



# Southern Ocean data sharing tools in a global data management community

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Pip Bricher, Steve Diggs, Joana Beja, Alicia Aleman, Mathieu Belbeoch, Taco de Bruin, Kenneth Casey, James Cusick, Bruno Danis, Florence Fetterer, Alexander Kozyr, Wu Lizong, Benjamin Pfeil, Roger Proctor, Petra Ten Hoopen, Anton Van de Putte, Peter Pulsifer



The problem: The Southern Ocean is massive!  
(beyond the capabilities of a single nation)





In order to detect and attribute changes in the Southern Ocean to their causes, and understand the impacts of these changes we need sustained, and internationally coordinated observations of the Southern Ocean

Its beyond the capability of single projects, programs, nations to address.

# But, it's all just data, right?

- In-situ observations
- Gridded interpolated datasets
- Model output
- Satellite imagery
- Standardised?
- Aggregated?
- Well documented?
- Findable?

# No science community is an island

*No man is an Iland, intire of it  
selfe; every man is a peece of  
the Continent, a part of the maine*

(John Donne, 1624)

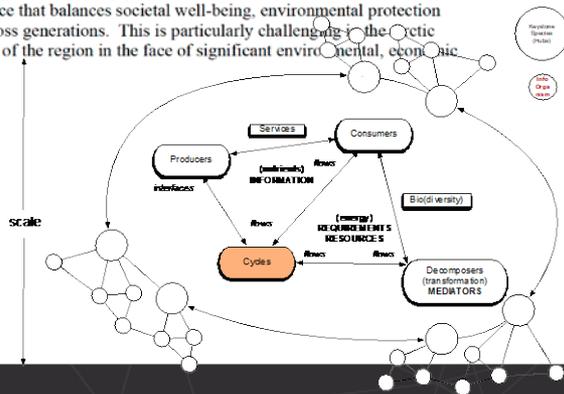
# Mapping and Understanding the Data Ecosystem

## Information Ecology to Map the Arctic Information Landscape

Peter L. Pulsifer, Yekaterina Kontar, Paul Arthur Berkman, D.R. Fraser Taylor

### 12.1 Introduction

Governance involves processes of interaction, dialogue, negotiation and decision-making among many actors involved in the development of social norms and institutions. Understanding and addressing the values, key priorities, and common interests of actors is critical to effective governance that balances societal well-being, environmental protection and economic prosperity across generations. This is particularly challenging in the Arctic region due to the complexity of the region in the face of significant environmental, economic



Arctic Data Ecosystem Map (DRAFT)

The objective of this activity is to establish a map of the arctic data management "ecosystem" or "universe". This is both a concept map indicating projects, services and relationships as well as a geographic map indicating location. The effort was started during the first meeting of the ADC in Potsdam, Germany, November 2014 and is an ongoing activity. The roadmap for this project includes establishing a linked open data end point that will allow people to query the database (i.e. using SPARQL).

In June of 2016, the concept of mapping the Arctic data ecosystem were presented by task lead, Peter Pulsifer, the second meeting of the Belmont Forum Funded Pan-Arctic Options Project, led by Professor Paul Berkman. Similar concepts were being discussed by the Pan-Arctic Options team and other initiatives under organizations such as the Research Data Alliance have recently emerged. Starting in early 2017, this activity is now being carried out using resources from and under a broader initiative led by the Pan-Arctic Options project in collaboration with a number of other polar and global cyberinfrastructure initiatives. Results will be posted here and elsewhere.



