



SOOS
SOUTHERN OCEAN
OBSERVING SYSTEM

The
Southern Ocean Observing System
2017 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



UNIVERSITY OF
GOTHENBURG

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2017 in review

By any measure, 2017 has been a great success for SOOS – the broader scientific community will now be benefitting from some major advances we have achieved.

If you have been following the SOOS website, you will have noticed two new tools that are important for all interested in the Southern Ocean. First, DueSouth has matured to provide a first point-of-access to plans for Southern Ocean voyages and projects, including deployments of observing platforms and research opportunities. It has long been sought by national Antarctic programs, oceanographic researchers and agencies, and programs relying on existing operations to support activities that only require a small amount of ship-time to undertake. Second, SOOSmap is a data discovery tool to help researchers find data in locations and at times of importance to their research programs. Built by EMODnet Physics in late 2017, it has already enabled one early-career researcher to find and use data essential to their thesis. It provides a central tool for finding integrated Southern Ocean datasets. It also provides SOOS with a mechanism for highlighting orphan data now made available through SOOS investment, such as the network of over 600 current and historical moorings in the Southern Ocean.

An additional measure of success is the engagement of our community in working groups, and 2017 has seen major steps forward in this area. SOOS has established and held the first meetings of three regional working groups, with two others now being formed. With international partners, such as GO-SHIP and ARGO, we now have groups covering all regions of the Southern Ocean, coordinating and filling gaps in our observational network. We are looking to further develop these groups and provide opportunities for all Southern Ocean researchers to participate at this important base-level, to define observing gaps and priorities, better coordinate, and collaborate in field programs.

SOOS is actively encouraging and facilitating the development of observational capabilities for locations and for types of data difficult to obtain, such as observing under ice, the ocean-atmosphere interface, and the counting of marine mammals and birds. In these, 2017 has seen major steps forward. This year also saw increased support through sponsorship and investment. Publications over the last 12 months have shown the expansion of SOOS activities and how it underpins research in the region, including a special issue arising from a SOOS Symposium on the West Antarctic Peninsula.

2018 will be an exciting year for further enhancing SOOS as a hub of observational and data activities to support Southern Ocean research, your research. It will see an advancement in the design of the system through collaborations with modelling communities, and a consolidation of the essential ocean variables that will form the backbone of SOOS in the coming years.

We thank you for your support of SOOS and we encourage you to continue supporting it and to participate in our upcoming activities.

Signed:



Dr. Andrew Constable; Biological Sciences Co-Chair
Australian Antarctic Division, Australia

Signed:



Dr. Sebastiaan Swart; Physical Sciences Co-Chair
University of Gothenburg, Sweden

Performance Report

SOOS published its 5-Year Implementation Plan in 2016, which articulated the key problems driving SOOS, and resulted in the identification of 4 Objectives and specific Key Result Areas (KRAs) that will address the causes of these Key Challenges.

The annual report for SOOS is the mechanism through which we review progress against the KRAs, to ensure the Objectives are being met.

The 5-Year Implementation Plan is available from the SOOS website (<http://soos.aq/activities/implementation>).

Progress report against Objectives and Key Result Areas

Objective One: Facilitate the design of a comprehensive and multi-disciplinary observing system for the Southern Ocean

Objective 1 will help to deliver a coordinated, integrated, efficient and sustained international program to deliver observations of essential elements of Southern Ocean Systems, following the Framework for Ocean Observing (FOO, 2010?) and the identification of Essential Ocean Variables (EOVs). Activity towards achieving Objective 1 will be predominantly carried out by the Regional Working Groups (RWGs) and Capability Working Groups (CWGs).

There are 4 KRAs that will focus work towards achieving this objective, however, only 2 (KRA 1.1 and 1.2) were identified for actioning in 2017. Progress for 2017 shown in the tables below.

Generally speaking, limited progress was made against Objective 1 in 2017, due mainly to the relatively immature status of the RWGs that will be delivering much of the activity. Looking forward, a much stronger statement by SOOS on the need for delivery of this information is required to ensure the RWGs and CWGs include it as an action for coming years. The addition of specific resources to support this KRA in 2018 is also expected to make a significant difference in its progress.

Key Result Area 1.1: Establish Criteria for adopting EOVs and communicate them

2017 Intended Actions	Progress Made (Y/ X)	Comment
Published, internationally defined criteria for EOVs	X	No progress was achieved in 2017, predominantly due to a lack of well-defined community to drive this initiative

Key Result Area 1.2: Southern Ocean EOVs are identified and the manner in which they satisfy the criteria are communicated

2017 Intended Actions	Progress Made (Y/ X)	Comment
Published table of status of EOVs	Y	<p>Progress in 2017 has been initiated through some Regional Working Groups – see individual RWG reports (pages X – X)</p> <p>Resources to support this activity were sourced (State Oceanic Administration, China), and work will begin in March 2018</p> <p>Identification of Essential Ocean Variables for Southern Ocean Fluxes, and advocacy for inclusion in the Global Climate Observing System's Essential Climate Variables</p>
Compiled EOV descriptions and supporting documentation	Y	Resources were sourced (State Oceanic Administration, China) to deliver actions against this in 2018

Objective Two: Unify and enhance current observation efforts and leverage further resources across disciplines, and between nations and programs

Achieving Objective 2 will ensure regional implementation of long-term, sustained observations to achieve circumpolar coverage of Southern Ocean systems, built by integrating across internationally coordinated observation programs and existing efforts by national programs.

There are 3 KRAs that will focus work towards achieving this objective, and all were identified for actioning in 2017. Progress for 2017 shown in the tables below.

In 2017, activity towards achieving this objective was substantial, with delivery of several key products and networks. Looking forward, 2018 will likely be a year of consolidation and communication of these tools to the broader SOOS community.

