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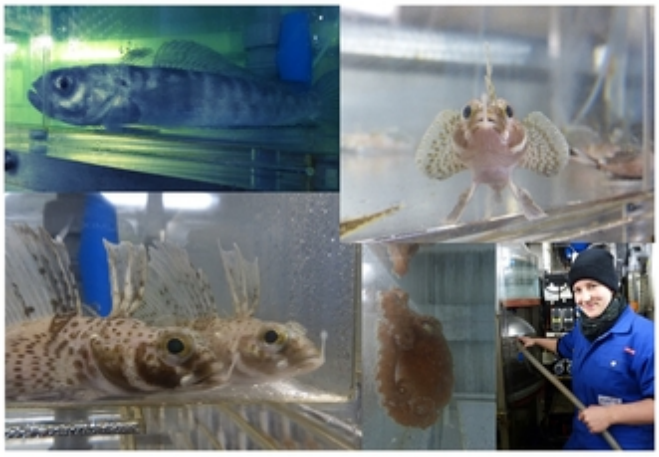
Heading north
March 7 - March 16, 2014

Figure 1: Loading, sunset and departure from the Port of Cape Town. © Hartwig Deneke, TROPOS, Dagmar Popke, MPI Hamburg.

The vessel Polarstern will end its successful and exceptionally long research campaign in the southern hemisphere and return to its home port Bremerhaven. However there are still 7,500 nautical miles ahead of us after having left Cape Town. We – a group of 28 scientists – want to use this opportunity for a number of measurements and observations. In this and in the following weekly reports we will inform those left behind at home, family, and the interested public about the life on board, and in particular the scientific work which will be carried out here. Each week, we will present an overview of some of the different projects and groups.
In the framework of the OCEANET program, detailed observations of the atmosphere will be carried out targeting aerosols and clouds, including their effect on atmospheric radiation and atmosphere-ocean exchange. For the first time, we will adjust the exact course of Polarstern to match the ship track to overflights of the A-Train satellite constellation, which among other instruments contains the space-born aerosol lidar CALIOP and the cloud radar CLOUDSAT. This offers the unique opportunity to intercompare vertical profiles of clouds and aerosols taken from the ground and from space. The distribution of birds and marine mammals along the route will be recorded by observers from the bridge. In addition, aquaria with organisms collected in Antarctica during the previous cruise leg will be transported to Bremerhaven. During our stop in Las Palmas on April 1st, thirteen further cruise participants will embark for evaluations of the HYDROSWEEP DS III multi-beam sonar and the TRIAXUS towed vehicle in the Bay of Biscaya.
But let's start this report beginning our cruise in Cape Town. On March 5th, RV Polarstern entered the port of Cape Town at 4am coming from Antarctica. Thus, unloading and loading operations could start during the early morning hours, and our three measurement containers were brought on board over the course of the day. The following day, the ship was handed over from the old to the new crew, and we were allowed to come on board with a group of about 15 scientists to begin setup of our experiments. Fortunately, only minor problems were encountered, which could all be solved with the excellent support of the crew and some advice from home. Prior to the cruise, the tentative departure was changed to March 7th, 20:00, so boarding was scheduled for noon of that day. In port, however, we had to learn that there were supply shortages of fuel. Thus, bunkering could only begin around noon on the 8th. In consequence, we only left port around 22:30 of that day. A strong breeze of 6 Beaufort welcomed us at sea. The wind increased to 8 Beaufort over the course of the next day, subjecting the scientists and experimental setups to a first test of their seaworthiness.

For some colleagues there was not much time to think about sea sickness and weather conditions. The group of eco-physiologists had to take care of the aquarium systems with their valuable freight, the living fish. There was no access to fresh sea water in the port and due to the delay, water had to be exchanged as soon as possible. This work lasted until late in the night.
Living fish had been caught with bottom trawls in the Filchner area of the Weddell Sea during the previous leg PS 82. The area of the Filchner shelf has been identified as a biological “hotspot” because of its specific hydrodynamic properties. Therefore, the aim of the previous cruise leg was to study the biological productivity of the Filchner system with its energy conversion of the trophic food web up to the highest top predators like sea elephants. Antarctic fishes feed on e.g. zooplankton and are in

addition a valuable energy source for higher organisms and represent a special position within this food web.
Around 150 fishes and some octopods were brought alive on board Polarstern and are kept in a special aquarium container at water temperatures of 0°C since then. Antarctic organisms react extremely sensitive as to environmental change, therefore the scientists have to take special care of these organisms during our cruise to keep the aquarium conditions as constant and optimal as possible. A regular exchange of sea water and tests of the water quality are necessary. For this purpose a cooling reservoir tank with a volume of around one ton is filled via a pump, where the sea water is cooled down to 0°C. An additional UV-lamp is used to eliminate the bacterial content in the sea water to reduce the risk of infections. The prepared sea water will then be used to exchange the water in the tanks of the aquarium container. This timely procedure can be extremely difficult especially in tropical areas where the water can easily reach temperatures above 30°C. Nevertheless, everything worked out fine until now due to the excellent support of the machine crew and the organisms are still in good shape.
After transportation of the animals to the Alfred-Wegener-Institute in Bremerhaven, the organisms will be brought directly to the aquarium system of the institute and kept for further experiments regarding the topic of climate change. The impact of the ongoing warming and increased CO2 concentrations, which reduces the sea water pH in the oceans, will be investigated on these species. These studies will give further insight how climate driven changes will affect Antarctic organisms and how the Antarctic ecosystem will be influenced in the future.



igure 2: Example of animals kept in the aquarium container (Fishes: agothenia borchgrevinki, Artedidraco spec., Octopus: Pareledone pec.). © Astrid Böhmer AWI (who is also shown refilling the system)

Figure 3: A shy albatross (Diomedea cauta) who visited our ship at sea. © Dominik Nachtsheim, PoIE.

As a further consequence of the strong winds at the start of the cruise, it was impossible to take daily water samples of the sea surface film during the first two days, and on the 12th of March as originally planned. On the 12th, the first satellite overflight took place, followed by a second overflight on the 15th. More details about both topics will be covered in next week's report. Furthermore, there are unconfirmed rumors on board about a sighting of Neptune on the helicopter deck during the night of the 13th. Supposedly, he showed great interest in the ship and specifically the polywogs (unbaptized) approaching the equator.

On behalf of all cruise participants on board Polarstern, best regards,

Hartwig Deneke

(Chief Scientist)