

Expedition METEOR 84/2



2nd Weekly Report: 28 February – 6 March 2011

During the second week of our cruise first of all we investigated methane emissions in the western working area of the Turkish sector. If free methane escapes from the seafloor deeper than 750m water depth the emission of gas is always associated with methane hydrate occurrence in the sediments. The 750m water depth at 9°C marks the upper stability boundary for methane hydrate of structure I within the Black Sea. For different reasons we want to examine more in detail those methane hydrate occurrences during our 5-weeks expedition in the Black Sea. Earlier samplings could prove methane hydrates down in the sediment to about 3-4m below seafloor, and with the portable drilling system MeBo we can penetrate the sediments even deeper, to understand also there the methane hydrate spreading. There is the imagination that a relatively high quantity of methane hydrate occurrences exists in the oceans – thus there are only few quantitative measurements are available which could give a solid estimation on this. With our drillings we want to give a contribution regarding the distribution and quantification of methane hydrates in the Black Sea. For this we took advantage of any preliminary investigation, and we plan drilling profiles with the Bremen seafloor drill rig (Fig. 1) in two areas of Turkey (Eregli and Samsun), in Georgia and towards the end of the cruise also in Ukraine.



Fig. 1: The seafloor drill rig just before its deployment on the working deck of R/V METEOR (left); MeBo being deployed towards the stern and tilted to the vertical before the device will go down to the seafloor (right; Volker Diekamp, MARUM, Bremen).

The acoustic systems of R/V METEOR, the multibeam echosounders EM122 and EM710 and the Parasound system are the most important tools we apply during our search for methane hydrate occurrences. For instance we intensively applied these echo sounders in the western Turkish work area of Eregli in water depths around 1000m on a plateau-like ridge, framed by two canyon systems. We had in hands a sidescan sonar map from a former cruise of R/V POSEIDON showing round structures on the seafloor of about 350m in diameter and giving a hint on gas and gas hydrate. These round gas ascent zones in the sediments could be traced in the backscatter signals of the new EM122 mapping whereas we found more than twice as many of those structures. The result was really amazing, and we can say that the EM122 system installed last year on RV METEOR enables a highly

expanded application compared with the former EM120 system. Further for the first time also gas emissions in the water column can systematically be detected (Fig. 2 left) which up to now could only be visualised directly under the ship with Parasound. So this means another technical renewal we can immediately apply during our scientific investigations. Drilling with MeBo at Ereğli Seep showed only a drilling result of a few meters, at least it sampled young sediments of the classic Black Sea sequence which we could not have sampled with the gravity corer in this area with considerably higher sedimentation rates. Further drillings in this area we saved for our way back to Istanbul

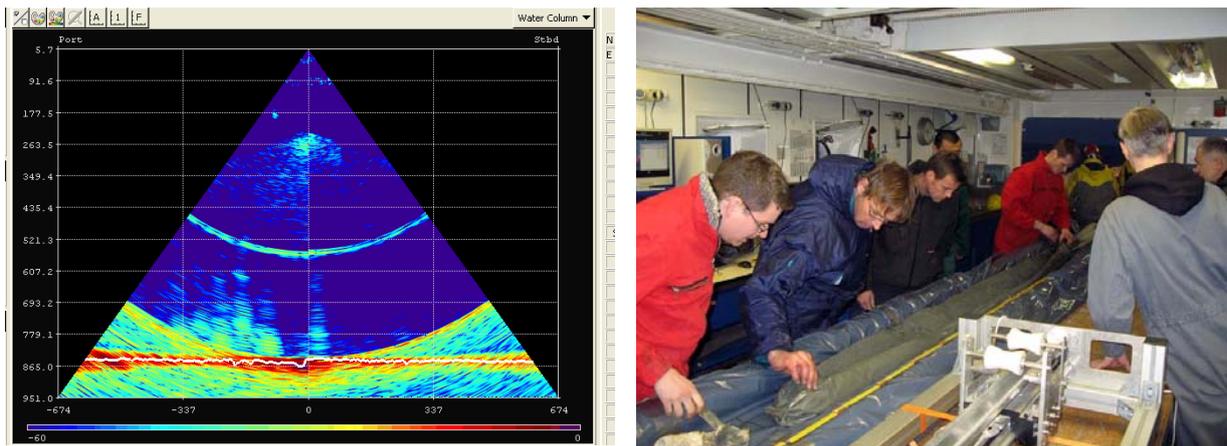


Fig.2: The fan recording of EM122t showing clear acoustic anomalies in the water column, originating from methane emissions at the seafloor (left). Gravity core sampling in the Geolab (right).

The further course of the expedition followed the Turkish Black Sea coast to the East into the next working area near the city of Samsun. Also there, in the later process of the cruise, drillings shall be accomplished at Archangelski Ridge. The side strip was only short, and our course led us to the Georgian continental margin – our main work area. We arrived there on Thursday, 3 March, and also here we started with the acoustic systems to map known seep structures whose activity is documented for several years already, in order to understand the dynamic of a methane hydrate area over a longer period. For instance we have an area at Batumi seep of half a square kilometre size whose gas hydrate presence in the upper 2.5m of sediments was quantified to represent 5,000-10,000 tons of methane. Along the gas flow of free methane in the water column is in the range of 55×10^6 mol per year and seems considerably increased during our actual mission. The weekend brought us fantastic weather which did not only give good conditions for the deployment of our devices but also a spectacular view on the surrounding snow-covered mountains in the southeasternmost corner of the Black Sea. About 50m from the coast, in the South, we could see the mountain chain of the Eastern Pontides in Turkey, whereas the eastside gave a free view on the as well deeply snow-covered mountain chain of the Caucasus. In between we saw the more than 5,600m high twin peak of the Elbrus Mountains.

Everyone on board is fine. On behalf of the cruise participants,

Gerhard Bohrmann

RV METEOR Sunday, 6th March 2011

Further information on the cruise (in German): http://www.marum.de/Logbuch_Meteor_84/2