Key Result Area 2.1: Working Groups and Task Teams that coordinate efforts across disciplines and programs, and between nations are developed to fill priority gaps

2017 Intended Actions	Progress Made (Y/ X)	Comment
Development of new WGs (as required)	Y	All 5 Regional Working Groups have been initiated Proposal accepted for new Capability Working Group (joint with IWC) "Acoustic Trends Working Group" Task Team on enhancing Observing System design and modelling efforts Task Team on defining requirements/scope of a Circumpolar Regional Working Group Issues – inability of IPO to provide required website, communication and coordination support for these groups

Key Result Area 2.2: Key products for the Southern Ocean that aid in information transfer and facilitate collaborative efforts are identified and produced

2017 Intended Actions	Progress Made (Y/ X)	Comment
Database of Upcoming Expeditions to the Southern Ocean	Y	Product was consolidated and delivered; Expeditions were populated manually by SOOS Data Officer; Automation of transfer of national expedition plan were initiated; Resources and personnel for further development of product were sourced; Engagement with COMNAP was developed Issues – Specific observational projects remain unpopulated; Inability to obtain user statistics; limited input of plans by community
SOOSmap	Y	Significant progress in delivering product; core portal designed and developed; new data layers added; future data layers identified; modifications to user interface initiated Issues – Low level of control over timing and delivery of enhancements and modifications to functionality due to in-kind delivery of product
Community annual calendar	Y	Product was delivered to the community and updated as required

Key Result Area 2.3: Collaborative, multidisciplinary and multinational workshops and meetings are undertaken, resulting in the SOOS mission being achieved

2017 Intended Actions	Progress Made (Y/ X)	Comment
Capability and Regional Working Group workshops	Y	OASIIS workshop; WAP WG workshop; Ross Sea workshop; Indian Sector workshop; Data Management Sub-Committee meeting
Capacity- or Community-building workshops	Y	SOOS-AWI Weddell/Dronning Maud Land symposium
International conference sessions, town-halls, side meetings, information sessions	Y	Southern Ocean Session at Asia Oceania Geosciences Society; Polar Connections Interoperability Workshop

Objective Three: 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

Achieving Objective 3 will enhance access to multidisciplinary, quality-controlled observational data from the Southern Ocean. Currently, such data is difficult and time consuming to access as there are many fragmented, mono-disciplinary or mono-platform data centres; a general lack of focused effort towards data sharing and platform interoperability; large variations in national/institutional data policies and data-sharing cultures; and a lack of general knowledge on the data that are being collected.

There are 4 KRAs that will focus work towards achieving this objective, and all were identified for actioning in 2017. Progress for 2017 is shown in the tables below.

In 2017, progress towards this objective was significant. Dedication to building strategic connections and networks within the data community over the last few years, resulted in enhanced opportunities to deliver against the KRAs in 2017. These connections are vital to maintain in the coming years. Several of the KRAs and specific actions towards achieving them are losing relevance or importance as priorities in data management shift. This is therefore reflected by a lower intensity of effort on these fronts.

Key Result Area 3.1: A multidisciplinary metadata portal is developed and populated and continuously updated with records. Efforts include archiving of orphan datasets and advocating for direct links to data in metadata records

2017 Intended Actions	Progress Made (Y/ X)	Comment
Maintenance of the SOOS NASA GCMD metadata portal	Y	Portal functionality maintained and number of records increased by 3% and the proportion of records with data links increased by 15% Issue: General recognition that the GCMD is no longer delivering what the community requires. Development of the Federated Data Search Tool will re-focus SOOS efforts away from the GCMD
International mooring network	Y	Significant effort in building network database of internationally deployed, retrieved and active moorings Delivery of mooring metadata to SOOSmap Management of BEDI mooring data rescue project and personnel

		<p>Management and delivery of previously inaccessible data from 63 mooring deployments into NCEI repository</p> <p>Identification and management of new resources to enhance mooring data delivery (sponsorship by State Oceanic Administration, China)</p>
Southern Ocean glider network	X	<p>An international effort to manage and deliver global glider data was initiated by communities external to SOOS; SOOS will support this effort where needed but will no longer deliver a Southern Ocean glider network</p>
NECKLACE data management	Y	<p>Development of international data policy for NECKLACE (downward-looking radar for ice-shelf melt) data</p> <p>Maintenance of instrument deployment and retrieval data in SOOSmap</p>
Argo Oxygen Data	Y	<p>**This is a new addition to actions against this KRA, due to newly articulated community needs</p> <p>Identification of data holders of Argo oxygen data, issues with delivery of the data, and support for efforts to standardise data quality control for delivery of an integrated dataset</p>
Sea-ice core chlorophyll database	Y	<p>**This is a new addition to actions against this KRA, due to newly articulated community needs</p> <p>Opportunistic activity leveraging off the NOAA-BEDI funding of the SOOS Mooring data rescue effort to combine and deliver international sea-ice core chlorophyll data through the Australian Antarctic Data Centre and SOOSmap</p>

Key Result Area 3.2: Up-to-date information on key Southern Ocean data programmes, centres and repositories is provided

2017 Intended Actions	Progress Made (Y/ X)	Comment
Catalogue of Southern Ocean data providers	Y	The online catalogue was updated and maintained on the SOOS website

Key Result Area 3.3: Web-based tools will be explored and, as needed, developed to aid data discovery and delivery; the wider community is encouraged to adopt and enhance tools that already exist

2017 Intended Actions	Progress Made (Y/ X)	Comment
Federated metadata search tool	Y	<p>Proposed by SOOS for recognition as priority for the global polar community in coming years</p> <p>Development of focused Working Group jointly with SCADM and the Arctic Data Council on scoping of product requirements and pathway to delivery</p> <p>Management of WG meetings and publications</p>
Brokering data discovery and interoperability	Y	<p>Discussions initiated on integrating metadata from PANGAEA into GCMD</p> <p>Discussions initiated on integrating datasets from PANGAEA into EMODnet</p> <p>Benthic data from Polish research programs at King George Island documented and curated at NCEI.</p> <p>Possibility of developing data projects through the Alfred Wegener Institute investigated.</p>
General data management advocacy and advice	Y	<p>Support for development of Swiss Polar Institute data management</p> <p>Support for development of Antarctica New Zealand's data management</p> <p>Delivery of Australian Research Council's Antarctic Gateway Partnership data policy, including data management advice to staff, development of data policy for new observing platforms (AUV), and facilitation of model output publishing guidelines and workshop</p>

Key Result Area 3.4: Data synthesis tools and products are made accessible

2017 Intended Actions	Progress Made (Y/ X)	Comment
Online catalogue of data products	Y	<p>Scoping of requirements, initial products online</p> <p>Delivery of products as SOOSmap base layers</p>

Objective Four: Provide services to communicate, coordinate, advocate and facilitate SOOS objectives and activities

Objective 4 provides the foundation for the work program of the International Project Office (IPO). It outlines the activities required to support the sustained implementation of SOOS, delivery of SOOS tools and products, and facilitate activities of the SOOS network.

