4. Weekly report (17.–23.09.2018)

Our fourth week was quite successful! As planned we were able to sample all four transects at Santa Maria Island, and then we returned to Terceira to catch up transect T10; you may remember that we had to skip that transect due to the tropical storm “Helene”. However, the sampling was so efficient that we decided even to sample transect T7; we had cancelled that transect (among others) at the beginning of the cruise (cf. WR 2), but in the meantime we are working at the penultimate depth position (400m), where the CTD and the box corer will be deployed. Afterwards we will steam to the last T7 depth position (1,500m). There, again the CTD and the box corer will be launched, but also the multicorer and the Agassiz trawl. For the three last-mentioned gears it will be the last deployment on our cruise; at Formigas Bank, only the CTD and the small grabs will be used.
The success of catching up T10 and T7 at Terceira and even to include the Formigas Bank actually is, however, not only because of the fantastic cooperation of all participants. So, at some stations we were unable to deploy all aimed gears, mainly because of the given sediment and/or the topography. That saving of time contributes to the circumstance that we will get all originally scheduled transects (except T4 at Flores Island) plus Formigas Bank.

To measure hydrographic data in the water column and to collect water samples from different depths, a CTD probe attached to a 24-bottle rosette is used (Fig. 1). The CTD probe continuously measures the pressure, conductivity and temperature of the water column as it descends towards the seabed on a wire, which displays and records the measurement data in real time on a PC in the laboratory. Attached to the probe are additional sensors measuring the oxygen content, the fluorescence and the light radiation relevant for photosynthesis (Fig. 2).
Based on the fluorescence and the oxygen profile, the appropriate depths for sampling of seawater are determined. These water samples are filtered on board and frozen, later analysed in the laboratories of the participating institutions. These samples are then used to detect phytopigments, and to study certain groups of the phytoplankton, as well as the content of microplastic particles and DNA.
To date, 60 CTD profiles have been recorded and more than 2,000 litres of seawater have been filtered from different depths of down to 150 meters.

Figure 1: Rosette with mounted CTD probe. Photo: B. Springer.

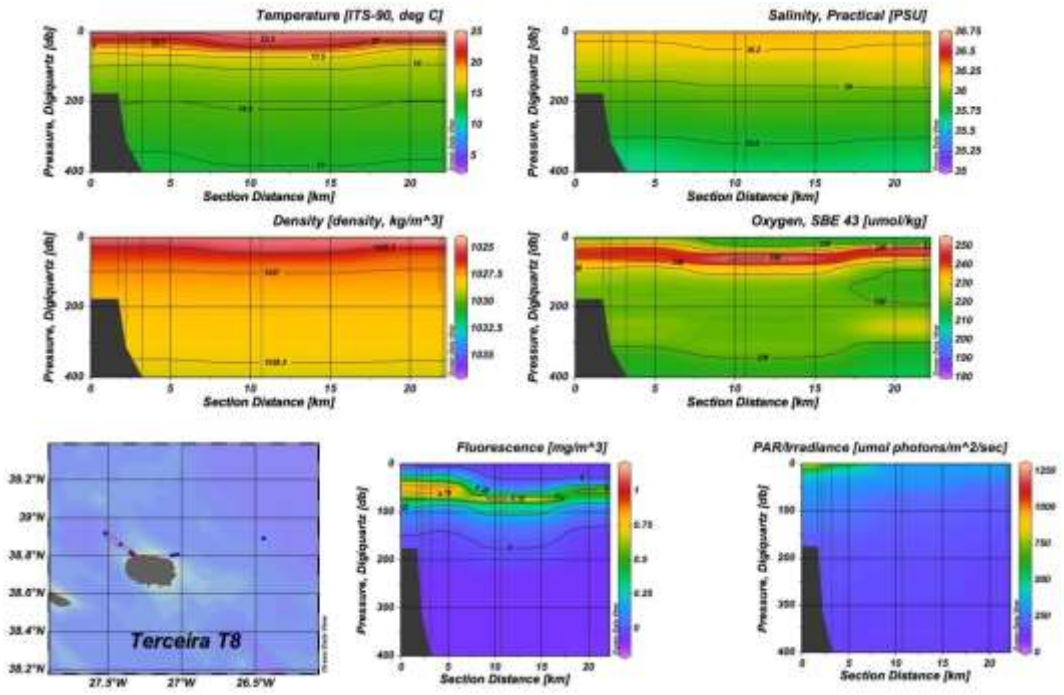

Figure 2: Profile along transect T8 in the NW of the island Terceira with distribution of temperature, salinity, density, oxygen, fluorescence and light radiation down to 400 m depth.

The phytoplankton forms the basis of the food chain in the sea and is therefore of great importance for species richness in the ocean. It can be divided into 3 size classes, namely pico-, nano- and microphytoplankton with different species composition. In the oligotrophic areas (low nutrient areas), e.g. the zone around the Azores, small-sized phytoplankton groups up to about 20 µm (pico- and nanophytoplankton) dominates, which are particularly adapted to these conditions. Islands and seamounts can cause higher nutrient concentrations due to local/regional flow conditions, leading to a shift in the species spectrum towards larger phytoplankton organisms (microphytoplankton).
The following questions will be answered on this cruise:

1. Are there differences in the species composition and abundance of phytoplankton between the different Azorean islands?
2. Is there a gradual difference in species composition and abundance in relation to water depth?

From the water samples of the rosette two further aspects are treated: bacterioplankton and microplastics. Bacterioplankton (bacteria and archaea), although microscopic in size, is one of the most important marine organisms as it plays a crucial role in the regulation of global element cycles due to its unique ability to decompose and re-mineralise dissolved organic matter. The term microplastic refers to plastic waste that is smaller than 5 mm. They are originated, among other things, by the degradation of large plastic waste.
For analysis, water samples are filtered through specific membranes to isolate cells for genomic DNA extraction and further sequencing for bacterioplankton ID and potential plastic particles. Those are characterized by size, shape and colour and undergo further chemical analyses for polymer identification.

Beside these scientific aspects, also personal circumstances do impact our cruise. At Santa Maria Island, one crew member had to leave the vessel because of urgent familiar conditions, and tomorrow, on our way to the Formigas Bank, we will stop in Ponta Delgada (Sao Miguel), to disembark one scientist – again because urgent familiar circumstances. At least we are close to the islands instead of somewhere in the vast Atlantic Ocean.

The remaining people on board are in good health. We look forward to a busy week, before our sampling program ends, and packing begins!

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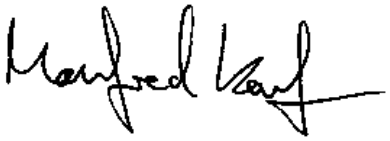
On behalf of all participants we remain with kind regards



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