3. Weekly Report (July 9, 2018 – July 15, 2018)

M148/2 „EreBUS“ 01.07.2018 (Walvis Bay, Namibia) - 20.07.2018 (Las Palmas, Spain)

Under the rain-heavy skies of the Intertropical Convergence Zone (ITCZ) the *R/V Meteor* skirts the coast of Western Africa on the transit north to Las Palmas. Cruising through the economic exclusive zones of countries such as Liberia and Sierra Leone since late Thursday morning, the underway data gathering systems and water sampling systems have been shut down, and the last station of this expedition also lies over two days behind us.

During our transit from the oxygen-minimum zone off Namibia into the open waters (Figure 1 left) sampling began for the much more oligotrophic waters of the Eastern South and Equatorial Atlantic. These waters not only have low concentrations of nutrients such as nitrate, but are also low in trace elements. Standard sampling equipment often poses a source of contamination for trace elements, and special Teflon-coated Go-Flo bottles were used on the shelf as well the open waters to obtain very clean water samples for the analysis of dissolved and particulate trace elements, particularly iron (Fe) (Figure 1 right). Fe can limit primary productivity in several oceanic regions, and the chemical phase and fluxes of Fe are not very well known in this so far under-sampled region. The samples obtained on this cruise will later be analyzed in the home laboratories of the Institute for Chemistry and Biology of the Marine Environment (ICBM) at the University of Oldenburg, where not only the chemical phase of the trace elements will be determined but also analysis will be carried out to distinguish sedimentary versus atmospheric sources of trace elements.

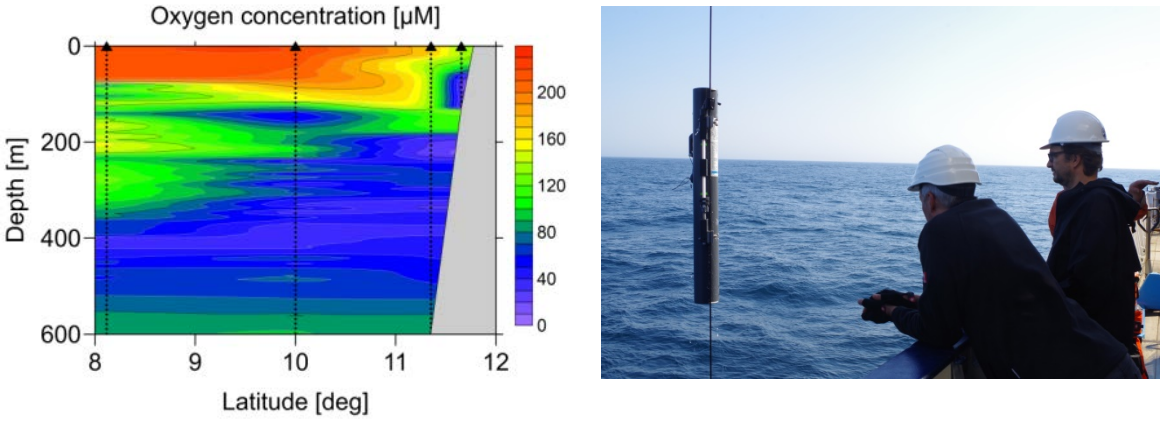

Figure 1: Oxygen concentrations across the Kunene upwelling cell (18°S) (preliminary CTD data; left panel, V. Mohrholz) and Go-Flo deployment on station (right panel).

Primary production is not the only process that can be limited by Fe in the oligotrophic oceans. The fixation of dinitrogen (N_2) gas, yet the largest external source of nitrogen (N) to the ocean, can also be limited by the availability of Fe. Scientists from the Max Planck Institute for Marine Microbiology in Bremen (MPI Bremen) carried out on-board experiments to determine both the rate of primary production and N_2 fixation using stable isotopes. Water samples are kept at close-to-in-situ conditions for a period of 24 h (Figure 2) and subsamples will later be analyzed at the MPI Bremen. While N_2 fixation is usually highest in the oligotrophic waters, not much is known about this process in the Eastern South and Equatorial Atlantic. This is partially due to the assumption that the coastal and equatorial upwelling would inhibit this process rather than on direct sampling and experiments.

The data from this cruise will add to our knowledge on the occurrence of N_2 fixation and its driving forces in this region.

Figure 2 (left): On-deck incubators on the aft deck to simulate in-situ light conditions.

Primary production is at the base of the food web in the ocean, and phytoplankton is grazed upon by larger organisms. To determine the composition of the zooplankton community and to study protists such as Foraminifera, a scientist from the Center for Marine Environmental Sciences (MARUM) at the University of Bremen deployed a so-called multinet. The multinet collects plankton samples throughout the water column at several intervals so that the depth distribution of the organisms can be studied. While the water column closer to the coastal upwelling off Namibia contained larger amounts of zooplankton, the oligotrophic waters were less densely populated, reflecting the oligotrophic conditions and the lower productivity in these waters. The samples from the multinet will be taken back home and will later be analyzed at the MARUM.

Figure 3 (up): Deployment of multi-net.

Back here on the ship, we are looking forward with anticipation to a nice Grill Evening on deck and the World Cup match.

Greetings from *12° 46'N 17° 43'E* from Tim Ferdelman, Chief Scientist, on behalf of the scientists and crew