

**XXXIV SCAR Delegates Meeting****Kuala Lumpur, Malaysia, 29-30 August 2016**

Looking ahead: Future multi-national initiatives from ICED and SOOS

Executive Summary

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Important Issues or Factors:

The SCAR co-sponsored groups ICED (Integrating Climate and Ecosystem Dynamics in the Southern Ocean) and SOOS (Southern Ocean Observing System) are multi-national, trans-disciplinary programs that are planning large scale initiatives to facilitate information flow and foster international collaboration. ICED is organising a conference in 2018 (www.MEASO2018.aq) with a principle focus on assessing the status and trends of habitats, species and foodwebs in the Southern Ocean. SOOS is designing the biological component of its observing system to be complementary to the CCAMLR Ecosystem Monitoring Program and is in the process of developing an initiative to undertake a circumpolar benchmarking of the Southern Ocean ecosystem. These initiatives will be working in collaboration and with support of the SCAR groups: Standing Scientific Group on Life Sciences, including its expert groups, Standing Committee on the Antarctic Treaty System (ATS), the Scientific Research Programmes on Antarctic Thresholds – Ecosystem Resilience and Adaptation (AnT-ERA) and State of the Antarctic Ecosystems (AntEco), the Action Group on Antarctic Nearshore and Terrestrial Observation Systems, and Biodiversity.AQ.

Recommendations/Actions and Justification:

Delegates should note these planned initiatives, encourage the development of them, and recognise their capacity to i) inform international bodies like the Antarctic Treaty System and the Intergovernmental Panel on Climate Change; ii) foster international collaboration and iii) highlight SCARs leadership in the provision of robust and independent scientific advice.

Budget Implications:

Preparation for the conference and the planning and development of the benchmarking program will be undertaken remotely and in conjunction with other meetings. Support from SCAR for participation in the conference by members of SCAR subsidiary bodies may occur, if funds are available, through contributions from those bodies who support this initiative.

Summary

In recent years, scientific work on the effects of climate change and ocean acidification on Southern Ocean ecosystems have been occurring in several programs sponsored by SCAR. These include the IMBER-SCOR program on Integrating Climate and Ecosystem Dynamics in the Southern Ocean (ICED), which is closely linked with SCAR, and the SCAR-SCOR Southern Ocean Observing System (SOOS). ICED and SOOS are complementary programs working on, respectively, (i) assessments and modelling of change in Southern Ocean ecosystems and (ii) the design and implementation of marine observing systems and the integration and facilitation of access to the observational data. They coordinate on areas of overlap between these objectives, as well as with scientists involved in other SCAR subsidiary bodies. This work is reported to the Scientific Committee of CCAMLR (SC-CAMLR). Both SOOS and ICED are committed to continuing and developing the provision of advice to support CCAMLR, as highlighted in the 2016 joint workshop of the Committee on Environmental Protection and SC-CAMLR.

ICED is organising a conference in 2018 (www.MEASO2018.aq) with a principle focus of assessing the status and trends of habitats, species and foodwebs in the Southern Ocean (see Appendix 1 for full details). The assessment will enable collective input from the Antarctic scientific community on the Antarctic marine ecosystem to the Sixth Assessment of the Intergovernmental Panel on Climate Change (IPCC). It is also intended to provide marine biological input to the SCAR Antarctic Climate Change and the Environment Report. This work could form the basis of an assessment of the current Reference State for CCAMLR and provide a State of Marine Ecosystem report flagged in SC-CAMLR as a priority.

SOOS is designing the biological component of its observing system to be complementary to the CCAMLR Ecosystem Monitoring Program (CEMP). It aims to provide the observations necessary for regular strategic assessments of the current ecosystem state, while the CEMP provides the tactical observations for management. As part of this work, SOOS is developing an initiative, building on the Census of Antarctic Marine Life, to undertake a circumpolar benchmarking of the Southern Ocean ecosystem (see Appendix 2 for more detail). This initiative will link historical time series from different parts of the region and provide the basis for future sustained circumpolar biological observations and assessments.

These initiatives will be developed in collaboration and with support of other SCAR subsidiary bodies: Standing Scientific Group on Life Sciences, the Standing Committee on the Antarctic Treaty System, the Scientific Research Programmes on Antarctic Thresholds – Ecosystem Resilience and Adaptation and State of the Antarctic Ecosystems, the Action Group on Antarctic Nearshore and Terrestrial Observation Systems, and Biodiversity.AQ.

