West Nile Delta project: POSEIDON cruise P388, 14 July 2009

Last Preparations in Malta

On Sunday, 12 July, an advance group of scientists arrived in Malta to meet R/V POSEIDON which had entered port in the morning. When the remaining participants of cruise P388 arrived on Monday, 13 July, loading was already in full swing: 2 trucks with expedition gear, additional air freight and other supplies had been delivered just in time . Heavy gear such as a containerized compressor, two large "trawl doors", OBS stations, and streamer cables were unloaded with the help of a shore crane. Loading operations were finished late in the afternoon.

During the morning and early afternoon of Tuesday, 14. July, electronic equipment and supplies were unpacked and distributed thoughout the laboratories, while the large trawl doors for the 3-D seismic system were assembled on the aft deck and tied to the bow of the vessel.

(WB)

R/V POSEIDON

The compressor-container

Trawl-doors are taken onboard

Trawl-doors are stowed on deck. Photos: W. Brückmann, IFM-GEOMAR

West Nile Delta project: POSEIDON cruise P388, 16 July 2009

Course East-South-East

After loading and stowing of expedition equipment and heavy gear for the planned 3-D seismic experiment has been completed on the previous day, POSEIDON is ready for an on-time departure in the morning of 15 July. At 0700 hours sharp Poseidon leaves the port of Malta for expedition P388. Only 20 minutes later the hour pilot departs the vessel. A large cruise ship is already waiting for its space on the dock. Even here, in the middle of the Mediterranean, the effects of the global economic downturn can be felt - a large number of vessels is anchored east of Malta, waiting for better times and cargo.

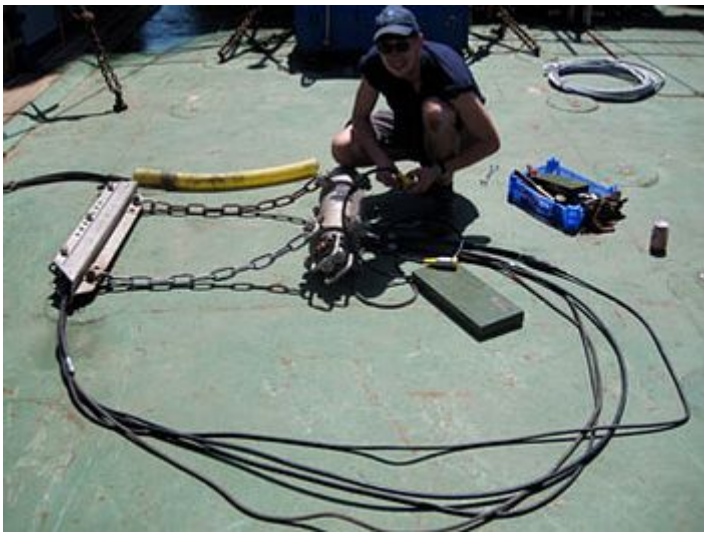
After taking a last glimpse back at the island of Malta in the morning sun, everyone, shipboard crew as well as technicians and scientists, go back to work.

There are still numerous boxes to unpack, instruments and computers to be installed and made ready for work. Over the course of the next 3 days the laboratories of POSEIDON will turn into a floating seismic computing center. At the same time an airgun is serviced on the aft deck and connected to the compressor system. All the while Poseidon is steaming ahead with 9.5 – 10 knots towards the working area in the western Nile Delta where it will arrive at Giza mud volcano late on Saturday.

