

PolarPredictNews

Newsletter #11

June 2019



Hunters at the edge of a polynya in the winter near Cape Dorset, Nunavut, Canada (photo: Gita Ljubicic). In the new blog post on the Polar Prediction Matters website, Gita Ljubicic and Rick Thoman give practical examples how local weather, water, ice and climate information can effectively be disseminated today within Arctic communities. Read more in this issue on page 7 (#05).

Dear Colleagues,

On 1 July 2019, YOPP will enter its third and last phase – the YOPP Consolidation Phase (mid-2019 to 2022). To mark this occasion, three online seminars will be held on 24 and 25 June 2019, which all readers of PolarPredictNews are warmly welcome to attend. On this occasion, it is also planned to issue the third and final version of the YOPP Implementation Plan, which includes a revised description of the YOPP Consolidation Phase, reflecting months of planning by the PPP Steering Group.

YOPPSiteMIP is an important element of the YOPP Consolidation Phase in terms of facilitating novel research and in providing a YOPP legacy. In this issue of PolarPredictNews, PPP Steering Group member Taneil Uttal provides an update on the current state of planning. I would like everyone, who is interested, to get involved. In my view, YOPPSiteMIP has really the potential of providing

a step change in our understanding of coupled processes in polar regions along with the ability of models representing them.

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Following feedback from the community at the YOPP-IASC Arctic Workshop in Helsinki earlier this year, the International Coordination Office for Polar Prediction (ICO) decided to revisit its communication and outreach strategy. An excerpt from the revised strategy is presented in this issue.

With this I would like to thank the YOPP community for their outstanding contributions to the Core Phase; and I am looking forward to an exciting YOPP Consolidation Phase, which should bring us much closer to our common goal: Advanced prediction capacity in polar regions and beyond.

Happy Reading,
Thomas Jung

The Year of Polar Prediction (YOPP) is a major international activity that has been initiated by the 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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The Year of Polar Prediction is moving forward, and so is the restless effort to deliver enhanced prediction capacity in the polar regions. June 2019 will mark the official start of the YOPP Consolidation Phase. During the final three years of YOPP, the data collected during its Core Phase will be made available to the community to improve predictive models and eventually transform these into more reliable products for people living and working in polar regions. The aim is to translate scientific achievements of YOPP into more reliable weather and sea ice forecast services.

Revised YOPP Implementation Plan

While cutting-edge science activities will also underpin the upcoming phase, the challenge for the Polar Prediction Project is to translate the scientific insights gained during the Core Phase into more reliable weather and sea-ice forecast services. In addition to consolidating and synthesising YOPP research and science, it will be necessary to prepare the ground for a post-YOPP structure of coordination and communication so that the work initiated by the Year of Polar Prediction can continue.

To provide guidelines and structures on how to realize these goals, the third version of the YOPP

01 Consolidating Polar Research – Three Webinars and a New Implementation Plan | June 2019 marks the official start of the YOPP Consolidation Phase. On 24 and 25 June, three webinars will highlight the achievements of the Year of Polar Prediction to date and challenges that lie ahead.



The major elements of the YOPP Consolidation Phase with some selected activities (source: YOPP Implementation Plan, Version 3.0).

Implementation Plan will be published in late June. This document updates the previous two versions of the plan, giving detailed descriptions of actions during the YOPP Consolidation, including strategies and objectives in light of the results achieved until now.

Three Webinars

To launch the new exciting period that lies ahead, the Polar Prediction Project (PPP) invites everyone to join three webinars. Participants will be given an overview of the work carried out as part of YOPP so far, and they will have a chance to ask questions about the concluding elements of the Polar Prediction Project.

AWI Webinar

The first webinar, hosted by the Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research (AWI), will take place on Monday, 24 June 2019 from 09:00 to 10:30 UTC. The chair of the PPP Steering Group, Thomas Jung, will provide an overview of the YOPP Core Phase and the plans for the Consolidation Phase. Please [join the AWI webinar on the day](#) from your computer, tablet or smartphone (no prior registration required). If you have any questions, please send an email to: office@polarprediction.net.

ECMWF Webinar

A second webinar, hosted by ECMWF, will take place later that day, from 15:00 to 15:45 UTC. PPP Steering Group member Irina Sandu will talk about how YOPP helps to address challenges in modelling, observations and data assimilation - all key ingredients of numerical weather prediction. Please [join the ECMWF webinar on the day](#) from your computer, tablet or smartphone (no prior registration required).

ECCC Webinar

A third webinar will be run by Environment and Climate Change Canada (ECCC) on 25 June 2019. At 15:00 UTC, PPP Steering Group member Greg Smith will talk about YOPP activities at Environment and Climate Change Canada (ECCC) and efforts toward improved sea-ice forecasting. To join the live stream at ECCC, use the connection details below. Any questions can

be directed to Gregory.smith2@canada.ca.

Video only:

<https://pwgsc-nh.webex.com/meet/Gregory.Smith2Canada.ca> | 558537926

Audio:

Join by phone

1-877-413-4791 Call-in toll-free number (US and Canada)

1-613-960-7515 Call-in number

279 263 6 Attendee access code

02 Update from the YOPP Supersite Model Intercomparison Project (YOPPsiteMIP) |
(by Taneil Uttal, National Oceanographic and Atmospheric Administration, Boulder, Colorado, and YOPPsiteMIP Team) **The YOPP Supersite Model Intercomparison Project is using observations from YOPP Supersites for process-level assessment of numerical forecast models in the Arctic and Antarctic.**

During an informal lunch in March 2017, a modeler and an observationalist discussed how observations made during the Year of Polar Prediction are best used to understand the sources of forecast error in polar regions. When it came to coffee and dessert, the YOPP Supersite Model Intercomparison Project, in short YOPPsiteMIP, was born (see an earlier article on YOPPsiteMIP [here](#)). Since then, a team of modelers, observationalists and data scientists drawn from members of the YOPP Task Teams have been working on the complex details of synergistically combining information from Arctic Observatories and Numerical Weather Forecasts to further our understanding of the mechanisms of the Arctic environment and to assess models' forecast skill. While the concept of model intercomparisons or model-observation comparisons are certainly not new, there are novel challenges associated with the YOPPsiteMIP activity: (1) the focus is on coupled Numerical Weather Prediction (NWP) models, assessing their performance on a process level in the polar environments, which requires the development of consistent, single grid-point, model time-step outputs from different NWP centers; and (2) the observatory data, which

includes variables originating from scores of instruments, researchers, institutions, archives and portals, need to be organized into consistent merged observation data files. The activity is open to regional and global climate models, as it is interesting to statistically evaluate the fast physical processes in them as well. We anticipate finding common issues across models, in particular regimes that through analysis can be attributed to certain processes/parameterizations which can then be tackled in community efforts.

Developing Detailed Recipes

The immediate goal is to develop detailed recipes for both the model and the observation outputs for ten to twelve land-based observatories encircling the Arctic Ocean (www.iasoa.org), for several research ship cruises, and for the September 2019 to October 2020 [MOSAiC expedition](#). MOSAiC provides an extraordinary opportunity to extend the YOPPSiteMIP exercise both geographically to the Central Arctic Ocean but also thematically to the ocean-sea ice-ecosystem component. The terrestrial ecosystem and human-factors components will be further expanded by the complementary [T-MOSAiC program](#). Importantly, the YOPPSiteMIP model and observation output recipes will be equally applicable to develop interoperable model and observation data sets for the YOPP Southern Hemisphere programs, not to mention non-Arctic locations where intensive, co-located, surface observations are available.

