



SOUTHERN OCEAN OBSERVING SYSTEM

3-YEAR PROGRESS REPORT

2012 - 2014

THE SOUTHERN OCEAN OBSERVING SYSTEM

Southern Ocean observations are sparse, difficult and expensive to obtain, and are often limited in space, time, quality and variables measured. Further, repositories of Southern Ocean data are fragmented, rarely quality controlled, and difficult to access, greatly restricting interdisciplinary and potential uptake of globally important data.

The Southern Ocean Observing System (SOOS) is an international initiative that aims to facilitate the collection and delivery of essential observations on variability and change of Southern Ocean systems to all international stakeholders (researchers, governments, industries), through design, advocacy, and implementation of cost-effective observing and data delivery systems.

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FROM THE CO-CHAIRS

In August 2011, following nearly a decade of international planning, the SOOS International Project Office was officially opened at the Institute of Marine and Antarctic Studies, University of Tasmania (Hobart Australia). This 3-Year Progress Report is the first official progress report for SOOS and encompasses activities achieved from August 2011 to December 2014. This includes a period of development (2012-2013), during which the policies, governance and strategies required to support SOOS implementation were developed, and more recently a period (2013 – 2014) during which we have worked more towards achieving the SOOS objectives. As Co-Chairs of SOOS, we are awed by the sheer force and speed with which the initiative is moving forward, and look forward to an exciting 2015.

The International Project Office has accelerated the planning, development and implementation of SOOS. Additionally it has developed and engaged an international Scientific Steering Committee (SSC). The Project Office and the SSC have been active in developing and communicating the strategic vision for SOOS in publications

(e.g., Schofield et al. 2012, Meredith et al. 2013) and at wide range of academic/operational meetings. The annual meetings have provided an effective resource for SOOS to identify gaps and laying out the paths forward. Beyond this, the SSC has focussed on galvanising community input and participation in SOOS. A major effort now is facilitating the development of grass-root Working Groups focussed on providing a foundation for collaboration and sharing of data, resources and infrastructure.

The international office has been the critical and extremely effective focal point for developing a strong foundation for a sustained SOOS effort.



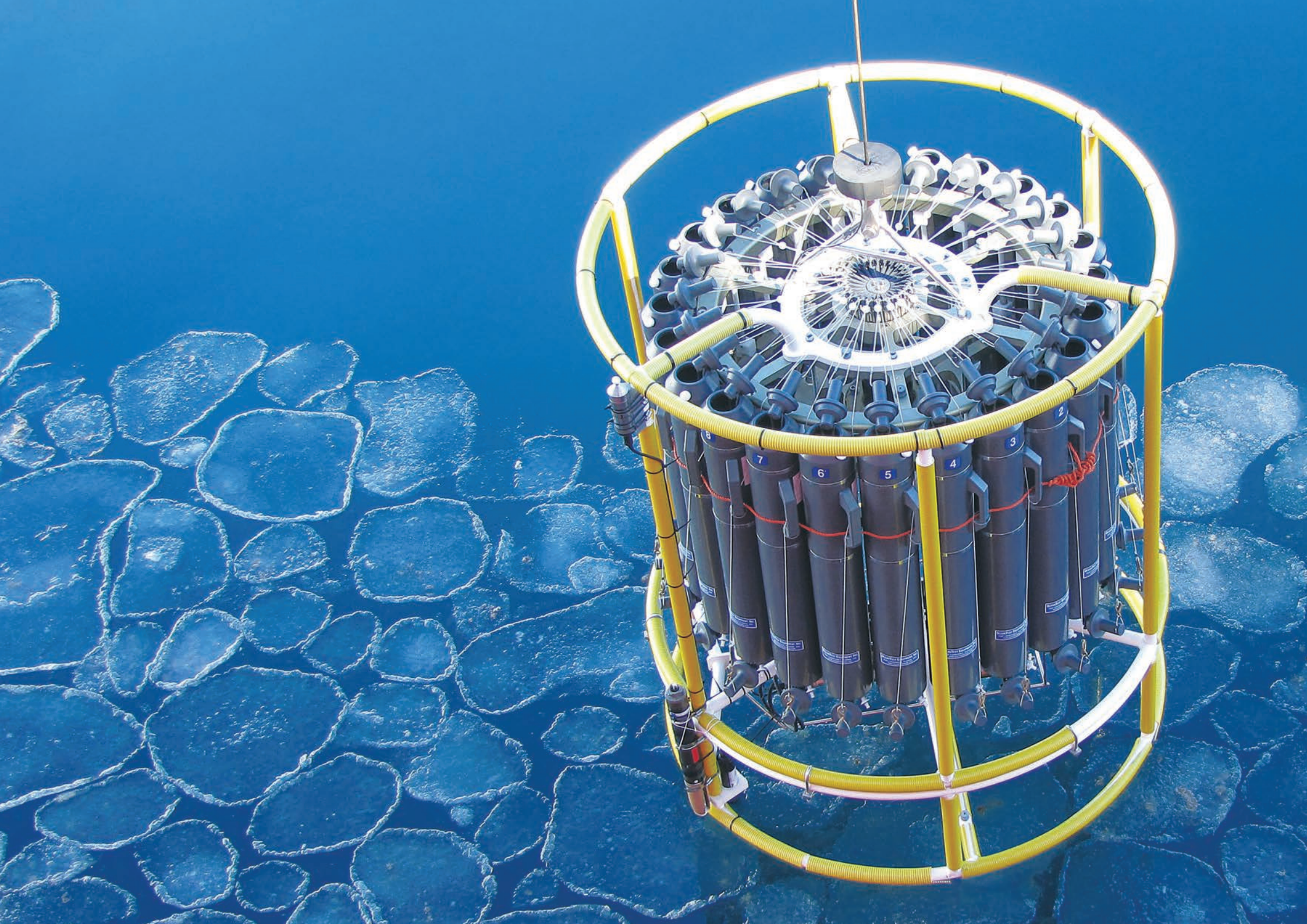
Prof. Oscar Schofield

SOOS Biological Sciences Co-Chair



Assoc. Prof. Anna Wählin

SOOS Physical Sciences Co-Chair



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LEGEND



PEOPLE



TIMELINE



STATUS



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PRODUCT



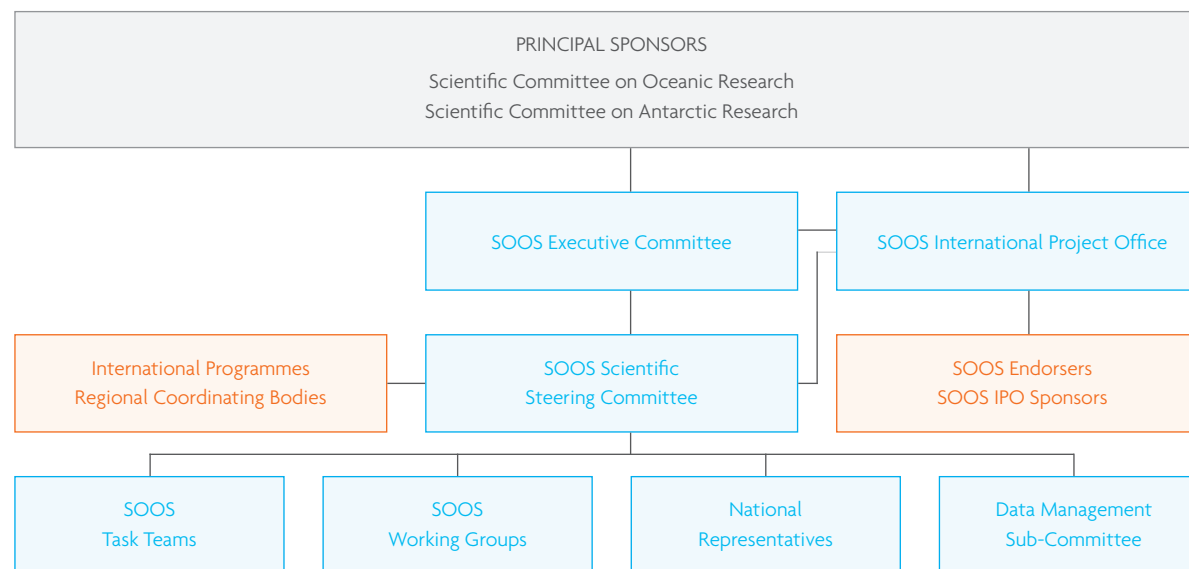
PRODUCT AVAILABLE ONLINE AT SOOS.AQ

MILESTONES: DEVELOPMENT OF A SOUTHERN OCEAN OBSERVING SYSTEM

IN THREE YEARS, SOOS HAS DEVELOPED AN INTERNATIONAL GOVERNANCE STRUCTURE OF TWO CORE SPONSORS, FIVE EXECUTIVE COMMITTEE MEMBERS, 13 SCIENTIFIC STEERING COMMITTEE MEMBERS, AND THREE EX-OFFICIO MEMBERS, REPRESENTING A TOTAL OF 12 NATIONS; RECEIVED ENDORSEMENT FROM THREE INTERNATIONAL ORGANISATIONS; SECURED FUNDING AND SPONSORSHIP FOR THE INTERNATIONAL PROJECT OFFICE; AND DEVELOPED ITS 20-YEAR VISION AND 5-YEAR STRATEGIC PLAN

SOOS GOVERNANCE

SOOS governance was developed in 2011, with both the Scientific Committee on Oceanic Research (SCOR) and the Scientific Committee on Antarctic Research (SCAR) agreeing to co-sponsor SOOS. A number of other international communities were integral in the development of SOOS; the Census of Antarctic Marine Life, the Partnership for Observation of the Global Oceans (POGO), the World Climate Research Programme's Climate and Cryosphere (WCRP CliC), and WCRP's Climate Variability and Predictability (CLIVAR), with POGO, CliC and CLIVAR becoming official endorsers of SOOS at the end of 2011.



SOOS Governance Structure with internal SOOS communities (blue) and external communities (orange).

SOOS GOVERNANCE

Executive Committee

SOOS is overseen by an Executive Committee (EXCOM). The inaugural SOOS EXCOM comprised a Biological Sciences Co-Chair, Mr. John Gunn (AIMS, Australia), a Physical Sciences Co-Chair Prof. Mike Meredith (BAS, UK), and the SOOS Executive Officer Dr. Louise Newman (SOOS, Australia). The inaugural Co-Chairs were integral in providing a solid foundation for the development of SOOS.

Mr. Gunn stepped down from this position in 2012 and was replaced by Prof. Oscar Schofield (Rutgers University, USA), and in 2014 Prof. Meredith also stepped down and was replaced by Assoc. Prof. Anna Wåhlin (University of Gothenburg, Sweden). In 2014, the EXCOM was extended to include a Physical Sciences Vice Chair, Dr. Sebastiaan Swart (CSIR, South Africa) and a Biological Sciences Vice Chair Dr. Andrew Constable (AAD, Australia) to ensure broader input and continuity in leadership.

