

WORLD METEOROLOGICAL ORGANIZATION

**COMMISSION FOR ATMOSPHERIC SCIENCES (CAS)
WORLD WEATHER RESEARCH PROGRAMME (WWRP)**

WWRP POLAR PREDICTION PROJECT

**STEERING GROUP – 5TH SESSION
INCORPORATING YOPP PLANNING MEETING – 3RD SESSION**

MONTRÉAL, QUÉBEC, CANADA

21-23 AUGUST 2014



REPORT final version – 13 October 2014



1. OPENING

1.1 Welcome from PPP-Steering Group Chair, Thomas Jung

The fifth session of the Steering Group (SG) for the WWRP-THORPEX Polar Prediction Project (PPP) was opened by the chair, Thomas Jung, at 1510 on 21 August 2014 at the offices of Environment Canada in Montréal, Québec, Canada.

Thomas Jung welcomed everyone, and thanked those involved in the local arrangements. Thomas introduced Helge Goessling as the designated Director of the PPP International Coordination Office and successor of Neil Gordon (Note: In the meantime the appointment has been confirmed).

The list of participants in the meeting is given as Annex 1 to this report.

1.2 Purpose of the Meeting

Thomas Jung stressed that PPP was entering into a new phase. The first phase had been dedicated to drafting and writing of plans and other documents (Implementation Plan, Science Plan, YOPP Plan, White Papers, etc.). He said that it was time to focus more strongly on promoting and implementing the plans. Another important aspect of this new phase would be to ensure alignment with other activities.

The main purpose of this 5th Steering Group meeting was to start with the development of two time lines with milestones – one for the short-term (next 2 years), and one for the long-term (vision for the duration of the Project). Thomas Jung stressed the importance of having such time lines when it comes to the financial planning of the project, and when it comes to promoting PPP with funding agencies.

1.3 Introductions

The participants briefly introduced themselves.

2. ORGANIZATION OF THE MEETING

2.1 Adoption of the Agenda

The provisional Agenda is given as Annex 2 to this report. The timing of items on agenda was slightly changed: Education (11.2) was moved up to Thursday; sea ice prediction (3.1) was moved to Friday; and some further small changes were agreed. This report follows the order of the provisional Agenda.

2.2 Working Arrangements

Greg Smith gave a short introduction to the working arrangements.

3. FLAGSHIP ACTIVITIES

3.1 Sea Ice Prediction

A draft plan for the flagship theme of sea ice prediction in PPP had been distributed by Greg Smith prior to the meeting. Greg Smith explained the importance and challenges of sea ice prediction in terms of benefits for users and new possibilities that have emerged recently (e.g., new parameterisations), and suggested to put the short-term focus on **verification**. To

fill gaps related to skilful sea-ice predictions, Greg Smith suggested joint efforts with the WWRP Subseasonal-to-Seasonal (S2S) project and other initiatives (FAMOS, CLIVAR, GOV, IICWG), improved communication between user groups, and improved sea ice verification metrics and standardization. He underlined that so far only very few relevant publications on sea ice verification are available, though some technical reports exist. While additional observations in the polar regions (in particular sea-ice thickness data) would be highly beneficial, a lot could be done to improve sea ice predictions also with existing products. How best to proceed regarding uncertainty and data assimilation issues was discussed. Greg Smith suggested publishing an EOS paper to get feedback from across the community and stressed the need to represent PPP at relevant meetings.

http://polarprediction.net/fileadmin/user_upload/redakteur/Home/Steering_Group/Meetings/SG-5/SG5_TOP3_Sea_Ice_Prediction.pdf

Greg Smith offered information on the envisaged Sea Ice Verification Workshop. Its main goal would be to bring together the key players. The contents of the workshop would be user needs, observation retrievals and errors, current sea ice verification methods and challenges, and NWP prediction methods. Evaluation and user needs would need to be taken into account when setting the scope of the workshop. Peter Bauer suggested that air-sea fluxes could be part of the workshop (with relevant data being available) due to their significance when it comes to process understanding. The workshop was discussed in terms of scope and scales, and whether or not diagnostics should be included. The meeting agreed that it is important to avoid doubling up with workshops planned by the Sea Ice Prediction Network and APPOSITE projects, so the scope needs to be carefully shaped. In terms of timing, IICWG will be contacted by Greg Smith to avoid collision or even to find a joint date. A tentative date of early 2016 was suggested. Pertti Nurmi reported that in 2016 the next regular WMO Verification Workshop together with a WMO tutorial would take place, and suggested combining this with the PPP Sea Ice Verification workshop. Thomas Jung suggested that the Sea Ice Prediction Network and similar projects should also be included in the planning of the Verification Workshop. Greg Smith countered the concern that the workshop might become too academic by arguing that IICWG will bring a strong user-oriented element into the workshop.

Following an extensive discussion of various sea ice specific aspects in the context of data assimilation and initialisation, Peter Bauer suggested to foster exchange with DAOS, particularly when it comes to planning YOPP-related assimilation activities. Peter made the point that “*the data you use to verify today, you want to assimilate tomorrow*”. Thomas Jung raised the question of how progress could be measured regarding sea ice prediction and verification, and that it could be worthwhile to formulate a vision for 2020.

Renee Tatusko suggested coordinating with the JCOMM expert team on sea ice and the Canadian and Russian Ice Services.

Action No.	Item	Action	Responsible	Due
SG5-01		Involve DAOS Working Group in YOPP-related assimilation activities relating to sea ice	Peter Bauer/Thomas Jung/Greg Smith	Ongoing, Mark Buehner has been

			identified as the contact person
SG5-02	Coordinate with IICWG at September 2014 workshop (and probably with the JWGFVR) and fix date for Sea Ice Verification Workshop and estimate costs	Greg Smith, Pertti Nurmi	Sep 2014
SG5-03	Coordinate with JCOMM Expert Team on Sea Ice, Canadian Ice Service, Russian Ice Service	Greg Smith	Dec 2014
SG5-04	Coordinate with FAMOS at workshop in October, Woods Hole	Helge Goessling	Oct 2014
SG5-05	Formulate sea-ice prediction and verification vision 2020	Steering Group	Early 2015

3.2 Polar-Lower Latitude Linkages

Francisco Doblaz-Reyes presented the status of the preparation of the workshop on “Polar-lower latitude linkages and their role in weather and climate prediction”, planned for 10-12 December 2014 in Barcelona, and explained the background and scope of the workshop. Refer: <http://polarprediction.net/linkages>

He said that preparatory documents will be prepared for the workshop to take into account progress made in previous workshops. In this context the following two documents were mentioned:

- “Arctic–lower latitude coupling: What is the forcing and what is the response?” http://www.usclivar.org/sites/default/files/documents/2014/2014Variations12-3_1.pdf.
- “Recent Arctic amplification and extreme mid-latitude weather”, *nature geosciences*, Aug 2014 doi:10.1038/ngeo2234.

Randall Dole said that one main outcome of the NOAA Science Challenge Workshop in May 2014 was that a large amount of uncertainty remains. Thomas Jung stressed that the Barcelona workshop would also focus on the prediction issue and the role of the ocean. These two topics had not been part of previous workshops. The workshop’s scientific committee had also put emphasis on bridging time scales so that the workshop will bring together PPP and PCPI. Also, both hemispheres will be covered.

Thomas Jung stressed that the outcome of such a workshop should be a set of recommendations with timeline and concrete actions directed towards the improvement of predictions. Two documents should result from the workshop: a short set of recommendations to address funding agencies, and a concise EOS or BAMS paper. These documents will be the basis for the further development of the linkages topic within PPP.

