MSM 16-3, PHAETON

3. weekly report

9.11.-15.11.2010

Mon 8.11.2010

During the night from Sun to Mon we moved southward while measuring a parasound section of the Timiris mud wedge at the edge of the southern Golfe d'Arguin in order to complete the profiling of this area. The day then was dedicated to sampling of the Timiris mud wedge by means of box coring and gravity coring. Seven cores were taken in order to gain a better understanding of the architecture of the sediment bodies on the shelf.

The map of the southernmost canyon off Cap Timiris was completed with a last multibeam survey at the canyon site during the following night, where the flourishing cold-water corals and deep-sea oysters where found last week. A 13-hour yoyo CTD was run in the canyon in order to gain data on the variability of oceanographic parameters during the tidal cycle.

Tue 9.11.2010

The yoyo CTD was completed at noon. The water column in the canyon clearly reflects the tidal cycle all the way down to 700 mwd. The oxygen level rises below 500 mwd, which corresponds to the coral window in the canyon. Also, the coral window is characterized by a drastic increase in turbidity.

After a short transit to an adjacent canyon head slope, we launched the ROV again in search for cold-water coral habitats. The ROV landed in muddy sediments that upslope rapidly changed to a rich *Lophelia*-dominated carpet including a rich associated fauna. Following this dive, we left the canyon-fissured area off northern Mauritania and headed south towards the open slope where we mapped a 30-mile-long sector with multibeam and parasound and documented the fascinating Timiris mound chain. This coral mound chain shows two parallel mound ridges in places. The deeper and outer mounds are forming arcuate ridges with summits in about 500 water depth, whereas the inner mounds are much more N-S elongated with average summit depths at 450 m. Lots of photoluminescent fish were seen from the vessel during this mapping survey.

Wed 10.11.2010

Two dives were carried out to explore the deeper and the shallower mounds. The deeper mound surveyed was plastered by trawl marks and destroyed coral framework. Only cerianthids (anemones) and crustaceans were common – and demersal fish. Near the summits, small *Lophelia* and *Madrepora* colonies grow on dead coral framework, but nowhere forming dense coral communities as seen in the canyons further north. The upper mound show no clear trawling impact but the fossil coral rubble and framework

was not re-colonised by live corals. Instead the summit area was covered by blocks of cemented coral hardground.

During the night, mapping was continued along the coral mound chains towards the south until a major canyon was reached that cuts the chains. Mound structures were detected on the canyon flanks.

Thu 11.11.2010

Returning to the ROV-position of Tuesday, sediment sampling took place by means of box coring and gravity coring in order to gain information on the development of the reefs through time, and in order to learn about the reasons for the status of the reefs – were the reefs already largely dead before trawling, or is trawling the reason for the underwater desert? Age dating will help to answer this question. The box cores confirmed the findings of the ROV dive, namely that the reef is heavily damaged and consists of coral rubble colonized by bryozoans, sponges, and hydrozoans. Both, the inner and outer ridge were sampled. As the gravity corer encountered technical problems, a yoyo CTD was run in the same area starting in the afternoon for 13 h and the remaining gravity cores of this area postponed until the next morning.

Fri 12.11.2010

Early Friday morning (5:30) the gravity coring was resumed, and cores reaching some 8 m in length were recovered. The longest core recovered here is expected to reach back into the "Saale" time, that is, the second to the last glacial. This will allow for judging the role of glacial vs. interglacial periods for the development of deep-water coral reefs in the area.

After coring, the Maria S. Merian transited back to the canyon mapped earlier this week. An ROV dive showed live *Lophelia* and abundant clusters of the giant bivalve *Acesta*, abundant crabs, and deep-sea oysters. The biodiversity was spectacular. Chemosynthetic bivalves (lucinids, thyasirids, vesicomyids) were identified next to *Lophelia* reef sites, continuing a pattern that we encountered all the way from the northernmost part of the study area to the current area of activity.

The night was spent on a yoyo CTD in the canyon.

Sat 13.11.2010

Coring of the coral facies in canyon area retrieved a core of 10 m in length. These long cores will allow for gaining an understanding of the evolution of reef growth, but also of the differences along the longitudes within Mauritania but also with other reef occurrences in the N-Atlantic. Interestingly, the different depth soundings with frequencies showed systematic differences where the CTD indicates a jump in turbidity. Apparently this highly turbid water is the environment where the reefs flourish.

An ROV dive in the canyon showed highly bioturbated sediment in the lower part of the flank but increasingly denser colonisation in an upward direction. The colonies are

dominated by *Madrepora* and as they are of similar size appear to be of the same age. Because of technical problems the dive had to be aborted in the afternoon.

Dinner was served as BBQ on deck. The weather was warm and calm, and crew and scientists enjoyed the evening.

During the evening and night, multibeam and parasound mapping continued southbound to the Banda Mounds off Nouakchott.

Sun 14.11.2010

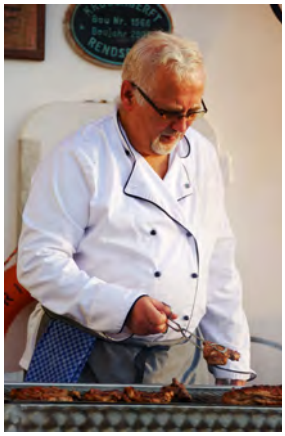
The Banda mound mapping was completed in the early morning. These mounds have been already intensely cored on RV Poseidon cruise 346 in 2006/7. Rough sea conditions lead to cancellation of the ROV dive. Instead, Van Veen grabs, gravity coring and a static CTD cast were carried out in this area. The afternoon was spent on mapping large slide scars that are populated by two chains of coral mounds. The mapping was completed in the evening and a yoyo CTD was started in an off-slope position off the Banda mounds.

The cruise is approaching its termination quickly now. The scientists are keen on finalizing the work on the coral mound chains off southern Mauritania, and the crew is very supportive. So far the expedition has been successful for all groups and projects involved, and the scientists have gained an understanding how the different working focuses are interconnected.

Prof. Dr. Hildegard Westphal
Chief Scientist on Maria S. Merian

Crab on the mud-sticking bivalve *Pinna*. Sample from Timiris mud wedge. (Photo: Nereo Preto)

Live deep-water coral *Madrepora* from canyon area.



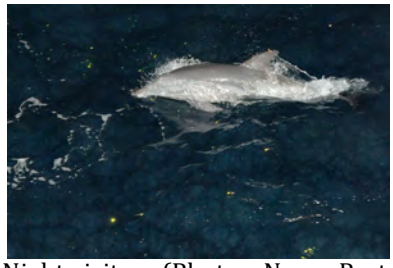
Cook Waldemar Arndt spoiling us yet once more (Photo: N Preto)

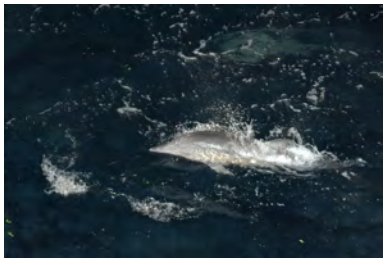
BBQ on deck on a wonderful Mauritanian evening (Photo: Nereo Preto).

Taking care or a gravity core (Photo: Steffen Hetzinger)

Happy Birthday to Norbert Bosselmann and Gerhard Müller! (Photos: Lydia Beuck, Nereo Preto)

Taking care of the samples taken with the ROV: André Freiwald, Nereo Preto, Claudia Wienberg, Lydia Beuck (Photo: Steffen Hetzinger)





Night visitors (Photos: Nereo Preto)