Dr. Katia Kontar

Title: Postdoctoral Fellow (Arctic Data e-Cosystem Scientist)  
 Reports To: Professor Paul Arthur Berkman and Dr. Peter Pulsifer  
 Location: Fletcher School of Law and Diplomacy, Tufts University  
 FTE: 28 Months (with possible extension)

POSTDOCTORAL FELLOW  
 Arctic Data e-Cosystem Scientist

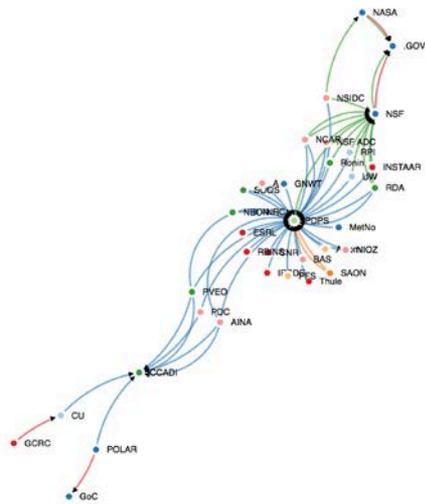
BACKGROUND OF FLETCHER SCHOOL OF LAW AND DIPLOMACY AT TUFTS UNIVERSITY

The Fletcher School is committed to educating in an inclusive and supportive environment that welcomes students regardless of national origin, religion or citizenship status. At the Fletcher School, for more than 80 years, we have tried to "break the world". Our job is to prepare our graduates to be practitioners in every dimension of international relations: economics, finance, diplomatic history, politics, culture, security and many other disciplines. The challenges we face in this turbulent 21st century quite literally transcend borders -- we must be ready to connect in every sense of the word.

We seek to build partnerships between nations, government agencies and the public/private sector in order to be ready to shape international issues and events. Our extensive network of graduates today serves in every sense in the global milieu -- heads of state and government, political leaders in power and opposition, judges, diplomats, senior military officers, corporate leaders at every level, international bankers, and development officials. The Fletcher School

# From Map to Model

- University
- Government Agency
- Coordinating Body
- Network
- Data Center
- Research Center
- Infrastructure
- Network of Networks
- member of
- is funded by
- unit Of
- linked to



```

OPTIONAL (?subject org:classification ?classification .
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?siteAddr vcard:country-name ?country .
?object org:hasPrimarySite ?site .
?site org:siteAddress ?siteAddr .
?siteAddr vcard:country-name ?country .
}
    
```

