

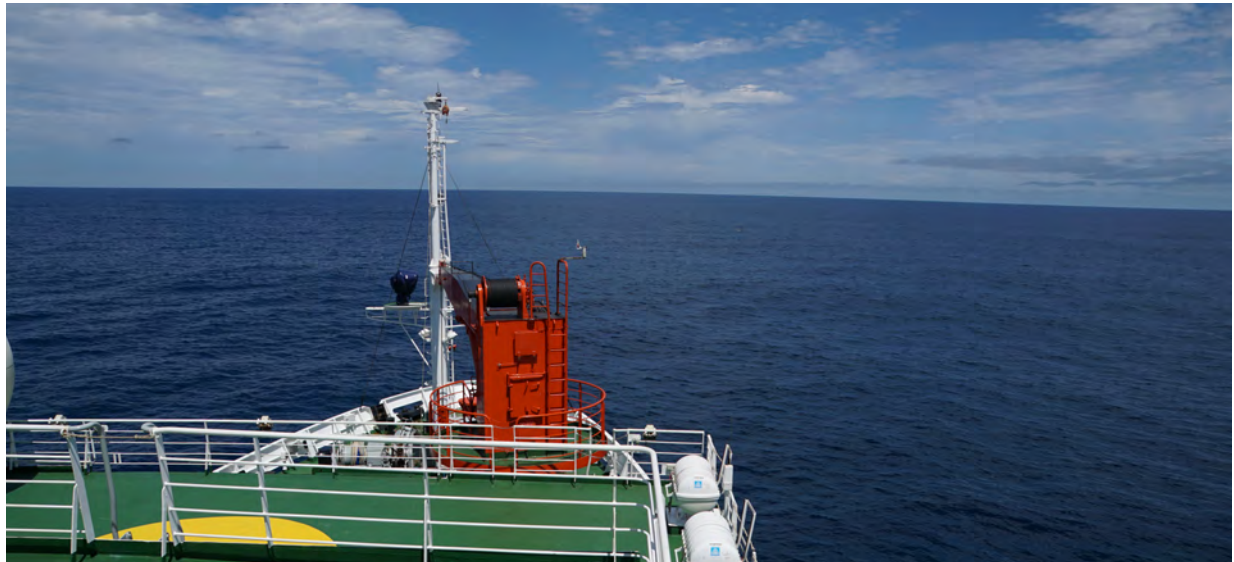


RV Meteor cruise M153 TRAFFIC

15.02. – 31.03.2019

from Walvis Bay to Mindelo

1. Weekly report from 24 February 2019



FS Meteor

Cruise M153 with RV Meteor is going into the Benguela Upwelling System. This upwelling system is one of the four highly productive coastal upwelling systems in the world.

The high phytoplankton productivity is in great contrast to the low production in the higher trophic levels and thus in the yield of fisheries. Nutrients, that are transported to the surface by upwelling processes, obviously are exported again and sedimented rapidly so that organisms of higher trophic levels cannot benefit from the high primary production. Even if we find a satisfying food situation (zooplankton abundance) for young fishes, the consequence of this inefficient transfer of nutrients is low fisheries yields in the northern Benguela system of about 0.42 mill. t in 2006, much less than in the 1960ies and 1970ies.

The investigations in the TRAFFIC project (*Trophic TRANSfer eFFICIency in the Benguela Current*), of which this cruise makes an essential part, will contribute to understand the reasons and processes responsible for the low efficiency. Aim is to study the foodweb structure and its functional links, to analyse the trophic transfer efficiency (TTE), and the associated effects of the biologically mediated CO₂ uptake. We hypothesise that a more efficient TTE increases fishery yields and the CO₂ uptake in the sBUS, and that human induced changes in the pelagic foodweb structure lowered fishery yields and favoured the CO₂ emission in the nBUS. Results will be used to develop conceptual models of the BUS explaining how changes in ecosystem structure affect fisheries and the biologically mediated CO₂ uptake as seen in the two subsystems.

