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SCAR SG Life Sciences

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SCAR Life Sciences Group **2022-23 Report**

Report Author(s)

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Summary paragraph

The most significant highlight for the Life Sciences SG has been the SCAR Biology Conference held in Christchurch, New Zealand 29th July – 4th August 2023. This meeting had been postponed from 2021 and was the first in person meeting for SCAR LS since Davos OSC in 2018. The meeting was well attended with over 300 delegates from over 20 countries, with over 50% of both talks and posters being presented by ECRs.

Highlights from the sub groups of Life Sciences include: The PLASTIC AG submitted an information paper “Plastic Pollution in the Southern Ocean” to the XLV Antarctic Treaty Consultative Meeting (ATCM) and the XXV Committee for Environmental Protection (CEP) meeting. The ImPACT AG published a paper in Lancet Planetary Health, titled “ Monitoring persistent organic chemicals in Antarctica in support of global chemical policy: a horizon scan of priority actions and challenges”. The ANTOS EG also submitted a paper to the Committee for Environmental Protection 45th ATCM.

Most sub groups also have clear plans for the next year, with ImPACT preparing a proposal for the transition of ImPACT to a SCAR Expert Group, including mapping of new strategic plan and priorities. None of the groups have indicated any changes to planned use of funds or changes in leadership. Currently there are no known proposals for new groups, but these often appear late in the day closer to the OSC meeting.

Sub-group updates

Sub-group – what has been achieved?

Sub-group	Activity
EG-ABI	<p>EGABI and ImPACT developed and released the first version of a database and app of Persistent Organic Pollutants in Antarctica and the Southern Ocean.</p> <p>Obtained the apps.aq web domain, and this is being used to host our Persistent Organic Pollutants (https://pops.apps.aq) and Diet and Energetics (https://diet.apps.aq) apps, with the possibility to host other SCAR apps in the future where appropriate. The AAD is providing funding for ongoing costs of hosting the two apps.</p> <p>We made a major update of the Diet and Energetics database, adding data from 21 new studies and fixing small errors and issues in the existing data.</p> <p>The Myctobase database of mesopelagic fish surveys was released along with corresponding publications, led by Briannyn Woods and Anton Van de Putte, with contributions from other EGABI members.</p> <p>EGABI members contributed to a publication led by Anne-Sophie Bonnet-Lebrun evaluating the suitability of large open biodiversity databases (e.g. OBIS, GBIF) for marine ecosystem assessments in the Southern Ocean.</p>
PLASTIC-AG	<p>COMNAP Antarctic fellowship “Policy analysis to curb plastic pollution in Antarctic environment”. This project aims at identifying policies to reduce the plastic waste generated through human activities in the Antarctic region, and predict future plastic accumulation with continued and increasing human activities.</p> <p>Contribution to the Southern Ocean Decade Action Plan publication as part of the UN Ocean Decade, deliver in achieving the UN Agenda 2030 and its Sustainable Development Goals in a polar context.</p> <p>Information paper “Plastic Pollution in the Southern Ocean” for the XLV Antarctic Treaty Consultative Meeting (ATCM) and the XXV Committee for Environmental Protection (CEP) meeting.</p> <p>Generated a SCAR_PLASTIC repository projects metadata including an interactive map to identify national and international projects and countries involved in plastic pollution research in the Antarctic and Sub-Antarctic regions.</p>
ImPACT-AG	<p>ImPACT have continued to hold twice yearly whole AG meetings, as well as task-specific meetings.</p> <p>Members of the Group published a perspective article for The Lancet Planetary Health, titled “ Monitoring persistent organic chemicals in Antarctica in support of global chemical</p>

