Breeding ecology of Antarctic petrels and southern fulmars in coastal Antarctica
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Where do breeding Southern Fulmars and Antarctic Petrels forage?

Studying the breeding biology of seabirds on land reveals many intriguing aspects of their breeding ecology, but also invokes questions about their behaviour in the habitat where they live most of their time. We were particularly interested to find out whether the longer durations of the foraging trips of Antarctic Petrels meant that they were covering longer distances or that their foraging areas were located further away than those of Southern Fulmars. A pilot study was set up to investigate the possibilities of tracking Southern Fulmars and Antarctic Petrels, which also gave the opportunity to elucidate some of these issues of the foraging strategy.

We used Microwave Telemetry satellite transmitters (Platform Transmitter Terminals) weighing 20 gram. With TESA®-tape the transmitters were attached to a couple of mantle feathers on the back of the birds and the total added mass amounted to 2.5 - 5% of the individual body mass. In total, 9 devices were available, which were attached to a bird for on average 13 days (range: 2-31 days). Because the trackers could be easily removed and applied again, most devices were used at least on two different birds. Between 23 January and 23 March 1999, we were able to fit satellite transmitters on 8 Antarctic Petrels and 12 Southern Fulmars, equally divided over both sexes. All individuals receiving a satellite transmitter had a chick at the moment of employment and per animal different foraging trips were recorded. Due to technical failures position data could not always be generated by each PTT.

Microwave PTTs use ARGOS satellites to calculate the location of the PTT and ARGOS also classifies the accuracy for each calculated position. We showed only satellite fixes of a highest category (0, 1, 2, 3) and filtered the dataset to remove most of the improbable locations (see McConnell et al. 1992).

The preliminary results of this pilot project are shown Fig. 1. Although some of the positions might not be fully accurate, the overall picture is clear. The areas where both species forage are clearly separated, if we compare Fig. 1A with Fig. 1B. Southern Fulmars stay closer to Ardery Island and virtually all foraging occurred below 66°S in a relatively small area within 100 km of the breeding colony. Fig. 1A showed five foraging trips that were recorded north of 65°S, which were different from the usual routine in Southern Fulmars. Two of these trips were of birds that left Ardery Island in March and were moving to their winter areas. One of these adult left its chick after heavy snowstorms early in March (the chick was fed by
Figure 1. Distribution of foraging Southern Fulmars (a) and Antarctic Petrels (b) in the chick-rearing period. Plotted are data of satellite transmitters of individual birds that were applied on their breeding colony on Ardery Island (66°22’S 110°27’E) between 23 January 1999 and 23 March 1999. Grey shades indicate changes in the bathymetry. North of Ardery Island the continental shelf (light grey) extends roughly until 65°S, where the continental shelf break is situated. Deep waters (more than 1000m deep, darker grey) are found north of this area. Sea-ice cover is not indicated in this figure. For more explanation on individual foraging trips, see text.
one partner, but predated just before fledging), the other one left the day after the chick successfully fledged. Two trips were of individuals that made an unusual large loop in mid February, which appeared to be just after the highly demanding chick guarding period. These individuals returned to the colony after 2 days and resumed their normal foraging regime with short trips. The fifth bird made a long trip end February and returned after two days. Possibly, Southern Fulmars also take occasionally long breaks (“bimodal foraging strategy”) when their body condition is low, or when parents have to recuperate.

Antarctic Petrels have not only longer durations of foraging trips, but they also forage further away. It is not clear whether these feeding grounds are more productive and thus contain more food or that these grounds are the typical ice-habitat where Antarctic Petrels prefer to forage. Possibly, further investigation of the satellite tracker data combined with detailed data on the cover and concentration of sea-ice might clarify this relationship. Although Antarctic Petrels have satellite positions around Ardery Island, their foraging ranges are generally between 64°S and 66°S. Probably most positions close to Ardery Island are of birds that are commuting between the feeding and breeding grounds, although some opportunistic feeding might occur on the way when they encounter large patches of prey. The distance to the furthest foraging ranges was much more than 300 km away.

The area where most Antarctic Petrels were foraging and the five deviating Southern Fulmar tracks were found appeared to be in the vicinity of the continental shelf break, which is here situated at around 65°S. The minimum sea-ice edge (in February) is located a bit closer to the continent, roughly at 65°30’S, and thus the main foraging area for Antarctic Petrels is situated within the highly productive, seasonal sea-ice zone. Interestingly, when a large part of the coast of East Antarctica was surveyed in 1996, the highest peak of krill density and especially seabird numbers in this area of Antarctica was observed north of Ardery Island, between 63° and 65°S along the 110°E north-south transect (Nicol et al. 2000).

Temporal differences in foraging, except for Southern Fulmars very late in the season, were not found. However a closer look to individual birds and individual foraging tracks is needed to verify this. The data of this pilot study also show that positions should be determined in a high temporal and spatial resolution, especially in Southern Fulmars that have short distances and short durations of their foraging trips.

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