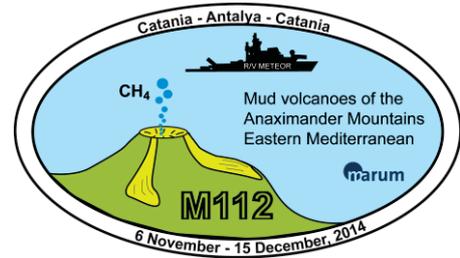


Expedition METEOR 112

1. Weekly Report: 6 – 9 Nov 2014



On Thursday 6 November 2014 at 9 a.m. local time R/V METEOR left berth No. 12 of road Sporgente Central in the port of Catania, heading for research work on the Calabrian Arc. Before sailing, R/V METEOR had spent time at dock in Catania while the scientists and research tools of cruises M111 and M112 were exchanged. New research tools on board for M112 are the deep-sea remotely operated vehicle ROV MARUM QUEST 4000 and the autonomous underwater vehicle AUV SEAL 5000, as well as a number of geologic sampling devices. In total seven 20' containers from Bremen had to be stored on deck – partly in double layers (Fig. 1) - and the entire contents of a 40' container were distributed to the labs by the vessel's boatswain and seamen.



Fig 1: Loading equipment on board R/V METEOR prior to cruise M112 in the port of Catania



Fig 2: Safety instructions given by the vessel's First Officer (photo: Philipp Spalek)

The scientists from Germany, Italy, Switzerland, Austria, Netherlands, France and Brazil embarked between 3 – 5 November and used the time to do necessary deck work together with the vessel's crew, as well as to set up the labs. We faced quite stormy weather, and were surprised by some heavy blasts while still in the port and upon sailing. Consequently the first days at sea, Thursday and Friday, were quite bumpy, and despite medical precautions resulted in some seasick persons. In particular, the first two nights were characterized by wind speeds on Beaufort-Scale of up to 7-8, peaking up to 9. Nonetheless, we were able to undertake the planned measurements using our hull-mounted hydro-acoustic systems, following the acquisition on Thursday of a first underwater sound profile in water depths of up to 1,500 m using the SVP-Sonde.

The focus of the forthcoming five weeks will be investigations of mud volcanoes in two areas, the Calabrian Arc, an accretionary system in the northern Ionian Sea, and the Anaximander Mountains, a submarine cordillera between Crete and Cyprus. Mud volcanoes are numerous in the eastern Mediterranean Sea and are situated mainly at zones of compression between the European and the African Plates, as well as within areas of locally high sediment accumulation, such as in the Nile deep-sea submarine fan. Although the first mud volcanoes were identified in the Mediterranean Sea over 30 years ago, it is only in the last 15 years that seabed mapping using swath acoustic systems has shown how remarkably widespread is

the phenomenon of mud volcanism. The main goal of our expedition is to investigate active mud volcanoes which are characterized by recent mud flows, and emissions of fluids and gases. Of particular interest is the presence of methane hydrates, which form within sediments of the mud volcanoes under certain conditions of pressure and temperature, and may play a sealing role during eruptions. At the same time, methane hydrates are a concentrated source of methane that is used by chemosynthetic organisms living at and below the seabed, which we plan to investigate quantitatively.

Over the last 2.5 days, we have systematically surveyed more than 30 known mud volcanoes previously identified within the fore-arc basins and across the inner accretionary wedge of the Calabrian Arc, using the hydroacoustic systems mounted on the hull of the METEOR. These have allowed us to record detailed bathymetric data, but above all to look for methane bubble emissions, which are readily detected as anomalies in the water column. The rough weather conditions over these days inhibited the deployment of the ROV and AUV, but also influenced the quality of the hydro-acoustic recordings. Thus, some acoustic anomalies might remain undiscovered. However, during the night from Friday to Saturday, we discovered a clear gas emission at Venere Mud Volcanoes, a structure with a double-cone shape that became our selected destination for examination during underwater dives.



Fig 3: Miriam Römer during her shift in the central sounding room of the vessel (photo: Philipp Spalek)

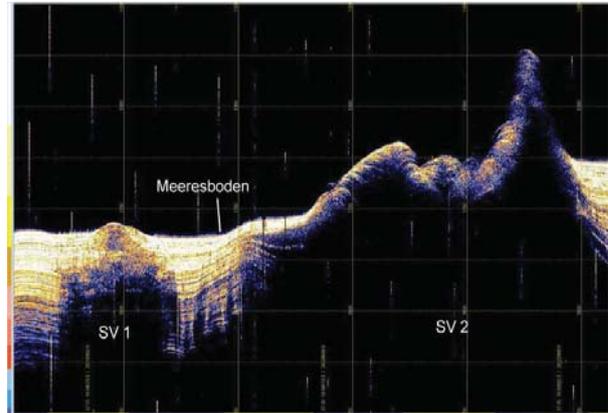


Fig 4: Parasound recording of 2 quite different mud volcanoes with the complex structure „called the Madonna dello Ionio“

Until Saturday night, under improving weather conditions, further potential locations were surveying using the hull-mounted Parasound and Multibeam systems (Fig. 3), including the „Madonna dello Ionio“ which shows a complex structure comprising several individual mud volcanoes (Fig. 4). During the night from Saturday to Sunday we sailed back to Catania where, off the entrance to the port, we could gather a very important spare part for the ROV, which had not been delivered before our official time of departure last Thursday. This was also an opportunity to bring on board the luggage of our French colleague, which had been lost during her flight to Catania. Under now ideal weather conditions and a bright blue sky, R/V METEOR sails back to Venere mud volcanoes where tonight the ROV will be deployed. We will report on this next week. All cruise participants are well!

Best regards on behalf of all cruise participants,
Gerhard Bohrmann

RV METEOR, Sunday, 9 Nov 2014

More information on the cruise:

www.nationalgeographic.de/meteor or under
www.marum.de/Logbuch_Meteor_112.html