

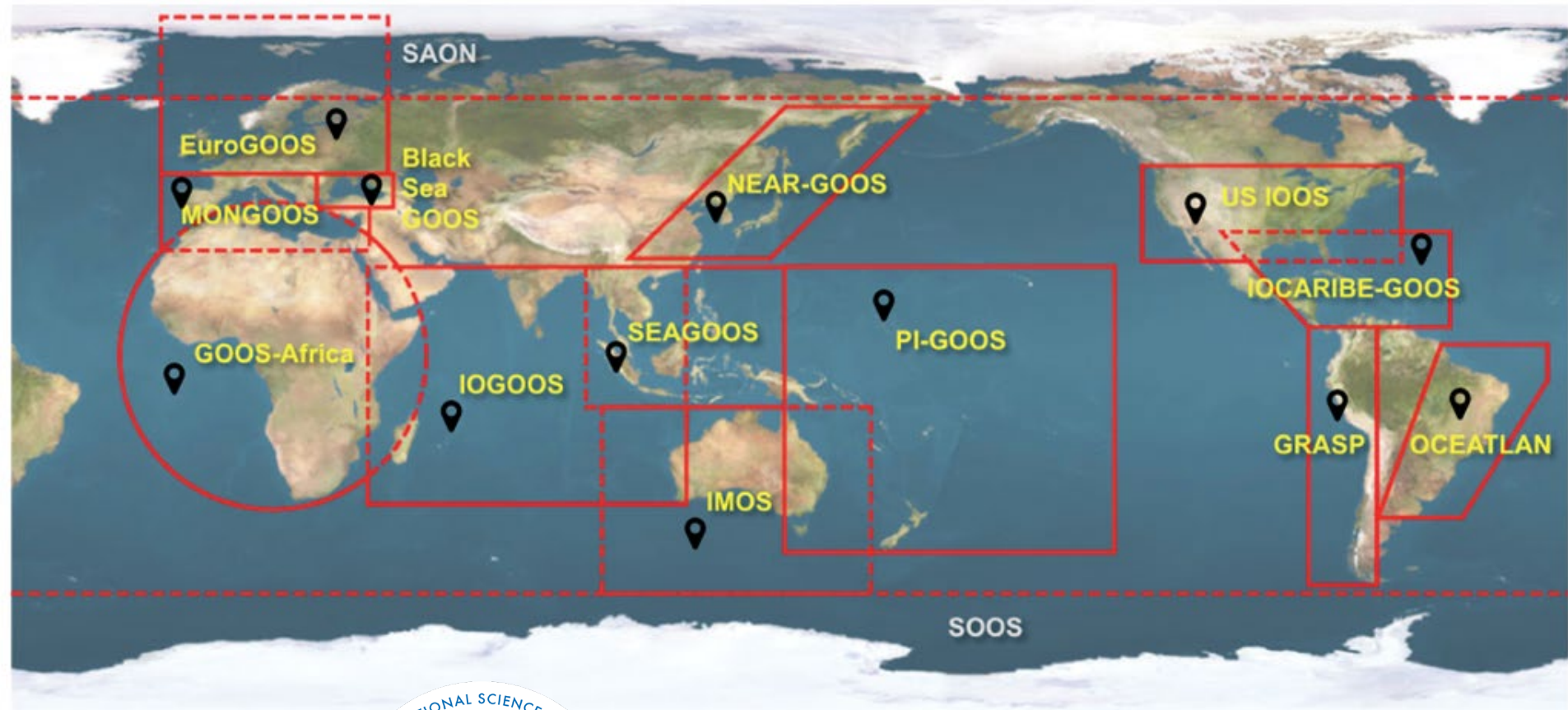
The Southern Ocean Observing System

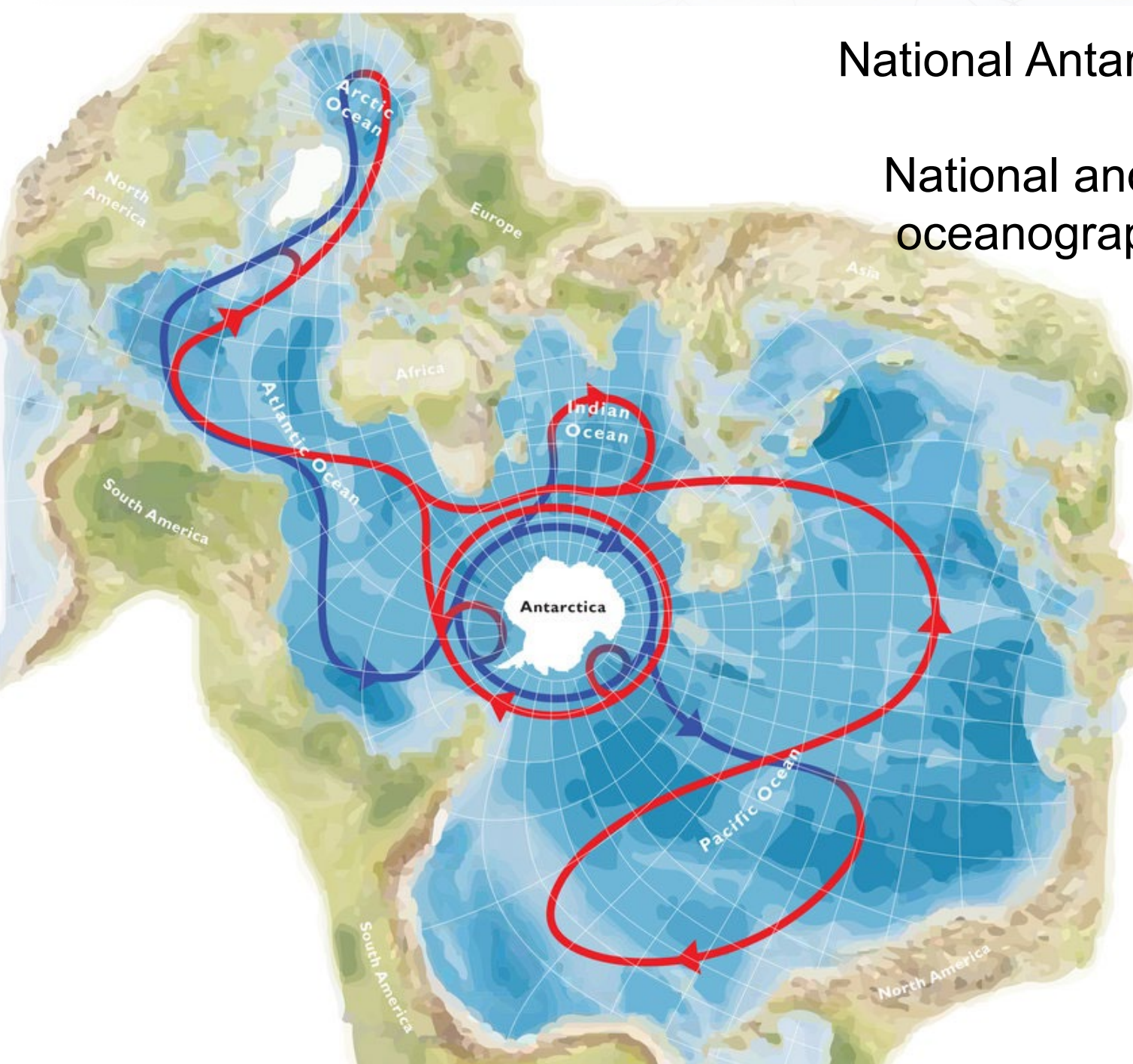
Pip Bricher, SOOS Data Officer
Alyce Hancock, SOOS Executive Officer



