



XIII SCAR BIOLOGY SYMPOSIUM 2023

31 July – 3 August 2023
Christchurch, New Zealand



scarbiology2023.co.nz

Themes/ Research Topics

1. Acclimation, adaptation and resilience of Antarctic flora and fauna

The Antarctic is often referred to as a bellwether of global climate change. In this theme we welcome papers that consider the acclimation and adaptation of Antarctic and sub-Antarctic flora and fauna to a changing environment, at all levels of organisation - organismal, physiological and genomic.

- Acclimation and adaptation
- Physiological adaptations to Antarctica

2. Ecosystem patterns and processes

This theme concerns the structure and function of ecosystems and food-webs across all environments: terrestrial, marine, pelagic, benthic, freshwater and subglacial. Papers are invited on understanding ecosystem patterns and processes, and particularly their influence on resilience of ecosystems to climate/environmental change.

- Ecosystem processes and environmental drivers
- Biota-climate feedbacks
- Trophic Structure and Processes
- Projecting future changes to ecosystems
- Impacts of climate/environmental change on Antarctic and sub-Antarctic ecosystems
- Biodiversity and resilience of ecosystem function
- Antarctic benthos in a changing world

3. Antarctic Microbial Ecology, Primary Production and Biogeochemistry

We invite papers on the microbial systems of Antarctica, the sub-Antarctic and the Southern Ocean, including phytoplankton, primary production, microzooplankton, bacteria, biogeochemical processes, nutrients and trace elements (including iron).

- Microbes and their role in ecosystem function and resilience
- Biogeochemistry: processes and sensitivity to climate
- Marine microbial ecology
- Subglacial Aquatic environments
- Ecological effects of meltwater and seeps

4. Pelagics, Mesopelagics and Demersals of the Southern Ocean

Appreciation of the ecological diversity and importance of pelagic, mesopelagic and demersal species in the Southern Ocean is increasing. We welcome research on the diversity, biology, ecology, resilience, trophic role and genomics of Southern Ocean demersal fish, krill, salps, zooplankton, myctophids, mesopelagic and cryopelagic fish, and hyperbenthos.

- Antarctic fishes: biology, ecology and fisheries
- Antarctic silverfish: a polar keystone
- Krill, salps and climate change
- Zooplankton of the Southern Ocean
- Myctophids and mesopelagics in the Antarctic and sub-Antarctic



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5. Teleconnections between Ecosystems

While the Southern Ocean and Antarctica have physical characteristics that can drive biological isolation, there is an increasing understanding of the role of teleconnections in shaping ecological processes in Antarctic marine ecosystems. This research topic invites papers that explore teleconnections that shape Antarctic marine biodiversity and ecological processes, ranging from the large-scale connections with higher latitudes, through to regional scale physical and biological processes that drive key links between coastal/open ocean and terrestrial/marine ecosystems. The topic aims to give insight into how climate change can influence these connections and drive biological change.

- Antarctic ecosystems teleconnections
- Linkages between marine and terrestrial systems
- Coastal-ocean connectivity

6. Molecular Ecology, Biogeography and Biosecurity

Several recent terrestrial studies have suggested the importance of geothermal refugia during the last LGM and, more recently wind-driven dispersal events in structuring local populations. These provide exciting examples of the link between environmental conditions and population stability. This theme will draw interest from those using molecular ecological tools to understand the environmental mechanisms that shape species distribution and community structure and how these mechanisms will be impacted in the future under current climate change predictions for the continent.

- Molecular ecology of Antarctic flora and fauna
- Diversity and distribution of life in Antarctica and the sub-Antarctic
- Biogeography and species distribution modelling
- Dispersal of propagules into and around the Southern Ocean
- Predicting incursions and potential biosecurity threats

7. Environmental Management and Protection

Environmental management and protection include a number of highly significant areas of research interest. This could include the Southern Ocean Marine Protected Areas (MPAs), Vulnerable Marine Ecosystems (VMEs), Antarctic Specially Protected/Managed Areas (ASPAs and ASMAs), invasive species, range shifts of indigenous species, and work to inform Antarctic policy. This Research Topic welcomes papers that include any area of environmental management or protection.

