ANT XXII/2 Weekly Report No. 6 13.12. - 19.12.2004

The weather conditions remained stable during the week with temperatures between –2 und –5°C and light winds. Therefore our helicopters were used frequently. They transported the oceanographers to distant ice floes, from which they deployed their transportable CTD (s. Weekly Report No. 4) and flew ice physicists to some buoys, which were set out in an array in a triangle, whose edges were 70 miles apart. The drift of these buoys is quite distinct and will elucidate the drift pattern from floes in our area. Ice thickness measurements were also performed from the flying helicopters. They towed a sonde at low height, which continuously records the data. Both projects will be highlighted in the next report.

The ice biologists also benefited from the weather conditions. Both of our floes remained in close contact, so that scientists could reach their working area by foot or rubber boat. They are investigating the algae and animals living within the sea ice interior. Sea ice was regarded as hostile for organisms for a long time. But a variety of organisms are thriving within the brine channel system (s. Weekly Report No. 5) with diameters in the range of millimetres to centimetres. Some of them complete their life cycles within the ice, while others use this habitat only during juvenile or larval stage. Diatoms are the most abundant and diverse group within the sea ice. Several hundreds of million cells occur in densely populated sections, where they build up a biomass of up to 2 mg chlorophyll a per litre. This results in an enrichment factor of 1000 compared to values within the open water. The concentration of cells may reach peak values especially at the undersides of the ice staining it a brownish colour. Together with flagellates, bacteria, and primitive fungi form the food resource for smaller animals, such as protozans (ciliates and foraminifers) or multicellular organisms (turbellarians and copepods). The channel system within the ice offers better light conditions compared to the under ice environment. Thus algae thrive and accumulate. This is utilized by the animals that are also better protected against their predators within the brine channel system. The sea ice biologists investigate temporal changes in species abundance and composition and study their role in the cycling of carbon and nitrogen. It is of interest to know what these organisms feed on and how much and what is finally released by them. These faecal remains are again utilized within the sea ice system.

The brine channels are an extreme environment with regard to temperature and salinity. Temperatures can drop below -10°C in upper layers of the ice and salinities rise above 100. Sea ice organisms had to evolve special mechanisms to counteract to these conditions and many of these processes are as yet not well understood.

Larger organisms, such as the Antarctic krill, several amphipod and fish species utilize the organisms on the sea ice underside as food resource. Their contribution to the overall budget of the sea ice system is also being investigated. Finally, the biologists deploy several types of

plank--ton nets, to analyse seasonal changes of zooplankton organisms over depth. The variation in developmental stages will be used to construct growth curves. Other plankton samples provide live zooplankton specimens, which are used in experiments to quantify food ingestion and excretion rates.

The drift pattern of our floe is somewhat unexpected. Although we have drifted about 40 miles to the North during the three weeks after our ar----rival at the floe (which is less than we expected), for the last five days the tidal forces daily move floe and ship daily about 5 miles to the West and back to the East respectively. Regular visitors on the floe in----clude Emperor and Adelie penguins, Crabeater and less frequently Weddell seals. To the dismay of the divers and those investigators relying on underice samples, some leopard seals were also encountered. The photog-ra---pher was the only person who was not unhappy with the situation, since he was able to get outstanding pictures of the animal by using big telephoto lenses.

Today is the last Sunday of Advent. The preparations for Christmas are underway here on board as well as at home

With pre Christmas greetings from all expedition members
Michael Spindler