(WB)

View back to Malta

The pilot is leaving



Preparations during the transit. Photos: W. Brückmann, IFM-GEOMAR

West Nile Delta project: POSEIDON cruise P388, 17 July 2009

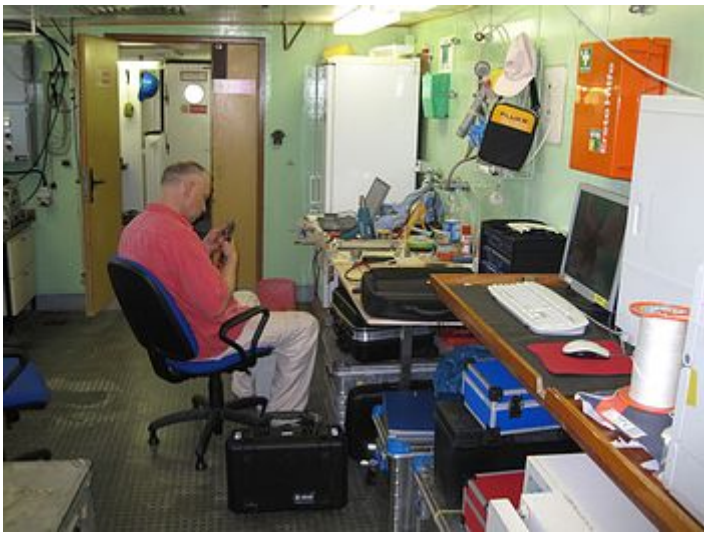
Transit with "Anchor Party"

While our journey towards the working area is continued under ideal weather conditions, all efforts are dedicated to setting up equipment and computers. This includes the preparation and assemblage of weight packages for ocean bottom seismometer (OBS) deployments, the so-called "anchor party". As conditions on deck are becoming too hot, this work is moved into the cooler evening hours.

Unfortunately, principal components of our 3-D system were delivered directly to the vessel from a previous cruise, making any pre-cruise checking impossible. Now, we are anxious to see how the different components fit together. Streamer segments that were last used on R/V METEOR 4 weeks ago off Uruguay are being re-configured to be used in 3-D mode. For the first time we are assembling these components into larger 3-D segments. To our great relief all parts of the new system successfully pass a dry-run test.

However, the integration of navigation and data acquisition software will still need further testing, and trial-runs are necessary to get all settings right.
We are scheduled to arrive at our working area in the evening of the 18. July, when we will start doing side-scan sonar calibrations and OBS release tests. During the night we are going to check on the status of the temperature observatory at Giza mud volcano, and hope to download 9 months worth of temperature data using an acoustic modem.
(JB)

"Anchor party" - Cord Papenberg, Marten Lefeld, Jörg Bialas and Torge Matthiessen assembling anchor weights for OBS deployments.



Bernd Hermann concentrating on the miniscule wiring of A/D converters.

Thomas Brandt working on A/D converters for streamer segments.

Chief scientist Jörg Bialas discussing technical aspects with Thomas Brandt and Bernd Herrmann next to storage box with segments of the streamer systems.

Cord Papenberg and Dirk Kläschen pondering software problems.

Warner Brückmann calibrating pore pressure sensor for the first piezometer deployment.

West Nile Delta project: POSEIDON cruise P388, 19 July 2009

Start of scientific work

This weekend we finally started our scientific work program. After four days of transit we reached our target area, the West Nile Delta, on Saturday, 18 July. About 20 to 40 nautical

CTD releaser check: The acoustic releasers used for the OBS are fixed to the frame of the CTD probe. This allows collecting data for underwater sounding and simultaneously checking if the releasers are ready for use.

miles off Alexandria, we are going to study the mud volcanoes Giza and North Alex.
The first step that was taken after we had reached the working area was to lower a sound probe and the acoustic releasers to be used for the ocean bottom seismometers (OBS) to water depths of up to 1000 m. In bathymetric mapping, it is important to have a sound profile such as provided by the sound probe, on the basis of which sound beams are calculated correctly. Furthermore, the releaser check proved once more how important it is to run such tests as two of the devices did not work. An instrument equipped with one of these releasers would not have been able to return to the surface.
The first scientific data obtained on this cruise was provided by the long-term temperature probe installed on Giza mud volcano. The temperature lance has been collecting data for nine months. The data was retrieved using an acoustic modem.
Following extensive dry runs, 11 channels were configurated for our planned 3-D seismic acquisition system. We are thus encouraged to trust that the first use will be successful. We have not been able to prepare for the deployment at home, as vital parts of the system were delivered directly to the ship. This is the very first time that all the connections have been plugged.
The night was used to continue seafloor mapping, which had been started on our last cruise with R/V PELAGIA.