New Graph Filter Graph

- University
- Government Agency
- Coordinating Body
- Network
- Data Center
- Research Center
- Infrastructure
- Network of Networks
- member of
- is funded by
- unit Of
- linked to



```

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?siteAddr vcard:country-name ?country .
?object org:hasPrimarySite ?site .
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New Graph Filter Graph

# Polar Data Planning Summit

## Boulder, May 2018

PDPS 2018

Details  
Published: 23 August 2018

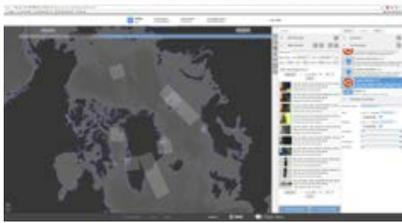
Page 3 of 6

### Registered Participants

Name	Affiliation	Country
David Arthur	Polar View	Denmark
Pip Bricher	Southern Ocean Observing System	Australia
Andreas Czforszky	British Antarctic Survey / Polar View	United Kingdom
Taco de Bruin	NIOZ Royal Netherlands Institute for Sea Research	The Netherlands
Eric Coplin	Battelle-NEON	United States
Ruth Duerr	Rorin Institute for Independent Scholarship	United States
Florence Fetterer	NSIDC	United States
Daniel Gibson	Government of Northwest Territories	Canada
Oystein Godoy	Norwegian Meteorological Institute	Norway
Sarah Inman	University of Washington	United States
Christopher Jones	National Center for Ecological Analysis and Synthesis, UC Santa Barbara	United States
Peter Kirsch	Polar Data Centre; British Antarctic Survey	United Kingdom
Christine Laney	Battelle-NEON	United States
Ellsworth LeDrew	University of Waterloo, Polar Data Catalogue	Canada
Corrado Leone	Italian National Research Council	Italy
Simona Longo	CNR	Italy
William Manley	University of Colorado, INSTAAR	United States
Heidi McCann	CIRES/NSIDC	United States
Maribeth Murray	Arctic Institute of North America, University of Calgary	Canada
Mark Parsons	Rensselaer Polytechnic Institute	United States
Peter L. Pulister	University of Colorado at Boulder	United States