SOOS Executive Committee 2015



Assoc. Prof. Anna Wåhlin
Physical Sciences Co-Chair,
University of Gothenburg, Sweden



Dr. Andrew Constable
Biological Sciences Vice Chair,
Australian Antarctic Division,
Australia



Prof. Oscar Schofield
Biological Sciences Co-Chair,
Rutgers University, USA



Dr. Louise Newman
Executive Officer,
SOOS International Project Office,
Australia



Dr. Sebastiaan Swart
Physical Sciences Vice Chair,
Southern Ocean Carbon and
Climate Observatory, South Africa



SOOS GOVERNANCE

Scientific Steering Committee (SSC)

All SOOS scientific activities are overseen by the international SSC of world-leading researchers who represent the broad sphere of SOOS science.

The inaugural SSC comprised two EXCOM members, 12 scientific members and four ex-officio members from across 10 nations. Following the election of the vice-chairs, the off-rotation of two inaugural scientific members, and the election of four new scientific members, the 2015 SSC comprises four EXCOM members, 13 scientific members and four ex-officio members, representing a total of 13 nations.

Since August 2011, SOOS has held two international calls for SSC nominations, three annual SSC meetings, and 11 EXCOM meetings; all contributing to the efficient running of SOOS.

In 2014, the SSC recognised the limitation of a governance system that relied on one body to carry out both the governance and implementation. To address this, the SSC put in place a structure of Working Groups and Task Teams to undertake the implementation activities required.

Scientific Members



Dr. Stephen Ackley
University of Texas San Antonio, USA



Dr. Parli Venkateswaran Bhaskar
National Centre for Antarctic and Ocean Research, India



Dr. Angelika Brandt
University of Hamburg, Germany



Prof. Daniel Costa
University of California, USA



Steve Diggs
Scripps Institution of Oceanography,
CLIVAR and Carbon Hydrographic
Data Office, USA



Dr. Alberto Naveira Garabato
National Oceanographic Centre, UK



Dr. SangHoon Lee
Korea Polar Research Institute, Korea



Dr. Jiping Liu
University at Albany, SUNY, USA



Prof. Mauricio Mata
Federal University of Rio Grande, Brazil



Prof. Michael Meredith
British Antarctic Survey, UK



Dr. Matthew Mazloff
Scripps Oceanographic Institute, USA



Dr. Jean-Baptiste Sallee
LOCEAN-IPSL, France



Dr. Mike Williams
National Institute of Water and
Atmospheric Research, New Zealand

Ex-Scientific Members



Dr. Bronte Tilbrook
Commonwealth Scientific & Industrial
Research Organisation, Australia



Dr. Steve Rintoul
Commonwealth Scientific & Industrial
Research Organisation, Australia



Dr. Kim Finney
Australian Antarctic Division, Australia

Ex-Officio Representatives



Dr. Tosca Ballerini
SOOS representative for the
Association of Polar Early Career
Scientists



Dr. Ed Urban
Executive Director, Scientific
Committee of Oceanic Research



Dr. Mike Sparrow
Executive Director, Scientific
Committee of Antarctic Research

INTERNATIONAL PROJECT OFFICE

A programme of the scale and complexity of SOOS requires an International Project Office (IPO) to serve as the central contact point for SOOS. The SOOS IPO monitors progress towards SOOS objectives, facilitates coordination of field activities, assists in the organisation of workshops and synthesis activities, and coordinates the website and other communication products.

In 2011, the Institute for Marine and Antarctic Studies, University of Tasmania (IMAS - UTAS), Australia, established the SOOS IPO and hired the SOOS Executive Officer to carry out the above tasks. The activities of the SOOS IPO are supported internationally through a combination of direct financial sponsorship and in-kind support. More information on sponsorship and support on page 36-37.

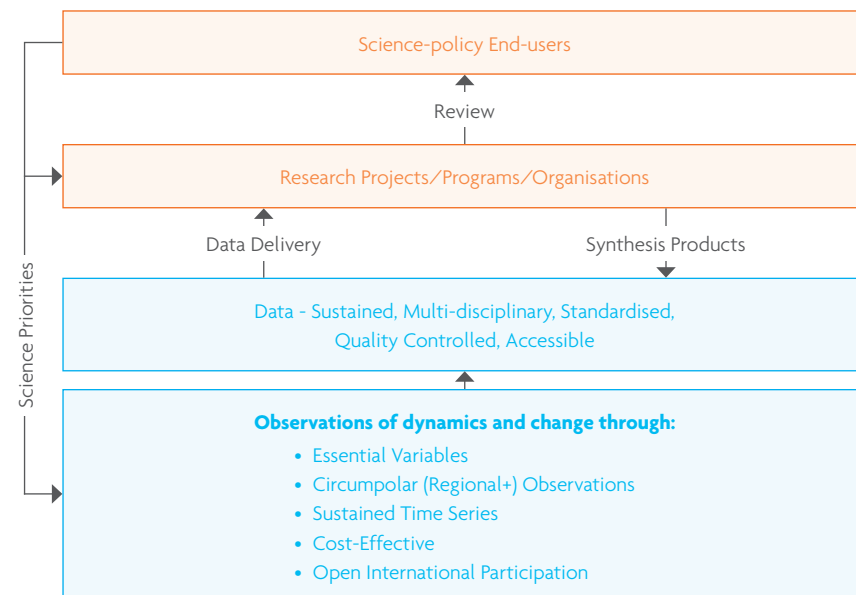


STRATEGIC DEVELOPMENT

In early 2012, SOOS published its [Initial Science and Implementation Strategy](#); a document that distils many years of discussions and meetings into a coherent rationale for the development of SOOS, and scopes an internationally agreed way forward towards implementation. This document provided a solid foundation for the development and initial implementation of SOOS.

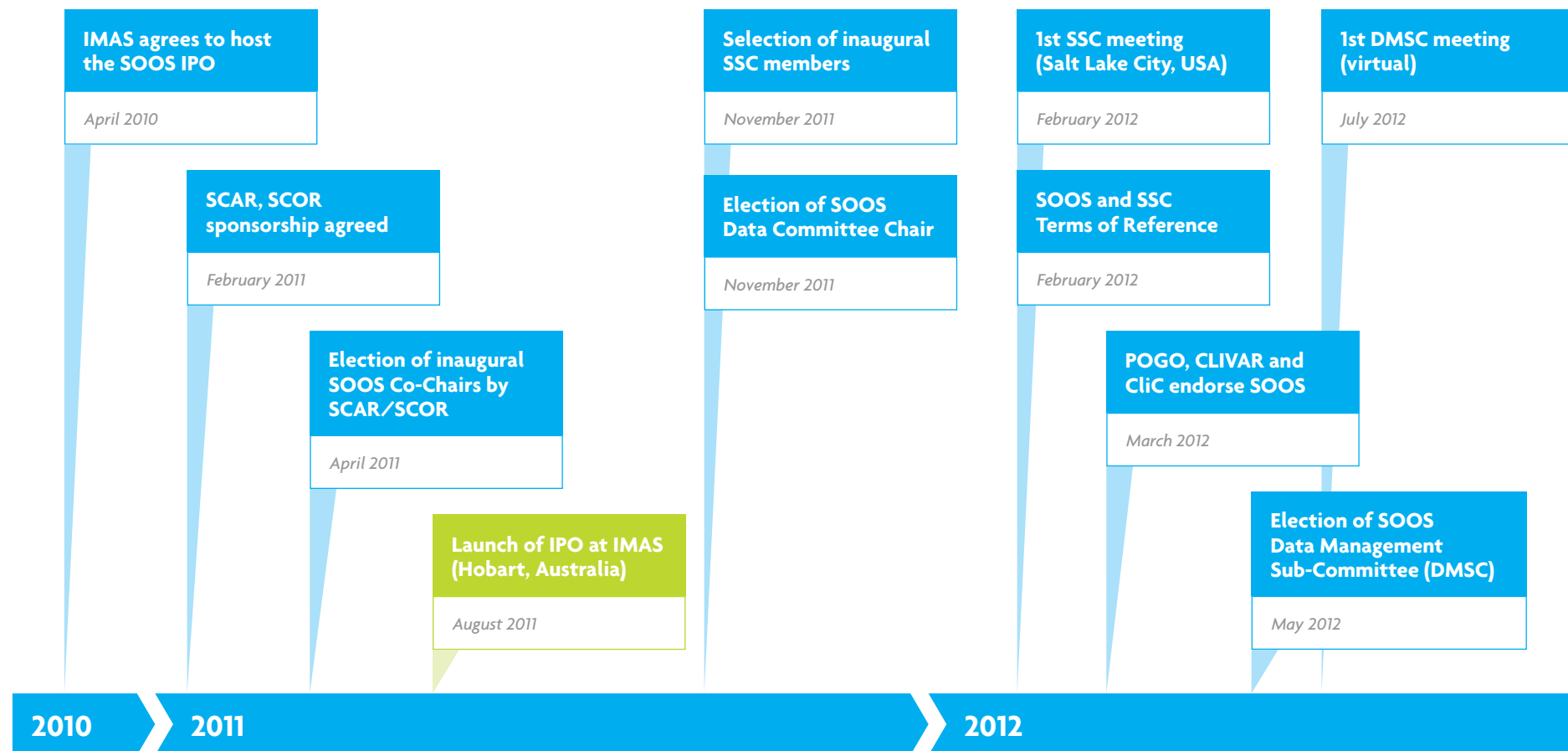
Building on discussions at the annual SSC meetings and planning documents compiled by the SOOS SSC (e.g., Science Theme Work Plans), SOOS clarified its vision in the 2013 publication [The Vision for a Southern Ocean Observing System](#) (Meredith et al., 2013). This document enabled a systematic and strategic approach to be taken in planning the required activities and products of the coming years, and will be invaluable in ensuring continuity of vision and preventing mission drift.

Based on the direction provided by the vision publication and the newly formed implementation structure of Working Groups and Task Teams, SOOS is now finalising its 5-Year Strategic Plan and Operating Plan (online in 2015).



Schematic of the role of SOOS (blue), within the sphere of international scientific research and coordination programmes.