Unique Datasets to Understand Coupled Small-Scale Processes

It is expected that the unique YOPPSiteMIP datasets of model time-step output and multi-variate high-frequency observations will enable detailed analysis of how the effects of the coupling of the atmosphere, ocean and cryosphere emerge very rapidly through fast, small-scale processes. For instance, the YOPPSiteMIP enterprise of looking at fast processes (including tendencies) at model time steps (commonly about

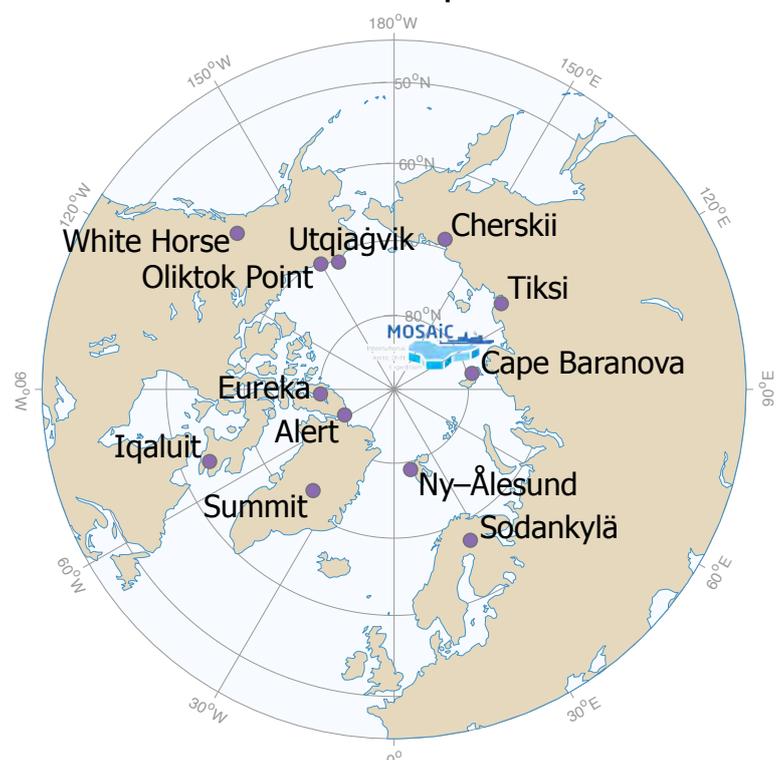
10 min) evaluated using observational data (cadences as fast as 1 min) will allow researchers to differentiate between local and large-scale transport processes in the Arctic environment. It will also help reveal how errors in fast processes accumulate into the biases seen in forecasts of user-relevant properties like 2-m temperature.

A working online document is currently the basis for the YOPP model and observations output recipes. It shows the evolving progress in developing YOPP protocols for date/time and location representation, variable names and units, file identification conventions, metadata, and how individuals and institutions will be properly cited and credited. Guidance is being provided by the data scientists of the [IASC Arctic Data Committee](#).

If you are interested in participating in the YOPPSiteMIP development or in previewing the online document, please contact Taneil Uttal Taneil.Uttal@noaa.gov or Gunilla Svensson at gunilla@misu.su.se

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YOPP Arctic Supersites



Observations from YOPP Arctic Supersites will be used in conjunction with coupled NWP models to assess the model's forecasting skill (map: Taneil Uttal/Leslie Hartten, NOAA)

03 Sending Weather Balloons from a Tiny Island | (by Vicki Heinrich, BoM Australia)

Around ninety extra weather balloons were released from Macquarie Island during the YOPP Special Observing Period in the Southern Hemisphere.

On Macquarie Island, we release two weather balloons every day, 365 days of the year. This is part of the scientific data collection carried out by the Australian BoM staff. The launch of a weather balloon provides a glimpse of the atmosphere above Macquarie Island. The balloon carries aloft a radiosonde, a box with sensors, and an antenna that sends back temperature, humidity, pressure and GPS data every two seconds for roughly two hours. These data tell us something about the cloud height and thickness, wind speed and direction, and the movement of the air mass.

One day the air might be a freezing southerly travelling up from Antarctica, the next we have a warm north air mass, delivered from Australia. All this information is processed, quality controlled on site, and sent to Australia.

From Melbourne Around the World
From Melbourne, the data are sent around the world to various meteorological centers for input into their super-computers and weather models. Shared through the World Meteorological Organisation (WMO), data are collected from around 1,300 upper air (weather balloon) sites world-wide.



Balloon release on Macquarie Island (Photo: Vicki Heinrich).

Most large meteorological offices (like the Australian BoM) have their own models for their country and geographic area. Forecasters use forecasting models to provide public weather and aviation forecasts, while the climate outlooks are based on climate models. Additional uses for the data include climate change monitoring and research. The Bureau of Meteorology stores the data as part of the climate record.

Tiny Island in a Big Ocean

Macquarie Island is important, as there are not many other places in the world that collect data at 54° South. We are a tiny island in a big ocean, that is, a location of high-quality weather data in an area with minimal observations. We are therefore part of the Global Climate Observing System Upper Air Network (GUAN). This means, once a day we attempt to reach a balloon burst height above 5 hpa (ca 35 km). The hydrogen-filled balloons are latex and stretch in the thinning atmosphere as they rise, until eventually they pop.

This summer we have been participating in the Year of Polar Prediction – Southern Hemisphere (YOPP-SH) Special Observing Period (SOP) from 16th November 2018 to 15th February 2019 with one additional daily balloon release at Macquarie Island and one to two extra flights a day from the Bureau of Meteorology’s Antarctic stations. The extra data collected from Macquarie Island during YOPP-SH SOP will be used for numerical model



Map: Australian Antarctic Division.

experimentation and internationally coordinated verification activities, as well as for forecast evaluation and observational impact studies. The extra measurements will help identify ways to improve the prediction systems and develop more accurate and reliable forecasts.

This article has been modified from the original article published at antarctica.gov.au

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04 SIPN South: Evaluation of Seasonal Sea Ice Forecasts for the Southern Ocean

| (by François Massonnet, Université catholique de Louvain, Belgium)

Almost 200 forecasts were submitted in late November 2018 to the SIPN South initiative to predict the sea-ice conditions of the following austral summer.

While in the test season summer 2017-2018, the unusual ice retreat in the Ross Sea was successfully predicted by a dynamical model, during the last summer, it were statistical forecast models that had a lower prediction error, and thus predicted more successfully.

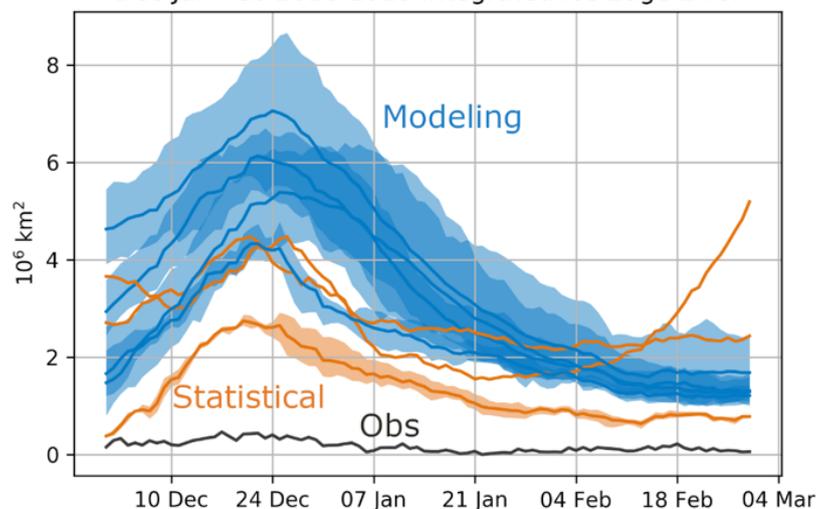
A triple aim motivated the launch of the Sea Ice Prediction Network South (SIPN South) in 2017: the increasing need for sea-ice information in the Southern Ocean, the existence of predictability mechanisms for summer sea ice recently suggested in the scientific literature, and the lack of knowledge regarding the skill of state-of-the-art operational forecasting at the seasonal time scale. The long-term objectives of SIPN South, which is one of the flagship activities of YOPP in the Southern Hemisphere, are to identify research institutions, governmental agencies or even individuals that can conduct such forecasts regularly (once to twice a year) and to archive these forecasts in a centralized database, to lay the foundations for a more systematic assessment of predictive skill in the coming years.