3.3 Improved Operational Availability Of Research Datasets From Polar Regions

Phil Reid pointed out that improved operational availability of research datasets from the Polar Regions will be a crucial component of YOPP. Following discussions at the Bureau of Meteorology (BoM) of Australia, an internal letter still needs to be set up to get the formal consent by the BoM to proceed with facilitating this be receiving and reformatted data for inclusion on the GTS/WIS. Phil Reid cited some recent examples for improvements regarding data set availability, and raised several questions on the kind of data types that should be available.

Thomas Jung stressed that it is very important to have a description of how to make research observational data available to the operational community (a “How To” document).

Thomas Jung said that one aim is to make available all the observations made during YOPP. The potential difficulty of getting (non-standard) data (atmosphere, ocean, ice, coupled information) onto and from the GTS/WIS was discussed at length, and different opinions were expressed. In general, the importance of using existing structures was acknowledged.

Greg Smith underlined the importance that the operational centres make use of research data if made available through GTS/WIS. Otherwise interest in making them available could be diminished with providing parties. Renee Tatusko said that IPY experience could be used to avoid such problems.

Thomas Jung stressed that by the YOPP-Summit in 2015 this question would need to be sorted out, and Phil Reid agreed to take responsibility for this.

Action No.	Action	Responsible	Due
SG5-06	Get advice from experts including those from BoM and scope preparation of a “How To” document.	Phil Reid / Neil Gordon	December 2014
SG5-07	Ensure the “How To” document is available by the YOPP-Summit in 2015	Phil Reid	April 2015

4. COORDINATION WITH PCPI INITIATIVES

Gunilla Svensson reported on recent PCPI developments and activities of the six PCPI initiatives.

http://polarprediction.net/fileadmin/user_upload/redakteur/Home/Steering_Group/Meetings/SG-5/SG5_TOP4_PCPI_Svensson.pdf

The meeting discussed the possibility and sense of running Transpose-CMIP-type experiments in the framework of YOPP. In general it was felt that having a possible Transpose-CMIP aligned with YOPP would be highly desirable.

Gunilla Svensson explained that a workshop on model error was planned. The timing has not yet been set but this workshop should take place well before the YOPP Summit. Gunilla Svensson then presented selected studies within GASS GEWEX.

Marika Holland stressed that existing model runs (e.g., CMIP5 decadal hindcasts) must be explored sufficiently to motivate new simulations. Francisco Doblas-Reyes pointed out that CMIP6 will have a predictability component (decadal hindcasts). A questionnaire is currently being designed to get input for these experiments from the polar-science community. The deadline for input is mid-September 2014. Marika Holland (assisted by Gunilla Svensson and Francisco Doblas-Reyes) will contact George Boer about this and provide PPP/PCPI recommendations for CMIP6 when it comes to decadal prediction.

David Bromwich presented insights into the use of reanalysis data for the detection of long-term trends and discussed challenges particular to the polar regions (data sparseness, shorter records, missing network for new types of observation data, etc.) and possible actions by PCPI.

http://polarprediction.net/fileadmin/user_upload/redakteur/Home/Steering_Group/Meetings/SG-5/SG5_TOP4_PCPI_Bromwich.pdf

Michel Rixen mentioned the 5th International Conference on Reanalyses which will probably take place in 2017. A paper on sea-ice/ocean reanalyses is currently being written up under the lead of Matthieu Chevallier, said Greg Smith. Sea-ice/ocean reanalyses and core-type experiments and their limited value for initialisation were discussed at length.

It was agreed that it would be very useful for David Bromwich to write a paper on the use of reanalyses for the detection of long-term trends.

Action Item No.	Action	Responsible	Due
SG5-08	Provide PCPI/PPP input to CMIP6 planning	Marika Holland, Gunilla Svensson, Francisco Doblas-Reyes	Before mid-September 2014
SG5-09	Write up paper on the use of reanalyses for the detection of long-term trends	David Bromwich	September 2015

5. INTERNATIONAL COORDINATION OFFICE

5.1 Coordination with PCPI and CliC

Thomas Jung reported that collaboration with the CliC director, Jenny Baseman, was running smoothly. One of the tasks of the new director of the PPP ICO (Helge Goessling expected to be designated) would be to maintain and further develop the link. This would hold not only for PCPI and CliC, but also for the many other activities relevant to polar prediction.

5.2 Website

Thomas Jung asked the Steering Group members to contribute actively to news items and tweets, thereby providing more 'life' to the PPP website and Twitter account.

5.3 Staffing

This item had been covered in the Opening (see item 1.1).

6. YOPP PLANNING MEETING 3 (YPM-3)

6.1 Review of Issues and Actions from YPM-2

The meeting reviewed the list of action items from YPM-2; most had been dealt with.

There will be a Transatlantic Arctic Meeting in October 2014 on “The Implementation of the Galway Statement & EU-US Marine Working Group” between Europe, the US, and Canada which Thomas Jung will attend, also giving him the opportunity to participate in PSTG-4. Relating to Thomas Jung’s visit to Washington, Renee Tatusko cited a call by NSF and suggested Thomas Jung meet with Kelly Faulkner to discuss PPP/YOPP-related funding opportunities (see item 12.1).

Thomas Jung gave a short summary from the last WGNE meeting in Melbourne in March 2014 where WGNE offered active contributions to PPP (e.g., assessment of analysis uncertainty in polar regions).

6.2 Finalisation of YOPP Implementation Plan

Thomas Jung proposed to have a version 1.0 of the YOPP Implementation Plan by 1 October 2014. This would allow NCEP time to review the current plan draft. It was stressed that the YOPP Implementation Plan is intended as a living document, which will be updated where and when required.

Greg Smith reported that the DAOS community considers the YOPP Implementation Plan to be very ambitious – the question of funding for additional observations being one issue. Thomas Jung agreed that this aspect is challenging, and it was discussed whether it is worth adding concrete estimates for the related costs to the plan. Greg Smith hinted at the value of existing infrastructures (e.g., RV Amundsen could be equipped with instrumentation for additional measurements). The general feeling was to build on existing structures and to make the observational community aware that additional observations within YOPP are desired. Øystein Hov stressed that it is mainly a question of communication to get observers to pay attention to the need for more data. The meeting agreed on the necessity to get the SIOS network involved.

Involving influential people in relevant institutions so that they can bring PPP interests forward was felt to be crucial. With this in mind Renee Tatusko suggested writing letters to certain key persons very soon to get additional measures into the financial plans; a high-level WMO letter stressing the need for additional observations, in particular within YOPP, to be sent primarily to WMO Permanent Representatives (PRs) was regarded essential to secure funding for additional observations. Thomas Jung offered to draft such a letter, and Renee Tatusko, Øystein Hov, and Randall Dole offered to contribute.

Thomas Jung suggested using the current draft of the YOPP Implementation Plan for Version 1.0 to be published by 1st October 2014.

6.3 Future Planning and Management Mechanisms for YOPP

The timing of the fourth YOPP planning meeting (YPM4), which is going to constitute the YOPP-Summit, was discussed. It was proposed having this meeting between May and July

2015. A suitable location to accommodate about 80 participants from science, science policy and stakeholders could be the ECMWF, Reading; Peter Bauer agreed to check with ECMWF. The objective of the summit will be to inform, to get funding agencies involved, design model experimentation set-ups, and particularly securing commitments for YOPP. Details on the balance between science and planning aspects at the YOPP-Summit were still to be discussed. A planning group (YOPP-Summit organising group) will need to be set up for the planning and implementation of the YOPP-Summit. Two to three people from PPP SG and more from external partners, such as Randall Dole, would be helpful for such a group. This YOPP-Summit should be highlighted in the WMO letter to the PRs and funding agencies, along with an invitation to nominate people to be sent to the YOPP-Summit (or to be on the YOPP-Summit organising group).

