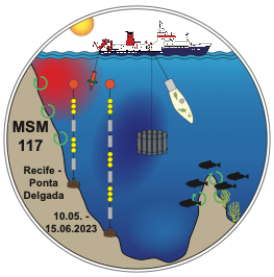
RV MARIA S. MERIAN MSM117

10.05. - 15.06.2023
Recife - Ponta Delgada



3. Weekly Report

22. - 28.05.2023

On Sunday evening, we arrived at the seamounts and started directly with our observations. We started the program with uCTD measurements, which can be performed at full speed along the cruise track (Fig. 1). Here, the "u" stands for underway. Like the CTD (Conductivity-Temperature-Depth), the uCTD measures conductivity and, thus, salinity as well as the temperature of the water as a function of depth. To measure with this probe, one spools up an appropriate length of stable rope and then allows the probe to fall freely through the water for a specified time. Of course, the rope length and fall time must be chosen to ensure that the probe does not touch the sea floor, which is somewhat of a challenge when encountering steep seamounts. Afterwards, the probe is brought back on board with a specially designed winch. We managed to collect a total of 101 uCTD profiles over the two seamounts.

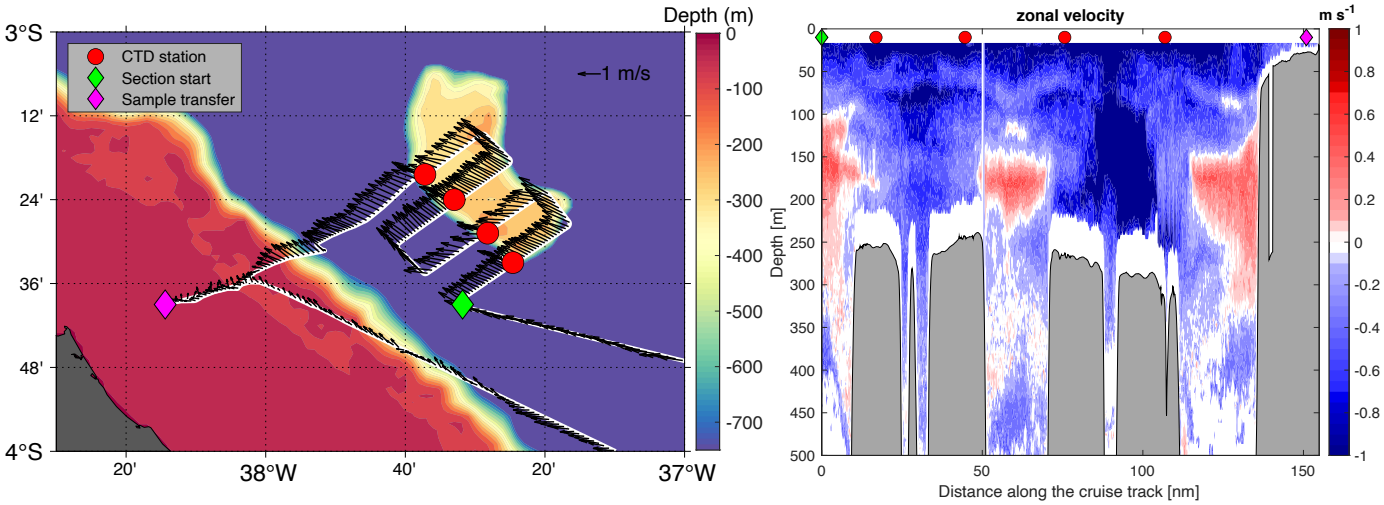


Fig. 1: Left: Cruise track (white line) over the second seamount, bathymetry in color. Surface velocities from the shipboard ADCP are shown with black arrows along the cruise track. Right: The east/westward flow field as a function of depth and distance from the initial point of the cruise track at this seamount (green diamond). One can see 4 crossings of the seamount. On the one hand the currents are relatively strong and on the other hand they show interesting structures. The red dots mark the CTD stations in both figures, the magenta diamond represents the meeting point for the sample transfer on the Brazilian shelf. Figure: Philip Tuchen und Rebecca Hummels

In addition to this uCTD program, which took place "underway", we carried out combined stations of the CTD and the microstructure probe as well as the multinet, as we did on the Brazilian shelf. 4 stations per seamount, evenly distributed over about 24 hours. Between the two seamounts we had a small transit. Looking at the velocities from the shipboard ADCP (Fig. 1, left), it is no surprise that we were able to reach the second seamount faster than expected. The current was pushing us in the right direction. In general, we experienced relatively strong currents of over 1 m/s in this area (Fig. 1), which also forced us to drift with the current during our station work so that the equipment could be deployed without danger. However, thanks to the great cooperation with the crew of the Maria S. Merian, this was not a problem.

