

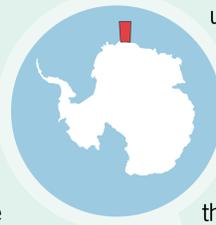
Scratching the Surface

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SUIT emerging from under ice.

The ice-water interface offers a substrate that nourishes aquatic organisms like krill *Euphausia superba* and ultimately feeds a rich community of birds, seals and whales. To obtain better insight in this inaccessible environment, we developed a special ice net. This 'Surface and Under-Ice Trawl'



The research area was situated between 3° W and 3° E, reaching from the coastal ice shelf north to 57° S.

(SUIT) can be towed along the underside of the sea ice to sample krill and other fauna. A link to the level of top consumers is made by simultaneous surveys of birds and mammals. Here we present preliminary results from our recent winter expedition in the Lazarev Sea.

RV "Polarstern"

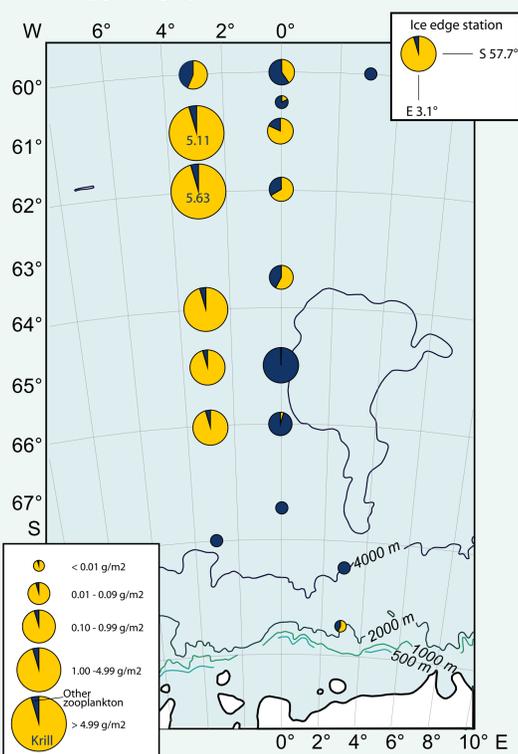


Top predator censuses were conducted from the ship.

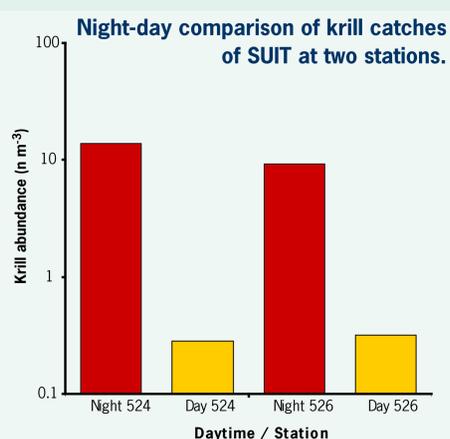


Sea ice and krill

Biomass distribution of surface zooplankton and nekton under mid-winter ice. An additional station was sampled at the ice edge (inset upper right).



Data from the winter 2006 SUIT campaign represent the first quantitative record of krill abundance at the water-ice interface, documenting high concentrations of krill (avg 2.05 m⁻³) directly under ice.

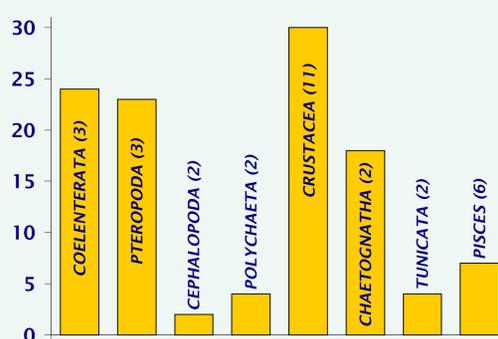


In winter 2006, a pronounced vertical migration of krill was evident: under-ice krill densities increased by two orders of magnitude during night. This indicates a feeding migration triggered by ice algae and ice fauna which are grazed during night, while during daytime krill stays at greater depth.

Sea ice and biodiversity



SUIT catches show that a wide range of macrofauna species actively utilizes ice-water interface of the Antarctic Ocean. Preliminary identifications number 31 species. New discoveries include oceanic ice-associated amphipods, fishes and remarkably two species of squid.



Frequency of occurrence of macrofauna taxa caught on the 30 stations sampled. Number of species per taxon in parentheses.

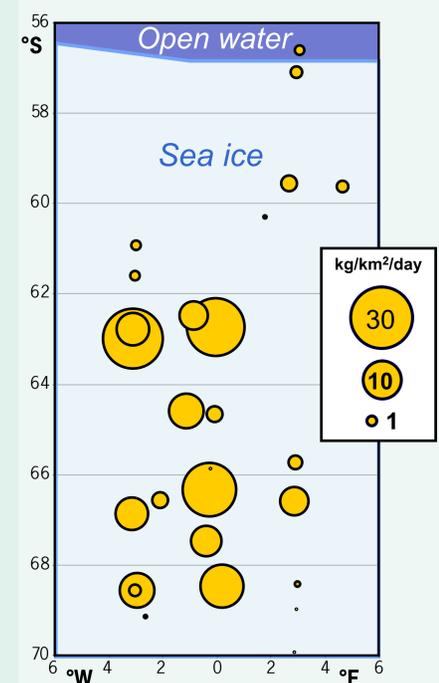


Antarctic minke whale breaking through the ice

Sea ice and top predators

In midwinter 2006, daily food requirements of birds and mammals in the extensive sea ice zone (avg ± 7 kg/km² fresh weight) were considerably higher than in open waters to the north and concentrated far south in the pack ice.

Top predator food requirements (kg/km²/day) from ship based band transect surveys.



Distributional patterns of surface feeding birds followed the pattern of SUIT catches of krill. The overall consumption pattern however, was strongly dominated by minke whales and crabeater seals, indicating additional food sources.

Conclusions

- This first quantitative evidence of krill aggregations under sea ice in winter emphasizes the importance of the ice-water interface layer for the Antarctic ecosystem
- The diel migration of krill and other organisms, indicates that community development of ice biota occurs even in mid-winter and provides an attractive foraging ground
- Sampling under sea ice provides new insights into the role of sea ice in supporting biodiversity, and possible consequences of climate change
- Top predator censuses and SUIT sampling both show that the total sea ice area, rather than just its marginal zone, is important for Antarctic food webs and thus for their management and conservation