:04	29°38,040	45°57,940	2099	empty
26-1	DR	19.09.	08:36	10:53	30°07,149	46°01,221	1401	ig
27-1	DR	19.09.	11:31	14:08	30°04,469	46°03,098	1597	ig
28-1	DR	19.09.	14:56	16:50	30°02,693	46°03,567	1510	empty
29-1	DR	19.09.	17:15	19:16	30°00,397	46°03,659	1502	ig
30-1	DR	19.09.	20:51	23:09	29°46,991	46°03,732	2114	ig
31-1	DR	20.09.	00:55	03:30	29°46,400	46°03,947	2043	ig
32-1	TV-MUC	20.09.	05:09	06:51	29°40,575	46°14,550	2201	n.a.
33-1	DR	21.09.	03:19	06:45	28°04,502	49°18,604	4308	o
34-1	DR	21.09.	07:06	11:14	28°04,563	49°18,658	4320	o
35-1	DR	21.09.	11:39	15:05	28°05,035	49°18,267	3796	ig
36-1	DR	21.09.	15:47	19:07	28°04,501	49°17,274	3276	ig
37-1	DR	22.09.	22:57	02:07	28°17,255	49°21,167	3615	ig
38-1	DR	22.09.	08:18	11:53	28°31,620	49°30,00	4093	o
39-1	CTD	22.09.	11:53	13:38	28°31,848	49°30,109	2004	n.a.
40-1	CTD	22.09.	13:38	14:28	28°31,846	49°30,110	800	n.a.
41-1	CTD	22.09.	20:14	23:27	28°04,939	50°14,000	5012	n.a.

Station No.	Device	Date	Time (start)	Time (end)	Latitude	Longitude	Water depth	Recovery
SO307-		2024	UTC	UTC	°S	°W	(m)	(dredge)
42-1	CTD	23.09.	23:55	00:43	28°04,943	50°14,906	801	n.a.
43-1	MUC	23.09.	00:52	04:16	28°04,943	50°14,906	5405	n.a.
44-1	MUC	23.09.	04:16	07:43	28°04,929	50°14,918	5400	n.a.
45-1	DR	23.09.	09:14	13:21	28°05,769	50°00,900	4514	ig
46-1	DR	23.09.	13:51	17:50	28°03,122	50°01,090	4372	ig
47-1	DR	23.09.	23:23	02:47	28°39,926	49°37,783	4320	ig
48-1	DR	24.09.	08:43	12:27	29°13,848	49°45,592	4372	ig
49-1	CTD	24.09.	15:17	16:27	29°39,928	49°41,916	803	n.a.
50-1	CTD	24.09.	16:27	18:26	29°39,939	49°41,906	3007	n.a.
51-1	DR	24.09.	18:35	22:19	29°36,574	49°43,517	3003	ig
52-1	DR	24.09.	23:14	01:56	29°34,295	49°42,942	2927	o
53-1	MUC	24.09.	10:55	14:04	30°34,997	50°52,994	4998	n.a.
54-1	DR	25.09.	16:35	20:42	30°48,632	51°05,953	3253	ig
55-1	DR	25.09.	21:18	00:12	30°47,420	51°07,186	2989	ig
56-1	DR	26.09.	02:06	05:54	30°45,219	51°12,781	4185	ig
57-1	CTD	26.09.	09:12	10:00	31°10,082	50°54,963	799	n.a.
58-1	CTD	26.09.	10:23	13:14	31°10,075	50°54,966	4009	n.a.
59-1	CTD	27.09.	06:03	06:57	33°26,590	48°57,206	800	n.a.
60-1	CTD	27.09.	07:11	09:51	33°26.586	48°57,205	4010	n.a.
61-1	CTD	27.09.	10:21	11:43	33°26,586	48°57,201	2006	n.a.
62-1	MUC	27.09.	11:51	14:37	33°26,581	48°57,206	4142	n.a.
63-1	DR	28.09.	11:08	13:03	35°47,846	46°50,043	3224	ig
64-1	DR	28.09.	13:35	17:00	35°45,944	46°50,085	3802	ig
65-1	DR	28.09.	18:11	21:34	35°55,366	46°55,366	3818	ig
66-1	CTD	29.09.	05:04	06:03	37°07,661	46°40,799	800	n.a.
67-1	CTD	29.09.	06:11	08:30	37°07,660	46°40,804	3508	n.a.
68-1	DR	29.09.	10:03	13:22	37°08,206	46°40,426	3729	empty
69-1	DR	29.09.	13:57	17:37	37°11,023	46°41,277	4238	ig
70-1	DR	29.09.	19:34	00:15	37°16,078	46°33,447	4246	ig
71-1	DR	30.09.	06:54	09:41	38°04,266	46°19,980	n.a	aborted
72-1	DR	30.09.	14:03	18:40	38°04,169	46°19,847	3798	empty
73-1	DR	30.09.	19:00	22:49	38°05,244	46°05,244	4052	empty
74-1	DR	01.10.	01:31	05:27	38°21,986	46°15,446	4499	empty
75-1	DR	01.10.	05:55	10:41	38°23,641	46°13,236	3886	empty
76-1	MUC	01.10.	12:06	15:25	38°27,297	46°15,129	4666	n.a.
77-1	DR	01.10.	17:06	20:17	38°28,941	46°11,999	3387	empty
78-1	DR	01.10.	20:51	00:08	38°29,980	46°11,825	3845	empty
79-1	DR	02.10.	10:12	13:52	39°02,173	45°05,343	3547	empty
80-1	DR	03.10.	06:07	08:46	39°58,352	43°04,368	1530	ig
81-1	DR	03.10.	10:27	13:08	40°05,457	43°02,829	2207	ig+o
82-1	DR	04.10.	10:05	13:46	39°23,481	43°13,139	2617	ig+o
83-1	DR	04.10.	15:17	17:49	39°11,010	43°21,119	2116	ig
84-1	DR	04.10.	18:42	21:20	39°08,920	43°27,898	2540	empty

Station No.	Device	Date	Time (start)	Time (end)	Latitude	Longitude	Water depth	Recovery
SO307-		2024	UTC	UTC	°S	°W	(m)	(dredge)
85-1	CTD	04.10.	21:29	23:05	39°08,978	43°27,622	2015	n.a.
86-1	DR	05.10.	04:43	07:25	38°30,105	43°49,753	2463	empty
87-1	DR	05.10.	08:47	11:57	38°39,754	43°43,750	2774	empty
88-1	DR	05.10.	12:22	15:44	38°39,359	43°43,277	2316	ig
89-1	DR	05.10.	16:57	19:50	38°30,059	43°49,742	2439	empty
90-1	DR	05.10.	22:37	01:43	38°22,761	43°54,204	2756	ig
91-1	DR	06.10.	06:51	09:54	37°46,896	44°10,624	2524	ig
92-1	MUC	06.10.	10:47	13:08	37°47,483	44°15,915	3067	n.a.
93-1	DR	06.10.	13:51	16:29	37°50,687	44°12,155	2563	empty
94-1	DR	06.10.	16:52	19:44	37°50,675	44°12,137	2543	ig
95-1	DR	07.10.	08:00	10:52	36°45,502	44°46,722	2410	ig
96-1	DR	07.10.	11:49	14:24	36°40,857	44°50,203	2219	ig
97-1	DR	07.10.	18:48	21:31	36°36,900	45°09,109	2849	ig
98-1	DR	07.10.	22:24	01:08	36°32,785	45°06,123	2640	ig
99-1	MUC	08.10.	08:43	11:25	35°56,596	45°51,679	3285	n.a.
100-1	DR	08.10.	15:44	19:08	35°33,958	46°23,495	3374	ig
101-1	DR	08.10.	23:42	02:52	35°10,584	46°47,082	3385	empty
102-1	DR	09.10.	03:21	06:03	35°10,362	45°49,285	2746	o
103-1	DR	09.10.	06:20	09:42	35°10,373	46°49,279	2747	ig
104-1	DR	09.10.	10:34	13:45	35°09,281	46°54,465	3551	empty
105-1	CTD	09.10.	15:16	16:21	34°59,993	46°44,004	807	n.a.
106-1	CTD	09.10.	16:21	19:19	35°00,002	46°44,005	4000	n.a.
107-1	CTD	09.10.	19:19	20:41	35°00,004	46°44,007	2004	n.a.
108-1	DR	09.10.	22:39	01:51	35°01,519	46°37,615	3473	ig
109-1	DR	10.10.	05:32	08:28	35°15,858	46°23,373	2983	empty
110-1	DR	10.10.	10:29	14:00	35°23,143	46°13,290	3308	ig
111-1	DR	10.10.	16:05	19:10	35°30,865	45°57,940	3251	ig
112-1	DR	10.10.	20:59	00:03	35°34,520	45°49,376	3061	empty
113-1	MUC	11.10.	01:56	05:06	35°40,020	45°39,991	3823	n.a.
114-1	DR	11.10.	17:12	19:37	34°16,226	45°52,731	1505	ig
115-1	DR	11.10.	23:46	02:01	34°44,009	45°34,475	2123	empty
116-1	DR	12.10.	02:26	04:58	34°42,865	45°36,266	2071	empty
117-1	DR	12.10.	08:51	11:57	34°50,477	45°08,356	1777	o
118-1	DR	12.10.	12:31	14:55	34°50,260	45°10,692	1706	o
119-1	CTD	12.10.	18:23	20:32	35°05,019	44°25,081	2502	n.a.
120-1	DR	12.10.	22:34	00:50	35°09,461	44°14,007	1707	ig
121-1	DR	13.10.	01:31	04:14	35°08,445	44°08,902	2187	ig
122-1	DR	13.10.	06:06	08:44	35°07,400	44°06,830	1803	ig
123-1	DR	13.10.	12:31	14:55	34°48,209	43°43,345	2050	empty
124-1	DR	13.10.	15:19	17:54	34°48,689	43°41,534	2274	o
125-1	DR	13.10.	18:09	21:42	34°47,700	43°41,518	1829	ig
126-1	DR	14.10.	01:11	03:41	34°39,250	43°17,690	1912	ig
127-1	DR	14.10.	04:14	09:42	34°39,623	43°16,103	2305	empty

Station No.	Device	Date	Time (start)	Time (end)	Latitude	Longitude	Water depth	Recovery
SO307-		2024	UTC	UTC	°S	°W	(m)	(dredge)
128-1	MUC	14.10.	11:11	12:39	34°33,895	43°13,059	1045	n.a.
129-1	DR	14.10.	14:40	16:54	34°31,823	43°26,482	1874	empty
130-1	CTD	15.10.	02:40	04:54	33°46,195	43°24,420	2506	n.a.
131-1	CTD	15.10.	04:55	06:22	33°46,177	43°24,405	2002	n.a.
132-1	DR	17.10.	04:40	07:24	30°29,977	44°00,926	3287	o
133-1	DR	17.10.	08:47	11:36	30°25,767	44°00,833	2236	empty
134-1	DR	17.10.	14:52	17:45	30°08,870	44°12,152	2589	ig
135-1	DR	17.10.	19:03	21:28	30°03,098	44°09,315	2075	ig
136-1	DR	17.10.	21:44	00:12	30°03,559	44°09,071	1933	empty
137-1	DR	18.10.	02:45	06:05	30°05,431	43°58,311	2879	ig
138-1	DR	18.10.	09:24	11:45	30°14,061	43°48,015	2259	ig
139-1	DR	18.10.	12:06	14:48	30°14,057	43°48,013	2276	ig
140-1	DR	18.10.	18:29	21:35	30°05,507	43°33,508	2382	ig
141-1	DR	19.10.	23:32	02:23	30°09,138	43°29,859	2448	o
142-1	DR	19.10.	04:30	07:08	30°16,090	43°24,239	2410	empty
143-1	DR	19.10.	08:21	11:10	30°17,586	43°22,680	2332	empty
144-1	DR	19.10.	11:51	14:27	30°16,846	43°23,266	2370	o
145-1	DR	19.10.	18:51	21:55	30°22,696	42°59,825	3060	ig
146-1	DR	19.10.	23:31	02:33	30°24,685	42°59,621	2760	o
147-1	DR	20.10.	03:06	05:54	30°24,012	42°56,582	2545	ig
148-1	CTD	20.10.	07:43	08:29	30°35,016	42°54,009	800	n.a.
149-1	CTD	20.10.	08:53	11:30	30°35,018	42°54,009	3900	n.a.
150-1	CTD	20.10.	11:57	13:23	30°35,016	42°54,005	2006	n.a.
151-1	DR	20.10.	15:12	18:29	30°38,353	42°57,848	3541	ig
152-1	DR	21.10.	23:45	02:12	31°03,744	42°58,511	2036	o
153-1	MUC	21.10.	06:09	07:29	31°26,188	43°13,687	1514	n.a.
154-1	MUC	21.10.	08:04	09:09	31°25,003	43°13,739	1542	n.a.
155-1	DR	21.10.	14:55	17:39	31°26,005	42°48,669	2697	ig
156-1	DR	21.10.	19:40	22:04	31°29,647	42°46,842	2323	o
157-1	DR	22.10.	01:14	04:00	31°34,373	42°42,896	2238	ig
158-1	MUC	22.10.	05:33	07:10	31°36,702	42°46,404	1393	n.a.
159-1	CTD	22.10.	09:33	10:22	31°30,040	42°33,637	798	n.a.
160-1	CTD	22.10.	10:44	12:48	31°30,033	42°33,627	3005	n.a.
161-1	DR	22.10.	21:51	01:22	30°53,562	42°15,658	3376	ig
162-1	DR	23.10.	01:49	05:06	30°54,560	42°17,292	3451	empty
163-1	DR	23.10.	07:42	11:05	30°52,487	42°28,511	3236	ig+o
164-1	DR	23.10.	12:17	15:10	30°52,305	42°22,173	2759	o
165-1	DR	23.10.	17:07	20:27	30°46,632	42°10,800	3521	ig+o

Abbreviations: ig: at least one igneous rocks; o: other in-situ rocks such as Fe-Mn crusts or carbonate crusts, or consolidated sediment (including fine-grained volcaniclastica). Note that the suffix "-1" behind the station numbers is only added for technical reasons (consistency with the ship's D-ship system) but not used in the rest of the document or for sample labelling.

7 Data and Sample Storage and Availability

(J. Geldmacher, C. Timm, C. Lüter, B. Pontiller)

The rock samples recovered during cruise SO307 will be stored at the rock repository at GEOMAR Helmholtz Centre for Ocean Research Kiel. Still on board, each sample was given an international generic sample number (IGSN, see: https://ev.igsn.org) by the GEOMAR rock sample curator (Appendix Table 10.1.). The rock samples will be analysed at GEOMAR and cooperating institutions, and the obtained analytical results will be published in English language in peer-reviewed journals and thus made publicly available. Availability of the geochemical data is restricted until publication. Upon request, individual samples will be made available to third parties after analysis, data interpretation and publication. The bathymetric and sediment echo sounding data as well as the sound probe data will be archived in the IT storage infrastructure at GEOMAR.

Data sharing and exchange will take place within the Ocean Science Information System (OSIS) maintained by the GEOMAR data management team. Bathymetric raw data from the EM122 were submitted to the Federal Maritime and Hydrographic Agency (Bundesamt für Seeschifffahrt und Hydrographie, BSH) and eventually uploaded to the World Data Center PANGAEA (Data Publisher for Earth & Environmental Science (https://www.pangaea.de) and the International Hydrographic Organization Data Centre for Digital Bathymetry (IHO DCDB). For a three-year moratorium, however, the high-resolution bathymetric data from the working area will be available to the project members only.

Environmental (CTD) data will be archived, published, and disseminated according to international standards by the World Data Center PANGAEA within two years after the end of the expedition at the latest. By default, the CC-BY license will be applied. Molecular data (DNA and RNA data) will be archived, published, and disseminated within one of the repositories of the International Nucleotide Sequence Data Collaboration (INSDC, www.insdc.org) comprising EMBL-EBI/ENA, GenBank, and DDBJ). Any other data will be submitted to an appropriate long-term archive that provides unique and stable identifiers for the datasets and allows open online access to the data.

The biological samples collected during the cruise SO307 will subsequently be analysed, archived, and permanently stored at the Museum für Naturkunde Berlin. They will be made available on request or given on loan (possibly after publication of the data collected during the

cruise). Common national and international standards will be followed. The collected material will be archived gradually. The catalogue numbers of newly described species will become available both in the official publication and in the collection database SeSam of the Museum für Naturkunde Berlin. This database follows the international ABCD-scheme (= Access to Biological Collection Data). Data can be directly seen via http://zmb.sesam.senckenberg.de or via the portal of GBIF (= Global Biodiversity Information System) https://www.gbif.org/search. Taxonomic and collection data of newly described species of Kinorhyncha will also become available via the portal WoRMS (World Register of Marine Species) at https://www.marinespecies.org/kinorhyncha/.

Table 7.1: *Overview of data availability*

Type	Database	Available	Free Access	Contact
SO307 metadata	OSIS	Dec. 2024	Dec. 2024	ctimm@geomar.de
Rock sample data	OSIS, Georoc, PetDB	n/a	After publication	khoernle@geomar.de
Echo-sounding data (working area) (KONGSBERG EM 122, EM710, PARASOUND)	BSH, OSIS, PANGAEA	Upon request	Oct. 2027	ctimm@geomar.de
Sound probe data (XSV-02)	BSH, OSIS, PANGAEA	Upon request	Oct. 2027	ctimm@geomar.de
Environmental (CTD)-Data	PANGAEA	Dec. 2024	Oct. 2026	bpontiller@geomar.de
UVP5	EcoTaxa	n/a	After publication	rkiko@geomar.de
Molecular data (DNA and RNA)	EMBL-EBI/ENA	n/a	After publication	bpontiller@geomar.de
Water samples	OSIS, PANGEA	n/a	After publication	bpontiller@geomar.de
Biological samples		Upon request	Oct. 2026	carsten.lueter@mfn.berlin

8 Acknowledgements

First of all, we would like to thank Master Tilo Birnbaum and his exceptionally skillful crew for their excellent support, great professionalism and for providing a very pleasant working atmosphere on board, which was vital for the success of this expedition. Despite several technical challenges, a solution was always found quickly so that the research could continue. Maik Lange, Karin Junge und Martina Schütt (all GEOMAR) are thanked for help with cruise preparations at GEOMAR. Florian Evers, Jan Fleer and Peter Linke have provided GEOMAR equipment for the biological program. We are also grateful to the Geschäftsstelle des Gutachterpanels Forschungsschiffe (GPF), the Leitstelle Deutsche Forschungsschiffe (LDF) and Briese Research for their support. This cruise was funded by the Federal Ministry of Education and Research (with

funding being administratively executed by the Projekträger Jülich) and the GEOMAR Helmholtz Centre for Ocean Research Kiel.

We dedicate this cruise report to the late Reinhard Werner, our colleague and friend, who did essential preparatory work for the planned expedition SO274 to the Madagascar Ridge (which was cancelled due to the pandemic), and on whose work we were able to build for this cruise.

9 References

Alldredge, A.L., Passow, U. and Logan, B.E., 1993. The abundance and significance of a class of large, transparent organic particles in the ocean. Deep Sea Research Part I: Oceanographic Research Papers, 40(6), 1131-1140.

Baltar, F., Legrand, C. and Pinhassi, J., 2016. Cell-free extracellular enzymatic activity is linked to seasonal temperature changes: a case study in the Baltic Sea. Biogeosciences, 13(9), 2815-2821.

Bouchet, P., Ternon, J.-F., Corbari, L., 2017. MD 208 / WALTERS SHOAL cruise, RV Marion Dufresne, https://doi.org/10.17600/17002700

Broecker, W. (2008). A need to improve reconstructions of the fluctuations in the calcite compensation depth over the course of the Cenozoic. Paleoceanography. 23. 10.1029/2007PA001456.

Coffin, M.F., Eldholm, O., 1994. Large Igneous Provinces: Crustal structure, dimensions, and external consequences. Rev. Geophys, 32, 1–36.

Conference Participants, 1972. Penrose Field Conference: Ophiolites. Geotimes, 17, 24–25.

Duncan, R.A., Richards, M.A., 1991. Hotspots, mantle plumes, flood basalts, and true polar wander. Rev. Geophys. 29, 31-50.

Dunn, C.W., Pugh, P.R. and Haddock S.H.D., 2005. Molecular Phylogenetics of the Siphonophora (Cnidaria), with Implications for the Evolution of Functional Specialization. Syst. Biol. 54 (6), 916-935.

Georgen, J.E, Lin, J., Dick, H.J.B., 2001. Evidence from gravity anomalies for interactions of the Marion and Bouvet hotspots with the Southwest Indian Ridge: effects of transform offsets. Earth and Planetary Science Letters 187(3-4), 283-300.

Goslin, J., Segoufin, J., Schlich, R. and Fisher, R.L., 1980. Submarine topography and shallow structure of the Madagascar Ridge, western Indian Ocean. Geol. Soc. Am .Bull. 91, 741–753.

Goslin, J., Recq, M. and Schlich, B., 1981. Structure profonde du plateau de Madagascar: relations avec le plateau de Crozet. Tectonophysics 76, 75-97.

Helmcke J.G., 1940. Die Brachiopoden der Deutsche Tiefsee-Expedition. Wissenschaftliche Ergebnisse der deutschen Tiefsee-Expedition auf dem Dampfer “Valdivia” 1898–1899, vol. 24 (39. G. Fischer Verlag, Jena, pp. 217–316.

Hestetun, J.T., Rapp, H.T. and Xavier, J., 2017. Carnivorous sponges (Porifera, Cladorhizidae) from the Southwest Indian Ocean Ridge seamounts. Deep-Sea Research II 137, 166-189.

Hoppe, H.G., 1983. Significance of exoenzymatic activities in the ecology of brackish water: measurements by means of methylumbelliferyl-substrates. Marine Ecology Progress Series, 299-308.

Jacques, G., Hauff, F., Hoernle, K., Werner, R., Uenzelmann-Neben, G., Garbe-Schönberg, D., Fischer, M., 2019. Nature and origin of the Mozambique Ridge, SW Indian Ocean. Chemical Geology 507, 9-22.

Klein, E.M., Langmuir, C.H., 1987. Global correlations of ocean ridge basalt chemistry with axial depth and crustal thickness. J. Geophys. Res. 92(B8), 8089-8115.

Kirchman, D., K'nees, E. and Hodson, R., 1985. Leucine incorporation and its potential as a measure of protein synthesis by bacteria in natural aquatic systems. Applied and environmental microbiology, 49(3), 599-607.

Langmuir, C.H., Klein, E.M., Plank, T., 1992. Petrological systematics of mid-ocean ridge basalts: constraints on melt generation beneath ocean ridges. In: Morgan JP, Blackman DK, Sinton JM (eds) Mantle flow and melt generation at mid-oceanic ridges. American Geophysical Union, 83-280.

Li, J., Xu, K., 2016. *Paraphelliactis tangi* n. sp. and *Phelliactis yapensis* n. sp., two new deep-sea species of Hormathiidae (Cnidaria: Anthozoa: Actiniaria) from a seamount in the tropical Western Pacific. Zootaxa 4072 (3), 358-372.

Long, R.A. and Azam, F., 1996. Abundant protein-containing particles in the sea. Aquatic Microbial Ecology, 10(3), 213-221.

Marsac, F., Galetti, F., Ternon, J.-F., Romanov, E.V., Demarcq, H., Corbari, L., Bouchet, P., Roest, W.R., Jorry, S.J., Olu, K., Loncke, L., Roberts, M.J. and Ménard, F., 2020. Seamounts, plateaus and governance issues in the South West Indian Ocean, with emphasis on fisheries management and marine conservation, using the Walters shoal as a case study for implementing a protection framework. Deep Sea Research II 176, 104715.

McKenzie, D., Bickle, M.J., 1988. The volume and composition of melt generated by extension of the lithosphere. J. Petrol. 29, 625-679.

Morgan, W.J., 1971. Convection plumes in the lower mantle. Nature 230, 42 – 43.

Morgan, W.J., 1972. Plate motions and deep mantle convection. In: Shagam, R., Hargraves, R., Morgan, W.J., Van Houten ,F., Burk, C., Holland, H., Hollister, L. (eds) Studies in earth and space sciences: A memoir in honor of Harry Hammond Hess. Geological Society of America Memoir, 7–22.

Munro, C., Siebert, S., Zapata, F., Howison, M., Damian-Serrano, A., Church, S.H., Goetz, F.E., Pugh, P.R., Haddock, S.H.D., and Dunn, C.W., 2018. Improved phylogenetic resolution within Siphonophora (Cnidaria) with implications for trait evolution. Mol. Phylog. Evol. 127, 823-833.

Niu, Y. and O'Hara, M.J., 2008. Global Correlations of Ocean Ridge Basalt Chemistry with Axial Depth: a New Perspective. Journal of Petrology 49(4), 633-664.

O'Hara, M.J., 1975. Is there an Icelandic mantle plume? Nature 253(5494), 708-710.

Presnall, D.C., Helsley, C.E., 1982. Diapirism of depleted peridotite - a model for the origin of hot spots. Phys. of the Earth and Planet. Inter. 29(2), 148-160.

Reeves, C., 2014. The position of Madagascar within Gondwana and its movements during Gondwana dispersal. J. Afr. Earth Sciences 94, 45-57.

Robinson J.H., Lee, D.E., 2007. The recent and Paleogene craniid brachiopod *Valdiviathyris quenstedti* Helmcke, 1940. Systematics and Biodiversity 5 (1), 123-131.

Picheral, M., Guidi, L., Stemmann, L., Karl, D.M., Iddaoud, G. and Gorsky, G., 2010. The Underwater Vision Profiler 5: An advanced instrument for high spatial resolution studies of particle size spectra and zooplankton. Limnology and Oceanography: Methods, 8(9), 462-473.

Riemann, L. and Azam, F., 2002. Widespread N-acetyl-D-glucosamine uptake among pelagic marine bacteria and its ecological implications. Applied and environmental microbiology, 68(11), 5554-5562.

Sato, T., Nogi, Y., Sato, H., Fujii, M., 2022. A new tectonic moel between the Madagascar Ridge and Del Cano Rise in the Indian Ocean. JGR Solid Earth, doi:10.1029/2021JB021743

Schilling, J.-G., 1973. Iceland mantle plume: Geochemical study of Reykjanes Ridge. Nature 242, 565 – 571.

Sinha, M.C., Louden, K.E., 1981. The crustal structure of the Madagascar Ridge. Geophys. J. R. Astr. Soc. 66, 351-377.

Starr, A., Hall, I.R., Barke, S., Rackow ,T., Zhang, X., Hemming,S.R., van der Lubbe1, H.J.L., Knorr, G., Berke, M.A., Bigg, G.R., Cartagena-Sierra, A., Jiménez-Espejo, F.J., Gong, X., Gruetzner, J., Lathika, N., LeVay, L.J., Robinson, R.S., Ziegler, M. & Expedition 361 Science Party, 2021. Antarctic icebergs reorganize ocean circulation during Pleistocene glacials. Nature 589, 236-241.

Storey, M., Mahoney, J., Saunders, A. D., et al., 1995. Timing of hot spot-related volcanism and the breakup of Madagascar and India. Science 267, 852–855.

Smith, D.C. and Azam, F., 1992. A simple, economical method for measuring bacterial protein synthesis rates in seawater using 3H-leucine. Mar. Microb. food webs, 6(2), 107-114.

Zhang T, Lin J, Gao J (2011) Interactions between hotspots and the Southwest Indian Ridge during the last 90 Ma: Implications on the formation of oceanic plateaus and intra-plate seamounts. Science China Earth Sciences 54(8):1177-1188

Zhou H, Dick HJB (2013) Thin crust as evidence for depleted mantle supporting the Marion Rise. Nature 494(7436):195-200

10 Appendices

10.1 Dredge Station Details and Rock Description

10.2 CTD/Rosette Water Sampler Sensors

10.3 Water Sampling Station List

10.4 Biological Sampling Station List

SO307 Dredge Station Details and Rock Description

Abbreviations in Table Header:

TS: thin section billet
CHEM: chemistry cube 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
IGSN: International Generic Sample Number (to be entered by curator)
REF: Reference sample (to be included in air cargo)

Abbreviations for Minerals and Materials:

Amph: amphibole
Apt: apatite
Bi: biotite
Cc: calcite
Chl: chlorite
Cpx: clinopyroxene
Fsp: feldspar
Gc: geochemistry
Gm: groundmass
GL: glass

NA: not applicable

MI: melt inclusions
Mn: manganese
Mt: magnetite
Ol: olivine
Opx: orthopyroxene
Pl: plagioclase
Px: pyroxene
Qz: quartz
Zr: zircon
Cc: carbonate
Pp: phosphate

SO307-DR7

Northern MR, western slope towards Mozambique Basin

Dredge on bottom UTC, hrs, °N, °E, depth m	11:03	29°10,15'S	43°52,29'E	2820
Dredge off bottom UTC, hrs, °N, °E, depth m	11:29	29°10,29'S	43°52,125'E	2693

total volume: *few rocks*
few small carbonates and corals, one ignous rock

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR7-1	1. Rock Type: volcanic 2. Size: 6,5 x 6 x 3,5 3. Shape / Angularity: angular 4. Color of cut surface: brownish-orange 5. Texture / Vesicularity: poorly vesiculated (sub-mm) 6. Phenocrysts: Fsp (5%; up to 2mm), px (1-2%, up to 1mm); olivine (iddingsite >1%, >1mm) 7. Matrix: fine-grained matrix 8. Secondary Minerals: mm-thick calcite coating along cracks/surfaces; probably zeolites 9. Encrustations: 2-3mm Mn crust; coral fot was attached to this rock						10.58031/KIEL0264GRAB201		
SO307-DR7-2	1. Rock Type: Biogenic rock; carbonate with many worm (?) burrows (up to several cm across). 2. Size: 14,5 x 10 x 9,5 3. Shape / Angularity: 4. Color of cut surface: light brown 5. Texture / Vesicularity: 6. Phenocrysts: 7. Matrix: 8. Secondary Minerals: 9. Encrustations: up to 2mm Mn coating						10.58031/KIEL0264GRAC201		
SO307-DR7-3	1. Rock Type: see DR7-2 2. Size: 11 x 10 x 9 3. Shape / Angularity: 4. Color of cut surface: 5. Texture / Vesicularity: 6. Phenocrysts: 7. Matrix: 8. Secondary Minerals: 9. Encrustations: 10. Comment: Similar to SO307-DR7-2						10.58031/KIEL0264GRAD201		

SO307 Dredge Station Details and Rock Description

SO307-DR15

Northen MR, small ridge to the west of the two large guyot-like seamounts. Scar at the north flank of a small ridge.

Dredge on bottom UTC, hrs, °N, °E, depth m 16:05 29°18,888'S 45°15,325'E 2832
Dredge off bottom UTC, hrs, °N, °E, depth m 16:57 29°18,814'S 45°15,078'E 2548
total volume: some cemented sand, one big Mn-nodule

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR15-1	1. Rock Type: Mn-nodule 2. Size: 10 cm diameter 3. Shape / Angularity: 4. Color of cut surface: 5. Texture / Vesicularity: 6. Phenocrysts: 7. Matrix: 8. Secondary Minerals: 9. Encrustations: 10. Comment: concentric growth rings from the center, the last 1cm is darker in color (dark brown)						10.58031/KIEL0264GRAF201		

SO307-DR16

Northern MR, southwestern flank of NW-SE elongated structure. Lower portion of the flank around 500m to NW

Dredge on bottom UTC, hrs, °N, °E, depth m 19:44 29°20,31'S 45°16,40'E 2927
Dredge off bottom UTC, hrs, °N, °E, depth m 20:42 29°20,092'S 45°16,302'E 2673
total volume: 1/4 full
Comments: Abundant Mn crusts/nodules containing fragments of volcanic rocks. Igneous clats found in the same piece of crusts where marked by suffix -A,- B, etc.

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR16-1A	1. Rock Type: volcanic, moderately altered 2. Size: 10 x 9 x 6 3. Shape / Angularity: angular 4. Color of cut surface: dark grey with red and white spots 5. Texture / Vesicularity: vesicular ~5% 6. Phenocrysts: plag 0.5-1.5mm fresh, ~5-7% 7. Matrix: microcystaline 8. Secondary Minerals: palagonite and Mn in voids, probably some alteration in groundmass 9. Encrustations: thick Mn crust (~10cm) - removed during preparation 10. Comment: rare plag-phyric basalt, plag fresh and suitable for dating, rock is moderately altered and good for gechemistry. Voids should be picked out.	X	X	X			10.58031/KIEL0264GRAH201		
SO307-DR16-1B	1. Rock Type: Mn-crust 2. Size: 12 x 12 x 10, crust of block A 3. Shape / Angularity: rounded surface, 2 angular sides 4. Color of cut surface: black 5. Texture / Vesicularity: 6. Phenocrysts: 7. Matrix: 8. Secondary Minerals: 9. Encrustations: 10. Comment:						10.58031/KIEL0264GRAH201		
SO307-D16-2A	1. Rock Type: volcanic, moderately altered 2. Size: 3 x 4 x 5 3. Shape / Angularity: angular 4. Color of cut surface: dark grey with red alteration spots 5. Texture / Vesicularity: two vesicles < 1mm, filled with CaCO3 6. Phenocrysts: aphyric 7. Matrix: fine grained/microcrystaline pl-bearing 8. Secondary Minerals: 9. Encrustations: thick Mn-crust (~10cm) - removed during preparation 10. Comment: Fe-alteration	X	X				10.58031/KIEL0264GRAK201		

SO307 Dredge Station Details and Rock Description

SO307-DR16-2B	1. Rock Type: volcanic, altered 2. Size: 3 x 3 x 3 3. Shape / Angularity: angular 4. Color of cut surface: dark grey with red alteration spots, brown alteration horizon on rim 5. Texture / Vesicularity: nonvesicular 6. Phenocrysts: aphyric 7. Matrix: microcrystaline, pl-bearing 8. Secondary Minerals: 9. Encrustations: thick Mn-crust (~10cm) - removed during prep 10. Comment: Fe-alteration of matrix, good for laser?						10.58031/KIEL0264GRAM201		
SO307-DR16-3A	1. Rock Type: volcanic, altered 2. Size: 5 x 4 x 3 3. Shape / Angularity: angular 4. Color of cut surface: grey with red alteration spots & black veins 5. Texture / Vesicularity: nonvesicular 6. Phenocrysts: aphyric 7. Matrix: microcrystalline 8. Secondary Minerals: palagonite or mn- in veins 9. Encrustations: thick Mn-crust (>10cm) removed during preparation 10. Comment: Fe-altered matrix, good for laser?						10.58031/KIEL0264GRAN201		
SO307-DR16-3B	1. Rock Type: Volcanic, moderately altered 2. Size: 4 x 3 x 3 3. Shape / Angularity: angular 4. Color of cut surface: dark grey with redish spots 5. Texture / Vesicularity: massive 6. Phenocrysts: none 7. Matrix: fine grained 8. Secondary Minerals: some oxidation in the groundmass, chloritization 9. Encrustations: fragment taken from thick (around 15cm) Mn crust 10. Comment: the sample is likely aphiric basalt, moderately altered and can be used for geochemistry						10.58031/KIEL0264GRAP201		
SO307-DR16-4	1. Rock Type: Sediment with clasts of volcanic rocks 2. Size: 25 x 20 x 8 3. Shape / Angularity: sub-rounded to angular 4. Color of cut surface: clasts are grey with black coatings 5. Texture / Vesicularity: 6. Phenocrysts: the volcanic clasts are aphiric basalts 7. Matrix: 8. Secondary Minerals: 9. Encrustations: clasts are covered with black coatings of Mn-oxides and placed in phosphate (?) outer surface covered with 0.5cm Mn-oxide 10. Comment:						10.58031/KIEL0264GRAQ201		
SO307-DR16-5	1. Rock Type: breccia cemented by phosphates and covered by Mn-crust 2. Size: 20 x 21 x 8 3. Shape / Angularity: angular 4. Color of cut surface: grey and redish grey fragments of basalts cemented by white phosphate (?) more redish in outer part, covered by black Mn-crust 5. Texture / Vesicularity: fragments represented by aphiric basalts similar to samples 1 to 3, size up to 2cm in diameter 6. Phenocrysts: 7. Matrix: 8. Secondary Minerals: 9. Encrustations: Mn-crust about 1cm on outer surface 10. Comment: the larger fragments might be usable for geochemistry						10.58031/KIEL0264GRAR201		

SO307 Dredge Station Details and Rock Description

SO307-DR16-6	1. Rock Type: Mn-crust representative sample 2. Size: 14 x 13 x 10 3. Shape / Angularity: 4. Color of cut surface: 5. Texture / Vesicularity: 6. Phenocrysts: 7. Matrix: 8. Secondary Minerals: 9. Encrustations: Mn-crust with yellowish intrusions of phosphate 10. Comment:						10.58031/KIEL0264GRAS201		
SO307-DR16-7	1. Rock Type: Mn-nodules (3 pieces) 2. Size: 8, 5 and 5cm in diameter 3. Shape / Angularity: 4. Color of cut surface: 5. Texture / Vesicularity: 6. Phenocrysts: 7. Matrix: 8. Secondary Minerals: 9. Encrustations: 10. Comment:						10.58031/KIEL0264GRAT201		

SO307-DR17

Northern MR, northern one of the two guyot-like seamounts, NW corner

Dredge on bottom UTC, hrs, °N, °E, depth m	02:02	29°25,07'S	45°41,45'E	2430
Dredge off bottom UTC, hrs, °N, °E, depth m	02:54	29°24,938'S	45°41,737'E	2130

total volume: 4 rock samples

Comments: sedimentary rocks

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR17-1	1. Rock Type: Sedimentary, coarse sandstone to fine conglomerate. 2. Size: 11 x 6 x 4.5 cm 3. Shape / Angularity: Subrounded, slightly triangular. 4. Color of cut surface: orange-brown with white specks. 5. Texture / Vesicularity: medium to coarse grain, porous (15-20% pores) 6. Grains: Rounded and radial white crystals (25-28%), transparent tetrahedral crystals (2-5%). Grains show alteration rims surrounding them. 7. Matrix (50-60%): composed of small rounded dark grains, orange coatings, with a white calcareous (?) cement. 8. Secondary Minerals: radial, rounded white secondary minerals fill the pores, possibly zeolites. Well-crystalized tetrahedral crystals fill some of the porous speces. Some pore surfaces are covered by green secondary minerals. 9. Encrustations: Mn cover (1 - 1.5mm thick)	X					10.58031/KIEL0264GRAV201		
SO307-DR17-2	1. Rock Type: Sedimentary, coarse sandstone to fine conglomerate. 2. Size: 8 x 5.5 x 3 cm 3. Shape / Angularity: Subrounded, flat 4. Color of cut surface: orange-brown with white specks. 5. Texture / Vesicularity: same as SO307-DR17-1 6. Grains: same as SO307-DR17-1 7. Matrix: similar as SO307-DR17-1 but with some elongated transparent crystals (plag?). 8. Secondary Minerals: secondary green alteration rims surrounding the pores. 9. Encrustations: same as SO307-DR17-1 10 Comment: same as SO307-DR17-1						10.58031/KIEL0264GRAW201		
SO307-DR17-3	1. Rock Type: Sedimentary, coarse sandstone to fine conglomerate. 2. Size: 9.5 x 7.5 x 3.5 cm 3. Shape / Angularity: Angular, flat 4. Color of cut surface: orange-brown 5. Texture / Vesicularity: same as SO307-DR17-1 6. Grains: same as SO307-DR17-1 7. Matrix: same as SO307-DR17-1 8. Secondary Minerals: same as SO307-DR17-1 9. Encrustations: same as SO307-DR17-1 10. Comment: same as SO307-DR17-1						10.58031/KIEL0264GRAX201		

SO307-DR17-4	1. Rock Type: Sedimentary, coarse sandstone to fine conglomerate. 2. Size: 7 x 5 x 2.5 cm 3. Shape / Angularity: Subrounded 4. Color of cut surface: orange-brown with white specks. 5. Texture / Vesicularity: similar to SO307-DR17-1 but with higher porosity (30-35% porosity) 6. Grains: same as SO307-DR17-1 7. Matrix: similar to SO307-DR17-1 but with more dark grains and higher porosity. 8. Secondary Minerals: same as SO307-DR17-1 9. Encrustations: same as SO307-DR17-1 10. Comment: 10: same as SO307-DR17-1						10.58031/KIEL0264GRAY201		

SO307-DR18

Northern MR, northern one of the two guyot-like seamounts, western corner

Dredge on bottom UTC, hrs, °N, °E, depth m 05:09 29°29,50'S 45°41,73'E 2321
Dredge off bottom UTC, hrs, °N, °E, depth m 06:01 29°29,30'S 45°41,97'E 2003
total volume: several rocks and a sponge
Comments: pillow fragments, lava blocks. There is 2 groups of samples: 1) is Ol-phyric lavas that are likely from the base stratigraphically and belong to a shield stage (Thol?); 2) vesicular aphyric lavas that belong to shallower stratigraphic levels, look more alkaline than the previous group

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR18-1	1. Rock Type: volcanic, moderately altered 2. Size: 18 x 13 x 8 3. Shape / Angularity: sub-angular to sub-rounded 4. Color of cut surface: dark grey 5. Texture / Vesicularity: aphyric with vesicules (about 1%) 6. Phenocrysts: none 7. Matrix: fine matrix composed of Pl, Px, and Ol, oriented Pg crystals lattices showing a flow direction (trachytic texture?) 8. Secondary Minerals: red and orange Fe-oxydes, vesicules are filled with zeolites 9. Encrustations: very well crystalized ground mass	X	X				10.58031/KIEL0264GRA2201		
SO307-DR18-2	1. Rock Type: Volcanic, moderately altered 2. Size: 17 x 12 x 9 3. Shape / Angularity: sub-angular 4. Color of cut surface: grey 5. Texture / Vesicularity: porphiritic 6. Phenocrysts: 1 to 2-mm in diameter Ol (25%) altered to iddingsite, <1mm Plag (10%) 7. Matrix: microcrystaline, very fine, composed of Plag + Opx + Ol 8. Secondary Minerals: oxides (orange, yellowspecks) 9. Encrustations: Mn-crust, <1mm thick and a carbonate crust up to 1.5cm 10. Comment: this basalt belongs to group 1, Ol-phyric lavas from likely a shield stage	X	X				10.58031/KIEL0264GRA3201		
SO307-DR18-3	1. Rock Type: volcanic, moderately altered 2. Size: 12 x 10 x 6 cm 3. Shape / Angularity: sub-angular 4. Color of cut surface: grey 5. Texture / Vesicularity: aphanitic-porphyritic 6. Phenocrysts: Ol (1-4mm, 20%) 7. Matrix: microcrystaline matrix composed of Plag, Cpx and Ol 8. Secondary Minerals: Fe-oxides, hydroxides, orange and redish in color. Iddingsite in the Ol. 9. Encrustations: crust of Mn (1mm) and carbonate (4mm) 10. Comment: belongs to group 1, Ol-phyric basalts						10.58031/KIEL0264GRA4201		

SO307 Dredge Station Details and Rock Description

SO307-DR18-4	1. Rock Type: volcanic 2. Size: 18 x 12 x 12 cm 3. Shape / Angularity: sub-angular 4. Color of cut surface: dark grey 5. Texture / Vesicularity: aphanitic, glomeroporphyritic 6. Phenocrysts: Glomerocrysts of Ol, up to 4 mm in diameter, completely replaced iddingsite (30% Ol) 7. Matrix: microcrystaline matrix composed of Plag, Cpx and Ol. Coarser than sample 3 8. Secondary Minerals: Fe-oxides and iddingsite 9. Encrustations: crust of Mn (<1mm) 10. Comment: belongs to group 1	x	x				10.58031/KIEL0264GRA5201	well crystalized matrix, good candidate for Ar/Ar dating	
SO307-DR18-5	1. Rock Type: volcanic, moderately altered 2. Size: 19 x 10 x 9cm 3. Shape / Angularity: angular 4. Color of cut surface: dark grey 5. Texture / Vesicularity: aphanitic-porphiritc 6. Phenocrysts: Ol (1-2mm, 40%) completely replaced by iddingsite 7. Matrix: microcrystaline composed of Pl + Px + Ol, fine grained 8. Secondary Minerals: Fe-oxides, iddingsite, pyrite (matrix) 9. Encrustations: some pyrite in the external crust 10. Comment: belongs to group 1						10.58031/KIEL0264GRA6201		
SO307-DR18-6	1. Rock Type: volcanic, altered 2. Size: 16 x 11 x 7 3. Shape / Angularity: sub-rounded 4. Color of cut surface: brown, grey 5. Texture / Vesicularity: aphanitic-porphyritic, vesicular (10% vesicules) filled with carbonates 6. Phenocrysts: Olivine (7%), plag (about 15%) 7. Matrix: fine grained, microcrystaline made of Pl + Px + Ol 8. Secondary Minerals: Fe-oxides, iddingsite completely replacing Ol, carbonates, zeolites in cavities 9. Encrustations: carbonate veins, less than 1mm Mn cover, oxides and carbonates 10. Comment: vesicular basalt similar to group 2						10.58031/KIEL0264GRA7201		
SO307-DR18-7	1. Rock Type: volcanic, altered 2. Size: 10 x 6 x 5 cm 3. Shape / Angularity: sub-rounded 4. Color of cut surface: grey 5. Texture / Vesicularity: aphanitic, porphyritic, with glomerocrystals similar to sample 4 6. Phenocrysts: Ol (up to 3mm, 35%) arrange in clusters 7. Matrix: fine microcrystaline matrix of Pl + Px + Ol 8. Secondary Minerals: Fe-oxides, iddingsite replacing olivive, carbonate veins 9. Encrustations: 10. Comment: belongs to group 1						10.58031/KIEL0264GRA8201		
SO307-DR18-8	1. Rock Type: volcanic, slightly altered 2. Size: 18 x 14 x 11 cm 3. Shape / Angularity: sub-angular 4. Color of cut surface: dark grey 5. Texture / Vesicularity: aphanitic-porphyritic, vesicular. Elongated 5mm to cm long vesicules. Filled with zeolites and carbonates (about 40%) 6. Phenocrysts: Plag (15-20%, 1mm in lenght), Ol (<1%, 2mm lenght) altered 7. Matrix: microcrystaline, with plag. very fine grained 8. Secondary Minerals: zeolites, carbonates filling vesicules, Fe-oxides 9. Encrustations: 10. Comment: belong to group 2, quite fresh, can be used for analysis	x	x				10.58031/KIEL0264GRA9201	candidate for age dating	

SO307 Dredge Station Details and Rock Description

SO307-DR18-9	1. Rock Type: volcanic, altered 2. Size: 24 x 19 x 9cm 3. Shape / Angularity: angular 4. Color of cut surface: redish gray 5. Texture / Vesicularity: same as 8 6. Phenocrysts: Olivine (completely replaces, 15%) and Plag (<1%). mm in lenght for both phases 7. Matrix: same as 8 but more oxidized (reddish) 8. Secondary Minerals: same as 8 9. Encrustations: 10. Comment: belong to group 2. vesicular						10.58031/KIEL0264GRBA201		
SO307-DR18-10	1. Rock Type: volcanic, altered 2. Size: 20 x 16 x 11 cm 3. Shape / Angularity: angular 4. Color of cut surface: reddish-grey 5. Texture / Vesicularity: same as sample 8, with larger vesicules (up to 5x3cm). filled with carbonate, zeolites and jasper 6. Phenocrysts: plag (around 2%), 1mm lenght 7. Matrix: same as sample 9, microcrystaline, oxidized matrix 8. Secondary Minerals: carbonates, zeolites, jasper 9. Encrustations: Mn, <1 mm-thick.						10.58031/KIEL0264GRBB201		
SO307-DR18-11	1. Rock Type: sedimentary 2. Size: 16 x 12 x 14 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: white-pinkish 5. Texture / Vesicularity: dense aggregate of forams? 6. Phenocrysts: none 7. Matrix: carbonatic 8. Secondary Minerals: none 9. Encrustations: <1mm-thick Mn crusts 10. Comment:						10.58031/KIEL0264GRBC201		
SO307-DR18-12	1. Rock Type: sedimentary 2. Size: 3. Shape / Angularity: 4. Color of cut surface: 5. Texture / Vesicularity: 6. Phenocrysts: 7. Matrix: 8. Secondary Minerals: 9. Encrustations: 10. Comment: same as sample DR18-11						10.58031/KIEL0264GRBD201		
SO307-DR18-13	1. Rock Type: sedimentary 2. Size: 3. Shape / Angularity: 4. Color of cut surface: 5. Texture / Vesicularity: 6. Phenocrysts: 7. Matrix: 8. Secondary Minerals: 9. Encrustations: 10. Comment: same as samples DR18-11 and -12						10.58031/KIEL0264GRBE201		

SO307-DR19

Northern MR, northern one of the two guyot-like seamounts, W corner, but higher up than DR18

Dredge on bottom UTC, hrs, °N, °E, depth m	08:16	29°26,614'S	45°41,887'E	2131
Dredge off bottom UTC, hrs, °N, °E, depth m	09:08	29°26,534'S	45°42,117'E	1738

total volume: one rock, some biology

Comments:

SO307 Dredge Station Details and Rock Description

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR19-1	1. Rock Type: sedimentary, moderately altered 2. Size: 12 x 10 x 6 cm 3. Shape / Angularity: rounded to sub-rounded 4. Color of cut surface: beige matrix with dark grey, brown and orange volcanic clasts, and white to yellowish bioclasts 5. Texture / Vesicularity: poorly vesiculated, well cemeted by carbonate matrix, 6. Grains: volcanic lithics (up to 1,5cm) of altered basalts, px (mm size), bioclasts, ooides(?) 7. Matrix: medium grained, crystaline, carbonitic (aragonite? and other carbonate minerals) 8. Secondary Minerals: carbonates 9. Encrustations: very thin cover of Mn-crust 10. Comment: shallow marine environment?						10.58031/KIEL0264GRBG201		

SO307-24

Northern MR, northern one of the two guyot-like seamounts (also targeted by DR 18), southern edge, middle to upper part of the slope.

