



SOOS
SOUTHERN OCEAN
OBSERVING SYSTEM

The

Southern Ocean Observing System

2020 Annual Report

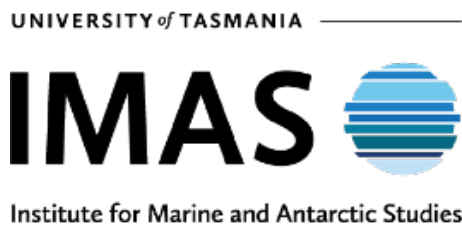


Summary

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); and is endorsed by the Partnership for Observations of the Global Ocean (POGO), and the “Climate Variability and Predictability (CLIVAR)” and “Climate and Cryosphere (CliC)” projects of the World Climate Research Programme (WCRP).

SOOS was launched in 2011 with the mission to facilitate the collection and delivery of essential observations on dynamics and change 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 2020



SWEDISH POLAR
RESEARCH SECRETARIAT



Contents

<u>SOOS IN 2020 – A YEAR OF CHALLENGES AND PROGRESS</u>	4
<u>PERFORMANCE REPORT</u>	6
<u>SOOS KEY PRODUCTS</u>	17
DATABASE OF UPCOMING EXPEDITIONS TO THE SOUTHERN OCEAN	17
SOOSMAP.....	18
<u>SOOS IPO SPONSORSHIP IN 2020</u>	20
SUSTAINED SUPPORT FOR THE IPO.....	20
SPONSORSHIP OF SOOS ACTIVITIES	22
<u>GOVERNANCE</u>	23
EXECUTIVE COMMITTEE	23
SCIENTIFIC STEERING COMMITTEE.....	23
ANNUAL SCIENTIFIC STEERING COMMITTEE MEETING.....	24
<u>SOOS IMPLEMENTATION GROUPS</u>	26
DATA MANAGEMENT SUB-COMMITTEE (DMSC)	26
REGIONAL WORKING GROUPS	29
CAPABILITY WORKING GROUPS	35
TASK TEAMS.....	39
NEW SOOS 2020 INITIATIVES	41
<u>APPENDIX I: ACRONYMS</u>	44

SOOS in 2020 – A Year of Challenges and Progress

2020 was a very different year for everyone. The Covid-19 pandemic impacted SOOS at many levels and changed the way our community works. The transition of in-person meetings to online formats reduced the ability for face to face interactions and opportunities to expand the observing system for the Southern Ocean. However, not all the effects of the pandemic were negative. The virtual meeting format provided easier access for participation in SOOS activities, by many who otherwise would have been challenged by in-person attendance. In 2020, SOOS hosted virtual annual meetings of the Scientific Steering Committee and Data Management Sub Committee; community workshops for the Observing System Design (OSD) Capability Working Group (CWG), and West Antarctica Peninsula-Scotia Arc and Weddell Sea-Dronning Maud Land Regional Working Groups (RWGs), as well as leadership meetings for all RWGs and CWGs. SOOS RWGs completed the definition of sub regions in support of documenting coverage of essential variables and enabling this assessment over the Southern Ocean. Scheduling virtual meetings to accommodate time zones was a challenge, but the willingness by participants to accept non-standard working times was appreciated and made the meetings possible and productive.

SOOS acknowledged the need to consider issues relating to Equity, Diversity and Inclusion (EDI) within SOOS and the community. In 2020, SOOS formed an independent EDI group to support these discussions. This group recognises the need for inclusivity for all representations and will make recommendations to SOOS to addresses identified needs and challenges.

SOOS' online presence continued to grow, underpinned by an updated and expanded website (soos.aq), and the transfer of SOOSmap to a standalone domain (soosmap.aq). SOOSmap has quadrupled the number of CTD casts available, and now delivers improved performance through a restructure of the web architecture. In addition, SOOS also established new hosting arrangements for DueSouth with the European Polar Board, which should expand its visibility and use by those planning voyages to the Southern Ocean.

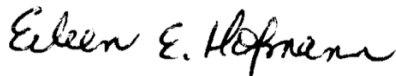
Preparation for the UN Decade of the Ocean for Sustainable Development began, and SOOS is partnering in an effort, funded by the Belgian Federal Science Policy Office (BELSPO), to develop the Southern Ocean Action Plan. This will provide a framework for Southern Ocean

stakeholders to formulate and develop activities that support the Decade Action Plan in the years ahead.

We continued our annual contribution of the BAMS State of the Climate Southern Ocean chapter, and delivered 4 other publications, including a combined effort of the OSD and Southern Ocean Fluxes CWGs on designing a flux mooring network (Wei et al. 2020).

Most importantly, we would like to thank our sponsors, in particular the University of Tasmania Institute for Marine and Antarctic Studies, the Tasmanian Government Department of State Growth, and the Commonwealth Scientific and Industrial Research Organisation, who provide critical core support in hosting the SOOS office. Additionally we thank Antarctica New Zealand and the Swedish Polar Research Secretariat for their support of SOOS in 2020.

Signed:



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

Signed:



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

Performance Report

SOOS published its 5-Year Implementation Plan in 2016, which articulated the key challenges driving SOOS, and resulted in the identification of 4 Objectives and specific Key Result Areas (KRAs) that will address the causes of these challenges. This annual report provides an overview of the final year of activities for the 2016-2020 Implementation Plan.

The progress against SOOS's objectives and KRAs are outlined in the table below.

Table 1: The table below shows the progress against the SOOS objectives and KRAs for both the year 2020 (Comments column), and also the status of that action for the whole 5-year Implementation Plan, where the colour coding is: **Achieved**; **Ongoing Activity**; **Modified from original plan and still in progress**; **No longer a priority**. All acronyms can be found in Appendix I.

	Comments on 2020 actions	Implementers
Objective 1: Facilitate the design of a comprehensive and multi-disciplinary observing system for the Southern		
KRA 1.1: Establish criteria for adopting EOVs and communicate them		
Publish table of status of EOVs	Achieved EOVs for each SOOS science theme published on the website. SOOS approved development of an eEOV Task Team to support EOV identification through the MEASO effort. Efforts of this group contribute to this KRA and will be published as part of the MEASO Special Issue. Full achievements of this group on page 39.	SOOS: SSC, RWGs, CWGs, eEOV TTs Broad community input
Published, international define criteria for EOVs	No longer a priority No progress was achieved on this outcome due to a lack of a well-defined community to drive this initiative.	SOOS: SSC, RWGs, CWGs Broad community input
KRA 1.2: Southern Ocean EOVs are identified and the manner in which they satisfy the criteria are communicated		
Compile EOV descriptions and supporting documentation	No longer a priority The eEOV Task Team will be articulating eEOVs and assessment requirements in a publication to be included in the MEASO Special Issue.	SOOS: SSC, RWGs, CWGs, eEOV TTs Broad community input
KRA 1.3: Spatio-temporal, system level EOV sampling requirements are identified, documented and agreed, and strategies implementation developed if needed		
Reviews of current status of EOV coverage, key gaps and requirements	Ongoing Activity Each RWG has defined sub-regions to enable quantification EOV coverage, key gaps and requirements. A framework for mapping the importance of the Science Themes and Challenges for these sub-regions was developed in 2020 to be implemented by RWGs in 2021.	SOOS: RWGs

