

PolarPredictNews

Newsletter #08

Sept. 2018

Ice camp set up mid of August near the North Pole. For several weeks, this has been the home of the team aboard the Swedish icebreaker Oden and the many different measurements and process studies conducted during the Arctic Ocean expedition (photo: Michael Tjernström/Stockholm University)



Dear Colleagues,

An Arctic summer, which has produced a wealth of extra observations during YOPP SOP2, is coming to a close. It will be exciting to learn what the impact of the extra observations has been, both in the Arctic and in mid-latitudes where some unusual weather prevailed.

After the SOP is before the SOP. Earlier this summer, the YOPP Southern Hemisphere planning team met in Madison, USA, putting finishing touches to the first Special Observing Period in the Southern Hemisphere (16 November 2018 to 15 February 2019). In terms of extra observations, the Antarctic SOP looks like it will be a match for the Northern Hemisphere counterparts. This effort has really come a long way since David Bromwich realized its potential at the YOPP Summit in 2015!

In my view, providing research capacity to advance polar prediction is one of the key elements of YOPP. In this issue, you will find details on three novel modelling datasets made available to the community as dedicated contributions to YOPP. I would like to invite all of you to take the opportunity and further our understanding of important aspects such as atmospheric processes in polar regions and the skill of coupled environmental prediction systems on weather time scales.

Finally, I would like to welcome three new members to the PPP steering group: Irina Sandu (modelling expert from ECWMF), Taneil Uttal (leads Polar Observations and Processes group at NOAA-ESRL), and Machiel Lamers (environmental policy expert from Wageningen University).

Happy reading,
Thomas Jung

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The Year of Polar Prediction (YOPP) is a major international activity that has been initiated by World Meteorological Organization as a key component of the Polar Prediction Project (PPP). The overarching goal of YOPP is to significantly advance our environmental prediction capabilities for the polar regions and beyond. As an internationally coordinated period of intensive observing, modelling, prediction, verification, user-engagement, and education activities which involves various stakeholders, YOPP contributes to the knowledge base needed to manage the opportunities and risks that come with polar climate change.

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01 Start of the YOPP Arctic Summer Special Observing Period | During the second Arctic Special Observing Period, more than 3,000 extra radiosondes are expected to be launched. For three months, observational efforts at Arctic meteorological stations and field campaigns are enhanced to improve weather and sea-ice forecasts within the Year of Polar Prediction (YOPP). From 1 July to 30 September 2018, extensive extra observations are carried out at numerous meteorological land stations in the Arctic, as part of YOPP-endorsed field campaigns and expeditions, and by autonomous instruments. Numerical experimentation and internationally coordinated verification activities will use the additional observations generated during the second YOPP Special Observing Period (SOP2) for forecast evaluation and observational impact studies. The measurements permit identification of ways to improve forecast systems towards more accurate and reliable forecasts of weather and sea-ice conditions in the Arctic, and to provide recommendations for the future Arctic Observing Systems.

In particular for the enhanced observations at the Arctic YOPP Supersites such as the Canadian

sites Whitehorse and Iqaluit, forecast centres will provide model data in unusual detail (for exact locations of YOPP Supersites see the [YOPP Observations Layer](#)). The increased radiosonde activity from meteorological stations and cruise expeditions can be noticed by the European Centre for Medium-Range Weather Forecasts (ECMWF). An increase in buoy data that is sent to the WMO Global Telecommunication System (GTS) was already perceived since the beginning of June as many of the buoys have been deployed in advance to the start of SOP2. Extra observational data which feed into the ECMWF system during the SOP can be monitored [here](#) (choose different observing systems and regions).

As during the first SOP earlier this year (see [here](#) for an overview), many field campaigns and expeditions are carried out by YOPP-endorsed projects to provide specific observational data. These will enable better understanding and representation of environmental processes in the Arctic in weather, climate, and sea-ice models. Details on these and other YOPP-endorsed projects contributing to the current SOP can be found through the [YOPP Explorer](#) and by following on [twitter](#) and [instagram](#) @polarprediction and hashtags #polarprediction and #YOPPextraobs.



Radiosonde launch from the helicopter deck aboard RV Polarstern during SOP2 (photo: Christian Rohleder/DWD).

02 Atmospheric Measurements from the Chinese icebreaker research vessel Xuelong | During the Arctic summer expedition of the Chinese icebreaking research vessel Xuelong, 84 weather balloons were launched supporting the Arctic Summer YOPP Special Observing Period. Xuelong (which literally means ‘snow dragon’) left Shanghai port on 20 July 2018 to head north for the western Arctic Ocean. After ten days of transfer, the ninth Chinese National Arctic Research Expedition entered the open waters of Chukchi Sea where the first of a number of radiosondes was launched on 31 July, as a contribution to the Year of Polar Prediction. Since then, Dongqi Zhang and his team aboard the former Arctic cargo ship that was converted to a research vessel in the mid-1990s have been releasing two radiosondes per day at 00 and 12 UTC as part of the YOPP-endorsed project ‘Intensive Atmospheric Soundings during the Chinese Arctic Cruise in 2018’ (IAS, for more information see [here](#)). In addition, three radiosondes were deployed daily at a sea-ice station set up near the North Pole from 26 August to 4 September.

IAS aims to study the vertical atmospheric profile above the Arctic Ocean by looking at meteorological parameters such as air temperature, humidity, wind speed, wind



Expedition members are preparing the weather balloon aboard the Chinese icebreaker Xuelong before launching a radiosonde over the Arctic Ocean (photo: Dongqi Zhang/China Meteorological Administration).

direction, or air pressure. The meteorological data obtained by the IAS radiosoundings are transferred to the Information Center of the China Meteorological Administration. Here, data will be converted into WMO BUFR format to send it to the WMO Global Telecommunication System (GTS) and to the YOPP Data Portal. The measured data will therefore be available for the YOPP community to improve predictions of weather and environmental conditions in Arctic regions.

