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Census of Antarctic Marine Life (CAML)

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Introduction

Australia and SCAR reported on the objectives and initial outputs of the Census of Antarctic Marine Life (CAML) in ATCMXXX/IP 32. Since its inception in 2005, CAML has developed a robust benchmark of the distribution and abundance of marine biodiversity in Antarctic waters, against which future change in the marine environment can be assessed. The CAML has been recognised as a highlight of the International Polar Year (IPY) and a significant activity of SCAR. Now in its final year of funding by the Alfred P Sloan Foundation (New York), the CAML will submit a final report of its achievements to the XXXIV Antarctic Treaty Consultative Meeting in 2011. As outlined below, the legacies of the CAML will continue well beyond the project's completion in 2010.

Inventory of biodiversity

In the biggest-ever survey of biodiversity in Antarctic waters, CAML has coordinated 18 major research cruises. The project has developed an inventory of 16,400 taxa spanning 17 phyla, from microbes to whales. Of these taxa, at least 70% have been confirmed as valid species, by a panel of 72 expert taxonomic editors. Together with classical taxonomy, modern DNA barcoding has uniquely identified 2,400 of the species from the DNA sequences of 11,000 specimens.

As a feature of the IPY, detailed comparison with the Arctic fauna was possible for the first time. The polar biota has shown unexpected diversity, overturning the concept of decreasing biodiversity at higher latitudes, at least in the marine realm. The results indicated 227 species that apparently occur both in the Southern Ocean (south of the polar frontal zone) and the Arctic Ocean (including its continental-shelf seas). Further research is underway, using molecular biology to clarify the status of these "bipolar" species.

Working with SCAR's Marine Biodiversity Information Network (SCAR-MarBIN) an Antarctic node of the Ocean Biogeographic Information System (OBIS) has been developed. This is the forerunner of the Antarctic Biodiversity Information Facility (ANTABIF), which will stand as a lasting legacy from the IPY. SCAR-MarBIN houses a dynamically-updated Register of Antarctic Marine Species, images of the organisms, field guides, interactive keys, tools for mapping and visualisation devices. These data and their availability have been made possible through the generosity of the Government of Belgium and will be available for future work on marine conservation and planning in Antarctic waters.

During 2010, CAML will make a major contribution to the Census of Marine Life on the distribution and abundance of biota in the Southern Ocean.

Marine spatial protection and management

The Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) has designated two Vulnerable Marine Ecosystems for protection, based on seafloor photographs and grab samples taken during the CAML Census of Eastern Antarctica. A bioregionalisation of benthic and pelagic realms has been produced using CAML data, informing decisions by the Committee for Environmental Protection, International Union for Conservation of Nature and CCAMLR. During the 2010 International Year of Biodiversity, the United Nations Educational, Scientific and Cultural Organisation (UNESCO) has set targets for the conservation of biodiversity; CAML is an active participant in these discussions.

Ocean observing systems

The CAML has contributed to the design of a Southern Ocean Observing System (SOOS), to provide an integrated, sustainable network of observatories for physical and biological monitoring of the Southern Ocean. SCAR is one of the original co-sponsors and founders of the SOOS. The objectives of SOOS are to monitor the Southern Ocean for change (see separate Information Paper).

Research network

In addition to establishing an inventory of biodiversity in the Southern Ocean, CAML researchers have mapped the distribution of species and classified their ecosystems and habitats, discovering new pathways of evolution, dispersal and colonization by Antarctic organisms. This broad scope was achievable only by collaboration among SCAR biologists, geoscientists and oceanographers from the outset.

The CAML has formed a network of over 350 biologists in 33 countries. In the seven countries of South America with Antarctic programs, CAML hosts a consortium and an annual conference to coordinate research. Scientists in the network will continue to collaborate through SCAR, invigorated by student participants from high schools and universities.

Publications and outreach

The discoveries of CAML have been published in over 1,000 scientific papers, books, taxonomic monographs, Antarctic Field Guides and pages for the Encyclopedia of Life. A special volume of the journal *Deep-Sea Research II* and book chapters are in press. Media coverage of each CAML voyage, three major international press events and the scientific achievements has alerted policy makers and the wider public. A CAML video “Life under the Ice” is available on YouTube.

Further information

ATCM will note the success of the CAML project and the potential of its findings to contribute to the future activities of ATCM, CCAMLR, CEP and SCAR. For further information, please visit the CAML website www.caml.aq or contact the Project Manager, Dr Victoria Wadley, at caml@aad.gov.au.