6.4 YOPP Modelling Activities

Thomas Jung presented datasets to be used for different objectives.

http://polarprediction.net/fileadmin/user_upload/redakteur/Home/Steering_Group/Meetings/SG-5/SG5_TOP6_YOPP_Modelling_Jung.pdf

Many valuable datasets already exist that must be exploited in terms of polar-specific aspects of modelling, data assimilation, and prediction. These datasets include: YOTC data, Transpose-AMIP, TIGGE and TIGGE-LAM, the S2S data base, CMIP5 decadal predictions, APPOSITE, SHEBA, IPY data, ATHENA, MINERVA, AOMIP, CORE2 data, ORA-IP (Magdalena Balmaseda to be contacted), lake modelling intercomparison group and data (contact person through Jeanette Onvlee, Ekatarina Kurzeneva, FMI), GAW data sets, as well as MACC and AMAP data sets (suggested by Alexander Baklanov).

New model data sets tailored to polar prediction could be: a YOPP virtual field experiment (like YOTC, model tendencies and high-resolution analyses and forecasts), a Transpose-CMIP, relaxation experiments, experiments designed to explore the role of coupling (coupled vs. uncoupled) and the role of resolution in the different compartments (atmosphere, sea ice, ocean), and experiments dedicated to support MOSAiC. Peter Bauer stressed the importance to develop and present lessons learned from existing data – e.g., CMIP5 – to motivate and guide the generation of new data. Peter Bauer also underlined the different kinds of operational modelling contributions possible (with increasing overhead): (i) additional output parameters, (ii) additional experiments within existing streams, and (iii) entirely new streams.

Wanqiu Wang held out the prospect of his institution running sea ice predictability experiments focussed on sea ice thickness and its verification using in particular YOPP observations. Another possible contribution, suggested by Greg Smith, was coupled high-resolution atmosphere-ice-ocean runs with Environment Canada's regional forecast system (10km atmosphere, 3-8 km ice/ocean).

Renee Tatusko suggested to look inside NCEP for coupled data like YOTC.

Marika Holland suggested having breakout groups at the YOPP-Summit to deal with the requirements for experiments to be carried out. Randall Dole suggested contacting NASA modelling groups. The WGNE experience should be used, suggested Jeanette Onvlee. Gunilla Svensson underlined that diagnostics and evaluation issues would have to be considered. Greg Smith suggested driving atmospheric models with high-resolution sea ice-ocean data and/or vice versa. Ice-ocean models are usually forced by relatively low-resolution atmospheric reanalysis (e.g. 80km ERA-Interim), and the impact of forcing with

these atmospheric fields has been suggested as a large source of error. Similarly, for the atmosphere, it would be interesting to examine the impact of using ice-ocean model output (including leads, etc..) which could be expected to impact the stability of the ABL.

Francisco Doblas-Reyes raised the question of how initial shock and drift will be tackled in the YOPP modelling component, which induced a lively discussion.

Peter Bauer reported about plans for data assimilation inside YOPP. High-level demonstration projects of coupled reanalysis could be set up. This could be added to the YOPP Implementation Plan at a later stage. By the time of the YOPP-Summit it should be clear whether this is possible. The timeline would need to be established. Secondly, as OSE (with ERA-CLIM), IPY data for observing system design purposes could be used for data assimilation within YOPP.

Craig Bishop pointed out that one of the YOPP objectives should be to really show that improvements were being made in modelling through PPP. Something like a PPP-value-demonstration-project comprising pre-YOPP forecasts and post-YOPP forecasts appears useful. This could contribute to a final BAMS paper.

Renee Tatusko mentioned that NCEP/EMC has an interesting call for funding for coupled ocean-ice- wave-atmosphere in the context of Arctic model development through KISS (Keep Ice'S Simplicity).

6.5 YOPP Data Archiving

After a short introduction to this topic by Thomas Jung there was a general discussion. Mikhail Tolstykh pointed out that operational centres needed to be clear on what was expected of them, to avoid data format problems (e.g., use of BUFR). Pertti Nurmi underlined the importance of centralised archiving and high-quality documentation. The question of whether or not a centralised archive is needed was discussed. Having central *standards* is important since different communities come together that might not use interoperable standards, said Jeanette Onvlee (who presented example of COPS and MAP DPHASE). Co-location of model- and observational data to bring together observations and model in one dataset was discussed. WIGOS is experimenting with a similar strategy, so it was suggested to link with the CBS Rolling Review of Requirements (RRR) and WIGOS. Non-standard data can be archived only outside WIGOS. WIGOS is just being elaborated, and requirements are being defined, said Alexander Baklanov.

If PPP decided about a hosting centre, the requirements should be negotiated with WIGOS. Jeanette Onvlee pointed out two experts in her working group who know how to establish standards (COPS): Volker Wulfmeyer and Matthias Rotach could advise PPP. Gunilla Svensson proposed to contact the MOSAiC community since they are likely to have a similar problem. Chris Fairall could establish contact to relevant people at the data centres and is experienced with such issues. Don Perovich recommended contacting MOSAiC through Chris Fairall, too, and look for an agreement. This issue was not yet covered in the MOSAiC plan.

It was discussed who from the Steering Group could push the data archiving issue forward. The expertise of Jeanette Onvlee and her colleagues was considered very helpful. It was decided that Randall Dole will suggest to Chris Fairall that he is the person responsible to get in touch with the Jeanette Onvlee group, and with Matthew Shupe to learn how MOSAiC is going to tackle this issue.

A data archiving session would be needed at the YOPP-Summit. Existing standards should be used, since it would take too long for WMO approval for any new data format standard. NSIDC was very experienced with satellite data, so David Bromwich suggested contacting them. The possibility to learn from SHEBA data archiving could be explored. To learn about the ACADUS database, Mark Serreze or Florence Fetterer could be contacted (UCAR, NSIDC).

NetCDF or WMS (Web Map Service) format would be the choice from the ocean-sea ice community, said Greg Smith.

Thomas Jung proposed a special issue on YOPP in the Earth System Science Data journal (ESSD). Jonathan Day and colleagues are planning to write a similar paper for the APPOSITE data and could share their experiences. Nature Scientific Data could be another possibility to publish YOPP data, proposed Francisco Doblado-Reyes. Thomas Jung proposed to update the YOPP Implementation Plan by mentioning publications in peer-reviewed data journals such as ESSD.

It was also noted that one option to solve the data archiving issue might be to invite someone with the required expertise to the Steering Group.

