



# SOOS

SOUTHERN OCEAN OBSERVING SYSTEM

## 5-YEAR REPORT

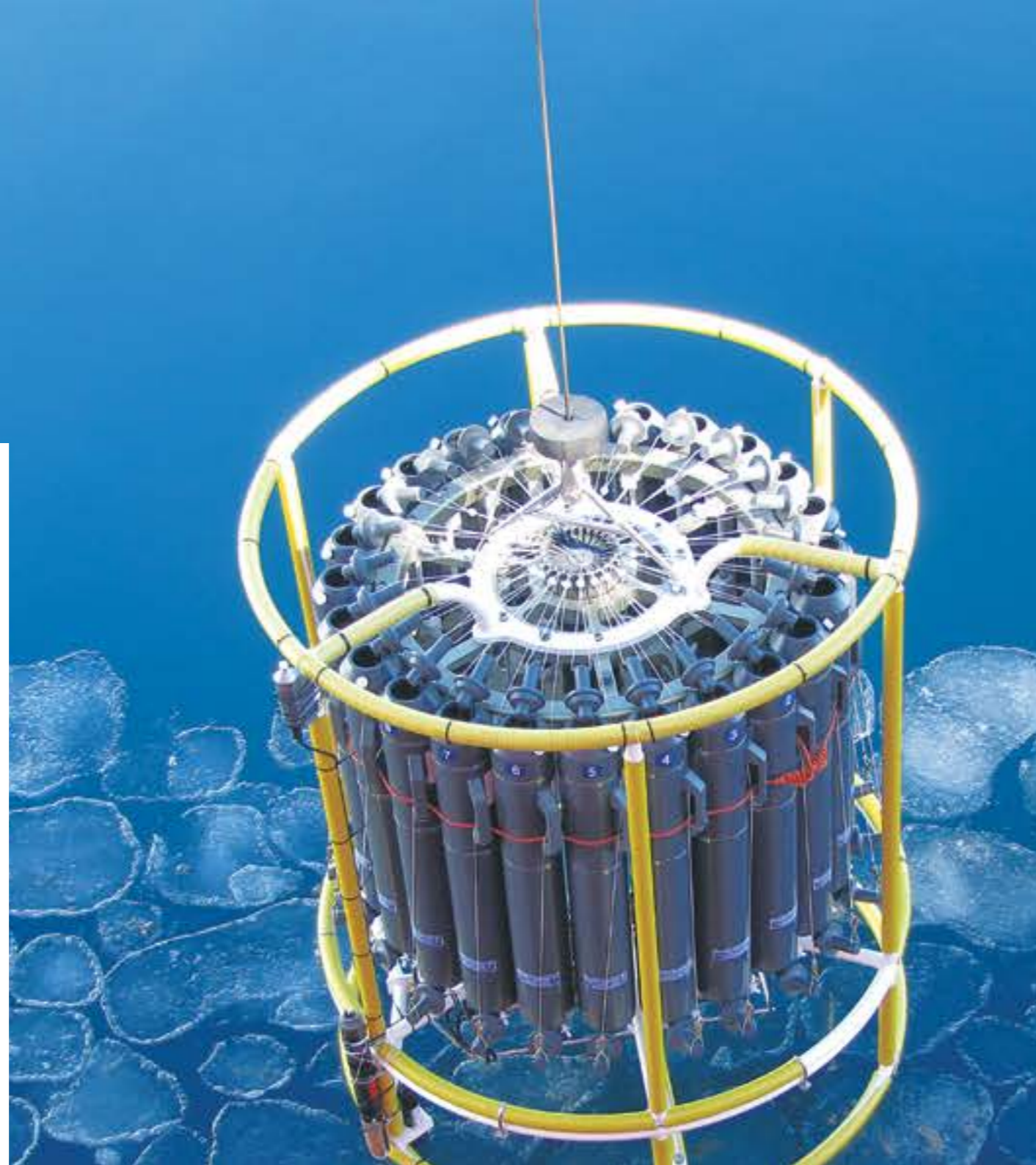
JANUARY 2016 – DECEMBER 2020

# THE SOUTHERN OCEAN OBSERVING SYSTEM

The Southern Ocean is disproportionately important in its effect on the Earth system, which makes recent observed changes to this system cause for global concern. Understanding and projecting future states of the Southern Ocean requires sustained observations. The Southern Ocean, however, remains one of the least-observed ocean regions, and access to observational data is fragmented and difficult.

The Southern Ocean Observing System (SOOS) is an international initiative that aims to address these data gaps and issues.

**The SOOS mission is to facilitate the collection and delivery of essential observations on variability and change of Southern Ocean systems to all international stakeholders, through design, advocacy, and implementation of cost-effective observing and data delivery systems.**



# 5 YEARS OF SPONSORS

## Core Sponsors and Hosts



To August 2016



August 2016 – December 2019



January 2020 – December 2022

## Other Sponsors



## In-Kind Sponsorship



# FROM THE CO-CHAIRS

The need for a coordinated approach to the design and implementation of a sustained observing and data delivery system has long been recognised as a critical component of Southern Ocean research. The Southern Ocean Observing System (SOOS) accepted the challenge of fulfilling this need with its mission to “facilitate and enhance Southern Ocean observations”. SOOS has met this challenge by becoming an integral component in the Southern Ocean science life cycle through its activities that support observational priorities, enhance collaboration and observational capabilities, ensure management and delivery of observational data, and facilitate knowledge sharing.

The impact of SOOS is seen in the establishment of 10 working groups that have improved regional coordination and collaboration and have developed observational capabilities to address the priorities identified by the Southern Ocean community. Since their inception, SOOS’s working groups have held 23 workshops and meetings, produced 2 special issues and 20 other publications, written 9 reports as well as generating numerous other products and achievements. These contributions have enhanced our understanding of the Southern Ocean and identified future data and observational needs. SOOS’s core tenets include equity, diversity and inclusion (EDI). The establishment of a SOOS EDI group in 2020 will ensure that SOOS will continue to operate with these values.

A key contribution of SOOS in the past five years is the development and implementation of SOOSmap and DueSouth – both a culmination of the vision of the Data

Management Sub-Committee (DMSC) to respond to community needs for a truly interoperable system of data management and logistical information for the Southern Ocean. SOOSmap is revolutionary in its ability to allow users to discover and download aggregated, circumpolar datasets via a single search interface. The launch of DueSouth provides a visionary web-based database with information on upcoming research and expeditions, thereby facilitating international collaboration and resource sharing. As well as the development of these two key SOOS products, the DMSC has also been a leader in advocating for management and delivery of Southern Ocean data, including developing a data policy that provides a guide for Southern Ocean data managers.

The exponential growth in members, along with numerous publications, workshops, newsletters, and expansion of the early career network highlights SOOS’s engagement with the global community. The global reach of SOOS is facilitated by participation in the Antarctic Treaty Consultative and the Commission for the Conservation of Antarctic Marine Living Resources Scientific Committee meetings as well as participation in the UN Climate Change Conferences, most recently at COP26. SOOS is a key partner in the Southern Ocean contribution to the UN Decade of Ocean Science for Sustainable Development and will be conducting many activities delivering into this initiative over the coming decade. The continuation and expansion of SOOS’s activities engaging and delivering into policy over the next five years will ensure SOOS is a leader in shaping and advocating for Southern Ocean research into the future.

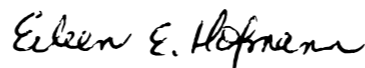
The coordination and management provided by the SOOS International Project Office (IPO) underpins its success. The guidance and gentle steering by Louise Newman, the IPO Executive Officer for ten years (2011 – 2021), has set SOOS on an excellent path. SOOS is pleased to welcome Alyce Hancock as the next Executive Officer, who will lead SOOS with new approaches and ideas. Just prior to the beginning of the 2016 – 2020 implementation plan, the SOOS IPO added a Data Officer, Pip Bricher, who made SOOSmap and DueSouth a reality. Her vision and contributions have brought Southern Ocean data management and delivery to a new level that is informing approaches and policies across polar communities.

SOOS would not be a reality without the continuing and strong support from all our sponsors, contributors, and community. We thank them for their belief in the need for SOOS and for their support and guidance, which have allowed SOOS to become an integral part of the Southern Ocean marine science community. SOOS looks forward to another five years of meeting and exceeding the challenge to collect, coordinate and deliver Southern Ocean data.

**Dr Mike Williams**  
SOOS Co-Chair  
2020 –





**Prof. Eileen Hofmann**  
SOOS Co-Chair  
2020 –




# CONTENTS

<b>Delivery of the Southern Ocean Observing System</b>	<b>05</b>	<b>Ensuring the Management and Delivery of Observational Data</b>	<b>29</b>
Value Proposition	07	Data Management Sub-Committee (DMSC)	31
SOOS Implementation Plan and Objectives	08	Southern Ocean Metadata Portal	32
Summary of Key Achievements Against Objectives	09	SOOSmap	33
<b>Enhancing Regional Collaboration</b>	<b>11</b>	Data Policy and Data Rescue	37
Regional Working Groups	13	Polar Data Enhancement Research (POLDER)	37
Amundsen and Bellingshausen Sector (ABS)	14	<b>Sharing Knowledge, and Aligning Scientific and Observational Priorities</b>	<b>39</b>
Ross Sea	15	Membership	41
Southern Ocean Indian Sector (SOIS)	16	Connected Observing Programmes	43
West Antarctic Peninsula and Scotia Arc (WAPSA)	17	Equity, Diversity and Inclusion (EDI)	43
Weddell Sea and Dronning Maud Land (WSDML)	18	Affiliated Institutes	44
DueSouth	19	Timeline of SOOS Events	45
<b>Enhancing Observational Capabilities</b>	<b>21</b>	Timeline of SOOS Implementation Groups	47
Blue and Fin Whale Acoustic Trends (ATWG)	23	Timeline of SOOS Major Products	48
Censusing Animal Populations from Space (CAPS)	24	<b>SOOS Governance</b>	<b>49</b>
Observing and Understanding the Oceans Beneath Antarctic Sea Ice and Ice Shelves (OASIIS)	25	Executive Committee 2016-2020	50
Observing System Design (OSD)	26	Scientific Steering Committee 2016-2020	53
Southern Ocean Fluxes (SOFLUX)	27	International Project Office	55
Task Teams	28	Looking Forward	56
		Acronyms	57
		References	59


# LEGEND

-  People
-  Working Group Members


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-  Timeline


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-  Status


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-  Sponsors


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-  Products


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-  Events


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-  Contributing Programmes

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-  SOOS Endorsed Projects

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-  Link

# DELIVERY OF THE SOUTHERN OCEAN OBSERVING SYSTEM

IN THE LAST 5 YEARS, SOOS HAS:

ALIGNED INTERNATIONAL OBSERVATIONAL PRIORITIES AND SHARED KNOWLEDGE THROUGH THE DELIVERY OF 63 PUBLICATIONS, 61 RESEARCH ENDORSEMENTS AND 40 WORKSHOPS;

ENHANCED OBSERVATIONAL CAPABILITIES AND REGIONAL COLLABORATION THROUGH THE DEVELOPMENT OF 18 INTERNATIONAL NETWORKS AND THE DEVELOPMENT OF THE COLLABORATIVE PLATFORM DUESOUTH; AND

ENSURED THE MANAGEMENT AND DELIVERY OF OBSERVATIONAL DATA BY CONNECTING DATA REPOSITORIES, RESCUING UNPUBLISHED DATA, AND DEVELOPING THE ONLINE DATA DISCOVERY TOOL SOOSMAP, WHICH DELIVERS 50,000 DATASETS.

## GROWTH OF SOOS

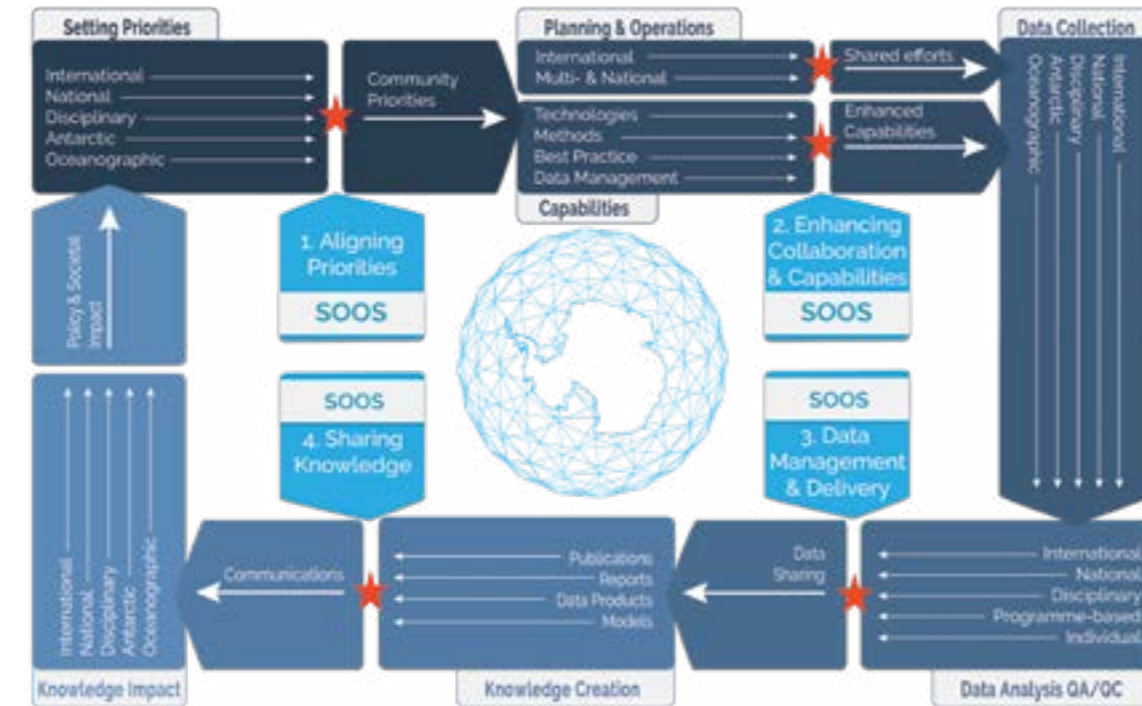
A coordinated approach to the design and implementation of a sustained observing and data delivery Earth system is critical in order to understand the Southern Ocean and its effect on the Earth System. Previously this work was done disparately, making observations and data patchy, disjointed and lacking in integration. Over the past decade SOOS has enhanced regional coordination and improved observational capabilities and data delivery, as well as providing strong advocacy mechanisms for the community.

At the start of 2016, the SOOS network consisted of three committees and numerous Task Teams. Since then, SOOS has established five Regional Working Groups which provide regional coordination to align observation priorities and share planning, logistics and resources. Further, a collaborative planning tool was called for, and the Database of Upcoming Expeditions to the Southern Ocean (DueSouth) was developed. Five Capability Working Groups and eight Task Teams were developed to bring the community together to improve observational knowledge, methodologies, and technological capabilities. Lastly, observations are of limited value unless the resulting data are open and available. Much of this data was only available across disparate data centres, making its discovery hard and time-consuming. SOOSmap was developed to be an interactive web map where users can discover and download aggregated and standardised datasets from a single interface. As of the end of 2020, SOOS has built 25 collaborative networks as well as three community-driven tools to facilitate and enhance the collection and delivery of Southern Ocean observations.

