

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

1. Weekly Report
11.01. – 16.01.2022



On January 9, our group of scientists and technicians from the Leibniz-Institute for Baltic Sea Research Warnemünde and MARUM Bremen boarded the MARIA S. MERIAN in Walvis Bay, Namibia. After a demanding period of cruise preparation under Corona conditions, we are happy to finally be able to put the second expedition of our EVAR project into action. EVAR stands for "The Benguela upwelling system under climate change - effects of variability in physical forcing on the budget of carbon and oxygen".

The Benguela ecosystem off the coast of Namibia is one of the four major upwelling areas on the eastern margins of the oceans, which are among the most fish-rich areas of the world ocean. Although they cover only 1% of the world ocean's surface, they provide an indispensable contribution to the world's food supply, accounting for 20% of global fisheries yields. These favorable conditions are caused by relatively constant ocean currents and winds in the continents' shelf areas, which ensure that nutrient-rich water from deeper layers of the ocean reaches the light-flooded area near the surface, where it boosts the cycle of life. However, this phenomenon, known as "upwelling" or "buoyancy," also has a downside: the high production of organic matter leads to oxygen minimum zones at the bottom of the shelf regions, associated with the release of toxic sulfide in the water. Under certain conditions, this can reach the productive zone and cause devastating collapses in the fishing industry. Another negative effect is the emission of climate gases such as CO₂ and methane in the upwelling areas.

Our goal on this expedition is to investigate how the complex web of physical forcing, geochemical processes, and microbial activities can change in the wake of climate change and what consequences this has for the release of greenhouse gases, the spread of oxygen minimum zones, and seafloor living conditions. The data we plan to collect on this expedition will help us understand whether changes in environmental conditions trigger feedbacks that affect the whole system.

Once on board, we used the remaining day in port to unload the containers and start preparing the labs and equipment. We benefited greatly from the support of the crew of the MARIA S. MERIAN.



Processing of the first samples of bottom fauna by the Benthos Working Group (Photo: V. Mohrholz).

We departed the port of Walvis Bay on the morning of January 11 and began our first research activities three hours later in our study area on a transect perpendicular to the coast. In the following days we worked stations on the central part of the Namibian shelf. The work program here includes sampling the water column with the CTD probe, performing high-resolution turbulence measurements, and collecting sediment cores with multicorer and gravity corer. In addition, organisms that colonize the seafloor are studied.

The atmosphere on board is good, and the weather leaves little to be desired, so we can look forward to a scientifically successful expedition.

Many greetings in the name of all participants, and special thanks to the DFG, the German Research Fleet Coordination Centre and the shipping company Briese, who made the expedition possible in this difficult time.

Volker Mohrholz

(Leibniz-Institute Institute for Baltic Sea Research Warnemünde)