4th Weekly Report M219, Recife-Mindelo-Emden

15.6.-21.6.2026

On Sunday last week, we made a port call in Mindelo, Cabo Verde (West Africa). This stop was used to take on board a new oceanographic buoy, developed and built at GEOMAR in Kiel. It is designed to continuously collect data from the ocean and the atmosphere above it and transmit these data to GEOMAR and Cape Verdean institutions.

During the weeks preceding the port call, the final preparations for the deployment were carried out at the Ocean Science Centre Mindelo (OSCM). When METEOR arrived in Mindelo, the buoy had already been placed on the pier together with additional equipment from the OSCM required for the deployment.

A final test of the buoy in the harbor basin was conducted using a portable crane before it was lifted onto the ship's deck and secured with ratchet straps (Fig. 1).

Part of the scientific team and crew had the opportunity to visit Mindelo during the day, while a group from the Ocean Science Centre Mindelo (OSCM) and the Instituto do Mar (IMar) visited METEOR. This visit was particularly meaningful, as it marked the final port call of METEOR III in Mindelo after many visits throughout the vessel’s service life. Many of our Cape Verdean colleagues have participated in numerous research cruises aboard the ship over the years, giving them the opportunity to visit this still impressive research vessel one last time.

The port stop was originally planned for 15 June. However, thanks to the excellent progress of the expedition up to that point, we were able to move the stop forward to Sunday. This decision also took into account that Cape Verde was scheduled to play its very first FIFA World Cup match on Monday, and it was not expected that any Cape Verdean would be eager to work on that day.

