

**Online discussions about the Year of Polar Prediction in the Southern Hemisphere (YOPP-SH)**  
**#1: Thursday October 27, 2016 3-5 pm EDT and #2: Tuesday November 1, 2016, 9-11 am EDT via Zoom.**  
**Website: <http://polarmet.osu.edu/YOPP-SH/>. Summary by D. Bromwich.**

Present: #1 :David Bromwich, John Fyfe, Helge Goessling, Greg McFarquhar, Matthew Lazzara, Matthew Mazloff and Jordan Powers. #2: Jenny Baeseman, Tom Bracegirdle, David Bromwich, Steve Colwell, Gert Koenig-Langlo, Tom Lachlan-Cope, Tom Bracegirdle, Sang-Jong Park, Kevin Speer, Lynne Talley, Vito Vitale, Zhaomin Wang, and Kirstin Werner.

***Input from the International Coordination Office (ICO) for the Polar Prediction Project/YOPP - Helge Goessling (Head of ICO) and Kirstin Werner.***

See **Appendix 1** for Current Special Observing Periods for YOPP and Current YOPP-Endorsed Projects and Initiatives.

Core phase of YOPP is mid 2017-mid 2019. YOPP Newsletter has been launched and needs contributions. Contact Kirstin Werner ([kirstin.werner@awi.de](mailto:kirstin.werner@awi.de)). Email list for YOPP is also available for use – contact Kirstin.

The Special Observing Period for YOPP-SH was agreed to be November 16, 2018-February 15, 2019; a short test period beforehand was suggested by Sang-Jong Park. This SOP is a period of enhanced routine observations, like radiosonde ascents. A letter needs to be sent very soon to the Permanent Representatives to WMO to alert them to YOPP and the Special Observing Periods, in particular, and to encourage their nations to actively participate. **Hard commitments for the SOP are needed now. Appendix 2 contains a list of known intentions.**

Drifting buoy coverage for the Special Observing Period was discussed and so far no concrete actions have been decided. Surface pressure observations from the Southern Ocean are extremely valuable for operational numerical weather prediction so this is an important area for contributions. The YOPP Task Team on Buoys needs Southern Hemisphere representative(s). International Arctic Buoy Programme (IABP) and International Programme for Antarctic Buoys (IPAB) (IABP/IPAB) is YOPP endorsed.

Important Meetings coming up:

**International Steering Group for PPP/YOPP meeting February 27-March 1, 2017** at the NOAA NCEP facility at the University of Maryland, College Park, Maryland, USA. It was agreed that this meeting is a perfect setting for the Southern Ocean oceanographic community to explore their role in YOPP and how they can contribute to coupled prediction.

World Meteorological Organizations Executive Council Panel of Experts on Polar and High Mountain Observations, Research and Services (**EC-PHORS**) **meeting in Ushuaia, Argentina in March 21-24, 2017.** This is the umbrella group for YOPP, and the status of YOPP-SH needs to be communicated to this group. Steve Colwell is planning to attend.

**Formal launch of YOPP** in conjunction with Executive Council Meeting at WMO Headquarters in Geneva, Switzerland, May 2017. Will be a short activity featuring the WMO President David Grimes.

**Next meeting on YOPP-SH** in conjunction with the next Antarctic Meteorological Observation Modeling and Forecasting Workshop (AMOMFW, now called the Antarctic Meteorology and Climate or AMC

workshop) on Wednesday afternoon June 28, 2017 and the morning of June 29 at NCAR Foothills Laboratory Auditorium in Boulder, Colorado, USA. The AMC announcement will soon be circulated to Climlist, ArcticInfo, Answer, Cryolist, IAMAS-IUGG, and the Antarctic weather and climate community through the University of Wisconsin-Madison.

***SOCRATES, MARCUS, and MICRE field campaigns over the Southern Ocean in the 2017-2019 YOPP time frame. Greg McFarquhar.***

These are comprehensive measurement campaigns to investigate cloud-aerosol-radiation interactions using ships, aircraft, fixed sites, models of various types, and remote sensing products. Greg McFarquhar has provided a summary that is attached as **Appendix 3**.

***Southern Ocean Regional Panel (SORP) and the Southern Ocean Observing System (SOOS) – Matthew Mazloff, John Fyfe, Lynne Talley, and Kevin Speer.***

SORP emphasizes research questions and SOOS emphasizes the oceanographic observations to be collected. They communicate regularly and have complementary activities. Both groups coordinate and facilitate.