International strategic plan for observing the ocean beneath Antarctic sea ice and ice shelves		SOOS-POGO OASIIS Factsheet (van Wijk et al., 2020)	SOOS: OASIIS CWG Community: POGO
Observing system design for Southern Ocean Flux moorings		Outcomes from Flux Mooring Task Team, a joint project between OSD and SOFLUX CWGs published here (Wei et al., 2020).	SOOS: OSD and SOFLUX CWGs
International standard, methodology and strategy for sustained and reliable remote sensing-based monitoring of pack-ice seal populations		The CAPS CWG have completed yearly tasking of images for the circumpolar census of pack-ice seals; completely measurements of four seal species at Rothera Station to assist with remote species identification; and developed habitat suitability models for crabeater seals throughout the Weddell Sea from satellite images and citizen science (Wege et al., 2020). Full achievements of the CAPS CWG on page 35.	SOOS: CAPS CWG
Development of international initiative Benchmark Southern Ocean ecosystems		This working group changed and developed into the MEASO initiative and therefore is no longer active within SOOS.	
KRA 1.4: A strategy for the uptake of EOVs within the Regional Working Groups is developed			
Regional implementation strategies developed		All 5 RWGs have defined sub-regions to enable quantification of observational coverage and requirements (with Ross Sea and WAPSA finalising their sub-regions in late 2020/early 2021).	SOOS: RWGs

	Comments on 2020 actions	Implementers
Objective 2: Unify and enhance current observation efforts and leverage further resources across disciplines, and between nations and programmes		
KRA 2.1: Working Groups and Task Teams that coordinate efforts across disciplines and programs, and between nations are developed to fill priority gaps		
Continuation of active working groups against WG-specific Terms of Reference	5 RWGs, 5 CWGs, 8 Task Teams (3 still active)	SOOS: RWGs, CWGs, TTs Community: POGO, ADC, SCADM, AAD, COMNAP, ASPeCt, CliC, SCAR
Development of new WGs and Task Teams (as required)	In 2020, the AUV Task Team had a shift in focus to better separate the objectives of the SOOS Task Team and the IEP-PAU, with strong interaction remaining between the two groups. Full description of the refocus on page 40. In 2020, SOOS developed an Equity, Diversity and Inclusion (EDI) group to ensure there is a mechanism for discussion, reflection and recommendation on all equity issues within SOOS and the broader community, as appropriate. Full description on page 42.	SOOS: SSC, TTs Community: IEP-PAU
KRA 2.2: Key products for the Southern Ocean that aid in information transfer and facilitate collaborative efforts are identified and produced		
Database of Upcoming Expeditions to the Southern Ocean	Support and population of DueSouth continued through 2020 with a total of 388 expeditions now available in DueSouth. During 2020, a new host for DueSouth, the EPB, was agreed and a Memorandum of Understanding signed. The EPB will take over hosting and technical maintenance in 2021.	SOOS: DMSC, RWGs, CWGs, TTs Community: AADC, COMNAP, CCAMLR, EPB
SOOSmap	A restructure at EMODnet and plans to redevelop the web architecture took precedence in 2020. Work also progressed on preparing fast ice chlorophyll, surface CO2, and biogeochemical data for future inclusion in SOOSmap.	SOOS: DMSC Community: EMODnet Physics

		SOOSmap has 18 data layers, ~50,000 datasets, has ~96, 000 page views per year, ~30,000 near-real-time data files downloaded per year, and ~11 long term archive files downloaded per year.	
Community annual calendar		SOOS's community annual calendar was maintained and updated as required.	SOOS: IPO Broad community input
SOOS Publications		<ul style="list-style-type: none"> - Wei et al., 2020. Optimizing mooring placement to constrain Southern Ocean air-sea fluxes. DOI:10.1175/JTECH-D-19-0203.1 - Queste et al., 2020. BAMS State of the Climate 2019, Section: Southern Ocean. DOI:10.1175/2020BAMSStateoftheClimate.1 - Wege et al., 2020. Citizen science and habitat modelling facilitates conservation planning for crabeater seals in the Weddell Sea. DOI:a 10.1111/ddi13120 - Shabangu et al., 2020a: Acoustic seasonality, behaviour and detection ranges of Antarctic blue and fine whales under different sea ice conditions off Antarctica. DOI: 10.3354/esr01050 - Shabangu et al., 2020b: Overview of the IWC SOWER cruise circumpolar acoustic survey data and analyses of Antarctic blue whale calls within the dataset. DOI: 10.13140/RG.2.2.20607.02720 	SOOS: SSC, RWGs, CWGs, TTs Broad community input
KRA 2.3: Collaborative, multidisciplinary and multinational workshops and meetings are undertaken, resulting in the SOOS mission being achieve			
Task Team Capability and Regional Working Group workshops		WAPSA Online Workshop; Data Management Sub-Committee Annual Meetings (online); CAPS Working Group Meeting (online); WSDML Online Workshop	SOOS: RWGs, CWGs, TTs
Capacity- or Community-building workshops		UN Ocean Decade Southern Ocean 1st Workshop; Science POLDER Datahacks "Polar-to-Global Online Interoperability and Data Sharing Workshop/Hackathon"; Observing System Design Teleconference	SOOS: RWGs, CWGs. TTs Broad Southern Ocean community and data community input
International conference sessions, town-halls, side meetings, information sessions		SOFLUX Ocean Science Town Hall	SOOS: SOFLUX

	Comments on 2020 actions	Implementers
Objective 3: Facilitate linking of sustained long-term observations to provide a system of enhanced data discovery and delivery, utilising existing data centres and programmatic efforts combined with, as needed, purpose-built data management and storage systems		
KRA 3.1: A multi-disciplinary metadata portal is developed and populated and continuously updated with records. Efforts include archiving orphan datasets and advocating for direct links to the data in metadata records		
Maintenance of the SOOS NASA GCMD metadata portal	Continued support of the NASA EarthData Search (formerly GCMD). Developers released new search functionality and filter queries resulting in twice as many records as the previous metadata portal, and several new search and filtering tools, including filtering by platform, data type, processing level, data formats, and new space, time, keywords and text-search tools.	SOOS: DMSC Community: NASA
International mooring network	The Southern Ocean Mooring Network, an index of known oceanographic moorings, was maintained and published through SOOSmap.	SOOS: IPO
Southern Ocean glider network	A report on the data management needs for the SOOS glider communities was completed and published. https://zenodo.org/record/3826080#.XrzowmgzY2w	SOOS: IPO, SSC
KRA 3.2: Up-to-date information on key Southern Ocean data programmes, centres, and repositories is provided		
Up-to-date catalogue of Southern Ocean data providers	The catalogue of key Southern Ocean data providers was maintained on the SOOS website.	SOOS: DMSC Broad community input
KRA 3.3: Web-based tools will be explored and, as needed, developed to aid data discovery and delivery; the wider is encouraged to adopt and enhance tools that already exist		
Federated data search tool	The SOOS POLDER Task Team (jointly with SCADM and the ADC), continued to work towards a federated search tool. In 2020, POLDER	SOOS: DMSC, POLDER TT Community: SCADM, ADC

		hosted three data hacks. Full achievements of the POLDER Task Team on page 40.	
Brokering data discovery and interoperability		Through POLDER, SOOS has advocated for all polar-relevant data centres to implement schema.org metadata, to support interoperability of metadata records. SOOS has also worked with PANGAEA to negotiate the standardisation and publication of 18,008 CTD datasets through SOOSmap, and with community members of SCAR Plastic in Polar Environments group and Saildrone to share their respective data types through SOOSmap	SOOS: DMSC, POLDER TT Community: EMODnet Physics, PANGAEA, SCAR, Saildrone
KRA 3.4: Data synthesis tools and products are made accessible			
Online catalogue of data products		No longer a viable effort for SOOS due to lack of capacity to review and maintain up-to-date products.	

