Year of Polar Prediction in the Southern Hemisphere (YOPP-SH)- Update

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YOPP-SH Task Team

WEATHER CLIMATE WATER
TEMPS CLIMAT EAU

WMO OMM
World Meteorological Organization
Organisation météorologique mondiale

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YOPP-SH in Detail

- Coordination Committee consists of representatives from Argentina, Australia, Brazil, Chile, China, Germany, Italy, Japan, New Zealand, Russia, UK, USA, SOOS, SORP.
- SOP: November 16, 2018-February 15, 2019 **Completed**
- YOPP-SH meeting #4: Charleston, South Carolina, June 27-28, 2019.
- Website: http://polarmet.osu.edu/YOPP-SH/

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Observational Contributions to YOPP-SH SOP

- Additional radiosondes
- Ship observations from the Southern Ocean
- Drifting buoy deployments in the Southern Ocean
- Ocean Observatories Buoy at 55S, 90W (west of Drake Passage) will continue through YOPP-SH SOP.

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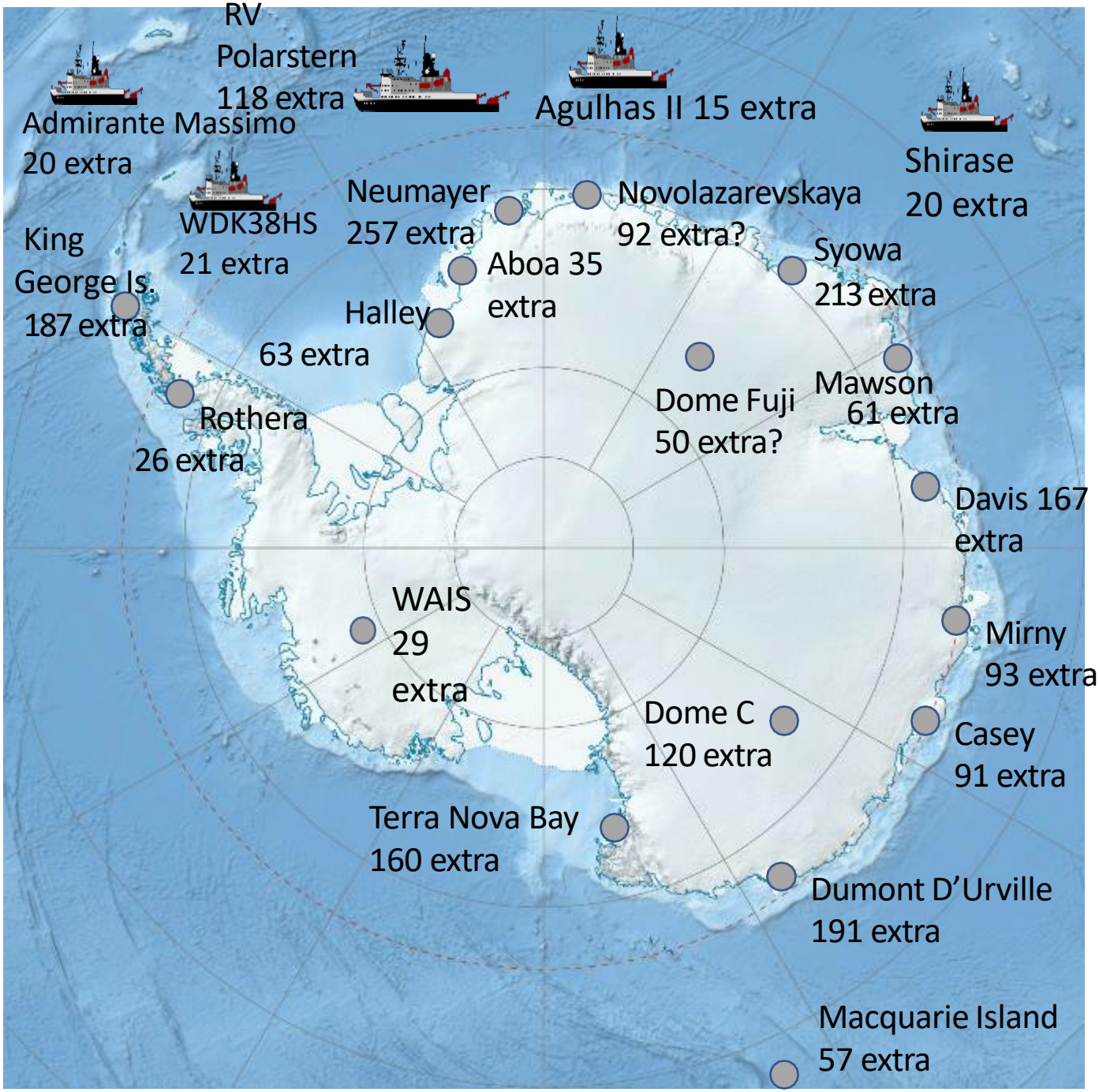
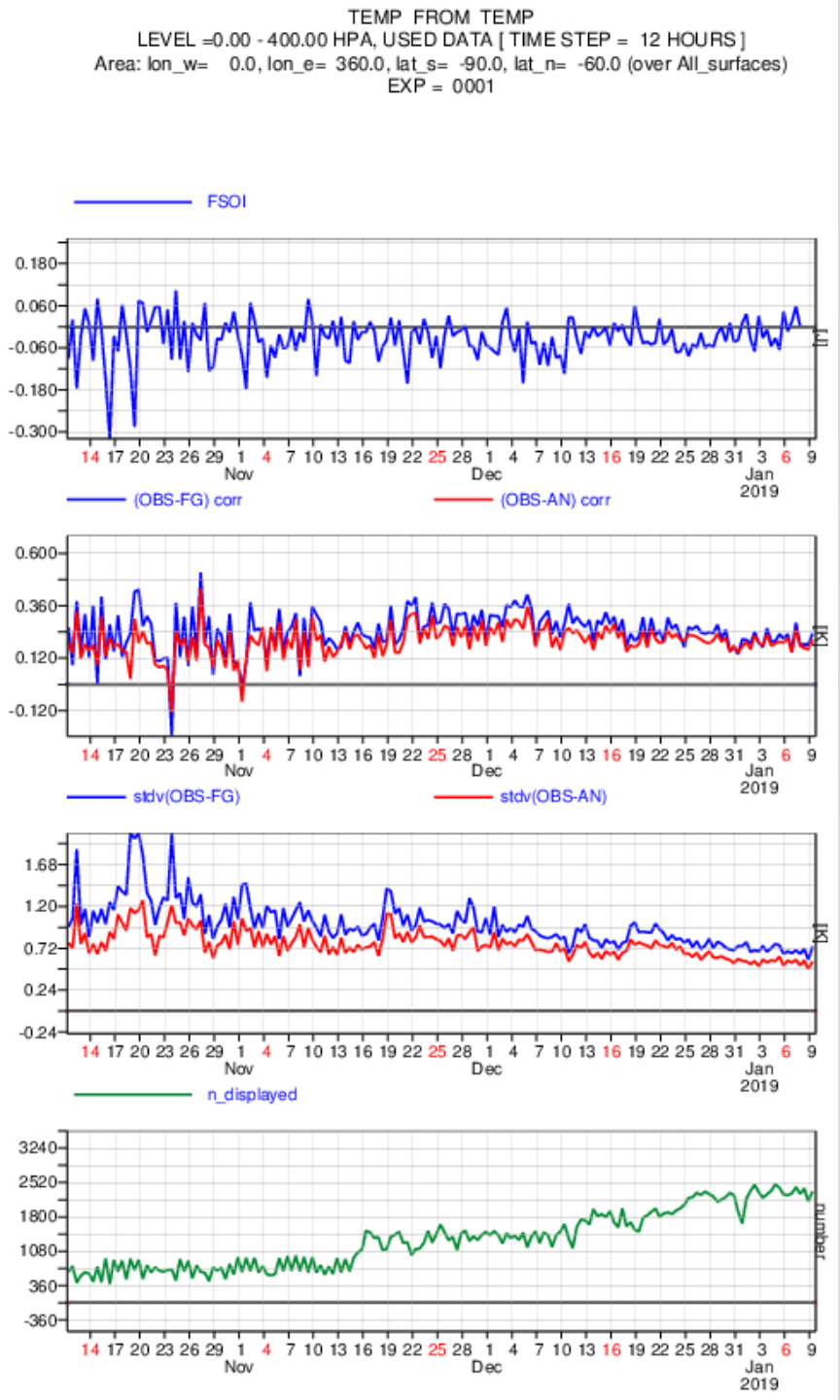
1944 (confirmed Steve Colwell, 2086 possible) extra radiosonde launches during YOPP-SH Special Observing Period