Aboard Xuelong, seven expedition members were involved in the IAS project, representing the Chinese Academy of Meteorological Sciences which is part of the China Meteorological Administration, and the National Marine Environment Forecasting Center which belongs to the Ministry of Natural Resources in China.
Contact: Dongqi Zhang dqzhang@cma.gov.cn

03 Extra radiosonde launches from Korean research icebreaker ARAON | Four radiosondes are launched daily over the Chukchi and East Siberian Seas from the Korean research icebreaker ARAON during the Arctic Summer Special Observing Period. The Korean icebreaking research vessel ARAON left the Alaskan Port of Nome on 4 August in order to set sail to the Western Arctic Ocean during the Arctic Summer Special Observing Period. The Arctic research mission to the Chukchi and Est Siberian Seas in two legs (with a 3-day break from 26 to 29 August at Barrow, Alaska) will last until 20 September. Every six hours, meteorological radiosondes are launched from aboard ARAON. In partnership with the Korea Meteorological Administration, radiosonde data are broadcasted into the World Meteorological Global Telecommunications System GTS. Four researchers on board ARAON are taking care of the weather balloon rises during the first expedition leg in the frame of the project ‘Korea Polar Prediction System for Climate Change and Weather Disaster’ (KPOPS) endorsed by the Year of Polar Prediction (see more information [here](#)). The 4-year project funded by the Korea Polar Research Institute (KOPRI) aims to enhance the predictability of Arctic and mid-latitude climate change and weather disasters. Taking



Radiosonde launch from the helicopter deck aboard the Korean icebreaking research vessel ARAON (photo: KOPRI).

meteorological profiles over the data-sparse high-latitude Arctic Ocean will help to improve climate/weather forecast models. KPOPS is also the title of the two models that will be developed in the project, a global climate model (KPOPS-Climate) and a weather forecast model (KPOPS-Weather).

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04 Message from the Oden | On 1 August, the Swedish research icebreaker Oden left Longyearbyen port in Svalbard to head towards the North Pole region looking out for a multi-year ice floe to drift with for several weeks. Aboard is the YOPP-endorsed project 'Arctic Climate Across Scales' (ACAS) led by the atmospheric scientist Michael Tjernström.

After a 24-hour station in the marginal ice zone, a brief stop at the North Pole on 12 August for taking the obligatory group photo, and two weeks in total of heading into the central Arctic Ocean, on 13 August the Oden team finally located a sea-ice floe that was large enough and sufficiently stable but also had some open water around to facilitate the different science projects. Ice conditions on the cruise track were unexpectedly severe this year so Oden made good use of the helicopter for ice reconnaissance to find the best routes. After intensive work to set up the ice camp, the work on the sea ice gradually started up; after a few days the ice camp consisted of several dedicated observation sites: a tethered

sounding site with two tethered balloons, a meteorological flux site with a 20-meter mast with instruments to measure fluxes, and a remotely operated vehicle (ROV) site with a red little tent from which the ROV is launched through a hole in the ice (see title picture page 1). On the other side of the ice floe an 'open lead' site was set up where measurements of the ocean-atmosphere interface have been taken.

Many other observing systems, including those of ACAS, had been running on the ship continuously all the way from Svalbard. For example, in collaboration with Environment and Climate Change Canada (ECCC), radiosondes are launched every six hours from from the helicopter deck of the Swedish research icebreaker within the ACAS project (see more [here](#)) led by the Swedish Stockholm University. These measurements serve as a backbone for much of the atmospheric science conducted on board but also provide input to improve the Arctic weather forecast models and atmospheric reanalysis, in support of the Year of Polar Prediction Arctic Summer Special Observing Period. Data from the weather balloons are sent to the Global Telecommunications System (GTS) operated by the World Meteorological Organization (WMO) in real time in collaboration with the United Kingdom's National Center for Atmospheric Science (NCAS) Atmospheric facility and the UK Met Office.

Contact: Michael Tjernström michaelt@misu.su.se



Radiosonde launch from the helicopter deck of the Swedish research icebreaker Oden within the YOPP-endorsed project ACAS (photo: Michael Tjernström).

05 Second Arctic Science Ministerial Meeting in Berlin | Co-hosted by the European Commission, Finland and Germany, the second Arctic Science Ministerial meeting will take place on 25 and 26 October 2018 in Berlin, Germany. As for the first Ministerial in 2016, the Year of Polar Prediction is again listed as one of the collaborative projects related to the Arctic.

Promoting the results of the deliverables agreed on at the first meeting, which took place on 28 September 2016 in the White House, is one of the goals of this 2nd Arctic Science Ministerial. Other objectives include increasing capacity to respond to major societal challenges in the Arctic, and encouraging further scientific cooperation among a large number of countries and representatives of indigenous people.

The **Year of Polar Prediction** has been listed as one of the many deliverables during the first meeting in 2016, and will this year again be highlighted as one of the many ongoing international initiatives and collaborations.

On 25 October, latest achievements with regard to the deliverables agreed at the first Arctic Science Ministerial will be showcased at the **Arctic Science Conference**. The discussion will focus on scientific advances and on the commitment needed in the future. The science conference will be open to a wide range of Arctic stakeholders, policymakers and media. Discussions from the first day will prepare the ground for 26 October when government ministers and delegates will discuss the main scientific issues. The key objectives of the meeting are to release a Joint Statement, issue a report on initiatives taken over the preceding two years and an updated list of deliverables expected to generate results over the next few years.

06 Increase in High Waves and Winds in Ice-free Arctic Ocean Waters | A study published by Japanese scientists in **Scientific Reports** earlier this year finds an increase in winds of high ocean waves due to the ongoing retreat in Arctic sea ice. The larger the ice-free area in the Arctic, the greater is the probability of larger waves causing turbulence and potential flooding and erosion in coastal areas of the Arctic, states Takuji Waseda, the lead author of a study published in scientific reports in March. Co-author and PPP Steering Group member Jun Inoue from the Japanese National Institute of Polar Research points to the implications of such findings as the gradual change in wave heights and frequency over the ice-free Arctic Ocean would not only impact safe navigation

for instance by sea-spray icing on a ship but would also affect coastal communities. Skilful surface wind speed forecasts will therefore be needed to reliably predict wave heights and frequency to support shipping and coastal regions to prepare for potential impacts of waves under a new and unusual state of the Arctic Ocean. An article on the study has been published in EurekAlert!