	Comments on 2020 actions	Implementers
Objective 4: Provide services to communicate, coordinate, advocate and facilitate SOOS objectives and activities		
KRA 4.1: The need for sustained Southern Ocean observations is strongly articulated		
Endorsement of observational research projects	Review and endorsement of 7 international observational research projects.	SOOS: SSC
High-level advocacy action	In 2020, SOOS worked with its community to draft a new Science and Implementation Plan covering 2021-2025. This plan involved all SOOS Implementation groups as well as broader community members. It will be independently reviewed before approval by SCAR and SCOR in 2021.	SOOS: SSC, DMSC, general SOOS community, UN Ocean Decade Southern Ocean Task Force Broad community input

	<p>In 2020 SOOS with other Southern Ocean communities, led the establishment of a Southern Ocean contribution to the UN Decade of Ocean Science for Sustainable Development. This included running a UN Ocean Decade Southern Ocean Workshop in San Diego in February 2020 and associated workshop report; coordinating a Southern Ocean community comment to the UN Decade Zero Draft Implementation Plan; and presentation of the Southern Ocean contribution to the UN Decade of Ocean Science for Sustainable Development. SOOS is now a member of the Southern Ocean Task Form set-up to develop the Southern Ocean Action Plan for the UN Decade.</p> <p>Attendance and representation: OceanSciences2020; IMOS Planning Meeting; Erring Data Collective; EU-PolarNet Webinar on Integrated Polar Research Programmes; ASPeCt Annual Meeting; SCAR2020; Improving the FAIRness of Antarctic Data; APECS SCAR 2020 Workshop; BEPSII/ECVice 2020 Meeting Online; NASEM Sustaining Ocean Observations Phase 2 Meeting; Evolving and Sustaining Ocean Best Practices System Workshop IV; EMODnet: A Decade of Achievements Connecting Marine Data to Knowledge; Antarctic Regional Climate Centre; SCOR AGM 2020; SOLAS SSC; EMODnet Arctic Launch; Hobart Engineering and Tech Forum; All-Atlantic Ocean Research Forum; OceanSITES; OceanObs Research Coordination Network Meeting</p>	
KRA 4.2: Engagement with international stakeholders, across all disciplines and nations, is maintained		
Reporting	In 2020, annuals reports were prepared for SCAR, SCOR, POGO, SCADM and the SOOS SSC.	SOOS: IPO
Development of SOOS Engagement Strategy	The SOOS contacts and engagement database was supported, maintained and further developed. The drafting and implementation of a SOOS Impact and Engagement Strategy is currently underway (to be finalised in 2021).	SOOS: IPO, SSC
Community engagement and conference presentations	Direct engagement included:	SOOS: SSC, DMSC, general SOOS community

		IMOS, ASPeCt; SCAR; SCOR; APECS; EMODnet; SOLAS; WMO; NASEM; CLIVAR/CLIC/SCAR SORP All engagement/presentations were carried out directly by IPO staff or by a community member facilitated by the IPO.	
Engagement with core IPO sponsors and stakeholders		Regular engagement was maintained through in-person and virtual meetings as well as email correspondence. Engagement included: IMAS, UTAS, CSIRO, Tasmanian State Government, AAPP, IMOS, TPN, Antarctica New Zealand, Swedish Polar Research Secretariat, SOA-China, National Centre for Polar and Ocean Research India, TUBITAK Polar Research Institute (Turkey), University of Cape Town	SOOS: IPO
KRA 4.3: A SOOS community bibliography is developed			
Scoping of requirements and delivery of product		The need for this product has changed and a bibliography will no longer be developed. The IPO will continue to track all published references to SOOS using Airtable, which was initiated in 2018.	SOOS: IPO, SOOS community
KRA 4.4: The SOOS Communication Strategy is implemented			
Maintaining the SOOS website		Development of a new website was initiated in 2019 to enhance functionality and was finalised in 2020.	SOOS: IPO, SOOS community
Online database of presentations, posters, publications and other products		As described under KRA 4.2, all products (including posters, maps, and slide presentations) were updated and maintained in the SOOS database, newly developed in Airtable (see 4.2 above).	SOOS: IPO, SOOS community
Delivery of the SOOS newsletter		Two issues of the SOOS Newsletter were delivered in 2020, May and September.	SOOS: IPO, SOOS community
SOOS publications (not including WG-specific publications)		Queste et al., 2020. BAMS State of the Climate 2019, Section: Southern Ocean. DOI:10.1175/2020BAMSSStateoftheClimate.1	SOOS community Broad community input
Other communication activities			

Social media		SOOS Facebook and Twitter accounts were maintained during 2020. SOOS has 2,303 followers on facebook (increased from 1,864 on the 1/1/2020), and 1,319 follows on twitter (increased from 1,029 on the 1/1/2020)	SOOS: IPO
KRA 4.5: Support for SOOS International Project Office is maintained and enhanced			
Hosting agreement for IPO		2020 saw the start of the new Partnership Agreement for hosting of SOOS by UTAS-IMAS, CSIRO and the Tasmanian Government Department of State Growth. This agreement concludes in 2022.	
Maintenance of existing IPO and SOOS sponsorship		Regular engagement with existing sponsors; Oversight of finance and budget; Development of annual sponsorship agreements and project schedules; Management of in-kind services and agreements.	SOOS: IPO
Actions on new sponsorship opportunities		Engagement with potential new sponsors of SOOS; significant progress with new sponsorship secured including TUBITAK Polar Research Institute (Turkey), and University of Cape Town Marine Biogeochemistry Lab. As part of the new Swedish Polar Research Secretariat sponsoring agreement (2020-2022), a SOOS-Swedish Southern Ocean Network was established in 2020.	SOOS: IPO, SSC, SOOS-Swedish Southern Ocean Network
KRA 4.6: SOOS Administration, facilitation of Strategic Plan activities, and delivery of support services is maintained			
Maintenance and support of SOOS Governance		Engagement with governing bodies SCAR and SCOR; Management of Executive Committee (meetings, membership, activities, TORs); Management of Scientific Steering Committee (meetings, membership, activities, TORs); Management of Data Management Sub-Committee (meetings, membership, activities, TORs)	SOOS: IPO, SSC
Management of Implementation Plan monitoring and progress review		Weekly IPO review and recording of activities against all KRAs.	SOOS: IPO

Administrative finance		Development of 2020-2022 budget; Management of income and expenditure; Sponsorship of SOOS events.	SOOS: IPO
Office administration and staff developments/supports		Management and support of SOOS IPO staff.	SOOS: IPO

SOOS Key Products

Database of Upcoming Expeditions to the Southern Ocean



DueSouth is a community-populated database for the sharing of information on upcoming field campaigns and expeditions. It enhances opportunities for collaboration and sharing of field resources.

