

Short-tailed shearwaters fly and navigate efficiently under strong winds over Southern Ocean

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Efficient exploitation of distant food resources is key for maximizing survival and breeding in seabirds under variable marine environmental conditions. Short-tailed shearwaters breed in southern Australia and forage in Antarctic waters. Strong westerly winds over the Southern Ocean may provide shearwaters the opportunity of efficient travel assisted by wind, but also represent challenges for navigation under wind drift. Here, we examined how wind affects the movement of short-tailed shearwaters, by tracking them with GPS loggers and analyzing synoptic near-surface wind. We tracked 42 birds from two breeding colonies in Tasmania, with 31 long foraging trips over Southern Ocean recorded. During these long trips, shearwaters first traveled south to the Marginal Ice Zone in Antarctic waters, then moved northwest to upwelling regions in the Polar Frontal Zone or west along the continent, before heading northeast and returning to the breeding colonies. They traveled for >10000 km, during 2-3 week-long foraging trips. We found that 1) shearwaters could fly at speeds of more than 80 km/h, when assisted by strong tail winds, and that 2) the shearwaters maintained relatively constant movement directions during homing, despite flying across the strong and variable wind fields. Our results suggest that short-tailed shearwaters use tail winds efficiently for their fast travel to and from Antarctic waters, exhibiting expert long-distance navigation over featureless open-ocean even under variable wind conditions. The capacity to perform fast and directed travel under strong winds allows these shearwaters to effectively exploit distant food resources available in the Southern Ocean.