During the Arctic research cruise aboard the Japanese research vessel Mirai, two wave buoys were deployed over the ice-free Arctic Ocean in September 2016 (photo: Toshihiro Ozeki).

shipping and coastal regions to prepare for potential impacts of waves under a new and unusual state of the Arctic Ocean. An article on the study has been published in EurekAlert!

Reference:

Waseda, T., Webb, A., Sato, K., Inoue, J., Kohout, A., Penrose, B., Penrose, S., 2018: Correlated increase of high ocean waves and winds in the ice-free waters of the Arctic Ocean. *Scientific Reports*, 8, 4489. doi.org/10.1038/s41598-018-22500-9

**07 The 'YOPP Virtual Field Campaign' –
ECMWF YOPP Analysis and Forecast Data Set**

| (by Irina Sandu/ECMWF and Thomas Jung/AWI)
Provided by the European Centre for Medium-Range Weather Forecasts (ECMWF), with co-funding from the EU Horizon 2020 project **APPLICATE**, the ECMWF YOPP Analysis and Forecast Data Set is now available. Scientists interested in YOPP are invited to download and use the data to understand physical and dynamical processes, investigate predictability in polar regions, and explore causes of forecast failures. The ECMWF YOPP Data Set builds on the success of the concept of a 'virtual field campaign', developed in the framework of the Year of Tropical Convection (YOTC). It provides analysis and coupled forecast data from the control of the operational ECMWF ensemble forecasts (18 km resolution). Furthermore, process tendencies from various physical and dynamical processes are available for the first 48-hours of the forecasts. Given that global fields are provided, it is expected that scientific studies in non-polar regions will as well benefit from this data set.

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Two slides summarizing the ECMWF YOPP Analysis and Forecast Data Set are available [here](#) (pdf).

Background information:

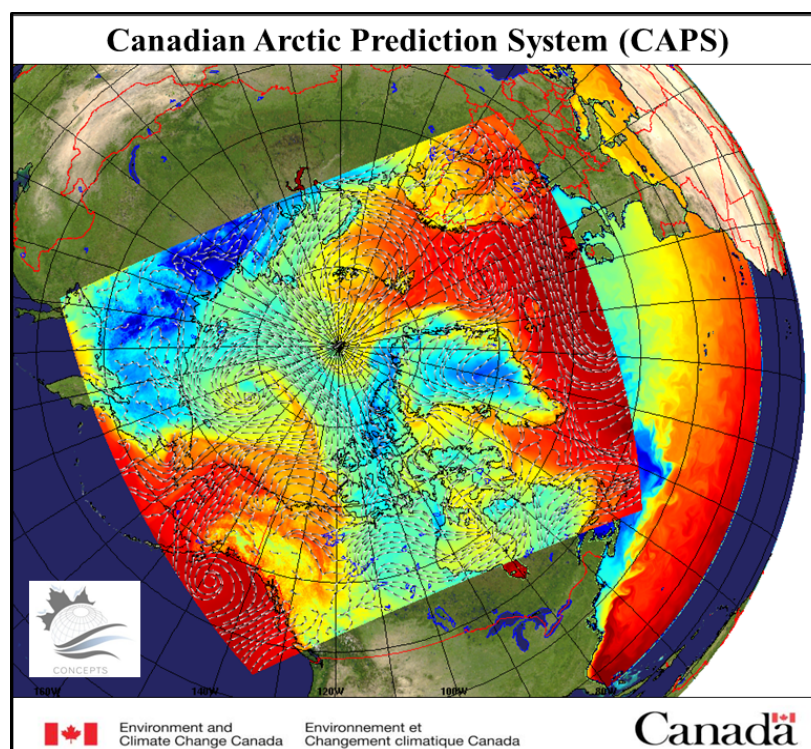
- [ECMWF Science Blog Featuring YOPP](#)
- [Description of ECMWF YOPP Data Set](#)
- [EU Horizon 2020 project APPLICATE](#)

Links to the data:

- [ECMWF YOPP Data Set](#)
- [YOPP Data Portal](#)

**08 High-Resolution Coupled Arctic
Atmosphere-Ice-Ocean Forecasts by ECCC**

| As a contribution to the Year of Polar Prediction, Environment and Climate Change Canada (ECCC) now provides coupled atmosphere-ice-ocean forecasts at high resolution for the Arctic. In support of Canada's contribution to the Year of Polar Prediction (YOPP), the ECCC Meteorological Service Canada (MSC) announces a new set of high-resolution coupled forecasts over the Arctic in real time where atmosphere, ice and ocean are now coupled into one system. This new system called the Canadian Arctic Prediction System (CAPS) has been implemented in experimental mode on 28 June 2018. The two separate components were originally implemented on 24 January 2018. The atmospheric part provides forecasts covering a large Arctic domain at 3-km resolution, while the ice-ocean model domain covers the northern part of the North Atlantic from 26°N and the whole Arctic Ocean at a resolution of 3 to 8 km. Now, the two components are coupled allowing for improved forecasts of atmosphere, ice and ocean conditions.



As an exceptional data base for users interested in Arctic regions produced for the scientific research goals of YOPP, CAPS data are freely available on the MSC Datamart testing data repository at the address: <http://dd.alpha.meteo.gc.ca/yopp>.

Newly coupled atmosphere-ice-ocean forecast CAPS available by ECCC (figure: Greg Smith/ECCC).

The data will be available online during the entire YOPP Core Phase, namely until mid-2019. As these forecasts are experimental, modifications may occur on relatively short notice, and product availability cannot be guaranteed at the same level as for an official operational system.

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09 U.S. Naval Research Laboratory

Contributions to YOPP | The U.S. Naval Research Laboratory (NRL) is making various modelling and forecasting contributions to the Year of Polar Prediction.