Dredge on bottom UTC, hrs, °N, °E, depth m 23:10 29°37,57'S 45°57,95'E 1806

Dredge off bottom UTC, hrs, °N, °E, depth m 00:19 29°37,41'S 45°57,76'E 1480

total volume: 7 volcanic rocks

Comments:

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR24-1	1. Rock Type: volcanic rock, moderately altered. 2. Size: 12 x 11 x 8 cm 3. Shape / Angularity: subangular 4. Color of cut surface: Dark grey with greenish bands. 5. Texture / Vesicularity: Massive, very rare vesicules (< 1%). 6. Phenocrysts: none 7. Matrix: Medium crystallized microdoleritic, fresh pl + cpx . 8. Secondary Minerals: variably altered, likely more altered in the greenish bands, less so in the grey bands. 9. Encrustations: very thin Mn coating and carbonates. 10. Comment: Representative sample of the dredge, the least altered and relatively good for geochemistry. Ar/Ar dating maybe possible for groundmass.	x	x	?			10.58031/KIEL0264GRBK201		
SO307-DR24-2	1. Rock Type: volcanic rock, moderately altered. 2. Size: Part of block A (34 x 22 x 14 cm), working sample: 15 x 11 x 11 cm. 3. Shape / Angularity: subangular 4. Color of cut surface: dark grey with brown spots and white dots (plg crystals). 5. Texture / Vesicularity: rare vesicular, vesicules (~5%, up to 1 cm diameter) filled with brown palagonite and white calcite. 6. Phenocrysts: plg-phyric, plg ~5-7%, <1 mm possibly altered. 7. Matrix: microdoleritic groundmass, well-crystallized. 8. Secondary Minerals: filling voids and in the groundmass. 9. Encrustations: Mn film on the outer surface. 10. Comment: like #1, the sample is relatively good for geochemistry. Ar/Ar dating maybe possible on plg or /and groundmass.	x	x				10.58031/KIEL0264GRBM201		

SO307 Dredge Station Details and Rock Description

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR24-3	1. Rock Type: volcanic rock, moderately altered. 2. Size: Part of B (34 x 18 x 11 cm), working sample: 23 x 17 x 9 cm. 3. Shape / Angularity: 4. Color of cut surface: 5. Texture / Vesicularity: 6. Phenocrysts: 7. Matrix: 8. Secondary Minerals: 9. Encrustations: 10. Comment: this sample is very similar to #2 but contains ~1% of small (<1cm) altered olivine phenocrysts along with plag phenocrysts. It appears slightly more altered thatn #2, more oxidized. Like samples #1 and #2, it is relatively good for geochemistry. Ar/Ar possible on plag phenocrysts and groundmass.	X	X				10.58031/KIEL0264GRBN201		
SO307-DR24-4	1. Rock Type: volcanic rock, moderately altered. 2. Size: 23 x 17 x 9 cm 3. Shape / Angularity: subangular 4. Color of cut surface: 5. Texture / Vesicularity: 6. Phenocrysts: 7. Matrix: 8. Secondary Minerals: 9. Encrustations: 10. Comment: the rock is similar to #2 and likely rare ol-plag phyric basalt. The amount of voids is small (<1%) and the rock is good for	X	X				10.58031/KIEL0264GRBP201		
SO307-DR24-5	1. Rock Type: volcanic rock, moderately altered. 2. Size: 10 x 8 x 6 cm 3. Shape / Angularity: subangular 4. Color of cut surface: 5. Texture / Vesicularity: 6. Phenocrysts: 7. Matrix: 8. Secondary Minerals: 9. Encrustations: 10. Comment: similar to #1, like all rocks of this dredge it has well-crystallized groundmass, and can be used for geochemistry and Ar/Ar dating.	X	X				10.58031/KIEL0264GRBQ201		
SO307-DR24-6	1. Rock Type: volcanic breccia, moderately altered. 2. Size: 16 x 10 x 9 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: one lava is dark grey and another is greenish grey. 5. Texture / Vesicularity: mostly massive, with ~2% vesicles, 1-2 mm in diameter. 6. Phenocrysts: both lavas are plag-phyric, 2-5%, ~1 mm in length. 7. Matrix: microcrystalline with some plag (<1mm) and slightly oxidized for both lithologies. 8. Secondary Minerals: carbonates filling vesicles, Fe-oxides (red-orange specks). 9. Encrustations: very thin Mn cover in some parts of the surface. 10. Comment:	X	X				10.58031/KIEL0264GRBR201		
SO307-DR24-7	1. Rock Type: volcanic, altered 2. Size: 10 x 9 x 6 cm 3. Shape / Angularity: subrounded to subangular. 4. Color of cut surface: light brownish-grey 5. Texture / Vesicularity: massive, porphyritic 6. Phenocrysts: Plag up to 3mm (most ~1mm in length), ~5%. Ol completely replaced to a brown mass, ~3%. 7. Matrix: fine-grained, well-crystallized groundmass composed by plag+px+ol. 8. Secondary Minerals: carbonates, ol completely replaced by brown secondary mineral. Carbonate veins throughout sample (~ 0.5 mm thickness). 9. Encrustations: carbonate crusts ~2-5mm thick. 10. Comment: possibly alkaline.						10.58031/KIEL0264GRBS201		

SO307 Dredge Station Details and Rock Description

SO307-DR26

Northern MR, southern one of the two guyot-like seamounts, southeast flank

Dredge on bottom UTC, hrs, °N, °E, depth m 09:10 30°07,148'S 46°01,220'E 1410

Dredge off bottom UTC, hrs, °N, °E, depth m 10:15 30°06,975'S 46°01,076'E 991

total volume: few rocks

Comments: dense basalts, coral

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR26-1	1. Rock Type: volcanic, moderately altered 2. Size: original - 22 x 12 x 10 cm; working sample - 18 x 10 x 9 cm 3. Shape / Angularity: angular 4. Color of cut surface: light grey 5. Texture / Vesicularity: massive, porphiritic, spherical voids (<1%, about 2mm in diameter) 6. Phenocrysts: Plag (about 1mm lenght, 2%), Ol (about 2mm in diameter, 3%) completely altered 7. Matrix: microdoleritic matrix, well-crystalized, fined grained (ol+pl+px) 8. Secondary Minerals: Fe-oxides (orange), carbonate veins, zeolites filling the vesicules 9. Encrustations: Mn cover around 2 mm-thick 10. Comment: samples 1-4 are similar = Ol-phyric and massive, possibly shield stage	X	X	matrix ground mass is good for Ar/Ar			10.58031/KIEL0264GRBU201		
SO307-DR26-2	1. Rock Type: volcanic (like #1), altered, 2. Size: 12 x 6 x 7 cm 3. Shape / Angularity: subangular 4. Color of cut surface: grey 5. Texture / Vesicularity: massive, Ol and Pl phyric. Vesicules <1% but are filled with concentric zeolites 6. Phenocrysts: Pl (3mm in lenght, 5%), Ol (2-3 mm, 4%), Px (about 1mm, <1%) 7. Matrix: same as sample DR26-1 8. Secondary Minerals: same as sample DR26-1 9. Encrustations: less than 1mm Mn cover 10. Comment: samples 1-4 are similar = Ol-phyric and massive, possibly shield stage	X	X				10.58031/KIEL0264GRBV201		
SO307-DR26-3	1. Rock Type: volcanic (like #1), moderately to highly-altered 2. Size: 10 x 7 x 5.5 cm 3. Shape / Angularity: angular 4. Color of cut surface: light grey/orange 5. Texture / Vesicularity: porphiritic, Pg phenocrysts might be possible, 2% filled vesicules 6. Phenocrysts: Pl (up to 8mm in lenght, 15%) quite altered but some fresh cores remain 7. Matrix: well crystalized 8. Secondary Minerals: filling vesicules, calcite filling cracks 9. Encrustations: thin (less than 1mm) Mn crust on parts of exterior 10. Comment: samples 1-4 are similar = Ol-phyric and massive, possibly shield stage			plag phenos might be possible			10.58031/KIEL0264GRBW201		
SO307-DR26-4	1. Rock Type: volcanic (like #1), highly-altered 2. Size: 5.5 x 8.5 x 5.5 cm 3. Shape / Angularity: semirounded 4. Color of cut surface: light grey/orange 5. Texture / Vesicularity: non vesicular, porphiritic 6. Phenocrysts: Pl (up to 5mm in lenght, 10%) very altered, only small cores of large grains remain unaltered 7. Matrix: well crystalized 8. Secondary Minerals: lots of small crack filled with secondary minerals 9. Encrustations: thin (less than 1mm) Mn crust on parts of exterior 10. Comment: samples 1-4 are similar = Ol-phyric and massive, possibly shield stage						10.58031/KIEL0264GRBX201		

SO307 Dredge Station Details and Rock Description

SO307-DR26-5	1. Rock Type: basalt, moderately-altered 2. Size: 12 x 5.5 x 7 cm 3. Shape / Angularity: semirounded 4. Color of cut surface: light grey 5. Texture / Vesicularity: porphiritic, 20% vesicules up to 1,5cm 6. Phenocrysts: Plg (up to 5mm in lenght, 10%) 7. Matrix: fined grained but well crystalized 8. Secondary Minerals: 90% of vesicules filled with calcite, 10% are filled with a green mineral (glauconite?) often forming around the rim of the vesicule 9. Encrustations: thin (less than 1mm) Mn crust on parts of exterior 10. Comment:	x		decent Pl for dating			10.58031/KIEL0264GRBY201		
SO307-DR26-6	1. Rock Type: basalt, highly-altered 2. Size: 7 x 2 x 5.5 cm 3. Shape / Angularity: angular 4. Color of cut surface: dark brown to red 5. Texture / Vesicularity: porphiritic, 10% vesicules up to 5mm 6. Phenocrysts: Plg (up to 4mm in lenght, 10%) completely replaced by secondary minerals 7. Matrix: very fine grained 8. Secondary Minerals: vesicules are filled (around 80%) with various clay minerals, some calcite 9. Encrustations: thin (less than 1mm) Mn crust in some places						10.58031/KIEL0264GRBZ201		

SO307-DR27

Northern MR, southern one of the two guyot-like seamounts, southeastern flank (NE of DR26)

Dredge on bottom UTC, hrs, °N, °E, depth m 12:04 30°04,470'S 46°03,094'E 1608

Dredge off bottom UTC, hrs, °N, °E, depth m 13:26 30°04,48'S 46°03,12'E 1626

total volume: few rocks

Comments: Volcanic rock fragments with thick Mn crusts. Igneous clats found in the same piece of Mn-crusts where marked by suffix -A,- B, etc.

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR27-1A	1. Rock Type: volcanic, moderately altered 2. Size: 6 x 5 x ? (not possible to measure 3rd dim.) 3. Shape / Angularity: subrounded 4. Color of cut surface: grey and orange 5. Texture / Vesicularity: microcrystaline, not highly vesiculated with some vesicles ~1mm long (<1%) 6. Phenocrysts: aphyric (plag (thin but elongated, up to 1cm, very rare (<<1%)) 7. Matrix: fine grained matrix 8. Secondary Minerals: filling vesicles and small veins, Fe-oxides and carbonates 9. Encrustations: very thick Mn-crust	x	x				10.58031/KIEL0264GRB3201		
SO307-DR27-1B	1. Rock Type: volcanic, moderately to highly altered 2. Size: 7 x 6 x ? (not possible to measure 3rd dim.) 3. Shape / Angularity: angular to subangular 4. Color of cut surface: grey and orange 5. Texture / Vesicularity: aphyric, up to 1mm vesicles (~2%) 6. Phenocrysts: aphyric 7. Matrix: microcrystaline (plag, px), px is ~25% 8. Secondary Minerals: Fe-oxides and carbonates filling vesicles and veins 9. Encrustations: 1mm Mn-crust						10.58031/KIEL0264GRB4201		

SO307 Dredge Station Details and Rock Description

SO307-DR27-1C	1. Rock Type: volcanic, moderately altered? 2. Size: 7,3 x 5 x 2 3. Shape / Angularity: angular 4. Color of cut surface: grey to red wine (merlot) color 5. Texture / Vesicularity: phyric, nonvesicular interior but highly vesiculed rim (scoriaceous) 6. Phenocrysts: plag, px? 7. Matrix: fine grained 8. Secondary Minerals: carbonates filling vesicles and veins, Mn 9. Encrustations: 1mm Mn-crust 10. Comment: Different lava type than 1A and 1B: vesicular, likely alkalic						10.58031/KIEL0264GRB5201		
SO307-DR27-2	1. Rock Type: Thick Mn crust 2. Size: 20 x 19 x 10 cm 3. Shape / Angularity: 4. Color of cut surface: 5. Texture / Vesicularity: 6. Phenocrysts: 7. Matrix: 8. Secondary Minerals: 9. Encrustations: 10. Comment: 9cm thick Mn rim growing from the inner part, some clasts are incorperated, mostly in the interior but some also near the boarder						10.58031/KIEL0264GRB6201		
SO307-DR27-3	1. Rock Type: Nucleation of Mn and carbonates 2. Size: 3. Shape / Angularity: 4. Color of cut surface: 5. Texture / Vesicularity: 6. Phenocrysts: 7. Matrix: 8. Secondary Minerals: 9. Encrustations: 10. Comment:						10.58031/KIEL0264GRB7201		

SO307-DR29

Northern MR, southern one of the two guyot-like seamounts (same as DR26, DR28); up the flank

Dredge on bottom UTC, hrs, °N, °E, depth m 17:51 30°00,390'S 46°03,065'E 1502

Dredge off bottom UTC, hrs, °N, °E, depth m 18:41 30°00,024'S 46°03,052'E 1206

total volume: few rocks

Comments:one large fragment of Plag-Ol-phyric pillow lava with quenched margin. No glass preserved

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR29-1	1. Rock Type: volcanic, moderately to strongly altered. 2. Size: 29 x 22 x 14 cm 3. Shape / Angularity: subangular 4. Color of cut surface: grey to brown. 5. Texture / Vesicularity: porphyritic, vesicular (<1%) 6. Phenocrysts: plag up to 10% <0.5 cm, fresh. Ol about 1-2%, < 0.2-0.3 cm, altered. 7. Matrix: hyalopilitic to intersertal (from rims to inner part of the pillow). Mostly microcrystalline, quite altered. Glass was not preserved. 8. Secondary Minerals: pervasive alteration in groundmass, ol completely altered, oxidation. 9. Encrustations: Mn coating on outer surface, some carbonate veins cutting inner parts of the pillow. 10. Comment: Ol-plag basalt, relatively altered but plagioclase may be fresh. Glass was not preserved and is replaced by palagonite, fragments of it in separate bag.	x	x		gl?		10.58031/KIEL0264GRB9201		

SO307-DR30

Northern MR, small ridge between the two large guyot-like seamounts, south facing slope

Dredge on bottom UTC, hrs, °N, °E, depth m 21:34 29°46,913'S 46°03,073'E 2167

Dredge off bottom UTC, hrs, °N, °E, depth m 22:16 29°46,076'S 46°03,053'E 1850

total volume: five rocks

Comments: two volcanic rocks, 2 Mn-crusts, 1 block of breccia with volcanic clasts.

SO307 Dredge Station Details and Rock Description

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR30-1	1. Rock Type: volcanic, altered 2. Size: 12 x 8 x 5 cm. 3. Shape / Angularity: rounded to angular 4. Color of cut surface: dark grey 5. Texture / Vesicularity: 5% vesicles/voids; filled with Mn or CaCO3, some veins/cracks. 6. Phenocrysts: N/A - aphyric 7. Matrix: fine grained matrix with pl and px 8. Secondary Minerals: Mn, palagonite (?), CaCO3, Fe-oxidation. 9. Encrustations: partly Mn-crusted <0.1 mm. 10. Comment: may be too altered for GC.	X	X				10.58031/KIEL0264GRCB201		
SO307-DR30-2	1. Rock Type: volcanic, moderately to strongly altered. 2. Size: 8 x 7 x 5 cm. 3. Shape / Angularity: subangular 4. Color of cut surface: grey to brown/yellow. 5. Texture / Vesicularity: Massive with rare phenocrysts. Vesicules ~5-7%, < 2mm filled with Mn. 6. Phenocrysts: Plag ~2-3%, < 2mm, fresh; Ol ~1%, < 2mm, altered. ~1%, < 2mm, 7. Matrix: fine grained matrix with pl and px 8. Secondary Minerals: Mn, palagonite (?), CaCO3, Fe-oxidation. 9. Encrustations: partly Mn-crusted <0.1 mm. 10. Comment: may be too altered for GC (?).	X	X				10.58031/KIEL0264GRCC201		
SO307-DR30-3	1. Rock Type: Mn crust 2. Size: Block A 34 x 28 x 25 cm. 3. Shape / Angularity 4. Color of cut surface: black 5. Texture / Vesicularity: 6. Phenocrysts: 7. Matrix: 8. Secondary Minerals: 9. Encrustations: 10. Comment: a large Mn crust including fragments of volcanic breccia and separate clasts.								
SO307-DR30-3A	1. Rock Type: a clast of volcanic rock from block A. 2. Size: 7 x 5 x 4 cm 3. Shape / Angularity: subangular 4. Color of cut surface: dark grey, brownish in central part. 5. Texture / Vesicularity: Massive, very rare vesicules (<1%) open. 6. Phenocrysts: no 7. Matrix: Microcrystalline. 8. Secondary Minerals: Mn precipitates. 9. Encrustations: Mn and calcium carbonate coatings on outer surfaces. 10. Comment: Likely the best sample for GC from this dredge.	X	X				10.58031/KIEL0264GRCD201		
SO307-DR30-3B	1. Rock Type: Clast of volcanic rock from block A. 2. Size: 6 x 4 x 3 cm. 3. Shape / Angularity: 4. Color of cut surface: 5. Texture / Vesicularity: 6. Phenocrysts: 7. Matrix: 8. Secondary Minerals: 9. Encrustations: 10. Comment: the clasts are similar to rocks described above (3A), more or less vesicular, and having variable degree of alteration. Some clasts may be relatively fresh but bulk analyses can be problematic because od small size.						10.58031/KIEL0264GRCE201		

SO307-DR30-3C	1. Rock Type: Fragments of volcanic breccia from block A. 2. Size: Clasts size from mm to ~5 cm. 3. Shape / Angularity: 4. Color of cut surface: 5. Texture / Vesicularity: 6. Phenocrysts: 7. Matrix: 8. Secondary Minerals: 9. Encrustations: 10. Comment:						10.58031/KIEL0264GRCF201		
SO307-DR30-4	1. Rock Type: A representative fragment of thick Mn crust. 2. Size: 17 x 13 x 8 cm 3. Shape / Angularity: 4. Color of cut surface: 5. Texture / Vesicularity: 6. Phenocrysts: 7. Matrix: 8. Secondary Minerals: 9. Encrustations: crust thickness ~ 8 cm. 10. Comment: Massive dense in the core, more porous toowards rim.						10.58031/KIEL0264GRCG201		

SO307-DR31

Northern MR, small ridge between the two large guyot-like seamounts, south facing slope east of DR30

Dredge on bottom UTC, hrs, °N, °E, depth m 01:36 29°46,040'S 46°03,094'E 2040

Dredge off bottom UTC, hrs, °N, °E, depth m 02:45 29°46,041'S 46°03,078'E 1883

total volume: ~seven rocks

Comments: Mn-crusts with volcanic clasts

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR31-1	1. Rock Type: volcanic, altered 2. Size: 11 x 7 x 4 cm. 3. Shape / Angularity: subangular 4. Color of cut surface: pink-ish grey 5. Texture / Vesicularity: vesicular (~15%, 4 mm x 1 mm). The vesicules are filled with zeolites and carbonates. Ol-phyric. 6. Phenocrysts: Ol (~1-2%, < 1 mm), two Px phenocrysts (<1%, < 1mm, fresh). 7. Matrix: well-crystallized matrix with ol+plag+px(?), oxidized. 8. Secondary Minerals: zeolites, Fe-oxides, carbonates filling vesicules and veins. 9. Encrustations: cm-thick Mn crust. 10. Comment: Fragment of lava was found as a block inside a large Mn crust , the sample may be too altered for GC, but could be used for TS.	X					10.58031/KIEL0264GRCK201		
SO307-DR31-2	1. Rock Type: volcanic, strongly altered. 2. Size: 22 x 10 x 15 cm. 3. Shape / Angularity: subrounded. 4. Color of cut surface: pink-ish grey. 5. Texture / Vesicularity: vesicular ~15%, 2 x 3 mm, filled with carbonates and zeolites. Ol-phyric. 6. Phenocrysts: Ol (~2-3%, < 1 mm), Plag (~1%, ~1 mm in length), one Px phenocryst (<1%, < 1mm, fresh). 7. Matrix: Same as sample DR31-1. 8. Secondary Minerals: Same as sample DR31-1. 9. Encrustations: thick centimetric Mn crusts. 10. Comment: Too altered and small for GC or TS.						10.58031/KIEL0264GRCM201		

SO307 Dredge Station Details and Rock Description

SO307-DR31-3	1. Rock Type: volcanic rock, altered. 2. Size: 9 x 5 x 2 cm. 3. Shape / Angularity: rounded 4. Color of cut surface: pink-ish grey 5. Texture / Vesicularity: 6. Phenocrysts: 7. Matrix: 8. Secondary Minerals: 9. Encrustations: 10. Comment: Same as samples DR31-1 and 2. This block of lava was within a 3-5 cm of Mn-crust.						10.58031/KIEL0264GRCN201		
SO307-DR31-4	1. Rock Type: sedimentary, carbonate. 2. Size: 10 x 6 x 4.5 cm 3. Shape / Angularity: subangular 4. Color of cut surface: light yellow to light orange. 5. Texture / Vesicularity: Massive, fine grained, with small angular grains of rock (microbreccia?) 6. Phenocrysts: N/A 7. Matrix: fine grained composed of bioclasts, CaCO3 cement. (bioclasts= round structures possibly forams). 8. Secondary Minerals: Fe-oxides (orange specks). 9. Encrustations: Mn coating 10. Comment: Microbreccia with angular fragments of igneous, sedimentary and bioclasts, also red and green jasper. Carbonate cement.						10.58031/KIEL0264GRCP201		
SO307-DR31-Mn	1. Rock Type: Mn-crust 2. Size: 11.5 x 8.5 x 7.5 cm. 3. Shape / Angularity: rounded. 4. Color of cut surface: black 5. Texture / Vesicularity: 6. Phenocrysts: 7. Matrix: 8. Secondary Minerals: 9. Encrustations: 10. Comment: representative Mn nodule of the dredge.						10.58031/KIEL0264GRCQ201		

SO307-DR33

NE rim of MR, lowest part of the plateau slope; NE facing slope to the Madagascar Basin

Dredge on bottom UTC, hrs, °N, °E, depth	04:39	28°04,504'S	049°18,60'E	4308
Dredge off bottom UTC, hrs, °N, °E, depth m	05:34	28°04,69'S	049°18,43'E	3916

total volume: 1 Rock

Comments:

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR33-1	1. Rock Type: Mn crust with millimetric fragments of rocks within it 2. Size: 11 x 7 x 7 cm 3. Shape / Angularity: rounded 4. Color of cut surface: black with orange veins 5. Texture / Vesicularity: massive 6. Phenocrysts: None; Fragments of altered igneous rocks (up 5mm in diameter) 7. Matrix: Mn & silicates (orange veins) 8. Secondary Minerals: silicate precipitates 9. Encrustations: Mn 10. Comment: only sample from this dredge, representative Mn-nodule						10.58031/KIEL0264GRCS201		

SO307-DR34

NE rim of MR, lowest part of the plateau slope; NE facing slope to the Madagascar Basin. Repeat of DR33 with slightly more westerly dredge direction

Dredge on bottom UTC, hrs, °N, °E, depth m	08:50	28°04,559'S	049°18,656'E	4320
Dredge off bottom UTC, hrs, °N, °E, depth m	09:53	28°04,580'S	049°18,378'E	3916

total volume: Few small Mn-crusted pebbles

Comments:

SO307 Dredge Station Details and Rock Description

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR34-1	1. Rock Type: Sedimentary (Mn-aggregate) 2. Size: Two pieces: 7 x 6 x 3.5 cm & 4 x 3.5 x 3 cm 3. Shape / Angularity: rounded 4. Color of cut surface: black with orange specks 5. Texture / Vesicularity: 6. Phenocrysts: 7. Matrix: 8. Secondary Minerals: 9. Encrustations: 10. Comment: Two pieces of Mn aggregate. Bioclasts cemented with Mn						10.58031/KIEL0264GRCU201		

SO307-DR35

NE rim of MR, NE facing slope to the Madagascar Basin, Middle part of NE-facing plateau slope

Dredge on bottom UTC, hrs, °N, °E, depth m 12:51 28°05,033'S 049°18,264'E 3791

Dredge off bottom UTC, hrs, °N, °E, depth m 13:45 28°04,878'S 049°18,051'E 3443

total volume: ca. 1/4 full

Comments:

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR35-1	1. Rock Type: Volcanic, moderately altered 2. Size: 11 x 9 x 6 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: grey with orange patches 5. Texture / Vesicularity: porphyritic, fine grained, vesicular (ca. 7%, mostly empty but partly filled with secondary minerals) 6. Phenocrysts: Plg (up to 5mm, very elongated, ca. 10%, sometimes with glomeritic clusters) 7. Matrix: microcrystalline, fine-grained 8. Secondary Minerals: Fe-oxides, Mn, other secondary minerals 9. Encrustations: thin (<1mm) Mn-crust 10. Comment:	X	X				10.58031/KIEL0264GRCW201		
SO307-DR35-2	1. Rock Type: Volcanic, slightly altered 2. Size: 10 x 9 x 6 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: brownish grey 5. Texture / Vesicularity: porphyritic, fine grained, large vesicles (up to 1,5 cm) partially filled with secondary minerals, vesicularity ca. 7% 6. Phenocrysts: Pl (up to 4mm, generally elongated, sometimes with glomeritic clusters, ca. 10%) 7. Matrix: microcrystalline 8. Secondary Minerals: Fe-oxides and others, filling vesicules, veins and small fractures 9. Encrustations: thin (<1mm) Mn-crust 10. Comment: similar to sample DR35-1	X	X				10.58031/KIEL0264GRCX201		
SO307-DR35-3	1. Rock Type: Volcanic, moderately to highly altered 2. Size: 9 x 9 x 5 cm 3. Shape / Angularity: subangular 4. Color of cut surface: grey with orange patches 5. Texture / Vesicularity: porphyritic, fine grained, large vesicles (up to 9mm, ca. 3%) 6. Phenocrysts: Pl (15%) occuring both as elongated (needle shape) and wider crystals, up to 3mm 7. Matrix: microcrystalline, fine grained 8. Secondary Minerals: Fe-oxides propagating from fractures 9. Encrustations: thin (<1mm) Mn-crust 10. Comment:	X	X				10.58031/KIEL0264GRCY201		

SO307 Dredge Station Details and Rock Description

SO307-DR-35-4	1. Rock Type: volcanic, moderately altered 2. Size: 16 x 8 x 6 cm 3. Shape / Angularity: sub-rounded 4. Color of cut surface: grey to orange 5. Texture / Vesicularity: porphyritic, fine grained, large vesicles (up to 9 mm, 3%) 6. Phenocrysts: Plg (15%) occuring both as elongated (needle shaped) and wider crystals, up to 3mm 7. Matrix: microcrystalline, fine-grained 8. Secondary Minerals: Fe-oxides and some secondary minerals inside the vesicles 9. Encrustations: very thin (<1mm) Mn-crust 10. Comment: similar to the previous samples but seems more altered	x					10.58031/KIEL0264GRC2201		
SO307-DR35-5	1. Rock Type: volcanic, moderately altered 2. Size: 9 x 9 x 4 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: grey with orange patches 5. Texture / Vesicularity: porphyritic, fine-grained, vesicular (up to 10%), vesicles up to 8mm. Some are partically filled with Fe-oxides and other secondary minerals. 6. Phenocrysts: Pl (15%) sometimes in glomerophyric clusters, up to 3mm 7. Matrix: microcrystalline 8. Secondary Minerals: Fe-oxides, Mn (?), especially along fractures 9. Encrustations: thin coating of Mn in some parts of the sample 10. Comment: similar to the previous sample						10.58031/KIEL0264GRC2201		
SO307-DR35-6	1. Rock Type: volcanic, moderately altered 2. Size: 18 x 14 x 12 3. Shape / Angularity: subrounded 4. Color of cut surface: grey with orange patches 5. Texture / Vesicularity: porphyritic, vesicular (<1%), some vesicles up to 4mm, some filled with Mn, Fe-oxides and other secondary minerals 6. Phenocrysts: Pl <3% (<3mm), altered 7. Matrix: fine-grained, Pl, Px 8. Secondary Minerals: Mn, Fe-oxides, some secondary minerals 9. Encrustations: Mn-crust < 1mm, partly covering the outside 10. Comment:	x	x				10.58031/KIEL0264GRC3201		
SO307-DR35-7	1. Rock Type: volcanic, moderately altered 2. Size: 11 x 10 x 3 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: grey with orange patches 5. Texture / Vesicularity: similar to sample DR35-5 but fine to medium grained, Ol phenos (<5%, <1mm) altered 6. Phenocrysts: similar to sample DR35-5 7. Matrix: similar to sample DR35-5 8. Secondary Minerals: similar to sample DR35-5 9. Encrustations: Mn-crust <0,1mm 10. Comment:						10.58031/KIEL0264GRC4201		
SO307-DR35-8	1. Rock Type: volcanic, altered 2. Size: 11 x 10 x 3 cm 3. Shape / Angularity: subrounded to angular 4. Color of cut surface: grey with orange patches, some dark-grey areas 5. Texture / Vesicularity: porphyritic, vesicles 7%, filled with Mn. Fractures, some filled with CaCO3 6. Phenocrysts: Pl <10%, <3mm, some glomerocrystic 7. Matrix: fine-grained, strongly altered, Px? 8. Secondary Minerals: Mn, Fe-oxides, CaCO3 9. Encrustations: Mn-crust (partly) <0,1mm 10. Comment: some plg fresh enough for Ar/Ar?			?			10.58031/KIEL0264GRC5201		

SO307 Dredge Station Details and Rock Description

SO307-DR35-9	1. Rock Type: volcanic, altered 2. Size: 10 x 6 x 4 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: grey with orange patches, black spots 5. Texture / Vesicularity: porphyritic, vesicles <1%, fractures 6. Phenocrysts: Pl <1%, <2mm 7. Matrix: fine to medium grained, Pl, Px, Fe-altered matrix 8. Secondary Minerals: Mn in vesicles and fractures, Fe-oxidation 9. Encrustations: partly Mn-encrusted <0,1mm 10. Comment:	x	x				10.58031/KIEL0264GRC6201		
SO307-DR35-10	1. Rock Type: volcanic, slightly to moderately 2. Size: 10 x 5 x 3 cm 3. Shape / Angularity: angular 4. Color of cut surface: grey 5. Texture / Vesicularity: porphyritic, filled voids (<5%) with Mn 6. Phenocrysts: Pl (<10%) <5mm, altered, some fresh?, glomeroclastic, Ol (altered) <2% (<1mm) 7. Matrix: fine-grained: Pl, Px, Ol 8. Secondary Minerals: Mn, Fe-oxidation 9. Encrustations: partly Mn-encrusted <0,1mm 10. Comment: quite fresh, good for GC	x	x	?			10.58031/KIEL0264GRC7201		
SO307-DR35-11	1. Rock Type: volcanic, very altered 2. Size: 10 x 9 x 7 cm 3. Shape / Angularity: angular to subrounded 4. Color of cut surface: grey to dark grey 5. Texture / Vesicularity: porphyritic, vesicles (<5%, <3mm), filled with Mn, fractures 6. Phenocrysts: strongly altered, Pl (<3%, <2mm), strongly altered Ol? 7. Matrix: microcrystalline 8. Secondary Minerals: Mn, Fe-oxidation 9. Encrustations: thin Mn-crust <0,1mm, partly 10. Comment:						10.58031/KIEL0264GRC8201		
SO307-DR35-12	1. Rock Type: volcanic, altered 2. Size: 15 x 10 x 7 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: brownish grey 5. Texture / Vesicularity: massive, no vesicles 6. Phenocrysts: Pl 5%, ≤3mm, altered?, Ol 2-3% ≤1mm, altered 7. Matrix: medium grained 8. Secondary Minerals: pervasive alteration of Gm, though Pl maybe fresh, iddingsite after Ol 9. Encrustations: Mn film on other surface <1mm 10. Comment:						10.58031/KIEL0264GRC9201		
SO307-DR35-13	1. Rock Type: volcanic, strongly altered 2. Size: 12 x 9 x 6 cm 3. Shape / Angularity: 4. Color of cut surface: 5. Texture / Vesicularity: porphyritic, vesicular 5% 6. Phenocrysts: 7. Matrix: 8. Secondary Minerals: 9. Encrustations: 10. Comment: similar to other samples of the dredge						10.58031/KIEL0264GRDA201		
SO307-DR35-14	1. Rock Type: volcanic, strongly altered 2. Size: 11 x 9 x 7 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: reddish-grey with white and black spots 5. Texture / Vesicularity: phyric, vesicles 5%, irregular in shape, up to 1cm diameter 6. Phenocrysts: Pl 5% ≤2mm, likely 7. Matrix: microcrystalline, ophitic? 8. Secondary Minerals: Mn in voids, pervasive alteration in Gm 9. Encrustations: Mn coating on outer surface 10. Comment:						10.58031/KIEL0264GRDB201		

SO307 Dredge Station Details and Rock Description

SO307-DR35-15	1. Rock Type: volcanic, altered 2. Size: 9 x 8 x 3 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: greenish-grey 5. Texture / Vesicularity: phyric 6. Phenocrysts: rare Pl 2-3% ≤ 2mm, Ol(?) 1-2% ≤ 1mm, altered 7. Matrix: fine crystalline 8. Secondary Minerals: pervasive alteration 9. Encrustations: thin Mn coating, Mn in veins 10. Comment:						10.58031/KIEL0264GRDC201		
SO307-DR35-16	1. Rock Type: volcanic, altered 2. Size: 20 x 11 x 10 cm 3. Shape / Angularity: subangular 4. Color of cut surface: dark grey with yellow-grey and black bands 5. Texture / Vesicularity: phyric, rare vesicular <1%, vesicles irregular 6. Phenocrysts: Pl 5% ≤5mm, altered? 7. Matrix: fine grained 8. Secondary Minerals: pervasive alteration in Gm 9. Encrustations: Mn in Gm and in veins, oxidation along cracks 10. Comment:						10.58031/KIEL0264GRDD201		
SO307-DR35-17	1. Rock Type: volcanic, strongly altered 2. Size: 13 x 11 x 9 cm 3. Shape / Angularity: subangular 4. Color of cut surface: dark greenish-grey with black spots and white elongated stripes 5. Texture / Vesicularity: phyric, strongly vesicular 10-15%, vesicles round 1-3 mm in diameter 6. Phenocrysts: Pl ≤4mm, 10%, altered 7. Matrix: fine grained, altered 8. Secondary Minerals: Mn or iddingsite in void and in Gm, pervasive alteration 9. Encrustations: thin Mn-coating 10. Comment: bad rock						10.58031/KIEL0264GRDE201		
SO307-DR35-18	1. Rock Type: volcanic, slightly altered 2. Size: 9 x 8 x 3 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: grey to dark grey 5. Texture / Vesicularity: non-vesicular, aphyric, fractures, 1 vesicle <2mm 6. Phenocrysts: none 7. Matrix: fine-grained, Pl-Px-Ol bearing (some Fe-alteration) 8. Secondary Minerals: Mn in one vesicle, Fe-alteration in fractures 9. Encrustations: Mn-crust (partly) <0,1mm 10. Comment: quite fresh, good for GC	X	X				10.58031/KIEL0264GRDF201		
SO307-DR35-19	1. Rock Type: volcanic, slightly altered 2. Size: 9 x 8 x 3 cm 3. Shape / Angularity: subangular 4. Color of cut surface: dark grey 5. Texture / Vesicularity: non-vesicular 6. Phenocrysts: aphyric 7. Matrix: fine-grained: Pl-Px-Ol (Fe-altered Ol) 8. Secondary Minerals: Mn, Fe-oxides, Mn in fractures 9. Encrustations: Mn-crust (partly, <0,1 mm) 10. Comment: quite fresh, good for GC	X	X				10.58031/KIEL0264GRDG201		
SO307-DR35-20	1. Rock Type: volcanic, moderately altered 2. Size: 8 x 8 x 4 cm 3. Shape / Angularity: subangular 4. Color of cut surface: dark grey with orange patches 5. Texture / Vesicularity: non-vesicular, 1 vesicle ca. 2 cm filled with Fe-oxidation 6. Phenocrysts: aphyric 7. Matrix: fine-grained+, altered (Fe-oxidized Ol?), Pl-Ol-Px bearing 8. Secondary Minerals: Fe-oxidation, Mn 9. Encrustations: Mn-crust (partly) < 0,1mm 10. Comment:	X	X				10.58031/KIEL0264GRDH201		

SO307 Dredge Station Details and Rock Description

SO307-DR35-21	1. Rock Type: volcanic, altered 2. Size: 13,5 x 7 x 4 3. Shape / Angularity: subangular 4. Color of cut surface: dark grey 5. Texture / Vesicularity: non-vesicular 6. Phenocrysts: aphyric 7. Matrix: fine grained, PL-Ol-Px-bearing, altered Olivine (Fe oxidizes)?, Pl <2mm 8. Secondary Minerals: Fe-oxidation 9. Encrustations: Mn-crust <0.1mm 10. Comment: good for GC, quite fresh!	X	X				10.58031/KIEL0264GRDK201		
SO307-DR35-22	1. Rock Type: volcanic, moderately altered 2. Size: 16 x 12 x 8 cm 3. Shape / Angularity: - 4. Color of cut surface: dark grey with orange patches 5. Texture / Vesicularity: <1%, <2mm, aphyric, fractures 6. - 9. similar to DR35-21 10. Comment: -						10.58031/KIEL0264GRDM201		
SO307-35-23	1. Rock Type: volcanic, strongly altered 2. Size: 10 x 8 x 6 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: grey with white fracture to greenish grey 5. Texture / Vesicularity: non-vesicular, fractures, alteration horizon 6. Phenocrysts: aphyric 7. Matrix: fine grained, Plg strongly altered 8. Secondary Minerals: Mn, Fe-oxidation minerals, CaCO3 in fractures 9. Encrustations: partly Mn-crusted 0.1mm 10. Comment: matrix looks fresh though						10.58031/KIEL0264GRDN201		
SO307-DR35-24	1. Rock Type: volcanic, strongly altered 2. Size: 16 x 10 x 7 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: grey to drak grey 5. Texture / Vesicularity: non-vesicular 6. Phenocrysts: aphyric 7. Matrix: Plg-matrix with dark phases (altered), Px ? 8. Secondary Minerals: Mn, Fe-oxidized fractures 9. Encrustations: Mn-crust partially (<0.1mm) 10. Comment: -						10.58031/KIEL0264GRDP201		
SO307-DR35-25	1. Rock Type: volcanic, strongly altered 2. Size: 15 x 9 x 7 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: grey with dark and red spots 5. Texture / Vesicularity: Mn-filled vesicules, <10%, <8mm, fractures 6. Phenocrysts: aphyric 7. Matrix: altered 8. Secondary Minerals: Mn, Fe-oxidized 9. Encrustations: Mn-crust partially 10. Comment: -						10.58031/KIEL0264GRDQ201		
SO307-DR35-26	1. Rock Type: volcanic, moderately altered 2. Size: 12 x 7 x 6 cm 3. Shape / Angularity: angular 4. Color of cut surface: dark grey with brownish areas 5. Texture / Vesicularity: voids (<1%, <2mm), fractures, porphyritic 6. Phenocrysts: Plg (7%, <3mm) strongly altered 7. Matrix: fine grained, Plg-bearing 8. Secondary Minerals: Mn in voids, CaCO3, Fe-alteration 9. Encrustations: partially Mn-crust <0.1 mm 10. Comment: -						10.58031/KIEL0264GRDR201		

SO307 Dredge Station Details and Rock Description

SO307-DR35-27	1. Rock Type: volcanic, moderately altered 2. Size: 9 x 6 x 5 cm 3. Shape / Angularity: angular 4. Color of cut surface: dark grey with orange patches 5. Texture / Vesicularity: vesicular ca. 7%, filled wiith Mn and oxidation horizon (voids), fractures 6. Phenocrysts: aphyric 7. Matrix: fine grained, Plg-Px-Ol (Px and Ol altered, <10%), Plg ca. 90% altered 8. Secondary Minerals: Mn and Fe-oxides 9. Encrustations: partially Mn-crust <0.1 mm 10. Comment: -						10.58031/KIEL0264GRDS201		
SO307-DR35-28	1. Rock Type: volcanic, moderately altered 2. Size: from large block >25 cm 3. Shape / Angularity: angular 4. Color of cut surface: grey with orange alteration horizon (ca. 2 cm) 5. Texture / Vesicularity: vesicular ca. 10%, filled with Mn, fractures (Mn-filled), porphyritic 6. Phenocrysts: Plg-phenocrysts (<1%, <3mm) altered Ol? 7. Matrix: fine to coarse grained, Plg-bearing 8. Secondary Minerals: Mn, Fe-oxidation of matrix and outer parts (around 2cm rim of rock) 9. Encrustations: Mn-crust ca. 1 mm 10. Comment: -						10.58031/KIEL0264GRDT201		
SO307-DR35-29	1. Rock Type: volcanic, strongly altered 2. Size: 9 x 6 x 4 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: grey with orange patches 5. Texture / Vesicularity: vesicules (<1%, <0,5 mm), big vesicule ca. 3 cm filled with Mn, red secondary minerals 6. Phenocrysts: <1% phenocrysts: Plg (<2mm), Ol (<1mm)-porphyritic 7. Matrix: coarse grained, Plg, Px (strongly altered) 8. Secondary Minerals: Mn, Fe-oxides 9. Encrustations: partially Mn-crusted <0.1 mm 10. Comment: some fresh parts but in general very altered						10.58031/KIEL0264GRDU201		
SO307-DR35-30	1. Rock Type: volcanic, slightly altered 2. Size: 11 x 9 x 6 cm 3. Shape / Angularity: subangular 4. Color of cut surface: light grey with orange patches, fractures 5. Texture / Vesicularity: voids (filled with Mn, Fe-oxides), ca. 2%, <1mm 6. Phenocrysts: aphyric but 3 Cpx (<3mm, altered) 7. Matrix: coarse grained, microcrystalline 8. Secondary Minerals: Mn, Fe-oxides filling voids and fractures 9. Encrustations: partially Mn-crusted <0.1 mm 10. Comment: matrix fresh enough for GC	X	X				10.58031/KIEL0264GRDV201		
SO307-DR35-31	1. Rock Type: volcanic, slightly altered 2. Size: 9 x 6 x 5 cm 3. Shape / Angularity: subangular 4. Color of cut surface: grey 5. Texture / Vesicularity: non-vesicular, aphyric 6. Phenocrysts: - 7. Matrix: microcrystalline with Plg, Ol (altered), some Px but Mn-filled 8. Secondary Minerals: Mn, Fe-oxides 9. Encrustations: Mn-crust ca. 0,5 mm 10. Comment: good for GC	X	X				10.58031/KIEL0264GRDW201		

SO307 Dredge Station Details and Rock Description

SO307-DR35-32	1. Rock Type: volcanic, altered 2. Size: 10 x 7 x 5 cm 3. Shape / Angularity: subangular 4. Color of cut surface: grey with orange fractures 5. Texture / Vesicularity: aphyric 6. Phenocrysts: - 7. Matrix: fine grained with Plg, Ol (altered), few Cpx? 8. Secondary Minerals: some bigger minerals from matrix are replaced by CaCO3, Fe-alteration in fractures, Mn, Fe-oxides 9. Encrustations: Mn-crust only on few parts < 0,1 mm 10. Comment: -						10.58031/KIEL0264GRDX201		
SO307-DR35-33	1. Rock Type: volcanic, strongly altered 2. Size: 11.5 x 6 x 4 cm 3. Shape / Angularity: subangular 4. Color of cut surface: grey to brown 5. Texture / Vesicularity: non-vesicular (vesicule ca. 1mm filled with Mn), fractures 6. Phenocrysts: aphyric 7. Matrix: very altered, Plg? 8. Secondary Minerals: Mn, Fe-oxides 9. Encrustations: Mn-crust <0.1 mm 10. Comment: -						10.58031/KIEL0264GRDY201		
SO307-DR35-34	1. Rock Type: volcanic, moderately altered 2. Size: 10 x 6 x 5 cm 3. Shape / Angularity: angular 4. Color of cut surface: grey to grey-green, orange and red patches 5. Texture / Vesicularity: vesicules <1mm, 7% 6. Phenocrysts: Ol? (very altered, <2%) 7. Matrix: microcrystalline, phyric, Plg (altered) 8. Secondary Minerals: Mn, Fe-oxides, red secondary minerals 9. Encrustations: Mn-crust <0.1mm 10. Comment: -						10.58031/KIEL0264GRDZ201		
SO307-DR35-35	1. Rock Type: volcanic, moderately altered 2. Size: 8 x 6 x 3 cm 3. Shape / Angularity: subangular 4. Color of cut surface: grey to dark grey with dark spots 5. Texture / Vesicularity: vesicular (<5mm, <5%), voids filled with Mn and Fe-oxides, fractures 6. Phenocrysts: Plg-phyric (<5%, <3mm), altered Cpx (<2mm, <1%) 7. Matrix: microcrystalline 8. Secondary Minerals: fractures and voids filled with Mn, Fe-oxides 9. Encrustations: partially Mn-crusted <0.1mm 10. Comment: maybe not fresh enough for GC!	X	X				10.58031/KIEL0264GRD2201		
SO307-DR35-36	1. Rock Type: volcanic, moderately altered 2. Size: 10 x 6 x 4 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: grey with dark spots 5. Texture / Vesicularity: vesicular (<3cm, 7%), some elongated, filled with Fe-oxides (in the core) and Mn (at the rim) 6. Phenocrysts: Plg-phyric (<5%, <3mm), altered Px?, altered Ol? 7. Matrix: microcrystalline 8. Secondary Minerals: Mn and Fe-oxides in voids and fracturea 9. Encrustations: partially Mn-crusted <0.1mm 10. Comment: -	X	X				10.58031/KIEL0264GRD3201		

SO307 Dredge Station Details and Rock Description

SO307-DR35-37	1. Rock Type: volcanic, strongly altered 2. Size: 11 x 9 x 4 cm 3. Shape / Angularity: rounded 4. Color of cut surface: grey to rosé-grey :) 5. Texture / Vesicularity: vesicular (<1cm, ca. 10%, filled with CaCO3) 6. Phenocrysts: aphyric 7. Matrix: strongly altered (Plg?), microcrystalline 8. Secondary Minerals: Mn, Fe-oxides, CaCO3 in voids 9. Encrustations: Mn-crust <0.1mm 10. Comment: -						10.58031/KIEL0264GRD4201		
SO307-DR35-38	1. Rock Type: volcanic, strongly altered 2. Size: 9 x 8 x 4 cm 3. Shape / Angularity: angular 4. Color of cut surface: grey to brown 5. Texture / Vesicularity: vesicular (<2mm, <7%, filled with Mn) and Fe-oxides filling voids and fractures 6. Phenocrysts: Plg-phyric (<5%, <3mm, altered), some other altered phenocrysts, Px? 7. Matrix: strongly altered, microcrystalline 8. Secondary Minerals: Mn, Fe-oxides 9. Encrustations: partial Mn-crust <0.1mm 10. Comment: -						10.58031/KIEL0264GRD5201		
SO307-DR35-39	1. Rock Type: volcanic, strongly altered 2. Size: 17 x 12 x 10 cm 3. Shape / Angularity: angular 4. Color of cut surface: grey to orange/brown - core is more orange 5. Texture / Vesicularity: vesicular (<2mm, ca. 15%). Vesicules in core filled with CaCo3, rim of the rock (ca. 2cm) vesicules not filled, only Fe-oxidized 6. Phenocrysts: aphyric 7. Matrix: microcrystalline, strongly altered 8. Secondary Minerals: Mn, Fe-oxides, secondary mineral: red colored, CaCO3 9. Encrustations: Mn-crust <0.1mm 10. Comment: -						10.58031/KIEL0264GRD6201		
SO307-DR35-40	1. Rock Type: volcanic, strongly altered 2. Size: 13 x 10 x 10 cm 3. Shape / Angularity: angular 4. Color of cut surface: dark grey to redish brown 5. Texture / Vesicularity: vesicular (<3mm, ca. 10%) some filled with Mn, fractures with Mn and Fe-oxides 6. Phenocrysts: aphyric 7. Matrix: fine-grained: Pl (strongly altered) 8. Secondary Minerals: Mn, Fe-oxides, CaCO3 in some vesicules 9. Encrustations: partial Mn-crust <3cm 10. Comment: -						10.58031/KIEL0264GRD7201		
SO307-DR35-41	1. Rock Type: volcaniclastic, strongly altered 2. Size: 22 x 17 x 10 cm 3. Shape / Angularity: rounded 4. Color of cut surface: greenish with white spots 5. Texture / Vesicularity: few vesicules/porosity (might be due to strong alteration) 6. Phenocrysts: clasts of volcanics in matrix 7. Matrix: coarse grained- too altered to say 8. Secondary Minerals: white secondary minerals (no CaCO3) 9. Encrustations: partly Mn-crust <0.1mm 10. Comment: -						10.58031/KIEL0264GRD8201		

SO307 Dredge Station Details and Rock Description

SO307-DR35-42	1. Rock Type: volcaniclastic 2. Size: 8 x 6 x 4 cm 3. Shape / Angularity: sub-rounded 4. Color of cut surface: orange 5. Texture / Vesicularity: non-vesicular 6. Phenocrysts: 7. Matrix: matrix with volcanic clasts, strongly altered, rounded to angular 8. Secondary Minerals: strongly Fe-Oxidized 9. Encrustations: partly Mn crusted (<0.1mm), Fe oxidation 10. Comment: -						10.58031/KIEL0264GRD9201		
SO307-DR35-43	1. Rock Type: volcaniclastic, strongly altered 2. Size: 8 x 6 x 4 cm 3. Shape / Angularity: sub-rounded 4. Color of cut surface: beige 5. Texture / Vesicularity: non-vesicular, fractures with Mn 6. Phenocrysts: - 7. Matrix: strongly altered matrix: Fe-oxidized volcanic clasts-minerals (rounded to angular clasts) 8. Secondary Minerals: Mn, Fe-Oxides, more secondary minerals (brown, white and red) 9. Encrustations: partly Mn crusted (<1mm) 10. Comment: -						10.58031/KIEL0264GREA201		
SO307-DR35-44	1. Rock Type: volcaniclastic, strongly altered 2. Size: 17 x 13 x 12 cm 3. Shape / Angularity: sub-angular 4. Color of cut surface: red/brown red 5. Texture / Vesicularity: non-vesicular 6. Phenocrysts: 7. Matrix: strongly altered, red matrix, Mn altered clasts, coarse grained, rounded to angular clasts (volcanic) 8. Secondary Minerals: Mn, Fe-Oxides 9. Encrustations: partly Mn crusted (<1mm) 10. Comment: -						10.58031/KIEL0264GREB201		

SO307-DR36

NE rim of MR, NE facing slope to the Madagascar Basin, upper part of slope

Dredge on bottom UTC, hrs, °N, °E, depth m	16:50	28°04,50'S	049°17,27'E	3276
Dredge off bottom UTC, hrs, °N, °E, depth m	18:00	28°04,83'S	049°17,27'E	2882

total volume: ca. 1/4 full

Comments: mainly igneous, some volcaniclastics, one huge block of mudstone and some fossiliferous carbonates. ***Note:*** *4 different groups in this dredge: 1) from sample 1 to 7; composed of Ol-phyric basalts, variable grain size, 2) from sample 8 to 19, composed of Plag-phyric lavas, less phenocrysts of Olivine and microcrystalline matrix, oxidized groundmass. They seem possibly subaerial with a lot of oxidation and various amount of vesicles. 3) sample 20 to 22, volcanoclastic, pyroclastic (?), 4) sedimentary cover: carbonate and sandstone samples*

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR36-1	1. Rock Type: volcanic, moderately altered 2. Size: 13 x 9 x 7 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: dark grey 5. Texture / Vesicularity: massive, Ol-phyric (ca. 15%) 6. Phenocrysts: Ol (ca. 15 %, ~1 mm in diameter), Plag (5%, < 1mm in length) 7. Matrix: well crystallized matrix, Plag + Ol + Magnetite (?), fine-grained 8. Secondary Minerals: Olivines entirely replaced by Fe-oxides, iddingsite, veins filled with Fe-oxides, Mn 9. Encrustations: Mn coating < 1mm thick, some carbonates coating as well 10. Comment: freshest sample of the group, the matrix seems well-crystallized and moderately altered, may be good for Ar-Ar dating	x	x	may be a good one for Ar/Ar dating			10.58031/KIEL0264GRED201		

SO307 Dredge Station Details and Rock Description

SO307-DR36-2	1. Rock Type: volcanic, moderately altered 2. Size: 12 x 10 x 9 cm 3. Shape / Angularity: subangular 4. Color of cut surface: dark grey with orange specks 5. Texture / Vesicularity: massive, OL-physric (15 %, 1 mm in diameter, up to 4 mm in length) 6. Phenocrysts: Ol (15 %, 1mm in diameter), Plag (~2 %, 1 mm in length) 7. Matrix: same as 1, fine grained, well crystalized 8. Secondary Minerals: same as 1 9. Encrustations: 1 mm crust of Mn coating 10. Comment:	x	x				10.58031/KIEL0264GREE201		
SO307-DR36-3	1. Rock Type: volcanic, moderately altered 2. Size: 14 x 9 x 11.5 cm 3. Shape / Angularity: subangular 4. Color of cut surface: dark grey 5. Texture / Vesicularity: massive, aphyric 6. Phenocrysts: 1 Pl, ~3mm length, less than 1 % 7. Matrix: same as sample 1 and 2, but maybe finer 8. Secondary Minerals: same as sample 1 9. Encrustations: 2 mm thick Mn crust 10. Comment: seems to have the same composition as 1 and 2 , but it is fine-grained, aphyric, well-crystallized. The same note on sample 1 about Ar/Ar applies to this sample			may be a good one for Ar/Ar dating			10.58031/KIEL0264GREF201		
SO307-DR36-4	1. Rock Type: volcanic, moderately altered 2. Size: 15 x 10 x 7.5 cm 3. Shape / Angularity: subangular 4. Color of cut surface: dark grey 5. Texture / Vesicularity: massive, porphyritic, ~ 20 % of Ol, ~ 5 % Pl 6. Phenocrysts: Ol (25 %, ~1 mm, altered), Plag (~5 %, ~2mm length, fairly fresh) 7. Matrix: well crystsllized, fine grained, composed of Ol + Pl + Opaque crystals (maybe magnetite) 8. Secondary Minerals: like the samples 1 to 3 before 9. Encrustations: like the samples 1 to 3 10. Comment: same as previous samples but a little bit coarser						10.58031/KIEL0264GREG201		
SO307-DR36-5	1. Rock Type: volcanic rock, moderately altered 2. Size: 27 x 18 x 6 cm 3. Shape / Angularity:subangular flat 4. Color of cut surface: dark grey 5. Texture / Vesicularity: massive, equigranular, medium grained 6. Phenocrysts: - 7. Matrix: microdoleritic, Ol (~20-30 %), Plag (~50-60%), black crystals (Magnetite ?, ~20 %), all minerals < 1mm 8. Secondary Minerals: same as previous samples 9. Encrustations: same as previous samples 10. Comment: compostition is similar to previous samples, but the texture indicates it may be an	x	x	may be a good one for Ar/Ar dating			10.58031/KIEL0264GREH201		
SO307-DR36-6	1. Rock Type: volcanic, altered 2. Size: 14 x 9 x 6 cm 3. Shape / Angularity: sub-angular 4. Color of cut surface: dark grey with orange specs 5. Texture / Vesicularity: massive, porphyritic with Ol crystals (~30-35%), ~1mm in diameter 6. Phenocrysts: Ol (1mm, 30-35%, completely altered to iddingsite) 7. Matrix: well-crystalized, composed of Ol-pl-cpx?-magnetite; fine grained. 8. Secondary Minerals: same as previous samples 9. Encrustations: oxidation coating (orange to redish)						10.58031/KIEL0264GREK201		

SO307 Dredge Station Details and Rock Description

SO307-DR36-7	1. Rock Type: volcanic, altered 2. Size: 12 x 10.5 x 3.5 cm 3. Shape / Angularity: sub-angular-subrounded 4. Color of cut surface: dark grey 5. Texture / Vesicularity: massive, Pl-phyric (~2-3%), 2-3 mm in lenght. 6. Phenocrysts: Pl (2-3%, 2-3 mm) 7. Matrix: well-crystalized, fine grained, same as the other samples 8. Secondary Minerals: same as previous samples 9. Encrustations: same as previous samples 10. Comment: last sample from group 1 and the						10.58031/KIEL0264GREM201		
SO307-DR36-8	1. Rock Type: volcanic, moderately altered 2. Size: 25.5 x 15 x 7.5 cm 3. Shape / Angularity: sub-angular 4. Color of cut surface: light grey 5. Texture / Vesicularity: 1% vesicules filled with secondary minerals, Pl-phyric (ca. 2%, 2mm) 6. Phenocrysts: very rare, ca. 2% Pl, 2mm, completely altered 7. Matrix: well-crystalized, very fine grained, microcrystaline (no glass), some Pl lattices are evident 8. Secondary Minerals: Pl altered to clay minerals, Fe-oxides impregnating the ground mass and in some veins 9. Encrustations: very thin Mn-coating, some Fe-oxides (orange) 10. Comment: this is the freshest sample of group 2, best candidate for GC or dating	x	x	maybe			10.58031/KIEL0264GREN201		
SO307-DR36-9	1. Rock Type: volcanic, moderately altered 2. Size: 10 x 5.5 x 6 cm 3. Shape / Angularity: sub-rounded 4. Color of cut surface: light grey 5. Texture / Vesicularity: 1% vesicules, <1mm, filled with Fe-oxides, Pl-phyric (~5%, 1mm, needle shape), Ol (<1mm, ~3%, completely altered) 6. Phenocrysts: Pl (5%, 1mm), Ol (<1mm, ~3%, completely altered) 7. Matrix: well-crystalized, very fine grained, microcrystaline 8. Secondary Minerals: alteration: Fe-oxides, iddingsite in the Ol, clay minerals on the Pl 9. Encrustations: same as sample 8 10. Comment: same texture and composition as sample 8 (at least similar)	x	x				10.58031/KIEL0264GREP201		
SO307-DR36-10	1. Rock Type: volcanic, moderately altered 2. Size: 8 x 11 x 7 cm 3. Shape / Angularity: sub-angular 4. Color of cut surface: light grey to brownish at the rims 5. Texture / Vesicularity: massive, Pl-phyric (3-4%), Ol-phyric (~1%) 6. Phenocrysts: Pl (3-4%, 3mm, acicular and completely altered), Ol (<1mm, ~1%, completely altered to iddingsite) 7. Matrix: well-crystalized, very fine grained, microcrystaline 8. Secondary Minerals: alteration: Fe-oxides, iddingsite in the Ol, clay minerals on the Pl 9. Encrustations: same as sample 8 10. Comment:						10.58031/KIEL0264GREQ201		
SO307-DR36-11	1. Rock Type: volcanic, altered 2. Size: 14 x 9 x 11 cm 3. Shape / Angularity: sub-angular 4. Color of cut surface: brown to greyish 5. Texture / Vesicularity: vesicular (ca. 5%, <1mm, filled with oxides and Mn), Pl-phyric (2%, completely altered to clays, 3mm) 6. Phenocrysts: Pl (2%, 3mm) 7. Matrix: same as previous but more oxidized 8. Secondary Minerals: alteration: Fe-oxides (orange) and Mn inside the vesicules 9. Encrustations: same as previous samples 10. Comment: more vesicules than the previous samples and more oxidized						10.58031/KIEL0264GRER201		