TIMELINE OF GOVERNANCE MILESTONES



**2nd SSC meeting
(Shanghai, China)**

May 2013

**2nd DMSC meeting
(Shanghai, China)**

May 2013

**SCOR AGM
(Wellington, NZ)**

November 2013

**3rd SSC Meeting
(Tromsø, Norway)**

June 2014

**3rd DMSC Meeting
(Auckland, NZ)**

August 2014

**SOOS Strategic
Planning meeting
(Hobart, Aus)**

December 2014

**SCAR Delegates
Meeting (Auckland, NZ)**

September 2014

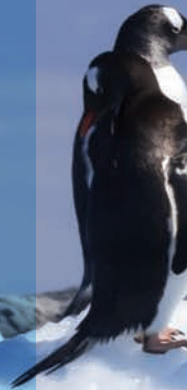
2013

2014

2015

MILESTONES: IMPLEMENTATION OF A SOUTHERN OCEAN OBSERVING SYSTEM

IN THREE YEARS, SOOS HAS DEFINED A LIST OF CANDIDATES FOR ESSENTIAL OCEAN VARIABLES; SUPPORTED DEVELOPMENT OF NEW OBSERVATION TECHNOLOGIES; PRODUCED A NUMBER OF KEY PRODUCTS; DEVELOPED AND SUPPORTED ACTIVE TASK TEAMS; DEVELOPED A WORKING GROUP STRUCTURE; HELD 9 INTERNATIONAL MEETINGS; DEVELOPED A SOUTHERN OCEAN METADATA PORTAL; IMPLEMENTED A COMPREHENSIVE COMMUNICATION STRATEGY; BUILT A NETWORK OF 40 AFFILIATED INTERNATIONAL INSTITUTES, PROGRAMMES AND ORGANISATIONS; GROWN A SPONSORSHIP BASE FOR SOOS ACTIVITIES AND PRODUCTS; RECEIVED INTERNATIONAL RECOGNITION FOR VISION AND IMPERATIVE



A photograph of several penguins, likely Adelie penguins, standing on white ice floes in a deep blue sea. The penguins are black and white with orange beaks. In the background, there are large, jagged ice formations under a clear blue sky.

IMPLEMENTATION MILESTONES

Initial implementation activities were carried out within the framework of five key objectives that were distilled from the [SOOS Initial Science and Implementation Strategy](#). More recently, development of the 2015-2020 Strategic Plan has re-structured SOOS objectives into a more logical sequence of implementation: Design of the System, Capabilities, Observations, Regional Implementation, Data Delivery, Support Activities.

All Implementation milestones will be reported against the newly defined objectives, to ensure continuity in reporting format into the future. Each objective is achieved through a number of deliverables or “Key Result Areas (KRAs)”. The table on page 18 shows each KRA and a likely timeline of implementation. Only those KRAs implemented between Aug 2011 – Dec 2014 will be reported against.

IMPLEMENTATION MILESTONES

This table represents the implementation timeline for the SOOS Key Result Areas, and highlights those KRAs that will be reported against in this report

✓ Activities reported on herein ✓ Activities currently in progress but not reported on in this report ○ Desirable start of activities dependant on available resources

Implementation Activities		Timeline of Implementation									
		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Objective 1: Design	Facilitate the design and implementation of a comprehensive and multi-disciplinary observing system for the Southern Ocean										
Key Result Area 1.1	Southern Ocean Essential Ocean Variables (EOV) are identified using the process defined by the Framework for Ocean Observing			✓	✓	✓					
Key Result Area 1.2	Spatial/temporal, system-level EOV sampling requirements are identified, documented and agreed					○	○	○	○	○	○
Key Result Area 1.3	A strategy for the uptake of EOVs within the Regional Working Groups is developed							○	○	○	○
Objective 2: Capability	Advocate and guide the development of new observation technologies										
Key Result Area 2.1	National and international projects that focus on aspects of technological advancement are advocated		✓	✓	✓	○	○	○	○	○	○
Key Result Area 2.2	A community of technologically focussed businesses and groups is built						○	○	○	○	○
Key Result Area 2.3	Priority requirements for advances in observation technology are identified and articulated						○	○	○	○	○
Objective 3: Facilitating Observations	Compile and encourage use of existing international standards and methodologies, and facilitate the development of new standards where required										
Key Result Area 3.1	Information on international standards for all relevant sampling methodologies and data quality control protocols is made easily accessible				✓	○	○	○	○	○	○
Key Result Area 3.2	Use of international sampling methodologies and data quality control standards is widespread						○	○	○	○	○
Key Result Area 3.3	Gaps in international standards are identified and, where possible developed						○	○	○	○	○
Objective 4: Regional Implementation	Unify and enhance current observation efforts and leverage further resources across disciplines, and between nations and programmes										
Key Result Area 4.1	Working Groups and Task Teams that coordinate efforts across disciplines and between nations are developed				✓	✓	○	○	○	○	○
Key Result Area 4.2	Key products that aid in information transfer and facilitate collaborative efforts are identified and produced				✓	✓	○	○	○	○	○
Key Result Area 4.3	Collaborative, multidisciplinary and multinational workshops and meetings are undertaken towards achieving the SOOS mission		✓	✓	✓	✓	○	○	○	○	○

Implementation Activities		Timeline of Implementation									
		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Objective 5: Data Delivery	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										
Key Result Area 5.1	A comprehensive, multidisciplinary Metadata Portal is developed and populated		✓	✓	✓	✓	○	○	○	○	○
Key Result Area 5.2	All Metadata records in the SOOS portal have links that lead directly to the data							○	○	○	○
Key Result Area 5.3	Orphan datasets are identified, stored and made available				✓	✓	○	○	○	○	○
Key Result Area 5.4	Up-to-date information on key data programmes, centres and repositories will be provided					✓	○	○	○	○	○
Key Result Area 5.5	Web-based visualisation tools will be developed to aid data discovery and delivery					✓	○	○	○	○	○
Key Result Area 5.6	A portal of community-developed Data Synthesis Products is developed							○	○	○	○
Objective 6: Support Activities	Provide services to communicate, coordinate, advocate and facilitate SOOS objectives and activities										
Key Result Area 6.1	Contributing to SOOS is highlighted as a national, institutional, or programmatic priority		✓	✓	✓	✓	○	○	○	○	○
Key Result Area 6.2	The contribution of existing and planned observation efforts of institutes, programmes and nations is acknowledged and highlighted		✓	✓	✓	✓	○	○	○	○	○
Key Result Area 6.3	The importance of support for individual research projects is recognised and articulated		✓	✓	✓	✓	○	○	○	○	○
Key Result Area 6.4	A SOOS community bibliography is developed						○	○	○	○	○
Key Result Area 6.5	The SOOS Communication Strategy is implemented	✓	✓	✓	✓	✓	○	○	○	○	○
Key Result Area 6.6	The SOOS Network is grown as a vehicle to disseminate information and aid collaborative efforts	✓	✓	✓	✓	✓	○	○	○	○	○
Key Result Area 6.7	Robust and sustained support for SOOS International Project Office is maintained and enhanced	✓	✓	✓	✓	✓	○	○	○	○	○
Key Result Area 6.8	SOOS Administration, facilitation of Strategic Plan activities, and delivery of support services is undertaken	✓	✓	✓	✓	✓	○	○	○	○	○

OBJECTIVE 1: OBSERVING SYSTEM DESIGN

Facilitate the design and implementation of a comprehensive and multi-disciplinary observing system for the Southern Ocean

Key Result Area 1.1 Southern Ocean Essential Ocean Variables (EOVs) are identified using the process defined by the Framework for Ocean Observing

Identification of EOVs is the first step towards the design of an observing system. Following the guidelines of the international Framework for Ocean Observing (FOO), SOOS has made considerable progress on this front. SOOS has contributed to the international efforts of GOOS and IOCCP in defining candidate EOVs for biogeochemistry, and will use these as the foundation to identify Southern Ocean-specific biogeochemistry variables. The SOOS Air-Sea Fluxes Task Team will also identify candidate flux EOVs. SOOS is thus well on the way to achieving this KRA, and has produced a candidate list of multidisciplinary EOVs for the Southern Ocean (see table on page 22).

Physical Oceanographic EOVs Task Team

	Mike Meredith (UK), Alberto Naveira Garabato (UK), Mauricio Mata (Brazil), Jean-Baptiste Sallee (France), Matthew Mazloff (USA)
	September 2014 – December 2014
	Completed
	Unfunded Collaboration with IPO Support
	A list of Candidate EOVs for the Southern Ocean

Building on the EOVs defined by the UNESCO/IOC Ocean Observations Panel for Climate, this SOOS Task Team has compiled a list of candidate physical oceanographic EOVs specific for the Southern Ocean. Following the FOO process, these EOVs will next undergo a process of prioritisation, which will likely require broader Task Team membership and input, as well as some level of resources.

Ecosystem Essential Ocean Variables (eEOV) Task Team

	Andrew Constable (Australia), Dan Costa (USA), Tosca Ballerini (France), Oscar Schofield (USA), + workshop participants
	August 2012 – March 2015
	Completed
	ICSU, SCOR, Rutgers University
	A workshop on identification of eEOVs (report); a defined process for identification of eEOVs; a SCOR Working Group proposal; A list of candidate eEOVs for the Southern Ocean

This Task Team was developed to organise an international workshop on identification of ecosystem Essential Ocean Variables (eEOVs). The Task Team worked with SCOR, SCAR, Integrated Marine Biogeochemistry and Ecosystem Research (IMBER) and Association of Polar Early Career Scientists (APECS) to submit a successful bid for workshop support from International Council for Science (ICSU). The international workshop was held in March 2014, hosted by Rutgers University, with the key outcome being a community consensus on the way forward, and a primary list of candidate eEOVs for the Southern Ocean; an enormous step forward for the biology community. Following the workshop, the Task Team and workshop participants produced a comprehensive workshop report, and a proposal to SCOR for a new Working Group (ultimately unsuccessful).

Sea-Ice EOVs Task Team

-  Steve Ackley (USA), ASPeCt Community
-  February 2013 – May 2013
-  Completed
-  Unfunded Collaboration with IPO Support
-  A list of [Candidate sea-ice EOVs for the Southern Ocean](#)

Antarctic Sea Ice Processes and Climate (ASPeCt) is an initiative of SCAR and CliC and are very active in coordinating the Antarctic sea-ice community and facilitating the development of research priorities. This community has therefore been integral in articulating the sea-ice EOV requirements (building on the European Space Agency (ESA) Climate Change Initiative on Sea Ice EOVs and adapting to Antarctic-specific EOVs), and have produced a [Work Plan](#) that highlights priority observations and readiness for integration into a sustained observing system.

Ocean-Ice EOVs Task Team

-  Anna Wåhlin (Sweden), Keith Nicholls (UK), Adrian Jenkins (UK), Karen Heywood (UK)
-  April 2013 – May 2013
-  Completed
-  Unfunded Collaboration with IPO Support
-  A list of [Candidate ocean-ice EOVs for the Southern Ocean](#)

The Forum for Research into Ice Shelf Processes (FRISP) is an international initiative that provides a forum for discussion and planning of ice-shelf research. Through communication with this community, Anna Wåhlin has compiled a list of candidate EOVs for observation of the ocean under sea ice and ice shelves.

