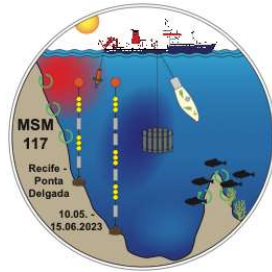


RV MARIA S. MERIAN MSM117

10.05. - 15.06.2023
Recife - Ponta Delgada



4. Weekly Report

29.05. - 04.06.2023

At the beginning of the week we were still busy with the north-south section along 35°W across the equator, which we could successfully complete in the night from Wednesday to Thursday with the CTD station at 5°N. The evolution of the image of the eastward-westward flow field could be followed live at the following link: https://gliderweb.geomar.de/html/msm117/msm_117_1_35W_livesection_small.jpg Here the final result is shown once again.

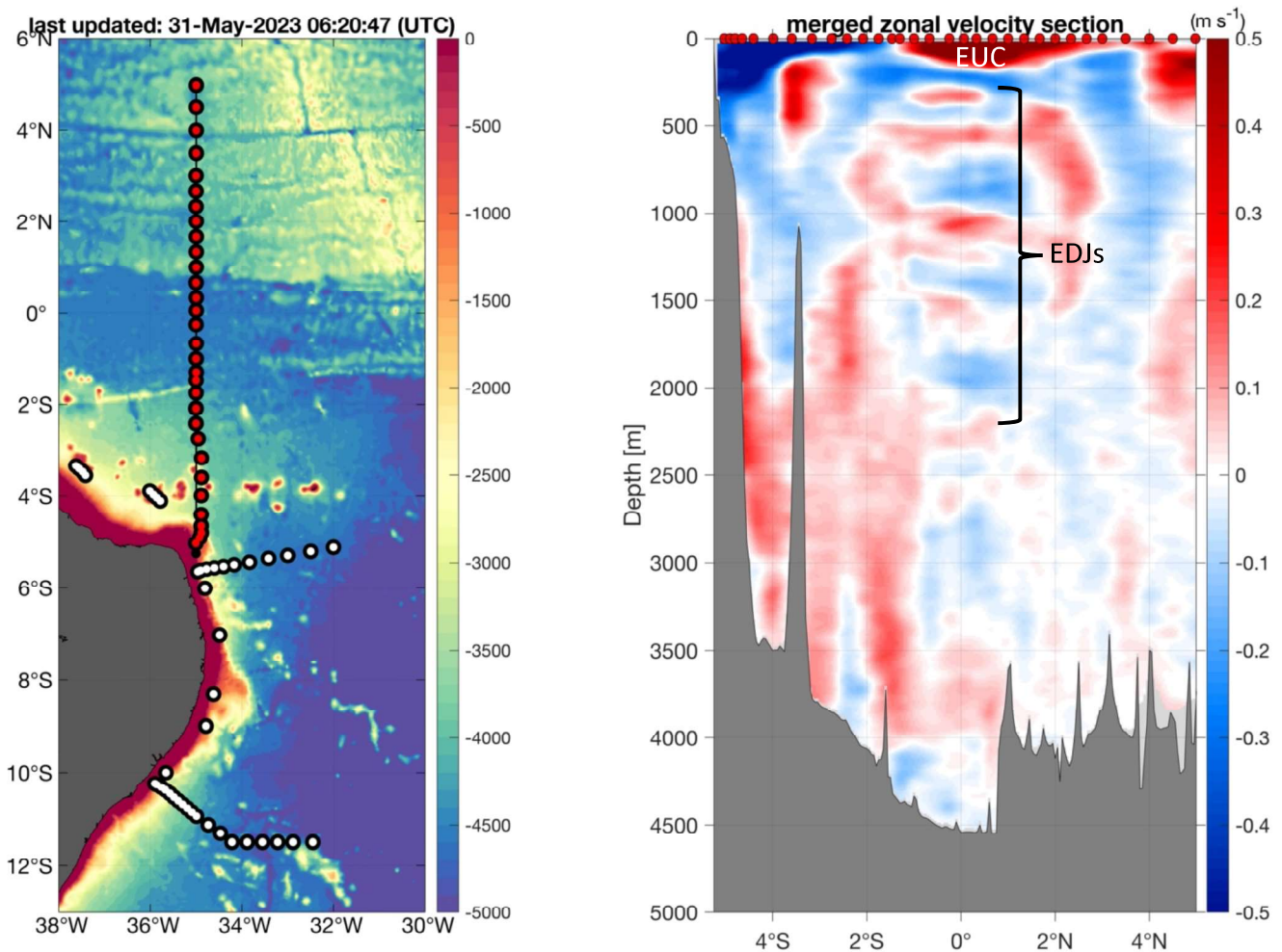
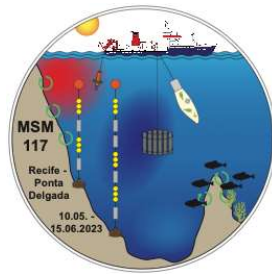