	policy: a horizon scan of priority actions and challenges” and is an outcome of the 2021 AG workshop which performed a horizon scan of priority actions and challenges in Persistent Organic Pollutant monitoring. The article derives from a white paper (2021) written for the 2021 Antarctic Treaty Meetings.
SO-CPR (EG)	While sample collection was restricted due to COVID-19, we worked on processing samples we had obtained so far and proceeded to register them in the database (Australian Antarctic Data Center). We also published papers and collaborated with other databases (FORCIS: Foraminifera Response to Climatic Stress).
SKEG	<p>At the last SCAR delegate meeting in 2023, our proposal to move from an Action to an Expert Group was approved. SKEG’s annual workshop in March 2023, was held as a series of five Webex meetings from 20 to 24 March 2023. The aim of the workshop was to start developing a working draft krill stock hypothesis (KSH) that captures the spatial and temporal dynamics of the krill stock in CCAMLR area 48.</p> <p>The KSH developed during the workshop was presented at the CCAMLR WG-EMM meeting (3-14 July 2023) and was very well received. A data collection plan to fill the knowledge gaps was developed.</p> <p>The KSH is a working hypothesis meant to be re-evaluated and updated as new insights arise. SKEG will further support refining the KSH in the upcoming years.</p> <p>In October 2023, SKEG, with support from the Pew Charitable Trusts, will launch a fact sheet on the KSH, which will introduce the KSH and related work to a broader audience beyond CCAMLR members and krill researchers.</p>
ANTOS (EG)	<p>Submission of a paper about ANTOS to the Committee for Environmental Protection 45th ATCM.</p> <p>Completion and analysis of the ANTOS Survey II: analysis completed by Abigail Borgmeier (PhD candidate, BYU, USA). Survey II targeted participants of Survey I to gain more detailed information on the data stream available and views on uniqueness/value of different sites. Data obtained from both surveys has been drafted for publication.</p> <p>Baseline biodiversity survey protocol development: Critical to the installation of any ANTOS system into a Sentinel site is the need for and intensive baseline biological survey. We can only monitor change if we know where we have started. These biodiversity assessment manuals are being finalised by ECRs at University of Wollongong.</p> <p>Development and purchase of Tier 3 terrestrial systems for deployment by the AAD. Led by Dana Bergstrom, working with Hoskin Scientific (Canada) to refine the design of, and</p>

	<p>technical manuals for the Tier 3 system. Deployment is planned for next year.</p> <p>Visit to NEON (USA) by Charles Lee, to discuss coordination and technical details about large multi-node observation systems.</p>
EGBAMM	
JEGHBM	
BEPSII	<p>The final activities of task group 1 (equivalent to SCOR-WG ECV-Ice): the intercomparison experiment for gas fluxes in and out of sea ice and for primary production in Cambridge Bay, Canada, at the Canadian High Arctic Research Station in spring 2022.</p> <p>A new SCOR Working Group Clce2Clouds connecting BEPSII and CATCH (the Cryosphere & Atmospheric Chemistry, co-sponsored by SOLAS and IGAC) has started activities.</p> <p>-BEPSII participated in a session on “Southern Ocean Ecosystems” in the CRYOSPHERE Pavilion at COP27.</p>

Sub-group – what lies ahead?

Sub-group	Activity
EG-ABI	<p>Continue to develop the Persistent Organic Pollutants app (entering additional data and considering additional app functionality). A similar app and database for microplastics with the Plastics group is also underway with release in 2023/24.</p> <p>Continuation of data entry into the Diet and Energetics Database, and maintenance/extension of the associated R software packages.</p> <p>Follow-on activities from the RAATD project will continue, with close collaboration with EGBAMM.</p> <p>EGABI members will contribute to the Essential Biodiversity Variables Workshop to be held in Hobart in August 2023</p>
PLASTIC-AG	<p>Preparation of a perspective paper focusing on Southern Ocean plastic research priorities, gaps and challenges in the context of SO decade Action plan.</p> <p>Update the SCAR online database on macro- and microplastics (hosted by SOOS).</p> <p>Imminent launch of the open access online interactive map of projects and countries involved in plastic pollution research in the Antarctic and Sub-Antarctic regions.</p>
ImPACT-AG	<p>Prepare proposal for the transition of ImPACT to a SCAR Expert Group, including mapping of new strategic plan and priorities.</p> <p>Continuing close communication and cooperation with AnMAP. Group members are also members of the Expert</p>

