



**SOOS**  
SOUTHERN OCEAN  
OBSERVING SYSTEM

The  
Southern Ocean Observing System  
2021 Annual Report



## Summary

The Southern Ocean Observing System (SOOS) is a joint initiative of the Scientific Committee on Antarctic Research (SCAR) and the Scientific Committee on Oceanic Research (SCOR). SOOS was launched in 2011 with the mission to facilitate the sustained collection and delivery of essential observations of Southern Ocean systems to all international stakeholders, through design, advocacy, and implementation of cost-effective observing and data delivery systems.

The SOOS International Project Office Core Sponsorship 2021:



# Contents

|                                                                     |           |
|---------------------------------------------------------------------|-----------|
| <b>SOOS IN 2021 – A YEAR OF CELEBRATION AND CHANGE .....</b>        | <b>4</b>  |
| <b>PERFORMANCE REPORT .....</b>                                     | <b>6</b>  |
| <b>SOOS KEY PRODUCTS.....</b>                                       | <b>17</b> |
| <b>DATABASE OF UPCOMING EXPEDITIONS TO THE SOUTHERN OCEAN .....</b> | <b>17</b> |
| <b>SOOSMAP.....</b>                                                 | <b>18</b> |
| <b>SOOS IPO SPONSORSHIP IN 2020 .....</b>                           | <b>20</b> |
| <b>GOVERNANCE.....</b>                                              | <b>23</b> |
| <b>EXECUTIVE COMMITTEE.....</b>                                     | <b>23</b> |
| <b>SCIENTIFIC STEERING COMMITTEE.....</b>                           | <b>23</b> |
| <b>ANNUAL SCIENTIFIC STEERING COMMITTEE MEETING.....</b>            | <b>25</b> |
| <b>SOOS IMPLEMENTATION GROUPS .....</b>                             | <b>27</b> |
| <b>DATA MANAGEMENT SUB-COMMITTEE (DMSC) .....</b>                   | <b>27</b> |
| <b>REGIONAL WORKING GROUPS .....</b>                                | <b>29</b> |
| <b>CAPABILITY WORKING GROUPS.....</b>                               | <b>36</b> |
| <b>TASK TEAMS .....</b>                                             | <b>42</b> |
| <b>SOOS NATIONAL NETWORKS .....</b>                                 | <b>44</b> |
| <b>EQUITY, DIVERSITY AND INCLUSION (EDI) GROUP .....</b>            | <b>44</b> |
| <b>SOOS PARTNERSHIPS AND COLLABORATIONS.....</b>                    | <b>45</b> |
| <b>NEW SOOS 2020 INITIATIVES.....</b>                               | <b>47</b> |
| <b>SOOS 10-YEAR CELEBRATION .....</b>                               | <b>47</b> |
| <b>APPENDIX I: ACRONYMS.....</b>                                    | <b>48</b> |

## SOOS in 2021 – A Year of Celebration and Change

In August 2021 SOOS celebrated its 10-year anniversary of the establishment of the International Project Office in Hobart, Australia. During this first decade SOOS facilitated major changes in how we coordinate data collection and find and access existing observations of the Southern Ocean. These changes provided a foundation for the development of a new SOOS Science and Implementation Plan (SIP), which, after extensive review, was approved by our sponsors, SCOR and SCAR, in early 2022.

The International Project Office staff has undergone changes this year. Dr. Louise Newman departed in late 2021, after 10 years as the SOOS Executive Officer, for a new position. Dr. Alyce Hancock took on the role of Executive Officer after serving as the SOOS Science and Communication Officer. Dr. Julia Bach joined SOOS in late 2021 as the new Science and Communication Officer. Dr. Pip Bricher's, SOOS Data Officer for 7 years, left in early 2022 for a new position. Dr. Imogen Jones joined SOOS as the new Data Officer. We wish Louise and Pip well in their next endeavours and thank them for their contributions to SOOS, particularly their formative work in establishing SOOS as a leader in Southern Ocean data. We welcome Alyce, Julia and Imogen and look forward to working with them.

SOOS continues to partner with polar organisations to make data more findable and accessible. Our data portal, [SOOSmap](#), has been undergoing continuing development and version 2 will be released in 2022. [DueSouth](#), which SOOS developed to help researchers find future opportunities, has been further developed in partnership with the European Polar Board and is now part of [Polardex](#).

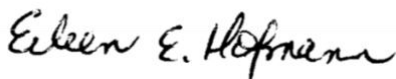
SOOS took a lead role in the organisation of a side-event at the 26th United Nations Climate Change conference, more commonly referred to as COP26, in Glasgow, UK in October 2021. This event, "[Antarctic Marine Ecosystems Under Pressure](#)", highlighted the importance of the Southern Ocean, and the significant changes occurring in the Southern Ocean due to climate change and direct human impacts. SOOS also participated in workshop and webinar related to development of the [United Nations Ocean Decade Southern Ocean Action Plan](#).

The impacts of COVID on international travel prevented in-person meetings in 2021. However, SOOS maintained an active schedule of virtual meetings that included two Scientific Steering Committee (SSC) meetings, two Data Management Subcommittee meetings (DMSC), our 10-year celebration, the 2nd Southern Ocean UN Ocean Decade Regional Workshop, Polar Data Forum IV, four polar to global online data hacks, an AUV Task Team meeting, three SOFLUX webinars, and a UN Ocean Decade Satellite Session "More Seats at the Table – Increasing Representation in the Marine Sciences". In addition, the SOOS Equity, Diversity and Inclusion (EDI) group meet and continued to guide SOOS in ensuring inclusivity for all representations within SOOS and the community.

Technology is changing and SOOS has recognised this in the formation of a Polar Technologies Task Team. This task team aims to develop a polar technologies group focused on addressing challenges and exploiting synergies in technology targeted at Southern Ocean and Antarctic marine research. A particular interest is helping to address the challenges faced by technology developers and operators in developing and growing the adoption of new technologies and methods in support of marine observations in the Southern Ocean and Antarctic.

SOOS continued active publication of science papers and reports in 2021. These publications include a paper highlighting the need for more timely and accurate information for decision making ([Van de Putte et al, 2021](#)), the annual *Bulletin of the American Meteorological Society*, State of the Climate Report, Southern Ocean chapter ([Tamsitt et al., 2021](#)), four publications from the Censusing Animal Populations from Space (CAPS) Capability Working Group (CWG), and a publication from the Acoustic Trends CWG. In addition, SOOS contributed to three reports: the [alignment of polar data policies and recommended principles](#); the [United Nations Ocean Decade Southern Ocean Action Plan](#); and a Ross Sea report providing an update of current and future national observational activities ([Smith et al., 2021](#)).

Signed:



Dr. Eileen Hofmann; Co-Chair  
Old Dominion University, United States

Signed:



Dr. Mike Williams; Co-Chair  
NIWA, New Zealand

# Performance Report

SOOS developed a Science and Implementation Plan for 2021-2025 which articulates the scientific priorities for SOOS through identification of key gaps in the observational network and by identifying the priorities in addressing these gaps. The plan has an emphasis on the capabilities required to support data collection and delivery, and the objectives and actions that SOOS will implement. The plan was developed by the SOOS community with extensive input from the broader Southern Ocean community. The [SOOS 2021-2025 Science and Implementation Plan](#) underwent an international, independent review coordinated by SOOS's governing bodies, the Scientific Committee for Antarctic Research (SCAR) and Scientific Committee for Oceanic Research (SCOR) and was approved in June 2022.

Incorporated in the SOOS 2021-2025 Science and Implementation Plan is a 5-Year Strategic Plan with five Objectives that combined will deliver the SOOS mission. Within each objective there are a number of Implementation Actions that indicate more specifically how these objectives will be achieved. The full and detailed SOOS 5-Year Strategic Plan is available [here](#).

The progress against SOOS's Objectives and Implementation Actions are outlined in the table below.

**Table 1:** The table below shows the progress against the SOOS Objectives and Implementation Actions for the year 2021. The status of the Implementation Action is shown as: **Achieved**; **In progress**; **Not yet started**; **Ongoing activity**; **No longer a priority**. All acronyms can be found in Appendix I.

|                                                                                                                                                                                      | Comments on 2021 actions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Implementers                                                                                        |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| <b>Objective 1: Develop and coordinate inclusive and collaborative networks for shared knowledge, enhanced observational capability and data collection, management and delivery</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                     |
| Coordination of regional networks                                                                                                                                                    | <p>In 2021 all RWGs were active, maintained active leadership teams and had growths in members between 10-20 members each. The RWGs developed 5-Year Workplans to deliver into the SOOS 2021-2025 Implementation Plan.</p> <p>Many RWGs (ABS and SOIS) initiated releasing quarterly newsletters to their membership teams to provide updates on activities within their regions and upcoming opportunities of relevance. The Ross Sea RWG produced a report on observation activities within the Ross Sea (<a href="#">Smith et al., 2021</a>). The WAPSA and WSDML RWGs initiated the coordination of special issues. Lastly, many RWGs began planned for workshops to be held in 2022 and 2023.</p> <p>RWG leadership team members actively represented SOOS at international meetings, conferences and workshops including the Ross Sea Oceanographic Collaboration Discussion, COP26 side-events, Ant-ICON Community Engagement Meeting, the Global Ocean Biogeochemistry (GO-BGC) array meeting and a SO-CHIC webinar.</p> <p>Full information and achievements of SOOS's RWGs are available on pages 29-35.</p> | <p>SOOS: RWGs</p> <p>Community: MEASO, SCAR, Argo, SO-CHIC</p>                                      |
| Coordination of networks to enhance observational capacity at any point in the value chain                                                                                           | <p>In 2021 all CWGs were approached to submit proposals to continue as SOOS CWGs in the 2021-2025 implementation period. Proposals were received and accepted by SOFLUX, OSD and CAPS CWGs.</p> <p>All CWGs and Task Teams were active, maintained active leadership teams and had growth in membership. Highlights of SOOS CWGs and Task Teams in 2021 include:</p> <ul style="list-style-type: none"> <li>- 4 scientific publications from the CAPS CWG</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <p>SOOS: CWGs and Task Teams</p> <p>Community: OASIS, NSF, British Antarctic Survey, SCAR, Argo</p> |

|                                                                                                                                                            |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                       |
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|                                                                                                                                                            |  | <ul style="list-style-type: none"> <li>- Refining of AI and other machine learning algorithms for automated counting (CAPS)</li> <li>- Appointment of 3 post-doctorates (CAPS)</li> <li>- New funding proposals (CAPS)</li> <li>- Compiling lists of methodologies and projects for observing system design (OSD)</li> <li>- Approximately two monthly <u>SOFLUX webinars</u> (recordings available via the SOOS YouTube Channel)</li> <li>- AUV Task Team Meeting (October 2021)</li> </ul> <p>CWG and Task Team leadership team members actively represented SOOS at international meetings, conferences and workshops including the COP26 side-events, Ant-ICON Community Engagement Meeting, the Global Ocean Biogeochemistry (GO-BGC) array meeting, BEPSII annual meeting, American Meteorological Society annual meeting, European Centre for Medium-Range Weather Forecasts (ECMWF)/OceanPredict workshop and Ocean Carbon &amp; Biogeochemistry (OCB) workshop.</p> <p>Full information and achievements of SOOS's CWGs are available on pages 36-43.</p> |                                                                                                                                                                                       |
| Integrate and engage between and across relevant programmes, organisations, and institutes to leverage and enhance impact of the SOOS programme as a whole |  | <p>SOOS was represented at international meetings, conferences and workshops including COP26, SCOR annual meeting, CCAMLR Scientific Committee meetings, Technologies and logistics in Antarctica roundtable, Tasmanian Polar Network meetings, OceanSITES meetings, GOOS Regional Alliance Forums, South West Pacific Hydrographic Commission Marine Spatial Data Infrastructure Working Group meetings, AntClimNow launch, Ant-ICON Community Engagement Meeting, International Marine Data and Information Systems Conference, CliC/CLIVAR/SCAR Southern Ocean Regional Panel meetings, UK Antarctic Science Conference, Digital Antarctica Reference Group meetings, European Polar Board Infrastructure Action Group meetings, Ross Sea Oceanographic Collaboration Discussion, the Global Ocean Biogeochemistry (GO-BGC) array meeting, BEPSII annual meeting, American Meteorological Society annual meeting, European Centre for Medium-Range Weather Forecasts (ECMWF)/OceanPredict workshop and Ocean Carbon &amp; Biogeochemistry (OCB) workshop.</p>   | <p>SOOS: EDI Group</p> <p>Community: UN Ocean Decade, SCAR, SCOR, CCAMLR, Tasmanian Polar Network, OceanSITES, GOOS, SORP, European Polar Board, American Meteorological Society,</p> |

