## 5<sup>th</sup> Weekly Report M208, Mindelo-Mindelo

10.3.-16.3.2025



The fifth and final week of Meteor cruise M208 focused on the filament study in the offshore waters of Mauritania. Cold upwelling filaments are scientifically interesting because they transport cold, nutrient-rich, and biologically productive waters from the coastal upwelling region into the open ocean. They are often associated with fronts — zones characterized by strong gradients in temperature or salinity. The interaction of these fronts with wind-driven currents is believed to generate upwelling, downwelling, or enhanced turbulent mixing. The plankton community and biogeochemical cycles are expected to vary significantly between the cold and warm sides of the front. With our interdisciplinary working groups onboard Meteor, we are well-equipped to study the diverse aspects of frontal dynamics in this highly productive coastal upwelling environment.

To observe the evolution of such a filament, we deployed two gliders programmed to repeatedly follow a section that crosses a cold filament and extends into an anticyclonic warm-core eddy. In parallel with the glider transects, we conducted repeated shipboard measurements, focusing on identifying biological productivity, zooplankton communities, and downward carbon flux within the different subregions. Additionally, we carried out raster surveys using the Moving Vessel Profiler to map the horizontal and vertical structures associated with the filament around the eddy. Our measurements were well-supported by satellite remote sensing, providing twice-daily high-resolution sea surface temperature images, which were mostly of high quality due to low cloud coverage.

One of the gliders was equipped with a microstructure probe, similar to the one extensively used during shipboard measurements. Comparing both datasets, which together capture the high variability in mixing, will help identify potential contamination of the turbulence field beneath the ship caused by the ship's propulsion.

After ending the shipboard measurements within our filament study, we continued with our last zonal section within the coastal upwelling system off Northwest Africa. The 18°N section of Mauritania was measured several times since about 2005 and excellent datasets are available to study variability and possible long-term changes in this upwelling system. We performed similar station and shipboard measurements as

we did along the other zonal section at 11°N off Guinea-Bissau, at 13°30'N of The Gambia, and at 14°30'N off Senegal. These measurements will allow the spatial variability of the tropical upwelling system from the strong upwelling off Mauritania to much weaker upwelling off Guinea-Bissau. This will be achieved after having all dataset at hand, many of them become only available after careful calibration of the used instruments or the analysis of biogeochemical and biological probes back in the laboratories at home.

After completing the 18°N section, we recovered the gliders that had continued their measurement program within the filament. Both gliders operated without issues, collecting exceptional datasets on microstructure turbulence and particle counts, alongside standard hydrographic parameters. With a few final CTD and Multinet stations, as well as the last preparations of water samples in the Meteor labs, the scientific program of M208 came to an end. Today, packing of our containers is in full swing. On Monday morning, we will arrive at the port of Mindelo, where we will complete the packing.

At this point we would like to thank captain Detlef Korte and his crew for the great support in all areas and their important contribution to the success of the cruise, which was of course only possible due to the great commitment of all scientists and technicians. Thanks for the great time we had onboard!

Greetings from the tropics,

Peter Brandt and the participants of Meteor cruise M208



**Fig. 1:** Sea surface temperature in the tropical Northwest Atlantic, measured by satellite at the start of our cruise on February 24, 2025. The white line indicates the ship's track, ending north of the Cape Verde archipelago. Throughout the cruise, an interdisciplinary measurement program was carried out, including mooring, autonomous glider, and drifter deployments; station work with CTD, in-situ pumps, water samplers, and zooplankton nets; as well as underway measurements (Figure M. Schulz).



Fig. 2: Scientific crew of R/V Meteor cruise M208 on the helideck (Photo: S. Speith).