



# ANTARCTIC RESEARCH



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## WHY IS ALTERRA INVOLVED IN ANTARCTIC RESEARCH?

As a Consultative Party to the Antarctic Treaty since 1991, the Dutch government has a permanent obligation to substantial investments in Antarctic science. Several ministries have joined forces in the Netherlands Antarctic Programme (NAAP).

The Dutch Ministry of Agriculture, Nature Management and Fisheries ('LNV') has commissioned Alterra to conduct research related to international nature conservation. The activity resorts under the 'International Nature Management' theme in the DWK-programme 'International Co-operation' (*Progr. 404; theme 4*).

Material budgets for research have to be obtained from NAAP, which is administered by the Netherlands Organization for Scientific Research (NWO). In addition, each Alterra project requires support of host countries that have stations or ships operating in the Antarctic.

## ALTERRA PROJECTS

Projects in the Antarctic are linked to Alterra's expertise in applied management-related research on marine birds and mammals. Top predators act as indicators for ecosystem processes and as monitors for changes in the environment. A variety of projects has been conducted in which seals, penguins and petrels were studied in relation to pollution, fisheries management, disturbance and climate change. In recent years Alterra has become increasingly involved in marine science projects where international oceanographic teams co-operate in integrated ecosystem studies. In this interdisciplinary framework Alterra investigates the role of the top predator community.

In 2002 a new project was started in co-operation with the German Alfred Wegener Institut (AWI). It involves investigations into Antarctic marine foodwebs, especially those influenced by the seasonal sea-ice in the Southern Ocean. The research is part of GLOBEC (Global Ocean Ecosystem Dynamics), a core-project under IGBP (International Geosphere-Biosphere Programme).

Adélie Penguin



Southern Fulmar



Weddell Seal



Polarstern



## SEA-ICE AS LUSCIOUS MEADOW ?

Alterra's new marine science study originates from our earlier projects in which a standard pattern was seen of extremely high top predator abundance in ice-covered areas. Apparently, in the under-ice environment, abundant food is available for whales, seals and birds.

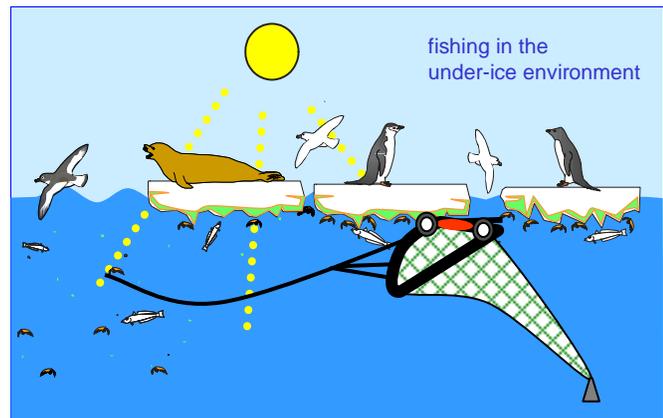
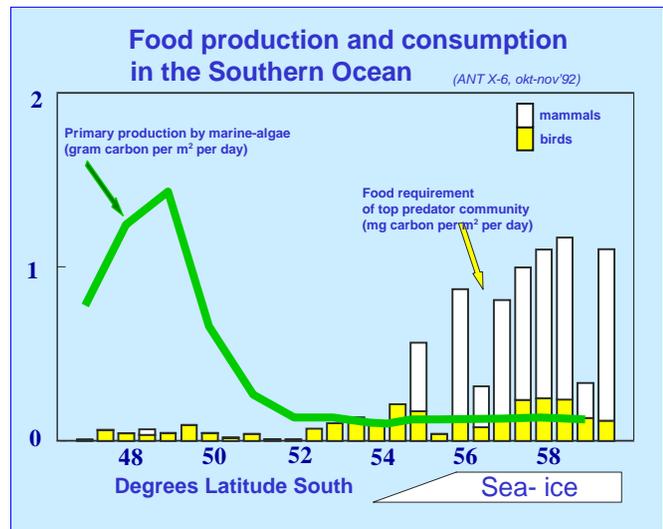
Such a finding contradicts results of oceanographic studies that consistently show low abundance of algae in the water under the ice. Algae are the 'grass of the sea' and as such the starting point of foodwebs on which all other life forms depend.

The explanation has to be sought in algae that grow within and on the undersurface of the icefloes. Growth of these ice-algae cannot be measured by traditional methods. Often, it is assumed that ice-algae in the cold water under the snow-covered floes receive too little light to have a major significance.

Top predators, however, tell a different story. Since the productivity of ice-algae cannot be properly measured, Alterra's new project aims to unravel the foodweb step by step from the top down. Studies of the abundance of marine birds and mammals will be combined with studies of their diet and investigations of abundance of available prey (krill, fish, ...) closely under the ice. In turn, prey captured will be analysed for stomach contents.

## ICE-NET

To realize this study approach, Alterra has constructed a special ice-net that can be towed closely along the undersurface of the sea-ice (*Surface and Under-ice Trawl - SUIT*) Over the next few years, SUIT will be used in GLOBEC cruises on the ice-breaking research vessel Polarstern. Evidently this is a challenge because risks for damage or loss of the net are considerable. On the other end of the balance however, lies better and urgently required understanding of the importance of sea-ice areas for the Antarctic ecosystem. Such knowledge is needed to interpret potential impacts of for example climatic change or fisheries. SUIT was successfully operated in young ice in early 2004, and will be put to heavier tests in the winter 2006 GLOBEC expedition.



SUIT net (Surface and Under Ice Trawl)