Yubao QIU	Institute of Remote Sensing and Digital Earth	China
Simon Roope	Canada Centre for Mapping and Earth Observation / Natural Resources Canada	Canada
Hannele Savola	Thule Institute, University of Oulu	Finland
Serge Scory	Royal Belgian Institute of Natural Sciences	Belgium
Donna Scott	National Snow and Ice Data Center	United States
Aleksandr Smirnov	Arctic Portal	Iceland
Sandy Starkweather	NOAA-ES&R/CIRES	United States
Don Stott	National Center for Atmospheric Research	United States
Coleen Strawhacker	National Snow and Ice Data Center	United States
Shane St. Savage	Arctic Data Science (Alaska Ocean Observing System)	United States
Martien Tacoma	NIOZ Royal Netherlands Institute for Sea Research	The Netherlands
Chris Torrence	NSIDC	United States
Tanell Utta	NOAA	United States
Thomas Vindenesberget	Royal Belgian Institute of Natural Sciences	Belgium
Nacomi Whitty	Polar Field Services	United States
Ann Windrager	NOAA/NSIDC	United States
Lynn Yarmey	Research Data Alliance	United States

POPS 2018
Agenda
Participants
Use Cases
Resources
Registration, Transportation, Weather
All Pages





Polar TEP / Polar View



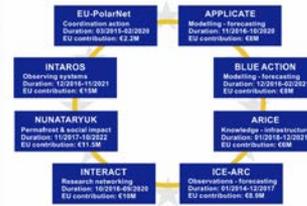
GEO(CRI)



U of the Arctic



CCADI



EU Arctic Cluster



Arctic Portal



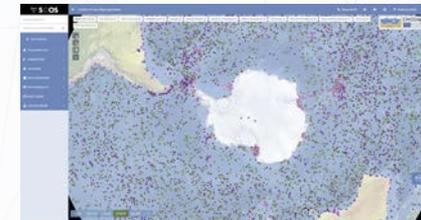
SCADM



ASDI



GCW



SOOS

# Initial Partner Organizations



# Building on Existing Work

**Sustaining Arctic Observing Network (SAON)**  
**SAON Data Management Workshop Report**  
Developing a Strategic Approach  
Prepared by Gillian B. Lachata, NOAA Arctic Research Program  
Klaus Wilson, AMAP

**Second Polar Data Forum**  
International Collaboration for Advancing Polar Data  
23-25 October 2016, Victoria, BC  
http://www.polar-data-forum.org

**REPORT OF THE POLAR CONNECTIONS INTEROPERABILITY WORKSHOP AND ASSESSMENT PROCESS**  
7-10 NOVEMBER 2016  