SO307 Dredge Station Details and Rock Description

SO307-DR36-12	1. Rock Type: volcanic, moderately altered 2. Size: 18 x 8 x 8 cm 3. Shape / Angularity: sub-angular 4. Color of cut surface: light grey 5. Texture / Vesicularity: same vesicularity as previous (1%, <1mm, filled) 6. Phenocrysts: Pl (elongated, needle like, 2%, 2mm), cluster of orange minerals (Ol?) 1.4 cm x 1.6 cm, completely altered (xenolith? dunite? it has a regular rectangular shape, 1-2%) 7. Matrix: well crystalized, very fine-grained, microcrystaline 8. Secondary Minerals: oxides in the phenocrysts and matrix, Pl replaced by clays 9. Encrustations: thin Mn coating 10. Comment: -						10.58031/KIEL0264GRES201		
SO307-DR36-13	1. Rock Type: volcanic, moderately altered 2. Size: 23 x 19 x 14 cm 3. Shape / Angularity: sub-angular 4. Color of cut surface: light grey 5. Texture / Vesicularity: massive, Plg-phyric (3%, clusters of 3mm), Ol (<1mm, 1%), Plg (3mm, <1%) 6. Phenocrysts: Plg, Px, Ol (see above), Ol completely altered 7. Matrix: well crystalized, very fine-grained, microcrystaline 8. Secondary Minerals: Fe-oxides impregnating groundmass -> some portions are more orange, and in veins. 9. Encrustations: thin Mn coating 10. Comment: looking under the bino, it is apparent that this and sample 19 are similar, only different textures. Sample 19 should belong to this group	X	X				10.58031/KIEL0264GRET201		
SO307-DR36-14	1. Rock Type: volcanic, altered 2. Size: 9 x 10 x 7 cm 3. Shape / Angularity: rounded 4. Color of cut surface: red 5. Texture / Vesicularity: massive 6. Phenocrysts: - 7. Matrix: groundmass completely oxidizes but still looks medium-grained 8. Secondary Minerals: Oxides 9. Encrustations: up to 5mm thick Mn-crust 10. Comment: -						10.58031/KIEL0264GREU201		
SO307-DR36-15	1. Rock Type: volcanic, altered 2. Size: 10 x 7 x 7 cm 3. Shape / Angularity: sub-rounded 4. Color of cut surface: red 5. Texture / Vesicularity: massive 6. Phenocrysts: apparent but hard to recognize. it may have been ol-phyric due to some of the shapes 7. Matrix: groundmass completely oxidized 8. Secondary Minerals: Oxidation 9. Encrustations: up to 5mm thick Mn-crust 10. Comment: -	X					10.58031/KIEL0264GREV201		
SO307-DR36-16	1. Rock Type: volcanic, altered 2. Size: 16 x 10 x 6 cm 3. Shape / Angularity: sub-angular 4. Color of cut surface: red 5. Texture / Vesicularity: vesicular (35-40%, elongated 3-4mm lenght, 1mm thick, coated with Mn or filled with Fe-oxides). 6. Phenocrysts: none 7. Matrix: groundmass completely oxidized, very fine-grained 8. Secondary Minerals: Oxidation 9. Encrustations: thin coatings of Mn and carbonates						10.58031/KIEL0264GREW201		

SO307 Dredge Station Details and Rock Description

SO307-DR36-17	1. Rock Type: volcanic, altered 2. Size: part of block B: 36 x 23 x 23 cm, working sample: 12 x 17 x 11 cm 3. Shape / Angularity: angular 4. Color of cut surface: reddish grey 5. Texture / Vesicularity: spherical rounded vesicules (25%, 3x4mm filled with carbonates) 6. Phenocrysts: hard to see, Pl (<1%, <1mm, altered) 7. Matrix: groundmass completely oxidized, very fine-grained 8. Secondary Minerals: Oxidation, carbonates 9. Encrustations: same as above 10. Comment: carbonate fillings in the center vs. in the rims might indicate subsidence and later dissolution of the carbonates in the outermost vesicules	X					10.58031/KIEL0264GREX201		
SO307-DR36-18	1. Rock Type: volcanic, altered 2. Size: 20 x 9 x 16 cm 3. Shape / Angularity: sub-rounded 4. Color of cut surface: red 5. Texture / Vesicularity: 35%, elongated vesicules, ca. 1.5 x 0.5cm, coated with Mn and/or Fe-oxide agregates 6. Phenocrysts: none 7. Matrix: groundmass completely oxidized, very fine-grained 8. Secondary Minerals: Oxidation 9. Encrustations: Mn coatings and oxidation 10. Comment: -						10.58031/KIEL0264GREY201		
SO307-DR36-19	1. Rock Type: volcanic, moderately altered 2. Size: 10 x 10 x 10 cm 3. Shape / Angularity: sub-rounded 4. Color of cut surface: light grey 5. Texture / Vesicularity: vesicular towards the rim (ca. 7%, ca. 3mm), rounded, filled with carbonates, towards the center, it has glomeritic clusters of Plg 6. Phenocrysts: Glomeritic Plg (ca. 25%, 9x4mm) fairly fresh, altered to clays in the rims 7. Matrix: well crystallized, very fine grained groundmass, oxidized especially towards the rim 8. Secondary Minerals: Carbonates, Fe-oxides 9. Encrustations: Thin Mn coatings and oxidation	X	X	X			10.58031/KIEL0264GREZ201		
SO307-DR36-20	1. Rock Type: volcanic, altered 2. Size: 12 x 4,5 x 11 cm 3. Shape / Angularity: sub-rounded 4. Color of cut surface: grey to orange 5. Texture / Vesicularity: several dark spots in a matrix (could be elongated vesicules filled with Mn or oxides) 6. Phenocrysts: 7. Matrix: fine grained, orange-reddish 8. Secondary Minerals: Fe-oxides 9. Encrustations: Thin Mn coatings 10. Comment: too altered for GC	X					10.58031/KIEL0264GRE2201		
SO307-DR36-21	1. Rock Type: volcanic, altered, aphyritic? 2. Size: 10 x 9 x 8 cm 3. Shape / Angularity: sub-rounded 4. Color of cut surface: grey to brown 5. Texture / Vesicularity: several dark spots in a matrix (could be elongated vesicules filled with Mn or oxides) 6. Phenocrysts: 7. Matrix: fine grained, brown-orange 8. Secondary Minerals: Oxides, altered zeolites? 9. Encrustations: Thin Mn coatings 10. Comment: very altered						10.58031/KIEL0264GRE3201		

SO307 Dredge Station Details and Rock Description

SO307-DR36-22	1. Rock Type: volcanic, hyaloclastic breccia 2. Size: 18 x 15 x 14 cm 3. Shape / Angularity: sub-rounded, brecciated 4. Color of cut surface: light to dark brown; black 5. Texture / Vesicularity: breccia with fragments up to 4cm in a palagonitic matrix, fragments consist of volcanic rock with mostly filled voids/ vesicules, some contain rare Fsp and/or Ol (Iddingsite) 6. Phenocrysts: 7. Matrix: palagonite with poorly sorted volcanic rock fragments 8. Secondary Minerals: prob. Mn-vesicule fillings, altered zeolite? 9. Encrustations: 10. Comment: looks like completely altered breccia with no fresh glass	x					10.58031/KIEL0264GRE4201		
SO307-DR36-23	1. Rock Type: sedimentary, somewhat altered 2. Size: 7.5 x 14 x 6 cm (out of big Block 56 x 43 x 25 cm) 3. Shape / Angularity: rounded 4. Color of cut surface: light brown - ocre - orange 5. Texture / Vesicularity: sedimentary, fine grained with mm thick horizons of up to mm-sized grains 6. Phenocrysts: 7. Matrix: fine grained, 8. Secondary Minerals: 9. Encrustations: Minor Mn coatings 10. Comment:						10.58031/KIEL0264GRE5201		
SO307-DR36-24	1. Rock Type: calcareous sediment (representative sample) 2. Size: 30 x 22 x 8 cm 3. Shape / Angularity: rounded 4. Color of cut surface: beige - white - black 5. Texture / Vesicularity: carbonate matrix containing <2cm fragments of fossilized bivalves Inoceramus and <1cm fragments of altered volcanic rock and dendritic Mn?-precipitates 6. Phenocrysts: 7. Matrix: fine grained, 8. Secondary Minerals: 9. Encrustations: up to few mm thick Mn-crust 10. Comment: **Species identification need to be confirmed by paleontologist. Inoceramus existed between 66-80 Ma and got extinct at KT-event. Since this dredge hauls is from the uppermost slope, any volcanic layers lieying beneath should therefore be older!**						10.58031/KIEL0264GRE6201		

SO307-DR37

Eastern flank of Madagascar Ridge; middle part of the slope, northern flank of collapsed slope

Dredge on bottom UTC, hrs, °N, °E, depth m	00:06	28°17,27'S	049°21,17'E	3612
Dredge off bottom UTC, hrs, °N, °E, depth m	00:53	28°17,44'S	049°21,17'E	3420

total volume: few rocks

Comments:

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	Gl/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR37-1	1. Rock Type: volcanic, moderately altered 2. Size: 8 x 5 x 4,5 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: grey and brown 5. Texture / Vesicularity: aphyric, 10% vesicles up to 2mm 6. Phenocrysts: none 7. Matrix: medium grained, well crystallized 8. Secondary Minerals: perhaps Iddingsite replacing Ol in groundmass, saponite fills some vesicles 9. Encrustations: thin Mn-coating on exterior 10. Comment: low to moderate alteration	x	x	yes, good for groundmass			10.58031/KIEL0264GRE8201		

SO307 Dredge Station Details and Rock Description

SO307-DR37-2	1. Rock Type: volcanic, moderately altered 2. Size: 8 x 5 x 4 3. Shape / Angularity: 4. Color of cut surface: grey and brown 5. Texture / Vesicularity: slightly porphyritic, 15% vesicles (up to 3 mm) 6. Phenocrysts: small Plg-phenocrysts (1%, up to 2mm) 7. Matrix: medium grained, well crystallized 8. Secondary Minerals: perhaps Iddingsite replacing Ol in groundmass, saponite fills some vesicles 9. Encrustations: thin Mn-coating on exterior 10. Comment: very similar to DR36-1, more moderate alteration compared to sample -1	x	x				10.58031/KIEL0264GRE9201		
SO307-DR37-3	very similar to sample DR36-1 2. 16 x 8 x 5,5 cm 5. Texture / Vesicularity: 15% vesicles (up to 3 mm) 10. Comment: more moderate alteration compared to sample -1						KIEL0264GRFA201		
SO307-DR37-4	1. Rock Type: volcanic, pillow-top, altered 2. Size: 16 x 14 x 7 3. Shape / Angularity: angular at bottom/ broken surface, rounded at top 4. Color of cut surface: grey to brown 5. Texture / Vesicularity: phyric (2-3% crystal content), poorly vesicular (<5mm) 6. Phenocrysts: Plg (<3mm), trace Ol (altered to Iddingsite) 7. Matrix: fine grained 8. Secondary Minerals: some minerals are replaced, red coating in vesicles, glass rim completely palagonised 9. Encrustations: Mn-crust <3mm 10. Comment: pillow top which is more crystalphyric than DR37-1 to -3, Plg potentially dateble; maybe also usable for GC		(x)	yes, go for Plg			10.58031/KIEL0264GRFB201		
SO307-DR37-5	1. Rock Type: volcanic, upper most part of pillow with ca. 1,5 cm thick rind of palagonised glass; second palagonised glass rind (<1cm) altered with carbonate infill 2. Size: 9 x 7 x 5 cm 3. Shape / Angularity: subangular 4. Color of cut surface: brown/ orange 5. Texture / Vesicularity: phyric (1-2% crystal content), poorly vesicular (<1mm) 6. Phenocrysts: Plg (<2%, <1mm) 7. Matrix: fine grained matrix 8. Secondary Minerals: void and vesicle infill of Mn-oxides + zeolites, crack infill/ cement, glass is completely palagonised 9. Encrustations: 10. Comment: sample of pillow top, pervasively altered						10.58031/KIEL0264GRFC201		
SO307-DR37-6	1. Rock Type: hyaloclastic with <1cm fragments, completely palagonised, siliciclastic cement?, poorly crystalised 2. Size: 13.5 x 8 x 5 cm 3. Shape / Angularity: rounded 4. Color of cut surface: Multicolor, pale brown to redbrown and black 5. Texture / Vesicularity: breccia, poorly sorted 6. Phenocrysts: - 7. Matrix: - 8. Secondary Minerals: - 9. Encrustations: - 10. Comment: pervasively altered rock, glass not usable						10.58031/KIEL0264GRFD201		

SO307-DR38

Eastern flank of Madagascar Ridge; NE-facing slope, central part at a small edge

Dredge on bottom UTC, hrs, °N, °E, depth m	09:35	28°31,627'S	049°30,006'E	4067
Dredge off bottom UTC, hrs, °N, °E, depth m	10:31	28°31,850'S	049°30,105'E	3894

total volume: few rocks

Comments: All calcareous, all very similar

SO307 Dredge Station Details and Rock Description

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR38-1	1. Rock Type: sedimentary, slightly to moderately altered - calcareous 2. Size: 12 x 10 x 5 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: beige with black spots 5. Texture / Vesicularity: porosity - 3% in the inner part, 10% close to the rim (secondary porosity due to bioturbation?) 6. Phenocrysts: - 7. Matrix: carbonitic, fine-grained 8. Secondary Minerals: Mn in voids and dendritic precipitates 9. Encrustations: Mn-crust, 1mm 10. Comment: -						10.58031/KIEL0264GRFF201		
SO307-DR38-2	1. Rock Type: sedimentary, slightly to moderately altered - calcareous 2. Size: 8 x 7 x 4 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: white to light beige 5. Texture / Vesicularity: porosity - 3-5%, slightly higher close to the rim (secondary porosity due to bioturbation?), voids are filled with Mn-precipitates 6. Phenocrysts: - 7. Matrix: carbonitic, fine-grained 8. Secondary Minerals: Mn in voids and filling small cracks, Mn dendritic precipitates 9. Encrustations: Mn-crust, 2mm						10.58031/KIEL0264GRFG201		
SO307-DR38-3	1. Rock Type: sedimentary, moderately altered - calcareous 2. Size: 10 x 7 x 3,5 cm 3. Shape / Angularity: rounded to subrounded 4. Color of cut surface: beige and brown, patchy 5. Texture / Vesicularity: porosity up to 30% close to the borders, ca.3% in the inner part, possible due to alteration and bioturbation. Some voids are totally or partially filled with Mn-precipitates 6. Phenocrysts: - 7. Matrix: calcareous, fine-grained 8. Secondary Minerals: Mn, Fe-oxides in voids, small cracks and dendrites 9. Encrustations: Mn-crust, 2mm 10. Comment:						10.58031/KIEL0264GRFH201		
SO307-DR38-4	1. Rock Type: sedimentary, calcareous 2. Size: 9 x 8 x 4 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: beige with brownish patches 5. Texture / Vesicularity: porosity up to 25% close to the borders (bioturbation?) 6. Phenocrysts: - 7. Matrix: calcareous, fine-grained 8. Secondary Minerals: Mn precipitates in voids, small cracks and dendrites, Fe-oxides 9. Encrustations: Mn-crust, 3mm 10. Comment: There is a spherical aglomerate of fine sediments (filling of a shell that got dissolved? ooide?)						10.58031/KIEL0264GRFK201		
SO307-DR38-5	1. Rock Type: sedimentary, calcareous 2. Size: 7 x 5 x 3 cm 3. Shape / Angularity: rounded 4. Color of cut surface: beige to brownish, patchy 5. Texture / Vesicularity: porosity close to 0% in the center but up to 15% close to the borders (bioturbation?), sometimes completely or partly filled with Mn-precipitates 6. Phenocrysts: - 7. Matrix: fine-grained, variations of massive calcareous and calcareous patches rich in sediments 8. Secondary Minerals: Mn precipitates filling small cracks, sometimes forming dendrites. red Fe-oxides on the sediment rich parts 9. Encrustations: Mn-crust, 2mm 10. Comment: There is a spherical aglomerate of fine sediments (filling of a shell that got dissolved?						10.58031/KIEL0264GRFM201		

SO307 Dredge Station Details and Rock Description

SO307-DR45

Seamount in Madagaskar Basin (35 km E of MR), steep south flank of seamount, which has a flat top with a small depression center

Dredge on bottom UTC, hrs, °N, °E, depth m	10:36	28°05,756'S	050°00,903'E	4499
Dredge off bottom UTC, hrs, °N, °E, depth m	11:48	28°05,453'S	050°00,928'E	4129

total volume: few rocks, mostly Mn-crust + one volcanic fragment in

Comments:

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR45-1	1. Rock Type: volcanic/volcaniclastic 2. Size: 13 x 12 x 7 cm 3. Shape / Angularity: rounded 4. Color of cut surface:brown/orange 5. Texture / Vesicularity: one large clast surrounded by many small fragments 6. Phenocrysts: Pl (ca. 1%, up to 7mm) somewhat fresh 7. Matrix: very fine-grained 8. Secondary Minerals:Fe-oxide staining percassive throughout glass altered to palagonite 9. Encrustations:8 mm thick Mn crust 10. Comment: one large fragment of basalt surrounded by hyaloclastite. The basalt is part of a chilled margin with a glassy rind that is all altered to palagonite. Many angular palagonite fragments surround the basalt clast with						10.58031/KIEL0264GRFP201		
SO307-DR45-2	1. Rock Type: sedimentary/Mn-crust 2. Size: 22 x 13 x 12 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: black and tan (brownish) 5. Texture / Vesicularity: some of the Mn is dendritic, clay is amorphous 6. Phenocrysts: - 7. Matrix: - 8. Secondary Minerals: - 9. Encrustations: 7mm Mn-crust on half of exterior 10. Comment: dendritic Mn and clay with a thin coating of Mn-crust						10.58031/KIEL0264GRFQ201		

SO307-DR46

Seamount in Madagaskar Basin. Northern flank of seamount

Dredge on bottom UTC, hrs, °N, °E, depth m	15:12	28°03,12'S	050°01,09'E	4457
Dredge off bottom UTC, hrs, °N, °E, depth m	16:30	28°03,474'S	050°01,015'E	3888

total volume: few rocks, all Mn-crust

Comments:

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR46-1	1. Rock Type: volcanic clast in sedimentary mudstone 2. Size: 13 x 8 x 6 cm 3. Shape / Angularity: rounded exterior but interior clasts are angular 4. Color of cut surface: tan, orange, black 5. Texture / Vesicularity: - 6. Phenocrysts: none in basalt clast 7. Matrix: basalt clast is very fine-grained 8. Secondary Minerals: basalt clasts is heavily altered + stained with Fe-oxides 9. Encrustations: 5mm Mn-crust on exterior 10. Comment: rock mostly consisting of beige mudrock with Mn-oxide dendrites and a fine-grained volcanic fragment (altered, ca. 3cm in						10.58031/KIEL0264GRFS201		

SO307 Dredge Station Details and Rock Description

SO307-DR46-2	1. Rock Type: volcanic clst in Mn-nodule 2. Size: 9 x 8 x 6 cm 3. Shape / Angularity: rounded exterior but interior basalt clast is angular 4. Color of cut surface: orange, black, tan 5. Texture / Vesicularity: basalt clast is aphyric 6. Phenocrysts: none 7. Matrix: basalt clast is very fine-grained, has a chilled margin 8. Secondary Minerals: basalt clast is heavily altered and stained with Fe-oxides 9. Encrustations: 2cm Mn-crust, nice growth rings 10. Comment: one basalt clast with a chilled margin including palagonised glass. Thick Mn-crust grows over the clast with a thin layer of sediment 5 mm from rim						10.58031/KIEL0264GRFT201		
SO307-DR46-3	1. Rock Type: sediment, Mn-crust 2. Size: 9 x 7 x 4 cm 3. Shape / Angularity: botryoidal 4. Color of cut surface: tan, black 5. Texture / Vesicularity: homogeneous 6. Phenocrysts: - 7. Matrix: fine-grained sediment 8. Secondary Minerals: - 9. Encrustations: up to 5mm Mn-crust 10. Comment: a piece of sediment (clay?) covered by Mn-crust						10.58031/KIEL0264GRFU201		
SO307-DR46-4	1. Rock Type: sediment, Mn-crust 2. Size: 11,5 x 7 x 6 cm 3. Shape / Angularity: rounded 4. Color of cut surface: brown, black 5. Texture / Vesicularity: dendritic Mn on interior 6. Phenocrysts: - 7. Matrix: sediment clast has medium sand sized grains 8. Secondary Minerals: - 9. Encrustations: up to 5mm Mn-crust 10. Comment: one sediment clast and denditric Mn makes up the interior. Thin Mn-crust coats the exterior						10.58031/KIEL0264GRFV201		
SO307-DR46-5	1. Rock Type: Mn-crust, sediment 2. Size: 8 x 8 x 4 cm 3. Shape / Angularity: rounded 4. Color of cut surface: black with a little tan 5. Texture / Vesicularity: dendritic Mn 6. Phenocrysts: - 7. Matrix: - 8. Secondary Minerals: - 9. Encrustations: 2cm Mn crust makes up almost all the sample 10. Comment: Mn-oxide mixed with sediment at the center, with thick Mn-crust surrounding it.						10.58031/KIEL0264GRFW201		

SO307-DR47

Eastern edge of the Madagascar Ridge. Isolated block ~2nm E from plateau rim. East facing steep slope, likely a wall of normal fault.

Dredge on bottom UTC, hrs, °N, °E, depth m	00:42	28°39,94'S	049°37,77'E	4289
Dredge off bottom UTC, hrs, °N, °E, depth m	01:23	28°40,07'S	049°37,67'E	?

total volume: ~ 30 rocks

Comments: volcanic rocks, volcanic rocks with fresh glass rims, breccia with fresh glass, Mn nodules.

SO307 Dredge Station Details and Rock Description

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR47-1	1. Rock Type: volcanic rock, fairly fresh. 2. Size: 13 x 9 x 8 cm. 3. Shape / Angularity: sub-angular 4. Color of cut surface: Light grey. 5. Texture / Vesicularity: Vesicular, ~15% spherical vesicles of < 1mm in diameter. Plag-phyric, ~2%, 3 mm in length. 6. Phenocrysts: Plag ~2%, 3 mm in length, moderately altered. 7. Matrix: fine-grained, well-crystallized groundmass composed of feldspars and opaque elongated crystals. Little (<1mm) orange specks may be altered microcrysalline olivine. 8. Secondary Minerals: Fe-oxide impregnations in the matrix, increasing towards the rim. 9. Encrustations: <1 mm coating of Mn on the surface. 10. Comment: Fairly fresh matrix	X	X				10.58031/KIEL0264GRFY201		
SO307-DR47-2	1. Rock Type: volcanic rock, moderately altered. 2. Size: 13 x 11 x 6 cm 3. Shape / Angularity: sub-angular 4. Color of cut surface: light grey 5. Texture / Vesicularity: same as sample 1 6. Phenocrysts: same as sample 1 7. Matrix: sames as sample 1. In this sample altered olivine is present in the matrix as < 1mm orange crystals (completely altered). 8. Secondary Minerals: Fe-oxides 9. Encrustations: ~1 mm thick Mn coating on the surface. 10. Comment: Very similar to sample 1, but more altered.	X	X				10.58031/KIEL0264GRFZ201		
SO307-DR47-3	1. Rock Type: volcanic rock, moderately altered. 2. Size: 20 x 12 x 8 cm 3. Shape / Angularity: sub-angular 4. Color of cut surface: light grey 5. Texture / Vesicularity: same as sample 1 but the content of Plag is slightly higher at ~5-7%. 6. Phenocrysts: Plag, ~1-2mm in length, ~5-7% 7. Matrix: same as 1, well-crystallized, fine-grained, plag+ol+opaque crystals. 8. Secondary Minerals: Fe-oxides (orange) incresing towards the rims, the plag in the matrix is altered to clays. 9. Encrustations: same as 1 and 2 10. Comment: same type of volcanic rock as 1 and 2 but slightly more altered	X	X				10.58031/KIEL0264GRFZ201		
SO307-DR47-4	1. Rock Type: Intrusive (possibly doleritic), moderately altered. 2. Size: 13 x 11 x 8 cm. 3. Shape / Angularity: sub-angular 4. Color of cut surface: light grey 5. Texture / Vesicularity: <1% vesicules of <1mm of diameter, very rare. Equigranular fine-grained. 6. Phenocrysts: N/A 7. Matrix: fine-grained, well-crystallized groundmass, microdoleritic texture. 8. Secondary Minerals: Fe-oxide orange specks in the matrix and fractures 9. Encrustations: <1mm thick Mn coating on the surface. 10. Comment: same paragenesis as the previous samples but different texture: no phenocrysts with a equigranular groundmass, slightly coarser than the previous samples.	X	X				10.58031/KIEL0264GRF3201		

SO307 Dredge Station Details and Rock Description

SO307-DR47-5	1. Rock Type: volcanic rock, altered. Fragment of pillow lava with glass rim. 2. Size: 11 x 9 x 7 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: orange 5. Texture / Vesicularity: massive, no vesicles. 6. Phenocrysts: none visible. 7. Matrix: fine-grained, very altered groundmass. 8. Secondary Minerals: Fe-oxides throughout the groundmass; the glass of the rim is altered to palagonite. 9. Encrustations: <1 mm thick Mn coating in the surface. 10. Comment: fragment of a pillow lava with the glass rim attached. Glass has been altered to palagonite, but small bits may be fresh enough to pick out.				?		10.58031/KIEL0264GRF4201		
SO307-DR47-6	1. Rock Type: volcanic, altered, pillow lava with glass rim. 2. Size: 13 x 8 x 7 cm 3. Shape / Angularity: sub-angular 4. Color of cut surface: orange 5. Texture / Vesicularity: same as sample 5 6. Phenocrysts: none visible due to alteration. 7. Matrix: same as sample 5 8. Secondary Minerals: same as sample 5, palagonite in the rims. 9. Encrustations: same as 5 10. Comment: the rim preserves fresh glass, good for picking and further analyses.				GL		10.58031/KIEL0264GRF5201		
SO307-DR47-7	1. Rock Type: volcanic altered rock, pillow lava fragment. 2. Size: 13 x 12 x 9 cm 3. Shape / Angularity: rounded 4. Color of cut surface: orange 5. Texture / Vesicularity: massive with less than <1% vesicles, very small (< 1mm diameter). 6. Phenocrysts: some plag ~1%, <1mm length, very altered. 7. Matrix: same as previous samples. 8. Secondary Minerals: Fe-oxides overall, palagonite in the glassy rims. Dendritic Mn in veins and fractures. 9. Encrustations: Mn coating in the surface, < 1mm thick. 10. Comment: pillow lava fragment, with glassy rim altered but with some fresh bits.				?		10.58031/KIEL0264GRF6201		
SO307-DR47-8	1. Rock Type: volcaniclastic breccia (hyaloclastite) 2. Size: 20 x 7 x 8 cm 3. Shape / Angularity: sub-rounded 4. Color of cut surface: grey-orange in a light colored matrix. 5. Texture / Vesicularity: brecciated, >50% glass fragments (4 x 5 cm size), ~5-10% altered igneous rock fragments (4 x 3 cm size). 6. Phenocrysts: N/A. The fragments are made up of glasses and igneous rocks that have the same characteristics as the samples from 5 to 7. 7. Matrix: light-colored siliceous cement, comprises about 30 - 40%. 8. Secondary Minerals: glass fragments are altered to palagonite in concentric rims. Igneous rock fragments are altered to Fe-oxides. 9. Encrustations: Mn coating in the surface (~1-2 mm thick) 10. Comment: Hyaloclastitic breccia probably from a pillow lava flow, either from the front or sides of the flow. The larger glass fragments may have fresh bits to pick.				GL		10.58031/KIEL0264GRF7201		

SO307 Dredge Station Details and Rock Description

SO307-DR47-9	1. Rock Type: volcanic rock, altered, pillow lava. 2. Size: 14 x 11 x 6 cm 3. Shape / Angularity: sub-rounded 4. Color of cut surface: brown-orange 5. Texture / Vesicularity: the pillow lava fragment has a massive texture, no phenocrysts. The attached volcaniclastic breccia is very similar to the previous one, with centrimetric glass clasts. 6. Phenocrysts: N/A 7. Matrix: same as previous sample 8. Secondary Minerals: lava altered to Fe-oxides, the glasses are altered to palagonite. 9. Encrustations: Mn coating <1mm thick. 10. Comment: this sample comprises a fragment of pillow lava with the hyaloclastite breccia attached to it . The lava is similar to samples 5 to 7, and the breccia is similar to 8 but with solely glass clasts. The inner core of the glass clasts, and some parts of the pillow lava rims are seemingly fresh. Good for crushing and separating fresh glasses				GL		10.58031/KIEL0264GRF8201		
SO307-DR47-10	1. Rock Type: volcaniclastic rock, altered. 2. Size: 23 x 14 x 8 cm 3. Shape / Angularity: sub-angular 4. Color of cut surface: dark brown with a light matrix. 5. Texture / Vesicularity: brecciated, 70% glass fragments (up to 5 x 3 cm, most ~0.5 cm in diameter) 6. Phenocrysts: N/A 7. Matrix: light colored siliceous matrix up to 30%. 8. Secondary Minerals: palagonite in glass fragments, zeolites in fractures. 9. Encrustations: same as sample 8 10. Comment: hyaloclastite breccia composed fully by glass fragments. The glass are variably altered to palagonite, with some showing fresher cores that can be crushed and picked.				?		10.58031/KIEL0264GRF9201		
SO307-DR47-11	1. Rock Type: volcaniclastic, altered, hyaloclastite 2. Size: 11 x 10 x 9 cm 3. Shape / Angularity: sub-angular 4. Color of cut surface: Brown-orange 5. Texture / Vesicularity: brecciated, ~90% fragments of glass (maximum 2 x 2 cm, most ~2mm in diameter) 6. Phenocrysts: N/A 7. Matrix: very scarce light colored siliceous cement (~10%) 8. Secondary Minerals: same as sample 10 9. Encrustations: same as sample 10 10. Comment: same type of hyaloclastite breccia but with smaller glass fragments. The smaller fragments have concentric bands of palagonite. A				?		10.58031/KIEL0264GRGA201		
SO307-DR47-12	1. Rock Type: volcaniclastic, hyalocastic breccia. 2. Size: 19 x 13 x 12 cm 3. Shape / Angularity: sub-angular 4. Color of cut surface: brown 5. Texture / Vesicularity: same as sample 11 6. Phenocrysts: 7. Matrix: 8. Secondary Minerals: 9. Encrustations: 10. Comment: same type of hyaloclastic breccia as previous sample, but glass fragments are slightly larger (centimetric, up to 6 x 4 cm) and a more altered matrix. We separated the pieces that have more promising fresh cores and fresh glassy				GL		10.58031/KIEL0264GRGB201		
SO307-DR47-13	1. Rock Type: same as sample 12 but smalles and more altered. 2. Size: 9 x 7 x 5 cm 3. Shape / Angularity: rounded. 4. Color of cut surface: 5. Texture / Vesicularity: 6. Phenocrysts: 7. Matrix: 8. Secondary Minerals: 9. Encrustations: 10. Comment: may be too altered.						10.58031/KIEL0264GRGC201		

SO307-DR47-14	1. Rock Type: Mn nodule 2. Size: 10 x 7 x 8 cm 3. Shape / Angularity: rounded 4. Color of cut surface: black 5. Texture / Vesicularity: porous texture 6. Phenocrysts: 7. Matrix: 8. Secondary Minerals: 9. Encrustations: 10. Comment: rounded nodule with concentric growing bands.						10.58031/KIEL0264GRGD201		

SO307-DR48

East of NE edge of Madagascar Ridge, small elongated structure, NNW-facing slope

Dredge on bottom UTC, hrs, °N, °E, depth m 10:07 29°13,859'S 049°45,591'E 4388

Dredge off bottom UTC, hrs, °N, °E, depth m 11:02 29°14,105'S 049°45,606'E 4041

total volume: few rocks: thickly Mn-encrusted igneous rocks, Mn-

Comments:

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR48-1	1. Rock Type: volcanic, moderetely altered, some parts are very orange, but others look fresher 2. Size: 23 x 16 x 13 cm 3. Shape / Angularity: sub-angular 4. Color of cut surface: grey and orange 5. Texture / Vesicularity: phyric, vesicular (5%, up to 1 mm, sometimes filled with secondary minerals including Fe-oxides and green mineral - glauconite? 6. Phenocrysts: Pl (10%, up to 5 mm, with different degrees of alteration), Ol (5%, very altered, completly replaced by iddingsite) 7. Matrix: microcrystalline to massive, fine grained, Pg (needle shape crystals and sometimes glomeritic clusters) 8. Secondary Minerals: Fe-oxides, Mn precipitates in dendrites filling small fractures and also dissiminated, green mineral filling vesicules 9. Encrustations: partly covered with Mn 10. Comment: Mn precipitates (and maybe other oxides) are precipitating from the rim towards the center and along the fractures, which gives the	x	x	(x)? Pl			10.58031/KIEL0264GRGF201		
SO307-DR48-2	1. Rock Type: volcanic, moderetely altered 2. Size: 9 x 7 x 7 cm 3. Shape / Angularity: sub-rounded on the outer part (Mn crust), but the volcanic fregment inside is sub-angular 4. Color of cut surface: orange-grey 5. Texture / Vesicularity: porphyritic, vesicular (5%, up to 4 mm, some empty, some filled with Fe-oxides, Mn) 6. Phenocrysts: Pl (20-25%, 3 mm), Ol (5%, completely altered, replaced by iddingsite) 7. Matrix: massive, fine grained (some Fsp) 8. Secondary Minerals: Fe-oxides, Mn precipitates (dissimilated and filling small voids) 9. Encrustations: 9 mm thick Mn-crust 10. Comment: similar to previous sample, maybe with a bit more of Pig.	x	x	(x)? Pl			10.58031/KIEL0264GRGG201	Date both? Choose the best?	
SO307-DR48-3	1. Rock Type: volcanic, moderetely to highly altered 2. Size: 11 x 8 x 5 cm 3. Shape / Angularity: sub-angular 4. Color of cut surface: orange 5. Texture / Vesicularity: porphyritic to glomeritic, vesicular (7%, 1mm) 6. Phenocrysts: Pl (10-15%, up to 5 mm, some seem to be relativly well preserved), Ol (5%, completely replaced by iddingsite) 7. Matrix: massive, fine grained, very altered (replaced by Clay?) 8. Secondary Minerals: Fe-oxides, Mn precipitates, green minerlas inside vesicules 9. Encrustations: thick, up to 4 mm Mn-crust 10. Comment: similar to samples 1 and 2, but the						10.58031/KIEL0264GRGH201		

SO307 Dredge Station Details and Rock Description

SO307-DR48-4	1. Rock Type: volcanic, moderetely to highly altered 2. Size: 17 x 14 x 9 cm (including Mn-crust, the volcanic fragment is about 8 cm) 3. Shape / Angularity: sub-angular 4. Color of cut surface: greyish-orange 5. Texture / Vesicularity: porphyritic to glomeritic, vesicular (7%, 1mm) 6. Phenocrysts: Pl (20%, up to 4 mm), usually elongated to acicular, Ol ? if yes, completely altered 7. Matrix: massive, fine grained, very altered (replaced by Clay?) 8. Secondary Minerals: Fe-oxides, Mn precipitates dissiminated and growing as dendrites from fractures						10.58031/KIEL0264GRGK201		
SO307-DR48-5	1. Rock Type: volcanic, moderetely to highly altered 2. Size: 11 x 10 x 7 cm (including Mn-crust, the volcanic fragment is about 6 cm) 3. Shape / Angularity: sub-angular 4. Color of cut surface: orange 5. Texture / Vesicularity: porphyritic, vesicular (5%, 1mm, empty in the inner parts of the sample, filled in the boarders) 6. Phenocrysts: Pl (20%, about 4 mm), 2 phases of Pg? (thin, elongated crystals, sometimes in glomeritic clusters and more wide crystals) 7. Matrix: very altered (replaced by Clay?) 8. Secondary Minerals: Fe-oxides, Mn in fractures and voids 9. Encrustations: 1.4 cm thick Mn crust						10.58031/KIEL0264GRGM201		
SO307-DR48-6	1. Rock Type: volcanic, moderetely to highly altered 2. Size: 6 x 6 x 5 cm (including Mn-crust, the volcanic fragment is about 15 x 4 cm) 3. Shape / Angularity: angular 4. Color of cut surface: brown, grey, orange 5. Texture / Vesicularity: porphyritic, vesicular (3%, 1mm) 6. Phenocrysts: Pl (15-20%, up to 2 mm) with different degrees of alteration, sometimes hard to say 7. Matrix: massive, replaced by clay 8. Secondary Minerals: Fe-oxides, Mn, palagonite 9. Encrustations: 2 cm thick Mn crust 10. Comment: one of the boulders of the volcanic clast presents a chilled margin which is						10.58031/KIEL0264GRGN201		
SO307-DR48-7	1. Rock Type: sedimentary, thick Mn-crust covering a mud rock 2. Size: 19 x 14 x 12 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: beige, tan, black 5. Texture / Vesicularity: secondary porosity, voids up to 3 cm 6. Phenocrysts: - 7. Matrix: fine-grained 8. Secondary Minerals: Mn-precipitates 9. Encrustations: 2 cm thick Mn crust 10. Comment: highly bioturbated						10.58031/KIEL0264GRGP201		
SO307-DR48-8	1. Rock Type: sedimentary, very thick Mn-nodule 2. Size: 55 x 43 x 19 cm (big block) 3. Shape / Angularity: subrounded 4. Color of cut surface: black with brownish and beige colors 5. Texture / Vesicularity: - 6. Phenocrysts: - 7. Matrix: - 8. Secondary Minerals: - 9. Encrustations: - 10. Comment: thick Mn-crust, >10cm, with some clay incorporated						10.58031/KIEL0264GRGQ201		

SO307-DR48-9	1. Rock Type: sedimentary; very rounded Mn-nodule with some incorporated clay and a bioclast (spicule?) as nucleus 2. Size: 7 x 10 x 7 cm 3. Shape / Angularity: rounded 4. Color of cut surface: black, beige, brownish 5. Texture / Vesicularity: - 6. Phenocrysts: - 7. Matrix: - 8. Secondary Minerals: - 9. Encrustations: - 10. Comment: -						10.58031/KIEL0264GRGR201		

SO307-DR51

Another elongated ridge SE of the NE rim of the MR (ca. 20 nm south of DR48), SE flank

Dredge on bottom UTC, hrs, °N, °E, depth m	20:13	29°36,54'S	049°43,51'E	3076
Dredge off bottom UTC, hrs, °N, °E, depth m	21:12	29°36,28'S	049°43,40'E	2680

total volume: 1/3 full; rounded boulders with thick Mn-crusts, volcanic

Comments:

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR51-1	1. Rock Type: volcanic, slightly altered 2. Size: 19 x 12 x 16 cm, from block A (40 x 32 x 38 cm) 3. Shape / Angularity: angular to subangular 4. Color of cut surface: grey with orange patches 5. Texture / Vesicularity: vesicules 15%, <1mm, filled with $CaCO_3$ (only in core of rock) 6. Phenocrysts: Pl (<3mm, <2%) moderately altered; Ol (<1mm, <1%), heavily altered 7. Matrix: microcrystalline: Pl; Fe-oxidized minerals - Ol, dark phase: Px 8. Secondary Minerals: $CaCO_3$ in vesicles, in a few Mn 9. Encrustations: thick Mn-crust, removed from sample 10. Comment: fresh enough for Ar/Ar?	x	x	?			10.58031/KIEL0264GRGT201		
SO307-DR51-2	1. Rock Type: volcanic, slightly altered 2. Size: 13 x 15 x 8 cm, from block H (18 x 17 x 16 cm) 3. Shape / Angularity: subangular 4. Color of cut surface: 4) to 9): similar to DR51-1, less vesicles (7%) 5. Texture / Vesicularity: 6. Phenocrysts: 7. Matrix: 8. Secondary Minerals: 9. Encrustations: 10. Comment: Pl fresh enough for Ar/Ar!	x	x	x			10.58031/KIEL0264GRGU201		
SO307-DR51-3	1. Rock Type: volcanic, slightly altered 2. Size: 20 x 20 x 11 cm, from block C (37 x 31 x 32 cm) 3. Shape / Angularity: angular 4. Color of cut surface: 4) to 9) similar to DR51-1; less Pl phenocrysts (<1%, <8mm), vesicles also filled with green secondary minerals 5. Texture / Vesicularity: 6. Phenocrysts: 7. Matrix: 8. Secondary Minerals: 9. Encrustations: 10. Comment: Pl phenocrysts not fresh enough, maybe in matrix?	x	x				10.58031/KIEL0264GRGV201		

SO307 Dredge Station Details and Rock Description

SO307-DR51-4	1. Rock Type: volcanic, slightly altered pillow basalt 2. Size: 20 x 17 x 12 cm, from block F (50 x 25 x 20 cm) 3. Shape / Angularity: subrounded 4. Color of cut surface: grey with orange patches 5. Texture / Vesicularity: 5) to 8) similar to DR51-3, with fractures 6. Phenocrysts: 7. Matrix: 8. Secondary Minerals: similar to DR51-3, less Pl phenocrysts <1% 9. Encrustations: 10. Comment: some Pl phenocrysts appear as megacrysts >1cm	X	X				10.58031/KIEL0264GRGW201		
SO307-DR51-5	1. Rock Type: volcanic, slightly altered 2. Size: 15 x 12 x 7 cm, from block D (50 x 35 x 20 cm) 3. Shape / Angularity: angular 4. Color of cut surface: dark grey 5. Texture / Vesicularity: vesicular (<10%, <1mm), some vesicles filled 6. Phenocrysts: Pl (<2mm, <1%) altered; Ol (<1mm, <1%) is heavily altered 7. Matrix: microcrystalline: Pl, Cpx - more Cpx in matrix than in DR51-1 to -4; Ol 8. Secondary Minerals: CaCO3, Mn, green secondary minerals in vesicles, Fe-oxidized matrix 9. Encrustations: thick Mn-crust, 10 cm; removed from sample 10. Comment:	X					10.58031/KIEL0264GRGX201		
SO307-DR51-6	1. Rock Type: volcanic, slightly altered, pillow basalt 2. Size: 19 x 12 x 7 cm, from block A (40 x 32 x 38 cm) 3. Shape / Angularity: subangular 4. Color of cut surface: grey 5. Texture / Vesicularity: 5) to 9) similar to DR51-5, less Px in matrix, vesicles in ore of rock filled 6. Phenocrysts: 7. Matrix: 8. Secondary Minerals: 9. Encrustations: 10. Comment:	X					10.58031/KIEL0264GRGY201		
SO307-DR51-7	1. Rock Type: sedimentary rock, 2. Size: 20 x 14 x 8 cm 3. Shape / Angularity:rounded 4. Color of cut surface: orange 5. Texture / Vesicularity: 6. Phenocrysts: 7. Matrix: angular clasts, altered 8. Secondary Minerals: 9. Encrustations: Mn-crust <3cm 10. Comment:						10.58031/KIEL0264GRGZ201		
SO307-DR51-8	1. Rock Type: Mn-crust/sediment 2. Size: 16 x 7 x 11 cm, from block A (40 x 32 x 38 cm) 3. Shape / Angularity: 4. Color of cut surface: 5. Texture / Vesicularity: 6. Phenocrysts: 7. Matrix: 8. Secondary Minerals: 9. Encrustations: 10. Comment:						10.58031/KIEL0264GRG2201		

SO307-DR52

Elongated ridge SE of the NE rim of the MR (ca. 20 nm south of DR48), dredge up northern flank

Dredge on bottom UTC, hrs, °N, °E, depth m	00:10	29°34,33'S	49°42,97E	2910
Dredge off bottom UTC, hrs, °N, °E, depth m	00:58	29°34,54'S	49°43,00'E	2640

total volume: 1 small Mn-crust

Comments:

SO307 Dredge Station Details and Rock Description

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR52-1	1. Rock Type: Mn-crust with phosphorite (?) on the lower part, including 1 volcanic clast, strongly altered 2. Size: 20 x 13 x 5 cm 3. Shape / Angularity: 4. Color of cut surface: 5. Texture / Vesicularity: 6. Phenocrysts: 7. Matrix: 8. Secondary Minerals: 9. Encrustations: 10. Comment:						10.58031/KIEL0264GRG4201		

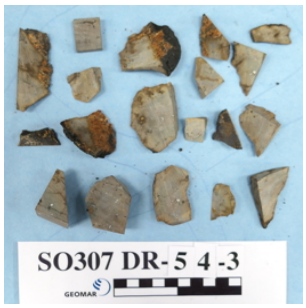
SO307-54

Large composite seamount in Madagascar Basin (100nm southeast od DR52). Southern flank at mid height of

Dredge on bottom UTC, hrs, °N, °E, depth m	17:35	30°48,63'S	51°05,95'E	3249
Dredge off bottom UTC, hrs, °N, °E, depth m	19:30	30°48,51'S	51°05,92'E	3103

total volume: few rocks

Comments: One big piece of pillow basalt with fresh glass, ol-pl-phyric basalts (slightly to moderately altered)

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR54-1	1. Rock Type: volcanic, moderately altered 2. Size: 20 x 9 x 12 3. Shape / Angularity: subrounded 4. Color of cut surface: grey to brownish 5. Texture / Vesicularity: vesicular (< 10%, < 0.1mm), fractures: filled with mn, green and white fillings (no CaCO3) 6. Phenocrysts: ol (< 10%, < 0.1mm, strongly altered), pl (< 1%, < 1mm) 7. Matrix: microcrystalline: pl, ol (altered), cpx 8. Secondary Minerals: mn, Fe-oxides, green and white minerals 9. Encrustations: mn-crust (< 1cm) 10. Comment: matrix pl might be good enough for Ar/Ar dating	x	x	x?			10.58031/KIEL0264GRG6201		
SO307-DR54-2	1. Rock Type: volcanic, moderately altered 2. Size: 13 x 10 x 8 3. Shape / Angularity: subrounded 4. Color of cut surface: grey 5. Texture / Vesicularity: voids (< 1%, 0.1 mm), Fe-oxidized, fractures filled with mn 6. Phenocrysts: ol (< 0.1mm, < 7%, altered), pl (< 1%, < 1mm, fresh to slightly altered) 7. Matrix: microcrystalline: pl, ol, px (altered) 8. Secondary Minerals: Fe-oxides, mn, green and white micerals in voids 9. Encrustations: mn-crust (< 0.5 cm) 10. Comment: /	x	x				10.58031/KIEL0264GRG7201		
SO307-DR54-3	1. Rock Type: volcanic, moderately altered 2. Size: 13 x 10 x 8 3. Shape / Angularity: subangular 4. Color of cut surface: grey to light grey, light orange patches 5. Texture / Vesicularity: vesicles (< 3%, < 1mm), CaCO3 and mn filling 6. Phenocrysts: ol (<1%, < 1mm, altered) 7. Matrix: microcrystalline: pl, px, pl? (altered) 8. Secondary Minerals: Fe-oxidation, CaCO3, mn 9. Encrustations: mn-crust (< 1mm) 10. Comment: /	x	x				10.58031/KIEL0264GRG8201		

SO307 Dredge Station Details and Rock Description

SO307-DR54-4	1. Rock Type: volcanic, moderately altered 2. Size: 12 x 9 x 12 from bloc A (38 x 31 x 15) 3. Shape / Angularity: angular 4. Color of cut surface: grey to orange/brown 5. Texture / Vesicularity: vesicles (< 7%, < 1mm) fractures, some filled with mn 6. Phenocrysts: ol (< 5%, < 0.1mm), pl? (< 1%; < 1mm) 7. Matrix: microcrystalline: ol, px, pl (altered) 8. Secondary Minerals: Fe-oxides, mn 9. Encrustations: mn-crusted (< 1mm) 10. Comment: /	x	x				10.58031/KIEL0264GRG9201		
SO307-DR54-5	1. Rock Type: volcanic, moderately altered 2. Size: 10 x 8 x7 3. Shape / Angularity: subangular 4. Color of cut surface: grey to brown, orange alteration horizon 5. Texture / Vesicularity: vesicular (< 5%, < 1mm), some filled with mn, fractures 6. Phenocrysts: some, strongly altered (< 1%, < 2mm) 7. Matrix: microcrystalline: pl, ol, px (strongly altered) 8. Secondary Minerals: Fe-oxides, mn 9. Encrustations: mn-crusted (< 0.5cm) 10. Comment: /	x					10.58031/KIEL0264GRHA201		
SO307-DR54-6	1. Rock Type: volcanic (pillow basalt fragments with fresh glass) 2. Size: 9 x 6 x 5 3. Shape / Angularity: angular 4. Color of cut surface: / 5. Texture / Vesicularity: / 6. Phenocrysts: / 7. Matrix: / 8. Secondary Minerals: / 9. Encrustations: / 10. Comment: fresh glass, volc. fragments similar to 1-5				GL		10.58031/KIEL0264GRHB201		
SO307-DR54-7	1. Rock Type: volcanic rock fragments (pillow basalt with fresh glass) 2. Size: 7 x 8 x5 3. Shape / Angularity: / 4. Color of cut surface: / 5. Texture / Vesicularity: / 6. Phenocrysts: / 7. Matrix: / 8. Secondary Minerals: / 9. Encrustations: / 10. Comment: similar to 6, fresh glass				GL		10.58031/KIEL0264GRHC201		
SO307-DR54-8	1. Rock Type: volcanic rock fragments (pillow basalt with fresh glass) 2. Size: 9 x 6 x 5 3. Shape / Angularity: / 4. Color of cut surface: / 5. Texture / Vesicularity: / 6. Phenocrysts: / 7. Matrix: / 8. Secondary Minerals: / 9. Encrustations: / 10. Comment: similar to 6 and 7, fresh glass				GL		10.58031/KIEL0264GRHD201		
SO307-DR54-9A	1. Rock Type: volcanic rock fragments (pillow basalt with fresh glass) 2. Size: 17 x 13 x 8 from bloc A (38 x 31 x 15) 3. Shape / Angularity: / 4. Color of cut surface: / 5. Texture / Vesicularity: / 6. Phenocrysts: / 7. Matrix: / 8. Secondary Minerals: / 9. Encrustations: / 10. Comment: similar to 7 and 8, fresh glass				GL		10.58031/KIEL0264GRHF201		

SO307 Dredge Station Details and Rock Description

SO307-DR54-9B	1. Rock Type: volcanic rock fragments (pillow basalt with fresh glass) 2. Size: 6 x 5 x 3 from bloc A (38 x 31 x 15) 3. Shape / Angularity: / 4. Color of cut surface: / 5. Texture / Vesicularity: / 6. Phenocrysts: / 7. Matrix: / 8. Secondary Minerals: / 9. Encrustations: / 10. Comment: similar to 7 and 8, 9A, fresh glass				GL		10.58031/KIEL0264GRHG201		
SO307-DR54-9C	1. Rock Type: volcanic rock fragments (pillow basalt with fresh glass) 2. Size: 15 x 8 x 7 from bloc A (38 x 31 x 15) 3. Shape / Angularity: / 4. Color of cut surface: / 5. Texture / Vesicularity: / 6. Phenocrysts: / 7. Matrix: / 8. Secondary Minerals: / 9. Encrustations: / 10. Comment: similar to 7 and 8, 9A, fresh glass, additional samples -9D and -9E were taken from block A later				GL		10.58031/KIEL0264GRHH201		
SO307-DR54-10	1. Rock Type: Leftovers from bloc A 2. Size: 38 x 31 x 15 3. Shape / Angularity: / 4. Color of cut surface: / 5. Texture / Vesicularity: / 6. Phenocrysts: / 7. Matrix: / 8. Secondary Minerals: / 9. Encrustations: / 10. Comment: similar to 6 - 9, fresh glass				GL		10.58031/KIEL0264GRHE201		

SO307-55

Large composite seamount in Madagascar Basin, same seamount as DR54, NE of DR54, SW facing flank

Dredge on bottom UTC, hrs, °N, °E, depth m	22:13	30°47,42'S	51°07,18'E	2995
Dredge off bottom UTC, hrs, °N, °E, depth m	23:08	30°47,14'S	51°07,06'E	2789

total volume:

Comments: few large rocks, Mn-encrusted tuff blocks

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GIMIN	SED	IGSN	NOTES	PICTURE
SO307-DR55-1	1. Rock Type: volcaniclastic, altered 2. Size: 17 x 15 x 9 cm 3. Shape / Angularity: sub-angular 4. Color of cut surface: beige 5. Texture / Vesicularity: brecciated, with bioturbation (?) 6. Phenocrysts: no, but igneous clasts (6 x 3.5 cm), Ol-phyric clasts 7. Matrix: calcareous cement 8. Secondary Minerals: Ol altered to iddingsite, CaCO3 in the matrix 9. Encrustations: Mn coating ca. 2 mm thick 10. Comment: very altered	X	X				10.58031/KIEL0264GRHM201		
SO307-DR55-2	1. Rock Type: volcaniclastic, altered 2. Size: 17 x 11 x 8 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: beige 5. Texture / Vesicularity: brecciated, clasts of igneous Ol-phyric lavas, possible bioturbation (?) 6. Phenocrysts: same as before, Ol crystals within the ignous rocks 7. Matrix: cemented by CaCO3 8. Secondary Minerals: same as DR55-1 9. Encrustations: same as DR55-1 10. Comment:						10.58031/KIEL0264GRHN201		

SO307 Dredge Station Details and Rock Description

SO307-56

Large composite seamount in Madagascar Basin, same seamount as DR54, small plateau E of main edifice, S facing flank of the plateau

Dredge on bottom UTC, hrs, °N, °E, depth m 03:27 30°45,22'S 51°12,78'E 4208

Dredge off bottom UTC, hrs, °N, °E, depth m 04:29 30°44,968'S 51°12,667'E 3830

total volume: few rocks

Comments: basalts, some with glass (fresh?) and Mn crusts

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR56-1	1. Rock Type: volcaniclastic, moderaltely altered 2. Size: 24 x 25 x 8 cm 3. Shape / Angularity: sub-rounded 4. Color of cut surface: light brown to orange 5. Texture / Vesicularity: brecciated (composed of glass fracments in various degrees of alteration, 90%), 10% matrix 6. Phenocrysts: clasts: altered glass (palagonite), ca. 1 cm x 0,5 cm, the largest fragments are glassy pillow lava rims with fresh glass (up to 4 x 2,5 cm) 7. Matrix: ca. 10%, composed of alite colored siliceous cement 8. Secondary Minerals: Palagonite 9. Encrustations: thick (> 4cm) Mn crust covering the breccia 10. Comment: Hyaloclastite, with promising large fragments of glass	x			GL?		10.58031/KIEL0264GRHQ201		
SO307-DR56-2	1. Rock Type: volcanic, pillow lava, altered 2. Size: 6 x 4,5 x 4 cm 3. Shape / Angularity: angular 4. Color of cut surface: orange 5. Texture / Vesicularity: massive, Pl-phyric, with a glassy rim 6. Phenocrysts: Plag (< 1%, 1 mm length, < 1 mm wide), altered 7. Matrix: altered, fine grained ground mass, no visible microcrystalls 8. Secondary Minerals: very oxidized 9. Encrustations: < 1mm Mn coating 10. Comment: It is an altered lava, but the rim may content fresh glass	x			GL?		10.58031/KIEL0264GRHR201		
SO307-DR56-3	1. Rock Type: volcanic, pillow lava fragment, altered 2. Size: 6 x 5 x 4.5 cm 3. Shape / Angularity: angular 4. Color of cut surface: orange 5. Texture / Vesicularity: same as sample 2 6. Phenocrysts: same as sample 2 7. Matrix: same as sample 2 8. Secondary Minerals: oxides 9. Encrustations: 0.5 cm thick Mn crust 10. Comment: like sample 2, the lava is altered, but the rim may contain glass						10.58031/KIEL0264GRHS201		
SO307-DR56-4	1. Rock Type: volcanic, slightly altered 2. Size: 6.5 x 6 x 4 cm 3. Shape / Angularity: angular 4. Color of cut surface: grey 5. Texture / Vesicularity: vesicular, < 1mm vesicules, spherical ca 3%, coated by secondary minerals, Pl-phyric 6. Phenocrysts: Pl ca 1%, 1 mm length, highly altered 7. Matrix: fine grained, well crystallized matrix, fresh 8. Secondary Minerals: Pl altered to clay minerals 9. Encrustations: < 1mm Mn coating						10.58031/KIEL0264GRHT201		

SO307-DR56-5	1. Rock Type: volcanic, moderatly fresh 2. Size: 5 x 6 x 6 cm 3. Shape / Angularity: sub angular 4. Color of cut surface: grey 5. Texture / Vesicularity: very small vesicules (1 to 2%, < 1 mm), Ol- and Pl-phyric 6. Phenocrysts: Ol (ca. 2%, < 1mm, completly altered), Pl (ca. 1%, < 1mm, moderately altered) 7. Matrix: well crystallized, fine grained, composed of Ol + Pl + opaque minerals, 97% of the rock, fairly fresh 8. Secondary Minerals: Ol replaced by iddingsite 9. Encrustations: < 1mm Mn coating 10. Comment: good sample for gc and ts	X	X				10.58031/KIEL0264GRHU201		
SO307-DR56-6	1. Rock Type: volcanic, moderately altered 2. Size: 9 x 6 x 7 cm 3. Shape / Angularity: sub-angular 4. Color of cut surface: grey 5. Texture / Vesicularity: same as sample 5 6. Phenocrysts: same as sample 5 7. Matrix: same as sample 5 8. Secondary Minerals: same as sample 5 9. Encrustations: same as sample 5 10. Comment: same basalts as sample 5 but slightly more altered	X	X				10.58031/KIEL0264GRHV201		
SO307-DR56-7	1. Rock Type: volcaniclastic?, tuffaceous 2. Size: 10 x 6 x 7cm 3. Shape / Angularity: rounded 4. Color of cut surface: white greenish 5. Texture / Vesicularity: massive, clastic 6. Phenocrysts: some rounded pumice (?), completely altered crystals (maybe) 7. Matrix: siliceous cement 8. Secondary Minerals: some oxides (orange specs), green mineral filling some of the voids 9. Encrustations: Mn-coating in the surface (<1mm) 10. Comment: mistery rock, maybe tuffaceous, some clasts look like pumice						10.58031/KIEL0264GRHW201		
SO307-DR56-8	1. Rock Type: Mn-nodule 2. Size: 7 x 6.5 x 5 cm 3. Shape / Angularity: rounded 4. Color of cut surface: black with a lithic fragment in the middle (brownish) 5. Texture / Vesicularity: massive 6. Phenocrysts: - 7. Matrix: - 8. Secondary Minerals: Mn 9. Encrustations: - 10. Comment: Mn-nodule						10.58031/KIEL0264GRHX201		

SO307-63

Ridge-like structure forming the northern tip of the Indomed fracture zone. Dredge up the middle slope.