|                                                                                                                                                |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                   |
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|                                                                                                                                                |  | <p>UN Ocean Decade:<br/>SOOS is a key partner in the Southern Ocean UN Ocean Decade Southern Ocean Task Force including holding three positions on the Task Force steering committee, 23 position in the Task Force Working Groups and had 5 co-authors in the Southern Ocean Task Force Action Plan.</p> <p>The SOOS EDI Group also convened a UN Decade Ocean Satellite Session, “More Seats at the Table – Increasing Representation in the Marine Sciences” (online, September 2021).</p>                                                                                                                                                |                                                                                                                                                                                   |
| Build an effective, networked community of data managers                                                                                       |  | <p>The SOOS DMSC continued to be active through 2021. The DMSC has 27 members from 21 institutions across 12 nations. A member joined the DMSC in 2021, Mike Meredyth-Young, Antarctica New Zealand’s Science Advisor – Data Curator. Due to COVID travel restrictions the DMSC were unable to meet in-person in 2021 but held a successful annual meeting in November.</p> <p>SOOS contributed and partnered in a number of online data events in 2021 including co-convening the <u>Polar Data Forum IV</u> (September 2021) and co-hosting four <u>Polar to Global Data Hacks</u> (online in January, April, June and December 2021).</p> | <p>SOOS: DMSC</p> <p>SOOS Partnerships and Collaborations: POLDER</p> <p>Community: BELSPO, Arctic Data Committee, SCADM, World Data System, EuroGOOS, Antarctica New Zealand</p> |
| Actively review and reflect on networking processes, activities, and structures to ensure that they are equitable, diverse and inclusive (EDI) |  | <p>The SOOS Equity Diversity and Inclusion Group held regular online meetings through 2021, convened a UN Decade Ocean Satellite Session, “More Seats at the Table – Increasing Representation in the Marine Sciences” (online, September 2021), and commenced drafting a commentary to submit to AGU.</p>                                                                                                                                                                                                                                                                                                                                   | <p>SOOS: EDI Group</p> <p>Community: UN Ocean Decade</p>                                                                                                                          |
| Build Southern Ocean community capacity, including early career development and support for new and emerging national programmes               |  | <p>All SOOS RWGs maintained active APECS Representatives as part of their leadership teams, ABS RWG, SOFLUX CWG and OSD CWG appointed new APECS Representatives (Alessandro Silvano, Iole Orselli and Yosr Ammar respectively). Additionally, SOOS has a further 11 early career researchers in leadership positions and has 212 early career members.</p> <p>SOOS maintained the SOOS-Swedish Southern Ocean Network.</p> <p>SOOS endorsed 6 projects.</p>                                                                                                                                                                                  | <p>SOOS: RWGs, CWGs, SSC, DMSC, SOOS-Swedish Southern Ocean Network</p> <p>Community: SCAR, OBIS, GBIF, MBON, Marine Life 2030, BIOPOLE</p>                                       |

| <b>Objective 2: Address gaps and inefficiencies in our ability to collect, deliver, use sustained observations</b>                                                                                                                           |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                  |
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| Support and lead efforts to better integrate modelling and observational efforts, including observing system design (OSD) elements such as Observing System Simulation Experiments (OSSEs) and Essential Ocean Variable (EOV) identification |  | The OSD CWG commenced compiling lists of methodologies and projects for observing system design in 2021.                                                                                                                                                                                                                                                                                                                                                                                                                                      | SOOS: OSD CWG                                                    |
| Support and lead efforts to advance observing system and data sharing technologies (hardware, software) and methods                                                                                                                          |  | The CAPS CWG continued working on refining AI and other machine learning algorithms for automated counting but these are not at a stage to be shared through an open repository (i.e., GitHub) yet.                                                                                                                                                                                                                                                                                                                                           | SOOS: CAPS CWG                                                   |
| Support and lead efforts to agree, document, advocate for and implement best practice, in both science and data                                                                                                                              |  | SOIS has and will continue to develop QC documents to be submitted to Ocean Best Practices (moored temperature and salinity now available, moored oxygen in prep.)                                                                                                                                                                                                                                                                                                                                                                            | SOOS: SOIS RWG                                                   |
| Identify gaps and opportunities across the foundational capabilities and support efforts to address them                                                                                                                                     |  | <p>SOOS approved a new Task Team in 2021 on Polar Technologies which aims to develop a polar technologies group to work on addressing and exploit synergies in technology targeted at Southern Ocean and Antarctic marine research (see more on page 47).</p> <p>SOOS also commenced discussions with the Global Ocean Acidification Observing Network (GOA-ON) on developing a joint SOOS/GOA-ON ocean acidification collaborative hub for the Southern Ocean. These discussions and the establishment of the hub will continue in 2022.</p> | <p>SOOS: Polar Technology Task Team</p> <p>Community: GOA-ON</p> |
| <b>Objective 3: Identify the spatio-temporal and thematic requirements of observations needed to address the science themes; identify existing coverage and work to maintain it; and address identified gaps.</b>                            |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                  |
| Map the geographic distribution of theme challenges to understand their regional importance, existing data coverage and the national/international effort to address them                                                                    |  | <p>All RWGs have now defined sub-regions for their sector, with the last outstanding RWG completing this work in 2021 (Ross Sea RWG).</p> <p>Most RWGs are planning workshops for 2022 and 2023 through which they will complete this work.</p>                                                                                                                                                                                                                                                                                               | SOOS: RWGs                                                       |

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| Develop a regional understanding of stakeholder requirements and data priorities for data pertaining to the theme challenges |  | This work will be completed through the above mentioned RWG workshops in 2022 and 2023 as well as a SOOS Symposium planned for 2023.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                  |
| Develop and utilise a system for identification of observational coverage and requirements                                   |  | The SOOS International Project Office have drafted systems for developing heatmaps of RWG sub-regions with the regional importance of SOOS' Science Themes and Challenges as well as observational coverage but these systems will be refined over the coming years as RWGs completed the mapping work.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                  |
| Enhance logistical collaborations to ensure sustained data coverage                                                          |  | <p>Support and population of SOOS's Database of Upcoming Expeditions, <u>DueSouth</u>, continued through 2021. An automated connection between DueSouth and IAATO's database of planned tourist cruises was developed in 2021 and launched 2022. Information on over 500 planned routes is now available through DueSouth with Southern Ocean/Antarctic planned route information provided by the SOOS community, CCAMLR, OceanOps, COMNAP and IAATO as well as some planned route information discovered and entered by the SOOS IPO.</p> <p>Additionally, the European Polar Board in partnership with SOOS, Svalbard Integrated Arctic Earth Observing System, the International Network for Terrestrial Research and Monitoring developed a new integrated database of logistical information, <u>Polar dex</u> which was <u>launched in April 2022</u>. The Southern Ocean planned routes segment of Polar dex is the <u>SOOS DueSouth database</u>.</p> <p>Full information and achievements of DueSouth and Polar dex are on pages 17-18.</p> <p>SOOS also contributed to the <u>Polar Observing Assets working group</u> including drafting a spreadsheet for cross-walking metadata standards for observing assets. This working group was initiated as part of the Polar dex.</p> | <p>SOOS: DMSC, RWGs, CWGs, TTs</p> <p>Community: AADC, COMNAP, CCAMLR, OceanOps, European Polar Board, IAATO</p> |
| Support and advocate for efforts to collect, deliver and use observational data                                              |  | <p>See above for SOOS representation at international meetings, workshops and conferences, and number of projects SOOS endorsed in 2021.</p> <p>SOOS contributed to two BELSPO funding proposals in 2021 (1 successful, 1 pending), the SOIS RWG submitted a proposal for the continued deployment/retrieval of the Southern Ocean Time Series Mooring (successful)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <p>SOOS: SOIS RWG, CAPS CWG, Ross Sea RWG, POLDER</p> <p>Community: BELSPO, British Antarctic Survey</p>         |

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|                                                                                                                                                                                                                              | <p>and several Australian Antarctic Science grant proposals or Antarctic field programmes (pending).</p> <p>The CAPS CWG appointed three new post doctorates to work on projects within the CAPS workplan (based at BAS).</p> <p>The Ross Sea RWG facilitated a collaborative Ross Sea cruise in the 2021/22 season which successfully deployed several floats.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                   |
| <b>Objective 4: Deliver high-quality scientific data, synthesis activities/products and knowledge that are needed to deliver our mission</b>                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                   |
| <p>Delivery of publications (scientific, strategic, data) that provide scientific knowledge towards addressing the science themes, enhancing observational capabilities, or delivering directly to policy and management</p> | <p>Tronstad, S, Bricher, P., Kool, J., Pulsifer, P., Van de Putte, A., <i>et al.</i> (2021). Alignment of polar data policies - recommended principles. Zenodo. <a href="https://doi.org/10.5281/zenodo.5734900">https://doi.org/10.5281/zenodo.5734900</a></p> <p>Van de Putte, A.P., Griffiths H.J., Brooks C., Bricher P., Sweetlove M., <i>et al.</i> (2021) From data to marine ecosystem assessments of the Southern Ocean: achievements, challenges, and lessons for the future. <i>Frontiers in Marine Science</i>, 8: 637063. <a href="https://doi.org/10.3389/fmars.2021.637063">https://doi.org/10.3389/fmars.2021.637063</a></p> <p>Tamsitt, V., Bushinsky, S., Li, Z., du Plessis, M., Foppert, A., <i>et al.</i> (2021). Southern Ocean [in "State of the Climate in 2020]. <i>Bulletin American Meteorological Society</i>, 102 (8), S341-S35, <a href="https://doi.org/10.1175/2021BAMSStateoftheClimate.1">https://doi.org/10.1175/2021BAMSStateoftheClimate.1</a></p> <p>LaRue, M., Salas, L., Nur, N., Ainley, D., Stammerjohn, S., <i>et al.</i> (2021). Insights from the first global population estimate of Weddell seals in Antarctica. <i>Science Advances</i>, 7:39. <a href="https://doi.org/10.1126/sciadv.abh3674">https://doi.org/10.1126/sciadv.abh3674</a></p> <p>Wege, M., Salas, L., &amp; LaRue, M. (2021) Ice matters: life history strategies of two Antarctic seals dictate climate change eventualities in the Weddell Sea. <i>Global Change Biology</i>, 27 (23): 6252-6262. <a href="https://doi.org/10.1111/gcb.15828">https://doi.org/10.1111/gcb.15828</a></p> <p>Labrousse, S., Iles, D., Viollat, L., Fretwell, P., Trathan, P.N., <i>et al.</i> (2021). Quantifying the causes and consequences of variation in satellite-derived population indices: a case study of emperor penguins. <i>Remote Sensing in Ecology and Conservation</i>. 8 (2): 151-165. <a href="https://doi.org/10.1002/rse2.233">https://doi.org/10.1002/rse2.233</a></p> | <p>SOOS: DMSC, Ross Sea RWG, Acoustic Trends CWG (now complete)</p> <p>SOOS Partnerships and Collaborations: POLDER, Southern Ocean Task Force, MEASO</p> <p>Community: SCAR, IASC and broad community input.</p> |

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|                                                                                                                                                                              | <p>Trathan, P.N., Wienecke, B., Barbraud, C., Jenouvrier, S., Kooyman, G., <i>et al.</i> (2021). The emperor penguin – vulnerable to projected rates of warming and sea ice loss. <i>Biological Conservation</i>. 241: 108216. <a href="https://doi.org/10.1016/j.biocon.2019.108216">https://doi.org/10.1016/j.biocon.2019.108216</a></p> <p>Miller, B.S., The IWC-SORP/SOOS Acoustic Trends Working Group, Balcazar, N., Nieukirk, S., Leroy, E.C., Aulich, M., <i>et al.</i> (2021). An open access dataset for developing automated detectors of Antarctic baleen whale sounds and performance evaluation of two commonly used detectors. <i>Scientific Reports</i>, 11: 806. <a href="http://doi.org/10.1038/s41598-020-78995-8">http://doi.org/10.1038/s41598-020-78995-8</a></p> <p>Southern Ocean Decade Task Force. (2021). Review of identified priorities for the Southern Ocean in the context of the UN Ocean Decade - 2021. Zenodo. <a href="http://doi.org/10.5281/zenodo.4784227">http://doi.org/10.5281/zenodo.4784227</a></p> <p>Smith, W., Rivaro, P., Wang, Z., LaRue, M., &amp; Heywood, K. (2021). Observational activities in the Ross Sea: current and future national contributions to SOOS – an update. Zenodo. <a href="http://doi.org/10.5281/zenodo.5762638">http://doi.org/10.5281/zenodo.5762638</a></p> |                                                                                                                                                                                                          |
| Populate SOOSmap with high-priority standardised datasets that are required to address the science themes and encourage broader use of SOOSmap by Southern Ocean researchers | <p>During 2021, SOOS worked with SOOSmap’s host, EMODnet Physics, to redevelop the SOOSmap interface and underpinning architecture to create SOOSmap Version 2. This is scheduled to launch in the second half of 2022. Version 2 includes improved functionality for managing large and complex data downloads, faster page loading, better provision of citation information to users, and functional website usage analytics.</p> <p>SOOSmap currently has 26 data layers available but a further 24 have been incorporated, or are being prepared to be incorporated, into the new SOOSmap version launch.</p> <p>The SOOS Southern Ocean Mooring Network, an index of known oceanographic moorings, was maintained, and published through SOOSmap. Additional moorings were added from US and Chinese data centres, and mooring datasets from Swedish researchers were converted to CF-compliant NetCDF format ready for addition into the mooring network in 2022.</p> <p>SOOS also worked with PANGAEA to correct errors in a feed of thousands of CTD datasets through SOOSmap.</p>                                                                                                                                                                                                                                             | <p>SOOS: DMSC</p> <p>Community: EMODnet Physics, SOCAT, GLODAP, ASPeCt, NECKLACE, BEPSII, MEOP/AniBOS, OceanSITES, SOCCOM, ACAP, SCAR, INSDC, State Oceanic Administration, PANGAEA, SCAR, Saildrone</p> |

