WWRP POLAR PREDICTION PROJECT (WWRP-PPP)

ELEVENTH PPP STEERING GROUP MEETING (PPP-SG#11)

19-21 FEBRUARY 2020
ALFRED WEGNER INSTITUTE
BREMERHAVEN
GERMANY

Photo: Sara Pasqualetto (AWI)

Back row (L-R): Francois Montagner, Machiel Lamers, Helge Goessling, Martin Wegmann, David Bromwich, Daniela Liggett, Jeff Wilson, Siri Jodha Khalsa, Zen Mariani
Middle Row (L-R): Jørn Kristiansen, Katharina Kirchhoff, Nanette Lomarda, Jun Inoue, Amy Solomon, Jonathan Day, Clare Eayrs, Gunilla Svensson, Kirstin Werner
Front row (L-R): Ian Renfrew, Eric Bazile, Vasily Smolyanitsky, Thomas Jung, Barbara Casati

Online participants not in photo: Irina Sandu, Greg Smith and Robert Grumbine (remote participation).

[Note: Subsequent to this session, the World Health Organisation (WHO) declared COVID-19 as a global pandemic. National and international actions as a result of this pandemic have resulted in some YOPP related activities being delayed or cancelled. This report covers the discussions at the time of the meeting and thus dates and activities referred to in this report may have changed subsequent to the meeting]

EXECUTIVE SUMMARY

The eleventh session of the Polar Prediction Project Steering Group (PPP-SG) took place at the headquarters of the Alfred Wegner Institute (AWI) in Bremerhaven, Germany, from Wednesday 19th February to Friday 21st February 2020.

The PPP-SG session was proceeded by a YOPP Science Workshop where results from some of the Special Observing Periods (SOPs) activities as well as Consolidation Phase activities were presented.

The PPP-SG #11 session specifically focused upon reviewing progress in the YOPP Consolidation Phase, considering options for the PPP evaluation, reviewing plans for the first Targeted Observing Period in the Northern Hemisphere (NH-TOP1), planning for the Final YOPP Summit as well as general coordination and administrative matters.

In closing the session, the chair of PPP-SG, Professor Thomas Jung noted the following outcomes from the session:

At the strategic level

- The PPP-SG recommends the development of a PPP/YOPP Legacy Scoping Workshop in late 2020 / early 2021 to look at how to capitalize on PPP accomplishments past 2022

At the tactical level, the PPP-SG had

- Noted excellent progress on PPP science activities in Numerical Experimentation, Verification, Sea Ice Forecasting, and the YOPPSiteMIP initiative to evaluate model performance at YOPP Supersites in the Northern and Southern Hemispheres;
- Agreed to extend the YOPP Southern Hemisphere effort (YOPP-SH) to the end of 2024 to accommodate planned activities such as the YOPP-SH Targeted Observing Period (TOP-SH1) expected in 2022;
- Agreed to pursue PPP-related education activities around the August 2020 SCAR meeting in Hobart, the Arctic Science Summit meeting in Lisbon in March 2021, and a PPP Spring School in Abisko, Sweden in March 2022 plus activities around the YOPP Final Summit in May 2022;
- Endorsed YOPPSiteMIP as a key activity for the PPP Consolidation Phase and designated it as high priority;
- Underlined the importance of the YOPP Data Portal for YOPPSiteMIP and YOPP Legacy activities in general;
- Agreed on dates for the YOPP Final Summit (2 to 5 May 2022 in Montreal, Canada) and the overall concept and outline for the session;
- Agreed in principle on providing fellowships for outstanding early career scientists for the YOPP Final Summit;
- Agreed on draft expenditure envelope for the remainder of the YOPP Consolidation Phase;
- Agreed to propose Eric Bazile for PPP-SG membership; and
- Developed options for PPP-SG#12 to be held in Zuhai City, China, with backup locations in Tokyo, Japan, or Geneva, Switzerland.

1. OPENING OF PPP-SG11

1.1 Welcome

Professor Thomas Jung (Chair of the PPP-SG) opened the session at 1415 and welcomed all members and invitees to the eleventh meeting of the PPP-SG. Prof Jung noted that this was the first time in the ten years of the PPP that the Steering Group (SG) had met at AWI. Whilst the SG now meets annually, in the first few years it was meeting twice a year to prepare and plan for the coming years. Prof Jung thanked the Alfred Wegner Institute (AWI), Dr Kirstin Werner and her colleagues from the International Coordination Office (ICO) for their arrangements for this session as well as for the preceding YOPP Science Workshop.

Dr Werner welcomed participants to AWI and Germany and hoped that they would enjoy their stay and benefit from the discussions in the meeting.

Ms Nanette Lomarda from the WMO Secretariat conveyed the best wishes of the WMO Secretary-General to the participants and his wishes for a successful session.

1.2 Purpose of the Meeting & Adoption of the Agenda

The Chair recalled that this session of the SG would specifically focus upon reviewing progress in the YOPP Consolidation Phase, considering options for the PPP evaluation, reviewing plans for the Northern Hemisphere Targeted Observing Program (NH-TOP1), planning for the Final YOPP Summit as well as general coordination and administrative matters. The Chair asked if there were any changes or adjustments to the agenda; receiving no comments the Agenda was adopted as circulated (see Annex I).

1.3 Working Arrangements

The PPP-SG agreed that the usual working arrangements of working in plenary with breaks as per the agenda or as required would apply. The Chair noted that a number of SG members, who could not attend in person, would be participating remotely.

2. UPDATE ON WWRP, WMO SECRETARIAT

2.1 Recent Developments in WWRP

Ms Nanette Lomarda (Senior Scientific Officer WWRP, WMO Secretariat) briefed the PPP-SG on developments within the WWRP and WMO in general. Ms Lomarda noted that the Eighteenth World Meteorological Congress agreed a major reform of the World Meteorological Organization that would significantly reduce the number of Technical Commissions and change the long-standing working arrangements.

Ms Lomarda further noted that the WMO Secretary General is in the process of reorganizing the WMO Secretariat to align with the new arrangements. Whilst these changes have been approved at the top, the full implementation at the WMO Member States level and within the WMO Secretariat was still underway and would take most of the first half of 2020 to complete, if not longer due to potential impacts of the COVID-19 epidemic.

The WWRP still exists in the new structure but the Commission for Atmospheric Science (CAS) has been changed into a non-governmental Research Board. The new Research Board has not yet met, so WWRP projects and activities are continuing as usual. Within the Secretariat, WWRP is supported by the Science and Innovation Department which is headed by Prof Jürg Luterbacher with Dr Paolo Ruti and Dr Oksana Tarasova as Chiefs of Division. Ms Lomarda recalled that the PPP was primarily funded directly by WMO Member States with some donors providing funds for activities and coordination. Due to these funding streams, it

is unlikely that PPP/YOPP will be directly impacted by the restructuring of the WMO. In response to a question by Prof Jung, Ms Lomarda advised the PPP-SG that roles of the WWRP Scientific Steering Committee (WWRP-SSC) and the WMO Executive Council Panel of Experts on Polar and High Mountain Observations, Research and Services (EC-PHORS) in overseeing PPP should be known by the Executive Council session scheduled for mid 2020.

3. YOPP SCIENCE WORKSHOP

3.1 Recap of YOPP Science Workshop

Prof Jung recalled the YOPP Science Workshop that was held prior to this PPP-SG session. He noted excellent progress on PPP science activities in Numerical Experimentation, Verification, Sea Ice Forecasting, and the YOPPSiteMIP initiative to evaluate model performance at YOPP Supersites in the Northern and Southern Hemispheres.

Of particular interest to the PPP-SG were the results from the Observing System Experiments (OSEs) in the Northern Hemisphere that showed conventional observations, which include radiosonde data, had the most impact in the winter months due to difficulties in assimilating microwave sounder data over snow and ice. In the summer months, the microwave data predominated over the conventional observations. It was also noted that the additional radiosondes (increased frequency and coverage) released during the winter and summer SOPs had a small but positive impact upon the forecasts with major impacts for particular weather events. This indicates that the current radiosonde network, when combined with satellite data, appears to capture the main atmospheric flow features. However, for particular weather events additional radiosondes such as deployed during SOPs can make a large difference. Prof Jung commented that the first Northern Hemisphere Targeted Observing Period (NH-TOP1) from March 2020 to April 2020 was expected to provide further insight into this matter.

The PPP-SG recalled the presentation by Dr Jun Inoue regarding a comparison of radiosonde launches from Cape Baranova and a nearby Roshydromet operational station. The comparison showed some differences in wind speed and height assignment between the different systems at the two stations. To help resolve these issues, the PPP-SG requested the ICO to write to Roshydromet requesting them to include the Cape Baranova radiosonde data in their GTS feed. The PPP-SG also asked the ICO to request further information from Roshydromet regarding the use and deployment of buoys in the Arctic.

Noting the positive progress in the PPP/YOPP science activities, the PPP-SG chair encouraged each of the PPP/YOPP Task Teams (TT) to discuss the publication strategy for their areas of expertise and report back so the PPP-SG has an overview of the publications that could come out of PPP/YOPP.

Action:

- ICO to write to Roshydromet requesting further information on the buoy deployments and to request the Cape Baranova radiosonde data be included in their GTS feed.

The PPP/YOPP TTs to discuss the publication strategy for their areas of expertise and report back to the PPP-SG. Dedicated overview papers for each of the PPP/YOPP TTs should be considered.

