Dear Colleagues,

Recently our first YOPP Special Observing Period (SOP) in the Arctic came to a successful end. Overall, about 1,900 additional radiosondes were launched from 16 different meteorological stations around the Arctic during the period from 1 February to 31 March 2018. In the coming months, it will be exciting to see what can be learnt from these additional data in terms of improving the Arctic observing system for prediction purposes. Meanwhile, SOP2 is nearing which will also provide improved buoy coverage, especially in the eastern Arctic Ocean.

Providing dedicated datasets to the research community for analysis is an important element of our strategy to improve prediction capabilities in polar regions in the context of YOPP. In this issue of PolarPredictNews, Greg Smith introduces a new dataset provided by Environment and Climate Change Canada (ECCC) which comprises high-resolution Arctic atmosphere-sea ice-ocean forecasts. This dataset will offer an excellent opportunity to investigate forecasts with coupled models on weather time scales!

Furthermore, John Methven and Craig Bishop make the point for using the multi-model ensemble forecast dataset TIGGE in polar prediction research.

Last but not least, I would like to welcome Siri Jodha Khalsa as a new member of the PPP steering group. Siri Jodha will be strongly involved in the planning and implemention the YOPP data component.

Happy reading,
Thomas Jung
After almost six years of planning, the first of the four Special Observing Periods of the Year of Polar Prediction (YOPP) commenced on 1 February. It has been successfully completed on 31 March. During eight weeks, station staff from 16 different meteorological stations in the Arctic launched extra weather balloons, amounting to up to four extra radiosonde launches per day. Numerous national weather services, EUMETNET, and academic research institutions have provided the material and human resources for overall more than 1,900 additional radiosonde launches.

Preparing a weather balloon ascent
In preparation of the ascent, balloons were filled with hydrogen, and a sonde to measure atmospheric conditions was attached on a rope to the weather balloons. On its rise through the atmosphere, the radiosondes monitored temperature, humidity and winds from which properties such as clouds, turbulence, icing, or wind shear can be detected. For an overview of extra radiosoundings during YOPP, including SOP1, please see the kml file for download.

YOPP-endorsed Field Campaigns
In addition to radiosonde deployments from Arctic stations, YOPP-endorsed field campaigns were carried out under challenging winter conditions as part of YOPP-endorsed projects. The Iceland-Greenland-Seas Project (see more under ‘YOPP-endorsed!’) and the OASIS-YOPP project at the Thule Air Base station in Greenland launched extra radiosondes to get additional observational data into the WMO Global Telecommunications Systems (GTS). These projects provide specific data to shed light on key polar processes that need better understanding and representation in weather and climate models. The Iceland-Greenland-Sea Project airborne mission and the campaign MACSSIMIZE have scrutinized processes governing the interaction between the ocean or land surface and the peculiar polar atmospheric boundary layer. Details on these and other valuable YOPP-endorsed projects contributing to the Arctic Winter SOP can be found through the YOPP Explorer.
Improving weather forecasts

These observations will help to shed light on the value of different kinds of measurements for environmental prediction in the Arctic and beyond. Numerical experimentation with these observations and internationally coordinated verification activities, in particular at YOPP Supersites where forecast centres will provide model data in unusual detail, will help understand causes for forecast deficiency and provide guidance for the design of the future polar observing system.

Forecasters at operational weather centres such as the European Centre for Medium-Range Weather Forecasts (ECMWF), the Finnish Meteorological Institute (FMI), or the Norwegian Meteorological Institute used the information from GTS for carrying out enhanced operational predictions. These operational forecasting centres will also carry out so-called data denial experiments in order to provide guidance for the development of the Arctic observing system and thus provide much improved predictions of weather and sea ice conditions for the Arctic and beyond.

Social Media and Picture Gallery

SOP activities, in particular related to extra observations from stations and in the field were shared via the @polarprediction account on Twitter using #polarprediction and #YOPPextraobs. Moreover, all pictures including behind-the-scene information from the station staff members and PIs of YOPP-endorsed Arctic winter field campaigns are available from our website.