Editors: Peter L. Pulsifer, Julie Friddeff, Pia Richter, Robert Gledhill, Colleen Sheehy, David Arthur, Lynn Yarmey, Andrew Fleming  
[DRAFT]

**International Forum on Data Activities - Global Data Systems Communiqué**  
Recommendations & Observations Arising From the 'International Polar Data Forum'  
10-14 October 2016, Reykjavik

**High Level Requirements for the Next Generation of Observing Systems for the Polar Regions**  
Summary Report  
Prepared for: European Space Agency  
Prepared by: Polar View Earth Observations Limited

**Report on WORKSHOP ON CYBERINFRASTRUCTURE FOR POLAR SCIENCES**

**TOWARDS AN INTERNATIONAL POLAR DATA NETWORK**  
P. L. Pulsifer<sup>1</sup>, L. Yarmey<sup>2</sup>, Ø. Godøy<sup>3</sup>, J. Friddeff<sup>4</sup>, W. Manley<sup>5</sup>, A. Gaylor<sup>6</sup>, A. Hayes<sup>7</sup>, S. Nickels<sup>8</sup>, C. ...  
National Snow and Ice Data Center, University of Colorado  
80309-2449, USA  
\*Email: pulsi@nsidc.org  
<sup>1</sup>Norwegian Meteorological Institute, Henrik Mohns plass 1,  
<sup>2</sup>Canadian Cryospheric Information Network, University of Waterloo, 3G1, Canada  
<sup>3</sup>Research Data Alliance, Renesstra Polytechnic Institute, Tr  
<sup>4</sup>CEN: Centre d'Etudes Nordiques, Laval University, Quebec  
<sup>5</sup>NIOZ Royal Netherlands Institute for Sea Research, Texel, T  
<sup>6</sup>Institute of Alpine and Arctic Research, University of Colorado

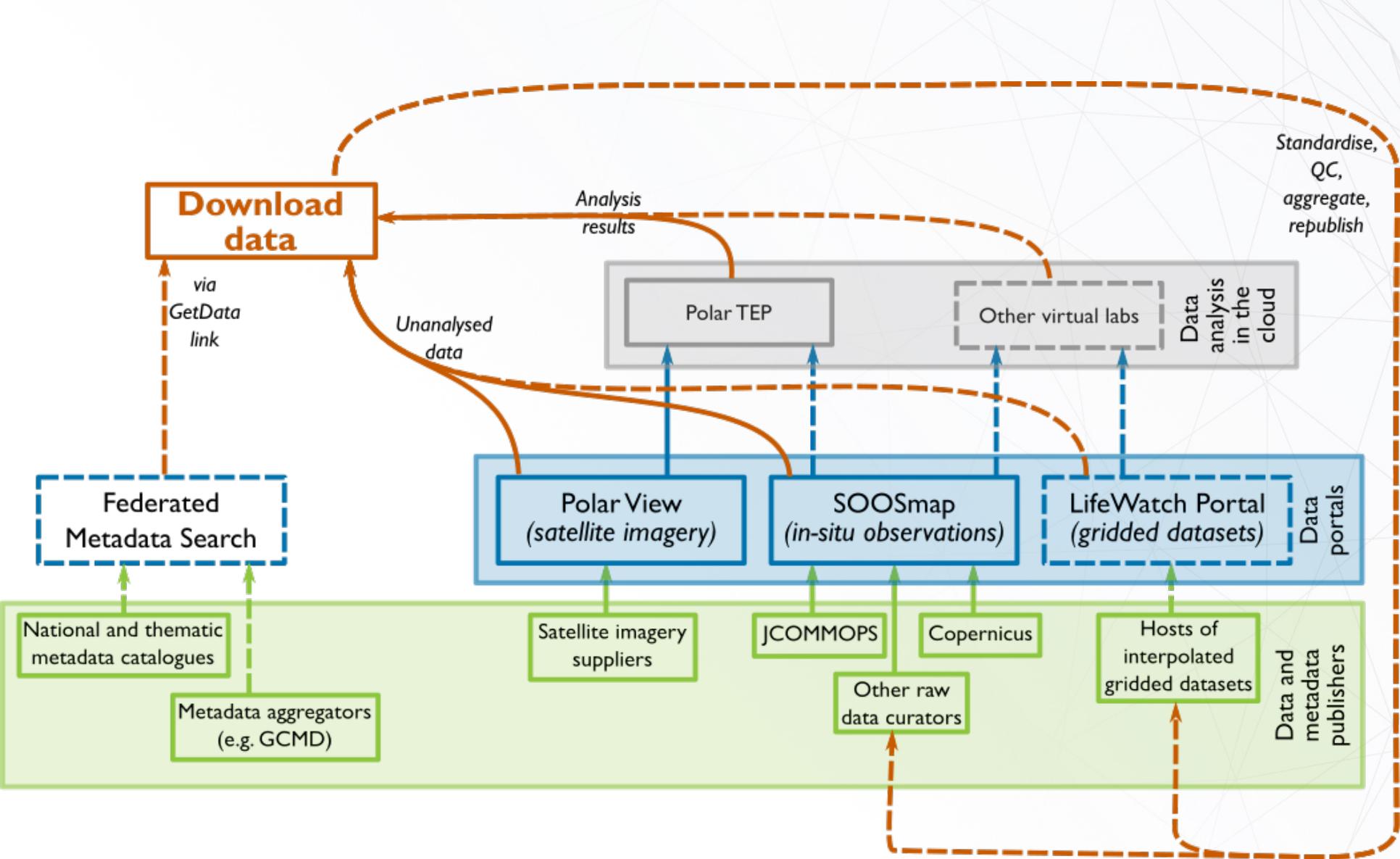
**Data Management for Arctic Observing**  
A Community White Paper  
Prepared for the Arctic Observing Summit 2013  
Peter L. Pulsifer<sup>1</sup>, Lynn Yarmey<sup>2</sup>, Øystein Godøy<sup>3</sup>, Julie Friddeff<sup>4</sup>, Warwick F. Vincent<sup>5</sup>, Taco DeBruijn<sup>6</sup>, Mark A. Parsons<sup>1</sup>

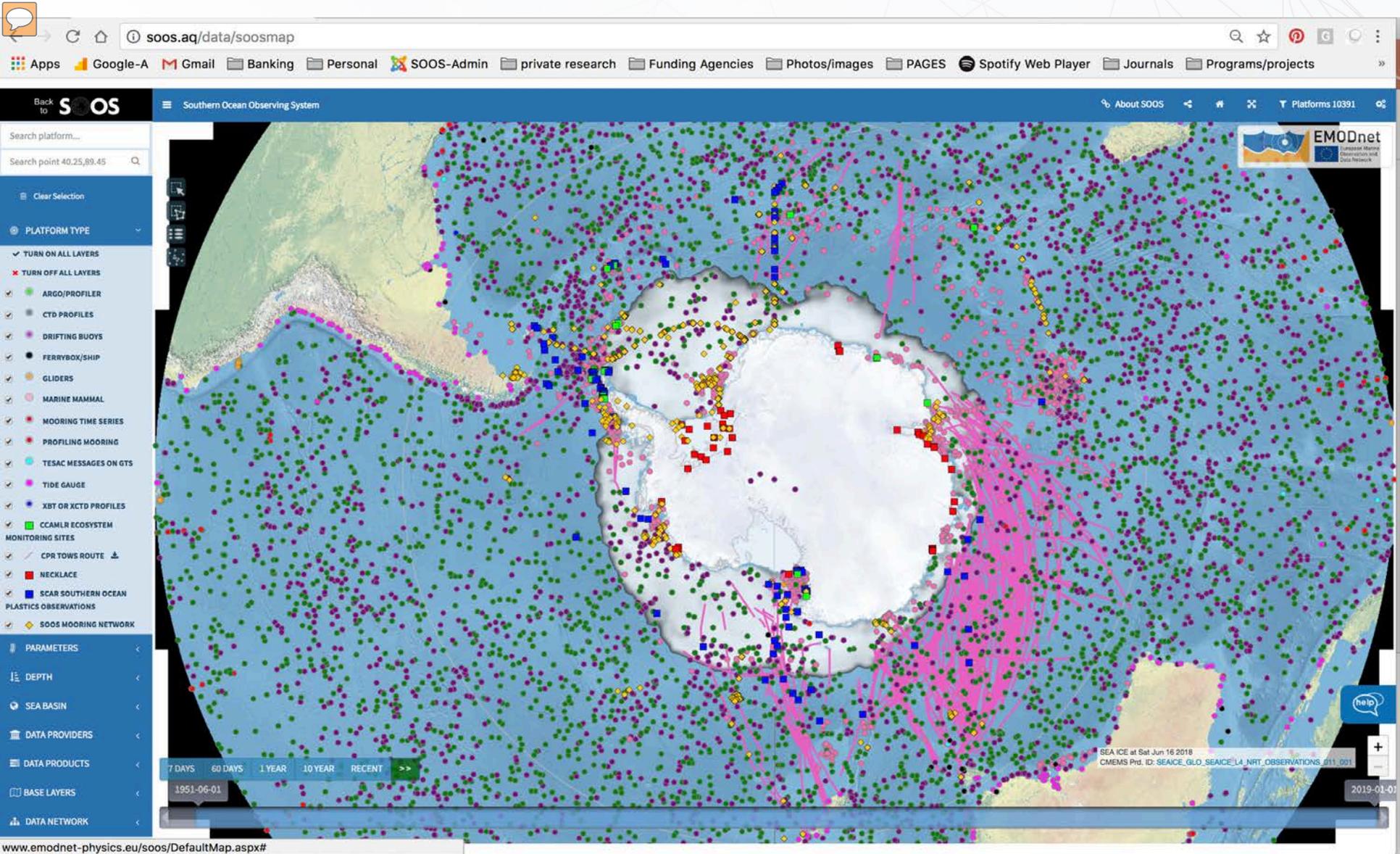