# VALUE PROPOSITION

- Aligning, advocating, and supporting scientific and observational priorities** to provide a unified voice to funders, national programmes, and intergovernmental agencies through publications, research endorsement, alignment of observing system requirements, and advocacy
- Enhancing collaboration and observational capabilities** by building integrative networks, developing collaborative tools, supporting capacity development opportunities, and facilitating efficiencies in sensor, platform, and data technologies
- Ensuring the management and delivery of observational data** by connecting data repositories, rescuing unpublished data, and encouraging the use of FAIR data principles
- Sharing knowledge** within the Southern Ocean community and beyond, to provide visibility and enhance the impact of Southern Ocean research and the knowledge created from it, through communication strategies, workshops, publications, and community coordination efforts

Southern Ocean Science Pathway



The steps in the Southern Ocean science pathway, highlighting the major roles that SOOS plays in integrating disparate communities to ensure greater impact (stars).

# SOOS IMPLEMENTATION PLAN AND OBJECTIVES

The 2016 – 2020 Implementation Plan was developed by the SOOS Scientific Steering Committee to align and prioritise international activities. The plan clarifies the SOOS mission by articulating the specific role of SOOS and its relationship to key communities; outlines the vehicles of implementation that are required to facilitate activities; and defines the goals, objectives, and key deliverables for SOOS over this 5-year period.

## The Objectives defined in this plan are:

- Facilitate the design of a comprehensive and multi-disciplinary observing system for the Southern Ocean
- Unify and enhance current observation efforts and leverage further resources across disciplines, and between nations and programmes
- Facilitate linkage 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
- Provide services to communicate, coordinate, advocate and facilitate SOOS objectives and activities

# SUMMARY OF KEY ACHIEVEMENTS AGAINST OBJECTIVES

Key Achievements	Product Type	Impact
<b>Objective 1: Facilitate the design of a comprehensive and multi-disciplinary observing system for the following outcomes/outputs</b>		
Identification and delivery of Essential Ocean Variables (EOVs) for SOOS Science Themes	Online Product	Enhancing Observational Capabilities
<a href="#">Developing priority variables (“ecosystem Essential Ocean Variables – eEOV”) for observing dynamics and change in Southern Ocean ecosystems</a>	Publication	Enhancing Observational Capabilities
<a href="#">Development and implementation of sub-regions for each SOOS Regional Working Group</a> (see page 13)	Network	Enhancing Regional Collaboration
<a href="#">Observing and understanding the ocean below the Antarctic sea ice and ice shelves (OASIS) Fact Sheet</a>	Report / Fact Sheet	Enhancing Observational Capabilities
<a href="#">Community review of Southern Ocean satellite data needs</a>	Publication	Enhancing Observational Capabilities
<a href="#">Optimizing Mooring Placement to Constrain Southern Ocean Air–Sea Fluxes</a>	Publication	Enhancing Observational Capabilities
<b>Objective 2: Unify and enhance current observation efforts and leverage further resources across disciplines, and between nations and programmes</b>		
Development and implementation of 5 Regional Working Groups with a circumpolar coverage (see pages 13 – 18)	Networks	Enhancing Regional Coordination
Development and implementation of 5 Capability Working Groups (see pages 23 – 27)	Networks	Enhancing Observational Capabilities
Development and implementation of 8 Task Teams (see page 28)	Networks	Enhancing Observational Capabilities
<a href="#">Development and delivery of a Database of Upcoming Expeditions to the Southern Ocean, DueSouth</a> (see pages 19 – 20)	Data Product	Enhancing Regional Collaboration
<a href="#">Development and delivery of a map-based data portal for curated datasets, SOOSmap</a> (see pages 33 – 36)	Data Product	Management and Delivery of Data
<a href="#">Development and delivery of a calendar of SOOS and SOOS-relevant events</a>	Online Product	Sharing Knowledge and Aligning Priorities

Key Achievements	Product Type	Impact
<b>Objective 3: Facilitate linkage 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</b>		
<a href="#">Development and implementation of a Southern Ocean metadata portal</a> (see page 32)	Data Product	Management and Delivery of Data
Aggregation and delivery of >800 datasets of Southern Ocean moorings through SOOSmap	Data Product	Management and Delivery of Data
<a href="#">Development and delivery of an online catalogue of Southern Ocean data providers</a>	Online Product	Management and Delivery of Data
Community consensus and initiation of a polar federated data discovery tool (see POLDER Task Team, page 37)		Management and Delivery of Data
Advocacy and advice on data management provided to polar programmes (see page 37)		Management and Delivery of Data
Development and implementation of a Data Management Sub-Committee (see page 31)	Network	Management and Delivery of Data
<b>Objective 4: Provide services to communicate, coordinate, advocate and facilitate SOOS objectives and activities</b>		
Endorsement of 61 projects		Sharing Knowledge and Aligning Priorities
Delivery of 62 reports to stakeholders (including 15 reports to policy makers and 43 reports to international bodies)		Sharing Knowledge and Aligning Priorities
Annual Scientific Steering Committee meetings		Sharing Knowledge and Aligning Priorities
Advocacy and representation of SOOS with over 200 presentations at international meetings		Sharing Knowledge and Aligning Priorities
Development and delivery of 8 SOOS newsletters		Sharing Knowledge and Aligning Priorities
Development and delivery of a new SOOS website		Sharing Knowledge and Aligning Priorities
Delivery of 37 community-driven publications		Sharing Knowledge and Aligning Priorities

# ENHANCING REGIONAL COLLABORATION

NATIONS OPERATE REGIONALLY IN THE SOUTHERN OCEAN, WHICH HAS LED TO PATCHY OBSERVATIONAL COVERAGE AND A LACK OF CIRCUMPOLAR INTEGRATION. SOOS HAS WORKED TO ENHANCE REGIONAL AND CROSS-REGIONAL COLLABORATION, THROUGH THE DEVELOPMENT OF 5 REGIONAL WORKING GROUPS, AND THE DELIVERY OF THE COLLABORATIVE PLANNING TOOL DUESOUTH. TOGETHER, THESE NETWORKS INTEGRATE INTERNATIONAL AND NATIONAL OBSERVING EFFORTS, TO DELIVER A CIRCUMPOLAR OBSERVING SYSTEM.

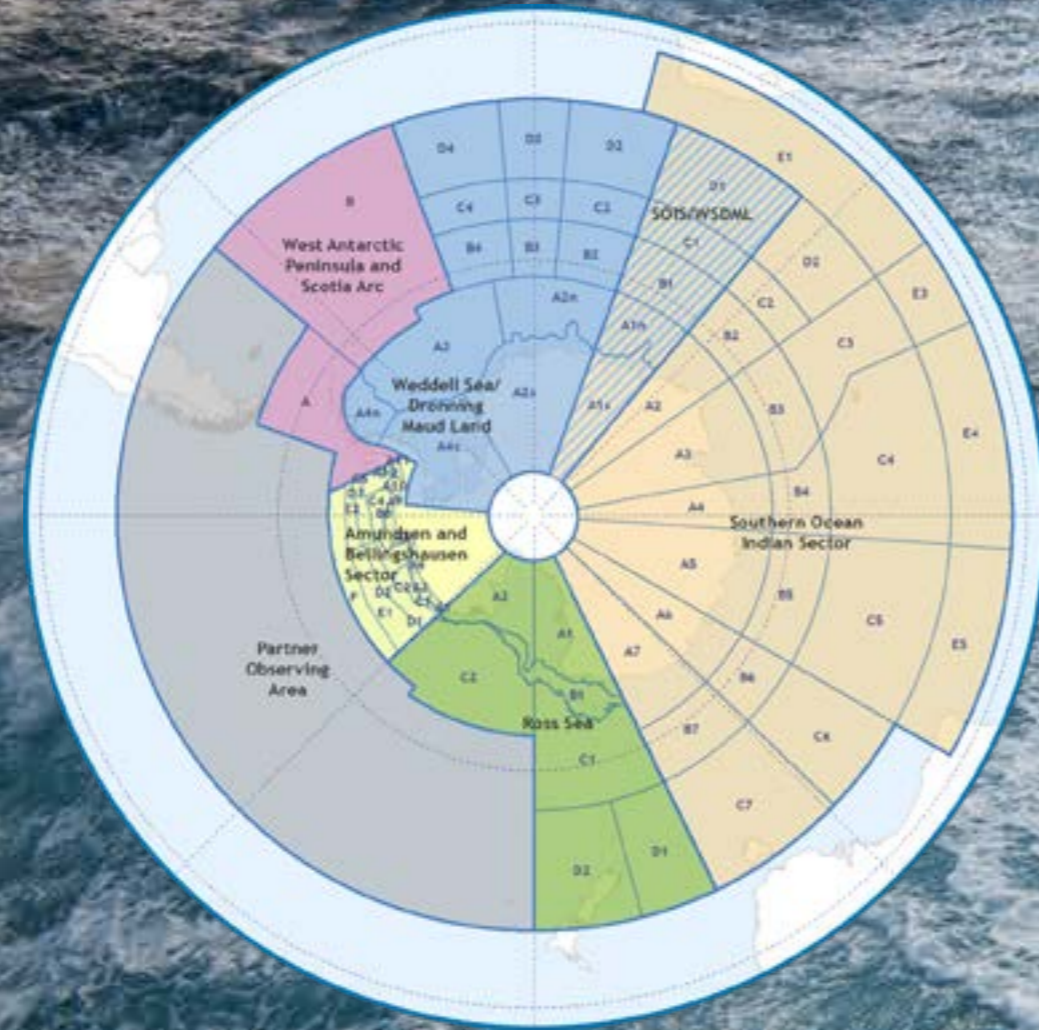
## SOOS IMPACT: ENHANCING INTERNATIONAL COORDINATION

Many of the key science challenges facing Southern Ocean researchers today are ambitious and require inordinate logistics and financial challenges. Overcoming these challenges is only possible through international collaboration. SOOS enhances this international collaboration by connecting various national Antarctic and oceanographic communities. An example of this is the integral role SOOS played in consolidating a collaboration between the University of Tasmania and the Korean Polar Research Institute (KOPRI), which created new opportunities for exciting ocean – ice shelf research with the Australian AUV, *nupiri muka*. Through SOOS's Regional Working Groups, the opportunity for the Australian AUV programme to collaborate with KOPRI and other international AUV programmes as part of the International Thwaites Glacier Collaboration was developed. This led to a successful deployment of the *nupiri muka* under the Thwaites Glacier in a 60km round trip, collecting a wealth of valuable datasets.



# REGIONAL WORKING GROUPS

SOOS REGIONAL WORKING GROUPS 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.

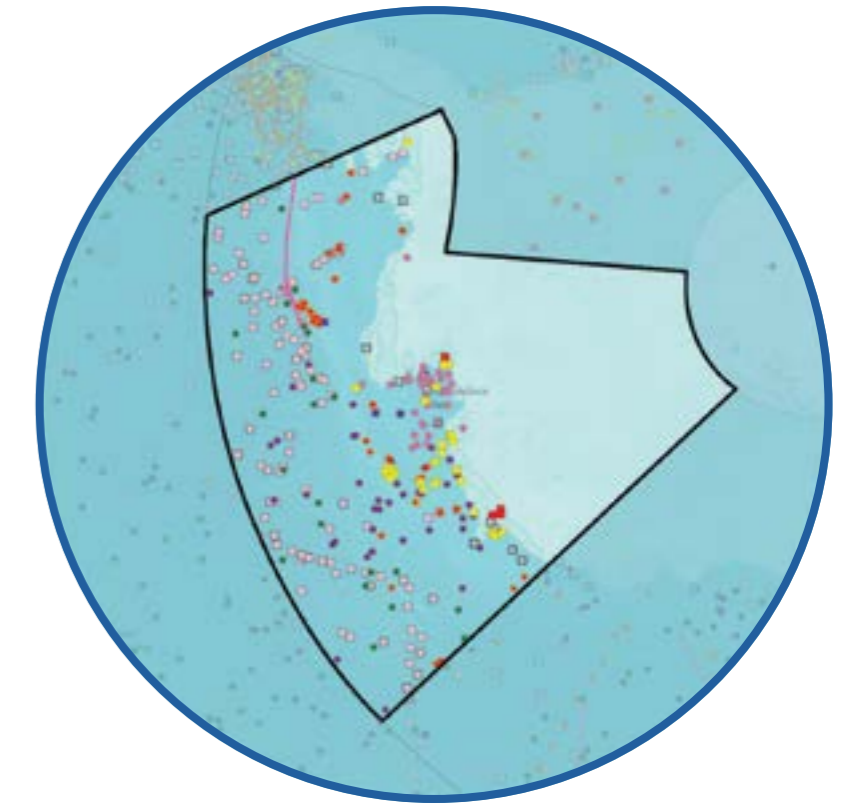


## AMUNDSEN AND BELLINGSHAUSEN SECTOR (ABS)

Initiated in 2017, this working group coordinates observations and collaborations in the Amundsen and Bellingshausen Seas across all national efforts, with working group leadership representation from the UK, Republic of South Korea, Sweden, USA, Brazil and Japan.

-  Co-Chairs: Bastien Queste (Sweden) 2019 – 2021, Patricia Yager (USA) 2020 – and Pierre Dutrieux (UK) 2021 –
-  76
-  2017 – ongoing
-  SOOS, SCOR, SCAR, KOPRI, AGP
-  Special Issue ([Lee et al., 2016](#)) and editorial ([Meredith et al., 2016](#)), Workshop Report ([Lowry et al., 2019](#))
-  Amundsen and Bellingshausen Sector Working Group Workshop (2019)
-  ITGC, ROAM-MIZ ☆, Towards an improved heat budget for the floating glaciers in Antarctica ☆


The ABS region is dominated by ice – ocean – atmosphere – ecosystem interactions. It experiences high tropospheric variability, increased exposure to the Antarctic Circumpolar Current and warm Circumpolar Deep Water (CDW) intrusions due to melting West Antarctic ice shelves. High biological productivity is found in coastal polynyas experiencing rapid declines in sea ice cover. Both types of ice loss impact ecosystem function, with buoyancy-driven upwelling delivering iron to phytoplankton, and sea ice melt driving shallow mixed layers and relief from light limitation. Ocean observing efforts are therefore focused on CDW and heat transport; meltwater production, fate, and biogeochemistry; primary productivity; carbon fluxes; and sea ice.






## ROSS SEA

Initiated in 2016, this working group coordinates observations and collaborations in the Ross Sea across all national efforts, with working group leadership representation from Italy, USA, New Zealand, China, South Korea, UK and Switzerland.