(1) Operational support during the second YOPP Arctic Special Observing Period (experimental forecasts)

NRL is providing 27/9/3km nested-domain forecasts, zooming from pan-Arctic into the Fram Strait region. The forecasts are based on the Navy's Coupled Ocean Atmosphere Mesoscale Prediction System (COAMPS®) model for the YOPP Arctic Summer Special Observing Period

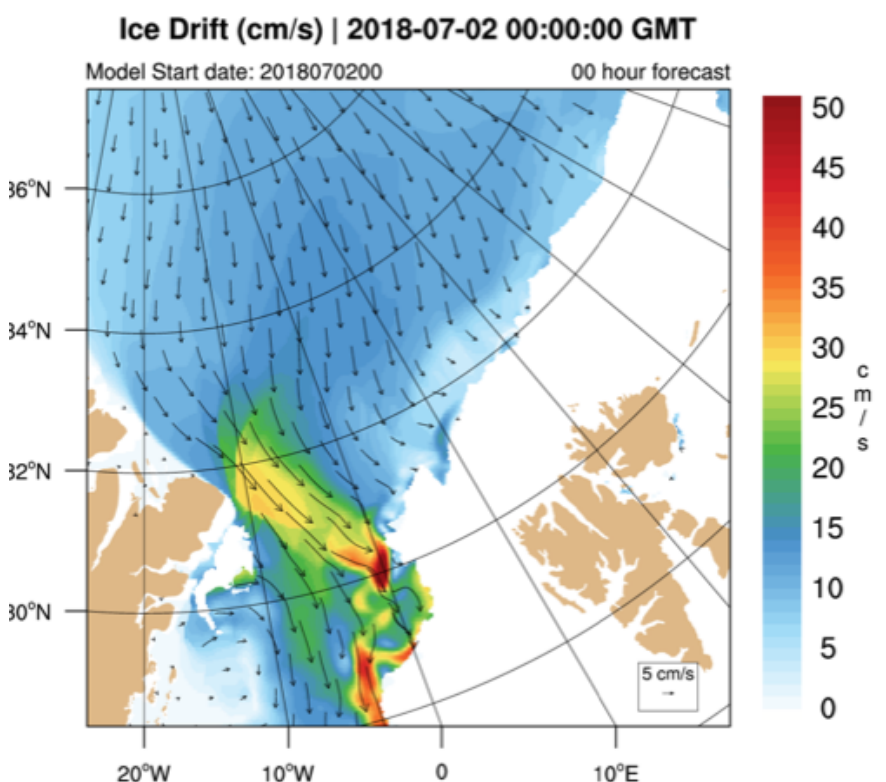
(SOP2) through 30 September, and the forecast range is 48 hours. In addition to numerous atmospheric and surface variables provided on the 27/9/3km grids, very-high-resolution sea-ice output based on a 1km-Community Ice CodE (CICE) is provided for the Fram Strait region. COAMPS and CICE forecasts are provided out to 48-hours.

The most recent forecasts and those from the previous 5 days can be obtained here (graphics only): <https://cavu.nrlmry.navy.mil/COAMPSOS/YOPP/>. Forecasts dating back to 1st of July can be obtained here (graphics only):

https://cavu.nrlmry.navy.mil/COAMPSOS/YOPP_ARCHIVE/.

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COAMPS® is a registered trademark of the Naval Research Laboratory.



02 July 2018 00Z CICE ice drift analysis (cm/sec) (source: NRL).

(2) Arctic and Antarctic Sea-Ice Forecast Research Datasets

Sea-ice forecasts for both hemispheres from two NRL systems – the fully coupled Navy Earth System Model (NESM) and the Global Ocean Forecast System (GOFS) 3.1 – for the period 1 February 2018 through 15 February 2019 (spanning all YOPP SOPs during the YOPP Core Phase) are made available to the research community. Outputs from the CICE sea-ice model are available for download and use through PANGAEA.

GOFS 3.1 is a sea ice-ocean prediction system consisting of the HYbrid Coordinate Ocean Model two-way coupled to CICE and is forced with the NAVy Global Environmental Model (NAVEM). GOFS 3.1 has ~3.5 km resolution at

the North Pole and employs the Navy Coupled Ocean Data Assimilation (NCODA) for available in-situ ocean observations and satellite data, including sea-ice concentration from SSMIS and AMSR2. The system is run daily and produces 7-day forecasts; near-real-time graphical output from this system can be obtained here:

<https://www7320.nrlssc.navy.mil/GLBhycomcice1-12/POLAR.html>.

NESM is a fully coupled atmosphere-ocean-sea ice model (NAVGEN/HYCOM/CICE). Operational NAVGEN 1.4 and pre-operational GOFS 3.1 provide the initial conditions. Each week, a time-lagged 4 member ensemble starting on Sat-Sun-Mon-Tue is run out 45 days. These ensemble forecasts are part of NOAA's Subseasonal eXperiment (SubX: <http://cola.gmu.edu/pejgon/subx/index.html>).

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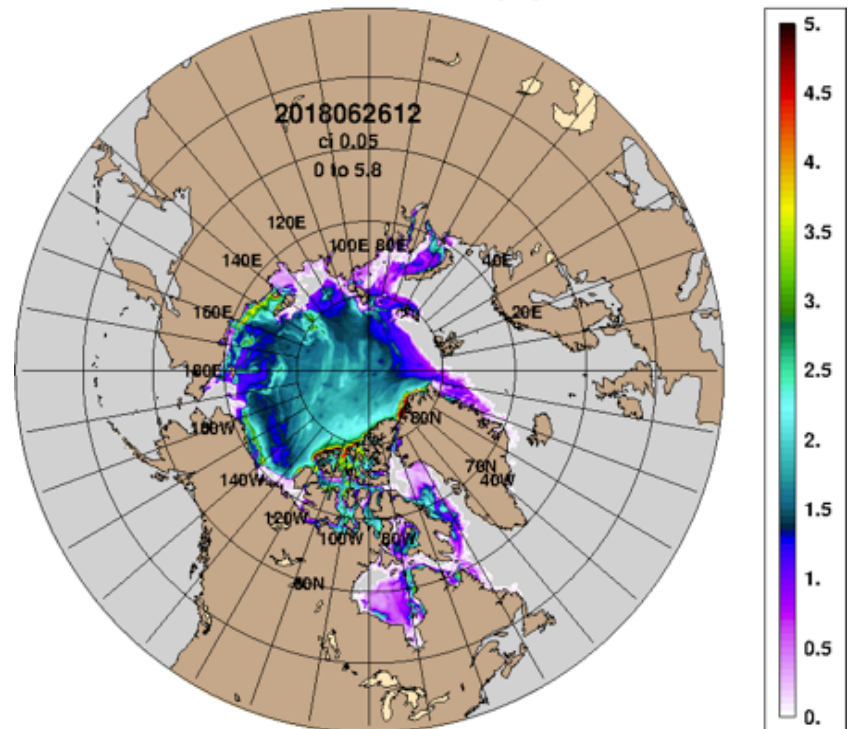
Contact: Joe Metzger joe.metzger@nrlssc.navy.mil, Amelie Driemel (PANGAEA) Amelie.Driemel@awi.de