Candidate EOV	Specifics
Temperature	Water column, sea surface
Salinity	Water column, sea surface
Oxygen	Dissolved O ₂
Velocity	
Microstructure	
Tracers	Non-transient, transient
Bottom Topography	Below ice shelves, seafloor bathymetry general and under floating ice, bedrock under grounded ice
Sea surface height	
Seabed pressure	
Wind, accumulation	
Nutrients	Macro
Ice shelf topography	
Ice shelf thickness	
Ice shelf flow speed	
Glacier topography	
Glacier flow speed	
Ice shelf basal melt/freeze rates	
Ice shelf englacial temperatures	Ocean-ice heat transfer flux
Sea-ice cover/concentration	

Candidate EOV	Specifics
Sea-ice thickness	
Sea-ice drift	
Snow depth on sea ice	
Sea-ice types	
Carbonate system	
Suspended particulates	
Particulate matter export	
Nitrous oxide	
Carbon isotope ¹³ C	
Dissolved organic matter	
Hyperspectral reflectance	
Multispectral backscatter	
Photosynthetically active radiation	
Fluorescence	
Multispectral irradiance	
Benthic Species	Species diversity, size spectrum, habitat extent/relative abundances
Protists, zooplankton, mesopelagic fish	Biomass, relative abundance, size spectrum
Krill	Abundance, size spectrum
Marine mammals and birds (select species)	Abundances, Foraging Range, Diet, Reproductive Success

OBJECTIVE 2: CAPABILITY

Advocate and guide the development of new observation technologies

Activities in support of Objective Two are in development and will be integrated in a systematic way from 2015 onwards. A Working Group with a focus on identifying and supporting technological advances is currently being proposed, and a specific Endorsement Category will be put in place in 2015 to further advocate for projects and initiatives that enhance observation technologies adapted for Southern Ocean research.

Result Area 2.1 National and international projects that focus on aspects of technological advancement are advocated

SOOS has endorsed 5 successful international funding proposals for research with a focus on advancing technological capabilities. Of particular note, is the international project NECKLACE (Network for the Collection of Knowledge on melt of Antarctic iCe sHElves), led by the British Antarctic Survey (BAS). Through SOOS endorsement of this initiative, the number of nations involved has been enhanced, with additional commitments made by Australia for 2015.

Stemming directly from discussions at the 2014 SOOS SSC meeting and 2014 FRISP Workshop, Australia and Sweden have agreed to collaborate on the purchase, maintenance and use of Autonomous Underwater Vehicles (AUVs) for research under Antarctic ice shelves (among other things). Through this agreement, resources, personnel and hard/software will be shared, and joint training activities will be run. Acquired knowledge and information will be made available through SOOS for other nations using AUVs.

Collaborative agreement between Australia and Sweden on Under-Ice Submersibles



Anna Wåhlin (Sweden), Richard Coleman (Australia)



June 2014 - Ongoing



In development



Unfunded Collaboration with IPO Support

OBJECTIVE 3: FACILITATING OBSERVATIONS

Compile and encourage use of existing international standards and methods, and facilitate the development of new standards where required

Key Result Area 3.1 Information on international standards for all relevant sampling methodologies and data quality control protocols is made easily accessible

Standardised Methods



TBD



TBD



Support secured, activity not yet initiated



SCOR



Online database of international standards and protocols

SCOR to support this process, and the SOOS IPO has outlined the requirements for the product. The envisioned product is a database of information on internationally agreed standard methods and protocols, housed within the Australian Antarctic Division's Southern Ocean Knowledge and Information Wiki.

Many methods can be used when measuring or monitoring ocean variables and parameters. Not all methods produce observations that are equal in quality and precision, and variability in methods can lead to significant comparability issues. For measurement of many variables, international standards and protocols exist, however this information can be difficult to access and is widely distributed across many websites. In many cases, users are unaware that they exist. The objective of this initiative is to compile all available internationally agreed standards and make the information easily accessible. During this process, any observations that do not have a consensus standard methodology will be identified, and the requirements for developing one will be assessed. Action on this initiative has been preparatory. Funds have been secured by

OBJECTIVE 4: REGIONAL IMPLEMENTATION

Unify and enhance current observations and leverage further resources across disciplines, and between nations and programmes

Key Result Area 4.1 Working Groups and Task Teams that coordinate efforts across disciplines and between nations are developed






Since 2011, SOOS has developed eight international Task Teams to organise short-term activities or produce key SOOS products. The development of Working Groups was first proposed at the June 2014 SSC meeting. Since this time, SOOS has been approached by four interested communities, and is expecting proposals for development of new Working Groups in early 2015. Key examples of recent Task Team activities are outlined below:

Ross Sea Task Team

	Mike Williams (NZ, Chair), Giorgio Budillon (Italy), Don Blankenship (USA), Walker Smith (USA), SangHoon Lee (Korea), Steve Ackley (USA), Won Sang Lee (Korea), Anna Wählin (Sweden), Jamin Greenbaum (USA), Duncan Young (USA)
	Sept 2014 – Dec 2014
	Completed
	Unfunded Collaboration with IPO Support
	Existing Activities and Key Gaps in International Observations in the Ross Sea

The Ross Sea is traditionally an area of focus for New Zealand, Italy and the USA, however new nations (e.g., Korea, China) are bringing scientific expertise and resources to the area and it is important to capitalise on this potential to enhance efforts. The Ross Sea Task Team brought Ross Sea nations together to identify current activities and key observation gaps, and to ensure that activities of nations new to the Ross Sea complement the international effort, rather than duplicating it.

Air-Sea Fluxes Task Team

	Sarah Gille (USA), Alberto Naveira Garabato (UK), Mark Bourassa (USA), Eric Schulz (Australia), Simon Josey (UK), Matthew Mazloff (USA), Hiroyuki Tomita (Japan), Andrew Lenton (Australia), Carol Anne Clayson (USA)
	June 2013 – September 2015
	Task Team membership is closed, but workshop is open to all interested
	ESRIN, WCRP, SOOS
	The SOOS Air-Sea Flux Workshop, 21 - 23 September 2015, Frascati, Italy

Identified in 2013 by the SOOS SSC as a priority observation gap, SOOS has initiated an international Task Team to bring together all communities interested in Southern Ocean air-sea flux observations (e.g., atmospheric, oceanographic, in-situ, satellite, modelling, sea ice, sensor development), to identify priority needs, clarify community vision, and to develop a coherent strategy for continuation and enhancement of existing efforts.

Observations Under Ice Task Team



Steve Rintoul (Australia, Co-Chair), Esmee van Wijk (Australia, Co-Chair), Anna Wåhlin (Sweden)



December 2011 – November 2014



Completed



CSIRO Wealth from Oceans Flagship, CliC, POGO, Antarctica New Zealand



[Seeing Below the Ice: A Strategy for Observing the Ocean Beneath Antarctic Sea Ice and Ice Shelves](#)

The ocean beneath Antarctic sea ice and ice shelves influences, climate, biogeochemical cycles, sea level and biological productivity on global scales, yet it is likely the least well observed physical system on the planet. The SOOS Under Ice workshop was held in October 2012 (Hobart, Australia) and was attended by 40 international researchers from 13 countries and developed an international strategy for observing the ocean in the sea-ice zone. This strategy has aligned international observation efforts towards a common vision, and strongly advocates for the development and use of key technologies, such as ice-capable Argo floats.

Joint SOOS-CliC-SCAR Southern Ocean Satellite Data Requirements Task Team



Allen Pope (USA), Penelope Wagner (Norway), Robert Johnson (Australia), Louise Newman (SOOS), Jenny Baeseman (CliC)



August 2014 – June 2015



Report in development



SCAR, SOOS, CliC



A peer-reviewed, open access publication on community needs for Southern Ocean satellite data.

Satellite data products are an integral component of SOOS and our requirements for this data are only going to increase through time. It has become clear that the data needs of the Southern Ocean oceanographic community are not as clearly articulated to the data providers as for the Northern Hemisphere. SOOS is working with CliC to develop a community report that articulates satellite data requirements for inclusion in future missions and planning. Community input was solicited and compiled through an online survey. The report is being compiled from the survey results and through discussions with key communities. The draft will be circulated for comment mid-2015.

Key Result Area 4.2 Key products that aid in information transfer and facilitate collaborative efforts are identified and produced





Over the last three years, the SOOS SSC has identified a number of products that are important to facilitate communication and collaboration between programmes, disciplines and nations. The IPO has worked to identify support and personnel for delivery of the products to the SOOS community.

National Capabilities Product

	Tomas Remenyi (Australia), Phillippa Bricher (SOOS)
	June 2013 – December 2015
	In development
	SCOR
	Live spatial database of national observing capabilities in the Southern Ocean

There is presently no central repository of information on National Capabilities for Southern Ocean nations, across categories such as funding bodies, national science strategies, key research institutes, data centres, and research infrastructure (shipping, Antarctic stations), routine shipping routes, and routine operational or project-based observations. This key product will compile information on national capabilities and activities and produce a user-friendly, web-based product that will enable all users to search and identify national efforts.

Southern Ocean Database of Field Activities

	Phillippa Bricher (SOOS), Steve Diggs (NSF-CCHDO)
	June 2014 - December 2015
	In Development
	Antarctic Gateway Partnership, NSF-CCHDO
	Live spatial database of planned (funded) national and programmatic annual field activities







Key to enhancing collaborative efforts, discovering data and sharing resources is knowledge of planned field campaigns. The need for this information is not unique to SOOS, but has been highlighted by the Integrating Climate and Ecosystem Dynamics (ICED) Steering Committee and CliC, and has been raised by researchers at various workshops, including the SOOS Asian Collaborative Workshop. This key product will build a database for researchers, logistics personnel and others to enter metadata on planned field activities, visualised with a dynamic online map.

Key Result Area 4.3 Collaborative, multidisciplinary and multinational workshops and meetings are undertaken towards achieving the SOOS mission


SOOS advocates for Southern Ocean observational activities by ensuring participation and involvement of the Southern Ocean community in relevant meetings and workshops.

SOOS also works to ensure that, where possible, all SOOS workshops, meetings and events are open to all interested in participating, across all nationalities. SOOS has also worked hard to include representatives of key programmes undertaking similar efforts, in order to avoid duplication and to build a cohesive community.





The SOOS Asian Workshop: Exploring Possibilities for Collaboration

	Jiping Liu (China), Sebastiaan Swart (South Africa), Parli V. Bhaskar (India)
	23 – 24 May 2013, Shanghai, China
	Completed
	Polar Research Institute of China, Chinese Academy of Science, SCAR, SCOR
	 Two Publications

The SOOS Asian Workshop brought together over 50 researchers from 6 Asian nations and abroad. This workshop identified key areas for future collaborative efforts, and

have resulted in  Two Publications, increased understanding of the SOOS vision and objectives, growth of the SOOS Network in Asia, a strong international statement of support for Asian Southern Ocean activities, and enhanced international involvement in a proposed field programme on the Kerguelen Plateau.