On Sunday, our new trawl doors were deployed and tested for the first time. Deploying and especially recovering the 2-m x 2.5-m-large doors that weigh about 1300 kg each demanded quite some skill on the part of the the boatswain and crew. The slightest movement may prompt them to drift away from the ship. Yet finally, this test run as well as the use of the specially developed GPS radio system were completed successfully.

The trawl doors are unhinged from their lashed position at the stern to be prepared for the first towing test.

In order to get an exact position of the trawl doors any time, we have developed a radio GPS system. The yellow housing has to be mounted at such a high point in order to freely transmit signals above the waves.

In the evening, a methane sensor was deployed in the middle of the area where ROV data had shown the highest density of active bubbling last year. Shortly afterwards, the first of the OBS that had been deployed here in November 2008 were recovered. All metal parts of the OBS are covered by a thin, yet hard crust which has to be removed by hammer. A first glance has confirmed that data recording has been successful. Now, we cannot wait to verify the quality of the data.

JB

Torge Matthiessen resorts to using a hammer. With gentle blows, he cleans away the crust which has enclosed all metal parts of the OBS within 9 months.

West Nile Delta project: POSEIDON cruise P388, 20 July 2009

Ups and Downs

In the morning of 20 July, all 6 ocean bottom seismometers (OBS) were recovered – that is, the instruments positioned at the seafloor were called by an acoustic retrieval signal which made them release the anchor that had kept them at the seafloor for 8 months. The instruments are equipped with floats which make them rise to the surface at a speed of 1.5 m/second, to be picked up by the ship. All 6 seismometers were retrieved, five of them have recorded a complete dataset of seismic activity of North Alex mud volcano starting

A leakage has caused the batteries of this OBS to explode - the electronic parts were completely destroyed by battery acid.

in November 2008. One of the instruments, however, had developed a leakage. Sea water entering at high pressure had caused the energy pack, consisting of lithium batteries, to virtually explode. As a result, the sensitive recording electronics were bathed in acid, which turned them into a shapeless mess of corroded hardware.

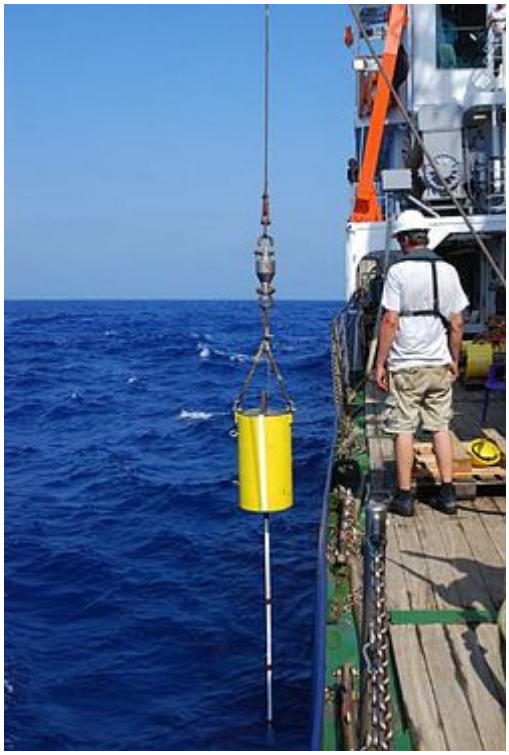
Rendezvous in the night: NORMAND NEPTUN is returning a lost OBS to the IFM-GEOMAR scientists.

Nevertheless, we can also report an unexpected OBS “recovery”: an instrument that had been deployed 10 months ago in the Aegean had popped up out of schedule and drifted the long way to the eastern Mediterranean, where it was found some weeks ago by the NORMAND NEPTUN, an Norwegian oil field supply ship. A nightly rendezvous of the two ships was arranged, during which the OBS was simply put into the water again, to be caught by a heaving line and be picked up by R/V POSEIDON. The instrument has survived its long journey without any major damage – it recorded continuously until the batteries went flat.