 Co-Chairs: Mike Williams (New Zealand) 2017 – 2020, Walker Smith (USA) 2017 – and Paola Rivaro (Italy) 2020 –

 77

 2016 – ongoing

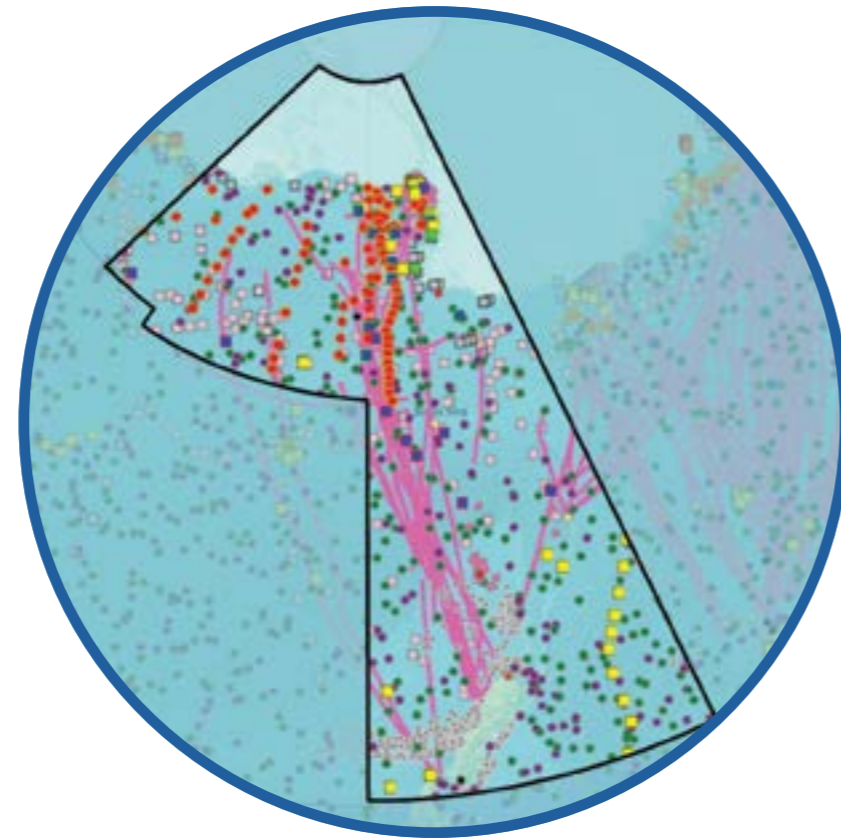
 SJTU; WHOI; SIO; QNLM

 Observing Activities in the Ross Sea Report ([Williams et al., 2015](#)), Workshop Report ([Smith et al., 2017](#))

 Observing the Ross Sea Workshop (2017)

 SONAR-CO<sub>2</sub> ☆, MORSea ☆, PIPERS ☆, T-REx ☆

*The Ross Sea region is the site for production of AABW formation and the site for the largest primary productivity in the Southern Ocean; it is also the location of the world's largest marine protected area. It is characterised by significant amounts of export from the surface layer to depth and massive accumulations of higher trophic levels (e.g., whales, penguins, seals, birds). Moreover, the Ross Sea shelf area is an important CO<sub>2</sub> sink due to its high biological productivity, intense winds, and high bottom-water ventilation rates. Observing efforts are focused on understanding the complex interactions among physical factors in driving changes in ice distributions; understanding the energy and material transfer within the food web; and the role of trace metals in governing the primary production.*




## SOUTHERN OCEAN INDIAN SECTOR (SOIS)

Initiated in 2015, this working group coordinates observations and collaborations in the Indian sector of the Southern Ocean across all national efforts, with working group leadership representation from Australia, India, China, South Africa, Japan and France.

 Co-Chairs: Tsuneo Odate (Japan) 2017 – 2020, Andrew Constable (Australia) 2017 – 2019, Philippe Koubbi (France) 2017 – 2019, Elizabeth Shadwick (Australia) 2020 – and Sarat Tripathy (India) 2020 –

 85

 2015 – ongoing

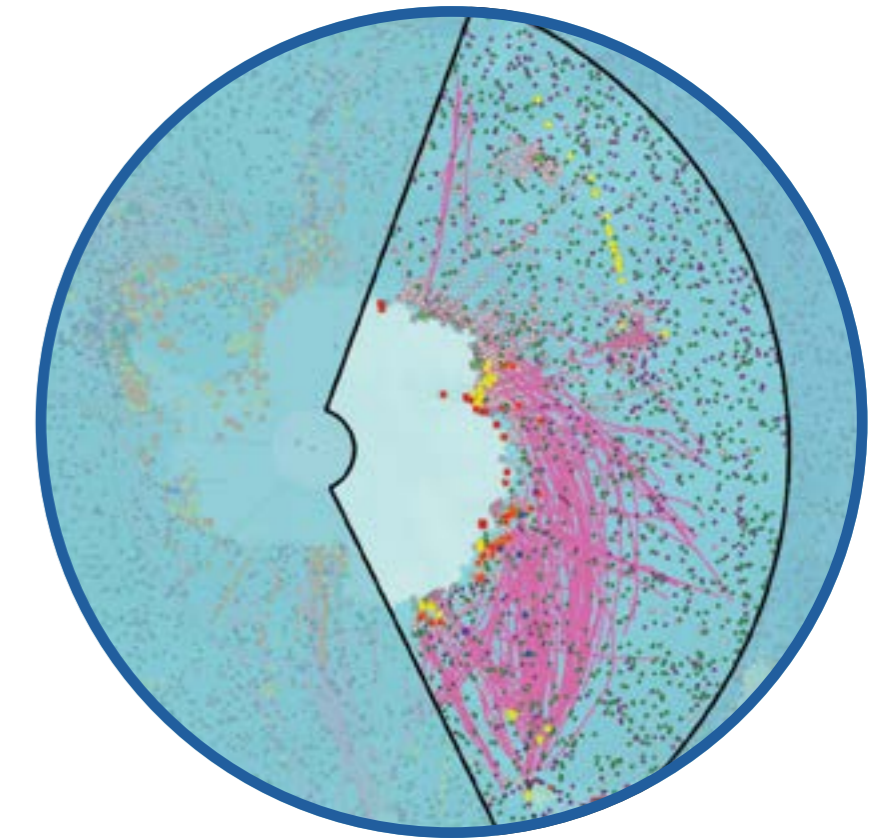
 NIPR/ROIS

 Workshop Report ([Constable et al., 2018](#))

 Southern Ocean Indian Sector Working Group Workshop (2017)

 SOTS ☆, ROBOTICA ☆, K-Axis ☆, SOSCEx ☆

*The SOIS region is important for AABW formation (Cape Darnley, Adélie Land) and hosts economically significant fisheries (toothfish and icefish, and a likely expansion of the krill fishery). This region is characterised by high biological productivity from natural iron fertilisation and frontal dynamics near the Crozet and Kerguelen Islands, and significant mass loss from the East Antarctic Ice Sheet. Observing efforts are focused on: primary productivity, carbon export and biodiversity; monitoring of zooplankton, fish, seabirds, seals and whales; and quantifying changing inventories of heat and carbon. This is achieved using ships, moorings, profiling floats, animal-borne sensors, and satellites.*




## WEST ANTARCTIC PENINSULA AND SCOTIA ARC (WAPSA)

Initiated in 2015, this working group coordinates observations and collaborations in the West Antarctic Peninsula and Scotia Arc across all national efforts, with working group leadership representation from the UK, Chile, Argentina, USA, Germany, Republic of South Korea, Canada, Spain and Brazil.


 Co-Chairs: Katharine Hendry (UK) 2016 – 2020, Sian Henley (UK) 2017 – 2020, Oscar Schofield (USA) 2016 – and Juan Höfer (Chile) 2020 –


 97

 2015 – ongoing

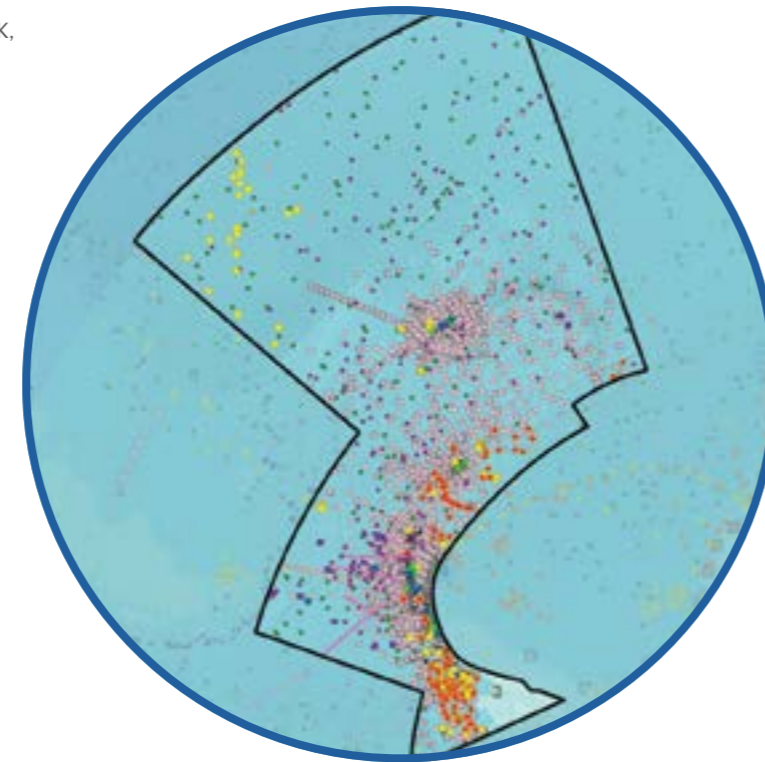
 SCAR, SCOR, NERC-ORCHESTRA, Royal Society (UK), BAS

 Special Issue ([Hendry et al., 2018](#)), 3 publications ([Hendry et al., 2017](#); [Hendry et al., 2018](#); [Henley et al., 2019](#)), 2 workshop reports ([Schofield et al., 2017](#); [Hendry et al., 2020](#))

 West Antarctic Peninsula and Scotia Arc Working Group Meeting (2020), Developing the West Antarctic Peninsula International Network within SOOS (2017), Royal Society of the United Kingdom Science Meeting (2017)


 Palmer LTER ☆, IDEAL ☆, Resolving CO<sub>2</sub> system seasonality in the WAP with year-round autonomous observations ☆, Nutrients dynamics and deep water behaviour of the WAP sea ice zone ☆, ChinStrAP ☆, DynOPO ☆

The WAPSA region is an economically significant area for krill fisheries and the tourism industry. The area also harbours the most intense research activity in Antarctica. This region is characterised by rapidly increasing temperatures, retreating glaciers and shrinking sea ice. Therefore, observing efforts in this region are focused on monitoring changes in those environmental drivers, and their effects on ecosystem functioning, krill populations and the top predators that rely on it.



## WEDDELL SEA AND DRONNING MAUD LAND (WSDML)

Initiated in 2017, this working group coordinates observations and collaborations in the Weddell Sea and Dronning Maud Land across all national efforts, with working group leadership representation from Germany, Norway, South Africa, UK, France, Sweden, Brazil and USA.


 Co-Chairs: Julian Gutt (Germany) 2017 – 2020, Laura de Steur (Norway) 2017 – 2020, Sebastien Moreau (Norway) 2017 – 2021, Markus Janout (Germany) 2019 – and Stefanie Arndt (Germany) 2021 –

 114

 2017 – ongoing

 AWI, NPI

 2 workshop reports ([de Steur et al., 2019](#); [Janout et al., 2020](#))

 Workshop on the Development of the SOOS Regional Group: Weddell Sea - Dronning Maud Land (2019), The Southern Ocean in the Weddell Sea and off Dronning Maud Land Workshop (2020)

 ORCHESTRA ☆

The WSDML's complex environment is characterised by pronounced seasonality, circumpolar currents, deep-water formation and multi-year sea ice cover. The Weddell Gyre connects water masses in the Antarctic Circumpolar Current with the ice shelf and sea ice shaped southern Weddell Sea waters. While the Antarctic Peninsula shows accelerated ice-shelf mass loss, the eastern regions are still relatively stable but warming and ice shelf loss is expected there in the future. Motivated by the region's global importance, extensive multi-disciplinary observational programmes aim at monitoring ocean properties and understanding the relevant processes such as on-shelf heat transport, ice shelf-ocean interaction, and heat and CO<sub>2</sub> uptake.





In addition to the 44 nations that operate and use vessels and aircraft in the Southern Ocean, industries such as tourism and fisheries routinely undertake Southern Ocean voyages. Each of these expeditions are potential platforms for collaboration and opportunistic data collection. The Database of Upcoming Expeditions to the Southern Ocean (DueSouth) provides information on upcoming research and industry voyages and flights, in support of international collaboration and sharing of resources.

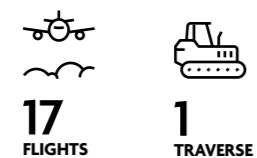
**Nations Represented**



**370 Ship Expeditions**



**18 Plane Expeditions**



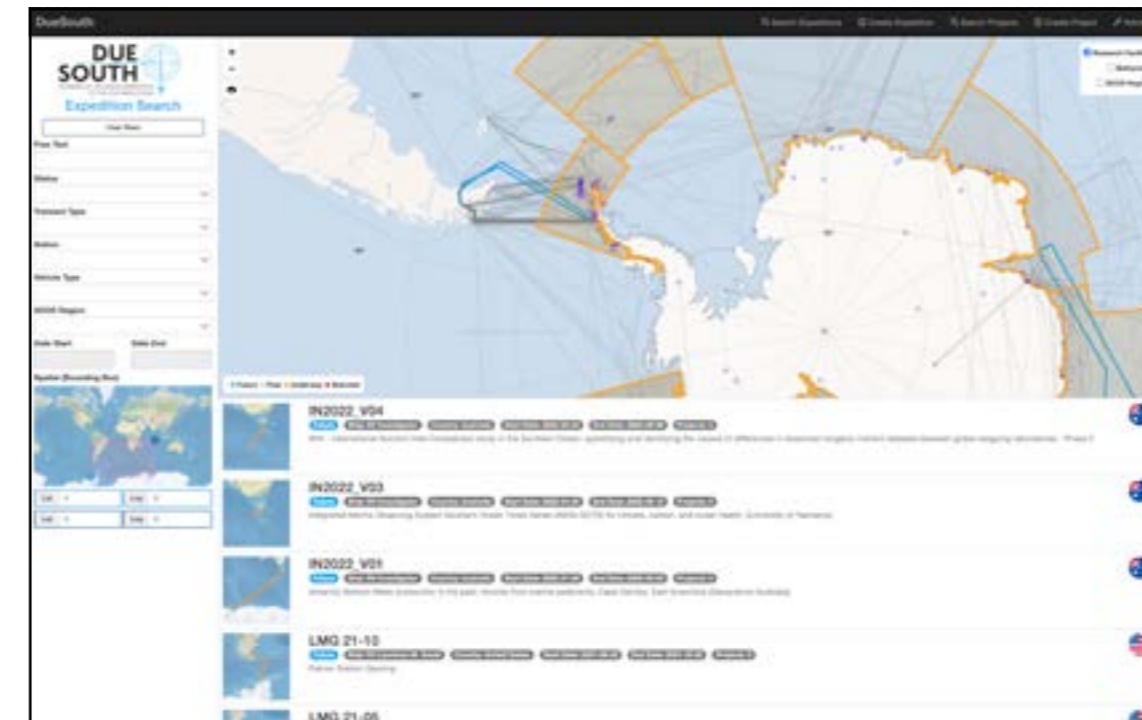
Coding and hosting support 2017 – 2020



Funding support for DueSouth initiation



Systematically provide expedition details to DueSouth




Visit DueSouth at [soos.aq/activities/duesouth](https://soos.aq/activities/duesouth)

# ENHANCING OBSERVATIONAL CAPABILITIES


SOOS RECOGNISES THE IMPORTANCE OF ENHANCING OUR ABILITY TO COLLECT, MANAGE AND USE OBSERVATIONAL DATA. OBSERVATIONAL KNOWLEDGE, METHODOLOGIES AND TECHNOLOGICAL CAPABILITIES HAVE BEEN ENHANCED THROUGH 5 CAPABILITY WORKING GROUPS AND 8 TASK TEAMS WITHIN SOOS. THESE INITIATIVES HAVE BEEN EITHER BOTTOM-UP COMMUNITY DRIVEN OR SOOS-INITIATED EFFORTS TO ADDRESS KEY GAPS IN OUR CAPABILITIES.