The COMNAP “SOOS Think Tank”

	Any interested COMNAP-member national Antarctic programmes
	Ongoing
	SOOS, COMNAP
	Development of SOOS Think Tank within the COMNAP Science Expert Group

In June 2013, COMNAP and SOOS held a joint workshop alongside the COMNAP Annual General Meeting (July 2013, Korea). The objectives of this workshop were to inform COMNAP delegates of the SOOS vision and objectives, and to identify areas of potential collaboration. Following a successful workshop, COMNAP developed a SOOS Think Tank within their Science Expert Group, comprising national representatives who are interested in sharing information relevant to Southern Ocean observing research and collaborating with the SOOS effort.

OBJECTIVE 5: DATA DELIVERY

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.

The SOOS Data Management Sub-Committee (DMSC)



Steve Diggs (Chair; CCHDO, USA), Florence Fetterer (NSIDC, USA), Roger Proctor (IMOS eMII, Australia), Alexander Kozyr (CDIAC, USA), Takahiro Iida (NIPR, Japan), Anton Van De Putte (Biodiversity.aq, Belgium), Jie Zhang (CNAADC, China), James Cusick (AAD, Australia), Mathier Belbeoch (JCOMMOPS, France), Margarita Conkright Gregg (NODC, USA), Adam Leadbetter (BODC, UK), Bruno Danis (ULB, Belgium), Taco de Bruin (NIOZ, Netherlands), Hannes Grobe (AWI, Germany), Phillippa Bricher (SOOS Data Officer)



2012 - Ongoing



Unfunded Collaboration with IPO Support



Development of a data system that uses existing infrastructure and resources to streamline the data discovery and delivery process

In early 2012, SOOS developed a Data Management Sub-Committee (DMSC) to facilitate and drive data-related activities against each of the KRAs. Dr Kim Finney (AAD, Australia) was the inaugural Chair for the DMSC (2012-2014) and led the DMSC through two annual meetings, initiated and fostered the collaboration with NASA GCMD, and developed and published the SOOS Data Policy. In March 2014, Steve Diggs (CCHDO, USA) replaced Kim Finney as Chair, and is currently leading a committee of 15 members affiliated with 15

international and national data centres, networks and programs. Steve Diggs led the DMSC through the 2014 DMSC meeting (sponsored by NIWA, New Zealand), and was integral in gaining in-kind sponsorship by NSF-CCHDO through support for web-development activities and services. The next DMSC meeting will take place 10-11 June 2015, hosted by IMAS-UTas, Australia.

A limitation of the SOOS data effort thus far has been support for a dedicated Data Officer to implement the required activities. In 2014, SOOS was successful in gaining support through the Australian Research Council's Special Research Initiative for Antarctic Gateway Partnership (Project ID SR140300001) and hired a Data Officer in April 2015. This will greatly enhance DMSC activities and capabilities towards achieving Objective Five.

SOOS Data Policy



Dr Kim Finney (AAD, Australia), Florence Fetterer (NSIDC, USA)



June 2013 – January 2014



Complete



Unfunded Collaboration with IPO Support



[🌐 The SOOS Data Policy](#)

SOOS relevant data are highly multidisciplinary and disparate in origin. This [🌐 Data Policy](#) aims to provide a framework for SOOS-project-affiliated data (and associated dataset and resource descriptions) to be discovered and exchanged in an interoperable manner. This policy concentrates on those data that are generated through SOOS-affiliated projects, or data that already exist but are brought within the purview of SOOS through specific agreements between data custodians and SOOS.

Key Result Area 5.1 A comprehensive, multidisciplinary Metadata Portal is developed and populated

In early 2012, an initial SOOS Data Portal was developed through collaboration with the Integrated Marine Observing System e-marine Information Infrastructure (IMOS emII). Due to unforeseen circumstances, IMOS emII were unable to commit the resources required to fully support the portal maintenance and development. The portal was closed in September 2013. Following this, NASA GCMD officially agreed to collaborate with SOOS on the development and maintenance of a Metadata Portal of Southern Ocean data. The SOOS Metadata Portal is currently in testing phase and future activities will focus on populating this portal with records from national and topical data centres. The Metadata Portal will soon be available from the SOOS website.

Key Result Area 5.3 Orphan datasets are identified, stored and made available

SOOS has identified a number of national data streams that are currently unavailable or difficult to discover, and is working with the researchers and data centres in question to remedy this. As an example, SOOS is working with the Swedish Polar Research Secretariat to make their data from the Bellingshausen, Amundsen and Ross Seas discoverable through the SOOS Metadata Portal.

OBJECTIVE 6: SUPPORT ACTIVITIES

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

Key Result Area 6.1 Contributing to SOOS is highlighted as a national, institutional, or programmatic priority

Highlighting contributions to SOOS in national, institutional and programmatic strategic plans is key to enhancing support for observational activities. Similarly, using SOOS science priorities as a base for rationale of these strategic plans ensures the priority of SOOS science is recognised in planning future activities, at the correct level to inform funding priorities.

Since August 2011, contribution to SOOS has been highlighted as a specific objective in the national strategic plans for Brazil, UK, USA and Australia. The importance of connecting with SOOS has also been articulated in the strategic and implementation plans of international programmes (e.g., ICED, SCAR AntEco, SCAR AnT-ERA, WMO Year of Polar Prediction, CLIVAR-CLIC-SCAR Southern Ocean Region Panel), and national observing efforts (e.g., Australia's Integrated Marine Observing System).

Key Result Area 6.2 The contribution of existing and planned observation efforts of institutes, programmes and nations is acknowledged and highlighted

Many institutes and organisations have been supporting Southern Ocean observation efforts for decades. It is important that these existing efforts are recognised for their contribution to the global SOOS effort. Since July 2012, SOOS has produced 7 newsletter issues that highlight national, organisational and programmatic activities and products. The newsletter is freely available online, sent to a growing subscription list of over 200 international subscribers from scientific, programmatic, funding and coordinating bodies.

In November 2014, the SOOS EXCOM approved the development of a number of "affiliation categories" designed to better articulate and recognise the breadth of international contributions to SOOS. These categories will be further developed during 2015 and are open to all interested parties who support the funding, collection and/or management of Southern Ocean observational data. For more information on national and international contributions to SOOS, see page 38.

Currently, SOOS has 40 Affiliated Institutes, Organisations, Programmes and Field Campaigns across 16 nations.



Key Result Area 6.3 The importance of support for individual research projects is recognised and articulated

Since early 2012, SOOS has provided endorsement for individual research projects, large national and international research projects, national and international collaborative and coordination programmes, and data management initiatives. Endorsement is through submission of a request for endorsement, which is reviewed by SOOS SSC members. All endorsed projects are highlighted on the website and in the SOOS newsletter and social media.

In three years SOOS has endorsed nearly 20 research projects, 11 of which were funded and highlighted in the [SOOS newsletter and website](#).

Key Result Area 6.5 The SOOS Communication Strategy is implemented

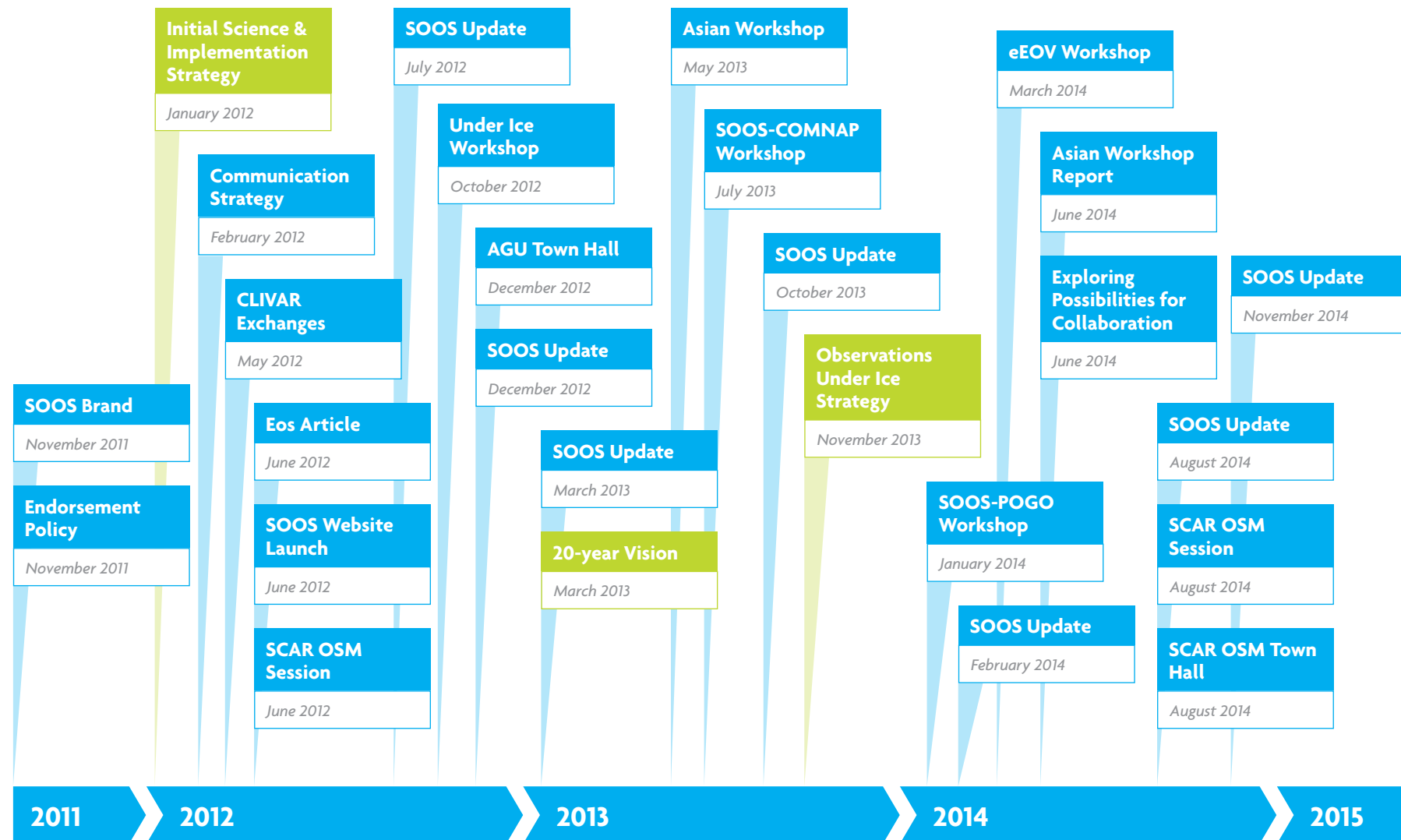
SOOS has been active in ensuring information on our objectives, products and activities is disseminated to our community and stakeholders. Key to this has been the development of the SOOS Communication Strategy, and implementation of this is predominantly through presentations at international meetings and workshops, the website and the newsletter [SOOS Update](#).

