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Southern elephant seal foraging and its ecological implications

Background & Objectives

The large populations, wide distribution and high energy demands of southern elephant seals play an important role in the dynamics of their marine food resources, mainly squid and fish. Information on the foraging ranges of seals from different breeding populations may provide clues as to why some colonies are growing while others are declining. Our studies were conducted between 1996 and 2001 on King George Island. Nothing was known about the foraging ranges and winter habitat of seals from this southernmost breeding population. Our objective was to fill that gap by satellite tracking adult and recently weaned juvenile seals to document their seasonal movements relative to the sea ice distribution.

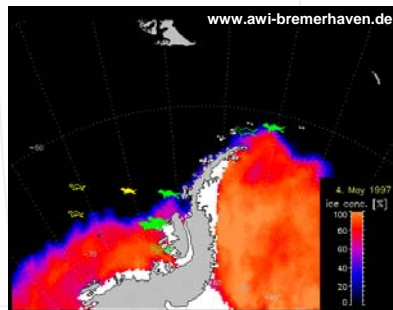
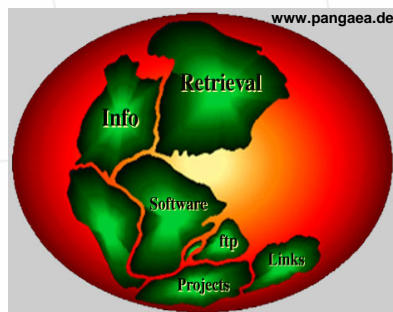
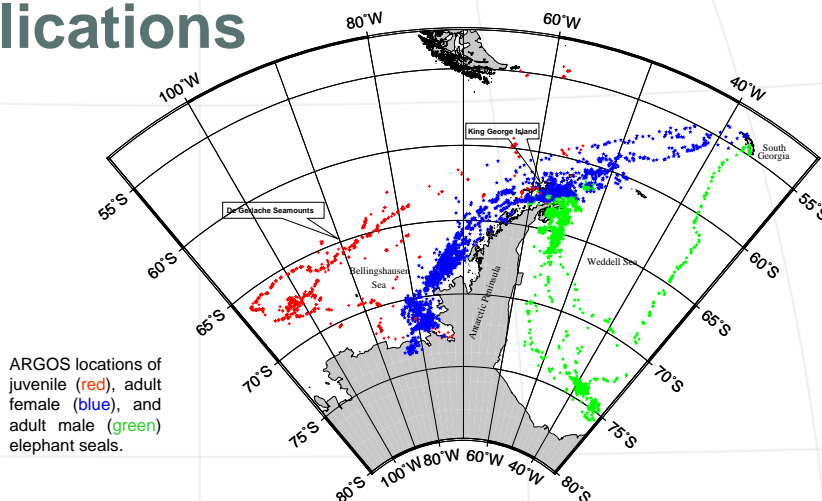


Illustration of elephant seal movements relative to sea ice distribution in the Antarctic Peninsula region. First-year elephant seals (yellow) avoided the ice. By contrast, adult females (green) frequented the outer ice fringe and even ranged into closed pack ice of up to 95% cover.



Comprehensive analyses of the seals' foraging activities will be achieved by the ICSU world data centre PANGAEA-Network for Geological and Environmental Data operated by AWI & MARUM.



ARGOS locations of juvenile (red), adult female (blue), and adult male (green) elephant seals.

Results & Discussion

The results show that first-year juveniles and adult female and male elephant seals from King George Island used different winter foraging habitats. Juveniles during their first trip to sea avoided the sea ice while the adults did not. This suggests that the feeding grounds of adult elephant seals are more closely associated with the pack ice zone than previously assumed.

Juveniles (tagged in December 1996) moved south-westward and finally centred their foraging activities in ice-free waters west of the De Gerlache Seamounts. Their maximum range was some 3000 km distant from King George Island. With increasing ice cover in mid-April they returned to the area of the South Shetland Islands. One juvenile reached the Patagonian Shelf in early September where it was last located in November 1997.

Adult females (tagged in January 1997) showed remarkably similar tracks along the shelf margin west of the Antarctic Peninsula. They moved as far as 90°W and foraged for 6 months in the ice-covered Bellingshausen Sea. In October, two females returned to King George Island while two other females moved far to the north-east to breed at South Georgia. Their last locations were received in March 1998.

Adult males (tagged in April 2000) moved along the shelf margin east of the Peninsula reaching their southernmost positions in the interior pack ice of the Weddell Sea. Here they centred their foraging for 4 months close to the cold water flow coming out of the Filchner Trough. This region corresponds to the Halley Bay Divergence of the Antarctic coastal current which forms the southern limb of the Weddell Gyre. In August, two males returned to King George Island and one male moved to South Georgia to breed. Last locations were received in March 2001.

Perspectives

Elephant seals spend most of their lives in the ocean where they rely on sufficient fish, squid and other prey resources. But why travel so far to feed, and what makes certain areas better for foraging than others? To answer the question we need to know more about the environment through which the elephant seals move. Our new approach focuses on a comprehensive interpretation of data obtained from elephant seals satellite tracked from King George Island, as well as from Marion Island, southern Indian Ocean. Elephant seal migratory and diving behaviour will be related to hydrographic features, ocean currents, bottom topography and prey availability to identify marine areas most important for these top predators.



Elephant seal satellite tagged on Marion Island

The complex synthesis of data on seal positioning and diving behaviour and likely links with oceanography and bathymetry aims to identify those parameters which are characteristic for the feeding areas of seals in the respective regions. This will further our understanding of the behaviour of the seals and the role they play in the Antarctic and Subantarctic marine ecosystems of the Southern Ocean.

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