FS MARIA S. MERIAN - MSM106 (26.02. – 19.03.2022**)**
2nd Weekly report (28.2. – 6.3.2022)

A week of many Ups and Downs lies behind us, with only the trade wind blowing constantly from the north-east at force 7 for almost the entire week.

Unfortunately, a suspected corona case of a crewmember was confirmed by a positive PCR test result from the ship's doctor, so that the outbreak management protocol immediately got activated by the ship's management: The person in question, who was already in his cabin when the infection got detected, was isolated and all scientific work was stopped for the time being. In fact, the ship was in lockdown in order to obtain an overview of the infection on board and to avoid further infections. Strict contact reduction and regular rapid tests were of particular help here. Fortunately, the person affected only had very mild symptoms, so that the cruise could be continued with everyone's agreement, albeit without any station work at the same time.

The work plan developed many weeks ago had to be completely turned upside down and substantially adapted to the new circumstances. The coordination between the chief scientist and the captain was mainly done by telephone and via a new communication platform on board. This way, at least surveys with the on-board ADCP and our SIMRAD EK80 Echosounder could still be carried out, as these devices could be monitored from the cabin.

Part of the scientific work program is to investigate the role of mesoscale eddies in the coastal upwelling region off West Africa in relation to biogeochemical cycles as well as a possible transport process for the distribution of plastics. The data collected during MSM106 are related to the BMBF-funded project REEBUS (Role of Eddies in Eastern-Boundary Upwelling Systems).

Satellite data (our analogue to the rapid test) had only barely suggested the presence of an anticyclonic eddy near the time series station CVOO. In order to obtain clear evidence for the existence of such an eddy we carried out two ADCP sections across the potential eddy candidate (our "PCR test", see Fig. 1).

Special attention was paid to the southwestern flank of the Eddy, which had already hit the island chain and resulted in a pronounced shear with the nearshore, southeasterly current. We took a closer look at this process with a high-resolution ADCP and EK80 survey and also collected biogeochemical data with our underway sensors we connected to the vessel’s seawater supply system.

