

R/V MARIA S. MERIAN



Cruise MSM98/2 (GPF20-3_073)

Development of the glacio-tectonic complex at Heligoland and investigation of the lateral extent and age dating of the Tampen landslide off Norway.

Emden – Emden

4th weekly report, 15. - 21.02.2021

In our last week of the expedition, we investigated geological relics of past ice advances (Fig. 1). With our Micro-GI and only 130 bar operating pressure from the air pulse station, we penetrate only about 200 m deep into the bottom, but achieve a very good vertical resolution. As a result, large geological structures become visible that one would hardly expect under the almost featureless seafloor. These include old subglacial meltwater channels (tunnel valleys) and scaling structures that form in ice masses advancing at the front - many know this effect on a much smaller scale from snow shoveling. From these scales we will reconstruct the geometry of the ice masses at the time of its formation. Already, however, we can say that the scaling is extraordinarily well defined in our data and extends farther than previously thought. Some of the scales were cut and eroded by subglacial meltwater channels - a relative temporal sequence thus quickly becomes clear.

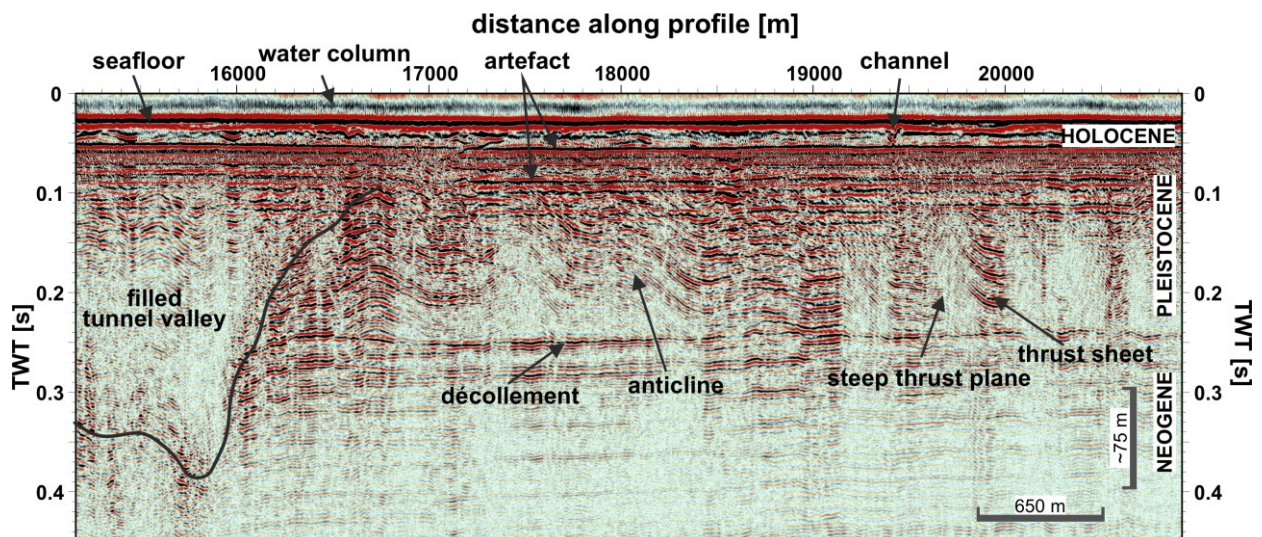


Fig. 1: Seismic profile in the west of the working area. To the NNW, a large subglacial meltwater channel (Tunnel Valley) is visible, which cuts the SSE located scales. The scales "rise" from a very shallow and slightly NNW-dipping décollement. From SSE to NNW, the steep scales progressively transition into flatter scales and folds. These glacial landforms are underlain by Neogene sediments, which show an almost scour-like bedding and are thus quasi undisturbed.

The new data set allows us to extend our knowledge of subglacial meltwater channels, since we can clearly follow them to the west. On the other hand, we had the unique opportunity to record seismic profiles in very high resolution along the base of these subglacial meltwater channels. From these profiles we expect to be able to answer questions about their genesis, which have been discussed for decades. Due to the very high resolution of the data, even near-surface channels are emerging, which lie only 1-2 m below the seafloor and are cut only a few meters into the ground.

After almost 4 weeks of research at sea, we can report that we have completed our work very successfully. The scientific questions can only be answered adequately in retrospect; at sea it is important that the equipment functions as faultlessly as possible, and we succeeded in this throughout. Given the limited number of scientists, this was only possible thanks to a strong team effort during the long measurement periods day and night. Equally fundamental to the success of marine expeditions is, of course, the ship and its crew. All participants would like to thank Captain Schmidt and the crew for the friendly welcome and the excellent support on the *MARIA S. MERIAN*. You have made the trip a complete success. Thank you very much! We are also grateful to have been able to carry out such an expedition in difficult times of a pandemic. The strict quarantine before the trip was definitely worth it. We would also like to thank the expert panel of research vessels GPF and especially the German Research Fleet Coordination Centre (LDF), who supported us very much in preparation before and during the expedition and helped our research work by their quick actions.

Already now we can say that the cruise was a complete success. We recorded about 1490 nautical miles of seismic data. In addition, we recorded countless profile lines for hydroacoustic work in relatively shallow water off Helgoland. The further processing of the data will be correspondingly intensive in order to answer the scientific questions.

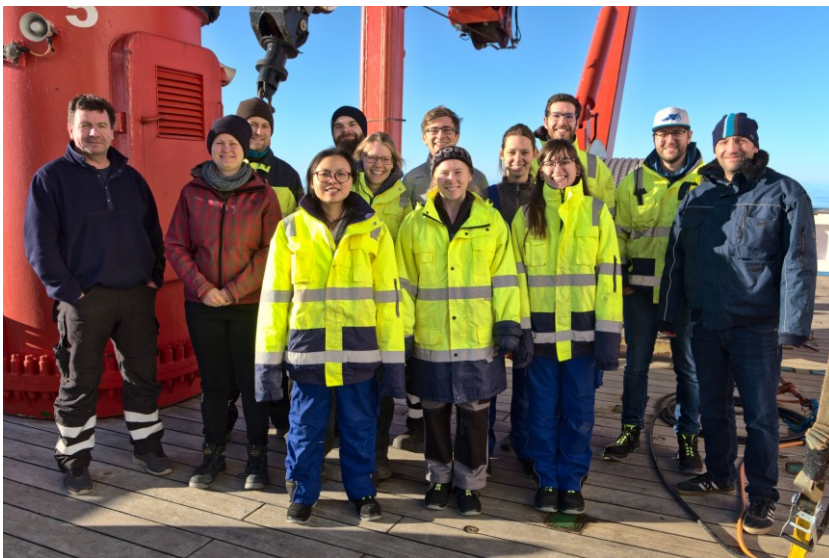


Fig. 2: Photo of the scientific crew from 16.02.2021.

Many greetings on behalf of everyone on board "MERIAN"

Jens Schneider von Deimling (Christian-Albrechts-University of Kiel)
At sea, 54° 25.72' N 007° 26.84' E