02 Arctic Warming to Increase Summer Storminess | (by Jonathan Day, ECMWF) In a paper now published in Geophysical Research Letters, British climate scientists Jonny Day and Kevin Hodges find that

Arctic warming will increase both the number and intensity of storms in Arctic summer.

The dramatic reduction in Arctic summer sea ice has led to an increase in human activity and hence exposure to extreme events in the Arctic. Unlike the mid-latitude storm tracks, which are most active in winter, the Arctic storm track is most active in summer, exactly during the time when Arctic shipping and tourism are on the rise, leading to the obvious question of how climate change will affect the storms themselves. Unfortunately, climate models perform poorly in representing even the basic features, such as the summer maximum in Arctic cyclone frequency. As a result, climate model projections for how Arctic cyclones will change in the future cannot be considered reliable.

Analogue Approach

In a recent paper published in Geophysical Research Letters, APPLICATE scientist Jonny Day from the European Centre for Medium-Range Weather Forecasts (ECMWF) and Kevin Hodges from the University of Reading develop an analogue approach to assess the impact of Arctic warming on Arctic storms, using the ECMWF reanalysis, ERA-Interim, which performs

Difference in mean cyclone track density between the years with the highest land-sea thermal contrast and the lowest (Day and Hodges, 2018).
well in the Arctic. Reanalyses use a combination of computer model simulations and observations to produce a gridded data set constrained by historical observations.

### Heating at Different Rates

Because near-surface air temperatures over the Arctic Ocean and Arctic land areas are heating up at different rates, with the land heating up about twice as fast as the ocean, the authors hypothesize that the increase in coastal temperature gradients will make the Arctic a much more favorable place for future cyclone development. Day and Hodges compare cyclone statistics for years with high temperature contrast between land and at sea against years with low contrast, as an analogue for the effects of climate change. Based on this method, they argue that storms over the Arctic Ocean are likely to become more frequent and more dynamically intense as the Arctic warms, increasing the risk to shipping and other human activities.


### New ECCC High-Resolution Arctic Atmosphere-Ice-Ocean Forecasts for YOPP

(by Greg Smith, ECCC) In support of Environment and Climate Change Canada’s (ECCC) contribution to the Year of Polar Prediction, a new set of real-time high-resolution atmosphere, ice and ocean forecasts over the Arctic are being made available. This includes a new system called the Canadian Arctic Prediction System (CAPS) that has been implemented in experimental mode on 24 January 2018, providing atmospheric forecasts covering a large Arctic domain. The data of this new system, produced over the entire Arctic domain at 3 km resolution for the scientific research goals of YOPP, are also available as of now to users on the MSC Datamart testing data repository at the address: [http://dd.alpha.meteo.gc.ca/yopp/model_caps/](http://dd.alpha.meteo.gc.ca/yopp/model_caps/)

Additionally, forecasts from the Regional Ice and Ocean Prediction System (RIOPS), implemented in experimental mode in June 2016 are also being made available. The model domain covers the North Atlantic from 26N and the whole Arctic Ocean at a resolution of 3 to 8 km. The data are interpolated to a grid in north-polar stereographic projection with 5 km resolution. These data are now available on the MSC Datamart testing data repository at the address: [http://dd.alpha.meteo.gc.ca/yopp/model_riops/](http://dd.alpha.meteo.gc.ca/yopp/model_riops/)

The data for both CAPS and RIOPS will be available on-line during the entire period of the YOPP core phase, namely until mid-2019, which offers an exceptional data base for users interested in Arctic polar regions. Following the first YOPP Arctic Winter Special Observing Period, these two systems will be coupled together.

Please note that these systems are experimental, such that modifications may occur on relatively short notices, and that product availability can not be guaranteed at the same level as for an official operational system.