Key Sponsors / People:

DueSouth coding and hosting in 2020 were provided to SOOS by James Cusick of the Australian Antarctic Data Centre (AADC). Antarctic Sea Ice Processes and Climate (ASPeCt) provided funding to complete the coding. Expedition plans are systematically provided by JCOMMOPS/OceanOps, CCAMLR, and COMNAP. DueSouth is available at <https://data.aad.gov.au/duesouth/>

2020 Achievements:

- European Polar Board (EPB) has agreed to take over hosting of DueSouth, and signed a Memorandum of Understanding with SOOS on the terms of this hosting arrangement. The movement of DueSouth to EPB will be conducted in 2021.
- COMNAP and CCAMLR provided annual data on upcoming expeditions which were added as a bulk entry to DueSouth.
- Negotiations continued with IAATO on integrating information from tourist vessels.

2021 Plans:

- Finalise the transfer of the hosting of DueSouth to EPB
- Work with SCAR, EPB, and other partners to develop a help forum that is compatible with DueSouth

DueSouth metrics:

- 388 Expeditions
- 24 Nations Represented
- 55.7% expeditions from CCAMLR; 18.3% from COMNAP Regional Information Exchange; 12.6% discovered and entered by the SOOS International Project Office (IPO); 8.8% entered by the community; 4.6% from JCOMMOPS/OceanOps

SOOSmap



SOOSmap is an interactive web map that allows users to explore circumpolar datasets before downloading the data they need. SOOSmap was developed for SOOS by the European Marine Observations and Data Network (EMODnet) Physics group.

Key Sponsors/People

All development and hosting are provided by Antonio Novellino and Marco Alba at EMODnet Physics as part of their mandate to support regional ocean observing systems and under the banner of EMODnet For Global, with support from Southern Ocean Carbon and Heat Impact on Climate (SO-CHIC). The relationship between SOOS and EMODnet was negotiated by Patrick Gorringer from the EuroGOOS secretariat.

2020 Milestones

During 2020, a number of developments were made to SOOSmap. These include:

- Addition of 18,008 casts from PANGAEA, which quadrupled the number of CTD casts in SOOSmap (4,900 from other data aggregators)
- Circumpolar data was added from Saildrone, the first data from a commercial source in SOOSmap
- Users can now display the historical transects of all mobile platforms (i.e. Argo, MEOP seals) to see where data were collected from
- New tools have been created to display basic metadata from SOOS-specific data layers
- The back-end SOOSmap architecture was partially restructured to improve performance
- SOOSmap was transferred to a stand-alone domain, soosmap.aq

2021 Plans:

In 2021, we plan to:

- Spread the data holdings across multiple servers to improve page loading speed
- Rebuild the user interface to make it responsive on mobile devices and simpler to use
- Develop a text interface for the ERDDAP server that hosts SOOSmap data
- Create a tool for selecting seasonal observations
- Improve our support for good data citation practices

SOOSmap metrics:

- 18 data layers with ~50, 000 datasets including 22, 908 CTD casts; 14, 543 Krillbase samples; 3,630 penguin colony counts; 2,067 Argo; 1,466 drifting buoys; 1,387 marine mammals (MEOP); 1,300 sea-ice chlorophyll cores; 814 SOOS mooring network (metadata); 766 continuous plankton recorder transects; 114 SCAR plastics sampling; 99 tide gauges; 83 moorings; 47 NECKLACE (metadata); 15 bathy messages on GTS; 15 gliders; 10 ferrybox; 7 TESAC messages on GTS; 1 Saildrone
- ~96, 000 page views per year, ~30, 000 near-real-time data files downloaded per year, and ~11 long term archive files downloaded per year.SOOS Sponsorship

SOOS IPO Sponsorship in 2020

SOOS remains an initiative of SCAR and SCOR, and in 2020 this support, governance and sponsorship continued, highlighted by the support provided for the Annual SOOS Scientific Steering Committee Meeting (see page 30).

Further, in 2020, 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 and the Tasmanian State Government Department of State Growth, was commenced, supporting the continuation of the SOOS IPO in Hobart, Australia. In addition, ongoing sponsorship was maintained from the State Oceanic Administration of China and Antarctica New Zealand, as well as a new 3-year collaboration with the Swedish Polar Research Secretariat.

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 IPO remains a significant activity of the IPO. Building on the significant effort to develop new sponsoring partnerships in 2020, further discussions took place with a number of other national communities on potential sponsorship opportunities to commence in 2021.

SOOS Governing Bodies



Core Sponsors



SWEDISH POLAR
RESEARCH SECRETARIAT



Service Providers



EMODnet



COMNAP
Council of Managers
of National Antarctic Programs



OLD DOMINION
UNIVERSITY

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 2020 for 2021 activities: - Purchasing of video conference equipment - Facilitate DueSouth help forum development - Publication and printing cost of the SOOS Science and Implementation Plan, and 5-Year Progress Report	SCAR
1st Southern Ocean Regional Workshop of the UN Decade of Ocean Science for Sustainable Development (San Diego, USA, February 2020)	Biodiversity.aq, SCAR, SOOS, ICED, NIOZ, Old Dominion University Report: https://zenodo.org/record/3973745#.YJlp0LUzY2x
SOFLUX Ocean Sciences Town Hall (San Diego, USA, February 2020)	Saildrone, SOOS

Governance

Executive Committee

In 2020, the SOOS Executive Committee (EXCOM) held quarterly virtual meetings. In June 2020, Andrew Constable (AUS) and Sebastiaan Swart (Sweden) rotated off as Co-chairs, and Mike Williams (NZ) and Eileen Hofmann (USA) rotated from Vice Chairs to Co-chairs. Sian Sian Henley (UK) joined the SOOS EXCOM as Vice Chair.

Scientific Steering Committee

One Scientific Steering Committee (SSC) member rotated off the SSC in 2020: Anya Waite (Canada). We thank Anya for her contribution to SOOS! Three new members were brought on to the committee in 2020: Delphine Lannuzel (AUS), Jilda Caccavo (Germany) and Luciano Pezzi (Brazil).

The composition of the SSC in 2020, including the Data Management Sub-Committee (DMSC), Regional Working Group (RWG) and Equity, Diversity and Inclusion (EDI) Co-Chair ex-officios, is shown below:

Name	Country	Region	Gender	Expertise	2015	2016	2017-mid 2018	Mid 2018- 2019	Md 2019- 2020	Mid 2020- 2021	Mid 2021- 2022
Mike Williams	NZ	Aus/Pac	M	Physical	1	1	1 [^]	2 [^]	2 [^]	2 ^{^^}	2 ^{^^}
Eileen Hofman	USA	N. Am	F	Biology				1 [^]	1 [^]	1 ^{^^}	2 ^{^^}
Sian Henley	UK	EU	F	Biogeochem						1 [^]	1 [^]
Matthew Mazloff	USA	N. Am	M	Physical	1	1	1	2	2	2	
JB Sallee	France	EU	M	Physical	1	1	1	2	2	2	
Dake Chen	China	Asia	M	Physical			1	1	1	2	2
Burcu Ozsoy	Turkey	EU/Asia	F	Sea ice			1	1	1	2	2
Irene Schloss	Argentina	S. Am	F	Biology				1	1	1	2
Andrew Meijers	UK	EU	F	Biology				1	1	1	2
Sarah Fawcett	S. Africa	Africa	F	Biogeochem				1	1	1	2
Delphine Lannuzel	Australia	Aus/Pac	F	Biogeochem						1	1
Jilda Caccavo	Germany	EU	F	Biology						1	1
Luciano Pezzi	Brazil	S. Am	M	Physical						1	1
Petra ten Hoopen	UK	EU	F	DMSC				1	1	2	2
Benjamin Pfeil	Norway	EU	M	DMSC					1	1	2
Walker Smith	USA/China	N. Am/Asia	M	Ross			1	1	1	2	2
Paola Rivaro	Italy	EU	F	Ross						1	1
Bastien Queste	Sweden	EU	M	ABS					1	1	
Patricia Yager	USA	N. Am	F	ABS						1	1
Elizabeth Shadwick	Australia	Aus/Pac	F	SOIS						1	1
Juan Hofer	Chile	S. Am	M	WAPSA						1	1
Oscar Schofield	USA	N. Am	M	WAPSA		1	1	1	2	2	2
Sebastien Moreau	Norway	EU	M	WSDML				1	1	1	
Markus Janout	Germany	EU	M	WSDML					1	1	1
Sarah Fawcett	S. Africa	Africa	F	EDI						1	1
Steve Diggs	USA	N. Am	M	EDI						1	1

Current SSC membership as of April 2020. Green represents current year; grey represents currently approved future terms; 1 = first term, 2 = second term, 3 = 3rd term. Names listed below the line are the ex-officio RWG Co-Chairs.

