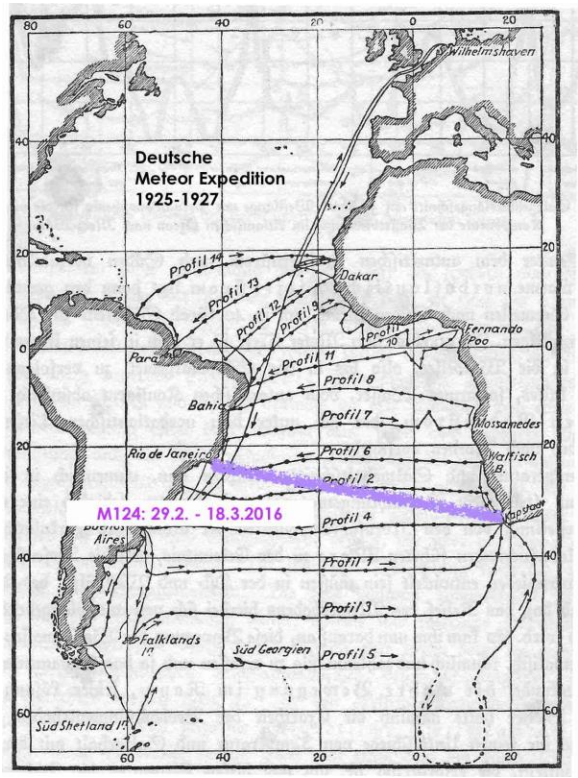
2. Weekly report - Cruise M124

The South Atlantic Ocean can be regarded as a relatively poorly sampled region. It is thus a remarkable fact, that the Meteor already explored the South Atlantic as a surveying vessel more than 90 years ago. This was one of the first expeditions that surveyed an entire ocean basin – from the seafloor to the atmosphere. Fundamental knowledge, which still endures today, has been gathered back then. However, the expedition was also about „societal profit“, namley the possibility to extract gold from sea water in order to make reparations for the 1. World War.



Sections of the surveying vessel Meteor 1925-1927. The cruise track of the M124 has been added.

Based on data collected during many expeditions we now know that the ocean is not a smoothly circulating system but highly turbulent. Our cruise leads along a „highway of vortices“. The vortices, called „eddies“, are rotating water masses with approximately the size of Schleswig-Holstein. Its rotation is clearly visible down to 2000 m. Many of the eddies develop south of South Africa and then take a route across the South Atlantic towards Brazil, partly lasting several years. Our goal is to investigate these eddies in detail: we want to better understand their dynamic structure in different phases of their westward migration; we want to determine the transport of substances with the eddies over long distances; and also the ecosystem within the eddies is of interest for some scientists on board.

Guided by satellite measurements we locate and visit one eddy centre after the other. In the middle of the eddies samples are taken with Multinets and deep profiles are measured with the CTD. During transit times, the vertical structure of the eddies can be determined very well with the underway CTD (uCTD, upper 450 m of the water column) and with the ADCP. By now over 230 uCTD profiles have been run – for the watches, operating day and night, this means putting the probe into the water once an hour. This routine is only interrupted when deep CTD profiles (2000 m) or Multinets are run.

Two of the three watch teams shortly before launching the 100. uCTD.

Since decades Expandable Bathythermographs (XBTs) are an established method to measure the distribution of temperature in the water off a moving ship. Today these single-serving probes are used mainly from container ships and count to the core instruments for determining the warming of the upper ocean due to climate change. We also took a bunch of XBTs, particularly to compare the measurements of XBTs and the uCTD.

Most of the science projects of the „MyScience-Cruise“ students are related to eddies. For instance, Veronica van der Schyff from South Africa is interested in the relationship between eddy transport and the distribution of „microplastic“. The South Atlantic is the second most with plastic contaminated ocean basin - right after the North Pacific. Microplastics are tiny plastic particles floating at different depth horizons. Until now, most studies focused on the plastic waste distribution at the ocean surface – Veronica instead uses plankton net catches, done once a day by Raphael Morard's team (Marum) and checks the residues for plastic particles. It is indeed depressing how much plastic Veronica even finds in samples from 100 m depth. During calm sea, in the middle of the South Atlantic, more than 2000 km off the coast, we see a great amount of plastic waste like for example buckets, rubber seals, and barrels floating past the Meteor.

The German ambassador and the Captain invited for a reception on the Meteor that will take place on March 19 in Rio de Janeiro and the preparations are going full speed. On this occasion the nine MyScience-Cruise students will present their science themes.

Everyone, crew member and scientist, is enjoying the markedly pleasant atmosphere on board. Only the lack of „heavy equipment“ makes the work, in particular the night shifts, slightly boring during this transit.

Regards from the South Atlantic,
Johannes Karstensen for the cruise participants M124