

M67/2b – 3. and last weekly report 15. - 24.4.2006

The last week of our research cruise our work was in the beginning quite labour intensive, however, this changed on the transit to Bridgetown and throughout Easter days. First we tried with the 3 meter long gravity corer to sample the deeper sediment of the active fluid- and gas seeps on the asphalt volcano "Chapopote". This happened with different stage of success, in which variable sedimentation-milieus of the cold seeps could be sampled through a depth of 1,5 m. One of the sediment cores contained oil-saturated sediment, which was underplayed by layers of mussel shells. The shells contained several centimetre long housings of the chemosynthetic mussel of the family Vescomyidae, which is known from submersible observations to be a characteristic habitant of cold seep areas on the seafloor. Another gravity corer deployment recovered a pure 90 cm asphalt core. This core contained throughout pores filled with methane hydrate. Because methane hydrates are not stable under atmospheric conditions on deck, we observed bubbling methane escaping from the pores of the asphalt core.

After finishing the gravity coring, we performed the last dive of the cruise, which turned out to become the longest dive with more than 18 hours bottom time. Scientific aim of this dive was the investigation of geochemical gradients and fluxes of oily and asphalt-like seep sediments with different of in-situ methods. To fulfil this task, Quest was packed with instruments and scientific payload prior to deployment. Two devices – a benthic chamber and an in-situ pore water sampler, where initially parked at touch down to allow Quest to search for bacterial mats. These are abundant in the marginal areas of asphalt covered zones on the seafloor, and document very active zones. Here the in-situ devices where deployed, and a set of push cores was taken precisely positioned, which can only be achieved with an ROV or submersible. During recovery of the cores from the sediment, rising oil drops were sometimes observed. During the second half of the dive, the benthic chamber was deployed onto a fresh-looking asphalt surface, being covered with a white bacterial mat. A dominant oxygen depletion inside the chamber is probably due to a high microbial activity above the fresh asphalt, whereas the flux is most probably due to the asphalt itself. Continuing the dive, a zone with rising gas bubbles through the water column was investigated. Although this area is situated only some 200 m apart from the last position, it shows a different cold seep habitat. The seafloor here consists of heavily altered asphalt, which is clearly recognizable due to the dark colour. Also, the biological facies of the active seeps is different. Pgonophores are dominant aside to mussels being known as chemosynthetic organisms, which are mixed with other sessile, coral or sponge-like organisms (see figure). Vagile animals, such as crabs, snails or sea cucumbers are abundant in this zone around 3000m as well. Gas bubbles detected in the water column were followed until their origin at the sea floor, where surprisingly gas hydrates of some cm thickness were found. Such hydrate structures were found at different gas bubble seeps and are probably connected to the free methane which immediately forms hydrate under high pressure in contact to the cold water.

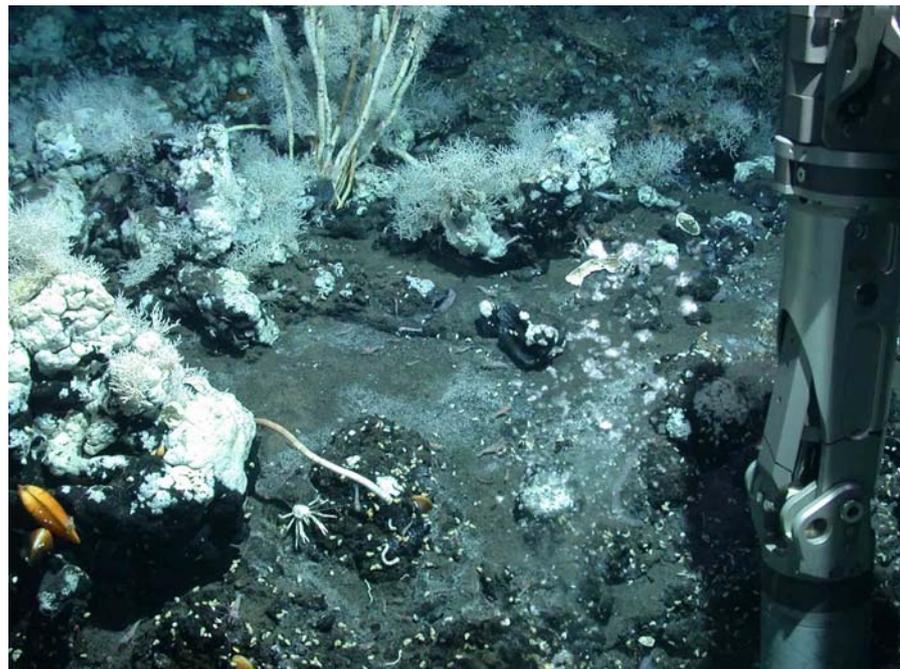
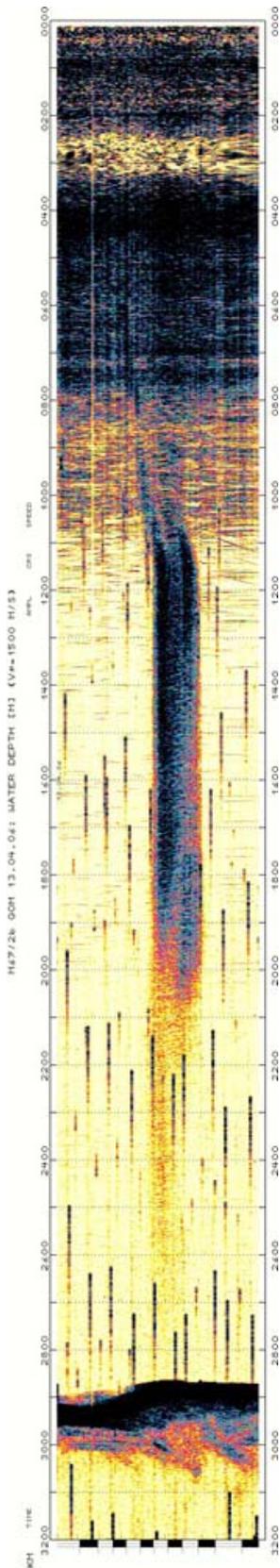
During ascent of the ROV we could follow the gas seep at a distance around 20m, visible as an acoustic anomaly in the sonar, all the way up to 600 m depth. This confirmation of an active gas seep can be connected with those gas observations at Chapopote performed with the new 18 kHz Parasound System.

After these exciting and scientifically very successful dive and a short following sampling campaign, we finished the scientific stations and METEOR steamed towards Progreso on Yucatan, where we said Good Bye to our Mexican and US American colleagues during the Easter Sunday evening. The seven days lasting transit towards Barbados, where we plan to arrive on schedule on Monday 24th of April, we use for examination of the samples and scientific results, for the preparation of the cruise report, and for daily seminars to discuss the scientific results of the cruise. Although both legs M67-2a and 2b where dealing with a variety of technical problems, they where finished with mostly very successful results. This is also due to the enthusiasm of all participants, especially of the ROV team and Captain Kull and his crew of the METEOR. Many thanks for the great support.

With best regards from all participants of Meteor M67/2 out of the American Mediterranean Sea, being still 250 nm away from the harbour in Bridgetown.

Best regards from all,

Gerhard Bohrmann, den 23. April 2006



Figures: A gas bubble seep from 2900 m water depth, acoustically detected with the new Parasound system (left side). Heterogeneous faunal assemblages of a cold seep community (right side) on the asphalt volcano "Chapopote" in 3000 m depth. (image from ROV QUEST, Marum)