|                                                                                                                                                                                                                          |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                            |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                                          |  | Full achievements and information on SOOSmap are on pages 18-19.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                            |
| Enhance FAIR data management and delivery through the use and linkage of existing tools and networks, and assist in connecting resource needs                                                                            |  | <p>Continued support of the NASA EarthData Search (formerly the GCMD). The SOOS metadata portal contains 6959 records, largely from National Antarctic Data Centres and NASA’s satellite programmes. It was used by ~300 unique users during the year.</p> <p><u>POLDER</u> (a joint project between SOOS, SCADM and ADC), continued to work towards a federated search tool. A pilot federated search tool was launch in April 2022. Through POLDER, SOOS has also advocated for all polar-relevant data centres to implement schema.org metadata and to support interoperability of metadata records. SOOS also contributed to a BELSPO funding proposal to extend and implement schema.org to support the development of a polar federated search too. Full achievements of the POLDER Task Team on page 45.</p> | <p>SOOS: DMSC</p> <p>SOOS Contributions and Collaborations: POLDER</p> <p>Community: BELSPO, NASA, SCADM, ADC</p>                                                                                                                                                                                          |
| Ensure SOOS data activities align with a clear data policy that is itself, aligned with the FAIR data principles of the Findable, Accessible, Interoperable and Reusable and with data policy of other polar communities |  | <p>Through 2021 SOOS developed a new SOOS Data Policy, published in February 2021. The data policy was based on the <u>Alignment of Polar Data Policies – Recommended Principles</u> and developed in alignment with the new SCAR Data Policy (in prep).</p> <p>SOOS Data Management Sub-Committee. (2022). SOOS Data Policy. Zenodo. <a href="http://doi.org/10.5281/zenodo.6041433">http://doi.org/10.5281/zenodo.6041433</a></p>                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                            |
| <b>Objective 5: Maintain SOOS as the world-leading hub to support the collection and delivery of Southern Ocean observations</b>                                                                                         |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                            |
| Reporting metrics and information are collected, compiled and delivered to stakeholders as required                                                                                                                      |  | In 2021 SOOS reported to SCAR, SCOR, CCAMLR, the SOOS Hobart Partners (IMAS/UTAS, CSIRO, Tasmanian Government), Scientific and Technological Research Council of Turkey Marmara Research Centre Polar Research Institute, Antarctica New Zealand and the Swedish Polar Research Secretariat.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <p>SOOS: International Project Office, EXCOM</p> <p>Community: SCAR, SCOR, CCAMLR, IMAS/UTAS, CSIRO, Tasmanian Government, Scientific and Technological Research Council of Turkey Marmara Research Centre Polar Research Institute, Antarctica New Zealand and the Swedish Polar Research Secretariat</p> |

|                                                                                   |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                        |
|-----------------------------------------------------------------------------------|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The SOOS communication and engagement strategy is kept up-to-date and implemented |  | <p>The SOOS International Project Office commenced the development of an updated SOOS Engagement and Communications Strategy (in prep.).</p> <p>SOOS produced three issues of the SOOS Newsletter (March, July, December), maintained the SOOS website and SOOS's social media accounts (Facebook and twitter). There was a growth in the subscribers to the SOOS newsletters of ~100 people with over 700 subscribers at the end of 2021. Engagement in the SOOS Twitter and Facebook accounts also grew with 1,439 and 2,579 followers, respectively.</p> <p>See above for SOOS representation at international meetings, workshops and conferences in 2021.</p>                                                                                                                                                                                                                       | SOOS: International Project Office, all SOOS community                                                                                                                                                                                                                                                                                 |
| Funding for the SOOS IPO is maintained and enhanced                               |  | <p>The core SOOS International Project Office sponsoring partnership continue in 2021 (3-year partnership between IMAS/UTAS, CSIRO and Tasmanian Government for 2020-2022). Discussed for the ongoing sponsorship beyond 2023 with this partnership and potential new partners progressed significantly in 2021.</p> <p>SOOS's international sponsorship agreements with the Swedish Polar Research Secretariat (for 2020-2022), Antarctica New Zealand (agreed annually) continued, and the agreement with the State Oceanic Administration was completed in 2021. New international sponsors, the University of Cape Town's Marine Biogeochemistry Lab (2021-2022) and the Scientific and Technological Research Council of Turkey Marmara Research Centre Polar Research Institute were developed in 2021.</p> <p>See pages 20-22 for full details on SOOS's sponsorship in 2021.</p> | <p>SOOS: International Project Office, EXCOM</p> <p>Community: IMAS/UTAS, CSIRO, Tasmanian Government, Swedish Polar Research Secretariat, Antarctica New Zealand, State Oceanic Administration, University of Cape Town, Scientific and Technological Research Council of Turkey Marmara Research Centre Polar Research Institute</p> |
| SOOS governance is managed and maintained                                         |  | SOOS's governance structure was maintained during 2021. A new Vice Chair, Sebastien Moreau, and a new SSC member, Wolfgang Rack, were appointed. All SOOS working groups also maintained their leadership structures.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <p>SOOS: International Project Office, EXCOM</p> <p>Community: SCAR and SCOR</p>                                                                                                                                                                                                                                                       |
| Implementation Plan objectives are coordinated and support                        |  | SOOS developed a Science and Implementation Plan for 2021-2025 which was submitted to SCAR and SCOR in 2021. The plan underwent an international, independent review coordinated by SCAR and SCOR, and was approved in June 2022. Despite the plan being in draft until 2022, SOOS worked towards the objectives outlined in the plan during 2021.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <p>SOOS: International Project Office, broad SOOS community</p> <p>Community: SCAR and SCOR, broad Southern Ocean community</p>                                                                                                                                                                                                        |

|                                                                                                            |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                            |
|------------------------------------------------------------------------------------------------------------|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|
|                                                                                                            |  | 20 of the 25 Implementation Actions were commenced in 2021.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                            |
| SOOS International Project Office administration and management is carried out efficiently and effectively |  | <p>The SOOS maintained the SOOS International Project Office staff (2.4 FTE) during 2021 but with significant changes to personnel. The inaugural SOOS Executive Officer, Louise Newman, finished working for SOOS in August 2021 and new Executive Officer, Alyce Hancock, was appointed. Alyce had previously worked as the SOOS Science and Communications Officer and as such a new Science and Communication Officer, Julia Bach, was appointed in November 2021. The SOOS Data Officer, Pip Bricher, also finished working for SOOS in early 2022 (March) and a new SOOS Data Officer, Imogen Jones, was appointed in May 2022.</p> <p>All SOOS International Project Office activities continued through 2021, with some delays due to the change-over of staff. And SOOS's finances continued to be administered.</p> | SOOS: International Project Office<br>Community: IMAS/UTAS |

## SOOS Key Products

### Database of Upcoming Expeditions to the Southern Ocean



[DueSouth](#) is a database for sharing information on upcoming field campaigns and planned routes. It enhances opportunities for collaboration and sharing field resources. DueSouth is hosted and maintained for SOOS by the European Polar Board.

#### Key Sponsors / People:

DueSouth coding and hosting in 2021 were provided to SOOS by the European Polar Board. Information on planned routes is systematically provided by OceanOps, Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), International Association of Antarctic Tour Operators (IAATO) and Council of Managers of National Antarctic Programs (COMNAP) as well as some planned routes supplied by the SOOS community or discovered and entered by the SOOS International Project Office.

#### 2021 Achievements:

- SOOS and the European Polar Board agreed to incorporate DueSouth into a new integrated database of polar observing assets and other logistical information, [Polardex](#), with the bulk of the software development completed in 2021 and [launched](#) in April 2022.
- SOOS collaborated with the Polar Observing Assets Working Group to begin identifying core metadata fields for a new metadata standard to describe projects, planned routes, research stations, ships, aircraft, and other logistical resources, to better support the integration of similar databases into Polardex.
- COMNAP and CCAMLR provided annual data on upcoming planned routes which were added to DueSouth.
- Members of the IAATO agreed to allow DueSouth to share information from their database of planned routes. A software connection between IAATO and Polardex was substantially developed in 2021 and launched in early 2022. The Memorandum of Understanding between SOOS and IAATO was also renegotiated, due to be signed in early 2022.

## 2022 Plans:

- Launch Polardex (completed April 2022) and populate with planned route and project information.
- Publish IAATO planned cruises information through Polardex (completed early 2022).
- Troubleshoot the code under Polardex and renew the data sharing connection with OceanOps.
- Develop and advertised tutorials to help the community use Polardex to both share and discover fieldwork logistical support.
- Contribute to the Polar Observing Assets Working Group discussions on developing a metadata standard for logistics information and encourage associated databases to implement any recommendations from the working group.

## DueSouth metrics:

- 499 planned routes
- 24 nations represented
- 49.5% planned routes from CCAMLR; 13.8% from COMNAP Regional Information Exchange; 26.3% discovered and entered by the SOOS International Project Office (IPO); 6.7% entered by the community; 3.5% from JCOMMOPS/OceanOps.

## SOOSmap



[SOOSmap](#) is an interactive web map that allows users to discover and access circumpolar datasets. SOOSmap was developed for SOOS by European Marine Observations and Data Network (EMODnet) Physics and is supported by Southern Ocean Carbon and Heat Impact on Climate (SO-CHIC).

## Key Sponsors/People

All development and hosting are provided EMODnet Physics as part of their mandate to support regional ocean observing systems under EMODnet for Global. SOOSmap is also supported SO-CHIC. The relationship between SOOS and EMODnet was negotiated by Patrick Gorringe from the European Component of the Global Ocean Observing System (EuroGOOS) secretariat.

## 2021 Milestones

During 2021, the underlying architecture of SOOSmap was substantially restructured with a SOOSmap Version 2 scheduled to launch in the second half of 2022. Major improvements in SOOSmap Version 2 include:

- Improved responsiveness, including the loading speed of individual data layers.
- Tools to support the download of large and complex composite datasets.
- The integration of SOOS-specific data layers including penguin, krill, mooring, and plastics data layers.
- A restructure of the interface to allow users to better explore specific combinations of platforms and variables using “cards” that describe pre-defined datasets.
- Development of elements to support users to more easily and accurately cite data collected through SOOSmap.

Updates to SOOSmap Version 1 in 2021 include:

- Correction of data feed errors of CTD casts from PANGAEA (resulting incorrect date information).

## 2022 Plans:

In 2022, we plan to:

- Finalise and launch Version 2 of SOOSmap
- Work with EMODnet to increase the number of data layers subsequently increasing the volume of data available to SOOSmap users.
- Implement Google Analytics to accurately track usage of SOOSmap Version 2.
- Develop and advertise User Guides to support the SOOS community in using SOOSmap.

## SOOSmap metrics:

Version 1 of SOOSmap has:

- 26 data layers including 34,937 CTD casts; 14,543 Krillbase samples; 3,630 penguin colony counts; 1,980 Argo; 1,378 drifting buoys; 1,636 marine mammals (MEOP); 1,300 sea-ice chlorophyll cores; 814 SOOS mooring network deployments (metadata); 766 continuous plankton recorder transects; 114 SCAR plastics sampling; 65 tide gauges; 71 moorings; 47 NECKLACE (metadata); 18 bathy messages on GTS; 22 gliders; 14 ferryboxes; 7 TESAC messages on GTS; 1 Saildrone transect; and 6 expendable bathythermographs.

## SOOS IPO Sponsorship in 2020

SOOS remains an initiative of SCAR and SCOR, and in 2021 this support, governance and sponsorship continued. Further, in 2021, SOOS maintained its broad sponsorship base.

Developed in 2019, the core sponsorship 3-year (2020-2022) partnership between the Institute for Marine and Antarctic Studies, University of Tasmania (IMAS/UTAS), Commonwealth Scientific and Industrial Research Organisation (CSIRO) and the Tasmanian State Government Department of State Growth, was commenced, supporting the continuation of the SOOS International Project Office in Hobart, Australia. Discussion for the ongoing sponsorship and hosting of the SOOS International Project Office in Hobart progressed significantly through 2021 and an agreement is expected in mid-2022.

Additionally, in 2021 a 3-year (2020-2022) collaboration with the Swedish Polar Research Secretariat continued, a 2-year (2021-2022) sponsorship agreement with the University of Cape Town's Marine Biogeochemistry Lab (South Africa) was established, sponsorship was received from the Scientific and Technological Research Council of Turkey Marmara Research Centre Polar Research Institute (Turkey), State Oceanic Administration (China) and Antarctica New Zealand.

In-kind service providers are important and enable SOOS to achieve outputs and outcomes that would not be possible if they had to be funded directly by SOOS. The figure below shows the Service Providers for SOOS in 2020.

SOOS is grateful to all sponsors for the contribution they make to ensuring the efficient and sustained delivery of SOOS for the community.

## Sustained support for the IPO

Sustaining funding and support of the SOOS International Project Office remains a significant activity. Building on the significant effort to develop new sponsoring partnerships in 2021, further discussions took place with a number of other national communities on potential sponsorship opportunities to commence in 2022.