Twelve Groups, 198 Forecasts

A [call](#) for contributions was issued to the polar community in late November 2019, wherein forecasts of Antarctic sea-ice area and concentration were requested for each of the ninety days of the period 1 December 2018 to 28 February 2019. The period was chosen to align with the YOPP Southern Ocean [Special Observing Period](#). Twelve groups responded to the call and contributed, altogether, a total of 198 forecasts. Two types of forecasts were submitted: forecasts based on dynamical models and based on statistical models trained on past observational data. This year, statistical forecasts tended to provide a lower prediction error than dynamical ones, both for the total sea-ice area and the regional patterns of the Antarctic sea-ice area (Figure above). Initial analyses revealed that dynamical models struggled to forecast the [rapid ice retreat in December](#), and most of them overestimated the ice concentration already at Day 1 of the forecasting period. This finding illustrates the challenges in initializing sea ice in coupled ocean-sea ice-atmosphere models. At this stage, however, it cannot be concluded that statistical models are systematically superior

Dec-Jan-Feb 2018-2019 Integrated Ice Edge Error



Integrated Ice Edge Error (IIEE, [Goessling et al., 2016](#)) of the SIPN South forecasts. The IIEE is a measure of the spatial mismatch between a forecast and an observational reference (here, the [NSIDC-0081](#)), with higher values indicating larger errors. To gauge the possible importance of observational uncertainty in the evaluation, the IIEE was applied to an alternative observational reference ([OSI-401b](#)).

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to dynamical models. Last year (summer 2017-2018), the unusual ice retreat in the Ross Sea was successfully predicted by a dynamical model but missed by statistical ones.

Outlook

SIPN South now enters its final consolidation phase. A synthesis of the two coordinated forecasting exercises will be presented at the [fourth YOPP-Southern Hemisphere meeting](#) in June. The writing of a scientific paper is underway to materialize the efforts undertaken by the SIPN Leadership Team and all contributors during the past two years. While SIPN South formally ends in mid-2019, it is anticipated that the project will continue to coordinate forecasts for the future austral summer seasons, given the positive interests that it has generated so far. In addition, even if these forecasts cannot be used reliably yet for applications like field trip planning or navigation, they are invaluable to guide future research in Antarctic sea-ice prediction. As SIPN South aims at achieving the highest quality standards in terms of data availability and reproducibility of the results, both forecast data and scripts to create the figures presented in reports, posters, and presentations are publicly available from an online [repository](#).

Contact: François Massonnet francois.massonnet@uclouvain.be

05 Giving the People What They Want | In the new blog post on the Polar Prediction Matters website, Rick Thoman from Fairbanks, Alaska, and Gita Ljubicic from Ottawa, Canada, give practical examples how local weather, water, ice and climate information can effectively be disseminated today within Arctic communities. Residents' needs in the North American Arctic are often very different from standard services on weather and ice conditions that have historically been provided in lower latitudes. In this new contribution to Polar Prediction Matters, Rick Thoman and Gita Ljubicic write about their experiences with Indigenous and northern residents who often consider sea ice as a platform for travel, subsistence, and economic activities such as hunting and fishing. Anticipating rapid changes of winds and the sea ice breaking off the floe edge is thus key for community members who make decisions about when or where to travel. Modern communication of weather and ice information is particularly challenging in northern North America due to limited bandwidth and unreliable Internet connectivity. The authors provide best-practices examples how to connect with local residents via traditional radio, newspapers, and social media.

Read the full article on the Polar Prediction Matters website [here](#).

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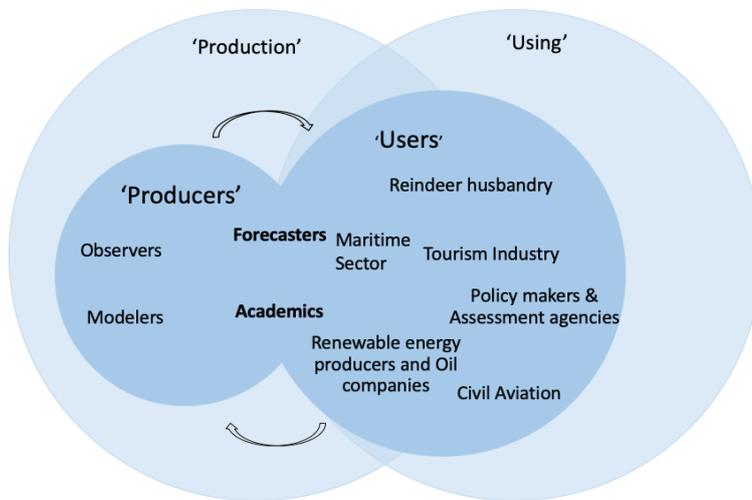
Gay Sheffield and Rick Thoman in Nome



Little Diomed Tribal Office

Communities with unreliable and low band-width internet still need weather and climate information. Gay Sheffield (NOAA SeaGrant) and Rick Thoman (ACCAP) talk by phone with community residents at Little Diomed, Alaska to review the winter 2018-19 sea ice outlook (photos, left to right: Gay Sheffield, Opik Ahkingha).

06 Master Thesis about YOPP Forecast User Groups | (by Kim Schnackenberg and Sara Pasqualetto, Alfred Wegener Institute) A master thesis research carried out in the Environmental Policy Group of Wageningen University in the Netherlands examines the groups of forecast users



The different (end)-user-groups and producers within the Year of Polar Prediction's-endorsed projects: The academic community as well as the forecasting centers are usually perceived as producers, but in the light of YOPP they are also an important (end-)user group of YOPP-endorsed projects output. By some of the (academic) 'producers', forecasters may also be perceived as users, but usually more frequently seen as partners (source: Hooghiem, 2019).

from Arctic YOPP-endorsed projects.

The title of the thesis by Marijn Hooghiem was 'User-engagement in developing improved weather information, predictions and forecasting services in the Arctic'. Supervised by the PPP Steering Group member and co-chair of the [PPP-SERA Task Team](#) Machiel Lamers, this work focused upon user-engagement in selected YOPP-endorsed projects.

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Since 2015, projects, programmes and initiatives that contribute to the aims of the Year of Polar Prediction have been invited to request [YOPP endorsement](#). In the meantime, more than eighty projects have been endorsed by YOPP (see [list](#) of all YOPP-endorsed projects). The main objective of the master thesis was to investigate how forty selected Arctic YOPP-endorsed projects involve societal applications. From the projects' descriptions, Marijn Hooghiem identified and conceptualised specific user groups for each of the project. In addition, she analysed results from a focus group discussion that took place as part of the IASC-YOPP Arctic Science Workshop in January 2019 at the Finnish Meteorological Institute in Helsinki.

What is a 'User'?

Because the term 'user' is rather ambiguous, it is very difficult to clearly identify user groups. Users can be defined as 'those who can do something with a product and those that do something to the product' (Hooghiem, 2019). Moreover, user groups can be classified based on geography or practices (i.e., academia,

operational centres etc.). In her study, Marijn analysed the description of the endorsed projects to identify one specific user group for each of the forty projects.