Antarctica
New Zealand







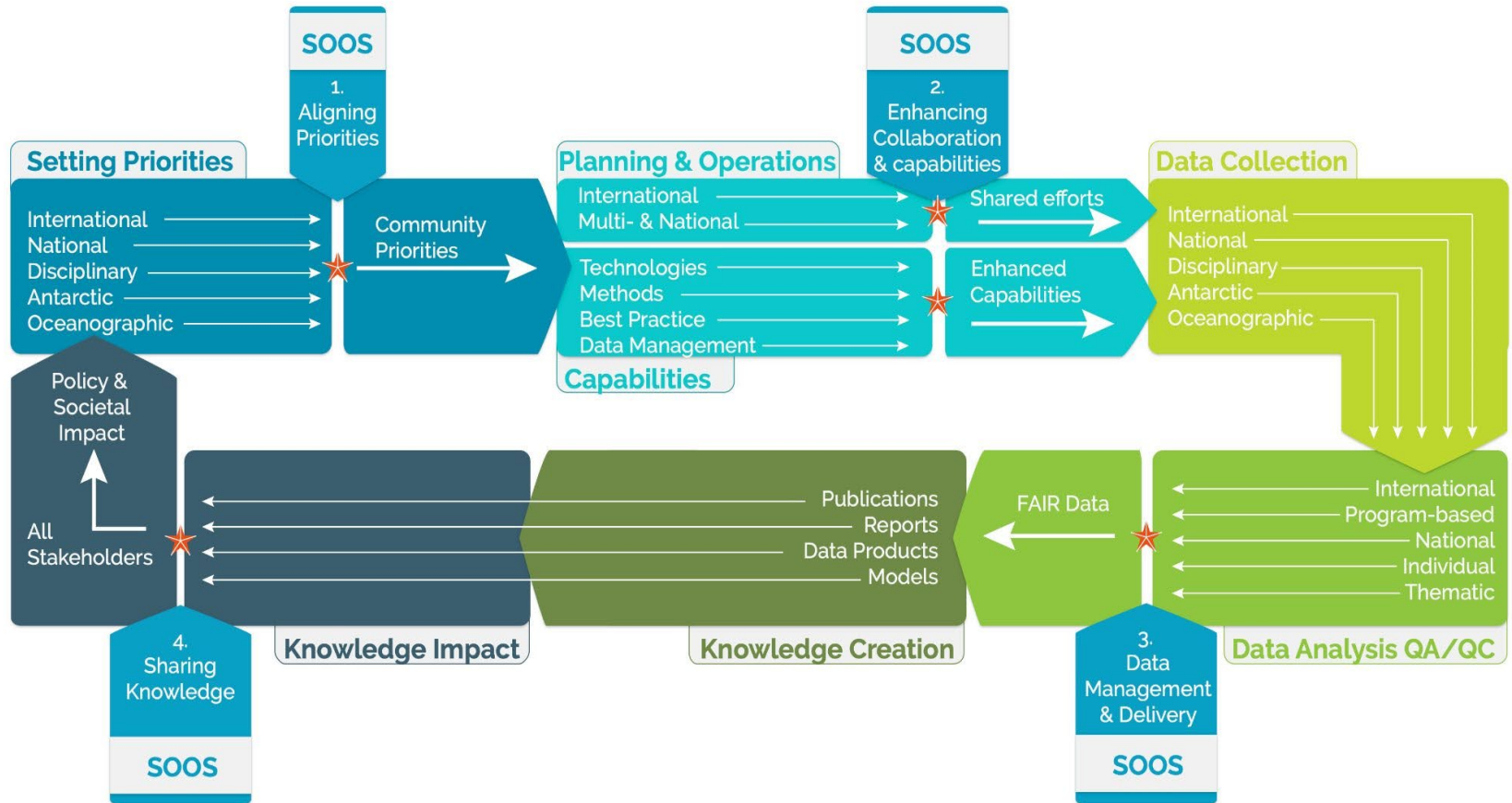
National Antarctic programs

National and international
oceanographic programs

62 nations

SOOS mission is to facilitate the sustained collection and delivery of essential observations of the Southern Ocean to all stakeholders, through the design, advocacy, and implementation of cost-effective observing and data delivery systems