	<p>Group on POPs of the AMAP: important both for AnMAP and for promoting bipolar research collaborations.</p> <p>Maintain and update the information provided by each group member to the ImPACT Antarctic Sample Database, and the ImPACT Active Project Database.</p> <p>Organise and lead a session to the proposed SCAR OSC Chile.</p>
SO-CPR (EG)	<p>Developing and enhancing the skills of current and new technicians. Due to COVID-19, we have not held a training workshop for the past four years. We are planning to hold a workshop in 2023 or 2024. The purpose of the workshop is to ensure that high standards of data quality are being maintained, in terms of species identification and methodology, and to discuss future training methods and a future roadmap for the SO-CPR program. We also aim to publish SO-CPR processing manuals and zooplankton counting rulebooks for the purpose of training for new technicians.</p>
SKEG	<p>Annual SKEG workshop, focusing on mandates addressed to SKEG from CCAMLR.</p> <p>Developing the SKEG vision paper on the Krill stock hypothesis for the Southwest Atlantic Sector of the Southern Ocean.</p> <p>Identification of key topics requiring information for the public and the media, and development of information materials to be hosted on the SKEG web page.</p>
ANTOS (EG)	<p>Plans to hold a workshop at the SCAR OSC in Chile. At that workshop we will present our plans and vision for the implementation phase of ANTOS. We will also provide:</p> <ol style="list-style-type: none"> 1. Recommendations for the locations for ANTOS Sentinel sites, a decision that is driven by the analysis of ANTOS Surveys I and II, and informed by published and expert knowledge of Antarctic and Subantarctic environmental change. 2. The recommended protocol for the marine and terrestrial baseline biodiversity surveys, and the technical manuals for the 3-tiered systems 3. Reports on existing ANTOS arrays and plans for implementation of new instrumentation arrays.
EGBAMM	
JEGHBM	
BEPSII	<ol style="list-style-type: none"> 1. Position Analysis on Antarctic sea-ice and ecosystems (Meiners et al.) 2. Polar Oceans and Sea Ice in a Changing Climate - SOLAS paper (Lannuzel et al.) 3. Sea ice Ecosystems, chapter in Comprehensive Cryospheric Science and Environmental Change (Tedesco et al.).

	<p>4. Policy brief for the Antarctic highlighting the position analysis and the Antarctic component of the sea ice ecosystem services paper (Steiner et al 2021).</p> <p>5. Ice Algae Model Intercomparison Project (IAMIP2) (Info: IAMIP2 website and Hayashida et al. 2021, GMD) – model runs, analysis and discussions among participants in progress.</p>
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Budget

Changes to planned use of funds for 2023 and 2024

Year (YYYY)	Purpose/Activity	Amount (in USD)	Contact Name	Contact Email
Total				

Membership

Changes to Sub Group Leadership since 2022 Delegates Meeting report

Role	First Name	Last Name	Affiliation	Country	Email	Date Started	Date Term is to End

(Please identify early-career researchers with * in first column)

SCAR Fellowship Reviewers

First Name	Last Name	E-mail	Principal Expertise
Anton	Van de Putte	antonarctica@gmail.com	Marine biology and evolution
Huw	Griffiths	hlg@bas.ac.uk	Marine Biogeography
Ryan	Reisinger	r.r.reisinger@southampton.ac.uk	Ecology of marine predators
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Clara	Manno	clanno@bas.ac.uk	Pelagic Marine Ecology
Elisa	Bergami	elisa.bergami@unimore.it	Ecotoxicology
Claire	Waluda	clwa@bas.ac.uk	Marine Ecology

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Craig	Cary	caryc@waikato.ac.nz	microbial ecology
Letizia	Tedesco	Letizia.tedesco@syke.fi	sea-ice ecosystems & biogeochemical modelling, sea-ice changes in Polar Oceans
Maria	Van Leeuwe	m.a.van.leeuwe@rug.nl	photosynthesis, algal physiology and ecology, sea-ice ecosystems

Additional information (optional)

Outreach, communication and capacity-building activities

(Brief highlights of any activities undertaken since the SCAR Delegates Meeting in 2022.)

Notable Papers

1. Bonnet-Lebrun A-S, Sweetlove M, Griffiths HJ, Sumner M, Provoost P, Raymond B, Ropert-Coudert Y, Van de Putte AP (2023) Value and limitations of large open biodiversity databases in the context of a Marine Ecosystem Assessment of the Southern Ocean. *Frontiers in Marine Science*. doi:10.3389/fmars.2023.1150603

Provides an assessment of the utility of OBIS and GBIF data in the context of a marine ecosystem assessment of the Southern Ocean, examining issues such as spatial, temporal and taxonomic sampling biases and the implications for ecosystem assessments.