Recommendations

Delegates should note these planned initiatives, encourage the development of them, and recognise their capacity to i) inform international bodies like the Antarctic Treaty System and the Intergovernmental Panel on Climate Change; ii) foster international collaboration and iii) highlight SCARs leadership in the provision of robust and independent scientific advice.

Appendix 1

International Conference on Assessing Status and Trends of Habitats, Key Species and Ecosystems in the Southern Ocean

Hobart, Tasmania, Australia

4 days in April-May 2018 - <http://www.measo2018.aq/>

Objective

This conference will bring together Antarctic marine scientists to showcase the work of an international and dynamic community. With a broad emphasis on status and trends of ecosystems throughout the Southern Ocean, the conference will highlight work across several core themes, and focus on how the research will contribute to future IPCC assessments, state of environment reporting for management bodies and other global initiatives. It represents a core activity of ICED (Integrating Climate and Ecosystem Dynamics in the Southern Ocean), a partner program of IMBER and SCAR

Endorsed by

- IMBER ICED
- IMBER CLIOTOP
- SCAR-SCOR Southern Ocean Observing System (SOOS)
- SCAR Standing Committee on the Antarctic Treaty System
- SCAR Advisory Group on Antarctic Climate Change and the Environment
- SCAR Standing Scientific Group - Life Sciences
- SCAR www.biodiversity.aq
- SCAR Scientific Research Programmes
 - Antarctic Thresholds – Ecosystem Resilience and Adaptation
 - State of the Antarctic Ecosystems
- SCAR Action Group on Antarctic Nearshore and Terrestrial Observation systems (ANTOS)

Themes

1. Assessments of status and trends in habitats, species and ecosystems
2. Responses of species to changing habitats, including ocean acidification, sea ice and temperature;
3. Modelling and analytical methods to assess status and trends; and
4. Implementation of observing systems to estimate dynamics and change, including benchmarking.

Summary

The four themes of the conference aim to facilitate contributions of the Antarctic marine science community to the next assessment by the Intergovernmental Panel on Climate Change and recent initiatives to assess status and trends in global ocean ecosystems. It also aims to make a significant contribution to the development of Theme 6 (Biology) of SOOS and for updating the SCAR Report on Antarctic Climate Change and the Environment. The outcomes of the conference are also expected to provide significant input to the Committee for Environment Protection (Antarctic Treaty System), the Scientific Committee for the Conservation of Antarctic Marine Living Resources, the International Whaling Commission's Scientific Committee and other organisations interested in the management and conservation of Southern Ocean ecosystems.

Outputs

Products will be developed for each theme, and will include:

1. products from individual researchers and research teams compiled into publications;
2. syntheses from the scientific community in review and position papers for use by the IPCC, CCAMLR, IWC and other bodies;
3. standard methods and approaches for observing Southern Ocean ecosystems,
4. increased capability and methods in modelling, statistics and presentation on status and trends to policy makers.

The SOKI wiki (www.soki.aq) will be a primary forum for developing and consolidating materials in preparation for the conference and for facilitating research teams in this work.

Appendix 2

Circumpolar assessment of the status of Southern Ocean Ecosystems *Benchmark 2022*

An initiative to advance the Census of Antarctic Marine Life and support SOOS and ICED

Purpose

To advance the work of the Census of Antarctic Marine Life by providing a circumpolar benchmark of the ecological state of Southern Ocean ecosystems in 2022.

Background

A great challenge for Southern Ocean ecosystem science is to assess the overall status and trends of Southern Ocean ecosystems, providing a baseline against which change in ecosystem structure and function can be unambiguously assessed in the future. This challenge includes being able to assess the likelihood of different states in the future. A range of management and policy bodies require baseline data and assessments, both regionally and globally, to inform tactical decisions, such as catch limits and conservation actions in the Commission for the Conservation of Antarctic Marine Living Resources. Such information will also inform strategic advice, such as to the Intergovernmental Panel on Climate Change.

There are three subsidiary questions to this challenge:

1. How should status and trends in those ecosystems be assessed and reported and how will the likelihood of future states be assessed?
2. What are the gaps in knowledge that need to be filled to allow these assessments to be made?
 - a. what is the current status of Southern Ocean ecosystems overall?
 - b. what are the critical processes, mechanisms and feedbacks that directly influence the population responses of biota to change in their habitats?
3. What observations need to be made that will indicate a change in state of those ecosystems and provide suitable input to, validation of, or correction of assessments?