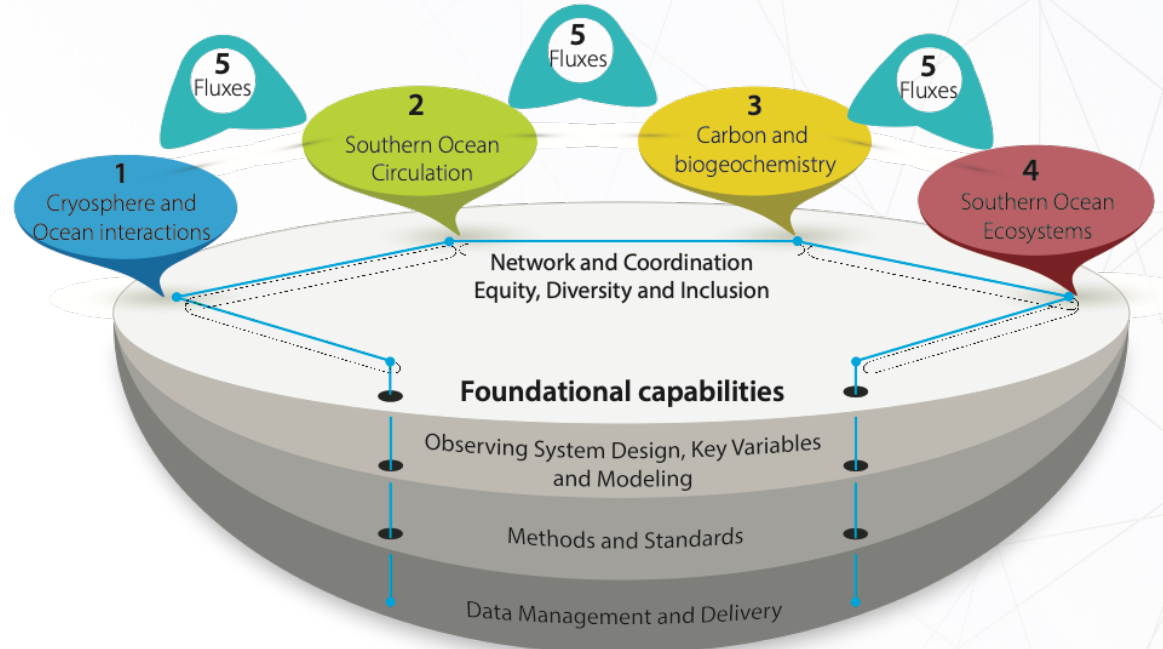
Southern Ocean Science Life Cycle



New SOOS Science and Implementation Plan (2021-2025)

- New 5-year (2021-2025) Science and Implementation Plan developed
 - Reviews just received by SCAR and SCOR

Five Community-agreed Science Themes



SOOS SIP - Key science challenges in each theme

CRYOSPHERE-OCEAN INTERACTIONS



Theme 1

1.2: Understand influences of changes in freshwater fluxes from iceberg melting, sub-ice shelf melting, subglacial discharge and sea ice.

SOUTHERN OCEAN CIRCULATION



Theme 2

2.1: Understand the impacts of Southern Ocean heat, freshwater and carbon exchange and storage on the global ocean.

CARBON AND BIOGEOCHEMISTRY



Theme 3

3.5: Determine the key drivers of primary productivity and the biological carbon pump and assess ongoing changes in these parameters

ECOSYSTEMS AND BIODIVERSITY



Theme 4

4.3: Evaluate the distribution of species in relation to CCAMLR, MPAs and climate change, considering historical changes and future projections

- Enhance the collection and delivery of the required data
- Addressing Challenges
 - SOOS working groups
 - Complement ongoing SCAR and SCOR activities

AIR-SEA-ICE FLUXES



Cross-Cutting
Theme 5

5.3: Decrease uncertainty in atmosphere and ocean dynamics and boundary-layer thermodynamic processes, aiding improvements in weather and climate models.

5.4: Constrain variability in Southern Ocean carbonate system and ocean-atmosphere CO₂ fluxes over seasonal and annual temporal scales.



Delivering Sustained, Coordinated, and Integrated Observations of the Southern Ocean for Global Impact