Dredge on bottom UTC, hrs, °N, °E, depth m	11:08	35°47,79'S	46°50,47'E	3298
Dredge off bottom UTC, hrs, °N, °E, depth m	11:54	35°48,03'S	46°50,05'E	3018

total volume: few rocks

Comments: variably metamorphozed basalts

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GIMIN	SED	IGSN	NOTES	PICTURE
SO307-DR63-1	1. Rock Type: metamorphic rock (metabasalt?). 2. Size: 30 x 14 x 8 cm 3. Shape / Angularity: angular 4. Color of cut surface: grey to greenish-grey 5. Texture / Vesicularity: fully crystallized, medium grained, composed by pl, px, or amph. 6. Phenocrysts: 7. Matrix: 8. Secondary Minerals: 9. Encrustations: partly Mn-crusted (<10 cm), removed from sample. 10. Comment: greenschist facies?	X	X				10.58031/KIEL0264GRHZ201		

SO307-DR63-2	1. Rock Type: volcanic rock, strongly altered. 2. Size: 9 x 6 x 5 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: brown 5. Texture / Vesicularity: voids filled with Mn (<7%, < 2mm) 6. Phenocrysts: pl (10%, < 1mm), ol (5%, mostly replaced by iddingsite < 1mm), single px crystals (<2 mm). 7. Matrix: microcrystalline (strongly altered) 8. Secondary Minerals: Mn, iddingsite, Fe-oxidation. 9. Encrustations: partly Mn-crusted <0.1 cm. 10. Comment: Metabasalt?	X	X				10.58031/KIEL0264GRH2201		
SO307-DR63-3	1. Rock Type: volcanic, strongly altered. 2. Size: 9 x 6 x 3 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: greenish-grey with black spots and fractures 5. Texture / Vesicularity: voids filled with Mn (<5%, < 3mm) 6. Phenocrysts: pl (<5%, <5mm), Ol?(hard to distinguished because of string alteration). 7. Matrix: not crystalline anymore. 8. Secondary Minerals: Mn in voids and fractures, Fe-oxidation. 9. Encrustations: partly Mn-crusted (<0.2mm) 10. Comment: metabasalt? greenshist facies?	X					10.58031/KIEL0264GRH3201		

SO307-64

Ridge-like structure forming the northern tip of the Indomed fracture zone, uplifted block, west facing slope, lower part

Dredge on bottom UTC, hrs, °N, °E, depth m	14:47	35°45,93'S	46°50,08'E	3800
Dredge off bottom UTC, hrs, °N, °E, depth m	15:42	35°45,63'S	46°50,08'E	3478

total volume: few rocks

Comments: two large blocks and a few more small angular and subrounded fragments; predominantely Ol-Pl-phyric and Ol-phyric basalts moderately altered. All have fully crystalline doleritic texture. Good for geochem and Ar/Ar.

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR64-1	1. Rock Type: volcanic rock, moderately altered 2. Size: 18 x 10 x 9 from block A (40 x 32 x 23) 3. Shape / Angularity: angular 4. Color of cut surface: grey 5. Texture / Vesicularity: fully crystallized, massive 6. Phenocrysts: Ol (<1%, <2mm), Px (<1%, <1mm), Pl (10%, <2mm) 7. Matrix: medium grained, doleritic 8. Secondary Minerals: Iddingsite after Ol, likely some chlorite in g.m. 9. Encrustations: Mn crust up to 10 cm thick 10. Comment: suitable for geochem. and Ar/Ar dating	X	X	X			10.58031/KIEL0264GRH5201		
SO307-DR64-2	1. Rock Type: volcanic rock, moder. altered 2. Size: 21 x 11 x 19 3. Shape / Angularity: angular 4. Color of cut surface: grey with black spots 5. Texture / Vesicularity: porphiritic with very rare vesicules 6. Phenocrysts: similar to DR-64-1 7. Matrix: similar to DR-64-1 8. Secondary Minerals: similar to DR-64-1 9. Encrustations: similar to DR-64-1 10. Comment: similar to DR-64-1	X	X	X			10.58031/KIEL0264GRH6201		

SO307 Dredge Station Details and Rock Description

SO307-DR64-3	1. Rock Type: volcanic rock, moder. altered 2. Size: 8 x 8 x 5 3. Shape / Angularity: subrounded 4. Color of cut surface: grey with light spots 5. Texture / Vesicularity: porphyritic, rare vesicules (about 1-2%) 6. Phenocrysts: Plag around 20% <0.5cm, CPX 1-2%, <3mm, Ol <1% if any (Ol altered, Plag and Cpx fresh) 7. Matrix: similar to DR-64-1, fully crystallized, doleritic 8. Secondary Minerals: likely some chlorite in g.m., Ol replaced by iddingsite 9. Encrustations: thin Mn crust <1mm 10. Comment:	x	x	x			10.58031/KIEL0264GRH7201		
SO307-DR64-4	1. Rock Type: volcanic rock mod. altered 2. Size: 11 x 11 x 7 3. Shape / Angularity: subrounded 4. Color of cut surface: grey with rare black spots, yellow-grey along fractures 5. Texture / Vesicularity: similar to DR-64-1 and DR64-2, perhaps more altered 6. Phenocrysts: similar to DR-64-1 and DR64-2 7. Matrix: similar to DR-64-1 and DR64-2 8. Secondary Minerals: similar to DR-64-1 and DR64-2 9. Encrustations: similar to DR-64-1 and DR64-2 10. Comment:	x	x				10.58031/KIEL0264GRH8201		
SO307-DR64-5	1. Rock Type: volcanic rock, moder. altered 2. Size: 12 x 13 x 4 3. Shape / Angularity: angular 4. Color of cut surface: similar to DR64-1 5. Texture / Vesicularity: similar to DR64-1 6. Phenocrysts: similar to DR64-1 7. Matrix: similar to DR64-1 8. Secondary Minerals: similar to DR64-1 9. Encrustations: similar to DR64-1 10. Comment:	x					10.58031/KIEL0264GRH9201		
SO307-DR64-6	1. Rock Type: volcanic rock, moder. to strongly altered 2. Size: 21 x 11 x 19 3. Shape / Angularity: subrounded 4. Color of cut surface: dark grey with orange spots 5. Texture / Vesicularity: porphysitic, massive, no vesicules 6. Phenocrysts: Ol around 10-15%, <2mm, altered, Fe hydroxides, Plag around 5%, <2mm, fresh (?) 7. Matrix: doleritic, fully crystallized, fresh 8. Secondary Minerals: Fe hydroxides after Ol, some chlorite (?) in g.m. 9. Encrustations: Mn-crust on outer surface, perhaps some Mn precipitates in g.m. 10. Comment: the only sample of Ol-phyric rocks from this dredge, sample should be analysed for	x	x	?			10.58031/KIEL0264GRKA201		
SO307-DR64-7	1. Rock Type: sedimentary rock breccia cemented by Mn-crust around 2 cm thick 2. Size: 12 x 13 x 4, clasts are <2cm diameter 3. Shape / Angularity: angular 4.-10.: the fragments in breccia are green metamorphosed basalts similar to those from DR63						KIEL0264GRKB201		
SO307-DR64-8	1. Rock Type: Mn crust on clast of basalt 2. Size: 18 x 16 x 10, crust around 6cm thick, massive with fine layering, Part of bloc B (35 x 25 x 23) 3.-10.: n/a 4. Color of cut surface: 5. Texture / Vesicularity: 6. Phenocrysts: 7. Matrix: 8. Secondary Minerals: 9. Encrustations: 10. Comment:						10.58031/KIEL0264GRKC201		

SO307 Dredge Station Details and Rock Description

SO307-65

Northern Indomed FZ, tilted block in fracture zone facing east, southern flank of the block

Dredge on bottom UTC, hrs, °N, °E, depth m	19:26	35°55,36'S	46°51,14'E	3816
Dredge off bottom UTC, hrs, °N, °E, depth m	20:18	35°55,13'S	46°51,13'E	3505

total volume: 1 large rock and two Mn-nodules

Comments: volcanic, Ol-phyric rocks; possibly good for Ar/Ar-dating.

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR65-1	1. Rock Type: volcanic, moderately altered 2. Size: 16 x 15 x 9 3. Shape / Angularity: rounded 4. Color of cut surface: grey with orange specks 5. Texture / Vesicularity: porphyritic, massive 6. Phenocrysts: Ol (20%, 2x1mm), Pl (10%, 3x1mm) 7. Matrix: well-crystallized, fine grained 8. Secondary Minerals: Ol completely altered to Iddinsite, Fe-oxides 9. Encrustations: Mn crust up to 3.5cm thick 10. Comment: good Pl, maybe good for Ar/Ar	x	x	?			10.58031/KIEL0264GRKE201		
SO307-DR65-2	1. Rock Type: volcanic, altered 2. Size: from block A (39 x 38 x 24 cm), working sample 20 x 10 x 8 cm 3. Shape / Angularity: subangular 4. Color of cut surface: grey with orange spots 5. Texture / Vesicularity: porphysritic, vesicular (3%, spherical around 1mm diameter) 6. Phenocrysts: Ol (around 35%, 2x1mm), Pl (around 10%, 3x1mm) fairly freh 7. Matrix: well-cyrstallized, fine grained matrix 8. Secondary Minerals: Ol completely replaced by iddingsite, Fe-oxides 9. Encrustations: Mn crust several cm thick 10. Comment: good Pl, also acceptable for Ar/Ar	x	x	?			10.58031/KIEL0264GRKF201		
SO307-DR65-3	1. Rock Type: volcanic, moderately altered 2. Size: 6 x 9 x 6 cm 3. Shape / Angularity: rounded 4. Color of cut surface: grey 5. Texture / Vesicularity: vesicular (5%, 1mm diameter sphericed), coated with Mn, oxides, some zeolites 6. Phenocrysts: Ol-phyric (3%, 1mm diameter), completely replaced to iddingsite 7. Matrix: well crystallized, very fine-grained 8. Secondary Minerals: Fe-oxides, iddingsite, Mn, zeolites 9. Encrustations: Mn crust 2cm thick 10. Comment: small lava fragment within a Mn nodule						10.58031/KIEL0264GRKG201		

SO307 Dredge Station Details and Rock Description

SO307-69

Northern Indomed fracture zone, eastern "wall" of fracture zone; similar ridge as empty DR 68, south-facing flank

Dredge on bottom UTC, hrs, °N, °E, depth m	15:13	37°11,02'S	46°41,27'E	4237
Dredge off bottom UTC, hrs, °N, °E, depth m	16:16	37°10,78'S	46°41,25'E	3916

total volume: few rocks

Comments: pillow lavas, some with well preserved glassy margin

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR69-1	1. Rock Type: volcanic, slightly altered 2. Size: 20 x 14 x 12 cm 3. Shape / Angularity: angular 4. Color of cut surface: grey to dark grey, with fractures, glassy parts dark grey close to glass rim 5. Texture / Vesicularity: voids (<3%, <1mm) filled with Mn, Fe-oxidized 6. Phenocrysts: aphyric 7. Matrix: cryptocrystalline: Pl, glassy matrix 8. Secondary Minerals: Mn, Fe-oxidation, white secondary mineral 9. Encrustations: partly Mn-encrusted (<1cm) 10. Comment: fresh Pl in matrix good for Ar/Ar, dark rounded glassy parts towards rim, fresh glass surrounded by palagonite	x	x	x	GL		10.58031/KIEL0264GRKK201		
SO307-DR69-2	1. Rock Type: volcanic rock, slightly altered 2. Size: 10 x 10 x 8 cm 3. Shape / Angularity: angular 4. Color of cut surface: grey 5. Texture / Vesicularity: slightly vesicular (2-3%, ≤0,5mm), massive 6. Phenocrysts: cryptocrystalline, glassy 7. Matrix: cryptocrystalline, glassy 8. Secondary Minerals: likely some alteration after glass in groundmass 9. Encrustations: oxidation, thin film on outer surface, filling in vesicles 10. Comment:	x	x				10.58031/KIEL0264GRKM201		
SO307-DR69-3	1. Rock Type: volcanic, slightly altered 2. Size: 10 x 8 x 5 cm 3. Shape / Angularity: angular 4. Color of cut surface: 4) to 10): similar to DR69-2 5. Texture / Vesicularity: 6. Phenocrysts: 7. Matrix: 8. Secondary Minerals:	x	x				10.58031/KIEL0264GRKN201		
SO307-DR69-4	1. Rock Type: volcanic, slightly to moderately altered 2. Size: 9 x 8 x 5 cm 3. Shape / Angularity: subrounded 4) to 10) similar to DR69-2 but more altered at outer margin 1-1,5cm thick						10.58031/KIEL0264GRKP201		
SO307-DR69-5	1. Rock Type: volcanic rock; moderately altered 2. Size: 8 x 9 x 10 cm 3. Shape / Angularity: angular 4. Color of cut surface: dark grey in core, rim (1 cm) grey-brown 5. Texture / Vesicularity: vesicular (<5%, <1mm) voids filled with white secondary minerals, some vesicles not filled 6. Phenocrysts: Pl (<10%, <1mm) one megacryst 3mm, altered or replaced by Mn 7. Matrix: microcrystalline: Pl altered 8. Secondary Minerals: Mn, Fe alteration						10.58031/KIEL0264GRKQ201		

SO307 Dredge Station Details and Rock Description

SO307-DR69-6	1. Rock Type: volcanic, moderately altered 2. Size: 15 x 18 x 11 cm 3. Shape / Angularity: angular 4. Color of cut surface: brown-grey with grey patches towards glassy rim 5. Texture / Vesicularity: vesicular (<7%, 1mm) partly have a Mn crust inside 6. Phenocrysts: former minerals, not distinguishable (<3%, <1mm) because of strong alteration, Pl? 7. Matrix: microcrystalline: Fe-alteration 8. Secondary Minerals: fractures filled with white secondary minerals 9. Encrustations: partly Mn-crusted (<2mm) 10. Comment: small patches of glassy rock (dark grey, rounded), close to glass rim, fresh glass surrounded by palagonite				GL		10.58031/KIEL0264GRKR201		
SO307-DR69-7	1. Rock Type: volcanic, moderately altered to fresh 2. Size: 20 x 16 x 7 cm 3. Shape / Angularity: 3) to 10): similar to DR69-6, contains rare Pl crystals (<1%, 1-2mm). Glass is abundant as well as grey fresh parts of rock in its marginal part 4. Color of cut surface: 5. Texture / Vesicularity: 6. Phenocrysts: 7. Matrix: 8. Secondary Minerals: 9. Encrustations:	x		x	GL		10.58031/KIEL0264GRKS201		
SO307-DR69-8	1. Rock Type: volcanic, moderately altered to fresh 2. Size: 32 x 20 x 10 cm 3. Shape / Angularity: 3) to 10): similar to DR69-6 and -7. Glass and glassy parts of pillow are abundant 4. Color of cut surface: 5. Texture / Vesicularity: 6. Phenocrysts: 7. Matrix: 8. Secondary Minerals: 9. Encrustations:				GL		10.58031/KIEL0264GRKT201		
SO307-DR69-9	1. Rock Type: Mn-crust 2. Size: 18 x 13 x 7 cm 3. Shape / Angularity: 4. Color of cut surface: 5. Texture / Vesicularity: 6. Phenocrysts: 7. Matrix: 8. Secondary Minerals: 9. Encrustations: 10. Comment: Mixed with phosphate in inner 5 cm part, pure Mn in outer 1,2-1,4cm margin.						10.58031/KIEL0264GRKU201		

SO307 Dredge Station Details and Rock Description

SO307-70

Indomed FZ western steep wall, eastern facing slope, lower part

Dredge on bottom UTC, hrs, °N, °E, depth m	21:15	37°16,08'S	46°33,441'E	4248
Dredge off bottom UTC, hrs, °N, °E, depth m	22:28	37°16,09'S	46°33,38'E	4206

total volume: few rocks, pillow lavas, some with well preserved glassy

Comments:

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR70-1	1. Rock Type: volcanic moder. altered 2. Size: 4 x 5 x 4 cm 3. Shape / Angularity: subangular 4. Color of cut surface: massive, porphyritic, grey 5. Texture / Vesicularity: 6. Phenocrysts: Pl (2x5mm, 20%), Ol (1mm diameter, 5%) 7. Matrix: fine grained, altered 8. Secondary Minerals: Ol completely replaced by iddingsite, matrix has Fe-oxides 9. Encrustations: thin Mn coating <1mm thick 10. Comment: large phenocrysts of Plag throughout the sample	X	X				10.58031/KIEL0264GRKW201		
SO307-DR70-2	1. Rock Type: volcanic, moder. altered 2. Size: 25 x 16 x 12 cm 3. Shape / Angularity: subangular 4. Color of cut surface: pinkish grey 5. Texture / Vesicularity: massive, porphyritic 6. Phenocrysts: Pl (25%, 5x3mm), Ol (10%, 3x2mm) 7. Matrix: fine grained, altered groundmass 8. Secondary Minerals: same as DR70-1 9. Encrustations: same as DR70-1 10. Comment: large phenocrysts; glassy rim, good for separating fresh glass; largest phenocrysts 1 x 0.5 cm of Pl, maybe glomeritic	X	X		GL		10.58031/KIEL0264GRKX201		
SO307-DR70-3	1. Rock Type: volcanic, moder. altered 2. Size: 12 x 6 x 6 cm 3. Shape / Angularity: subangular 4. Color of cut surface: pinkish grey 5. Texture / Vesicularity: massive, porphyritic 6. Phenocrysts: Pl (25%, 3x2mm), Ol (7%, 2x1mm) 7. Matrix: fine grained, altered ground mass 8. Secondary Minerals: Ol completely replaced by iddingsite, matrix pervasively altered by Fe-oxides, giving it a pinkish hue 9. Encrustations: same as DR70-1 10. Comment: similar to DR70-1 and -2, but different texture (more phenocrysts), maybe more altered than DR70-1 and -2	X	X				10.58031/KIEL0264GRKY201		
SO307-DR70-4	1. Rock Type: volcanic breccia, fragments of lava similar to DR70-1 to -3 2. Size: 10 x 5 x 5 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: brown, orange 5. Texture / Vesicularity: brecciated 6. Phenocrysts: - 7. Matrix: glassy, silceous cement 8. Secondary Minerals: siliceous cement between fragments, palagonite 9. Encrustations: - 10. Comment: the glassy rim may contain fresh				?		10.58031/KIEL0264GRKZ201		

SO307-DR80

Southern Discovery Fracture Zone , western wall

Dredge on bottom UTC, hrs, °N, °E, depth m	06:46	39°58,35'S	43°04,35'E	1622
Dredge off bottom UTC, hrs, °N, °E, depth m	08:12	39°58,31'S	43°04,01'E	1247

total volume: 1/3 full

Comments: ol-px-pl-phyric volc. Rocks (slightly to moderatley altered), vesicular volc. Rocks (slightly altered), volcaniclastic rocks (hydrothermally altered?), breccias

SO307 Dredge Station Details and Rock Description

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR80-1	1. Rock Type: volcanic, slightly altered 2. Size: 14 x 14 x 12 3. Shape / Angularity: subangular 4. Color of cut surface:dark grey to orange towards some of the edges 5. Texture / Vesicularity: porphyritic 6. Phenocrysts: pl (< 2%, 8 mm) preservation state varies from fairly fresh to completely replaced); px (< 3%, < 10 mm), ol (< 1%, < 5mm) mostly pseudomorphs 7. Matrix: fine-crystalline, slightly altered, Fe-oxidized 8. Secondary Minerals: Fe-oxidation 9. Encrustations: very few parts mn-coated (<	X	X	X			10.58031/KIEL0264GRK3201		
SO307-DR80-2	1. Rock Type: volcanic, moderately altered 2. Size: 21 x 11 x 10 3. Shape / Angularity: angular 4. Color of cut surface: grey to grey-brown 5. Texture / Vesicularity: voids (10%, < 3mm) filled with CaCO3, Mn 6. Phenocrysts: porphyritic: few pl (< 1%, < 3mm) altered 7. Matrix: medium-grained matrix; pl, px (strongly altered, oxidized, replaced by mn) 8. Secondary Minerals: orange amorphous phases partially replace some matrix phases, mn replaces some matrix phases 9. Encrustations: mn-crust (< 3mm) 10. Comment: /	X	X				10.58031/KIEL0264GRK4201		
SO307-DR80-3	1. Rock Type: volcanic, moderately altered 2. Size: 19 x 11 x 10 3. Shape / Angularity: angular 4. Color of cut surface: grey, slightly green 5. Texture / Vesicularity: voids (< 5%, < 2mm) filled with mn, some filled with CaCO3 6. Phenocrysts: phyric: pl (< 2%, < 5mm)with alteration rim, ol? replaced by mn 7. Matrix: medium-grained: px (oxidized (orange)), pl (black phase) 8. Secondary Minerals: Fe-oxidation, mn 9. Encrustations: partly mn-crusted (< 5mm) 10. Comment: /	X					10.58031/KIEL0264GRK5201		
SO307-DR80-4	1. Rock Type: volcanic, moderately altered 2. Size: 22 x 12 x 9 3. Shape / Angularity: subrounded 4. Color of cut surface: grey, slightly grey-green 5. Texture / Vesicularity: voids (< 5%, < 2mm) filled with mn, some filled with CaCO3, fractures 6. Phenocrysts: phyric: pl (< 2%, < 5mm)with alteration rim, ol? replaced by mn 7. Matrix: medium-grained: px (oxidized (orange)), pl (black phase) 8. Secondary Minerals: Fe-oxidation, mn 9. Encrustations: partly mn-crusted (< 5mm) 10. Comment: similar to -3	X					10.58031/KIEL0264GRK6201		
SO307-DR80-5	1. Rock Type: volcanic, moderately altered 2. Size: 17 x 17 x 9 3. Shape / Angularity: subangular 4. Color of cut surface: grey, slightly grey-green 5. Texture / Vesicularity: voids (< 5%, < 2mm) filled with mn, some filled with CaCO3, fractures 6. Phenocrysts: phyric: pl (< 7%, < 5mm)with alteration rim, ol? replaced by mn 7. Matrix: medium-grained: px (oxidized (orange)), pl (black phase) 8. Secondary Minerals: Fe-oxidation, mn 9. Encrustations: partly mn-crusted (< 5mm) 10. Comment: similar to -4	X	X				10.58031/KIEL0264GRK7201		

SO307 Dredge Station Details and Rock Description

SO307-DR80-6	1. Rock Type: volcanic, strongly altered 2. Size: 20 x 15 x 10 from bloc A 3. Shape / Angularity: angular 4. Color of cut surface: red/brownisch grey 5. Texture / Vesicularity: vesicular(< 7%, < 3mm), partly filled with silica, mn, green minerals, Fe-oxidations, mn-filled fractures; nonvesicular in core 6. Phenocrysts: < 5%, < 1mm; replaced by mn, not distinguishable 7. Matrix: fine-crystalline (strongly altered and oxidized) 8. Secondary Minerals: Fe-oxidation, mn, silica, green minerals 9. Encrustations: /	X	X				10.58031/KIEL0264GRK8201		
SO307-DR80-7	1. Rock Type: volcanic, strongly altered 2. Size: 9 x 8 x 6 3. Shape / Angularity: rounded 4. Color of cut surface: orange-brown 5. Texture / Vesicularity: vesicular (< 7%, < 6mm) partly filled with CaCO3, Fe-oxidized, mn; fractures 6. Phenocrysts: aphyric 7. Matrix: coarse-grained (strongly altered), red phase, black phase (mn?), beige phase 8. Secondary Minerals: matrix seems to be completely replaced by secondary minerals, Fe-oxidation, mn, CaCO3 9. Encrustations: / 10. Comment: /						10.58031/KIEL0264GRK9201		
SO307-DR80-8	1. Rock Type: volcanic, strongly altered, partly brecciated 2. Size: 23 x 16 x 12 3. Shape / Angularity: rounded 4. Color of cut surface: brownish 5. Texture / Vesicularity: vesicular (< 10%, < 3mm) partly filled with CaCO3, Mn, Fe-oxidation, green minerals, silica 6. Phenocrysts: pl (< 7%, < 2mm) altered, replaced by mn 7. Matrix: fine-grained (strongly altered) 8. Secondary Minerals: Fe-oxides, mn, CaCO3, silica 9. Encrustations: partially mn-coated (< 0.1mm) 10. Comment: brecciated part: angular clasts of volcanic rocks, pl clasts; all rounded						10.58031/KIEL0264GRMA201		
SO307-DR80-9	1. Rock Type: volcanic, moderately altered 2. Size: from block B (23 x 17 x 14 cm) 3. Shape / Angularity: subangular 4. Color of cut surface: grey with black dots. 5. Texture / Vesicularity: voids filled with Mn (< 1%, <1 mm), fractures filled with Mn 6. Strongly filled phenos (< 1%, <1 mm), fractures filled with Mn 7. Matrix: medium grained: pl < 1mm(strongly altered, px) 8. Secondary Minerals: Mn, Fe oxides 9. Encrustations: / 10. Comment: /	X	X				10.58031/KIEL0264GRMB201		
SO307-DR80-10	1. Rock Type: volcanic 2. Size: from large block C (21 x 20 x20 cm) 3. Shape / Angularity: rounded 4. Color of cut surface: grey/light brown 5. Texture / Vesicularity: porphyrictic, 1 % vesicles up to 2 mm 6. Phenocrysts: 2 % plag phenocrysts, up to 8 mm, rounded shape, suggests resorption 7. Matrix: coarse-grained, well-crystallized 8. Secondary Minerals: calcite fills, most vesicles, other dark orange amorphons phases partially replace some matrix phases 9. Encrustations: none 10. Comment: appears doleritic, but it has phenocrysts + some vesicles						10.58031/KIEL0264GRMC201		

SO307 Dredge Station Details and Rock Description

SO307-DR80-11	1. Rock Type: volcanic, volcaniclastic? 2. Size: 21 x 13 x 14 cm 3. Shape / Angularity: rounded 4. Color of cut surface: grey, green, orange, brown 5. Texture / Vesicularity: 6. Phenocrysts: 7. Matrix: 8. Secondary Minerals: most appear to be secondary minerals 9. Encrustations: thin <1 mm Mn crust 10. Comment: heavily altered sample, difficult to recognize original. There are ~10% 4-10 mm fragments, rounded to angular in shape, that are now mostly composed of a soft, light green mineral, but some also have orange color. The matrix is grey to tan/brown						10.58031/KIEL0264GRMD201		
SO307-DR80-12	1. Rock Type: volcaniclastic 2. Size: 20 x 19 x 19 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: dark grey, light green 5. Texture / Vesicularity: 6. Phenocrysts: 7. Matrix: 8. Secondary Minerals: most of the rock appears to be secondary minerals 9. Encrustations: thin <1 mm Mn crust 10. Comment:several larger (up to several cm) angular clasts of vesicular basalt (~5 % < 1mm) hosted within a dark grey to black matrix. This matrix is also composed of many smaller, subrounded to subangular fragments that are dark grey to brownish. Two clasts have green color. The entire rock appears heavily altered and primarily composed of unknown secondary minerals.						10.58031/KIEL0264GRME201		
SO307-DR80-13	1. Rock Type: volcaniclastic 2. Size: 26 x 16 x 10 cm 3. Shape / Angularity: rounded 4. Color of cut surface: dark brown to black; fragments grey to brown 5. Texture / Vesicularity: mm-sized vsicles in one of the fragments; some filled with Mn-oxides 6. Phenocrysts: fsp? altered in largest fragment? 7. Matrix: fine grained in volcanic fragments; fragment size <= 7cm; breccia is poorly sorted 8. Secondary Minerals: difficult to discern 9. Encrustations: Mn crust 10. Comment: Poorly sorted volcaniclastic breccia. Volcanic rock fragments might be usable for geochemistry						10.58031/KIEL0264GRMF201		
SO307-DR80-14	1. Rock Type: volcanic, strongly hydrothermally altered 2. Size: 16 x 8 x 9 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: largely pale green with black spots and vein filling in 1 cm thick silicate? gypsum? vein 5. Texture / Vesicularity: fine grained, chlorified 6. Phenocrysts: 7. Matrix: 8. Secondary Minerals: secondary hydrothermal 9. Encrustations: mm thin Mn coating 10. Comment: volcanic rock (probab. basaltic) that underwent significant hydrothermal alteration replacing much/all of the original minerology						10.58031/KIEL0264GRMG201		
SO307-DR80-15	1. Rock Type: volcaniciclastic breccia; hydrothermally? altered 2. Size:15 x 12 x 5 cm 3. Shape / Angularity: subrounded to rounded 4. Color of cut surface: mostly dark green to grey 5. Texture / Vesicularity: breccia consisting of fragments <= 2cm (most likely volcanic fragments), poorly sorted 6. Phenocrysts: 7. Matrix: see SO307-DR80-5 8. Secondary Minerals: probably chlorite(green color); no other secondary minerals discernable 9. Encrustations: patchy sub-mm coating of Mn-oxide						10.58031/KIEL0264GRMH201		

SO307 Dredge Station Details and Rock Description

SO307-DR80-16	1. Rock Type: volcaniclastic; heavily altered, infused with Mn Oxides 2. Size:10 x 8 x 6 cm 3. Shape / Angularity: rounded 4. Color of cut surface: mostly green to black; multicolor 5. Texture / Vesicularity: 6. Phenocrysts: 7. Matrix: fine to medium grained; max fragment size 2 mm 8. Secondary Minerals:Chlorite (green color); Mn oxide infiltrate 9. Encrustations: none 10. Comment:rounded piece of volcaniclastica, cloritized and heavily filled with Mn-oxides						10.58031/KIEL0264GRMK201		

SO307-DR81

Southern Discovery Fracture Zone, western wall, irregular slope

Dredge on bottom UTC, hrs, °N, °E, depth m	11:11	40°05,457'S	43°02,826'E	2218
Dredge off bottom UTC, hrs, °N, °E, depth m	12:13	40°05,311'S	43°02,469'E	1913

total volume: few rocks

Comments: one volcanic rock, many carbonates

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR81-1	1. Rock Type: volcanic, slightly altered 2. Size: 6 x 5 x 5 3. Shape / Angularity: angular 4. Color of cut surface: dark grey in core, outer part (< 1cm) lighter grey 5. Texture / Vesicularity: nonvesicular, fractures with Fe-oxides and mn 6. Phenocrysts: pl (< 5%, 4 mm), quite fresh, perhaps ol replaced by mn (< 1%, < 1mm)? 7. Matrix: fine-crystalline 8. Secondary Minerals: Fe-oxidation, mn 9. Encrustations: partial Fe-ox. and CaCO3 crusted (< 0.1 mm) 10. Comment: fresh enough for Ar/Ar dating	X	X	X			10.58031/KIEL0264GRMN201		
SO307-DR81-2	1. Rock Type: Carbonate 2. Size: 15 x 8x 7 3. Shape / Angularity: rounded 4. Color of cut surface: white 5. Texture / Vesicularity: / 6. Phenocrysts: / 7. Matrix: / 8. Secondary Minerals: / 9. Encrustations: partly mn-crusted (< 0.1mm) 10. Comment: representative sample						10.58031/KIEL0264GRMP201		

SO307-DR82

Southern Discovery FZ, western wall. Large block, eastern flank.

Dredge on bottom UTC, hrs, °N, °E, depth m	11:40	39°23,48'S	43°13,14'E	2759
Dredge off bottom UTC, hrs, °N, °E, depth m	12:42	39°23,36'S	43°12,87'E	2317

Total volume: Full

Comments: pillow lavas, massive dolerites, tuffs, Mn-crusts, consolidated sediments. Three main groups: volcanic, subvolcanic, and sedimentary/other.

SO307 Dredge Station Details and Rock Description

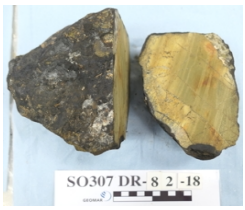
SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR82-1	1. Rock Type: volcanic, slightly altered. 2. Size: 18 x 23 x 13 cm 3. Shape / Angularity: subangular 4. Color of cut surface: grey with black dots. 5. Texture / Vesicularity: voids (<7%, <2mm) filled with Mn. 6. Phenocrysts: aphyric 7. Matrix: medium-crystalline, Pl (slightly to mod. altered), Px (mod. altered, replaced by Mn?) 8. Secondary Minerals: Mn 9. Encrustations: partly-Mn coated, Fe-oxidation 10. Comment:	X	X				10.58031/KIEL0264GRMR201		
SO307-DR82-2	1. Rock Type: volcanic, moderately altered. 2. Size: 19 x 12 x 8 cm 3. Shape / Angularity: subangular 4. Color of cut surface: grey with black dots 5. Texture / Vesicularity: voids (<10%, < 2mm) 6. Phenocrysts: Pl-phyric (<2%, <3mm, strongly altered) 7. Matrix: medium-grained. Pl, Px (strongly altered). 8. Secondary Minerals: Mn 9. Encrustations: Partly Mn-coated, partly Fe-oxidation. 10. Comment:	X	X				10.58031/KIEL0264GRMS201		
SO307-DR82-3	1. Rock Type: volcanic, moderately altered. 2. Size: 13 x 15 x 7 cm 3. Shape / Angularity: subangular 4. Color of cut surface: grey with black dots 5. Texture / Vesicularity: voids (<7%, <2mm) filled with Mn, few with CaCO3, few fractures (Fe-oxidized, Mn-filled). 6. Phenocrysts: few phenocrysts of Pl (<2mm, <3%, strongly altered). 7. Matrix: medium-grained. Pl, Px (strongly altered) 8. Secondary Minerals: Mn, Fe-oxidation, CaCO3 9. Encrustations: partly Mn-coated 10. Comment:	X	X				10.58031/KIEL0264GRMT201		
SO307-DR82-4	1. Rock Type: volcanic, moderately altered. 2. Size: 20 x 13 x 19 cm 3. Shape / Angularity: subangular 4. Color of cut surface: grey to light grey with orange patches. 5. Texture / Vesicularity: vesicular (<7%, <10mm) partly filled with Fe-oxides. 6. Phenocrysts: Ol (<5%, <2mm) strongly altered, replaced by Fe-oxides, porphyritic. 7. Matrix: Pl, Px, coarse-grained (slightly altered) 8. Secondary Minerals: Mn, Fe-oxidation. 9. Encrustations: Mn-crust (<0.1mm) 10. Comment:	X	X				10.58031/KIEL0264GRMU201		
SO307-DR82-5	1. Rock Type: volcanic, moderately altered. 2. Size: 16 x 8 x 15 cm 3. Shape / Angularity: subangular 4. Color of cut surface: similar to -4 5. Texture / Vesicularity: similar to -4, less vesicles (<5%) 6. Phenocrysts: similar to 4, Ol (<7%, <2mm) 7. Matrix: sligthly to moderately altered. 8. Secondary Minerals: similar to -4 9. Encrustations: similar to -4 10. Comment:	X	X				10.58031/KIEL0264GRMV201		
SO307-DR82-6	1. Rock Type: breccia, altered clasts. 2. Size: 18 x 15 x 12 cm 3. Shape / Angularity: subangular 4. Color of cut surface: orange-white-brown-grey clasts 5. Texture / Vesicularity: - 6. Phenocrysts: - 7. Matrix: - 8. Secondary Minerals: CaCO3, Mn, Fe-oxidation 9. Encrustations: partly Mn-coated 10. Comment: Fresh glass				GL		10.58031/KIEL0264GRMW201		

SO307 Dredge Station Details and Rock Description

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR82-7	1. Rock Type: volcanic, moderately to strongly altered 2. Size: 12 x 19 x 9 cm 3. Shape / Angularity: subangular 4. Color of cut surface: grey to greyish-green with orange & white patches. 5. Texture / Vesicularity: vesicular (voids-filled with Mn, <7%, <3mm), fractures filled with Mn, CaCO3, Fe-ox, partly elongated. 6. Phenocrysts: Pl (<5%, <4mm), strongly altered. 7. Matrix: medium-grained, Pl, Px? (both moderately to strongly altered) 8. Secondary Minerals: Fe-ox, Mn, CaCO3 9. Encrustations: partly Mn-coated. 10. Comment:	X	X				10.58031/KIEL0264GRMX201		
SO307-DR82-8	1. Rock Type: volcanic, strongly altered 2. Size: 11 x 18 x 11 cm 3. Shape / Angularity: angular 4. Color of cut surface: grey to brown 5. Texture / Vesicularity: vesicular (some filled with Mn, some with CaCO3), <10%, <5mm, partly elongated) 6. Phenocrysts: aphyric 7. Matrix: medium-grained (strongly altered), Pl. 8. Secondary Minerals: CaCO3, Mn, Fe-ox 9. Encrustations: partly Mn-coated. 10. Comment:	X	X				10.58031/KIEL0264GRMY201		
SO307-DR82-9	1. Rock Type: subvolcanic, slightly altered 2. Size: 21 x 21 x 14 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: dark grey 5. Texture / Vesicularity: nonvesicular 6. Phenocrysts: - 7. Matrix: holocrystalline: cpx 45%, pl: 45%, ol ?: 10%, coarse grained (Ol strongly altered) 8. Secondary Minerals: few Fe-oxidation, Mn replaced some phases 9. Encrustations: Mn-coating (partly) 10. Comment: fresh pl good for Ar/Ar- dating, doleritic	X	X	X			10.58031/KIEL0264GRMZ201		
SO307-DR82-10	1. Rock Type: subvolcanic, slightly altered 2. Size: 14 x 12 x 9 cm from bloc E (25 x 16 x 19 cm) 3. Shape / Angularity: subrounded 4. Color of cut surface: dark grey 5. Texture / Vesicularity: similar to DR82-9 6. Phenocrysts: similar to DR82-9 7. Matrix: similar to DR82-9 8. Secondary Minerals: similar to DR82-9 9. Encrustations: Fe-oxidation coating (partly) 10. Comment: fresh pl good for Ar/Ar- dating, doleritic	X	X	X			10.58031/KIEL0264GRM2201		
SO307-DR82-11	1. Rock Type: subvolcanic, slightly altered 2. Size: 23 x 12 x 13 cm 3. Shape / Angularity: subangular 4. Color of cut surface: dark grey with light grey patches 5. Texture / Vesicularity: non-vesicular 6. Phenocrysts: - 7. Matrix: holocrystalline: cpx: 45% (mod. altered), pl: 45%, coarse grained (slightly to mod. altered), Ol: 10% (strongly altered) 8. Secondary Minerals: Mn replaced some phases, Fe-oxidation (few) 9. Encrustations: partly Mn-coated (<0.2mm) 10. Comment: pl might be fresh enough for Ar/Ar dating, doleritic	X	X	x?			10.58031/KIEL0264GRM3201		

SO307 Dredge Station Details and Rock Description

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR82-12	1. Rock Type: subvolcanic, slightly altered 2. Size: 16 x 10 x 12 cm from bloc A (36 x 22 x 10 cm) 3. Shape / Angularity: subangular 4. Color of cut surface: dark grey with light-grey & orange patches 5. Texture / Vesicularity: non-vesicular 6. Phenocrysts: - 7. Matrix: holocrystalline: coarse-grained, cpx: 40% (mod. altered), pl: 40% (slightly to mod. altered), ol? 20% (strongly altered) 8. Secondary Minerals: Fe-oxides, Mn 9. Encrustations: partly Mn coated 10. Comment: pl good enough for Ar/Ar dating, doleritic	X	X	X			10.58031/KIEL0264GRM4201		
SO307-DR82-13	1. Rock Type: subvolcanic, slightly to mod. altered 2. Size: 18 x 17 x 12 cm 3. -10.: similar to DR82-12 slightly more altered, some fractures	X	X	X			10.58031/KIEL0264GRM5201		
SO307-DR82-14	1. Rock Type: subvolcanic, moderately altered 2. Size: 11 x 15 x 6 cm 3. Shape / Angularity: subangular 4. Color of cut surface: dark grey, light grey part on one half, orange patches 5. Texture / Vesicularity: non-vesicular, some fractures 6. Phenocrysts: ol-phyric: glomerophyric, strongly altered around 20%, <0.5mm 7. Matrix: holocrystalline, coarse-grained: cpx: 40% mod. altered, pl: 40% slightly altered 8. Secondary Minerals: Fe-oxidation, Mn 9. Encrustations: partly Mn & Fe-oxidation coated 10. Comment: pl might be fresh enough for Ar/Ar dating, doleritic	X	X	x?			10.58031/KIEL0264GRM6201		
SO307-DR82-15	1. Rock Type: volcanic, strongly (hydrothermally?) altered 2. Size: 15 x 16 x 6 cm from bloc D (40 x 22 x 19 cm) 3. Shape / Angularity: subangular 4. Color of cut surface: brown with white veins 5. Texture / Vesicularity: voids (sec. min) <7%, <2mm Mn, quartz, CaCO3 6. Phenocrysts: replaced? 7. Matrix: totally altered, fine-grained?, Fe-oxidized 8. Secondary Minerals: Fe-ox., Mn, qz, CaCO3 9. Encrustations: partly Mn-coated 10. Comment: thick veins of CaCO3 <2cm and qz						10.58031/KIEL0264GRM7201		
SO307-DR82-16	1. Rock Type: sedimentary or volcaniclastic strongly altered 2. Size: 11 x 12 x 10 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: green 5. Texture / Vesicularity: - 6. Phenocrysts: - 7. Matrix: - 8. Secondary Minerals: - 9. Encrustations: - 10. Comment: semiconsolidated clast of volcanics						10.58031/KIEL0264GRM8201		

SO307-DR82-17	1. Rock Type: breccia with volc. clasts 2. Size: 11 x 20 x 6 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: white matrix with red/green/brown clasts 5. Texture / Vesicularity: - 6. Phenocrysts: - 7. Matrix: - 8. Secondary Minerals: - 9. Encrustations: - 10. Comment: strongly altered volc. clasts, angular shaped						10.58031/KIEL0264GRM9201		
SO307-DR82-18	1. Rock Type: sedimentary 2. Size: 21 x 16 x 12 cm 3. Shape / Angularity: rounded 4. Color of cut surface: green-brown 5. Texture / Vesicularity: fractures 6. Phenocrysts: fractures 7. Matrix: fine-grained 8. Secondary Minerals: Mn-crusted <3mm 9. Encrustations: Mn-crusted <3mm 10. Comment: few brecciated sed. clast on rim						10.58031/KIEL0264GRNA201		
SO307-DR82-19	1. Rock Type: Mn-crust 2. Size: 18 x 13 x 15 cm from block C (45 x 23 x 20 cm) 10. Comment: few brecciated pieces within Mn-crust						10.58031/KIEL0264GRNE		

SO307-83

Central Discovery FZ, western wall, upper slope

Dredge on bottom UTC, hrs, °N, °E, depth m	16:01	39°11,010'S	43°21,117'E	2116
Dredge off bottom UTC, hrs, °N, °E, depth m	16:58	39°10,849'S	43°20,845'E	1821

total volume: half full

Comments: pillow lavas

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR83-1	1. Rock Type: volcanic, moderately altered. 2. Size: 16 x 7 x 12 cm 3. Shape / Angularity: Angular 4. Color of cut surface: Light grey 5. Texture / Vesicularity: subparallel, elongated vesicules (10%, up to 2cm in length x 0.5 cm in width) filled with Mnand Fe-oxides, CaCO3 as well. 6. Phenocrysts: Aphyric 7. Matrix: very fine-grained with Fe-oxide alteration. 8. Secondary Minerals: Mn, CaCO3, and Fe-oxides 9. Encrustations: Mn coating (<1mm thick) 10. Comment: Least altered sample fom the volcanic group, best for GC and TS.	X	X				10.58031/KIEL0264GRND201		
SO307-DR83-2	1. Rock Type: volcanic, moderately altered. 2. Size: 18 x 18 x 10 cm 3. Shape / Angularity: Subangular 4. Color of cut surface: Grey 5. Texture / Vesicularity: vesicular (~15%, 4x3mm, filled with Mn, CaCO3) 6. Phenocrysts: Pl-phyric, ~7%, 4x1mm, completely altered. The largest phenocryst measured 8x2mm. 7. Matrix: fine-grained, well-crystallized, altered with Fe-oxides. 8. Secondary Minerals: Mn, Fe-oxides, CaCO3 9. Encrustations: Mn coating ~1 mm 10. Comment: similarly altered a sample -1, also good for TS and GC.	X	X				10.58031/KIEL0264GRNE201		

SO307 Dredge Station Details and Rock Description

SO307-DR83-3	1. Rock Type: volcanic, altered. 2. Size: 23 x 15 x 11 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: brownish grey 5. Texture / Vesicularity: vesicular ~3%, ~2mm in diameter, completely filled with Mn and CaCO3. 6. Phenocrysts: Pl-phyric ~5%, completely altered, 3x1 mm 7. Matrix: fine-grained, altered to Fe-oxides. 8. Secondary Minerals: Mn, CaCO3, Fe-oxides 9. Encrustations: Mn crust ~2mm thick. 10. Comment: Similar to sample -2 but more altered.	X					10.58031/KIEL0264GRNF201		
SO307-DR83-4	1. Rock Type: volcanic, altered 2. Size: 13 x 12 x 6 cm 3. Shape / Angularity: subangular 4. Color of cut surface: grey 5. Texture / Vesicularity: vesicular ~ 3%, 3x2mm, coated by Mn or filled with CaCO3. 6. Phenocrysts: Pl-phyric, ~5%, 4x2 mm, altered. 7. Matrix: fine-grained, well-crystallized but altered to Fe-oxides. 8. Secondary Minerals: Mn, CaCO3, Fe-oxides 9. Encrustations: covered by a CaCO3 cemented breccia, ~0.5 cm thick. 10. Comment: -	X					10.58031/KIEL0264GRNG201		
SO307-DR83-5	1. Rock Type: volcanic, altered 2. Size: 19 x 13 x 13 cm, from block C 3. Shape / Angularity: abgular 4. Color of cut surface: brownish-grey 5. Texture / Vesicularity: vesicular ~20%, elongated, ~0.5 x0.3 mm, coated with Mn, Fe-oxides or CaCO3.The vesicules are subparallel oriented in some areas, suggesting flow direction. 6. Phenocrysts: aphyric 7. Matrix: very fine-grained, altered. 8. Secondary Minerals: Mn, CaCO3, Fe-oxides 9. Encrustations: Mn coating ~1mm thick. 10. Comment: -	X					10.58031/KIEL0264GRNH201		
SO307-DR83-6	1. Rock Type: volcanic, altered 2. Size: 17 x 8 x 10 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: redish-brown 5. Texture / Vesicularity: vesicular ~20%, 5x2 mm, Mn-coated, Fe-oxides or CaCO3 as fillings. 6. Phenocrysts: Pl-phyric ~2%, 2x1 mm, altered. 7. Matrix: Fine-grained, oxidized. 8. Secondary Minerals: Mn, Fe-oxides, CaCO3. 9. Encrustations: Mn coating, < 1mm thick. 10. Comment: representative sample of several oxidized, vesicular lavas in the dredge, all with similar characteristics but too altered for TS or GC.						10.58031/KIEL0264GRNK201		
SO307-DR83-7	1. Rock Type: volcaniclastic?, breccia. 2. Size: 9 x 6 x 8 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: brown-redish 5. Texture / Vesicularity: brecciated, composed of altered sedimentary (?) clasts. 6. Phenocrysts: - 7. Matrix: Mn-cemented breccia. 8. Secondary Minerals: Mn, Fe-oxides 9. Encrustations: 1.5 cm thick Mn crust. 10. Comment: representative sample of several breccias within the dredge.						10.58031/KIEL0264GRNM201		
SO307-DR83-8	1. Rock Type: sedimentary, breccia 2. Size: 17 x 7 x 10 cm 3. Shape / Angularity: subrounded. 4. Color of cut surface: brown-grey 5. Texture / Vesicularity: brecciated, with sedimentary clasts 10 x 5 mm. 6. Phenocrysts: - 7. Matrix: CaCO3 cemented breccia. 8. Secondary Minerals: Mn, CaCO3 9. Encrustations: ~2mm thick Mn crust 10. Comment: -						10.58031/KIEL0264GRNN201		

SO307 Dredge Station Details and Rock Description

SO307-DR88

Central Discovery Fracture Zone, western wall, uppermost slope

Dredge on bottom UTC, hrs, °N, °E, depth m	13:19	38°39,36'S	43°43,26'E	2306
Dredge off bottom UTC, hrs, °N, °E, depth m	14:51	38°39,42'S	43°43,03'E	2027

total volume: few rocks

pillow fragments, semiconsolidated sediments, ol-phyric basalts

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR88-1	1. Rock Type: volcanic, slightly altered 2. Size: 12 x 6 x10 3. Shape / Angularity: subangular 4. Color of cut surface: grey 5. Texture / Vesicularity: non-vesicular, fractures filled with mn, Fe-oxides 6. Phenocrysts: ol-phyric (10%, < 1mm) strongly altered (Fe-oxidized), partly replaced by mn 7. Matrix: medium-grained: pl, px (slightly altered) 8. Secondary Minerals: Fe-oxides, mn 9. Encrustations: partly mn coated 10. Comment: pl might be fresh enough for Ar/Ar-dating	x	x	x? pl			10.58031/KIEL0264GRNQ201		
SO307-DR88-3	1. Rock Type: volcanic, moderately altered 2. Size: 22 x 20 x 18 3. Shape / Angularity: subangular 4. Color of cut surface: grey with orange spots 5. Texture / Vesicularity: vesicular (< 3%, < 0.5 mm) partly filled with mn, fractures filled with CaCO3 6. Phenocrysts: ol-phyric (< 15%, < 1mm) strongly altered 7. Matrix: medium grained; pl, px (moderately altered) 8. Secondary Minerals: Fe-oxidation, mn, CaCO3 9. Encrustations: partly mn-coated 10. Comment: whole sample is fractured, filled with CaCO3 (< 1cm)	x	x				10.58031/KIEL0264GRNS201		
SO307-DR88-4	1. Rock Type: volcanic, moderately altered 2. Size: 12 x 10 x 9 3. Shape / Angularity: subrounded 4. Color of cut surface: grey with orange/black and white spots 5. Texture / Vesicularity: vesicular (< 10%, < 2cm) partly filled with CaCO3, Fe-ox., mn 6. Phenocrysts: ol (< 5%, 1 mm), strongly altered, replaced by Fe-oxides or other secondary minerals; pl (< 10%, < 2mm) moderately altered 7. Matrix: fine-grained (strongly altered) no crystals recognizable 8. Secondary Minerals: CaCO3, Mn, Fe-oxidation 9. Encrustations: partly mn-crusted (< 3mm) 10. Comment: /	x	x				10.58031/KIEL0264GRNT201		
SO307-DR88-5	1. Rock Type: volcaniclastic, strongly altered 2. Size: 20 x 10 x 8 3. Shape / Angularity: subangular 4. Color of cut surface: beige to green-beige with brownish clasts 5. Texture / Vesicularity: / 6. Phenocrysts: / 7. Matrix: / 8. Secondary Minerals: / 9. Encrustations: partly mn-coated 10. Comment: tuffaceous? cemented rounded to angular clasts						10.58031/KIEL0264GRNU201		

SO307 Dredge Station Details and Rock Description

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR88-6	1. Rock Type: sediment 2. Size: 13 x 8 x6 3. Shape / Angularity: subangular 4. Color of cut surface: brown with black fractures 5. Texture / Vesicularity: / 6. Phenocrysts: / 7. Matrix: / 8. Secondary Minerals: / 9. Encrustations: / 10. Comment: Phosphorite?						10.58031/KIEL0264GRNV201		
SO307-DR88-7	1. Rock Type: sediment 2. Size: 14 x 7 x 6 3. Shape / Angularity: subrounded 4. Color of cut surface: brown-beige with black layers 5. Texture / Vesicularity: medium-grained 6. Phenocrysts: / 7. Matrix: / 8. Secondary Minerals: / 9. Encrustations: /						10.58031/KIEL0264GRNW201		
SO307-DR88-8	1. Rock Type: volcanic, moderately to strongly altered 2. Size: 6 x 4 x 4 3. Shape / Angularity: angular 4. Color of cut surface: grey to orange 5. Texture / Vesicularity: voids and fractures with Mn, other secondary minerals (< 10%, < 3mm) 6. Phenocrysts: pl (< 7%, < 2mm) strongly altered, ol? replaced 7. Matrix: fine-grained, strongly altered, not distinguishable 8. Secondary Minerals: Fe-oxides, mn 9. Encrustations: partly mn-coated 10. Comment: fresh glass within rim (few pieces)				GL		10.58031/KIEL0264GRNX201		

SO307-DR89

Central Discovery Fracture Zone, western wall, ESE-facing cliff, middle to upper slope.