There are 6 KRAs that will focus work towards achieving this objective, and all were scheduled for action in 2017. Progress for 2017 is shown in the tables below.

Although progress was made against all the KRAs of Objective 4 in 2017, required actions were limited in depth and quality of progress due to limited capability of the IPO staff to implement all required actions, in addition to supporting the SOOS network in actions against the other objectives.

Key Result Area 4.1: The need for sustained Southern Ocean observations is strongly articulated

2017 Intended Actions	Progress Made (Y/ X)	Comment
Endorsement of observational research projects	Y	Review and endorsement of international observational research projects as requested
High-level advocacy actions	Y	Letter of support for AMSR satellite observations Engagement with WMO Polar Space Task Group on advocacy for continued satellite observations Presentation at UN "The Ocean" Conference Presentation at the Asian Forum for Polar Sciences on the need for interoperable data sharing and discovery tools

Key Result Area 4.2: Engagement with international stakeholders, across all disciplines and nations, is maintained

2017 Intended Actions	Progress Made (Y/ X)	Comment
Reporting	Y	<p>In 2017, annual reports were delivered for SCAR, SCOR, CCAMLR, COMNAP, ATCM-CEP, Australian Research Council's Antarctic Gateway Partnership, POGO, SCADM, and the SOOS SSC</p> <p>Issue: Reporting requirements are a significant overhead for the IPO, particularly given the lack of consistency between required information. Where possible, the general annual SOOS SSC report is delivered as the standard report to the above stakeholders.</p>
Development of SOOS Engagement Strategy	X	This is a significant undertaking, and there is currently no capacity in the IPO to carry out this work
Community Engagement and conference presentations	Y	<p>Direct engagement included (but not limited to): IICWG, CCAMLR, COLTO, EU-PolarNet, CEP, SORP, EPB, WDS, GEOSS, APECS, GOOS, OOPC, POGO, SCAR Programs, EuroGOOS, WCRP, CLIVAR, CLIC, RDA, SCADM, COMNAP, ICED, IEEE, IMBER, IMOS, IAPSO, YOPP, SCOR</p> <p>All engagement/presentations were carried out directly by IPO staff or by a community member and facilitated by IPO</p>
Engagement with core IPO sponsors and stakeholders	Y	<p>Regular engagement was maintained through in-person meetings and email correspondence</p> <p>Engagement included: IMAS, UTAS, AAD, ACE CRC, CSIRO, AGP, IMOS, TPN, Tas. State Government, Antarctic NZ, University of Gothenburg, SOA-China</p>

Key Result Area 4.3: A SOOS community bibliography is developed

2017 Intended Actions	Progress Made (Y/ X)	Comment
Scoping of requirements and delivery of product	X	No progress was achieved in 2017 but the database of SOOS publications was maintained on the SOOS website

Key Result Area 4.4: The SOOS Communication Strategy is implemented

2017 Intended Actions	Progress Made (Y/ X)	Comment
Sourcing of new website domain host; contact management system; transfer to standardised Joomla template;	X	No progress was achieved in 2017 Issue: This is a high priority but the IPO does not have the capacity and expertise to identify best options. External advice is required
Content of website is kept up-to-date	Y	Some aspects of the website were updated Issue: Website updates were done only when immediately required, rather than when they became out-of-date or when new information was available (e.g., reactive rather than strategic/pro-active). This is due to the growth in the SOOS network and activities, and lack of growth in IPO capacity and resources
Delivery of the SOOS Newsletter	Y	One issue was produced in December 2017 Issue: The newsletter has historically been produced quarterly, with production out-sourced by the IPO to a UTAS PhD student. In 2017, delivery was significantly delayed when the PhD student finished at the University and no alternative student was identified. Production is now out-sourced to a commercial communication company
Merchandise	X	Issue: Some merchandise remains from previous years' investments, however there are no stocks of up-to-date information fliers. There was no capacity within the SOOS IPO to develop new fliers in 2017. Newly agreed in-kind support by Australia's ACE CRC will ensure development of new fliers in 2018
Social Media	Y	Basic-level updates to SOOS Facebook and Twitter accounts was maintained and automated where possible Issue: Social media is not used strategically and is ad-hoc at best. Facebook posts are automatically delivered to Twitter irrespective of the different type of engagement that Twitter facilitates

Key Result Area 4.5: Support for SOOS International Project Office is maintained and enhanced

2017 Intended Actions	Progress Made (Y/ X)	Comment
Development of future IPO hosting Partnership Agreement	Y	<p>Direct, regular and strategically-planned engagement with Partners was a significant action in 2017</p> <p>Drafting of strategic and financial documentation in support of partnership development</p> <p>Management of partnership meetings and associated administration</p>
Maintenance of existing IPO and SOOS sponsorship	Y	<p>Regular engagement with existing sponsors</p> <p>Oversight of finance and budget</p> <p>Development of annual sponsorship agreements and project schedules</p> <p>Management of in-kind services and agreements</p> <p>Issue: Most direct sponsorship is agreed on an annual basis, requiring ongoing management of agreements, increased budget risk and inability to forward-plan</p> <p>Most in-kind services are agreed verbally without the ability to develop a Service Level Agreement on delivery of product/service</p>
Actions on new sponsorship opportunities	Y	<p>Connection to Hobart-based protein supplement company "BioFlex" for in-kind marketing support</p> <p>Initiation and delivery of newly agreed IPO sponsorship by State Oceanic Administration (China) for SOOS Project Officer</p>

Key Result Area 4.6: SOOS Administration, facilitation of Strategic Plan activities and delivery of support services is maintained