Annual Scientific Steering Committee Meeting

Due to the COVID pandemic, the annual meeting for the SSC and Executive Committee was conducted online. These meetings were as a series of sessions, duplicated to facilitate engagement from all time zones across the weeks starting 26th October and 2nd November.

In addition to reviewing progress, a focus of the 2020 SSC meeting was the development of the SOOS Science and Implementation Plan (2021-2025) with the end of the current Implementation Plan (2016-2020). The meeting also had a session focused on the UN Decade of Ocean Science for Sustainable Development, and the Southern Ocean contribution to the UN Decade.

The minutes from the SSC meeting will be made available on the SOOS website (soos.aq/about-us/scientific-steering-committee).



SOOS Annual 2020 SSC Meetings, held online.

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 (documented in other sections of this report).

Leadership

Joana Beja completed her term as co-chair of the DMSC and was replaced by Benjamin Pfeil. Petra Ten Hoopen continued her role as co-chair.

Total DMSC membership: 28 members from 21 institutions and 12 nations.

Strategic Planning

The DMSC defined a series of metrics to measure the impact of SOOS' data activities, as part of the draft Science and Implementation Plan 2021-2025. These metrics are designed to measure both the unique impact of the SOOS discovery portals and its underlying network, as well as the impact we have on the broader international data community with which we collaborate. The DMSC also developed the data strategies in the new SOOS Science and Implementation Plan, which is expected to be published in 2021.

SOOS Metadata Portal

The SOOS portal on NASA's EarthData Search (formerly the GCMD) was rebuilt in 2020, based on the new Common Metadata Repository structure. The new portal contains 7589 records, almost double the holdings of the previous portal, as it is more inclusive of a wide range of Southern Ocean-relevant datasets. Usage metrics for 2020 are difficult to interpret as the portal went through three iterations but usage is generally low, in the range of 400-500 users over the course of the year.

Southern Ocean Mooring Network

In 2020, the DMSC maintained the SOOS Mooring Network index, published via SOOSmap, adding small numbers of new moorings and refining details in the metadata from extant moorings.

Data Policy Development

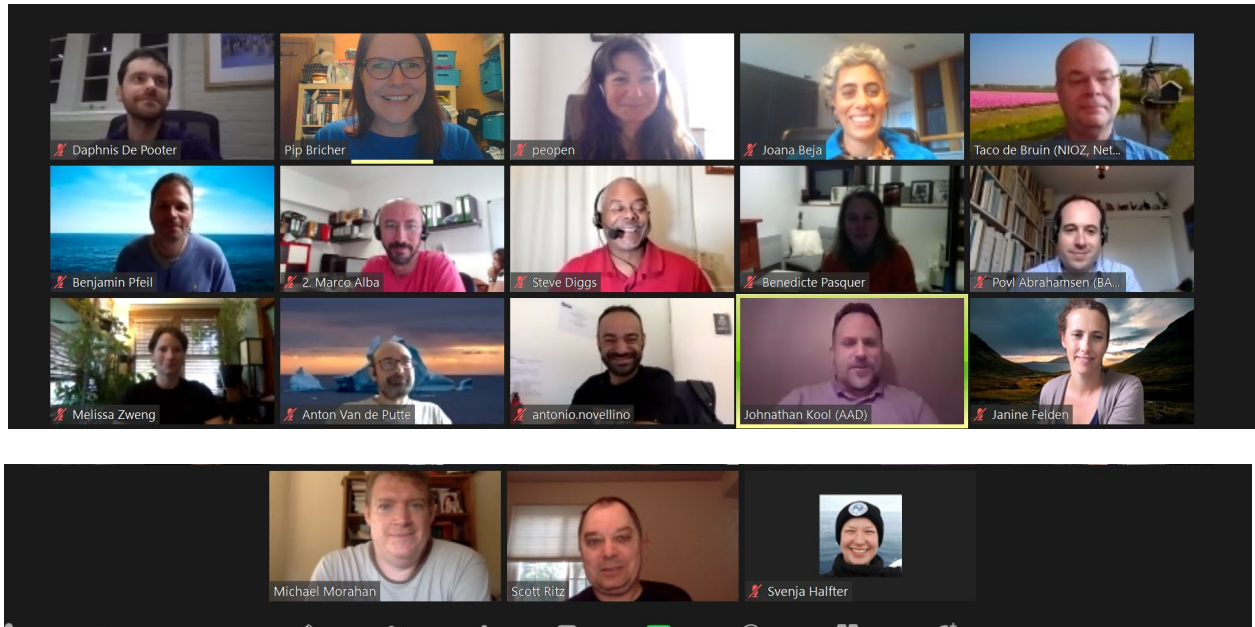
DMSC members collaborated with colleagues in the Standing Committee on Antarctic Data Management (SCADM) and the Arctic Data Committee (ADC) during 2020 on a set of recommendations for data policies. In 2021, It is expected that the recommendations will be presented to SCAR and the Antarctic Treaty and adapted into an updated SOOS Data Policy.

Federated Metadata Search

The Polar Data Discovery Enhancement Research (POLDER) continued its work in 2020. Details are highlighted in the Task Teams section below.

Annual Meeting

The DMSC annual meeting was held online (27-29 July, 2020) due to travel restrictions, with 20 people participating in at least one session. This is close to double the usual attendance at DMSC in-person meetings and the difference is likely thanks to the increased accessibility of an online meeting. Changes were made to the meeting format to accommodate the online format, including replacing slide presentations with advance reading materials, and using Google docs for discussion and minute-taking to allow for asynchronous participation. Meeting lengths were limited to four hours per day, split into two blocks to accommodate different time zones. Scheduling lessons from the DMSC meeting were used to inform later online meetings of other SOOS groups.