Dredge on bottom UTC, hrs, °N, °E, depth m	16:58	38°30,06'S	43°49,74'E	2435
Dredge off bottom UTC, hrs, °N, °E, depth m	19:45	38°30,09'S	43°49,47'E	2270

total volume: 1 small rock

Comments: volcaniclastic

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR89-1	1. Rock Type: volcaniclastic 2. Size: 8 x 13 x 4 cm 3. Shape / Angularity: angular 4. Color of cut surface: blue-green with white veins 5. Texture / Vesicularity: 6. Phenocrysts: 7. Matrix: 8. Secondary Minerals: 9. Encrustations: ~2 mm Mn-crust on outer surface. 10. Comment: tuff with clasts up to 1 cm, mostly 0.5-1 mm. Completely palagonized ash particles. White cement, no reaction with HCl, Phosphorite ?						10.58031/KIEL0264GRNZ201		

SO307-DR90

Central Discovery fracture zone, E-facing slope, middle part.

Dredge on bottom UTC, hrs, °N, °E, depth m	23:37	38°22,761'S	43°54,199'E	2729
Dredge off bottom UTC, hrs, °N, °E, depth m	00:34	38°22,840'S	43°53,833'E	2499

total volume: half full

Comments:

SO307 Dredge Station Details and Rock Description

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR90-1	1. Rock Type: volcanic, altered 2. Size: 22 x 14 x 10 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: brown 5. Texture / Vesicularity: vesicular, 40%, 3mm diameter, filled with Mn and CaCO3 6. Phenocrysts: Pl-phyric, 2%, 3x1mm, mod. altered 7. Matrix: fine grained, brown, mod. altered, oxidized 8. Secondary Minerals: Mn, CaCO3, Fe-oxides 9. Encrustations: Mn-crust	X	X				10.58031/KIEL0264GRN3201		
SO307-DR90-2	1. Rock Type: volcanic, mod. altered 2. Size: 7 x 5 x 5 cm 3. Shape / Angularity: rounded 4. Color of cut surface: grey with orange specks 5. Texture / Vesicularity: massive 6. Phenocrysts: Ol-phyric, 15%, 1mm diameter, completely altered to iddingsite; Pl-phyric, 5%, 2mm length, less than 1mm width, fairly fresh 7. Matrix: fine grained, composed of Pl, Ol 8. Secondary Minerals: iddingsite, Mn 9. Encrustations: Mn-coating, 1mm thick 10. Comment: sample is to small for geochem.	X					10.58031/KIEL0264GRN4201		
SO307-DR90-3	1. Rock Type: volcaniclastic breccia, altered 2. Size: 23 x 20 x 15 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: brown-orange 5. Texture / Vesicularity: brecciated, clasts of vesicular lavas (2.5x1.5 cm) with the same characteristics as sample -1, variable degrees of alteration/oxidation 6. Phenocrysts: - 7. Matrix: cemented by CaCO3 and siliceous material 8. Secondary Minerals: Mn, Fe-oxides, CaCO3 9. Encrustations: Mn-crust, 1 cm thick 10. Comment: representative sample for several						10.58031/KIEL0264GRN5201		
SO307-DR90-4	1. Rock Type: volcaniclastic breccia, altered 2. Size: 18 x 17 x 11 cm 3. Shape / Angularity: subangular 4. Color of cut surface: brown 5. Texture / Vesicularity: brecciated, composed by volcanic clasts similar to DR90-1, 1 cm diameter, in variable degrees of alteration 6. Phenocrysts: - 7. Matrix: same as DR90-3 8. Secondary Minerals: Mn, CaCO3 9. Encrustations: Mn-crust, 2mm thick 10. Comment: Contains large fragments of vesicular, aphyric lava. TS and GC were cut from such a fragment	X	X				10.58031/KIEL0264GRN6201		
SO307-DR90-5	1. Rock Type: volcaniclastic breccia, altered 2. Size: 24 x 16 x 10 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: brown 5. Texture / Vesicularity: brecciated, clasts of igneous rocks similar to DR90-1, one clast is a different lava (black, with Pl phenocrysts) less altered than surrounding clasts: up to 7x2.5cm 6. Phenocrysts: - 7. Matrix: cemented by CaCO3 and Mn 8. Secondary Minerals: Mn, CaCO3 9. Encrustations: Mn-crust, 1cm thick 10. Comment:						10.58031/KIEL0264GRN7201		

SO307-DR91

Central Discovery fracture zone, western wall, dredge up the upper flank, NW direction

Dredge on bottom UTC, hrs, °N, °E, depth m	07:44	37°46,9'S	44°10,62'E	2523
Dredge off bottom UTC, hrs, °N, °E, depth m	08:38	37°46,73'S	44°10,37'E	2303

total volume: one huge block hyaloclastite

Comments:

SO307 Dredge Station Details and Rock Description

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR91-1	1. Rock Type: volcaniclastic 2. Size: large block (143 x 67 x 20) with small fragments inside (up to 4 cm) 3. Shape / Angularity: clasts are angular to subangular 4. Color of cut surface: white /beige (background), brown to yellowish (clasts) 5. Texture / Vesicularity: clasts are highly vesicular, up to 40%, scoriaceous texture, vesicles are sometimes filled with secondary minterlas bit they are mainly empty 6. Phenocrysts: / 7. Matrix: fine.grained: phosphoritic 8. Secondary Minerals: Fe-oxid., Mn, CaCO3 9. Encrustations: Mn-crust (< 1cm)		?				10.58031/KIEL0264GRN9201		
SO307-DR91-2	1. Rock Type: volcanic, strongly altered 2. Size: 10 x 9 x 4 3. Shape / Angularity: subangular 4. Color of cut surface: orange to brown 5. Texture / Vesicularity: vesicular (7 %, < 2mm) partly filled with mn, CaCO3, fractures 6. Phenocrysts: / 7. Matrix: strongly altered, Fe-oxidized 8. Secondary Minerals: CaCO3, mn, different other secondary minerals, palagonite 9. Encrustations: mn-crust (partly, < 1mm) 10. Comment: quenched margin, mybe fresh glass, but porbably not						10.58031/KIEL0264GRPA201		

SO307-DR94

Central Discovery fracture zone, wesetrn wall, N-flank of NE-SW elongated ridge

Dredge on bottom UTC, hrs, °N, °E, depth m	17:47	37°50,67'S	44°12,13'E	2701
Dredge off bottom UTC, hrs, °N, °E, depth m	18:52	37°50,67'S	44°11,77'E	2198

total volume: 10 rocks

Comments: pillow lavas with glassy rims and vesicular lavas

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR94-1	1. Rock Type: volcanic, moderately altered 2. Size: 21 x 14 x 12 cm 3. Shape / Angularity: subangular 4. Color of cut surface: dark grey 5. Texture / Vesicularity: vesicular: 15%, 2mm diameter, filled with CaCO3 6. Phenocrysts: Pl-phyric, 5%, 4x3mm, mod. altered 7. Matrix: well crystallized, fine to medium grained, composed by Pl, Ol (?) and opaque minerals 8. Secondary Minerals: CaCO3 filling vesicles and fractures, Fe-oxides towards the rim, the glass rim is altered to palagonite 9. Encrustations: Mn crust, 0.5mm thick 10. Comment: sample preserved a glassy rim (pillow lava) with fresh glass, may be good for Ar/Ar	x	x		GL		10.58031/KIEL0264GRPC201		
SO307-DR94-2	1. Rock Type: volcanic, moderately altered 2. Size: 14 x 10 x 11 cm 3. Shape / Angularity: subangular 4. Color of cut surface: grey 5. Texture / Vesicularity: vesicular: 15%, elongated and suparallel vesicules, up to 3.5 cm in length, and 4mm wide, filled with Mn- and Fe-oxides, or a white siliceous precipitate 6. Phenocrysts: Pl-phyric: 2%, 4x2mm, fairly fresh 7. Matrix: well crystallized, fine-grained matrix with Pl, Ol (?), opaque minerals 8. Secondary Minerals: Mn, CaCO3 and Fe-oxides 9. Encrustations: Mn coating 1mm thick	x	x				10.58031/KIEL0264GRPD201		

SO307 Dredge Station Details and Rock Description

SO307-DR94-3	1. Rock Type: volcanic, moderately altered 2. Size: 12 x 7 x 13 cm 3. Shape / Angularity: subangular 4. Color of cut surface: grey 5. Texture / Vesicularity: vesicular, 10%, 1mm diameter, up to 1.5cm diameter, coated by Mn and Fe oxides 6. Phenocrysts: Pl-phyric, 1%, 2x1mm, competely altered 7. Matrix: well-crystallized, fine-grained matrix, with Pl, Ol and opaque minerals 8. Secondary Minerals: Mn, Fe-oxides 9. Encrustations: Mn coating 1mm thick 10. Comment: -	x	x				10.58031/KIEL0264GRPE201		
SO307-DR94-4	1. Rock Type: volcanic, altered 2. Size: 9 x 7 x 10 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: grey 5. Texture / Vesicularity: vesicular: 15%, 3x2mm, filled with Mn, Fe-oxides 6. Phenocrysts: Pl-phyric 1%, 2x1mm, altered 7. Matrix: very fine-grained, no crystals visible 8. Secondary Minerals: Mn, Fe-oxides, palagonite in the glassy rim 9. Encrustations: Mn coating <1mm thick 10. Comment: glassy rim with some fresh glass				GL		10.58031/KIEL0264GRPF201		
SO307-DR94-5	1. Rock Type: volcanic, moderately altered 2. Size: 6 x 5 x 6 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: grey 5. Texture / Vesicularity: vesicular, 15%, elongated vesicles up to 3cm in length x 3mm wide, filled with Mn and/or Fe-oxides 6. Phenocrysts: Pl-phyric, 1%, 2x1 mm, completely altered 7. Matrix: fine-grained, no visible crystals 8. Secondary Minerals: Mn, Fe-oxides 9. Encrustations: Mn coating, <1mm thick						10.58031/KIEL0264GRPG201		
SO307-DR94-6	1. Rock Type: volcanic, moderatly altered 2. Size: 15 x 11 x 17 from Block A: 21 x 41 x 18 cm 3. Shape / Angularity: subangular 4. Color of cut surface: grey 5. Texture / Vesicularity: vesicular 25%, 1mm diameter, spherical vesicles, with Mn coating and zeolite Fe-oxides filling 6. Phenocrysts: Aphyric 7. Matrix: fine-grained, well crystallized with Pl+Ol+opaque minerals 8. Secondary Minerals: Mn, Fe-oxides, zeolites in the vesicules, and some CaCO3 also filling vesicles 9. Encrustations: Mn coating <1mm thick	x	x				10.58031/KIEL0264GRPH201		
SO307-DR94-7	1. Rock Type: volcanic, altered 2. Size: 9 x 10 x 6 cm 3. Shape / Angularity: subangular 4. Color of cut surface: grey 5. Texture / Vesicularity: vesicular 20%, spherical 3mm diameter, up to 1cm diameter, filled with CaCO3 and also zeolites 6. Phenocrysts: Pl-phyric, 1%, 3x1mm, completely altered 7. Matrix: well-crystallized, fine-grained matrix, composed of Pl, Ol and opaque minerals 8. Secondary Minerals: Mn, CaCO3, zeolites 9. Encrustations: Mn coating <1mm thick						10.58031/KIEL0264GRPK201		
SO307-DR94-8	1. Rock Type: volcanic, moderately altered 2. Size: 14 x 13 x 8 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: grey 5. Texture / Vesicularity: massive 6. Phenocrysts: Aphyric 7. Matrix: fine-grained groundmass with significantly more olivine than previous samples, no phenocrysts, Ol is completely removed by iddingsite, Pl as well 8. Secondary Minerals: Iddingsite 9. Encrustations: Mn-crust 3cm thick 10. Comment: different lava than the previous ones, was a small fragment within a Mn crust; too small for	x	too small				10.58031/KIEL0264GRPM201		

SO307 Dredge Station Details and Rock Description

SO307-DR95

Semount cluster at northern Discovery fracture zone; satellite cone, dredge up the eastern flank

Dredge on bottom UTC, hrs, °N, °E, depth m	09:04	36°45,50'S	44°46,72'E	2406
Dredge off bottom UTC, hrs, °N, °E, depth m	09:55	36°45,57'S	44°46,36'E	2190

total volume: almost full

Comments: lots of Mn-crust, some volcanic rock plus volcaniclastic breccias

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR95-1	1. Rock Type: volcanic, moderately altered 2. Size: 18 x 17 x 14 (from block A (53 x 40 x 26 cm) 3. Shape / Angularity: subangular 4. Color of cut surface: grey to grey-brown with orange and white spots 5. Texture / Vesicularity: vesicular (<40%, <3mm), partly filled with phosphorite, CaCO3 6. Phenocrysts: Ol (<7%, <5mm) strongly altered, px (<3%, <2mm), pl (<3%, <2mm), px & pl slightly altered 7. Matrix: microcrystalline, fine-grained, mod. altered 8. Secondary Minerals: Fe-ox., CaCO3, phosphorite, Mn 9. Encrustations: Mn-crust (<4cm) partly 10. Comment: pl might be fresh enough for Ar/Ar dating	x	x	x?			10.58031/KIEL0264GRPP201		
SO307-DR95-2	1. Rock Type: volcanic, scoriaceous, altered 2. Size: 18 x 18 x 9 cm (from block B: 58 x 32 x 25 cm) 3. Shape / Angularity: subangular 4. Color of cut surface: orange to brown, huge white or yellow patches (<6cm) 5. Texture / Vesicularity: vesicular (40%, <2mm) partly filled with CaCO3, Fe-ox., phosphorite 6. Phenocrysts: Ol (<7%, <5mm; strongly altered), Pl (<3%, <2mm), px (<3%, <3mm), slightly altered 7. Matrix: strongly Fe-oxidized, not distinguishable 8. Secondary Minerals: Fe-ox., Mn, CaCO3, phosphorite 9. Encrustations: partly Mn-crusted (<0.1mm) 10. Comment: massive parts have been removed from sample						10.58031/KIEL0264GRPQ201		
SO307-DR95-3	1. Rock Type: Mn-crust 2. Size: 11 x 11 x 9 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: black 5. Texture / Vesicularity: - 6. Phenocrysts: - 7. Matrix: - 8. Secondary Minerals: - 9. Encrustations: - 10. Comment: <10cm crust with few rock clasts on lower part						10.58031/KIEL0264GRWD201		

SO307-DR96

Semount cluster at northern Discovery fracture zone, pancake-like large seamounts (which satellite cone was sampled by DR95), northeastern slope

Dredge on bottom UTC, hrs, °N, °E, depth m	12:34	36°40,86'S	44°50,17'E	2216
Dredge off bottom UTC, hrs, °N, °E, depth m	13:32	36°41,14'S	44°50,10'E	2000

total volume: few rocks

Comments: pebbles of rocks cemented by Mn crust and carbonate (?), well-rounded shape suggests beach deposition; angular fragments are present in breccia, the seamount was likely an island

SO307 Dredge Station Details and Rock Description

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR96-1A	1. Rock Type: volcanic, slightly altered 2. Size: 14 x 12 x 8 cm 3. Shape / Angularity: rounded 4. Color of cut surface: grey to grey-brown 5. Texture / Vesicularity: non-vesicular, few fractures 6. Phenocrysts: Pl (15%, <6mm) quite fresh, few altered 7. Matrix: fine-grained: pl, px, ol (?) slightly altered, Fe-ox. 8. Secondary Minerals: Fe-ox., Mn 9. Encrustations: Mn-crust (<3cm) 10. Comment: well-rounded pebbles within large Mn crust! Together with other rounded volc. rocks (1B & 1C) with Mn-crust, plag. might be fresh enough for Ar/Ar dating	x	x	x?			10.58031/KIEL0264GRPS201		
SO307-DR96-1B	1. Rock Type: volcanic, moderately altered 2. Size: 4 x 5 x 3 cm 3. Shape / Angularity: rounded! 4. Color of cut surface: brownish to red 5. Texture / Vesicularity: vesicular (<2%, <2mm, two big (7mm diameter), Fe-ox. coated & Mn filled (few) 6. Phenocrysts: aphyric 7. Matrix: fine-grained: Fe-ox., few Pl (<1mm) visible 8. Secondary Minerals: Fe-ox., Mn 9. Encrustations: Mn-crust (<3cm) 10. Comment: together with 1A & 1C in one bag, thick Mn-crust, well rounded volcanic rocks		x				10.58031/KIEL0264GRPT201		
SO307-DR96-1C	1. Rock Type: volcanic, slightly altered 2. Size: 3 x 5 x 2 cm 3. Shape / Angularity: well rounded 4. Color of cut surface: grey 5. Texture / Vesicularity: non-vesicular 6. Phenocrysts: pl? (<2%, <2mm) altered, some replaced 7. Matrix: fine-grained: slightly altered, minerals not dintinguishable 8. Secondary Minerals: Fe-ox., Mn 9. Encrustations: similar to DR96-1A &-B 10. Comment: /						10.58031/KIEL0264GRPU201		
SO307-DR96-2	1. Rock Type: volcanic, moderately altered 2. Size: 10 x 12 x 11cm 3. Shape / Angularity: well rounded 4. Color of cut surface: grey with black spots 5. Texture / Vesicularity: vesicular (<7%, <2mm) filled with Mn or Fe-ox. 6. Phenocrysts: pl (<10%, <5mm), quite fresh, Ol (<1%, <1mm) strongly altered 7. Matrix: fine-grained: not distinguishable 8. Secondary Minerals: Fe-ox., Mn 9. Encrustations: Mn-crusted (<2cm) 10. Comment: rounded, pl might be fresh enough for Ar/Ar dating	x	x	x?			10.58031/KIEL0264GRPV201		
SO307-DR96-3	1. Rock Type: volcanic, mod. altered 2. Size: 8 x 6 x 4 cm 3. Shape / Angularity: rounded 4. Color of cut surface: grey with black spots 5. Texture / Vesicularity: non-vesicular 6. Phenocrysts: pl (<5%, 2mm), altered 7. Matrix: medium-grained: pl, px, (some replaced by Mn) altered 8. Secondary Minerals: Fe-ox., Mn 9. Encrustations: Mn-coated (<1mm) 10. Comment: /						10.58031/KIEL0264GRPW201		
SO307-DR96-4	1. Rock Type: breccia with volcanic clasts & Mn 2. Size: 13 x 7 x 6 cm 3. Shape / Angularity: subangular 4. Color of cut surface: orange matrix with black spots and clasts of grey & orange in colour 5. Texture / Vesicularity: non-vesicular 6. Phenocrysts: clasts are angular to subrounded 7. Matrix: sedimented matrix: coarse grained, phosphorite? 8. Secondary Minerals: - 9. Encrustations: Mn-crust (<2mm) partly 10. Comment: volc. clasts, few vesicular clasts, Fe-						10.58031/KIEL0264GRPX201		

SO307 Dredge Station Details and Rock Description

SO307-97

Semount cluster at northern Discovery fracture zone, easternmost seamount (possessing a caldera), scarp at its NE flank

Dredge on bottom UTC, hrs, °N, °E, depth m 19:43 36°36,90'S 45°09,10'E 2840

Dredge off bottom UTC, hrs, °N, °E, depth m 20:28 36°37,11'S 45°09,10'E 2630

total volume: 1 rock

Comments: pillow basalt fragment with glass

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR97-1	1. Rock Type: volcanic, moderately altered 2. Size: 42 x 36 x 27 cm 3. Shape / Angularity: subangular 4. Color of cut surface: grey 5. Texture / Vesicularity: vesicular 30%, spherical 1 mm diameter, and elongated ones up to 2cm in length. Vesicles filled with Fe-oxides and/or Mn, zeolites sometimes 6. Phenocrysts: Pl-phyic, 10%, 4x1mm, altered 7. Matrix: fine-grained, well-crystallized, Pl and Ol(?) 8. Secondary Minerals: Mn, Fe-oxides, zeolites, palagonite 9. Encrustations: Mn-coating the surface 1 mm thick 10. Comment: spots of fresh glass in quenched margin	x	x		GL		10.58031/KIEL0264GRPZ2201		

SO307-98

Semount cluster at northern Discovery fracture zone, easternmost irregular structure, N-facing slope

Dredge on bottom UTC, hrs, °N, °E, depth m 23:18 36°32,789'S 45°06,120'E 2639

Dredge off bottom UTC, hrs, °N, °E, depth m 00:10 36°32,973'S 45°05,974'E 2426

total volume: 2 rocks

Comments: Mn-crusted basaltic breccia and volcaniclastics, palagonite altered glass

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR98-1	1. Rock Type: volcaniclastic, altered 2. Size: 42 x 27 x 18 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: grey with orange specks 5. Texture / Vesicularity: brecciated, lava clasts (up to 8cm diameter), small glass fragments (6x2mm altered) 6. Phenocrysts: see below 7. Matrix: siliceous cement, white 8. Secondary Minerals: Mn, Fe-ox., palagonite in the glass fragments 9. Encrustations: Mn crust up to 3cm thick 10. Comment: lava fragment large enough for TS, GC was cut: vesicular (25%, 3x2mm, filled with Mn, Fe-oxides and zeolites), pl-phyric (3%, 4x2mm, altered), matrix: fine to medium grained, composed of plag. + Ol?, some alteration; fractures with Fe-ox. filling; preservation of fresh glass is unlikely; sample was part from block DR98-A	x	x				10.58031/KIEL0264GRP3201		
SO307-DR98-2	1. Rock Type: volcaniclastic, altered 2. Size: 11 x 13 x 9 3. Shape / Angularity: subrounded 4. Color of cut surface: grey-brownish with orange specks 5. Texture / Vesicularity: brecciated: lava fragments (40%, same lava as described above in point 10, 5x3cm), glass fragments (50%, altered, 4x3mm) 6. Phenocrysts: - 7. Matrix: same as DR98-1 8. Secondary Minerals: same as DR98-1 9. Encrustations: Mn crust 1cm thick 10. Comment: like DR98-1,fresh glass not preserved						10.58031/KIEL0264GRP4201		

SO307-100

Small NW-SE trending ridge west from northern tip of Indomed FZ, lower part

Dredge on bottom UTC, hrs, °N, °E, depth m 16:47 35°33,97'S 46°23,49'E 3373

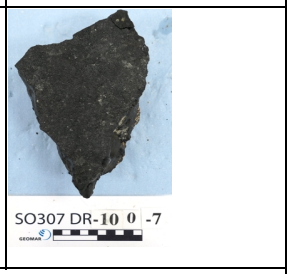
Dredge off bottom UTC, hrs, °N, °E, depth m 17:48 35°34,21'S 46°23,45'E 3100

total volume: 10 rocks, 1 huge Mn-crust

Comments: volcanic rocks: 1 aphyric basalt, few Ol-Pl-bearing (<2%) basalts, 1 with glass, 1 sample with glass within Mn-crust block

SO307 Dredge Station Details and Rock Description

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR100-1	1. Rock Type: volcanic, slightly altered 2. Size: 23 x 16 x 12 cm 3. Shape / Angularity: subangular 4. Color of cut surface: grey in the "core", grey-brownish around fractures 5. Texture / Vesicularity: vesicular (<10%, <1mm) partly filled with Mn, phosporite, CaCO3, fractures 6. Phenocrysts: aphyric 7. Matrix: medium-grained: slightly to mod. altered: pl, px 8. Secondary Minerals: Fe-ox., Mn, Phosphorite, CaCO3 9. Encrustations: very few parts: Mn-coated 10. Comment: carefully picking bc. of filled vesicles	X	X				10.58031/KIEL0264GRP6201		
SO307-DR100-2	1. Rock Type: volcanic, moderately altered 2. Size: 30 x 12 x 14 cm 3. Shape / Angularity: angular 4. Color of cut surface: grey 5. Texture / Vesicularity: vesicular (15%, spherial, 1mm diameter), completely filled with Fe-ox, fractures 6. Phenocrysts: pl-phyric (10%, 3x1mm, altered), Ol phyric (5%, <1mm, completely replaced by Fe-ox.) 7. Matrix: medium-grained composed of pl+ol, moderately altered 8. Secondary Minerals: Fe-ox., Mn 9. Encrustations: Mn coating, <1mm thick	X	X				10.58031/KIEL0264GRP7201		
SO307-DR100-3	1. Rock Type: volcanic, moderately altered 2. Size: 10 x 9 x 8 cm 3. Shape / Angularity: subangular 4. Color of cut surface: light grey 5. Texture / Vesicularity: vesicular (10%, <1mm diameter, filled with zeolites, Mn) 6. Phenocrysts: Pl (3%, 3x1mm, altered), Ol (1%, 1mm diameter, completely replaced by iddingsite) 7. Matrix: fine-grained, composed pf pl+ol, mod. altered 8. Secondary Minerals: Fe-ox., zeolites, Mn 9. Encrustations: Mn coating, <1mm thick	X	X				10.58031/KIEL0264GRP8201		
SO307-DR100-4	1. Rock Type: volcanic, altered 2. Size: 16 x 12 x 8 cm 3. Shape / Angularity: angular 4. Color of cut surface: brownish-grey 5. Texture / Vesicularity: vesicular (10%, 1mm diameter, spherical, coated with Mn, some filled with zeolites), fractured, filled with siliceous? precipitates 6. Phenocrysts: pl (2%, 2x1mm, altered), ol (1%, 1mm diameter, completely replaced by Fe-ox.) 7. Matrix: fine-grained composed by pl+ol, altered by Fe-ox. 8. Secondary Minerals: Mn, Fe-ox. 9. Encrustations: Mn coating <1mm 10. Comment: glass rim includes some fresh parts	X			GL		10.58031/KIEL0264GRP9201		
SO307-DR100-5	1. Rock Type: volcanic, moderately altered 2. Size: 8 x 6 x 7 cm 3. Shape / Angularity: angular 4. Color of cut surface: grey to grey/brown, rim: brown, white fractures 5. Texture / Vesicularity: 7%, <1mm, partly filled with Fe-ox., Mn, white sec. minerals- phosphorite?, fractures 6. Phenocrysts: ol (<1%, <2mm, strongly altered) replaced by Fe-ox., pl (<2%, <3mm, strongly altered) 7. Matrix: fine-grained: mod. altered, Fe-ox., pl? 8. Secondary Minerals: Fe-ox., Mn, phosphorite 9. Encrustations: partly Mn-coated 10. Comment: towards rim: more altered, fractured and sec. minerals						10.58031/KIEL0264GRQA201		

SO307-DR100-6	1. Rock Type: volcanic, altered 2. Size: 13 x 14 x 10 cm, from block A: 90 x 50 x 20 cm 3. Shape / Angularity: subangular 4. Color of cut surface: brownish-grey 5. Texture / Vesicularity: vesicular (10%, spherical, <1mm diameter, Fe-ox., Mn, coating the vesicules) 6. Phenocrysts: aphyric 7. Matrix: glassy matrix 8. Secondary Minerals: Mn, Fe-ox. 9. Encrustations: Mn-crust 0.5mm 10. Comment: lava block with a glass rim, fresh glass present	x			GL		10.58031/KIEL0264GRQB201		
SO307-DR100-7	1. Rock Type: Mn-crust 2. Size: 17 x 10 x 9 cm from block A: 90 x 50 x 20 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: black 5. Texture / Vesicularity: massive 6. Phenocrysts: - 7. Matrix: - 8. Secondary Minerals: Mn 9. Encrustations: crust of around 6cm thick 10. Comment: Mn crust from block A						10.58031/KIEL0264GRQC201		

SO307-DR102

Northern tip of Indomed FZ

Dredge on bottom UTC, hrs, °N, °E, depth m	03:23	35°10,36'S	46°49,285'E	2795
Dredge off bottom UTC, hrs, °N, °E, depth m	05:09	35°10,645'S	46°49,32'E	2449

total volume: 3 small rocks

Comments: small volcaniclastics

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR102-1	1. Rock Type: volcaniclastic (?), highly altered 2. Size: 7 x 6 x 4 cm 3. Shape / Angularity: sub-rounded 4. Color of cut surface: greenish-grey, orange 5. Texture / Vesicularity: clastic, some volcanic fragments have scoriaceous textures, fragments are vesicular (>40%, up to 0.5 cm) 6. Phenocrysts: - 7. Matrix: medium to coarse grained matrix, with carbonates, volcanic fragments, Pl? 8. Secondary Minerals: carbonate crystals, green clay minerals (glauconite?), oxides (only on the volcanic fragments) 9. Encrustations: very thin Mn-crust (<0.1 cm) 10. Comment: -						10.58031/KIEL0264GRQE201		
SO307-DR102-2	1. Rock Type: volcaniclastic (?), highly altered 2. Size: 8 x 7 x 6 cm 3. Shape / Angularity: sub-rounded 4. Color of cut surface: green 5. Texture / Vesicularity: clastic, vesicular (ca 15%), volcanic fragments are more vesicular (ca. 25%, filled with clay minerals) 6. Phenocrysts: - 7. Matrix: fine to medium grained, with carbonates, volcanic fragments, Pl? 8. Secondary Minerals: carbonates, dark minerals filling vesicules, green clay minerals 9. Encrustations: - 10. Comment: -						10.58031/KIEL0264GRQF201		

SO307-DR103

Northern tip of Indomed FZ (repeat of DR102)

Dredge on bottom UTC, hrs, °N, °E, depth m	07:18	35°10,39'S	46°49,278'E	2735
Dredge off bottom UTC, hrs, °N, °E, depth m	08:45	35°10,79'S	46°49,33'E	2385

total volume: 1/4 full

Comments: one large lava block and volcaniclastics

SO307 Dredge Station Details and Rock Description

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR103-1	1. Rock Type: volcanic 2. Size: - 3. Shape / Angularity: sub-rounded 4. Color of cut surface: grey and orange 5. Texture / Vesicularity: porphyritic 6. Phenocrysts: olivine (5%, up to 5mm, all altered to iddingsite), Plag (<1%, up to 4mm, fresh) 7. Matrix: fine to medium grained, well crystalized, fresh matrix except for Ol 8. Secondary Minerals: iddingsite replaces all olivine, calcite veins 9. Encrustations: <1mm Mn-crust 10. Comment: nice Ol-basalt	X	X	X (good for plag, groundmass also)			10.58031/KIEL0264GRQH201		
SO307-DR103-2	1. Rock Type: volcaniclastic 2. Size: - 3. Shape / Angularity: sub-rounded 4. Color of cut surface: dark green 5. Texture / Vesicularity: - 6. Phenocrysts: - 7. Matrix: medium-coarse grained, subrounded grains 8. Secondary Minerals: mostly composed of altered, secondary minerals 9. Encrustations: - 10. Comment: green volcaniclastic grains are subrounded medium to coarse sand-sized						10.58031/KIEL0264GRQK201		

SO307-108

SE rim of Madagascar Ridge, nose along steep SE-facing flank around 11nm NW of DR101-DR104

Dredge on bottom UTC, hrs, °N, °E, depth m 23:48 35°01,521'S 46°37,607'E 3481

Dredge off bottom UTC, hrs, °N, °E, depth m 00:38 35°01,620'S 46°37,332'E 3284

total volume: several rocks

Comments: thickly Mn-encrusted cobbles of basalt + volcaniclastics, and small igneous cobbles, 3 types of igneous rocks: avesicular aphyric lava, a Ol-phyric lava and a

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR108-1	1. Rock Type: volcanic, moderately altered 2. Size: 13 x 6 x 8 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: light grey 5. Texture / Vesicularity: vesicular: 7%, 1mm diameter, coated by Fe-ox. 6. Phenocrysts: aphyric 7. Matrix: fine-grained, well-crystallized, made up of pl+ol. mod. altered 8. Secondary Minerals: Mn, Fe-ox. 9. Encrustations: Mn crust 3mm thick 10. Comment: -	X	X				10.58031/KIEL0264GRQN201		
SO307-DR108-2	1. Rock Type: volcanic, altered 2. Size: 12 x 5 x 10 cm 3. Shape / Angularity: subangular 4. Color of cut surface: light grey 5. Texture / Vesicularity: vesicular 5%, same as DR108-1 6. Phenocrysts: same as sample DR108-1 7. Matrix: - 8. Secondary Minerals: - 9. Encrustations: - 10. Comment: similar sample as DR108-1 but slightly more altered and fractured						10.58031/KIEL0264GRQP201		
SO307-DR108-3a	1. Rock Type: volcanic, mod. altered 2. Size: 5 x 6 x 2 cm, from block A (43 x 32 x 18 cm) 3. Shape / Angularity: angular 4. Color of cut surface: light grey 5. Texture / Vesicularity: vesicular 2%, same as DR108-1 6. Phenocrysts: same as DR108-1 7. Matrix: - 8. Secondary Minerals: - 9. Encrustations: - 10. Comment: the following samples correspond to fragments within a block of Mn-crust						10.58031/KIEL0264GRQQ201		

SO307 Dredge Station Details and Rock Description

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR108-3b	1. Rock Type: volcanic, mod. altered 2. Size: 10 x 5 x 6 cm, from block A 3. Shape / Angularity: angular 4. Color of cut surface: light grey 5. Texture / Vesicularity: vesicular, 3%, same as DR108-1 6.-9.: same as DR108-1 10. Comment: very similar to DR108-1, not too	X	X				KIEL0264GRQR201		
SO307-DR108-3c	1. Rock Type: volcanic, altered 2. Size: 7 x 5 x 6 cm, from block A 3. Shape / Angularity: angular 4. Color of cut surface: grey with orange specks 5. Texture / Vesicularity: vesicular 2%, 1mm diameter, filled with Mn 6. Phenocrysts: ol-phyric (7%, 1mm diameter, completely replaced by iddingsite) 7. Matrix: fine-grained, crystallized matrix, with pl+ol, altered 8. Secondary Minerals: iddingsite, Mn 9. Encrustations: Mn-crust 5mm thick 10. Comment: different groups of lavas, with Ol	X					10.58031/KIEL0264GRQS201		
SO307-DR108-3d	1. Rock Type: volcanic, altered 2. Size: 10 x 3 x 6 cm from block A 3. Shape / Angularity: angular 4. Color of cut surface: light grey with orange specks 5.-9.: same as sample DR108-3c 10. Comment: same group as sample DR108-3c but far more altered						KIEL0264GRQT201		
SO307-DR108-3e	1. Rock Type: Mn-crust 2. Size: 9 x 9 x 10 cm from block A 3. Shape / Angularity: subrounded 4. Color of cut surface: black 5. Texture / Vesicularity: - 6. Phenocrysts: - 7. Matrix: - 8. Secondary Minerals: - 9. Encrustations: - 10. Comment: sample from the Mn-crust that surrounded the previous samples						10.58031/KIEL0264GRQU201		
SO307-DR108-4	1. Rock Type: subvolvanic, doleritic, altered 2. Size: 8 x 6 x 6 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: brownish grey 5. Texture / Vesicularity: massive, equigranular 6. Phenocrysts: - 7. Matrix: groundmass composed of ol+pl+px?, microdoleritic texture 8. Secondary Minerals: Ol altered to iddingsite, Fe-ox. 9. Encrustations: Mn-coating 1mm thick 10. Comment: only sample with this texture	X	X				10.58031/KIEL0264GRQV201		
SO307-DR108-5a	1. Rock Type: volcanic, very altered 2. Size: 7 x 9 x 8 cm, from block B (46 x 31 x 22 cm) 3. Shape / Angularity: subrounded 4. Color of cut surface: brown-grey 5. Texture / Vesicularity: vesicular 5%, 1mm diameter, filled with Mn 6. Phenocrysts: pl 20%, 2x1mm, altered 7. Matrix: very fine-grained, no visible phenocrysts, altered 8. Secondary Minerals: Fe-ox., Mn 9. Encrustations: Mn-crust >1cm thick 10. Comment: a fragment from a block of Mn-crust, different from the vesicular lavas of this dredge, but						10.58031/KIEL0264GRQW201		
SO307-DR108-5b	1. Rock Type: volcaniclastic, very altered 2. Size: 7 x 5 x 4 cm, from block B 3. Shape / Angularity: rounded 4. Color of cut surface: orange-grey 5. Texture / Vesicularity: clastic, the fragments are very altered, with sizes around 2mm diameter 6. Phenocrysts: - 7. Matrix: granular matrix, no reaction to HCl 8. Secondary Minerals: Mn, Fe-ox. 9. Encrustations: Mn-crust >1cm thick						10.58031/KIEL0264GRQX201		

SO307-DR108-6	1. Rock Type: sedimentary, unconsolidated sandstone 2. Size: 16 x 11 x 9 cm, from block C 3. Shape / Angularity: rounded 4. Color of cut surface: yellow-brown 5. Texture / Vesicularity: fine to medium-grained sandstone 6. Phenocrysts: - 7. Matrix: not cemented, matrix does not react to HCl 8. Secondary Minerals: Mn 9. Encrustations: Mn-coating >1mm thick 10. Comment: soft sediment, muddy						10.58031/KIEL0264GRQY201		

SO307-DR110

SE rim of Madagascar Ridge, Dredge up ESE-facing cliff

Dredge on bottom UTC, hrs, °N, °E, depth m	11:38	35°23,14'S	46°13,288'E	3304
Dredge off bottom UTC, hrs, °N, °E, depth m	12:44	35°22,92'S	46°13,04'E	2995

total volume: approximately 10 rocks

Comments: 2 big blocs anf few samaller: volcanic rocks (vesicular, aphyric to pl-phyric, slightly to moderately altered)

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR110-1	1. Rock Type: volcanic, slightly altered 2. Size: 24 x 13 x 15 from bloc A (35 x 27 x 24) 3. Shape / Angularity: angular, columnar shaped 4. Color of cut surface: grey 5. Texture / Vesicularity: vesicular (< 20%, < 2mm), partly filled with mn, white sec. mineral, Fe-oxides, rounded to irreguar shaped 6. Phenocrysts: pl (< 1%, < 2mm, slightly to moderately altered), ol? (< 1%, < 1mm, replaced by Fe-oxides) 7. Matrix: medium-grained (pl, px, slightly altered) 8. Secondary Minerals: Fe-oxides, mn 9. Encrustations:partly mn-coated 10. Comment: groundmass pl might be fresh enough for Ar/Ar dating	x	x	x?			10.58031/KIEL0264GRQ2201		
SO307-DR110-2	1. Rock Type: volcanic, slightly altered 2. Size: 15 x 12 x 10 3. Shape / Angularity: angular 4. Color of cut surface: grey 5. Texture / Vesicularity: vesicular (< 20%, < 2mm), partly filled with mn, white sec. mineral, Fe-oxides, rounded to irreguar shaped 6. Phenocrysts: pl (< 1%, < 2mm, one big pheno (< 5mm)), slightly to moderately altered), ol? (< 1%, < 1mm, replaced by Fe-oxides) 7. Matrix: medium-grained (pl, px, slightly altered) 8. Secondary Minerals: Fe-oxides, mn 9. Encrustations:partly mn-coated 10. Comment: groundmass pl might be fresh enough for Ar/Ar dating	x	x	x?			10.58031/KIEL0264GRQ3201		
SO307-DR110-3	1. Rock Type: volcanic, slightly altered 2. Size: 10 x 9 x 9 3. Shape / Angularity: angular 4. Color of cut surface: grey to light grey 5. Texture / Vesicularity: vesicular (< 10%, < 1mm, mostly rounded), vesicles on rim are elongated (< 1cm), party filled with mn, Fe-oxides, CaCO3 6. Phenocrysts: very few pl (< 0.5%, < 1mm), altered, rather aphyric 7. Matrix: fine-grained (pl, px) slightly altered, ol? (Fe-oxidized) 8. Secondary Minerals: mn, Fe-oxides, CaCO3 9. Encrustations: partly mn-coated (< 1mm) 10. Comment: /	x	x				10.58031/KIEL0264GRQ4201		

SO307 Dredge Station Details and Rock Description

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR110-4	1. Rock Type: volcanic, slightly altered 2. Size: 25 x 15 x 15 part of bloc B (37 x 21 x 19) 3. Shape / Angularity: angular 4. Color of cut surface: grey 5. Texture / Vesicularity: vesicular (< 20%, < 2mm) partly filled with Fe-oxides, CaCO3, few bigger vesicles (<5mm), mostly rounded 6. Phenocrysts: aphyric 7. Matrix: fine-grained (pl, px, ol?), moderately altered, ol replaced by Fe-oxides 8. Secondary Minerals: Fe-oxides, mn, CaCO3, phosphorite 9. Encrustations: partly mn-coated 10. Comment: fresh glass-removed in extra bag - needs to be crushed and picked	x	x		GL		10.58031/KIEL0264GRQ5201		
SO307-DR110-5	1. Rock Type: volcanic, moderately altered 2. Size: 9 x 7 x 4 3. Shape / Angularity: subangular 4. Color of cut surface: grey to brown on rim (4 cm) 5. Texture / Vesicularity: vesicular (< 10%, most < 1mm, but few elongated (< 4cm) and bigger (< 2mm), partly filled with CaCO3, mn, phosphorite, mostly rounded 6. Phenocrysts: pl (< 1%, < 2mm) strongly altered, mostly replaced 7. Matrix: fine-grained (slightly to moderately altered and Fe-oxidized) 8. Secondary Minerals: CaCO3, mn, Fe-oxides, phosphorite 9. Encrustations: thin mn-crust on one side (< 1mm) 10. Comment: fresh glass - removed in extra bag, needs to be crushed and picked				GL		10.58031/KIEL0264GRQ6201		
SO307-DR110-6	1. Rock Type: volcanic, slightly altered 2. Size: 9 x 7 x 7 3. Shape / Angularity: subangular 4. Color of cut surface: grey with few orange patches 5. Texture / Vesicularity: vesicular (< 20%, < 2mm, rounded (most)) some bigger and elongated (< 2cm) partly filled with CaCO3, Fe-oxides, mn 6. Phenocrysts: aphyric, evtl. some phenos (< 0.5%) replaced by secondary minerals 7. Matrix: fine-grained (slightly altered) 8. Secondary Minerals: CaCO3, mn, Fe-oxides 9. Encrustations: partly mn-coated 10. Comment: /						10.58031/KIEL0264GRQ7201		
SO307-DR110-7	1. Rock Type: volcanic, moderately altered 2. Size: 21 x 12 x 8 3. Shape / Angularity: angular 4. Color of cut surface: brown/grey with brown patches 5. Texture / Vesicularity: vesicular (20%, < 2mm, rounded (most)), some biger and elongated (< 3mm) partly filled with mn, Fe-oxides 6. Phenocrysts: < 0.5%, all replaced 7. Matrix: medium-grained: moderately altered 8. Secondary Minerals: Fe-oxides, CaCO3, mn 9. Encrustations: mn-crust (< 6mm) 10. Comment: /	x	x				10.58031/KIEL0264GRQ8201		
SO307-DR110-8	1. Rock Type: volcanic, moderatley altered 2. Size: 12 x 10 x 8 3. Shape / Angularity: angular 4. Color of cut surface: grey with orange patches (brownish towards the rim) 5. Texture / Vesicularity: vesicular (< 10%, 1-4 mm) partly filled with mn, Fe-oxides, CaCO3, mostly irregular shaped 6. Phenocrysts: aphyric 7. Matrix: medium-grained: pl, px, moderately altered, partly Fe-oxidized 8. Secondary Minerals: Fe-oxides, mn, CaCO3 9. Encrustations: partly Mn-coated, one side with mn-crust (< 2mm) 10. Comment: /						10.58031/KIEL0264GRQ9201		

SO307-DR110-9	1. Rock Type: volcanic, moderately altered 2. Size: 10 x 8 x 7 3. Shape / Angularity: angular 4. Color of cut surface: grey to grey/brown on the rim 5. Texture / Vesicularity: vesicular (< 15%, < 2mm, rounded to irregular shaped) partly filled with mn, Fe-oxides, CaCO3 6. Phenocrysts: aphyric 7. Matrix: medium-grained: pl, px, moderately altered, Fe-oxidized 8. Secondary Minerals: Fe-oxides, mn, CaCO3 9. Encrustations: partly Mn-coated and crusted (< 2mm) 10. Comment: /						10.58031/KIEL0264GRRA201		
SO307-DR110-10	1. Rock Type: volcanic, moderately altered 2. Size: 10 x 8 x 6 3. Shape / Angularity: angular 4. Color of cut surface: grey with grey/orange patches 5. Texture / Vesicularity: vesicular (< 15%, < 1mm to < 5mm, mostly rounded) partly filled with mn, Fe-oxides, CaCO3 6. Phenocrysts: fwe altered and fully replaced (< 1%, < 1mm) 7. Matrix: fine-grained: pl, px, moderately altered 8. Secondary Minerals: CaCO3, Fe-oxides, mn, green secondary minerals 9. Encrustations: partly Mn-coated 10. Comment: /						10.58031/KIEL0264GRRB201		

SO307-DR111

Southeastern rim of Madagascar Ridge - south facing slope, fault scarp

Dredge on bottom UTC, hrs, °N, °E, depth m	17:05	35°30,86'S	45°57,94'E	3251
Dredge off bottom UTC, hrs, °N, °E, depth m	18:01	35°30,86'S	45°57,70'E	3010

total volume: 3 rocks

Comments: volcanic rocks: 2 aphyric, 1 pl-phyric, vesicular and slightly altered

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR111-1	1. Rock Type: volcanic, slightly altered. 2. Size: 10 x 17 x 7 cm 3. Shape / Angularity: angular 4. Color of cut surface: grey with orange rim and orange patches towards rim. 5. Texture / Vesicularity: vesicular (<3%, <1mm, rounded), partly filled with Fe-oxides, Mn, CaCO3. 6. Phenocrysts: Aphyric. 7. Matrix: fine-grained (px, pl), slightly altered, Fe-ox. 8. Secondary Minerals: Fe-oxides, Mn, CaCO3 9. Encrustations: partly Mn-crusted sediment.	X	X				10.58031/KIEL0264GRRD201		
SO307-DR111-2	1. Rock Type: volcanic, slightly altered 2. Size: 14 x 10 x 7 3. Shape / Angularity: angular 4. Color of cut surface: grey with white spots, orange to brown towards the rim. 5. Texture / Vesicularity: vesicular (<5%, 1mm to <5mm), partly filled with CaCO3, Fe-ox, Mn. Few elongated vesicules, more elongated towards the rim. Few fractures 6. Phenocrysts: aphyric 7. Matrix: fine-grained (pl, px), slightly altered. 8. Secondary Minerals: CaCO3, Fe-oxides, Mn. 9. Encrustations: partly Mn-coated, sediment. 10. Comment: Needs to be picked for CaCO3, matrix is good for GC. Palagonite rim, double check for fresh glass but looks altered.	X	X				10.58031/KIEL0264GRRE201		

SO307 Dredge Station Details and Rock Description

SO307-111-3	1. Rock Type: volcanic, slightly altered. 2. Size: 11 x 6 x 6 cm 3. Shape / Angularity: angular 4. Color of cut surface: grey 5. Texture / Vesicularity: vesicular (around 1%, <1 mm, rounded), patly filled with Mn. 6. Phenocrysts: Pl (2%, <3mm) moderately altered. 7. Matrix: medium-grained, Pl,Px, slightly altered, Fe-oxides. 8. Secondary Minerals: Fe-oxides, Mn, brownish secondary minerals. 9. Encrustations: partly Mn-crusted, Fe-oxides, sediment. 10. Comment: on one side: volcanic clast, within sediment, angular.	X	X				10.58031/KIEL0264GRRF201		

SO307-DR114

SW Madagascar Ridge - small seamount, S-facing slope of cone

Dredge on bottom UTC, hrs, °N, °E, depth m	17:47	34°16,22'S	45°52,73'E	1498
Dredge off bottom UTC, hrs, °N, °E, depth m	18:53	34°15,92'S	45°52,74'E	1170

total volume: 1/3 full

Comments: mostly volcanic rocks, plus some volcaniclastic rocks

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR114-1	1. Rock Type: volcanic; moderately altered 2. Size: 55 x 20 x 36 cm 3. Shape / Angularity: rounded 4. Color of cut surface: grey/brown, white, orange 5. Texture / Vesicularity: porphyritic, ca.15% vesicles up to 10 mm in diameter 6. Phenocrysts: ca. 8% olivine up to 3mm; all altered to iddigsite; ca. 1% additional black to blocky phenocryst phases difficult to identify up to 2mm across 7. Matrix: fine-grained, except for plagioclase, which is medium-grained 8. Secondary Minerals: predominately calcite infill of most vesicles; olivine replaced with iddigsite. 9. Encrustations: < mm Mn-oxide 10. Comment: olivine-phyric basalts	X	X	Yes, could perhaps separate the plag from the groundmass			10.58031/KIEL0264GRRH201		
SO307-DR114-2	1. Rock Type: volcanic; moderately altered 2. Size: 19 x 11x 11 cm 3. Shape / Angularity: rounded 4. Color of cut surface: grey, white, orange 5. Texture / Vesicularity: porphyritic, ca. 30 % vesicularity up to 3mm across 6. Phenocrysts: ca. 8% olivine up to 2mm altered to iddigsite 7. Matrix: fine-grained; tiny plagioclase phenocrysts. 8. Secondary Minerals: calcite/carbonate vesicle infills in up to ca. 70% of the vesicles, olivine replated to iddingsite. 9. Encrustations: Mn-oxide up to 10 mm thick 10. Comment: olivine-phyric basalts	X	X				10.58031/KIEL0264GRRK201		
SO307-DR114-3	1. Rock Type: volcanic; moderately altered 2. Size: 31 x 24 x 11 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: grey with white and orange spots 5. Texture / Vesicularity: porphyritic, vesicular (30% up to 0,5mm), some vesicles are filled with carbonates 6. Phenocrysts: olivine 15% up to 3mm completely replaced by iddingsite 7. Matrix: micrcrystalline with some feldspars? 8. Secondary Minerals: calcilte/carbonate minerlas filling vesicles and fractures, iddingsite replacing olivine 9. Encrustations: Mn crust up to 11mm	X	X				10.58031/KIEL0264GRRM201		

SO307 Dredge Station Details and Rock Description

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR114-4A	1. Rock Type: volcanic; moderately altered 2. Size: 25 x 25 x 11 (total sample size) 3. Shape / Angularity: subrounded 4. Color of cut surface: grey with white and orange spots 5. Texture / Vesicularity: porphyritic, vesicular 15 % up to 1 cm filled with carbonate minerals 6. Phenocrysts: olivine 15% up to 3mm completely replaced by iddingsite 7. Matrix: micr-crystalline 8. Secondary Minerals: iddigsite replacing olivine and carbonates filling vesicles 9. Encrustations: Mn-crust up to 5 mm 10. Comment: olivine-phyric basalts	X	X				10.58031/KIEL0264GRRN201		
SO307-DR114-4B	1. Rock Type: volcanic; moderately altered 2. Size: 25 x 25 x 11 (total sample size) 3. Shape / Angularity: subrounded 4. Color of cut surface: grey with white and orange spots 5. Texture / Vesicularity: porphyritic, vesicular 25 % up to 5 mm with majority around 1mm; filled with carbonate minerals 6. Phenocrysts: olivine 10% up to 2 mm completely replaced by iddingsite 7. Matrix: micro-crystalline 8. Secondary Minerals: iddingsite replacing olivine and carbonates filling vesicles 9. Encrustations: Mn-crust up to 8 mm 10. Comment: olivine-phyric basalts	X	X				10.58031/KIEL0264GRWE201		
SO307-DR114-5	1. Rock Type: volcanic; moderately altered 2. Size: 15 x 14 x 11 3. Shape / Angularity: subrounded 4. Color of cut surface: grey with white/beige and orange spots 5. Texture / Vesicularity: porphyritic, highly vesicular 40 % up to 2 cm filled with carbonate minerals in the inner parts, empty close to border/outside 6. Phenocrysts: olivine 10% up to 1-2 mm, completely replaced by iddingsite 7. Matrix: micro-crystalline 8. Secondary Minerals: iddingsite replacing olivine and carbonates filling vesicles 9. Encrustations: Mn-crust up to 1 mm 10. Comment: olivine-phyric basalts						10.58031/KIEL0264GRRP201		
SO307-DR114-6	1. Rock Type: volcaniclastic 2. Size: 26 x 24 x 22 cm 3. Shape / Angularity: subangular 4. Color of cut surface: dark red, white 5. Texture / Vesicularity:- 6. Phenocrysts:- 7. Matrix: -8. Secondary Minerals: 9. Encrustations: less than 1mm Mn crust 10. Comment: volcaniclastic breccia with angular clasts of angular basalt between 1-4 cm. Clasts are highly altered (dark red colour). Matrix is a white clay material around 50%. Could maybe be considered hyaloclastite.						10.58031/KIEL0264GRRQ201		
SO307-DR114-7	1. Rock Type: volcaniclastic 2. Size: 16 x 10 x 9 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: dark red, white 5. Texture / Vesicularity:- 6. Phenocrysts:- 7. Matrix: -8. Secondary Minerals: 9. Encrustations: none 10. Comment: volcaniclastic breccia broadly similar to sample 6, but ca. 90% clasts (less matrix)						10.58031/KIEL0264GRRR201		

SO307 Dredge Station Details and Rock Description

SO307-DR114-8	1. Rock Type: Mn crust 2. Size: 30 x 19 x 9 cm 3. Shape / Angularity: subrounded, butrioidal 4. Color of cut surface: black 5. Texture / Vesicularity: 6. Phenocrysts: 7. Matrix: 8. Secondary Minerals: 9. Encrustations: 10. Comment: around 3.5 cm thick, flat piece of Mn crust, one small basaltic fragment						10.58031/KIEL0264GRRS201		

SO307-DR117

Southern Madagascar Ridge. Isolated W-E elongated seamount, south facing slope, upper part.