4. REVIEW OF OPEN ACTION ITEMS

The PPP-SG reviewed the open actions from PPP-SG#10 and noted with pleasure that most of the actions had been completed or are no longer required. In addition to the actions from PPP-SG#10, the Chair reminded the PPP-SG that the ICO has been maintaining action items from the PPP-SG sessions and teleconferences on the Trello software (link shared internally). PPP-SG Task Team chairs and co-chairs were encouraged to login to the site and review and update the action items for their Task Team.

The major outstanding item was for the Task Teams to update the descriptions of their work on the Polar Prediction website (https://www.polarprediction.net/organization/yopp-task-teams/). The PPP-SG Chair requested Mr Jeff Wilson to assist the TT Chairs with this task.

Action: PPP-SG TT leaders to review and update the action items for their TTs on Trello.

5. UPDATE ON KEY YOPP ACTIVITIES

5.1 Targeted Observing Periods

Prof Gunilla Svensson briefed the PPP-SG on the preparations for the first Northern Hemisphere Targeted Observation Period (NH-TOP1) scheduled for mid-March/mid-April 2020 (with the possibility of being extended into summer) to investigate airmass transformations between the Arctic and the midlatitudes. The timing of NH-TOP1 takes advantage of the MOSAiC expedition in-situ and aircraft observation programmes and supplements these observations with additional radiosondes from selected locations when airmass transformation events are anticipated.

Prof Svensson noted that she had received responses from Canada, Finland, Germany, Iceland, Norway and Sweden to the letter circulated by Prof Jung and herself seeking support for NH-TOP1. The responses either offered additional observations or sought further information on what was required and how the program would work. Figure 1a provides an overview of additional sources of observations for NH-TOP1.

Prof Svensson advised the PPP-SG that she and a small team (Prof Ian Renfrew, Prof Manfred Wendisch, and a colleague from the University of Stockholm) would be monitoring the ten-day ECMWF forecasts to identify potential airmass transformation events. The NH-TOP1 team would identify the potential tracks of the transformation events and identify which stations to contact about five days prior to the event to advise them of the potential request for additional observations and over what period they may occur. As the events get closer, the team would activate the protocols required by the countries to confirm the required launches. The team would be monitoring diagnostics such as the "Water vapour flux extreme forecast index" (Figure 1b) and forward and backward airmass trajectories based upon RV Polarstern's position to help identify likely situations. The Barents Straits and Greenland Sea are expected to be key areas to investigate (Figure 1a).

In response to some questions from the PPP-SG regarding the NH-TOP1, Prof Svensson noted she was supportive of the proposal to run some social media interactions and challenges with the PPP community about when and where airmass transformations may occur, but she would not be in the position to organize or run this activity. Dr Kirstin Werner advised the PPP-SG that the ICO would be willing to help coordinate and run the social media activity around the NH-TOP1.

Figure 1a. NH-TOP1 observation opportunities (Courtesy of Prof Svensson)

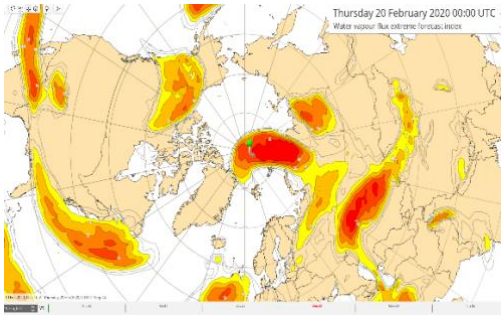

Figure 1b. Example of Water vapour flux extreme forecast index (ECMWF diagnostic provided by Prof Svensson).

Prof David Bromwich from the YOPP-SH Task Team informed the PPP-SG that the Targeted Observing Period for the Southern Hemisphere would likely be delayed due to the long lead times required for work in the Antarctic.

In closing Prof Svensson noted that there was the possibility of a further TOP in 2021 but no decisions on further TOPs would be made until after NH-TOP1.

[Note: Due to the spread of COVID-19 since the PPP-SG#11 session, the aircraft flights associated with the NH-TOP1 had subsequently been cancelled. However, launching extra radiosondes during episodes of strong linkages between the Arctic and mid-latitudes is still being considered.]

5.2 YOPP Final Summit

Dr Barbara Casati briefed the PPP-SG on the local arrangements and preparations for the YOPP Final Summit which is scheduled for 2 to 5 May 2022 in Montreal, Canada. Environment and Climate Change Canada (ECCC) has offered to host the YOPP Final Summit and has committed funding towards room hire and other costs.

Dr Casati noted that in addition to the four days of plenary meetings, consideration is being made for social events on 1 and 6 May. Based upon the planning figures of 200 to 300 participants, a suitable venue (Centre Mont Royal) has been located that will allow a plenary session in the mornings and parallel sessions in the afternoons as well as one or more poster sessions. Two panel sessions are planned as well as an icebreaker and no-host dinners on the other nights. There will be room for some sponsor booths.

Dr Casati advised the PPP-SG that ECCC were investigating contracting a conference-organizing company to deal with many of the logistics of setting up and running the Final Summit. Initial estimates for costs were of the order of CAD$120,000 with a registration fee of around CAD$300. The difference between the conference fees and the total costs would need to be covered by new donors and the existing commitment from ECCC.

Dr Casati concluded her presentation with an initial timeline of key actions for the YOPP Final Summit.

March–April 2020	Contract Managing agency and venue
June 2020	Save-the-date announcement, start promotions, networking and contacting potential sponsors
January 2021	First announcement
June 2021	Second announcement, website opens with registration and abstract submission

October 2021	Abstract submission deadline
December 2021	Letters of acceptance, registration opens
May 2022	YOPP Final Summit

In the ensuing discussion, the following points were made by the PPP-SG: a science committee including PPP-SG members and the Final Summit Task Team will need to be established to guide the Final Summit programme development, develop guidance for abstract submission, review and selection; the program needs to carefully balance between reporting upon the PPP science and promoting the PPP legacy. Consideration should be made for remote participation in the YOPP Final Summit. The Final Summit Task Team, potentially with some help from the contracting company, will need to consider sponsorship matters including how to approach sponsors, levels of sponsorship and what this provides in terms of booths and acknowledgement and recognizing institutions who have supported PPP in the past. It may be appropriate to have differing levels of registration such as student and early bird. It would be highly desirable to provide some prestigious fellowships to allow exceptional early career scientists to participate and take prominent roles in the YOPP Final Summit; other groups such as IASC could also be encouraged to provide fellowships for early career scientists. It would be desirable to supplement the YOPP Final Summit Task Team in late 2021 or early 2022 with an early career scientist representative as well as an indigenous representative. It is also highly desirable to invite and recognize the efforts of the people such as Gilbert Brunet, Neil Gordon, David Grimes, previous PPP-SG members and other individuals and institutions who helped develop, fund and implement PPP/YOPP. The PPP-SG also suggested that Prof Jung considers approaching a number of high profile journals such as Nature to invite their editors to participate in the YOPP Final Summit.

In closing this section of the agenda, Prof Jung thanked Dr Casati and Dr Greg Smith for their leadership and efforts in the planning of the YOPP Final Summit. He looked forward to continuing working on this with them over the coming two years.

Action:

- Investigate options and costs for remote participation in some or all of the YOPP Final Summit;
- Consider involving a Canadian APECS delegate in the Final Summit planning in 2022;
- PPP-SG members to identify potential sponsors and advise ICO/Final Summit TT by end of March 2020. Potential groups such as ESA, EUMETSAT, European Commission, plus commercial companies such as Vaisala, SCAR, IASC;
- PPP-SG members to talk to their institutions/National Meteorological and Hydrological Services (NMHS) to see if they have end of year funds that could be donated to the PPP Trust Fund in support of the Final Summit or other activities prior to the Final Summit;
- Consider whether an indigenous person and a representative from PPP-SERA should be on the organising committee for YOPP Final Summit; and
- YOPP Summit TT to develop a concept on how to approach donors.

5.3 YOPP Legacy

Prof Jung introduced the topic of the YOPP legacy, recalling that the previous two PPP-SG sessions had also touched on this topic nominating activities such as the YOPP Data Portal, the YOPPSiteMIP activities (particularly the definition and use of MMDF/MDF structured data for intercomparison between collocated observation and model data), recommendations for the polar observing system, recommendations for future research and better understanding, and engagement with users of environmental prediction data.

Noting that some YOPP activities had been delayed due to the challenges of planning work in the polar environment (SH-SOP2) and others due to delays in major partnerships such as MOSAiC (NH-TOP1), the PPP-SG considered that some of the key activities of PPP may not be fully completed by the end of 2022. To this end, the PPP-SG decided that YOPP-SH could continue as a YOPP-endorsed activity until the end of 2024. At this stage, the PPP-SG did not see the need to extend the PPP or YOPP past the end of 2022. Noting the importance of the polarprediction.net website as a repository for PPP/YOPP, the ICO advised the PPP-SG that it anticipates AWI will continue to host the site past the end of 2022 but with little maintenance.

Recalling the outcomes of the preceding YOPP Science Workshop, the PPP-SG suggested that the PPP-SG Chair would engage with the WWRP-SSC, WRCP and other WWRP projects to suggest a cross-disciplinary YOPP Legacy Scoping Workshop be held in late 2020/early 2021 to identify how to capitalize on the successes of PPP/YOPP in terms of a follow-on research program. Such a follow-on program could examine coupling between the polar regions and the midlatitudes in both hemispheres and would undoubtably look at processes that effect both weather and climate timescales as well as the influences of sea-ice on weather and climate. Building on the work of PPP, such a follow-on program would also benefit from further user engagement and service definitions as well.