In the course of the day, all data was read out from the instruments and saved by backup copies. All instruments that were in working order were newly programmed and equipped with batteries to be deployed for the scheduled follow-up recording campaign. While programming goes on in the laboratories, a small group of scientists and technicians is working on deck, equipping the OBS and releasers with new anchors. Their task is complicated by waves that keep washing the deck from time to time.

Preparatoinof the OBS for their next deployment is complicated by high waves.

One group within the West Nile Delta project is cooperating with BP by performing a geotechnical survey of slope stability. For this purpose, on cruise



A piezometer is being deployed for testing.

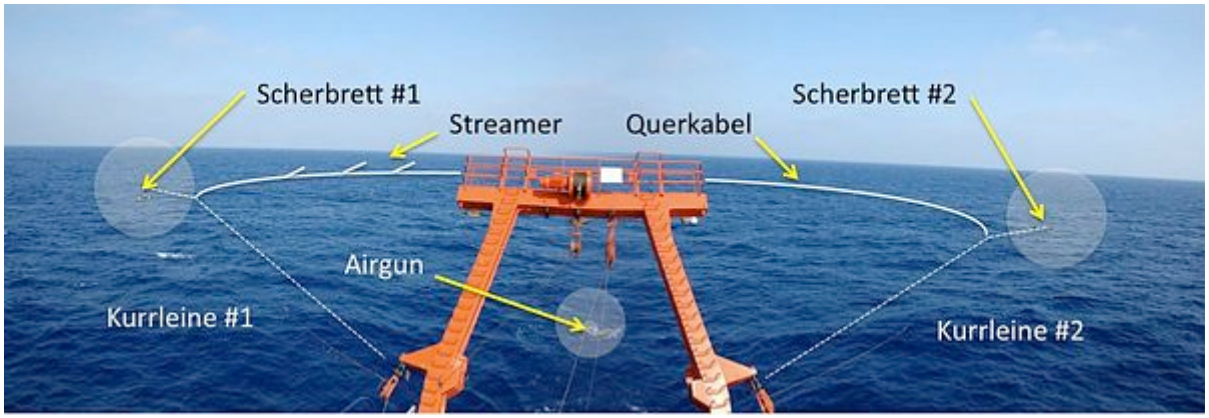
P388 several sites will be equipped with so-called piezometers, which are designed to determine pore pressure in the sediment. The piezometers can run for several years, recording changes of pressure conditions in the seafloor and serving as an early-warning system for slopes that are affected by an elevated risk of sliding. Several planned sites of installation are first visited to test handling and penetration of the lances, which are up to 10 m long, and to check the transmission of pressure data.

(WB)

West Nile Delta project: POSEIDON cruise P388, 21 July 2009

3-D seismics

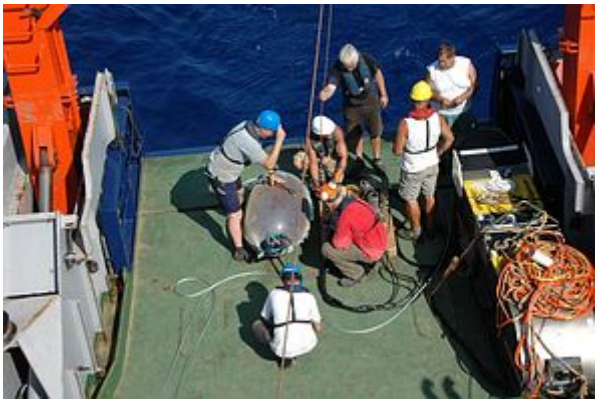
All twelve ocean bottom seismometers have been deployed. It is now time for the first regular operation of the new 3-D system, for which the trawl doors are deployed together with the streamer segments. With this system design, a cross wire is kept under tension between the trawl doors. Several streamers (acoustic signal receivers) are fixed to the cross wire so that they are towed in parallel. This way, spatial recording of signals (pulses of compressed air produced by a so-called airgun) is possible. The last evenings were used to fix the cross wire with the data cable and the streamer plugs. Now, it is slowly reeled off the winch, and the streamer sections are being attached. Look here for another schematic drawing.



