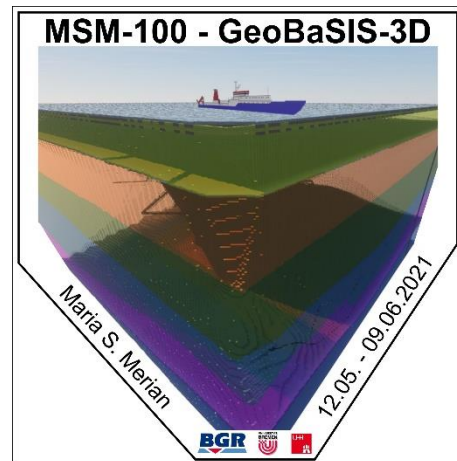


Project GeoBaSIS-3D

Weekly Report No. 1 - 11.05.2021 – 16.05.2021

MSM100, Emden – Emden

12.05.2021 – 09.06.2021



On 11.05.2021, after a 10-day stay in the quarantine hotel, we embarked the research vessel Maria S. Merian. After this long period of isolation in a single room, the regained freedom of movement was more than welcome. Most of our equipment was already set up on the working deck - many thanks to the crew of the Maria S. Merian.

After completion of the remaining mobilisation, which could only take place in the harbor, we left the port of Emden on May 12, 2021 at 6:00 p.m. for the 100th expedition of Maria S. Merian and sailed overnight to our working area in the so-called "Entenschnabel". This is the name of the area of the German exclusive economic zone (EEZ) in the very northwest in the border area to the Netherlands, Denmark and Great Britain. Our working area is located in the area of the salt dome "Belinda". The aim of our project is to map the Cenozoic sediments, i.e. the sediments of the last 65 million years precisely and in 3D. In particular, we are interested in the barrier rocks, e.g. claystone. These are impermeable and can serve as a seal to prevent gases or fluids from migrating upward toward the seafloor. If there are formations with increased porosity under the barriers (e.g. sandstones), fluids such as CO₂ could be stored here. In our project GeoBaSIS-3D (**Geophysical Investigations for Barrier Structures and their Integrity in the subsurface of the German North Sea by means of 3D-Seismic data**) we want to image these units in high resolution and in 3D, in particular to investigate whether there are faults, i.e. small offsets in the barrier rocks, which could affect the integrity of the barrier and up to what size we can detect these faults. To do this, we are surveying the work area with both our 3D reflection seismic equipment and ocean bottom seismometers deployed on the seafloor. This information is important to assess the chances, but also the risks of storing gases or fluids in the subsurface.

After arriving in our working area on May 13, 2021, we initially deployed click detectors for the German Oceanographic Museum Foundation in Stralsund. These detect the clicking sounds of harbor porpoises and record them. This will be used to study the effects of our seismic measurements on harbor porpoises by recording the numbers of these marine mammals during and after our seismic measurements. During the measurements, the immediate area around the research vessel is additionally monitored by a professional marine mammal observer. During the night hours, monitoring is done by an acoustic monitoring system that responds to the vocalizations of marine mammals.

We then deployed our ocean bottom seismometers. The deployment of the reflection seismic equipment was very complex and took a good day and a half, since a total of 2 paravans, 2 cables (streamers) with a length of 1050 meters each, 2 air pulser units and various buoys have to be towed in a precise arrangement behind the vessel. On 15.05.2021 we started our measurements in very good weather conditions.

On board everyone is well and sends greetings home.

Best regards on behalf of all cruise participants

Axel Ehrhardt

(Federal Institute for Geosciences and Natural Resources (BGR) – Hannover)



Fig. 1: Departure on the evening of 12.05.21 for expedition MSM100.



Fig. 2: View of the measuring equipment on the starboard side. On the outside you can see the paravan, further inside the yellow head buoy of the streamer cable, the orange buoyancy balls of the air pulsers and inside the yellow navigation buoy. Not visible here is the mirrored display of the measuring instruments on the port side.

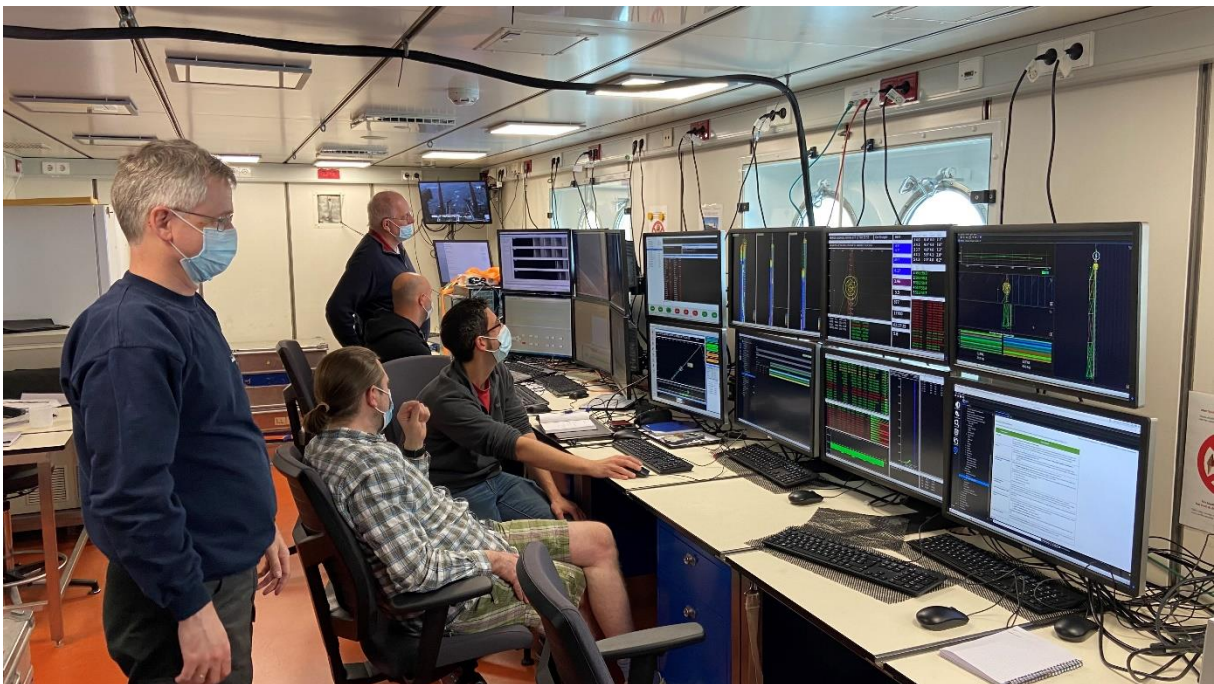


Fig. 3: In the seismic lab, all measurement data converge, are controlled and recorded. During the first 72 hours after leaving the port, masks still had to be worn. In the meantime, the quarantine and hygiene measures have made it possible to dispense with the wearing of mouth and nose protection.