In closing this section of the agenda, Prof Jung noted that the PPP/YOPP legacies would be interwoven and would include scientific advances, better understanding of user needs and services, ongoing access to YOPP model and observation data, improvements in verification of observations and models in the polar regions, tools for comparing model and observational data for process studies as well as a successful model on how to plan, coordinate and run a ten year collaborative international project.

Action: PPP-SG Chair to discuss options for a post PPP project scoping with Dr Peter Bauer/Dr Mike Sparrow. Ms Lomarda to discuss options for the scoping workshop with Dr Ruti and colleagues in the WMO Secretariat.

Decision: YOPP-SH could continue as a YOPP endorsed activity until the end of 2024.

Recommendation: S2S leaders should be invited to the YOPP Legacy Scoping Workshop as well as the relevant groups from WWRP and WCRP (including joint groups like WGNE) plus IASC and SCAR.

5.4 YOPP Evaluation and Success Stories

Ms Nanette Lomarda briefed the PPP-SG on how WMO evaluates capacity development projects that are coordinated through the WMO Secretariat Project Management Unit. The WMO Evaluation template focusses on the following areas: assessment of relevance to targeted stakeholders and key beneficiaries; assessment of effectiveness in project design, progress/achievements of the project activities, cross-cutting issues, partner coordination, monitoring and reporting systems, possible unexpected results, possible benefits; assessment of efficiency in budgeting and expenditures, and cost-effectiveness; assessment of impact; assessment of sustainability; review of financial management and project risk systems; and, other issues such as document management, and overlap and synergy with other WMO Programmes/Projects.

Ms Lomarda noted that the PPP was not a capacity development project and thus would not need to rigorously follow the Project Management Unit approach. Ms Lomarda concluded her presentation with the following three recommendations: (1) WMO to commission an external evaluation team with the assistance of the WMO Secretariat Project Coordination

Office; (2) the ICO, PPP Project Manager in the WMO Secretariat and the PPP-SG to provide documents to the external evaluation team as required; and, (3) the resulting Evaluation Report to be submitted to Project Partners/Donors.

In the ensuing discussion, the following points were discussed by the PPP-SG:
(1) the importance of obtaining feedback and success stories from YOPP-endorsed projects on how they have contributed to and benefited from PPP/YOPP, noting that many projects will only provide feedback once so getting the timing right for questionnaires and other contact is important;
(2) development of a short four-page booklet with key information and graphics in preference to an IPY style book;
(3) that the YOPP success factors could include indicators showing the

- improvements in environmental prediction systems and predictions;
- number of publications from PPP/YOPP science activities;
- number of additional observations for the SOPs/TOP(s);
- access to and utility of the YOPP Data Portal;
- uptake of YOPPSiteMIP approach to the comparison of model and observational data;
- benefits of the PPP coordination and collaboration model;
- amount of user engagement;
- amount of third-party funding;
- amount of media coverage; and,
- number of YOPP-endorsed projects.

(4) the potential for obtaining feedback from participants in the PPP Summer/Spring Schools and other YOPP-related education and training activities on how participation has influenced their studies and careers;
(5) how to structure the YOPP Final Summit program to showcase the science but also identify the legacy elements of PPP; and,
(6) options to use cases and stories from the Polar Prediction Matters dialogue platform and similar sources to compile a publication on user cases.

The PPP-SG further noted that whilst the overall project is the Polar Prediction Project (PPP), the Year of Polar Prediction (YOPP) became a brand now which is often used interchangeably with PPP so any searches for publications etc. would need to accommodate both abbreviations PPP and YOPP as keywords along with their long forms.

In closing this agenda item, Prof Jung thanked Ms Lomarda for her presentation and insight into how the WMO Secretariat Project Management Unit undertakes evaluation of Capacity Development Projects. Prof Jung noted that at this stage, due to the uncertainty about cost and who would fund it, the PPP-SG would be reluctant to suggest an external evaluation team be commissioned to evaluate PPP/YOPP.

Action:

- ICO to work with WMO and the Evaluation TT to progress the evaluation activity;
- ICO to encourage projects that are undertaking YOPP-related activities but are not YOPP endorsed, to seek YOPP endorsement;
- ICO to use the PPP email list and advertise in the PolarPredictNews newsletter that the endorsement process is closing in the near future;
- ICO to draft a questionnaire for YOPP-endorsed projects and make it available for discussion at the PPP-SG#12

5.5 YOPP Data Portal

Dr Øystein Godøy from the Norwegian Meteorological Institute (Met Norway) briefed the

PPP-SG on the current status of the YOPP Data Portal (https://yopp.met.no/) hosted by MET Norway. Dr Godøy recalled that the purpose of the YOPP Data Portal was to provide an overview of datasets relevant to YOPP and, wherever possible, provide access to either the real-time data streams or archived data.

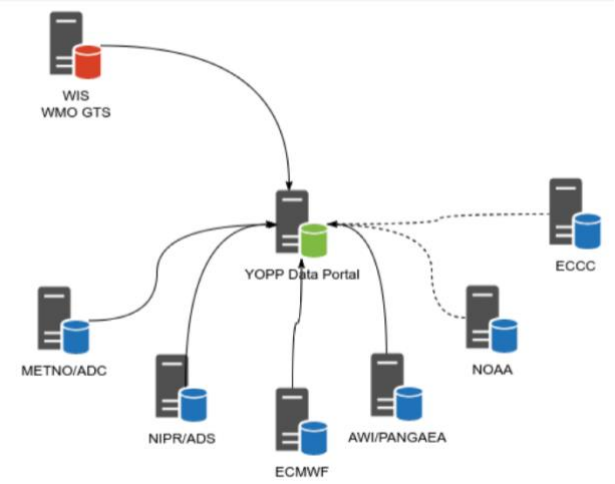

Figure 2. YOPP Data Portal model

The YOPP Data Portal model depicted in Figure 3 is a physically distributed network of data servers with a central discovery metadata repository harvesting information from contributing Data Centres. The YOPP-related data is not hosted (stored) on the YOPP Data Portal, rather the YOPP Portal links users to the data host data centres (including Met Norway) which are considered authoritative for information on the data sets they hold. The model relies on standardization of data documentation and interfaces to data and discovery metadata for full integration.

Dr Godøy advised the PPP-SG that the YOPP Data Portal site has been upgraded a number of times to improve the search and Open Geospatial Consortium Web Map Services (WMS) client interfaces. A metadata form for ad hoc documentation of datasets has also been added. Conformance checkers for datasets using CF and ACDD conventions are now added as services. The metadata scheme includes an entry for Digital Object Identifier (DOI) information for publication use but not all YOPP Data sets currently have DOI tags. There is a news feed to advise subscribers of new datasets. A taxonomy has been developed to tag news items on maintenance, e.g. “YOPPSiteMIP”.

Dr Godøy further advised the PPP-SG that it is currently possible to download and visualize single products with support for download and visualization of multiple products yet to come. The visualization of gridded products is also to be added. Overall, the functionality of the portal depends on the details of the underlying discovery metadata, and this is not uniform across all of the datasets at the present time.

Dr Godøy stated that the data available via the portal can be broadly split into three data streams: WMO Global Telecommunication System (GTS) covering surface data from fixed and moving stations as well as radiosonde data; YOPPSiteMIP model datasets provided by the YOPPSiteMIP team; and, YOPP Special Observing Periods (SOP) data which is obtained via PANGAEA or as ad hoc datasets. In concluding his presentation, Dr Godøy recalled that Digital Object Identifiers (DOIs) should be provided (minted) by the contributing data centre, however, not all data centres have this capability. Met Norway is providing DOIs for the data they are holding.

In the ensuing discussion, the PPP-SG focused on two main areas: DOIs for the YOPPSiteMIP data and for the SOPs; and, how to capture/harvest the discovery metadata, particularly for ad hoc data sets. In terms of the DOI discussions, Prof Svensson advised the PPP-SG that the Processes TT was discussing the option of having one DOI covering all of the Numerical Weather Prediction (NWP) data for each SOP. Dr Godøy noted that Met Norway could provide one DOI to cover all of the YOPPSiteMIP NWP data, or for the data they held at Met Norway, a DOI for the YOPPSiteMIP data provided by each contributing NWP centre. The PPP-SG asked to be kept informed of developments with the DOI activities. Regarding the

harvesting of discovery metadata, Dr Godøy advised the PPP-SG that if the contributing data centre was serving the data via http or ftp, it was not possible for Met Norway to automatically harvest the discovery metadata. In these cases, the contributing data centres were encouraged to fill in the ad hoc metadata form. Ian Renfrew was encouraged to fill in the metadata form for the datasets he has made available via CEDA (http://archive.ceda.ac.uk) as a test of the discovery system.

In closing this agenda item, Prof Jung thanked Dr Godøy and Met Norway for the efforts they are undertaking to implement and host the YOPP Data Portal. This work was critical to the Consolidation Phase as the YOPP Data Portal will clearly be one of the major PPP/YOPP legacies.