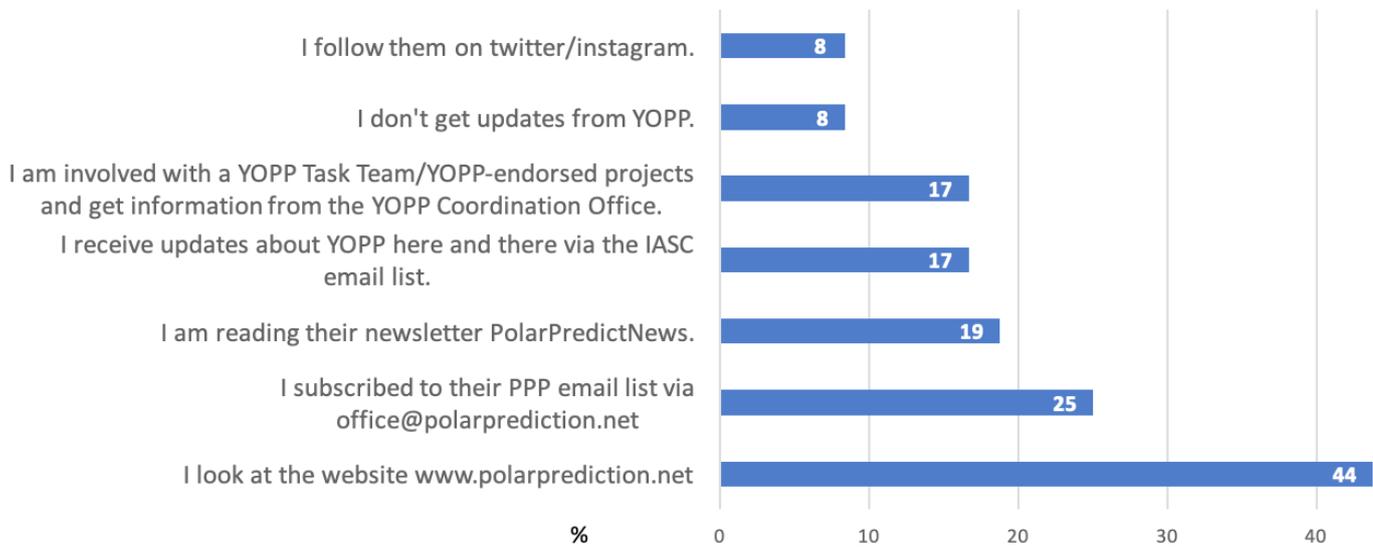
Academia Identified as Largest User Group

While YOPP reaches out to the science community, it also involves various operational centers and different societal and economic groups using polar forecast in their daily operations. However, the largest user group identified from the selected YOPP-endorsed projects is the academic community, using advances of polar predictive skill in their research campaigns or verification and modelling studies.

In light of the results from the analysis of YOPP-endorsed projects and the focus group discussion, the master thesis suggests to continue engagement with the different actors within YOPP to further increase the level of user engagement.

Contact: Marijn Hooghiem machooghiem@gmail.com or office@polarprediction.net.

07 YOPP Survey – YOPP-IASC Arctic Workshop and Communication | Results of an online survey in the aftermath of the YOPP-IASC Arctic Science workshop in January showed overall positive impressions of participants. Preferred channels for receiving information about YOPP are the PPP website and Mailing List. Survey responses indicate that information about the available YOPP Dataset need to be better targeted.



How do you receive updates on activities and news about the Year of Polar Prediction (multiple choices allowed)? (YOPP Survey, Question 9)

The results of the online survey following up from the YOPP-IASC Arctic Science workshop that was held from 14 to 16 January 2019 at the Finnish Meteorological Institute (see [here](#) for more information) has been initiated by the International Coordination Office (ICO) to gain feedback by the YOPP community about the organization and logistics of the workshop, as well as on the effectiveness of YOPP communication through the various YOPP media channels. In particular, the ICO was interested to see how aware is the YOPP community about the currently available YOPP Datasets linked through the YOPP Data Portal (<https://yopp.met.no/>). Results of the second part of the survey fed into the review and evaluation of the current YOPP Communication Concept (see [#08](#)) in preparation of the YOPP Consolidation Phase.

In general, the 48 workshop participants who responded to the survey were satisfied with the YOPP-IASC Workshop and appreciated information flows prior and during the workshop, as well as the length and format of the meeting with a mixture of keynote lectures, science sessions, poster presentations and breakout discussions in a world café style. More than half of the respondents rated the quality of the oral and poster presentations during the workshop as excellent. Breakout sessions were rated good to fair by more than half of the respondents but

could be improved by e.g., 'more time to ask questions'. Other recommendations included less parallel sessions to be placed right at the beginning of the workshop instead of starting the workshop with keynote lectures. More time for discussions during science sessions could also further the networking character of a potential similar workshop in the future.

YOPP Communication

With regard to YOPP Communication, survey results clearly indicate that the majority of respondents receive their information about YOPP from the website and the PPP Mailing List (see figure above). Social Media platforms Twitter and Instagram are less well used amongst the survey participants. Many participants learned about YOPP by colleagues, or they are involved in one of the more than eighty YOPP-endorsed projects. In particular, respondents indicated they would like to see more information about the currently available YOPP Datasets and upcoming observations and campaigns.

Information on YOPP Datasets

Those who were already familiar with the YOPP Datasets indicated difficulties in using as well as in retrieving, selecting and assessing the data. Many of the respondents only learned about the YOPP Dataset during the workshop itself. With the start of the YOPP Consolidation Phase in July

2019, the communication strategy for YOPP will be revised. Results from this survey has been taken into account for the YOPP Consolidation Phase Plan that is currently finalized as part of a new version of the YOPP Implementation Plan. A better targeted communication of YOPP-related information will make sure to address the YOPP community with all relevant information through their preferred channels of communication.

08 Communication Revised | The International Coordination Office has revised its communication concept for the upcoming Consolidation Phase, developing a strategy that will give life and faces to frontier science within YOPP. With the revised communication concept, relevant and important content regarding YOPP is going to be addressed via ongoing activities and shared with the entire community as well as the wider public. In the Consolidation Phase, a new concept will be implemented to address an even wider range of people with new, more focussed contents.

10 As well, we will seek to present the people
/ behind the project and credit the efforts that our
21 community carries out. To ensure that everyone involved with the Year of Polar Prediction is well-informed, the ICO provides information via various communication channels:

Website www.polarprediction.net

Our recent analysis of YOPP Communication through the survey (see #07) shows that the PPP Website is core of the YOPP communication with a steady daily traffic and up to almost 5,000 visits only the during the first half of this year. The Website will be optimized in the nearest future, for an even better overview of the project.

Polar Prediction Matters <https://blogs.helmholtz.de/polarpredictionmatters/>

Hosted by the Helmholtz Association, Polar Prediction Matters (PPM) is a special dialogue platform from users of polar environmental forecast services reaching out to the providers of these services and products. As the articles provide interesting insights on the perspectives of forecasts' users, we aim to disseminate the content even wider to academia and operational forecasting centers. Share your stories and thoughts on forecast user requirements with office@polarprediction.de to be included to the PPM Blog.

Mailing Lists

The PPP mailing list, used to provide regular updates about YOPP activities and additional developments, job announcements etc., is now partially managed through the platform Mailchimp, to enhance visibility and optimize the coordination and management of the list. In addition, there are mailing lists for YOPP-endorsed projects, the YOPP in the Southern Hemisphere community, the YOPPSiteMIP activity, and the community working with forecast user requirements. To be subscribed to any of these lists, please send an email office@polarprediction.net.



WMO Polar Prediction Project: Year Of Polar Prediction

The [YOPP YouTube](#) channel features the YOPP animation video as well as interviews with YOPP scientists who provide an easy-to-understand overview about the project.

Social Media

Nowadays, social media platforms have become crucial for an effective communication to reach out to everyone involved. This is also true for the communication within the Year of Polar Prediction. With almost 1,300 followers, our Twitter account [@PolarPrediction](https://twitter.com/PolarPrediction) stands as the main social media channel. Twitter will continue to play an important role during the YOPP Consolidation Phase as a vehicle for live updates and news on important events such as the start of the MOSAiC drift in September and another two YOPP Special Observing Periods.

The Instagram profile [@polarprediction](https://www.instagram.com/polarprediction) has shown a high potential since we went online in March 2018. Currently, there are more than 300 followers, thanks to the beautiful pictures we received from you, the YOPP community, during the Special Observing Periods in 2018 and early 2019. These photographs give a lively face to the observations carried out in the Arctic and Antarctic, and make the activities within YOPP also visible beyond the involved YOPP researchers.

By the way: Did you know there is a [YOPP YouTube](#) channel? The YOPP animation video, and interviews with YOPP scientists provide an easy-to-understand overview about the project.

09 The Arctic Ship Traffic DataBase | The Arctic Ship Traffic Database (ASTD) has been launched by the Arctic Council Working Group Protection of the Arctic Marine Environment (PAME) in February 2019. Aim is to collect and distribute up-to-date information on shipping activities in the Arctic. An Interview with the PAME Executive Secretary Soffia Guðmundsdóttir (Iceland).

Dr. Guðmundsdóttir, what is the Arctic Ship Traffic Database?