- Southern Ocean Marine Protected Areas
- Effectiveness of Antarctic Specially Protected Areas
- Invasive species and range shifts of indigenous species
- Science informing Antarctic policy

8. Humans in Antarctica and Anthropogenic Impacts

Via our direct presence through scientific expeditions, tourism and fisheries or our indirect impacts coupled to our influence on the changing global climate humans are altering the landscape and ecosystems of Antarctica. Those who spend time at deep field research stations or overwinter in turn experience the unique impacts that Antarctica can have on us. How we govern ourselves within this unique environment has global impact. In this research topic we welcome submissions that investigate the role and impacts of humans in Antarctica including governance, the role of first nations peoples, human biology, fisheries, pollution and increased tourism and scientific presence.

- First nations peoples and polar governance
- Human biology
- Pollution and contaminants; sources, fates and impacts
- Plastics
- Tourism



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9. Technological Advances, Development and Applications

Antarctica and the Southern Ocean are some of the most remote ecosystems on Earth, requiring constant technological innovation to advance data collection and synthesis. This session will focus on new technology development to better understand life in and around Antarctica. We invite papers that showcase technological advances in areas such as: (i) remote monitoring of the environment via image platforms (e.g., satellite imagery or uncrewed aerial vehicles); (ii) developments in genetics and genomics; and/or (iii) papers that suggest blue-sky research and needs for technological developments in the future.

- New technologies
- Satellite remote sensing of the Southern Ocean
- Monitoring species and ecosystems
- Genomics in the Antarctic

10. Data Analysis and Modelling

Analysis of large-scale data sets is required to gain an understanding of Antarctic and sub-Antarctic ecosystems and biota that can be generalised across habitats, yet many such data sets are poorly structured, noisy, spatially uneven, or challenging in other ways. Biological and ecological research in Antarctica is posed to leverage developments in data science to address pressing questions such as conservation, biosecurity, and impacts of climate change. This Research Topic is for research that employs novel or advanced data analysis techniques as well as researchers with challenging data sets that can benefit from collaboration with data scientists.

- Data analysis/integration
- Big data

11. Sea Ice Biology and its Impact on the Southern Ocean

The importance of sea ice in facilitating and regulating primary productivity in the Southern Ocean and coastal Antarctica, and the critical habitat it provides for sympagic metazoans, is well recognised. However, more knowledge of sea ice habitat and ecological processes is required to project the impact of climate- and oceanography-driven sea ice regime changes on sympagic organisms and, consequently, the wider Southern Ocean food web. For this session, we are particularly interested in novel observations of Antarctic sympagic organisms and unknown linkages between sea ice and pelagic communities.

- The ecology of Antarctic sea ice
- Primary production in sea ice

12. Marine Mammals and Birds

Antarctic birds and marine mammals play an important role in the Southern Ocean ecosystem, which will be the focus of this session. Therefore, we invite studies on broad topics including but not limited to: (i) ecology, including diet, trophic interactions, habitat use, population modelling and demography, (ii) physiology, including energetics and reproductive biology, (iii) behaviour, including foraging ecology, movement, intra- and interspecific interactions, and (iv) genetics, including population and evolutionary genetics, and molecular ecology. The session will place particular emphasis on how aspects ecology, behaviour, physiology and genetics interact with environmental variability.

- Birds and mammals
- Animal movement and foraging
- Higher trophic predators as ecosystem sentinels



13. Emerging Trends and Opportunities in Antarctic Biology

The diverse cold-adapted ecosystems of Antarctica and the Southern Ocean are facing rapid climatic and environmental changes. There are gaps in our knowledge of the vulnerability of marine and terrestrial species, ecosystems and food webs to change. This theme explores the innovative technologies, research and initiatives underway (or proposed) to accelerate our understanding of Antarctic biology through observation, monitoring, data capture, analysis, modelling and more.

14. Polar Research by and with First Nations People

We invite submissions of research done by and with First Nations people across Arctic and Antarctic ecosystems in terrestrial, freshwater, and marine habitats, including connectivity between subpolar and polar environments. Of particular interest is research that demonstrates synthesis of knowledge systems and/or the shift of scientific paradigms through First Nations leadership

- All aspects of polar biology
- Concepts, mechanisms, and challenges for ecosystem-based management
- Long-term ecological observation and climate variation
- Understanding traditional methods for encoding biological/ecological complexity
- Frameworks for synthesising different knowledge systems in polar biology