**Workshop on Arctic Data Coordination at IPY 2012, Montreal**  
A workshop to begin to design an Arctic Data Coordination Network will be held at IPY 2012, Montreal, Friday 07 April, 1300-1700, Room 9143  
Further Network (ISCO) under the auspices of SAON, IASC, and the Arctic Council Research Coordination Network to make this as possible. The idea is to use the one framework. A short report will be prepared and submitted to the SAON Board, IASC.

**Statement of Principles and Practices for Arctic Data Management**  
April 16, 2013  
All IASC-endorsed scientific results shall be verifiable and reproducible through ethically open access to all data necessary to produce those results. Data shall be preserved, accessible, and used in accordance with scientific norms of fair attribution and use.  
To this end, IASC Council approves the following actions:  
1. Endorsement of the Statement of Principles and Practices for Arctic Data

**EU-PolarNet**  
WP3  
**D3.8 White paper on European polar data accessibility**  
EU-PolarNet retreat







SOOS

SOOSmap

Development in collaboration with EMODnet Physics

## PLATFORM TYPE

- ARGO/PROFILER
- CTD PROFILES
- DRIFTING BUOYS
- FERRYBOX/SHIP
- GLIDERS
- MARINE MAMMAL
- MOORING TIME SERIES
- PROFILING MOORING
- TIDE GAUGE
- XBT OR XCTD PROFILES
- SOOS MOORING NETWORK
- NECKLACE
- CPR TOWS ROUTE 

## PARAMETERS

- W** WAVES
- T** WATER TEMPERATURE
- S** WATER SALINITY
- C** CURRENTS
- H** OPTICAL PROPERTIES
- L** SEA LEVEL
- A** ATMOSPHERIC
- C** WATER CONDUCTIVITY/  
BIOGEOCHEMICAL
- W** WINDS
- R** RIVER
-  UNDER WATER NOISE

## BASE LAYERS

- CCAMLR AREAS, SUBAREAS, AND DIVISIONS
- MARINE PROTECTED AREAS (MPAS)
- RESEARCH BLOCKS
-  RESEARCH FACILITIES
- SEA ICE CONCENTRATION
- SEA SURFACE TEMPERATURE

## DATA NETWORK

- SHIP BASED OBSERVATION NETWORKS
- AUTONOMOUS OBSERVING NETWORKS