2017 Intended Actions	Progress Made (Y/ X)	Comment
Maintenance and support of SOOS Governance	Y	<p>Management and engagement with governing bodies SCAR and SCOR</p> <p>Management of Executive Committee (meetings, membership, activities, TORs)</p> <p>Management of Scientific Steering Committee (meetings, membership, activities, TORs)</p> <p>Management of Data Management Sub-Committee (meetings, membership, activities, TORs)</p>
Management of Implementation Plan monitoring and progress review	Y	Weekly review and recording of activities against all KRAs
Administrative finance	Y	<p>Development of 2017 budget</p> <p>Management of income and expenditure</p> <p>International sponsorship of SOOS representatives</p>
Office administration and staff development/support	Y	<p>Management of staff Professional Development updates and strategies</p> <p>Involvement of Executive Officer on International Scientific Advisory Board of the Swedish Marine Robotics Centre</p> <p>Weekly IPO workplan meetings</p> <p>Annual review of staff performance</p> <p>Development of new staff position of Project Officer</p>

Database of Upcoming Expeditions to the Southern Ocean



DueSouth coding and hosting is provided to SOOS by James Cusick of the Australian Antarctic Data Centre and DueSouth has been added to the project schedule between SOOS and AAD to provide long-term security. Antarctic Sea Ice Processes and Climate (ASPeCt) has provided funding to complete the coding.



2017 Milestones:

Initial construction of DueSouth was completed in early 2017 and the database was populated with key voyages from some large Southern Ocean projects. DueSouth was presented to the SOOS annual meeting in Bremerhaven, Germany in June 2017 and SOOS members encouraged to enter details of upcoming voyages and projects. This process highlighted limitations of the existing code and the need for some fundamental restructuring of the core functions. For example, the initial database design was predicated on a project being assigned to a single expedition or research facility, when many multi-year projects should be assigned to multiple expeditions.

During 2017, SOOS reached in-principle agreement with JCOMMOPS, CCAMLR, and the Alfred Wegener Institute (AWI) to automate the sharing of upcoming voyages with DueSouth. DueSouth was presented at scientific conferences throughout the year but the major focus of work on this product during 2017 was securing coding support to make the product stable and fully functional. Funding support for this coding work was secured from ASPeCt and DueSouth has been added to the Project Schedule with the AAD, giving it hosting and maintenance security in coming years.

2018 Plans:

- Complete the refactoring of the DueSouth code, including full administration rights for the SOOS data officer, allowing many-to-many relationships between projects and expeditions, and allowing record-authors to edit their records
- Add automatic data feeds from JCOMMOPS, AWI, and the Australian and New Zealand Antarctic science programs
- Ask the SOOS community to comprehensively populate DueSouth with expedition plans for 2018/19 and beyond.
- Implement site analytics to enable user statistics to be collected

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 coders at the European Marine Observations and Data Network (EMODnet) Physics group, using the infrastructure they have created for aggregating and sharing data from disparate European and global oceanographic programs.

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. The relationship between SOOS and EMODnet was negotiated by Patrick Gorringer from the EuroGOOS secretariat.

2017 Milestones

In early 2017, the SOOS data officer completed development of a prototype SOOSmap, populated with a few data layers showing key observing platforms for the Southern Ocean in an interactive web map. This map allowed users to explore the state of the observing system and produce maps for reporting. However, by mid-year, SOOS DMSC member, Taco de Bruin introduced the EMODnet Physics group to SOOS. EMODnet Physics had produced other portals showing the distribution of observing platforms in European waters and also providing access to the underlying data. Adding data access to SOOSmap would bring SOOSmap considerably closer to the SOOS vision of an interconnected cyber infrastructure.

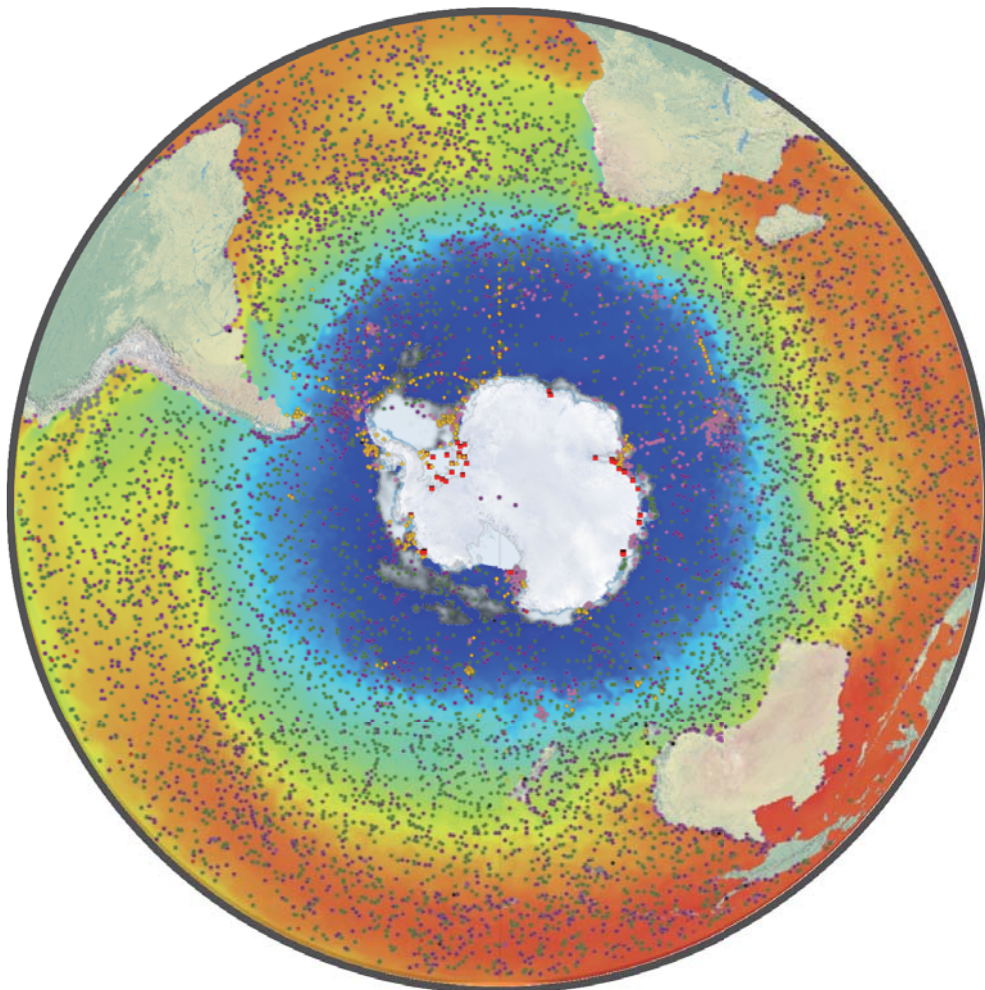
By the end of 2017, the core design and coding for SOOSmap was complete, the user interface had been amended and SOOSmap was publishing data from Argo, MEOP seals, ferrybox, drifting buoys, gliders, moorings, tide gauges, and COMNAP research facilities. Additionally, it displayed metadata from the SOOS mooring network and NECKLACE programs. It enables users to filter by time, place, platform type, parameters, or research program. The DMSC has identified target layers for inclusion in SOOSmap.

