ICED
Integrating Climate and Ecosystem Dynamics in the Southern Ocean

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Southern Ocean Food Web Modelling – A Multidisciplinary Approach:
Preliminary outcomes of the first ICED modelling workshop

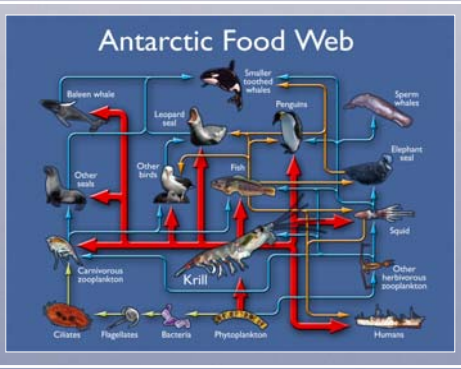
What is ICED?

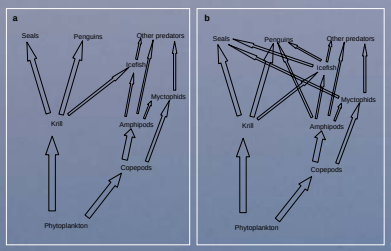
Integrating Climate and Ecosystem Dynamics (ICED) is an international programme, established to provide the integrated analyses required to determine the major controls on Southern Ocean ecosystem dynamics and the potential for feedbacks as part of the Earth System.

A primary goal of ICED is to improve the reliability of predictions of ecosystem dynamics. The preliminary outcomes of the first in a series of ICED modelling workshops are presented here, focusing on the development of Southern Ocean food web models.

Workshop Objectives

- Establish a multidisciplinary working group (expertise in physics, biogeochemistry, ecosystems, fisheries, modelling)
- Characterise food webs across a range of species, trophic levels and geographical areas towards developing end-to-end food web models
- Review the status of Southern Ocean food web models
- Explore issues associated with circumpolar food web models
- Develop the strategic basis for generating models of circumpolar operation of Southern Ocean ecosystems
- Make recommendations for future directions in Southern Ocean ecosystem modelling





Dominant pathways of energy flow through krill-centred food webs during years of (a) high and (b) low krill availability. This highlights the importance of alternative pathways in maintaining food web structure; also a key consideration in model design.

Background

The Southern Ocean has been impacted by climate change and harvesting. Understanding the effects on the physics, biology and biogeochemistry of this ecosystem remains a challenge.

Modelling challenges include:
i) understanding ecosystem responses to variability and change;
ii) developing a circumpolar view of ecosystem operation.

Southern Ocean ecosystem modelling is at an early stage (often with geographic/trophic restrictions) with considerable questions regarding model structures.

Discussion

Core discussions focused on:

Key issues: role of climate-related change, harvesting impacts, controls and feedbacks on food webs structure.

Food webs: discussions focused on identifying the main food web structures, addressing generic food web model concepts and identifying gaps in understanding and data.

Modelling approaches: for simulating and predicting key components of the Southern Ocean were discussed as was the potential for generalised modelling of the food webs.

Preliminary outcomes

A key product will be an overview of the current status of knowledge of Southern Ocean ecosystems. This will provide a basis for future directions in Southern Ocean food web modelling.

Gaps in knowledge were identified, as was the importance of understanding regional/trophic complexities. Modelling approaches to bring together different scales and processes are needed and will be a focus of future workshops.

An ICED community was formed to focus on Southern Ocean ecosystem modelling, with emphasis on cross-disciplinary studies.

Summary

ICED will adopt a number of different modelling approaches to characterise and model the circumpolar Southern Ocean food web. No single approach alone is sufficient to capture the links between ecosystems and climate in Southern Ocean for the multidisciplinary research and management purposes envisaged. A workshop report will be made available at: www.iced.ac.uk

If you would like to become involved in ICED, please contact the programme coordinator rcav@bas.ac.uk or visit www.iced.ac.uk

IMBER GLOBEC Oceans SCAR International Council for Science Scientific Committee on Oceanic Research British Antarctic Survey NATURAL ENVIRONMENT RESEARCH COUNCIL