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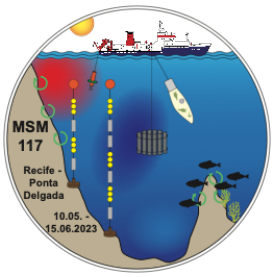

3. Weekly Report

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8 Seamount Stations	Number of Profiles	Analysis of watersamples for	Number of samples
CTD including:	8	Nutrients (Nitrit, Nitrate, Phosphate, Silicate)	48
LADCP	8	Chlorophyll	24
OPUS	8	Cytometry	55
UVP	8	Phytoplankton taxonomy	16
		Istotopes (POM)	64
Multinet	8	Zooplankton taxonomy	32
		Isotopes	64
uCTD	101		
Microstructure	41		

Our shallowest stations over the first seamount had a water depth of only 60-70m, while at the second seamount the plateau was reached at about 200m (Fig. 1). At the 8 stations over the two seamounts, 8 CTD/LADCP/UVP profiles were recorded, 41 microstructure profiles and 8 multinet measurements. Many water samples were taken from the CTD water samplers and analyzed for the parameters listed above. All of these samples can only be further analyzed in the laboratories onshore. A glimpse of the particle distribution and the types of phyto- and zooplankton present in the water column is provided by the UVP (Underwater Vision Profiler). This instrument, which is mounted on the CTD rosette, observes the particle distribution of a volume of 150 x 180 x 23 mm of water, which is illuminated by a very powerful lamp. From this device one gets for example a profile of the particle distribution for different size classes of particles (Fig. 2), where the larger particles can also be quite small animals, which are then actually stored as images (Fig. 2).

Early in the morning of May 24, 2023, we were able to complete our measurement program at the two seamounts and headed to the meeting point for the sample transfer (Fig. 1, 3). The biological samples of zoo- and phytoplankton will remain in Brazil, so that they do not have to be imported again in a cumbersome way, which of course always bears the risk of interrupting the cold chain in case of cooled or frozen samples. For this purpose, Prof. Dr. Ralf Schwamborn (from the University in Recife) together with Prof. Dr. Marcelo Soares (Labomar Fortaleza) came with a chartered fishing boat from Fortaleza to our meeting point to receive the biological samples, which will now be further analyzed at the University in Recife and Sao Paolo (Fig. 3)

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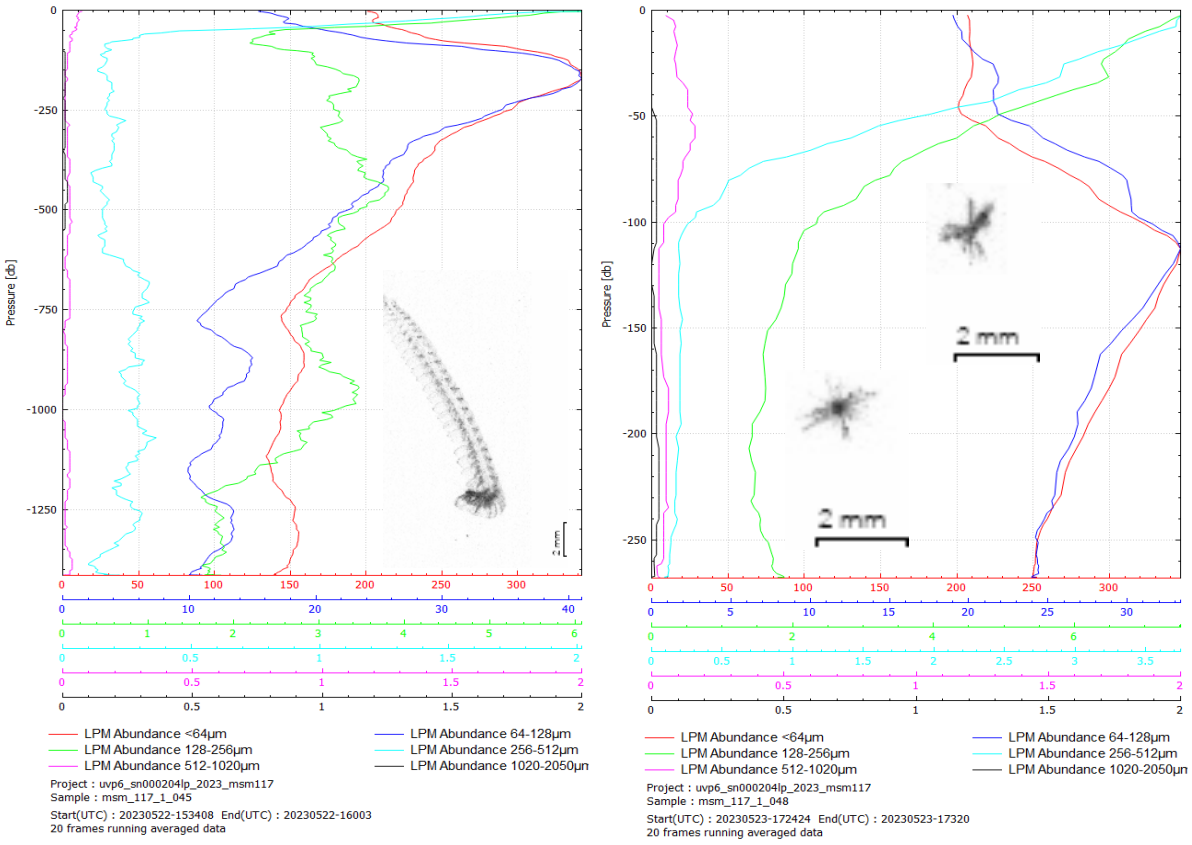