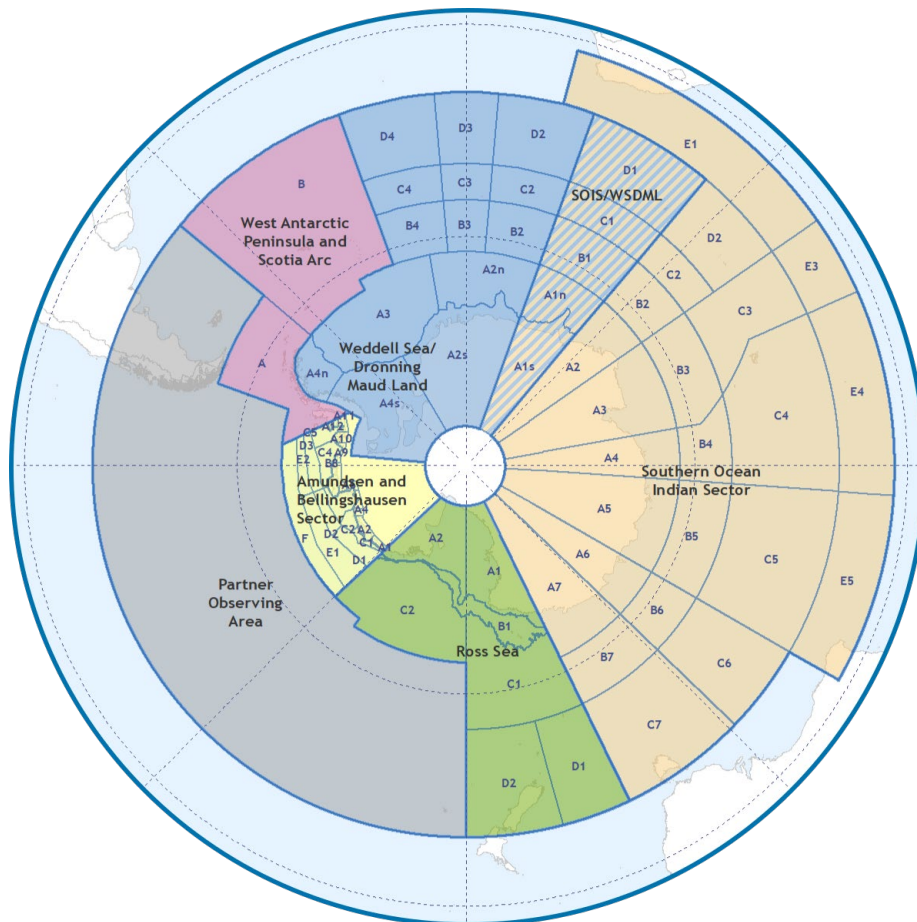
Participants in Day 1 of the DMSC 2020 meeting

Meeting participants: Marco Alba, Anton Van de Putte, Benjamin Pfeil, Joana Beja, Jonathan Kool, Melissa Zweng, Petra ten Hoopen, Taco de Bruin, VS Samy, Scott Ritz, Michael Morahan, Antonio Novellino, Steve Diggs, Svenja Halfter, Daphnis de Pooter, Benedicte Pasquer, Povl Abrahamsen, Janine Felden, Patrick Gorringer, 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, WAPSA and Ross Sea, drafted their sub-regions. These were finalised in early 2021.



West Antarctic Peninsula and Scotia Arc (WAPSA) RWG

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)

2020 Milestones:

The second meeting of the West Antarctic Peninsula and Scotia Arc (WAPSA) working group was held on July 28th, 2020. The meeting was originally planned to be held in Hobart, to coincide with the SCAR2020 Open Science Conference. However, due to the COVID pandemic, the meeting was held online. The working group would like to extend their thanks to APECS for their assistance with organising the Zoom meeting facilities.

The aims of the meeting were:

- To discuss research progress and share exciting new results from the WAP and Scotia Arc regions across the international community;
- To discuss ways forward for the implementation of the WAPSA working group goals;
- To build working group membership, activities and momentum, and to highlight leadership opportunities the in WAPSA working group

The workshop was attended by 51 people representing 31 institutes and 12 countries.

Workshop recording and poster presentations available [here](#).

Workshop report available [here](#) (Hendry et al., 2020, DOI: 10.5281/zenodo.4018199)

During 2020, Sian Henley and Katherine Hendry stepped down as WAPSA co-chairs, with Sian joining EXCOM and Katherine stepping back to general WAPSA leadership. Juan Höfer stepped up from APECS Representative to co-chair in 2020 (with Oscar Schofield continuing) and a new APECS Representative, Elisa Seyboth, joined the working group. Andres Barbosa and Carlos Rafael Mendes also joined the WAPSA leadership team in 2020.

The WAPSA co-chairs were approached by Marine Technology Society to develop a proposal about the status and trends for marine technologies for polar systems. This was submitted and accepted as a proposal for a special issue planned for publication early 2022, edited by Oscar Schofield. Whilst this special issue is on polar systems in general, it will be drawing examples from the WAPSA region.

A student project was developed for summer 2020 sponsored through the NSF RIOS program, focusing on whale migration along the WAP. This student project is through a virtual program and the student was engaged from America Samoa.

Late 2020, the WAPSA leadership team defined sub-regions for the WAPSA region to align with other SOOS RWGs. These sub-regions were to be finalised and implemented from early 2021 (see map above).

Total working group membership: 96 (from 22 countries and 61 institutes)

Ross Sea RWG

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 (Switzerland/South Korea)

2020 Milestones:

The Ross Sea RWG developed a full new leadership team in 2020 with only the pre-existing member remaining in the leadership team being co-chair, Walker Smith; previous co-chair Mike Williams stepped down, so a new co-chair, leadership group members and an APECS Representative were elected through an open nomination process. Once established, the Ross Sea leadership team held 3 online meetings in 2020 (May, June and October) with plans in place to continue these regular meetings into 2021.

Late 2020, the Ross Sea leadership team defined sub-regions for the Ross Sea to align with other SOOS RWGs. These sub-regions were to be finalised and implemented from early 2021 (see map above).

Total working group membership: 74 (from 20 countries and 53 institutes)

Southern Ocean Indian Sector (SOIS) RWG

Leadership:

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

2020 Milestones:

An entirely new leadership team of the Southern Ocean Indian Sector (SOIS) RWG was called for and selected during 2020, with previous co-chairs Andrew Constable and Philippe Koubbi stepping down from the working group, and Tsuneo Odate's recent passing. With the establishment of a new leadership team, Elizabeth Shadwick was nominated as co-chair and a call for a second co-chair to join Elizabeth to be made early 2020. A call for an APECS Representative was also made late 2020, and Svenja Halfter was selected as the first SOIS APECS Representative. The working group has commenced a regular newsletter to re-build engagement in the working group from the Southern Ocean Indian Sector community.

Total working group membership: 83 (from 17 countries and 58 institutes)

Weddell Sea and Dronning Maud Land (WSDML) RWG

Leadership:

S. Moreau (Co-chair, Norway), M. Janout (Co-chair, Germany), S. Fawcett (South Africa), A. Meijers (UK), U. Nixdorf (Germany), JB. Sallee (France), L. Biddle (Sweden), R. Kerr (Brazil), S. Arndt (Germany), E. Campbell (APECS Representative, USA)

2020 Milestones:

The second Weddell Sea and Dronning Maud Land (WSDML) RWG workshop, “The Southern Ocean in the Weddell Sea and off Dronning Maud Land”, was held online in October 2020. The workshop was originally planned to be held in April 2020 in Delmenhorst, Germany, but due to the COVID pandemic was postponed and modified to an online format.

The aims of the workshop were:

- Provide an overview and update of scientific findings, which underline the WSDML as an important area for multidisciplinary studies, and a discussion on initiating a WSDML special issue.
- Inform the SOOS WSDML community about the progress of activities in the area of interest.
- Present ideas, actions and products for the future including multi-national initiatives and ongoing and future national plans, including a discussion on the impact of COVID on the 2020/2021 field season.

The workshop was attended by 80 people from 51 institutes and 22 countries.