The role of the Southern Ocean oceanographic community in YOPP is not yet defined. The International Steering Group meeting at NCEP in Maryland would be a great opportunity to start an in-depth formulation. Perhaps the key question to be addressed is how the predictable ocean behavior out to 2 months projects onto the behavior of the atmosphere, i.e., how coupled numerical weather prediction over the Southern Ocean could be enhanced. It was agreed that a good place to start is to update the following document, outlining relevant research projects, as a result of subsequent developments:

Newman, L., L. Talley, M. Mazloff, B. Galton-Fenzi, S. Ackley, P. Heimbach, F. Massonnet, J. Shi, and M. Sparrow, 2015: Southern Ocean community comment on the Year of Polar Prediction Implementation Plan. *SOOS Report Series #2*.

From Francois Massonnet: I'm preparing with Phil Reid a proposal to get a SIPN-South activity started (Sea Ice Prediction in the Southern Ocean), targeting February 2019. We'll launch the endorsement process in November, hopefully. We have already talked about SIPN leaders and they are quite enthusiastic about the idea.

From Louise Newman: Also, I was interested to see the slide that Helge sent through of YOPP-endorsed projects. I think there are at least a few other large-scale programs that could contribute to the SOP...even if they are not endorsed by YOPP. The Japanese ROBOTICA project and UK ORCHESTRA program come to mind. I think they both flagged that they would be interested to contribute to YOPP but might need a prod to remind them. I know that Steve Ackley was also keen for his PIPERS project to contribute, but perhaps because it falls outside of the 3-month time window it is no longer relevant?

During the Tuesday Nov. 1 Zoom session, the following items were discussed:

- Ship cruises during the YOPP-SH and especially during the Special Observing Period need to be identified. SOOS does have a database on ships.
- Now is the time to identify needed oceanographic observations. Instrumentation needs to be deployed in 2017-2018 austral summer to contribute to the Special Observing Period in 2018-

2019. Argo floats in the sea ice zone and tethered ice profilers were discussed as possible measurement approaches although no definitive conclusions were reached.

- A recommended suite of oceanographic observations for YOPP-SH Special Observing Period is needed. This is a task for SORP and SOOS.
- Oceanographic research projects taking place during the YOPP-SH and especially during the Special Observing Period need to be identified. Updating of the Newman et al. publication will accomplish this task. Endorsement by YOPP of oceanographic projects will help the coordination. Orchestra and Roses efforts were mentioned.
- Plans for drifting buoys in the Southern Ocean during the YOPP-SH and especially during the Special Observing Period need to be identified.
- Surface drifters, Argo floats, and moorings in the Southern Ocean during the YOPP-SH and especially during the Special Observing Period need to be identified.
- The YOPP International Steering Group meeting at NCEP should be attended by representatives of the Southern Ocean oceanographic community to establish its role in YOPP-SH. Discussions with NOAA about Argo floats and with Arctic colleagues were aspects to be addressed there. Possible attendees include Matthew Mazloff, Patrick Heimbach, Kevin Speer, and Lynne Talley.

