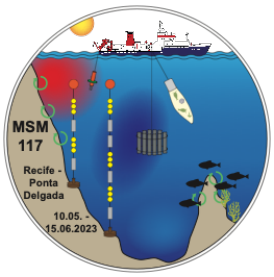
RV MARIA S. MERIAN MSM117

10.05.-15.06.2023
Recife – Ponta Delgada



2. Weekly Report

15.05.-21.05.2023

Already on Monday we were able to complete the mooring work with the deployment of the deepest mooring at 4110m water depth. This means that all moorings of the mooring array consisting of four deep-sea moorings along the Brazilian shelf at 11°S have been re-deployed, after we had only started with the first recovery on the morning of May 5, 2023 - i.e., after only 3.25 days. This was a great success for our scientific team, which was only able to achieve this effective result with the energetic and professional support of the crew of the Maria S. Merian.

As already suspected, the data yield is great. Only one deeper current meter did not record any data because of water damage. All other devices provided almost 100%; a great result.

sensor type / mooring	T (%)	C (%)	P (%)	U,V (%)	O_2 (%)	other (%)
KPO 1238	100	100	100	100	-	-
KPO 1239	100	98	100	100	-	-
KPO 1240	100	100	100	100	-	-
KPO 1241	100	100	100	83	-	-
all moorings	**100**	**99.5**	**100**	**95.75**		

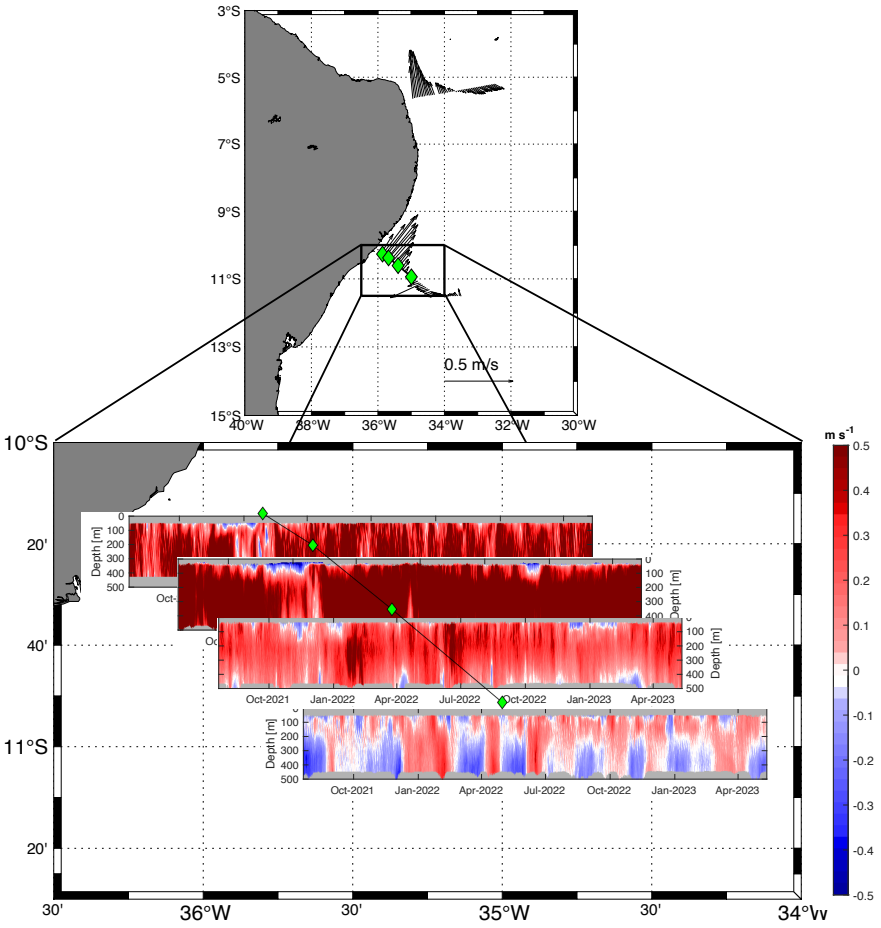


Fig. 1: The upper map shows the flow velocities of the shipboard ADCP averaged over the upper 400m depth along the cruise track as black arrows. The green diamonds mark the positions of the four moorings. These are also shown in the lower map along with the time series of the moored current meters covering the upper 500m of the water column. Figure: Rebecca Hummels

Both in the data of the moored ADCPs (Acoustic Doppler Current Profiler) and in the measurements of the shipboard ADCP along our track, the North Brazil Undercurrent (NBUC) is very clearly visible. It can be seen at both 11°S and 5°S due to high velocities parallel to the coast. In the mooring time series, where the velocities parallel to the coast are also shown, it can be seen as high positive velocities (red areas) that only weaken towards

the outermost mooring (farthest from the coast). These time series allow us to study the temporal variability of this strong current (Fig. 1).

