R/V MARIA S. MERIAN Cruise MSM 15/2

Third and last Weekly Report: 24 May – 1 June, 2010

After a 24-hour transit from the first research area at Ukraine through the Russian sector arriving in the Georgian territory, on our way to the Batumi seep area, we approached a location whose position was known to us due to SAR slick analyses. There had been observed an oil slick on the water surface in several image series for a longer time which is fed by a source at the sea bottom. Actually we found a broad acoustic anomaly in the water column which indicates a gas emission site at the seafloor. Later during the expedition we wanted to verify the hypothesis that oil and gas escape together from the seafloor. First of all we now had to accomplish a dive at the Batumi seep area. There, in an area of about one km², occur about 25 gas bubble streams in 10 distinguishable clusters. This is the area in the Black Sea with the strongest gas emission within the gas hydrate stability zone, and we have been prepared for an intense diving program here and at two oil seeps close by. During the first dive we analysed three of the known Batumi clusters, and a sonar module (called ASSMO) which would register the gas bubble streams for several days was left at cluster 3. After this first successful dive we accomplished an AUV mapping dive at the Colkheti oil seep which is about 12km away. While AUV SEAL mapped its programmed track at the ground we could take first oil samples from the water surface in a rubber boat. In the late afternoon we were called by the German Embassy in Tbilisi advising us to stop our work. Although we had obtained an official research permission from Georgian authorities we were ordered to cease our work. The reason was that there were still some open questions on our research. As the following day was a Georgian holiday and we could already see the end of our cruise we decided to leave Georgia and to use the remaining time in Ukraine.

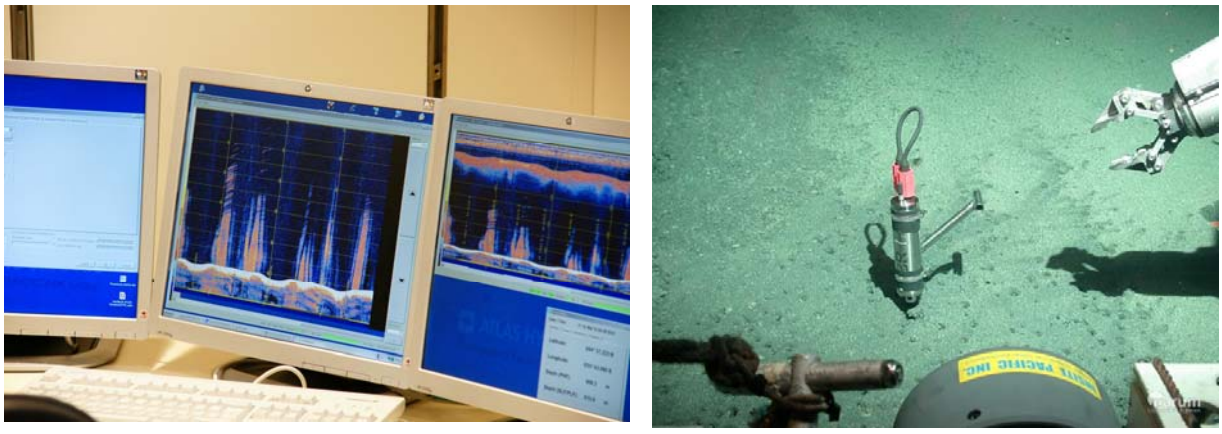

Fig. 1: While most of the geo scientists analyse the sediments below the seafloor with the sediment echosound Parasound, we mainly have a look on the anomalies in the water column (flares) during our expedition. Numerous anomalies which are caused by gas emissions are found in the western Sorokin Trough (left) above the seafloor. At the seafloor different devices were operated by ROV QUEST. Here the T-stick measures the seabed temperature in 8 different depths in a gas emission area (right). After 10 minutes the ROV arm picks the T-stick up again.

After a short dive to recover the ASSMO we steamed back to the eastern Sorokin Trough in Ukraine where the remaining four days would be used for detailed verification of three gas seeps. Those were the Kerch flare, the Helgoland mud volcano and a gas escape in 1700m water depth connected to a fault. We produced detailed micro-bathymetric maps of all the

three locations with the AUV SEAL 5000 giving us high-definition orientation for the accomplished ROV dives, so that our sampling and measuring program was efficient and under complete consideration of the geological structures. The escaping gas could be successfully sampled at all the emission places so that we have information about their chemical composition and at the same time obtain important information about the sources. The fluxes of numerous bubble streams could successfully be defined, so that considering the exact seafloor mapping we could cover the regional extension of each seep. Due to this we will be able to present a quantification of gas emissions from the deep gas seeps of the Sorokin Trough soon after the analysis of the expedition, so that the scientific goal of the expedition has been reached. We are very glad about this because the technical challenge of this expedition was very high, and we are well aware that technical problems could heavily diminish the success of an expedition.

Fig. 2: Before the ROV QUEST dive all the scientific devices are placed in the vehicle. Miriam Römer and Stephan Klapp just have prepared some gas bubble samplers and now prepare a sketch about the position of the devices so that the pilots can grab the right one during the dive (left). Carefully the ROV QUEST is being launched at the A-frame of the vessel (right) for the next dive.

The cruise is coming to an end, today on Monday we will go through Bosporus, Marmara Sea and Dardanelles towards the Mediterranean Sea where we are scheduled to disembark on Wednesday in the port of Piraeus. We thank both captains, Friedhelm von Staa and Ralf Schmidt, and also their crew for the outstanding support of our scientific work on board the research vessel. At the same time we thank both teams of ROV and AUV, without their achievements we would not have reached our scientific goals.

Greeting on behalf of the participants for the last time from MSM15/2
Gerhard Bohrmann

R/V MARIA S. MERIAN, 31 May 2010

Further information about the expedition (in German): http://www.marum.de/Expeditions-Logbuch.html