OPEN ACCESS

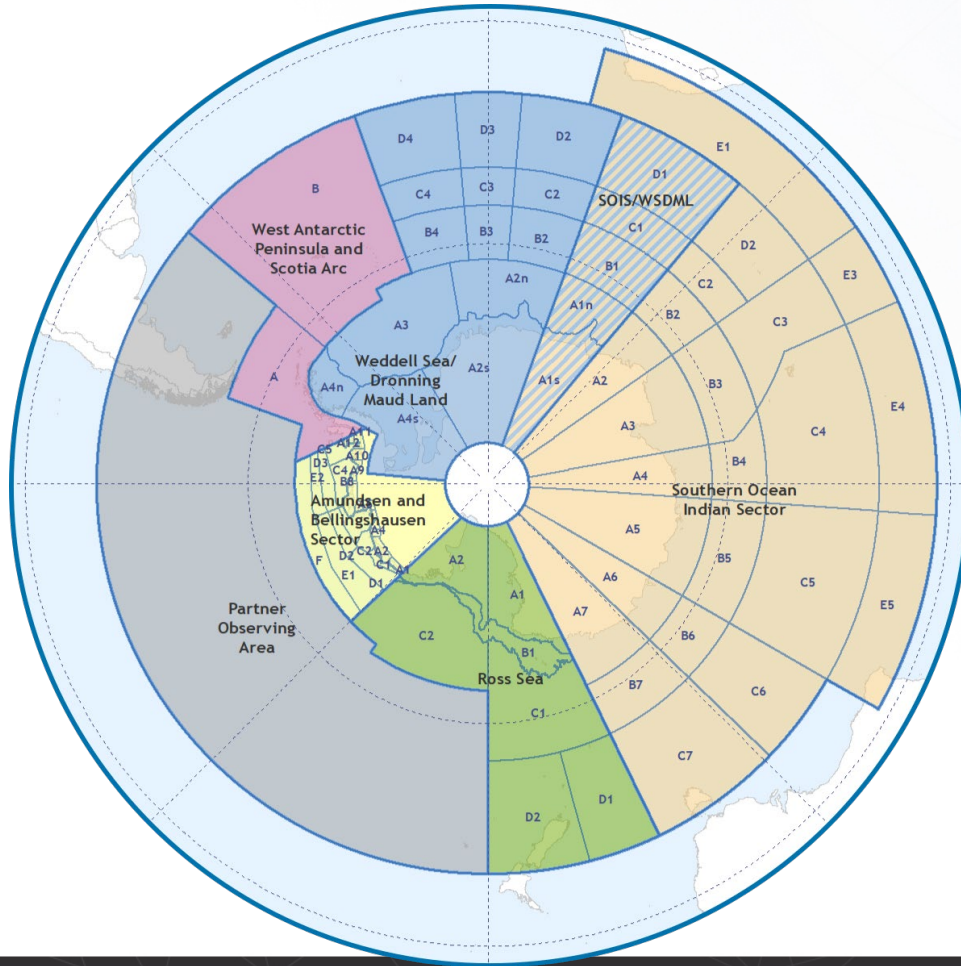


Ocean FAIR Data Services

Toste Tanhua^{1}, Sylvie Pouliquen², Jessica Hausman³, Kevin O'Brien⁴, Pip Bricher⁵, Taco de Bruin⁶, Justin J. H. Buck⁷, Eugene F. Burger⁸, Thierry Carval², Kenneth S. Casey⁹, Steve Diggs¹⁰, Alessandra Giorgetti¹¹, Helen Glaves¹², Valerie Harscoat², Danie Kinkade¹³, Jose H. Muelbert¹⁴, Antonio Novellino¹⁵, Benjamin Pfeil¹⁶, Peter L. Pulsifer¹⁷, Anton Van de Putte¹⁸, Erin Robinson¹⁹, Dick Schaap²⁰, Alexander Smirnov²¹, Neville Smith²², Derrick Snowden²³, Tobias Spears²⁴, Shelley Stall²⁵, Marten Tacoma⁶, Peter Thijsse²⁰, Stein Tronstad²⁶, Thomas Vandenberghe¹⁸, Micah Wengren²³, Lesley Wyborn²⁷ and Zhiming Zhao²⁸*

Knowledge delivery to address challenges

SOOS implementation working groups, community efforts



Regional Working Groups (RWGs):

Southern Ocean Indian Sector (SOIS)

Ross Sea

Weddell Sea and Dronning Maud Land (WSDML)

West Antarctic Peninsula and Scotia Arc (WAPSA)

Amundsen/Bellingshausen Sea (ABS)

Capability Working Groups (CWGs):

Censusing Animal Populations from Space (CAPS)

Southern Ocean Air Sea Flux (SOFLUX)

Observing System Design (OSD)

Task Teams:

Ecosystem Essential Ocean Variables (eEOVs)

Autonomous Underwater Vehicles (AUVs)

Polar Data Discovery (POLDER)

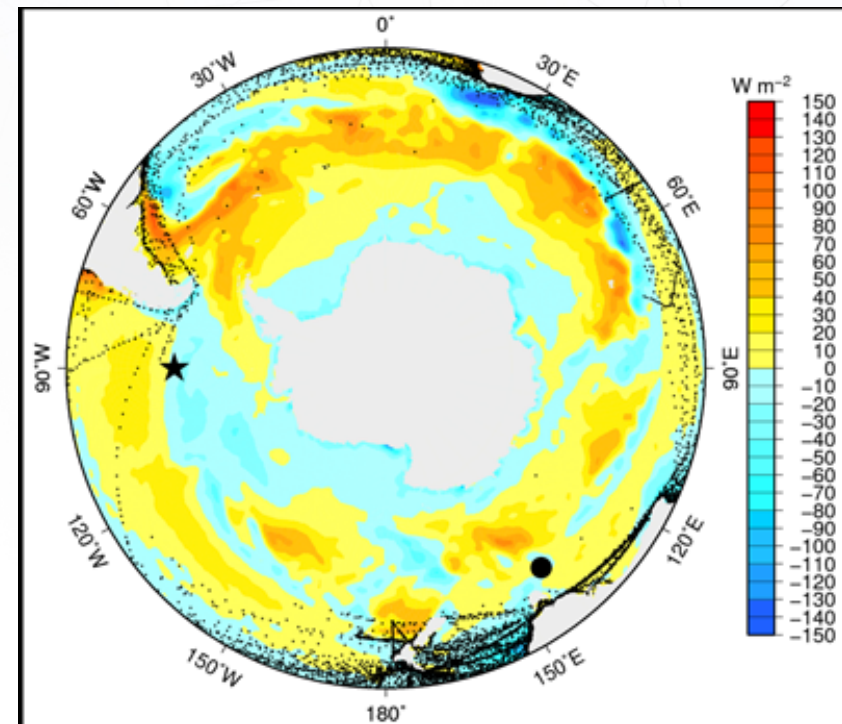
+Future...

Southern Ocean Air-Sea Fluxes (SOFLUX)

Reduce uncertainties in the understanding of air-sea and air-sea-ice exchanges

SOFLUX are achieving this aim through:

- *facilitating international communication*
- *providing a foundation for improving;*
 - *in situ observations*
 - *remote sensing of fluxes*
 - *modeling and data assimilation*



