

Expedition METEOR 84/2



4th Weekly Report: 14.03. – 20.03.2011

At the beginning the fourth week of the cruise was related to an intensive sampling program at the different seep locations in Georgia. On this occasion for the first time during this cruise the dynamic autoclave piston corer (DAPC) could be deployed for sampling the upper 250cm of the sediments. Besides the sediments also gases and gas hydrates were sampled under in-situ pressure of the seafloor in the pressure-tight autoclave. While during the normal sampling using the gravity corer the gas fractions get lost in high quantity and the gas hydrates decompose because of the pressure reduction during heaving, the gases and gas hydrates in the autoclave survive and allow a quantitative determination. The DAPC deployment at Poti-Seep was successful, more than 230 Litres of gas could be determined corresponding to 15-25% of an average gas hydrate concentration. This average concentration which was confirmed in further measurements can be well integrated by an estimation of the area based on our backscatter map, so that we can develop a pretty precise estimation on the gas hydrate content in the entire seep area.



Fig. 1: First deployment of the dynamic autoclave piston corer (DAPC) at Poti Seep (left). After recovering the DAPC the lower core tube will be removed and the real autoclave is vertically posted, so that a quantitative degassing upwards will be easier. A critical moment after removing the protective cover is the metering of the pressure from the manometer (right). In this case we succeeded in keeping the pressure of the seafloor at about 100 bar.

In the further course we could recover gas hydrates from all the seeps we know in the working area in Georgia and also at three completely new locations, and will analyse them in our labs onshore for their composition and structure. These new seeps we had discovered by their oil slicks shown in satellite imaging. The hydro-acoustic measurements of these oil seeps showed that they are connected to gas emissions, and the sampling proved that near the seafloor gas hydrates can be encountered. The gas-chromatographic analyses we made on board with regard to the gas composition showed that we already now have quite different sources, whereas the deep thermogenic gas sources can clearly be distinguished from the biogenic generated methane sources. According to the different gases also different gas hydrate structures should exist which we will only be able to examine at home only.

After this intensive deployment of our devices we left the working area in Georgia on Tuesday and arrived at the Samsun working area in Turkey after a 7-hour transit. Also here several areas with a higher backscatter signal on the seafloor in 1,200-1,400m water depth were known from former expeditions, and we had the suspicion that also these were gas emissions on the seafloor. Here again we used the EM122 and tried to compare the backscatter pattern measured with the deep-towed Sidescan Sonar with the backscatter images of the EM122 mapping. We were surprised to find identical figures of structures in the areas of the overlapping measurements, which made us map the entire ridge during the first night. We found that we could trace 22 areas with higher backscatter signals along the approx. 25km ridge, half of the patches showing active gas emissions to the water column. A sampling program with the gravity corer on five of these patches with higher backscatter proved that everywhere gas hydrate was abundant so that we could clearly document the rise of gas from the underground. The gas emissions seem to follow a tectonic line. As the ridge up to now was unnamed, and we intend to publish our investigations, we named this ridge in accordance with our Turkish colleagues on board "Ordu Ridge". The ridge can be morphologically clearly separated and is situated in a South/North prolongation of the provincial town Ordu, so that we think to have found a suitable name for our subject matter of investigation.



Fig. 2: White gas hydrate layers are also found in the sediments of the Turkish working area Samsun (left), View on the helmstand on the bridge during the entrance to the port of Trabzon (right; Photos Volker Diekamp, MARUM, Bremen).

On Thursday the METEOR entered the port of Trabzon in order to embark part of the scientific crew and also the expedition equipment on Thursday and Friday. We were glad about the spring-like weather, and most of us took the opportunity to discover the quite interesting area between the Black Sea coast and the high mountains. On Saturday we moved back to the Samsun working area where we will accomplish our final investigations. After that we plan to accomplish further scientific work in the Ukraine, which will be reported next week.

On behalf of the cruise participants

Gerhard Bohrmann

RV METEOR, Sunday 20 March 2011

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