Action:

- PPP-SG to give Dr Godøy and Dr Khalsa feedback on the content and layout of the YOPP Data Portal landing page, particularly the search functionality, by the end of March;
- Delay the decision regarding whether only datasets discoverable via the YOPP Data Portal can be counted as "YOPP data" until later this year via the PPP-SG telecon;
- Dr Godøy and Dr Khalsa to review/update the ad hoc metadata form and guidance document as necessary and then publicise information about how to ensure remotely held data is searchable via the YOPP Data Portal. ECCC, ECMWF and Prof Renfrew to wait until the guidance document and the ad hoc meta data form has been completed before using the ad hoc metadata form to test the discoverability of their YOPP data. Dr Godøy and Dr Khalsa to have the updated document completed by 28 February.

Recommendation: NWP Centres, hosting their data on a server that is not compatible with the Open-source Project for a Network Data Access Protocol (OpenDAP) or has a searchable interface to fill in the YOPP Data Portal metadata form so people, can discover the locally held metadata via the YOPP Data Portal.

5.6 YOPP Data Component

Dr Siri Jodha Khalsa, from the YOPP Data Task Team, briefed the PPP-SG on the current status and future work plans of the TT. Dr Khalsa recalled that the purpose of the YOPP Data Task Team was to help ensure YOPP's legacy by facilitating the preservation, description, discovery and access to YOPP-produced and YOPP-relevant data based upon the Findable, Accessible, Interoperable, and Reusable (F. A. I. R.) Principles; encourage submission of metadata from YOPP related projects to the YOPP Data Portal; coordinate with YOPP Task Teams on data issues; and, help promote availability of YOPP data in coordination with the YOPP Communication, Outreach and Education TT.

In light of the purpose of the TT, Dr Khalsa noted that the oversight and enhancement of the YOPP Data Portal was one of the key activity areas for PPP/YOPP. Actions in this area included:

- cataloguing all YOPP data sets, including availability and copyright information;
- making the core YOPP data available through the YOPP Data Portal;
- capturing metrics on data search and access to contribute to the evaluation of PPP/YOPP;
- track YOPP Data Portal usage, including click-throughs to other data repositories; and,
- capture additional observational and forecast data generated during YOPP to ensure availability and traceability.

Dr Khalsa reminded the PPP-SG of the data producer responsibilities: to adhere to the data-publishing guidelines posted on the YOPP Data Portal; to make data publicly available via the internet; to create metadata records in the YOPP Data Portal catalogue, or make metadata harvestable by the YOPP Data Portal; to make reanalysis datasets available via the YOPP Data Portal and the Copernicus Climate Change Service Data Store; and, publish YOPP Data Sets in Data Journals using the guidance to be published on the YOPP Data Portal in the very near future.

In closing his presentation, Dr Khalsa noted the challenges and actions ahead for the YOPP Data TT as: getting the YOPP data producers to submit metadata entries to the YOPP Data Portal catalogue; that YOPPSiteMIP is a prime opportunity to generate interest in YOPP outputs amongst the academic community; the need to ensure the usability of the YOPP Data Portal features to encourage return visits and promotion of the YOPP Data Portal by third parties; designating a point of contact for each datatype (it may be possible to harvest this from the data files); to include a section in the PolarPredictNews newsletter where new data sets are announced; add the ability to be notified of new datasets to the YOPP Data Portal; and, to update the YOPP Data TT webpages on polarprediction.net.

Prof Jung thanked Dr Khalsa for his presentation and his active role in the YOPP Data Task Team noting the key role that the YOPP Data TT would have in developing the YOPP Data legacy.

Decision: Delay decision regarding whether only datasets discoverable via the YOPP Data Portal can be counted as "YOPP data" until later this year via the PPP-SG telecon.

Action: Dr Khalsa to provide material for YOPP Data TT page on polarprediction.net based upon the first three pages of his presentation;
- Dr Khalsa to advise ICO of the correct member names of the YOPP Data TT so the Polar Prediction website and the YOPP Data Portal site can be updated and synchronised.
- YOPP Data TT to work with Dr Godøy and the ICO on a video/webinar showing how to use the YOPP Data Portal. It would be similar to the material developed to support APPLICATE.

5.7 Communication and Outreach

Dr Kirstin Werner, Director of the ICO and lead of the Communication, Outreach and Education TT, briefed the PPP-SG on actions and plans for Communication and Outreach in the remainder of the PPP Consolidation Phase.

Dr Werner recalled the goals of YOPP Communication: promoting YOPP findings, data and recommendations through knowledge transfer (how YOPP is making a difference); tell success stories from YOPP (what are the societal benefits from YOPP); Community Engagement and Network Formation (essentially the knowledge gain and transfer from science, services and users); and, Coordination of YOPP Task Teams and YOPP-endorsed projects. Dr Werner informed the PPP-SG that a multi-pronged approach of storytelling, actively involving the scientists in the various communication channels, using a mix of personal impressions and research-focussed information, and in-conjunction with PPP-SERA providing Met Services recommendations on how to increase their interactions with users of environmental prediction.

Dr Werner presented the communication and outreach milestones and major activities for the remainder of the Consolidation Phase as depicted in Table 1 below.

Table 1. Communication and outreach milestones and major activities for the remainder of the Consolidation Phase

2020 • APPLICATE Final General Assembly (January 2020) • Special Issue of Advances in Atmospheric Research (AAS) • YOPP Science Workshop – 17-19 February 2020, Bremerhaven • PPP SG#11 – 19-21 February2020, Bremerhaven • Targeted Observing Period TOP-NH1 (March-April, maybe also summer 2020) • Open session with PPP-SERA – 20–24 April 2020, Bremerhaven (now postponed to 7–11 June 2020 due to Corona crisis) • EGU YOPP-APPLICATE joint session (due to Corona now online) • European Arctic Weather and Society Workshop (mid 2020) • Earth Observation for Polar Science, Copenhagen (EAS&EU, June) • Weather and Society Workshop, YOPP-SH meeting, SCAR conference, WAMC workshop, Hobart (August) • Special Services Period (Antarctic; late 2020) • Weather and Society Workshops, Canada (December)
2021 • Arctic Frontiers Session (with Met Norway; January) • PPP-SG#12 (Zhuhai, Geneva; early 2021) • SOP Antarctic Winter (March/April-June?) • Polar Prediction School (April) • EGU YOPP session • PPP-SERA meeting • YOPP-SH meeting
2022 • EGU-YOPP session • YOPP Final Summit in Montreal (3-5 May 2022 - thereafter final PPP-SG#13) • Special Services Period (Arctic; 2020 or 2021) Ongoing • Publications • Other meetings (task teams...)

Dr Werner reminded the PPP-SG that the ICO were using conference presentations and sessions, Social Media (Twitter, Instagram, YouTube and the IcePod podcast), the polarprediction.net website, the PolarPredictNews newsletter, mailing lists, and the Polar Prediction Matters blogsite as the communication and outreach channels. The number of followers (Table 2) on social media and users of the Website continue to grow, albeit at a moderate pace. Dr Werner noted that numbers tended to jump around major events such as the SOPs and the launch of the PPP Consolidation Phase, and when other organisations retweeted or referenced PPP. The PPP-SG discussed options for engaging new groups through initiatives such as a forecast challenge on event timing and location associated with the NH-TOP1 and encouraged the ICO to work with Prof Svensson to launch the activity in the near future.

In response to a question from Dr Clare Eayrs regarding where links and other references to PPP/YOPP education material should be held, Dr Werner agreed to work with Dr Eayrs to identify an appropriate section of the polarprediction.net website. Mr Wilson offered to check with the YOPP Data TT to see if metadata for education material could be included in the YOPP Data Portal.

Table 2. Numbers of users of PPP/YOPP outreach channels

Channel	Number of users
Twitter (@polarprediction)	1572
Instagram (@polarprediction)	572
Website (www.polarprediction.net)	700-800 visits / month
Mailing list (office@polarprediction.net)	➢ 660 subscribers
Newsletter (PolarPredictNews)	13 issues published since October 2018
Polar Prediction Matters blogsite (https://blogs.helmholtz.de/polarpredictionmatters/)	16 contributions since September 2017

In closing this agenda item, Prof Jung thanked Dr Werner and Ms Sara Pasqualetto for their work and encouraged all of the PPP-SG members to submit material to the ICO for the various communication and outreach channels.

Action:

- PPP-SG members to submit content for the Polar Prediction website.
- Dr Daniela Liggett and Dr Eayrs to advise ICO of the email addresses of Course Coordinators for polar related courses so ICO can reach out to them to publicise the Twitter feed and "competition" for NH-TOP1.
- ICO to consider writing and submitting an article for “The Conversation” as a strategy to link more readers to the Polar Prediction Matters blogsite. Similarly approaching high profile individuals such as Mr Michael White from the Journal Nature to generate further interest in PPP/YOPP and its findings.
- ICO to investigate the option of compiling the Polar Prediction Matters (https://blogs.helmholtz.de/polarpredictionmatters/) articles into a booklet for the Final Summit.
- PPP-SG members to make suggestions for potential Polar Prediction Matters articles, such as the APPLICATE user cases. Dr Helge Goessling has plans for article on aircraft campaign with Prof Manfred Wendisch, Dr Liggett to approach Ms Vicki Heinrich (University of Tasmania) about an article for Polar Prediction Matters.

5.8 Education

Dr Clare Eayrs, co-lead of the Communication, Outreach and Education TT and recently appointed as a member of PPP-SG, briefed the PPP-SG on the tentative plans for education activities during the PPP Consolidation Phase. Dr Eayrs recalled that the target audience for PPP education activities were PhD students and Early Career Scientists, including indigenous Early Career Scientists for the Arctic region. The tentative plans included another Polar Prediction School, once again utilising the facilities at Abisko in Sweden, as well as a series of webinars that could focus on the access and use of YOPP data, and events around the YOPP Final Summit.

