

10.05. - 15.06.2023
Recife - Ponta Delgada

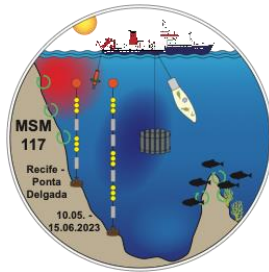
Despite minor obstacles in the port logistics, the research vessel MARIA S. MERIAN was able to set sail on the afternoon of 10.05.2023 with only a short delay. The scientific team on board consists of 20 people, about half from GEOMAR - Helmholtz Centre for Ocean Research Kiel, together with six scientists from the University of Pernambuco (UFPE) and the University of Sao Paulo (USP) in Brazil, as well as a colleague from NOAA/AOML in Miami, USA.

The majority of the scientific participants met before embarkation for a bilateral seminar in Recife at the University of Pernambuco (UFPE) to exchange ideas in advance about their scientific interests and goals during the research cruise. For more than 20 years, these seminars have fostered the close partnership between Brazilian and German researchers.



*Fig. 1: Participants of the 8th bilateral seminar at the University of Pernambuco in Recife.
Picture: Leonardo Bruto.*

The scientific program of the cruise focuses on the western boundary current circulation off Brazil in relation to the Atlantic Meridional Overturning Circulation (AMOC) and its connection to the equatorial current system. The work program of the cruise includes the recovery and deployment of a total of six deep-sea moorings predominantly on the Brazilian shelf and the sampling of three hydrographic sections accompanied by current measurements. In addition, a large number of measurements are planned on the Brazilian shelf and at two seamounts, where the effect of the physical setting in these highly turbulent regions on the ecosystem will be studied.



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After the containers with the scientific instruments were finally released from customs on the evening of May 8, 2023, the scientific equipment could be set up in no time at all. The measurement program was to begin just two hours after departure. Thanks to the great cooperation of the entire science party and the crew of the MARIA S. MERIAN, this ambitious project could actually be realized and we reached the first station of the research cruise on May 10, 2023 at 18:00 local time.

The stations along the Brazilian shelf and in the further course of the voyage at the two seamounts should provide information about the physical setting of these two regions and the influence of the physics on the distribution of nutrients and thus the occurrence of phyto- and zooplankton. Especially at these stations the German-Brazilian cooperation is required, because the physical measurements are mainly performed by the German-American team and the biological measurements by the Brazilian team. Here, four different measurement systems will be used at the same time. The use of the different measurement systems, which includes the typical profile measurements of the CTD (temperature, conductivity and thus salinity, pressure, oxygen and chlorophyll) accompanied by current measurements, the microstructure probe with which the strength of the turbulence in the water column is determined, as well as the multinet with which phyto- and zooplankton samples can be taken, worked perfectly. Only the underway measurements with the uCTD required the repair of the built-in winch, which became sluggish after a few profiles. However, this was quickly repaired and the first section of the shelf survey was completed just before the start of the 11°S section.

The first results of the current and turbulence measurements along the Brazilian shelf show that this region is highly dynamic. The strong currents alternate with depth and deep regions with strong shear are formed. Measurements with the microstructure probe show that these depth regions are very turbulent and the water is well mixed there. This results in step-like structures, which can also be observed well in the temperature profile, for example (Fig. 2).

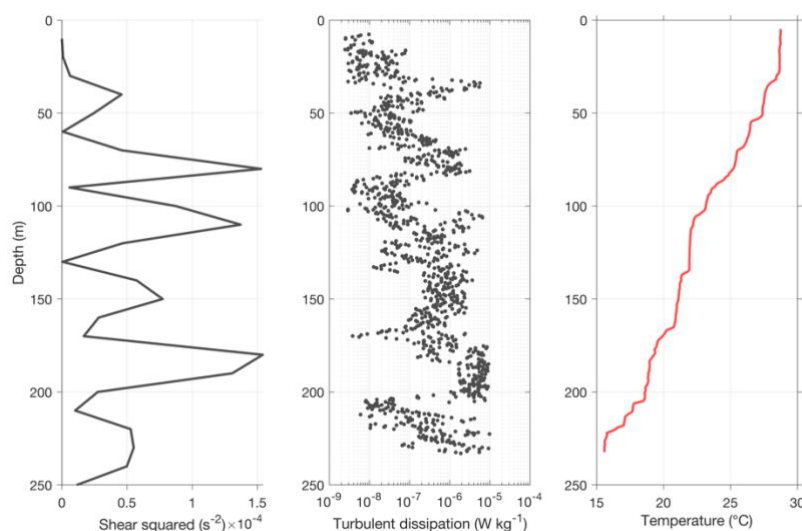
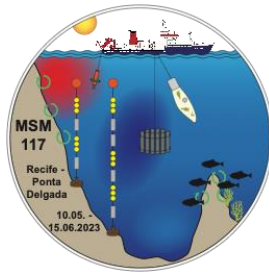


Fig. 2: Vertical profiles of the current shear (left), turbulence (middle), and temperature (right). Figure: Tim Fischer and Philip Tuchen.



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Already after 1.5 days - in the morning of May 12, 2023 - the recovery of four moorings along 11°S was started. This mooring array follows the design of a mooring array already laid out here on site between 2000 and 2004. The measurements which were resumed in 2013 are intended to investigate longer-term variations in the boundary current system. The four mooring recoveries could already be completed on May 13, 2023 and all went without problems.

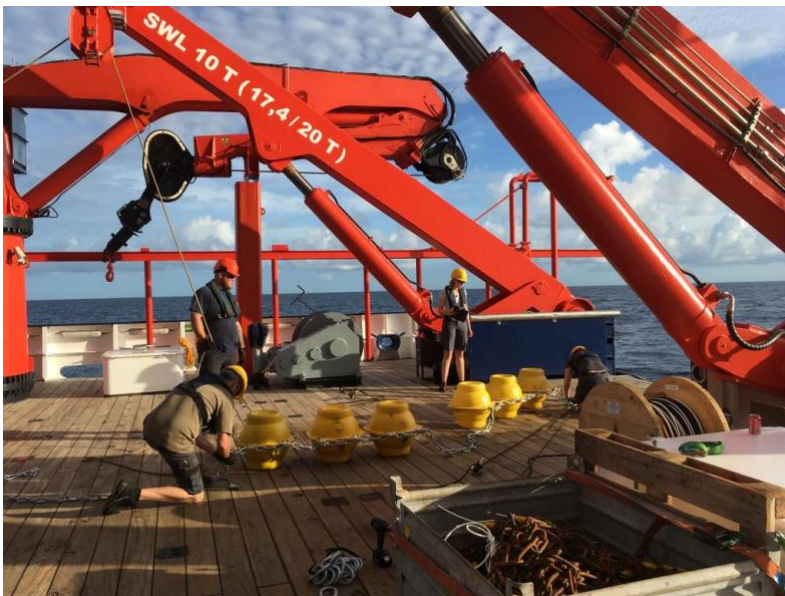


Fig. 3: Mooring deployment on the Brazilian shelf. Picture: Joke Lübbecke

At first glance, most of the instruments have run very well and we expect a very good data yield. This is also largely due to the very good cooperation with the crew of MARIA S. MERIAN.

On behalf of the MSM117 team
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