Dredge on bottom UTC, hrs, °N, °E, depth m	09:41	34°50,47'S	45°08,36'E	1777
Dredge off bottom UTC, hrs, °N, °E, depth m	11:10	34°50,41'S	45°08,36'E	1700

total volume: Mn-crusts

Comments:

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR117-1	1. Rock Type: Mn-crust 2. Size: 19 x 15 x 5 cm 3. Shape / Angularity: - 4. Color of cut surface: black 5. Texture / Vesicularity: dense, layered, with bubbly outer texture (botryoidal) 6. Phenocrysts: - 7. Matrix: - 8. Secondary Minerals: - 9. Encrustations: - 10. Comment: representative sample of the Mn-crust of the dredge.						10.58031/KIEL0264GRRU201		

SO307-118

Southern Madagascar Ridge, isolated E-W elongated seamount, south-facing slope, east of DR117

Dredge on bottom UTC, hrs, °N, °E, depth m	13:10	34°50,259'S	45°10,692'E	1704
Dredge off bottom UTC, hrs, °N, °E, depth m	14:11	34°49,990'S	45°10,662'E	1450

total volume: few Mn crusts

Comments: sedimentary (clastic-bioclastic-volcaniclastic)

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR118-1	1. Rock Type: sedimentary, clastic 2. Size: 14 x 14 x 9 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: orange-brown 5. Texture / Vesicularity: clastic 6. Phenocrysts: rounded volcaniclastic fragments are around 2-3mm, altered (25%) bioclasts include foraminifera and broken shells (50%) 7. Matrix: CaCO3 cement and Mn-cement 8. Secondary Minerals: Mn 9. Encrustations: Mn 10. Comment: Representative sample for the dredge. Microconglomerate (?), cemented by Mn and CaCO3 with rounded volcaniclastic fragments and bioclasts (well-preserved).						10.58031/KIEL0264GRRW201		

SO307 Dredge Station Details and Rock Description

SO307-120

Large seamount at southern margin of Madagascar Ridge

Dredge on bottom UTC, hrs, °N, °E, depth m	23:12	35°09,46'S	44°14,01'E	1708
Dredge off bottom UTC, hrs, °N, °E, depth m	00:09	35°09,23'S	44°13,98'E	1459

total volume: few rocks

Comments:

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR120-1	1. Rock Type: volcanic, strongly altered 2. Size: 10 x 8 x 7 3. Shape / Angularity: subrounded 4. Color of cut surface: grey/brown 5. Texture / Vesicularity: porphyritic, some spongy vesicularity (<5%) 6. Phenocrysts: Plag (5%, up to 8mm), looks mostly altered 7. Matrix: fine-medium grained 8. Secondary Minerals: pervasive alteration, no identificable secondary minerals 9. Encrustations: thin Mn-crust (<1mm) 10. Comment: Plag phyric basalt, very altered	X	X				10.58031/KIEL0264GRRY201		
SO307-DR120-2	1. Rock Type: volcanic, very altered 2. Size: 9 x 7 x 7 3. Shape / Angularity: angular 4. Color of cut surface: grey/brown 5. Texture / Vesicularity: porphyritic, some patchy vesicularity (<1%) 6. Phenocrysts: Plag (5%, up to 5mm), looks very altered, trace black mineral (biotite or px?), trace ol (altered to iddingsite, only one pseudomorph observed) 7. Matrix: fine-medium grained 8. Secondary Minerals: pervasive alteration, no identifyable secondary minerals 9. Encrustations: Mn-crust (up to 8mm) 10. Comment: Plag phyric basalt, very altered						10.58031/KIEL0264GRRZ201		
SO307-DR120-3	1. Rock Type: volcanic, very altered 2. Size: 9 x 7 x 5 3. Shape / Angularity: angular 4. Color of cut surface: grey/brown 5. Texture / Vesicularity: porphyritic, some patchy spongy vesicularity (<1%) 6. Phenocrysts: Plag (5%, up to 5mm), looks altered 7. Matrix: fine-medium grained 8. Secondary Minerals: pervasive alteration, no identifyable secondary minerals 9. Encrustations: Mn-crust (up to 8mm) 10. Comment: Plag phyric basalt, very altered, similar to sample DR120-2						10.58031/KIEL0264GRR2201		
SO307-DR120-4	1. Rock Type: sedimentary, Mn-crust 2. Size: 22 x 16 x 15 3. Shape / Angularity: subrounded 4. Color of cut surface: tan, black 5. Texture / Vesicularity: - 6. Phenocrysts: - 8. Secondary Minerals: - 9. Encrustations: thick Mn-crust (up to 4cm) 10. Comment: hard sediment with worm burrows covered by thick Mn-crust, small basaltic clast in Mn-crust						10.58031/KIEL0264GRR3201		
SO307-DR120-5	1. Rock Type: sedimentary, Mn-crust 2. Size: 16 x 13 x 6 3. Shape / Angularity: flat, subrounded 4. Color of cut surface: tan, orange, black 5. Texture / Vesicularity: - 6. Phenocrysts: - 8. Secondary Minerals: - 9. Encrustations: thick Mn-crust (up to 3cm) 10. Comment: small basalt clasts and sediment covered in a Mn-crust						10.58031/KIEL0264GRR4201		

SO307-DR121

Madagascar Ridge, same seamount as DR120 appr. 4nm west of DR120, lower portion of cliff. Dredge up 'a' nose/promitory

Dredge on bottom UTC, hrs, °N, °E, depth m	02:17	35°08,44'S	44°08,99'E	2187
Dredge off bottom UTC, hrs, °N, °E, depth m	03:23	35°08,15'S	44°08,96'E	1862

total volume: few rocks

Comments: Greenschist facies (?) rock with up to 1 cm diameter fragments of ol-hbl (!)-phyric rocks.

SO307 Dredge Station Details and Rock Description

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR121-1	1. Rock Type: metamorphic ?, n.a. 2. Size: 20 x 11 x 16 3. Shape / Angularity: subangular 4. Color of cut surface: grey-green: chlorite and actinolite (orientated in one direction); grey spots: fragments of slightly altered volcanic rocks (rounded, ca. 1-2cm, 1%) further desctiption of the volcanic rock fragments: 5. Texture / Vesicularity: vesicular (5%, 1mm, partly filled with Mn and colorless secondary minerals) 6. Phenocrysts: hbl (5%, up to 5mm, slightly altered), ol (1%, < 1mm, strongly altered, Fe-oxidized (iddingsite?)) 7. Matrix: medium-grained (pl, amph?, px?) 8. Secondary Minerals: Fe-oxides, Mn, colourless sec. mineral within vesicles; further description for the whole rock: 9. Encrustations: partly Mn-coated and crusted (up to 5mm) 10. Comment: **melange rock with volcanic rock fragments wich can be basalts or andesites, hbl together with ol phenocrysts and no pl phenocrysts is really rare for oceanic rocks, more likely common in subduction areas. Volcanic rock fragments from 1-4 are extracted as sample DR121-5.**	X	X				10.58031/KIEL0264GRR6201	Very exotic rock! Deserves further investigation!	
SO307-DR121-2	1. Rock Type: metamorphic, n.a. 2. Size: 13 x 10 x 12 3. Shape / Angularity: subangular 4. Color of cut surface: grey-green: chlorite and actinolite (orientated in one direction); grey sports: fragments of slightly altered volcanic rocks (rounded, ca. 1-2cm, 1%) further desctiption of the volcanic rock fragments: 5. Texture / Vesicularity: vesicular (5%, 1mm, partly filled with Mn and colorless secondary minerals) 6. Phenocrysts: hbl (5%, up to 5mm, slightly altered), ol (1%, < 1mm, strongly altered, Fe-oxidized (iddingsite?)) 7. Matrix: medium-grained (pl, amph?, px?) 8. Secondary Minerals: Fe-oxides, Mn, colourless sec. mineral within vesicles; further description for the whole rock: 9. Encrustations: partly Mn-coated and crusted (up to 5mm) 10. Comment: similar to DR121-1, melange rock with volcanic rock fragments.	X	X				10.58031/KIEL0264GRR7201	Very exotic rock! Deserves further investigation!	
SO307-DR121-3	1. Rock Type: metamorphic, n.a. 2. Size: 16 x 11 x 8 3. Shape / Angularity: subangular 4. Color of cut surface: grey-green: chlorite and actinolite (orientated in one direction); grey sports: fragments of slightly altered volcanic rocks (rounded, ca. 1-2cm, 1%) further description of the volcanic rock fragments: 5. Texture / Vesicularity: vesicular (5%, 1mm, partly filled with Mn and colorless secondary minerals) 6. Phenocrysts: hbl (5%, up to 5mm, slightly altered), ol (1%, < 1mm, strongly altered, Fe-oxidized (iddingsite?)) 7. Matrix: medium-grained (pl, amph?, px?) 8. Secondary Minerals: Fe-oxides, Mn, colourless sec. mineral within vesicles; further description for the whole rock: 9. Encrustations: partly Mn-coated and crusted (up to 5mm) 10. Comment: similar to DR121-1, melange rock with volcanic rock fragments.	X					10.58031/KIEL0264GRR8201	Very exotic rock! Deserves further investigation!	

SO307 Dredge Station Details and Rock Description

SO307-DR121-4	1. Rock Type: metamorphic, n.a. 2. Size: 14 x 10 x 8 3. Shape / Angularity: subangular 4. Color of cut surface: grey-green: chlorite and actinolite (orientated in one direction); grey sports: fragments of slightly altered volcanic rocks (rounded, ca. 1-2cm, 1%) further desctiption of the volcanic rock fragments: 5. Texture / Vesicularity: vesicular (5%, 1mm, partly filled with Mn and colorless secondary minerals) 6. Phenocrysts: hbl (5%, up to 5mm, slightly altered), ol (1%, < 1mm, strongly altered, Fe-oxidized (iddingsite?)) 7. Matrix: medium-grained (pl, amph?, px?) 8. Secondary Minerals: Fe-oxides, Mn, colourless sec. mineral within vesicles; further description for the whole rock: 9. Encrustations: partly Mn-coated and crusted (up to 5mm) 10. Comment: similar to DR121-1, melange rock with volcanic rock fragments.	X					10.58031/KIEL0264GRR9201	Very exotic rock! Deserves further investigation!	
SO307-DR121-5	1. Rock Type: volcanic rock fragments from DR121-1 to 4 for GC 2. Size: few smaller pieces 3. Shape / Angularity: / 4. Color of cut surface: / 5. Texture / Vesicularity: / 6. Phenocrysts: / 7. Matrix: / 8. Secondary Minerals: / 9. Encrustations: / 10. Comment: cut small volc. rock pieces for GC and epoxy mounts (laser)	X	X					Very exotic rock! Deserves further investigation!	

SO307-DR122

Southern margin of Madagascar Plateau, the eastern one in a group of three big seamounts, SW-facing slope, upper part

Dredge on bottom UTC, hrs, °N, °E, depth m	06:46	35°07,39'S	44°06,83'E	1805
Dredge off bottom UTC, hrs, °N, °E, depth m	07:50	35°07,15'S	44°06,77'E	1490

total volume: several rocks

Comments: basaltic lavas, vesicular lavas, Mn-encrusted igneous rocks

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR122-1	1. Rock Type: volcanic, slightly altered 2. Size: 25 x 25 x 19 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: Grey-brownish 5. Texture / Vesicularity: vesicular (~3%, 1 mm diameter, some vesicles are filled with CaCO3. Fractures filled with CaCO3. 6. Phenocrysts: Ol-phyric (<1%, ~1 mm in diameter, altered), Pl (<1%, 2x1 mm in diameter, slightly altered), Mt (<1%, 1 mm diameter, fresh). 7. Matrix: very fine-grained (Pl+Ol+Mt?) 8. Secondary Minerals: Fe-oxides, fractures filled with CaCO3. 9. Encrustations: Mn crust. 10. Comment: the sample corresponds to a large igneous block within a Mn cemented volcaniclastic breccia. Possible glass fragments within the breccia.	X	X		?		10.58031/KIEL0264GRSB201		
SO307-DR122-2	1. Rock Type: volcanic, sligthly altered. 2. Size: 16 x 12 x10 cm, from Block B=36 x 25 x 27 cm 3. Shape / Angularity: subangular 4. Color of cut surface: grey with orange specks. 5. Texture / Vesicularity: Massive 6. Phenocrysts: Pl (~1%, 3x1 mm, slightly altered), Ol (<1%, 2x1 mm, completely replaced by iddingsite) 7. Matrix: fine-grained, Pl+Ol, with Fe-oxides (orange stains). 8. Secondary Minerals: Fe-oxides, iddingsite in Ol. 9. Encrustations: Mn crust. 10. Comment: sample from Block B, both Blocks A and B belong to the same piece of rock. Pl in the matrix is well-preserved, may be suitable for Ar/Ar dating.	X	X	X			10.58031/KIEL0264GRSC201		

SO307 Dredge Station Details and Rock Description

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GIMIN	SED	IGSN	NOTES	PICTURE
SO307-DR122-3	1. Rock Type: volcanic, slightly altered 2. Size: 14 x 13 x 9 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: Grey 5. Texture / Vesicularity: mostly massive, some parts are vesicular. 6. Phenocrysts: Pl (1%, 4x2 mm, slightly altered), Px (<1%, < 1mm in diameter, fresh) 7. Matrix: fine-grained, Pl+Ol? (orange specks) 8. Secondary Minerals: Fe-oxides in the matrix and fractures. 9. Encrustations: Mn-crust ~0.5 cm thick. 10. Comment: Rounded fragments of a vesicular lava (~10%, 1 mm in diameter, Pl-phyric (<1%)) were incorporated into the massive lava. Both lavas are similar, just a different texture.	X	X				10.58031/KIEL0264GRSD201		
SO307-DR122-4	1. Rock Type: volcanic, slightly altered 2. Size: 31 x 14 x 12 cm 3. Shape / Angularity: Angular 4. Color of cut surface: Grey 5. Texture / Vesicularity: Massive, some factures filled by Fe-oxides and/or CaCO3. 6. Phenocrysts: Pl-phyric (<1%, 2x1 mm, relatively fresh), Ol (<1%, <1mm in diameter, replaced by iddingsite) 7. Matrix: very fine-grained, Pl+Ol+Mt? (+Px?) 8. Secondary Minerals: Fe-oxides, iddingsite in the Ol. 9. Encrustations: Mn-crusted 10. Comment: Pl in the matrix appears fresh, may be			?			10.58031/KIEL0264GRSE201		
SO307-DR122-5	1. Rock Type: volcanic, slightly altered. 2. Size: 10 x 10 x 7 cm 3. Shape / Angularity: subangular 4. Color of cut surface: dark grey with white spots. 5. Texture / Vesicularity: non-vesicular, few fractures, filled with CaCO3, white secondary mineral 6. Phenocrysts: Pl (7%, <4mm) slightly to moderately altered. Px? (<1%), Ol (<1%, 1 mm diameter, replaced by iddingsite. 7. Matrix: fine-grained (mafic minerals) 8. Secondary Minerals: Mn, Fe-oxides, CaCO3. 9. Encrustations: partly Mn crusted (~1 cm) and coated. 10. Comment: Pl good enough for Ar/Ar dating	X	X	X			10.58031/KIEL0264GRSF201		
SO307-DR122-6	1. Rock Type: volcanic slightly altered. 2. Size: 8 x 9 x 6 cm 3. Shape / Angularity: subangular 4. Color of cut surface: Light grey 5. Texture / Vesicularity: vesicular (<1mm in diameter, filled with Mn, CaCO3 6. Phenocrysts: Pl (~2%, 2x1 mm, altered), Px (~1%, 1mm diameter, partly fresh). 7. Matrix: Fine-grained (Pl+Ol?), slightly altered (orange specks). 8. Secondary Minerals: Mn, Fe-oxides, and CaCO3. 9. Encrustations: ~ 0.5 cm of Mn crust. 10. Comment: has one visible phenocryst of Mt	X	X				10.58031/KIEL0264GRSG201		
SO307-DR122-7	1. Rock Type: volcanic, moderately altered 2. Size: 10 x 10 x 6 cm 3. Shape / Angularity: rounded 4. Color of cut surface: grey 5. Texture / Vesicularity: vesicular (~3%, <1 mm diameter, Mn-coated or filled woth Fe-oxides) 6. Phenocrysts: Pl-phyric (~10%, 3x1mm, fairly fresh) 7. Matrix: very fine-grained, Pl visible, moderately altered 8. Secondary Minerals: Mn, Fe-oxides 9. Encrustations: Mn coated, ~1mm thick. 10. Comment: the sample is covered with a carbonate-cemented volcaniclastic breccia.						10.58031/KIEL0264GRSH201		

SO307-DR122-8	1. Rock Type: volcanic, moderately altered. 2. Size: 19 x 14 x 12 cm, from Block B= 36 x 25 x 27 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: dark grey 5. Texture / Vesicularity: vesicular (~15%, elongated and subparallel vesicles filled with CaCO3) 6. Phenocrysts: Pl-phyric (<1%, 1x2 mm, altered). Some phenocrysts of Px (only 2). 7. Matrix: fine-grained, some Pl lattices are evident 8. Secondary Minerals: CaCO3, Fe-oxides 9. Encrustations: Mn-crust, 1 cm thick 10. Comment: -						10.58031/KIEL0264GRSK201		

SO307-DR124

Southern margin of the Madagascar Ridge. Middle one of three large seamounts, S-facing slope, lower part, W of DR123

Dredge on bottom UTC, hrs, °N, °E, depth m 16:12 34°48,688'S 43°41,534'E 2274

Dredge off bottom UTC, hrs, °N, °E, depth m 17:45 34°48,454'S 43°41,519'E 2040

total volume: a few "rocks"

Comments: semi-consolidates carbonaceous material

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR124-1	1. Rock Type: sedimentary 2. Size: 45 x 30 x 24 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: yellowish-white 5. Texture / Vesicularity: unconsolidated carbonaceous material, soft and plastic. 6. Phenocrysts: - 7. Matrix: fine grained, composed of foraminifera in a carbonated matrix. 8. Secondary Minerals: - 9. Encrustations: Mn coating in the surface, <1mm thick 10. Comment: representative sample of the dredge. Very unconsolidated material; preserves burrows.						10.58031/KIEL0264GRSN201		

SO307-DR125

Southern margin of the Madagascar Ridge. Middle one of three large seamounts, S-facing slope, upper part, above DR124

Dredge on bottom UTC, hrs, °N, °E, depth m 18:52 34°47,700'S 43°41,518'E 1827

Dredge off bottom UTC, hrs, °N, °E, depth m 20:54 34°47,65'S 43°41,52'E 1781

total volume: 2 rocks and a shell

Comments: max. rope tension 94,9 kN, >80kN 9x stuck at around 1840 m rope length

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR125-1	1. Rock Type: volcanic, moderately to highly altered 2. Size: 12 x 8 x 7 cm 3. Shape / Angularity: subangular 4. Color of cut surface: brown 5. Texture / Vesicularity: phyric, vesicular (2%, up to 0,5 mm, filled with carbonate minerals) 6. Phenocrysts: Fsp (1%, 1 mm) 7. Matrix: fine grained, with needle shaped Fsp 8. Secondary Minerals: carbonates filling vesicules, oxides?, orange colors 9. Encrustations: Mn-crust (<1mm) 10. Comment: fine-grained, altered basalt	X	X				10.58031/KIEL0264GRSQ201		
SO307-DR125-2	1. Rock Type: volcaniclastic, moderately altered 2. Size: 11 x 7 x 4 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: dark grey to brown (clasts), beige (matrix) 5. Texture / Vesicularity: clastic, volcanic clasts are highly vesicular (20%, up to 4mm) and slightly scoriaceous 6. Phenocrysts: - 7. Matrix: volcanic clasts aggregated by a carbonatic matrix. The clasts are fine grained. 8. Secondary Minerals: Mn-precipitation-dendrites, oxides (reddish colors) 9. Encrustations: Mn-crust (ca. 1mm) 10. Comment: hyaloclastite, some volcanic clasts are relativelly well preserved and if separated may be used for GC (?)						10.58031/KIEL0264GRSR201		

SO307 Dredge Station Details and Rock Description

SO307-DR126

Madagascar Ridge; large westernmost of NW-SE aligned seamount south of main plateau, dredge up the mid-upper southern wall

Dredge on bottom UTC, hrs, °N, °E, depth m	01:57	34°39,25'S	43°17,69'E	1987
Dredge off bottom UTC, hrs, °N, °E, depth m	03:01	34°38,97'S	43°17,56'E	1528

total volume: one igneous rock plus breccia

Comments:

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR126-1A	1. Rock Type: volcanic, altered 2. Size: 16 x 14 x 9 (from bloc 22 x 20 x 15) 3. Shape / Angularity: subangular 4. Color of cut surface: darkgrey, brownish 5. Texture / Vesicularity: massive lava 6. Phenocrysts: pl (< 4mm, up to %), olivine completely altered to iddingsite, plus trace px 7. Matrix: very fine grained with pl and ol microcrystals 8. Secondary Minerals: iddingsite replacing ol, partly with Mn-precipitates 9. Encrustations: partly Mn-coated 10. Comment: pl good enough for Ar/Ar dating	X	X	X			10.58031/KIEL0264GRST201		
SO307-DR126-1B	1. Rock Type: volcanic, strongly altered (clasts of breccia) 2. Size: 5 x 4 x 2 (clasts of bloc 22 x 20 x 15) 3. Shape / Angularity: subangular 4. Color of cut surface: brown 5. Texture / Vesicularity: massive lava, nonvesicular 6. Phenocrysts: strongly altered phenos: pl (< 3mm, < 1%), ol (< 1mm, < 1%), px? 7. Matrix: very fine grained, strongly altered 8. Secondary Minerals: iddingsite replacing ol, Mn 9. Encrustations: thick Mn crust (< 4cm) 10. Comment: 4 clasts ectracted						10.58031/KIEL0264GRSU201		
SO307-DR126-2	1. Rock Type: Mn-crust 2. Size: 21 x 14 x 8 3. Shape / Angularity: angular 4. Color of cut surface: black 5. Texture / Vesicularity: / 6. Phenocrysts: / 7. Matrix: / 8. Secondary Minerals: / 9. Encrustations: / 10. Comment: very heavy, Fe-ox.						10.58031/KIEL0264GRSV201		
SO307-DR126-3	1. Rock Type: Mn-crust 2. Size: 19 x 13 x 9 3. Shape / Angularity: rounded 4. Color of cut surface: black 5. Texture / Vesicularity: / 6. Phenocrysts: / 7. Matrix: / 8. Secondary Minerals: / 9. Encrustations: / 10. Comment: including small rock and pheno fragments (< 1cm, strongly altered)						10.58031/KIEL0264GRSW201		

SO307-DR132

Western Madagascar Ridge, S-N trending ridge. Eastern slope

Dredge on bottom UTC, hrs, °N, °E, depth m	05:44	30°29,97'S	44°00,92'E	2375
Dredge off bottom UTC, hrs, °N, °E, depth m	06:43	30°30,30'S	44°00,76'E	2157

total volume: three blocs of rocks, few corals

Comments: Mn-crust, one strongly altered volcaniclastic rock

SO307 Dredge Station Details and Rock Description

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR132-1	1. Rock Type: volcaniclastic, strongly altered 2. Size: 18 x 13 x10 from bloc B (38 x 25 x 15) 3. Shape / Angularity: subrounded 4. Color of cut surface: orange/brown (core) to grey on rims with orange and white spots 5. Texture / Vesicularity: non-vesicular 6. Phenocrysts: / 7. Matrix: fine- to coarse-grained, volcanic clasts (rounded to angular) with one bigger clast (1cm, strongly altered, including one phenocrysts (strongly altered)) clasts and matrix replaced by secondary minerals 8. Secondary Minerals: Mn, Fe-oxides, phosphorite, palagonite 9. Encrustations: thick Mn-crust (10 cm) 10. Comment: palagonized volcanic tuff	X					10.58031/KIEL0264GRSY201		
SO307-DR132-2	1. Rock Type: sedimentary, n.a. 2. Size: 18 x 11 x 4 from bloc C (35 x 20 x 10) 3. Shape / Angularity: rounded 4. Color of cut surface: brown/beige/grey to orange, red spots 5. Texture / Vesicularity: non-vesicular 6. Phenocrysts: / 7. Matrix: coarse-grained, rounded 8. Secondary Minerals: Fe-oxides, CaCO3, palagonite 9. Encrustations: none 10. Comment: /						10.58031/KIEL0264GRSZ201		
SO307-DR132-3	1. Rock Type: Mn-crust 2. Size: 15 x 13 x 6 from bloc B (38 x 25 x 15) 3. Shape / Angularity: rounded 4. Color of cut surface: black 5. Texture / Vesicularity: non-vesicular 6. Phenocrysts: / 7. Matrix: / 8. Secondary Minerals: / 9. Encrustations: up to 10 cm 10. Comment: /						10.58031/KIEL0264GRS2201		

SO307-DR133

Western Madagascar Ridge, N-S trending ridge, upper part, NE-facing slope

Dredge on bottom UTC, hrs, °N, °E, depth m	09:44	30°25,77'S	44°00,83'E	2235
Dredge off bottom UTC, hrs, °N, °E, depth m	10:35	30°25,99'S	44°00,74'E	2035

total volume: 2 small pieces

Comments: 1 sedimentary rock, 1 coral

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR133-1	1. Rock Type: sedimentary, n.a. 2. Size: 7 x 5 x 3 3. Shape / Angularity: subrounded 4. Color of cut surface: brown 5. Texture / Vesicularity: non-vesicular 6. Phenocrysts: / 7. Matrix: fine-grained, glay 8. Secondary Minerals: CaCO3, Fe-oxides, Mn within the clay 9. Encrustations: / 10. Comment: limestone?, mergel?						10.58031/KIEL0264GRS4201		

SO307-134

Western part of Madagascar Ridge, N-S alongated ridge, it´s lower step, east-facing slope

Dredge on bottom UTC, hrs, °N, °E, depth m	15:43	30°08,870'S	44°12,152'E	2587
Dredge off bottom UTC, hrs, °N, °E, depth m	16:47	30°09,084'S	44°11,927'E	2218

total volume: several rocks

Comments: igneous rocks, massive ol-phyric lavas and vesicular lavas

SO307 Dredge Station Details and Rock Description

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR134-1	1. Rock Type: volcanic, moderately altered 2. Size: 22 x 10 x 11 cm 3. Shape / Angularity: angular 4. Color of cut surface: dark grey 5. Texture / Vesicularity: vesicular (ca. 2%, spherical, < 1 mm in diamater), fractures, somecoated with Fe-Oxides 6. Phenocrysts: Ol (5%, 2 mm in diameter, completely altered), Pl:1x1mm, 3%, altered) 7. Matrix: well crystalized, fine grained matrix, Pl and Ol, moderaltely altered 8. Secondary Minerals: Fe-Oxides replacing the Olivines and filling some of the vesicules 9. Encrustations: phosphoritic (?) crust (about 1 cm thick) 10. Comment:	X	X				10.58031/KIEL0264GRS6201		
SO307-DR134-2	1. Rock Type: volcanic, moderately altered 2. Size: 26 x 25 x 10 cm 3. Shape / Angularity: angular 4. Color of cut surface: brownish-grey 5. Texture / Vesicularity: massive 6. Phenocrysts: aphyric 7. Matrix: well-crystalized, fine-grained groundmass, modereately altered, composed by Pl + Ol + Mt (?) 8. Secondary Minerals: Fe-oxides replacing micro olivins 9. Encrustations: Mn-coating on the surface about 1mm thick 10. Comment: very similar to sample -1, but different texture: massive and aphyric	X	X				10.58031/KIEL0264GRS7201		
SO307-DR134-3	1. Rock Type: volcanic, slightly altered 2. Size: 19 x 10 x 8 cm 3. Shape / Angularity:subangular 4. Color of cut surface: grey 5. Texture / Vesicularity: massive with some fractures 6. Phenocrysts: Pl (2x1mm, 2%, altered), Ol (1x2mm, 1%, completely replaced), Mt (1x1mm, 1%, fresh) 7. Matrix: fine-grained, well-crystallized 8. Secondary Minerals: Fe-Oxides 9. Encrustations: Mn-crust, 3 mm thick 10. Comment: this sample is the freshest from the dredge, however there is less percentage of ol	X	X				10.58031/KIEL0264GRS8201		
SO307-DR134-4	1. Rock Type: volcanic, altered 2. Size: 14 x 16 x 8 cm 3. Shape / Angularity: subangular 4. Color of cut surface: light grey with black spots 5. Texture / Vesicularity: vesicular (15%, about 3 mm in diameter, mostly spherical) filled with Mn and CaCO3 6. Phenocrysts: aphyric 7. Matrix: very fine grained matrix, altered (orange stains, Fe-Oxides) 8. Secondary Minerals: Mn-coated, < 1mm, Fe-Oxides 9. Encrustations: Mn-coated, < 1 mm 10. Comment:	X					10.58031/KIEL0264GRS9201		
SO307-DR134-5	1. Rock Type: volcanic, altered 2. Size: 8 x 5 x 4 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: same as sample 4 5. Texture / Vesicularity: same as sample 4 6. Phenocrysts: same as sample 4 7. Matrix: same as sample 4 8. Secondary Minerals: same as sample 4 9. Encrustations: same as sample 4 10. Comment:						10.58031/KIEL0264GRTA201		

SO307 Dredge Station Details and Rock Description

SO307-DR134-6	1. Rock Type: volcanic, altered 2. Size: 15 x 14 x 12 cm 3. Shape / Angularity: subangular 4. Color of cut surface: grey, purple 5. Texture / Vesicularity: vesicular (15%, about 3 mm in diameter, filled with CaCO3) 6. Phenocrysts: aphyric 7. Matrix: very fine-grained 8. Secondary Minerals: CaCO3 9. Encrustations: Mn-coated 10. Comment:	x					10.58031/KIEL0264GRTB201		
SO307-DR134-7	1. Rock Type: sedimentary, limestone? 2. Size: 18 x 16 x 13 cm 3. Shape / Angularity: subangular 4. Color of cut surface: pale, pinkish-white 5. Texture / Vesicularity: massive 6. Phenocrysts: - 7. Matrix: CaCO3, possiböly some bioclasts 8. Secondary Minerals: Mn 9. Encrustations: Mn-coated 10. Comment: Representative sample of the sedimentary rocks brought up in the dredge						10.58031/KIEL0264GRTC201		

SO307-135

Western part of Madagascar Ridge, N-S alongated ridge, northern part, NE-facing slope, middle section

Dredge on bottom UTC, hrs, °N, °E, depth m	19:51	30°03,099'S	44°09,315'E	2083
Dredge off bottom UTC, hrs, °N, °E, depth m	20:43	30°03,33'S	44°09,45'E	1788

total volume: one rock

Comments: volcanic rock with thick Mn-crust

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR135-1	1. Rock Type: volcanic, moderately altered 2. Size: 36 x 15 x 12 3. Shape / Angularity: subangular 4. Color of cut surface: grey 5. Texture / Vesicularity: mostly aphyric 6. Phenocrysts: Ol? (1%, up to 1mm, all replaced) 7. Matrix: fine-grained 8. Secondary Minerals: olivines replaced with something (not iddingsite, perhaps a Mn-oxide) 9. Encrustations: Mn-crust (>2-4cm) 10. Comment: slightly Ol-phyric basalt, moderately altered	x	x	try ground-mass			10.58031/KIEL0264GRTE201		

SO307-DR137

Western Madagscar Ridge, ~N-S elongated seamount, ~15 km W of seamount sampled during DR134- DR136.

Dredge on bottom UTC, hrs, °N, °E, depth m	03:42	30°05,34'S	43°58,31'E	2882
Dredge off bottom UTC, hrs, °N, °E, depth m	04:56	30°05,60'S	43°58,57'E	2510

total volume: 1/3 full

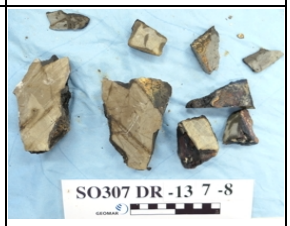
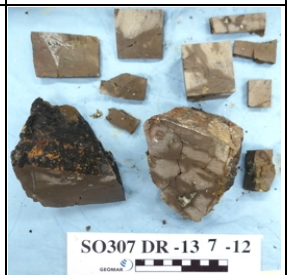
Comments: Dredge up lower western slope. Several blocks of aphyric to pl-phyric lavas.

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR137-1	1. Rock Type: volcanic, sligthly altered 2. Size: 14 x 14 x 8 cm 3. Shape / Angularity: angular 4. Color of cut surface: grey 5. Texture / Vesicularity: vesicular (1%, <0.5 mm), partly filled with Mn. 6. Phenocrysts: aphyric - one single Pl (1 mm) 7. Matrix: medium-grained, Pl (slightly altered), Px (Fe-oxidized), Ol? 8. Secondary Minerals: Fe-oxides, Mn, few dark red spot (~2mm) of Fe-ox of the matrix 9. Encrustations: partly Mn-coated 10. Comment: Pl in the matrix may be good enough for dating.	x	x	x			10.58031/KIEL0264GRTG201		

SO307 Dredge Station Details and Rock Description

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR137-2	1. Rock Type: volcanic, slightly to moderately altered. 2. Size: 12 x 20 x 10 cm from Block A: 62 x 39 x 27 cm. 3. Shape / Angularity: angular, coluMnar joint 4. Color of cut surface: Grey 5. Texture / Vesicularity: Non-vesicular. 6. Phenocrysts: aphyric (few bigger phenocrysts fo Pl <2mm, moderately altered, part of the matrix?) 7. Matrix: fine to medium-grained. Pl (moderately altered), Px (moderately altered) 8. Secondary Minerals: some replaced by Fe-ox and Mn 9. Encrustations: partly Mn-coated 10. Comment: Accumulation of Mn and Fe-ox similar	X	X	X			10.58031/KIEL0264GRTH201		
SO307-DR137-3	1. Rock Type: volcanic slightly to moderately altered 2. Size: 20 x 22 x 6 cm 3. Shape / Angularity: angular 4. Color of cut surface: grey 5. Texture / Vesicularity: ≤1% vesicles (0,5mm) filled with Mn 6. Phenocrysts: aphyric 7. Matrix: medium-grianed: Pl (slightly altered), Px (Fe-oxidized), Ol?, partly replaced by Mn 8. Secondary Minerals: Mn, Fe-oxides 9. Encrustations: partly Mn-coated 10. Comment: maybe some Pl Ar/Ar datable; similar to samples -1, -2	X	X	?			10.58031/KIEL0264GRTK201		
SO307-DR137-4	1. Rock Type: volcanic, slightly altered 2. Size: 19 x 13 x 5 cm 3. Shape / Angularity: angular 4. Color of cut surface: grey 5. Texture / Vesicularity: vesicular (<1%, ≤0,5mm) partly filled with Mn, Fe-oxides, fractures 6. Phenocrysts: aphyric 7. Matrix: medium-grained, Pl,Px (slightly altered, partly replaced by secondary minerals Fe-oxides, Mn), few bigger Pl in matrix 8. Secondary Minerals: Fe-oxides, Mn 9. Encrustations: partly Mn-coated 10. Comment: Fe-oxide accumulations up to 2mm, similar to samples -1 to -3	X	X				10.58031/KIEL0264GRTM201		
SO307-DR137-5	1. Rock Type: volcanic, moderately altered 2. Size: 13 x 6 x 7 cm 3. Shape / Angularity: angular 4. Color of cut surface: grey to grey-brownish 5. Texture / Vesicularity: vesicular (5%, ≤3mm) filled with Mn, fractures (Fe-oxide, Mn) 6. Phenocrysts: Pl (<1%, 1mm) slightly altered, Ol? (Fe-oxide) 7. Matrix: medium-grained (Pl, Px) moderately altered, partly replaced by Mn and Fe-oxides 8. Secondary Minerals: Mn, Fe-oxides 9. Encrustations: partly Mn-coated 10. Comment: similar to samples -1 to -4	X					10.58031/KIEL0264GRTN201		
SO307-DR137-6	1. Rock Type: volcanic, moderately altered 2. Size: 40 x 15 x 8 cm from block B (38 x 37 21 cm) 3. Shape / Angularity: angular from coluMnar jointing 4. Color of cut surface: grey 5. Texture / Vesicularity: non-vesicular 6. Phenocrysts: Pl (3%, ≤4mm) moderately altered and partly replaced CaCO3, and other secondary mineral (white), Ol? replaced by Mn? 7. Matrix: medium-grained: Pl, Px, moderately altered 8. Secondary Minerals: Mn, Fe-oxides, CaCO3 9. Encrustations: partly Mn-coated and encrusted (≤1mm) 10. Comment: different to samples -1 to -5	X	X				10.58031/KIEL0264GRTP201		

SO307 Dredge Station Details and Rock Description

SO307-DR137-7	1. Rock Type: breccia with volcanic clasts (moderately altered) within sedimentary matrix 2. Size: 20 x 10 x 20 cm 3. Shape / Angularity: angular clast 4. Color of cut surface: grey 5. Texture / Vesicularity: vesicular (2%, up to 6mm) filled with Mn, fractures 6. Phenocrysts: aphyric 7. Matrix: medium-grained: Pl, Px (moderately altered) few bigger Pl (1mm), mainly replaced by Fe-oxides and Mn 8. Secondary Minerals: Fe-oxides, Mn 9. Encrustations: partly Mn-coated 10. Comment:	X	X				10.58031/KIEL0264GRTQ201		
SO307-DR137-8	1. Rock Type: volcanic, slightly altered 2. Size: 19 x 16 x 10 cm 3. Shape / Angularity: angular 4. Color of cut surface: grey to grey-brownish 5. Texture / Vesicularity: vesicular (2%, ≤2mm) filled with Mn, fractures filled with Fe-oxides 6. Phenocrysts: aphyric 7. Matrix: medium-grained: Pl, Px (slightly altered) 8. Secondary Minerals: Fe-oxides, Mn 9. Encrustations: Mn-crust up to 4cm 10. Comment: similar to DR134?	X					10.58031/KIEL0264GRTR201		
SO307-DR137-9	1. Rock Type: volcanic, slightly altered 2. Size: 16 x 12 x 6 cm 3. Shape / Angularity: angular 4. Color of cut surface: grey with white spots 5. Texture / Vesicularity: vesicular (10%, up to 1cm, irregular shapes) filled with CaCO3, phosphorite, Mn, Fe-oxides 6. Phenocrysts: aphyric 7. Matrix: fine-grained: Px, Pl (partly replaced by Mn) slightly to moderately altered 8. Secondary Minerals: Mn, Fe-oxides, CaCO3, phosphorite 9. Encrustations: partly Mn-coated 10. Comment:	X					10.58031/KIEL0264GRTS201		
SO307-DR137-10	1. Rock Type: volcanic, moderately altered 2. Size: 20 x 13 x 12 cm 3. Shape / Angularity: subangular 4. Color of cut surface: grey with black dots 5. Texture / Vesicularity: vesicular (10%, ≤4mm) filled with Mn, CaCO3, Fe-oxides, fractures 6. Phenocrysts: aphyric 7. Matrix: fine-grained: Pl, Px (moderately altered) partly replaced by Fe-oxides and Mn 8. Secondary Minerals: CaCO3, Mn, Fe-oxides 9. Encrustations: partly Mn-coated, sed 10. Comment: different to previous samples	X	X				10.58031/KIEL0264GRTT201		
SO307-DR137-11	1. Rock Type: volcanic, moderately altered 2. Size: 18 x 13 x 11 cm 3. Shape / Angularity: subangular 4. Color of cut surface: grey-magenta 5. Texture / Vesicularity: vesicular (10%, up to 10mm, some elongated) most filled with Mn, some with CaCO3, fractures Fe-oxidation 6. Phenocrysts: aphyric 7. Matrix: fine-grained: moderately altered matrix, Pl, Px -> magenta coloured -> Fe-oxidation? 8. Secondary Minerals: CaCO3, Mn, Fe-oxides 9. Encrustations: partly Mn-coated and encrusted (<1mm) 10. Comment: similar to sample -10 more altered	X	X				10.58031/KIEL0264GRTU201		
SO307-DR137-12	1. Rock Type: volcanic, moderately altered 2. Size: 21 x 10 x 10 cm 3. Shape / Angularity: subangular 4. Color of cut surface: grey to magenta-grey 5. Texture / Vesicularity: vesicular (2%, up to 1cm, elongated) partly filled with secondary minerals, Mn, fractures 6. Phenocrysts: Ol (7%, <1mm) replaced by iddingsite? 7. Matrix: fine-grained: Px, Pl moderately altered, partly replaced by Mn 8. Secondary Minerals: Mn, Fe-oxides, CaCO3 9. Encrustations: Mn-coated 10. Comment: different to all of them: Ol-phyric	X	X				10.58031/KIEL0264GRTV201		

SO307-DR137-13	1. Rock Type: volcaniclastic breccia 2. Size: 25 x 9 x 12 cm 3. Shape / Angularity: angular 4. Color of cut surface: grey, purple-ish 5. Texture / Vesicularity: massive 6. Phenocrysts: 7. Matrix: 8. Secondary Minerals: fractures and voids filled with a white precipitate (silicious?). Some voids are filled with a green precipiated (chlorite?). Calcite on the surface 9. Encrustations: Mn-coated <1mm thick 10. Comment: sample is a volcaniclastic breccia composed of fragments of altered lava surrounded by a matrix of the same material, and set with a white cement which does not react to HCL.	x					10.58031/KIEL0264GRTW201		

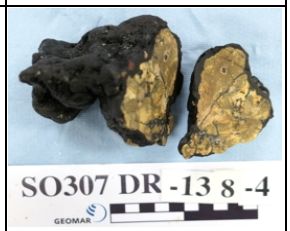
SO307-DR138

Western part of the Madagascar Ridge

Dredge on bottom UTC, hrs, °N, °E, depth m	10:14	30°14,06'S	43°48,00'E	2260
Dredge off bottom UTC, hrs, °N, °E, depth m	11:08	30°14,17'S	43°48,21'E	1955

total volume: few rocks

Comments: sedimentary rocks, 1 volcanic and 1 volcaniclastic.

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR138-1	1. Rock Type: volcanic, altered 2. Size: 9 x 5 x 4.5 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: Grey 5. Texture / Vesicularity: vesicular (2x3 mm, ~5%, coated with Mn and/or Fe-oxides. Some are filled with sediment. 6. Phenocrysts: Pl (~7%, 3x2 mm, altered) 7. Matrix: Fine-grained, composed by Pl, Ol? (red crystals), Mt?, moderately altered. 8. Secondary Minerals: Mn, Fe-oxides. 9. Encrustations: Mn coated, <1mm thick 10. Comment: -	X	X				10.58031/KIEL0264GRTY201		
SO307-DR138-2	1. Rock Type: volcaniclastic breccia 2. Size: 9 x 6 x 5 cm 3. Shape / Angularity: rounded 4. Color of cut surface: Red-brown 5. Texture / Vesicularity: Massive, clastic 6. Phenocrysts: - 7. Matrix: volcanic fragment surrounded by a red (jasper?) matrix with white fragments of a white precipitate (phosphorite? silica?) that do not react to HCl. 8. Secondary Minerals: Fe-oxides 9. Encrustations: Mn-coated 10. Comment: only one recognizable lava fragment, vesicular, Pl-phyric, very altered.	X					10.58031/KIEL0264GRTZ201		
SO307-DR138-3	1. Rock Type: sedimentary, moderately altered. 2. Size: 13 x 7 x 6 cm 3. Shape / Angularity: rounded 4. Color of cut surface: yellowish-beige 5. Texture / Vesicularity: coarse grained-sandstone 6. Phenocrysts: - 7. Matrix: white-ish CaCO3 matrix 8. Secondary Minerals: Fe-oxides 9. Encrustations: Mn-coated, ~2 mm thick. 10. Comment: orange, yellow, white lithic fragments surrounded by a CaCO3 matrix. Reaction to HCl is not too strong; lithic fragments do not seem to react.						10.58031/KIEL0264GRT2201		
SO307-DR138-4	1. Rock Type: Sedimentary 2. Size: 13 x 8 x 7 cm 3. Shape / Angularity: rounded 4. Color of cut surface: Grey, yellowish. 5. Texture / Vesicularity: clastic 6. Phenocrysts: - 7. Matrix: made up of phosphorite(?) 8. Secondary Minerals: Mn (dendritic) 9. Encrustations: Mn-crusted, ~4mm thick. 10. Comment: Shark tooth found within the Mn crust.						10.58031/KIEL0264GRT3201	shark tooth!	

SO307-DR138-5	1. Rock Type: sedimentary 2. Size: 10 x 6 x 3 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: beige 5. Texture / Vesicularity: fine grained sandstone. 6. Phenocrysts: - 7. Matrix: carbonated cement. 8. Secondary Minerals: Mn, Fe-ox 9. Encrustations: Mn coated, < 1mm thick. 10. Comment:						10.58031/KIEL0264GRT4201		

SO307-DR139

Western part of Madagascar Ridge. A small NE-SW trending ridge NW facing steep upper slope

Dredge on bottom UTC, hrs, °N, °E, depth m 12:09 30°14,057'S 43°47,014'E 2260

Dredge off bottom UTC, hrs, °N, °E, depth m 13:52 30°14,159'S 43°48,201'E 1956

total volume: several rocks, biology

Comments: Several blocks including many coral fragments. Blocks of rather altered lavas

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR139-1	1. Rock Type: volcanic, altered. 2. Size: 28 x 20 x 10 cm 3. Shape / Angularity: angular 4. Color of cut surface: Grey 5. Texture / Vesicularity: vesicular, 4x3mm, 20%, with Mn coatings, and filled with a spherical precipitate (Fe-ox?, like aggregated spheres). Mn has a botryiodal texture 6. Phenocrysts: Pl (4x1 mm, ~10%, moderately altered) 7. Matrix: well crystallized, medium grained 8. Secondary Minerals: Mn, Fe-ox 9. Encrustations: Mn coated 10. Comment:	X	X				10.58031/KIEL0264GRT6201		
SO307-DR139-2	1. Rock Type: volcanic, altered 2. Size: 18 x 11 x10 cm 3. Shape / Angularity: subangular 4. Color of cut surface: grey with orange specks. 5. Texture / Vesicularity: vesicular 20%, same fillings as sample 1. 6. Phenocrysts: same as sample 1, large Pl crystals 7. Matrix: fine-grained matrix, altered 8. Secondary Minerals: Fe-oxides, Mn 9. Encrustations: Mn-coated 10. Comment: similar to sample 1	X	X				10.58031/KIEL0264GRT7201		
SO307-DR139-3	1. Rock Type: volcanic altered 2. Size: 17 x 10 x 7 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: brownish-grey 5. Texture / Vesicularity: 15%, 3x2 mm. Filled with phosphorite? (white, does not react). Coatings of Mn and chlorite (green) in several vesicles, as well as Mn fillings. 6. Phenocrysts: Ol (?) some red secondary minerals in the matrix have Ol-like shapes. ~2% and 1 mm diameter. 7. Matrix: Fine-grained, brown, altered matrix. 8. Secondary Minerals: Mn, Fe-oxides, chlorite 9. Encrustations: Mn-coated, 1 mm thick 10. Comment:						10.58031/KIEL0264GRT8201		
SO307-DR139-4	1. Rock Type: volcanic, altered 2. Size: 18 x 12 x 8 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: purplish-brown 5. Texture / Vesicularity: massive, with fractures 6. Phenocrysts: Pl: up to 7x5mm sizes, altered, ~25%. Ol: 3x2mm, completely replaced, ~5%. 7. Matrix: Fine-grained, altered. 8. Secondary Minerals: Mn, Fe-oxides in fractures, chlorite. 9. Encrustations: Mn crust, 2 cm thick. 10. Comment:	x					10.58031/KIEL0264GRT9201		

SO307 Dredge Station Details and Rock Description

SO307-DR139-5	1. Rock Type: volcanic, altered 2. Size: 10 x 7 x 6 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: red-brownish 5. Texture / Vesicularity: vesicular 25%, 5x2 mm, coated with a mixture of Mn and chlorite (?), Fe-oxides. 6. Phenocrysts: Pl: 10%, 4x2 mm, moderately altered. Ol: <1mm diameter, <2%, completely altered. 7. Matrix: fine-grained, altered. 8. Secondary Minerals: Mn, Fe-oxides, chlorite. 9. Encrustations: Mn-coating in the surface. 10. Comment:	x					10.58031/KIEL0264GRUA201		
SO307-DR139-6	1. Rock Type: sedimentary, altered 2. Size: 7 x 8 x 4 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: beige 5. Texture / Vesicularity: coarse grained, clastic. 6. Phenocrysts: - 7. Matrix: yellow/beige precipitate (maybe phosphorite?) 8. Secondary Minerals: Mn, Fe-oxides , phosphorite(?). 9. Encrustations: Mn crust, ~2cm thick. 10. Comment: rounded pieces of aphyric lavas surrounded by a matrix of yellow/beige precipitate (phosphorite?). The lava fragments appear well-crystallized.						10.58031/KIEL0264GRUB201		
SO307-DR139-7	1. Rock Type: sedimentary, moderately altered 2. Size: 13 x 8 x 7 cm 3. Shape / Angularity: rounded 4. Color of cut surface: beige 5. Texture / Vesicularity: massive 6. Phenocrysts: - 7. Matrix: fine-grained, cemented by CaCO3 8. Secondary Minerals: CaCO3, Fe-oxides 9. Encrustations: Mn-coating <1mm thick. 10. Comment: microconglomerate composed of rounded lithic fragments (average ~2x1 mm size) surrounded by a beige matrix (phosphorite?). The lithics appear to be igneous and elongated. They are subparallel in some areas. The cement is made of CaCO3. There are some bioclasts.						10.58031/KIEL0264GRUC201		
SO307-DR139-8	1. Rock Type: sedimentary 2. Size: 9 x 5 x 7 cm 3. Shape / Angularity: rounded 4. Color of cut surface: red 5. Texture / Vesicularity: massive 6. Phenocrysts: - 7. Matrix: very fine grained, red 8. Secondary Minerals: Mn 9. Encrustations: Few spots have Mn coating, <1 mm 10. Comment: Clay-like, very soft rock.						10.58031/KIEL0264GRUD201		

SO307-140

Western margin of Madagascar Ridge

Dredge on bottom UTC, hrs, °N, °E, depth m	19:22	30°05,507'S	43°33,509'E	2368
Dredge off bottom UTC, hrs, °N, °E, depth m	20:17	30°05,663'S	43°33,777'E	2342

total volume: few rocks, sediment

Comments: two small volcanic rocks and sediment

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-140-1	1. Rock Type: volcanic, remarkably fresh 2. Size: 6 x 5 x 3 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: grey 5. Texture / Vesicularity: porphyritic 6. Phenocrysts: Pl (10%, up to 4mm) 7. Matrix: fine-grained 8. Secondary Minerals: olivine in groundmass replaced by iddingsite 9. Encrustations: thin Mn-crust 10. Comment: Pl-phyric basalt, all sample was packed for GC	X	X	if any material remains from geochem, yes pl if possible, otherwise groundmass			10.58031/KIEL0264GRUF201		

SO307 Dredge Station Details and Rock Description

SO307-140-2	1. Rock Type: volcanic, slightly altered 2. Size: 8 x 7 x 7 cm 3. Shape / Angularity: angular 4. Color of cut surface: grey/ purpleish 5. Texture / Vesicularity: porphyritic 6. Phenocrysts: Plg (10%, up to 4mm) 7. Matrix: fine-grained 8. Secondary Minerals: 9. Encrustations: Mn-crust 10. Comment: Plg-phyric basalt, groundmass is slightly to moderately altered, Plg phenocrysts are good for Ar/Ar	x	x	Yes, plg			10.58031/KIEL0264GRUG201		
SO307-140-3	1. Rock Type: sediment 2. Size: 16 x 12 x 9 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: tan 5. Texture / Vesicularity: - 6. Phenocrysts: - 7. Matrix: - 8. Secondary Minerals: - 9. Encrustations: - 10. Comment: soft, tan sediment						10.58031/KIEL0264GRUH201		

SO307-141

Western margin of Madagascar Ridge. Dredge up the middle slope

Dredge on bottom UTC, hrs, °N, °E, depth m	00:28	30°09,14'S	43°29,87'E	2692
Dredge off bottom UTC, hrs, °N, °E, depth m	01:25	30°09,21'S	43°30,13'E	2469

total volume: one small "rock"

Comments: carbonate

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-141-1	1. Rock Type: sediment 2. Size: 5 x 4 x 2 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: beige to white 5. Texture / Vesicularity: secondary vesicularity due to bioturbation 6. Phenocrysts: - 7. Matrix: carbonate 8. Secondary Minerals: Mn 9. Encrustations: - 10. Comment: carbonate rock/mud						10.58031/KIEL0264GRUM201		

SO307-144

Western margin of Madagascar Ridge, upper slope

Dredge on bottom UTC, hrs, °N, °E, depth m	12:39	30°16,847'S	43°23,268'E	2382
Dredge off bottom UTC, hrs, °N, °E, depth m	13:33	30°17,007'S	43°23,466'E	2128

total volume: one small Mn crust

Comments:

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-144-1	1. Rock Type: Mn crust 2. Size: 12 x 9 x 4.5 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: black 5. Texture / Vesicularity: 6. Phenocrysts: - 7. Matrix: - 8. Secondary Minerals: - 9. Encrustations: - 10. Comment: small sample						10.58031/KIEL0264GRUP201		

SO307-145

Small seamount west of western margin of Madagascar Ridge, northern flank, NNE-facing slope, middle section

Dredge on bottom UTC, hrs, °N, °E, depth m	19:54	30°22,698'S	42°59,825'E	3062
Dredge off bottom UTC, hrs, °N, °E, depth m	20:54	30°22,94'S	42°59,87'E	2770

total volume: few rocks

Comments: fsp-amph-phyric (trachyte?); ol-pl-phyric; fsp-px-phyric rocks

SO307 Dredge Station Details and Rock Description

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-145-1	1. Rock Type: volcanic 2. Size: 11 x 10 x 6 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: dark grey, orange 5. Texture / Vesicularity: phyric, vesicles (15%, very small, most <1mm but some get up to 2mm) 6. Phenocrysts: Ol (5%, up to 2mm, all altered to iddingsite), Pl (2%, up to 1 mm) 7. Matrix: very fine-grained except for Plg 8. Secondary Minerals: iddingsite replaced olivine, some vesicles filled with an opaque, white mineral 9. Encrustations: Mn-crust up to 5mm 10. Comment: Plg-Ol-phyric basalt	X	X	Plg if enough is available			10.58031/KIEL.0264.GRUR.201		
SO307-145-2A	1. Rock Type: volcanic 2. Size: 16 x 11 x 11 cm 3. Shape / Angularity: subangular 4. Color of cut surface: purple, grey 5. Texture / Vesicularity: phyric, spongy groundmass texture 6. Phenocrysts: Feldspar or feldspathoid? (10%, up to 10mm,), Amphibole (1%, up to 1 mm) 7. Matrix: fine-grained 8. Secondary Minerals: Fsp variably altered (some with rims) 9. Encrustations: Mn-crust up to 6mm 10. Comment: A somewhat strange looking rock, the Fsp are milkey in appearance, suggesting they may actually be a feldspathoid, presence of amphibole and pyroxene indicates this is an alkalic volcanic rock of some sort, but hard to name it without chemistry. Aggregated with sample 2B by Mn and carbonate matrix	X	X	?			10.58031/KIEL.0264.GRUS.201	feldspathoid minerals?	
SO307-145-2B	1. Rock Type: volcanic 2. Size: 9 x 8 x 6 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: grey and orange/dark red 5. Texture / Vesicularity: phyric, vesicules (5%, up to 8mm but most are about 1mm) 6. Phenocrysts: Feldspar or feldspathoid? (maybe both?, 10%, up to 6mm,), Ol (1%, up to 1mm), Px (2%, up to 5mm) 7. Matrix: fine-grained 8. Secondary Minerals: some vesicles filled with secondary minerals, including calcite and other white minerals 9. Encrustations: Mn-crust and hyaloclastite 10. Comment: Another alkalic lava of some sort. Aggregated with sample 2A by Mn and carbonate matrix						10.58031/KIEL.0264.GRUT.201		
SO307-145-3	1. Rock Type: volcanic 2. Size: 8 x 7 x 5.5 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: light grey 5. Texture / Vesicularity: phyric, some voids but no vesicules 6. Phenocrysts: Feldspar or feldspathoid? (maybe both?, 8%, up to 8mm), Amphibole (2%, up to 3mm long), Px (<1%, up to 1mm) 7. Matrix: fine-grained 8. Secondary Minerals: - 9. Encrustations: Mn-crust, up to 10mm 10. Comment: Alkalic lava ?						10.58031/KIEL.0264.GRUU.201		
SO307-145-4	1. Rock Type: volcanic 2. Size: 9 x 8 x 4 cm 3. Shape / Angularity: rounded 4. Color of cut surface: grey/brown 5. Texture / Vesicularity: phyric, some voids and strange linear cracks/voids 6. Phenocrysts: Feldspar or feldspathoid? (5%, up to 5mm), Px (2%, up to 3mm) 7. Matrix: fine-grained 8. Secondary Minerals: - 9. Encrustations: Mn-crust, up to 6mm 10. Comment: Alkalic lava?						10.58031/KIEL.0264.GRUV.201		