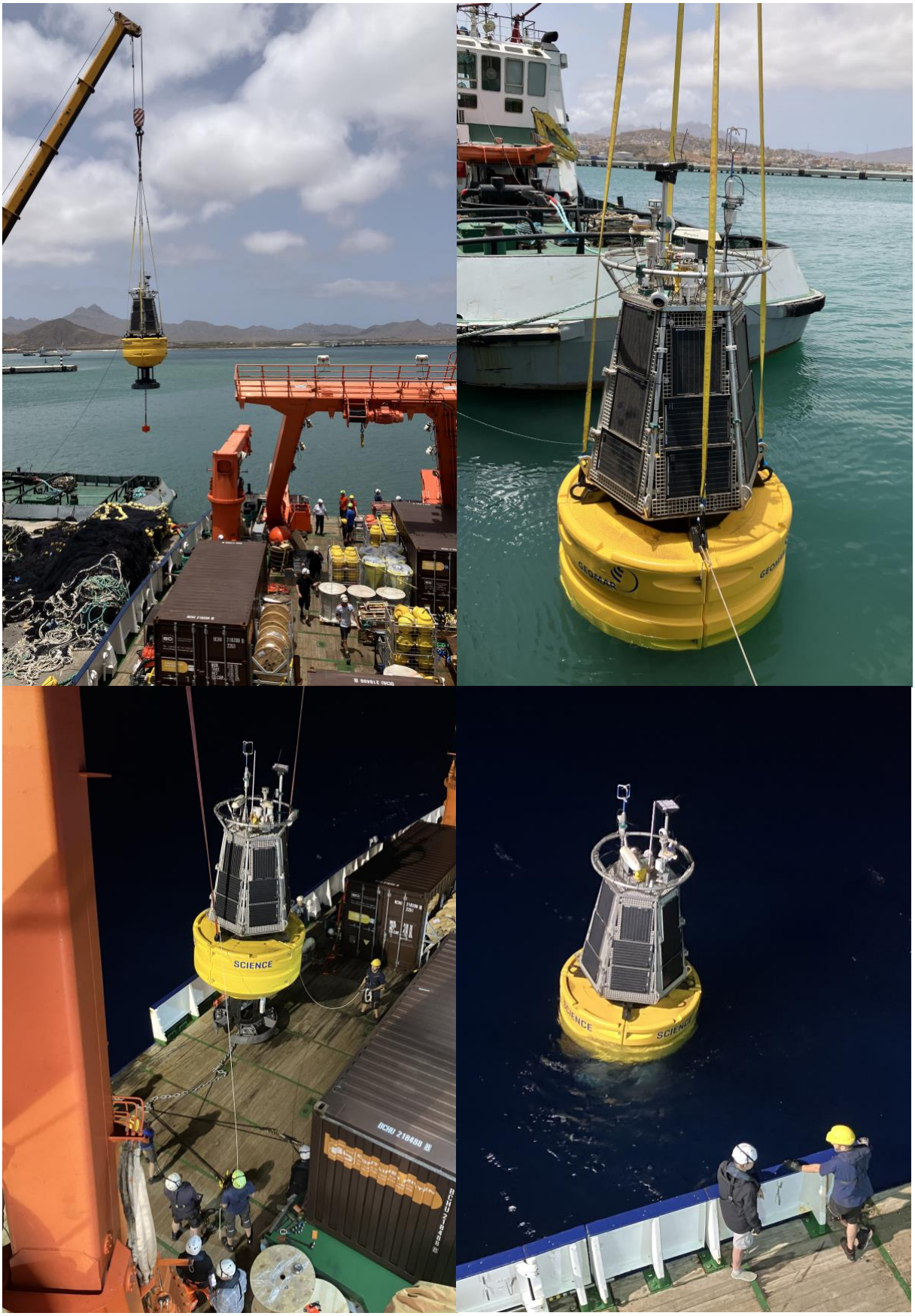

Fig. 1: Buoy test in the Port of Mindelo on 14 June (upper panels) and final buoy deployment during a two-crane operation coordinated by Captain Hammacher on 15 June (lower panel, Photos P. Brandt).

After departing Mindelo on Sunday evening, the scientific programme of the fourth week of M219 began on Monday morning with the recovery of the CVOO (Cape Verde Ocean Observatory) mooring. The mooring was recovered without any problems, and we then proceeded directly to the deployment of the surface buoy.
The mooring line for the surface buoy was first deployed with a temporary buoyancy sphere attached to its upper end, which was intended to remain at the surface after deployment. The sphere was subsequently recovered aboard METEOR, and the end of the mooring line was connected to the buoy. By the time this work had been completed, darkness had already fallen. The final deployment of the buoy was therefore carried out at night under the direction of Captain Hammacher in a two-crane operation, with all of METEOR's floodlights illuminating the working deck (Fig. 1). The operation proceeded very smoothly, and we would like to thank Captain Hammacher, the bosun, and the entire crew of METEOR for their excellent work during the buoy deployment, as well as throughout all mooring operations during the cruise. Their professionalism and support were greatly appreciated by the scientific party.
The scientific station work was concluded with the deployment of the CVOO during the next day and some CTD station for water sampling and instrument calibration.

Underway measurements were performed by the Institute of Chemistry and Biology of the Marine Environment (ICBM, University of Oldenburg) and the Lamont-Doherty Earth Observatory (LDEO, Columbia University). The main objective of the ICBM measurements was to study radiative heat and freshwater fluxes between the ocean and the atmosphere during the transect through the ITCZ (Intertropical Convergence Zone). For the observation of precipitation, a disdrometer (laser precipitation sensor, Thies Clima) and an acoustic rain sensor (RF4 ISAW) were installed on the top deck of the ship to record rain intensity, droplet size, velocity, and counts.
To observe incoming and outgoing radiative heat fluxes at the air–sea interface, pairs of upward- and downward-looking radiometers were installed at the front of the ship on the starboard side on a beam extending approximately 3 m beyond the railing. In addition, a ferrybox (Open Ocean version) was used to measure oxygen, temperature, salinity, turbidity, and chlorophyll, allowing the along-track determination of physical, biological, and chemical properties of the water.
Overall, rain events on this cruise were scarce with only a couple of small rain events and no heavy rain events. Rain intensities were recorded together with droplet size, velocity and counts using a disdrometer. Three distinct rain events on June 6 (6°S), June 11 (5°N) and June 12 (10°N) were chosen to compare these droplet properties (Figure 1). The events differed in intensity and duration, and notably differed in velocity vs. diameter pattern during the peak of the events. Less intense rain (June 6 and 12) was characterized by higher abundance of smaller but faster droplets, while the more intense rain event (June 11) followed the expected curve of speed/size ratio.

