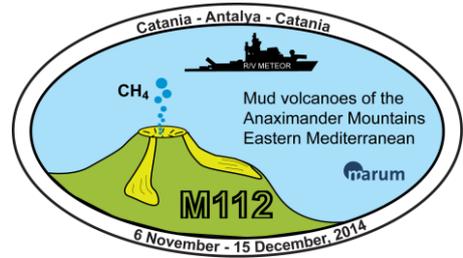
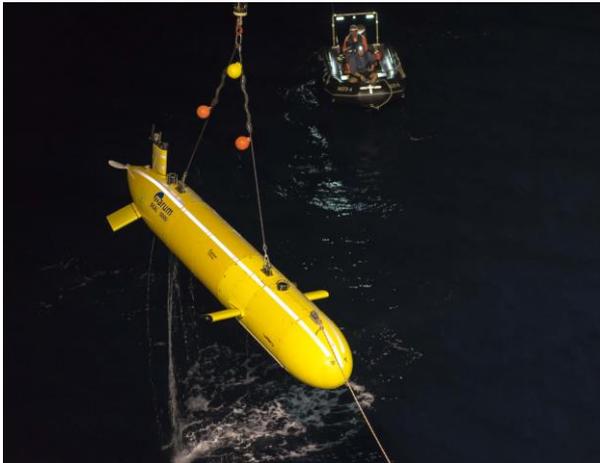


# Expedition METEOR 112

3rd Weekly Report: 17 – 23 Nov 2014



Following last week's decision to refocus the expedition M112 on the Calabrian Arc in Italy, we developed several new ideas for planning the scientific program over the coming days. First priority was given to deployment of the AUV (Fig. 1), as the autonomous underwater vehicle and its crew were only available until our stopover in Catania on 20-21 November. Several AUV dives were therefore planned, and professionally and perfectly undertaken by the AUV-team, but some problems were experienced with the recording of data by the new multibeam system on the vehicle. Although we tried several times to get in touch with the producer of the system via their hotline and email, the problems could not be solved satisfactorily. A severe intervention into the electronic part of the pressure chamber and a change of hard disks finally brought a workaround, so that – after a short processing – on 17 November we could admire a fantastically detailed micro-bathymetry map of Venere mud volcano. A striking difference between the two summits of the mud volcano was immediately apparent: whereas the western summit showed fresh mud flows northwards, but especially to the south, the eastern summit does not show any recent mud flows, but includes fractures along its northeastern flank, which cut both structures. The map backscatter intensity from our AUV dives indicates a clear distinction between the different mud flows, which probably is connected to differences in their ages.



**Fig. 1:** Recovery of MARUM AUV SEAL5000 in early morning darkness (Photo: Christian Rohleder).

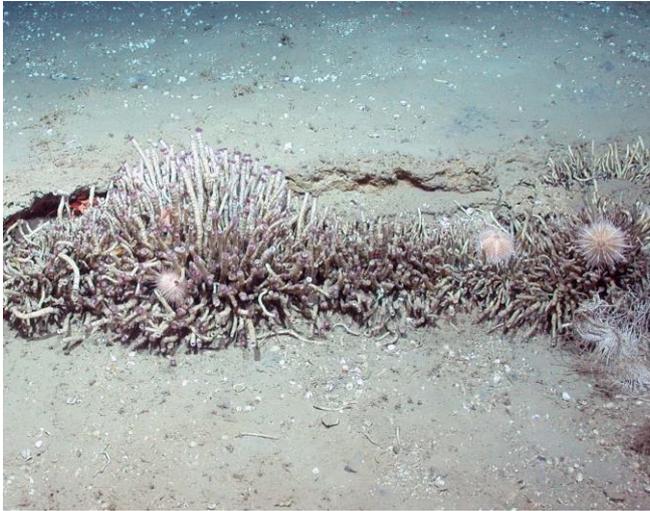


**Fig. 2:** Preparing ROV QUEST on the working deck for the next dive.

We do not yet know the ages of mud flows at Venere mud volcano, but by means of micro-bathymetry it becomes clear that there has been recent activity at the western peak. On Monday and Tuesday we sampled the water column with the CTD/rosette, with interest in samples near seabed and at high resolution above the northern flank of the mud volcano, where the ship's PARASOUND echosounder shows gas bubble emissions to occur. With the CTD we simultaneously measured the flow of different water bodies by means of a lowered acoustic Doppler-Sonar current profiler (LADPC). This is crucial for understanding the three-dimensional drift of methane plumes from the emission point.

On Monday 17 November, we also performed a 10-hour dive with the ROV QUEST 4000 (Fig. 2) in the area of the most prominent gas emission (Flare 1). All experiments and samplings at the seafloor were performed without technical problems and to the participating scientists' great satisfaction. The ROV successfully acquired several short sediment cores from various habitats and porewater environments, as well as samples of gas bubbles, and sediment temperature measurements using the

T-stick. Furthermore we measured two profiles with our new Prosilica camera, which will be combined in a mosaic to allow high-resolution mapping and quantification of the details of this seep area. A preliminary comparison of the dive observations with the high-resolution backscatter map of the AUV suggests the seep area to correspond with an area of particularly high backscatter. This map information will be used in planning future dives in the area.



**Fig. 3:** Tube worm colony rooting below a calcareous crust, settled with sea-urchins. Numerous white clam shells are spread on the seafloor.



**Fig. 4:** View on Catania from the port, 20 November 2014, date of arrival after the first leg of our cruise.

The 340th dive of the ROV QUEST was performed on Tuesday 18 November, at the foot of the southern flank of Venere mud volcano, where acoustic data indicate a relatively weak gas emission (Flare 2). Through sampling and targeted observation we documented a heterogeneous seep area similar to that north of the mud volcano, also including thick carbonate crusts and occurrences of tube worms (Fig. 3). The next and final AUV dive of this cruise was performed during the night, in the area of the central caldera of Cetus mud volcano. Its mapped micro-bathymetry was astonishing because of the high details, and an ROV dive to this very interesting seabed structure was promptly agreed among the scientists. On Wednesday, after acquiring two gravity core samples and 1 water column profile measurement at Cetus mud volcano, we headed for Catania and arrived punctually in the port under best possible weather conditions.

Mount Etna with its height of more than 3300 m is Europe's most active volcano, highly visible not only in front of Catania (Fig. 4) but dominating the entire east of Sicily. The two days in harbor were used for an exchange of expedition equipment, scientists and crew members, and divide our cruise into two legs. After departure on Saturday morning for the second leg, we resumed our seabed mapping work, moving southwards to the younger part of the Calabrian accretionary wedge. We will use the ship's acoustic instruments to record the bathymetry and detect further gas emissions from targets of interest at slow survey speeds until Monday.

Everyone aboard is healthy and highly motivated for the second leg of the cruise.

Best regards on behalf of the cruise participants,  
Gerhard Bohrmann

RV METEOR, Sunday 23 Nov 2014