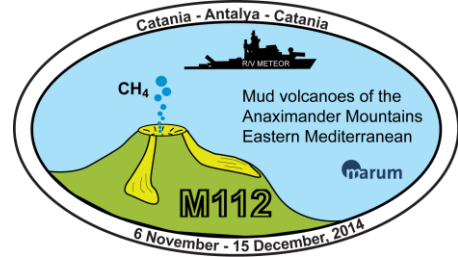


Expedition METEOR 112

4th Weekly Report: 24 – 30 November 2014



After leaving the port of Catania last Saturday we focused on mapping the seafloor in the southern part of our working area using the hull-mounted multibeam sonar. In addition to looking for new mud volcanoes, we simultaneously prospected for gas emission sites on the seafloor. The Spartivento and Crotone fore-arc basin, as well as part of the inner pre-Messinian accretionary wedge were in our focus, but now we concentrate on further tectonic segments from the outer part of the Calabrian Arc. From a long mapping profile across a major part of the tectonic sections of the Calabrian Arc, we now have a very good impression of the complexity of this part of the collision zone between Africa and Europe. An extremely high quantity of closely folded ridge segments alternate with intercalated sediment basins that document the higher complexity of this accretionary wedge relative to others. A further complication of this system is the presence of Messinian salt deposits in the underground, which are partly involved in the tectonic folding and may serve as a thrust plane in the younger, outer part of the accretionary wedge. Most subseafloor structures are manifested in a complex seafloor morphology, from which we also try to identify the presence of mud volcanoes. The first station work of this leg occurred on Tuesday, 25 November, and included a sediment core (Fig. 1), and a CTD-deployment in the 3,100 m deep basin on. The rest of that day and through the night we conducted mapping on several crooked profile lines north of Venere Mud Volcano. During the following day we performed a dive at the northern Flare 1, which is the same location where we had observed the strongest gas emissions at the seafloor the previous week.



Fig. 1: Deployment of the 3 m long gravity core for sampling of mud breccia.



Fig. 2: Accompanying the dive on the big screen in the all-purpose lab.

During our acoustic surveys, we found up to five gas emission locations at Venere Mud Volcano, which were chronologically named Flare 1 to 5 according to their discovery date. The ROV QUEST dive on Wednesday morning, 26 November, started with a surprise. At the seafloor in 1,570 m water depth, we could not see any gas bubbles at the emission location that always showed strongest gas emission the Parasound records. Such a change in gas bubble activity after only a few days revealed the high variability of the active gas emissions, both in time and space. Now we will focus on studying the variability patterns of these 5 flares in more detail by crossing the locations almost daily and checking them with PARASOUND several times in a 1.5-hours transit. Nevertheless the dive, which was accompanied intensively in the all-purpose lab of the ship (Fig. 2) brought very valuable information even without bubbles.

Water samples were taken above an active seep field from which the methane concentration will complement samples taken from the water column with rosette/CTD. Combining both data sets will

allow us to better characterize the seepage area and the methane transport in the water column. In addition we obtained several temperature measurements in the sediment using our T-stick, as well as a targeted sediment sampling from hydrogen sulfide rich seeps by push coring (Fig. 3 and 4).

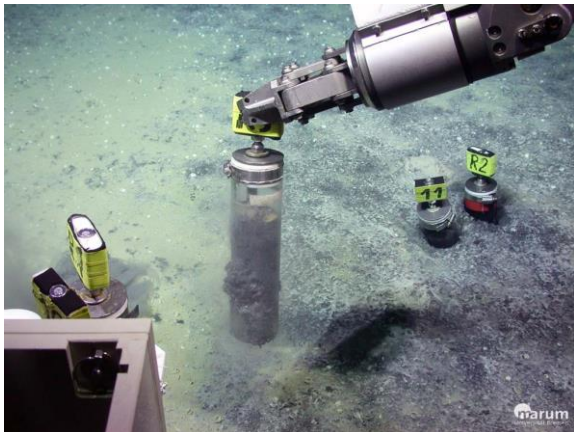


Fig. 3: Push core sampling by MARUM ROV QUEST at the seafloor.



Fig. 4: Sampling of push cores in the main lab after a dive (Photo: Christian Rohleder).

During the night to 27 November, we steamed for Catania in order to obtain a late parcel from the USA and some luggage lost during the flight from Germany. The parcel contained spare parts for the ROV QUEST, and the luggage contained a number of cables and spare parts for our ROV. The handing over went well and again gave us an opportunity to gaze at the surmounting volcano Mount Etna.

Back in the northern work area off Calabria we successfully conducted a ROV-dive at the western summit of Venere Mud Volcano on 28 November. This investigation visualized for the first time fresh mud flows 'live' at the seafloor. These flows are moving downhill from the summit area in well defined channels via more than 100 m altitude difference along the slope at the southern flank. Across a larger plain some wide spread, single gas bubble plumes seem to represent a slow degassing of the mud volcano.

The following Saturday became a day of gravity coring, which we continuously deployed at six different locations within the mud volcano area. The selection of the stations was supported by the backscatter map. On Sunday we had an early CTD-station for studying the methane plume in the water column. Afterwards we conducted an extremely fascinating ROV dive at Flares 4 and 5, at the southern edge of the mud volcano structure. Report on this will be given next week.

Some of the scientists aboard are very lucky not to have been involved in the pre-Christmas turbulences. However, they appreciate a little something like e.g. the Christmas table decoration prepared by the ship's crew in the refectory for 1st Advent. Quite festive was also the menu for today's 1st Advent, with marinated beef, red cabbage and bread dumplings, accompanied by a delicious soup and a dessert. Everyone is healthy and sprightly.

Best wishes for 1st Advent, on behalf of the cruise participants,

Gerhard Bohrmann

RV METEOR, Sunday 30 November 2014