ECMWF Observation Monitoring for South Polar Region (60S to 90S)

https://www.ecmwf.int/en/forecasts/charts/obstat/temp__hist_0001_plot_o_hist_temp?facets=Experiment,Operational%3BParameter,Temperature&time=2019011000&Datatype=RADIOSONDES&Layer=0-400hPa&Area=South%20Polar



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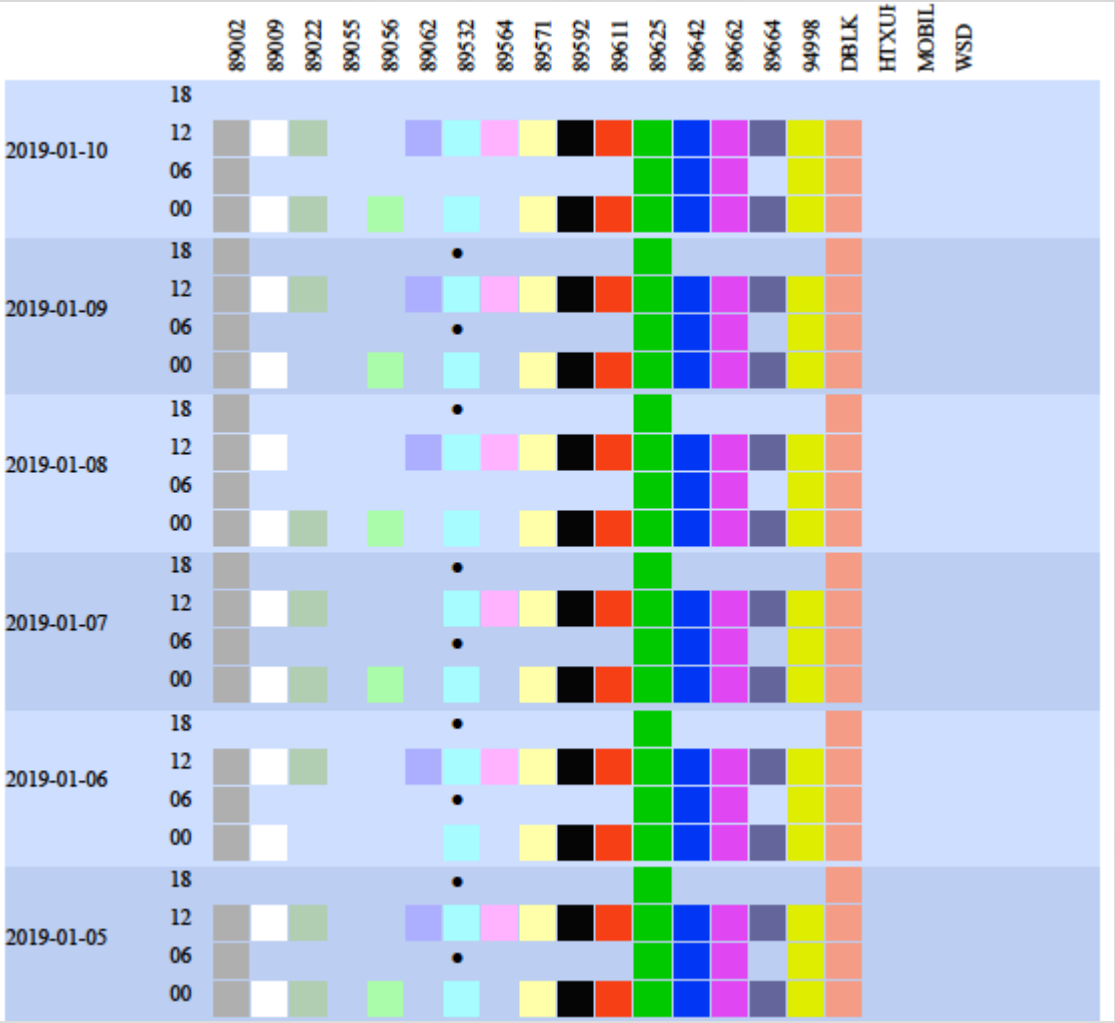
Antarctic RAOB reports in NCEP PREPBUFR files

