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Antarctic Sea Ice Habitat and Minke Whales

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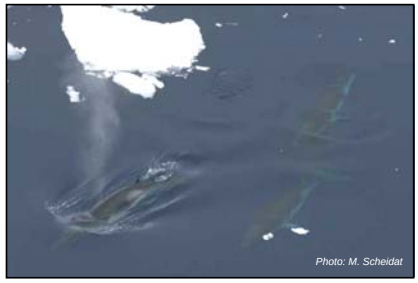
Introduction

In the Southern Ocean, biological production in sea ice is considered to be a major driving force for Antarctic animal population sizes and biodiversity. It is known that sea ice forms an important habitat for the Antarctic Minke Whale during the summer months when production is high. Sightings of Minke whales during the austral winter in the pack ice were considered atypical and it has been thought that Antarctic Minke whales (*Balaenoptera bonaerensis*) only stay in Antarctic waters during the austral summer and spend the winter breeding season in tropical and subtropical waters. However, continuing food availability under the sea ice during the winter months might also enable them to overwinter in the deep pack ice. Data on Minke whale occurrence in Antarctic winter months is scarce, due to limited observation effort during this time, as well as due to difficult sighting conditions. This pilot study is a first attempt to compile and analyze existing data in order to investigate the



Antarctic Minke in the summer sea ice (Weddell Sea)

Antarctic Minke in the winter sea ice (Lazarev Sea)

Data used & results

To investigate the hypothesis that Antarctic minke whales regularly overwinter in the pack ice, we compiled year-round information on historical references, published data (e.g. available databases online) and observations from non-dedicated shipboard surveys as well as from dedicated helicopter and ship surveys in Antarctic waters. Data was collected from different observation platforms, including helicopters, tourist vessels, research vessels, acoustical recording stations as well as observations from ice floes. The analyzed data covers a range of different seasons, including winter months, and records in a period from 1955 to 2008. In total, 77 different data sources have been accessed, including: ASAC (Australian Antarctic Data Centre (http://data.aad.gov.au), MAPS database within the open access library PANGAEA of the Alfred Wegener Institute, SO GLOBEC cruises

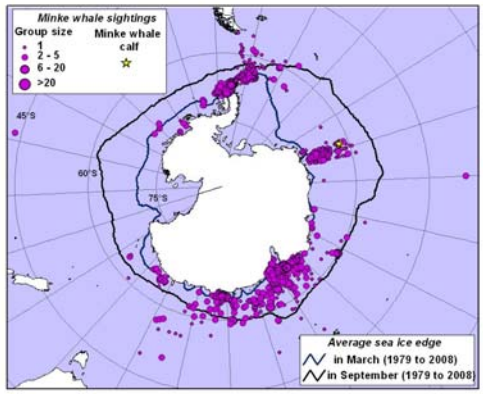


Figure 1: Overview of minke whale sightings used in the current analyses

Effort

A total of 1018 records of minke whale sightings were compiled, comprising a total of 2383 animals (Fig. 1). The data shown here concentrates on the region of the Antarctic Peninsula, the Lazarev Sea and the Antarctic area south of Australia. Observation effort (number of sources analysed per month, generally surveys) was highest in austral summer from December to March (Fig. 4). Lowest effort was in June with only two sources available for this month (Fig. 4). Numbers of records (sightings) were highest in November and December and, not surprisingly, lowest in June. When considering the number of sightings per source per month, the data from July shows the highest ratio. This is probably due to the dedicated top predator helicopter and boat survey conducted in the winter of 2006 in the Lazarev Sea (Figs. 3 & 4) during which a considerable number of minke whales were sighted in the ice.

Behaviour

Feeding was observed only in the months December to February. Defecation of red scat was observed on several occasions in December and January indicating at least partial feeding on crustaceans. In the months July and August minke whales were observed to break breathing holes through the sea ice (see photo above).

Group size and composition

On August 7th in 2006 a mother calf pair was sighted. Mean group size for all records was 2.4 animals, including two large aggregations of minke whales (125 and 150 animals). One of these was sighted in August 1955 in a polynya close to James Ross Island at the northern end of the Antarctic Peninsula. The seasonal distribution of mean group sizes showed the

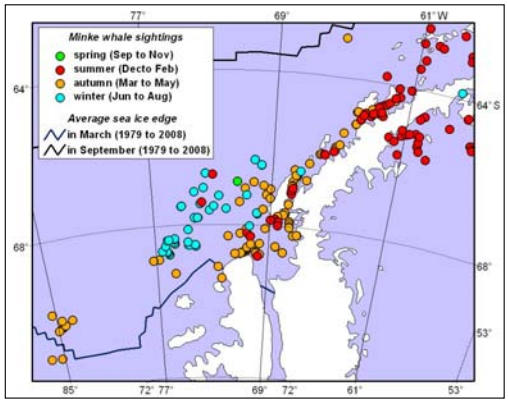


Figure 2: Minke whale sightings in different seasons around the Antarctic

Conclusions & future work

This first analysis reveals that minke whales occur in Antarctic waters throughout the year. Although sighting effort was low during winter months, especially in June, a considerable number of animals were seen in the ice, including a calf. This means that an unknown proportion of minke whales is overwintering in sea ice. Studies on krill and fish availability (v. Franeker et al. 2006) under the pack ice in winter indicate that these might be a food source for top predators such as minke whales.

Even though this first analysis did not include all available data, it points out that whenever (dedicated) surveys were conducted (independent of the season), minke whales were sighted. Conditions for detecting minkes in the winter are more challenging as daylight hours are limited and weather conditions are less favourable. Thus the future analyses of year-round acoustic stations, such as PALAOA (http://www.awi.de/PALAOA), for further analysis, would be very helpful. In the future the data sources need to be completed by including several more large databases (e.g. US American survey efforts, International Whaling Commission) as well as historic information (e.g. whaling records). Good baseline information on how the Antarctic minkes use the sea ice habitat is particularly important in light of the current whaling activities as well as the

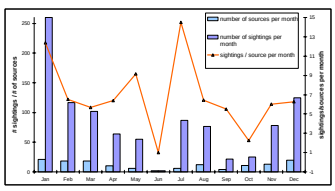


Figure 4: Seasonal distribution of effort (expressed as number of sources used) and Minke whale

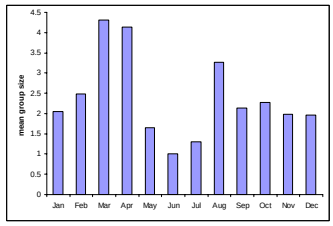


Figure 5: Seasonal distribution of mean group sizes.

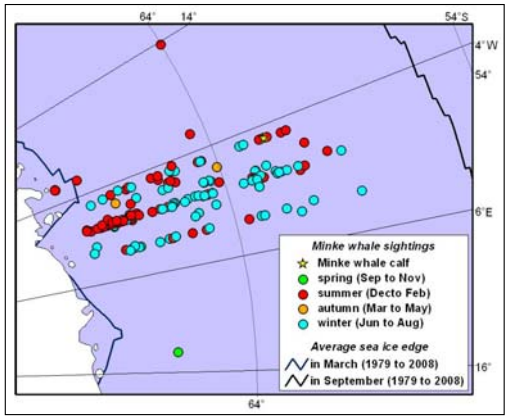


Figure 3: Minke whale sightings during different seasons in the Lazarev Sea