## SOOS IMPACT: IMPROVING OBSERVATIONAL GAPS


Observational coverage in the Southern Ocean can be highly variable in both space and time, particularly during winter months when the collection of observations is challenging. This is despite the key role the Southern Ocean plays in the global system, influencing physical, chemical and biological ocean processes globally. An area particularly lacking in measurements is air-sea fluxes in the Southern Ocean. SOOS's Southern Ocean Air-Sea Fluxes (SOFLUX) and Observing System Design (OSD) Capability Working Groups have been jointly working to improve air-sea flux observations in the Southern Ocean. Through several publications, the working groups have been addressing how air-sea flux observations can be improved, what platforms and instrumentations can be used, and how many observations are required to constrain air-sea flux measurements. Further, a Fluxes Mooring Task Team was developed between the two groups, funded by the State Oceanic Administration (SOA), China. This project determined the optimal air-sea flux mooring sites to constrain estimates of large-scale air-sea heat fluxes ([Wei et al., 2020](#) )

# BLUE AND FIN WHALE ACOUSTIC TRENDS (ATWG)


Historical commercial whaling resulted in a massive decline in Antarctic blue and fin whales. The importance of these species to the Antarctic ecosystem necessitates an understanding of the recovery of these populations. However, visual surveys from ships are difficult, expensive and limited in space and time. This working group was initiated to develop a circum-Antarctic network of passive acoustic recorders to monitor post-whaling blue and fin whales population recovery. It is a joint IWC-SORP and SOOS working group which aims to align international collaboration to develop and implement an ongoing hydrophone network for long-term circumpolar acoustic observations of blue and fin whales (Miller et al., 2021). The working group has developed an annotated library of baleen whale acoustic detections, and novel and efficient methods for standardising analysis of acoustic data collected in the Southern Ocean.

-  Co-Chairs: Flore Samaran (France) and Kate Stafford (USA)


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-  33


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-  2017 – 2020


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-  Completed


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-  IWC-SORP


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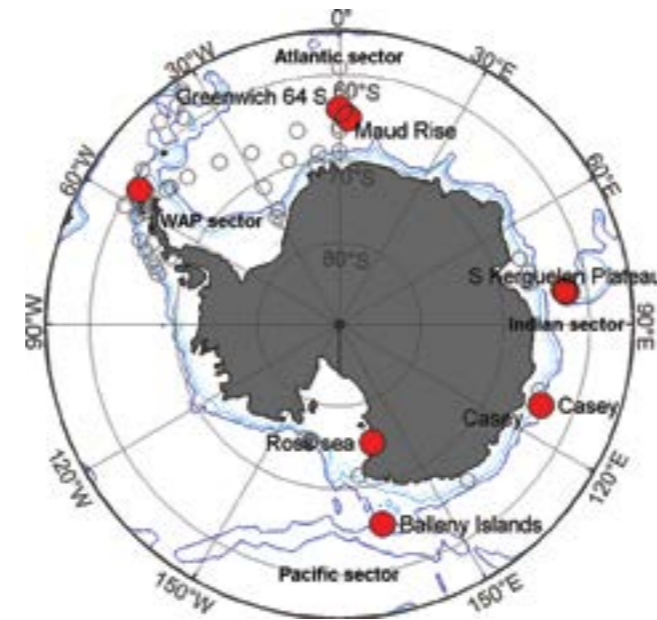
-  3 publications (Shabangu et al., 2020a; Shabangu et al., 2020b; Miller et al., 2021), conference proceedings (Miller et al., 2020), annotated library of baleen whale acoustic detections (Miller et al., 2021)

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-  Working Group Meetings 2019 and 2020

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-  Acoustic recorder mooring recovery and replacement in East Antarctica, Ross Sea and off Dumont D'Urville Station (2019 – 2020), low-latitude data collection (2018 – 2019), ENRICH voyage (2018), Antarctic data collection >60°S (2017 – 2018)




The map above shows underwater recording sites in Antarctica with those used to create the annotated library of baleen whale acoustic detections (red circles) and known locations of long-term recordings from 2001-2017 (open circles). Light, medium and dark blue lines show 1000, 2000, and 3000m depth contours respectively (Miller et al., 2021, Figure 1, Scientific Reports).

# CENSUSING ANIMAL POPULATIONS FROM SPACE (CAPS)


Traditional surveys of pack-ice seals in the Southern Ocean are logistically challenging, resource-intensive and expensive, limiting our understanding of population status and trends. However, recent developments in remote sensing methodology has provided a cost-effective approach to monitoring seals. CAPS was developed to coordinate and develop the use of satellite remote sensing of pack-ice seals in the Southern Ocean. Since 2019, the group has successfully gained Southern Ocean satellite images to develop a circumpolar pack-ice seal census (for example, LaRue et al 2019b); developed algorithms for the transformation of the satellite images to estimates of seal abundance; and developed habitat models of two key pack-ice seal ecosystems.

-  Co-Chairs: Peter Fretwell (UK), Mark Hindell (Australia)


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-  2015 – 2020


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-  Renewed for 2021 – 2025 Implementation Period


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-  AAS, NERC, NSF, The Alan Turing Institute, BAS


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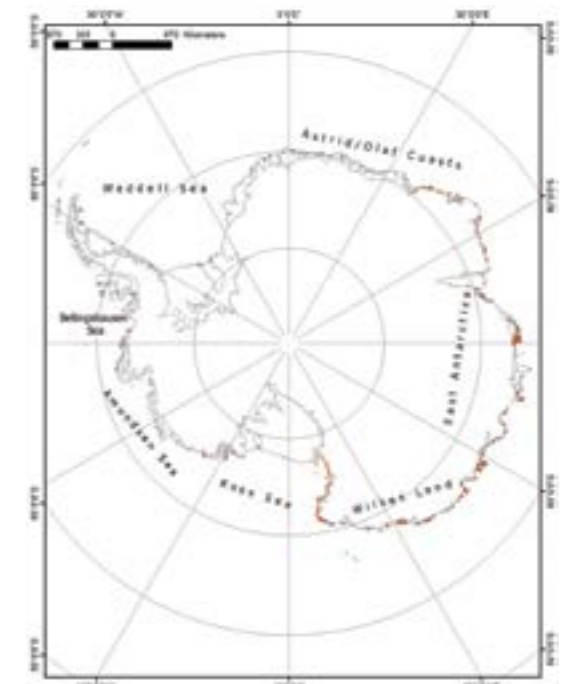
-  3 publications (LaRue et al., 2019a; LaRue et al., 2019b; Wege et al., 2020), workshop report (Fretwell and Hindell, 2016), machine learning GitHub for counting seals in Antarctica (Lynch and Goncalves, 2019)

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-  Annual Working Group Workshops (2016 with SCAR observers, 2017, 2018 and 2020)

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-  Ground-truthing at Akta Bay (2018), spectral measurements at Rothera (2020), collaboration between data study groups to automate sea ice types classification with linkages to seal distribution from VHR imagery (2020)




Map showing the Antarctic regions searched for Weddell Seal presence (orange) on fast ice using images from seven campaigns during November 2010 – 2011 (LaRue et al., 2019b, Figure 2, Remote Sensing in Ecology and Conservation, e).

# OBSERVING AND UNDERSTANDING THE OCEANS BENEATH ANTARCTIC SEA ICE AND ICE SHELVES (OASIIS)


Despite its global importance, the ocean beneath the Antarctic sea ice and ice shelves remains one of the least observed physical systems on the planet, limiting our understanding of air-ice-ocean interactions and potential Antarctic contributions to global sea-level rise. This working group was a joint effort between SOOS and POGO and aimed to share knowledge and align observing system priorities. In 2017, OASIIS held a community workshop that brought together modellers, glaciologists, oceanographers and polar technologists. Additionally, OASIIS advocated for under-ice observations and priorities through significant contribution to the SOOS OceanObs19 paper (Newman et al., 2019).

-  Co-Chairs: Richard Coleman (Australia) and Esmee van Wijk (Australia)


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-  104


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-  2016 – 2020


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-  Completed

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-  POGO, SCOR, SCAR, AWI, AGP, The Ekman Foundation, CSIRO, CliC, Antarctica NZ

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-  Fact Sheet (van Wijk et al., 2020), Workshop Report (Rintoul et al., 2014)

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-  Seeing Below the Ice Workshop (2012), Observing and Understanding Sea Ice and Ice Shelves (OASIIS) 2017




The schematic above shows an integrated system of under-ice observational platforms required to determine the contribution of oceanic heat to ice shelf melt. These include ship-based observations (a); moored instrumentation (b); ice-capable profiling floats (c); ice-tethered profilers (d); ice-mass buoys (e); seal tags (f); gliders (g); radars (h); automatic weather stations (i); GPS, boreholes and other landers (j); sensors/moorings deployed through boreholes (k); moorings deployed by remotely operated vehicles (l); bottom landers (m) (Newman et al., 2019, Figure 7, *Frontiers in Marine Science*).

# OBSERVING SYSTEM DESIGN (OSD)


This working group developed from the need to quantify the minimal amount of data required to address specific quantities or variables of interest. This work supports efforts to gain greatest scientific benefit from limited resources. In the two years of operation, this working group notably provided quantified observational targets for the AniBOS programme; modelled the optimal placement of moorings to constrain large-scale fluxes of heat in the Southern Ocean (Wei et al., 2020); and held a scientific workshop focusing on bridging the Southern Ocean modelling and observational communities.

-  Co-Chairs: Matthew Mazloff (USA) 2018 – 2022, Luc Lenain (USA) 2022 – and Dan Jones (UK) 2022 –

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-  85

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-  2018 – 2020


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-  Renewed for 2021 – 2025 Implementation Period

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-  SOA

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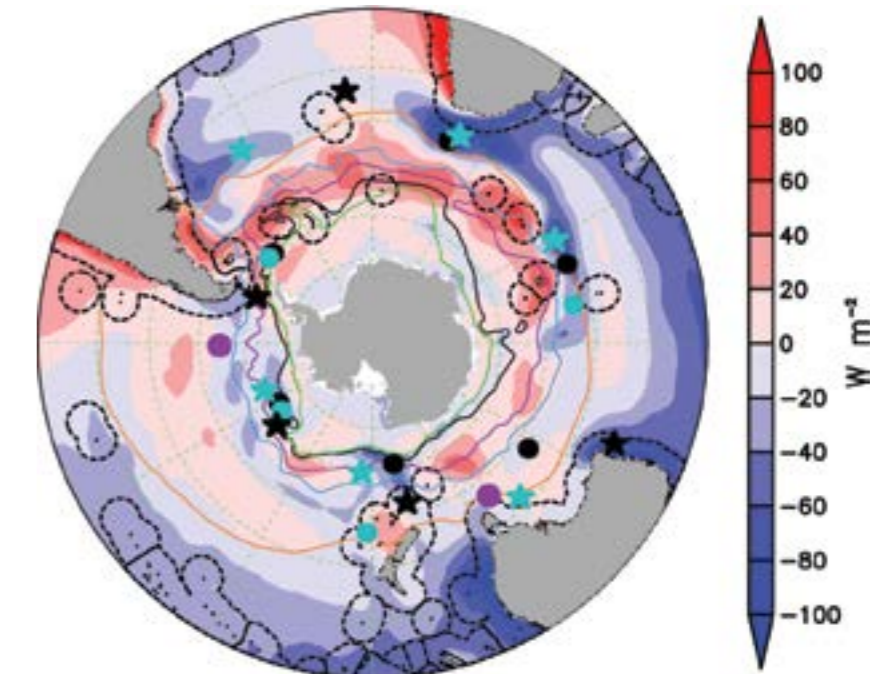
-  4 publications (Giglio et al., 2018; Liang et al., 2018; Mazloff et al., 2018; Wei et al., 2020), workshop report (Mazloff et al., 2018), contribution to the AniBOS GOOS proposal (2020)

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-  Southern Ocean Modelling Workshop (2018), Working Group Teleconference (2020)

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-  Fluxes Mooring Project Task Team (see page 28)



The map above shows current mooring sites (purple dots) and proposed optimal mooring sites (black and cyan dots and stars, each representing optimal locations to constrain the different key modes of variability within the Southern Ocean) to constrain Southern Ocean air-sea fluxes (Wei et al., 2020, Figure 8, *Journal of Atmospheric and Oceanic Technology*).

# SOUTHERN OCEAN FLUXES (SOFLUX)

Air–sea and air–sea ice fluxes in the Southern Ocean play a critical role in global climate but challenges in obtaining sustained flux observations have led to sparse spatial and temporal coverage of observations. This working group was developed to build a network of researchers and provide a framework for discussions and activities that enhance our ability to collect and share Southern Ocean flux data. Since 2016, SOFLUX has standardised flux data methodologies; supported flux observing system design efforts; aligned international priorities for flux observations through community publications; and maintained a strong and inclusive Southern Ocean flux community network for sharing knowledge and resources. Notably, the working group successfully advocated for essential flux variables to be included as official Essential Climate Variables in GCOS.








