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INSIDE JEB

How wind pattern change could impact albatrosses

Campbell albatrosses on Campbell Island. Photo credit: Caitlin Kroeger.

Rumoured to be the souls of lost sailors, albatrosses cruise the southern oceans effortlessly, borne aloft by the strong winds circling Antarctica in search of squid and fish dinners. Yet, the bird's nomadic lifestyle could be at risk. 'Wind patterns over the Southern Ocean are expected to change over the next century', says Caitlin Kroeger from the University of California at Santa Cruz (UCSC), possibly making it harder for the vagrant animals to reach their foraging grounds. So, when Kroeger had the opportunity to visit Campbell Island – 700 km south of New Zealand – to study the birds, she jumped at the opportunity to find out how they cope in the harsh environment. Most intriguingly, Kroeger and Scott Shaffer, from San Jose State University, USA, knew that one resident, the Campbell albatross (*Thalassarche impavida*), breeds every year, while its neighbour, the grey-headed albatross (*Thalassarche chrysostoma*) only breeds in alternate seasons. 'I wanted to understand the costs of different foraging strategies between species of albatross that depend on wind to forage', says Kroeger.

Sailing from New Zealand, Kroeger, Rachael Orben (Oregon State University, USA) and Lisa Sztukowski (Plymouth University, UK) took everything that they would need for the 4 month stay, storing the majority of their provisions at an automated meteorological station before hiking 10 km to the small hut close to the albatross colonies that would be their base. 'We drank rainwater from the roof, cooked on a camping stove and set up a solar panel to power our research device and satellite phone. It was pretty rugged', chuckles Kroeger. Fortunately, the birds were completely unperturbed by their human visitors: 'You can walk right up to them and pick them up', says Kroeger, who, together with Orben and Sztukowski, measured the birds' vital statistics, before injecting them with 'heavy' water – made from heavy oxygen and tritium, to determine their energy use during their odysseys – and collecting a blood sample. In addition, the trio attached a GPS tracker to the birds to track their manoeuvres while away from the nest. When the birds returned after days of foraging, Kroeger took a second blood sample, which she later analysed with Dan Crocker, from Sonoma State University, USA, to calculate how much heavy water had been exhaled as carbon dioxide, to calculate the birds' daily energy expenditure.

After years of patient work by Kroeger and Dan Costa at UCSC, it was apparent that the two species had dramatically different foraging patterns, with grey-headed albatrosses covering distances of up to 1066 km in a day, while Campbell albatrosses only roamed over ranges of up to 768 km per day. Yet, the two species used similar amounts of energy, ∼2000 kJ day^{-1}, despite their different lifestyles and breeding patterns. When Kroeger compared the birds' physical condition, she found a possible explanation for the grey-headed albatross's biannual breeding pattern: 'They had lower reserves during early chick rearing, which might contribute to their need to recover between breeding events and breed every other year', she says. In addition, satellite records of the winds transporting the birds on their voyages showed that wind speed impacts the grey-headed albatrosses more. 'Higher proportions of strong head winds were costlier for them, probably because they experienced higher wind speeds than Campbell albatrosses in general', says Kroeger, although both species struggled to take off when the wind speed was low.

Looking to the future, Kroeger suspects that grey-headed albatrosses will be more at risk from higher winds when foraging while their Campbell neighbours may struggle in areas where wind speeds are predicted to fall, 'Which could have negative population-level consequences', she says, with concern.

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