ASTD is a significant step by PAME to reduce the knowledge gap of circumpolar ship traffic in the Arctic. With the current changes in the Arctic sea-ice extent and projected changes including an increase in Arctic shipping, the database will allow the Arctic Council to be at the forefront of monitoring trends and assessing any changes for

use in its studies, assessments and analyses. Based on ASTD data, recommendations can be developed to enhance Arctic marine safety and support protection of Arctic people and the environment. ASTD seeks to further the work of the shipping database developed in 2005 for the release of the Arctic Marine Shipping Assessment Report (AMSA 2009), albeit with the application of more advanced technology for data collection and presentation.



Who will have access to the ASTD data?

PAME and the Arctic Council will use the data from the system to conduct analyses and develop projects that will benefit many different activities across working groups. The participating countries Canada, Denmark, Finland, Iceland, Norway, Russia, Sweden and the U.S. will have access for their own research and analysis, while others can gain access to the system upon request.

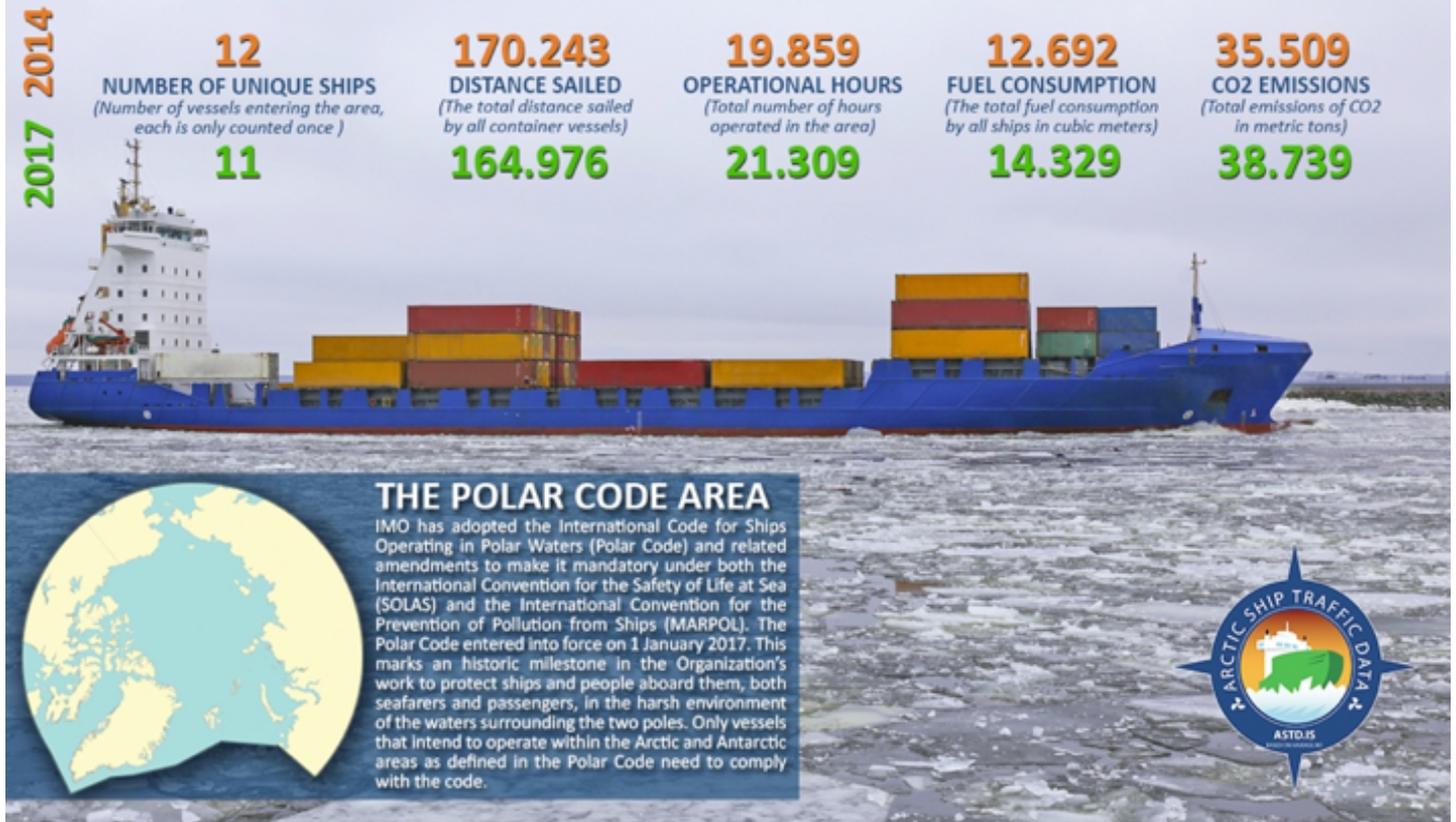
What is in the data?

The project collects data on the numbers and location of vessels operating in the Arctic, their routes, speed, and types. In addition, environmental information such as the sea ice extent are monitored through ASTD. We have a wide range of historical information, including ship tracks by fifty different ship types including oil tankers, cruise ships and container ships; information on the number of ships in over sixty ports and communities across the Arctic; detailed measurements on emissions from ships; shipping activity in specific areas (e.g. the Exclusive Economic Zone, Arctic Large Marine Ecosystems, and the Polar Code area); and fuel consumption by ships. These data can be compared and follow trend month by month or year by year.

How does ASTD contribute to improving the number of data and its quality in the Arctic?

The lack of high quality data on shipping

CONTAINER SHIPS IN THE ARCTIC POLAR CODE AREA COMPARISON BETWEEN 2014 AND 2017



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The Arctic Shipping Database aims to reduce the knowledge gap of circumpolar shipping traffic in the Arctic Ocean by collecting and distributing information on Arctic shipping activities. While the database also contains historical data, modern shipping information is regularly updated by PAME (Figure: PAME).

activities was one of the main drivers of this project. It will allow for ease of access for many entities, including governments, academia and research institutions of reliable and detailed data.

Who leads the effort within PAME?

USA and Norway are the project leads. Designated experts from each state are responsible for the project development. They are supported by the PAME Secretariat and a team of experts. The database itself is designed and hosted by the Norwegian Coastal Administration. The PAME Secretariat is the administrator, and oversees access to the database and other aspects.

Are there any challenges you are currently facing?

The data is very comprehensive, and we are

just starting to give out access. The project has been in development for several years and we are already looking into improvements. ASTD will continue to grow and use of its data and capabilities has already been planned in several projects. Amongst main challenges is to continually develop and maintain the system which is very comprehensive. Several aspects can be added to the system and will be in the near future. However, PAME is excited about its use and is extremely proud of ASTD. We believe that it will benefit greatly and will lead to a better understanding of shipping activities in the Arctic.

10 Training on Northern Hemisphere Weather and Climate Predictive Capability | YOPP, in collaboration with APPLICATE, the Association of Polar Early-Career Scientists (APECS) and other partners will run a



Co-funded by the Horizon 2020 programme of the European Union



free online course “Advancing Predictive Capability of Northern Hemisphere Weather and Climate” in fall 2019. The online course is designed for early-career researchers (e.g., Master and PhD students, and Postdocs) with a specific interest in Arctic weather and climate prediction and modelling. Various webinars from September to December 2019 will provide an overview of the state-of-the-art knowledge of northern high-latitude weather and climate predictions, including aspects relevant for the Arctic climate system; linkages between Arctic and mid-latitude/global weather, and specific challenges of Arctic climate prediction and modelling. An important aspect of the course is the engagement of stakeholders who are using weather and climate predictions in their daily operations. The registration for either the entire course or separate sessions is now open. For more information, including the preliminary course syllabus, please visit the [APECS webpage](#).