SO307 Dredge Station Details and Rock Description

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-145-5	1. Rock Type: volcanic 2. Size: 8 x 8 x 5 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: grey/brown 5. Texture / Vesicularity: phyric 6. Phenocrysts: Feldspar or feldspathoid? (5%, up to 8mm), Px (2%, up to 3mm) 7. Matrix: fine-grained 8. Secondary Minerals: - 9. Encrustations: thin Mn-crust 10. Comment: very similar to sample 4, alkalic lava?						10.58031/KIEL0264GRUW201		
SO307-145-6	1. Rock Type: volcanic 2. Size: 8 x 6 x 5 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: brown/grey 5. Texture / Vesicularity: phyric 6. Phenocrysts: Feldspar or feldspathoid? (5%, up to 8mm), Px (1%, up to 2mm) 7. Matrix: fine-grained 8. Secondary Minerals: - 9. Encrustations: thin Mn-crust 10. Comment: Similar to samples 4 and 5, alkalic lava?						10.58031/KIEL0264GRUX201		
SO307-145-7	1. Rock Type: sedimentary 2. Size: 12 x 7 x 7 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: beige to orange, patchy 5. Texture / Vesicularity: some voids of different sizes, up to 1cm (bioturbation) 6. Phenocrysts: - 7. Matrix: carbonitic 8. Secondary Minerals: Mn, light green and orange/brownish minerals 9. Encrustations: Mn-crust, up to 1mm thick 10. Comment: partly beige, partly orange sediment with different voids due to bioturbation						10.58031/KIEL0264GRUY201		
SO307-145-8	1. Rock Type: sedimentary 2. Size: 12 x 15 x 10 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: beige to white with pinkish tones 5. Texture / Vesicularity: voids <1mm 6. Phenocrysts: - 7. Matrix: carbonitic 8. Secondary Minerals: Mn, calcite filling voids, green minerals 9. Encrustations: some parts have a thin (<1mm) Mn crust 10. Comment:						10.58031/KIEL0264GRUZ201		

SO307-146

Small seamount W of Madagascar Ridge (same as for DR145), dredge up mid-upper eastern flank

Dredge on bottom UTC, hrs, °N, °E, depth m	00:33	30°24,67'S	42°59,61'E	2725
Dredge off bottom UTC, hrs, °N, °E, depth m	01:26	30°24,49'S	42°59,48'E	2477

total volume: 1/3 full

Comments: variety of sedimentary rocks with/and Mn-crust and Mn-nodules; altered volcanic clasts as nucleous of Mn noduls

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-146-1	1. Rock Type: Mn-nodule 2. Size: 14 x 11 x 9 cm 3. Shape / Angularity: round 4. Color of cut surface: black + orange 5. Texture / Vesicularity: - 6. Phenocrysts: - 7. Matrix: - 8. Secondary Minerals: - 9. Encrustations: 3cm Mn-crust 10. Comment: Mn-nodule with an angular basalt clast at the center. The basalt is highly altered						10.58031/KIEL0264GRU3201		

SO307 Dredge Station Details and Rock Description

SO307-146-2	1. Rock Type: sediment + Mn-crust 2. Size: 19 x 12 x 7 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: black + tan 5. Texture / Vesicularity: - 6. Phenocrysts: - 7. Matrix: - 8. Secondary Minerals: - 9. Encrustations: 4cm Mn-crust 10. Comment: sand + pebble-sized sediment with rounded clasts (basalt clasts mostly with a thick Mn-crust surrounding it)						10.58031/KIEL0264GRU4201		
SO307-146-3	1. Rock Type: Mn-nodule 2. Size: 12 x 10 x 10 cm 3. Shape / Angularity: round 4. Color of cut surface: black 5. Texture / Vesicularity: - 6. Phenocrysts: - 7. Matrix: - 8. Secondary Minerals: - 9. Encrustations: 5cm Mn-crust 10. Comment: No nucleous, pure Mn, center ca. 5cm is cracked with small amount of sediment filling the cracks						10.58031/KIEL0264GRU5201		
SO307-146-4	1. Rock Type: Sediment, Mn-crust 2. Size: 12 x 8 x 6 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: black + tan 5. Texture / Vesicularity: - 6. Phenocrysts: - 7. Matrix: - 8. Secondary Minerals: - 9. Encrustations: 1cm Mn-crust 10. Comment: tan sediment with some small (sand-sized) clasts with Mn-crust						10.58031/KIEL0264GRU6201		

SO307-147

Small seamount W of western margin Madagascar Ridge (same as for DR146), eastern flank of seamount,

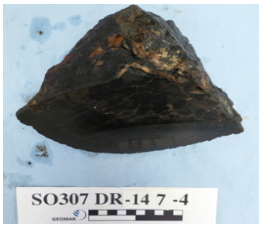
Dredge on bottom UTC, hrs, °N, °E, depth m	04:00	30°24,011'S	42°56,587'E	2543
Dredge off bottom UTC, hrs, °N, °E, depth m	04:55	30°23,86'S	42°56,83'E	2250

total volume: 1/4 full

Comments: Abundant Mn-crust with fragmants of magmatic rocks. Two good samples of Ol-Px-Pl-phyric volcanic rocks

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-147-1	1. Rock Type: volcanic, moderately altered 2. Size: 23 x 16 x 12 from block B (25 x 21 x 13) 3. Shape / Angularity: angular 4. Color of cut surface: grey 5. Texture / Vesicularity: vesicular (20%, up to 1 cm, mostly 0.5mm) some filled with white sec. minerals 6. Phenocrysts: ol (15%, up to 4mm, replaced by iddingsite, some glomeritic); px (18%, up to 1cm, megacrysts, slightly altered); pl (5%, up to 5mm, megacrysts, slightly altered); mt (<1%, 2mm) 7. Matrix: fine-grained: px, pl (moderately altered), Fe-oxidized 8. Secondary Minerals: CaCO3, iddingsite, Fe-oxides 9. Encrustations: Mn-crust of several cm, removed from sample 10. Comment: xenolith of gabbro 2cm (mostly px, pl and few ol), extra TS taken for xenolith; pl good enough for Ar/Ar-dating	X	X	X			10.58031/KIEL0264GRU8201		

SO307 Dredge Station Details and Rock Description

SO307-147-2	1. Rock Type: volcanic, moderately altered 2. Size: 17 x 14 x 11 from block A (29 x 20 x 10) 3. Shape / Angularity: angular 4. Color of cut surface: grey 5. Texture / Vesicularity: vesicular (10%, up to 3mm) some are elongated, some filled with CaCO3 and other sec. minerals 6. Phenocrysts: ol (10, < 4mm, replaced by iddingsite); px (8%, < 4mm, megacrysts, slightly altered); pl (5%, < 3mm, megacrysts, slightly to moderately altered) 7. Matrix: fine-grained: pl, px (moderately altered), Fe-oxidized 8. Secondary Minerals: iddingsite, CaCO3, Fe-oxides 9. Encrustations: Mn-crust of several cm, removed from sample 10. Comment: pl may be good enough for Ar/Ar-	x	x	x?			10.58031/KIEL0264GRU9201		
SO307-147-3	1. Rock Type: Mn-crust 2. Size: 18 x 11 x 3 3. Shape / Angularity: plate 4. Color of cut surface: / 5. Texture / Vesicularity: / 6. Phenocrysts: / 7. Matrix: / 8. Secondary Minerals: / 9. Encrustations: / 10. Comment: /						10.58031/KIEL0264GRVA201		
SO307-147-4	1. Rock Type: Mn-crust 2. Size: 17 x 11 x 12 3. Shape / Angularity: rounded 4. Color of cut surface: / 5. Texture / Vesicularity: / 6. Phenocrysts: / 7. Matrix: / 8. Secondary Minerals: / 9. Encrustations: / 10. Comment: /						10.58031/KIEL0264GRVB201		

SO307-151

Western margin of Madagascar Ridge

Dredge on bottom UTC, hrs, °N, °E, depth m	16:18	30°38,353'S	42°57,850'E	3540
Dredge off bottom UTC, hrs, °N, °E, depth m	17:18	30°38,469'S	42°58,096'E	3215

total volume: a few rocks

Comments: Abundant pillow lava fragments

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-151-1A	1. Rock Type: volcanic, moderately altered 2. Size: 20 x 15 x 10 cm, from Block A: 35 x 23 x 31 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: brownish grey 5. Texture / Vesicularity: vesicular (4 x 3 mm, some are elongated, the longest is approx. 1cm x 4 mm, filled with concentric precipitation of CaCO3), Mn-coating in some vesicles (radially arranged) 6. Phenocrysts: Pl (10%, 4 x 2 mm, altered to moderately altered), Ol (1%, 2 x 1 mm, replaced by Fe-oxides), a couple of crystals maybe Px 7. Matrix: fine-grained, brown groundmass, possibly glassy 8. Secondary Minerals: Calcite, Fe-oxides, palagonite (in the glass) 9. Encrustations: palagonite rim 10. Comment: fragments of large pillow lava. Palagonite rim was cut but no fresh glass was found. The vesicules are radial and elongated towards the rims. Pl in the matrix, maybe good for Ar/Ar.			?			10.58031/KIEL0264GRVD201		

SO307 Dredge Station Details and Rock Description

SO307-151-1B	1. Rock Type: volcanic, altered to moderately altered 2. Size: 19 x 16 x 11 cmfrom Block A 3. Shape / Angularity: subrounded 4. Color of cut surface: brwonish grey 5. Texture / Vesicularity: vesicules (15%, 5 x 3 mm, similar to sample DR151-1A), coated with Mn, CaCO3 (concentric) 6. Phenocrysts: Plg (15%, 5 x 3 mm, moderately altered, some are together in glomerocrysts), Ol (1%, 1 x 1 mm, completely altered) 7. Matrix: fine-grained, composed of Plg, Ol, (glass?) 8. Secondary Minerals: Calcite, Fe-oxides, Palagonite in the glass 9. Encrustations: Mn-coating (2 to 3 mm) 10. Comment: very similar to sample DR151-1A	X	X				10.58031/KIEL0264GRVD201		
SO307-151-1C	1. Rock Type: volcanic, altered 2. Size: 13 x 10 x 7 cm from Block A 3. Shape / Angularity: subrounded 4. Color of cut surface: brownish grey, orange 5. Texture / Vesicularity: vesicles (radial, elongated, 2,4 cm x 3 mm). Some alterations as samples before 6. Phenocrysts: Plg (5 x 2 mm, about 7%, altered), Ol (1%, 1 x 1 mm, completely altered) 7. Matrix: fine-grained, same as sample DR151-1B 8. Secondary Minerals: Calcite, Fe-oxides, palagonite (in the glass) 9. Encrustations: Mn-coating (2 to 3 mm) 10. Comment: -						10.58031/KIEL0264GRVD201		
SO307-151-1D	1. Rock Type: volcanic, altered 2. Size: 16 x 14 x 8 cm, from Block A 3. Shape / Angularity: subrounded 4. Color of cut surface: grey to orange 5. Texture / Vesicularity: vesicles (10%, up to 5 mm, some are elongated), aphyric 6. Phenocrysts: two pieces have Pl (2%, <9 mm) 7. Matrix: fine-grained with microlitic Pl 8. Secondary Minerals: some vesicles filled with clay 9. Encrustations: Mn-crust up to 3mm 10. Comment: several pieces of vesicular basalt, some with glassy (palagonised), chilled rims. Pieces are glued together by hard sediment						10.58031/KIEL0264GRVD201		
SO307-151-2	1. Rock Type: volcanic 2. Size: 13 x 10 x 8 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: grey, transitioning to orange at rim 5. Texture / Vesicularity: vesicles (10%, pipe shaped, up to 4 mm in diameter in a 3 cm band near the rim) 6. Phenocrysts: Pl (2%, up to 5 mm, most are very altered), additional phase (dark green to black, hexagonal, <1%, up to 1 mm, unclear what it is) 7. Matrix: fine-grained, microlitic Plg 8. Secondary Minerals: Calcite fills some of the vesicles 9. Encrustations: very thin Mn-crust in places 10. Comment: Pl-phyric basalt, clearly part of a pillow basalt due to the chilled margin and pipe vesicles						10.58031/KIEL0264GRVE201		
SO307-151-3	1. Rock Type: volcanic, moderately to heavily altered 2. Size: 18 x 16 x 6 cm 3. Shape / Angularity: subangular 4. Color of cut surface: mostly brown 5. Texture / Vesicularity: pipe vesicles in discrete places, phyric 6. Phenocrysts: Plg (2%, up to 10 mm) 7. Matrix: fine- grained with Plg microliths 8. Secondary Minerals: clay and calcite bind some of the fragments together 9. Encrustations: Mn-crust up to 4 mm in places 10. Comment: several fragments of lava with one piece consisting of hyalaclastite palagonised glass is abundant in places, moderately to heavily altered						10.58031/KIEL0264GRVF201		

SO307 Dredge Station Details and Rock Description

SO307-152

Western margin of Madagascar Ridge. Dredge up the upper slope

Dredge on bottom UTC, hrs, °N, °E, depth m	00:31	31°03,75'S	42°58,52'E	2020
Dredge off bottom UTC, hrs, °N, °E, depth m	01:24	31°03,81'S	42°58,80'E	1821

total volume: a few rocks

Comments: carbonates

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-152-1	1. Rock Type: sedimentary, carbonate 2. Size: 17 x 8 x 4 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: manilla, beige 5. Texture / Vesicularity: porosity (3%), secondary porosity due to bioturbation 6. Phenocrysts: - 7. Matrix: fine-grained, carbonatic 8. Secondary Minerals: Mn, CaCO3 minerals 9. Encrustations: partly thin Mn-coat 10. Comment: some voids due to bioturbation, biomictite (small bioclasts aggregated by calcareous matrix; bioclasts are forams, bivalves, gastropods). Unconsolidated sediment found on top is foraminiferal ooze.						10.58031/KIEL0264GRVH201		
SO307-152-2	1. Rock Type: sedimentary, carbonate 2. Size: 13 x 10 x 5 cm 3. Shape / Angularity: subrounded 4. Color of cut surface: manilla, whitish beige, some light brown specs 5. Texture / Vesicularity: porosity (5%), secondary porosity due to bioturbation and small cracks 6. Phenocrysts: 7. Matrix: fine-grained, carbonatic 8. Secondary Minerals: Mn, CaCO3 minerals 9. Encrustations: partly thin Mn-coat 10. Comment: some voids due to bioturbation, biomictite (small bioclasts aggregated by calcareous matrix; bioclasts are forams, bivalves, gastropods). Unconsolidated sediment found on top is foraminiferal ooze.						10.58031/KIEL0264GRVK201		

SO307-155

Seamount west of Madagascar Ridge, small cone on NE edge of seamount, NW-facing slope

Dredge on bottom UTC, hrs, °N, °E, depth m	15:49	31°26,006'S	42°48,669'E	2704
Dredge off bottom UTC, hrs, °N, °E, depth m	16:43	31°26,194'S	42°48,865'E	2373

total volume: 1 small rock

Comments:

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR155-1	1. Rock Type: volcaniclastic (tuff?), altered. 2. Size: 14 x 10 x 7 cm 3. Shape / Angularity: subangular 4. Color of cut surface: greenish grey 5. Texture / Vesicularity: massive, equigranular. 6. Phenocrysts: - 7. Matrix: Groundmass is composed mainly by elongated twinned crystals of yellowish pale color (about 65%, Fsp, maybe Pl). Dark crystals (mafic?) make up the rest 35% of the rock. These are very altered, some are elongated (Px?, Amph?) while others are smaller, rounder, and reddish (maybe Ol?). 8. Secondary Minerals: Fe-oxides, Mn in the outside. 9. Encrustations: Mn-coating 10. Comment: the rock is composed of mainly crystals (Fsp+mafic crystals), it is hard to classify without a thin section: maybe volcaniclastic, like a crystal-rich tuff.	X	X				10.58031/KIEL0264GRVN201		

SO307 Dredge Station Details and Rock Description

SO307-156

Seamount west of Madagascar Ridge, small cone on NE edge of seamount, ca.3 km S of DR155, W-facing slope

Dredge on bottom UTC, hrs, °N, °E, depth m	20:27	31°29,647'S	42°46,843'E	2319
Dredge off bottom UTC, hrs, °N, °E, depth m	21:18	31°29,88'S	42°46,88'E	1916

total volume: one sedmentary rock

Comments:

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR156-1	1. Rock Type: Mn-crust aggregating sedimentary fragments, altered 2. Size: 16 x 7 x 5 cm 3. Shape / Angularity: subangular 4. Color of cut surface:grey, tan 5. Texture / Vesicularity: 6. Phenocrysts: 7. Matrix: fine-grained, carbonatic, cementing bioclasts (micrite?) 8. Secondary Minerals: Mn-precipitates, CaCO3 minerals 9. Encrustations: Mn-crust, up to 5 mm 10. Comment: highly bioturbated, full of cracks filled with secondary minerals and muddy sediment						10.58031/KIEL0264GRVQ201		

SO307-DR157

Seamount west of western margin of Madgascar Ridge

Dredge on bottom UTC, hrs, °N, °E, depth m	02:12	31°34,376'S	42°42,902'E	2335
Dredge off bottom UTC, hrs, °N, °E, depth m	03:10	31°34,469'S	42°43,187'E	1943

total volume:

Comments:

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR157-1	1. Rock Type: volcanic, strongly altered, clasts from Mn-crust 2. Size: 28 x 17 x 11, small clasts were removed 3. Shape / Angularity: subrounded 4. Color of cut surface: brown-orange 5. Texture / Vesicularity: vesicular (20%, up to 1mm, rounded), partly filled with CaCO3, Mn and white to beige secondary minerals; fractures filled with Mn and CaCO3 6. Phenocrysts: pl (1%, < 1mm, moderately altered); ol? (strongly altered (Fe-oxidized) but could be also filled vesicles filled with Fe-oxides) 7. Matrix: fine-grained: strongly altered, Fe-oxidized 8. Secondary Minerals: Fe-oxides, Mn, CaCO3, white/beige secondary minerals, phosphorite 9. Encrustations: thick Mn-crust of up to 10cm (removed from clasts and taken as extra sample (-1-Mn), including mm to cm thick layers of phosphorite 10. Comment: one clast is 'fresher' compared to the other clasts which are strongly altered, vesicles are mainly filled with Mn, Fe-oxides, fractures are filled with Mn, matrix fully replaced by sec. minerals. The 'fresher' clast may be to small for GC but can be used for TS and is in the TS bag. The other clasts might be used for GC. A separate bag of extra clasts (strongly altered) is taken as sample -1 - extra clasts	X	X				10.58031/KIEL0264GRVS201		
SO307-DR157-1-Mn	1. Rock Type: Mn-crust 2. Size: 28 x 17 x 11 3. Shape / Angularity: rounded 4. Color of cut surface: / 5. Texture / Vesicularity: / 6.-10:/						10.58031/KIEL0264GRVS201		

SO307-DR161

Solitary seamount ca. 40nm west of the Madagascar Ridge margin, dredge up the upper southern slope

Dredge on bottom UTC, hrs, °N, °E, depth m	23:07	30°53,56'S	42°15,66'E	3358
Dredge off bottom UTC, hrs, °N, °E, depth m	00:02	30°53,49'S	42°15,87'E	3107

total volume: few rocks

Comments:

SO307 Dredge Station Details and Rock Description

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR161-1	1. Rock Type: volcanic 2. Size: 21 x 12 x 12 cm 3. Shape / Angularity: subangular 4. Color of cut surface: grey/brown 5. Texture / Vesicularity: aphyric 6. Phenocrysts: none 7. Matrix: fine to medium grained 8. Secondary Minerals: groundmass olivine replaced by iddingsite, Fe-oxide staining 9. Encrustations: 4 cm Mn-crust 10. Comment: moderate to highly altered aphyric basalt.	x	x	could maybe try groundmass but unlikely to be successful			10.58031/KIEL0264GRVU201		
SO307-DR161-2	1. Rock Type: volcanic 2. Size: 19 x 12 x 9 cm 3. Shape / Angularity: subangular 4. Color of cut surface: brown 5. Texture / Vesicularity: aphyric 6. Phenocrysts: none 7. Matrix: fine grained 8. Secondary Minerals: clay fills cracks 9. Encrustations: 10 mm Mn-crust 10. Comment: highly altered aphyric basalt, has a chilled margin but no fresh glass						10.58031/KIEL0264GRVV201		
SO307-DR161-3	1. Rock Type: volcanic 2. Size: 7 x 6 x 4 cm 3. Shape / Angularity:angular 4. Color of cut surface: brown 5. Texture / Vesicularity: vesicular (10%, up to 5 mm) aphyric 6. Phenocrysts: none 7. Matrix: fine grained 8. Secondary Minerals: 50% of vesicles filled with calcite, some cracks filled with clay 9. Encrustations: thin Mn-crust 10. Comment: highly altered vesicular basalt						10.58031/KIEL0264GRVW201		

SO307-DR163

Solitary seamount ca. 40nm west of the Madagascar Ridge margin, it's eastern slope twinned seamount, northern summit

Dredge on bottom UTC, hrs, °N, °E, depth m	08:53	30°52,48'S	42°28,51'E	3257
Dredge off bottom UTC, hrs, °N, °E, depth m	10:03	30°52,32'S	42°28,72'E	2970

total volume: Mn-Nodules

Comments: With rare fragments of basalts and hyaloclastites

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR163-1	1. Rock Type: volcanic, moderately altered 2. Size: 10x7x5 (from block A (39x24x18) 3. Shape / Angularity: angular 4. Color of cut surface: grey-brown 5. Texture / Vesicularity: vesicular (40%, ≤0,5mm, few bigger vesicles up to 4mm) rounded and some elongated, some filled with Fe-oxides, Mn, white sec.mineral, fractures (filled) 6. Phenocrysts: ol (3%; <o,5mm, replaced by iddingsite) 7. Matrix: fine-grained: pl 8. Secondary Minerals: Fe-oxides, Mn, white sec.mineral, iddingsite 9. Encrustations: thick Mn-crust of several cm: removed from sample 10. Comment:	X	X				10.58031/KIEL0264GRVY201		

SO307-DR163-2	1. Rock Type: volcanic, moderately altered 2. Size: 8x7x6 3. Shape / Angularity: angular 4. Color of cut surface: grey to brown-grey 5. Texture / Vesicularity: vesicular (40%, ≤0,5mm, rounded) partly filled with Fe-oxides, Mn, white sec.mineral, few bigger vesicles up to 3mm 6. Phenocrysts: Ol (3%, ≤0,5mm, replaced by iddingsite) 7. Matrix: fine grained: mod.altered: Px? Pl? 8. Secondary Minerals: Mn, Fe-oxides, Iddingsite, white sec.mineral 9. Encrustations: thick Mn-crust of several cm: removed from sample 10. Comment:						10.58031/KIEL0264GRVZ201		
SO307-DR163-3	1. Rock Type: Hyaloclastite, strongly altered 2. Size: 10x8x6 3. Shape / Angularity: angular & angular clasts 4. Color of cut surface: beige to orange 5. Texture / Vesicularity: some clasts are vesicular 6. Phenocrysts: none 7. Matrix: fine-grained: Phosphorite with Mn-fractures 8. Secondary Minerals: Mn, Phosphorite, Fe-oxides 9. Encrustations: Mn-crust (3cm): removed from sample 10. Comment:						10.58031/KIEL0264GRV2201		
SO307-DR163-4	1. Rock Type: Mn-nodule 2. Size: 14x13x10 3. Shape / Angularity: rounded, with angular clasts (Hylaloclastites similar to -3) 4. Color of cut surface: / 5. Texture / Vesicularity: / 6. Phenocrysts: / 7. Matrix: / 8. Secondary Minerals: / 9. Encrustations: / 10. Comment: /						10.58031/KIEL0264GRV3201		

SO307-164

Solitary seamount ca. 40nm west of the Madagascar Ridge margin, small parasitic cone at its flat top, NW slope

Dredge on bottom UTC, hrs, °N, °E, depth m 13:15 30°52,305'S 42°22,174'E 2759

Dredge off bottom UTC, hrs, °N, °E, depth m 14:12 30°52,484'S 42°22,414'E 2503

total volume: 2 blocks of Mn-crust

Comments:

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE
SO307-DR164-1	1. Rock Type: Mn-crust 2. Size: 10 x 9 x 9 cm, piece of block A (37 x 24 x 14 cm) 3. Shape / Angularity: subrounded 4. Color of cut surface: black 5. Texture / Vesicularity: porous 6. Phenocrysts: 7. Matrix: 8. Secondary Minerals: 9. Encrustations: 10. Comment: representative sample from the 2 Mn-crusts retrieved by the dredge						10.58031/KIEL0264GRV5201		

SO307-DR165

Solitary seamount ca. 40nm west of the Madagascar Ridge margin, small cone to the NW, NW-facing flank

Dredge on bottom UTC, hrs, °N, °E, depth m 18:19 30°46,633'S 42°10,801'E 3519

Dredge off bottom UTC, hrs, °N, °E, depth m 19:15 30°46,831'S 42°10,965'E 3254

total volume: 1/4 full

Comments: Mn-nodules, volcanic rocks within Mn crusts

SAMPLE #	SAMPLE DESCRIPTION	TS	CHEM	Ar/Ar	GI/MIN	SED	IGSN	NOTES	PICTURE

SO307 Dredge Station Details and Rock Description

SO307-DR165-1	1. Rock Type: volcanic, moderately altered 2. Size: 8 x 6 x 6 cm 3. Shape / Angularity: subangular 4. Color of cut surface: grey brownish 5. Texture / Vesicularity: massive, phyric, some fractures within the sample 6. Phenocrysts: pl (5%, 3mm x < 1mm, moderately altered, some glomeritic); ol (2%, < 1mm in diameter, replaced by iddingsite, some glomeritic) 7. Matrix: medium-grained, well crystallized: pl, ol and opaque minerals 8. Secondary Minerals: Fe-oxides, Mn, Phosphorite? fillings in the fractures 9. Encrustations: Mn-crust (1 cm) 10. Comment: freshest basalt lava from the dredge, clast found in Mn-nodule	X	X				10.58031/KIEL0264GRV7201		
SO307-DR165-2	1. Rock Type: volcanic, moderately altered 2. Size: 13 x 13 x 10 cm 3. Shape / Angularity: angular 4. Color of cut surface: grey-brownish 5. Texture / Vesicularity: massive, phyric, some fractures (filled with Mn, Phosphorite?) 6. Phenocrysts: pl (5%, up to 2mm, moderately altered, some glomeritic); ol (2%, up to 1mm, replaced by iddingsite, some glomeritic) 7. Matrix: medium-grained, pl, ol, px 8. Secondary Minerals: Fe-oxides, Mn, Phosphorite, Iddingsite 9. Encrustations: Mn-crust up to 2cm 10. Comment: similar to -1	X	X				10.58031/KIEL0264GRV8201		
SO307-DR165-3	1. Rock Type: volcanic, altered 2. Size: 8x 6 x 4 cm 3. Shape / Angularity: angular 4. Color of cut surface: grey-redish 5. Texture / Vesicularity: massive, phyric, fractured in the middle 6. Phenocrysts: pl (5%, 1mm x <1mm, moderatley altered); ol (<5%, 1mm in diameter, replaced by iddingsite) 7. Matrix: medium-grained, well crystallized: pl, ol and opaque microlits (Mt?, Px?) 8. Secondary Minerals: Fe-oxides, iddingsite, Mn 9. Encrustations: Mn-crust (1.5 cm) 10. Comment: similar to -1 and -2						10.58031/KIEL0264GRV9201		
SO307-DR165-4	1. Rock Type: volcanic, moderately altered 2. Size: 13 x 8 x 7 cm 3. Shape / Angularity: angular 4. Color of cut surface: grey-brownish 5. Texture / Vesicularity: massive but some vesicles? along the fractures (<1%, partly filled with secondary minerals), some fractures filled with Mn 6. Phenocrysts: pl (3%, up to 2mm, moderately altered); ol (3%, up to 2mm, replaced by iddingsite) 7. Matrix: medium-grained: pl, ol, px (moderately altered) 8. Secondary Minerals: Fe-oxides, Mn, Iddingsite 9. Encrustations: Mn-crust of several cm (removed from sample) 10. Comment: similar to -1 to -3						10.58031/KIEL0264GRWA201		
SO307-DR165-5	1. Rock Type: volcanic, moderately altered 2. Size: 5 x 6 x 3 cm 3. Shape / Angularity: subangular 4. Color of cut surface: grey-brownish 5. Texture / Vesicularity: massive (2 vesicles, rpunded, < 1mm, filled with phosphorite), phyric, fractures (filled with Mn, Fe-oxides, Phosphorite) 6. Phenocrysts: pl (3%, up to 2mm, slightly altered); ol (1%, up to 1mm, replaced by Iddingsite) 7. Matrix: medium-grained: pl, px, ol (moderately altered) 8. Secondary Minerals: Fe-oxides, Mn, Phosphorite, Iddingsite 9. Encrustations: Mn-crust (up to 1cm) 10. Comment: similar to -1 to -4 but pl-phenocrysts may be fresh enough for Ar/Ar-dating if enough material is available?			x?			10.58031/KIEL0264GRWB201		

10.2 CTD/Rosette Water Sampler Sensors

Sensor	Type	Calibration Date	Serial Number
CTD sonde	SBE 911+		SN 0485
CTD sensors:			
Conductivity	SBE4	31.10.2023	Primary: SN 4262
		08.03.2024	Secondary: SN 6339
Temperature	SBE3	10.11.2023	Primary: SN 6051
		06.03.2024	Secondary: SN 6843
Pressure		11.07.2023	SN 1535
Oxygen	SBE43	17.02.2024	Primary: SN 2811
		31.01.2024	Secondary: SN 2813
Fluorometer / Turbidity	WET Labs ECO-FLNTURTD	06.05.2024	SN 3332
PAR	LI-COR Biospherical	03.09.2024	SN 70549
Altimeter	Teledyne Benthos PSA-916	-	SN 78375

Table 10.2: Overview of CTD/Rosette Water Sampler sensors used during SO307.

10.3 Water Sampling Station List

	Stn ID	Date	Time	Latitude	Longitude	Sampling depth	Water depth
Nr.		2024	[UTC]	[°S]	[°E]	[m]	[m]
S1	SO307 1	09-14	23:30	28° 20,000'	041° 35,004'	744	4585
	SO307 2	09-15	01:49	28° 20,002'	041° 34,996'	4474	4585
	SO307 3	09-15	05:20	28° 19,970'	041° 35,001'	1978	4585
S2	SO307 8	09-16	13:40	29° 07,906'	044° 01,300'	1980	2436
	SO307 9	09-16	15:17	29° 07,908'	044° 01,296'	2000	2436
	SO307 10	09-16	16:48	29° 07,910'	044° 01,295'	1999	2436
	SO307 11	09-16	18:20	29° 07,909'	044° 01,299'	800	2436
S3	SO307 20	09-18	12:00	29° 41,253'	045° 51,472'	1900	2005
	SO307 21	09-18	13:47	29° 41,254'	045° 51,471'	800	2005
S7	SO307 39	09-22	11:56	28° 31,850'	049° 30,105'	1998	3876
	SO307 40	09-22	13:40	28° 31,847'	049° 30,095'	800	3876
S8	SO307 41	09-22	20:10	28° 04,941'	050° 14,909'	5000	5405
	SO307 42	09-22	23:58	28° 04,942'	050° 14,915'	800	5405
S6	SO307 49	09-24	15:20	29° 39,934'	049° 41,918'	799	4245
	SO307 50	09-24	16:28	29° 39,957'	049° 41,894'	2999	4245
S5	SO307 57	09-26	09:13	31° 10,078'	050° 54,956'	799	4818
	SO307 58	09-26	10:27	31° 10,076'	050° 54,974'	4000	4818
S9	SO307 59	09-27	06:06	33° 26,586'	048° 57,200'	799	4140
	SO307 60	09-27	07:13	33° 26,588'	048° 57,214'	3998	4140
	SO307 61	09-27	10:22	33° 26,586'	048° 57,204'	2002	4140
S11	SO307 66	09-29	05:05	37° 07,666'	046° 40,789'	800	3820
	SO307 67	09-29	06:10	37° 07,661'	046° 40,798'	3499	3820
S10	SO307 85	10-04	21:30	39° 08,982'	043° 27,631'	1999	2338
S12	SO307 105	10-09	15:16	34° 59,996'	046° 44,003'	802	4020
	SO307 106	10-09	16:22	35° 00,002'	046° 44,007'	3989	4020
	SO307 107	10-09	19:21	34° 59,996'	046° 44,006'	2002	4020
S13	SO307 119	10-12	19:02	35° 05,019'	044° 25,079'	2500	2646
S14	SO307 130	10-15	02:41	33° 46,185'	043° 24,408'	2502	2594
	SO307 131	10-15	05:00	33° 46,176'	043° 24,386'	2001	2594
S16	SO307 148	10-20	07:46	30° 35,014'	042° 54,008'	800	3924
	SO307 149	10-20	08:54	30° 35,016'	042° 54,012'	3891	3924
	SO307 150	10-20	11:58	30° 35,016'	042° 54,005'	2002	3924
S15	SO307 159	10-22	09:34	31° 30,037'	042° 33,632'	800	3832
	SO307 160	10-22	10:46	31° 30,103'	042° 33,528'	3001	3832

Table 10.3: Detailed overview of CTD/RO (including UVP5) deployments for the biogeochemical and microbiological work during SO307.

Appendix 10.4 Biological Sampling list

SO307 Biological Samples 12.9.2024 - 28.10.2024

Abbreviations: n = number of collected specimens, FIX = fixation, F = Formalin, EtOH = 100 % pure Ethanol, Glu = 2.5 % Glutaraldehyde/PB-buffered, RNA=RNALater, PFA=paraformaldehyde. gDr = geological dredge, TVG = TV grab, MUC = TV-multicorer, PD = Petri dish, TOC = total organic carbon, TC=total carbon
The numbers 2, 5, 50, 100, 200, 500 and 1000 refer to the size of the vials in ml, WP= Whirl Pack, OT=Orange Tube, LC=Large Cryotube
Fixation of meiofauna from sediment traps as 1 vol sediment : 1 vol 6 % formaldehyde

SO307 - MUC4 : Deep sea plain W off Madagascar Ridge

MUC on bottom: 15/09/2024, UTC, lat, long, depth (m)		12:38	28°33,61'S	42°17,95' E	4612
MUC off bottom: 15/09/2024, UTC, lat, long, depth (m)		12:40	28°33,61'S	42°17,95' E	4612
total volume:	9 tubes,full, ca. 40cm sediment				
Comments:	thick, fine-grained clayish material				
MUC, sediment					

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	8							x		F	
ToC-sediment		1								x	dry	upper 5cm of tube dried at 90°C overnight

SO307 - DR6: NW rim of Madagascar Ridge, same as DR5, 400m W of DR5

Dredge on bottom: 16/09/2024, UTC, lat, long, depth (m)		4:09	29°07,17' S	43°33,11' E	3987
Dredge off bottom: 16/09/2024, UTC, lat, long, depth (m)		5:03	29°07,43' S	43°33,36' E	3783
total volume:	empty				
Comments:	ca. 450g sediment				
gDR, sediment					

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1							x		F	from sediment traps

SO307 - DR7: NW part of Madagascar Ridge, small nose along a gentle slope

Dredge on bottom: 16/09/2024, UTC, lat, long, depth (m)		11:03	29°10,15'S	43°52,29'E	2802
Dredge off bottom: 16/09/2024, UTC, lat, long, depth (m)		11:29	29°10,29'S	43°52,13'E	2693
total volume: few rocks					
Comments: few small carbonates and corals					
gDR, macrofauna					

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Macrofauna	Octocorallia	>10						x			F	Bamboo-corals, Isididae
	Octocorallia	2			x						EtOH	Bamboo-corals, Isididae
	Octocorallia	>5			x						EtOH	Bamboo-corals, Isididae

SO307 - MUC14:

MUC on bottom: 17/09/2024, UTC, lat, long, depth (m)		8:34	29°09,98'S	44°24,97'E	2407
MUC off bottom: 17/09/2024, UTC, lat, long, depth (m)		8:36	29°09,98'S	44°24,97'E	2407
total volume:	9 tubes, 1/3 full				
Comments:	yellowish, clay like				
MUC, sediment					

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna		8							x		FIX	
ToC sediment		1								1	dry	upper 5cm of tube dried at 90°C overnight

SO307- DR 16: Southwestern flank of NW-SE elongated structure. Dredge track from lower portion of the flank around 500m to NW

Dredge on bottom: 17/09/2024, UTC, lat, long, depth (m) 19:44 29°20,31'S 45°16,40'E 2927

Dredge off bottom: 17/09/2024, UTC, lat, long, depth (m) 20:42 29°20,09'S 45°16,30'E 2673

total volume: 1/4 full

Comments: Abundant Mn crusts and nodules with fragments of aphyric and rare plag porphyritic basalts

gDR, sediment, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1							x		F	from sediment traps
Macrofauna	Porifera	1	x								EtOH	cushion-like, many spiny spicules, yellowish
	Porifera	2	x								EtOH	hexactinellids?, encrusting
	Porifera	>10	x								EtOH	tubes made of foram shells with spines, pieces
	Cnidaria	1	x								EtOH	Scyphozoa, Coronatae
	Porifera	1	x								EtOH	hexactinellid, erect
	Bryozoa	1	x								EtOH	branched colony
	Bryozoa	1	x								EtOH	branched colony
	Bryozoa	>5	x								EtOH	erect, stick-like
	Bryozoa	4	x								EtOH	erect, stick-like, tower-like
	Bryozoa	1	x								EtOH	branched colony, tree-like
	Bryozoa	3	x								EtOH	erect colony, unbranched
	Bryozoa	1	x								EtOH	trunk-like
	Ophiuroidea	1	x								EtOH	central plate with 5 tips, star-like
	Echinoidea	1	x								EtOH	tiny sea urchin, juvenile?

SO307 - DR17: Central part of Madagascar Ridge

Dredge on bottom: 18/09/2024, UTC, lat, long, depth (m) 2:02 29°25,07'S 45°41,45'E 2430

Dredge off bottom: 18/09/2024, UTC, lat, long, depth (m) 2:54 29°24,94'S 45°41,74'E 2130

total volume: 4 rock samples

Comments: sedimentary rocks

gDR, sediment , macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1							x		F	from sediment traps
Macrofauna	Cnidaria	1					x				F	Hydrozoa, Sertulariidae?, large, branched colony

SO307 - DR18: Central part of Madagascar Ridge

Dredge on bottom: 18/09/2024, UTC, lat, long, depth (m) 5:09 29°29,50'S 45°41,73'E 2321

Dredge off bottom: 18/09/2024, UTC, lat, long, depth (m) 6:01 29°29,30'S 45°41,97'E 2003

total volume: several rocks and a sponge

Comments: pillow fragments, lava blocks. There is 2 groups of samples: 1) is Ol-aphyric lavas that are likely from the base stratigraphically and belong to a shield stage (Thol?); 2) vesicular aphyric lavas that belong to shallower stratigraphic levels, look more alkaline than the previous group

gDR, sediment, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1							x		F	from sediment traps
Macrofauna	Porifera	3	x								EtOH	net-like small hexactinellids
	Porifera	1	x								EtOH	Stalked, with broad foot, carnivorous?
	Porifera	1	x								EtOH	on matrix, hexactinellid
	Porifera	1	x								EtOH	carnivorous, flower-like "head", *Asbestopluma*
	Porifera	1	x								EtOH	
	Porifera?	1	x								EtOH	consists of "tentacles",
	Porifera	1	x								EtOH	
	Anthozoa?	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1						x			F	ball-like, size of a fist

SO307 - DR 19: Central part of Madagascar Ridge

Dredge on bottom: 18/09/2024, UTC, lat, long, depth (m)	8:16	29°26,614'S	45°41,887'E	2131	
Dredge off bottom: 18/09/2024, UTC, lat, long, depth (m)	9:08	29°26,534'S	45°42,117'E	1738	
total volume: total volume: one rock, some biology					
Comments: none					
gDR, sediment, macrofauna					

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1							x		F	from sediment traps
Macrofauna	Porifera	>10								x	dry	Hexactinellida,
	Cnidaria, Actiniaria	1									F	*Phelliactis* sp.
	Cnidaria, Actiniaria	>5	x								EtOH	same as above: orange gonads for DNA

SO307 - DR 22: Central part of Madagascar Ridge, same seamount as DR19

Dredge on bottom: 18/09/2024, UTC, lat, long, depth (m)	17:21	29°41,15' S	45°53,38' E	2298	
Dredge off bottom: 18/09/2024, UTC, lat, long, depth (m)	18:01	29°40,99' S	45°53,32' E	2133	
total volume:	empty				
Comments:					
gDR, sediment					

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted							x				from sediment traps

SO307 - DR 23: same as DR 22, at lower south eastern flank

Dredge on bottom: 18/09/2024, UTC, lat, long, depth (m)	20:37	29°38,31' S	45°57,26' E	1994	
Dredge off bottom: 18/09/2024, UTC, lat, long, depth (m)	21:28	29°38,01' S	45°57,19' E	1883	
total volume:	empty				
Comments:					
gDR, sediment					

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1							x		F	from sediment traps

SO307 - DR 24: Central part of Madagascar Ridge. Large seamount south-facing slope, middle to upper part of the slope.

Dredge on bottom: 18/09/2024, UTC, lat, long, depth (m)	23:10	29°37,57'S	45°57,95'E	1806	
Dredge off bottom: 19/09/2024, UTC, lat, long, depth (m)	0:19	29°37,41'S	45°57,76'E	1480	
total volume:	7 volcanic rocks				
Comments:					
gDR, macrofauna					

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Macrofauna	Cnidaria	2					x				F	*Dendrophyllia*, eroded, with manganese
	Tunicata	1	x								EtOH	

SO307 - DR 25: Central Madagascar Ridge, large seamount, S facing slope

Dredge on bottom: 19/09/2024, UTC, lat, long, depth (m)	2:24	29°38,04' S	45°57,94' E	2099	
Dredge off bottom: 19/09/2024, UTC, lat, long, depth (m)	3:17	29°37,79' S	45°57,91' E	1837	
total volume:	empty				
Comments:					
gDR, sediment					

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1							x		F	from sediment traps

SO307 - DR 26: Central Madagascar Ridge, Southern Seamount, SE flank

Dredge on bottom: 19/09/2024, UTC, lat, long, depth (m) 9:10 30°07,15'S 46°01,22'E 1401
Dredge off bottom: 19/09/2024, UTC, lat, long, depth (m) 10:15 30°06,98'S 46°01,08'E 992
total volume: few rocks
Comments: dense basalt,coral
gDR, sediment, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1						x			F	from sediment traps
Macrofauna	Porifera	9			x						EtOH	pieces of a flat yellowish sponge
	Porifera	1			x						F	coral-like upright sponge, grey
	Porifera	2		x							EtOH	branch of coral-like sponge
	Cnidaria	1								x	dry	Octocorallia, stem
	Cnidaria	>5								x	dry	*Dendrophyllia*, eroded, with manganese
	Cnidaria	1						x			F	Octocorallia, Isididae, large, orange polyps, photo
	Cnidaria	1		x							EtOH	same as above
	Cnidaria	1					x				F	Octorallia, Isididae, very delicate, pink polyps
	Cnidaria	2		x							EtOH	same as above
	Bryozoa	1	x								EtOH	small branched, tree trunk-like

SO307 - DR 28: Madagascar Ridge, southern seamount at central northern part, 2 nm north of DR 27

Dredge on bottom: 19/09/2024, UTC, lat, long, depth (m) 15:28 30° 02,693' S 046° 03,567' E 1510.0
Dredge off bottom: 19/09/2024, UTC, lat, long, depth (m) 16:15 30° 02,525' S 046° 03,402' E 1260.5
total volume: empty
Comments:
gDR, sediment

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1						x			F	from sediment traps

SO307 - DR 29: Madagascar ridge same seamount as DR28; dredge location about 2 nm north of DR28 up the flank

Dredge on bottom: 19/09/2024, UTC, lat, long, depth (m) 17:51 30°00,39'S 46°03,07'E 1502
Dredge off bottom: 19/09/2024, UTC, lat, long, depth (m) 18:41 30°00,02'S 46°03,05'E 1206
total volume: few rocks
Comments:one large fragment of Plag-phyric pillow lava with quenched margin. No glass preserved
gDR, sediment, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1							x		F	from sediment traps

SO307 - MUC32:

MUC on bottom: 20/09/2024, UTC, lat, long, depth (m) 5:57 29°40,58'S 46°14,56'E 2207
MUC off bottom: 20/09/2024, UTC, lat, long, depth (m) 5:59 29°40,58'S 46°14,56'E 2207
total volume:
Comments: 9 tubes 1/3 full
MUC, sediment

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	8							x		F	from MUC tubes
ToC-sediment		1								x	dry	upper 5cm of tube dried at 90°C overnight
Macrofauna	Mollusca	1	x								EtOH	empty gastropod shell, filled with forams
	Crustacea	1	x								EtOH	Paguridae, in encrusted gastropod shell
	Echinodermata	1	x								EtOH	Ophiuroidea with erected disc, Ophiohelidae

SO307 - DR 33: Eastern rim of Madagascar ridge, lowest part of the plateau slope; NE facing slope

Dredge on bottom: 21/09/2024, UTC, lat, long, depth (m) 4:39 28°04,50'S 049°18,60'E 4308
Dredge off bottom: 21/09/2024, UTC, lat, long, depth (m) 5:34 28°04,69'S 049°18,43'E 3916
total volume: 1 rock
Comments:
gDR, sediment

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1						x			F	from sediment traps

SO307 - DR 34: Eastern flank of Madagascar Ridge; repeat of DR33 at slightly more westerly dredge direction

Dredge on bottom: 21/09/2024, UTC, lat, long, depth (m) 8:50 28°04,56'S 49°18,66'E 4320
Dredge off bottom: 21/09/2024, UTC, lat, long, depth (m) 9:53 28°04,58'S 49°18,38'E 3916
total volume: *total volume: Few small Mn-crusted pebbles*
Comments:
gDR, sediment

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1							x		F	from sediment traps

SO307 - DR 35: Eastern flank of Madagascar Ridge; middle part of NE-facing plateau slope

Dredge on bottom: 21/09/2024, UTC, lat, long, depth (m) 12:51 28°05,03'S 49°18,26'E 3791
Dredge off bottom: 21/09/2024, UTC, lat, long, depth (m) 13:45 28°04,88'S 49°18,05'E 3443
total volume: ca. 1/4 full
Comments:
gDR, sediment, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1							x		F	from sediment traps
Macrofauna	Porifera	>5	x								EtOH	pieces of the same animal
	Porifera	1	x								EtOH	glass sponge?
	Polychaeta	1	x								EtOH	Terebellidae? In tube consisting of forams
	Brachiopoda	1	x								EtOH	*Pelagodiscus atlanticus*

SO307 - DR 36: Eastern flank of Madagascar Ridge; upper part of NE-facing slope

Dredge on bottom: 21/09/2024, UTC, lat, long, depth (m) 16:50 28°04,50'S 049°17,27'E 3276
Dredge off bottom: 21/09/2024, UTC, lat, long, depth (m) 18:00 28°04,83'S 049°17,27'E 2882
total volume: ca. 1/4 full
Comments: mainly igneous, some volcaniclastics, one huge block of mudstone and some fossiliferous carbonates.
gDR, sediment

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1						x			FIX	from sediment traps

SO307 - DR 37: Eastern flank of Madagascar Ridge; middle part of the slope, northern flank of collapsed slope

Dredge on bottom: 22/09/2024, UTC, lat, long, depth (m) 0:06 28°17,27'S 049°21,17'E 3612
Dredge off bottom: 22/09/2024, UTC, lat, long, depth (m) 0:53 28°17,44'S 049°21,17'E 3420
total volume: few rocks
Comments:
gDR, sediment

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1						x			F	from sediment traps

SO307 - DR 38: Eastern flank of Madagascar Ridge; Ne-facing slope, central part at a small edge

Dredge on bottom: 22/09/2024, UTC, lat, long, depth (m) 9:35 28°31,63'S 49°30,01'E 4067
Dredge off bottom: 22/09/2024, UTC, lat, long, depth (m) 10:31 28°31,85'S 49°30,11'E 3894
total volume: few rocks
Comments: All calcareous, all very similar
gDR, sediment

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	2						x	x		F	from sediment traps

SO307 - MUC 44:

MUC on bottom: 23/09/2024, UTC, lat, long, depth (m) 5:57 28°04,93'S 50°14,91E 5391
MUC off bottom: 23/09/2024, UTC, lat, long, depth (m) 6:02 28°04,93'S 50°14,91E 5391
total volume: 11 tubes full (10-15 cm), 1 didn't close
Comments: very soft, reddish fine sediment
MUC, sediment

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	9							x		F	from MUC tubes
ToC sediment		1								x	dry	upper 5cm of tube dried at 90°C overnight

SO307 - DR 46: Northern flank of seamount NE off eastern slope of Madagascar Ridge

Dredge on bottom: 23/09/2024, UTC, lat, long, depth (m) 15:12 28°03,12'S 50°01,09'E 4457
Dredge off bottom: 23/09/2024, UTC, lat, long, depth (m) 16:30 28°03,47'S 50°01,02'E 3888
total volume: few rocks, all Mn-crust
Comments:
gDR, sediment

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1							x		F	from sediment traps

SO307 - DR 48: East of Madagascar Ridge, small elongated structure, NNW-facing slope

Dredge on bottom: 24/09/2024, UTC, lat, long, depth (m) 10:07 29°13,86'S 49°45,59'E 4388
Dredge off bottom: 24/09/2024, UTC, lat, long, depth (m) 11:02 29°14,11'S 49°45,61'E 4041
total volume: few rocks, thickly Mn-encrusted igneous rocks, Mn-nodules, calcareous sediment
Comments:
gDR, sediment

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1						x			F	from sediment traps

SO307 - DR 51: Seamount ca. 30 nm south of NE cliff the Madagascar Ridge, dredge up SE flank

Dredge on bottom: 24/09/2024, UTC, lat, long, depth (m) 20:13 29°36,54'S 49°43,51'E 3076
Dredge off bottom: 24/09/2024, UTC, lat, long, depth (m) 21:12 29°36,28'S 49°43,40'E 2680
total volume: 1/3 full; rounded boulders with thick Mn-crusts, volcanic rocks inside, some pillow basalts, Mn-crusts; Ol-Pl phyric basalts, pillow lavas, slightly altered but glass not preserved
Comments:
gDR, sediment

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1							x		F	from sediment traps

SO307 - DR 52: Seamount ca 30 nm south of NE cliff of the Madagascar Ridge, dredge up northern flank

Dredge on bottom: 25/09/2024, UTC, lat, long, depth (m) 0:10 29°34,33'S 49°42,97E 2910
Dredge off bottom: 25/09/2024, UTC, lat, long, depth (m) 0:58 29°34,54'S 49°43,00'E 2640
total volume: 1 small Mn-crust
Comments:
gDR, sediment, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1							x		F	from sediment traps
Macrofauna	Porifera	1						x			EtOH	Hexactinellidae

SO307 - MUC 53:

MUC on bottom: 25/09/2024, UTC, lat, long, depth (m) 12:25 30°34,90'S 50°34,90'E 4994
MUC off bottom: 25/09/2024, UTC, lat, long, depth (m) 12:29 30°34,90'S 50°34,90'E 4994
total volume: full
Comments:
gDR, sediment

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	11							x		F	from MUC tubes
ToC sediment		1								x	dry	upper 5cm of tube dried at 90°C overnight

SO307 - DR 54: Large composite seamount 100nm south SE of DR 52

Dredge on bottom: 25/09/2024, UTC, lat, long, depth (m) 17:34 30°48,63' S 51°05,95' E 3253
Dredge off bottom: 25/09/2024, UTC, lat, long, depth (m) 19:31 30°48,51' S 51°05,92' E 3101
total volume: few rocks, few corals
Comments: 1 big crust of pillow basalts
gDR, sediment, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1							x		F	from sediment traps
Macrofauna	Porifera	1	x								EtOH	
	Cnidaria	1	x								EtOH	

SO307 - DR 55: seamount east of Madagascar Ridge, same seamount as DR54, NE of DR54, SW facing flank

Dredge on bottom: 25/09/2024, UTC, lat, long, depth (m) 22:13 30°47,42'S 51°07,18'E 2995
Dredge off bottom: 25/09/2024, UTC, lat, long, depth (m) 23:08 30°47,14'S 51°07,06'E 2789
total volume: few large rocks
comments: Mn-encrusted tuff blocks
gDR, sediment, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1							x		F	from sediment traps
Macrofauna	Porifera	1	x								EtOH	Lithistidae
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Cnidaria	1	x								EtOH	Coronata
	Polychaeta	1	x								EtOH	
	Polychaeta	1	x								EtOH	

SO307 - DR 56: isolated seamount 100 nm SE from plateau edge, small plateau E of main edifice, S facing flank of the plateau

Dredge on bottom: 26/09/2024, UTC, lat, long, depth (m) 3:27 30°45,22'S 51°12,78'E 4208
Dredge off bottom: 26/09/2024, UTC, lat, long, depth (m) 4:29 30°44,97'S 51°12,67'E 3830
total volume: few rocks
Comments: basalts, some with glass (fresh?) and Mn crusts
gDR, sediment

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1							x		F	from sediment traps

SO307 - MUC 62:

MUC on bottom: 27/09/2024, UTC, lat, long, depth (m) 13:12 33°26, 60'S 48°57,21'E 4140
MUC off bottom: 27/09/2024, UTC, lat, long, depth (m) 13:16 33°26, 60'S 48°57,21'E 4140
total volume: 11 tubes full
Comments: ca. 30 cm sediment, 1 tube lost
MUC, sediment

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	10							x		F	from MUC tubes
ToC sediment		1								x	dry	upper 5cm of tube dried at 90°C overnight

SO307 - DR 63: Northern ridge-structure at the northern end of the Indomet fracture zone. Dredge up the middle slope.