A view to the aft shows the main components of the 3-D seismic system: Trawl doors, towing wires, cross wirewith streamers (schematic representation).

Subsequently, the signal source, a GI airgun, is deployed. Scientists and crew are working together for some finishing touches before the instrument is lowered into the water. Unless there are any failures, North Alex mud volcano will be covered by a dense grid of profiles during the next days.

Torge Matthiessen and Bernd Hermann are fixing floats to the streamer segments to prevent them from sinking too dee, so that the signal receivers are kept at the same level. The boatswain checks the wires and watches the trawl doors, which are still close to the ship.



Scientists and crew are giving some finishing touches to the airgun before it is lowered into the water.

Watchkeepers will be checking the control screens to see if all systems are working correctly. Dirk Klaeschen and Cord Papenberg are drawing profile plans and creating first seismic sections. These maps will be used to determine further profile coordinates in order to fill in gaps in data coverage.

(WB)

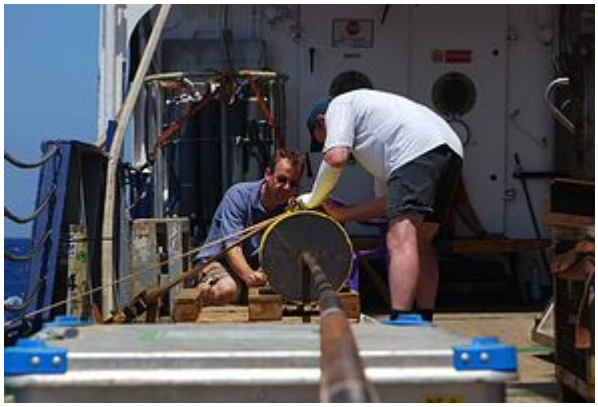
Cord Papenberg in front of his computer. Here, navigational information is checked and coverage is planned.

West Nile Delta project: POSEIDON cruise P388, 26 July 2009

Successful deployments

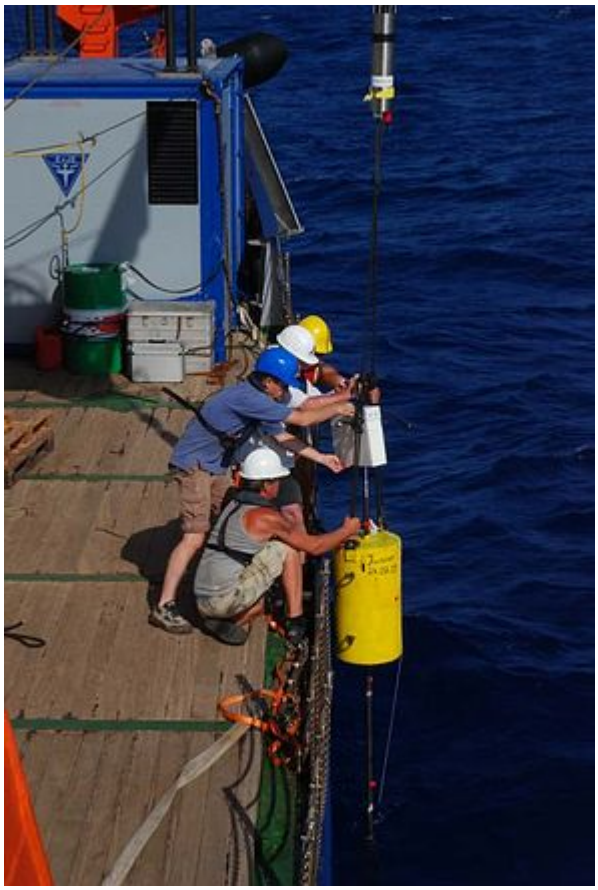
The first use of our 3-D seismic system was completed successfully after almost three days. A preliminary map shows that the centre of North Alex has been fully covered.