Our first working area is the southern Benguela upwelling system. The transit to the first routine station provides an opportunity to establish our equipment and laboratories. Besides a series of plankton nets such as Multiple Opening Closing nets (with 55, 200 and



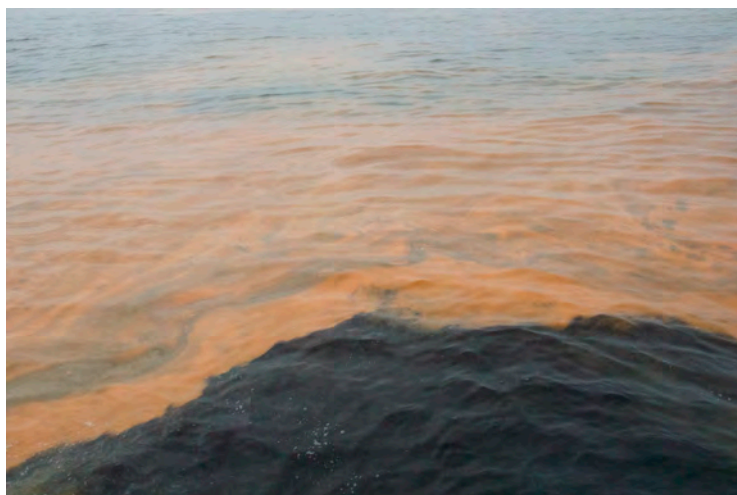
300 µm mesh size), a Rectangular Midwater Trawl (RMT) and a neuston net (neuston is a special living community right at the surface) we are using an underway system for analysing green house gases and an echo integrating device (EK80 with frequencies of 38 und 200 kHz) will be used. We will also deploy a set of sediment traps, four drifting traps remaining in the water for two days, and four anchored traps in shallow and deep water that will remain for about 15 months.

Narrative of the cruise

RV Meteor left Walvis Bay on 15 Februar with calm weather but no sun. Scientists had arrived already one to two days in advance and unloaded the containers. Shortly after leaving the port the first gear was deployed, the so called TRIAXUS. This gear is towed over the stern and is a more or less self-controlled device that undulates between near surface and near bottom water depths. TRIAXUS is equipped with a number of probes and devices:



A video plankton recorder with a CTD records Temperature, Salinity, Fluorescence, Turbidity and photosynthetic components like Chl a, Phycoerythrin and Phycocyanin. Also oxygen and nitrate are measured. With the Video plankton recorder photos and videos can be taken on the organisms passing by, with a horizontally working echo sounder (EK60, 200 and 300 kHz) biomass and distribution patterns can be assessed. A Laser Optical Particle Counter (LOPC) counts the organisms passing the camera. We plan to use this device on several transects in the north and south and validate and compare the results with the net catches. The first of these transects started right after leaving Walvis Bay and went down to the first plankton station at 29°S, 16°E.



On 17 February in the evening we reached our first regular station and started the plankton work. We worked up a transect along the coast passing several areas with strong upwelling. Cold water masses with temperatures down to ca.

13°C were accompanied by strong plankton blooms, mainly *Noctiluca*. Accordingly the zooplankton catches were low at these stations.

The first 48h station was realised at 30°32'S, 16°50'E. A drifting and a moored sediment trap were deployed. The drifting trap was recovered after two days, the moored trap will remain until austral winter 2020 to record the seasonal variability in the sedimentation of



organic material.

After the deployment we headed towards the southern most transect of our station grid. Diversity and plankton abundance increased and the first results of our plankton work became "visible". Especially the RMT resulted in good samples of mesopelagic fishes, one of the target groups of the project besides sardine, anchovy and round herring.

The rich catches with the neuston net again showed us, that this very

narrow ecosystem (only the upper ca. 5 cm of water at the surface) provides a very important but so far mostly neglected habitat for a very special living community. To avoid turbulence in front of the net caused by the RV Meteor the nets are mounted on a catamaran and placed in a way that the upper one cuts the surface. The lower



frame is placed right below the upper frame, only 15 cm below the surface, but the species composition in both nets is obviously completely different (left: catch from bottom net; right: catch from upper net).

By now we have worked up the transect and deployed the second long time mooring with sedi-

ment traps at 31°S/15°15'E. We are now starting a second transect with the towed TRIAXUS and continue plankton work with nets on Tuesday.

All participants are in a good mood and we are looking forward to the next days with great expectations!

With (slowly getting warmer) regards from 31° S/15° E

Werner Ekau and all cruise participants