Dredge on bottom: 28/09/2024, UTC, lat, long, depth (m) 11:08 35°47,85' S 46°50,04' E 3224
Dredge off bottom: 28/09/2024, UTC, lat, long, depth (m) 11:54 35° 48,03' S 46°50,05' E 3018
total volume: few rocks
Comments: metamorphozed basalts
gDR, sediment, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1							x		F	from sediment traps
Macrofauna	Cnidaria	1	x								EtOH	*coronata*
	Polychaeta	1	x								EtOH	

SO307 - DR 64: fracture zone trending N-S at ist northern end, uplifted block, west facing slope, lower part

Dredge on bottom: 28/09/2024, UTC, lat, long, depth (m) 14:47 35°45,94' S 46°50,09' E 3802
Dredge off bottom: 28/09/2024, UTC, lat, long, depth (m) 15:46 35°45,63' S 46°50,09' E 3498
total volume: few rocks
Comments: basalts
gDR, sediment, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1							x		F	from sediment traps
Macrofauna	Polychaeta	2	x								EtOH	Maldanidae

SO307 - DR 65: N part of indomed FZ, tilted block facing east, southern flank of the block facing south

Dredge on bottom: 28/09/2024, UTC, lat, long, depth (m) 19:26 35°55,37' S 46°51,15' E 3818
Dredge off bottom: 28/09/2024, UTC, lat, long, depth (m) 20:20 35°55,13' S 46°51,14' E 3496
total volume: 1 large rock and two manganese nodules
Comments:
gDR, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Macrofauna	Bryozoa	1	x								EtOH	branched, tree-like

SO307 - DR 68: Indomed fracture zone, north flank of E-W trending ridge

Dredge on bottom: 29/09/2024, UTC, lat, long, depth (m)
Dredge off bottom: 29/09/2024, UTC, lat, long, depth (m)
total volume: empty
Comments:
gDR, sediment

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1							x		F	from sediment traps

SO307 - DR 69: Indomed fracture zone - central area; similar ridge as DR 68, south-facing flank

Dredge on bottom: 29/09/2024, UTC, lat, long, depth (m) 15:12 37°11,02' S 46°41,28' E 4238
Dredge off bottom: 29/09/2024, UTC, lat, long, depth (m) 16:16 37°10,78' S 46°41,25' E 3919
total volume: few rocks
Comments: pillow lavas
gDR, sediment, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1							x		F	from sediment traps
Macrofauna	Porifera	1	x								EtOH	
	Cnidaria	1	x								EtOH	
	?	1	x								EtOH	

SO307 - DR 70: Indomed fracture zone, western steep wall, eastern facing slope, lower part

Dredge on bottom: 29/09/2024, UTC, lat, long, depth (m) 21:15 37°16,08' S 46°33,45' E 4246
Dredge off bottom: 29/09/2024, UTC, lat, long, depth (m) 22:28 37°16,09' S 46°33,38' E 4207
total volume: few rocks
Comments: pillow lavas
gDR, sediment

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1						x			F	from sediment traps

SO307 - DR 74: Southern Indomed fracture zone, lower part of protruding nose

Dredge on bottom: 01/10/2024, UTC, lat, long, depth (m) 3:01 38°21,99' S 46°15,45' E 4499
Dredge off bottom: 01/10/2024, UTC, lat, long, depth (m) 3:54 38°21,91' S 46°15,09' E 4273
total volume:
Comments:
gDR, sediment

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	2						x	x		F	from sediment traps

SO307 - DR 75: Northern part of Indomed fracture zone, E facing slope

Dredge on bottom: 01/10/2024, UTC, lat, long, depth (m) 7:14 38°23,64' S 46°13,24' E 3886
Dredge off bottom: 01/10/2024, UTC, lat, long, depth (m) 9:28 38°23,62' S 46°12,68' E 3277
total volume: empty
Comments:
gDR, sediment

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1							x		F	from sediment traps

SO233 - MUC 76:

Dredge on bottom: 01/10/2024, UTC, lat, long, depth (m) 13:44 38°27,30' S 46°15,13' E 4666
Dredge off bottom: 01/10/2024, UTC, lat, long, depth (m) 13:49 38°27,30' S 46°15,13' E 4658 8 m difference?
total volume: tubes empty, 1 tube lost (same as 62?)
Comments: empty tube holder distorted
MUC, just two spoons of sediment

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
ToC-sediment											dry	small amount dried at 90° C overnight

SO307 - DR 77: Southern Indomed fracture zone, 20 nm from SWIR

Dredge on bottom: 01/10/2024, UTC, lat, long, depth (m) 18:15 38° 28,94' S 046° 12,00' E 3387
Dredge off bottom: 01/10/2024, UTC, lat, long, depth (m) 19:12 38° 28,97' S 046° 11,73' E 3102
total volume: empty
Comments: few Mn-crust pieces in sediment traps
gDR, sediment

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1							x		F	from sediment traps

SO307 - DR 79: Small topographic high W of Indomed fracture zone

Dredge on bottom: 02/10/2024, UTC, lat, long, depth (m) 11:23 39° 02,17' S 045° 05,34' E 3547
Dredge off bottom: 02/10/2024, UTC, lat, long, depth (m) 12:18 39° 02,07' S 045° 05,06' E 3343
total volume: empty
Comments:
gDR, sediment

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1							x		F	from sediment traps

SO307 - DR 80: Southern Segment of Discovery II Fracture Zone

Dredge on bottom: 03/10/2024, UTC, lat, long, depth (m) 6:45 39° 58,352' S 043° 04,368' E 1530.4
Dredge off bottom: 03/10/2024, UTC, lat, long, depth (m) 8:13 39° 58,308' S 043° 04,008' E 1263.1
total volume: 1/3 full
Comments: volcanic rocks, volcaniclastic rocks, breccias
gDR, sediment, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1							x		F	from sediment traps
Macrofauna	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Bivalvia	1	x								EtOH	
	Porifera	1	x								EtOH	
	Polychaeta	2	x								EtOH	pieces of same animal
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Polychaeta	1	x								EtOH	tube
	Cnidaria?	1	x								EtOH	maybe Bryozoa?
	Cnidaria	1	x								EtOH	tree-like
	Porifera	3	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
		1	x									individual autozooids losely connected; still attached to piece of rock
	Bryozoa										EtOH	
	Bryozoa	1		x							EtOH	Tree-like
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	encrusting on rock
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Polychaeta	1	x								EtOH	still in tube
	Bryozoa	1	x								EtOH	
	Bryozoa	1	x								EtOH	
	Porifera	1	x								EtOH	
	Bryozoa	1	x								EtOH	
	Cnidaria	3	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
		3	x									encrusting on rock; pieces of same animal
	Porifera										EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	2	x								EtOH	
	Porifera	1	x								EtOH	
	Bivalvia	1	x								EtOH	
	Bryozoa	1	x								EtOH	
	Porifera	1	x								EtOH	
	Crustacea	1			x						EtOH	Paguridae
	Porifera	1			x						EtOH	
	Polyplacophora	1	x								EtOH	
	Cnidaria	1	x								EtOH	
	Cnidaria	1	x								EtOH	Coronata
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Bivalvia	1	x								EtOH	
	Porifera	1	x								EtOH	
	Bryozoa	1	x								EtOH	
	Porifera	1	x								EtOH	
	Polychaeta	1	x								EtOH	
	Crustacea	1	x								EtOH	incl. Tube
	Bryozoa	1	x								EtOH	branching, coral-like
	Cnidaria	1	x								EtOH	Coronata
	Porifera	1	x								EtOH	

	Polychaeta	1	x								EtOH	Sponge on tube
		2	x									pieces of same animal;
	Polychaeta										EtOH	long, slender tube
	Crustacea	1	x								EtOH	inside tube
	?	2	x								EtOH	tissue, white, 2 pieces

SO307 - DR 81: Southern Discovery II Fracture Zone, eastern wall, irregular slope

Dredge on bottom: 03/10/2024, UTC, lat, long, depth (m) 11:11 40° 05,46' S 043° 02,83' E 2207

Dredge off bottom: 03/10/2024, UTC, lat, long, depth (m) 12:13 40° 05,31' S 043° 02,47' E 1914

total volume: few rocks

Comments: volcanic rocks and carbonates

gDR, sediment, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1							x		F	from sediment traps
Macrofauna	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x		x						EtOH	
	Porifera	1	x								EtOH	
	Porifera	3	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1		x							EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	Hexactinellida
	Porifera	1	x								EtOH	
	Porifera	4	x								EtOH	
	Porifera	1	x								EtOH	Hexactinellida
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	Hexactinellida
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Cnidaria	1	x								EtOH	Octocoralia
	Cnidaria	1	x								EtOH	Hexacorallia
	Cnidaria	1	x								EtOH	Actiniaria
	Cnidaria	7	x								EtOH	Octocorallia
	Mollusca	1	x								EtOH	Bivalvia
	Bryozoa	1	x								EtOH	colony on hexactinellid sponge
	Bryozoa	1	x								EtOH	Ctenostomata, calcified
	Bryozoa	1	x								EtOH	encrusting, blue
	Bryozoa	1	x								EtOH	tree-like
	Bryozoa	1	x								EtOH	tree, glassy, spiny
	Bryozoa	1	x								EtOH	
	Bryozoa	1	x								EtOH	encrusting
	Bryozoa	1	x								EtOH	erect, bifurcate, calcitic
	Polychaeta	1	x								EtOH	in tube
	Polychaeta	1	x								EtOH	Serpulida
	Polychaeta	1	x								EtOH	with tube
	Polychaeta	1	x								EtOH	Polynoida, Aphroditidae
	Echinodermata	1			x						EtOH	Asteroidea
	Echinodermata	1			x						EtOH	Ophiuroidea
	Porifera	1			x						EtOH	Hexactinellida
	Porifera	1			x						EtOH	
	Porifera	1			x						EtOH	
	Bryozoa	1			x						EtOH	
	Bryozoa?	1	x								EtOH	
	Porifera	1	x								EtOH	
	Bivalvia	1	x								EtOH	translucent
	Bryozoa	1	x								EtOH	calcific
	Porifera	1	x								EtOH	

SO307 - DR 82: Discovery II fracture zone, southern part of the fracture zone. Large crustal block, eastern flank.

Dredge on bottom: 04/10/2024, UTC, lat, long, depth (m) 11:40 39° 23,48' S 043° 13,14' E 2617

Dredge off bottom: 04/10/2024, UTC, lat, long, depth (m) 12:42 39° 23,36' S 043° 12,88' E 2317

total volume: full

Comments: pillow lavas, dolerites, Mn-crusts, tuffs, consolidated sediments

gDR, sediment, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1							x		F	from sediment traps
Macrofauna	Brachiopoda	2	x								EtOH	*Valdiviathyris?*
	Mollusca	1		x							EtOH	Solenogastres
	Solenogastres?	1	x								EtOH	
	Bryozoa	1	x								EtOH	calcific
	Cnidaria	1	x								EtOH	tree-like
	Bryozoa	1	x								EtOH	
	Porifera	2	x								EtOH	pieces of same animal
	Cnidaria	1	x								EtOH	Coronata
	Cnidaria	1	x								EtOH	Coronata
	Cnidaria	2	x								EtOH	Coronata
	Polychaeta	1	x								EtOH	in tube
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Cnidaria	1	x								EtOH	Coronata
	Bryozoa	1	x								EtOH	Calcific
	Bryozoa	1	x								EtOH	Calcific
	Cnidaria	1	x								EtOH	Octocorallia
	Porifera	1	x								EtOH	
	Polychaeta	3	x								EtOH	
	Porifera	1	x								EtOH	brush-like
	Polychaeta	1	x								EtOH	
	Cnidaria	1	x								EtOH	Actiniaria
	Brachiopoda	6	x								EtOH	*Valdiviathyris?*
	Porifera	1	x								EtOH	
	Cnidaria	1	x								EtOH	Coronata
	Porifera	1	x								EtOH	
	Bryozoa	3	x								EtOH	erect Ctenostomata
	Bryozoa	1	x								EtOH	delicate, branched
	Bryozoa	1	x								EtOH	branched
	Bryozoa	3	x								EtOH	tree-like, ctenostome
	Bryozoa	1	x								EtOH	tree-like
	?	1	x								EtOH	Annelida?

SO307 - DR 83: central segment of western wall of Discovery II fracture zone, slope at western wall (near the top)

Dredge on bottom: 04/10/2024, UTC, lat, long, depth (m) 16:01 39° 11,01' S 043° 21,12' E 2116

Dredge off bottom: 04/10/2024, UTC, lat, long, depth (m) 16:58 39° 10,85' S 043° 20,85' E 1833

total volume: half full

Comments: pillow lavas

gDR, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Macrofauna	Cnidaria	1	x								EtOH	Octocorallia
	Polychaeta	1	x								EtOH	pieces, Spionidae?
	Polychaeta	1	x								EtOH	with tube
	Polychaeta	1	x								EtOH	Maldanidae
	Bryozoa	1	x								EtOH	Ctenostomata
	Bryozoa	1	x								EtOH	ctenostome, disk with chimneys
	Echinodermata	1	x								EtOH	Ophiuroidea, 4 arms

SO307 - DR 87: Discovery II fracture zone, 10 nm SSW of DR 86

Dredge on bottom: 05/10/2024, UTC, lat, long, depth (m) 9:50 38° 39,75' S 043° 43,75' E 2774

Dredge off bottom: 05/10/2024, UTC, lat, long, depth (m) 10:58 38° 39,84' S 043° 43,42' E 2476

total volume: empty

Comments:

gDR, sediment

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1							x		F	from sediment traps

SO307 - DR 88: Western Wall of Discovery II Fracture Zone, uppermost slope

Dredge on bottom: 05/10/2024, UTC, lat, long, depth (m) 13:19 38° 39,36' S 043° 43,28' E 2316
Dredge off bottom: 05/10/2024, UTC, lat, long, depth (m) 14:51 38° 39,43' S 043° 43,03' E 2024
total volume: few rocks
Comments: pillow fragments, semiconsolidated sediment, basalts
gDR

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1						x			FIX	from sediment traps

SO307 - DR 90: Discovery II Fracture Zone, middle section E-facing slope, middle part.

Dredge on bottom: 05/10/2024, UTC, lat, long, depth (m) 23:37 38° 22,76' S 043° 54,20' E 2756
Dredge off bottom: 06/10/2024, UTC, lat, long, depth (m) 0:34 38° 22,84' S 043° 53,83' E 2494
total volume: half full
Comments: volcanic rocks, breccias
gDR, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Macrofauna	Cnidaria	1	x								EtOH	
	Porifera	1			x						EtOH	
	Bryozoa	1	x								EtOH	green
	Cnidaria?	3	x								EtOH	branching, small, eggs attached
	Cnidaria	1	x								EtOH	Hexacorallia
	Cnidaria	1	x								EtOH	Coronata

SO307 - DR 91: Discovery II fracture zone, northern tip, dredge up the upper flank, NW direction

Dredge on bottom: 06/10/2024, UTC, lat, long, depth (m) 7:44 37° 46,89' S 044° 10,62' E 2524
Dredge off bottom: 06/10/2024, UTC, lat, long, depth (m) 8:38 37° 46,73' S 044° 10,37' E 2303
total volume: one huge block of hyaloclastite
Comments: volcaniclastics
gDR, sediment, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1							x		F	from sediment traps
Macrofauna	Porifera	1			x						EtOH	Hexactinellidae, soft
	Porifera	1					x				F	same as above
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Cnidaria	1	x								EtOH	Hexacorallia
	Cnidaria	1								x	dry	Octocorallia
	Bryozoa	1	x								EtOH	branched, green
	Bryozoa	3	x								EtOH	Ctenostomata
	Brachiopoda	1		x		x					RNA	*Platidia*

SO307 - DR 93: Discovery fracture zone, northern tip, N-flank of NE-SW elongated ridge

Dredge on bottom: 06/10/2024, UTC, lat, long, depth (m) 14:42 37° 50,69' S 044° 12,16' E 2563
Dredge off bottom: 06/10/2024, UTC, lat, long, depth (m) 15:40 37° 50,69' S 044° 11,78' E 2563
total volume: empty
Comments:
gDR, sediment

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1						x			F	from sediment traps

SO307 - DR 94: same spot as DR 93

Dredge on bottom: 06/10/2024, UTC, lat, long, depth (m) 17:46 37° 50,68' S 044° 12,14' E 2543
Dredge off bottom: 06/10/2024, UTC, lat, long, depth (m) 18:53 37° 50,68' S 044° 11,77' E 2191
total volume: 10 rocks
Comments: pillow lavas
gDR, sediment, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1						x			F	from sediment traps
Macrofauna	Bryozoa	1	x								EtOH	on dead hexacoral
	Polychaeta	1	x								EtOH	

SO307 - DR 95: Small cone at SSW-NNE directed trending, line of volcanoes (65nm north of northern tip of the Discovery fracture zone); dredge up the eastern flank

Dredge on bottom: 07/10/2024, UTC, lat, long, depth (m) 9:03 36° 45,50' S 044° 46,72' E 2410

Dredge off bottom: 07/10/2024, UTC, lat, long, depth (m) 9:54 36° 45,57' S 044° 46,37' E 2191

total volume: almost full

Comments: mainly Mn-crusts, some volcaniclastic rocks and breccias

gDR, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Macrofauna	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Bivalvia	1	x								EtOH	
	Bryozoa	1	x								EtOH	small, tree-like
	Bryozoa	1	x								EtOH	encrusting
	Porifera	1	x								EtOH	
	Cnidaria	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Crustacea?	1	x								EtOH	broken
	Porifera	1	x								EtOH	
	Polychaeta	1	x								EtOH	spiny, calcerous tube
	Cnidaria	1	x								EtOH	coronata
	Ophiuroidea	1			x						EtOH	
	Polychaeta	2	x								EtOH	Likely same animal
	Porifera?	1	x								EtOH	branching
	Porifera	1	x								EtOH	
	?	1	x								EtOH	maybe porifera
	Bryozoa?	1	x								EtOH	
	Cnidaria	1	x								EtOH	Coronata
	Cnidaria?	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	2	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Bryozoa	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Bryozoa	1	x								EtOH	

SO307 - DR 96: Northern end of Discovery FZ, accumulation of seamounts, NE slope of pancake-like large seamounts

Dredge on bottom: 07/10/2024, UTC, lat, long, depth (m) 12:34 36° 40,86' S 044° 50,20' E 2219

Dredge off bottom: 07/10/2024, UTC, lat, long, depth (m) 13:32 36° 41,14' S 044° 50,10' E 1998

total volume: few rocks

Comments: pebbles of rocks cemented by Mn-crust, round shape suggestes beach deposition, seamount may have been an island

gDR, sediment, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1							x		F	from sediment traps
Macrofauna	Cnidaria	6									dry	Octtocorallia, pink
	Cnidaria	1	x								EtOH	Octtocorallia, red
	Porifera	3			x						EtOH	Hexactinellida
	Mollusca	2	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	2	x								EtOH	

SO307 - DR 97: Northern Discovery FZ, chain of volcanoes trending N-E, easternmost volcano, northern scarp

Dredge on bottom: 07/10/2024, UTC, lat, long, depth (m) 19:43 36° 36,90' S 045° 09,11' E 2849

Dredge off bottom: 07/10/2024, UTC, lat, long, depth (m) 20:29 36° 37,12' S 045° 09,10' E 2633

total volume: 1 rock

Comments: pillow basalt

gDR, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Macrofauna	Porifera	1	x								EtOH	
	Cnidaria	1	x								EtOH	Octocor. or Actniaria?

SO307 - DR 98: Northern Discovery II FZ, N of chain of volcanoes trending E-W, easternmost irregular structure, N-facing slope

Dredge on bottom: 07/10/2024, UTC, lat, long, depth (m) 23:18 36° 32,79' S 045° 06,12' E 2640
Dredge off bottom: 08/10/2024, UTC, lat, long, depth (m) 0:11 36° 32,97' S 045° 05,97' E 2426
total volume: 2 rock
Comments: Mn-encrı Mn-encrusted basaltic breccia and volcaniclastics
gDR, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Macrofauna	Porifera	>5	x								EtOH	Hexactinellida; pieces of same animal
	Cnidaria	1	x								EtOH	
	Polychaeta	1	x								EtOH	Partially in tube
	Cnidaria	1								x	dry	Octocorallia
	?	1	x								EtOH	possibly Cnidaria?
	Porifera	1	x								EtOH	

SO307 - DR 100: NW-SE trending ridge west from Northern Indomed FZ, northern tip, lower part

Dredge on bottom: 08/10/2024, UTC, lat, long, depth (m) 16:46 35° 33,96' S 046° 23,49' E 3374
Dredge off bottom: 08/10/2024, UTC, lat, long, depth (m) 17:49 35° 34,22' S 046° 23,46' E 3115
total volume: 10 rocks , 1 huge Mn-crust
Comments: volcanic rocks, basalts
gDR, sediment, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1							x		F	from sediment tubes
Macrofauna	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	brush
	Porifera	5	x								EtOH	
	Porifera	2	x								EtOH	
	Mollusca	1	x								EtOH	Gastropoda
	Bryozoa	1	x								EtOH	Ctenostomata, disk
	Bryozoa	1	x								EtOH	green!
	Bryozoa	4	x								EtOH	
	Tunicata?	1	x									

SO307 - DR 101: N-S elongated ridge SE of Madagascar Ridge

Dredge on bottom: 09/10/2024, UTC, lat, long, depth (m) 0:51 35° 10,58' S 046° 47,08' E 3385
Dredge off bottom: 09/10/2024, UTC, lat, long, depth (m) 1:46 35° 10,79' S 046° 47,21' E 3079
total volume: empty
Comments:
gDR, sediment

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	2						x	x		F	from sediment tubes

SO307 - DR 102: N-S elongated ridge SE of Madagascar Ridge, 1.5 nm E of DR 101

Dredge on bottom: 09/10/2024, UTC, lat, long, depth (m) 4:18 35° 10,36' S 046° 49,29' E 2746
Dredge off bottom: 09/10/2024, UTC, lat, long, depth (m) 5:09 35° 10,64' S 046° 49,32' E 2466
total volume: 3 small rocks
Comments: volcaniclastics
gDR, sediment

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1							x		F	from sediment tubes

SO307 - DR 103: N-S elongated ridge SE of Madagascar Ridge (repeat of DR102)

Dredge on bottom: 09/10/2024, UTC, lat, long, depth (m) 7:17 35° 10,37' S 046° 49,28' E 2747
Dredge off bottom: 09/10/2024, UTC, lat, long, depth (m) 8:45 35° 10,79' S 046° 49,33' E 2383
total volume: 1/4 full
Comments: 1 large lava block and volcaniclastics
gDR, sediment, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	2						x	x		F	from sediment tubes
Macrofauna	Porifera	1	x								EtOH	
	Porifera	2	x								EtOH	
	Porifera	3	x								EtOH	
	Polychaeta	1	x								EtOH	Maldanidae
	Bryozoa	>5	x								EtOH	
	Echinodermata	1	x								EtOH	Ophiuroidea?

SO307 - DR 104: NE tip of northernmost end of Indomed fracture zone

Dredge on bottom: 09/10/2024, UTC, lat, long, depth (m) 11:40 35° 09,28' S 046° 54,47' E 3551
Dredge off bottom: 09/10/2024, UTC, lat, long, depth (m) 12:35 35° 09,46' S 046° 54,18' E 3239
total volume: empty
Comments:
gDR, sediment

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1							x		F	from sediment traps

SO307 - DR 108: SE rim of Madagascar Ridge, nose along steep SE-facing flank around 11nm NW of DR101-DR104

Dredge on bottom: 09/10/2024, UTC, lat, long, depth (m) 23:48 35° 01,52' S 046° 37,62' E 3473
Dredge off bottom: 10/10/2024, UTC, lat, long, depth (m) 0:38 35° 01,62' S 046° 37,33' E 3269
total volume: few rocks
Comments: Mn-encrusted basalt and volcaniclastic cobbles
gDR, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Macrofauna	Porifera	2	x								EtOH	
	Bryozoa	1	x								EtOH	tree-trunk, ctenostome
	Mollusca?	1	x								EtOH	Solenogastres?

SO307 - DR 109: SE fault scarp of Madagascar Ridge

Dredge on bottom: 10/10/2024, UTC, lat, long, depth (m) 6:31 35° 15,85' S 046° 23,37' E 2983
Dredge off bottom: 10/10/2024, UTC, lat, long, depth (m) 7:27 35° 15,72' S 046° 23,06' E 2701
total volume: empty
Comments:
gDR, sediment

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1						x			F	from sediment traps

SO307 - DR 110: Southeastern margin of the Madagascar Ridge, Dredge up ESE-facing cliff

Dredge on bottom: 10/10/2024, UTC, lat, long, depth (m) 11:38 35° 23,14' S 046° 13,29' E 3308
Dredge off bottom: 10/10/2024, UTC, lat, long, depth (m) 12:44 35° 22,93' S 046° 13,04' E 3001
total volume: 10 rocks
Comments: volcanic rocks
gDR, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Macrofauna	Bryozoa	1	x								EtOH	

SO307 - DR 111: Southern margin of Madagascar Ridge - south facing slope, fault scarp

Dredge on bottom: 10/10/2024, UTC, lat, long, depth (m) 17:08 35° 30,87' S 045° 57,94' E 3251
Dredge off bottom: 10/10/2024, UTC, lat, long, depth (m) 18:01 35° 30,68' S 045° 57,70' E 3007
total volume: 3 rocks
Comments: volcanic rocks
gDR, sediment

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1							x		F	from sediment traps, fixed 9hrs later

SO307 - DR 114: SW Madagascar Ridge - small seamount, S-facing slope of cone

Dredge on bottom: 11/10/2024, UTC, lat, long, depth (m) 17:47 34° 16,23' S 045° 52,73' E 1505
Dredge off bottom: 11/10/2024, UTC, lat, long, depth (m) 18:53 34° 15,92' S 045° 52,74' E 1171
total volume: 1/3 full
Comments: volcanic rocks, some volcaniclastics
gDR, sediment, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1							x		F	from sediment traps
Macrofauna	Cnidaria	2								10L	F	Octocorallia, golden
	Cnidaria	2									EtOH	same as above
	Cnidaria	1								10L	F	Antipatharia
	Cnidaria	4									EtOH	same as above
	Cnidaria	3								dry		Octocorallia, fossil, bases
	Pteropoda	1	x								EtOH	
	Polychaeta	1	x								EtOH	in tube
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Cnidaria	1	x								EtOH	Octocorallia
	Cnidaria	1								x	dry	Octocorallia
	Porifera	1	x								EtOH	
	Bryozoa	1	x								EtOH	
	Polychaeta	1	x								EtOH	
	Cnidaria	1								x	dry	Octocorallia
	Porifera	1	x								EtOH	
	Porifera	2	x								EtOH	
	Porifera	8	x								EtOH	
	Porifera	1	x								EtOH	
	Polychaeta	1	x								EtOH	in tube
	Cnidaria	1	x								EtOH	
	Cnidaria	1	x								EtOH	
	Cnidaria	1	x								EtOH	
	Porifera	2	x								EtOH	
	Porifera	1	x								EtOH	spherical, small
	Porifera	1	x								EtOH	
	Ophiuroidea	1						x			F	large
	Cnidaria	1					x				EtOH	Hexacorallia
	Cnidaria	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	2	x								EtOH	
	Cnidaria	4	x								EtOH	Hydrozoa
	Cnidaria	6	x								EtOH	Polyps, Alcyonaria
	Cnidaria	1	x								EtOH	Hexacorallia
	Bryozoa	1	x								EtOH	
	Bryozoa	1	x								EtOH	
	Bryozoa	1	x								EtOH	
	Bryozoa	1	x								EtOH	
	Polychaeta?	1	x								EtOH	transparent, foram tube

SO307 - DR 115: Madagascar Ridge, elongated plateau-like seamount, SE edge

Dredge on bottom: 12/10/2024, UTC, lat, long, depth (m) 0:29 34° 44,01' S 045° 34,48' E 2123
Dredge off bottom: 12/10/2024, UTC, lat, long, depth (m) 1:14 34° 43,81 S 045° 34,36' E 2003
total volume: empty
Comments:
gDR, sediment

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1							x		F	from sediment traps

SO307 - DR 116: Madagascar Ridge, 2 nm NE of DR 115

Dredge on bottom: 12/10/2024, UTC, lat, long, depth (m) 3:11 34° 42,87' S 045° 36,27' E 2071
Dredge off bottom: 12/10/2024, UTC, lat, long, depth (m) 4:07 34° 42,61' S 045° 36,09' E 1950
total volume: empty
Comments:
gDR, sediment

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1							x		F	from sediment traps

SO307 - DR 117: Southern margin of Madagascar Plateau, isolated W-E elongated seamount, South facing slope, upper part.

Dredge on bottom: 12/10/2024, UTC, lat, long, depth (m) 9:41 34° 50,48' S 045° 08,36' E 1777
Dredge off bottom: 12/10/2024, UTC, lat, long, depth (m) 11:09 34° 50,41' S 045° 08,36' E 1703
total volume:
Comments: Mn-crusts
gDR, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Macrofauna	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	Hexactinellida
	Porifera	1	x								EtOH	
	Porifera	3	x								EtOH	Hexactinellida
	Cnidaria	1	x								EtOH	Coronata
	Cnidaria	1	x								EtOH	Hydrozoa
	Polychaeta	2	x								EtOH	
	Echinodermata	1	x								EtOH	Ophiuroidea

SO307 - DR 118: Southern margin of Madagascar Ridge, isolated E-W elongated seamount, south-facing slope, E of DR117

Dredge on bottom: 12/10/2024, UTC, lat, long, depth (m) 13:10 34° 50,26' S 045° 10,69' E 1706
Dredge off bottom: 12/10/2024, UTC, lat, long, depth (m) 14:11 34° 49,99' S 045° 10,66' E 1450
total volume: few Mn-crusts
Comments: sedimentary (clastic, bioclastic, volcaniclastic)
gDR, sediment, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	2						x	x		F	from sediment traps
Macrofauna	Cnidaria	1			x						EtOH	Actiniaria
	Polychaeta	1	x								EtOH	

SO307 - DR 120: Large seamount south of Madagascar Ridge

Dredge on bottom: 12/10/2024, UTC, lat, long, depth (m) 23:12 35° 09,46' S 044° 14,01' E 1707
Dredge off bottom: 13/10/2024, UTC, lat, long, depth (m) 0:10 35° 09,23' S 044° 13,98' E 1459
total volume: 4 rocks
Comments:
gDR, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Macrofauna	Porifera	1			x						EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	>5	x								EtOH	
	?	1	x								EtOH	

SO307 - DR 121: Madagascar Ridge, same seamount as DR120 appr. 4nm west of DR120, lower portia of cliff. Dredge up 'a' nose/promitory

Dredge on bottom: 13/10/2024, UTC, lat, long, depth (m) 2:17 35° 08,45' S 044° 08,90' E 2187
Dredge off bottom: 13/10/2024, UTC, lat, long, depth (m) 3:22 35° 08,15' S 044° 08,96' E 1862
total volume: few rocks
Comments: greenschist (exotic for the region!)
gDR, sediment, macrofanua

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	2						x	x		F	from sediment traps
Macrofauna	Cnidaria	1					x				F	fossil octocoral with living hexacoral and sea anemones
	Cnidaria	1	x								EtOH	Octocorallia
	Cnidaria	1	x								EtOH	
	Cnidaria	1	x								EtOH	
	Cnidaria	1	x								EtOH	
	Cnidaria	1	x								EtOH	
	Bryozoa	1	x								EtOH	
	Polychaeta	1	x								EtOH	
	Cnidaria	1	x								EtOH	
	Cnidaria	1								x	dry	Desmophyllum dianthus, fossil
	Cnidaria	2	x							x	dry	Hexacorallia

SO307 - DR 122: Southern margin of Madagascar Plateau, a big seamount, the eastern one in a group of three seamounts, SW-facing slope, upper part

Dredge on bottom: 13/10/2024, UTC, lat, long, depth (m) 6:46 35° 07,40' S 044° 06,83' E 1803
Dredge off bottom: 13/10/2024, UTC, lat, long, depth (m) 7:50 35° 07,15' S 044° 06,77' E 1481
total volume: several rocks
Comments: bsaltic lavas, vesicular lavas, Mn-encrusted igneous rocks
gDR, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Macrofauna	Porifera	3	x								EtOH	
	Porifera	1			x						EtOH	
	Porifera	2	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Bryozoa	1	x								EtOH	tree-trunk-like
	Bryozoa	1	x								EtOH	erect, ctenostome, tree-like
	Crustacea	1	x								EtOH	arcturid isopod
	Crustacea	2	x								EtOH	Amphipod male & female
	Crustacea	1	x								EtOH	tube of amphipod pair
	Crustacea	1			x						EtOH	Paguridae, with shell, from sediment trap
	Bivalvia	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	3	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	2	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Cnidaria	1	x								EtOH	Hexacorallia
	Cnidaria	1	x								EtOH	Hydrozoa
	Polychaeta	1	x								EtOH	
	Bryozoa	1	x								EtOH	
	Bryozoa	1	x								EtOH	

SO307 - DR 123: Southern margin of Madagascar Ridge, 2nd of three large seamounts

Dredge on bottom: 13/10/2024, UTC, lat, long, depth (m) 13:15 34° 48,21' S 043° 43,35' E 2050
Dredge off bottom: 13/10/2024, UTC, lat, long, depth (m) 14:10 34° 47,97' S 043° 43,25' E 1796
total volume: empty
Comments:
gDR, sediment, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1							x		F	from sediment traps
Macrofauna	"Pisces"	1								x	F	*Halosauropsis macrochir*
	"Pisces"	2			x						EtOH	same as above, swim bladder and muscle
	Crustacea	1			x						EtOH	Galatheidae (from sediment trap)

SO307 - DR 124: Southern margin of the Madagascar Ridge. Second of three large seamounts, S-facing slope, lower part, W of DR123

Dredge on bottom: 13/10/2024, UTC, lat, long, depth (m) 16:11 34° 48,69' S 043° 41,53' E 2274
Dredge off bottom: 13/10/2024, UTC, lat, long, depth (m) 17:01 34° 48,45' S 043° 41,52' E 2040
total volume: few rocks
Comments: semi-consolidated carbonaceous material
gDR, sediment, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1							x		F	from sediment traps
Macrofauna	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Cnidaria	1	x								EtOH	
	Cnidaria	1	x								EtOH	Octocorallia
	Polychaeta	1	x								EtOH	
Pastries	prezel & chocolate cookie	2									dry	yummy!

SO307 - DR 125: Southern margin of the Madagascar Ridge. 2nd of three large seamounts, S-facing slope, upper part, above 124

Dredge on bottom: 13/10/2024, UTC, lat, long, depth (m) 18:52 34° 47,70' S 043° 41,52' E 1829
Dredge off bottom: 13/10/2024, UTC, lat, long, depth (m) 20:53 34° 47,65' S 043° 41,52' E 1786
total volume: two small rocks and a shell
Comments:
gDR, sediment, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1							x		F	from sediment traps
Macrofauna	Porifera	2	x								EtOH	
	Porifera	1	x								dry	
	Mollusca	1								x	dry	*Acesta* shell
	Mollusca	1	x								dry	Pteropoda

SO307 - DR 126: Madagascar Ridge; seamount south of main plateau, dredge up the mid-upper southern wall

Dredge on bottom: 14/10/2024, UTC, lat, long, depth (m) 1:57 34° 39,25' S 043° 17,69' E 1912
Dredge off bottom: 14/10/2024, UTC, lat, long, depth (m) 3:00 34° 38,98' S 043° 17,56' E 1544
total volume: three rocks
Comments:
gDR, sediment, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1							x		F	from sediment traps
Macrofauna	Polychaeta	1	x								EtOH	Sabellidae

SO307 - DR 127: SW flank of Madagascar Ridge, westernmost of three seamounts

Dredge on bottom: 14/10/2024, UTC, lat, long, depth (m) 5:05 34° 40,62' S 043° 16,10' E 2306
Dredge off bottom: 14/10/2024, UTC, lat, long, depth (m) 8:38 34° 40,73' S 043° 16,12' E 2443
total volume: empty
Comments:
gDR, sediment

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1							x		F	from sediment traps

SO307 - DR 129: SW flank of Madagascar Ridge, westernmost of three seamounts, eastern flank

Dredge on bottom: 14/10/2024, UTC, lat, long, depth (m) 15:19 34°31,82' S 43°26,48' E 1874
Dredge off bottom: 14/10/2024, UTC, lat, long, depth (m) 16:12 34°31,72' S 43°26,22' E 1629
total volume: empty
Comments:
gDR, sediment

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	2						x	x		F	from sediment traps

SO307 - DR 132: Western part of Madagascar Ridge, S-N trending ridge. Eastern slope

Dredge on bottom: 17/10/2024, UTC, lat, long, depth (m) 5:45 30°29,98' S 44°00,93' E 2387

Dredge off bottom: 17/10/2024, UTC, lat, long, depth (m) 6:43 30°30,21' S 44°00,76' E 2155

total volume: few roc few rocks, corals

Comments: mn-crust, one strongly altered volcaniclastic rock

gDR, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Macrofauna	Echinodermata	2			x						EtOH	stalked crinoids, bright yellow
	Porifera/Cnidaria	2	x								EtOH	*Asbestopluma*, Octocorallia
	Crustacea / Cnidaria	>10								x	dry	Ciripedia shells, 1 Hexacorallia from sediment traps
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Cirripedia	1	x								EtOH	Barnacle
	Cnidaria	5	x								EtOH	Yellow, connected via stolons
	Cnidaria	>5	x								EtOH	Thin, branching, tree-like
	Cnidaria	2	x								EtOH	
	Cnidaria	1	x								EtOH	
	Cnidaria	1	x								EtOH	
	Cnidaria	1	x								EtOH	
	Cnidaria	1	x								EtOH	
	Cnidaria	4	x								EtOH	
	Porifera	1	x								EtOH	
	Bryozoa	1	x								EtOH	branched
	Crustacea	5	x								EtOH	Cirripedia, Verrucomorpha
	Cnidaria	1	x								EtOH	
	Cnidaria	6	x								EtOH	
	Porifera	5			x						EtOH	

SO307 - DR 133: Western part of Madagascar Ridge, N-S trending ridge, upper part, NE-facing slope

Dredge on bottom: 17/10/2024, UTC, lat, long, depth (m) 9:43 30°25,77' S 44° 00,83' E 2236

Dredge off bottom: 17/10/2024, UTC, lat, long, depth (m) 10:36 30°25,99' S 44°00,74' E 2037

total volume: 1 piece of coral, 1 sedimentary rock

Comments:

gDR, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Macrofauna	Cnidaria	1								x	dry	fossil Octocorallia

SO307 - DR 134: Western part of Madagascar Ridge, N-S alongated ridge, it´s lower step, east-facing slope

Dredge on bottom: 17/10/2024, UTC, lat, long, depth (m) 15:43 30°08,87' S 44°12,15' E 2589

Dredge off bottom: 17/10/2024, UTC, lat, long, depth (m) 16:47 30°09,08' S 44°11,93' E 2217

total volume: several rocks

Comments: igneous rocks, massive Ol-phyric lavas and vesicular lavas

gDR, sediment, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted								x		F	from sediment traps
Macrofauna	Crustacea	1								x	dry	Cirripedia shell from sediment trap

SO307 - DR 135: Western part of Madagascar Ridge, N-S elongated ridge, northern part, NE-facing slope, middle section

Dredge on bottom: 17/10/2024, UTC, lat, long, depth (m) 19:51 30°03,10' S 44°09,32' E 2075

Dredge off bottom: 17/10/2024, UTC, lat, long, depth (m) 20:43 30°03,33' S 44°09,45' E 1792

total volume:1 big rock

Comments: volcanic rock with thick Mn-crust

gDR, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Macrofauna	Crustacea	>10								x	dry	Cirripedia shells, from sediment traps

SO307 - DR 136:

Dredge on bottom: 17/10/2024, UTC, lat, long, depth (m) 22:28 30°03,56' S 44°09,07' E 1933
Dredge off bottom: 17/10/2024, UTC, lat, long, depth (m) 23:21 30°03,64' S 44°09,34' E 1801
total volume: 1 coral
Comments:
gDR, sediment, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted							x			F	from sediment traps
Macrofauna	Cnidaria	2								x	dry	Octocorallia, fossil
	Cnidaria	6			x						F	Octocorallia, red/orange

SO307 - DR 137: Madagscar Ridge, ~N-S elongated seamount, ~15 km W of seamount sampled during DR134- DR136.

Dredge on bottom: 18/10/2024, UTC, lat, long, depth (m) 3:42 30°05,43' S 43°58,31' E 2879
Dredge off bottom: 18/10/2024, UTC, lat, long, depth (m) 4:57 30°05,60' S 43°58,56' E 2515
total volume: 1/3 full
Comments: Several blocks of aphyric to Pl-phyric lavas
gDR, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Macrofauna	Tunicata	1			x						EtOH	with calcitic spicules, delicate, mantle fixed to rock
	Bryozoa	1	x								EtOH	Cyclostome, Stenolaemata

SO307 - DR 138: Western part of the Madagascar Ridge

Dredge on bottom: 18/10/2024, UTC, lat, long, depth (m) 10:13 30°14,06' S 43°48,02' E 2259
Dredge off bottom: 18/10/2024, UTC, lat, long, depth (m) 11:08 30°14,17' S 43°48,20' E 1956
total volume: few rocks
Comments: sedimentary rocks, 1 volcanic and 1 volcaniclastic
gDR, sediment

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1							x			from sediment traps

SO307 - DR 139: Western part of Madagascar Ridge. A small NE-SW trending ridge NW facing steep upper slope

Dredge on bottom: 18/10/2024, UTC, lat, long, depth (m) 12:58 30°14,06' S 43°48,01' E 2276
Dredge off bottom: 18/10/2024, UTC, lat, long, depth (m) 13:52 30°14,16' S 43°48,20' E 1957
total volume: several rocks, corals
Comments: Several blocks including many coral fragments. Blocks of rather altered lavas
gDR, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Macrofauna	Cnidaria	>10								x	dry	large fossil octocorals
	Porifera	1						x			F	ball-shaped
	Porifera	1			x						EtOH	ball-shaped, same as above, pieces
	Porifera	2			x						EtOH	2 pieces, demosponge
	Porifera	3	x								EtOH	*Asbestopluma*
	Porifera	1	x								EtOH	
	Porifera	3			x						EtOH	pieces
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	Lithistidae
	Porifera	1	x								EtOH	
	Porifera	2	x								EtOH	*Asbestopluma*
	Cnidaria	3	x								EtOH	Hexacorallia
	Cnidaria	>5						x			F	Octocorallia
	Cnidaria	2			x						EtOH	Octocorallia, same as above
	Cnidaria	1								x	F	Antipatharia, in drum
	Cnidaria	4			x						EtOH	Antipatharia, same as above
	Cnidaria	1			x						EtOH	Actiniaria, Phelliactis?
	Cnidaria	3	x								EtOH	Octocorallia
	Cnidaria	1	x								EtOH	Actiniariia
	Cnidaria	>10		x							EtOH	Actiniaria
	Cnidaria	1	x								EtOH	Octocorallia
	Cnidaria	1	x								EtOH	Actniaria
	Polychaeta	1	x								EtOH	Polynoida, front part

SO307 - DR 140: Western margin of Madagaskar Ridge

Dredge on bottom: 18/10/2024, UTC, lat, long, depth (m) 19:22 30°05,51' S 43°33,51' E 2382
Dredge off bottom: 18/10/2024, UTC, lat, long, depth (m) 20:17 30°05,66' S 43°33,78' E 2342
total volume: few rocks, sediment
Comments: two small volcanic rocks and sediment
gDR, sediment, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted								x		F	from sediment traps
Macrofauna	?	1	x								EtOH	Porifera?

SO307 - DR 141: Madagascar Ridge, northwestern margin

Dredge on bottom: 19/10/2024, UTC, lat, long, depth (m) 0:27 30°09,19' S 43°29,86' E 2448
Dredge off bottom: 19/10/2024, UTC, lat, long, depth (m) 1:26 30°09,21' S 43°30,14' E 2467
total volume: one small rock
Comments: carbonate
gDR, sediment

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted								x		F	from sediment traps

SO307 - DR 143:

Dredge on bottom: 19/10/2024, UTC, lat, long, depth (m) 9:15 30°17,59' S 43°22,68' E 2332
Dredge off bottom: 19/10/2024, UTC, lat, long, depth (m) 10:15 30°17,82' S 43°22,80' E 2076
total volume: corals
Comments:
gDR, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Macrofauna	Cnidaria	1						x			F	Actiniaria, *Phelliactis*?
	Cnidaria	>5							x		F	Octocorallia
	Cnidaria	>10			x						EtOH	Octocorallia, same as above
	Cnidaria	3	x								EtOH	Hydrozoa
	Bryozoa	5	x								EtOH	
	Echinodermata	1						x			F	Ophiuroidea
	Echinodermata	2		x							EtOH	Ophiuroidea, arm pcs., same as above
	Cnidaria											fossil Octocorallia

SO307 - DR 144: Western flank of Madagascar Ridge, upper slope

Dredge on bottom: 19/10/2024, UTC, lat, long, depth (m) 12:39 30°16,85' S 43°23,27' E 2370
Dredge off bottom: 19/10/2024, UTC, lat, long, depth (m) 13:33 30°17,01' S 43°23,47' E 2128
total volume: 1 Mn-crust
Comments:
gDR, sediment

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted							x			F	from sediment traps

SO307 - DR 145: small seamount west of Madagascar Ridge, northern flank, NNE-facing slope, middle section of slope

Dredge on bottom: 19/10/2024, UTC, lat, long, depth (m) 19:53 30°22,70' S 42°59,83' E 3060
Dredge off bottom: 19/10/2024, UTC, lat, long, depth (m) 20:54 30°22,94' S 42°59,87' E 2789
total volume: few rocks
Comments:
gDR, sediment, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted								x		F	from sediment traps
Macrofauna	Cnidaria	1	x								EtOH	*Coronata*

SO307 - DR 146: Seamount W of Madagascar Ridge (same as for DR145), dredge up mid-upper eastern flank

Dredge on bottom: 20/10/2024, UTC, lat, long, depth (m) 0:29 30°24,69' S 42°59,62' E 2760
Dredge off bottom: 20/10/2024, UTC, lat, long, depth (m) 1:26 30°24,49' S 42°59,48' E 2477
total volume: 1/3 full
Comments: smorgas board of sedimentary rocks with/and Mn-crust and Mn-nodules; no volcanic rocks
gDR, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Macrofauna	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Polychaeta	1	x								EtOH	
	Polychaeta	1	x								EtOH	
	Polychaeta	1	x								EtOH	Serpulidae
	Polychaeta	1	x								EtOH	Serpulidae
	Mollusca	1	x								EtOH	Bivalvia
	Bryozoa	1	x								EtOH	
	Bryozoa	1	x								EtOH	
	Echinodermata	1	x								EtOH	Ophiohelidae, 1 arm

SO307 - DR 147: Seamount W of Madagascar Ridge (same as for DR146), eastern flank of seamount, upper part of slope

Dredge on bottom: 20/10/2024, UTC, lat, long, depth (m) 4:00 30°24,01' S 42°56,58' E 2545
Dredge off bottom: 20/10/2024, UTC, lat, long, depth (m) 4:56 30°23,86' S 42°56,83' E 2248
total volume: 1/4 full
Comments: Abundant Mn-crust with fragments of magmatic rocks
gDR, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Macrofauna	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Bryozoa	1	x								EtOH	erect, tree-like
	Cnidaria	1	x								EtOH	
	Polychaeta	1	x								EtOH	Calcareous tube, Serpullid-like

SO307 - CTD 148-150

SO307 - DR 151: Western margin of Madagascar Ridge

Dredge on bottom: 20/10/2024, UTC, lat, long, depth (m) 16:18 30°38,35' S 42° 57,85' E 3541
Dredge off bottom: 20/10/2024, UTC, lat, long, depth (m) 17:19 30°38,47' S 42° 58,10' E 3202
total volume: a few rocks
Comments: Abundant pillow fragments
gDR, sediment

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted							x			F	from sediment traps

SO307 - DR 152: Madagascar Ridge, western margin. Dredge up the upper slope

Dredge on bottom: 21/10/2024, UTC, lat, long, depth (m) 0:31 31°03,74' S 42°58,51' E 2036
Dredge off bottom: 21/10/2024, UTC, lat, long, depth (m) 1:23 31°03,81' S 42°58,80' E 1813
total volume: a few rocks
Comments: carbonates
gDR, sediment, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted								x		F	from sediment traps
Macrofauna	"Pisces"	2	x								dry	shark's teeth

SO307 - MUC 153:

MUC on bottom: 21/10/2024, UTC, lat, long, depth (m) 6:52 31°26,19' S 43°13,69' E 1514
MUC off bottom: 21/10/2024, UTC, lat, long, depth (m) 6:57 31°26,19' S 43°13,69' E 1514
total volume: empty
Comments:
MUC, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Macrofauna	Cnidaria	1			x						EtOH	large tentacle network of siphonophore, bright orange, on MUC frame

SO307 - MUC 154:

MUC on bottom: 21/10/2024, UTC, lat, long, depth (m) 8:37 31°25,00' S 43°13,74' E 1542
MUC off bottom: 21/10/2024, UTC, lat, long, depth (m) 8:42 31°25,00' S 43°13,74' E 1542
total volume: 12 tubes full, 20-30 cm
Comments: pure foraminiferan sand
MUC

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	11							x		F	from MUC tubes
ToC sediment		1								x	dry	upper 5cm of tube dried at 90°C overnight

SO307 - DR 155: Seamount west of Madagascar Ridge, small cone on NE edge of seamount, NW-facing slope

DR on bottom: 21/10/2024, UTC, lat, long, depth (m) 15:48 31°26,01' S 42°48,67' E 2697
DR off bottom: 21/10/2024, UTC, lat, long, depth (m) 16:44 31°26,19' S 42°48,86' E 2363
total volume: 1 basalt rock
Comments:
gDR, sediment

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1							x		F	from sediment traps

SO307 - DR 156: Seamount west of Madagascar Ridge, small cone on NE edge of seamount, ca.3 km S of DR155, W-facing slope

Dredge on bottom: 21/10/2024, UTC, lat, long, depth (m) 20:26 31°29,65' S 42°46,84' E 2323
Dredge off bottom: 21/10/2024, UTC, lat, long, depth (m) 21:17 31°29,88' S 42°46,88' E 1938
total volume: 1 rock
Comments:
gDR, sediment, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1							x		F	from sediment traps
Macrofauna	Porifera	1	x								EtOH	
	Cnidaria	1	x								EtOH	

SO307 - DR 157: Seamount at western flank of Madgascar Ridge

Dredge on bottom: 22/10/2024, UTC, lat, long, depth (m) 2:12 31°34,37' S 42°42,90' E 2238
Dredge off bottom: 22/10/2024, UTC, lat, long, depth (m) 3:09 31°34,47' S 42°43,19' E 1961
total volume:
Comments:
gDR, sediment, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted								x		F	from sediment traps
Macrofauna	Porifera	2	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Porifera	1	x								EtOH	
	Polychaeta	1	x								EtOH	
	Polychaeta	1	x								EtOH	
	Cnidaria	1	x								EtOH	
	Cnidaria?	1	x								EtOH	

SO307 - MUC 158:

MUC on bottom: 22/10/2024, UTC, lat, long, depth (m) 6:04 31°36,70' S 42°46,40' E 1393
MUC off bottom: 22/10/2024, UTC, lat, long, depth (m) 6:09 31°36,70' S 42°46,40' E 1393
total volume:
Comments:
MUC, sediment

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	10							x		F	from MUC tubes
ToC sediment		1								x	dry	upper 5cm of tube dried at 90°C overnight

SO307 - DR 161: Seamount ca. 40nm east of the Madagascar Ridge, dredge up the upper southern slope

Dredge on bottom: 22/10/2024, UTC, lat, long, depth (m) 23:07 30°53,56' S 42°15,66' E 3376
Dredge off bottom: 23/10/2024, UTC, lat, long, depth (m) 0:02 30°53,49' S 42°15,87' E 3109
total volume: few rocks
Comments:
gDR, sediment

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	1							x		F	from sediment traps

SO307 - DR 162: Seamount W of Madagascar Ridge, same as DR161

Dredge on bottom: 23/10/2024, UTC, lat, long, depth (m) 3:00 30°54,56' S 42°17,29' E 3451
Dredge off bottom: 23/10/2024, UTC, lat, long, depth (m) 3:53 30°54,46' S 42°17,58' E 3155
total volume: empty
Comments:
gDR, sediment

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	2						x	x		F	from sediment traps

SO307 - DR 163: An isolated seamount, it's eastern slope twinned seamount, northern summit, Western margin of Madgascar R.

Dredge on bottom: 23/10/2024, UTC, lat, long, depth (m) 8:53 30°52,49' S 42°28,51' E 3236
Dredge off bottom: 23/10/2024, UTC, lat, long, depth (m) 10:03 30°52,32' S 42°28,72' E 2971
total volume: few rocks
Comments: Mn-crusts and nodules
gDR, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Macrofauna	Cnidaria	1	x								EtOH	Actiniaria
	Polychaeta	2	x								EtOH	

SO307 - DR 164: Western margin of Madagascar Ridge, isolated seamount, flat top, a small parasitic cone, it´s NW slope

Dredge on bottom: 23/10/2024, UTC, lat, long, depth (m) 13:15 30°52,31' S 42°22,17' E 2759
Dredge off bottom: 23/10/2024, UTC, lat, long, depth (m) 14:12 30°52,48' S 42°22,42' E 2503
total volume: 2 rocks
Comments: Mn-crusts
gDR, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Macrofauna	Bryozoa	2	x								EtOH	

SO307 - DR 165: Western margin of Madagascar ridge; Isolated seamount, small cone to the NW, NW-facing flank

Dredge on bottom: 23/10/2024, UTC, lat, long, depth (m) 18:18 30°46,63' S 42°10,80' E 3520
Dredge off bottom: 23/10/2024, UTC, lat, long, depth (m) 19:14 30°46,83' S 42°10,97' E 3248
total volume: 1/4 full
Comments: Mn-nodules, rocks with Mn-crusts
gDR, sediment, macrofauna

	TAXA	n	2	5	50	100	200	500	1000	other	FIX	NOTES
Meiofauna	unsorted	2						x	x		F	from sediment traps
Macrofauna	Cnidaria	1	x								EtOH	Actiniaria
	Porifera	1	x								EtOH	