Since August 2011, SOOS has produced eight publications (five in peer review literature), two scientific strategies, and seven issues of SOOS Update. In addition to this, SOOS has been presented at nearly 100 international conferences and meetings, has organised 12 international meetings in six countries, and produced 10 reports to sponsors and intergovernmental agencies, such as the Antarctic Treaty, the Commission for the

Conservation of Antarctic Marine Living Resources (CCAMLR), SCAR and SCOR. SOOS also has a social media presence in both Twitter and Facebook, providing updates on activities, products and other SOOS relevant information to a following of more than 800 people, reaching 45 countries combined.

The SOOS website is central to our communication strategy. Since it was first released in June 2012, the website has grown to include a resources database, calendar of events, membership database, members-only collaborative section, a forum for community discussion, and a news section. In addition to this, the website hosts information on all SOOS activities, community and vision. With the recent development of new affiliation categories, and implementation bodies, such as the Working Groups and Task Teams, the website will be further updated in late 2015.

Timeline of Activities and Products Milestones



SOOS Attendance at Meetings

2011

SCOR AGM, International Hydrographic Organisation's Hydrographic Commission on Antarctica, Commission for the Conservation of Marine Living Resources, IMOS-NZ Symposium, Tasmanian Polar Network, ACE CRC Annual Symposium

2012

American Geophysical Union Ocean Sciences, AGU-ECR Panel of Ocean Experts, International Conference of Southern Hemisphere Meteorology and Oceanography, International Polar Year, The Sentinel Workshop, Antarctic Treaty Commission of Environmental Protection, SCAR Open Science Meeting, Under Ice Workshop, AGU Townhall Meeting, CLIVAR-SCAR-CLiC Southern Ocean Panel Meeting, 4th Argo Science Workshop, European Polar Board, Forum for Research into Ice Shelf Processes, IGBP Planet Under Pressure, International Program on Antarctic Buoys, Indo Pacific Oceanography Reference Group, Latin American Managers of Antarctic Programmes, SCOR AGM, Swedish Polar Research Meeting, UK Antarctic Science Meeting, UK Challenger Society for Marine Science Conference, US Polar Research Board, Climate and Cryosphere annual meeting

2013

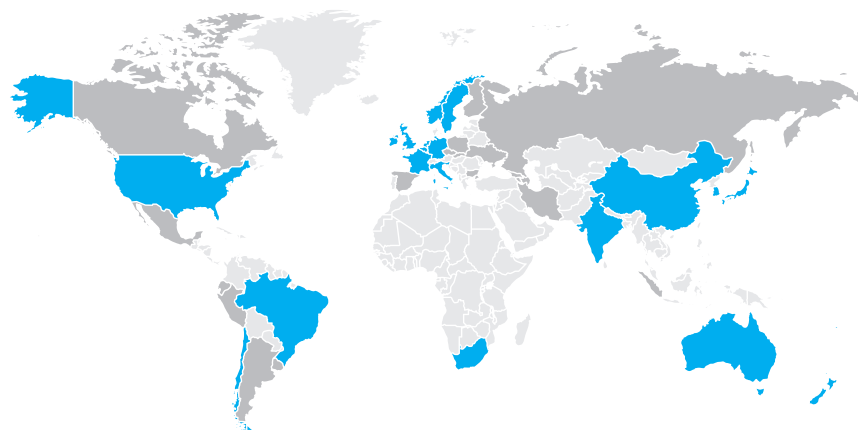
American Geophysical Union, Antarctic Treaty Consultative Meeting, CAS-TWAS-WMO Forum on operational oceanography, SOOS Asian Workshop, Theo Murphy Science Meeting, SOOS-COMNAP Joint Workshop, GRC Polar Marine Science, Partnership for Observation of the Global Ocean, European Geosciences Union, Forum for Research into Ice Shelf Processes, GOOS Regional Alliances Workshop, Latin-American Antarctic Congress, Strategic Science in Antarctica, Polar Data Forum, SCAR Biology Symposium, SCAR Delegates Meeting, WCRP Joint Science Committee-34, Ocean Carbon and Biogeochemistry, U.S. SCOR Committee Meeting, Integrating Climate and Ecosystem Dynamics Workshop, SCOR AGM,

2014

POGO-SOOS Workshop, POGO Communications Workshop, Australian Meteorological and Oceanographic Society, AGU Ocean Sciences, International Program of Antarctic Buoys, International Symposium on Sea Ice in a Changing Environment, Antarctic Sea Ice Processes and Climate, Identification of ecosystem Essential Ocean Variables Workshop, Forum of Research into Ice Shelf Processes, Integrated Marine, Biogeochemistry and Ecosystem Research Open Science Conference, International Ice Chart Working Group, NSF Polar DataVis hack-a-thon, Korean Polar Symposium, SCAR Open Science Meeting, SCAR Delegates Meeting, International Ocean Research Conference, The seasonal Dynamics of Iron Supply, Biological Consumption and Cycling in the Southern Ocean, CLIVAR- Southern Ocean Panel, Antarctic Treaty Consultative Meeting, The role of Alternative Platforms in Swedish Oceanographic Research, IMAS Board Meeting, International Ice Chart Working Group,

Key Result Area 6.6 The SOOS Network is grown as a vehicle to disseminate information and aid collaborative efforts

In the last three years, the internal SOOS network has grown to include 18 SSC members, three ex-officio representatives, 15 Data Management Sub-Committee members, and three National Representatives, representing 18 nations—a coverage of over 50% of the official SCAR and SCOR nations. Over the coming years, SOOS will aim to increase representation in the internal SOOS network, ensuring participation of each of the SCAR/SCOR nations who are involved in Southern Ocean research.



- Internal SOOS Network
- SCAR-SCOR nations with no current SOOS representation

Beyond this, the network of affiliated institutes, organisations, programmes and field campaigns is vast, representing communities across 16 nations .

Key Result Area 6.7 Robust and sustained support for SOOS International Project Office is maintained and enhanced

The SOOS IPO is central to the coordination and implementation of the SOOS Strategy. Maintaining support for the office is therefore vital. Further to this, for SOOS to deliver across all its objectives, the SOOS IPO needs to grow.

The Institute for Marine and Antarctic Studies, University of Tasmania (IMAS-UTas) has been the host of the SOOS IPO since August 2011, and will remain so until August 2016. This hosting covers the salary of the Executive Officer and provision of an office within the institute. Running costs of the IPO are covered through either direct funding or in-kind support for activities and products. SOOS IPO presently has 10 international sponsors, 4 of which provide direct financial support for IPO activities.

Throughout the end of 2014, SOOS worked with a number of institutes in Hobart, Australia to develop a case for sponsorship of the IPO by the Special Research Initiative of the Australian Research Council, the “Antarctic Gateway Partnership”. SOOS was successful in this venture and sponsorship by the Partnership will begin in 2015. This includes not only IPO support for new activities, but also the salary for a SOOS Data Officer.

SOOS greatly appreciated the contributions of all sponsors, without which SOOS would not exist.

SOOS has a diverse suite of funders and look to grow the scale and diversity of investments in the coming years. SOOS will also work to identify a better way to report on the significant contributions being made through in-kind sponsorship.

✓ Delivered Support

✓ Agreed Future Support

Sponsor	Sponsorship Type	Amount	2011	2012	2013	2014	2015	2016	2017	2018
INTERNATIONAL										
SCOR	Direct - SSC Meeting Support	USD 10,000		✓	✓	✓	✓			
SCAR	Direct - SSC Meeting Support	USD 10,000		✓	✓	✓	✓			
AUSTRALIA										
UTAS-IMAS	Direct – Salary (Executive Officer)	AUD 125,000	✓	✓	✓	✓	✓	✓		
	Direct - IPO budget	AUD 15,000	✓	✓	✓	✓				
AAD	Direct – IPO budget	AUD 15,000	✓	✓	✓	✓	✓			
Antarctic Gateway Partnership	Direct – IPO Budget	AUD 30,000					✓	✓	✓	
	Direct – Salary (Data Officer)	AUD 125,000					✓	✓	✓	
IMOS	In-Kind - Office Support	N/A	✓	✓	✓	✓	✓			
	In-Kind - Budget and Administration Duties	N/A				✓	✓			
TPAC	In-Kind - Web-Programming Support	N/A			✓	✓	✓			
Antarctic Tasmania	In-Kind - Event Coordination	N/A			✓					
NEW ZEALAND										
ANZ	Direct – IPO Budget	NZD 10,000		✓	✓	✓	✓			
NZARI	Direct – IPO Budget	Joint with ANZ			✓	✓				
	Direct – SSC Meeting Support	NZD 2,500					✓			
SWEDEN										
University of Gothenburg	Direct – Computing Hardware	N/A					✓			
	In-Kind - 5% of Co-Chair Time (Anna Wåhlin)	N/A				✓	✓	✓	✓	
USA										
NASA GCMD	In-Kind - SOOS Metadata Portal	N/A			✓	✓	✓			
NSF CCHDO	In-Kind - Web-Programming Support	N/A				✓	✓			

Key Result Area 6.8 SOOS Administration, facilitation of Strategic Plan activities, and delivery of support services is undertaken

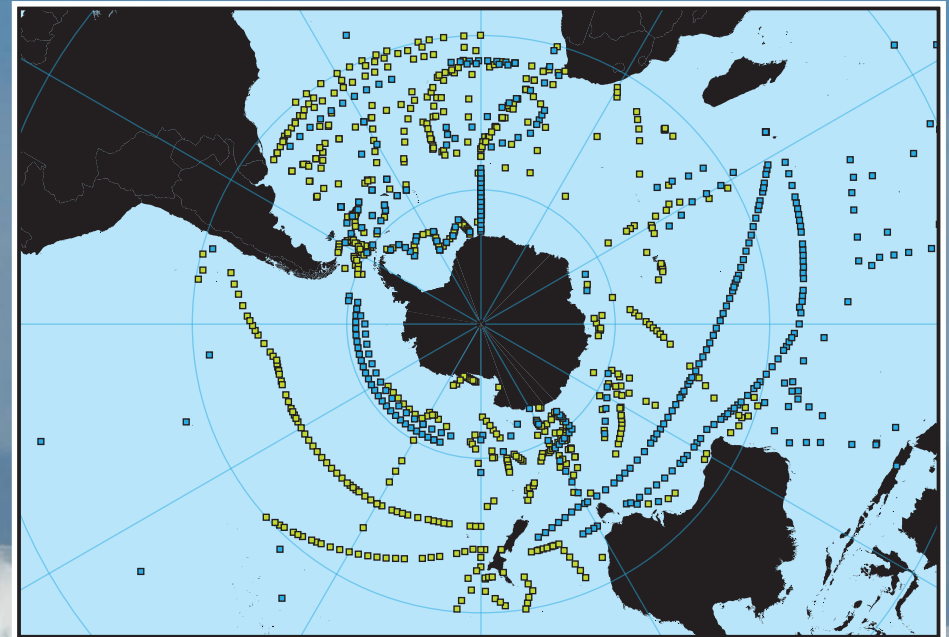
All activities highlighted in this report have, to some degree been facilitated by the IPO. The SOOS IPO secures, manages and delivers the resources required for SOOS activities, and provides support for the greater SOOS community to implement the SOOS mission. The SOOS IPO regularly engages with sponsors and stakeholders, implements the communication strategy, supports workshop and meeting organisation, advocates for Southern Ocean observations, and undertakes all required reporting to sponsors and stakeholders.

