



R/V Meteor
Cruise M168 (GPF 20-3_080)
08.11.2020 – 08.12.2020
Emden – Emden



2. Weekly report, 09. – 15.11.2020

We spent the first days of the second week with the transit to our working area. After a nice passage through the English Channel with fine weather and calm seas, it quickly became rougher as we reached the North Atlantic Ocean. We used the transit days to further unpack our equipment out of the containers and to set up the laboratories, to carry out laboratory briefings and make plans for the first sampling stations. We also had the opportunity to participate in an exciting tour through the engine rooms.

On Thursday afternoon we finally reached the first foothills of our working area. First of all, a sound probe was used to measure the speed of soundwaves in seawater and a waterborne sounding profile down to 2000 m water depth was created, which is necessary for the calibration of the on-board deepsea-multibeam echo sounder EM122. The multibeam echo sounder is an



*During the transit to our working area in the North Atlantic
(picture by Antje Dürkefälden)*

important instrument for the creation of accurate maps of the seafloor and for us it is essential for the selection of suitable sampling stations (more on that in one of the next weekly reports). We started our mapping on Thursday evening in the northeastern part of the Azores-Biscay Rise which extends from northeast to southwest. However, the structure consisting of seamounts and small ridges proved to be difficult to sample. In addition, bad weather conditions with stormy winds and a swell of 3 - 4 m made sampling impossible for a short time. Nevertheless, we were able to use the time for further mapping and we plan to sample selected seamounts afterwards during the last days before starting the return transit. On Friday evening we headed for two canyons adjacent to the Azores-Biscay Rise, the Freen and Peake Troughs, which are parallel to each other and separated by the Palmer Ridge. The troughs are up to 6000 m deep and together with the King's Trough extending to the west they form a complex of several basins. Despite continued high swell, we were able to carry out several dredge hauls on the flanks of the Peake and Freen Troughs and to recover magmatic samples.

For sampling, we use a so-called chain bag dredge, which is lowered to the seafloor and then slowly pulled up the steep flank of a canyon or the steep slope of a seamount along the seafloor to break off rocks or collect loose rock pieces.



Left: The dredge is lowered to the seafloor on a thick wire. Upper right: The late shift collects the rock samples on deck. On board, we are working around the clock in a three-shift system. Lower right: During examination of the samples in the laboratory, we discovered fresh glass, visible as black stripes, which is particularly important for our geochemical analyses (pictures by Fabian Hampel, Antje Dürkefälden).

Apart from a few fragments of manganese crust, which is typically deposited on the surfaces of the rocks on the seafloor over millions of years, almost every dredge haul also contained volcanic rocks, mainly relatively well-preserved fragments of so-called pillow lavas. These pillow lavas are formed when hot lava extrudes under water and cools rapidly upon contact with the seawater. Everyone was excited when we discovered a thick black crust in several pillow lavas consisting of fresh volcanic glass. Such a glass rim is formed when the lava is rapidly quenched in the seawater, but especially in many millions of years old rocks also expected in our working area, glass is rarely preserved. Fresh glass is particularly important for us because it reflects the original composition of the lava and its chemical composition has not been changed by alteration processes.

All cruise participants are doing well and send their best greetings to everybody at home!

Antje Dürkefälden and the scientific party of M168
(GEOMAR Helmholtz Centre for Ocean Research Kiel)