2018 Plans

In 2018, we plan to:

- Improve the user interface to make it more intuitive

- Add data from the following programs
- Southern Ocean Continuous Plankton Recorder program
- CCAMLR administrative boundaries (CEMP sites; MPAs; Research Blocks; and Areas, sub-Areas, and Divisions)
- Bathymetry surveys
- Sea ice concentration
- Sea surface temperature
- Other programs as opportunity allows
- Investigate opportunities to produce high resolution maps for reporting purposes
- Implement site analytics to enable user statistics to be collected



All data layers available in SOOSmap as at January 2018

SOOS Sponsorship

General SOOS Sponsorship

In 2017, SOOS redefined its sponsorship categories to better articulate the types of support that we receive. SOOS Sponsors are identified by 4 categories:

- 1) SOOS Governing Bodies – the Scientific Committee on Antarctic Research (SCAR) and the Scientific Committee on Oceanic Research (SCOR) are the SOOS Governing Bodies and provide strategic and programmatic oversight and guidance to SOOS.
- 2) Core Sponsors – Core sponsors are those that support the salaries of IPO staff
- 3) IPO Operational Sponsors – Operational Sponsors are those that provide sponsorship monies in support of SOOS IPO activities. This support is for use by the IPO in delivery of communication products, support for workshops, IPO travel and other IPO-directed actions or products
- 4) Service Providers – This category is to give recognition to all providers of in-kind services for SOOS.

2017 saw significant growth in sponsorship of SOOS. The State Oceanic Administration of China (SOA) became a Core Sponsor, through their support of a Project Officer to work in the IPO in Hobart. Dr Yuhua Pei will work as the SOOS Project Officer until early 2019.

In addition to this, 3 organisations became new Service Providers for SOOS: the Australian Antarctic Climate and Ecosystems Cooperative Research Centre (ACE CRC) now provides SOOS with ad-hoc administration and communication support; European Marine Observation and Data Network (EMODnet) provide SOOS with SOOSmap; and the Council of Managers of National Antarctic Programs (COMNAP) support SOOS in the delivery of DueSouth and other related information.

Sustained support for the IPO

In 2017, the SOOS IPO faced a funding cliff, with contracts for the IPO staff secure until end-2018 only. Therefore, a significant effort for the IPO in 2017 was engagement with Hobart-based organisations to develop a vision for sustained and enhanced support of the IPO in Hobart beyond 2018. The University of Tasmania, Australian Antarctic Division, CSIRO, Australia's Integrated Marine Observing System (IMOS), the ACE CRC and the Tasmanian State Government, all declared strong support for the SOOS IPO to remain in Hobart over the coming years. This support will form the foundation of a Partnership Agreement between the local organisations and SCAR and SCOR, to be developed in 2018.

IPO Sponsorship in 2017

The current sponsorship for the SOOS IPO is shown below.

SOOS Governing Bodies



Core Sponsors



Service Providers



IPO Operational Sponsors



Governance

Executive Committee

In 2017, the SOOS Executive Committee held one in-person meeting, and several virtual meetings. Membership also changed during 2017, with Anna Wåhlin finishing her term as Physical Sciences Co-Chair, and Oscar Schofield finishing his term as Biological Sciences Co-Chair. Following the recommendations of the SSC, the vice chairs, Andrew Constable and Sebastiaan Swart, were approved by SCAR and SCOR as the co-chairs for SOOS from mid-2017 to mid-2020.

At the same time, Mike Williams was elected Physical Sciences Vice Chair for a 3-year term, and Oscar Schofield remained on the Executive Committee as Biological Sciences Vice Chair for a 1-year term.

Scientific Steering Committee

The 2017 SSC meeting was hosted by the Alfred Wegener Institute (Germany) in June 2017. The minutes of this meeting are available online <http://soos.aq/about-us/ssc/meeting-minutes>

In November 2017, SOOS made an open call for nominations for new SSC members, with terms starting in May 2018 at the 2018 SSC meeting, when 5 members rotate off the committee.

The composition of the SSC in 2017 is shown below:

Name	Country	Expertise	2012	2013	2014	2015	2016	2017- Mid 2018	Mid 2019	Mid 2020	Mid 2021	Mid 2022	Mid 2023
Anna Wåhlin	Sweden	Physical	1	1^	1^	2^	2^						
Mauricio Mata	Brazil	Physical	1	1	1	2	2	2					
Mike Meredith	UK	Physical	1	1	1	2	2	2					
Dan Costa	USA	Biology	1	1	1	2	2	2					
Parli Bhaskar	India	Biology	1	1	1	2	2	2					
Oscar Schofield	USA	Biology	1^	1^	1^	2^	2^	2^					
SangHoon Lee	Korea	Biology				1	1	1	2				
Sebastiaan Swart	Sweden*	Physical	1	1	1^	2^	2^	2^	3^	3^			
Andrew Constable	Australia	Biology			1^	1^	1^	2^	2^	2^			
Matthew Mazloff	USA	Physical				1	1	1	2	2	2		
JB Sallee	France	Physical				1	1	1	2	2	2		
Mike Williams	NZ	Physical				1	1	1^	2^	2^	2^	3^	3^
Dake Chen	China	Physical						1	1	1	2	2	2
Burcu Ozsoy	Turkey	Sea ice						1	1	1	2	2	2
Anya Waite	Germany	Biology						1	1	1	2	2	2
DMSC Co-Chair													

