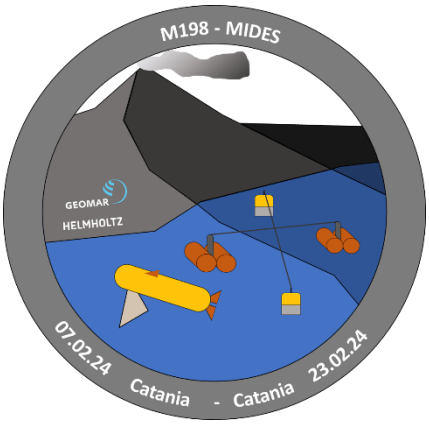
# M198

Catania (09.02.24) – Catania (22.02.24)

**MIDES** - Measuring and Imaging Deformation of Etna's Submerged unstable flank




**Weekly Report no. 1** (09.02.24-11.02.24)

The work planned for cruise M198 on RV METEOR is part of the Helmholtz Young Investigator Group "Do volcanoes collapse retrogressively?" led by Morelia Urlaub at GEOMAR Helmholtz Centre for Ocean Research Kiel. A key objective of this group is to implement a shoreline-crossing observatory dedicated to monitoring fault systems linked to flank instability of Mount Etna's partly submerged eastern flank. During M198 we aim to (1) service and expand the current seafloor monitoring systems on the southern fault system, (2) improve the structural understanding of the offshore flank, and (3) test a new generation of low-cost and easy-to-handle smart instruments for seafloor volcano monitoring (MOLA).

In anticipation of a short (3h) transit time from Catania to the working area, preparational work was conducted on board, while the ship was still in the port of Catania on Wednesday 7th and Thursday 8th of February. The main group of scientists arrived at the ship in the morning of 8th of February, where we were not only greeted by the captain and crew, but also a film team recording for a documentary on tsunami research for the German national television.

We left port under a clear sky and mild temperatures on Thursday 9th of February at 10 am and made our way out of the 12-mile zone, before returning to our working area at the southern edge of the eastern marine flank of Mt. Etna about 15 km offshore Catania. Our first task was to retrieve the five geodesy stations of the GeoSEA-Network, which were deployed two years before also with RV METEOR. We successfully contacted the stations via an acoustic modem and were able to download the geodetic data. Figure 1 shows a data example. We can see an offset in the distance measurements on the 12th of March 2023 of about 2 cm, which may be a slip-event of the volcano flank moving eastwards, though a thorough analysis is needed to confirm this.

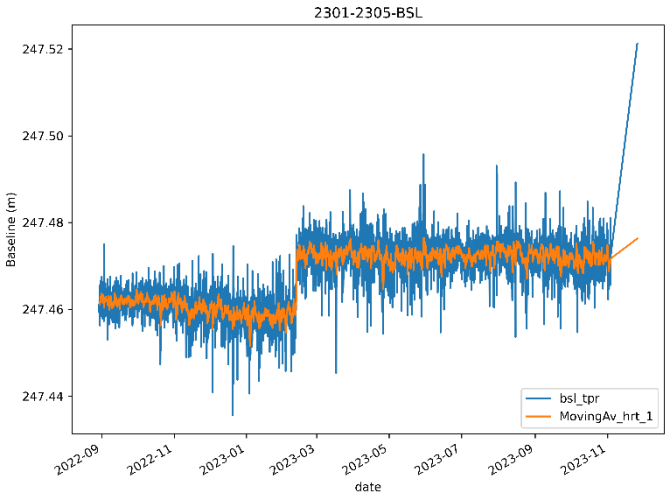



***Figure 1**:*

*Data example of acoustic distance measurements between two transponders at the seafloor („baseline"). A distance change, as recorded in February 2023 suggests deformation of the seafloor.*

Unfortunately, none of the five seafloor geodesy stations could be retrieved yet. Together with captain Rainer Hammacher and his crew we are currently attempting alternative recovery methods. We are very thankful for this support!

Based on the hydroacoustic data recorded during night-time, we took a 5m gravity core directly inside the fault zone. We successfully retrieved 4.6 m of sediment. The sediment in the lower part of the core is unusually stiff and overconsolidated, which likely is a result of shearing in the fault zone. The site is thus a good candidate for piezometer deployment that will be done later during the cruise. Nevertheless, further sites will be explored with gravity coring in the coming days.

On Sunday, AUV ABYSS started its first dive equipped with its multibeam echosounder. It will map the same area that it mapped four years ago. We are hoping to see differences in the two maps that are of tectonic or sedimentological nature.

Greetings from all participants

Morelia Urlaub
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