

ANT XXIII/6 Weekly Report No. 2 (Cape Town - Cape Town)
24 June - 1 July 2006

The second week of our expedition started with a surprise. The depression field which was slowly emerging from northwest and which we tried to avoid, suddenly intensified, gained travelling speed, and changed direction.

On Saturday night (June 24 to 25) and still on southerly course, the mid-summer celebration, which was organized by a group of Swedish and German krill scientists in Scandinavian style with paper flowers as decoration, came to an abrupt end at about 1:30 pm. The depression had developed to a hurricane that hit Polarstern with its mighty forces of Beaufort 11 wind speed (with peaks of 12 and maximum 42 m/sec).

It was impossible to sleep as the ship was rocking and rolling in the swell with wave heights above 12m. Chairs started moving, books fell out of the shelves and crew and scientists were eagerly tightening the equipment. Waves and ice crushed on board as the bow of the ship kept ramming into walls created by the steered ocean. Tones of water flooded the working deck. Containers, winches and large equipment standing in its way were covered, flooded or pushed aside. People did not feel well and most of them tried to stay in a safe place for not being pushed around by the unpredictable movements of the ship.

Breakfast on Sunday was served as a small buffet with rolls and Wieners for the few people willing to eat, and so was dinner. By Sunday afternoon Neptune's forces decreased and Monday became the day of repairs and cleaning up. The beginning of our scientific water stations had to be postponed.

Biological processes in the surface ocean also were influenced by the winter storm. Before, we measured chlorophyll concentrations - a biochemical indicator for the amount of phytoplankton - in the upper ocean layer of around $0.2\mu\text{g}/\text{l}$. Now the very well mixed surface layer had deepened to 120 m with chlorophyll of less than $0.1\mu\text{g}/\text{l}$. The phytoplankton is the nutritional basis for all other life in these areas and such low concentrations limit the energy for the food webs.

To retrieve the necessary information about the structure in the water column, the physical oceanographers deploy their CTD probe. CTD stands for conductivity, temperature and depth. All those parameters are measured and transmitted back to the lab on-line while the probe is lowered with one meter per second to depths of more than 5000m, and as close as 100m above the sea floor. In addition a fluorometer measures algal pigments with depth and a turbidity sensor records light attenuation from particles (e.g. dead or living algal cells and zooplankton or detritus) passing a 25 cm long, and few millimetres wide light beam. The operator can close 24 bottles holding 11 litres of water, each remotely in distinct depth layers. The water is then analysed for oxygen, plant pigments, plankton species composition and abundance and the amount of total organic carbon.

Mesozooplankton is also very rare. These zooplankters are small animals of the size range between a few millimetres up to some centimetres comprised mainly by crustaceans (copepods, amphipods and euphausiids), jellyfish (ctenophores and siphonophores), pelagic snails (pteropods), arrow worms (chaetognaths) and tunicates (salps). The catches with the various nets reveal low quantities. In contrast, at our first position near the northern rim of the Weddell Gyre at 60°S 3°E, krill was even more abundant in the upper 200m of the water column compared to previous summer situation. Our biologists identified males and females ready for overwintering, and some larvae were around also. At stations some degrees further south, krill abundance had drastically decreased. It is too early to give precise information on species abundance and to say which kind of energy such krill utilises to maintain its activity, but experiments conducted in the cooled laboratory containers on board ship will help us to find out. With that little plankton to eat it is not surprising that we do not see many top predators like seals and whales; only some birds, snow petrels and Antarctic petrels, circum round the ship.

We are truly in Antarctic waters since we have crossed 60° S a few days ago, and we are making our way south towards the icy continent from where temperatures below minus 30°C are reported by e-mail from the German Antarctic station Neumayer. At the moment we experience air temperature between minus 12 and minus 20°C with moderate wind velocities between 12 and 20 m/s (Beaufort 6 to 8). 75 stations are awaiting us and we hope for reasonable good weather and ice conditions. Our stations are lined up with 30 nautical miles distance on three transects perpendicular to the coast of the Antarctic Shelf Ice. With these low temperatures the equipment is permanently stressed. Material breaks more easily and everything moves much slower. Our personal equipment is good, but standing outside in the freezing wind chills body temperature no matter how many layers of warm clothing you wear. We appreciate the work of our sailors in such conditions.

Despite these harsh environmental conditions and several breakages of gear, operations proceed smoothly with the different sampling gear. The CTD and a krill net, the Rectangular Midwater trawl (RMT), are our standard instruments accompanied by several plankton nets and other equipment, but this will be the topic for another weekly report. Even the diving team has successfully tested its equipment in the relatively warm (minus 1.8°C) patches of open water that give the only prominent optical contrast on the whitish sea ice plains that merge with the grey cloud cover at the horizon.

Following the matches of the World Soccer Games is not an easy task; traditional radio communication is the fastest means. The fan community on board is diverse and supports each of the 8 teams to reach the semi final round, depending who you ask.

Hope all of you are fine at home; we at least enjoy our work and the warm environment we have inside the ship.

All the best
Uli Bathmann