

Metal Geochemistry Meets Machine Learning in the North Atlantic



Surveying the seabed is still an enormous task. So far, only 20% of the regions under water have been mapped with echosounders. This refers only to the topography, not to the content; that is, the composition of the seafloor.

“The existing sampling efforts are virtually just tiny pinpricks in the vast amount of uncertainty that has so far covered the seafloor,” says Dr Timm Schöning from

the Deep-Sea Monitoring group of [GEOMAR](#), who led an [Atlantic](#) expedition aboard the German research vessel *Maria S. Merian* in autumn 2020. Over a period of four weeks, a team of geochemists and data scientists explored the seafloor of the North Atlantic using an innovative combination of mapping, direct sampling and novel data analysis methods.

Different Measuring Methods

The researchers had chosen two work areas: the [Porcupine Abyssal Plain](#) off Ireland, and the Iberian Abyssal Plain between the Portuguese mainland and the Azores. Different measuring methods were used. The seafloor was mapped regionally with the shipboard

multibeam echosounder on the *Merian* research vessel. A towed camera system provided additional photos of the seafloor at selected positions, which will then be combined to create local, high-resolution maps. A TV-Multicorer was used selectively, with which several samples of the uppermost seafloor sediment layers are collected simultaneously.



The team aboard RV *Maria S. Merian* prepares to retrieve sediment samples from the multicorer. (Image courtesy T. Schöning)

“In this way, we not only obtained more data on the seafloor structure itself, but also on its composition at particularly interesting points,” says Dr Schöning. “Using new data analysis methods, we eventually intend to extrapolate the results of the sample analyses to local photo maps. In turn, the findings from the photo mosaic maps will be extrapolated to the regions covered by the echosounder mapping by means of machine learning.”

Overall, the trip was very successful for the team. In addition, they were able to assist international colleagues by salvaging an instrument belonging to the UK's National Oceanography Centre: during a storm offshore Ireland, a large measuring buoy from the Porcupine Abyssal Plain Observatory had broken loose from its mooring, which was recovered by the *Merian* and brought back to Emden, Germany. It will be returned to the UK by land – much to the relief and gratitude of its owners.

Now the team is busy publishing all the acquired digital data according to FAIR standards, and all data will be made available to the international research community.

You can read the expedition blog at www.oceanblogs.org/msm96/.



Rescue mission: successful recovery of the UK's PAP mooring buoy onto the back deck of the *Maria S. Merian*.