Fig. 1: Left: Bathymetry in the western tropical Atlantic along with the cruise route in black and the stations already completed (white and red dots). The red dots are the stations along 35°W that are included in the section of the zonal (east-west) current (shown on the right). Figure: Philip Tuchen.

The east-west flow field at 35°W is characterized by alternating eastward (red) and westward (blue) flows. The Equatorial Undercurrent (EUC) is particularly prominent, dominating the upper 200m between 2°S and 2°N with flow speeds exceeding 1 m/s. At depth, the equatorial region is also characterized by alternating current bands, the so-called Equatorial Deep Jets (EDJs), which are also well pronounced in our new section.

RV MARIA S. MERIAN MSM117

10.05. - 15.06.2023
Recife - Ponta Delgada



4. Weekly Report

29.05. - 04.06.2023

The equatorial current system, has a major influence on, for example, the distribution and variability of oxygen in the ocean. Only with the help of regular measurements can we determine the long-term changes in these important parameters.

Rather surprisingly, we made much less good progress between about $2^{\circ}30'S$ and $1^{\circ}30'N$, due to relatively strong southward currents near the surface that Maria S. Merian had to fight against (not shown here). We could not detect this southward current in the last stations along $35^{\circ}W$, but independent confirmation of this strong southward current was provided by the 8 drifters we deployed between about $2^{\circ}30'S$ and the equator at intervals of 15-20 nautical miles. Also in their trajectories, we can see that at least the 5 northernmost drifters initially move directly with the southward current along the $35^{\circ}W$ section before eventually drifting with the alongshore western boundary current. The deployed drifters contribute to the global drifter dataset, which currently consists of about 1300 drifters in the global ocean. The drifters consist of a GPS transmitter for position, located in a surface buoy along with a temperature sensor (white sphere in Fig. 2), and a long, holey drogue attached to a cable below the transmitter. The drogue is to ensure that the drifters are really following the ocean current at 15m depth and not just represent the wind drift of the surface layer. Since satellites can be used to monitor the hourly position and thus the trajectories of all drifters, this can be used to derive a data set of the global surface ocean current. For more information, see also <https://www.aoml.noaa.gov/global-drifter-program/>.