**Contact:** Greg Smith [gregory.smith2@canada.ca](mailto:gregory.smith2@canada.ca)
04 Operational Support by ECMWF and NRL | (by Emma Pidduck, ECMWF, and Rick Allard, NRL)
The European Centre for Medium-Range Weather Forecasts (ECMWF) and the United States Naval Research Laboratory (NRL) are providing operational support to YOPP-endorsed campaigns.

The European Centre for Medium-Range Weather Forecasts (ECMWF) is an independent intergovernmental organization supported by 34 states. ECMWF is both a research institute and a 24/7 operational service, producing and disseminating numerical weather predictions to its Member States. These data are fully available to the national meteorological services in the Member States. The centre also offers a catalogue of forecast data that can be purchased by businesses worldwide and other commercial customers, as well as provided via research licences. If you are interested in obtaining a research licence to receive real time data, web charts, or archive data to support your YOPP project, then please contact data.services@ecmwf.int providing details of the project to be completed and the parameters and datasets that you require.

Please note that if you are based in a country that is an ECMWF Member or Co-operating State (http://www.ecmwf.int/en/about/who-we-are/member-states), we will not be able to provide data directly to you. You will need to get in touch with one of our catalogue contact points who will be able to discuss with you requirements and costs. You can contact any of the people in the list: http://www.ecmwf.int/en/forecasts/accessing-forecasts/order-real-time-forecasts/delivery-arrangements

Information of the real-time datasets available can be found: https://www.ecmwf.int/en/forecasts/datasets/catalogue-ecmwf-real-time-products

The U.S. Naval Research Laboratory (NRL) is making the pre-operational Global Ocean Forecasting System (GOFS 3.1) sea ice output available to the YOPP community. GOFS 3.1 is a sea ice-ocean prediction system consisting of the HYbrid Coordinate Ocean Model two-way coupled to the Community Ice CodE (CICE) and is forced with the NAVy Global Environmental Model (NAVGEM). 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.

NRL is also running 45-day forecasts with the Navy Earth System Model (NEM) which is a fully coupled atmosphere-ocean-sea ice model (NAVGEM/HYCOM/CICE). Operational NAVGEM 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). See the link below for access to global SubX products.

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Relevant websites:
GOFS 3.1 forecasts for the Arctic and Antarctic: https://www7320.nrlssc.navy.mil/GLbytecomcice1-12/POLAR.html

SubX global ensemble products out to 45 days: http://cola.gmu.edu/kpegion/subx/index.html

05 Using the Multi-Model Ensemble Forecast Dataset TIGGE in Polar Prediction Research | (by John Methven and Craig Bishop, co-chairs of the Predictability, Dynamics and Ensemble Forecasting Working Group of WWRP)

As a living dataset, The International Grand Global Ensemble (TIGGE) presents a golden opportunity for the study of polar weather systems and their predictability during the Year of Polar Prediction. TIGGE is a living dataset comprised of operational global ensemble forecast data from ten weather forecasting centres (Swinbank et al., 2016). The purpose is to
facilitate dynamics and predictability research based on the state-of-the-art global models used in weather prediction. Ensemble methods are used to represent the evolution of uncertainty with time through a forecast. The initial conditions of the different ensemble member simulations are designed to span the uncertainty in the analysis state for the atmosphere, and at most centres, there are also different stochastic parameterization schemes that perturb each simulation as the forecast runs. However, the multi-model aspect of TIGGE is intended to address an additional uncertainty – model error related to the construction of numerical weather prediction models.

Golden Opportunity for the Year of Polar Prediction
TIGGE data have been used for a range of research studies on predictability and dynamical processes. It has also proved invaluable for the development of products for future operational forecasting. Examples include the forecasting of tropical cyclone tracks, heavy rainfall, strong winds, and flood prediction through coupling hydrological models to ensembles. TIGGE has added to our understanding of the dynamics of tropical cyclones, extra-tropical cyclones and storm tracks. However, to date TIGGE has been under-utilised in the study of polar weather systems and their predictability and presents a golden opportunity (Jung and Matsueda, 2016). The Polar Prediction community is therefore invited to consider how TIGGE might be a useful tool in research to improve polar predictive skill. Any suggestions about aspects, such as parameters, that are lacking for polar prediction research, are welcome.