The colleagues of the piezometer group had been waiting in the wings during the seismic survey, ready for their turn. They immediately started their preparations: First, the heavy head weigth with its CPT threaded bar is installed and the permeable filter tip as well as the pressure-sealed connection for the data logger are mounted. Then, the weight with the lance is carefully lifted outboard and lowered into the water. As the pressure sensor will only work faultlessly if all internal connections are completely filled with sea water, the pressure data logger is only put on loosely on board. Only when in the water, it will be attached firmly. After assembly, the system will be lowered to the seafloor by winch. It will be disconnected from the rope by an acoustic receiver.

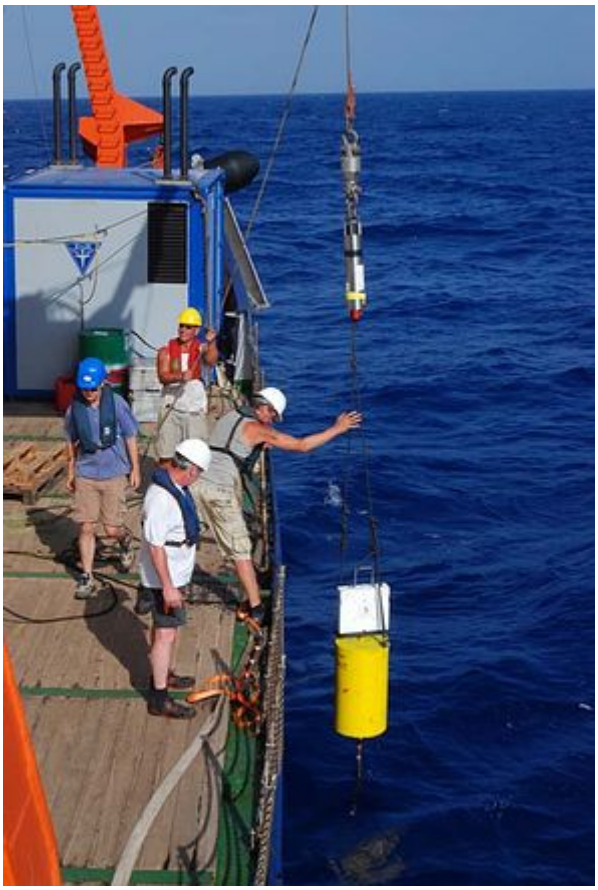


Warner Brückmann and Thomas Brandt preparing the piezometer lance

The tip of the piezometer lance is designed so that after it has entered into the sediment to depths of up to 10 m, a hydraulic connection can be made to the head of the piezometer lance, where a data logger can record changes of pore pressure for up to several years.



Attaching the piezometer data logger requires a concentrated joint effort of everyone involved in the deployment.



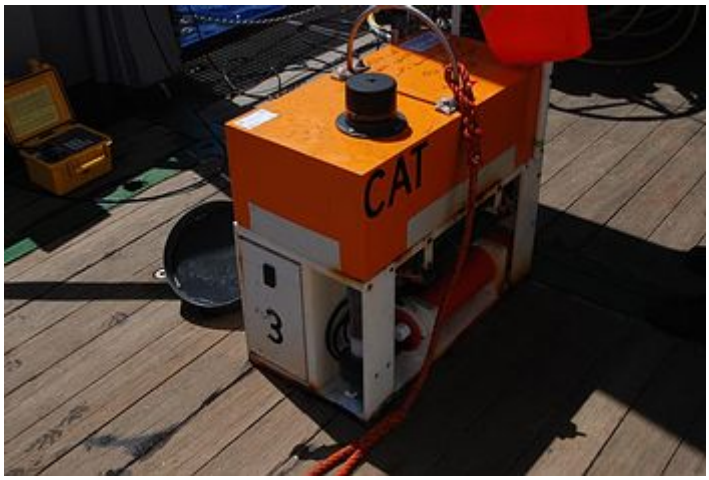
After all components have been assembled, the piezometer is ready for deployment.