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

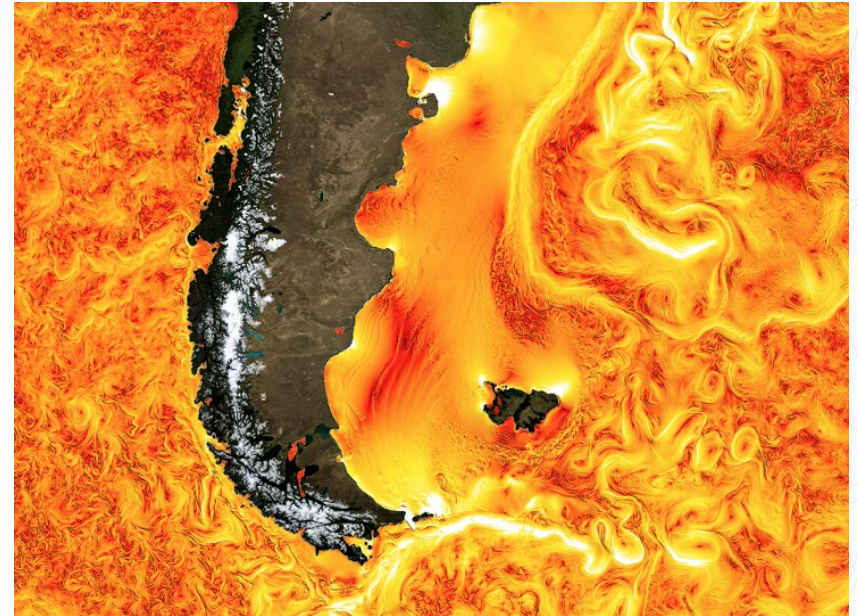
Observing System Design (OSD)

Designing a multi-disciplinary Southern Ocean observing system

Assessing observing system design

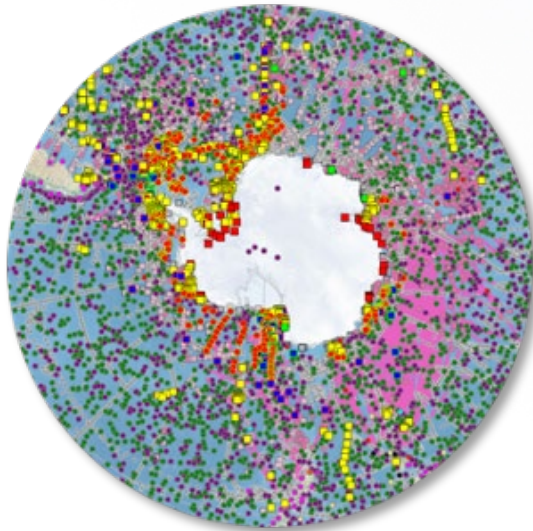
The OSD Capability Working Group can assess the design of an optimal observing system for a particular variable to compliment and build-on existing observations.

- 1) Determine how well the current observing system is constraining that variable*
- 2) Identify gaps and possible platforms and instrumentation to fill those gaps*



SOOS Data Delivery

Data Management Committee



Scientific observations and results from Antarctica shall be exchanged and made freely available (Antarctic Treaty III 1c)

What are we sharing?

**Standardised
datasets**

**Long-tail
data**

**Logistical
information**

Standardised datasets

www.soosmap.aq

Southern Ocean Observing System

About SOOS



Search platform...