 Co-Chairs: Sebastiaan Swart (Sweden) 2016 – 2021, Sarah Gille (USA) 2016 – and Marcel du Plessis (Sweden) 2021 –

 145

 2016 – 2020

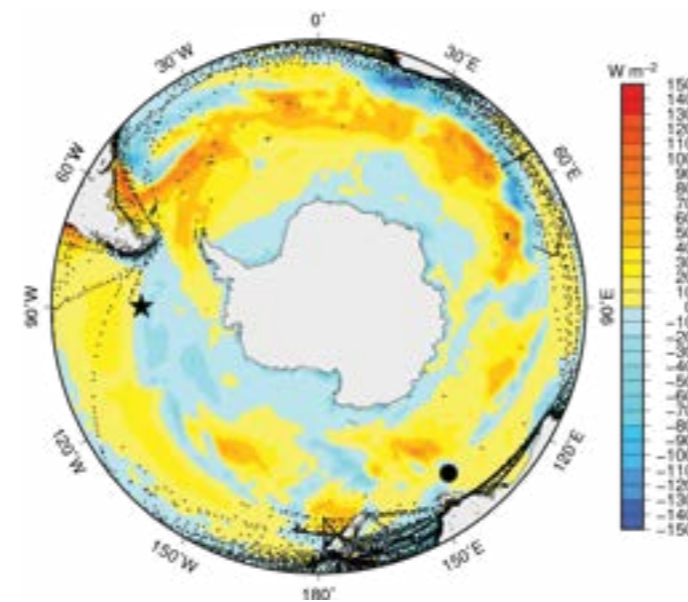
 Renewed for 2021 – 2025 Implementation Period


 Saildrone

 6 publications ([Gille et al., 2016](#) ; [Cronin et al., 2019](#) ; [Smith et al., 2019a](#) ; [Smith et al., 2019b](#) ; [Swart et al., 2019](#) ; [Wei et al., 2020](#) ) flux EOVs and flux GCOS ECVs, regular (1-3 monthly) working group newsletters

 Air-Sea Fluxes for the Southern Ocean Workshop (2015), Working Group Workshop (2018), Working Group Meeting (2018), SOFLUX Ocean Science Town Hall (2020)

 Fluxes Mooring Task Team (see page 28), SO-CHIC , SOTS , ROAM-MIZ , ORCHESTRA , SOCCOM, Saildrone, SOSCEX 



The map above shows time-averaged net air-sea heat flux with the blue indicating areas where ocean heat is lost to the atmosphere. The symbols indicate surface flux moorings and the dots show available winter ship observations over all July months between 2000 and 2004 with sufficient information to estimate latent heat flux ([Gille et al., 2016](#) 


## TASK TEAMS




### Autonomous Underwater Vehicles

The development of new Autonomous Underwater Vehicles (AUVs) technologies has greatly expanded the capacity for under-ice exploration, monitoring of sea ice thickness, and mapping of the under-ice seafloor and ice shelf structure. In order to develop these observing systems, nations will need to collaborate and share resources. The AUV Task Team was developed to match AUV science objectives and engineering abilities with deployment capabilities and sensor development across National Antarctic Programmes, in collaboration with IEP-PAUV. The focus of this team has since shifted to coordination of multi-national, multi-AUV field campaigns, and will be completed in 2022.

 Co-Chairs: Guy Williams (Australia), Anna Wählin (Sweden), Karen Heywood (UK), Won Sang Lee (South Korea)


### Flux Moorings


Long-term mooring deployments in the Southern Ocean are expensive and logistically demanding. It is therefore important to optimise the placement of these moorings for greatest scientific benefit. The Fluxes Moorings Task Team was developed to determine the optimal mooring sites to constrain estimates of large-scale air-sea heat fluxes. The Task Team was a joint effort between the SOOS Southern Ocean Fluxes and Observing System Design Capability Working Groups, and resulted in the publication of a framework for designing mooring array configurations to maximise air-sea heat flux estimates ([Wei et al., 2020](#) 

 Yanzhou Wei (China), Sarah Gille (USA), Matthew Mazloff (USA),  
 Veronica Tamsitt (Australia), Sebastiaan Swart (Sweden), Dake Chen (China),  
Louise Newman (Australia)  
 SOA


### Ecosystem Essential Ocean Variables (eEOVs)


Essential ocean variables of the physical marine system are relatively well developed but despite their importance as indicators of status and change in marine habitats, ecosystem Essential Ocean Variables (eEOVs) for the Southern Ocean are yet to be defined. The eEOV Task Team aims to identify and implement eEOVs for the Southern Ocean. The Task Team is drafting an evaluation of eEOVs to be published in the *Frontiers MEASO* special issue, titled: “Sentinel” observations to support conservation and management of Southern Ocean ecosystems.

 Co-Chairs: Andrew Constable (Australia) and Irene Schloss (Argentina)

 Pew Charitable Trusts

### Southern Ocean Satellite Data

The Southern Ocean is vast but globally connected, and the communities that require satellite-derived data in the region are diverse. The Satellite Data Task Team was developed to identify and integrate the diverse requirements for satellite data and provide recommendations to funders and data providers on current and future priorities. The Task Team was a joint effort between SOOS and the WCRP-CLIC community, and involved coordination of a community survey and delivery of a peer-reviewed publication ([Pope et al., 2016](#) ). The publication considers sea ice variables, atmospheric parameters, physical oceanographic properties, terrestrial cryospheric connections, marine microbes, marine biology, surface winds and more. It is designed to stand as an important strategy paper that provides the rationale and information required for future strategic planning and investment.

 Allen Pope (USA), Penelope Wagner (Norway), Rob Johnson (Australia), Jamie Shutler (UK), Jenny Baeseman (USA), Louise Newman (Australia)

 SOA

# ENSURING THE MANAGEMENT AND DELIVERY OF OBSERVATIONAL DATA

ENHANCING OBSERVATIONS OF THE SOUTHERN OCEAN WILL BE OF LIMITED VALUE UNLESS THE RESULTING DATA ARE OPEN AND EASILY “FINDABLE, ACCESSIBLE, INTEROPERABLE AND REUSABLE” (FAIR). SOOS’S DATA MANAGEMENT EFFORTS HAVE LED TO THE DEVELOPMENT OF DATA TOOLS FOR THE COMMUNITY, RESCUED UNPUBLISHED DATA, AND ENCOURAGED THE USE OF FAIR DATA PRINCIPLES.

## SOOS IMPACT: BROKERING DATA

SOOS plays a key role in connecting disparate efforts to enhance visibility and access to Southern Ocean data. For example, through SOOS investment, considerable current and historical moorings orphan data has been made available through SOOSmap. Additionally, SOOS brokered discussions to publish, through EMODnet Physics and SOOSmap, CTD data held in PANGAEA. These have resulted in significant increases in CTD and mooring data now visible and easily accessible to the community.

Before SOOS



**12,929**  
GLOBAL CTDS IN EMODNET



**<50**  
MOORINGS DATA EASILY DISCOVERABLE

After SOOS



**166,998**  
GLOBAL CTDS IN EMODNET



**814**  
MOORINGS DATA EASILY DISCOVERABLE



## DATA MANAGEMENT SUB-COMMITTEE (DMSC)

Initiated in 2012, the DMSC is a network of data experts from national and international data centers and programmes which advises the SSC on the most effective collaboration mechanisms for managing and publishing observational data from the Southern Ocean, implements SOOS's data management activities, and provides guidance for the SOOS Data Officer. The DMSC collaborates with partners of a global scale to promote existing data standards and the FAIR data principles.

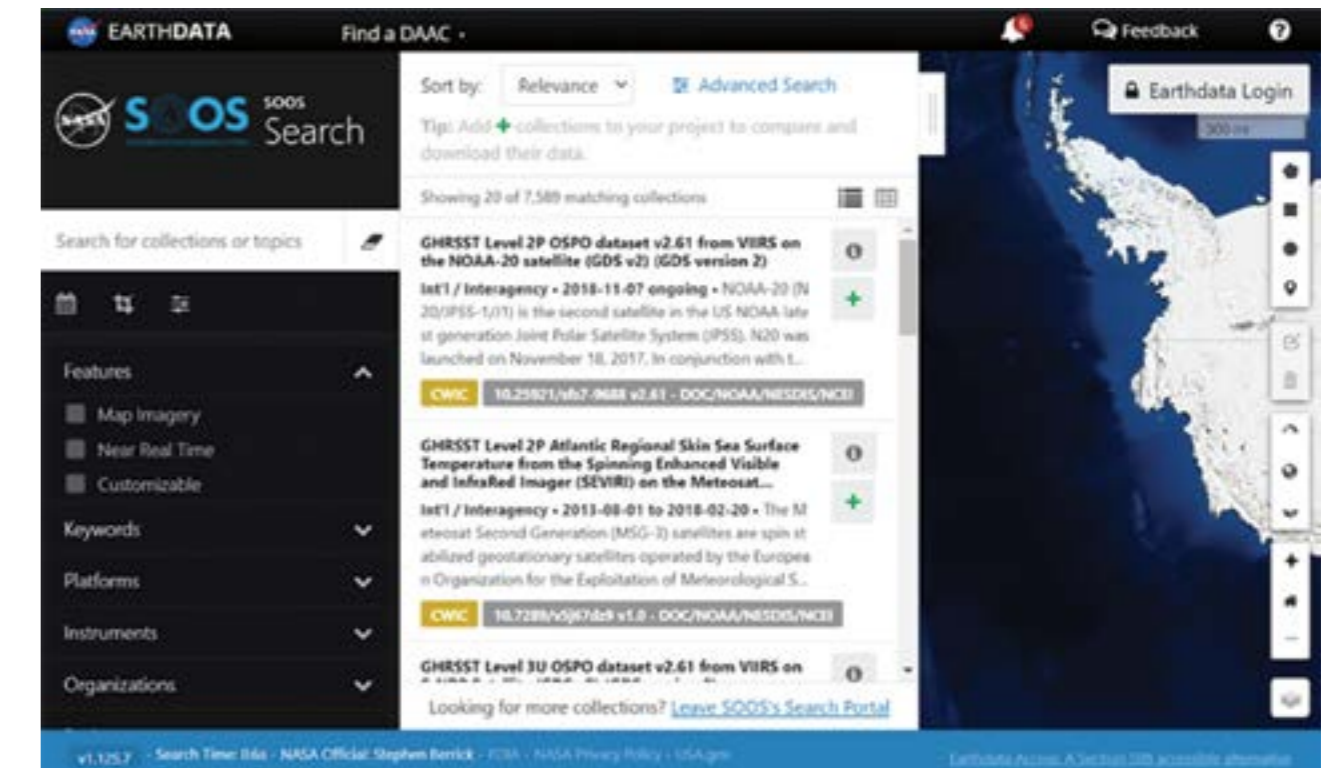
- Co-Chairs: Steve Diggs (USA) 2015 – 2019, Joana Beja (Belgium) 2016 – 2020, Petra ten Hoopen (UK) 2019 – and Benjamin Pfeil (Norway) 2020 –
- 28
- 2012 – ongoing
- EMODnet Physics, AADC, NASA Earth Data
- Publication (Tanhua et al., 2019), workshop report (Bricher et al., 2019)
- Annual DMSC Meetings, Polar Data Forum (2019), Datahack (2019)

**A truly sustainable system of ocean observing cannot be achieved without robust data management systems that support scientists to develop best practice processes for collecting, storing, and sharing data so that a single observation can be used to answer a wide range of questions. Those data systems will be a network of local and disciplinary systems that are truly interoperable to allow data to flow beyond political and scientific boundaries. The DMSC comprises data managers from many nations and many disciplines, who connect SOOS scientists with data systems from around the globe.**

## SOUTHERN OCEAN METADATA PORTAL

Many kinds of observational data in the Southern Ocean are only discoverable by searching for metadata records. The most comprehensive international metadata collection for the Southern Ocean is available through the SOOS metadata portal, which was launched in 2015 and is hosted by NASA's Earth Data Search, formerly known as the Global Change Master Directory. The SOOS metadata portal was launched in 2015, and by 2020 contained 7000 records, provided by more than 500 institutions, including National Antarctic Data Centres, space agencies, and other thematic data centres. The portal is used by approximately 500 users per year.

Visit the SOOS Portal  
<https://search.earthdata.nasa.gov/portal/soos>





Southern Ocean observational data are accessible from National Antarctic Data Centres, national oceanographic data centres and international thematic data repositories, making data discovery a time-consuming and inefficient process. Platform- or variable-specific datasets that are collected in a standardised way should be aggregated and made available to the community through a single searchable interface. Launched in 2017, SOOSmap is an interactive web map that allows users to discover and download aggregated, circumpolar datasets from a single search interface.



Development, hosting and maintenance



Development support



**50,000**  
DATASETS



**22,908**  
CTD CASTS



**814**  
SOOS MOORING NETWORK



**766**  
CONTINUOUS PLANKTON RECORDER TRANSECTS



**14,543**  
KRILLBASE SAMPLES



**3,630**  
PENGUIN COLONY COUNTS



**18**  
DATA LAYERS



**114**  
SCAR PLASTICS SAMPLING



**2,067**  
ARGO FLOATS



**1,387**  
MARINE MAMMALS (MEOP)



**96,000**  
VIEWS PER YEAR



**30,000**  
NEAR-REAL-TIME DATA FILES DOWNLOADED PER YEAR



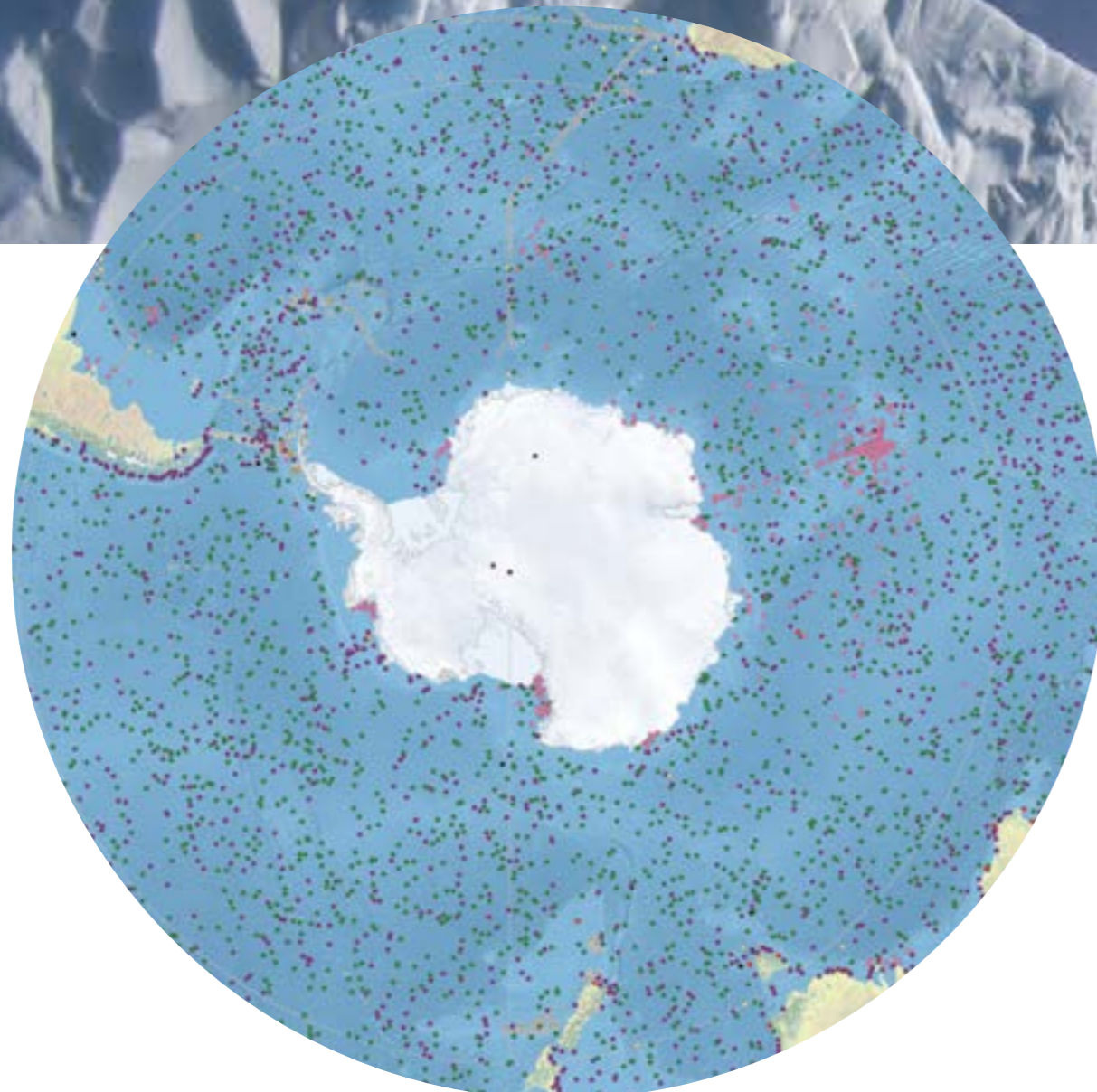
Visit SOOS Map [soosmap.aq](https://soosmap.aq)