(3) Contributions to the YOPP Sea Ice Drift Forecast Experiment

NRL is contributing (sub-)seasonal forecasts to the YOPP Sea Ice Drift Forecast Experiment (SIDFEx) based on the Navy Earth System Model (NESM) in a setup that is used for NRL's contributions to the Sea Ice Prediction Network (SIPN) Sea Ice Outlook (SIO). In this setup, the fully coupled air/ocean/ice system is used to run time-lagged ensemble simulations from June/July/August out to September following the SIO protocol. Drift forecasts are currently being made for selected buoys of the International Arctic Buoy Program (IABP).

An additional contribution to SIDFEx consisting of near-real-time short-term forecasts based on GOFS 3.1, driven with NAVY Global

GLBb0.08-93.0 Ice Thickness (m): 20180627



Sea-ice thickness (m) from the Global Ocean Forecast System (GOFS) 3.1 on 27 June 2018 at the analysis time (tau 000) (source: NRL).

Environmental Model (NAVGEN) forcing, is currently under consideration. Details on SIDFEx can be found here: <http://www.polarprediction.net/yopp-activities/sidfex/>.

The NRL (sub-)seasonal drift forecasts can be obtained here (GroupID nrl001): https://swiftbrowser.dkrz.de/public/z_0262ealf00e34439850f3f1d71817205/SIDFEx_processed/.

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10 Polar Prediction School Report 2018 |

The meeting report of the second Polar Prediction School which took place earlier this year in Northern Sweden has now been published in the Eos Earth and Space News. Education is one of the key activities within the World Meteorological Organization's (WMO) Year of Polar Prediction initiative. In cooperation with the European Union Horizon 2020-funded project 'Advanced Prediction in Polar Regions and Beyond' (APPLICATE) and the Association of Polar Early Career Scientists (APECS), the second Polar Prediction School has been organized at



Students of the Polar Prediction School 2018 set up a micrometeorological mast on a frozen lake close to Abisko Research Station (photo: Fiona Tummon).

the Abisko Research Station in Northern Sweden from 17 to 27 April 2018. In order to prepare the next generation of polar weather and climate researchers, theory lectures, practical exercises, and fieldwork were combined with a dedicated science communication program. To ensure present limitations in our ability to predict polar weather and climate changes on scales from days to decades are addressed in future science work, topics such as satellite and conventional observation techniques; numerical modelling of the polar atmosphere, sea ice, and ocean, data assimilation and model evaluation were included in the 10-day course. The meeting report is now available in the [Eos Earth and Space News Online](#).

11 Where will the Ice be Tomorrow? | In two new contributions to the Polar Prediction Matters dialogue platform authors provide insight into a new sea-ice forecast product and how coastal communities are affected by changing sea-ice conditions in the Bering Sea.

PRIIMA – Predictive Ice Images

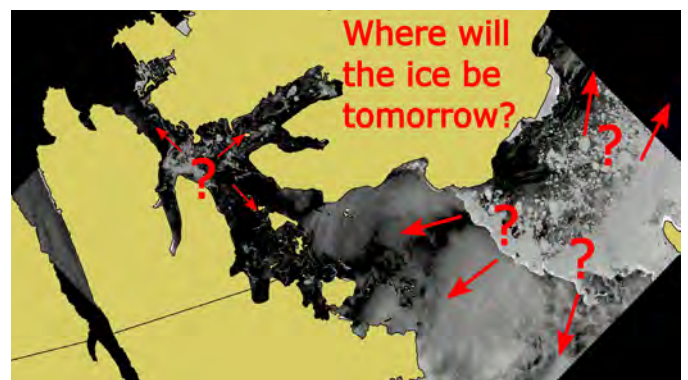
Drift + Noise Polar Services GmbH (DNPS) is a start-up and spin-off company of the Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research. In the contribution to Polar Prediction Matters entitled [‘Where will the Ice be Tomorrow? – Polar Prediction Matters on Predictive Ice Images’](#), the DNPS managing

director Lasse Rabenstein and DNPS Head of Remote Sensing Panagiotis Kountouris describe their newly developed sea-ice forecast product Predictive Ice Images (PRIIMA) which may eventually become instrumental for tactical decision-making in and near ice-covered waters. This ESA kick-start project aims at combining high-resolution satellite images with lower-resolution operational sea-ice models. PRIIMA will thus be able to deliver ice forecasts with the resolution of a satellite radar image, as if the satellite recording of tomorrow would be available already today.

Polar Forecasts Against Impacts of Declining Bering Sea Ice on Alaska Coastal Communities – Part 1

The daily sea-ice extent in autumn and winter of 2017-2018 has been the lowest in the satellite era record in the Bering Sea. In their [Part #1 contribution to Polar Prediction Matters](#), Eugene Petrescu, Rick Thoman and Becky Heim from the Alaska U.S. National Weather Service report on various impacts of changing sea-ice conditions to the regional and community levels. Some of the most significant impacts have been experienced in the Bering Strait region and on St. Lawrence Island including diminished food stocks and increasing pressure on making decisions to remain in place and enhance defenses against the erosion, or to even move to a new location.

Stay tuned: In Part #2 (to be published soon), authors will report on how subsistence hunters use the sea-ice forecast information along with their traditional knowledge.



Sentinel-1 scene around Hinlopen Strait, Svalbard, Norway (source: Drift & Noise GmbH).