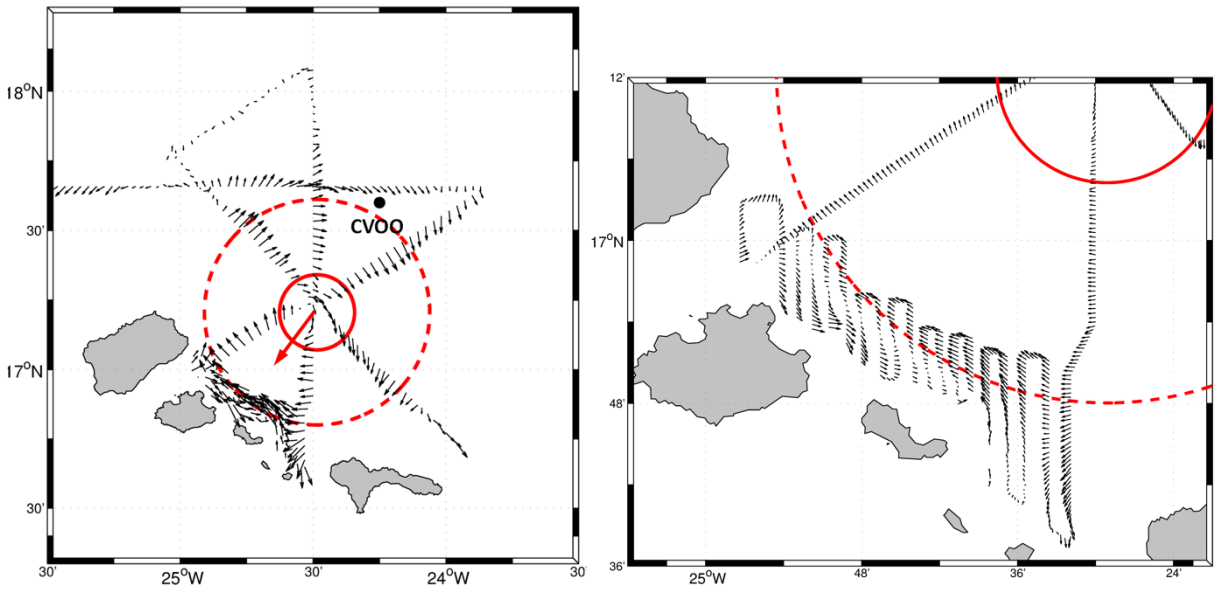

Figure 1, (T. Fischer): The eddy north of Cabo Verde drifts southwest at about 2 miles per day directly towards the island chain. The inner solid circle is the area in solid rotation (about 30km diameter, 15km radius), the outer dashed circle delimits the area of trapped water (about 90km diameter, 45km radius). Outside the trapping radius, the water still circulates clockwise, but water from outside can mix in here. The maximum circulation speed is 0.2m/s

After a few days, "single-handed" station work could be carried out again under strict protective measures. We gained inside into the vertical structure from the interior of the eddy through a CTD section as well as reduced water sampling. Our suspicion was quickly confirmed that we found a so-called "mode-water" eddy, which is characterized by a strongly isolated lens of South Atlantic Central Water below the surface layer (see Fig. 2). The Winkler titration data for the determination of dissolved oxygen indicated a minimum value of 28 µmol kg-1 at a water depth of only 150 m. Such a strong reduction in oxygen below the surface layer in those eddies is caused by accumulation of organic material below the surface layer, high respiration rates and enormously reduced ventilation of this water mass. Such eddies have been very rarely discovered in the past and even more rarely sampled specifically. The data collected during MSM106 therefore represent a very exciting data set that will contribute to a better understanding of this phenomenon and at the same time represent an exciting phenomenon for the student education on board.

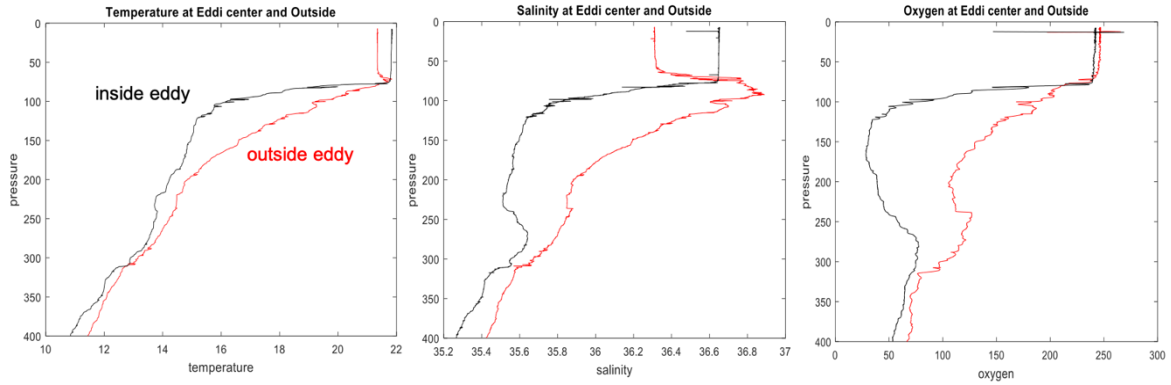

Figure 2, (D. Konate): Vertical profiles for temperature (left), salinity (middle) and dissolved oxygen (right) measured with the CTD rosette system inside (black line) and outside (red line) the eddy. Data are uncalibrated.

After it became apparent that no further infections had developed on board, more station work could gradually be carried out and the training component could finally start with full swing after a few days of delay. In smaller groups and divided by discipline, the students used the CTD rosette system, ran net trawls and collected water samples (see Fig. 3). Our daily meetings as well as the presentations of the students, where we also learn a lot about West Africa, have been moved from the meeting room to the hangar due to the rough seas... in everyone's interest ;-)

Figure 3, (B. Fiedler): Impressions from the onboard training program.

Special thanks go to the shipping company Briese, the ship's management, the coordination office in Hamburg as well as the directorate of GEOMAR for the prudent procedure in dealing with the infection on board. In the meantime, the crew member has also fully recovered and life on board has returned to normal.

Even the wind has been kind to us and has dropped to 5 Beaufort.

Warm regards from south of Canary Islands,

Björn Fiedler and all MSM106 Participants

GEOMAR Helmholtz Centre for Ocean Research