*Note – These members have changed country of residence since joining the SSC

^EXCOM position (2 x 3 year terms)

Annual Scientific Steering Committee Meeting



The annual meeting for the SSC and Executive Committee took place in Bremerhaven, Germany (June 2017) hosted by the Alfred Wegener Institute. These meetings took place alongside the SOOS Data Management Sub-Committee meeting, a joint SOOS-AWI symposium on the Weddell Sea and Dronning Maud Land, and the workshop of the POGO Working Group “Observing and Understanding the Ocean beneath Antarctica’s Sea Ice and Ice Sheet (OASIIS)”.

In addition to reviewing progress against the Implementation Plan, a focus of the 2017 SSC meeting was broad stakeholder engagement. To this end, an additional 18 observers attended the SOOS meetings, representing 16 different external programs or national communities.

The minutes from the SSC meeting are available on the SOOS website. SOOS thanks the Alfred Wegener Institute for the significant organisation and financial support provided in hosting these meetings. SOOS also thanks SCOR and SCAR for their continued support of these annual meetings.



Participants of the 2017 SOOS SSC Meeting in Bremerhaven

SOOS Implementation Groups

Data Management Sub-Committee

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 Key Products section of this report).

Membership

Steve Diggs (CCHDO; Scripps Institution of Oceanography)

Joana Beja (British Oceanographic Data Centre)

Taco de Bruin (SCADM; Royal Netherlands Institute for Sea Research)

Kenneth Casey (USA National Centers for Environmental Information)

James Cusick (Australian Antarctic Data Centre)

Bruno Danis Royal Belgian Institute of Natural Sciences

Florence Fetterer (National Snow and Ice Data Centre)

Hannes Grobe (PANGAEA)

Michael Morahan (NASA Global Change Master Directory)

Mathieu Belbeoch JCOMMOPS

Benjamin Pfeil Bjerknes Centre for Climate Research

Roger Proctor Australian Ocean Data Network

Scott Ritz NASA Global Change Master Directory

Stefanie Schumacher Alfred Wegener Institute

Petra Ten Hoopen British Antarctic Survey

Anton Van De Putte Biodiversity.aq

Jie Zhang Chinese National Antarctic and Arctic Data Centre

2017 Milestones

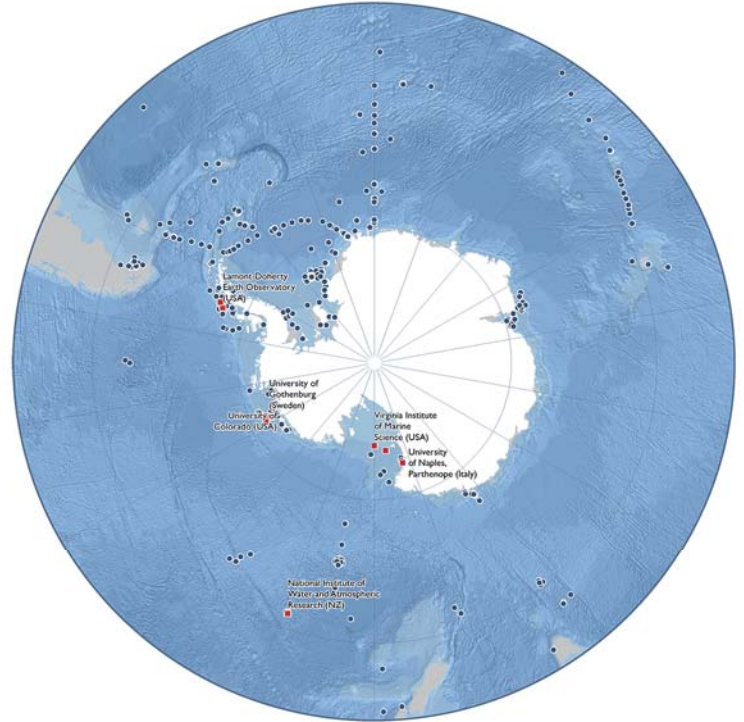
Federated search Tool

The DMSC is pursuing development of a federated metadata search tool, as a potential successor to the SOOS portal on the NASA Global Change Master Directory. Towards this end, a Polar Federated Data Search Working Group has been formed, drawing together members of the SOOS DMSC, the Standing Committee on Antarctic Data Management, and the Arctic Data Committee (ADC). SOOS data officer, Pip Bricher, and DMSC member, Taco de Bruin, are co-chairs, alongside Alexander Smirnov from (ADC). The group is preparing a journal article on federated search and investigating opportunities for funding its development and ongoing support. <http://www.soos.aq/data/federatedsearch>

Southern Ocean Mooring Network and other data rescue efforts

During 2017, the Southern Ocean Mooring Network continued to grow, with hundreds of additional moorings added to the spreadsheet of known deployments. Additionally, David Pasquale (NSIDC; NOAA Big Earth Data Initiative grant) has continued to transform and publish mooring data that was previously invisible to the broader community.

Other datasets were also discovered that had not yet been submitted to a data centre for curation and publication. David also: documented and prepared for publication physical data from the King George Island benthic intertidal zone (PI: Piotr Kuklinski, Poland); began standardising biological Argo data (PI: Robert Drucker, USA); converting 1300 sea-ice chlorophyll measurements into a standardised netCDF file for publication through SOOSmap (PI: Klaus Meiners, Australia). It is anticipated that these datasets will be published in 2018.



Data Management Advocacy

SOOS was active in advocating for stronger data management policies and activities in the Southern Ocean. In 2017, SOOS was officially approved as a Partner Member of the ICSU World Data System – an international body that certifies data centres that meet their high standards. As part of this membership, SOOS will advocate for partner data centres to apply for certification to demonstrate their high standards.