12 The YOPP Supersite Model Inter-comparison Project | An extended set of model output variables has now been defined for the YOPP Supersites modelling efforts. Operational centres are invited to participate in the project 'The YOPP Supersite Model Intercomparison Project' (YOPPsiteMIP).

The YOPP Supersites comprise a number of key locations in the Arctic and Antarctic including the supersites of the International Arctic Systems for Observing the Atmosphere (IASOA; www.iasoa.org), supersites operated by Environment and Climate Change Canada (ECCC; ecpass.ca), key locations in the Arctic Ocean, selected Antarctic research stations, and key locations covering the so-called 'third pole' (Tibetan plateau). At these locations, suites of instruments such as micrometeorological towers, lidars, radars, ceilometers, and radiometers provide detailed measurements, continuously characterizing the vertical column of the atmosphere as well as the surface conditions and energy fluxes. The data from these sites extend far beyond the traditional synoptic surface and upper-air observations, and efforts are underway to create Merged Observatory Data Files with variables from different observing systems formatted to be consistent with model output during the YOPP

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Special Observing Periods.

For these key sites at the poles, operational centres have kindly offered to provide numerical weather prediction (NWP) model output during YOPP. This unique data set enables in-depth process-based verification of model-based forecasts against high-frequency observations. The target processes include representation of hydrometeors and cloud micro- and macro-physics, radiation, turbulence and energy budgets, and the representation of energy and momentum fluxes. The process-diagnostic aim is to identify strengths and weaknesses of current prediction systems, with the final goal of improving the reliability for weather and environmental predictions in polar regions (and beyond).

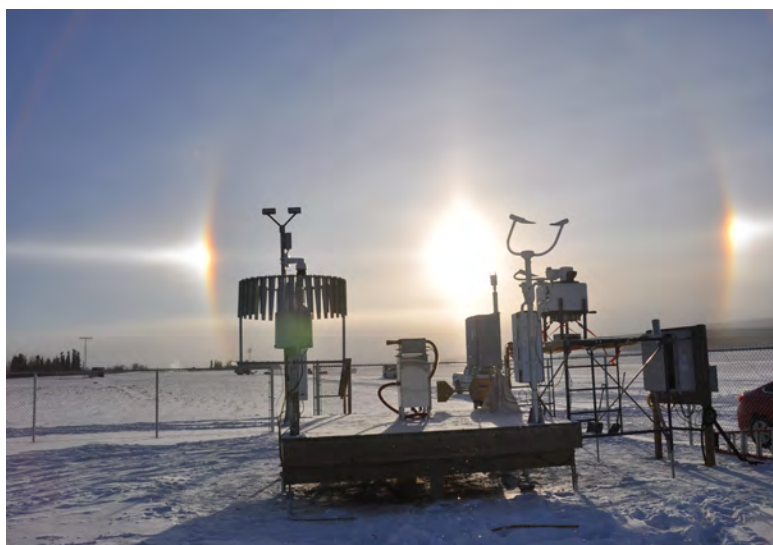
The YOPP Task Teams (TT) on Modelling and Verification have worked closely together to finalize a guidance document for the modelling efforts at YOPP supersites. The YOPPsiteMIP document can be downloaded from the PPP Modelling TT website. This document lists the different YOPP Supersite locations and site-specific variables to be produced by the different models. The standardization of the YOPPsiteMIP model output enables a direct comparison of the model output from the participating forecasting centres.

Modelling centers are invited to join this project called 'The YOPP Supersite Model Intercomparison Project' or in brief YOPPsiteMIP.

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13 Welcome to the PPP Steering Group | Three new members joined the Polar Prediction Project's Steering Group (PPP SG) over summer. PPP SG and ICO look forward to further strengthening already existing close collaborations.

Irina Sandu leads the Physical Processes Team in the Research Department of ECWMF. Her research revolves around the representation of atmospheric processes



Ice crystals suspended in the atmosphere, also called diamond dust, produce the sun dog – a halo effect around the sun. The lidar instrument installed at the ECCC site Whitehorse, Yukon detects the ice crystals via their ability to reflect the laserbeam enhancing the backscattered signal (photo: Mike Harwood).

From left to right: New PPP SG members Taneil Uttal (photo: private), Machiel Lamers (photo: private) and Irina Sandu (photo: Simon Witter, ECMWF).



in numerical models, with a particular focus on stable boundary layers, boundary layer clouds and surface drag impacts on the large-scale circulation. Irina brings a strong modelling and NWP expertise and is involved in the YOPP modelling activities. Irina is also now coordinating polar prediction related activities at ECMWF, particularly in the context of the ongoing Year of Polar Prediction and the H2020 project [APPLICATE](#).

Taneil Uttal is a supervisory meteorologist and leads the Polar Observations and Processes group in the Physical Science Division of the NOAA Earth Systems Research Laboratory. Her research is based on direct observations from the surface of all components of the Arctic system including surface energy budgets, aerosols and clouds. She was the originator of the International Arctic Systems for Observing the Atmosphere ([IASOA](#)). This consortium of Arctic Observatories around the Arctic Ocean comprise the YOPP Supersites, and the IASOA consortium is coordinating observing assets and expertise to support the verification goals of YOPP.

Machiel Lamers is Associate Professor in Environmental Policy at the Wageningen University, The Netherlands. He coordinates the Environmental Mobilities theme in his chair group and is interested in the role of environmental information in governing mobility systems and the relation between tourism and nature conservation. Machiel is one of the co-chairs of the PPP Task Team Societal and

Economic Research and Applications ([PPP-SERA](#)) and is PI of the YOPP-endorsed project [SALIENSEAS](#).

15 YOPP in the Southern Hemisphere – A Special Observing Period during Austral Summer | The YOPP in the Southern Hemisphere Special Observing Period (YOPP-SH SOP) is scheduled from 16 November 2018 to 15 February 2019. Scientists and representatives of operational weather services, with research and operational/logistical interests in Antarctic meteorology and forecasting, met on 19 July 2018 to discuss related activities. As in previous years, the third YOPP in the Southern Hemisphere (YOPP-SH) meeting was again held in conjunction with the Workshop on Antarctic Meteorology and Climate (WAMC). This time, both meetings were kindly hosted by the Antarctic Meteorological Research Center (AMRC) at the University of Wisconsin-Madison in Madison, Wisconsin, United States. Following the 13th WAMC from 16 to 18 July 2018, the YOPP-SH#3 meeting was held on Thursday, 19 July 2018.