## SOOS Governing Bodies



## SOOS Sponsors



Antarctica  
New Zealand



SWEDISH POLAR  
RESEARCH SECRETARIAT



## Service Providers



## Sponsorship of SOOS Activities

Sponsors of SOOS events and activities provide a vital service in enabling the delivery of SOOS activities. Due to the COVID pandemic and related travel restrictions, few in-person events were held in 2020. The following institutes sponsored SOOS events and activities during 2020, and we thank them for their important support.

| Event/Activity                                                                                     | Sponsoring Institute/Organisation                                                                                                                                                                                                                                                                                                                                                     |
|----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sponsorship support received in 2021 to add new data layers into SOOSmap (to be completed in 2022) | SCAR                                                                                                                                                                                                                                                                                                                                                                                  |
| 2 <sup>nd</sup> Southern Ocean Decade Regional Workshop (online, September 2021)                   | <p>Hosted by the European Polar Board and Southern Ocean Task Force (on which SOOS is a key partner)</p> <p>Funding: BELSPO</p> <p><b>Southern Ocean Decade Action Plan:</b><br/> <a href="https://doi.org.10.5281/zenodo.6412191">https://doi.org.10.5281/zenodo.6412191</a></p>                                                                                                     |
| Polar Data Forum IV (online, September 2021)                                                       | <p>Co-hosted by Royal Belgian Institute of Natural Sciences and the European Polar Board</p> <p>Co-organised by SOOS, SCAR Standing Committee on Antarctic Data Management, the World Data System, EuroGOOS and other polar data management organisations</p> <p>Funding: BELSPO</p> <p><b>Website:</b> <a href="https://polar-data-forum.org/">https://polar-data-forum.org/</a></p> |

# Governance

## Executive Committee

In 2021, the SOOS Executive Committee (EXCOM) held approximately monthly virtual meetings. The SOOS Co-Chairs are Mike Williams (New Zealand) and Eileen Hofmann (USA), and SOOS Vice Co-Chairs are Sian Henley (UK) and Sebastian Moreau (Norway) who joined EXCOM in June.

## Scientific Steering Committee

Two Scientific Steering Committee (SSC) members rotated off the SSC in 2021: Jean-Baptiste Sallée (France) and Matthew Mazloff (USA). We thank Jean-Baptiste and Matthew for their contribution to SOOS! A new SSC member was brought on to the committee in 2021: Wolfgang Rack (New Zealand). The composition of the SSC in 2021, including the Data Management Sub-Committee (DMSC), Regional Working Group (RWG) and Equity, Diversity and Inclusion (EDI) Co-Chair ex-officios, is shown in Table 1.

Table 1: Current SSC membership as of July 2022 with first term shown as (1) and second term shown as (2). Table includes DMSC, RWG Co-Chair and EDI Co-Chair ex-officios. The SOOS Governance and Terms of Reference are available [here](#).

| Name               | Country      | Gender | Expertise      | Role         | 17/18      | 18/19      | 19/20      | 20/21      | 21/22      | 22/23      | 23/24    |
|--------------------|--------------|--------|----------------|--------------|------------|------------|------------|------------|------------|------------|----------|
| Mike Williams      | New Zealand  | Male   | Physical       | Co-Chair     | Vice Chair | Vice Chair | Vice Chair | Co-Chair   | Co-Chair   |            |          |
| Eileen Hofmann     | USA          | Female | Biological     | Co-Chair     |            | Vice Chair | Vice Chair | Co-Chair   | Co-Chair   | Co-Chair   |          |
| Sian Henley        | UK           | Female | Biogeochemical | Vice Chair   | RWG        | RWG        | RWG        | Vice Chair | Vice Chair | Co-Chair   | Co-Chair |
| Sebastien Moreau   | Norway       | Male   | Biogeochemical | Vice Chair   |            | RWG        | RWG        | RWG        | Vice Chair | Vice Chair | Co-Chair |
| Dake Chen          | China        | Male   | Physical       | SSC          | SSC (1)    | SSC (1)    | SSC (1)    | SSC (2)    | SSC (2)    | SSC (2)    |          |
| Burcu Ozsoy        | Turkey       | Female | Sea ice        | SSC          | SSC (1)    | SSC (1)    | SSC (1)    | SSC (2)    | SSC (2)    | SSC (2)    |          |
| Sarah Fawcett      | South Africa | Female | Biogeochemical | SSC & EDI    |            | SSC (1)    | SSC (1)    | SSC (1)    | SSC (2)    | SSC (2)    | SSC (2)  |
| Andrew Meijers     | UK           | Male   | Physical       | SSC          |            | SSC (1)    | SSC (1)    | SSC (1)    | SSC (2)    | SSC (2)    | SSC (2)  |
| Irene Schloss      | Argentina    | Female | Biological     | SSC          |            | SSC (1)    | SSC (1)    | SSC (1)    | SSC (2)    | SSC (2)    | SSC (2)  |
| Luciano Pezzi      | Brazil       | Male   | Physical       | SSC          |            |            |            | SSC (1)    | SSC (2)    | SSC (2)    | SSC (2)  |
| Delphine Lannuzel  | Australia    | Female | Biogeochemical | SSC          |            |            |            | SSC (1)    | SSC (1)    | SSC (1)    | SSC (2)  |
| Jilda Caccavo      | Germany      | Female | Biological     | SSC          |            |            |            | SSC (1)    | SSC (1)    | SSC (1)    | SSC (2)  |
| Wolfgang Rack      | New Zealand  | Male   | Physical       | SSC          |            |            |            |            | SSC (1)    | SSC (1)    | SSC (1)  |
| Benjamin Pfeil     | Norway       | Male   | Data           | DMSC         |            |            | DMSC (1)   | DMSC (1)   | DMSC (2)   |            |          |
| Petra ten Hoopen   | UK           | Female | Data           | DMSC         |            | DMSC (1)   | DMSC (1)   | DMSC (2)   | DMSC (2)   | DMSC (2)   |          |
| Patricia Yager     | USA          | Female | Biogeochemical | ABS RWG      |            |            |            | RWG (1)    | RWG (1)    | RWG (2)    | RWG (2)  |
| Pierre Dutrieux    | US           | Male   | Physical       | ABS RWG      |            |            |            |            | RWG (1)    | RWG (1)    | RWG (2)  |
| Walker Smith       | USA/China    | Male   | Biological     | Ross Sea RWG | RWG (1)    | RWG (1)    | RWG (1)    | RWG (2)    | RWG (2)    |            |          |
| Paola Rivaro       | Italy        | Female | Biogeochemical | Ross Sea RWG |            |            |            | RWG (1)    | RWG (1)    | RWG (1)    | RWG (2)  |
| Elizabeth Shadwick | Australia    | Female | Biogeochemical | SOIS RWG     |            |            |            | RWG (1)    | RWG (1)    | RWG (1)    | RWG (2)  |
| Sarat Tripathy     | India        | Male   | Biological     | SOIS RWG     |            |            |            | RWG (1)    | RWG (1)    | RWG (1)    | RWG (2)  |
| Oscar Schofield    | USA          | Male   | Biological     | WAPSA RWG    | RWG (1)    | RWG (1)    | RWG (1)    | RWG (2)    | RWG (2)    |            |          |
| Juan Höfer         | Chile        | Male   | Biological     | WAPSA RWG    |            |            |            | RWG (1)    | RWG (1)    | RWG (1)    | RWG (2)  |
| Markus Janout      | Germany      | Male   | Physical       | WSDML RWG    |            |            | RWG (1)    | RWG (1)    | RWG (1)    | RWG (2)    | RWG (2)  |
| Stefanie Arndt     | Germany      | Female | Sea ice        | WSDML RWG    |            |            |            |            | RWG (1)    | RWG (1)    | RWG (1)  |
| Steve Diggs        | USA          | Male   |                | EDI          |            |            |            | EDI        | EDI        | EDI        | EDI      |
| Joana Beja         | Belgium      | Female |                | EDI          |            |            |            |            | EDI        | EDI        | EDI      |

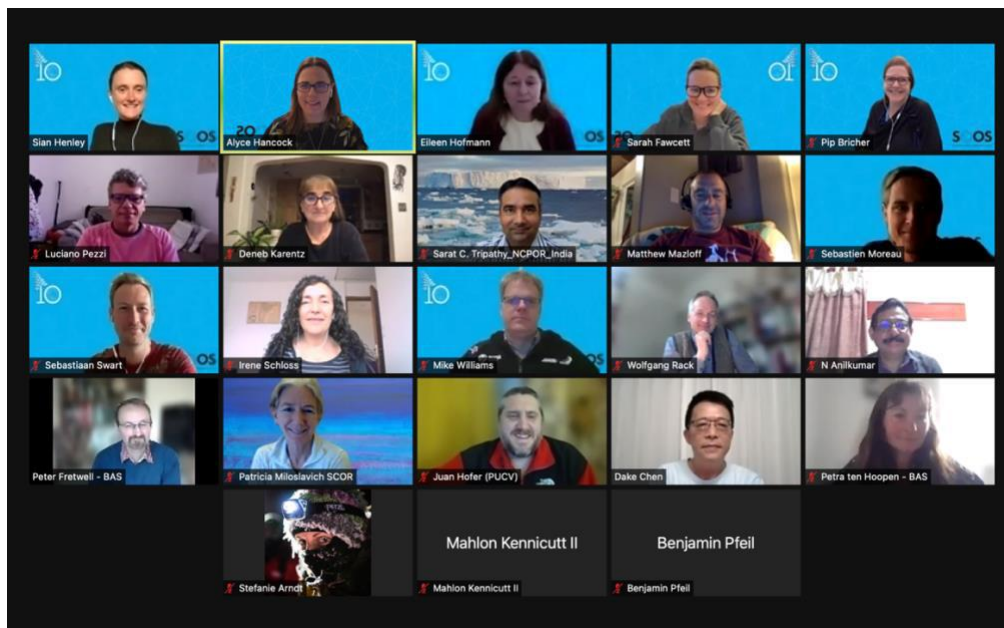
## Annual Scientific Steering Committee Meeting

Due to the COVID pandemic, the 2021 meetings of the SOOS SSC were conducted online. Two sets of virtual meetings were conducted, the first was conducted on the 1<sup>st</sup> and 2<sup>nd</sup> of September with an online celebration of the [10-Year anniversary of SOOS](#) held on the 1<sup>st</sup> September followed by an SSC meeting on the 2<sup>nd</sup> of September. The second set of virtual meetings were held as three, two-hour meetings held across consecutive days (7-9<sup>th</sup> December).

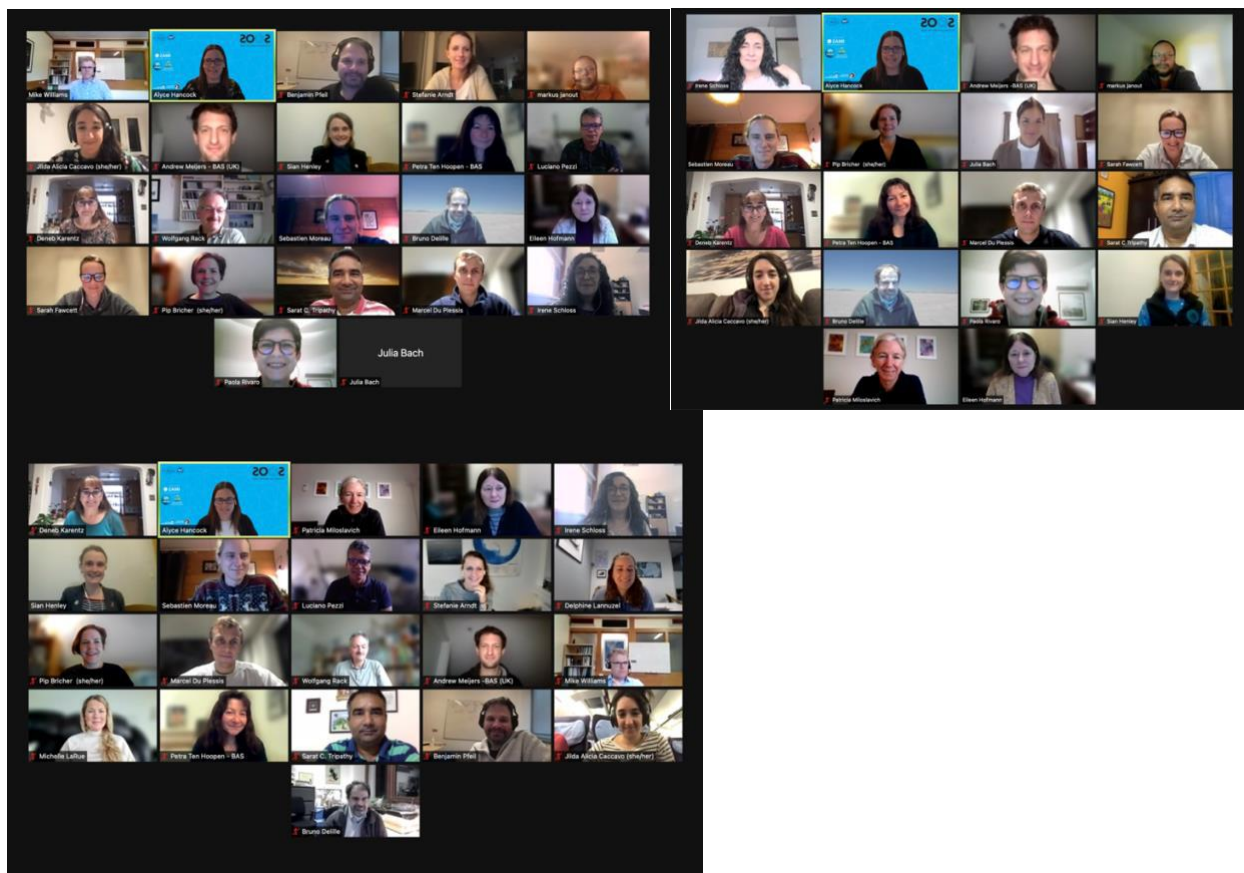
The September meeting had presentations for the five SOOS Regional Working Groups outlining their 5-Year Workplans with actions against the SOOS 2021-2025 Implementation Plan. All SOOS Capability Working Groups were invited to submit a proposal to continue as a SOOS Capability Working Group in the new SOOS implementation period (2021-2025). These proposals were presented to the SSC for feedback and approval. Additionally, discussion on potential future SOOS Task Teams was had and the SOOS Equity, Diversity and Inclusion (EDI) group presented on their activities through 2021 and sought feedback on a proposed commentary for submission to AGU Advances (in prep).