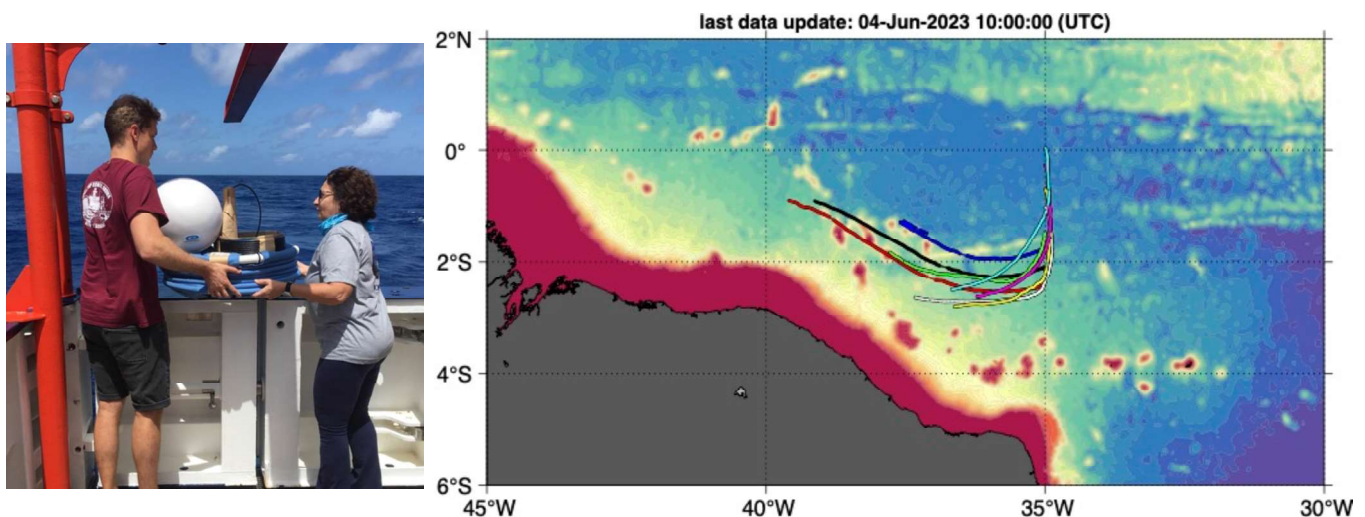
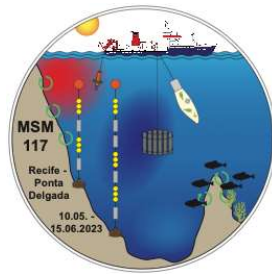


Fig. 2: Drifter deployment at the stern of Maria S. Merian (left, Picture: Joke Lübbecke). Trajectories of drifters that have been deployed about 10 days ago along the $35^{\circ}W$ section (right, Figure: Philip Tuchen).

After the end of the $35^{\circ}W$ section we could start the transit to the equatorial mooring at $23^{\circ}W$. We used the time between the measurements to catch up on our “Bergfest” (mountain party), where we had a barbecue. Many thanks to the galley of the Maria S. Merian, which provided us with great food during this party in particular, but also on all other days.

RV MARIA S. MERIAN MSM117

10.05. - 15.06.2023
Recife - Ponta Delgada



4. Weekly Report

29.05. - 04.06.2023

Unfortunately, the weather did not quite cooperate. We had good weather for almost the entire trip, but it wasn't supposed to be quite like this for the barbecue. Therefore, a large part of the mountain party had to take place indoors first.



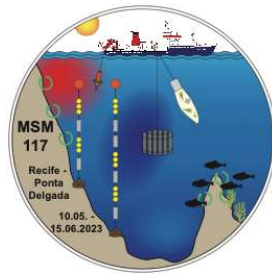
Fig. 3: Celebrations on June 1, 2023. Picture: Sunke Schmidtko and Linus Gummert.

Early in the morning of June 3, 2023, we started with the recovery of the mooring, which as always went very professionally and quickly. Here, thanks to the great cooperation with the crew of the Maria S. Merian, we were able to set a record of only 2 hours for the recovery. After a lunch break, we went straight back to the deployment of the mooring, which also went smoothly. The data from the two ADCPs (current meters) moored at about 200m show complete time series. Again, as at 35°W, the dominant equatorial undercurrent and the upper part of the equatorial deep jets can be seen. In comparison with Fig. 1, one can see very well how a spatially high-resolution section can complement well with a temporally high-resolution mooring time series, which then shows the temporal variability only at one location. In addition, one can see from this example that both the EUC and the EDJs are characteristic structures of the equatorial flow field that extend across the entire basin, or at least between 35°W and 23°W.