The rest of the time was used to pick up further instruments. Among these are three tiltmeters, which were recovered from the seafloor. One of them was combined with a CATmeter, which

was mounted in the same frame. The tiltmeters are supposed to show whether events of high fluid/ gas seepage or elevated microseismicity are associated with continuous variations or even permanent changes of seafloor inclination in the mud volcano. By combining the two instruments, it was possible for the first time to monitor both parameters parallely at the same site.

In addition, one of the autonomous CAT meters was recovered. Samples of gas and water collected by the osmotic pump method will be subject to lab analysis in the next months. For this purpose, the teflon tube containing the water samples, which is about 80 m long, will be cut into smallest sections for individual chemical analysis. Based on the known constant pumping rate of the osmotic pump, this will result in a chronological succession of chemical parameters to be correlated with other time-dependent physical characteristics recorded during the last eight months, such as seismicity, temperature and deformation.

One more OBS has popped up. It can be seen floating by from the bulleye before it is picked up by the deck crew.



One of the autonomous CAT meters for measuring fluid and gas seeping is back on deck after having been installed at the seafloor for 8 months.

On the PELAGIA cruise in November 2008, we attached a CAT meter to a tiltmeter for the first time. This combination will allow to record both parameters, fluid seepage and change of inclination, at the same site.

West Nile Delta project: POSEIDON cruise P388, 29 July 2009

Number crunching

It is kind of a general rule that the last days of an expedition are a bustling time of rivalling interests and intense discussion concerning the agenda of the few remaining days and hours.

If, however, a cruise is as blessed with well-working instruments and good weather as ours, towards its end the scientists will devote themselves to a first interpretation of the collected data. From long-standing experience they know that the onboard time is the most fertile phase for joint data interpretation , allowing more extensive and more productive work than would be possible on land. All the labs are currently filled with activity as data from several deployments is being analysed and processed.

Dirk Kläschen and Cord Papenberg proudly present the first animated 3-D cube of time slices across the 3-D dataset of North Alex, which has been corrected for navigational errors and

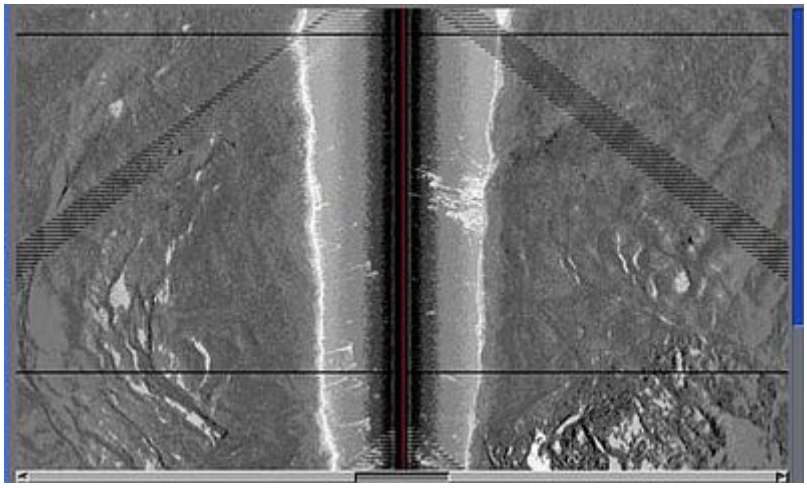
processed. Even this first version, created during several nights of programming work, already shows a clear three-dimensional image of the mud volcano.

A first round of 3-D processing is finished. For the first time in days…

…Dirk Kläschen can lean back and relax.

Layer by layer, the animation of the 3-D block takes viewers through North Alex mud volcano by horizontal sections.