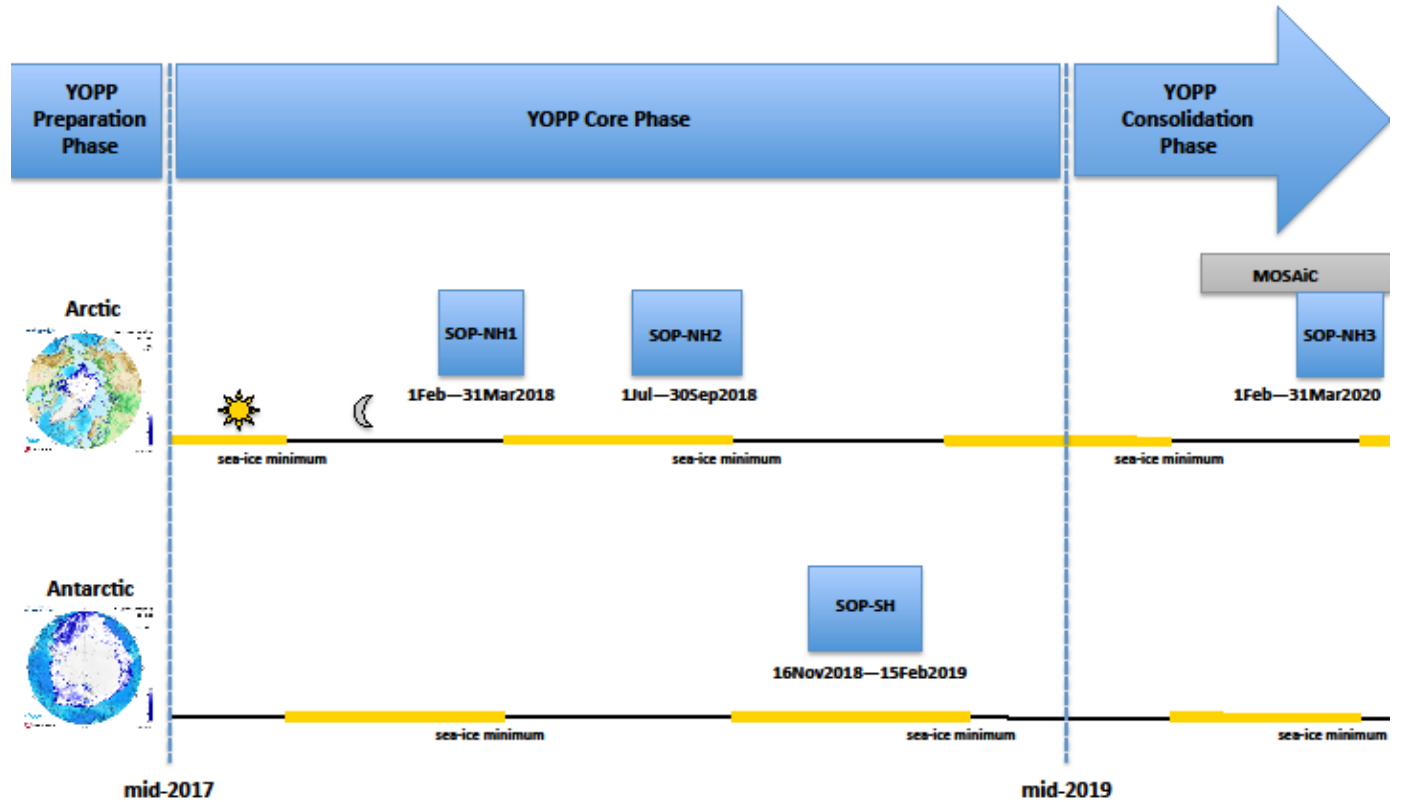
***Action Items:***

1. Commitments need to be made for the Special Observing period, November 16, 2018-February 15, 2019. See Appendix 2 for a current list.
2. The Southern Ocean oceanographic community needs to identify oceanographic resources available to contribute to YOPP-SH and especially the Special Observing Period in preparation for the YOPP International Steering Group meeting at NCEP, College Park, Maryland, February 27-March 1, 2017. One or more community representatives need to participate to define the community role(s) in YOPP-SH. Funding for their participation needs to be identified.
3. Next Zoom session on YOPP-SH will be organized after YOPP International Steering Group meeting at NCEP, likely in March 2017.

Appendix 1: YOPP Special Observing Periods and YOPP Endorsed Projects & Initiatives. From Helge Goessling, International Coordination Office.

