FS Maria S. Merian, Cruise MSM 79

Weekly Report 4

Edinburgh (UK) - Las Palmas (Gran Canaria, ES) - Mindelo (Kap Verde)
30.10.2018 - 09.11.2018 - 06.12.18

During the fourth week of research cruise MSM79, we were again accompanied by fantastic weather with decreasing winds and lots of sunshine. Although the low pressure cell, which had caused severe damage at the Canary Islands, caused a swell of more than four meters, our station work was not affected, since the individual waves were very long.

This week, we moved our research activities to a region closer to the Moroccan/Mauritanian coast. This region is characterized by the presence of permanent upwelling; waters which originate from the deep ocean being transported to the ocean surface. The local wind and flow conditions cause this freshly upwelled water to be transported further into the open ocean in the form of smaller and larger vortices and filaments. In contrast to the position of the active upwelling cells which have a more or less fixed position at the edge of the shelf, the vortices and filaments do not follow a fixed path.

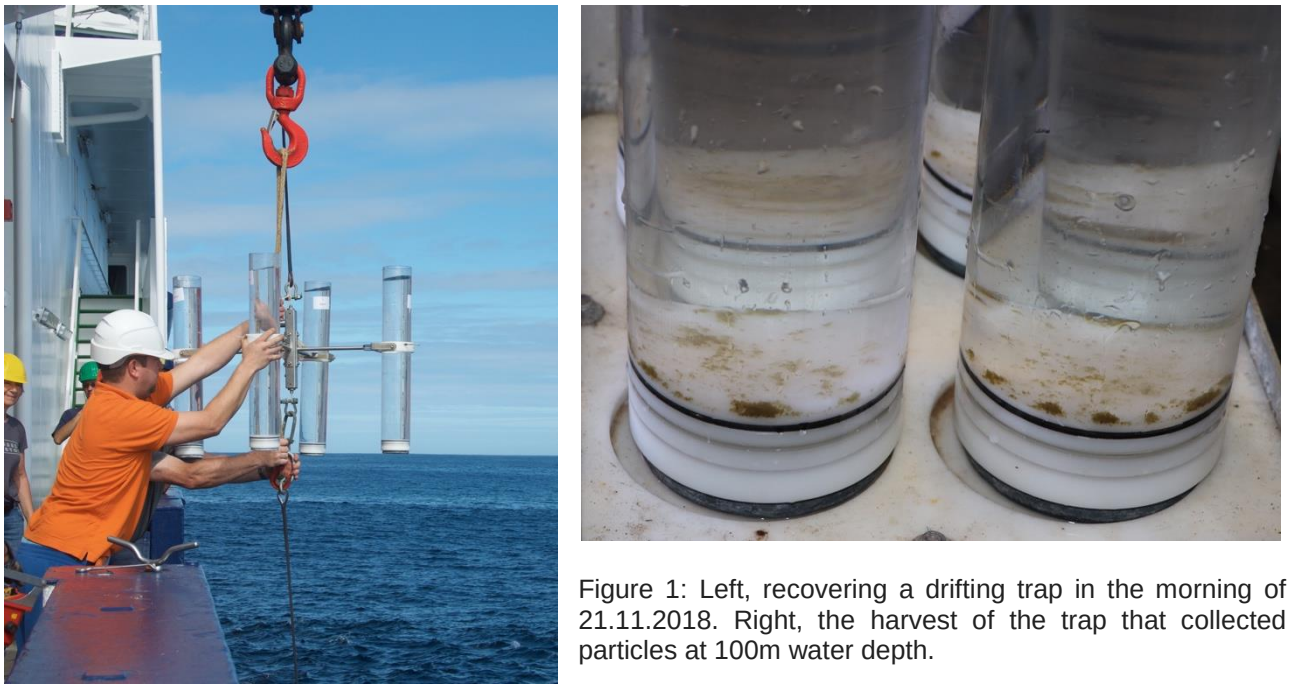
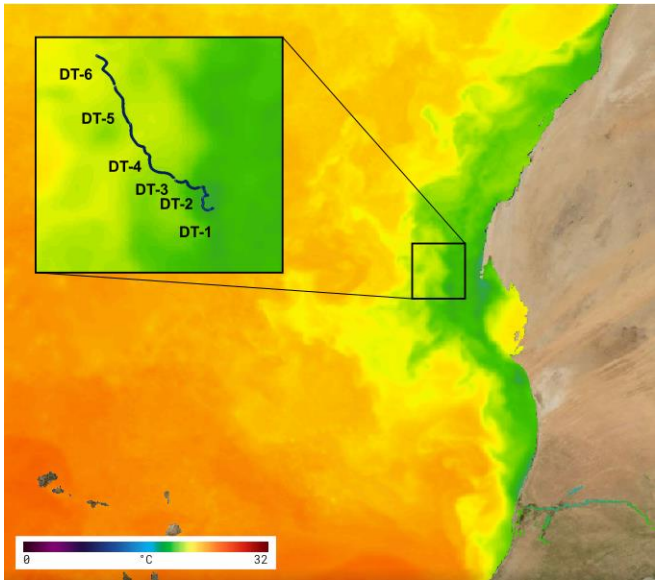