This initiative to benchmark the ecological status of Southern Ocean ecosystems aims to provide the foundation for circum-Antarctic assessments of change in the future. It will use observations from satellites, ships (physics, chemistry, biology), land-based observations of predators, and remote platforms such as gliders and moorings, to develop an integrated view of the state of the ecosystem. The design of the core activities is intended to help link time-series of observations from the past with a coordinated set of observations to be made in the future.

Products will further advance the SCAR Biogeographic Atlas of the Southern Ocean (de Broyer et al 2014, www.atlas.biodiversity.aq), support an updated assessment of the state of the ecosystem in 2025 (MEASO 2025), update the design of sustained biological observations for SOOS, and support the use of ecosystem models for assessing ecosystem scenarios for the future.

Strategy

The initiative will draw on existing programs where possible and develop an integrated core program around the following regions:

- West Antarctic Peninsula - Amundsen Sea
- Weddell & Scotia Seas
- Maud Rise – Bouvet Island
- Prydz Bay - Kerguelen Plateau
- Balleny Islands – Macquarie Ridge
- Ross Sea

Projects to support the circumpolar assessment, such as existing or planned national field projects, will be invited to add to the core program of work.

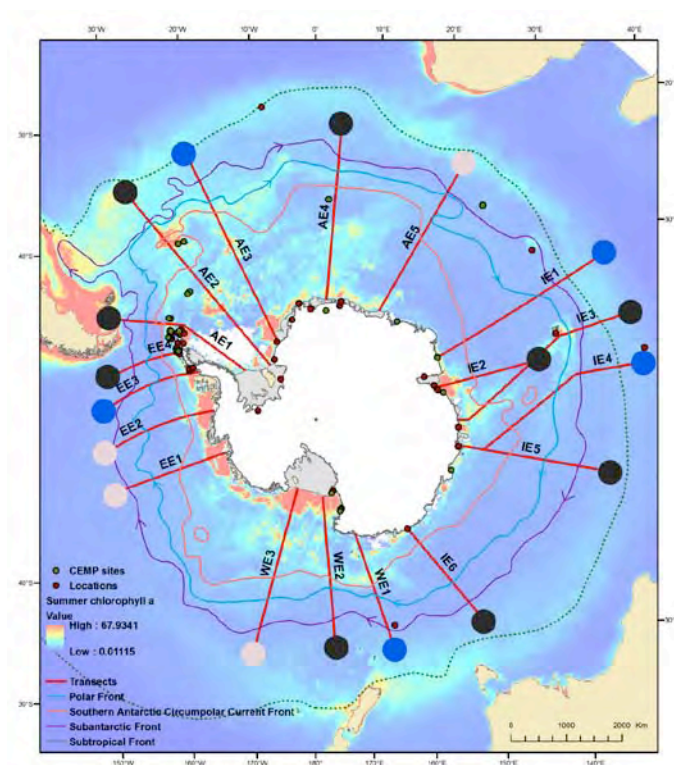


Figure 1:

Map of mean summer chlorophyll *a* showing possible transects (red lines) and locations being investigated for measuring biological and ecosystem parameters throughout the Southern Ocean. Transects will be combined with intensive study areas to take account of latitudinal and longitudinal variation in physical and chemical habitats and primary production, giving rise to variation in food webs. Initials indicate regions and transect numbers: EE = East Pacific sector ecosystem transect; AE = Atlantic sector ecosystem transect; IE = Indian sector ecosystem transect; WE = West Pacific sector ecosystem transect. Registered sites for monitoring in the CCAMLR Ecosystem Monitoring Program are shown. Locations are coastal bases or other possible research locations. Large dots show the degree of feasibility that existing operations in the region may be used as ships of opportunity for taking underway measurements along transects. Dark blue dots represent transects that could be feasible for repeated sampling within current operational activity. Lighter blue dots represent transects that could be done repeatedly but with some operational adjustments. Light dots represent desirable transects but not easily undertaken within the current operations.

Timeline

2017	Develop designs of the core activities; Proposals to governments to support field operations
2018	Present framework for core activities to the 2018 International Conference on Assessing Status and Trends of Habitats, Key Species and Ecosystems in the Southern Ocean (MEASO 2018); Invite projects to support the circumpolar assessment.
2020	Pilot programs as needed
2022	Circumpolar activities to benchmark the ecological status of Southern Ocean ecosystems
2023- 2024	Publications emerging from benchmarking Workshops to synthesise results
2025	International conference to present results (MEASO 2025)