

SOUTHERN OCEAN ENVIRONMENTAL FORCING AND MARINE PREDATOR POPULATIONS: EFFECTS OF CLIMATE VARIABILITY AND CHANGE

PN Trathan, J Forcada, EJ Murphy

British Antarctic Survey, Cambridge, United Kingdom

Introduction: The Southern Ocean is a major component within the global ocean/climate system and potentially the location where rapid climate change is most likely to happen, particularly in the high latitude Polar Regions. In these regions even small temperature changes can potentially lead to major environmental perturbations. Climate change is most likely to be regional and may include alterations to climate and weather patterns across a variety of spatio-temporal scales that include changes to the long inter-decadal background signals such as the El Niño–Southern Oscillation (ENSO).

Methods: Use of lagged cross-correlation analysis potentially provides a unique opportunity to explore how biological communities respond to oscillating climate signals such as ENSO and to change.

Results: Around the Southern Ocean, marine predator populations show inter-decadal periodicity in breeding performance and productivity, with relationships with the environment driven by physical forcing from the ENSO region of the Pacific. Wherever examined, these relationships are congruent with mid-trophic level processes that are also correlated with environmental variability. For example, in the south Atlantic, failure of Antarctic krill recruitment foreshadows recruitment failures in a range of higher trophic level marine predators.

Discussion: The Southern Ocean, though oceanographically interconnected, is not a single ecosystem and different areas are dominated by different foodwebs. Understanding how different regional foodwebs respond to change and how they interact, is a critical step that may provide the potential to make predictions about future change scenarios. Studies such as these are currently a key focus for both the BAS national programme *DISCOVERY 2010* and for international programmes such as ICED – *Integrated analyses of circumpolar Climate interactions and Ecosystem Dynamics in the Southern Ocean*.