



Press Release

Optimal searches help albatrosses find far away prey

Wandering albatrosses employ the best possible search pattern to find food in the vast expanses of the Southern Ocean, according to research published online this week in *Methods in Ecology and Evolution*.

Wandering albatrosses are the epitome of the long distance traveller. An albatross can cover up to 13,000 km in a single foraging trip lasting 20 days, before returning to their nest on a windswept island in the Southern Ocean. But it has been an enduring mystery how these birds can increase their chances of finding prey such as squid and small fish that appear only sporadically at the sea's surface.

Collaborative research led by Dr Nicolas Humphries of the Marine Biological Association's Laboratory in Plymouth, UK, has developed a new technique for analysing the GPS trackings of animals. Working with French scientists from the Centre National de la Recherche Scientifique (CNRS) who tagged the birds, the research revealed that the majority of albatross foraging patterns tracked were near optimal for finding food items separated by large distances in the ocean.

"We suspected that albatrosses must use particularly efficient search patterns to locate prey in the open ocean, but we didn't know what those patterns were, and whether most individuals actually use them." said Dr Humphries.

The researchers attached GPS receivers to 27 wandering albatrosses and collected very detailed data about where they went, then subjected these tracks to a new statistical approach that tests more accurately than previously possible the different theoretical search patterns that could potentially be present. They found that most birds exhibited patterns best described by a Lévy flight.

A Lévy flight is a mathematical 'walk' pattern characterised by long, straight movements interspersed by smaller steps. By using this search pattern the albatrosses are able to increase their chances of finding new food patches, however widely scattered they may be.

Dr Humphries said, "Our method for analysing movement data provides a new window on the wild behaviour of albatrosses showing that a theoretical Lévy flight pattern, known to optimise searches for hard to find prey, is actually very common among the albatrosses we tracked."

The importance of the findings goes beyond marine ecology. The prevalence of the Lévy flight search pattern, which has now been identified in several different predators, indicates it may have naturally evolved in response to sparse resources brought about by environmental changes, implying it may be very common across diverse species.

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Because the new analysis method works for any type of two-dimensional or three-dimensional track it will allow similar analyses in a wider range of organisms, from motile cells to humans, for exploring whether Lévy-type behaviour is a universal way of moving when the whereabouts of resources are incompletely known.

The research was funded through the UK Natural Environment Research Council's Oceans 2025 strategic research programme.

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Further information

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Notes

1. 'A new approach for objective identification of turns and steps in organism movement data relevant to random walk modelling' is published online this week in *Methods in Ecology and Evolution*. A copy of the paper can be obtained from the MBA Communications Office.
2. The analysis software developed in this research is being made freely available with the paper. For a download go to the website of Professor David Sims at the MBA: www.mba.ac.uk/simslab
3. The Marine Biological Association (MBA) is a professional body for marine scientists with around 1200 members world-wide. Since its inception in 1884 the MBA has established itself as a leading marine biological research organization based at its Laboratory on Plymouth Hoe – contributing to the work of several Nobel Laureates and over 170 Fellows of the Royal Society. Find us at www.mba.ac.uk
4. Oceans 2025 is a strategic marine science programme, bringing marine researchers together to increase people's knowledge of the marine environment so that they are better able to protect it for future generations. This is a unique achievement involving all of NERC's marine centres and national facilities.