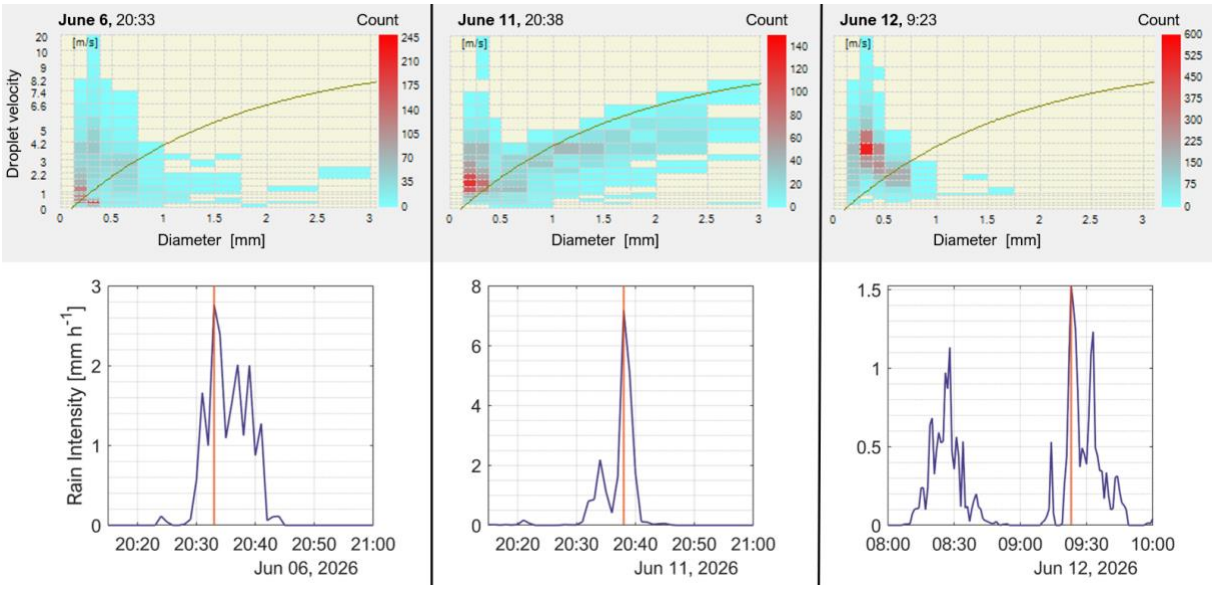

Fig. 2: Rain intensities of three distinct rain events on June 6, 11 and 12 (bottom panel) and corresponding droplet properties velocity, diameter and counts during their peak time (top panel). Red vertical line in the time series marks the peak time of the rain event. Green curve shows the expected speed/size ratio for precipitation in liquid form (Figure L. Jaeger).

The CLASS instrument was used by LDEO to study surface phytoplankton community. This instrument uses a blue and green laser to excite fluorescence of the surface seawater water flowing through from the ship's seawater intake system. Chlorophyll is a pigment found in all phytoplankton while phycoerythrin is a pigment found mostly in cyanobacteria. By measuring fluorescence of these two pigments, the system can estimate surface phytoplankton and cyanobacteria concentrations. In addition, the fluorescence measurements also give estimates of surface dissolved organic matter. These measurements were merged with the ship's Thermosalinograph data and position information from DSHIP to produce the along track map (Fig 3).

The Cold Tongue can be seen as cooler, more saline waters around the Equator with slightly elevated Chlorophyll concentrations. Cyanobacteria seem to dominate the community around 5-6ºN and also around 12ºN. These data have to be calibrated later in the lab with water samples taken from the surface CTD bottles.

