Project summary

RAATD
Retrospective Analysis of Antarctic Tracking Data

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Start and finish: 2016-2019

Identifying the habitat requirements of Antarctic predators is fundamental to understanding how they will respond to commercial fisheries and climate change. RAATD identified multi-species areas of ecological significance that require monitoring and management in the future.

Context and objectives

Globally, species' habitat is being altered or lost due to human activity. This project will determine how predicted environmental changes in the Southern Ocean are likely to affect its apex predators, animals at the top of the food web. There is reason for concern as the Southern Ocean is now subject to rapid and intensifying environmental changes. These changes will alter the availability of habitats and the spatial distributions of species that depend on them. For apex predators, changes in the habitats bring cascading effects for entire ecosystems. Information on their responses to intensifying climate change is therefore urgently required for informed management action. The Retrospective Analysis of Antarctic Tracking

Data (RAATD) is based on a joint initiative of the Expert Groups on Birds and Marine Mammals (EGBAMM) and Antarctic Biodiversity Informatics (EGABI) within the Life Science Group (LSG) of the Scientific Committee for Antarctic Research (SCAR) and has received the support of CESAB between 2016 and 2019. Our goal is to determine 1) how does habitat use differ among apex predator species in the Southern Ocean and what are the areas of ecological significance; 2) how will climate-induced changes in habitat affect these species' foraging activity and distribution?

Methods and approaches used for the project

The first step is to collate existing tracking data for the key species from data holders. As there is a large source of variance in data type and quality we will perform an intensive quality control and combine the data into a single, consolidated database, housed in the biodiversity.aq repository. The second step is then to model the species distributions and habitats for the individual species, use them to estimate distribution across the entire spatial domain, and then combine these predicted distributions to identify Areas of Ecological Significance. These AES are then examined in the light of current oceanographic characteristics and the projected ones according to the IPCC scenarios.

Principal conclusions

The first major output of the RAATD is the data paper that has been accepted in *Nature* Scientific Data. In this data paper, we present the compiled tracking data from research groups that have worked in the Antarctic since the 1990s. The strength of RAATD is that the data have been intensively curated, cleaned and processed so that RAATD is delivering a powerful dataset that can be used by other communities with confidence. In addition, the codes for trimming the raw tracks and the state space filtering are available on the SCAR github page (https://github.com/SCAR/RAATD). The data are publicly available through biodiversity.aq. The archive includes tracking data from over 70 contributors across 12 national Antarctic programs, and includes data from 17 predator species, 4060 individual animals, and over 2.9 million observed locations.

The synthesis paper that use these data and present the Areas of Ecological Significance is currently under revision in *Nature*.

Anticipated (or actual) impact of these results for science, society, and public and private decision making

As long as the synthesis paper is not accepted for publication we have decided to keep the main outputs of the paper confidential, but we started the dissemination of the methodologies used and the concept behind RAATD. Among the principal stakeholders interested by the outputs of RAATD are the SCAR (www.scar.org), the Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR, www.ccamlr.org), the Antarctic Treaty System (www.ats.aq) and Committee for Environmental Protection (CEP, www.ats.aq/e/cep.htm). SCAR is following with great interest the development of the project as the Standing Committee of the Antarctic Treaty System of SCAR will be one of the major conduits to deliver the final product of RAATD to the Parties of the Treaty. RAATD was thus presented recently at a workshop (www.scar.org/policy/scar-cep-workshop/) and its potential to assist Parties in assessing the zones that are crucial to protect was discussed in several instances during the following CEP and ATCM meetings in Prague in July 2019. The reception of RAATD by the Parties was enthusiastic and we are hopeful that it will become a reference for environmental protection in the Antarctic. The same route will be followed for introducing RAATD to the CCAMLR where we anticipate that it will be considered as a useful tool for the delimitation of yet-to-be-designed Marine Protected Area, as CCAMLR has committed to develop a network of MPAs around the Antarctic.

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