Enhanced radiosonde releases from most Antarctic upper air stations that are on the Global Telecommunications System (GTS) as monitored by the AMPS Team at NCAR (K. Manning, UCAR)

http://www2.mmm.ucar.edu/rt/amps/status/prepbufr_raob_accounting.html



89002 : 200 : NEUMAYER / GERMANY STTN
89009 : 110 : AMUNDSEN-SCOTT / U.S.A. STTN
89022 : 048 : HALLEY / U. KINGDOM STTN
89055 : 004 : BASE MARAMBIO(CENTRO MET. ANTARTICO) / A
89056 : 041 : CENTRO MET. ANTARTICO PDTE. EDUARDO FREI
89062 : 053 : ROTHERA POINT / U. KINGDOM STTN
89532 : 104 : SYOWA / JAPAN STTN
89564 : 056 : MAWSON / AUSTRALIA STTN
89571 : 112 : DAVIS / AUSTRALIA STTN
89592 : 114 : MIRNYJ / RUSSIAN FEDERATION STTN
89611 : 114 : CASEY / AUSTRALIA STTN
89625 : 130 : CONCORDIA / ITALY STTN
89642 : 164 : DUMONT D'URVILLE / FRANCE STTN
89662 : 158 : BASE BAIA TERRA NOVA / ITALY STTN
89664 : 114 : MCMURDO / U.S.A. STTN
94998 : 171 : MACQUARIE ISLAND / AUSTRALIA (ADDITIONAL
DBLK : 069 : Polarstern
HTXUH4H : 001 : HTXUH4H
MOBIL : 000 : mobile
WSD : 006 : WAIS DIVIDE

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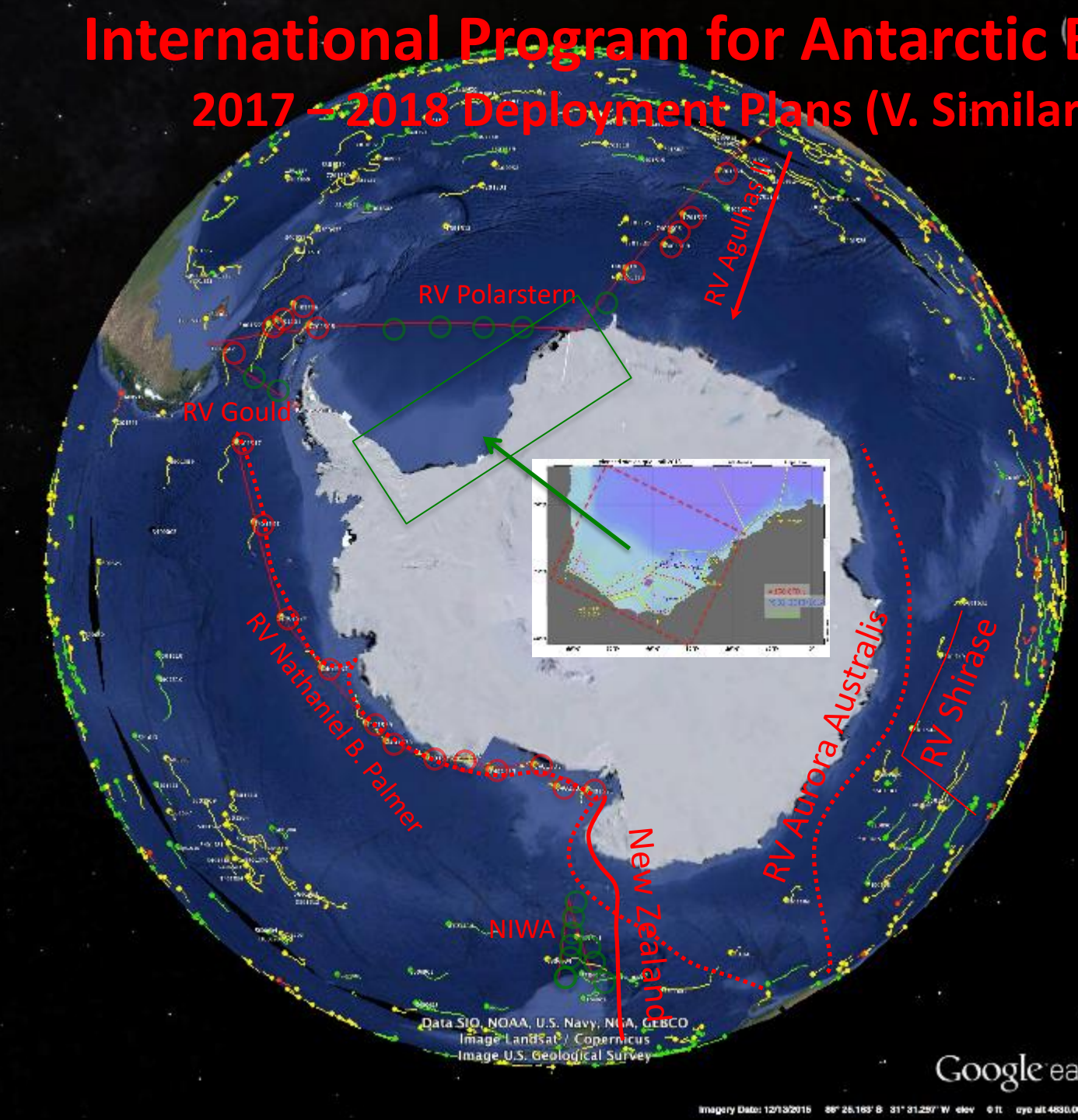
International Program for Antarctic Buoys (IPAB)