11 YOPP Supports MOSAiC School | During the first leg of the MOSAiC expedition, the MOSAiC School 2019 will take place on board the support icebreaker RV Akademik Fedorov. YOPP supports an early-career scientist and a lecturer to join the school. RV Akademik Fedorov will support the German research icebreaker RV Polarstern for six weeks on its way into the central Arctic. During the transit into the ice in September and October this year, twenty early career scientists will be aboard the vessel to attend lectures, workshops and hands-on exercises on e.g., Arctic atmosphere, sea-ice and ocean conditions. Once arrived in the Arctic, MOSAiC School participants will support the MOSAiC teams to set up the distributed regional network of observational sites within an area of up to ~50 km distance from RV Polarstern. On their way back to Tromsø, students will be given another set of workshops and practical exercises, this time on media and outreach. Each participant

will work on an individual communication project to prepare becoming a MOSAiC ambassador after returning from the cruise. Master student Thea Schneider from the University of Potsdam will attend the school as an early-career scientist. As a lecturer, Thomas Rackow from the Alfred Wegener Institute will provide insights to climate and sea-ice modelling to school participants. Both will be supported by YOPP to join this floating training aboard RV Akademik Fedorov.

12 PAMIP Workshop in Exeter | (by Tido Semmler, Alfred Wegener Institute) **From 24 to 27 June 2019, a workshop will take place in the surroundings of Exeter (UK) to share and discuss first results of the Polar Amplification Model Intercomparison Project (PAMIP).** Since it is well known that the Arctic and also the Antarctic peninsula are undergoing rapid change since a few decades, an important question is how the mid-latitude weather and climate may be affected. The need for a coordinated modeling project on this topic is evident and has been expressed at various workshops and conferences, for example the 2017 Workshop on Arctic Change and Its Influence on Mid-Latitude Climate and Weather in Washington, DC. The result is the Polar Amplification Model Intercomparison Project which is endorsed by the Coupled Model Intercomparison Project 6 (CMIP6). In this project, at least eight modeling centers worldwide are currently carrying out and evaluating model simulations according to a common protocol (, see more by [Smith et al., 2019](#)). The YOPP-endorsed European Horizon2020 project [APPLICATE](#) is one of the leading projects contributing to this effort. **Contact:** Doug M. Smith doug.smith@metoffice.gov.uk

13 Polar Prediction Workshop 2019 | The sixth Polar Prediction Workshop took place from 24 to 26 April 2019 in Norman, Oklahoma. Organized by the University of Oklahoma and the Cooperative Institute for Mesoscale Meteorological Studies (CIMMS), the workshop brought together a diverse community of researchers and users of forecast products. The participants discussed the current state of knowledge of both polar processes and predictive skill as well as how weather and climate changes

can impact the society and socio-economic decision-making. More about the workshop can be found [here](#).

14 EC-PHORS – From Science to Service | End of March, the Executive Council Panel of Experts on Polar and High-mountain Observations, Research and Services (EC-PHORS) discussed how polar prediction research findings will become operational

during the YOPP Consolidation Phase. The ninth session of EC-PHORS took place from 27-29 March 2019 at the WMO headquarters in Geneva, Switzerland. As a crosscutting panel of the World Meteorological Organization (WMO), EC-PHORS provides guidance to relevant national and international programmes in the Antarctic, the Arctic, and the high mountain regions. The Polar Prediction Project is one of the WMO activities overseen by EC-PHORS to meet global needs and requirements for meteorological observations, research and services in the polar and high mountain regions.

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21

The meeting focused on framing the EC-PHORS agenda in view of the next WMO Financial Period (2020-2023). Improving the linkages between research results and operational services was central to the discussions for the Polar Prediction Project (PPP) currently moving into its Consolidation Phase. Amongst others, the EC-PHORS panel recommended to examine how to apply the new knowledge from PPP to develop a service interface. It will be key for developing a YOPP Legacy for the operational centres to retain the full YOPP model archive, including the YOPPsiteMIP and MOSAiC model data, until at least the end of 2022, if

not beyond. More information on the EC-PHORS meeting can be found [here](#).

15 PPP-SERA Meeting in Chile | The fifth meeting of YOPP-involved social scientists took place from 8–12 April in Punta Arenas, Chile. As last year, during an Open Session the group engaged with local stakeholders and operators in polar waters.

For the fifth time, the YOPP Task Team on Societal and Economic Research and Applications (PPP-SERA) met to further advance user-related activities during the Year of Polar Prediction. As YOPP is soon moving into its Consolidation Phase, the discussions focussed on the detailed planning and development of the local Weather & Society workshop series that PPP-SERA will hold in the coming years with the aim to discuss how improved numerical modelling predictions can be translated into reliable and applicable services for operations in the polar regions.

This year, the University of Magallanes hosted the meeting in Punta Arenas, Chile, which is one of the closest gateways to Antarctica, with more than twenty countries operating out of Punta Arenas



The same week, the PPP-SERA Task Team met in Punta Arenas, Chile, the German research icebreaker RV Polarstern had a supply stopover in town. Punta Arenas is one of the closest gateways to Antarctic peninsula with more than twenty countries operating out of Punta Arenas each year (photo: Emma Stewart).



Open Session of the YOPP Task Team on Societal and Economic Research and Applications (PPP-SERA) at the University of Magallanes in Punta Arenas, Chile. Members of the Chilean National Weather Service, the Chilean Navy Weather Service and the Argentinean Weather Service presented the current state of environmental forecasting services for operating in the Antarctic Peninsula region and the Southern Ocean. (photo: University of Magallanes).

each year. As during the last annual meetings, the PPP-SERA task team again organized an Open Session to create a dialogue among social science researchers, environmental forecasters and end-user groups.

Travelling to Antarctica

The Open Session on 10 April entitled 'Travelling to Antarctica: A conversation with providers and users of Antarctic environmental forecasting services to improve the safety of operational, touristic and research activities' gathered representatives of providers of environmental forecasting services and end-users. Members of the Chilean National Weather Service, the Chilean Navy Weather Service and the Argentinean Weather Service presented the current state of environmental forecasting services for operating in the Antarctic Peninsula region and the Southern Ocean. These forecasting services provide products ranging from current meteorological conditions observed at Antarctic stations to specialized weather forecasts for aviation in coded format and public forecasts for general users in clear text and using well-known weather icons. It became clear during the following discussion that these important resources might

not be very well known among many of the Antarctic operators. One reason for this lack of awareness could be that this information is not easy to find on the forecasting services' websites.

High Variability of Weather and Ice

In addition, while emphasizing that logistic and field operations rely on good forecasts, end users, such as the air force, the navy and the research community, indicated difficulties and uncertainties associated with the high variability of the weather and ice conditions in Antarctica. To minimize such uncertainty, information provided by intermediary private companies (e.g., Windy.com) are used in addition to those from national services. Governmental organizations such as National Weather and Hydrological Services (NWHSSs) are therefore not the only providers of weather and sea-ice information. Rather, environmental information is also provided by private organizations, which is sometimes easier to access online and through mobile phone apps than the information provided by NWHSSs. To overcome this, the NWHSSs should have specific websites and apps with polar information that is equally easy to access and recognize as those offered by private providers. Difficulties in

communicating and accessing information also persist due to the restrictions on bandwidth limit in the high southern latitudes, reducing the information that can be received by ships and field research camps. Since the reliability of the information provided to the users is critical for planning and operating in the field, closer relationships between governmental and non-governmental environmental service providers are needed. A report of the PPP-SERA meeting will be published in the coming weeks [here](#). The text has been modified from Carrasco and Uribe (2019) published in the [Polar Journal](#) 9(1).

16 Third Pan-Arctic Regional Climate Outlook Forum | (by Riina Haavisto, Finnish Meteorological Institute) **The third 'Pan-Arctic Regional Climate Outlook Forum' (PARCOF) was held in Rovaniemi, Finland, on 8 to 9 May 2019. One of PARCOF's objectives is to facilitate sustainable interactions between providers and users of climate information in the Arctic.** The meeting was organized by the World Meteorological Organization and the Finnish Meteorological Institute and hosted discussions with around sixty people. As the Year of Polar Prediction aims to improve polar weather and climate services, PARCOF is an important forum to learn about user perspectives and state-of-the-art of regional climate services. The PPP-SERA Task Team participated in the meeting to establish close collaboration, in particular regarding a planned regional Weather and

Society workshop series that will be organized during the YOPP Consolidation Phase.

