

M72/3 – weekly report no 3: 30 March – 5 April 2007

After one day of sailing from the Ukrainian Sorokin Trough to the Georgian continental margin offshore Batumi we reached the area of Batumi seeps, for which the M72/3 scientists had already carefully prepared further dives with ROV QUEST. Major support for the preparation of these dives came from the newly installed sonar systems onboard of RV METEOR. In particular the EM710 multibeam system, which is normally used for bathymetry in shallow waters, was used during the first week for detecting gas bubble emanations over the entire 2-km wide swath. By using this method 150-250 individual gas seeps which cluster at 10 locations were identified in an area of 1.2 x 0.9 km which is named the Batumi Seeps. For the purpose of using the same names for locations we used numbers for these clusters (# 1 to # 10). During the dives in the Batumi Seeps area all ten clusters were inspected and at each of the ten clusters several active bubble streams have been detected, which is a perfect confirmation that the acoustically detected flares by EM710 are really representing bubble streams emanating from the seafloor. Temporal changes in seepage activity have been obvious (Fig. 1). Such variations are generally related to tidal changes, but should not play an important role in the Black Sea, where tidal variations are very small.



Figure 1: Active bubble sites of Batumi Seep Cluster 9 with strongly changing bubble activities in 850 m water depth. Left image: vigorously rising bubble streams which form fountains. Right: Similar view of the same location, when only one individual bubble stream is currently active. Images from ROV QUEST (MARUM)

Besides regional mapping of bubble streams using all systems from the ROV or the hull-mounted echosounder systems of the ship, quantification of the gas amount from single bubble streams was only possible by using the ROV QUEST. We therefore used various sizes of plastic bags with known volumes. The bag was put on the bubble stream with the aperture facing down, so that the upward moving gas is collected in the bag. The volume of the bag which was filled per time defines the amount of bubbles escaping from the seafloor (Fig. 2). Although this method seems to be quite simple, it is very efficient in determining the amount of emanating gas. The ninth dive of the ROV, which is official dive number 163 of ROV QUEST ended the diving program of sub-leg M73/3a with a total bottom time of 80 hours. This successful diving program included many highlights and gave us essential new insights into the fluid and gas circulation on the sea bed of the Black Sea. Many thanks to the ROV team for their untiring efforts to make the scientific diving program a success.

The last two days of leg 3a were dedicated at sampling sediment cores from specific site of interest. The autoclave piston corer was used twice in addition to several gravity cores in order to sample gas hydrates at the gas seeps from the Batumi Seeps as well as the hydrocarbon seeps from Colkhetti Seep. The two locations represent completely different cold seep types. While the Batumi Seeps are characterised by methane hydrates with small amounts of ethane form structure-I hydrates, the Colkhetti Seep involves higher hydrocarbons, which cannot be included in structure-I hydrates. As a consequence mixed hydrates should occur.

Sampling was successful at Colkheti Seep and gas hydrates have been recovered and stored in liquid nitrogen at -190° C for transportation to further shore-based studies.



Abbildung 2: Single bubble streams emanating from the seafloor leave individual holes in the seabed in 850 m water depth (left), from which the wall structures document the youngest sediments like the whitish coccolith ooze layers. Right image: One of two bubble streams is caught in plastic bag on the manipulator arm of ROV QUEST. By measuring time and volume a simple quantification of methane release from the seafloor is possible. Images taken by ROV QUEST (MARUM)

At the end of sub-leg M72/3a RV METEOR came to the port of Trabzon (Turkey) on Tuesday April 3, 2007, at 8:00 a.m. local time. Eighteen scientists, technicians, engineers and ROV pilots disembarked in Trabzon, and four containers containing ROV QUEST and its equipment were unloaded. New equipment for the upcoming seismic investigations, like the compressor container and the streamer winch were loaded. Among the equipment we took on board was a 12-m-long, 4-m-high and 22-tons heavy trailer which contains two completely installed labs for running medical computer-tomography (CT) scanners. The CT-scanner will be used for imaging small-scale structures of gas-hydrate samples within the autoclave chambers. Before the laboratory trailer was loaded by the crane a platform, made of several layers of wood beams, was built in order to distribute the heavy load on the working deck. The work in the port of Trabzon could be finished by the end of the day and RV METEOR could start sailing with a new scientific party at the end of that same day.

On the following day, Thursday, 5 April, mapping of sediments and bathymetry by Parasound and the EM120 started along the Georgian continental margin, followed by a first multi-channel seismic survey over the Gudauta Ridge.

We wish everyone a "Happy Easter" and send our regards from the Black Sea.

In the name of all cruise participants

Gerhard Bohrmann,

FS METEOR April 5, 2007