The December meetings included a presentation on the overall SOOS activities during 2021, a discussion on the role of SSC members within SOOS and how they can ensure connections are maintained and strengthen between SOOS and SOOS relevant communities, the SOOS Data Policy, an update from the SOOS EDI Group and RWGs as well as a discussion on future SOOS activities including a SOOS conference in 2023. A proposal was also received for a new SOOS Task Team on Polar Technology, which was approved by the SSC.

The minutes from the SSC meeting are available [here](#).



SOOS September virtual Scientific Steering Committee meeting.



SOOS December virtual Scientific Steering Committee meetings.

# SOOS Implementation Groups

## Data Management Sub-Committee (DMSC)

The SOOS Data Management Sub-Committee (DMSC) has been engaged on a wide range of data activities, in addition to the development of DueSouth and SOOSmap (see above).

### Leadership

Benjamin Pfeil and Petra Ten Hoopen continued their roles as co-chairs through 2021. Total DMSC membership: 27 members from 21 institutions and 12 nations.

### Data Policy

DMSC members participated in a series of workshops and contributed to a publication ([Tronstad et al. 2021](#)) aimed at aligning the principles that underpin new data policies for three polar data committees – SOOS DMSC, the Standing Committee on Antarctic Data Management, and the Arctic Data Committee. This document includes a description of the core data management principles held by key global, oceanographic, and polar environmental science organisations. The DMSC subsequently drafted a new SOOS data policy, which they presented to the SSC in November 2021. This policy was finalised and published in February 2022 ([SOOS Data Management Sub-Committee 2022](#)).

### SOOS Metadata Portal

The SOOS metadata portal on NASA's EarthData Search (formerly the GCMD) contains 6959 records, largely from National Antarctic Data Centres and NASA's satellite programme. Usage of the portal is generally low, in the range of 300 users over the course of the year.

### Southern Ocean Mooring Network

In 2021, the DMSC maintained the SOOS Mooring Network index, published via [SOOSmap](#), adding a small numbers of new moorings and refining details in the metadata for extant moorings. Additional moorings were added from US and Chinese data centres, and mooring datasets from Swedish researchers were converted to CF-compliant NetCDF format ready for addition into the mooring network in 2022.

## **Annual Meeting**

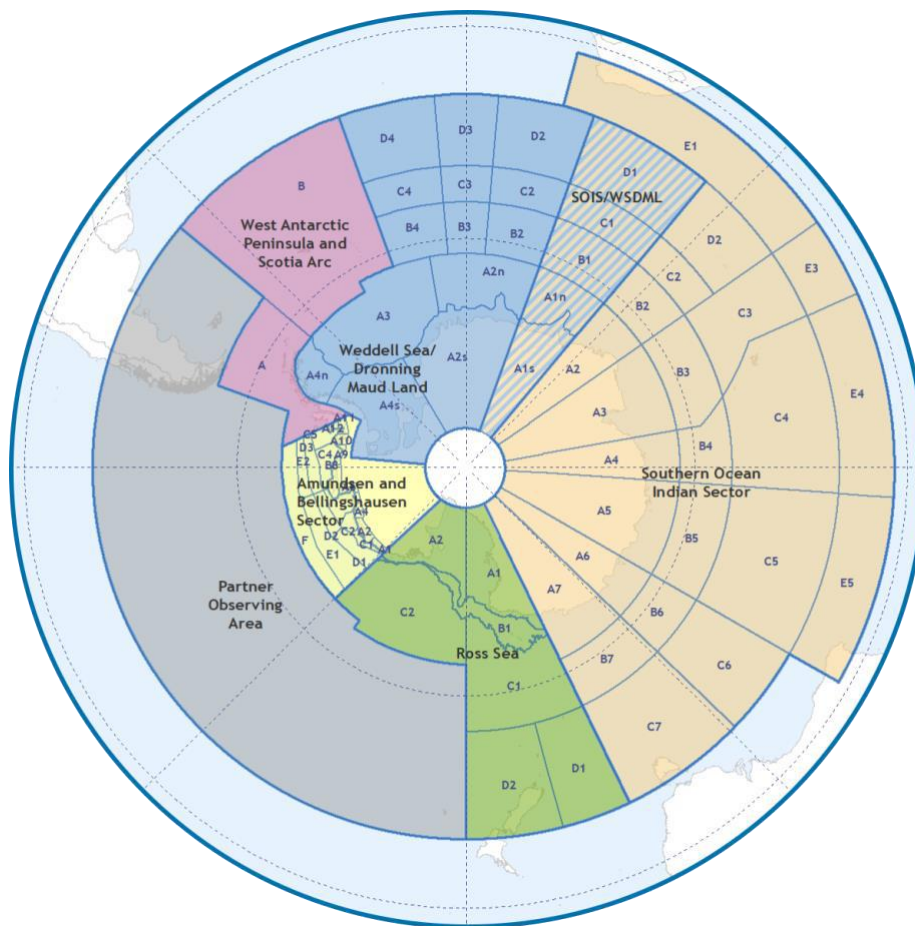
The DMSC annual meeting was held online on the 9<sup>th</sup> and 30<sup>th</sup> of November 2021 with 18 DMSC members participating in at least one session. Due to COVID travel restrictions an in-person meeting was not possible in 2021. Changes were made to the meeting format to accommodate the online format, including replacing slide presentations with advance reading materials, and using Google documents for discussion and minute-taking to allow for asynchronous participation.

Meeting participants: Petra Ten Hoopen, Benjamin Pfeil, Antonio Novellino, Patrick Gorringer, Marco Alba, Joseph Nolan, Joana Beja, Taco de Bruin, Melissa Zweng, Scott Ritz, Michael Morahan, Alyce Hancock, Steve Diggs, Alex Kozyr, Jonathan Kool, Benedicte Pasquer, Povl Abrahamsen, and Pip Bricher.

## Regional Working Groups

SOOS Regional Working Groups (RWG) develop, coordinate and implement the observing system in their defined region. The regions align with the natural areas of focus of nations involved in Southern Ocean activities (although some activities will be coordinated at a circumpolar scale e.g., Argo). Given the long-term requirements for coordination and implementation, the SOOS Regional Working Groups are viewed as ongoing efforts, whilst still undergoing annual reviews.

In 2018, SOOS SSC recommended that all RWGs develop sub-regions for quantification of observational requirements, coverage and gaps. In 2020, the last two RWGs to define sub-regions, West Antarctic Peninsula and Scotia Arc (WAPSA) and Ross Sea, drafted their sub-regions. These were finalised in early 2021.



## Amundsen and Bellingshausen Sector (ABS) Regional Working Group

### Leadership:

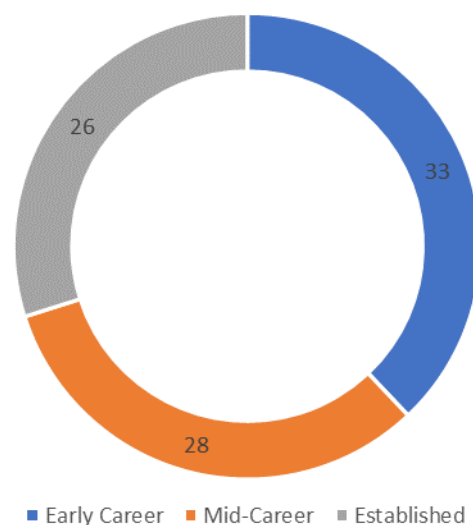
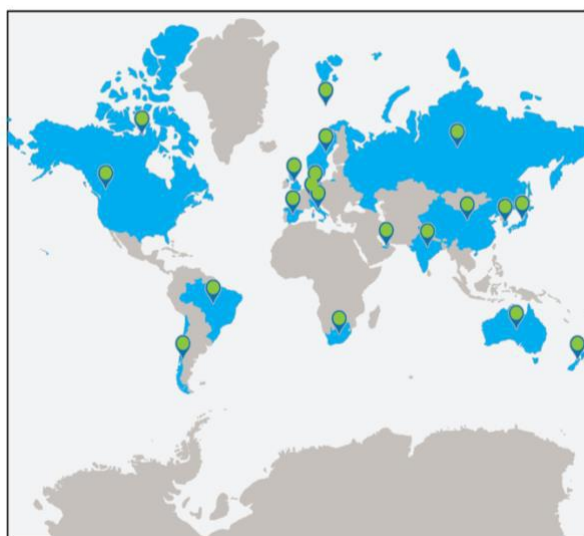
B. Queste (Co-Chair till mid-2021, Sweden), P. Yager (Co-Chair, USA), P. Dutrieux (Co-chair from mid-2021, UK), A. Wåhlin (Sweden), T-W Kim (South Korea), P. Abrahamson (UK), Y. Nakayama (APECS Representative till mid-2021, Japan), A. Thompson (USA), T. Dotto (Brazil/UK), A. Silvano (APECS Representative from mid-2021, UK)

### 2021 Milestones:

During 2021 the ABS RWG:

- Developed a 5-Year Workplan for the ABS RWG activities to deliver into the SOOS 2021-2025 Implementation Plan.
- Bastien Queste stood down as ABS co-chair but remained as a general leadership team member.
- New leadership team members were called for and appointed, Pierre Dutrieux (UK), Andrew Thompson (USA), Tiago Dotto (Brazil/UK). Pierre Dutrieux was subsequently appointed as ABS co-chair.
- Yoshihiro Nakayama finished his term as ABS APECS Representative and rotated to a general leadership team member. A new APECS Representative was called for and appointed, Alessandro Silvano (UK).
- Initiated quarterly ABS newsletters to the RWG membership (first issue published in December 2021).

Total working group membership: 88 from 59 institutions across 21 countries  
(growth of an addition 12 members in 2021)



## Ross Sea Regional Working Group

### Leadership:

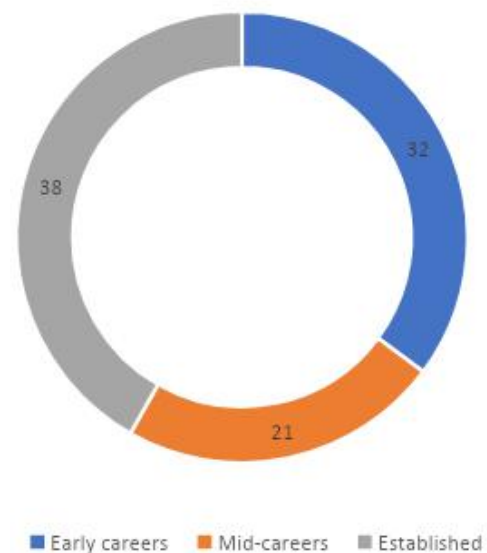
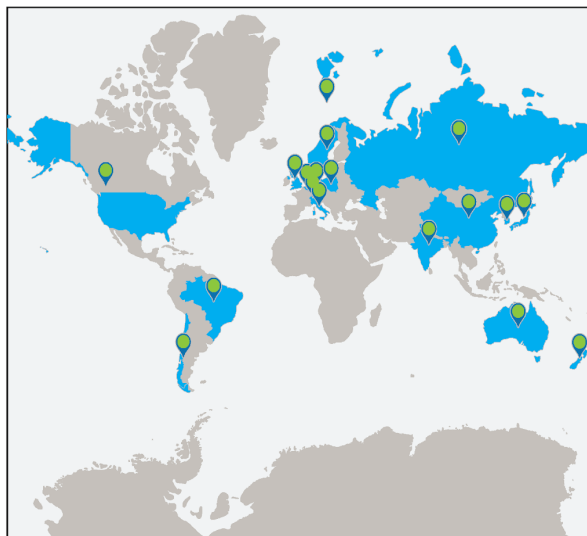
W. Smith (Co-Chair, USA), P. Rivaro (Co-Chair, Italy), M. LaRue (NZ/USA), J. Park (South Korea), C. Stevens (NZ), J. He (China), Z. Wang (China), K. Heywood (UK), P. Falco (Italy), M. Kim (APECS Representative, Switzerland/South Korea)

### 2021 Milestones:

During 2021 the Ross Sea RWG:

- Finalised the identification of sub-regions for the Ross Sea sector.
- Provided a report on updating the current and future Ross Sea RWG contributions to SOOS, “Observational Activities in the Ross Sea: Current and Future Contributions - An Update” (<https://doi.org/10.5281/zenodo.5762638>).
- Engaged in the Ross Sea Oceanographic Collaborative Discussion for Italy and New Zealand (online, December 2021). The Ross Sea RWG was represented by Craig Stevens and Pierpaolo Falco.
- Begun planning for an Italian Ross Sea International Conference (2023, Italy).
- Proposed a session titled “Atmosphere-ocean-ice interactions: physical, biogeochemical and biological processes in the Ross Sea” to the 2023 IUGG Meeting (Berlin, July 2023).
- Collaborative Ross Sea cruises in the 2021/22 season successful deployed several floats.