The PPP-SG agreed to support a third Polar Prediction School at Abisko, Sweden, and tentatively scheduled it for March 2022. In addition to the usual activities, it was suggested that a PPP-SERA representative could participate to provide insight into user needs and engagement. Prof David Bromwich encouraged the organisers to include some material from the Southern Hemisphere. It was also suggested that the Polar Prediction School could include material from the YOPP Data Portal and use of supersite observation and modelling data. A number of actions (see below) were identified to commence the preparation for the third Polar Prediction School.

In addition to the Polar Prediction School, the PPP-SG encouraged Dr Eayrs to work with the

Association of Polar Early Career Scientists (APECS) to offer workshops around the SCAR meeting in Hobart in August 2020, the Arctic Science Summit in Lisbon in March 2021 and the PPP/YOPP Final Summit in May 2022. The concept of webinars was welcomed, particularly to promote the YOPP Data Portal and the use of YOPP Supersite data but no firm plans or decisions were made.

In relation to the YOPP Final Summit, the PPP-SG reiterated its support for the concept of providing some fellowships to enable outstanding young scientists to attend the Final Summit. The PPP-SG considered that other groups (such as IASC and SCAR) may also be interested in following suite. The PPP-SG suggested that this opportunity could be advertised through participants from previous PPP Summer Schools and through PhD programs at appropriate universities and colleges. The YOPP Final Summit TT were also encouraged to consider inviting a Canadian APECS member to the YOPP Final Summit TT in 2022.

In closing this agenda item, Prof Jung welcomed Dr Eayrs to the Steering Group and thanked her for taking on this important role.

Action: YOPP Final Summit TT to consider involving someone from the Canadian APECS in the Final Summit planning in 2022;

- Dr Eayrs and the ICO to coordinate on where and how to organise collections of the YOPP education and outreach material on the polarprediction.net website;
- ICO to contact all participants in previous Polar Prediction Schools with the view of distributing a questionnaire to them on how PPP/YOPP has assisted them in their work and career;
- Mr Wilson to contact the YOPP Data TT to see if the YOPP Data Portal could host PPP/YOPP education and training material metadata in the future.
- Prof Svensson to contact Prof Ian Brooks regarding his availability and willingness to be involved in the Spring School at Abisko in March 2022.
- Prof Svensson to liaise with Prof Thomas Spengler (University of Bergen/IASC) regarding potential sponsorship for the Abisko Polar Prediction School

6. PPP RECOMMENDATIONS FOR THE POLAR OBSERVING SYSTEM

6.1 Observing System Experiments

Dr Irina Sandu, Chair of the Numerical Experimentation Task Team, briefed the PPP-SG on the assessment of the impact of atmospheric polar observations on forecast skill, which has been made for the first time by performing coordinated numerical experimentation with several global and regional operational Numerical Weather Prediction (NWP) systems by ECMWF, Environment and Climate Change Canada, DWD and Met Norway.

The impact of polar observations on forecast skill was assessed by performing Observing System Experiments (OSEs), in which different observation types were removed from the full observing system (north of 60N, and south of 60S). The OSEs were performed for selected periods, each of several months duration. The OSEs covered the two NH Special Observing Periods (SOPs). The bulk of the analysis so far has focused on the impact of Arctic observations and at this stage, the results of the OSEs for the Southern Hemisphere have not been explored.

All Arctic observations were found to have a positive impact on forecast skill in the Arctic region, with the greatest tropospheric impacts on both short- and medium-range forecasts due to microwave, conventional and infrared sounding observations. These observations

were found to have positive and statistically significant impacts on forecasts not only in the Arctic but also in the midlatitude regions at longer lead times. Results highlight, however, that the observation impact depends on the season and on the NWP system. Thus, while conventional observations are found to be the key observing system during winter in all NWP systems, during summer the key observing system differs from one system to the other. The microwave sounding data are the key observing system during summer in the ECMWF system, due to a more extensive use of these data, in particular in all sky conditions. Differences between the seasons are most likely due to problems assimilating microwave sounding observations over snow and sea ice, leading to a reduced impact of these observations in winter.

This comparison also demonstrated for the first time the positive impact of Arctic observations on forecast skill both through assimilation in the limited area NWP system and through assimilation of the observations in the global NWP system used as boundary conditions. Finally, a comparison of results from the OSEs and relaxation experiments performed at ECMWF demonstrated that both techniques provide quite similar information regarding the polar to mid-latitude linkages (Day et al, 2019).

Dr Sandu advised the PPP-SG that in addition to removing all observations of a particular type poleward of 60N and 60S, ECMWF, ECCC, DWD and Met Norway also made model runs just removing the additional SOP observations. This approach helps to examine how the models handle diurnal changes given the increased frequency of the YOPP SOP observations. On average (across all regions, time and weather events) the additional YOPP radiosondes made a small but positive impact, but in some situations their impact was much larger. At this stage there are no plans to run Observing System Simulation Experiments (OSSEs) due to the computational cost in their set-up and running.

Dr Sandu noted that the bulk of the experimentation has now been completed with the focus shifting to further analysis of the results. To date three main conclusions can be drawn: all existing observing system have positive impacts on forecast skill; we can further improve the forecast skill by increasing the uptake of existing observational data (in particular microwave data over snow and sea ice) through investments into all the components of NWP systems (coupled modelling, usage of observations and data assimilation techniques); and, the OSEs can be used to investigate polar/mid-latitude linkages.

In the ensuing discussion, Dr Sandu noted that the Numerical Experimentation Task Team will continue their work via teleconferences. Dr Eric Bazile offered to see if a Météo France student would be interested in looking at the OSE results for the Southern Hemisphere.

Action: Numerical Experimentation TT to decide whether to share a subset of the data from the relaxation experiments and the OSE's to the wider community.

6.2 PPP Budget

Ms Lomarda briefed the session on the overall funding situation for the final three years of PPP. Canada and Norway continue to support the PPP and it is anticipated that funding of the order of CHF400,000 should be available until the end of 2022 for ongoing activities as well as the Final Summit. Noting the various Task Team work programs, options for a Third PPP Spring School at Abisko, meetings of the PPP-SG and costs around the Final Summit the PPP-SG identified activities with a first costing of around CHF550,000 for the remainder of the PPP. This leaves a gap of up to CHF 150,000 between estimated available funds and expenditure. The PPP-SG requested the ICO to tabulate the anticipated expenses and circulate after the session for comment. The PPP-SG also recalled actions under the Final

Summit agenda that may assist address some of the potential shortfall in funds. Noting that some of the funding had to be used before the end of March 2021 the PPP-SG agreed to provide funding for the PPP-SERA meeting in April, the PPP-SERA Weather and Society Workshop in St Petersburg in June at the ICASS conference, the PPP-SERA Workshop and YOPP-SH activities around the SCAR conference in Hobart in August 2020, the YOPPSIteMIP workshop in October 2020 and PPP-SG#12 in 2021 as well as a number of other smaller activities. Task Team leaders were urged to work with the ICO and other donors to identify additional funding sources for these and future events.

6.3 Membership

The PPP-SG recalled that at its tenth session in 2019 Dr Qizhen Sun as well as Dr Clare Eayrs were nominated for membership of the PPP but their membership had not been officially confirmed by the WWRP-SSC. The ICO and Ms Lomarda were requested to follow up these nominations. The PPP-SG noted with thanks Dr Mikhail Tolstykh's and Dr Matthieu Chevallier's contributions to the work of the PPP over the last ten years and wished them all the best for the future. In light of the vacancy, the PPP-SG considered the work program for the coming three years and representation resulting in the recommendation to the PPP-SG that Dr Eric Bazile from Météo France be nominated for membership of the PPP-SG. Furthermore, the ICO were requested to contact PPP-SG members who were not present at the meeting to see if they intended to continue in their membership of the Steering Group.

Action:

- ICO to contact PPP-SG members who were not present in Bremerhaven to check that they are expecting to continue.
- ICO and Ms Lomarda to follow up with the Chair of the WWRP-SSC on the status of the PPP-SG#10 nominations of Dr Clare Eayrs and Dr Qizhen Sun to the PPP-SG.

6.4 Next Steering Group Meeting

The PPP-SG chair recalled that PPP-SG#10 had agreed to hold the twelfth session of the PPP-SG in Zuhai City in China in early 2021. Noting the early impact of the COVID-19 virus, the PPP-SG accepted an offer from Dr Jun Inoue from the National Institute of Polar Research in Japan as an alternative host, if required, and from the WMO Secretariat to hold the session in Geneva if a meeting in Japan or China would not be possible. Prof Jung advised the PPP-SG that the ICO would circulate a poll to clarify what date(s) in late February/early March 2021 would be preferred dates for the PPP-SG#12 session. The decision about the location of the session would be taken later in the year as the impact of the COVID-19 virus becomes better known. In the meantime, the regular PPP-SG monthly teleconferences would continue with times changing from session to session to accommodate the different time zones.

Action: PPP-SG to suggest options for alternative locations of 2021 PPP-SG. Decision on location to be made later in the year. Offers received from Japan and WMO Secretariat for hosting in Japan and Switzerland, respectively.

6.5 Review of action items from PPP-SG#11

The PPP-SG reviewed the draft actions and proposed due dates from this session clarifying and refining some actions (Annex III). The PPP-SG Chair requested that the action items and a short summary of the meeting be prepared for circulation to all PPP-SG members within two weeks of the meeting and that the final minutes be made available by late March or early

April 2020.

