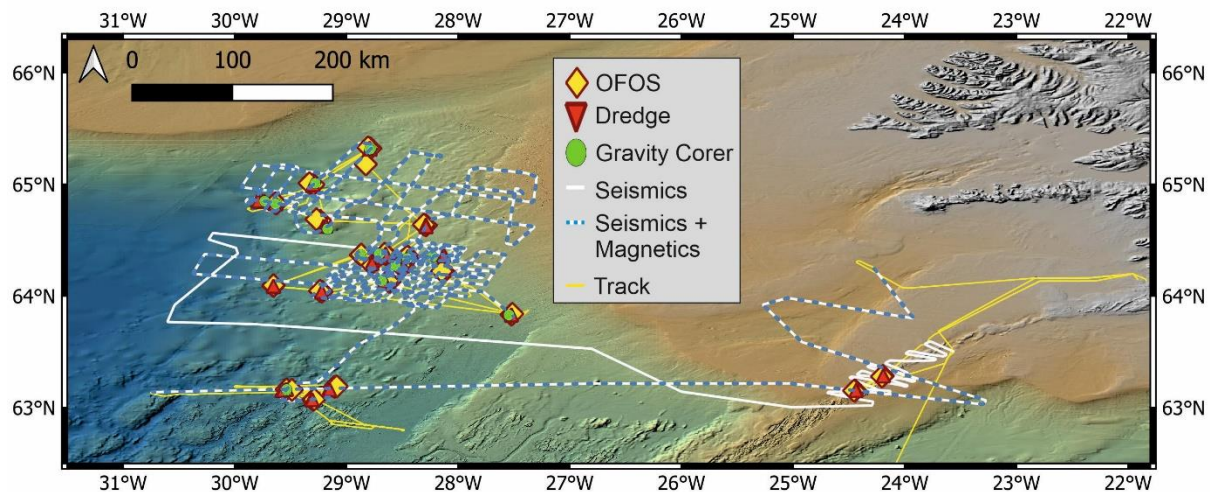


## 7. Weekly Report (15. - 18. July 2024)

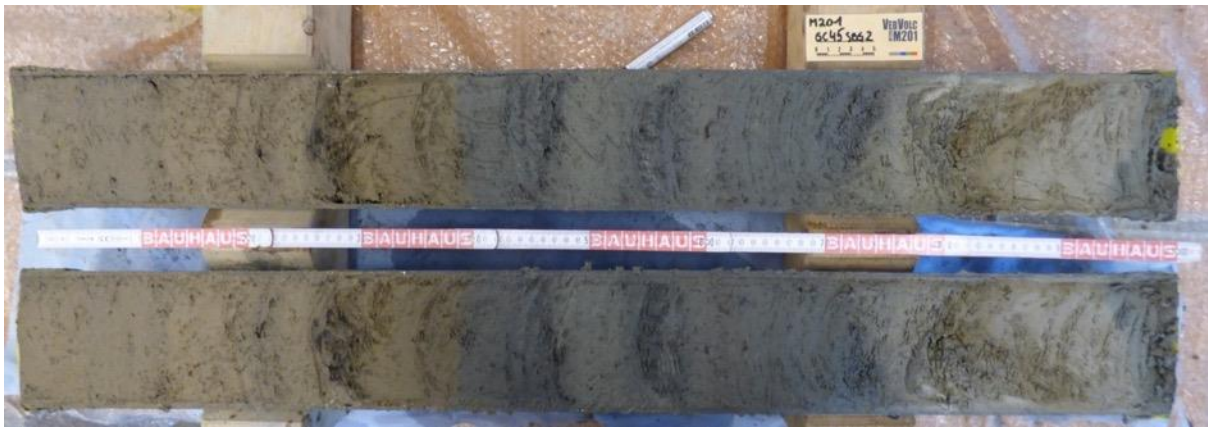


Map of the RV METEOR cruise route with the scientific program.

The last days of our expedition and the transit southward passed quickly. The wind subsided, and the sea calmed, facilitating focused work in the laboratories. Besides cleaning up, we found time to draw initial conclusions. The scientific work program is summarized in the map.