- COASTAL OBSERVING SYSTEMS
- INTEGRATORS

6901849

Type argo/profiler

Data provider OGS - Istituto Nazionale di Oceanografia e di Geofisica Sperimentale - Divisione di Oceanografia - Italy

Lat/Lon -63.621 -114.098 Country IT

Last data measured 2016/11/08 07:41:05

Water salinity, Water Temperature

Data type LATEST, MONTHLY, HISTORY

Data range 2014 - 2016



PLATFORM CODE  
6901849

WMO CODE  
6901849

INSTITUTION  
OGS - Istituto Nazionale di Oceanografia e di Geofisica Sperimentale - Divisione di Oceanografia - Italy

ASSEMBLY CENTER  
GLOBAL DAC (Coriolis)

TYPE  
argo/profiler

PRINCIPAL INVESTIGATOR  
Pierre-Marie POULAIN

CMEMS - PROD ID  
INSITU\_GLO\_NRT\_OBSERVATIONS\_013\_030

DATA QUALITY REFERENCES

Argo DOI  
Argo GDAC  
Argo Data Guide

7 Days | 60 Days | Older data

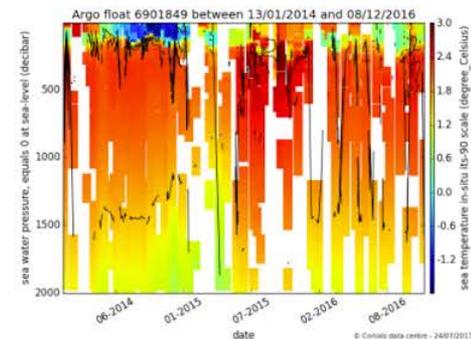
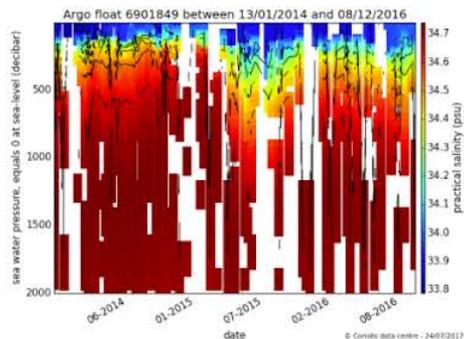


No data available for PSAL-TEMP last 60 days

plots are a Runtime undersampled view of the dataset. to see full details open the "preview"

quick download(60 days): select data format and go

[NetCDF](#) | [CSV](#) | [Download](#) | [Preview](#)





# DUE SOUTH

DATABASE OF UPCOMING EXPEDITIONS  
TO THE SOUTHERN OCEAN



This database allows you to share plans for upcoming Southern Ocean and Antarctic research projects. It will help you to find collaborators and coordinate your field plans. The database holds multi-disciplinary, multi-national information about planned projects. Use it to find out who is working near you in the upcoming field season, or who is working on similar problems in other parts of the Southern Ocean. Upload your field plans to help potential collaborators find you.

 Create Expedition

 Create Project

 Search Expeditions

 Search Projects

# DUE SOUTH

OUTLINE OF UPCOMING EXPEDITIONS TO THE SOUTHERN OCEAN