2. Rowlands, E., Galloway, T., Cole, M., Peck, V. L. , Posacka, A., Thorpe, S., Manno, C. 2023. Vertical flux of microplastic, a case study in the Southern Ocean, South Georgia. *Marine Pollution Bulletin*, 193, 115117.

The paper used an array of floating sediment traps combined with optical microscopy and Raman spectroscopy to measure the microplastic flux between 50 and 150 m water depth over 24 h within a natural harbour of the sub-Antarctic island of South Georgia.

3. Bergami, E., Ferrari, E., Löder, M.G.J., Birarda, G., Laforsch, C., Vaccari, L., Corsi, I. 2023. Microfibers in wild specimens of the Antarctic whelk *Neobuccinum eatoni* (Smith, 1875) from Terra Nova Bay (Ross Sea, Antarctica). *Environmental Research* 216(2), 114487.

This work provides the first assessment on the occurrence of textile microfibers in a wild benthic gastropod from Terra Nova Bay, Ross Sea. It was the outcome of a scientific research project coordinated by AG-co-chair Ilaria Corsi.

4. Bengtson Nash S., Bohlin-Nizzetto P., Galban-Malagin, C., Corsolini S., Cincinelli A., Lohmann R., 2023. Monitoring persistent organic chemicals in Antarctica in support of global chemical policy: a horizon scan of priority actions and challenges. *The Lancet Planetary Health*, 7(5), e435 - e440.

All Authors are members of the Group and collaborated to write the article. It communicates the priorities and recommendations for future chemical pollution research in the Antarctic context.

5. Corsolini S., Ademollo N., 2022. POPs in Antarctic ecosystems: is climate change affecting their temporal trends? *Environ. Sci.: Processes Impacts*, 24(10), 1631-1642, <https://doi.org/10.1039/D2EM00273F>.

The Authors are both members of the Group. This article reviews the scientific literature concerning the impact of climate change on the POP temporal trend in Antarctic ecosystems. It is an outcome of the AMAP Assessment: "AMAP, 2021. POPs and Chemicals of Emerging Arctic Concern: Influence of Climate Change", Published by Arctic Monitoring and Assessment Programme (AMAP), Oslo, Norway.

6. Esquivel-Garrote, O., Muxagata, E., Hosie G.W. (2023) Spatial and temporal variation and distribution of mesozooplankton in the Drake Passage sampled with the continuous Plankton Recorder. *Deep-Sea Research I* 192: 103936. DOI: 10.1016/j.dsr.2022.103936.

This study investigated the horizontal spatial variations of mesozooplankton in the Drake Passage relative to Southern Ocean oceanographic fronts and zones. Changes in composition were perceptible compared to previous studies, with a decrease of larger organisms and richness, lack of larger copepods, decrease of krill and increase of *Salpa* abundances.

7. Meyer, Kawaguchi, S. (2022) Antarctic marine life under pressure. *Science*, 378 (6617), <https://www.science.org/doi/10.1126/science.adf3606>

This Editorial outline the current pressing questions and open knowledge gaps in krill fisheries management and SKEGs support to provide biological information critical for CCAMLR's krill management efforts.

8. Diaz, M.A., Gardner, C.B., Elliot, D.H., Adams, B.J., Lyons, W.B. (2023). Change at 85 degrees south: Shackleton Glacier region proglacial lakes from 1960 to 2020. *Annals of Glaciology*:1-6.

This article documents large-scale climate changes in the southern Transantarctic Mountains, a vast, unique, ice-free biogeographic conservation area that is devoid of

any type of long-term monitoring of ecologically relevant data. These preliminary findings point to a burgeoning need for a continent-wide monitoring program as proposed by ANTOS.

9. Marini, S., Bonofiglio, F., Corgnati, L. P., Bordone, A., Schiaparelli, S., Peirano, A. (2022). Long-term automated visual monitoring of Antarctic benthic fauna. *Methods in Ecology and Evolution*, 13, 1746–1764. <https://doi.org/10.1111/2041-210X.13898>

This pilot study, conducted in the nearshore region of Terra Nova Bay, describes the successful collection of continuous biological data using autonomous imaging devices in a remote environment, in tandem physical and bio-chemical data.