Search point 40.25,89.45



Clear Selection

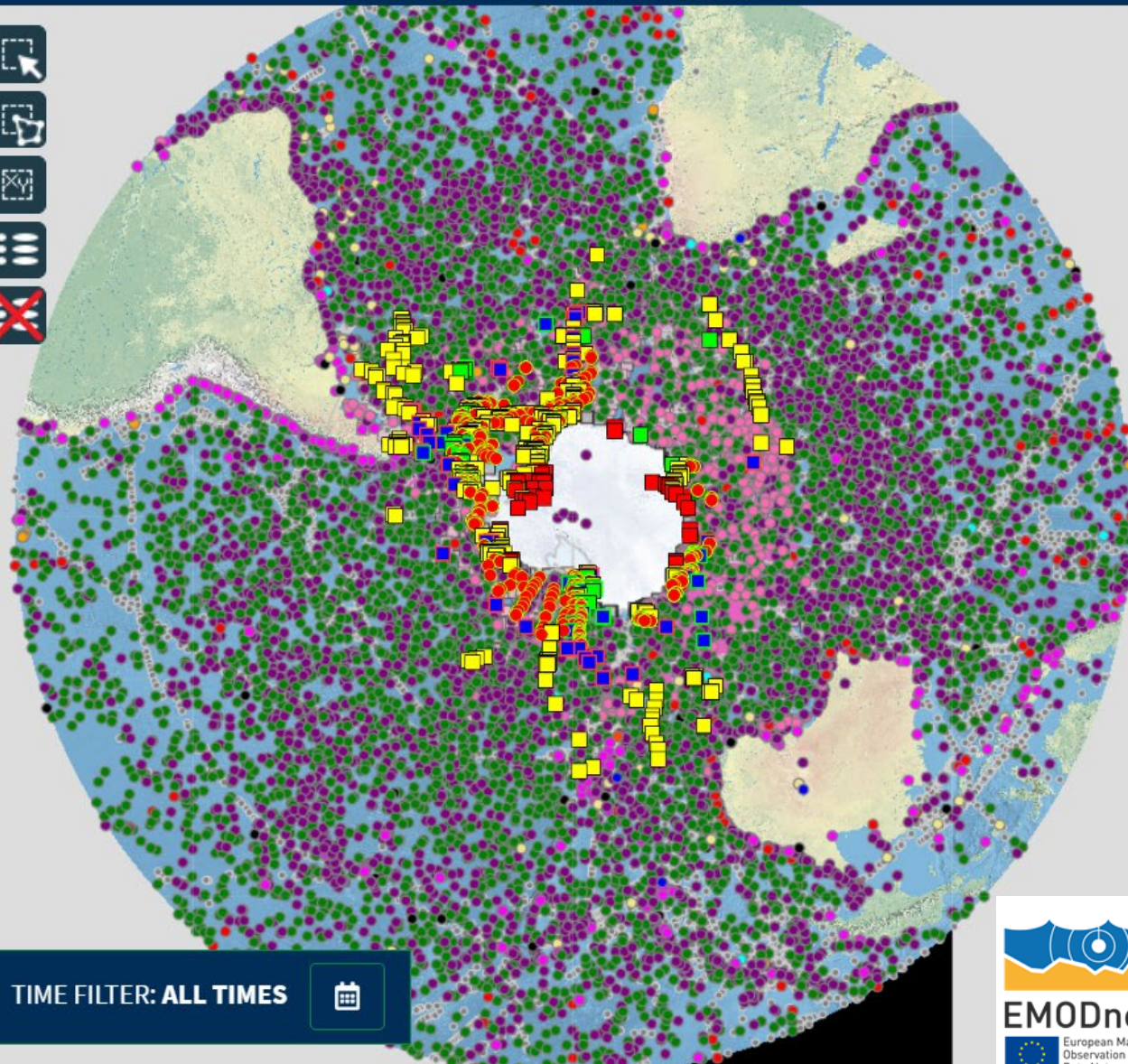
OBSERVATION TYPE

TURN ON ALL OBSERVATIONS

TURN OFF ALL OBSERVATIONS

EMODnet Physics

- ARGO/PROFILER
- BATHY MESSAGES ON GTS
- CTD PROFILES
- DRIFTING BUOYS
- FERRYBOX/SHIP
- FISHING VESSELS
- GLIDERS
- MARINE MAMMAL
- MINI LOGGER
- MOORING TIME SERIES
- OSIS



TIME FILTER: ALL TIMES





www.soosmap.aq



Federated ERRDAP servers for “core” physics datasets

Regular caches of files in varied formats for other SOOS data types (shapefiles, csv, GEOJSON, Google Sheets)

Currently only supports downloads through the map interface, which limits to 400 files per download. Creating bulk download tools as part of a system rebuild

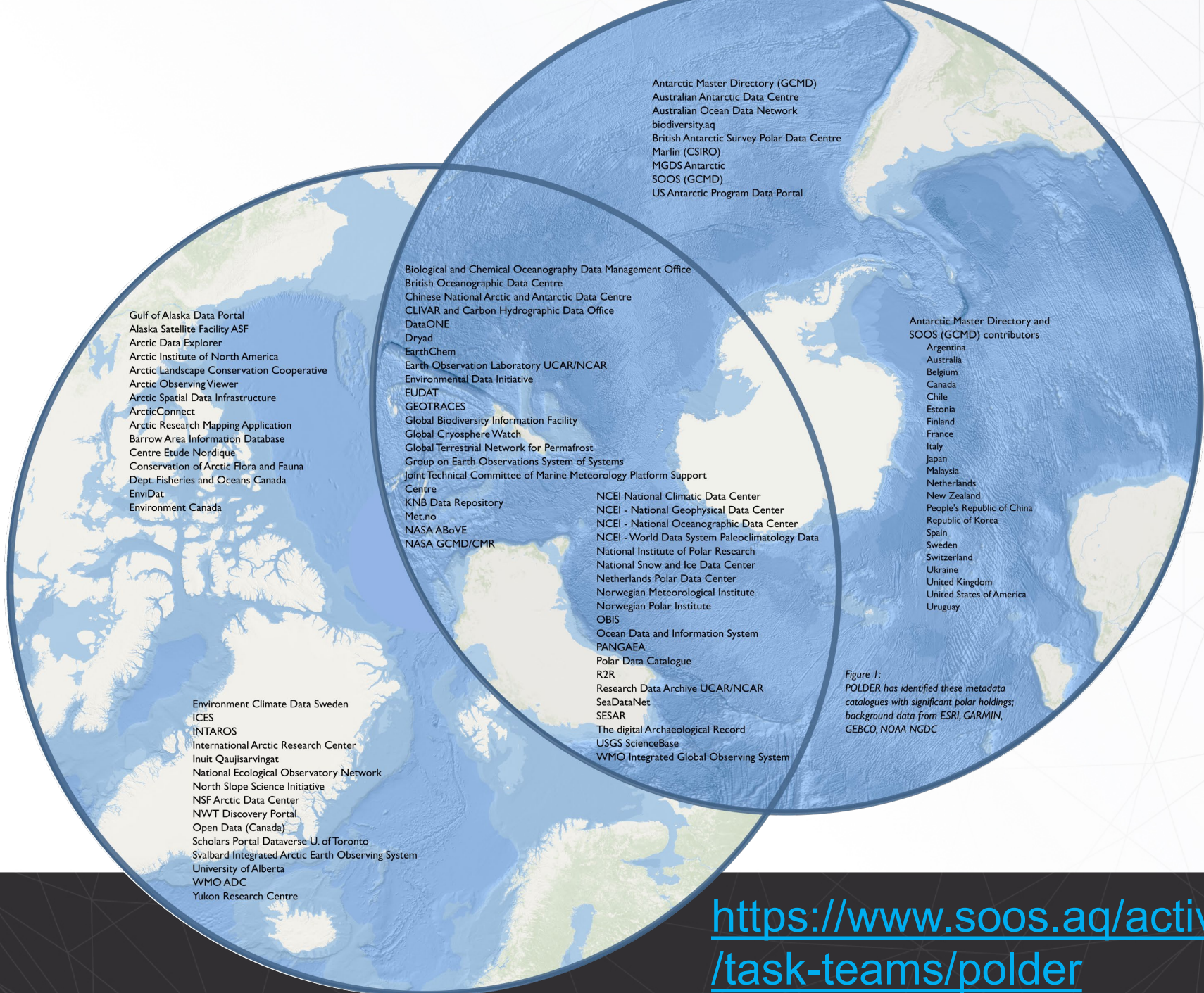
Long-tail
data

SOOS Metadata Portal

The screenshot displays the SOOS Metadata Portal interface. At the top, there is a navigation bar with the NASA Earthdata logo, a search bar, and a 'Find a DAAC' dropdown. Below this is the 'SOOS SEARCH' header. The main content area shows a search for '6,987 Matching Collections'. A list of results is displayed, including 'SENTINEL-1A_SLC' (1,056,823 Granules, 2014-04-03 ongoing) and 'SENTINEL-1B_SLC' (693,768 Granules, 2016-04-25 ongoing). Each result has an information icon and a plus sign. A sidebar on the left contains a 'Filter Collections' section with categories like 'Available from AWS Cloud', 'Customizable', 'Map Imagery', and 'Near Real Time'. A map on the right shows a satellite view of a coastal area.