17 AMS Conference on Polar Meteorology and Oceanography in Boulder, Colorado | (by David Bromwich, Byrd Polar and Climate Research Center, Columbus, Ohio) **The American Meteorological Society's (AMS) 15th Conference on Polar Meteorology and Oceanography was held in Boulder, Colorado from 20 to 23 May, 2019.** Attendance at the conference which was organized at the University of Colorado-Boulder's Williams Village Conference Center was an all-time record, illustrating the broad and growing interest in polar meteorology and oceanography. This year being the centenary anniversary of the AMS, the conference started with a historical overview of polar meteorology presented by conference chair Ryan Fogt. Of particular interest for the YOPP community were three sessions on the evolution, formation and impacts of Arctic cyclones. PPP Steering Group members Thomas Jung (Chair), David Bromwich, Gunilla Svensson and Taneil Uttal participated and presented papers on polar prediction and related topics. The conference program can be found [here](#).

18 Last MOSAiC Workshop before Expedition Start | (by Anja Sommerfeld and Helge Goessling, Alfred Wegener Institute) **The last MOSAiC workshop before the expedition which is to commence in September took place from 11 to 15 March at Alfred Wegener Institute's**



About 220 people came together for the last MOSAiC workshop before the German research icebreaker RV Polarstern leaves Tromsø port in September 2019. During six legs of about three months each, Polarstern will drift with the sea ice from the central Arctic towards Fram Strait (photo: Sabine Helbig/Alfred Wegener Institute).

research unit in Potsdam. Around 220 people participated in the workshop; many of them were scientists that will be on board during the one year of Polarstern's sea-ice drift. The workshop was partly dedicated to provide to participants logistical details and further formalities that are required for the cruise. Concerns around safety, especially in the presence of polar bears, and the data and media policy were also discussed. In addition, it was announced that the last of the six cruise legs will be extended for Polarstern to arrive in mid-October 2020 in Bremerhaven, Germany, instead of its originally scheduled arrival end of September in Tromsø.

Linking MOSAiC Observations with YOPP Modelling Activities

One day of the workshop was dedicated to linking the MOSAiC observations with modelling activities, including those carried out as part of the Year of Polar Prediction. For example, progress has been made regarding the question how the YOPPsiteMIP model verification can be extended to include the MOSAiC campaign as a moving YOPP Supersite, to make best use of the unique observations to evaluate and improve models of the atmosphere, ice, and ocean. Moreover, the status of and further plans for the YOPP Sea Ice Drift Forecast Experiment, which aims to deliver forecasts for the MOSAiC position and ice deformation, have been presented and discussed. Find more on [MOSAiC](#) now also on [twitter](#) and [instagram](#).

19 EU-PolarNet and ARICE General Assemblies | (by Sara Pasqualetto, Alfred Wegener Institute) **During the last week of March, the city of Lisbon hosted the general assemblies of two projects of the European Arctic Cluster, EU-PolarNet (25-26 March) and ARICE (28-29 March).** The week started off with the symposium 'Polar Research and Europe: New challenges and opportunities', which was co-organized by EU-PolarNet and the Portuguese PROPOLAR programme which promotes and coordinates Portugal's efforts in Arctic and Antarctic science. More than seventy top figures

from 36 different institutes from all over Europe gathered at the University of Lisbon. With representatives of the European Commission and the private sector, they discussed advancements and ways forward in European polar research.

EU-PolarNet successfully facilitated the organization and collaboration among the various polar institutes in Europe to enable access to polar structures for the past four years. For the partners of EU-PolarNet, the general assembly was the moment to coordinate the efforts of the last year when an implementation plan for a European polar infrastructure has been put together. This plan will facilitate international activities at the poles and establish a channel of communication with relevant stakeholders from the industry. See more [here](#).

Goal of the European project ARICE is to facilitate and manage transnational access to marine-based research in the Arctic. The progress carried out half way through the project and activities planned for the future were discussed at the ARICE General Assembly. The Finnish research icebreaker Fennica was welcomed as the latest entry to the ARICE icebreakers fleet. Learn more on [ARICE](#).

20 YOPP-endorsed! – Use of Climate and Weather Information UCWI | YOPP endorsement is available for projects, programmes and initiatives and also for institutions and operational centres that contribute to making the Year of Polar Prediction successful. More than eighty projects, programmes and initiatives already received project endorsement from YOPP.

Decisions made in the Antarctic can have far-reaching consequences due to the increased risks associated with the remoteness, harshness, and fragility of the environment. In her YOPP-endorsed project, the psychology researcher and weather observer Vicki Heinrich studies how people living and working in Antarctica use weather information for both, their day-to-day operations and seasonal and strategic planning to safely undertake their tasks and scientific research.



What is your YOPP-endorsed PhD project 'Use of Climate and Weather Information: Risk perception and decision-making in Antarctica', in short UCWI, about?

Psychology is the science of studying human behaviour. My specific interest is in how people think about, interpret, understand, react, and use weather and climate information in their decision-making processes and protective behaviours, from carrying an umbrella to cancelling a trip due to expected bad weather.

For my PhD I expect to take three to four years to complete. It will focus on the use of weather and climate information in Antarctica using metacognition, and social and behavioural psychological theories.

Search and rescue resources, access, transport, and technological infrastructures are limited in Antarctica. Lack of knowledge, misinterpretation of information, inexperience, and poor risk communication can mean people are unprepared and caught unaware by hazards (e.g., sea ice, blizzards, and whiteout) leading to costly rescue efforts, cancelation of scientific programs, operational delays, severe injury, and even death. My findings will be used to help mitigate health and other risks associated with human activities in the Antarctic through improved risk perception, communication, tailored weather services, education, and informed decision-making.

How does UCWI contribute to the Year of Polar Prediction?

The most accurate forecast in the world is of no use if people don't hear, understand, listen or act on it in the desired manner. For forecasts to be of value to society, we need to apply behavioural science to ensure it is relevant, useful, the message is heard, and people react appropriately. As the PPP-SERA reports detail, there is a strong need for more social science work in the polar regions to reduce risks to humans and the fragile environment.

I am investigating how people incorporate weather and climate information in their operational



Vicki Heinrich at the Australian Antarctic station Mawson (photo: Peter Hargreaves).

decision-making and strategic planning. We are aiming to assist people in making better decisions. It will contribute to evidence-based, best practice and education in decision-making to reduce risk relating to human health and the environment in Antarctica and improved forecasting products and services.

What are you planning to reach the goals of your project?

A mix of qualitative and quantitative research methods, using interviews, surveys, and workshops.

Whom are you going to meet with/talk to/ask to respond to your surveys?

I'm focusing on weather and climate use so therefore I am talking to anyone who provides weather and climate information, e.g., national weather services, private providers – those we might call the 'experts' in this context. And I work with the users, those who operationally use the weather information in their decision-making in Antarctica, to the everyday expeditioner who is on station for several months to a year. The users include Station Leaders, Operations Coordinators, Program Leaders, and Field Leaders, who are using weather information in their decision-making and long-term planning. Additional users include aviation providers, tourist operators and providers, fisheries, Defence, Non-for-Profit Organisations and Heritage Trusts. To provide an international perspective and capture the unique nature of the collaboration and scientific research under