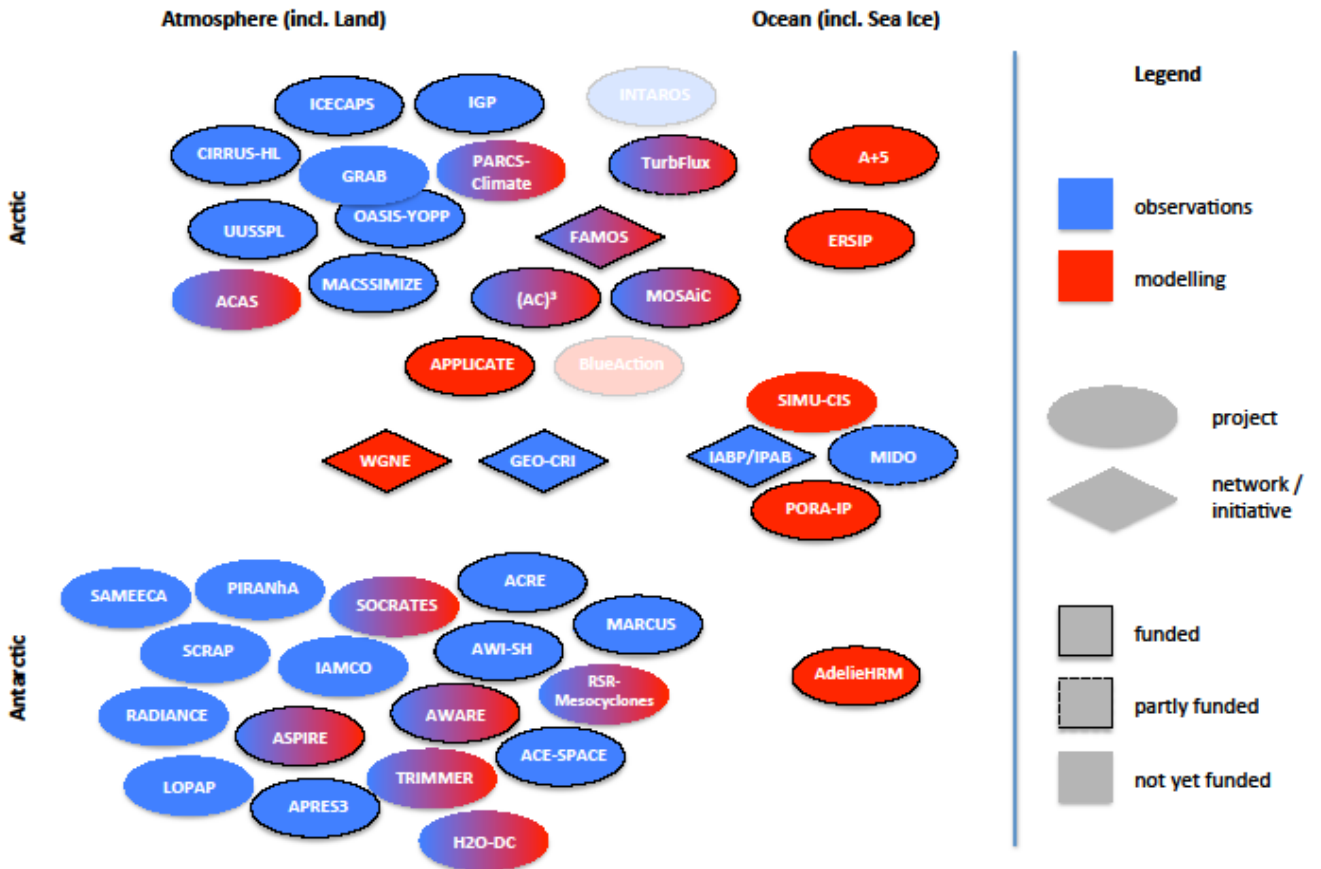
Year of Polar Prediction  
Special Observing Periods (SOPs)

Final approval pending (12 Oct 2016)



# YOPP-endorsed projects & initiatives

state 23 October 2016



**Appendix 2: Commitments for YOPP-SH Special Observing Period Nov. 15, 2018-Feb. 15, 2019 – Actual or Planned.**

**A potential complication is the switch over of radiosonde type from Vaisala RS-92 to Vaisala RS-41. Some stations are planning the switch for the 2017-2018 austral summer.**

**Australia – Scott Carpentier from June YOPP-SH meeting:**

At Casey, Davis, and Macquarie Island stations, two radiosondes per day are deployed on a regular basis while there is one radiosonde per day launched at Mawson station. Plans during YOPP are to conduct additional radiosondes at those stations. On the Australian research icebreaker RV Aurora Australis, 4 radiosondes per day can potentially be deployed.

Other considerations involve the improvement of radiosonde launches from GUAN (Global Climate Observing System (GCOS) Upper-Air Network) to GRUAN (GCOS Reference Upper-Air Network) standards at the Macquarie Island and Davis stations.

**China – Zhaomin Wang:**

Expect to release more radiosondes. Details to come.

**Germany – Gert Koenig-Langlo/Holger Schmithüsen:**

3 additional radiosondes each day from Neumayer and the icebreaker Polarstern.

2 AWS: 71S, 10W (south of Neumayer) and 80S, 44W (Filchner Ice Shelf)

Buoy network in the Weddell Sea – may extend through the start of the SOP.

**Italy and Korea – Vito Vitale-Sang-Jong Park:**

Are discussing additional radiosondes from Mario Zucchelli and Jang Bogo stations in Terra Nova Bay. Also from Concordia Station in the East Antarctic interior.

**Japan - Naohiko Hirasawa from June YOPP-SH meeting:**

Possibly 3-4 radiosondes per day from Syowa Station.

**Korea – Sang Jong Park:**

Radiosonde ascents planned from King Sejong Station on King George Island (near Antarctic Peninsula).

**United Kingdom – Steve Colwell**

Halley: Increase from once a day to twice per day – from 12Z to 00 and 12Z.

Rothera: Increase from 4 times/week to once per day.