USA	51%
Australia	29%
Japan	4%
New Zealand	3%
UK	2%
South Korea	2%
China	2%

<https://search.earthdata.nasa.gov/portal/soos/>



Gulf of Alaska Data Portal
 Alaska Satellite Facility ASF
 Arctic Data Explorer
 Arctic Institute of North America
 Arctic Landscape Conservation Cooperative
 Arctic Observing Viewer
 Arctic Spatial Data Infrastructure
 ArcticConnect
 Arctic Research Mapping Application
 Barrow Area Information Database
 Centre Etude Nordique
 Conservation of Arctic Flora and Fauna
 Dept. Fisheries and Oceans Canada
 EnviDat
 Environment Canada

Environment Climate Data Sweden
 ICES
 INTAROS
 International Arctic Research Center
 Inuit Qaujisarvingat
 National Ecological Observatory Network
 North Slope Science Initiative
 NSF Arctic Data Center
 NWT Discovery Portal
 Open Data (Canada)
 Scholars Portal Dataverse U. of Toronto
 Svalbard Integrated Arctic Earth Observing System
 University of Alberta
 WMO ADC
 Yukon Research Centre

Biological and Chemical Oceanography Data Management Office
 British Oceanographic Data Centre
 Chinese National Arctic and Antarctic Data Centre
 CLIVAR and Carbon Hydrographic Data Office
 DataONE
 Dryad
 EarthChem
 Earth Observation Laboratory UCAR/NCAR
 Environmental Data Initiative
 EUDAT
 GEOTRACES
 Global Biodiversity Information Facility
 Global Cryosphere Watch
 Global Terrestrial Network for Permafrost
 Group on Earth Observations System of Systems
 Joint Technical Committee of Marine Meteorology Platform Support
 Centre
 KNB Data Repository
 Met.no
 NASA ABoVE
 NASA GCMD/CMR

NCEI National Climatic Data Center
 NCEI - National Geophysical Data Center
 NCEI - National Oceanographic Data Center
 NCEI - World Data System Paleoclimatology Data
 National Institute of Polar Research
 National Snow and Ice Data Center
 Netherlands Polar Data Center
 Norwegian Meteorological Institute
 Norwegian Polar Institute
 OBIS
 Ocean Data and Information System
 PANGAEA
 Polar Data Catalogue
 R2R
 Research Data Archive UCAR/NCAR
 SeaDataNet
 SESAR
 The digital Archaeological Record
 USGS ScienceBase
 WMO Integrated Global Observing System

Antarctic Master Directory (GCMD)
 Australian Antarctic Data Centre
 Australian Ocean Data Network
 biodiversity.aq
 British Antarctic Survey Polar Data Centre
 Marlin (CSIRO)
 MGDS Antarctic
 SOOS (GCMD)
 US Antarctic Program Data Portal

Antarctic Master Directory and
 SOOS (GCMD) contributors
 Argentina
 Australia
 Belgium
 Canada
 Chile
 Estonia
 Finland
 France
 Italy
 Japan
 Malaysia
 Netherlands
 New Zealand
 People's Republic of China
 Republic of Korea
 Spain
 Sweden
 Switzerland
 Ukraine
 United Kingdom
 United States of America
 Uruguay

Figure 1:
 POLDER has identified these metadata
 catalogues with significant polar holdings;
 background data from ESRI, GARMIN,
 GEBCO, NOAA NGDC

<https://www.soos.aq/activities/task-teams/polder>

Logistical information

DueSouth and Polardex

DUE SOUTH
DATABASE OF UPCOMING EXPEDITIONS TO THE SOUTHERN OCEAN
Expedition Search

Clear filters

Free Text

Status

Vessel Type

SOOS Region

Date Start

Date End

Geographical (Bounding Box)

Future Underway Selected

LMG 21-10
Nation: United States
Vehicle name: RV Laurence M. Gould
Vehicle type: Ship
Start date: 2021-09-25
End date: 2021-10-20
[View expedition](#)

IN2022_V04
Future Ship: RV Investigator Country: Australia Start Date: 2022-05-22 End Date: [blank]
INIV - International Nutrient Inter-Comparison study in the Southern Ocean: quantifying ice-seagoing laboratories - Phase 2

IN2022_V03
Future Ship: RV Investigator Country: Australia Start Date: 2022-04-30 End Date: [blank]
Integrated Marine Observing System Southern Ocean Times Series (IMOS-SOTS) for climate

IN2022_V01
Future Ship: RV Investigator Country: Australia Start Date: 2022-01-08 End Date: [blank]
Antarctic Bottom Water production in the past: records from marine sediments, Cape Dar

LMG 21-10
Future Ship: RV Laurence M. Gould Country: United States Start Date: 2021-09-25
Palmer Station Opening

LMG 21-05
Past Ship: RV Laurence M. Gould Country: United States Start Date: 2021-05-03 End Date: [blank]

Australian Government
Department of the Environment
Australian Antarctic Division

Expedition

Expedition name LMG 21-10

Expedition code LMG 21-10

Nation United States

Start date 2021-09-25

End date 2021-10-20

Dates are approximate No

Description Palmer Station Opening

Website link https://www.usap.gov/vesselScienceAndOperations/documents/LMG_sched.pdf

Berth availability Unknown

SOOS region West Antarctic Peninsula and Scotia Arc

Vehicle name RV Laurence M. Gould

Vehicle type Ship

Vehicle code -

Further information -

Source

Details for this expedition were provided by a member of the Southern Ocean research community. To correct or update any information in this record, please contact the SOOS data officer ([data\[at\]soos.aq](mailto:data[at]soos.aq)).
DueSouth

Details for this expedition were provided by a member of the Southern Ocean research community. To correct or update any information in this record, please contact the SOOS data officer ([data\[at\]soos.aq](mailto:data[at]soos.aq)).