Background
The TIGGE dataset was constructed as a major component of the World Weather Research Programme THORPEX (The Observing System Research and Predictability Experiment) whose aim was to accelerate improvements in forecasting high-impact weather. The dataset extends from October 2006 to the present day and the data from the contributing centres is stored in a common format, using agreed variables and model levels. The National Centre for Medium Range Weather Forecasting, India, has joined as a new contributor this year. TIGGE is not intended for operational forecasting and is therefore released 48 hours behind real time. Users can access the data through two TIGGE data portals:
ECMWF: https://software.ecmwf.int/wiki/display/TIGGE
CMA: http://wisportal.cma.gov.cn/wis/

From the portal, links to the data can be followed as well as to TIGGE research websites and to data portals of the WWRP projects PPP and S2S.

A workshop on predictability, dynamics and applications research using the TIGGE and S2S ensembles will take place from 2 to 5 April 2019 at ECMWF (Reading, UK). Registration and abstract submission opens on 4 June and closes on 30 November 2018. More information can be found here.
Contact: John Methven j.methven@reading.ac.uk

References


06 Start of MACSSIMIZE Aircraft Campaign
(by Chawn Harlow, PI of MACSSIMIZE, The Met Office) The YOPP-endorsed MACSSIMIZE campaign started on 10 March 2018. For 15 days, researchers from the UK and Canada used the FAAM aircraft to better understand how to implement snow radiation into numerical weather prediction models over Canada. British and Canadian researchers were flying out of Fairbanks, Alaska, to study microwave emissivities of snow surfaces over Trail Valley Creek near Inuvik, Northwest Territories, Canada. MACSSIMIZE focuses on improving the use of satellite data assimilated into operational numerical weather prediction
(NWP) models. Data from satellite sounding provide strong constraints on the temperature and humidity profiles within modern NWP models and are the most important measurements needed to determine the flow on the synoptic to global scales. Typically, channels on such sounding instruments are arranged along the wings of an absorption line with channels near the line centre providing information about the stratosphere, and channels further from line centre giving information about atmospheric levels closer to the surface. The channels that penetrate to near the Earth's surface are sensitive to the surface temperature and emissivity, however, so information about the surface is mixed in with information about the lower atmosphere. The surface information needs thus to be separated from the atmospheric information in order for it to be used effectively. Therefore, during MACSSIMIZE different satellite demonstration instruments installed aboard the British aircraft ‘Facility for Airborne Atmospheric Measurements’ (FAAM aircraft) were used to measure emissivities and effective radiating temperatures of snow over Trail Valley Creek. In order to evaluate models that predict surface emissions over snow-covered surfaces, personnel on the ground measured snow properties while FAAM flew overhead measuring the surface emissions. The resultant emissivity models can then be used within NWP to separate information about the lower atmosphere from that pertaining to the surface allowing improvements in the weather forecasts in the polar regions and beyond to the mid-latitudes through teleconnections.

In addition to snow studies, there were two other projects involved with the same above goal to improve NWP forecasts. In the first, Arctic stratus clouds were investigated to better understand their formation and decay. FAAM overflew the United States Department of Energy’s Atmospheric Radiation Measurement (ARM) facility near Barrow, Alaska, to characterize the boundary layer conditions effecting stratus cloud formation. The second additional project focused on flow conditions upstream and downstream of mountain ranges and their impacts on the regional meteorological conditions. For this project, the aircraft flew over the north side of the Brooks Range which provides a nearly linear barrier to a southerly flow. Here the team were looking for hydraulic jumps, roller vortices, preferential flow through gaps and lee-side drying and heating of air.