7. WRAP UP, NEXT STEPS AND CLOSING

7.1 Wrap-up and Next Steps

Chair of the PPP-SG Prof Thomas Jung summarized the discussions and decisions taken during the session noting that perhaps the most important decision was to reach out to the wider WWRP community and other groups to hold a YOPP Legacy Scoping Workshop in late 2020 to look at post PPP/YOPP activities. Prof Jung noted his pleasure with the progress of work during the Consolidation Phase, particularly the OSEs and underlined the importance of advancing the YOPPSiteMIP activities to enable the science around the Processes Task Team to proceed. Prof Jung further noted his satisfaction with the plans and preparations being made by Environment and Climate Change Canada for the YOPP Final Summit and progress with the PPP-SERA and Education activities.

7.2 Closure

Prof Jung thanked AWI for their support to the session, particularly Dr Kirstin Werner, Ms Katharina Kirchhoff, Ms Sara Pasqualetto and the ICO intern Mr Aaron-Christoph Frehlich and to the PPP-SG members for their contributions during the session. Prof Jung wished everyone a safe trip home and closed the session at 1050 on Friday 21 February 2020.

ANNEX I – MEETING AGENDA

Polar Prediction Project (PPP) Steering Group Meeting #11

AGENDA
19–21 February 2020
Alfred Wegener Institute
Address: AWI Building F, Bussestrasse 24, 27570 Bremerhaven

Session 1: Opening and Welcome to PPP SG#11		
14:15–14:25	*Welcome at AWI*	Thomas Jung (PPP SG Chair)
14:25–14:30	*Welcome from WMO*	Nanette Lomarda (WMO WWRP)
Session 2: Update on WWRP, WMO Secretariat		
14:30–14:45	*WWRP Updates*	Nanette Lomarda (WMO WWRP)
Session 3: Summary YOPP Science Workshop		
14:45–15:30	*Recap of YOPP Science Workshop*	Thomas Jung
15:30–16:00	Coffee & Health Break	
Session 4: Review of Open Action Items		
16:00–16:45	*Review Open Action Items*	Jeff Wilson
Session 5: Update on Key YOPP Activities (5 min presentation & discussion)		
16:45–17:45	*Targeted Observing Periods*	Gunilla Svensson
17:45–18:30	*YOPP Final Summit*	Barbara Casati

Thursday 20 February 2020		
Session 5 cont'd: Update on Key YOPP Activities (5 min presentation & discussion)		
09:00–10:00	***YOPP Legacy***	Thomas Jung
10:00–11:00	***YOPP Evaluation and Success stories***	Thomas Jung
11:00–11:30	***Group Photo & Morning Break***	
11:30–11:40	***YOPP Data Portal***	Øystein Godøy
11:40–12:30	***YOPP Data Component***	SiriJodha Khalsa

Thursday 20 February 2020		
Session 5 cont'd: Update on Key YOPP Activities (5 min presentation & discussion)		
12:30-13:45	***Lunch***	
13:45–14:45	*Communication & Outreach*	Kirstin Werner
14:45–15:45	*Education*	Clare Eayrs
15:45–16:15	***Coffee Break***	
Session 6: PPP Recommendations for the Polar Observing System		
16:45–17:45	*Observing System Experiments*	Irina Sandu (remote)
18:30	***No-host dinner at Villa Seebeck*** *Address: Deichstraße 15, 27568 Bremerhaven*	

Friday 21 February 2020		
Session 7: Steering Group Matters (Closed		
09:00–09:15	*PPP Budget*	Nanette Lomarda
09:15–09:35	*Membership*	Thomas Jung
09:35–09:45	*Next Steering Group Meeting*	Thomas Jung
Session 8: Review of Actions from this Meeting		
09:45–10:15	*Review of Actions*	Jeff Wilson
10:15–10:45	***Morning Break***	
Session 9: Closure		
10:45–11:15	*Wrap Up and Next Steps*	Thomas Jung
11:15–11:30	*Closure*	Thomas Jung
12:00-13:00	***Lunch (optional)***	

ANNEX II – PPP-SG#11 PARTICIPANTS

Given Name	Family Name	Affiliation
PPP-SG Members		
Thomas	Jung	AWI
David	Bromwich	Ohio State University
Barbara	Casati	ECCC
Jonathan	Day	ECMWF
Robert	*Grumbine*	*National Center for Weather and Climate Prediction*
Jun	Inoue	National Institute of Polar Research
Thomas	Jung	AWI
Siri Jodha	Khalsa	University of Colorado, Boulder
Jorn	Kristiansen	Met Norway
Machiel	Lamers	Wageningen University
Daniela	Liggett	*University of Canterbury*
Donald	*Perovich*	*Engineer Research and Development Center*
Ian	Renfrew	University of East Anglia
Irina	*Sandu*	*ECMWF*
Gregory	*Smith*	*ECCC*
Vasily	Smolyanitsky	*AARI*
Yuchen	*Sun*	*National Marine Environmental Forecasting Center*
Gunilla	Svensson	Stockholm University
WMO		
Nanette	Lomarda	WMO
Martin	Wegmann	WMO
ICO		
Kirstin	Werner	AWI
Aaron	Frehlich	AWI
Helge	Goessling	AWI
Katharina	Kirchhoff	AWI
Sara	Pasqualetto	AWI
Jeff	Wilson	WMO (retired)
Invited Guests		
Eric	Bazile	Météo France
Clare	Eayrs	New York University Abu Dhabi
0ystein	*Godoy*	*Met Norway*
Zen	Mariani	*ECCC*
Francois	Montagner	EumetSat
Amy	Solomon	NOAA

ANNEX III – DECISIONS AND ACTIONS FROM PPP-SG#11

		Action items from PPP-SG#11			
#	Session	Description	Who	When	Status
1	3 -Summary YOPP Science Workshop	Decide whether to share a subset of the data from the relaxation experiments and the OSE's.	Numerical Experimentation TT	1/5/2020	
2	3 -Summary YOPP Science Workshop	Actions and budget estimates for sea ice task team are required	Helge Goessling	21/2/2020	Done
3	3 -Summary YOPP Science Workshop	ICO to prepare a letter to Roshydromet Copy to AARI (end of April), two letters one on the buoys (can Roshydromet continue to deploy buoys to fill gaps and document how many buoys were deployed and where, the technical lessons learnt from the planning and deployment and what the impact of the buoys has been) and one on the radiosondes (can Roshydromet send the Baranova research sonde flights to the GTS in near real time)	ICO		Underway
4	3 -Summary YOPP Science Workshop	TT's to discuss their YOPP publication strategy(s) and report back to PPP-SG by mid-year. Dedicated overview papers for each of the PPP/YOPP TTs should be considered.	TT leaders	30/6/2020	
5	4 Review of Open Action Items	PPP-SG TT leaders to review and update the action items for their TT's on Trello	TT leaders	1/3/2020	
6	5-2 YOPP Final Summit	PPP-SG Chair to consider inviting editor of Nature to YOPP Final Summit (Michael White Nature editor).	PPP-SG Chair	30/6/2020	
7	5-2 YOPP Final Summit	Nominate an indigenous person and someone from PPP-SERA for the organising committee for YOPP Final Summit	PPP-SERA/Gita Ljubicic	31/5/2020	
8	5-2 YOPP Final Summit	YOPP Summit TT to develop a concept on how to approach donors.	Final Summit TT	31/5/2020	
9	5-2 YOPP Final Summit	PPP-SG to identify potential sponsors and advise ICO/Final Summit TT by end of March. ESA, EUMETSAT, European Commission, plus commercial such as Vaisala, SCAR, IASC?	PPP-SG members	31/3/2020	
10	5-2 YOPP Final Summit	PPP-SG members to talk to their institutions/NMHSs to see if they have end of year funds that could be donated to the PPP trust fund in support of the conference.	PPP-SG members	31/3/2020	
11	5-2 YOPP Final Summit	Consider involving Canadian APECS in the planning in 2022.	Final Summit TT, Clare Eayrs to contact Jackie Dawson on this	30/06/2020	