### OBSERVATION TYPES

#### EMODnet Physics

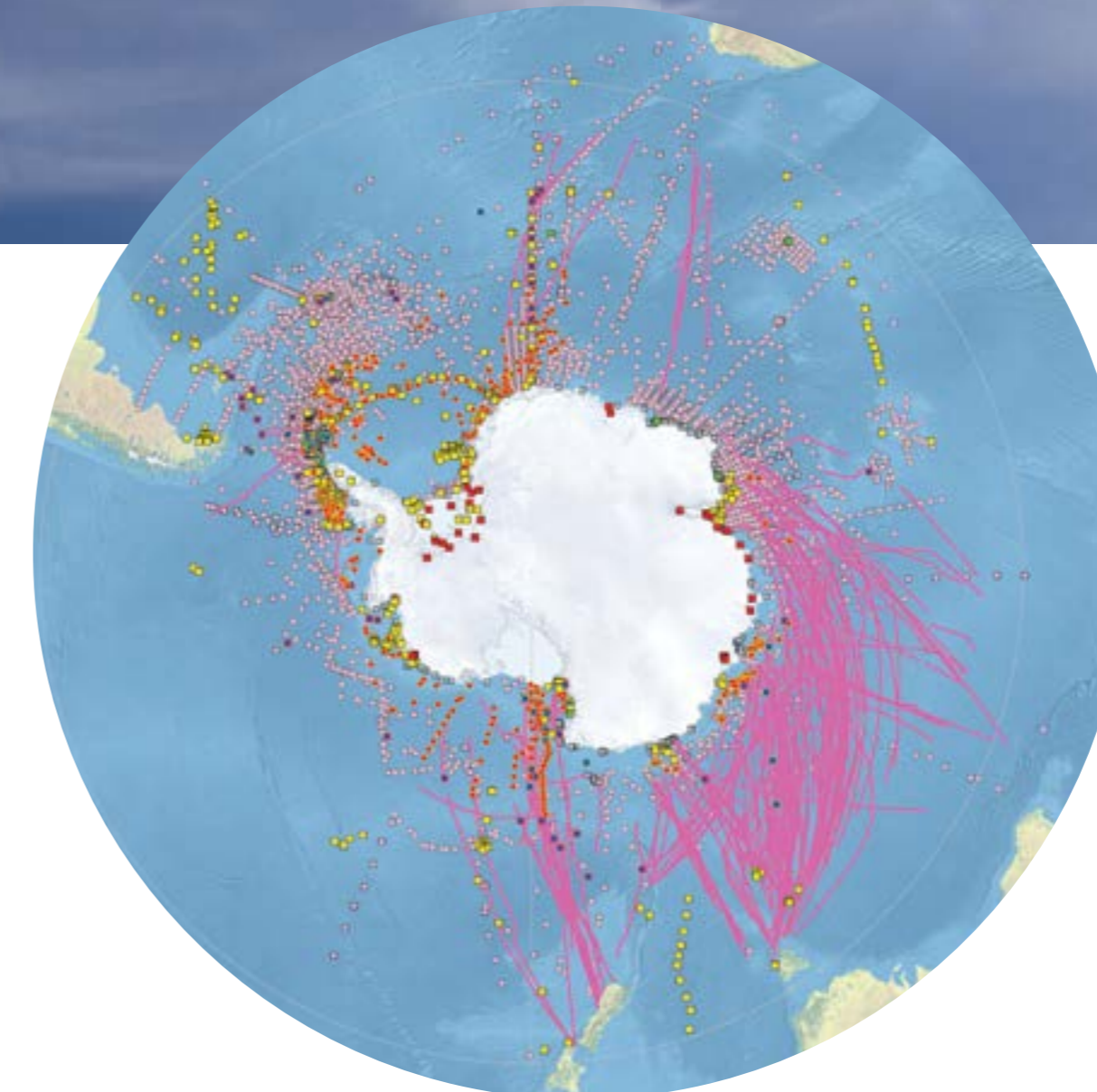
- ARGO/Profiler
- Bathy Messages on GTS
- CTD Profiles
- Drifting Buoys
- Ferrybox/Ship
- Fishing Vessels
- Gliders
- Marine Mammal
- Mooring Time Series
- Profiling Mooring
- Saildrone
- Tide Gauge
- XBT or XCTD Profiles



### OBSERVATION TYPES

#### SOOS

- CCAMLR Ecosystem Monitoring Sites
- / CPR Tows Route
- Krillbase
- NECKLACE
- Plastic
  - Macro
  - Micro
- Penguin Colonies
- Sea Ice Chlorophyll
- SOOS Mooring Network



#### Background Layers (not shown here)

- Bathymetric Survey Effort
- CCAMLR Areas, Subareas and Divisions
- High Resolution Bathymetry
- Marine Protected Areas (MPAs)
- Regional Working Groups
- Research Blocks
- Research Facilities
- Sea Ice Concentration
- Sea Surface Temperature

## DATA POLICY AND DATA RESCUE


The vision of a truly interoperable system of data management for the Southern Ocean depends on many people and organisations across the globe working in similar ways to allow their systems to interoperate. This cooperation is needed both at the broadest policy levels and in managing every individual dataset. The SOOS DMSC wrote a data policy in 2015 and contributed to a polar data policy recommendations document in 2020, to help align data policies of data managers working in this region. SOOS has provided direct data policy advice to Antarctica New Zealand, the Australian Research Council's Antarctic Gateway Partnership, and the Swiss Polar Institute.

Simultaneously, we undertook a range of small data rescue projects, including reformatting and documenting data from oceanographic moorings, plastic pollution research and sea ice chlorophyll research. This work has made more data available through SOOSmap and other data systems and the policy recommendations lay a foundation for closer integration in the future.

 Pip Bricher (Australia), Stein Tronstad (Norway), Peter Pulsifer (Canada), Jonathan Kool (Australia), Florence Fetterer (USA), Melissa Zweng (USA), David Pasquale (USA)

 Ongoing


 NASA Big Earth Data Initiative

 SOOS Data Policy, Tronstad et al. (in prep), data layers in SOOSmap (plastics and chlorophyll, SOOS mooring network)

 Workshops at Polar Data Forum III and Polar to Global Datahacks

## POLAR DATA ENHANCEMENT RESEARCH (POLDER)

Polar metadata are currently distributed across multiple metadata catalogues that need to be searched individually to discover the data they contain, making data discovery a resource-intensive exercise for researchers and programmes. A federated metadata search tool would simplify polar data discovery. Initiated in 2018, the POLDER Group aims to enhance polar data discovery by developing and implementing a metadata aggregation and federated search tool. The Task Team is an ongoing effort between the ADC, SCADM and SOOS.

 Co-Chairs: Pip Bricher (Australia) 2019 – 2020, Taco De Bruin (Netherlands), 2019 – , Amos Hayes (Canada) 2019 – and Chantelle Verhey (Canada) 2020 –

 2019 – ongoing

 SCADM, ADC

 Publication ([Tanhua et al., 2019](#))

 Polar Data and Systems Architecture Workshop (2018), Task Team Meeting (2018), Polar Data Planning Summit (2018), Three Workshops/Hackathons (2020)



# SHARING KNOWLEDGE, AND ALIGNING SCIENTIFIC AND OBSERVATIONAL PRIORITIES

44 NATIONS AND MANY MORE INTERNATIONAL PROGRAMMES OPERATE IN THE SOUTHERN OCEAN, EACH WORKING TO PRIORITIES DEFINED NATIONALLY, THROUGH ANTARCTIC PROGRAMMES, OR THROUGH OCEANOGRAPHIC PROGRAMMES. SOOS BRIDGES THE ANTARCTIC AND OCEANOGRAPHIC COMMUNITIES, AND ALIGNS OBSERVATIONAL PRIORITIES TO PROVIDE A STRONG, UNITED COMMUNITY VOICE. SOOS BUILDS COLLABORATIVE NETWORKS AND PRODUCTS TO ENHANCE SHARED KNOWLEDGE AND REMOVE DISCIPLINARY, PROGRAMMATIC AND NATIONAL BOUNDARIES. THROUGH ADVOCACY AND ENDORSEMENT, SOOS SUPPORTS THE CONTINUATION AND INTEGRATION OF OBSERVATIONS, TO DELIVER A CIRCUMPOLAR SYSTEM.

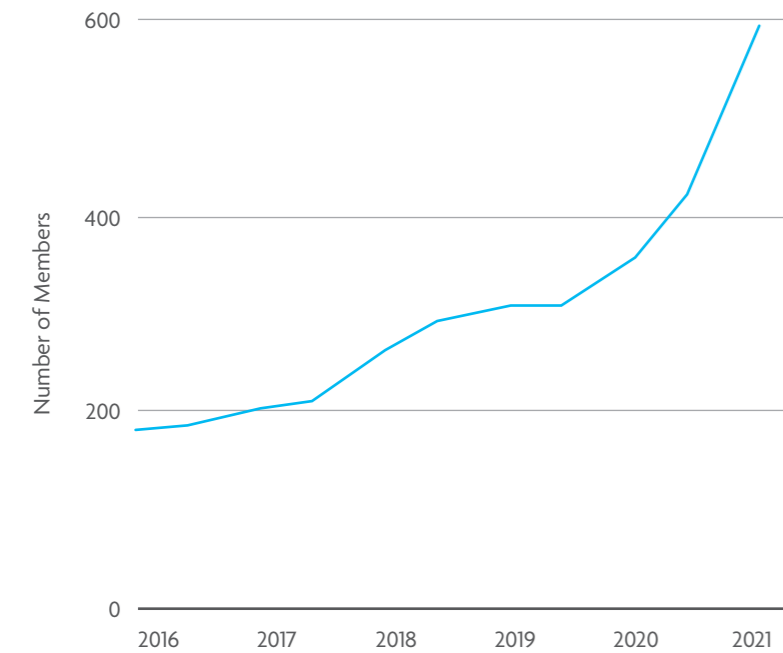
## SOOS IMPACT: ALIGNING PRIORITIES

Over the last decade, SOOS has established a broad network encompassing the oceanographic and Antarctic communities. This broad, integrated network produced a statement on the major scientific and observational progress made over the last decade, and an assessment of the key observational priorities for the coming decade in the Southern Ocean. [Newman et al., 2019](#) highlighted the important role SOOS has played in defining and promoting the vision around the systems required for a sustained, integrated and multi-disciplinary Southern Ocean observing system. With SOOS's Regional Working Groups and other implementation groups now, the community is in a position to coordinate and collaborate to design robust observing and data delivery systems to meet the needs of all end-users.

# MEMBERSHIP

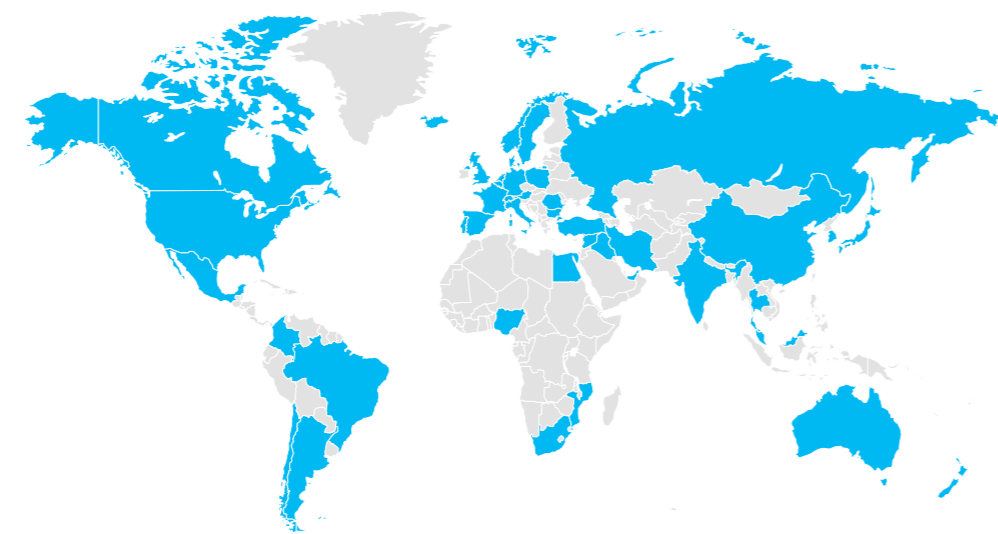
## Membership Timeline

Growth of SOOS membership from January 2016 to December 2020



## Membership Map

Countries represented through SOOS membership



# COMMUNITY ENGAGEMENT

## Other Metrics



## CONNECTED OBSERVING PROGRAMMES

There are many internationally coordinated programmes operating to facilitate aspects of the planning, organisation, collection and management of specific observational data or platforms. Combined, these programmes form the backbone of SOOS and are integral in efforts to deliver sustained observations of a determined set of key variables. Additionally, SOOS integrates these international initiatives with national sustained time-series and project-based observational efforts, to form a circumpolar system of observations. SOOS advocates for the continuation and funding of these projects and programmes through endorsement.



## EQUITY, DIVERSITY AND INCLUSION (EDI)

Equity, diversity and inclusion are core tenets of SOOS's values, and are actively considered in all SOOS activities. The SOOS EDI group, initiated in 2020, will be an ongoing initiative of SOOS that will ensure SOOS continues to operate in accordance with these values. SOOS EDI actions will focus on developing and implementing approaches to make Southern Ocean science more welcoming, identifying barriers to full participation in SOOS, and acting where possible to circumvent them.