6.6 Formal Commitments from Contributors

Refer to item 6.2

6.7 YPM-4

Refer to item 6.3

6.8 Next steps (detailed plans for 2 years; and vision to 2022)

Action Item No.	Action	Responsible	Due
SG5-10	Add possible high-level demonstration projects on coupled reanalysis to YOPP plan	Neil Gordon	1 Oct 2014
SG5-11	Finalise, then circulate version 1.0 of YOPP Implementation Plan, based on the current draft and any additional comments (e.g., from NCEP)	Neil Gordon/ICO	1 Oct 2014
SG5-12	Check with ECMWF if YOPP-Summit can be held there	Peter Bauer	1 Oct 2014
SG5-13	Choose a suitable date for YOPP-Summit & establish YOPP-Summit organising group	Thomas Jung	15 Oct 2014
SG5-14	Confirm participation in PSTG-4 Meeting (29 Sep to 1 Oct 2014); cover issue of data archive with programme managers while in Washington	Thomas Jung	Done

Action Item No.	Action	Responsible	Due
SG5-15	Draft letter promoting YOPP to go from WMO to PRs and have Randall Dole, Renee Tatusko and Øystein Hov to review. Mention YOPP-Summit in the letter	Thomas Jung	15 Oct 2014
SG5-16	Set timeline and confirm implementation of coupled reanalysis experiments for YOPP and OSE with ERA-Clim (incorporate in YOPP Implementation Plan when appropriate)	Peter Bauer	YOPP-Summit 2015
SG5-17	Propose to Chris Fairall to settle data archiving/data format standards problem for YOPP	Randall Dole	25 Aug 2014
SG5-18	Contact MOSAiC about the data archiving and data format standardization issue	Chris Fairall	31 Oct 2014
SG5-19	Liaise with Volker Wulfmeyer and Matthias Rotach concerning data format standards	Chris Fairall	31 Oct 2014
SG5-20	Get SIOS network involved in YOPP	ICO	Before YOPP-Summit

7. COORDINATION WITH S2S

7.1 General Discussion

The meeting started with discussion of the status quo and issues regarding S2S in polar regions. The skill of existing S2S systems in the polar regions has not yet been explored. Aspects related to snow and sea ice have not yet been looked into closely. The meeting agreed that it would be advisable to look into the S2S database to explore it with regard to polar issues. 11 models were available; half of them are coupled to the ocean, but only two (or more?) include prognostic sea ice. The S2S database could provide an interesting opportunity to distinguish between models with and without interactive ocean and/or sea-ice, and to learn something about polar predictability at the 3-4 weeks time scale. Thomas Jung proposed considering, e.g., weather regimes, the stratosphere, sea ice, ocean temperatures, and circulation patterns. Further promising aspects to investigate using the S2S data could be: snow, near-surface temperature, sea ice extent, wind, waves, precipitation, and seasonal dependencies.

Thomas Jung proposed to ask bold questions – e.g., the predictability of ship passage opening. While the latter would draw the attention of stakeholders with an interest in shipping, similar questions could be formulated to address stakeholders concerned with natural resources exploitation and inhabitants relying on aircraft services. The question

whether S2S itself was planning to look into polar regions was also discussed. S2S has subprojects that could facilitate coordinating work in the community. It is not yet clear whether ice products will be part of the S2S archive. The meeting feels that the relations between PPP and S2S are quite obvious and that it would be favourable to have “sea ice” or “cryosphere” mentioned or PPP included in the S2S research issues or modelling issues on their organisation chart. Paolo Ruti suggested that PPP would fit into the subgroups “Extremes” and “Verification”. Generally, it was agreed that the links between the WMO THORPEX Legacy projects S2S, PPP and HIWeather had to be made clear and to be communicated.

7.2 S2S Database

Frederic Vitart gave an overview presentation on the S2S database.

http://polarprediction.net/fileadmin/user_upload/redakteur/Home/Steering_Group/Meetings/SG-5/SG5_TOP7_S2Sdatabase_PPP_Vitart.pdf

The proposal for the database includes the TIGGE protocol (GRIB2) for archiving the data. NetCDF will be available as well. ECMWF and UKMO will serve as archiving centres. The data format changes were approved by WMO in May 2014 and officialised.

For sea ice, so far only ice concentration is planned to be archived. A centralised verification action regarding polar prediction on the grounds of the planned S2S database might be considered. Peter Bauer will get in touch with colleagues from S2S to find out whether MIPs were intended for S2S.

PPP would be interested in additional sea-ice parameters, including thickness, albedo, and melt pond fractions, and in cloud parameters. Frederic Vitart noted that adding some missing parameters was possible, but those would need to be defined by (northern) summer 2015.

The meeting discussed if interesting case studies could be carried out during YOPP. Craig Bishop proposed S2S data to be used to provide predictions for field campaigns. Limitations regarding the usability of S2S data in the context of polar prediction are the relatively coarse resolution at which output will be stored (1.5°) and the fact that very few contributing models have prognostic sea ice. The meeting agreed nevertheless that it is highly desirable to have the cryosphere featuring more prominently in the scope of S2S. A PPP delegate present at future S2S meetings could help to ensure this.

Action Item No.	Action	Responsible	Due
SG5-21	Letter to S2S about their database specification based on the joint meeting at SG5 / Provide information to S2S on what additional parameters should be archived for YOPP	Thomas Jung	Oct 2014 / Northern Summer 2015
SG5-22	Identify a case study S2S could carry out, ideally during YOPP	SG	Northern Summer 2015
SG5-23	Get in touch with S2S colleagues to find whether MIPs are intended in	Peter Bauer	End of 2014

	S2S		
SG5-24	Find a PPP delegate to take part in future S2S meetings	SG	October 2014

8. MOSAIC SCIENCE PLAN

Don Perovich gave an overview of the MOSAIC project, based on a presentation by Matthew Shupe. Don Perovich reported that MOSAIC needed PPP to provide the following: comments on draft Science Plan: (i) improvements for section 4 of the Science Plan, (ii) suggestions for integrations and collaborations, and (iii) a set of requirements about what PPP needs from MOSAIC.

http://polarprediction.net/fileadmin/user_upload/redakteur/Home/Steering_Group/Meetings/SG-5/SG5_TOP8_MOSAIC_Perovich.pdf

Ian Renfrew summarised important aspects of the MOSAIC Science Plan.

http://polarprediction.net/fileadmin/user_upload/redakteur/Home/Steering_Group/Meetings/SG-5/SG5_TOP8_MOSAIC_Renfrew.pdf

Ian Renfrew's impression was that atmosphere-ocean coupling deserves more depth in the plan. The same held for the distinction between operational NWP and "special" (YOPP) NWP. The modelling component could be strengthened, by explaining better how additional observations will benefit model development.

The large-scale linkages mentioned in MOSAIC Figure 3.3 were discussed. It was not clear whether by incorporating large-scale aspects as well, MOSAIC would be at risk of losing its focus. Gunilla Svensson offered to try to help with some of the modelling parts and proposed to not only use regional models but global models as well. The targeted (model error) workshop (refer to item 4) will invite experts regarding ocean, atmosphere, and sea ice to get a broad expertise to contribute to the MOSAIC modelling component. Ian Renfrew reminded the meeting that some of the modelling requirements were already included in the PPP Science Plan. These parts could be useful to support the MOSAIC Science Plan. Marika Holland proposed to use the single column model to improve, for example, the snow cover in the model with the help of MOSAIC observations taken and the comparison thereof. Gunilla Svensson reported on existing case studies already prepared within GASS and hopes to use those to assist MOSAIC and to include them into the MOSAIC science plan. The group around Gunilla Svensson is already starting to prepare modelling work and is keen to incorporate MOSAIC observations. The question whether GASS experimentations should be part of preparatory YOPP research and included into the YOPP plan was being discussed.

As a crucial point the meeting identified the question of how to turn MOSAIC observations into model improvements. Greg Smith offered to help with the prioritisation of potential MOSAIC observations regarding their relevance to PPP/YOPP.