In addition, the SOOS data officer has provided advice to the Swiss Polar Institute and Antarctica New Zealand on development of National Antarctic Data Centres for their nations.

NECKLACE

The SOOS data officer has continued her support for data management in the NECKLACE program, a SOOS-endorsed collaboration of scientists collecting measurements of basal melt rates of ice shelves around Antarctica. A draft data policy has been prepared and in 2018, the data officer will work with the community for use of a new database to aggregate datasets.

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.

Observing System Design Task Team

This Task Team was initiated in June 2017 and has the specific mission to advise methods for assessing observing system design for a given quantity of interest. This Task Team is an important contribution to SOOS Objective 1.

Members

Matthew Mazloff (Chair; mmazloff@ucsd.edu)
Andrew Constable
Oscar Schofield
Anya Waite

Summary of Deliverables

1. Compile list of possibly useful methodologies
2. Determine scope of requirements
3. Recommend methods for estimating correlation scales
4. Recommend methods for estimating covariance scales and significance
5. Recommend methods for observing system design experiments (OSSEs)
6. Build user-friendly OSSE tools

2017 Milestones

Towards goal 3, “Establish a method to determine spatial and temporal correlation scales”, a manuscript has been published:

Mazloff, M. R., Cornuelle, B. D., Gille, S. T., & Verdy, A. (2018). Correlation lengths for estimating the large-scale carbon and heat content of the Southern Ocean. Journal of Geophysical Research: Oceans, 123, 883–901. <https://doi.org/10.1002/2017JC013408>

And press release: <https://usclivar.org/research-highlights/designing-carbon-and-heat-observing-system-southern-ocean>

This work describes the scales of variability for heat and carbon, and thus the scales the observing system is required to resolve. This can be extended to other EOVS (or QoIs) as they are identified.

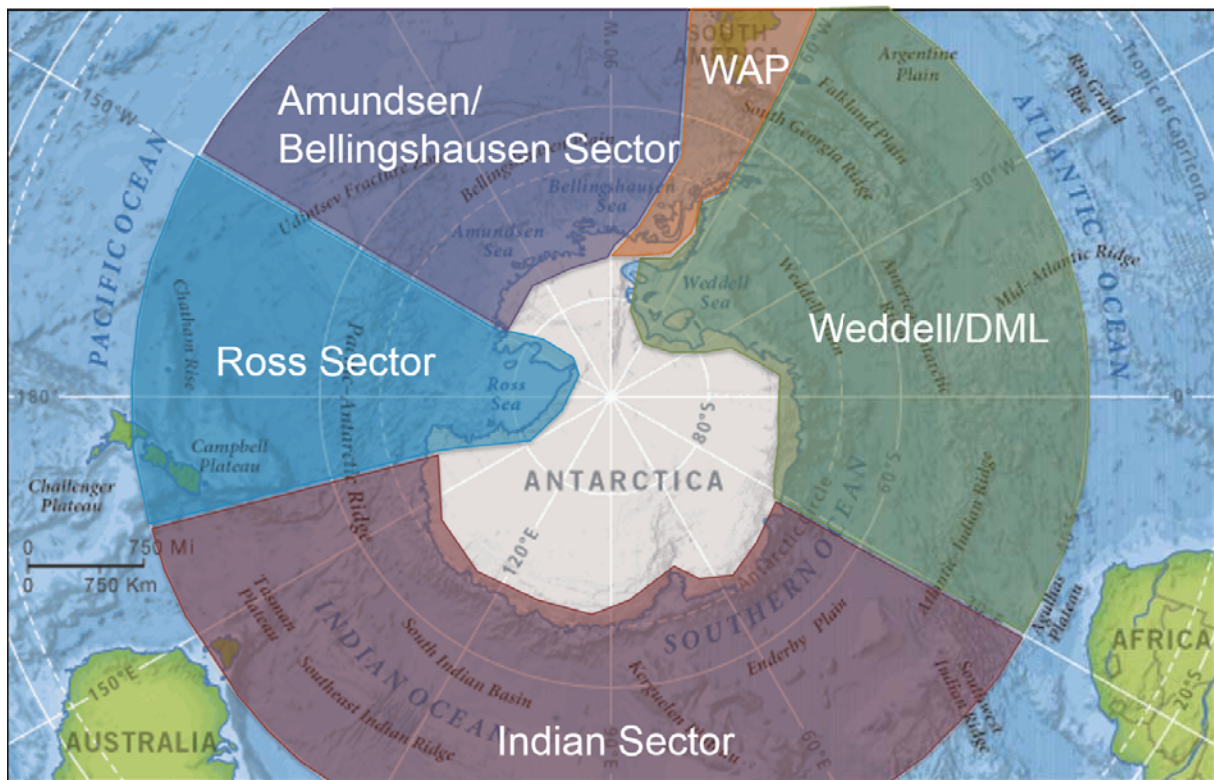
2018 Plans

Plans to accomplish or advance the other deliverables should be addressed at the 2018 SOOS modelling workshop and annual SOOS SSC meeting in May (Hangzhou, China).

Regional Working Groups

SOOS Regional Working Groups develop, coordinate and implement the observing system in their defined region. In 2015, the community identified five regions to be developed as regional groups: West Antarctic Peninsula; Ross Sea; Amundsen/Bellingshausen Seas; Weddell Sea and Dronning Maud Land; and the Indian Sector.

Three regional groups were active in 2017 and progress was made in initiating the development of the final 2 groups.



The above map shows the general area of focus for each Regional Working Group. Each group is working to define its specific boundaries.

West Antarctic Peninsula WG

Co-Chairs: Kate Hendry (UK), Oscar Schofield (USA), Sian Henley (UK)

2017 Milestones:

- 1st Workshop, hosted by British Antarctic Survey (May 2017). Over 80 participants from 13 countries helped to define observing priorities for the coming decade. This workshop resulted in a [workshop report](#) and a report published in [Eos](#). This workshop was sponsored by BAS, SOOS, and SCAR.