MACSSIMIZE is a collaboration between the Met Office, Environment and Climate Change Canada, the British and Canadian Universities Wilfrid Laurier University, Université de Sherbrooke, Northumbria University and the Universities of Edinburgh, Leeds and East Anglia, and the United States Department of Energy’s Atmospheric Radiation Measurement (ARM) facility. Operational weather forecasting support was provided by the National Weather Service and Met Service Canada.

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07 Engaging Users of Sea Ice Forecast | A new contribution on ‘Engaging Users of Sea Ice Forecasts’ has been uploaded to the forecast user dialogue platform Polar Prediction Matters (PPM). In this new article, Lawrence Hislop, Executive Director of the global Climate and Cryosphere project ( CliC) of the WMO World Climate Research Programme, describes the outcomes of a workshop that was held during the Arctic Frontiers conference in Tromsø, Norway in
January 2018 (see also 09). A cross-section of sea-ice forecasters from Europe and North America along with key forecast user representatives from the private sector had been invited to Tromsø to discuss issues and opportunities of current sea-ice forecasting systems and how to better meet stakeholders’ needs. See here for the new PPM article.

08 YOPP-SH#3 Meeting – Registration Open
| Registration is open for this year’s 13th Workshop on Antarctic Meteorology and Climate (WAMC) and the third Year of Polar Prediction in the Southern Hemisphere Meeting (YOPP-SH#3) taking place in Madison, Wisconsin, USA. The Antarctic Meteorological Research Center (AMRC) at the University of Wisconsin-Madison invites to participate in the 13th Workshop on Antarctic Meteorology and Climate (WAMC) 16–18 July 2018, which will be held at the University of Wisconsin’s Pyle Center on the shore of Lake Mendota in beautiful Madison, Wisconsin, USA. The third Year of Polar Prediction in the Southern Hemisphere meeting (YOPP-SH#3) will be held following WAMC on Thursday, 19 July 2018.

For the YOPP-SH#03 meeting, project investigators and representatives of national agencies active in Antarctica are invited to provide updates on the current status of planning with regards to the YOPP Special Observing Period (SOP) in the Southern Hemisphere that will be launched during the next austral summer season taking place from 16 November 2018 to 15 February 2019.

Please see the meeting website for more information, including registration and abstract submission. There is a registration fee of $75 to attend both WAMC and YOPP-SH#3. Attending only YOPP-SH#3 on 19 July will be free of charge.

Contact: 13th WAMC—Carol Constanza carol.constanza@ssec.wisc.edu and Matthew Lazzara mattl@ssec.wisc.edu; YOPP-SH#03–David Bromwich bromwich.1@osu.edu & ICO office@polarprediction.net

09 The New Arctic in a Global Context – YOPP Topic at the Arctic Frontiers Science Conference 2018 | (by Kirstin Werner, YOPP Office/Alfred Wegener Institute and Juhyeong Han, WMO intern) From 23 to 25 January 2018, YOPP together with other projects, organized a topic at this year’s Arctic Frontiers Science Conference in Tromsø, Norway, covering a wide range of different Arctic science fields. The Arctic Frontiers Science Conference always stands out as a yearly winter highlight for

The 13th WAMC brings together those with research and operational/logistical interests in Antarctic meteorology and forecasting and related disciplines. As in the past, annual activities and the status of the observing (e.g., Automatic Weather Stations) and modelling (e.g., Antarctic Mesoscale Prediction System) efforts will be addressed, and feedback and results from their user communities are solicited. More broadly, this workshop also is a forum for current results and ideas in Antarctic meteorology, numerical weather prediction, and weather forecasting from contributors around the world. There will be discussions on the relationships among international efforts and Antarctic forecasting, logistical support, and science. Welcome are any papers and posters on these topics.