## Expedition Search

Clear filters

Hide past Expeditions

Free Text

Nation

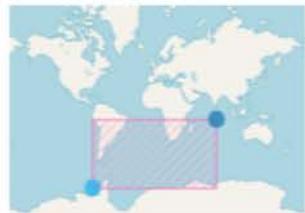
Vehicle Type

SOOS Region

Date Start

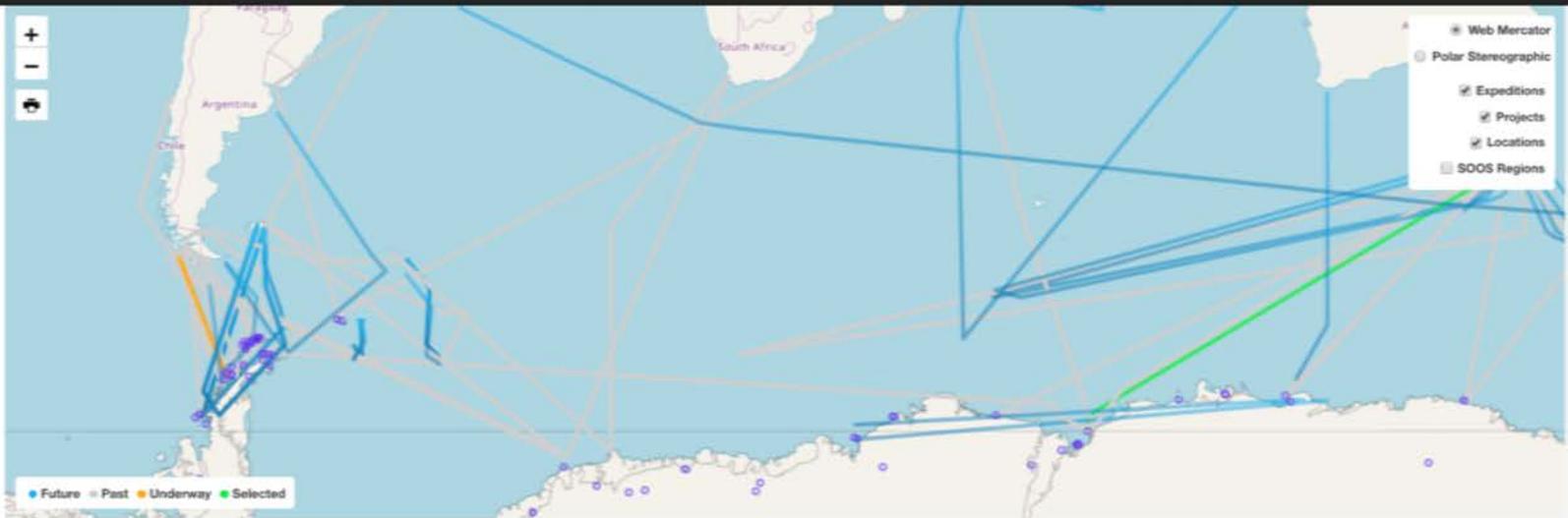
Date End

Spatial (Bounding Box)



Lat  Lng

Lng  Lat



11	JR17001	RRS James Clark Ross	Ship	0	2017-11-21	2017-12-16	United Kingdom
12	SR1b repeat hydrography 2019/2020	RRS James Clark Ross	Ship	0	2019-11-01	2019-12-01	United Kingdom
13	SR1b repeat hydrography 2020/2021	RRS Sir David Attenborough	Ship	0	2020-11-01	2020-12-01	United Kingdom
14	A23 repeat hydrography section	RRS James Clark Ross	Ship	0	2018-01-20	2018-02-11	United Kingdom
15	A23 repeat hydrography section 2018/19	RRS James Clark Ross	Ship	0	2019-01-01	2019-05-01	United Kingdom
16	A23 repeat hydrography section 2019/20	RRS James Clark Ross	Ship	0	2020-01-01	2020-05-01	United Kingdom
17	A23 repeat hydrography section 2020/21	RRS Sir David Attenborough	Ship	0	2021-01-01	2021-05-01	United Kingdom
18	Orkney Passage moorings 2018/19	RRS James Clark Ross	Ship	0	2019-01-01	2019-05-01	United Kingdom
19	Orkney Passage moorings 2020/21	RRS Sir David Attenborough	Ship	0	2021-01-01	2021-05-01	United Kingdom
20	V1 2017/18	Aurora Australis	Ship	0	2017-10-25	2017-12-06	Australia
21	LMG17-06 (XBT)	Laurence M. Gould	Ship	0	2017-06-30	2017-07-24	United States
22	Tangaora Antarctic Voyage 2018	Tangaora	Ship	0	2018-02-01	2018-03-31	New Zealand
23	Tangaora Antarctic Voyage 2019	Tangaora	Ship	0	2019-01-01	2019-02-28	New Zealand
24	IDEAL Beagle Channel 2017	FORREST	Ship	1	2017-07-17	2017-07-28	Chile

Data management: The bit of science  
where copying each other is actually a  
good thing to do.....

(with permission, of course!)



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& ECOSYSTEMS CRC



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# ARCTIC DATA COMMITTEE