Fig. 2: Particle distribution for different size classes at the 2 different seamounts. In the figures: UVP photos of individual particles or organisms. Figure: Claudeilton Santana.

Figure. 3: Handover of the biological samples from Maria S. Merian to the fishing boat "Agraciado" (left). Photo: Felix Duerkop. Prof. Dr. Ralf Schwamborn and Prof. Dr. Marcelo Soares after the sample handover (right). Picture: Ralf Schwamborn.

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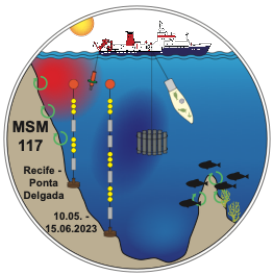

3. Weekly Report

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Thanks to the professional execution by the crew of the MARIA S. MERIAN, the sample transfer went smoothly and we were able to start the transit to the 35°W transect already at 9:00 am.

The north/south transect along 35°W, which crosses the equator, has been sampled many times in the 1990s and provides information about the complex zonal current system near the equator. There was a considerable break between 2003 and 2019, and we are now carrying out measurements for the third time since 2019. Currently we are right at the equator and will also need a few more days to complete the measurements up to about 5°N. If you want to be up to date as the current measurements become more complete, you can follow the progress at the following link: https://gliderweb.geomar.de/html/msm117/msm_117_1_35W_livesection_small.jpg.

We will provide an update at least twice a day. The current state of the measurements at 35°W is shown in Fig. 4.

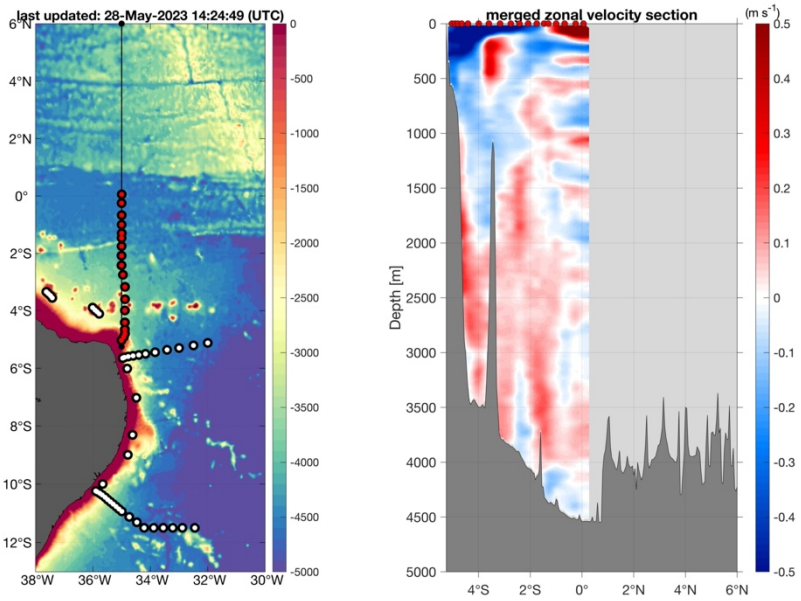

Fig. 4: Bathymetry in the western tropical Atlantic along with the cruise track in black and the stations already completed (white and red dots). The red dots are the stations at 35°W, which are included in the section of the zonal flow (shown on the right). Figure: Philip Tuchen.

After the 35°W section, we will head to the equator at 23°W where more mooring work awaits us.

On behalf of the team of MSM117
Rebecca Hummels
(GEOMAR Helmholtz Centre for Ocean Research Kiel)