2017 – 2018 Deployment Plans (V. Similar for 18-19)



RV Gould (US)

- 24 SVP-B, 2/month (USIPAB)

RV Shirase (December 2017, Australia)

- 6 SVP-B (BOM/AU)
- 4 SVP-B (GDP/USIABP)

RV Nathaniel B. Palmer (December, US)

- 20 SVP-B (USIPAB) on leg from PA to MCM, to Hobart.
- 20 SVP-B (USIABP) on S4P and P16 on the shelf.

RV Polarstern (January, Germany)

- 10 SVP-B (USIPAB)
- 2 IMB, 2 Snow, and 3 SVP-B (AWI)
- 7 SVP (Petra Heil)

NIWA (New Zealand)

- 10 SVP-B (USIPAB)
- 10 SVP-B (USIPAB)

BOM (Australia)

- **2 Ice Beacons near Heard Island, and 2 drifters.**

RV Agulhas II (SAWS)

- N SVP-Bs (USIPAB)

RV Aurora Australis (Australia)

- N SVP-Bs (USIPAB)

From Ignatius Rigor, UW

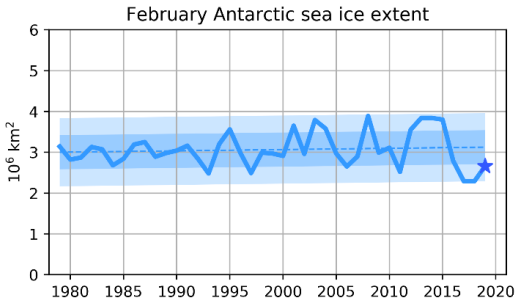
Coordinating Seasonal Predictions of Sea Ice in the Southern Ocean for 2017-2019

Scientific Question

How well do current prediction systems forecast the seasonal evolution of circumpolar and regional Antarctic sea ice conditions?

