MSM140 – 1. Weekly Report

We are on our way!
On Sept. 4, 2025 RV Maria S. Merian set sail in Reykjavik, Island for it's 140th expedition. Our target is the Vøring Plateau offshore Norway, where we intend to conduct electromagnetic and seismic experiments in order to characterize ancient lava flows that date back to the opening of the North Atlantic Ocean. We, that is a group of 20 scientists from Germany and Norway that embarked on RV Maria S. Merian on Sept. 3 and immediately went to work, setting up the scientific equiment on deck (Fig. 1) and in the labs - equipment that the crew had already loaded onto the vessel in the days before.

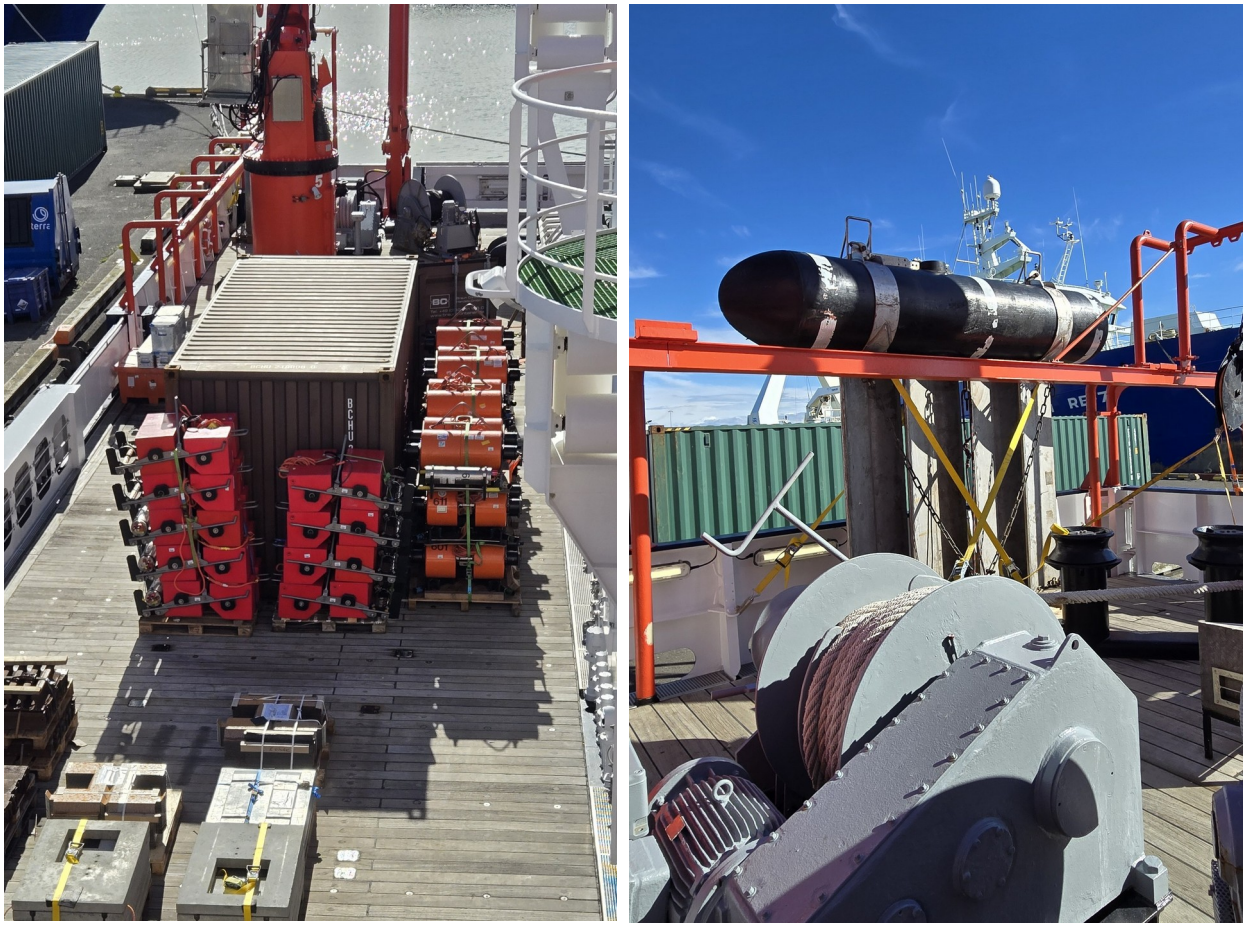

Figure 1: OBS, OBEM and their anchor weights (left) and the rigged trawl door of the P-cable system (right) on the deck of RV Maria S. Merian in the port of Reykjavik. Photos: I. Klaucke.

The basaltic lava flows underlying the Vøring Plateau are of particular interest because they may play an important role in the reduction of CO_2 in the atmosphere. Model projections show that in conjunction with zero net emissions of CO_2, CO_2 also needs to be actively removed from the atmosphere and safely stored in order to achieve the goal of limiting global warming. For this carbon capture and storage (CCS) almost all current projects use depleted oil and gas fields or saline

aquifers for the storage of CO_2. Unfortunately, the supercritical CO_2 injected into these reservoirs remains mobile for a long time (hundreds to thousands of years) and the reservoirs may be leaking in the future due to a generally large number of wells drilled into these reservoirs, but even under best circumstances the storage capacity of these reservoirs will be insufficient for future CCS requirements. A promising large-scale alternative is the storage of CO_2 in basalt, as recent experiments in Iceland and the USA have shown. In these rocks that occur worldwide in large quantities injected CO_2 precipitated as carbonates within two years and was therefore permanently bound in the rock. Offshore Norway is one area in Europe where such basaltic lavas occur and the Vøring Plateau in particular has been studied intensively during several ODP and IODP drilling campaigns. The detailed extent of individual lava flows as well as the porosity and permeability of these flows is, however, not yet known and constitute the primary goals of expedition MSM140. In order to reach these objectives we will aquire high-resultion 2D and 3D seismic data using the P-cable seismic system from GEOMAR together with ocean bottom seismometers (OBS). We will also run a 3D electromagnetic experiment with ocean bottom electromagnic receivers (OBEM) placed on the seafloor and a transmitter being towed in the water column.

On our way eastward on Saturday evening we deployed two Arvor floats East of Iceland for the German contribution to the Argo programme. After the successful launch of two additional floats in an area that was not yet well covered by floats, we continued our transit eastward and expect arrival in our target area early next week. At present we are interrupting our transit for tests of the acoustic releaser and the updated electromagnetic source.

All participants onboard are doing well and look forward to an exciting work programme over the next five weeks.

On behalf of everyone onboard I am sending best regards,
Ingo KLAUCKE
Chief Scientist MSM140