Action Item No.	Action	Responsible	Due
SG5-25	Provide feedback on MOSAIC science plan, SG members to contribute	Ian Renfrew	1 Sept 2014

SG5-26	Have set of GASS experiments for MOSAiC ready for YOPP-Summit/Model error workshop	Gunilla Svensson	31 March 2015
SG5-27	Include the GASS experiments for MOSAiC into the preparatory YOPP research in YOPP Plan	Neil Gordon	1 October 2014
SG5-28	Develop priorities of potential observations regarding relevance to PPP/YOPP together with MOSAiC community	SG	31 December 2014

9. COORDINATION WITH SNAP

Om Tripathi presented the scope and goals of the SPARC-SNAP network and possible links with PPP.

http://polarprediction.net/fileadmin/user_upload/redakteur/Home/Steering_Group/Meetings/SG-5/SG5_TOP9_SNAP_Tripathi.pdf

SNAP can share its experimental datasets with the PPP community in the YOPP preparation phase. SNAP is in the process of collecting operational data from major operational forecasting systems for one complete year that might be useful for the PPP community, also for studies related with the seasons other than winter. Furthermore, the SNAP community will be interested in analysing YOPP forecast datasets for stratospheric predictability and stratospheric impact in the troposphere particularly in higher latitudes and polar regions. SNAP also proposed to continue collaboration through YOPP beyond the funded period (until 2016).

The meeting felt that the outlook given by Om Tripathi was a very welcome and concrete proposal for a way forward. Om Tripathi agreed to inform PPP-ICO by e-mail about upcoming news/papers relevant to PPP/YOPP that could be distributed via the PPP website and Twitter account. Updates about SNAP activity and the way to access its experimental database can be found at www.sparcsnap.org.

Action Item No.	Action	Responsible	Due
SG5-29	Stay connected, including provision of SNAP-related news to the ICO for publication on the ICO website	Om Tripathi / ICO	ongoing

10. WWRP WORKING GROUP INVOLVEMENT IN PPP

10.1 Merged Mesoscale and Nowcasting Working Group

Jeanette Onvlee presented the tasks and focus of two existing working groups that will be merging into one in January 2015, and brought up a set of possible contributions of this new working group to PPP.

http://polarprediction.net/fileadmin/user_upload/redakteur/Home/Steering_Group/Meetings/SG-5/SG5_TOP10_MWFR_Onvlee.pdf

Possible contributions to PPP could be: Experience with field campaigns, snow/sea ice analysis and modelling, process studies and high-res NWP model improvements concerning behaviour under very stable boundary layer conditions, Arctic clouds and cloud – radiation – aerosol interactions, relevant sources of uncertainty on small scales in polar regions, development and validation of high-resolution LAM EPS systems for polar regions, and the relevant metrics (spatial).

She announced that a polar component was going to be added to TIGGE-LAM. As a possible link to MOSAiC Jeanette Onvlee identified the proposed contribution of process studies and high-resolution NWP model improvements. The Pan-Eurasian Experiment PEEX might be interesting, too, said Alexander Baklanov. <https://www.atm.helsinki.fi/peex/>

EPS forecasts for polar lows are already produced by the Meteorological Institute of Norway and others; Jeanette Onvlee expressed the working group’s interest to implement this with Danish colleagues over Greenland and Iceland, too. Thomas Jung said that PPP would be happy to approach this new working group when it comes to formulating the data archive for PPP and other possible contributions. It was regarded as helpful if LAM EPS capabilities were available by 2017, which indeed might be the case for three systems. Russian colleagues still need to be contacted about the Russian Arctic.

Action Item No.	Action	Responsible	Due
SG5-30	Inform MOSAiC of the merged Mesoscale and Nowcasting Working Group (contact Jeanette Onvlee), and link them together	Ian Renfrew	Oct 2014
SG5-31	Have a table of possible contributions in LAM EPS systems available	Jeanette Onvlee	30 April 2014
SG5-32	Take up the metrics (verification) aspect of links with the Mesoscale and Nowcasting Working Group	Pertti Nurmi	Oct 2014

10.2 DAOS Working Group

Mark Buehner presented the members, scope and activities of the DAOS working group. DAOS was moving from a THORPEX to a WWRP working group, and one of their tasks is to assist WWRP projects. PPP could be supported through observation impact studies focused on polar regions and guidance for conducting a pre-YOPP OSSE and/or a post-YOPP OSE (the latter being much simpler to implement than the former).

http://polarprediction.net/fileadmin/user_upload/redakteur/Home/Steering_Group/Meetings/SG-5/SG5_TOP10_DAOS_Buehner.pdf

Craig Bishop suggested that, while targeting did not meet expectations in the atmosphere-only context, targeting might be an option for the ocean-sea ice system. Observation impact studies could be supported by DAOS. This would be interesting for YOPP to assess – e.g., the value of additional launches of radiosondes, helping to prioritise the observational component of YOPP. This guidance would however be needed rather soon. Thomas Jung

asked Mark Buehner to communicate to the DAOS group the importance of observation impact studies for YOPP.

Action Item No.	Action	Responsible	Due
SG5-33	Initiate observation impact studies DAOS support and relevant plots	Thomas Jung/Mark Buehner	Well before YOPP-Summit
SG5-34	Communicate importance of observation impact studies for YOPP to DAOS Working Group	Mark Buehner	Oct 2014
SG5-35	Include YOPP-OSSE into timeline (to be incorporated into YOPP Implementation Plan at a later stage)	Thomas Jung	Oct 2014

10.3 New Predictability, Dynamics and Ensemble Forecasting (PDEF) Working Group

Craig Bishop gave a presentation on a working group to be established from the merger of two former working groups (GIFS-TIGGE and PDP). He said that the group is still being put together, and suitable candidates are being sought. General predictability issues and possible links to PPP were presented.

http://polarprediction.net/fileadmin/user_upload/redakteur/Home/Steering_Group/Meetings/SG-5/SG5_TOP10_PDEF_Bishop.pdf

Craig Bishop underlined that it is necessary to clearly specify the peculiarities of the polar regions in terms of predictability and predictions. One would have to make sure that past experience gathered in lower latitudes is exploited, and that new ideas and techniques are developed “from scratch” only where actually no experience exists.

Ian Renfrew suggested using some of Craig Bishop’s ideas for the Dynamics Workshop. Possible candidates for the new working group were discussed, and will be formally conveyed to Craig Bishop.

Action Item No.	Action	Responsible	Due
SG5-36	Send names of potential candidates to represent PPP in the PDEF Working Groups to Craig Bishop	SG/Thomas Jung	Done

11. PPP KEY ACTIVITIES

11.1 PPP-Verification

Pertti Nurmi introduced Barbara Brown, another member of the WMO JWGFVR, and he gave an overview on verification as PPP key activity and an extended set of activities for the YOPP preparation phase.

http://polarprediction.net/fileadmin/user_upload/redakteur/Home/Steering_Group/Meetings/SG-5/SG5_TOP11_Verification_Nurmi.pdf

Pertti Nurmi advertised an upcoming workshop on spatial verification techniques that would be relevant for PPP and to which he himself would participate. He further emphasized the relevance of participation of polar scientists who would be actively doing verification studies of polar variables and phenomena in the future: MesoVICT Mesoscale Verification Inter-comparison over Complex Terrain Workshop, 2-3 Oct 2014 in Vienna.

The verification community is really interested in the polar regions and the opportunities which YOPP might open up, but funding would be needed to engage people, said Barbara Brown.

