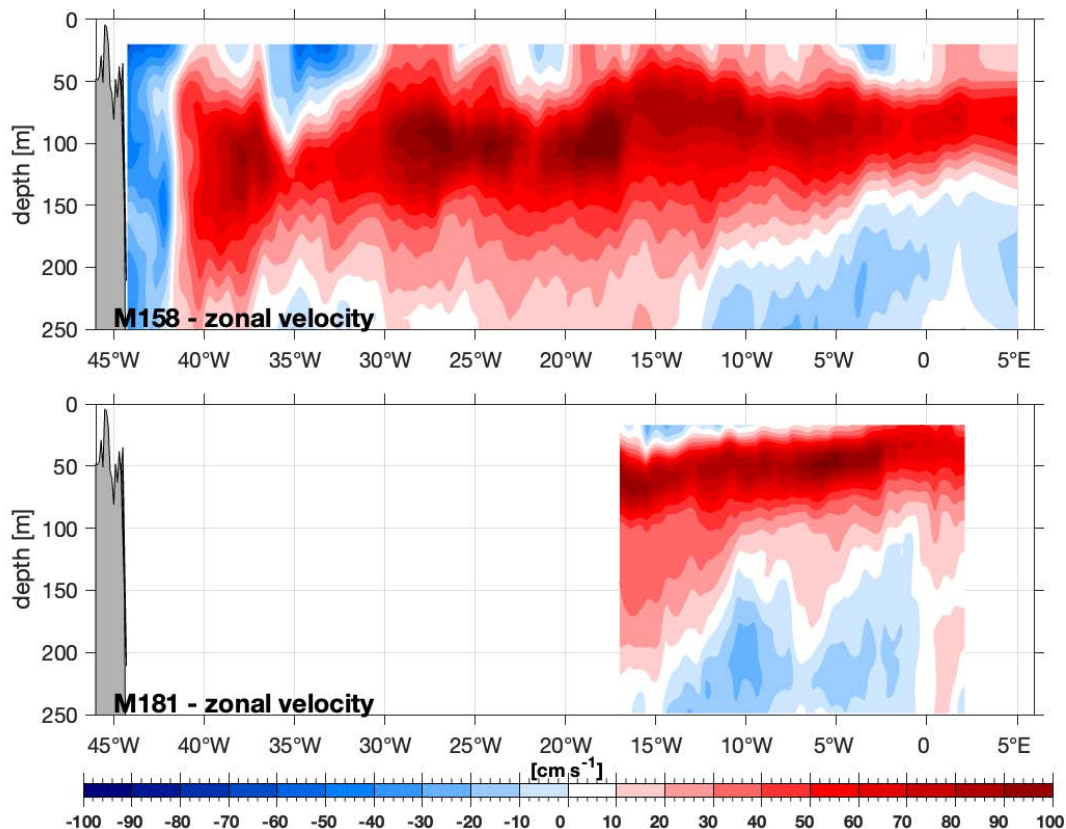


## RV METEOR - M181 - "TRATLEQ2"

17.04. - 28.05.2022, Cape Town - Mindelo

### 4<sup>th</sup> Weekly Report (02. - 08.05.2022)

During the fourth week, we performed a regular CTD program along the equator. The first station on the equator was on April 30<sup>th</sup> at 2°E just outside the exclusive economic zone of Equatorial Guinea, where we were not given allowance for sampling. CTD stations are carried out every degree in longitude with double CTD stations every 5 degrees in longitude to provide the extended water needs for sampling a large number of physical, biogeochemical and biological parameters. At the end of the week, we reached 18°W, a station at the Romanche Fracture Zone, a deep cut through the Mid-Atlantic Ridge with water depths far larger than 6000 m, the maximum range of most of our instruments.



**Fig. 1:** Section of zonal velocity as measured during M158, the companion cruise in September/October 2019, and the first part of M181. Red colours denote the eastward flow of the Equatorial Undercurrent having a shallower core during M181 than during the previous cruise M158 (Figure: Rena Czeschel).

One of the main points of the METEOR cruise M181 is to enhance our understanding of the role of the ocean circulation and its variability for biogeochemical cycles and the marine ecosystem. M181 is the second cruise of two Trans-Atlantic Equatorial cruises (TRATLEQ 1 and 2) with the first one, M158, carried out in September/October 2019.

For the observation of upper ocean currents, we were relying on the shipboard velocity measurements with the two Ocean Surveyors (75-kHz OS and 38-kHz OS) providing excellent data during previous TRATLEQ 1 cruise. Unfortunately, the 75-kHz OS instrument that provides higher vertical resolution data than the 38-kHz OS, failed during the last cruise M180 and could not be repaired in time. As our focus was on high-resolution velocity measurements near the surface, we decided to use a Longranger 75-kHz ADCPs. This type of instrument is typically used in our long-term moorings. With the help of the ship's Technical Service team, the Longranger 75-kHz ADCP could be successfully installed in the ship's moon pool but had to replace the 38-kHz OS that is normally installed at that location. First tests showed that this newly installed instrument delivers reliable data, particularly in the upper 250 m. The performance in the deeper layers is, however, reduced compared to the 75-kHz OS.



**Fig. 2:** Measurements with the microstructure profiler (Photo: Peter Brandt).

In comparison to the companion cruise in September/October 2019, the velocity data show a stronger and shallower Equatorial Undercurrent in the eastern equatorial Atlantic (Fig. 1). However, both seasons are associated with current velocities that are often greater than 1 m/s, which is extremely energetic for open-ocean conditions. The vertical migration of the current core follows the seasonal cycle of the wind-driven upper ocean circulation. One focus of this cruise is to understand the impact of the changing currents on the mixing of nutrients and other biogeochemical parameters. Mixing is measured during our cruise with a shipboard microstructure profiler (Fig. 2). Every CTD station along the equator is followed by a microstructure station. At these stations typically three microstructure profiles down to about 120 m are taken that cover particularly the depth range between the base of the oceanic mixed layer and the core of the Equatorial Undercurrent. First look at our data show strongly enhanced mixing above the energetic core of the Equatorial Undercurrent in the eastern Atlantic.

While there is intense work with the continuous station work along the equator, there is also time to celebrate birthdays, enjoying the tropical sunrise or sunset as well as doing sports in the ship's gym. There were also some good fishing and the caught fish and calamari were excellently prepared by the ship's cook team and by the crew on deck. Thus, the mood onboard is excellent and characterized by great cooperation between crew and science team.

Greetings from the tropics and the cruise participants of M181,

Peter Brandt  
(GEOMAR Helmholtz Centre for Ocean Research Kiel)