12	5-2 YOPP Final Summit	Investigate options and costs for remote participation in some or all of the Final Summit	Barbara Casati	31/03/2020	
13	5-3 YOPP Legacy	PPP-SG Chair to discuss with Peter Bauer/Mike Sparrow options for follow on Scoping Workshop. Irina Sandu to also talk to Peter Bauer	PPP-SG Chair/Irina Sandu	15/3/2020	
14	5-3 YOPP Legacy	Nanette Lomarda to discuss with Paolo Ruti et al options for holding a scoping meeting for PPP follow on	Nanette Lomarda	15/3/2020	
15	5-3 YOPP Legacy	Recommend S2S leaders should be at a scoping workshop as well as the joint WWRP/WCRP groups plus IASC and SCAR	ICO/WMO	31/5/2020	
16	5-3 YOPP Legacy	Decides that YOPP-SH as a recognised project will continue until the end of 2024	PPP-SG Chair to report this to WWRP-SC	30/4/2020	
17	5-4 YOPP Evaluation and Success Stories	Consider whether one or more face to face meetings with WMO staff on evaluation will be necessary	ICO and Nanette Lomarda	31/3/2020	
18	5-4 YOPP Evaluation and Success Stories	ICO to work with WMO and Evaluation TT to see how to progress evaluation work	ICO, Nanette Lomarda	30/4/2020	
19	5-4 YOPP Evaluation and Success Stories	ICO to reach out to unendorsed projects undertaking YOPP related activities to advise them of the opportunity to seek YOPP endorsement.	ICO, PPP-SG members to advise ICO of potential projects.	30/6/2020	
20	5-4 YOPP Evaluation and Success Stories	Use PPP email list, website etc to remind people it is still possible to seek YOPP endorsement for projects.	ICO	31/12/2020	
21	5-4 YOPP Evaluation and Success Stories	PPP-SG#12 to review draft questionnaire for YOPP endorsed projects	ICO	31/01/2021	
22	5-4 YOPP Evaluation and Success Stories	ICO to contact all participants in PPP Summer Schools with the view of distributing a questionnaire at a later time	ICO	30/06/2020	
23	5-5 YOPP Data Portal	Delay decision regarding whether only datasets discoverable via the YOPP portal can be counted as YOPP until later this year via the PPP-SG telecom.	PPP-SG, ICO to ask Ian Renfrew to test and comment	30/4/2020	
24	5-5 YOPP Data Portal	Siri Jodha Khalsa provide material for YOPP Data TT page on polarprediction.org based upon the first three pages of his presentation	Siri Jodha Khalsa	29/2/2020	
25	5-5 YOPP Data Portal	Siri Jodha Khalsa to advise ICO of the correct names of the YOPP Data TT members so the website, YOPP Portal etc can be updated.	Siri Jodha Khalsa	29/2/2020	
26	5-5 YOPP Data Portal	Data TT to work with Øystein Godøy and ICO on the video/webinar, similar to what was done for APPLICATE	YOPP Data TT, ICO, Øystein Godøy	31/5/2020	

27	5-5 YOPP Data Portal	PPP-SG to give Øystein Godøy and Siri Jodha Khalsa feedback on the content and layout of the landing page by the end of March	PPP-SG	31/3/2020	
28	5-5 YOPP Data Portal	Recommendation: NWP Centres hosting their data on a server that is not OpenDAP compatible or has a searchable interface to fill in the YOPP Portal ad hoc metadata form so people can discover the locally held metadata via the YOPP Portal. Øystein and Siri Jodha Khalsa to review/update as necessary and then publicise information about how to ensure remoted held data is searchable via the YOPP portal. Need a short summary on how to set it up (Siri Jodha and Øystein to do this). ECCC, ECMWF and Ian Renfrew to wait until the doc done before trying this out. Øystein and SiriJodha to have the update document completed by 28 Feb)	ECCC, ECMWF (Irina Sandu to contact Øystein Godøy for further details), Ian Renfrew	30/04/2020	
29	5-6 YOPP Data Component	ICO to contact Michael White (Nature) to see if he still producing the podcast series and explore possible cooperation	Kirstin Werner	31/03/2020	
30	5-6 YOPP Data Component	PPP-SG to submit content for the PolarPrediction website.	PPP-SG	Ongoing	
31	5-7 Communication and Outreach	ICO to contact all TT leaders re members and website presence	ICO		
32	5-7 Communication and Outreach	Daniela Liggett and Clare Eayrs to advise ICO of the email addresses of course coordinators for polar related courses so ICO can reach out to them to publicise the Twitter feed and "competition" for TOP.	Clare Eayrs and Daniela Liggett	31/03/2020	
33	5-7 Communication and Outreach	ICO to consider writing and submitting an article for “The Conversation” as a means to lure people onto the PolarPredictionMatters website.	ICO	30/04/2020	
34	5-7 Communication and Outreach	PPP-SG members to make suggestions for potential polar prediction matters articles. APPLICATE user cases could form part of articles. Helge Goessling has plans for article on aircraft campaign with Manfred Wendisch. Daniela Liggett to approach Vicki Heinrich (University of Tasmania) about an article for PolarPredictionMatters.	PPP-SG	Ongoing	
35	5-7 Communication and Outreach	ICO to investigate the option for compiling the articles from PolarPredictionMatters blogsite into a WMO publication or similar	ICO	30/06/2020	
36	5-8 Education	Decides to hold Spring School in March 2022 in Abisko, Sweden	Clare Eayrs	Ongoing	

37	5-8 Education	Gunilla Svensson to approach Ian Brooks Re supporting the spring school	Gunilla Svensson	29/02/2020	
38	5-8 Education	Approach APECS re possibility of YOPP Session during APECS day on 1 August in Hobart	Clare Eayrs	29/02/2020	
39	5-8 Education	Clarify with APECS if possible to offer a YOPP session around the Arctic Science Summit week in Lisbon in March 2021	Clare Eayrs	31/03/2020	
40	5-8 Education	Advise Thomas Spengler of suggested month for the Abisko Spring School	Gunilla Svensson	31/03/2020	
41	5-8 Education	Coordinate on where and how to organise collections of the YOPP education and outreach material	ICO and Clare Eayrs	30/06/2020	
42	5-8 Education	YOPP Data TT and Øystein Godøy to advise whether the YOPP data portal could conceptually hold metadata for educational resources	Jeff Wilson to contact Siri Jodha Khalsa and Øystein Godøy	31/03/2020	Done
43	7-2 PPP Membership	ICO and Nanette Lomarda to follow up with the status of the nominations of Clare Eayrs and Qizhen Sun to the PPP-SG	ICO and Nanette Lomarda	29/02/2020	
44	7-2 PPP Membership	ICO to contact PPP-SG members who were not present in Bremerhaven to check that they are expecting to continue	ICO	31/03/2020	
45	7-2 PPP Membership	PPP-SG Chair to consult with Eric Bazile regarding nominating Eric for PPP-SG membership and take appropriate follow-up action	PPP-SG Chair	29/02/2020	
46	7-3 Next Steering Group Meeting	PPP-SG to suggest options for alternative locations of 2021 PPP-SG on Friday. Decision on location to be made later in the year.	PPP-SG	21/2/2020	
47	7-3 Next Steering Group Meeting	Location of PPP-SG#12. ICO to check with Qizhen Sun regarding his offer to host PPP-SG in Zuhai City and potential dates in Feb/March 2021. Jun Inoue offered to consult re potential for hosting in Japan if the meeting can't be held in Zuhai City, Nanette Lomarda to investigate options for Geneva if Zuhai City or Japan not appropriate	ICO, Jun Inoue, Nanette Lomarda	31/03/2020	

ANNEX IV- GLOSSARY

3D-EnVar: A form of data assimilation used in NWP models.
4d-EnVar: A form of data assimilation used in NWP models.
4D-Var: A form of data assimilation used in NWP models.
ACDD: ACDD stands for NetCDF Attribute Convention for Dataset Discovery (ACDD). The discovery metadata identifies: **who** measured, simulated or analysed **what**, **where**, and **when** as well as **conditions for reuse** and **access mechanisms** for the data. https://www.unidata.ucar.edu/software/netcdf/conventions.html
AMAP: Arctic Council's Arctic Monitoring and Assessment Programme. https://www.amap.no/
AMPS: The US Antarctic Mesoscale Prediction System. http://www2.mmm.ucar.edu/rt/amps/
AMS: American Meteorological Society. https://www.ametsoc.org/index.cfm/ams/
APECS: Association of Polar Early Career Scientists. https://www.apecs.is/
APPLICATE: Advanced Prediction in Polar regions and beyond: Modelling, observing system design, and LInkages associated with a Changing Arctic climaTE (EU Horizon2020 project). https://applicate.eu/
AROME: AROME is a small scale numerical prediction model, operational at Météo-France since December 2008. https://www.umr-cnrm.fr/spip.php?article120&lang=en
ASM: Arctic Science Ministerial. https://www.arcticscienceministerial.org/en/conference-1706.html
AWI: Alfred Wegner Institute Helmholtz Centre for Polar and Marine Research. https://www.awi.de/en.html
BAMS: The Bulletin of the American Meteorological Society. https://www.ametsoc.org/index.cfm/ams/publications/bulletin-of-the-american-meteorological-society-bams/
CAS: The WMO Commission for Atmospheric Science. http://www.wmo.int/pages/prog/arep/cas/index_en.html
CBS: The WMO Commission for Basic Systems. http://www.wmo.int/pages/prog/www/BAS/CBS-info.html
CF: Used with netCDF formatted files. CF stands for Climate and Forecast. The purpose of the CF conventions is to require conforming datasets to contain sufficient metadata that they are self-describing in the sense that each variable in the file has an associated description of what it represents, including physical units if appropriate, and that each value can be located in space (relative to earth-based coordinates) and time. http://cfconventions.org/Data/cf-conventions/cf-conventions-1.7/cf-conventions.html
CLiC: A WMO initiative on Climate and the Cryosphere. http://www.climate-cryosphere.org/
CMIP: Coupled Model Intercomparison Project. https://www.wcrp-climate.org/wgcm-cmip
COMNAP: The Council of Managers of National Antarctic Programs. https://www.comnap.aq/
DA: Data Assimilation.
DAOS: WWRP Working Group on Data Assimilation and Observing Systems. https://www.wmo.int/pages/prog/arep/wwrp/new/daos_wg_2015_main_web_page.html
DOI: Digital Object Identifier. https://www.doi.org/
DWD: Deutscher Wetterdienst (The German Weather Service). https://www.dwd.de/EN/Home/home_node.html
ECCC: Environment and Climate Change Canada. https://www.ec.gc.ca/?lang=en
ECMWF: European Centre for Medium-Range Weather Forecasts. https://www.ecmwf.int/
EC-PHORS: The World Meteorological Executive Council Panel of Experts on Polar and High