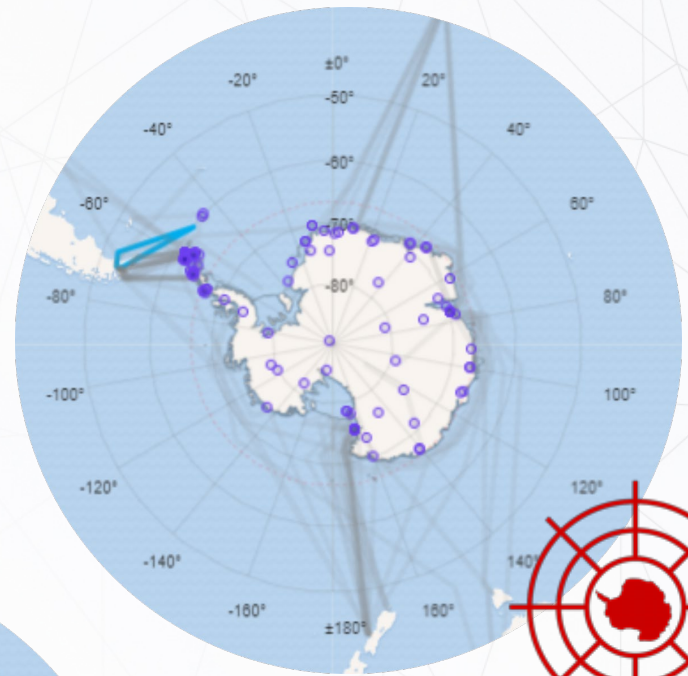
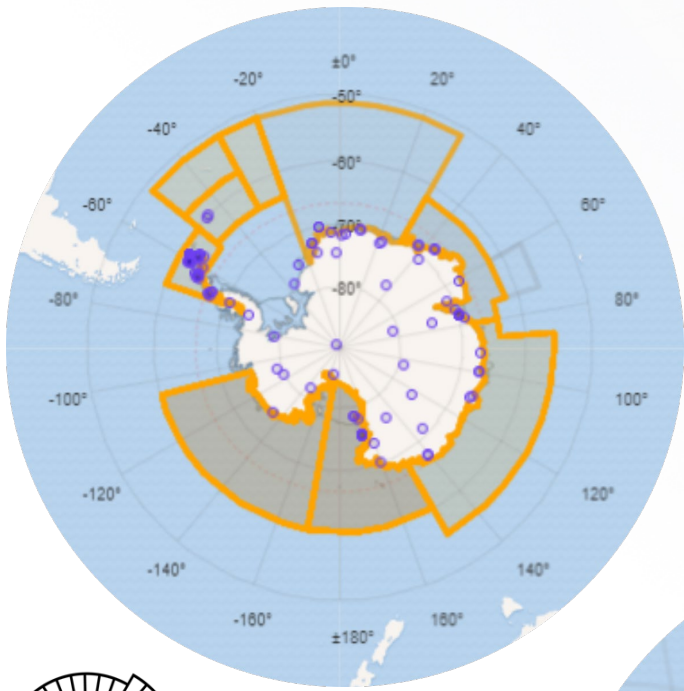
Expedition Personnel

No personnel attached to this project.

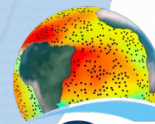
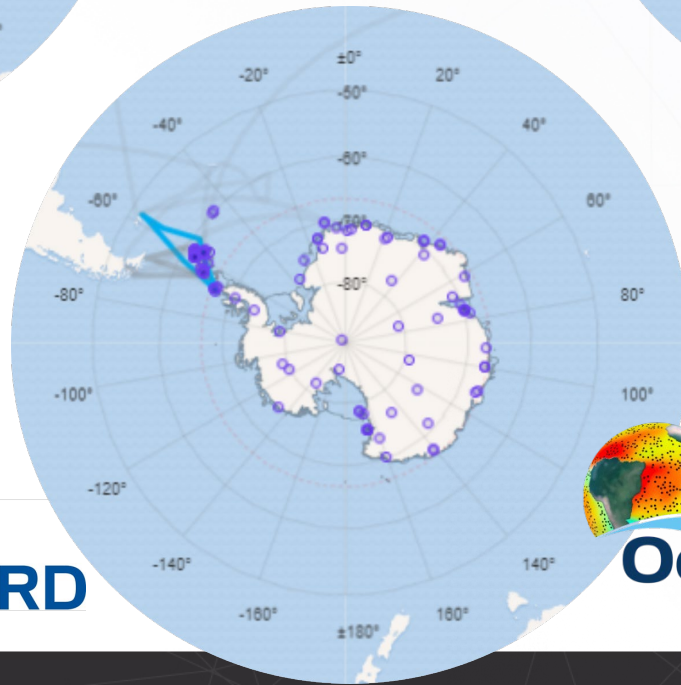


**EUROPEAN
POLAR BOARD**

<https://soos.aq/activities/duesouth>



CCAMLR



OceanOPS



EUROPEAN
POLAR BOARD



SOOS Equity, Diversity and Inclusion Group

- Ongoing initiative to ensure SOOS acts in accordance with our values in all things
- Group to play a strategic implementation and advisory role and make recommendations to the SOOS EXCOM and broader community where appropriate
- Make Southern Ocean science more welcoming
- Identifying barriers to full participation in SOOS, and acting where possible to circumvent them

Recently established (2020)

Chairs: Sarah Fawcett, Steve Diggs

SOOS & UN Decade

- Co-convened Southern Ocean regional workshop (February 2020, alongside OCEAN Sciences)
- Community input to Decade Implementation Plan
- Partner in Southern Ocean Task Force to lead and drive the Southern Ocean regional program
 - 2nd workshop joint with Polar Data Forum IV to develop Southern Ocean contribution to UN Decade 20-22 September



2021
2030 United Nations Decade
of Ocean Science
for Sustainable Development

- Active participation in Decade-related webinars/meetings

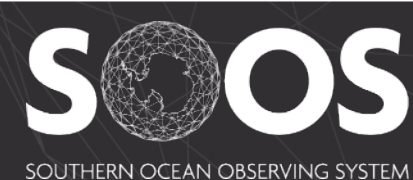


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Acknowledgements

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Antarctica
New Zealand