Implementation

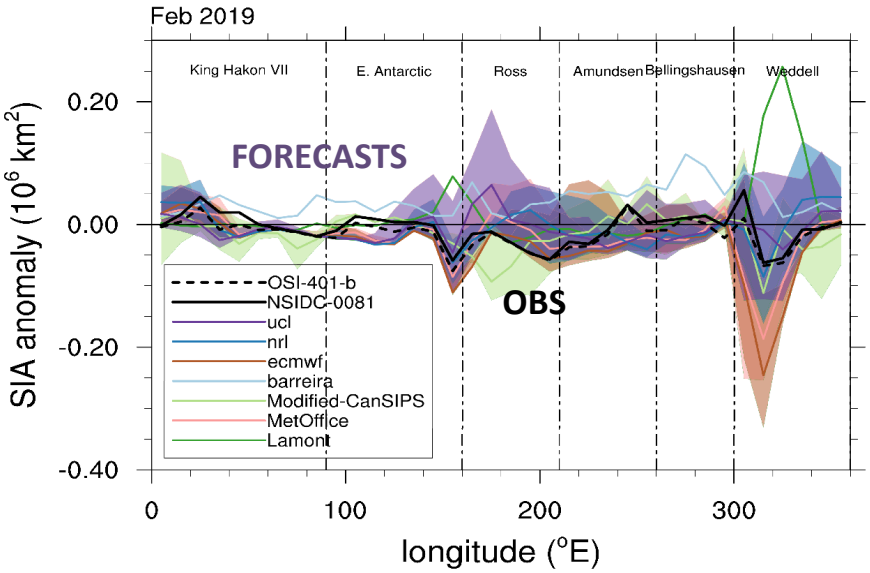
- Focal point for Antarctic sea ice outlooks
- Forum for community and hub for discussions
- Support of the YOPP-SH Special Observing Period



Summer sea ice extent variability has increased in recent years, and 2019 (*) is above 2018 low.

A call for contributions for February forecasts was sent in November 2018. A total of **12 groups** contributed **198 forecasts**. These were compared against **two observational data sets.**

Anomaly of February 2019 mean sea ice area (anomaly w.r.t 1979-2014 obs climatology) by longitude



Predicting the **sea ice anomalies in the embayments** proved to be **challenging**.

More information? Feedback?

Real-time Numerical Weather Prediction

- **Antarctic Mesoscale Prediction System (AMPS, USA)**: Regional, dedicated NWP for Antarctica at 8 km, finest grid in western Ross Sea and Ross Ice Shelf at 0.9 km. Runs at 00 and 12 UTC for various durations. Global open access via AMPS webpage. All forecasts archived.
  http://www2.mmm.ucar.edu/rt/amps/
- **European Centre for Medium-Range Weather Forecasts (ECMWF)**: operational global ensemble forecasts. 18 km coupled forecasts to 15 days. Process tendencies archived for 2-day forecasts. Output at Supersites archived also. Global open access via their YOPP webpage. “Virtual Field Campaign”. https://apps.ecmwf.int/datasets/

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New Real-time/Near Real-time NWP

- **India –** has been running Polar WRF for sometime in support of their logistical operations at Maitri and Bharati stations. http://nwp.imd.gov.in/maitri.php# Short Range Forecast/WRF Polar.
- **China - real-time by NMEFC**: Polar WRF runs for various Antarctic domains for logistical resupply. Open Access (http://47.93.39.48:88/Polar.html).
- **Chile–** Real-time started November 2018: Polar WRF runs for the Antarctic Peninsula. Open access available on the Direccion Meteorologica de Chile website. See PRODUCTOS ANTÁRTICA http://archivos.meteochile.gob.cl/portaldmc/wrf/modelo_atmosferico.php
- **MeteoFrance – near-real-time**: Arpege stretched global grid centered over Antarctica. Limited runs with AROME. Real-time access?.
- **Korea**: Polar WRF runs for the King George Island, Antarctic Peninsula region. Case study only so far. Access?

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Supersite Output

MeteoFrance (ftp site: ftp.umr-cnrm.fr)

YOPP-SH : 16 Nov 2018-16 Feb 2019. (cd YOPP-SH)

◦ Output from a specific global model ARPEGE configuration: **ARPEGE-SH**. It is the operational configuration and version used over France but with the high resolution at Dome-C (7.5km) instead over France.

◦ 21 sites are available in 2 NetCdf formats.

◦ The forecasts length for 00UTC and 12UTC are 10 days and 5 days respectively, however the output at the supersites are only up to 78h.

◦ In addition: two AROME configurations at 1.3km might have been provided: one around Dumont D'Urville and one for the Alexander Tower and McMurdo. Details?

AMPS: Output archived at NCAR but will take some effort to turn this into user friendly format. The data set is large.