Mountain Observations, Research and Services. https://www.wmo.int/pages/polar/

EGU: European Geosciences Union. https://www.egu.eu/

EMS: European Meteorological Society. https://www.emetsoc.org/

EU Arctic Cluster: Nine currently funded Horizon 2020 Arctic projects and a FP7 funded project together build the EU Arctic Cluster – a network, which merges the most up-to-date findings on Arctic change and its global implications. https://www.eu-polarnet.eu/eu-arctic-cluster/

F.A.I.R: Findable, Accessible, Interoperable, and Reusable Principles. The FAIR principles are designed to support knowledge discovery and innovation both by humans and machines, support data and knowledge integration, promote sharing and reuse of data, be applied across multiple disciplines and help data and metadata to be 'machine readable', support new discoveries through the harvest and analysis of multiple datasets and outputs. https://ardc.edu.au/resources/working-with-data/fair-data/

FMI: Finnish Meteorological Institute. https://en.ilmatieteenlaitos.fi/

github: GitHub Inc. is a web-based hosting service for version control of data and computer code. https://github.com/

GODAE: The Global Ocean Data Assimilation Experiment. https://www.godae-oceanview.org/

GOS: WMO Global Observing System. http://www.wmo.int/pages/prog/www/OSY/GOS.html

GTS: The WMO Global Telecommunication System. http://www.wmo.int/pages/prog/www/TEM/GTS/index_en.html

H2020: European Union Research and Innovation Programme. https://ec.europa.eu/programmes/horizon2020/

IABP: International Arctic Buoy Programme. http://iabp.apl.washington.edu/

IASC: International Arctic Science Committee. https://iasc.info/

IASOA: International Arctic Systems for Observing the Atmosphere. https://arctic.noaa.gov/Arctic-News/ArtMID/5556/ArticleID/384/International-Arctic-Systems-for-Observing-the-Atmosphere

ICO: International Coordination Office for Polar Prediction. https://www.polarprediction.net/background/ico/

IICWG: International Ice Charting Working Group. https://nsidc.org/noaa/iicwg

IOC: Intergovernmental Oceanographic Commission. http://www.unesco.org/new/en/natural-sciences/ioc-oceans/

IUGG: International Union of Geodesy and Geophysics. http://www.iugg.org/

JCSDA: Joint Center for Satellite Data Assimilation in the United States of America. https://www.jcsda.noaa.gov/index.php

JWGFVR: WWRP Joint Working Group on Forecast Verification Research. https://www.wmo.int/pages/prog/arep/wwrp/new/Forecast_Verification.html

Met Norway: The Norwegian Meteorological Institute. https://www.met.no/en

Météo-France: The French Weather Service. http://www.meteofrance.fr/

MOSAiC: Multidisciplinary drifting Observatory for the Study of Arctic Climate. https://www.mosaic-expedition.org/

NAWDEX: The North Atlantic Waveguide and Downstream Impact Experiment. http://www.pa.op.dlr.de/nawdex/

NCAR: National Center for Atmospheric Research in the United States of America. https://ncar.ucar.edu/

NCEP: National Centers for Environmental Prediction in the United States of America. https://www.ncep.noaa.gov/

netCDF: The Network Common Data Form, or netCDF, is an interface to a library of data access functions for storing and retrieving data in the form of arrays. https://www.unidata.ucar.edu/software/netcdf/docs/netcdf_introduction.html

NMHS: National Meteorological and Hydrological Services. Generic WMO term for weather and hydrology services.

NOAA: National Oceanographic and Atmosphere Administration, United States of America. https://www.noaa.gov/

NWP: Numerical Weather Prediction.

OPeNDAP: Open-source Project for a Network Data Access Protocol (OPeNDAP) is the developer of client/server software, of the same name, that enables scientists to share data more easily over the internet. The OPeNDAP group is also the original developer of the Data Access Protocol (DAP) that the software uses. https://earthdata.nasa.gov/collaborate/open-data-services-and-software/api/opendap

OSEs: Observing System Experiments. https://www.wmo.int/pages/prog/www/WIGOS-WIS/reports/6NWP...3/3.10.pdf

OSSEs: Observing Simulation System Experiments. http://www.met.reading.ac.uk/~stefano/research/osse/index.html

PAMIP: Polar Amplification Model Intercomparison Project. https://www.wcrp-climate.org/modelling-wgcm-mip-catalogue/cmip6-endorsed-mips-article/1303-modelling-cmip6-pamip

PARCOF: Pan-Arctic Regional Climate Outlook Forum. https://www.arctic-rcc.org/taxonomy/term/4

PDEF: WWRP Working Group on Predictability, Dynamics and Ensemble Forecasting. https://www.wmo.int/pages/prog/arep/wwrp/new/pdef_wg_2015_main_web_page.html

PPM: Polar Prediction Matters, a YOPP initiated dialogue platform to engage with users of polar weather and sea-ice forecasts. https://www.polarprediction.net/yopp-activities/polar-prediction-matters/

PPP: Polar Prediction Project. https://www.polarprediction.net/

PPP-SERA: Polar Prediction Project Task Team on Societal and Economic Research and Applications. https://www.polarprediction.net/yopp-activities/yopp-task-teams/ppp-sera/

PPP-SG: Polar Prediction Project Steering Group. https://www.polarprediction.net/steering-group/

RMSEs: Root Mean Square Error is the standard deviation of the residuals (prediction errors).

Roshydromet: The national weather service of Russia. http://government.ru/en/department/49/

RV Polarstern: German Icebreaking Research Vessel Polarstern. https://www.awi.de/en/expedition/ships/polarstern.html

S2S: Sub-seasonal to seasonal. S2S is a joint initiative of the World Weather Research Programme (WWRP) and the World Climate Research Programme (WCRP). http://s2sprediction.net/

SCAR: Scientific Committee on Antarctic Research. https://www.scar.org/

SH: Southern Hemisphere.

SIDFex: Sea Ice Drift Forecast Experiment. https://www.polarprediction.net/yopp-activities/sidfex/

SIPN: The Sea Ice Prediction Network. https://nsidc.org/data/sipn

SOP: Special Observing Period.

SOP1-NH: First Special Observing Period in the Arctic, 1 February to 31 March 2018.

SOP1-SH: First SOP for the Southern Hemisphere, 16 November 2018 to 15 February 2019.

SOP2-NH: Second Special Observing Period in the Arctic. 1 July to 30 September 2018.

SOP3-NH: Third Special Observing Period for the Arctic. 1 February to 31 March 2020.

SPICE: WMO Solid Precipitation Intercomparison Project. https://public.wmo.int/en/resources/meteoworld/spice-%E2%80%93-improving-snowfall-measurements

Supersites: Locations were additional observations or model data has been produced for

YOPP, particularly during the Special Observing Periods.

THINICE 2021: A conference to be organized by AMAP in 2021

Third Pole: The region that encompasses the Himalaya-Hindu Kush mountain range and the Tibetan Plateau. http://www.icimod.org/?q=3487

THORPEX: The Observing system Research and Predictability Experiment) is an international research programme established in 2003 by the World Meteorological Organization to accelerate improvements in the utility and accuracy of weather forecasts up to two weeks ahead. It is part of the World Weather Research Programme. https://www.wmo.int/pages/prog/arep/wwrp/new/thorpex_new.html

TIGGE: THORPEX Interactive Grand Global Ensemble. https://www.wmo.int/pages/prog/arep/wwrp/new/documents/TIGGE_brochure.pdf

UK MetOffice: The Weather Service of the United Kingdom of Great Britain and Northern Ireland. https://www.metoffice.gov.uk/

UK: United Kingdom of Great Britain and Northern Ireland.

US: The United States of America.

WCRP: The World Climate Research Programme. https://www.wcrp-climate.org/

WGNE: The Working Group on Numerical Experimentation (WGNE), jointly established by the WCRP Joint Scientific Committee (WCRP-JSC) and the WMO Commission for Atmospheric Sciences (CAS), which is responsible for WWRP. http://wgne.meteoinfo.ru/

WMO: World Meteorological Organisation. https://public.wmo.int/en

WMS: Web Mapping Service. The OpenGIS® Web Map Service Interface Standard (WMS) provides a simple HTTP interface for requesting geo-registered map images from one or more distributed geospatial databaseshttps://www.ogc.org/standards/wms

WWIC: Weather, Water, Ice and Climate. https://www.polarprediction.net/yopp-activities/yopp-task-teams/ppp-sera/

WWRP: World Weather Research Project. https://www.wmo.int/pages/prog/arep/wwrp/new/wwrp_new_en.html

WWRP-SSC: WWRP Scientific Steering Committee. https://www.wmo.int/pages/prog/arep/wwrp/new/main_page_wwrp_ssc.html

x-validation: is a statistical method for assessing how the results of a statistical analysis will generalize to an independent data set.

YOPP Core Phase: From mid 2017 to mid 2019.

YOPP Data Portal: Website providing information and access to data collected during YOPP (https://yopp.met.no/).

YOPP: Year of Polar Prediction. https://www.polarprediction.net/

YOPP-SH: The Year of Polar Prediction in the Southern Hemisphere.

YOPPsiteMIP: Year of Polar Prediction Numerical Model Intercomparison Project. https://www.polarprediction.net/.../YOPP_Supersite_common_model_output.pdf