The sea ice forecast verification workshop (refer item 3.1) will be one of the decisive elements in this key activity. A vision for this key activity up to 2022 is expected to be developed within this workshop. The importance to verify also quantities of immediate relevance to actual users was emphasised.

11.2 Education

Jonathan Day explained the educational components of the PPP key activity "Education". He said that the components will be "Frostbytes" (video clips of scientists involved in field campaigns), two YOPP summer schools (2016 and 2018), webinars on polar prediction, and networking events at conferences.

http://polarprediction.net/fileadmin/user_upload/redakteur/Home/Steering_Group/Meetings/SG-5/SG5_TOP11_summer_school_Day.pdf

The first YOPP summer school is planned to take place from 5th to 15th April 2016, at the Bolin Centre station Abisko. A joint PPP/PCPI summer school planning group has been established and consists of Jonathan Day, Gunilla Svensson, Matt O'Regan, Rodrigo Caballero, Thomas Jung and Jennifer Kay. The first planning meeting took place in May 2014. In terms of funding, contributions by WMO and the Bolin Centre are anticipated. The Bolin Centre will probably cover a large share of the housing costs for the students so that they would only need to cover for their own travel.

Previously Tetsuo Nakazawa had indicated that funding for 2 students to attend the summer school could be provided by the WMO, but could not be guaranteed until next WMO budget (June 2015). This limited WMO funding was in general felt to be very small. Michel Rixen recommended getting in touch with Jenny Baeseman, director of CliC project office, to secure funding and assistance via WCRP. Jonathan Day confirmed that contact with WCRP had been established in this matter.

Pertti Nurmi suggested adding a verification component to the summer school to create verification know-how. It was agreed to first set the focus of the summer school and to then work out the details accordingly. Jonathan Day said that the planning group was going to define the focus at their next meeting.

The target group of the summer school was discussed. It was felt that PhD candidates and Postdocs were the right target group since (i) this would complement other existing and regular community education activities, and (ii) this would be the group that would be pivotal in delivering the science during YOPP.

Randall Dole said that a prediction focus of a summer school could be helpful to secure funding through US agencies because it complemented existing measures. He said that Jennifer Kay was the person to contact along with Randall Dole for funding through US agencies. Current UCAR activities focus on forecasting training (with focus on first to second year students). He proposed to make use of that expertise.

On the recommendation of Phil Reid, Jonathan Day suggested having the second summer school (2018) in the Southern Hemisphere to account for PPP's bipolar focus.

Pertti Nurmi mentioned regular WMO verification training courses with a typical duration of three days. The next was going to happen in 2016 (students coming with their own verification problem). That could be seen as complementary to the 2015 summer school.

Marika Holland suggested having a series of webinars to promote the 2016 summer school. Om Tripathi underlined that the lecturers will have to be selected carefully to raise people's interest. The meeting agreed to have two webinar series: one in spring 2015 and one in September/October 2015. Thomas Jung volunteered to give an overview lecture on polar prediction. Marika stressed there should be focussed talks as well. Ian Renfrew suggested that Jonathan Day get in touch with APECS for advice on how to tailor the webinars. Renee Tatusko suggested including the social science aspect. Gunilla Svensson suggested another topic could be on how to take observations, maybe during MOSAiC.

Action Item No.	Action	Responsible	Due
SG5-37	Set clear focus for PPP summer school 2016 and continue planning accordingly	Jonathan Day	October 2014
SG5-38	Contact Jennifer Kay and Randall Dole to explore possibility of PPP summer school funding from US	Jonathan Day	October 2014
SG5-39	Organise two webinars (spring 2015 and autumn 2015) to advertise summer school / coordinate with APECS	Jonathan Day	December 2014
SG5-40	Initiate planning process for second PPP Summer School 2018, in Southern Hemisphere, including possible venues	Jonathan Day	June 2015

12. OTHER MATTERS

12.1 Report from NOAA Science Challenge Workshop in Boulder, May 2014

Randall Dole gave a summary report on the workshop “Predicting Arctic Weather and Climate and Related Impacts: Status and Requirements for Progress” held in Boulder 13-15 May 2014.

http://polarprediction.net/fileadmin/user_upload/redakteur/Home/Steering_Group/Meetings/SG-5/SG5_TOP12_NOAA_Arctic_Workshop_Summary_Dole.pdf

The primary goal of the workshop was to inform NOAA on actions needed for future polar prediction research. Interest in the workshop amongst the community had been very high (85 participants). PPP was well represented by David Bromwich, Chris Fairall and Marika Holland and their contributions. NSF, Navy, NCAR, Special advisors and the private sector were very interested and well represented. One of the outcomes of the workshop was a new call for proposals from the NOAA Climate Programme Office:

http://cpo.noaa.gov/sites/cpo/GrantsandProjects/2015/FY15CVP_InfoSheet_v3.pdf

The PPP Implementation Plan was distributed in print during this meeting. Polar-lower latitudes linkages had been a hot topic. Recommendations to NOAA regarding support for YOPP were formulated in the resulting set of recommendations. A briefing to CLIVAR would be very helpful, said Randall Dole, and that he was going to follow this up. A website with almost all presentations is available for the workshop at <http://www.esrl.noaa.gov/psd/events/2014/arctic-predictions-science/agenda.html>

Thomas Jung acknowledged the great effort, the importance of this workshop, and the extraordinary composition in terms of participating organisations with respect to interagency processes. Randall Dole stressed the interest of NASA in augmented usage of their satellite products for data assimilation. Coordination with international programmes was important. Such workshop reports could be an incentive for the European Commission to step forward in funding Arctic research. Marika Holland said it might be worth promoting PPP and YOPP in specific with Erica Key, Neil Swanberg, and Kelly Faulkner of NSF to strengthen polar prediction research in future calls.

Phil Reid enquired whether there were any plans for the Antarctic as well. Randall Dole expects continued support for the Antarctic, though the May workshop did not have a bi-polar focus.

NSF calls and NOAA calls were presenting great opportunities, said Renee Tatusko. She recommended coordinating these calls with European calls for joint ventures. It was suggested that Thomas Jung should meet with Kelly Faulkner of NSF and Wayne Higgings, Director of NOAA Climate Programme Office, during his upcoming visit to Washington. In the US there is very high-level interest on the climate side, up to the White House.

Action Item No.	Action	Responsible	Due
SG5-41	Briefing prior to visit to Washington, organise to meet NOAA and NSF representatives	Thomas Jung, Renee Tatusko	September 2014
SG5-42	Arrange to Meet NOAA and NSF (and ONR) representatives in	Thomas Jung	Done. Meeting to be held on

	Washington		29 September 2014
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12.2 Arctic Test Bed at Anchorage

Eugene Petrescu, NWS Alaska Regional Scientist, introduced the NOAA Arctic Test Bed with focus on sea ice and service challenges.

http://polarprediction.net/fileadmin/user_upload/redakteur/Home/Steering_Group/Meetings/SG-5/SG5_TOP12_Alaska_Region_Testbed_Petrescu.pdf

Eugene Petrescu presented several cases in which better weather predictions would have been most helpful. The scope and time frame of the test bed fit very well with YOPP, particularly in relation to SERA aspects. A verification framework (from user perspective, too) and work with CIS will be developed during 2015/2016. This test bed intends to meet the requirements of both operations and research. Randall Dole said this would give the opportunity to collaborate with the JWGFVR (Barbara Brown). This test bed might strengthen the SERA component in PPP/YOPP.