INTERNATIONAL CONTRIBUTIONS TO SOOS

International coordination of Southern Ocean observations is not new. Several programmes exist that facilitate and coordinate the planning, organisation, collection, and management of observational data. National funding in support of these initiatives make a significant contribution to the coverage of data required in an observing system. These coordination programmes also make enormous contribution to quality control and management of data, as well as ensuring the continuation and enhancement of funding for these observational activities.

They are imperative to the success of SOOS.

Since August 2011, many activities have been undertaken. For example, during this period seven nations contributed to the Southern Ocean Continuous Plankton Recorder programme, by completing 140 tows across 56,000 nautical miles. Highlighted below are just three more examples of the observations collected by international programmes during the last three years.

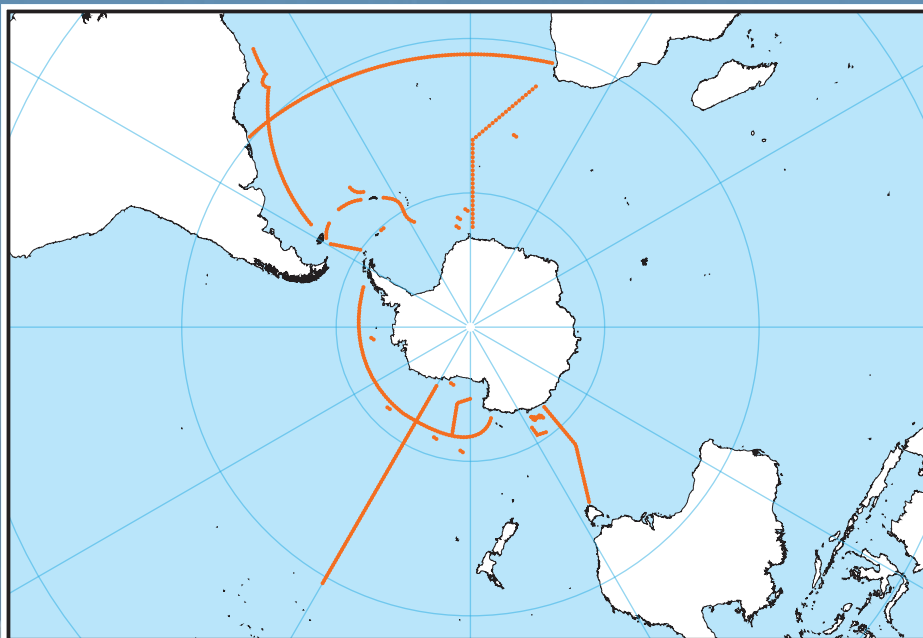


International Argo Programme

Argo is an international programme coordinating the collection and distribution of temperature and salinity observations from underwater autonomous floats. This map illustrates all the floats that were deployed in the Southern Ocean within the time-span of this report (green dots), and planned future deployments (blue). Deployments in the Southern Ocean and data quality control, are both coordinated by the Southern Ocean Argo Regional Centre (SOARC).

- Argo Deployment Plans
- Argo Deployments From 08/2011 (649)



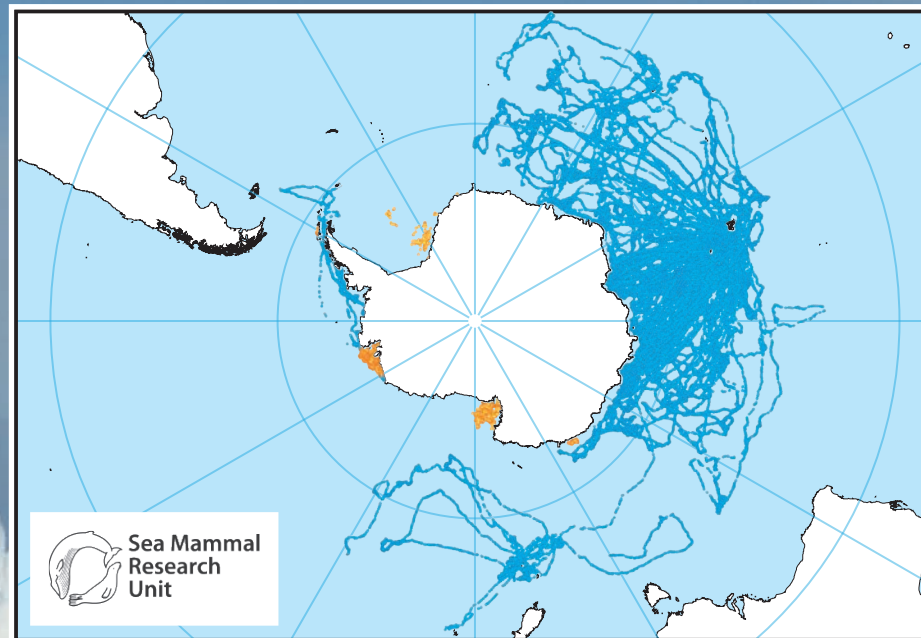


Global Ocean Ship-Based Hydrographic Investigations Program

The Global Ocean Ship-Based Hydrographic Investigations Program (GO-SHIP), is a globally coordinated network of sustained hydrographic sections, providing the highest possible quality CTD and hydrographic data to the international community. This map indicates GO-SHIP transects in the Southern Ocean that were occupied between August 2011 and December 2014.

GO-SHIP data available from CCHDO

 Southern Ocean GO-SHIP transects



International Seal Tagging Efforts

This map illustrates the tracks of southern elephant and Weddell seals equipped with instruments (CTD-SRDs) collecting oceanographic data between Aug 2011- Feb 2015. The instruments (SMRU Instrumentation) collected temperature, salinity and depth profiles, and time and location data, and relayed this daily to researchers via Satellite. This builds on a decade of observations forming the SEaOS and MEOP projects from an international collaboration across 10 countries. Deployment of CTD-SRDs is not yet coordinated through an official international programme but the community is well-coordinated and most field campaigns are achieved through a collaborative effort. The community also has well-entrenched data quality and sharing ethos and a web portal to make data available to the international community.

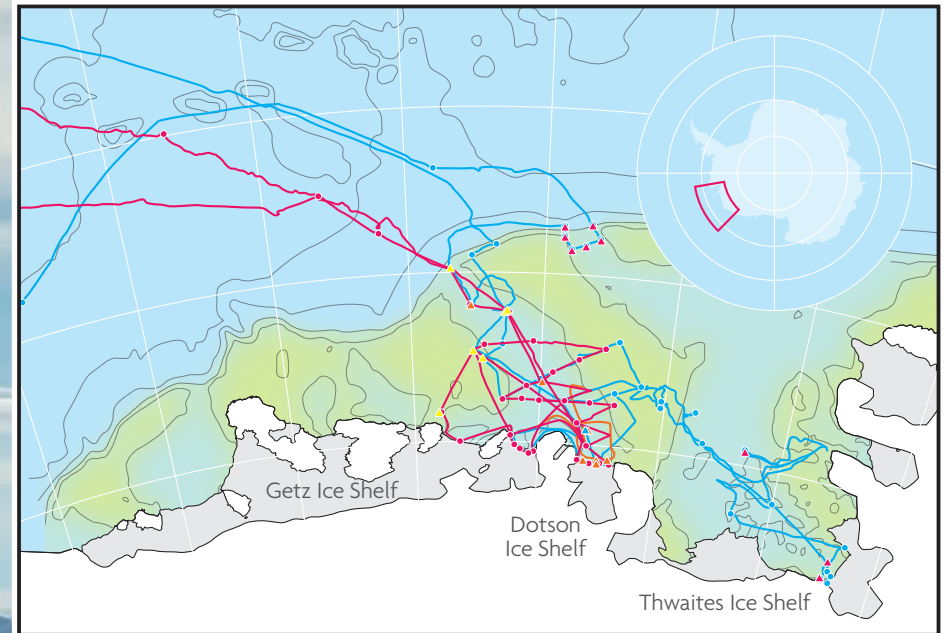
 Southern Elephant Seal

 Weddell Seal

MULTI-NATIONAL CONTRIBUTIONS TO SOOS

In addition to these large internationally coordinated programmes, national and multi-national field campaigns form the bedrock of SOOS implementation. Many large field campaigns have collected and contributed data over the last 3 years; New Zealand and Italy have maintained various long-term [moored arrays](#) in the Ross Sea; South Africa has pushed technological boundaries with the deployment of wave gliders through the [SOSCEX project](#), Germany has supported a RAFOS sound source array and acoustically-tracked floats in the Weddell sea; the USA has supported activities under its [Long-Term Ecological Research](#) site at Palmer Station for 25 years...and the list goes on.

This section cannot highlight all of them, but the maps below showcase just some of these important contributions.



