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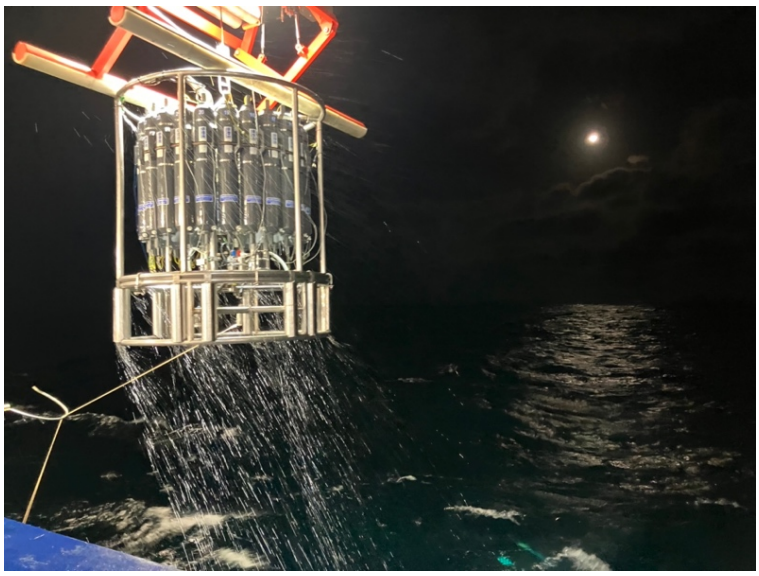
Las Palmas - Malaga

PAPROTA
Particle Production, Transfer and Transformation
off Cape Blanc

Weekly Report No. 2
09.02.25 - 16.02.25

The beautiful weather that had welcomed us in the research area a week ago continued and we enjoyed the perfect research weather with much sun, some wind but not so severe that it hampers our deck and lab work.

In this second week of the expedition we moved our research activities to the more coastal shelf/slope region. We sampled data and material along a transect from the shelf break to the open ocean. In our research area, winds blow permanently from the north-east (in south-west direction). This causes that the upper ocean water drifts away from the shelf towards the open ocean. This results in colder deeper waters that contain a lot of nutrients, moving upward along the slope to come to the surface near the shelf-break form so called “active upwelling cells”. The northeastern winds cause that this upwelled water is moved offshore in large filaments. The high amounts of nutrients in these waters fertilize the ocean and the plankton reacts by high production.
We follow the succession of plankton export production and composition in these offshore drifting waters by deploying drifting traps that collect particles at 100m, 200m and 400m water depths. The drifting-trap device is allowed to float with the surface currents for 24 hours. After recovering a new trap series is started at the same position. So far the deployment was very successful with the first trap being deployed in an active upwelling cell after which it started to drift offshore and was trapped in by offshore drifting filament.


Picture 1. CTD/Rosette arrives at the surface (Photo: K. Zonneveld).

Apart from the plankton and particle export production and succession, we are also interested how particles behave during their sinking process and to what extend the move vertically or horizontally through the water column. Previous research in the region has revealed that the latter occurs mainly through so called “subsurface, intermediate and deep water nepheloid layers”. These are layers in the water column that are characterized by a high density of suspended material. Previous research have shown that these layers are very pronounced near the shelf break and at the slope to become less pronounced in more offshore regions to disappear at about 200 km offshore. Previous research has shown as well that these layers are extremely heterogene and do not have stable positions in the pater column in the research area.

We therefore we started this week by determining the exact position of the nepholoid layers by CTD profiling on 12 positions along the transect. It allowed us to observe where in the water column the nepheloid layers are present and how far offshore they can be traced. This. in turn. allowed detailed sampling of the water column with Rosette and in-situ pumps (= underwater filtering devices) that collect and filter suspended matter (incl. particulate organic matter POM) and dissolved organic matter (DOM) from selected water layers. The collected particles will be investigated on the content of plankton and microbial remains as well as on their molecular composition. Apart from this we collected, both in and between these nepheloid layers deep ocean water to investigate the processes that influence the degradation of POM and formation and alteration of DOM. Water column profiling and sampling was performed mainly during the nights whereas the days were filled with recovery and deployment of the drifting traps followed by sampling of the ocean floor upper sediments at the station transect positions. These surface sediment samples will be investigated to determine the amount of Carbon reaching the ocean floor as well as the particle association and molecular composition of carbon based particles. Hereby we study the degradation processes, notably to determine which particles and complex organic molecules are being preserved in the sediment and what .


Picture 2. Recovery of the multicorer, collection of sediment (photo’s: K. Zonneveld).

Apart from the sampling of water, suspended matter and sediments, incubation experiments are being executed using the water and sediment samples we collected in the first week of the expedition. The incubation experiments focus on how the microbial community as well as zooplankton is able to digest differential polysaccharids (different forms of sugar) such as for instance fucoidan, a sugar made by algae. The waters we collected in the first week are being filtered by use of selective anion exchange chromatography. This enables the capture of different polysaccharides from deep ocean waters to study their chemical structure as well as their characteristics with respect to their degradation potential.

The coming week we will continue our profiling and collection work on the more offshore part of the transect. We hope to finish our work along the transect at the end of next week to replace our working area to a more southern location for the re-deployment of another sediment trap mooring. For now, the weather forecast promises us that we can continue to enjoy the summer weather with a lot of sun and beautiful sunsets and sunrises due the large amounts of Sahara dust in the atmosphere. We are very pleased that apart from being able to successfully collect high quality data and samples, we experience regular visits of wales and delfins as well as numerous ocean birds that seem to be very curious to find out what we are doing on their wide blue ocean.

on behalf of all cruise participants
met beste groet van de blauwe oceaan

Karin Zonneveld