3. Weekly Report MSM132 MMC-1

15.12.-22.12.2024

The third week of MSM132 was eventful with an unplanned call at Santorini where we had to discharge of a sick person and a bit of wind passing through the study area.

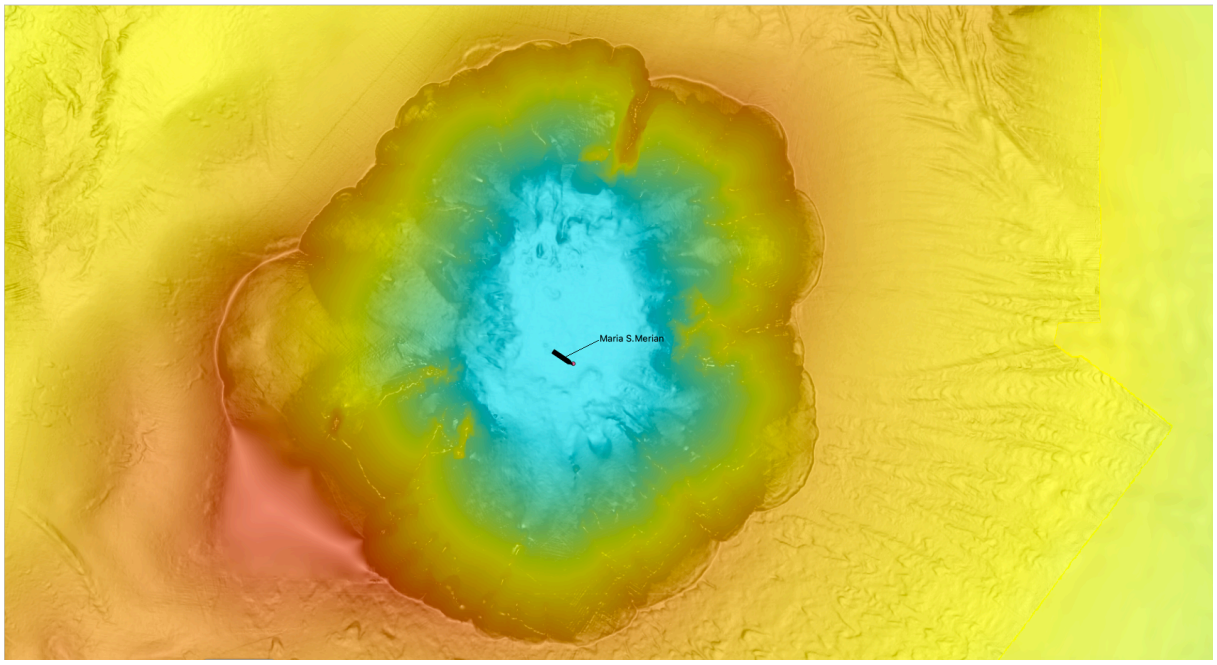
The week started out with the continuation of the 3D seismic survey of the Amorgos fault. After having repaired the starboard GPS antenna, seismic surveying continued without interruptions but in unfavourable sea conditions until the evening of the 16th (Monday) when the GPS on the port side paravane also failed. Because of safety concerns it was agreed to wait with the replacement of this GPS antenna until noon on the next day (Tuesday) when the winds had sufficiently abated to hoist the paravane and replace the GPS antenna and 3D seismic surveying continued.

For most of the 3D survey we have been running Parasound sediment profiling and without switching on the multibeam echosounders. This ensured best possible quality for the sediment echosounder. The only exception was the night from the 17th to the 18th when we filled in gaps in the multibeam coverage. The multibeam bathymetry data recorded during MSM132 are superb and show a significant uplift compared to previous multibeam surveys carried out in the study area. The high data quality allows to trace fault scarps at the seafloor over much greater distances and yields insights into the complex sedimentation regime in the Anhydros Basin. Already the preliminary evaluation of these data show a stark difference between the seafloor areas with volcaniclastic surface sediments and those that are covered by the hemipelagic background sedimentation.

During the afternoon of December 19 the MOMO team managed to establish a direct link between MOMO and the Arena visualization dome at GEOMAR using the Starlink internet connection. In the future, this will allow involvement of onshore scientists and the connection can be used for outreach activities that are crucial for Multi-Marex.

3D seismic acquisition continued until 3:30 on December 20, when we had to recover the system because of a medical emergency. After retrieval of the system we headed for Santorini where the sick person was taken ashore. Work continued at noon of December 20 with the recovery of the previously deployed ocean bottom seismometers at Kolumbo that had been equipped with temperature and pressure sensors. All instruments had been safely recovered by 16:30 and we continued with the deployment of six Mola landers around Kolumbo.

At 17:00 we began a second MOMO dive starting at the northern rim of Kolumbo volcano and diving into the crater along its steep wall and into the hydrothermal vent field at the crater floor. The dive showed significant incising by erosion, a muddy seafloor on the crater fall with signs of bioturbation. The vent field consists of individual chimneys and rough material in between. White decolouration perhaps indicating bacteria mats are widespread throughout the vent field. MOMO operations lasted until 5 am on December 21. We then continued multi-beam mapping as a fresh southwestly came in and the sea state did not allow other work.



Bathymetric impression of Kolumbo crater with Maria S. Merian for scale. Water depth in the crater is 500 m (light blue) and the shallowest part of the crater at its southwestern rim is 18 m deep. The crater formed during the 1650 eruptions when the volcano erupted explosively and generated a major tsunami throughout the Aegean Sea. The crater walls are very steep and in some places vertical where volcanic dikes are sticking out of the otherwise eroding face.

In the early morning of December 22 the weather had calmed down sufficiently to redeploy the 3D seismic system. This was accomplished by 10 am and we began to survey the last remaining sail lines of the 3D seismic cube across the Amorgos fault which we hope to finish by Monday lunchtime before another weather front is supposed to come through.

Weather conditions are reasonable and everybody on board is well and looking forward to the well-deserved Christmas celebrations.

Christian Berndt, Chief Scientist