Total working group membership: 94 from 64 institutions across 22 countries  
(growth of an additional 20 members in 2021)



## Southern Ocean Indian Sector (SOIS) Regional Working Group

### **Leadership:**

E. Shadwick (Co-chair, Australia), S. Tripathy (Co-Chair, India), J. Shi (China), A. Makhado (South Africa), C. Cotté (France), C. McMahon (Australia), W. Hobbs (Australia), J. George (India), T. Hirawake (Japan), T. Tamura (Japan), S. Halfter (APECS Representative, Australia)

### **2021 Milestones:**

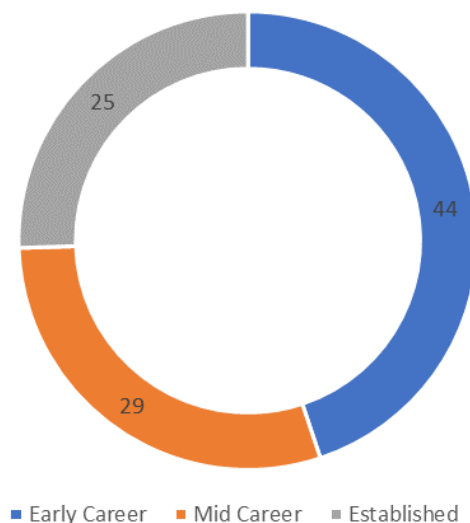
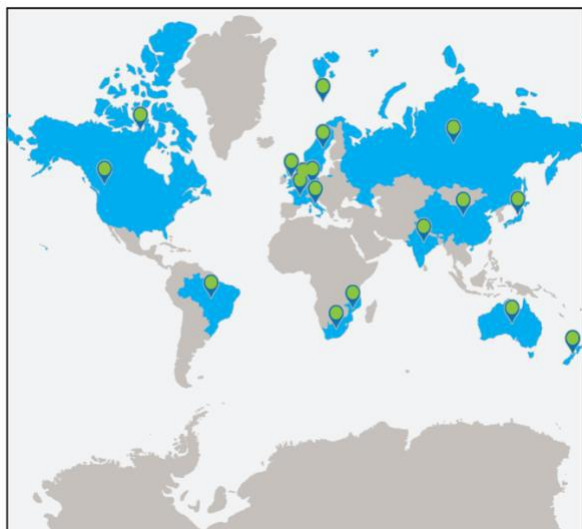
During 2021 the SOIS RWG:

- Developed a 5-Year Workplan for the SOIS RWG activities to deliver into the SOOS 2021-2025 Implementation Plan.
- Call for and appointed two new leadership team members from Japan, Toru Hirawake and Takeshi Tamura.
- Produced quarterly newsletters to the SOIS RWG membership.
- Developed a publication identifying the gaps in observing system and emerging challenges being led by Svenja Halfter, SOIS RWG APECS Representative (in prep.).
- Began planning for a 2022 SOIS Workshop to be held alongside SCAR2022 in India (this workshop is now postponed till 2023 to be held alongside another in-person relevant international conference).
- Developed QC documents to be submitted to Ocean Best Practices (moored temperature and salinity now available, moored oxygen in prep.).
- Successful deployment and retrieval of the Southern Ocean Time Series moorings as well as successful proposal for the continual of these deployments/retrievals on the RV Investigator for 2024, 2025 and 2026.
- Submitted several proposals for international collaborative Antarctic field programmes to the Australian Antarctic Science grant science (submitted February 2022).

Members from the SOIS RWG represented SOOS and SOIS at the following international meeting:

- COP26 (in-person and online, October/November 2021), Elizabeth Shadwick presented as part of the side-event “[Ocean Acidification in Polar Regions: Poles Apart but not Polar Opposites.](#)”

Total working group membership: 101 from 67 institutions across 19 countries (growth of an additional 18 members in 2021)



## West Antarctic Peninsula and Scotia Arc (WAPSA) Regional Working Group

### *Leadership:*

J. Höfer (Co-Chair, Chile), O. Schofield (Co-chair, USA), I. Schloss (Argentina), P. Trathan (UK), K. Hendry (UK), D. Abele (Germany), I. Ahn (South Korea), J. Arata (Canada), A. Barbosa (Spain), C. Mendes (Brazil), E. Seyboth (APECS Representative, Brazil)

### *2021 Milestones:*

During 2021 the WAPSA RWG:

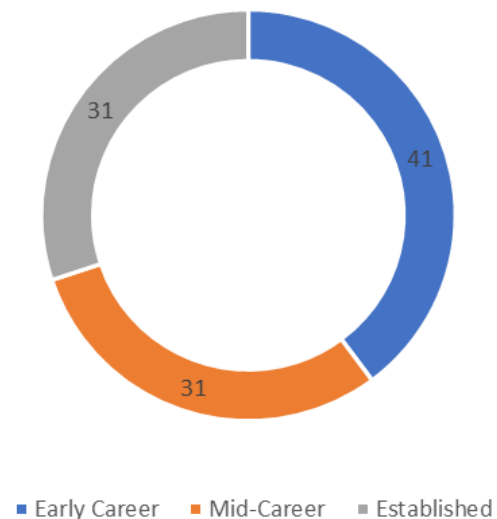
- Developed a 5-Year Workplan for the WAPSA RWG activities to deliver into the SOOS 2021-2025 Implementation Plan.
- Coordinating a special issue in the Marine Technology Society (in prep.) on the use of new technologies for polar science-exploration with any manuscripts submitted and accepted in 2021 (planned for publication late 2022).
- Coordinated SOOS engagement with the newly funded UK BioPole Programme.
- Development of a ErDAPP web portal for polar data which will include WASPA data from the Palmer LTER and beyond.

Members from the WASPA RWG represented SOOS and WAPSA at the following international meetings:

- Ant-ICON Community Engagement Meeting (online, May 2021), Irene Schloss.
- Virtual Working on the New Global Ocean Biogeochemistry (GO-BGC) Array (online, June 2021), Oscar Schofield.

- COP26 (in-person and online, October/November 2021), Juan Höfer along with other SOOS leadership members were speakers and panel members of the SOOS/MEASO side-event, “[Antarctica Marine Ecosystems Under Pressure](#).”

Total working group membership: 106 from 66 institutions across 28 countries  
(growth of an addition 10 members in 2021)



## Weddell Sea and Dronning Maud Land (WSDML) Regional Working Group

### **Leadership:**

S. Moreau (Co-Chair till mid-2021, Norway), M. Janout (Co-Chair, Germany), S. Arndt (Co-Chair from mid-2021, Germany), S. Fawcett (South Africa), A. Meijers (UK), U. Nixdorf (Germany), JB. Sallée (France), L. Biddle (Sweden), R. Kerr (Brazil), S. Thomalla (South Africa), T. Photopoulou (UK), E. Campbell (APECS Representative, USA)

### **2021 Milestones:**

During 2021 the WSDML RWG:

- Developed a 5-Year Workplan for the WSDML RWG activities to deliver into the SOOS 2021-2025 Implementation Plan.
- Sebastien Moreau joined EXCOM in June 2021 and therefore stood down from his role in the WSDML RWG. Stefanie Arndt was appointed as the new WSDML co-chair.
- Two new leadership members were appointed in 2021, Sandy Thomalla (South Africa) and Theoni Photopoulou (UK).
- [Call for papers](#) for a “The Weddell Sea and the ocean off Dronning Maud Land: unique oceanographic conditions shape circumpolar and global processes – a multi-disciplinary

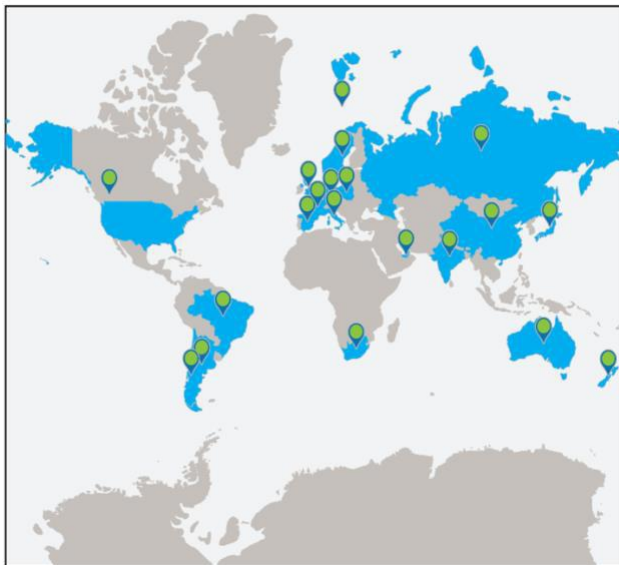
study” Special Issue across Copernicus Ocean Science, Biogeosciences, the Cryosphere journals. First manuscripts were accepted and published in 2021 (3 published in 2021). Manuscripts submissions to the special issue will be accepted till the 31<sup>st</sup> of December 2022.

- Planned for a “Weddell Sea Dronning Maud Land Science” workshop held online in 6-9<sup>th</sup> June 2022.

Members from the WSDML RWG represented SOOS and WSDML at the following international meetings:

- [The Southern Ocean on Europe’s shores – climate impacts, sea level rise, and the marine environment](#) (online, February 2021), Jean-Baptiste Sallée

Total working group membership: 122 from 75 institutions across 24 countries  
(growth of an addition 22 members in 2021)



## Capability Working Groups

SOOS Capability Working Groups enhance observational capabilities for SOOS, such as:

- Developing and implementing technologies.
- Improving observational design, efficiency and coverage.
- Developing associated methods for managing and disseminating information.

The enhanced knowledge, technology and observing capabilities from these groups are intended to feed directly into the implementation plans of the RWGs. Capability Working Groups (CWG) are multi-year efforts, with annual review of progress provided by SOOS governance. With 2020 being the final year of the 5-Year Implementation Plan (2016-2020), all the CWGs completed their first phase. Those interested to continue as SOOS CWGs were invited to submit a proposal for continuation under the new Science and Implementation Plan (2021-2025). Proposals were received from three of the previous five SOOS CWGs: Southern Ocean Fluxes (SOFLUX) CWG, Censusing Animal Populations from Space (CAPS) CWG and Observing System Design (OSD) CWG.

### Censusing Animal Populations from Space (CAPS) Capability Working Group

#### **Leadership:**

M. Hindell (Co-Chair, Australia), P. Fretwell (Co-Chair, UK), P. Trathan (UK), H. Lynch (USA), D. Costa (USA), A. Lowther (Norway), C. Southwell (Australia), M. LaRue (New Zealand), C. McMahon (Aus), H. Bornemann (Germany), B. de la Mare (Australia)

#### **2021 Milestones:**

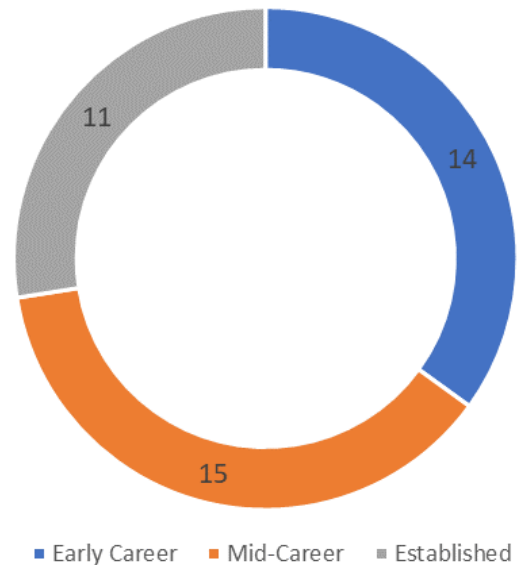
During 2021 the CAPS CWG:

- Developed a proposal to continue as a SOOS Capability Working Group for the SOOS implementation period 2021-2025 (accepted).
- Continued and increased the satellite acquisition on several species including emperor penguins, pygoscelis penguins, whales, albatross, crabeater seals and Weddell seals.
- Worked on refining AI and other machine learning algorithms for automated counting.
- Planned for an annual CAPS meeting as a side-event of SCAR2022.
- Submitted a paper to the Antarctic Treaty Consultative Meeting on the establishment of emperor penguin specially protected areas.
- Appointment of 3 new post-doctorates at the British Antarctic Survey working on CAPS CWG activities.
- A new NSF/NERC crabeater seal project was initiated to coordinate research effort on the Antarctic Peninsula.
- Several other remote sensing projects have been initiated on Antarctic vertebrae that will be incorporated into CAPS including projects on albatross, emperor penguins and whales.