For the 12th time, the Arctic Frontiers Conference took place in Tromsø this year. View from Fjelheisen mountain by night. (Photo: Juhyeong Han/WMO).
bringing together international Arctic scientists to the very far north, right at the time when the polar night concludes with beautiful polar lights still wobbling across the longlasting night sky and already few hours of beautiful sunshine tinting the neat Norwegian Arctic town into an emotionally inspiring atmosphere. Inspiration was also provided to the ca 600 international Arctic scientists by this year's location of the 12th of a series of Arctic Frontiers conferences. Other than in previous years, when the science part of the conference was organized further uphill at the University of Tromsø campus, for the first time, downtown Tromsø offered a beautiful venue to participants as the meeting was organized in three adjacent hotels located just next to the fjord waterfront and opposite to the nicely illuminated top of mountain ledge Storsteinen to be reached by the Fjellheisen cable car.

Together with other projects APPLICATE, MOSAiC, The Nansen Legacy (see also 11), N-ICE2015, GreenEdge, and BaySys, the YOPP International Coordination Office had organized one of the three topics at this year's Arctic Frontiers Science Conference. The topic ‘The New Arctic in a Global Context’ featured six different sessions where advances in Arctic observations, ecosystem processes, modelling, prediction, linkages to mid-latitudes as well as developments of user engagement were presented and discussed by a very active and committed audience. Keynote speaker David Barber from the University of Manitoba, Canada, set the stage for the many different following speakers and poster presenters by providing thought on the different implications that Arctic sea ice melting can have. Featured talk speakers such as the biologist Letizia Tedesco, the sea ice scientist Ingrid H. Onarheim, the social scientist Machiel Lamers or the climate scientist François Massonnet presented their work and perspectives on the ongoing changes in the Arctic and what may be to expect in the near future. As impacts of severe weather phenomena can be significant on the Arctic environment but also commerce and infrastructure, it will be crucial to develop new methods and tools to predict when and how changes in the Arctic will affect the high latitudes but also densely populated regions such as Europe, Asia, or North America.

The Arctic Frontiers Science Conference was followed by buoyant activity on twitter. Follow the conference retrospectively by checking @polarprediction and @arcticfrontiers.

10 PPP-SERA Open Session | The Polar Prediction Project’s Societal and Economic Research and Applications subcommittee (PPP-SERA) organized an Open Session in cooperation with the European Polar Board. The PPP-SERA task team addresses the social-science and economics aspects of the Polar Prediction Project. Their Open Session entitled ‘Generating Societal Value from Improved Weather, Water & Ice Forecasts in the Polar Regions’ took place on 18 April 2018 and was hosted by the European Polar Board in The Hague, Netherlands. Aims of the session included sharing developments and insights from the Polar Prediction Project and the social science agenda during the Year of Polar Prediction, to provide perspectives on the role and value of Weather, Water, Ice and Climate (WWIC) services from a range of maritime sectors, and to exchange ideas on the societal value of enhanced WWIC services. Please see agenda with more information on the PPP-SERA Open Session here.

11 The Nansen Legacy Project Kicks Off | (by Marit Reigstad, PI of the Nansen Legacy project, University of Tromsø, Norway) From 6-8 March, the YOPP-endorsed project the Nansen Legacy had its kick-off meeting in Tromsø, Norway. 160 participants gathered for the Nansen Legacy project’s kick-off meeting in Tromsø. The aim of this new Norwegian interdisciplinary research project covering a time line from 2018 to 2023 is to gain a holistic understanding of the climate and ecosystem responses to the changing Arctic climate, with a focus on the northern Barents Sea where sea ice conditions have changed considerably over the past decade.
Physical and human impacts on the marine ecosystem will be crucial to the Nansen Legacy project to understand how the past and present are key to address predictive capabilities. Improved ice and weather forecasts for the region are thus one of the main project's goals. The Nansen Legacy will therefore utilize the new Norwegian ice-breaking research vessel Kronprins Haakon to carry out annual and seasonal investigations along a climatic gradient from the central Barents Sea into the Arctic Basin from 2018 to 2022. A seasonal study is scheduled for 2019/20, synoptic to the planned MOSAiC drift. Five cruises are envisaged already this year to collect data related to physical and biogeochemical conditions and processes, in addition to ecosystem studies starting in mid-June.

