RV Meteor cruise M153
TRAFFIC

15.02. – 31.03.2019
from Walvis Bay to Mindelo
2. Weekly report from 3 March 2019

TRIAXUS shortly after recovery on RV Meteor

In the meantime the second part of the M153 cruise with RV Meteor in the Benguela Upwelling system has started. Since Saturday March 2nd we are working in Namibian waters.
On 2 March in Walvis Bay we had a little exchange in the scientific crew. Three participants left and four Namibian colleagues and students and a German one came on board to collect samples in Namibian waters.
Our work has made good progress and we could successfully finish our stations in South African waters on 1 March. Goal was to investigate the horizontal and vertical distribution of different plankton groups and to describe the diel vertical migration of organisms by performing a sampling around the clock at two stations (25 and 67 hours). For the analysis of daily rhythms in feeding stomach contents were collected in mesopelagic fishes and larvae of small pelagics.

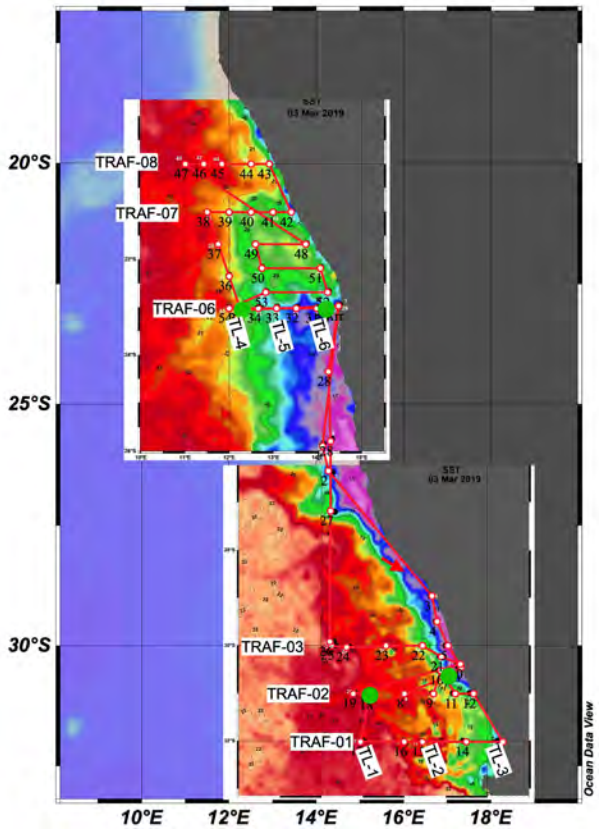
Narrative of the cruise

The first stations we worked on in South African waters were placed along the coast. Close to the coast we found strong upwelling of nutrient rich water masses that extended from Walvis Bay at 23°S all along the coast until 31°S showing characteristic pattern of smaller singular upwelling cells. In the mean time these upwelling cells grew together and form a single stretch along the coast. This can be seen in the figure of the Sea Surface Temperature (SST). The stations were characterised by huge algal blooms consisting mainly of the dinoflagellate *Noctiluca scintillans* , one of the most commonly occurring bioluminescent organisms in coastal regions of the world. We only found few fish larvae or small fish in these waters as they need small crustaceans for food that are only developing in such waters in a later stage after an upwelling event.

Stations on the southern transect (TRAF-01), which was done from the coast into the open ocean, showed an increasing diversity in the plankton communities and specially on the outer shelf small pelagic and mesopelagic fish. Final work on the outer part of the southern transect was a long-term station, at which we could sample over a period of 67 hours (the green dot next to the label TRAF-02). At both stations long-term sediment traps were deployed that will remain in the area for about 18 months and recovered during the next TRAFFIC cruise into the area in summer 2020.

These samples will then be analysed to show the annual cycle of production sedimentation of organic material in the southern Benguela and contribute to the understanding of the carbon cycle in the ocean.

After the deployment of the trap we realised a second transect with TRIAXUS towing the instrument over a distance of 130 nm from the long-term station towards the coast until we reached 50 m water depth. With this we recorded the structure of the water bodies we crossed and estimated biomass by means of acoustic probes and plankton communities by taking photographs of the plankton organisms. The collected data and photos will later be compared with results that we achieved from our investigations with the EK80 echo sounder and the net catches resulting in a comprehensive picture of the ecosystem and its several components.



Sea surface temperature in the investigation area from NOAA satellite data processed by our colleague Tarron Lamont in DEA, Cape Town

Two of our multiple opening closing nets are equipped with nets of 55 and 200 µm mesh size, respectively. Both are deployed vertically, which means that the ship is not moving. The multinet® equipped with 200µm meshes is used to on one hand analyse the depth distribution of organisms depending on daytime and secondly collect living organisms for various physiological onboard experiments. The estimation of oxygen consumption and production of eggs are two methods to assess condition and productivity of the small planktonic crustaceans (Copepoda).

The bigger multinet® equipped with nets of 300µm mesh size and the RMT (Rectangular Midwater Trawl) with a net of 4 mm mesh size were deployed to catch lager plankton organisms (fish larvae, shrimps) and small nekton (freely swimming organisms such as juvenile fish, shrimps and krill). Both gears are towed through the water performing a V-shaped track through the water column.

After finishing station work in the southern investigation area the ship headed north. We reached Walvis Bay on 2 March where we exchanged few scientists. While RV Meteor was riding at anchor in the outer reaches of the harbour the exchange of scientists was realised by means of a pilot boat.
this was the only occasion that all participants of the cruise met on RV Meteor for a short time. New participants from South Africa and Germany but mainly from Namibia came on board! After six hours in Walvis Bay harbour RV Meteor left the again heading towards its first station of the northern part of the investigation area.

To enable a comparison of the northern and southern Benguela Upwelling area the design of the station work in the north is mostly similar to that in the south. Already the first stations showed the obvious differences between the two subsystems. While in the south we found mainly *Noctiluca* in the phytoplankton of the freshly upwelled waters, there are mainly diatoms in the north. In the south we found quite high numbers of anchovy larvae while in the north sardine larvae dominated the first catches.


Foto: Knut Heinatz

Fishing vessels and numerous sea birds are showing us that at least around Walvis Bay at 23°S, where we are working at the moment, higher amounts of fish can be found. We will try to catch some squid and fish by means of angling to collect material and data of these animals representing the highest levels in the trophic pyramid. This will allow us to integrate these high trophic levels in modelling the entire ecosystem.

The results so far are bringing us into a good mood and we are looking forward to the next days to continue our work. All equipment and systems are running well.

With (much warmer) regards now from 23° S/14° O

Werner Ekau and all cruise participants