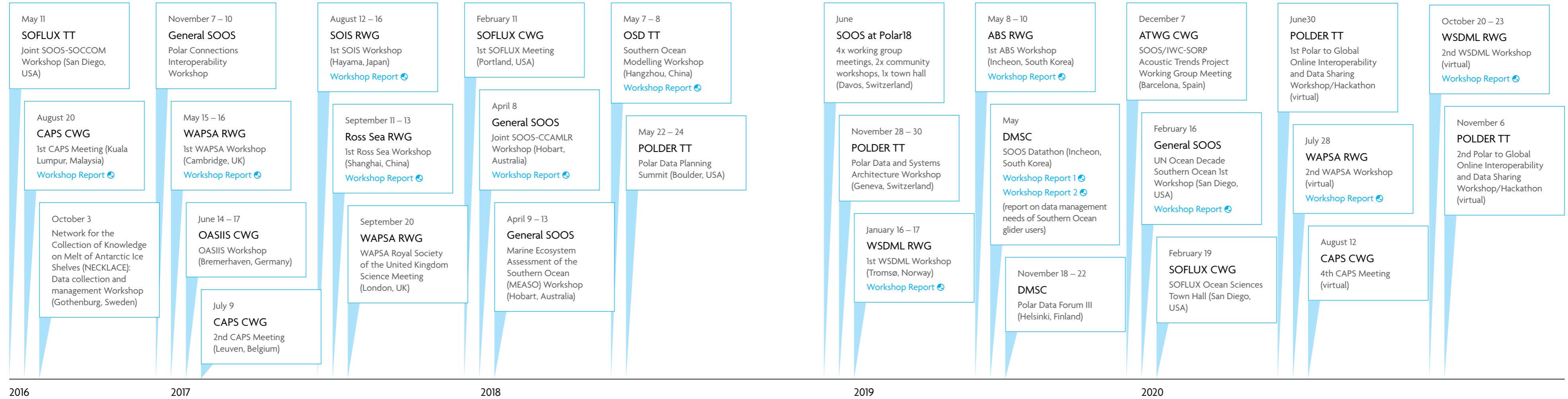
### SOOS's Values for the 2015 – 2020 Implementation Period (updated by SOOS in 2021)

1. Open involvement in all interested nations, programmes, organisations and projects across all relevant disciplines, industries, and stakeholders
2. Widespread adoption of international standards in data quality control and methodologies
3. International sharing of resources and knowledge
4. Open access to data and data products

## AFFILIATED INSTITUTES

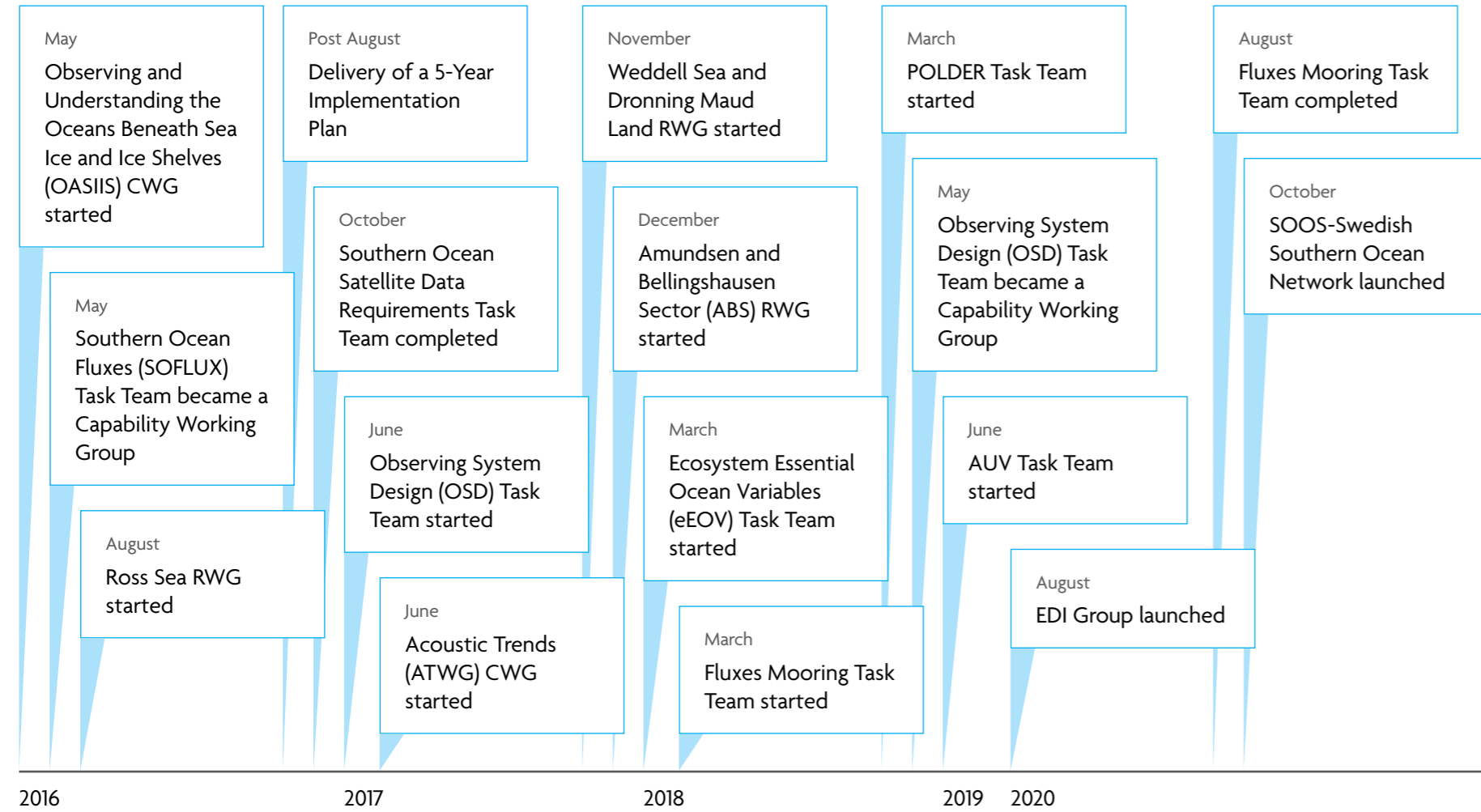


# TIMELINE OF SOOS EVENTS

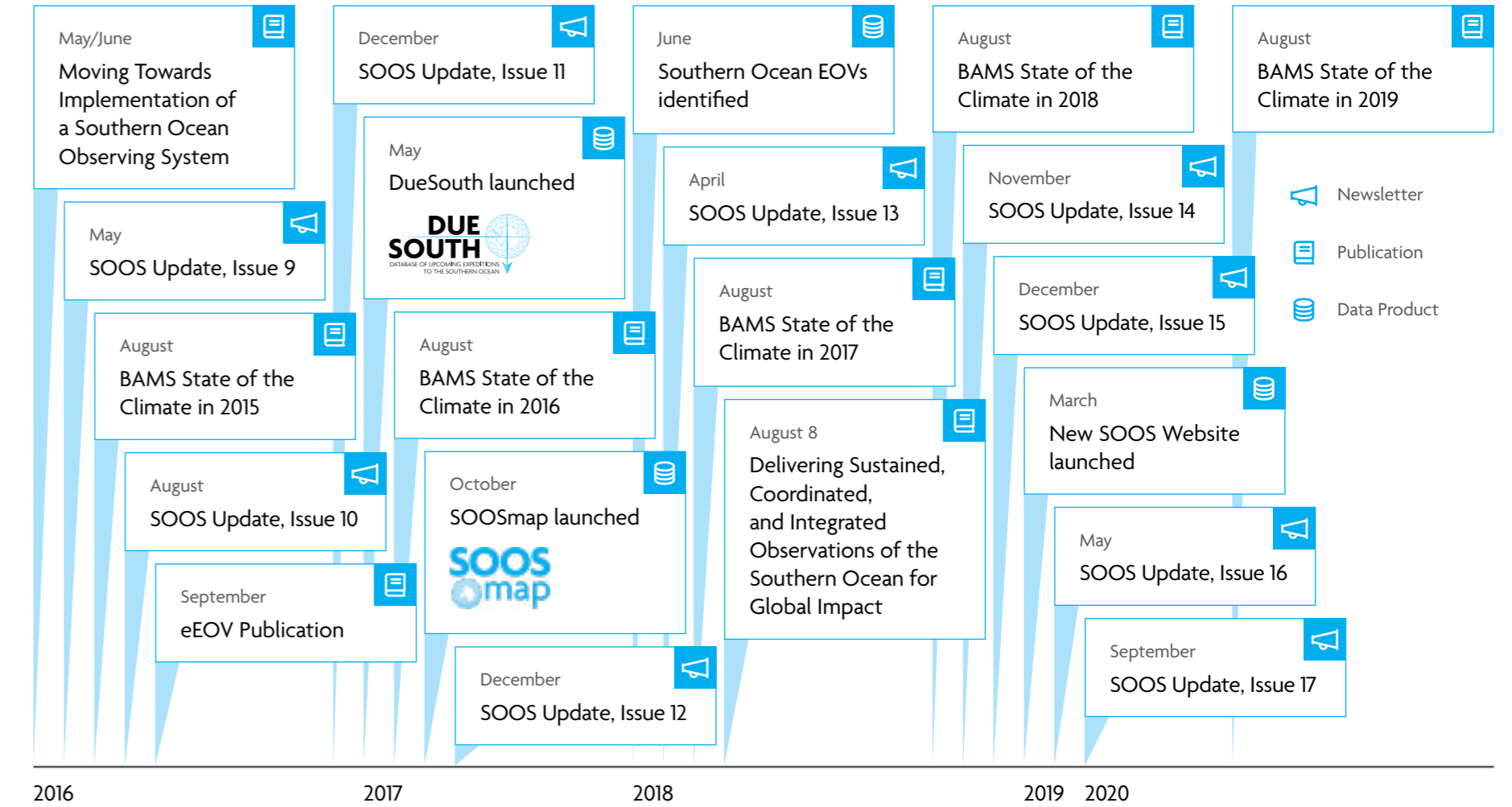




# TIMELINE OF SOOS IMPLEMENTATION GROUPS



# TIMELINE OF SOOS MAJOR PRODUCTS

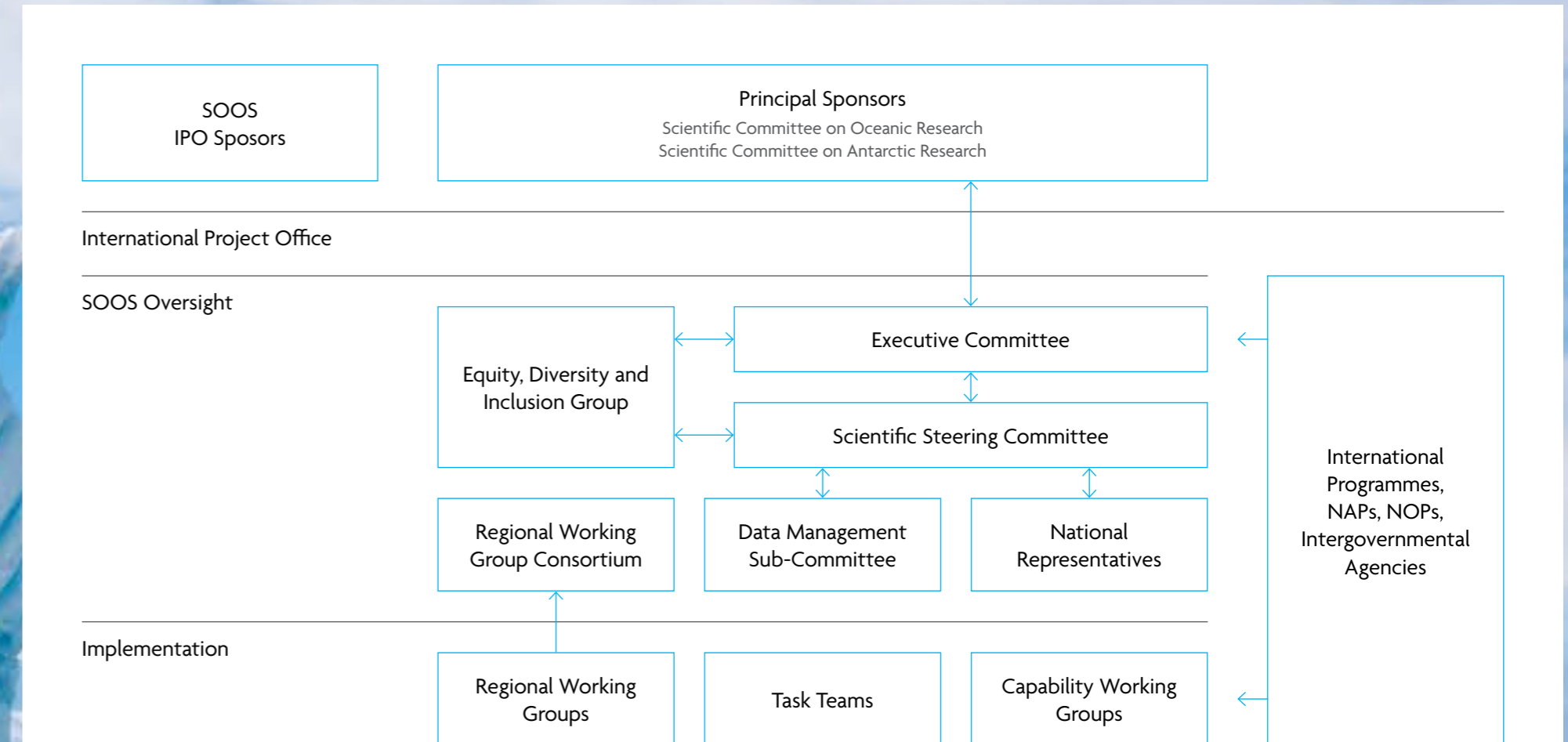


- Newsletter
- Publication
- Data Product

# SOOS GOVERNANCE

SOOS IS AN INITIATIVE OF SCAR AND SCOR, WHO PROVIDE GOVERNANCE, GUIDANCE AND ADVICE, AND IMPORTANT ACCESS FOR SOOS TO ENGAGE WITH INTERGOVERNMENTAL AGENCIES (E.G. ATCM, CCAMLR, IOC). THE STRATEGIC VISION AND DIRECTION FOR SOOS IS LED BY THE SOOS EXECUTIVE COMMITTEE. THE SCIENTIFIC STEERING COMMITTEE PROVIDES THE SCIENTIFIC DIRECTION AND OVERSIGHT OF WORKING GROUPS AND ACTIVITIES, AND ENSURES CLOSE CONNECTION TO THE BROADER COMMUNITY AND OTHER INTERNATIONAL STAKEHOLDERS.

## GOVERNANCE OVERVIEW



## EXECUTIVE COMMITTEE 2016 – 2020

SOOS is overseen by an Executive Committee (EXCOM) comprising two Co-Chairs, two Vice Chairs, and the SOOS Executive Officer.



**Prof. Anna Wählin**

Co-Chair, 2013 – 2016

University of Gothenburg, Sweden



**Assoc. Prof. Sebastiaan Swart**

Co-Chair, 2017 – 2019

Vice Chair, 2014 – 2017

University of Gothenburg, Sweden

Southern Ocean Carbon and Climate Observatory, South Africa



**Prof. Oscar Schofield**

Co-Chair, 2012 – 2017

Vice Chair, 2017 – 2018

Rutgers University, USA



**Dr. Andrew Constable**

Co-Chair, 2017 – 2019

Vice Chair, 2014 – 2018

Australian Antarctic Division, Australia



**Dr. Mike Williams**

Co-Chair, 2020 –

Vice Chair, 2017 – 2019

*Scientific Steering Committee Member, 2015 – 2017*

National Institute of Water and Atmospheric Research,  
New Zealand



**Dr. Sian Henley**

Vice Chair, 2020 –

University of Edinburgh, UK



**Prof. Eileen Hofmann**

Co-Chair, 2020 –

Vice Chair, 2018 – 2019

Old Dominion University, USA



**Dr. Louise Newman**

Executive Officer, 2011 – 2021

SOOS International Project Office, Australia



**Dr. Sébastien Moreau**

Vice-Chair, 2021 –

Norwegian Polar Institute, Norway



**Dr. Alyce Hancock**

Executive Officer, 2021 –

SOOS International Project Office, Australia

# SCIENTIFIC STEERING COMMITTEE 2016 – 2020

SOOS's scientific activities are overseen by an international Scientific Steering Committee (SSC) of world-leading researchers who represent the broad scope of SOOS science and geographic representation. The SSC has three governance levels represented by the Executive Committee, Scientific Committee and Ex-Officio advisors. The Scientific Committee is composed of ten scientific members. Ex-Officio advisors are SOOS's Regional Working Group Co-Chairs, Data Management Sub-Committee Co-Chairs, and an Equity, Diversity and Inclusion Group Representative.

