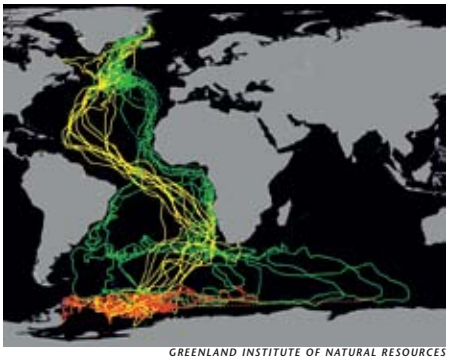
Arctic Tern

TRACKING *the longest migration*



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Tracks of Arctic Terns migrating south from colonies in Greenland and Iceland (green), their movements in the austral summer (red) and return migration to the breeding grounds (yellow). Dashed lines indicate periods close to the equinoxes when latitudinal fixes are compromised.

The Arctic Tern is renowned for having the longest migration and seeing more daylight than any other organism on earth.

The Arctic Tern's *Sterna paradisaea* northernmost colonies are well north of the Arctic Circle yet the birds spend the austral summer foraging off the Antarctic continent. Ringing recoveries indicate that most terns breeding in Greenland and northern Europe fly down the west coast of Africa, with some individuals travelling as far east as Australia, but it is only recently that the details of their epic journeys have been unravelled, thanks to tiny light-loggers.

In the early 1990s, bird-gadget wunderkind Rory Wilson was approached by the Royal Society for the Protection of Birds to design a way to discover where British Roseate Terns go in winter. Weighing around 100 grams, the terns were too small to carry a satellite transmitter, so Wilson decided to use a very small sensor that recorded light intensity every minute. With this information a bird's latitude (from day length) and longitude (from the time of sunrise and sunset) could be calculated each day. It would only be accurate to a few hundred kilometres, but the device required very little power and could perhaps be made small enough to be carried by a tern.

The first 'geolocator' models were too big to be used on terns, but engineers at the British Antarctic Survey have continued to refine the sensors, reducing them to a little more than a gram. In July 2007, a team led by Carsten Egevang deployed 50 light-loggers on Arctic Terns breeding in north-east Greenland and 20 on terns breeding in Iceland. The following summer, 11 terns were recaptured and the data from their loggers used to reconstruct their movements. The results, published in the *Proceedings of the Academy of Natural Sciences of the USA* (107: 2078–2081), provide unparalleled insights into this most extreme of migrations.

The southward movement after breeding is leisurely, lasting about three months. The birds feed along the way, with a major stopover lasting three to four weeks on the west slope of the mid-Atlantic Ridge east of Newfoundland. They then travel to the upwelling zone off Senegal, West Africa, whence some continue inshore around the Gulf of Guinea to Namibia. Others cross the Atlantic Ocean to the coast of Brazil, travelling rapidly through the tropics, where food is scarce, and starting to fan out across the Southern Ocean once they reach the Subtropical Convergence. Interestingly, all the tracked birds flying down the west coast of Africa moved offshore in central Namibia, continuing south off the shelf edge and passing South Africa at the beginning of November. This fits well with observations of southward movements of Arctic Terns and Long-tailed Jaegers several hundred miles west of the Cape at this time.

Although some Arctic Terns move east into the Indian Ocean, most spend the southern summer around the Antarctic Circle between South America and Africa. The return migration is more rapid, taking on average 40 days to cover more than 25 000 kilometres. All birds travel north through the eastern South Atlantic, then move west after crossing the equator to take advantage of prevailing wind patterns. By the end of this mammoth trip they travel 500–600 kilometres per day in their rush to return to the breeding grounds.

The southbound and northbound migrations are highly synchronised and the terns travel a total of 60 000–80 000 kilometres each year. With some individuals living up to 30 years, they will cover at least two million kilometres in their lifetime, more than three return trips to the moon!

PETER RYAN □

For more information, visit *www.arctictern.info*. Tiny geolocators have also been used to track the migrations of Purple Martins and Wood Thrushes in the New World (see Stutchbury et al. 2009, *Science* 323: 896) and Eurasian Hoopoes travelling between Europe and West Africa (Bächler et al. 2010, *PLoS ONE* 5(3): e9566), as well as the 27 000-kilometre migration of Ruddy Turnstones between Siberia and south-east Australia (*home.vicnet.net.au/~vwsg*).