Workshop report is available [here](#) (Janout et al., 2020, DOI: 10.5281/zenodo.443108)

Call for submissions to the special issue, “The Weddell Sea and the ocean off Dronning Maud Land: unique oceanographic conditions shape circumpolar and global processes”, [here](#)

During 2020, co-chairs Julian Gutt and Laura de Steur stepped down from the WSDML leadership leaving the RWG with two co-chairs, Sebastien Moreau and Markus Janout (bringing the RWG leadership into alignment with other RWGs, e.g., 2 co-chairs). In addition, two new

members joined the general leadership team, Rodrigo Kerr and Stefanie Arndt. Mia Wege completed her 2-year term as APECS Representative, and a new APECS Representative, Ethan Campbell, was selected in early 2021.

Total working group membership: 110 (from 23 countries and 67 institutes)

Amundsen and Bellingshausen Sector (ABS) RWG

Leadership:

B. Queste (Co-Chair, UK), P. Yager (Co-chair, USA), A. Wåhlin (Sweden), T-W Kim (Korea), P. Abrahamson (UK), Y. Nakayama (APECS Representative, Japan)

2020 Milestones:

During 2020, the SOOS Autonomous Underwater Vehicles (AUV) Task Team was incorporated into the Amundsen and Bellingshausen Sector (ABS) RWG as three large AUV polar programs (UK, Sweden, Australia/South Korea) are heading to the Thwaites Glacier in the 2021/22 season. A combined ABS RWG and AUV Task Team meeting was held to discuss this integration and upcoming field plans. More on the SOOS AUV Task Team and integration with ABS RWG is available [here](#).

The ABS leadership team presented a poster at SCAR2020 Online. The poster is available [here](#). A working group bulletin was also commenced in 2020 to build engagement in the ABS community.

In 2020, ABS elected a second co-chair to join Bastien leading the RWG, Patricia Yager. The RWG also commenced a call for nominations for a new APECS Representative (with Y. Nakayama at the end of his 2-year term in 2021) and additional leadership roles to join the ABS leadership team in late 2020. These new positions will commence by mid-2021.

Total working group membership: 76 (from 21 countries and 53 institutes)

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, generally speaking, limited to 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 of the CWGs will complete their first phase. Those interested to continue as SOOS CWGs will be invited to submit a proposal for continuation under the new Science and Implementation Plan (2021-2025).

Censusing Animal Populations from Space (CAPS) CWG

Leadership:

M. Hindell (Co-Chair, Aus), P. Fretwell (Co-Chair, UK), P. Trathan (UK), H. Lynch (USA), D. Costa (USA), K. Kovacs (Norway), A. Lowther (Norway), C. Southwell (Aus), M. LaRue (NZ), C. McMahon (Aus), H. Bornemann (Germany)

2020 Milestones:

- Spectral measurements of four seal species were conducted at Rothera Station (2020) to assist with remote species discrimination
- The working group met online in August 2020, in lieu of an in-person meeting alongside SCAR2020. During the meeting the progress of the working group to date was discussed and the future plans for the working group under a new proposal to continue as a SOOS CWG.

- Satellite images and citizen science were used to model habitat suitability for crabeater seals throughout the Weddell Sea, published in Diversity and Distributions (Wege et al., 2020)
- Applied for NSF/NERC funding. “Differences in the trophic ecology, distribution and foraging success of crabeater seals across a latitudinal gradient”, PI: Lius Huckstadt (applied 2020)

Total working group membership: 42 (from 18 countries and 32 institutes)

Acoustic Trends in Antarctic Blue and Fin whales in the Southern Ocean (ATWG) CWG

Leadership:

F. Samaran (Co-Chair, France), K. Stafford (Co-Chair, USA), S. Buchan (Chile), F. Castro (Chile), K. Findlay (S. Africa), D. Harris (UK), B. Miller (Aus), I. van Opzeeland (Germany), A. Sirovic (USA)

2020 Milestones:

- Published a library of annotated recording for the purpose of training and evaluating automated detectors of Antarctic blue and fin calls. This was published in Nature January 2021 (Miller et al., 2021).
- *Publications:*
 - o Record acoustic files from over 700 sonobuoy deployments recording blue whale vocalisations were collated and reviewed to develop a database of both digital acoustic files and associated deployment station metadata, published in Journal of Cetacean Research and Management (Shabangu et al., 2020)
 - o Bioacoustics data from an Autonomous acoustic recorder used to describe seasonal occurrence, behaviour and detection ranges Antarctic blue and fine whales of the Maud Rise, published in Endangered Species Research (Shabangu et al., 2020).

- Presentation and conference paper on passive acoustic survey for marine mammals conducted during the 2019 Antarctic voyage on Euphausiids and Nutrient Recycling in Cetacean Hotspots, Acoustics 2019 (Miller et al., 2020).

Total working group membership: 32 (from 14 countries and 26 institutes)

Southern Ocean Fluxes (SOFLUX) CWG

Leadership:

S. Gille (Co-Chair, USA), S. Swart (Co-Chair, Sweden), B. Delille (Belgium), M. Bourassa (USA), C-A. Clayson (USA), S. Josey (UK), A. Lenton (Aus), I. Smith (NZ), E. Schulz (Aus), B. Ward (UK), M. du Plessis (APECS, S. Africa)

2020 Milestones:

- SOFLUX Town Hall was conducted at Ocean Sciences, San Diego, February 2020, funded by SOOS and Saildrone.
- Optimization of mooring placement to constrain Southern Ocean air-sea fluxes, published in Journal of Atmospheric and Oceanic Technology (Wei et al., 2020). This was also presented at OceanOPS in September 2020 by Matthew Mazloff (video available [here](#)). This publication presents the findings from the Flux Moorings Task Team, a joint project between the SOFLUX and Observing System Design CWGs.
- Regular communication to all members through newsletters (every ~3 months) to update on key events, papers, field activities etc.

SOFLUX Co-chair, Sarah Gille, presented on SOFLUX at the Surface Ocean - Lower Atmosphere Study (SOLAS) Scientific Steering Committee meeting in November 2020. Discussions were also had at the meeting on future collaborations between SOLAS and SOFLUX.

Total working group membership: 139 (from 24 countries and 78 institutes)

Observing and Understanding the Ocean beneath Antarctic sea ice and ice shelves (OASIIS) CWG

Leadership:

E. van Wijk (Co-Chair, Aus), R. Coleman (Co-Chair, Aus), A. Breierly (UK), L. Herraiz-Borreguero (Aus), P. Dutrieux (USA)

2020 Milestones:

- Publication of the SOOS-POGO Working Group Fact Sheet: Observing and understanding the ocean below the Antarctic sea ice and ice shelves (OASIIS). Factsheet is available [here](#) (van Wijk et al., 2020. DOI: 10.5281/zenodo.401492)

Total working group membership: 103 (from 24 countries and 68 institutes)

Observing System Design (OSD) CWG

Leadership:

M. Mazloff (USA)

2020 Milestones:

This working group was proposed in mid-2018, builds on the priorities identified in the Observing System Design (OSD) Task Team (2017).

- The OSD CWG held its first meeting in August 2020, online with 23 attendees. The objectives of the working group and the below publication were presented at the meeting along with a discussion on how the CWG can support other SOOS WGs with observing system design to meet their objectives.
- Optimization of mooring placement to constrain Southern Ocean air-sea fluxes, published in Journal of Atmospheric and Oceanic Technology (Wei et al., 2020). This was also presented at OceanOPS in September 2020 by Matthew Mazloff (video available [here](#)). This publication presents the findings from the Flux Moorings Task Team, a joint project between the SOFLUX and Observing System Design CWGs.