Publications of the CAPS CWG in 2021:

- Insights from the first global population estimate of Weddell seals in Antarctica (La Rue et al., 2021) – <https://doi.org/10.1126/sciadv.abh3674>
- Ice matters: life-history strategies of two Antarctic seals dictate climate change eventualities in the Weddell Sea (Wege et al., 2021) – <https://doi.org/10.1111/gcb.15828>
- Quantifying the causes and consequences of variation in satellite-derived population indices: a case study of emperor penguins (Labrousse et al., 2021) – <https://doi.org/10.1002/rse2.233>
- The emperor penguin – vulnerable to projected rates of warming and sea ice loss (Trathan et al., 2021) – <https://doi.org/10.1016/j.biocon.2019.108216>

Total working group membership: 45 from 32 institutions across 20 countries  
(growth of an addition 3 members in 2021)



## Observing System Design (OSD) Capability Working Group

### **Leadership:**

D. Jones (Co-Chair, UK), L. Lenain (Co-Chair, USA), M. Mazloff (USA), K. Baldry (Australia), R. Eriksen (Australia), B. Ward (Ireland), S. Halfter (Australia), Y. Ammar (APECS Representative, Sweden)

### **2021 Milestones:**

During 2021 the OSD CWG:

- Developed a proposal to continue as a SOOS Capability Working Group for the SOOS implementation period 2021-2025 (accepted).
- Recruited new leadership team members with Matt Mazloff stepping down as co-chair but remaining in the general leadership team, the new OSD leadership team is listed above.
- Commenced compiling a list of observing system design projects and list of possible useful methodologies for observing system design.

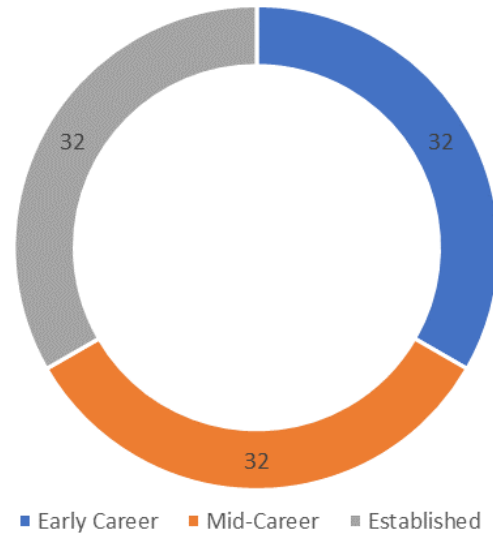
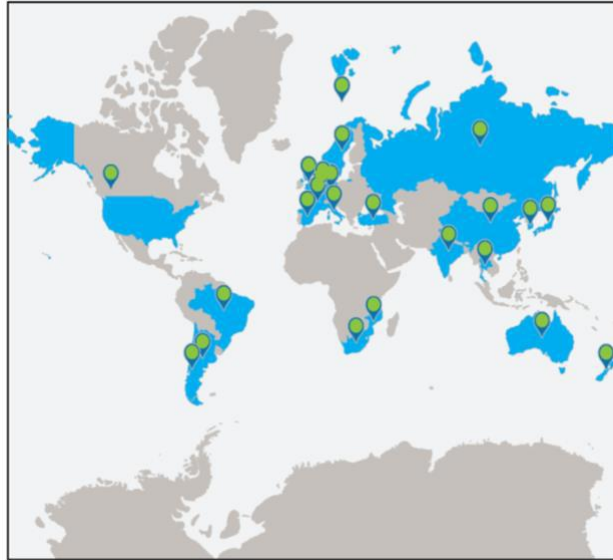
Members from the OSD CWG represented SOOS and the assimilation of Southern Ocean biogeochemical, ocean and sea ice data at the following meetings:

- Joint ECMWF/OceanPredict workshop on Advances in Ocean Data Assimilation (online, May 2021), Matt Mazloff.
- OCB Filling the Gaps in Observation-Based Estimates of Air-Sea Carbon Fluxes Workshop (online, May 2021), Matt Mazloff.
- Virtual Working on the New Global Ocean Biogeochemistry (GO-BGC) Array (online, June 2021), Matt Mazloff.

Publications of the OSD CWG in 2021:

Contributed to the BAMS 2020 State of the Climate Report, Southern Ocean Chapter (published 2021 – <https://doi.org/10.1175/BAMS-D-21-0081.1>).

Total working group membership: 97 from 67 institutions across 27 countries (growth of an addition 13 members in 2021)



## Southern Ocean Fluxes (SOFLUX) Capability Working Group

### Leadership:

S. Gille (Co-Chair, USA), S. Swart (Co-Chair till late-2021, Sweden), M. du Plessis (Co-Chair from late-2021, Sweden/South Africa), B. Delille (Belgium), M. Bourassa (USA), C-A. Clayson (USA), S. Josey (UK), A. Lenton (Australia), I. Smith (New Zealand), E. Schulz (Australia), B. Ward (UK), V. Tamsitt (Australia/USA), M. du Plessis (APECS Representative till late-2021, Sweden/South Africa), I. Orselli (APECS Representative from late-2021, Brazil)

### 2021 Milestones:

During 2021 the SOFLUX CWG:

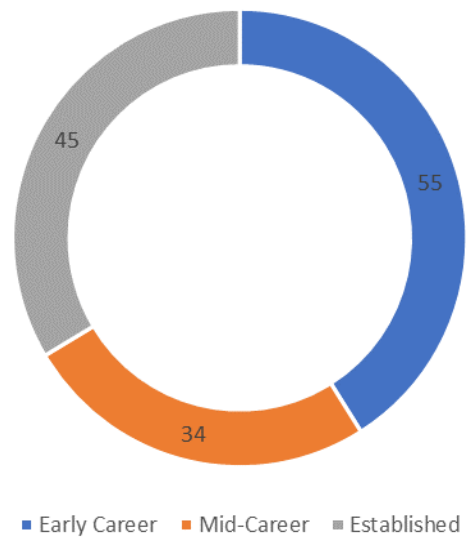
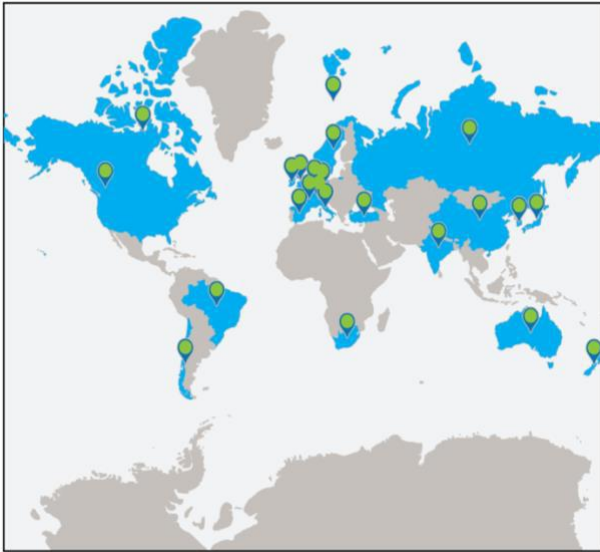
- Developed a proposal to continue as a SOOS Capability Working Group for the SOOS implementation period 2021-2025 (accepted).
- Sebastiaan Swart stepped down as co-chair but remaining in the general leadership team, and Marcel du Plessis (Sweden/South Africa) finishing his term as APECS Representative and stepped into the Co-Chair position.
- New leadership team members were recruited, Veronica Tamsitt (Australia/USA) and Iole Orselli (Brazil) was recruited as a new APECS Representative.
- The working group continued to produce approximately monthly newsletter to the SOFLUX membership.
- Commenced a webinar series with three webinars produced 2021:
  - o [“Update on the Southern Ocean Time Series Observatory”](#), May 2021, Eric Schulz (Australia).
  - o [“Air-Sea CO<sub>2</sub> Fluxes Inferred from Biogeochemical Argo Data”](#), July 2021, Alison Gray (USA).

- [“Air-Sea Fluxes from the Polar Pod”](#), September 2021, Peter Sutherland (France).

Members from the SOFLUX CWG represented SOOS and the SOFLUX CWG at:

- American Meteorological Society Annual Meeting (online, January 2021), Sarah Gille.
- BEPSII Annual Meeting, “Biogeochemical exchange processes at sea ice interfaces” (online, August 2021), Bruno Delille and other SOOS leadership team members

Total working group membership: 152 from 83 institutions across 26 countries  
(growth of an addition 13 members in 2021)



### **Acoustic Trends in Antarctic Blue and Fin whales in the Southern Ocean (ATWG) Capability Working Group**

The SOOS ATWG CWG was completed in 2021. The working group was active within SOOS between 2017 to 2021, producing three scientific publications, a conference paper and an annotated library of Antarctic baleen whale sounds (Miller et al., 2021 – <https://doi.org/10.1038/s41598-020-78995-8>). Additionally, they held regular leadership team meetings and an open working group meeting in Barcelona, Spain in 2019.

### **Observing and Understanding the Ocean beneath Antarctic sea ice and ice shelves (OASIIS) Capability Working Group**

The SOOS OASIIS CWG was completed in 2021. The working group was a joint working group of SOOS and the Partnership of Observation of the Global Ocean (POGO) and was active within SOOS between 2016 to 2021. The working group contributed significantly to the SOOS publication to the OceanObs'19 Special Issue (Newman et al., 2019 – <https://doi.org/10.3389/fmars.2019.00433>). The working group also held a successful workshop in 2017, Germany with 66 attendees from 36 institutions across 13 countries. Finally, the working group produced an OASIIS factsheet (van Wijk et al., 2020 – <https://doi.org/10.5281/zenodo.4011492>).

## Task Teams

SOOS Task Teams are developed to produce specific products, organise events, or solve a particular problem. Each Task Team is made up of a small group of experts and aims to complete its work within weeks or months. SOOS Capability Working Groups can be formed to address issues requiring a long-term effort (e.g., months to years).

### Autonomous Underwater Vehicles (AUVs) Task Team

#### **Leadership:**

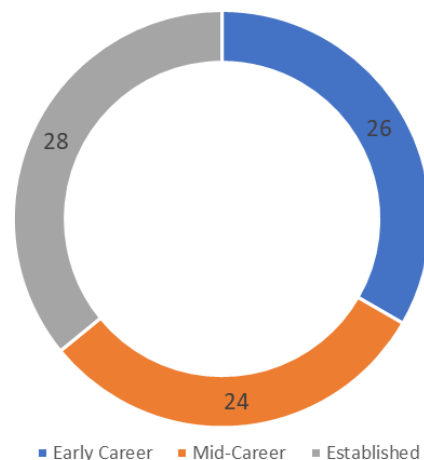
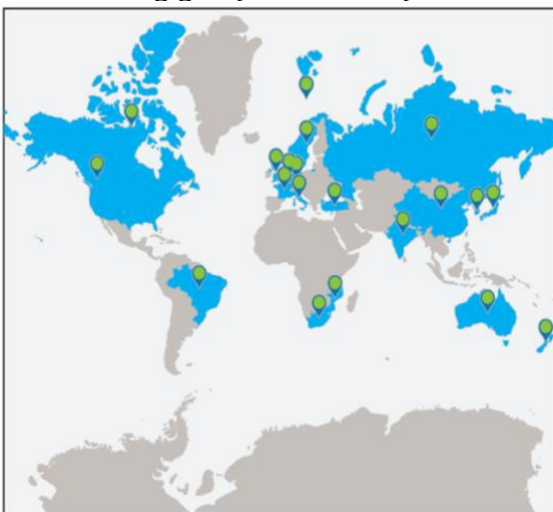
G. Williams (Co-Chair, Australia), K. Heywood (Co-Chair, UK) W.S. Lee (Co-Chair, South Korea), A. Wählin (Co-Chair, Sweden), P. van der Merwe (Australia), T. Tamura (Japan), D. Chen (China), J. O'Callaghan (New Zealand), P. Dutrieux (UK), A. Martin (Australia), B. Schmidt (USA)

#### **2021 Milestones:**

During 2021 the AUV Task Team:

- Held an [online AUV Task Team meeting](#) with over 30 attendees in preparation for the 2021/22 field season where three AUV teams (UK, Sweden, Australia/South Korea) were collaborating in a Thwaites Glacier campaign (later became only a two AUV team, UK and Sweden, campaign) as well as presentations by other polar AUV teams.
- Continued collaboration between the Australia (University of Tasmania) and South Korea (KOPRI) to support polar AUV field deployments.
- Continued to strengthen connections and build an international polar AUV network with engagement for all key polar AUV programmes.