Figure 1: Left, recovering a drifting trap in the morning of 21.11.2018. Right, the harvest of the trap that collected particles at 100m water depth.

In order to investigate how bioproductivity, the plankton community and vertical particle flow change during the movement from the upwelled water masses, we deployed drifting traps that collected the export flux of particles out of the surface waters at 100m, 200m, and 400m water depth. Using satellite records of water temperature, we determined the exact location of an active upwelling cell. In the early morning of November 19, we were about to deploy our drifting traps in the very center of this selected cell as we were surrounded by a fleet of local fishermen in small boats that had started to fish at exactly this position. To avoid our traps being captured in their fishing nets, we moved our deployment position a few miles in the direction of the open ocean to the edge of the

upwelling cell. There the traps, that were equipped with Iridium and AIS transmitters, were successfully deployed to collect particles for 24 hours. Their trajectory was tracked using the iridium satellite and VHF signals. The next day the traps were recovered and replaced by a second trap series. This continued for the rest of the week with the traps being replaced daily.

Figure 2: Track of the drifting traps off Cape Blanc (image courtesy of NASA and downloaded from the “state of the ocean” website) .



During the rest of the days and nights, we continued our investigations of the vertical and lateral transport of biogenic particles, as well as their degradation within the water column and at the sediment-water interface. For this purpose, the CTD was used to determine the exact position and thickness of the oxygen minimum zone and the nepheloid layers (layers in the water column with increased particle concentrations) along the transect running from the coast to the open ocean. Subsequently, the nepheloid layers and the water layers with different oxygen concentrations were sampled by means of rosettes and in-situ pumps. Immediately after collecting the water, "incubation experiments" were started. These "incubation experiments" enable the study of the formation and growth of archaea and bacteria under different oxygen concentrations.

This weekend our work along the transect running from the coast to the open ocean and the particle flow of the upwelling cells and vortices is coming to an end. During the night of Sunday to Monday, we will sample the nepheloid layers for the last time with in-situ pumps. Early Monday morning, we hope to recover the drift traps after which we will head south. There, in the second half of the next week, we intend to recover, service and deploy another dust buoy, as well as two sediment trap moorings southeast of the Cape Verde Islands.

Figure 3: Recovery of an In-situ pump

At the moment the renewed increasing wind speed and the presence of the cold upwelling water that surrounds the Maria S. Merian cause that the air temperature is slightly cooler (19°C) compared to the first half of the week. Therefore, we are all looking forward to the next week, for which the weather forecast promises us wonderful summer weather during the work on the moorings and buoy.

Zeer veel hartelijke groeten van de Atlantische Oceaan 21°07.350’ N, 17°59.251’ W (Wassertiefe 1682 m)

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und Teilnehmer MSM 79