RV MARIA S. MERIAN
Cruise MSM105
11.01.2022 - 23.02.2022
Walvis Bay - Mindelo

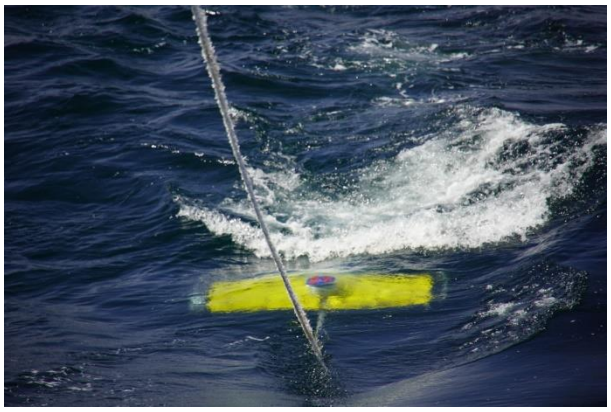
BUSUC II
The Benguela System
under climate change –
Effects of variability in physical forcing
on carbon and oxygen budgets

2nd Weekly Report
17. - 23.01.2022

In our second week of the expedition the weather was unusual nice and calm. The daily satellite images are dominated by red tones. A color code, which indicates the sea surface temperature in the Benguela upwelling area, is well above 20°C everywhere. With only very light wind blowing for days, we are surrounded by a smooth ocean whose surface is only occasionally disturbed by slight ripples. However, there is a very long swell running through from the southern ocean, which makes the MARIA S. MERIAN gently but vigorously moving.

Sea surface temperature data are available daily with one-day delay. The situation is quite different for observing the processes below the sea surface. Sensors are lowered from the ship to measure water temperature and salinity, but also the oxygen content and turbidity of the seawater. The depth at which the measuring device, the so-called CTD, is currently located is determined by a pressure sensor. The data readings are delivered via winch cable directly to the ship, where they are recorded by a computer and immediately displayed graphically.

When the ship is at a station, the CTD is deployed and the profiles of the measured variables are recorded, the ocean shows its internal structure. Based on typical temperature and salinity characteristics, we can identify different water bodies originating from the northern Atlantic Ocean, the equatorial ocean, or the southern ocean. The Benguela upwelling area is a mixing pot of all these water masses, which also differ in their oxygen and nutrient content, their signature of dissolved gases such as methane or nitrous oxide, and sometimes harbor very specialized microbial communities. As the CTD sinks into the water and the vertical profiles of water properties become visible, the control room fills with colleagues from marine chemistry and microbiology. Animated discussions take place about the depths from which water samples should be taken for subsequent analysis in the laboratory. For this purpose, the CTD is equipped with a ring of large water samplers. These are long tubes with a lid at each end. Initially open the tubes can be closed remotely at the desired depths. After the measurement, up to 240l of water from different depths are thus brought on deck at each station for further investigation in the laboratories.

In the control room scientists watching the CTD deployment (ldeft). The ScanFish at work, mountend on a tow calble behind the ship (right) (Photo: V.Mohrholz).

Sampling the ocean with this technique is time consuming. The work on the hydrographic section at 23°S took almost a week. A picture of oceans internal structure from the coast through the shelf to the deep sea is emerging only slowly. What conditions exist between stations remains unknown. Data density can be significantly improved if measurements are taken from a moving ship. To do this, the sensors are mounted on a wing like platform called ScanFish, which is towed through the water behind the ship and steered up and down. This results in a two-dimensional slice through the ocean, revealing the distribution of different water bodies on the shelf. However, the water resistance of the tow cable limits the use of this device. Even if the cable diameter is kept very small, the ScanFish cannot dive deeper than 170m.

Besides the hydrographic work, the other planned investigations could be successfully continued during the past week. Sediment samples were collected, chemical and microbiological analyses were performed, and bottom-dwelling organism communities were studied. In the meantime we are working on the northernmost stations of our working area near the border to Angola. We will leave this area in the next few days and heading southward.

Best regards from all participants of the Expedition BUSUC II
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