The Nansen Legacy is a collaboration between ten Norwegian universities, governmental and private institutes with complementary expertise in Arctic research. The financial frame is 740 mill NOK (ca. 77 mill EUR), where 50% is provided as in-kind from the participating partners. It is funded by the Research Council of Norway, and the Ministry of Science and Education. Data will be made accessible through SIOS. The project also links with several international initiatives, including the Year of Polar Prediction.

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12 Statement on Gender Equality for YOPP | Atmospheric scientist and expert on Earth-observing data products Siri Jodha Khalsa from the National Snow and Ice Data Center (NSIDC) has recently joined the Steering Group of the Polar Prediction Project. Siri Jodha S. Khalsa has spent two decades performing science evaluation and algorithm support for data products from NASA’s Earth observing system. As a physicist, he has worked with optical and
Ivan Renfrew is a British atmospheric scientist who is professor of meteorology at the University of East Anglia School of Environmental Sciences. IGP is an atmosphere-ocean project encompassing coupled wintertime observations and numerical modelling. The motivation and overall programme hypothesis for the project is that wintertime convection in the northwest Iceland Sea and southeast Greenland Sea, forced by intermittent cold-air outbreaks, forms the densest component of the Atlantic Meridional Overturning Circulation. The Twin Otter aircraft campaign which was coordinated with a cruise aboard the RV Alliance took place from 31 January to 19 March 2018. 100 radiosondes were launched from the ship, right in time with the YOPP Arctic Special Observing Period. In May, Ian Renfrew will receive the Adrian Gill Prize at the Royal Meteorological Society meeting for his excellence in multidisciplinary meteorological research. Ian was so kind to reply via email to some questions we’ve asked him while he was still aboard the RV Alliance for the IGP campaign.

Dr. Renfrew, you are just returning from two exciting campaigns involving rare winter observations from the aircraft and a research vessel in the Iceland Greenland Seas. What exactly did you spend your time on during the last few weeks?

We have been very busy over the last few weeks as the IGP has featured an aircraft campaign coordinated with a research vessel cruise. On board the ship, we have had boundary-layer profiling wind lidars and radiometers, and we have launched 100 radiosondes as part of YOPP’s ambitions to enhance the sounding network during the Arctic Winter Special Observing Period. We will have flown 70 hours in our research aircraft by the end of the campaign, with several flights coordinated with the ship, either flying patterns over and around it, or sometimes using the ship as an upstream station. This has all taken quite a bit of coordination with regular e-mails exchanged between the aircraft and ship teams to give predicted positions, forecast weather conditions and charts, and outlooks of
both of our observational plans. The coordination has been hampered by intermittent internet on the ship, but we’ve managed.

**What is the goal of the project?**
We are investigating how the atmosphere and ocean interact: where, when and why dense water is created in the Iceland and Greenland seas as a result of atmospheric forcing. We want to obtain observations of atmosphere-ocean processes and then assess their representation in weather and climate prediction models. For example, forecast models struggle with some aspects of simulating cold-air outbreaks such as the surface fluxes, especially around sea ice, and shallow convective clouds and mesoscale weather systems. We aim to improve these model weaknesses using our observational data to improve parameterizations.

**How will IGP contribute to improving Arctic predictive skills?**
Our radiosondes have gone straight onto the GTS and to forecast centres so should have helped improve operational forecasts. As well as launches at 00 and 12 UTC, we have also coordinated additional radiosondes (up to 3-hourly) with our aircraft flights and when there was ‘interesting’ weather. While our plans to assess models and then hopefully test and develop certain parameterizations should lead to better predictive skills in the longer term.