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Observing System Experiments (OSEs)

Applying the SOP Observations to Improve Real-time Antarctic NWP

- The US National Science Foundation funded a project to evaluate the impact of the Special Observing Period observations on AMPS forecasts. This is being done by two data assimilation techniques in order to see which results in the greatest forecast improvement. The project will have a lasting value for AMPS and the PPP/YOPP community with implementation of an advanced Data Assimilation approach.
- Japan and France are developing/have developed plans for their own OSEs.

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Education and Outreach Activities

CAPIRE-YOPP. Italian effort. November 2018-June 2019. Led by Vito Vitale.

4 soundings/day from Dome Concordia for Jan. 1-15, 2019. Field data collection related to activities with several intermediate and high schools in the Milan metropolitan area. 17 school classes and about 400 students explored polar meteorology and climate. Activities included in-depth events, seminars, lessons and visit(s) to operational meteorological centres. High school students also involved in performing data analysis and presenting results.

Antarctic Weather Forecasting Project at Ohio State University, January 7-18, 2019. Led by D. Bromwich

Undergraduate students (~12) in the Synoptic Meteorology class (Geography 5942) forecasted the maximum and minimum temperatures and daily average wind speed for South Pole and McMurdo stations. Forecasts were entered online and graded according to the closeness to actual conditions.
http://polarmet.osu.edu/class/geog5942_2019/ant_forecast.php

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Radiosonde release from Dome Concordia
at start of expanded observing program

The YOPP Consolidation Phase – Elements

Consolidating YOPP research

From research to operations and services

YOPP coordination

Communication and outreach

Creating a YOPP legacy

Determining success

Consolidation Phase Activities for YOPP-SH

Early overview paper on YOPP-SH for BAMS.

Winter 2021 SOP? Decide this before BAMS proposal finalized.

To facilitate the transition of science into services during YOPP, a Special Services Period has been proposed by Scott Carpentier (Thursday afternoon presentation)

Continuation and coordination of data denial experiments. Identify improvements to the observing system. Enhance operational NWP systems.

Conferences and special journal issues devoted to research results.

Recent Communication from Phil Reid on Possible Australian Contributions:

We can contribute to data-denial analysis based on the SH-YOPP period(s) and enhanced observations.

Appointing a polar-specific atmospheric modeller to work on a nested high-resolution model covering the greater Antarctic region. This would give us an outlet to implement appropriate findings from YOPP and other polar-specific models.

Examine the use of high-latitude satellite data assimilated into ACCESS-G.

Support the SCAR/COMNAP conference to be held in Hobart in August 2020, along with proposing to hold a PPP/YOPP meeting here around that time.

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Topic for Final Decision

A Winter SOP During 2021

Pros:

General community enthusiasm for such a SOP that features the meteorologically active early to core winter period. Emphasizing physical oceanography this SOP – there is a compelling scientific case to focus on the fall freeze-up period, mid-April to mid-July.

Questions:

A key issue is whether enough additional observations will be available to make a meaningful forecast impact. One islikely strategy to emphasize the Ross Sea region. Three stations in that vicinity may be able to launch additional radiosonde balloons. Very few additional oceanographic observations at this time. Data denial experiments are uncertain and would have to be developed.

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BAMS on YOPP-SH -- Outline

Intro. Fit with YOPP as a whole. Kirstin and Dave B.

Special Observing Period. Dave B. and Kirstin.
Radiosondes and drifting buoys. Could have one or more nice pictures of balloon releases.

Supersites Barbara Casati.

NWP Performance:
Canadian global model - **Barbara Casati**.
French - **Eric Bazile**.
AMPS – **AMPS Team**. Need to have a targeted goal.

Observing System Experiments
Preliminary results from AMPS. Probably not until August 2019 time frame. **AMPS Team**.
Japanese results. **Jun Inoue**

Education and Outreach
Feature the Italian effort. Some nice pictures are a possibility. Exploit material already prepared for the Newsletter. **Vito Vitale**.
Effort at OSU. **Dave B**.

BAMS on YOPP-SH – Outline (Continued)

The Future:

YOPP Consolidation Phase.
Second SOP, April -July 2021.
Special Services Period, 20-21 austral summer. **Scott Carpentier-Daniela Liggett**
More OSEs.
Better NWP. Enhanced DA, better physics, in AMPS.
Pass benefits to operational centers?
Coupled model forecasting performance?
Beyond YOPP.