As an international forum for current results and ideas in Antarctic meteorology, numerical weather prediction, and weather forecasting, annual activities and the status of the observing (e.g., Automatic Weather Stations) and modelling (e.g., Antarctic Mesoscale Prediction System) efforts have been addressed during WAMC. During the YOPP-SH #03 meeting, project investigators and representatives of national

agencies operating in Antarctica provided updates on the current status of planning with regard to the Special Observing Period (SOP) in the Southern Hemisphere that is scheduled from 16 November 2018 to 15 February 2019.

Amongst others, operational numerical weather prediction (NWP) support provided by involved national weather centres was discussed. The YOPP Supersites in the Southern Hemisphere will be key locations for joint modelling and verification efforts. An in-depth data set from these key Antarctic stations will enable process-based verification of model-based forecasts against high-frequency observations. In addition to plans for the upcoming austral summer YOPP-SH SOP, the oceanographic community, in particular, suggested another ('light version') Special Observing Period is needed during austral winter, perhaps during 2019 or 2020; discussion during the coming months will determine the feasibility and timing of this new effort.

Presentations from the YOPP-SH meeting are available from the [YOPP-SH webpage](#) hosted by the Byrd Polar and Climate Research Center, Columbus, Ohio, USA. See also the [WAMC meeting website](#) for more information.

15 SIPN South on YouTube | A SIPN South presentation is now available via the YOPP YouTube channel. Because François Massonnet, the lead of the Sea Ice Prediction Network South (SIPN South), could not join the third YOPP in the Southern Hemisphere meeting (YOPP-SH#03) in person, he recorded his presentation prior to the meeting. The recording is now available on the YOPP YouTube channel for everyone to learn more about this initiative to coordinate seasonal predictions of sea ice in the Southern Ocean. Find the recording on SIPN South [here](#).



Participants of the third YOPP in the Southern Hemisphere meeting in Madison, Wisconsin (photo: Mouse Marie Reusch)

16 YOPP Issue Tracker | Issues due to data acquisition or transmission may appear during polar operations. Issues that in particular are noted during YOPP Special Observing Periods are going to be reported on the [YOPP Issue Tracker](#). Please inform the International Coordination Office office@polarprediction.net about any additional issues you might become aware of.

17 YOPP-endorsed! – Sea Ice Research Team: New Observation Platforms in High Latitudes (SIRT) | YOPP endorsement is available for projects, programmes and initiatives but also for institutions and operational centres that contribute to making the Year of Polar Prediction successful. More than 80 projects, programmes and initiatives already received project endorsement from YOPP.

During the second YOPP Special Observing Period, the YOPP-endorsed project 'Sea Ice Research Team: New Observation Platforms in High Latitudes' (SIRT) joined three tourist expeditions to the North Pole. In July and August, the nuclear icebreaker 50 Let Pobedy was chartered by Poseidon Expeditions to sail from Murmansk, Russia, to the North Pole. Poseidon Expeditions offer these trips every year, carrying paying polar tourists who want to stand at the top of the world and enjoy the experience of thundering through pack ice on board a powerful

icebreaker. Passenger education and engagement is a key part of the cruises. In the frame of SIRT, passengers could take part in many observations and learn about sea ice, its relationship to climate and also how to be sea-ice observers. The geologist Alex Cowan is one of the PIs of SIRT. For the last 8 years, he has been working as an expedition leader in both the Arctic and Antarctic.

Dr. Cowan, the YOPP-endorsed SIRT campaign is a citizen-science project that took place aboard the Russian icebreaker 50 Let Pobedy. Can you please tell a bit about the people who came on board? How did you motivate people to support SIRT?

The travellers on board have a mixture of motivations and there are always some who are traveling to further their own educations and to learn more about the natural world, and these people often jump at the chance to take part in a citizen science project. Many passengers are also concerned about the ecosystems where we travel and they see taking part in a science project as a small way of contributing to our understanding of the world. So every cruise we have a ready-made cadre of citizen scientists who can't wait to take part.

The SIRT campaign joined the icebreaker for three cruises to the Arctic. When, how long, and most importantly where exactly did these cruises take place?

The cruises take place from mid July until mid August. Each one lasts for 10 days, with at least three days of icebreaking and a day at an ice station close to the north pole on each cruise. We

leave from Murmansk and head straight for Franz Josef Land where we often make landings. From Franz Josef Land the ship heads directly to the Geographic North Pole where it spends around 12 hours parked in the ice, before returning the way it came. This itinerary, making repeated passes along the same line of latitude from the pack edge to the pole, presents a unique opportunity for data collection.

In addition to SIRT, were other science projects to participate, or educational programmes for the tourists available?

Like most expedition cruises, education is a key aspect of the voyage, with lectures ranging from history and geology to polar bears and birds, but this was the only science project which guests could participate in.

SIRT measurements were taken from aboard and during ice stations. Which measurements

did you carry out and how will these help achieving the project's goals? Were you able to obtain some early findings? While breaking ice we made visual observations of ice concentration, thickness, age, floe size, ridging and the degree of melt, using the ASSIST program for data recording. At the pole we

made depth and salinity profiles of melt ponds. In addition, we used the ship's helicopter to collect aerial images of the ice.

The observations and measurements we made are immediately communicated by satellite mail to project partners where the data can inform a



Holding up the YOPP flag – from left to right: expedition leader Alex Cowan, scientific advisor and PPP Steering Group member Don Perovich, and photographer Lauren Farmer at the North Pole (photo: Lauren Farmer)

better understanding of how the pack is changing through the season. Our constant movement within a set area of the pack made us ideal for the purposes of monitoring those aspects that are hard for satellites to accurately assess, such as the degree of advancement of melt.

How does SIRT contribute to improving weather and sea-ice predictions in the Arctic?

We were traveling in an undersampled region and so much of the data we collected on both sea ice and on atmospheric conditions such as cloud cover, temperature and relative humidity is valuable because the database is otherwise sparse. Observations were timed to coincide with satellite overpasses so that it complements the data the satellites are collecting. Ice observations were sent to the Norwegian Ice Service where they can be compared to Sentinel-1 images.