## Scientific Members

### Assoc. Prof. Stephen Ackley

2012 – 2016  
University of Texas San Antonio, USA

### Prof. Alberto Naveira Garabato

2012 – 2016  
University of Southampton, UK

### Jiping Liu

2012 – 2016  
State Key Laboratory of Numerical Modelling for Atmospheric Sciences and Geophysical Fluid Dynamics and Chinese Academy of Sciences, China

### Prof. Mauricio Mata

2012 – 2017  
Federal University of Rio Grande, Brazil

### Prof. Mike Meredith

2012 – 2017  
British Antarctic Survey, UK

### Prof. Daniel Costa

2012 – 2017  
University of California, Santa Cruz, USA

### Dr. Parli Bhaskar

2012 – 2017  
National Centre for Polar and Ocean Research, India

### Dr. SangHoon Lee

2015 – 2019  
Korean Polar Research Institute, South Korea

### Dr. Matthew Mazloff

2015 – 2021  
University of California, San Diego, USA

### Dr. Jean-Baptiste Sallee

2015 – 2021  
National Centre for Scientific Research and Institute Pierre Simon Laplace, France

### Dr. Anya Waite

2018 – 2020  
Alfred Wegener Institute (AWI) Helmholtz Centre for Polar and Marine Research, Germany  
University of Dalhousie, Canada

### Prof. Dake Chen

2017 –  
State Oceanic Administration, China

### Assoc. Prof. Burcu Ozsoy

2017 –  
Istanbul Technical University, Turkey

### Dr. Irene Schloss

2018 –  
Argentine Antarctic Institute, Argentina

### Dr. Andrew Meijers

2018 –  
British Antarctic Survey, UK

### Dr. Sarah Fawcett

2018 –  
Equity, Diversity and Inclusion Co-Chair, 2020 –  
University of Cape Town, South Africa

### Assoc. Prof. Delphine Lannuzel

2020 –  
Institute for Marine and Antarctic Studies, University of Tasmania, Australia

### Dr. Jilda Caccavo

2020 –  
Alfred Wegener Institute (AWI) Helmholtz Centre for Polar and Marine Research, Leibniz Institute for Zoo and Wildlife Research and Berlin Center for Genomics in Biodiversity Research, Germany

### Dr. Luciano Pezzi

2020 –  
National Institute for Space Research, Brazil

## Ex-Officio Advisors

### Steve Diggs

Data Management Sub-Committee Co-Chair, 2013 – 2019  
Equity, Diversity and Inclusion Co-Chair, 2020 –  
Scripps Institute for Oceanography, USA

### Joana Beja

Data Management Sub-Committee Co-Chair, 2016 – 2020  
Flander Marine Institute and EMODnet Biology, Belgium

### Dr. Petra ten Hoopen

Data Management Sub-Committee Co-Chair, 2018 –  
British Antarctic Survey, UK

### Benjamin Pfeil

Data Management Sub-Committee Co-Chair, 2019 –  
University of Bergen, Norway

### Dr. Bastien Queste

Amundsen and Bellingshausen Sector Regional Working Group Co-Chair, 2019 – 2021  
University of Gothenburg, Sweden

### Prof. Patricia Yager

Amundsen and Bellingshausen Sector Regional Working Group Co-Chair, 2020 –  
University of Georgia, USA

### Prof. Walker Smith

Ross Sea Regional Working Group Co-Chair, 2017 –  
Shanghai Jiao Tong University, China and Virginia Institute of Marine Science, USA

### Assoc. Prof. Paola Rivaro

Ross Sea Regional Working Group Co-Chair, 2020 –  
University of Genova, Italy

### Prof. Philippe Koubbi

Southern Ocean Indian Sector Regional Working Group Co-Chair, 2017 – 2020  
Sorbonne University, France

### Prof. Tsuneo Odate

Southern Ocean Indian Sector Regional Working Group Co-Chair, 2017 – 2020  
Research Organization of Information and Systems, Japan

### Dr. Elizabeth Shadwick

Southern Ocean Indian Sector Regional Working Group Co-Chair, 2020 –  
Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia

### Dr. Sarat Tripathy

Southern Ocean Indian Sector Regional Working Group Co-Chair, 2020 –  
National Centre for Polar and Ocean Research, India

### Dr. Sian Henley

West Antarctic Peninsula and Scotia Arc Regional Working Group Co-Chair, 2017 – 2020  
University of Edinburgh, UK

### Prof. Oscar Schofield

West Antarctic Peninsula and Scotia Arc Regional Working Group Co-Chair, 2016 –  
Rutgers University, USA

### Assoc. Prof. Katharine Henry

West Antarctic Peninsula and Scotia Arc Regional Working Group Co-Chair, 2017 – 2020  
University of Bristol, UK

### Dr. Juan Höfer

West Antarctic Peninsula and Scotia Arc Regional Working Group Co-Chair, 2020 –  
Dynamics of High Latitude Marine Ecosystems and Pontifical Catholic University of Valparaiso, Chile

### Dr. Julian Gutt

Weddell Sea and Dronning Maud Land Regional Working Group Co-Chair, 2017 – 2020  
Alfred Wegener Institute (AWI) Helmholtz Centre for Polar and Marine Research, Germany

### Dr. Laura de Steur

Weddell Sea and Dronning Maud Land Regional Working Group Co-Chair, 2018 – 2021  
Norwegian Polar Institute, Norway

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## INTERNATIONAL PROJECT OFFICE

The International Project Office (IPO) is the central hub of the SOOS effort, coordinating international efforts; facilitating communication; developing avenues for data management/sharing; and fostering programmatic, national and disciplinary relationships. The IPO is the communicating body between the SOOS Scientific Steering Committee, researchers, observational platform operators, data centres and other stakeholders.

The SOOS IPO is hosted by the Institute for Marine and Antarctic Studies, University of Tasmania (IMAS UTAS). Since 2016, the SOOS IPO has grown from one staff member, the SOOS Executive Officer, to now include a Data Officer, Science and Communications Officer and a Project Officer. The activities of the SOOS IPO are supported locally and internationally through a combination of direct financial sponsorship and in-kind support (more information on sponsorship and support on page 2).

## INTERNATIONAL PROJECT OFFICE STAFF



**Executive Officer, 2011 – 2021**

Louise Newman



**Executive Officer, 2021 –  
Science and Communications Officer, 2019 – 2021**

Alyce Hancock



**Data Officer, 2015 – 2022**

Pip Bricher



**Project Officer, 2018 – 2021**

Yuhua Pei



**Science and Communications Officer, 2021 –**

Julia Bach

## LOOKING FORWARD

Achieving the objectives identified in the 2016 – 2020 Implementation Plan has enabled SOOS to build connected, inclusive, and active networks and deliver high-priority data and products to the community. With the completion of this plan in 2020, SOOS is looking to the future. The new [SOOS Science and Implementation Plan 2021-2025](#) articulates 5 interconnected new Science Themes and several Key Science Challenges, designed to align observational priorities across national and disciplinary communities. Addressing these Science Themes and Key Challenges requires parallel advances in coordination networks, cyberinfrastructure and data management tools, observing system design, modelling, methods and standards. Thus, the plan also identifies several “foundational capabilities” that require support in the coming years.

As always, supporting national and international observational efforts is a key remit of SOOS, as these programmes are fundamental to the delivery of a Southern Ocean observing system. SOOS working group activities are intended to integrate across internationally coordinated programmes and shorter-term national/multinational projects, overlapping areas of national and thematic focus. With five developed Regional Working Groups providing circumpolar coverage, SOOS can work towards developing an understanding of the spatio-temporal and thematic requirements of observations to address both the Science Themes and stakeholder needs. New and existing Capability Working Groups and Task Teams will continue to address gaps and inefficiencies in the collection and delivery of observations. The Data

Management Sub-Committee will continue to coordinate ways to support the management and delivery of observation data, towards the aim that all data are FAIR (“Findable, Accessible, Interoperable and Reusable”). Across these networks, SOOS will actively review and reflect on all activities and structures to ensure they are as equitable, diverse and inclusive as possible, supported by the newly formed SOOS Equity, Diversity and Inclusion Group. Additionally, SOOS will continue to engage with, partner with, and contribute to relevant initiatives such as the UN Decade of Ocean Science for Sustainable Development, specifically the Southern Ocean UN Ocean Decade efforts. Through all SOOS’s mechanisms, we will ensure that SOOS is maintained as the world-leading hub to support the collection and delivery of Southern Ocean observations.

**Dr Louise Newman**  
SOOS Executive Officer  
2011 – 2021

**Dr Alyce Hancock**  
SOOS Executive Officer  
2021 –

# ACRONYMS

<b>AABW</b>	Antarctic Bottom Water	<b>EMODnet</b>	European Marine Observation and Data Network	<b>NAP</b>	National Antarctic Programmes	<b>SOFLUX</b>	Southern Ocean Fluxes
<b>AADC</b>	Australian Antarctic Data Centre	<b>ENRICH</b>	Euphausiids and Nutrient Recycling in Cetacean Hotspots	<b>NECKLACE</b>	Network for the Collection of Knowledge on Melt of Antarctic Ice Shelves	<b>SOIS</b>	Southern Ocean Indian Sector
<b>AAS</b>	Australian Antarctic Science	<b>EXCOM</b>	Executive Committee	<b>NERC</b>	National Environment Research Council	<b>SONAR-CO<sub>2</sub></b>	Southern Ocean Nanoplankton Response to CO <sub>2</sub>
<b>ABS</b>	Amundsen and Bellingshausen Sector	<b>EXCOM</b>	Executive Committee	<b>NIPR/ROIS</b>	National Institute of Polar Research, Research Organization of Information and Systems	<b>SOSCEX</b>	Southern Ocean Seasonal Cycle Experiment
<b>ADC</b>	Arctic Data Committee	<b>DynOPO</b>	Dynamics of the Orkney Passage Outflow	<b>NOP</b>	National Oceanographic Programmes	<b>SOTS</b>	Southern Ocean Time Series
<b>AGP</b>	Antarctic Gateway Partnership	<b>FAIR</b>	Findable, Accessible, Interoperable and Reusable	<b>NPI</b>	Norwegian Polar Institute	<b>SSC</b>	Scientific Steering Committee
<b>AniBOS</b>	Animal Borne Ocean Sensors	<b>GCOS</b>	Global Climate Observing System	<b>NSF</b>	National Science Foundation	<b>T-REX</b>	Terra Nova Bay Research Experiment
<b>ATCM</b>	Antarctic Treaty Consultative Meeting	<b>GOOS</b>	Global Ocean Observing System	<b>PIPERS</b>	Polynas, Ice Production and Seasonal Evolution in the Ross Sea	<b>TT</b>	Task Team
<b>ATWG</b>	Blue and Fin Whale Acoustic Trends Working Group	<b>IDEAL</b>	Centro de Investigación Dinámica de Ecosistemas Marinos de Altas Latitudes	<b>POGO</b>	Partnership of Observation of the Global Ocean	<b>VHR</b>	Very High Resolution
<b>AUV</b>	Autonomous Underwater Vehicle	<b>IEP-PAUV</b>	International Expert Panel on Polar AUV	<b>POLDER</b>	Polar Data Discovery Enhancement Research	<b>WAP</b>	West Antarctic Peninsula
<b>AWI</b>	Alfred Wegener Institute	<b>IOC</b>	Intergovernmental Oceanographic Commission	<b>QNLN</b>	Pilot National Laboratory for Marine Science and Technology	<b>WASPA</b>	West Antarctic Peninsula and Scotia Arc
<b>BAMS</b>	Bulletin of the American Meteorological Society	<b>IPO</b>	International Project Office	<b>ROAM-MIZ</b>	Robotic Observations and Modelling of the Marginal Ice Zone	<b>WCRP</b>	World Climate Research Programme
<b>BAS</b>	British Antarctic Survey	<b>ITGC</b>	International Thwaites Glacier Collaboration	<b>ROBOTICA</b>	Research of Ocean-Ice Boundary Interaction and Change around Antarctica	<b>WHOI</b>	Woods Hole Oceanographic Institute
<b>CAPS</b>	Censusing Animal Populations from Space	<b>IWC-SORP</b>	International Whaling Commission Southern Ocean Research Partnership	<b>RWG</b>	Regional Working Group	<b>WSDML</b>	Weddell Sea and Dronning Maud Land
<b>CCAMLR</b>	Convention for the Conservation of Antarctic Marine Living Resources	<b>K-Axis</b>	Kerguelen Axis Marine Science Voyage	<b>SCADM</b>	SCAR Standing Committee on Antarctic Data Management	<b>XBT</b>	Expendable Bathythermograph
<b>ChinStrAP</b>	Changes in Stratification at the Antarctic Peninsula	<b>KOPRI</b>	Korea Polar Research Institute of Marine Research Placement	<b>SCAR</b>	Scientific Committee on Antarctic Research	<b>XCTD</b>	Expendable Conductivity, Temperature, Depth
<b>CLIC</b>	Climate and Cryosphere	<b>LTER</b>	Long Term Ecological Research Network	<b>SCOR</b>	Scientific Committee of Oceanic Research		
<b>CSIRO</b>	Commonwealth Scientific and Industrial Research Organisation	<b>OASIS</b>	Observing and Understanding the Ocean Beneath Antarctic Sea Ice and Ice Shelves	<b>SIO</b>	Second Institute of Oceanography		
<b>CTD</b>	Conductivity, Temperature, Depth	<b>ORCHESTRA</b>	Ocean Regulation of Climate by Heat and Carbon Sequestration and Transports	<b>SJTU</b>	Shanghai Jiao Tong University		
<b>CWG</b>	Capability Working Group	<b>OSD</b>	Observing System Design	<b>SOA</b>	State Oceanic Administration		
<b>DMSC</b>	Data Management Sub-Committee	<b>MEASO</b>	Marine Ecosystem Assessment of the Southern Ocean	<b>SO-CHIC</b>	Southern Ocean Carbon and Heat Impact on Climate		
<b>ECV</b>	Essential Climate Variable	<b>MORSea</b>	Marine Ross Sea Observatory	<b>SOCCOM</b>	Southern Ocean Carbon and Climate Observations and Modelling		
<b>EDI</b>	Equity, Diversity and Inclusion						
<b>eEOV</b>	ecosystem Essential Ocean Variable						

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