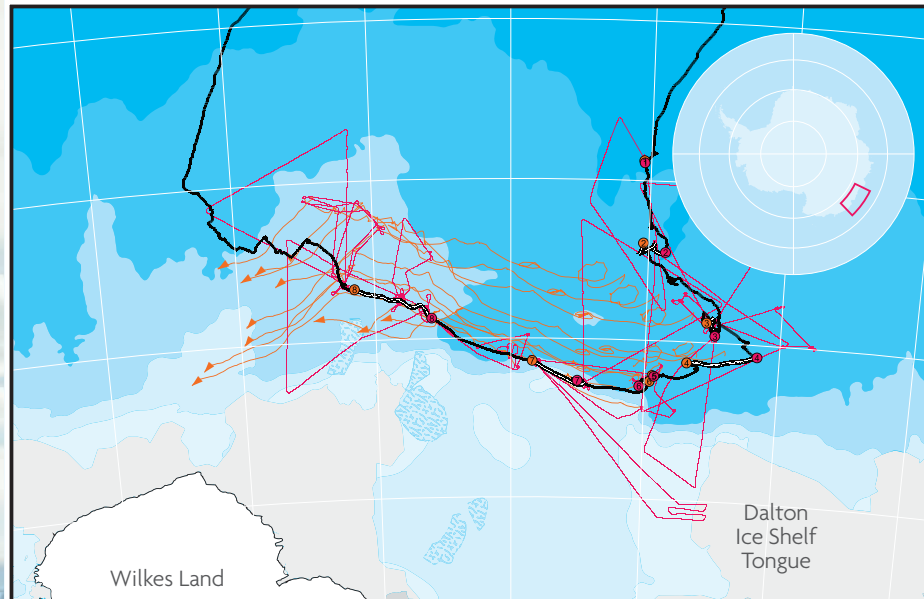
KOPRI Multi-National Amundsen Sea Project

The KOPRI Amundsen Sea Project is a multi-disciplinary and multi-national (Sweden, USA, UK, France, Norway) programme that aims to understand regional climate change mechanisms in the West Antarctica, and impacts of these changes on ecosystems and biogeochemical cycles. The map above indicates international activities undertaken in 2012 (blue) and 2014 (green).

	2012 Ship Track & CTD		Mooring (KOPRI)
	2014 Ship Track & CTD		Mooring (UGot, Sweden)
	Glider Track (Rutgers, US)		Mooring (BAS, NERC iSTAR, UK)
			Mooring (ASPIRE, US)



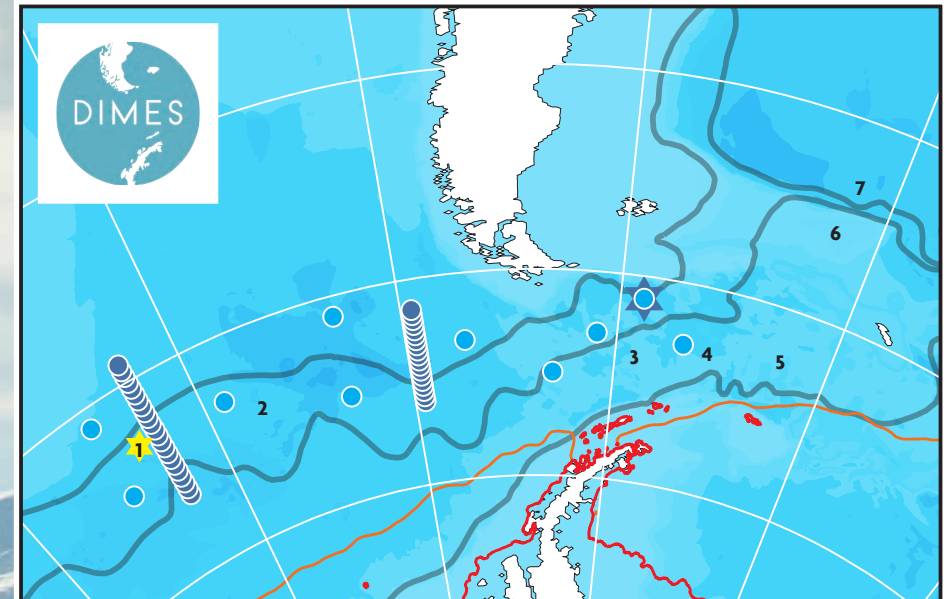
Korea Polar Research Institute



Sea Ice Physics and Ecosystems Experiment 2 (SIPEX-2)

SIPEX-2 addressed gaps in our understanding of how the sea-ice zone is impacted by changing climate. The project (Sept – Nov 2012) was one of two major multi-disciplinary and internationally collaborative sea ice field campaigns, coordinated by the AAD and the ACE CRC. The first, SIPEX-1, was conducted in Sept 2007. SIPEX-2 focussed on the sea-ice zone off Wilkes Land, Antarctica, and involved 50 scientists from 17 institutions and nine countries. First results have been published (e.g., Kohout et al., 2014; Williams, et al., 2015) and data are currently being utilised in the validation of satellite- products and the parameterisation of sea-ice processes in climate and ecosystem models. All SIPEX-2 data is available from the AADC.

	Voyage Track		Station Start
	Station Track		RAPPLS Flight
	Station Start		Ice Deformation Bouy



Diapycnal & Isopycnal Mixing Experiment in the Southern Ocean

DICES was a US/UK experiment in 2009 - 2014 that measured mixing in the Southern Ocean through a combination of tracer release, isopycnal and EM-APEX floats, microstructure measurements, a mooring array, inverse modelling of hydrography, and analyses of altimetry and numerical models. Publications are available at dimes.ucsd.edu. DICES was funded by the US NSF and the UK NERC.

2009	1 US1: Initial deployment of sound sources , floats , tracer
2010	2 US2: Tracer and micro-structure survey, float deployment
2011	3 UK1: Moored profiler , current meters, and sound sources 4 UK2 & UK2.5: Hydrology and micro-structure survey US3: Drake Passage section
2012	5 UK3: Tracer and micro-structure survey mooring recovery US4: Drake Passage section
2013	6 UK4: Tracer and micro-structure survey US4: Drake Passage section
2014	7 UK5: Tracer and micro-structure survey

LOOKING FORWARD

The activities of the last three years have provided a solid foundation on which to move forward and implement SOOS. In the coming years, core activities will be structured around achieving the objectives outlined in the SOOS 5-year Strategic Plan. A primary goal will be designing the observing system, which will involve firstly prioritising the candidates for Essential Ocean Variables into a list of high-impact, high feasibility variables for Southern Ocean observations, and secondly quantifying the temporal and spatial sampling requirements of these variables.

Supporting and enhancing current observation efforts is key. Existing national and international observing efforts are fundamental to the success of SOOS, ultimately providing the expertise, resources and logistics required to deliver core SOOS observations. A number of Regional Working Groups will be developed in 2015 to facilitate international collaboration, coordinate field campaigns, and enhance data sharing. These Working Groups are crucial to connect existing national efforts, standardise methodologies, and ultimately implement the designed system.

A strong focus looking forward is making solid progress against the SOOS data objective. The recent 2-year funding of a SOOS Data Officer by the Australian Research Council's Special Research Initiative for Antarctic Gateway Partnership will enable significant advances to be made on this front. The work required, however, is considerable and involvement of national and international data centres is imperative. Sustained and enhanced funding is vital and efforts on this front will be ongoing.

The SOOS International Project Office will continue to support all SOOS activities. The SOOS website (soos.aq) was designed during the developmental phase of SOOS and now needs updating to better reflect the implementation activities, data capabilities and extensive network of communities. This will be a core focus during late 2015. Securing sustained funding of the IPO is also a focus looking forward, including growing IPO capabilities through direct and in-kind support.

SOOS is open to all interested in being part of this international initiative. There are many ways for individuals, institutes, projects and organisations to contribute. We look forward to working with you all in the years to come!



Dr. Louise Newman

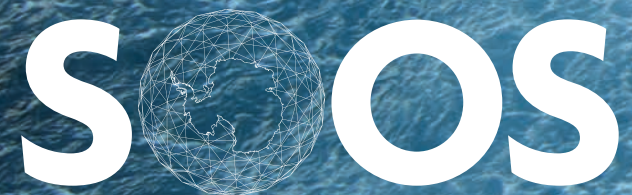
SOOS Executive Officer (newman@soos.aq)



ACRONYMS

AAD	Australian Antarctic Division	ICSU	International Council for Science
AADC	Australian Antarctic Data Centre	IOC	Intergovernmental Oceanographic Commission
ACE CRC	Antarctic Climate and Ecosystems Cooperative Research Centre	IOCCP	International Ocean Carbon Coordination Project
AIMS	Australian Institute of Marine Science	IMAS-UTAS	Institute for Marine and Antarctic Studies, University of Tasmania
Ant-Eco	State of the Antarctic Ecosystem	IMBER	Integrated Marine Biogeochemistry and Ecosystem Research
AnT-ERA	Antarctic Thresholds – Ecosystem Resilience and Adaptation	IMOS	Integrated Marine Observing System
APECS	Association of Polar Early Career Scientists	IMOS eMII	Integrated Marine Observing System e-Marine Information Infrastructure
ASPeCt	Antarctic Sea Ice Processes and Climate	IPO	International Project Office
AWI	Alfred Wegener Institute	JCOMMOPS	Joint Technical Commission for Oceanography and Marine Meteorology in-situ Observations Programme Support Centre
BAS	British Antarctic Survey	KOPRI	Korean Polar Research Institute
BODC	British Oceanographic Data Centre	KRA	Key Result Area
CCAMLR	Commission for the Conservation of Marine Living Resources	NASA GCMD	National Aeronautics and Space Administration Global Change Master Directory
CCHDO	CLIVAR and Carbon Hydrographic Data Office	NECKLACE	Network for the collection of knowledge on melt of Antarctic ice shelves
CDIAC	Carbon Dioxide Information Analysis Center	NIOZ	Royal Netherlands Institute for Sea Research
CLIC	Climate and Cryosphere	NIPR	National Institute of Polar Research, Japan
CLIVAR	Climate and Ocean Variability, Predictability and Change	NIWA	National Institute of Water and Atmospheric Research
CNAADC	Chinese National Antarctic and Arctic Data Centre	NODC	National Oceanographic Data Centre (USA)
CSIR	Council for Scientific and Industrial Research	NSIDC	National Snow and Ice Data Center
DIMES	Diapycnal and Isopycnal Mixing Experiment in the Southern Ocean	NSF	U.S. National Science Foundation
DMSC	Data Management Sub-Committee	POGO	Partnership for Observation of the Global Oceans
eEOV	ecosystem Essential Ocean Variable	SCAR	Scientific Committee on Antarctic Research
EOV	Essential Ocean Variable	SCOR	Scientific Committee on Oceanic Research
ESA	European Space Agency	SIPEX	Sea Ice Physics and Ecosystem Experiment
ESRIN	European Space Research Institute	SOOS	Southern Ocean Observing System
EXCOM	Executive Committee	SSC	Scientific Steering Committee
FOO	Framework for Ocean Observing	ULB	Free University of Brussels
FRISP	Forum for Research into Ice Shelf Processes	UNESCO	United Nations Educational, Scientific and Cultural Organization
GOOS	Global Ocean Observing System	VOS	Voluntary Observing Ship
GO-SHIP	Global Ocean Ship-Based Hydrographic Investigations Program	WCRP	World Climate Research Programme
ICED	Integrating Climate and Ecosystem Dynamics in the Southern Ocean	WMO YOPP	World Meteorological Organization Year of Polar Prediction





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