**Who was onboard with you, and where is funding coming from?**
We had 20 people here for the aircraft campaign, around half were here for the whole campaign, some scientists contributed for a week or two. The aircraft campaign was led by the UK: by my team from the University of East Anglia (UEA), and our collaborators at the British Antarctic Survey (BAS) who own and operate the instrumented aircraft. We also had scientists from Bergen, Norway and from Iceland taking part. The cruise was led by Bob Pickart from Woods Hole Oceanographic Institution and Kjetil Våge from the University of Bergen, also with other scientists from Bergen and a meteorology team from UEA and Bergen aboard. We’ve been a pretty international bunch! Funding has also been very international, coming from the UK (NERC), the US (NSF) and Norway (National Research Council) primarily. Coordinating the funding has been one of the challenging aspects of this coupled atmosphere-ocean project.

**Can interested people access the data?**
The radiosonde data has already been on the GTS. All of the meteorological data will be going to the Centre of Environmental Data Analysis (CEDA) when quality controlled.

**What did you like the most during the last weeks’ field work?**
Flying on the research aircraft was a lot of fun and at times with spectacular views and interesting meteorological features. But I have also enjoyed looking at the charts, deciding what to do, and putting together the flight plans. It is necessarily a team effort and quite intense, which makes it all pretty exciting.

**What should the community keep in mind on IGP, and how can everyone stay up-to-date?**
I hope we will make some discoveries about how the ocean-atmosphere system works in this Nordic Seas region and also devise some improvements to forecasting models. Keep an eye out for IGP results at upcoming workshops and conferences. People can follow us on twitter [@IGPResearch](#) and our blog. We also were joined by American, Norwegian and French documentary makers at various times - watch out for their films and radio pieces.
15 Upcoming Events

17–27 April 2018
*Polar Prediction School* on Weather and Climate Prediction in the Polar Regions ([more info](#))
Abisko Scientific Research Station, Sweden

7–9 May 2018
*Polar Prediction Workshop 2018* ([more info](#))
Montreal, Québec, Canada

15–26 June 2018
**POLAR2018 SCAR/IASC Conference** ([more info](#))
Davos, Switzerland

• 19 June 2018 (11 am – 12.30 pm)
  *COMNAP Mini-Symposium* (11.00 am – 12.30 pm)

• 19 June 2018 (12.30 – 1.30 pm)
  *YOPP Side Event at POLAR2018 SCAR/IASC Conference* (12.30 – 1.30 pm)

• 21 June 2018 (2 – 5.30 pm)
  Session AC-3 ‘High-Latitude Boundary Layers and Model Evaluation’ co-convened by Ian Renfrew (PPP Steering Group)/Timo Vihma (YOPP-endorsed project)

19 July 2018
*Third YOPP in the Southern Hemisphere meeting (YOPP-SH#03)* – In conjunction with 13th Antarctic Meteorology and Climate Workshop (16–18 July)
Madison, Wisconsin, USA

14-16 January 2019
*Arctic YOPP Science Workshop* – Jointly organized with IASC
Finnish Meteorological Institute
Helsinki, Finland

2-5 April 2019
*Workshop on predictability, dynamics and applications research using the TIGGE and S2S ensembles* ([more info](#))
ECMWF
Reading, UK

Any news or upcoming events to be announced to the community? Send an email to [office@polarprediction.net](mailto:office@polarprediction.net)

The next issue of PolarPredictNews is expected to be out in June 2018.
First Circular

Arctic YOPP Science Workshop 2019

January 14-16, 2019, the Arctic Year of Polar Prediction (YOPP) Science Workshop will take place at the Finnish Meteorological Institute in Helsinki, Finland.

Jointly organized by the Polar Prediction Project and its International Coordination Office (ICO), the International Arctic Science Committee (IASC), and the Finnish Meteorological Institute (FMI).

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The workshop will bring together YOPP scientists to present and discuss the first results from the Arctic Special Observing Periods in winter and summer 2018, providing a vivid forum for exchange, networking, and interaction. Studies of coupled atmospheric, ocean, sea ice, and land processes will be addressed to share feedback on the latest Arctic observations, modelling and prediction efforts including their benefits to society on time scales from hours to seasonal.

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More information on the workshop including session topics will be announced soon. Please direct any questions to the YOPP International Coordination Office office@polarprediction.net.