### **Appendix 3: Planned Observational Campaigns over the Southern Oceans for Determining the Role of Clouds, Aerosols and Radiation in the Climate System: SOCRATES, MARCUS and MICRE**

Greg M. McFarquhar, Chris Bretherton, Roger Marchand, Robert Wood, Simon Alexander, Alain Protat, Paul DeMott, Patricia Quinn, Steven Siems and Robert Weller

The Southern Ocean (SO) region is one of the cloudiest on Earth. Clouds largely determine its albedo and play a major role in climate. Studies show that the Earth's climate sensitivity and the Intertropical Convergence Zone location depend upon SO clouds. But, climate models are challenged by uncertainties and biases in the simulation of clouds, aerosols, precipitation and radiation which trace back to a poor process-level understanding. Further, there is a strong seasonality in aerosol sources and sinks over the SO that is poorly understood. Due to the SO's remote location, there have been sparse observations of clouds, aerosols, precipitation, and radiation apart from those from satellites.

Motivated by these issues, a series of field campaigns have been proposed to improve our understanding of clouds, aerosols, precipitation, radiation and their interactions over the SO including the proposed Southern Ocean Clouds Radiation Transport Aerosol Transport Experimental Study (SOCRATES), the funded Measurements of Aerosols, Radiation and Clouds over the Southern Oceans (MARCUS) Experiment and the ongoing Macquarie Island Cloud and Radiation Experiment (MICRE). These experiments are summarized below:

**SOCRATES:** It is proposed that the National Science Foundation (NSF)/National Center for Atmospheric Research (NCAR) G-V aircraft make in-situ and remote sensing observations for 6 weeks between Jan. and March 2018 over a North-South curtain from Tasmania/New Zealand to ~62°S to characterize clouds, aerosols, precipitation and radiation. The Australian Research Vessel Investigator will make oceanographic, aerosol and remote sensing observations during the time of SOCRATES. Specific hypotheses to be tested during SOCRATES will examine variability in SO boundary layer (BL) cloud droplet concentration and the occurrence of supercooled liquid clouds as a function of ice nucleating particle (INP) concentrations and BL dynamics, as well as relationships between cloud microphysics, BL accumulation-mode aerosols, wind speeds, precipitation occurrence and overlying free tropospheric aerosols. Model parameterization development and testing needs are integrated in SOCRATES' design so that systematic confrontation and improvement of leading model bias in absorbed shortwave radiation and conditions conducive to extensive supercooled water can be uncovered.

**MARCUS:** Funding has been obtained to mount the Department of Energy (DOE) Atmospheric Radiation Measurement (ARM) Program's Mobile Facility-2 (AMF-2) on the Australian Antarctic supply vessel Aurora Australis during a 7-month period between Oct. 2017 and April 2018 on its routine transits between Hobart, Australia and the Australian Antarctic stations of Mawson, Davis and Casey, as well as Macquarie Island. In-situ aerosol, and cloud and precipitation remote sensing measurements will be made. MARCUS data will be obtained under a range of synoptic settings to document how temperature-dependent distributions of cloud properties and the frequency of occurrence of supercooled water vary with concentrations of cloud condensation nuclei (CCN) and INPs, synoptic regime, latitude and season (spring, summer and fall). MARCUS will help understand the sources, sinks and variability of CCN and INPs, the increased bias of absorbed shortwave radiation in summer in models, and conditions conducive to extensive supercooled water. Specific hypotheses will be tested to understand (1) the synoptically-varying vertical structure of SO BL clouds and aerosols, (2) sources and sinks of SO CCN and INPs, including the

role of local biogenic sources over spring, summer and fall, (3) mechanisms controlling supercooled liquid and mixed-phase clouds, and (4) advances in retrievals of clouds, precipitation and aerosols over the SO.

**MICRE:** Funding has been secured to install ground-instrumentation on Macquarie Island. Macquarie Island, at 54°S 159°E has a permanently manned research station operated by the Australian Antarctic Division (AAD). For a 2-year period starting in Oct. 2016, DOE ARM instruments including a set of surface broadband radiometers, a microwave radiometer, a multi-filter rotating shadow-band radiometer, a sun photometer and disdrometer will operate as well as a millimeter-wavelength cloud radar and Cloud and Aerosol Backscatter lidar provided by the Centre for Australian Weather and Climate Research. Data from these instruments will be used to address issues such as evaluating the seasonal cycle of satellite-derived and climate model-simulated surface radiative fluxes.

Combined, the SOCRATES, MARCUS and MICRE projects will provide a comprehensive dataset on the BL structure and associated vertical distributions of liquid and mixed-phase cloud and aerosol properties across a range of synoptic settings, especially in the cold sector of cyclonic storms.