We have now also been able to sample the entire 5°S section and all systems have worked reliably and recorded good data. In the upper about 1000m of the 5°S section the NBUC can be seen again with velocities of up to 1 m/s (Fig. 2) The velocities here are rotated to represent again the velocity along the coast. In Fig. 1 one could already see how the NBUC follows the coastline and also dominates the flow field in the upper 500m of the 11°S field in the time series of our current meters. At greater depths of about 1500 - 3500m we see an opposite southward flow representing the deep western boundary current (DWBC)

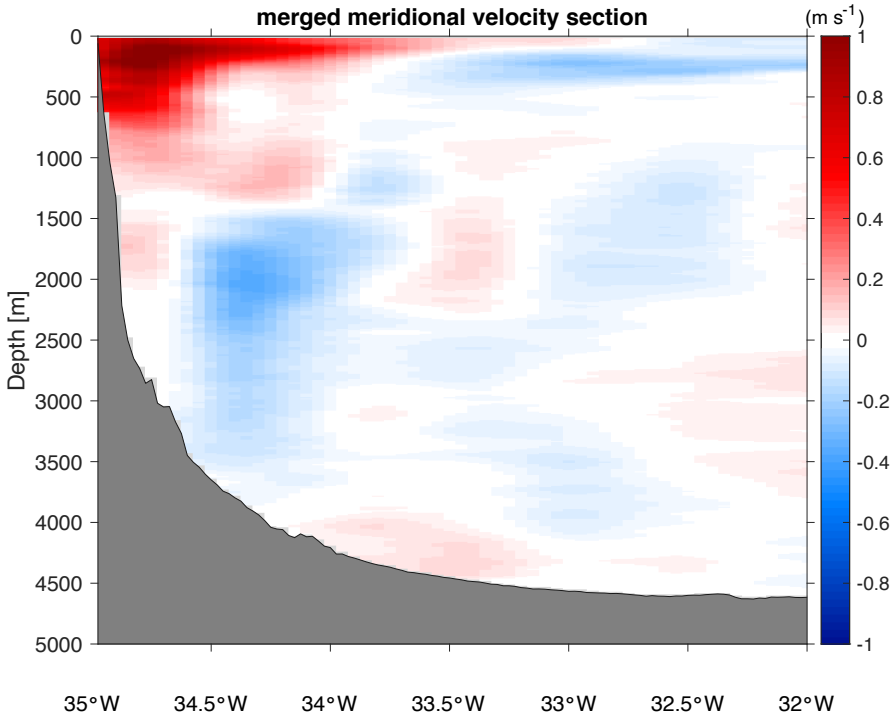


Fig. 2: Velocity parallel to the coast along 5°S, combined from data from the shipboard ADCP and the L(owered)ADCP lowered to the seafloor with the CTD probe, recording currents down to the seafloor. Figure: Philip Tuchen.

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On one of the last stations of the 5°S section we lowered together with the CTD probe styrofoam balls to a depth of about 4200m, which we had painted before by two German school classes. After the balls were exposed to the high pressure of the 4200m water column on the seafloor, they had shrunk very clearly. The little mole serves as a scale in this case. This is to show the students as well as everyone else the pressure effect of the water column very clearly.

Fig. 3: The little mole with the styrofoam balls (before (after) they were tied to the CTD left (right)) shrunk at 5°S at 4200m depth under the high pressure of the water column. Picture: Joke Lübbecke

Several times we were visited by some dolphins at sunset, who seemed to have fun surfing in the bow wave of the ship (Abb. 4).

Fig. 4: Dolphins in the bow wave of the Maria S. Merian. Pictures: Felix Duerkop und Sunke Schmidtko

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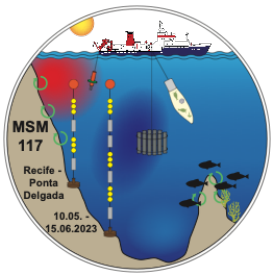

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At the moment we are on a small transit to our next working area at the seamounts. We are curious what conditions await us there and what our observations will tell us about the interaction of the physical conditions and the prevailing ecosystem.

Rebecca Hummels on behalf of the team of MSM117
(GEOMAR Helmholtz Center for Ocean Research Kiel)