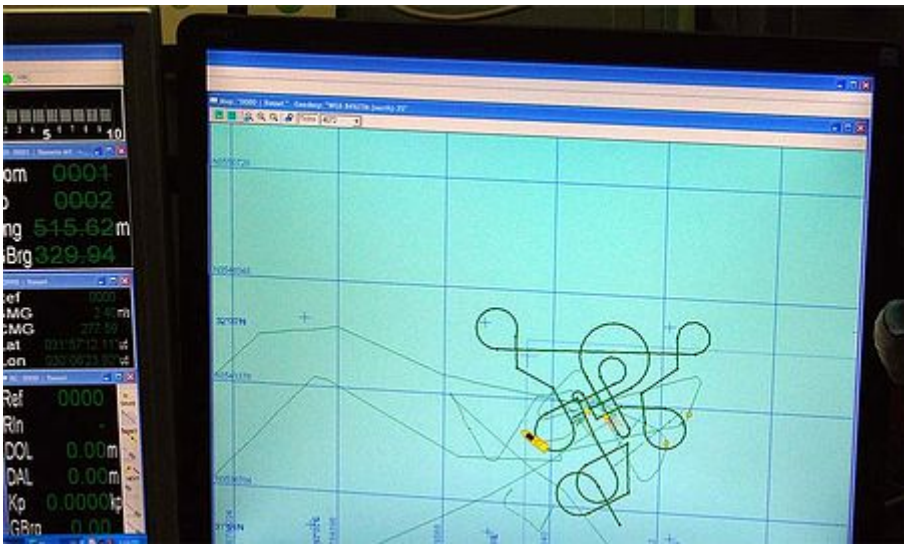
Ingo Klaucke has passed the last two days converting and processing side scan sonar data. He has mapped numerous gas flares in the working area. Especially the centre of North Alex looks impressing with a great number of gas flares.



A first, quickly filtered version of the sidescan data clearly shows suspicious areas where gas flares are visible.

Unfortunately, swell has been increasing since Tuesday evening, rendering any work with towed instruments impossible from Wednesday morning on. Chief scientist Jörg Bialas therefore draws a shortened agenda for Wednesday night. It consists of a complex shooting pattern for exact localization of the ocean bottom seismometers and identification of their components. This shooting plan is quite different from the usually straight geometry of regular geophysical profiles and therefore soon becomes a matter of discussion on board as “crop circles”.

(WB)



The tracking plan for OBS localisation is certain to cause some frowns on the bridge: “Gosh! That’s crop circles!”

West Nile Delta project: POSEIDON cruise P388, 31 July 2009

Transit

The station work of cruise P388 concluded on 30 July around midnight, whereupon R/V POSEIDON set off for its 800-nm-long transit from the West Nile Delta to Malta, where the ship is expected to arrive on Tuesday morning. The laboratories as well as the instruments on deck are being taken apart and packed. The deck crew has already taken the trawl doors to the afterdeck, where they have been safely stored. The streamer sections are being disconnected, the airgun needs complete dismantling and maintenance.

At the same time, we have started to draw up our cruise report, a preliminary version of which should be ready when we reach port in Malta.

(WB)

Cord Papenberg is merging several bathymetric datasets from the PELAGIA and POSEIDON cruises.

Torge Matthiessen and Jörg Bialas dismantling the airgun for thorough maintenance.

Bernd Herrmann, Ingo Klaucke and Hans-Otto Stange doing maintenance work on the side scan sonar system, which is placed on POSEIDON's afterdeck.

West Nile Delta project: POSEIDON cruise P388, 04 August 2009

Group photograph

Cruise POSEIDON P388 ended in the morning of 4 August 2009, when R/V POSEIDON reached the port of La Valletta, Malta. Loading work is in full swing.

The cruise participants are happy about the successful work and thank you for your interest in the cruise:

The P388 science crew. Above, from left to right: Bernd Hermann, Dirk Kläschen, Torge Matthiessen, Cord Papenberg, Klaus Cramer, Jörg Bialas. Below, from left to right: Warner Brückmann, Ingo Klaucke, Thomas Brandt.