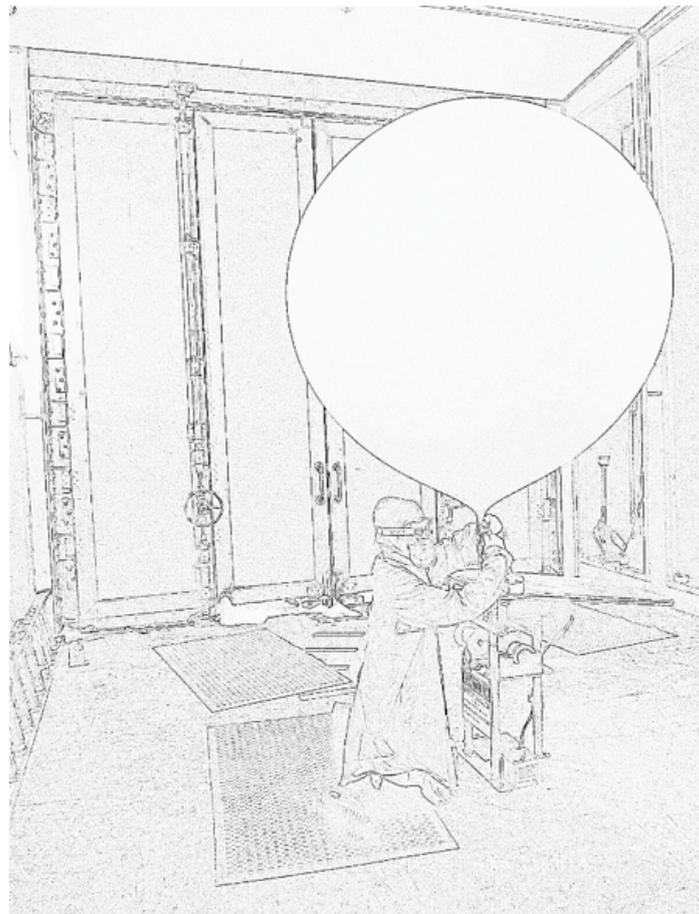
the Antarctic Treaty, participants will be sought from the Australian and other countries' National Antarctic programs.

We are hoping to be involved with the CONMAP/SCAR conference in 2020 as well as conducting surveys during the next Antarctic summer season.

How does your current job for BoM help you with your PhD project? Since 2003, I have spent my career working as a technical officer observer for the Australian Bureau of Meteorology. I have worked around Australia at airports and Meteorological Observing Offices collecting weather data through synoptic, upper air, and aviation observations programs. This includes reading thermometers, checking rain gauges, identifying cloud and weather, releasing weather balloons, reporting significant weather for aviation and assisting other scientific research programs. Weather observers collect and quality control the data that is sent around the world and ingested into forecasting models, used by meteorologists, and stored as a part of the climate record.

Over the last ten years I have spent several seasons at the Australian Antarctic stations as a Senior Observer. This experience provides context and background to my project from the Australian Antarctic Program viewpoint. I have been involved in and heard of different accidents, incidents, and search and rescue events where potentially improved weather information and communication

may have prevented the incident or lead to better outcomes. I have seen first-hand the relevance and absolute necessity for the research I am planning to undertake.



In her spare time, Vicki Heinrich enjoys photography and creating images of her daily work life (copyright: Vicki Heinrich).

Are there more people involved with UWCI, and where do the funds come from?

My primary supervisor is Dr Kimberley Norris from the University of Tasmania (UTAS). Others who are involved in the project from UTAS are Dr Matt Palmer, Dr Jim Sauer and Prof Andrew Heathcote. As well, I collaborate with Dr Daniela Liggett from the New Zealand University of Canterbury who is also co-chair of PPP-SERA, with Prof. Douglas Paton from the Australian Charles Darwin University, and with Dr Carla Mooney from BoM. Plus, many more generous people who have answered my questions and offered

to help.

The project is funded through the Division of Psychology, School of Medicine, at the University of Tasmania.

How to follow the project and what should the polar prediction community keep in mind about UWCI?

Updates on the project will be posted to [ResearchGate](https://www.researchgate.net) and the Facebook project page: [@UWCIAntarctica](https://www.facebook.com/UWCIAntarctica).

New Publications

21 Improved Reanalysis and Prediction of Atmospheric Fields Over the Southern Ocean Using Campaign-Based Radiosonde Observations | Additional radiosondes launched from ships over the Southern Ocean reduce errors in midlatitude cyclone forecasts.

Accurate weather forecasts over the Southern Ocean are required for reducing severe damage for ship operations over the high latitudes and social activities over the midlatitudes in the Southern Hemisphere. However, the sparseness of observations over the Southern Ocean causes failures in predicting the low-pressure systems. Authors of this paper investigated the impact of additional radiosonde observations over the Southern Ocean aboard the Australian RV Aurora Australis on prediction skill of forecasting systems for weather over the Southern Hemisphere. Results indicate that the initial conditions in the reanalysis data, which is used for operational weather forecasts, were improved by the additional radiosonde observations at upper levels, contributing to a more accurate reproduction of a low-pressure system over the midlatitudes in Southern Hemisphere.

Sato, K., Inoue, J., Alexander, S.P., McFarquar, G., Yamazaki, A. 2018. Improved Reanalysis and Prediction of Atmospheric Fields Over the Southern Ocean Using Campaign-Based Radiosonde Observations. *Geophysical Research Letters*, 45. <https://doi.org/10.1029/2018GL079037>

22 An Intercomparison of Verification Scores for Evaluating the Sea Ice Edge Position in Seasonal Forecasts | Authors of this paper use different verification methods to evaluate the position of the sea-ice margin in forecasts. In order to assess the reliability of sea ice forecasts, several methods have recently been suggested for evaluating the spatial distribution of sea ice. In this study, the performances of new seasonal forecasts from the European Centre for Medium-Range Weather Forecasts have been evaluated using three verification methods. These methods have been compared in order to identify their characteristics, as well as their strengths and weaknesses. It has been shown that the methods

have different sensitivities to the presence of remote isolated ice patches, and that one of them is not suitable for comparing the forecast skill between different seasons. The paper is a contribution to the Year of Polar Prediction and is part of the SALIENSEAS project. Authors have also developed a new demonstration service showing sea-ice forecasts for the SALIENSEAS project (see at <http://metno-salienseas.com>).

Palerme, C., Müller, M., Melsom, A., 2019. An Intercomparison of Verification Scores for Evaluating the Sea Ice Edge Position in Seasonal Forecasts. *Geophysical Research Letters*, 46. <https://doi.org/10.1029/2019GL082482>

23 How strong is the Influence of the Tropics and Mid-Latitudes on the Arctic Atmospheric Circulation and Climate Change? | Authors investigate the impact of lower latitudes on the Arctic troposphere for both winter and summer. The study examines results from numerical experiments using the ECMWF atmospheric model in which several variables have been relaxed towards the ERA Interim reanalysis in the midlatitudes and tropics. Results suggest that the lower latitudes constrain the atmospheric circulation in the Arctic regions mainly during winter, while the summer state is mostly determined by internal drivers. In the winter months, the west Arctic sector is mainly influenced by the atmospheric state in the tropics. On the contrary, the midlatitudes play a central role influencing the atmospheric circulation and climate variability in the east Arctic sector. Concerning the Arctic surface warming, lower latitudes seem to play a minor role. Local sea-ice feedback is primarily responsible for the recently observed winter surface warming trend; winter warming at higher altitude is more strongly tied to the lower latitudes.

Ye, K., Jung, T., 2019. How strong is influence of the tropics and midlatitudes on the Arctic Atmospheric circulation and climate change? *Geophysical Research Letters*, 46. <https://doi.org/10.1029/2019GL082391>

24 Upcoming Events

17-19 June 2019

Ninth IICWG workshop on sea-ice modelling, data assimilation and verification ([more](#))
Bremen, Germany

24 June 2019

Launch of YOPP Consolidation Phase
Online Webinars (see more at [#01](#))

24-27 June 2019

Workshop on Polar Amplification Model
Intercomparison Project (PAMIP) (see more at [#12](#))
Exeter, United Kingdom

25-27 June 2019

Workshop on Antarctic Meteorology and Climate
(WAMC) ([more](#))
Charleston, South Carolina, USA

27-28 June 2019

YOPP in the Southern Hemisphere #04 ([more](#))
Charleston, South Carolina, USA

8-18 July 2019

International Union of Geodesy and Geophysics
(IUGG) General Assembly ([more](#))
Session: First Results from YOPP (M02)
Montréal, Canada

23-27 September 2019

20th IICWG meeting ([more](#))
Copenhagen, Denmark

26-27 November 2019

Arctic Earth System Modelling Workshop
Reykjavík, Iceland

19-21 February 2020

PPP Steering Group meeting
Bremen, Germany

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

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The next issue of PolarPredictNews is expected to be out in September 2019.

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