Total working group membership: 79 from 51 institutions across 23 countries



## Ecosystem Essential Ocean Variables (eEOVs) Task Team

### **Leadership:**

A. Constable (Co-Chair, Australia), I. Schloss (Co-Chair, Argentina), O. Schofield (USA), M. Muelbert (Brazil), J. Melbourne-Thomas (Australia)

### **2021 Milestones:**

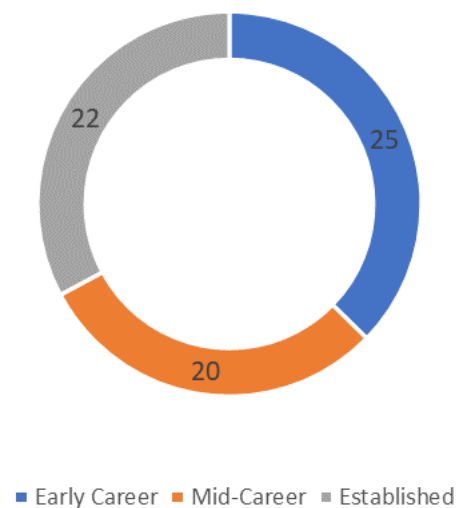
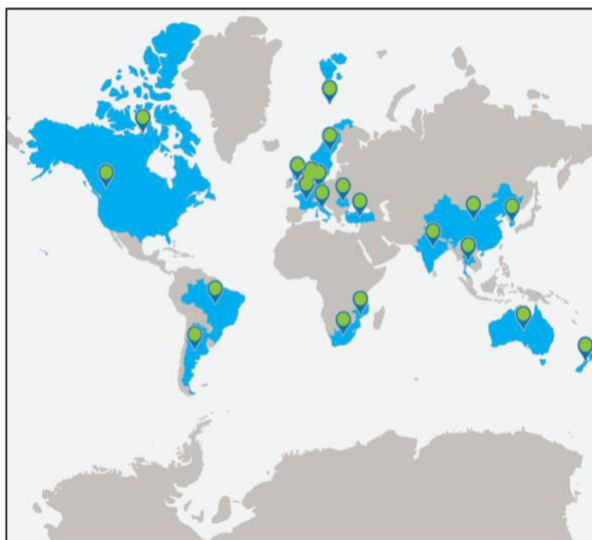
During 2021 the eEOV Task Team:

- Work continued on a publication of Southern Ocean sentinels for submission to the Marine Ecosystem Assessment of the Southern Ocean (MEASO) Special Issue (in prep.).

Members from the eEOV Task Team represented SOOS at the following international meetings:

- Ant-ICON Community Engagement Meeting (online, May 2021), Irene Schloss.
- COP26 (in-person and online, October/November 2021), Andrew Constable along with other SOOS leadership members were speakers and panel members of the SOOS/MEASO side-event, “[Antarctica Marine Ecosystems Under Pressure](#).”

Total working group membership: 69 from 52 institutions across 24 countries



## SOOS National Networks

### SOOS-Swedish Southern Ocean Network

The Swedish Polar Research Secretariat has partnered with SOOS in a 3-year partnership (2020-2022) to develop a national network of researchers, policy and industry members with an interest in the Southern Ocean; to enhance the connections of the Swedish Southern Ocean community to the international community; and to provide support for increased visibility of Swedish Southern Ocean data and activities.

#### **Leadership:**

S. Swart (Co-Chair; Sweden), T. Dahlgren (Co-Chair; Sweden)

#### **2021 Milestones:**

During 2021 SOOS-Swedish Southern Ocean Network has:

- Planned for an in-person network meeting to be held at the University of Gothenburg in June 2022.
- Released the first [network newsletter](#).
- Prepared Swedish mooring datasets to be included into the SOOS Mooring Network (to be added in 2022).

## Equity, Diversity and Inclusion (EDI) Group

The SOOS Equity, Diversity and Inclusion (EDI) group is a mechanism to ensure there is discussion, reflection and recommendations on all equity issues with SOOS to focus on real actions relevant to the SOOS community.

#### **Leadership:**

S. Fawcett (Co-Chair; South Africa), S. Diggs (Co-Chair; USA), J. Beja (Co-Chair; Belgium)

#### **2021 Milestones:**

- Appointed a 3<sup>rd</sup> Co-Chair, Joana Beja (Belgium).
- Convened the UN Decade Ocean Satellite Session, “[More Seats at the Table – Increasing Representation in the Marine Sciences](#)” (online, September 2021).
- Commenced drafting an AGU commentary of EDI within the Southern Ocean (in prep.).
- Held regular EDI Group meetings.

## SOOS Partnerships and Collaborations

### Polar Data Discovery Enhancement Research (POLDER)

Polar Data Discovery Enhancement Research (POLDER) is a collaboration between the Arctic Data Committee, SCAR Standing Committee on Antarctic Data Management and SOOS. The aim of POLDER is to develop tools and resources to support metadata aggregation, and federated search tools to improve the discoverability of polar science data.

During 2021 POLDER has:

- Continued the development of the POLDER Best Practices Guide to implementing schema.org as an interchange format for discovery metadata.
- Hosted four online data hacks in the “Polar to Global Online Interoperability and Data Sharing Workshop Series” with ~20-40 attendees per session.
- Advised on the development of a POLDER Pilot Federated Search tool, which was funded by the World Data System – International Technology Office, as a contribution to the POLDER vision.

Total working group membership: 84 (from 68 institutes across 27 countries)

### Marine Ecosystem Assessment of the Southern Ocean (MEASO)

The MEASO project aims to assess long-term status and trends in Southern Ocean biota and food webs. The project is now nearing completion (planned to be finalised in 2022) with a Frontiers in Marine Science Special Issue planned for release in 2022 including over 20 publications. SOOS is a key partner in the MEASO project with strong engagement from the SOOS community.

During 2021 the SOOS contributions to MEASO included:

- Co-convened a COP26 side-event with SOOS titled “[Antarctica Marine Ecosystems Under Pressure](#).” with SOOS speakers and panel members including Sian Henley (side-event lead), Jilda Caccavo (SSC), Andrew Constable (ex-SOOS Co-Chair) and Juan Höfer (WAPSA RWG). This event was held in-person and online in October/November 2021.
- Published “From data to marine ecosystem assessments of the Southern Ocean: achievements, challenges, and lessons for the future” to the MEASO Frontiers in Marine Science Special Issue (Van de Putte et al., 2021 – <https://doi.org/10.3389/fmars.2021.637063>).

## **Southern Ocean UN Ocean Decade Task Force**

The Southern Ocean UN Ocean Decade Task Force is coordinated by SCAR and was set up to develop the Southern Ocean UN Ocean Decade Action Plan. SOOS is a key partner in the Task Force with SOOS representation on the Task Force steering committee from SOOS Co-Chairs (Eileen Hofmann and Mike Williams), SOOS Vice Chair (Sian Henley) and SOOS Data Officer (Pip Bricher).

Additionally, SOOS has had strong involvement in the Task Force working groups which identified the needs of the Southern Ocean community to deliver into the seven UN Ocean Decade outcomes. SOOS leadership members who contributed to these working groups included Kate Hendry (WAPSA RWG), Clive McMahon (SOIS RWG), Jean-Baptiste Sallée (WSDML RWG and ex-SSC), Giorgio Budillon (SOOS National Representative), Sarat Tripathy (SOIS RWG), Sebastien Moreau (SOOS Vice Chair), Bhaskar Parli (SOOS National Representative), Andrew Meijers (SSC), Dan Jones (OSD CWG), Bruno Delille (SOFLUX CWG and SOOS National Representative), Marcel du Plessis (SOFLUX CWG), Alessandro Silvano (ABS RWG), Delphine Lannuzel (SSC), Sebastiaan Swart (SOFLUX CWG), Svenja Halfter (SOIS RWG), Won Sang Lee (AUV Task Team), Andrés Barbosa (WAPSA RWG), Craig Stevens (Ross Sea RWG), Louise Biddle (WSDML RWG), Javier Arata (WAPSA RWG), Ruth Eriksen (OSD CWG), Stefanie Arndt (WSDML RWG) and Pip Bricher (SOOS Data Officer).

During 2021 the SOOS contributions to the Southern Ocean Task Force included:

- Participation in the Task Force working groups.
- Assisted in the convening of the 2<sup>nd</sup> Southern Ocean UN Ocean Decade Regional Workshop (online, September 2021).
- Publication of the Southern Ocean UN Ocean Decade Action Plan (published in April 2022, <https://doi.org/10.5281/zenodo.6412191>) SOOS co-authorship including Pip Bricher (SOOS Data Officer), Sian Henley (SOOS Vice Chair), Eileen Hofmann (SOOS Co-Chair), Mike Williams (SOOS Co-Chair) and Anton Van de Putte (DMSC).
- Eileen Hofmann presented in the [Southern Ocean UN Decade Webinar](#) (online, December 2021).

## **CliC/CLIVAR/SCAR Southern Ocean Regional Panel (SORP)**

The CliC/CLIVAR/SCAR Southern Ocean Regional Panel (SORP) aims to coordinate the discussion and communications of scientific advances in the understanding of climate variability and change in the Southern Ocean. SOOS has a long history of collaboration and partnership with SORP including holding an ex-officio position on the SORP steering committee. This position was held by Matt Mazloff till mid-2021 when Matt rotated off the SOOS Scientific Steering Committee (SSC) and new SSC member, Luciano Pezzi, took on this position from mid-2021. Matt and Luciano attended and presented on SOOS at SORP meetings, and Luciano is co-editing a SORP CLIVAR Exchanges Special Issue (planned for released in late 2022).

## New SOOS 2020 Initiatives

### Polar Technologies Task Team

In 2021, the SOOS Scientific Steering Committee received a proposal (accepted) for a new SOOS Task Team on Polar Technologies. This task Team aims to develop a polar technologies group to work on addressing challenges and exploit synergies in technology targeted at Southern Ocean and Antarctic marine research. See more on the Task Team via their page on the SOOS website (<https://soos.aq/activities/task-teams/polar-tech>).

Task Team Objectives:

- Collate challenges faced by technology developers and operators in developing and growing the adoption of new technologies/methods in support of marine observations in the Southern Ocean and Antarctic.
- Work towards outlining the efficacy and potential impacts of a community working group around polar technology.
- Prepare a proposal to become a SOOS Capability Working Group.

### *Leadership:*

A. Marouchos (Chair, Australia), A. Meijers (UK), R. Verrinder (South Africa)

## SOOS 10-Year Celebration

SOOS celebrated its 10-year anniversary in August, 2021. To celebrate, an online event with a series of presentations on SOOS' achievements of the last decade and plans for the coming decade was held.

Recordings of the SOOS 10-Year Celebration presentations are available via the [SOOS Youtube Channel](#).

## Appendix I: Acronyms

AADC - Australian Antarctic Data Centre  
ABS - Amundsen and Bellingshausen Sector  
ACAP – Agreement on the Conservation of Albatrosses and Petrels  
ADC - Arctic Data Committee  
AniBOS – Animal Borne Ocean Sensors  
APECS - Association of Polar Early Career Scientists  
ASPeCt - Antarctic Sea Ice Processes and Climate  
ATWG - Acoustic Trends in Antarctic Blue and Fin Whales in the Southern Ocean Working Group  
AUV(s) - Autonomous Underwater Vehicle(s)  
BAMS - Bulletin of American Meteorological Society  
BELSPO – Belgian Science Policy Office  
BEPSII - Biogeochemical exchanges at Sea Ice Interfaces  
BioPole – Biogeochemical processes and ecosystem function in changing polar systems and their global impacts  
CAPS - Censusing Animal Populations from Space  
CCAMLR - Commission for the Conservation of Antarctic Marine Living Resources  
CLIVAR - Climate Variability and Predictability  
CliC - Climate and Cryosphere  
COMNAP - Council of Managers of National Antarctic Programs  
CSIRO - The Commonwealth Scientific and Industrial Research Organisation  
CTD - Conductivity, Temperature, Depth  
CWG(s) - Capability Working Group(s)  
DMSC - Data Management Subcommittee  
EDI - Equity, Diversity and Inclusion  
EMODnet - European Marine Observation and Data Network  
eEOV - ecosystem Essential Ocean Variables  
EuroGOOS - European Global Ocean Observing System  
EXCOM - Executive Committee  
FAIR - Findable, Accessible, Interoperable, Reusable  
GBIF – Global Biodiversity Information Facility  
GCMD - Global Change Master Directory  
GLODAP – Global Ocean Data Analysis Project  
GOA-ON – Global Ocean Acidification Observing Network  
GOOS – Global Ocean Observing System  
GTS - Global Telecommunication System  
IAATO - International Association of Antarctic Tour Operators  
IMAS - Institute for Marine and Antarctic Studies  
INSDC – International Nucleotide Sequence Database Collaboration  
MBON – Marine Biodiversity Observation Network  
MEASO - Marine Ecosystem Assessment of the Southern Ocean  
MEOP - Marine Mammals Exploring the Oceans Pole to Pole  
NASA - National Aeronautics and Space Administration  
NECKLACE - Network for the Collection of Knowledge on meLt of Antarctic iCe shElves

NERC - National Environment Research Council  
NSF - National Science Foundation  
OASIIS - Observing and Understanding the Ocean below Antarctic Sea Ice and Ice Shelves  
OASIS – Observing Air-Sea Interactions Strategy  
OBIS – Ocean Biodiversity Information System  
OSD - Observing System Design  
POGO - Partnership for Observations of the Global Ocean  
POLDER - Polar Data Discovery Enhancement Research  
RWG(s) - Regional Working Group(s)  
SCADM - Standing Committee on Antarctic Data Management  
SCAR - Scientific Committee on Antarctic Research  
SCOR - Scientific Committee on Oceanic Research  
SOA / SOA-China - State Oceanic Administration, China  
SO-CHIC - Southern Ocean Carbon and Heat Impact on Climate  
SOCCOM – Southern Ocean Carbon and Climate Observations and Modelling project  
SOFLUX - Southern Ocean Fluxes  
SOIS - Southern Ocean Indian Sector  
SOLAS - Surface Ocean - Lower Atmosphere Study (SOLAS)  
SOOS - Southern Ocean Observing System  
SORP - Southern Ocean Regional Panel Expert Group  
SSC - Scientific Steering Committee  
UN - United Nations  
UTAS - University of Tasmania  
WAPSA - West Antarctic Peninsula and Scotia Arc  
WSDML - Weddell Sea and Dronning Maud Land