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As a citizen-science project, is the SIRT data available publicly?

Our data can be found on the Ice Watch website (<http://icewatch.gina.alaska.edu/>) and on the NASA GLOBE Observer data visualisation page (<https://vis.globe.gov/GLOBE/>). In addition we welcome hearing from anybody interested in our data or interested in us collecting further data for them.

Any plans to do a similar thing in the Antarctic?

We have collected sea-ice data in the Antarctic but with the itineraries we follow the opportunities are more limited. However, we continue the atmospheric observations for NASA and carry out other programmes such as phytoplankton measurements in Antarctic fjords, ID of individual whales, and seabird surveys in the Southern Ocean.



Participants of the cruise to the North Pole are measuring melt pond depth and salinity in the citizen-science project SIRT (photo: Lauren Farmer).

Where can the polar prediction community learn more about SIRT?

We run a non-profit organization called 'The Polar Citizen Science Collective' which utilizes expedition cruise vessels as platforms of opportunity for data collection across the polar regions. You can learn more about SIRT and our other projects at our website <http://www.polarcollective.org/>.

18 New Publications

Atmospheric Response to Kilometer-Scale Changes in Sea Ice Concentration Within the Marginal Ice Zone | A realistic representation of the spatial structure of sea ice and its interaction with the ocean and atmosphere in models are key to improve forecasts of Arctic weather and sea-ice conditions. Currently, in most of atmospheric modelling systems, the sea-ice cover is represented as a relatively smooth field, and therefore introducing a more realistic representation of the spatial structure of sea ice is expected to have important effects on the atmospheric dynamics. In this study, authors modified the representation of sea-ice cover in the AROME Arctic model to mimic the sea-ice lead structure by combining a coarse resolution sea-ice concentration product with a dedicated fine resolution sea-ice lead product. Findings suggest that the impact is as large as the forecast accuracy of a 12 hour weather forecast. This implies that model applications will benefit from improved capabilities in monitoring and simulating of sea-ice lead characteristics.

Batrak, Y., Müller, M., 2018: Atmospheric Response to Kilometer-Scale Changes in Sea Ice Concentration Within the Marginal Ice Zone. *Geophysical Research Letters*, 45 (13), 6702-6709. <https://doi.org/10.1029/2018GL078295>

Medium-range predictability of early summer sea ice thickness distribution in the East Siberian Sea | How good can sea-ice thickness be forecasted in the East Siberian Sea? Reliable forecasts of the summer thickness of sea ice are becoming increasingly important for safe maritime navigation in the Arctic Ocean, e.g, when crossing the East Siberian Sea on the Northern Sea Route. In this study, authors evaluated the reliability of medium-range (lead time below ten days) forecast of the sea-ice thickness distribution in the East Siberian Sea in early summer (June–July). The sea-ice thickness distribution produced by the operational model TOPAZ4 ice-ocean data system was compared to reliable sea-ice thickness estimates from hindcast, satellite, and in-situ data. Results show

that the model accurately predicts the distribution of sea-ice thickness for a lead time of up to three days while after the fourth day uncertainty increases due to the amplification of forecast error for features such as Arctic cyclones.

Nakanowatari, T., Inoue, J., Sato, K., Bertino, L., Xie, J. et al., 2018: Medium-range predictability of early summer sea ice thickness distribution in the East Siberian Sea based on the TOPAZ4 ice–ocean data assimilation system. *The Cryosphere*, 12, 2005–2020. <https://doi.org/10.5194/tc-12-2005-2018>

Understanding user needs: a practice-based approach to exploring the role of weather and sea ice services in European Arctic expedition cruising | In this paper, authors analyse how the expedition cruise tourism sector in the European Arctic Ocean currently uses weather and sea-ice services in various operational decision-making contexts. Findings are based on interviews and social practice theory perspective. Results show that weather and sea-ice services are one of many sources of information relevant to expedition cruise decision-making. Communication technologies are key for the information to become accessible to users for decision-making practices, and efforts that aim to enhance weather and sea-ice services might thus want to seriously consider all various media channels available for their users. Also, it is noted that the supply of environmental information services in Arctic maritime sectors is currently changing: weather and sea-ice services are no longer the only ones used by captains, expedition leaders, and guides but additional e-navigation services may be increasingly used.

Lamers, M., Duske, P., van Bets, L., 2018: Understanding user needs: a practice-based approach to exploring the role of weather and sea ice services in European Arctic expedition cruising. *Polar Geography*. <https://doi.org/10.1080/1088937X.2018.1513959>

19 Upcoming Events

10-14 December 2018

ArcticNet Annual Scientific Meeting
Ottawa, ON, Canada

8 January 2019

*Special Symposium on Catalyzing Innovation in
Weather Science Internationally (part of the 99th
AMS Annual Meeting)*
Phoenix, AZ, United States

14-16 January 2019

*Arctic YOPP Science Workshop – Jointly organized
with IASC*
Finnish Meteorological Institute, Helsinki, Finland

16-18 January 2019

PPP Steering Group Meeting #10
Finnish Meteorological Institute, Helsinki, Finland

2-5 April 2019

*Workshop on Predictability, Dynamics and
Applications Research using the TIGGE and S2S
/ ensembles ([more info](#))*
16 ECMWF, Reading, UK

8-12 April 2019

*PPP Societal and Economic Research and
Applications (PPP-SERA) Meeting #05*
Universidad de Magallanes, Punta Arenas, Chile

22-30 May 2019

Arctic Science Summit Week 2019
Arkhangelsk, Russia

8-18 July 2019

*International Union of Geodesy and Geophysics
(IUGG) General Assembly ([more info](#))*
Session: *First Results from the Year of Polar
Prediction*
Montréal, Canada

4-6 September 2019

*Arctic Futures 2050: Science and Policy for a
Changing Arctic*
Washington, DC, United States

Any news or upcoming events to be announced to
the community? Send an email to
office@polarprediction.net.

The next issue of PolarPredictNews is expected to
be out in November 2018.

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