Total working group membership: 84 (from 26 institutes and 59 countries)

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).

Ecosystem Essential Ocean Variables (eEOVs) Task Team

Leadership:

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

2020 Milestones:

The Task Team was approved in mid-2019, and has worked to document, evaluate and scope routine reporting products for ecosystem Essential Ocean Variables (eEOVs) to support assessments of the status and trends of Southern Ocean ecosystems. A publication on these efforts is being delivered as a component of the Marine Ecosystem Assessment for the Southern Ocean (MEASO) being undertaken by the program Integrating Climate and Ecosystem Dynamics, a joint program of Integrated Marine Biosphere Research (IMBeR) and SCAR. This will summarise the biological observing system, titled “ Southern Ocean Sentinels: sustained observing of ecosystem change”, and is currently being prepared for publication as part of the MEASO special issue in *Frontiers of Ecology and Evolution*. To be published in 2021.

Autonomous Underwater Vehicles (AUVs) Task Team

Leadership:

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

2020 Milestones:

The Task Team on Autonomous Underwater Vehicles (AUVs) was approved in mid-2019 and aims to match polar AUV science objectives and engineering abilities with deployment capabilities and sensor development across National Antarctic Programs. Alignment with the Society for Underwater Technology's Polar AUV group and the international Expert Panel on Polar AUV (IEP-PAUV) has resulted in a shift of focus for the SOOS Task Team in 2020. The SOOS AUV Task Team has re-focused on international AUV science coordination, delineating itself from the 'Engineering Best Practices' mandate for the IEP-PAUV whilst maintaining strong connections where appropriate. In the short term, the SOOS AUV Task Team will be targeting the multi-AUV deployments scheduled in the Thwaites Glacier region during 2021/22. As such, the Task Team has been embedded within the Amundsen and Bellingshausen Sector RWG for 2 years.

Polar Data Discovery Enhancement Research (POLDER) Task Team**Leadership:**

P. Bricher (SOOS); A. Hayes (Canada); T. De Bruin (Netherlands)

2020 Milestones:

Polar Data Discovery Enhancement Research (POLDER) is a collaboration between the ADC, SCADM and SOOS, to develop tools and resources to support metadata aggregation, and federated search tools to improve the discoverability of polar science data.

During 2020 POLDER has:

- Begun developing POLDER Schema.Org best practice guide and template via a GitHub repository (Hayes et al., 2020).
- Run three online data hacks, “Polar to Global Online Interoperability and Data Sharing Workshop Series” with ~50 attendees per session.

Total working group membership: 73 (from 22 countries and 63 institutes)

New SOOS 2020 Initiatives

In 2020, SOOS developed a number of new groups and initiatives; SOOS-Swedish Southern Ocean Network; Equity, Diversity and Inclusion (EDI) group; and the UN Decade for Ocean Science for Sustainable Development Southern Ocean Task Force.

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)

2020 Milestones:

- Leadership for the network was development and a number of leadership meetings held
- An invitation to join the network was established
- A network mailing list was developed
- Planning began for a 2021 Swedish Southern Ocean Science Symposium
- The network currently has 34 members

Equity, Diversity and Inclusion (EDI) Group

In June 2020, SOOS issued a statement on our values regarding Equity, Diversity and Inclusion following the global upheaval and movement due to race discrimination. 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)

2020 Milestones:

- Development of the EDI group including initial scoping meetings, appointment of co-chairs
- 3 meetings of the EDI group

UN Decade of Ocean Science for Sustainable Development, Southern Ocean Task Force

SOOS planned an integral role in initiating the Southern Ocean contribution into the UN Decade of Ocean Science for Sustainable Development, which is now the Southern Ocean Task Force.

2020 Milestones:

- Workshop on the Southern Ocean Contribution to the UN Decade held in San Diego, February 2021, as a side-meeting of Ocean Sciences. This was attended by 30 people representing 11 countries including representatives with expertise in ocean sciences, policy, governance and science communication, from all career stages.
- A report from the workshop was published providing Southern Ocean community inputs to the Science Action Plan of the UN Decade. Workshop report available [here](#) (Hofmann et al., 2020. DOI: 10.5281/zenodo.3973745)
- SOOS coordinated a Southern Ocean community comment into the Zero Draft Implementation Plan for the UN Decade. This community included a broad community response including perspectives from groups that are industry-based (IAATO); delivering science to policy (ICED); focussed on data management (SOOS DMSC); coordinating

observational science (SOOS SSC); and focused on climate and modelling (SORP), as well as individuals from the general Southern Ocean scientific community.

- A Southern Ocean Task Force has now been set-up to develop the Southern Ocean Action Plan for the UN Decade, SOOS is a member of the Southern Ocean Task Force.

Appendix I: Acronyms

AAD - Australian Antarctic Division

AADC - Australian Antarctic Data Centre

AAPP - Australian Antarctic Program Partnership

ABS - Amundsen and Bellingshausen Sector

ADC - Arctic Data Committee

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

BEPSII/ECVice - Biogeochemical exchanges at Sea Ice Interfaces (BEPSII)/ Measuring Essential Variables in Sea Ice (ECVice)

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

EPB - European Polar Board

EOVs - Essential Ocean Variables

eEOV - ecosystem Essential Ocean Variables

EuroGOOS - European Global Ocean Observing System

EXCOM - Executive Committee

FAIR - Findable, Accessible, Interoperable, Reusable

GCMD - Global Change Master Directory

GTS - Global Telecommunication System

JCOMMOPS - Joint Technical Commission for Oceanography and Marine Meteorology in situ
Observations Programme Support Centre

KOPRI - Korean Polar Research Institute

KRAs - Key Result Areas

IAATO - International Association of Antarctic Tour Operators

ICED - Integrated Climate and Ecosystem Dynamics

IMBeR - Integrated Marine Biosphere Research

IMAS - Institute for Marine and Antarctic Studies

IMOS - Integrated Marine Observing System

IPO - International Project Office

MEASO - Marine Ecosystem Assessment of the Southern Ocean

MEOP - Marine Mammals Exploring the Oceans Pole to Pole

NASA - National Aeronautics and Space Administration

NASEM - National Academies of Sciences, Engineering, and Medicine

NECKLACE - Network for the Collection of Knowledge on meLt of Antarctic iCe shElves

NERC - National Environment Research Council

NOIZ - Royal Netherlands Institute for Sea Research

NSF - National Science Foundation

OASIIS - Observing and Understanding the Ocean below Antarctic Sea Ice and Ice

ShelvesOOPC - Ocean Observations Physics and Climate Panel

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

SOFLUX - Southern Ocean Fluxes

SOIS - Southern Ocean Indian Secor

SOLAS - Surface Ocean - Lower Atmosphere Study (SOLAS)

SOOS - Southern Ocean Observing System

SORP - Southern Ocean Regional Panel Expert Group

SSC - Scientific Steering Committee

TESAC - Temperature, salinity and current observations

TUBITAK - The Scientific and Technological Research Council of Turkey

TORs - Terms of Reference

TPN - Tasmanian Polar Network

TT(s) - Task Team(s)

UN - United Nations

UTAS - University of Tasmania

WAPSA - West Antarctic Peninsula and Scotia Arc

WCRP - World Climate Research Programme

WMO - World Meteorological Organisation

WSDML - Weddell Sea and Dronning Maud Land