It was agreed that the Arctic test bed could be a valuable contributor to YOPP. Having someone from the Arctic test bed on the SERA subgroup for YOPP would be very helpful. Additional observations that had previously already been taken by the local people should be evaluated to assess the usefulness of community-based observations. Eugene Petrescu might establish contact about community-based offshore observations through his management.

Action Item No.	Action	Responsible	Due
SG5-43	Contact Brian Mills to include someone from the Arctic Test Bed into YOPP SERA subgroup	Eugene Petrescu	15 Oct 2014
SG5-44	Establish contact about community based offshore observations through his management.	Eugene Petrescu	15 Oct 2014

12.3 ONR Project Proposal – Possible Joint Bid

Don Perovich gave a presentation on the US Arctic and Global Prediction Office of Naval Research.

http://polarprediction.net/fileadmin/user_upload/redakteur/Home/Steering_Group/Meetings/SG-5/SG5_TOP12_ONR_PPP_Perovich.pdf

Don Perovich presented the ONR proposal procedure and stressed the importance of contacting the Programme Managers (e.g., Commander Blake McBride). Funding announcements, which PPP could respond to, usually occur every January. Don Perovich underlined that ONR was definitely interested in improving prediction capabilities in Polar Regions. The ONR Global Collaborative Science Program also supports international conferences and workshops.

It was recommended to bring PPP to the attention of the ONR community, in particular Scott Harper and Martin Jeffries for Arctic and Global Prediction who Thomas Jung could potentially meet during his visit to Washington. Before Thomas Jung meets Scott Harper and Martin Jeffries they should be briefed. Don Perovich offered to provide them with copies of the PPP Implementation Plan and to give them a short presentation on PPP. In the briefing Don Perovich could be supported by NOAA colleagues on the Steering Group. To facilitate the process, ideas for potential projects should be at hand when presenting PPP/YOPP to ONR. Renee Tatusko proposed to brief ONR about NOAA involvement in PPP and YOPP. Renee Tatusko also proposed to investigate the possibility of an interagency meeting – e.g., to invite ONR to NSF in October at the time of Thomas Jung visiting Washington.

Thomas Jung asked SG members and guests to approach him if ideas for potential projects come up.

Action Item No.	Action	Responsible	Due
SG5-45	Produce ideas for potential ONR funded projects before presenting YOPP/PPP to ONR	Steering Group	Sept 2014
SG5-46	Thomas Jung to see ONR programme managers Martin Jeffries and Scott Harper when visiting Washington, to introduce PPP/YOPP and potential projects to	Thomas Jung, Don Perovich	Oct 2014

12.4 QJRMS Special Issue

Peter Bauer presented the list of contributions to the QJ special issue. The list needs to be checked for consistency (in particular the contributions by Buehner and Renfrew). Peter Bauer underlined that it would be good to have something at hand 18 months after the respective workshop, meaning that everyone involved should try to speed up if possible.

http://polarprediction.net/fileadmin/user_upload/redakteur/Home/Steering_Group/Meetings/SG-5/SG5_TOP12_QJ_Status_Bauer.pdf

12.5 BAMS Paper

The meeting discussed whether the proposed BAMS paper should bear a science-focussed title such as “Prediction in High Latitudes” or have “Polar Prediction Project” and/or “Year of Polar Prediction” explicitly in the title. The meeting was generally in favour of “Prediction in High Latitudes”. The meeting supported Thomas Jung’s suggestion of using the PPP “master presentation” as the basis for an article highlighting the challenges and opportunities. Marika Holland pointed out that a lot of material is already available through the PPP Implementation and Science Plans, so that the effort that needs to be taken should be moderate.

Action Item No.	Action	Responsible	Due

SG5-47	Write up draft for BAMS article	Thomas Jung	October 2014
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12.6 Russian Aircraft-laboratory for YOPP (additional item)

Mikhail Tolstykh gave a presentation on the Russian aircraft laboratory Yak42D, which is configured for the measurement of atmospheric characteristics and could potentially be used during YOPP.

http://polarprediction.net/fileadmin/user_upload/redakteur/Home/Steering_Group/Meetings/SG-5/SG5_TOP12_Russian_plane_laboratory4YOPP_Tolstykh.pdf

Additional instruments could be taken aboard (the respective measurements might be of interest for other projects as well). Mikhail Strunin (mikhail_strunin@mail.ru) is the person to contact about possible extensions to missions, which could be coordinated with MOSAiC. A formal letter from PPP to Roshydromet was suggested, in which to explain the requirements of PPP/YOPP and to ask for access to the data that will be measured. This letter should also include a note that YOPP would like to get more rapid (ideally real-time) access to the data measured at the drifting station "North pole".

A preliminary flight programme will be needed as soon as possible, preferably by autumn 2014. Russian colleagues would be needed to ask for help with the specification of what is necessary. The first step will be to book the aircraft in autumn for a certain period during YOPP, and then link with relevant colleagues.

Action Item No.	Action	Responsible	Due
SG5-48	Draft letter to Roshydromet	ICO with input from Mikhail Tolstykh (Mikhail to provide point of contact)	Autumn 2014

12.7 Dynamics of Atmosphere-Ice-Ocean Interactions in the High-Latitudes (additional item)

Ian Renfrew presented plans for the upcoming workshop "Dynamics of Atmosphere-Ice-Ocean Interactions in the High-Latitudes", to be held 23-27 March 2015 in Rosendal, Norway, with up to 90 participants. It was agreed that PPP would support the workshop financially, with the amount to be determined within the coming weeks. Outcomes of the event are planned to be compiled in a workshop report. Ian Renfrew stressed that this workshop will have a stronger research (as opposed to application) focus compared to a number of other polar-science related workshops taking also place in 2015.

Action Item No.	Action	Responsible	Due
SG5-49	PPP to confirm financial support, and the amount	Thomas Jung	September 2014

			(done)
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13. STEERING GROUP MATTERS

13.1 Steering Group Composition

According to the Steering Group terms of reference, individual membership on the PPP Steering Group should be limited to four years. However, the meeting felt that it would be unfortunate if all experienced members had to leave the Steering Group at the same time. It was noted that, due to some appointments having been made at later times, there will fortunately be some scatter. It was suggested to incorporate more observational experts and researchers from currently under-represented regions (in particular Asia) to the Steering Group. Alexander Makshtas (observations, Russia), Jun Inoue (observations, Japan), Qinghua Yang (modelling, China) and Matthieu Chevallier (modelling, Météo France) had all indicated interest in becoming members of the Steering Group, and the meeting supported inviting these to the Steering Group.

Tetsuo Nakazawa recommended having a Steering Group of only up to 10-12 people. The pros and cons of a larger Steering Group were discussed. Given the tremendous tasks ahead, the meeting felt that a larger PPP/YOPP Steering Group would be favourable for the time being, at least until the YOPP-Summit. Thomas Jung was tasked to write an e-mail to the Steering Group explaining the rotational process, proposing to start the signing-off process, and asking for opinions on inviting the above mentioned and more potential SG candidates.

Alexander Baklanov noted that the Southern Hemisphere is also under-represented and suggested someone from Argentina as a potential SG member. Francisco Doblas-Reyes could establish the contact to find a potential Argentine expert to be invited. It was also noted that Denmark (Greenland) was not represented on the Steering Group despite its strong ties to the Arctic. It was proposed to contact a potential SG member from Denmark.

