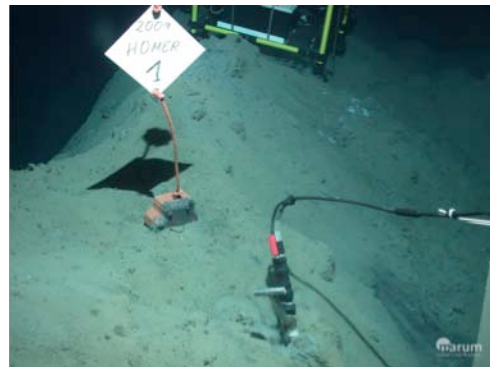


Second weekly report RV MERIAN MSM13-3
Expedition "HOMER"
01.11.-08.11.09



On the first November we carried out Dive 241 which was dedicated to in situ biogeochemical measurements to investigate changes in the geological and chemical drivers of chemosynthetic ecosystems in the second target area, a deep water mud volcano. We have studied this area already during the METEOR expedition M70/2 BIONIL in 2006. Coming back to the same chemosynthetic habitats three years later, we are totally surprised to find a rich world of bacteria, fish, crabs, worms and bivalves on the seafloor, and several different signs of a declining activity in mud volcanism. The heat flux transects carried out by the team from IfM GEOMAR show strongly decreased temperature gradients in the underlying seabed compared to 2006. The shape and morphology of the mud ripples indicate that the bottom currents have smoothed out the disturbed, ploughed appearance of the soft sediments, and bacterial mats as well as a variety of benthic fauna have started to populate the inner mud volcano center. Our geochemical measurements carried out during the next dives will show if the availability of energy from microbial redox reactions has increased or declined.



Before and after: The left image from 2006 shows the disturbed structure of the seabed looking like freshly ploughed sediments. On the right the structure is significantly smoothed after three years. We measure temperature and have deployed the microprofiler for measurements of benthic fluxes. Source: MARUM, University Bremen



In 2009 we find many crabs and fish to populate the inner center of the mud volcano, which were absent in 2006. Source: MARUM; University Bremen

The night of the 1-2 November was spent with heat flux and multibeam transects. Unfortunately, the next morning started with bad news: the weather situation had worsened, and wind and waves were too high for deploying QUEST.



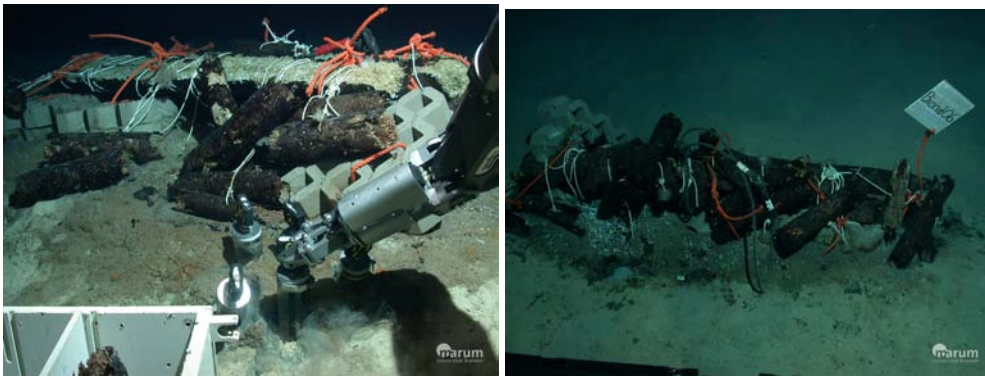
No weather for diving. Source: Gabi Schüssler

Our brave mapping team from MARUM was willing to use the bad weather time to continue with transects in our working area, looking for evidence of flares and bottom structures indicative of geological activity. And the bridge was so kind to alert us of every turn of the ship for a new transect, which caused quite some stomping and rolling. But as fast as the storm came it left us again, and already in the evening of the 3 November we could carry out a short dive 242. Unfortunately, the ROV sonar system broke, and we decided to get a replacement delivered to Limassol, to pick it up as soon as possible, because it is an essential tool in several scientific tasks. Luckily, this was already possible on the 5-6 November. And the 4 November brought back Mediterranean weather, with sun and blue skies, and a wonderful dive 243, during which we explored other chemosynthetic habitats on the flanks of the mud volcano. Again, it was surprising to see how rapid changes can occur in these deep water ecosystems. At a lateral mud flow visited already in 2006 during the BIONIL expedition, we detected new rivers of mud, a replacement of the mat forming bacteria by others, and the immense growth of giant tubeworms, which had developed from two small colonies to a large population surrounding the mud flows. Furthermore, we have started sampling the large DIWOOD sunken wood colonization experiments during dive 244 and 245 (for explanations see last blog). It is puzzling that two wood parcels deployed at the same time have had very different destinies. Closer to the mud flows, the wood was not very degraded, and a swarm of wood boring bivalves seems to have given up wood degradation early in the process. The more distant wood is almost completely

degraded – only bark is left and builds the home for some large crabs and sea urchins.



Tubeworm colonies populating the sulfidic mud flows on the flank of the mud volcano. A new bacterial mat has replaced the old one, and is surrounded by fresh flows. We use the MPI microprofiler for measurements of benthic fluxes. Source: MARUM, University Bremen



Experiment 4 (left): still some wood left over. Experiment 3 (right): only the bark remains. Source: MARUM, University Bremen

On 5 November, after dive 244, we steamed to Limassol to pick up the replacement sonar system. We used this occasion of the transit for celebrating two birthdays of scientists and crew, as well as for the midterm party “Bergfest”. Luckily we needed less than two hours for the pick up on Limassol anchorage and were ready for the next dive 245 with sonar in the morning of the 7 November. Today, on Sunday we started with two gravity cores to analyse the geochemical composition of the subsurface fluids in the center of the mud volcano. Afterwards, we were treated to a royal surprise lunch by our fabulous cook and his team, so that it really felt like Sunday – at least during lunch time.

The afternoon was spent on a short dive 246 to achieve a better mapping of flares and associated emissions from the seafloor, as well as carrying out more biogeochemical measurements. Just as I write, this Sunday ends with the ROV and the lift being recovered on deck. Unfortunately, it turns out that the cable of the ROV is again broken and needs a major repair. So I have to run to create a new station plan, but would like to use the occasion to cordially greet family and friends of all participants of the expedition HOMER MSM13-3.



*Sampling of subsurface fluids with rhizones from muds retrieved with a gravity corer. How convenient, that the in situ temperature is almost the same as on deck.
Source: Gabi Schüssler*

Please find more information on this expedition on our weblog
[http://www.mpi-bremen.de/
European_scientists_at_sea_A_scientific_weblog.html](http://www.mpi-bremen.de/European_scientists_at_sea_A_scientific_weblog.html) (updated every 3-4 days)

All the best

Antje Boetius
Chief scientist