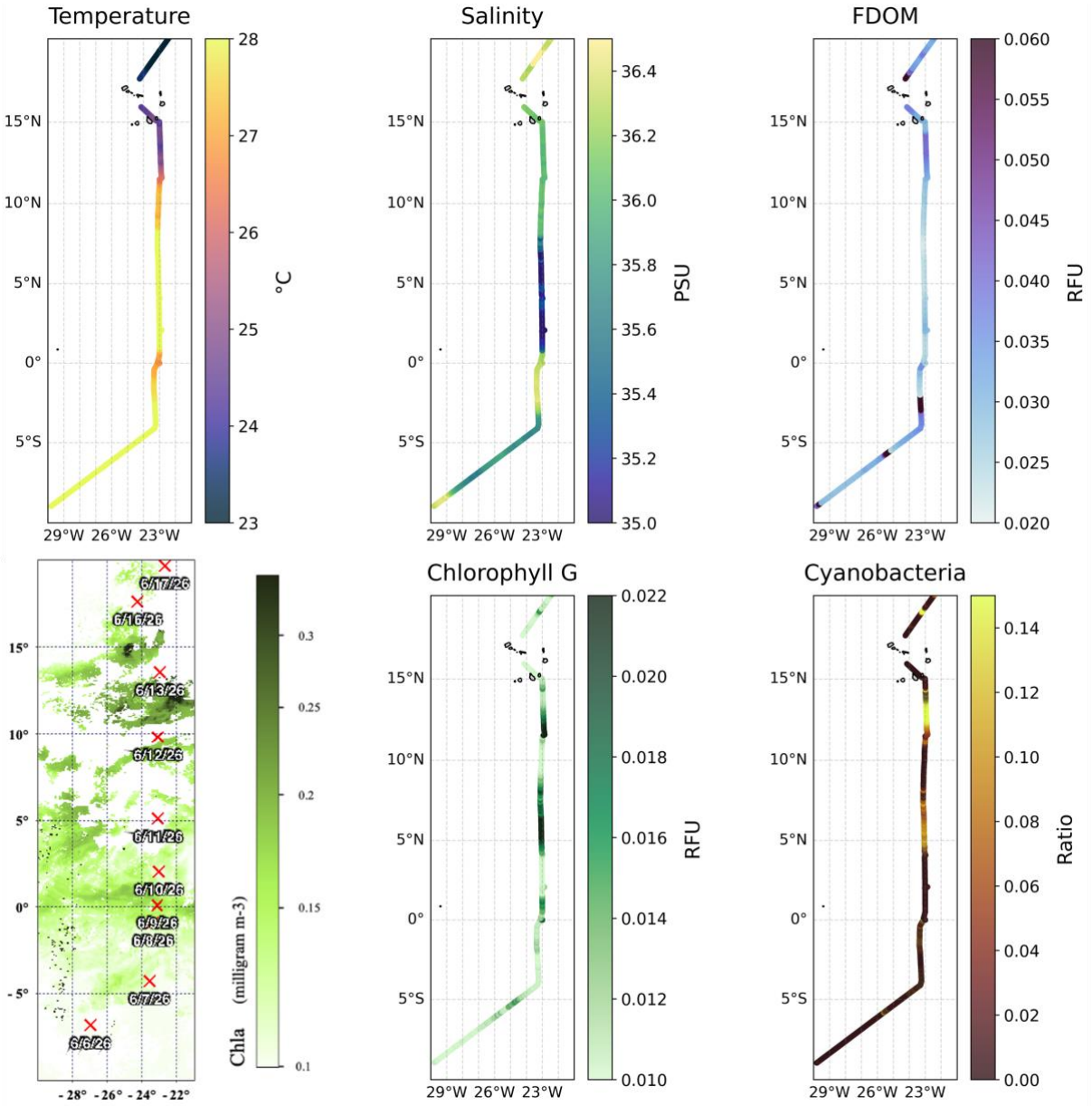

Fig. 3: Along track measurements of surface temperature, salinity, Dissolved Organic Matter, Chlorophyll, and Cyanobacteria. Satellite derived Chlorophyll concentration for 8 June 2026 is also shown for context (Figure H. Sandberg).

The scientific programme was concluded with the deployment of two surface drifters and the recovery of a biogeochemical (BGC) Argo float equipped with an Underwater Vision Profiler 6 (UVP6). On short notice, we received permission to recover the float in the Spanish EEZ and were able to secure a very valuable and exciting dataset. We would like to thank the German Research Fleet Coordination Centre, the Embassy of the Federal Republic of Germany in Spain, and, of course, the professional work of the nautical and deck crew for safely recovering the float using the rescue star.

Greetings from the waters off Portugal,
Peter Brandt and the participants of Meteor cruise M219