- An international scientific workshop “The future of Marine biogeochemical research off the West Antarctic Peninsula”, sponsored by the UK Royal Society. This workshop of 30 participants resulted in a special issue on the status of the West Antarctic Peninsula, to be published in 2018.

The Ross Sea WG

Co-Chairs: Mike Williams (NZ); Walker Smith (USA)

2017 Milestones:

- 1st workshop, hosted by Shanghai Jiao Tong University, China (Sept 2017). Over 40 participants from 7 nations attended the workshop and identified existing observational efforts and recommendations for future priorities, including close collaboration with the CCAMLR Ross Sea MPA. This workshop resulted in a [workshop report](#) and was sponsored by the Institute of Oceanography, Shanghai Jiao Tong University; the US Ocean Carbon and Biogeochemistry (OCB) program; SOOS; Second Institute of Oceanography, China; and the National Laboratory for Marine Science and Technology, China

Southern Ocean Indian Sector (SOIS)

Co-Chairs: Andrew Constable (AUS); Tsuneo Odate (Japan); Phillippe Koubbi (France)

2017 Milestones:

- 1st workshop, hosted by NIPR and TUMSAT, Japan (Aug 2017). 20 participants from 5 nations attended the workshop to identify the status of multidisciplinary observations in the Indian Sector. This workshop resulted in a workshop report that will soon be available on the SOOS website, and was sponsored by NIPR, TUMSAT and SOOS.

Weddell/Dronning Maud Land

Co-Chairs: Julian Gutt (Germany); Sebastian Moreau (Norway); Laura de Steur (Norway)

2017 Milestones:

- A joint SOOS-AWI Symposium on the status of observational activities in the Weddell/DML region, hosted by AWI, Germany (June 2017). The outcome of this symposium was enhanced understanding and engagement of the research community in development of a regional working group for this region

- Initial co-chairs of the working group were identified and discussions held to plan development of the working group

Amundsen/Bellingshausen Sea

Co-Chairs: Tae-Wan Kim (Korea); Anna Wahlin (Sweden); others (TBA)

2017 Milestones:

- Initial co-chairs of the working group were identified and discussions held to plan development of the working group and expansion of leadership group

Capability Working Groups

SOOS Capability Working Groups enhance observational capabilities for SOOS.

The enhanced knowledge, technology and observing capabilities from these groups are intended to feed directly into the implementation plans of the Regional Working Groups. Capability Working Groups are, generally speaking, limited to multi-year efforts, with annual review of progress provided by SOOS governance.

Censusing Animal Populations from Space (CAPS)

Co-Chairs: Mark Hindell (Aus); Peter Fretwell (UK)

Members: Phil Tratham (UK); Dan Costa (USA); Kit Kovacs (Norway); Andrew Constable (Aus); Colin Southwell (Aus); Bill de la Mare (Aus); Andrew Lowther (Norway); Michelle LaRue (USA); Clive McMahon (Aus); Monica Muelbert (Brazil); Heather Lynch (USA)

2017 Milestones:

- Tomnod crowdsourcing platform to count seals in Antarctica has been successfully launched by Michelle LaRue. 16 300 km² images acquired from Prydz Bay. Visual counts have revealed a preliminary density estimate of 0.15 ± 0.07 seals per km², which translates to 100,873 (range: 51,450 - 150,295)
- 2nd annual meeting held in Leuven, Belgium

- Two proposals to NERC, UK were funded to support 2 PhD students to contribute to the work of this Working Group; one to look at automation of the counting process, and the other to convert counts into a broader population structure.

Southern Ocean Fluxes (SOFLUX)

Co-Chairs: Sebastiaan Swart (Sweden); Sarah Gille (USA)

Steering Committee: Mark Bourassa (USA); Carol Anne Clayson (USA); Bruno Delille (Belgium); Simon Josey (UK); Andrew Lenton (Aus); Eric Schulz (Aus); Inga Smith (NZ); Brian Ward (UK). Over 30 additional community members from 8 nations are listed as members of SOFLUX.

2017 Milestones:

- 4 observational field programs during 2017, contributing to enhanced Southern Ocean fluxes observations
- Submission of SOFLUX community White Paper abstract to OceanObs19
- Regular community online newsletters to keep the SOFLUX network informed
- Organisation of SOFLUX meeting at Polar 2018 Conference
- Organisation of SOFLUX steering committee meeting at Ocean Sciences 2018
- Growth of membership to include 3 researchers from S. Africa and one from Brazil

Observing and Understanding the Ocean beneath Antarctic Sea Ice and Ice Shelves (OASIIS) – A POGO-Supported working group

Co-Chairs: Esmee van Wijk (Aus); Richard Coleman (Aus-POGO)

Steering Committee (from POGO institutes): Mike Meredith (UK); Jiuxin Shi (China); Alexander Brearley (UK); Oscar Schofield (USA); Lynne Talley (USA); Olaf Boebel (Germany); Susan Wijffels (USA); Steve Rintoul (Aus); Ben Galton-Fenzi (Aus); Anna Wahlin (Sweden); Seb Swart (Sweden); Fabian Roquet (Sweden); Craig Lee (USA); Dan Costa (USA); Kevin Speer (USA)

2017 Milestones:

- 1st workshop hosted by AWI, Germany (June 2017) with 70 participants from 17 nations. Outcomes of the meeting were shared field programs, strengthened collaborations for field planning, development of draft paper
- Submission of abstract for White paper at OceanObs19

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

Co-Chairs: Flore Samaran (France); Kathleen Stafford (USA)

Members: Susannah Buchan (Chile); Ken Findlay (S. Africa); Dannielle Harris (UK); Brian Miller (Aus); Ilse van Opzeeland (Germany); Ana Sirovic (USA)

2017 Milestones:

- Serviced 2 existing recording stations; deployed 1 new station; continued data collection from 17 sites; deployment of 2 autonomous recorders in sub-Antarctic.
- Development of annotated library of acoustic detections (funded by IWC grant)
- Working Group meeting (May 2017, Slovenia) funded by IWC that focused on reviewing progress, identifying gaps in coverage, developing framework for standardised analysis of long-term acoustic data for call density and abundance estimates
- 3-year forward planning