

At Håkon Mosby Mud Volcano

Shortly before midnight of July 18 we finished our last station work including CTD and multicorer at Hausgarten and set sail towards the Hakon Mosby Mud Volcano (HMMV) some 430 nautical miles away to the south. The wind was blowing constantly from northern directions, so „Polarstern“ sailed smoothly during our transit on Sunday.

On Monday, July 20, we reached our second target area at 72 ° northern latitude and 14 ° eastern longitude after lunch. The main task of this week was the installation of an observatory called LOOME (LOng term Observations of Mud volcano Eruptions). LOOME is a demonstration mission for the long-term observation of a major site of methane emission from the deep European margin, the Håkon Mosby mud volcano (HMMV). It is one of the few selected missions of the EU funded project ESONET (European Seas Observatory NETwork). The HMMV is a cold seep ecosystem located at a water depth of 1250 m on the SW Barents Sea slope off Norway. The mud volcano is ca 1,4 km in diameter, but its seabed features reach only up to 15 m in height. The volcano sits on top of a giant gas chimney forming a window to the deep subsurface down to 3 kilometers from where warm mud and methane-rich fluids rise upwards towards the cold seafloor.

All onboard were of course very much interested to see the first video transmissions from the seafloor by the ROV QUEST. However, we had to wait patiently since strong winds from northern direction induced a swell so that the stern of „Polarstern“ was heaving up to three meters - too much for safe deployment. Other station work was done instead using the shipboard winches for multicorer, temperature lance and others. Early Wednesday morning the wind together with the swell had decreased and the ROV QUEST was finally send down to the seafloor which needs about one hour at 1250 m water depth. One of the first tasks was the localization of the 12 m long temperature lance and pore pressure probe (Piezometer) of IFREMER which had been deployed the year before by the Norwegian research vessel „Jan Mayen“. After some time at the seafloor the ROV – team localized the lance sticking half in the soft sediments. A cable with a hook was lowered with one of the ships winches and attached with one of the manipulator arms of QUEST to the upper part of the lance, which was then carefully recovered. Along the lance there are temperature sensors, which had measured subsurface sediment temperature over the past year. As seafloor temperature and pore pressure are related to the activity of the HMMV, this will help to improve our

understanding of the temporal variability of mud volcanism. A similar approach but with higher spatial resolution was done by ship based temperature lance measurements across the HMMV during the night from Wednesday to Thursday. The intention here was to find the „hot spot“, e.g. the most active centre of the mud volcano. Based on previous studies over the last years the „hot spot“ was confirmed in the northern part of the mud volcano centre, characterized by rather fresh mud flows and gas dilatation of the seafloor. At less than 2 meters below sediment surface temperatures of about 30°C were recorded in the seafloor. This is an enormous temperature gradient taking into account that seawater temperature close to the bottom is only – 0.8 °C.

The Håkon Mosby Mud Volcano appears extraordinarily active this year. Parasound mapping and ROV observations - both visually and acoustically - have shown numerous gas flares in the centre and around the elevated rim of the HMMV. A second dive plan of the ROV was designed to locate among other objectives a good location at the seafloor where to deploy the control node of the LOOME observatory. Due to joint efforts of IFREMER, AWI and MPI in 2003 we have an outstanding high-resolution bathymetry chart of the HMMV so that a very suitable site was found shortly after arrival at the seafloor with QUEST. Other objectives of this dive was push coring and sampling of experiments, which were deployed during previous expeditions at the bottom.

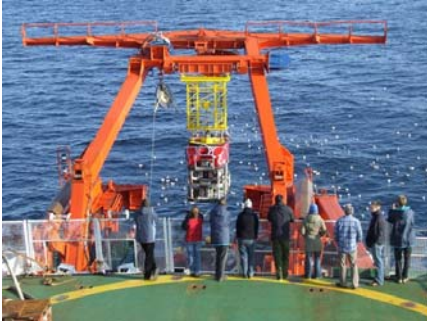
On Friday afternoon the 3 meters high LOOME observatory including various sensors was lowered and deployed on the spot. Subsequently the ROV was sent down again for a very successful dive – all sensors of MPI and IFM-GEOMAR connected via 100 m long cables were precisely positioned with the help of the manipulator arms. Camera, sonar and seismic devices from IFREMER, MARUM and University of Tromsø, respectively, will continuously monitor biological activity and gas expulsion in the vicinity of the observatory. Hydrographic modules contributed by MPI and AWI will record the temporal variability of physical and chemical parameters. Thus, an important milestone in our expedition programme and within the ESONET project was reached: to demonstrate that European marine research institutes have the capacity and expertise to design and install such rather complex deep-sea technology in the ocean.

It is Saturday evening and while writing this second cruise report, the ROV QUEST is again at the seafloor of the Håkon Mosby and delivers fantastic deep-sea imagery to the „Polarstern“. At the same time the midnight sun has generated a beautiful scenery at the horizon which makes it difficult to decide which events to watch.

All feel well onboard and send their wishes

Michael Klages

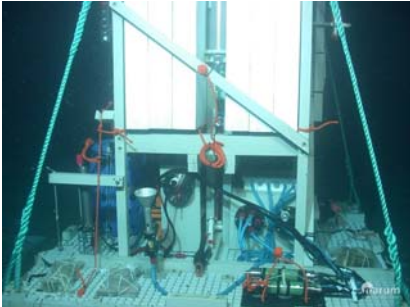
Picture Gallery



The deployment of the ROV QUEST observed from shipboard and seaside (photo: Melanie Dillon, Fielax)



Sampling of a large hydrate and gas structure which has emanated from the seafloor (photo: MARUM, University Bremen)



The LOOME observatory control node. Here data of 12 different instruments are stored, some of which can be read out online under water by the ROV (photo: MARUM, University Bremen)



The IFREMER temperature lance after one year of deployment, shortly before its recovery by QUEST. It has penetrated gas hydrate and measures subsurface and surface temperatures (photo: MARUM, University Bremen)