RV MARIA S. MERIAN MSM117

10.05. - 15.06.2023

Recife - Ponta Delgada



4. Weekly Report

29.05. - 04.06.2023

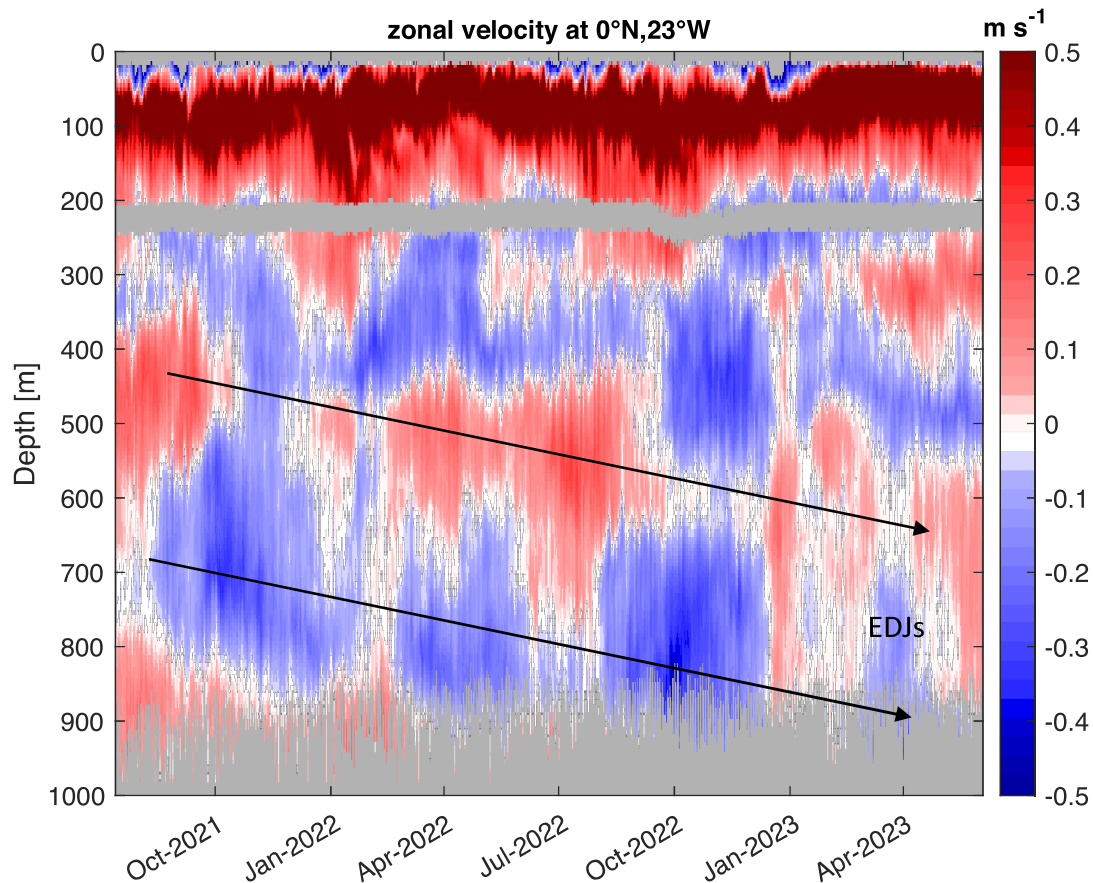


Fig. 4: East-westward currents from both ADCPs (current meters) of the equatorial 23°W mooring. Figure: Rebecca Hummels.

With all work completed at 0°N, 23°W, we are now in transit to the mooring north of Cape Verde, the Cape Verde Ocean Observatory, where mooring work awaits us one last time for this trip.

Best regards on behalf of the team of MSM117,

Rebecca Hummels
(GEOMAR Helmholtz Centre for Ocean Research Kiel)