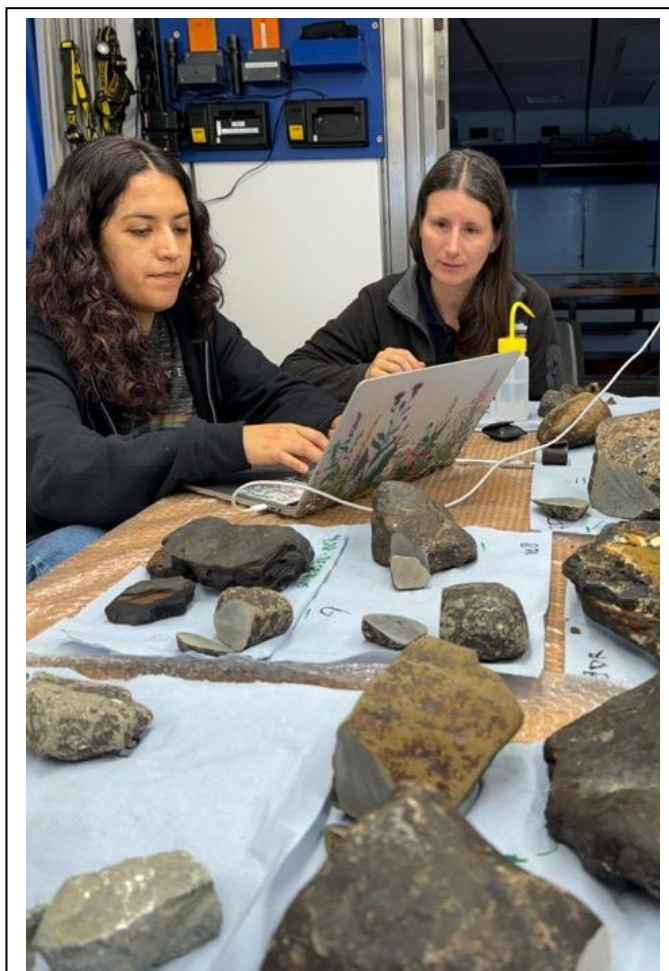
Sampling the seafloor proved very challenging during the expedition—not because the dredge stations were unsuccessful, but due to the sheer number of rock samples. A total of 22 dredge hauls yielded, after careful selection, 570 individual rock samples, all described and prepared for further analysis by our petrology team. The difficulty lay in the fact that we collected more than 20 rock types, most of which did not originate from the Vesturdjúp volcanoes but from "dropstones." These stones were transported over millions of years by millions of icebergs, primarily from Greenland, and have covered the basin with sandstones, granites, and gneisses. Many of the basaltic rocks we found likely did not originate from the Vesturdjúp volcanoes either. Fortunately, we collected some basalts with a glassy rim, typically formed during underwater eruptions. These samples will serve as anchor points for future analyses and help us identify which basalts come from the basin itself to study the geochemical history of the Vesturdjúp volcanoes.

The gravity coring operations were completed the weekend before last. During the expedition, we conducted 17 stations in the Vesturdjúp Basin with a success rate of 76%, collecting a total of 25.3 meters of sediment cores. The coring was performed at the summits of the volcanoes, at their bases, and in the plains between them, resulting in significant sediment deposits. The stations between the seamounts were the most successful, while attempts at the summits were often less productive. The cores, primarily consisting of silt with clay, sand, gravel, and smaller stones, were sampled on board and will be extensively analyzed in laboratories on land for sedimentation processes and the paleoenvironmental conditions in the Vesturdjúp Basin.



A typical sediment core segment from the Vesturdjúp Basin. Different colored layers are clearly visible in this image of core M201-45GC Segment 2. © D. Palgan

The OFOS data collected on M201 provides a detailed visual insight into the geological characteristics of the seamounts in the Vesturdjúp Basin. The obtained profiles enable detailed habitat mapping of various depth zones. From the acquired images, 3D models can be generated to better understand the geological conditions and contextualize the collected samples.



The sawing, sorting, and describing of hundreds of rock samples was a real challenge for our petrologists during M201. © N. Augustin

Using the acquired multibeam data, we were able to map approximately 5,300 km<sup>2</sup> of the seafloor comprehensively. These data partially extend the existing Icelandic datasets with additional coverage and higher resolution. The information gathered allows us to draw conclusions about the seafloor's characteristics.

We surveyed approximately 4,000 km of multichannel seismic profiles. Thanks to the data processing experience gathered over multiple expeditions by our team, composed almost entirely of students, individual profiles were processed within a few hours after completion. This allowed for preliminary interpretations and continuous adjustments to the work program based on the findings. Despite the occasionally rough seas, the quality of the seismic data after processing was very good. This will enable us to better understand the volcanism and magmatic processes in the Vesturdjúp Basin and on the Reykjanes Ridge, as well as reconstruct the water exchange between the Arctic Ocean and the Atlantic over the past millions of years. The more than 3,500 km of magnetic profile data will help us understand the deeper magmatic processes that cannot be imaged with seismic methods.

On the last day at sea, we cleaned the laboratories and packed the first container. In overview presentations, the working groups shared measurements and initial hypotheses derived from the data, and developed perspectives for the evaluation phase, which will undoubtedly take several years.

On Thursday, July 18, we reached the port of Praia da Vitória on the Azorean island of Terceira. At 08:30 in the morning, we docked at the pier, and two containers were prepared and loaded. With the final closing of the last container, the RV METEOR Expedition M201 came to an end.

We thank Captain Korte and his crew for their constant and thoughtful assistance, collegial cooperation, high safety standards, and their excellent seamanship. We wish them always fair winds and following seas.

Christian Hübscher  
Chief Scientist