Action Item No.	Action	Responsible	Due
SG5-50	Email SG members about Steering Group composition	Thomas Jung	done
SG5-51	Invite new candidates to the PPP SG	Thomas Jung	Oct 2014

13.2 Budget

Thomas Jung gave an overview on the current balance of the PPP budget in the Trust Fund. Unspent money can be left there as savings, whereas the annual contributions from Canada have to be spent during the Canadian fiscal year. It was proposed to control the cash flow and to e-mail Paolo Ruti about this.

Tetsuo Nakazawa announced that Alexander Baklanov will probably take over as PPP project officer at WMO for Tetsuo Nakazawa from 2015.

The current financial state of PPP leaves room for additional expenses. Thus, since Brian Mills had announced that we would need some funding to establish a SERA subgroup for PPP/YOPP, it was decided to inform Brian Mills that funding for this should be available. The current balance also enables supporting an intermediately larger steering group. To ensure funding for the PPP summer school 2016, Thomas Jung asked Jonathan Day to have the summer school planning group send a funding proposal to the ICO.

The twofold character of PPP (improving predictions for the sake of serving humanity in general, versus supporting certain industries) was discussed. The PPP Steering Group might be asked to think about whether or not research money coming from industry would be welcome.

Action Item No.	Action	Responsible	Due
SG5-52	Email Paolo Ruti to remind him about 15kSfr (?) for the Linkages Workshop	Thomas Jung/Doblas-Reyes	done
SG5-53	Check cash flow from EC	ICO	October 2014
SG5-54	Contact Brian Mills about available funding to start SERA subgroup	ICO	October 2014
SG5-55	Send funding proposal for 2016 summer school to ICO	Jonny Day and summer school planning group	November 2014

14. WRAP-UP, NEXT STEPS AND CLOSING

14.1 Wrap-up

Thomas Jung summarized the main issues arising from the discussion of the different items on the meeting agenda.

Education: Date and location for summer school 2016 have been set, as well as two webinars (possible lecturers include Thomas Jung, Greg Smith, Craig Bishop). The date and location for the summer school 2018 remains to be determined.

FAMOS workshop: It was proposed having a breakout group on YOPP. Helge Goessling will attend the FAMOS workshop 21-24 October 2014 at Woods Hole.

Arctic Change Conference in Ottawa: Brian Mills will be asked whether he could attend (8-12 December 2014).

Coordination with PCPI: One strong collaborative activity will be the Sea Ice Verification Workshop in early 2016. Coordination with PCPI, IASC, US sea ice prediction network must be ensured. (A proposal by Cecilia Bitz through the Belmont Forum is linked to a Belmont proposal, which Greg Smith is on). Greg Smith could be supported by Marika Holland and possibly Matthieu Chevallier and Jonathan Day. Greg Smith offered to submit a proposal to the ICO for funding support of the Sea Ice Verification Workshop through PPP.

Coordination with S2S: An important aspect is to foster polar aspects in S2S; the planned data resolution of 1.5° was felt to be not enough may be insufficient for many polar-specific aspects, and a proper description of the experimental setups (e.g., initialisation) should be

ensured. It was suggested to send someone from PPP (Helge Goessling, Matthieu Chevallier) as a liaison member to S2S meetings.

Polar-lower latitude linkages workshop, Barcelona: Information from Paolo Ruti about financial support (through WWRP, WCRP tbd, EC) to be sought. Tetsuo Nakazawa promised to brief Paolo Ruti on the granted funding by WMO for travel for early career and keynote speakers to the workshop.

YOPP-Summit organisation group: Possible members of such group could include: Jeanette Onvlee, Alexander Makshtas, Randall Dole, Christian Haas, Øystein Hov (or colleague). The organisation group needs scientific expertise and strategic expertise.

YOPP-Summit: The YOPP-Summit was identified as the right time to get commitments by the community.

Data archiving: Since the Steering Group lacked the relevant expertise for the observational side it was suggested to seek assistance through WMO. Tetsuo Nakazawa proposed to ask NCAR experts. The way forward is to wait until Randall Dole has contacted Chris Fairall and to investigate how MOSAiC is proceeding in that respect. For a demonstration project for real-time data, a respective UK Met Office project could be taken as example.

SPARC: Francisco Doblas-Reyes will attend a scientific steering group meeting and include some slides about YOPP. A list of wishes should be formulated to SPARC.

DAOS: Having Mark Buehner next door to Greg Smith will help maintaining strong ties between PPP and DAOS.

PDEF: Potential candidates for the new group had been identified.

Verification: The meeting agreed that user engagement deserves further attention. Presenting a concrete proposal at the Arctic Shipping Summit would be helpful. It was suggested to include Tero Vauraste into a to-be-compiled stakeholder list. Verification of sea ice predictions was in general considered a very hot topic. Calibration for stakeholders appears necessary.

House of Lords Science Call for written evidence: A letter will be written by Ian Renfrew and Jonathan Day to support PPP-related funding in the UK.

Funding: Polar prediction has been brought up as a topic to the community at WWOSC. It was suggested that now might be the right time for a WMO call. Alexander Baklanov recalled the planned letter to the WMO Permanent Representatives (see item 6.2). It was proposed to keep and refresh connections to the European Commission. Francisco Doblas-Reyes asked whether something like the GEO structure with the European Commission could be possible for the THORPEX legacy projects through WMO.

Workshop on Dynamics of Atmosphere-Ice-Ocean Interaction in the High-Latitudes: 23-27 March 2015, Rosendal, Bergen. Ian Renfrew stressed the importance of the workshop and had asked whether PPP could contribute financially. The workshop aims mainly at academia and science. <http://highlatdynamics.b.uib.no/>

Relevant meetings: Several events will have to be considered when selecting a date for the YOPP-Summit: AMS Polar Meteorology and Oceanography Meeting, British Columbia, 31 May to 2 June 2015; Arctic Shipping Summit 18-19 March 2015; ASSW Yokohama 23-20 April 2015, IUGG Prague, 22 June to 2 Jul 2015; Antarctic Meteorology Get-together, following IUGG.

YOPP-Summit: The YOPP-Summit will happen probably in early northern summer 2015.

National funding opportunities: Greg Smith repeated that it was time to establish contacts to funding agencies. In the US this seemed to be in pretty good shape; Europe could deserve some more impetus; Canada is starting to get organized. It was suggested that the remaining countries should catch up. There were some tentative plans in the UK to contact funding agencies, confirmed Ian Renfrew. All Steering Group members should consider whether their national funding agencies should be addressed to open up possibilities.

Action Item No.	Action	Responsible	Due
SG5-56	Send liaison member from PPP to S2S working group	Thomas Jung	1 Dec 2014
SG5-57	Inform IASC and PCPI that Greg Smith is the key person for sea ice predictability	Thomas Jung	Oct 2014
SG5-58	Email to SG about candidates for the YOPP-Summit organising group	Thomas Jung	Oct 2014
SG5-59	Present PPP at SPARC scientific committee and provide wish list	Francisco Doblas-Reyes	Paco to add date
SG5-60	All SG members to get in touch with national/local funding agencies to open up possibilities, meet, advertise PPP	Steering Group	ongoing
SG5-61	How can THORPEX legacy projects be included into the GEO stream of funding at WMO?	Tetsuo Nakazawa	Oct 2014
SG5-62	Ask Brian Mills whether he can attend Arctic Change Conference in Ottawa	Thomas Jung	Sept 2014 (done)

14.2 Next Steps

The next SG meeting should happen for the two days prior to the YOPP-Summit.

14.3 Closure

Thomas Jung thanked everyone for coming, and for their contributions to the productive meeting. He thanked especially Greg Smith (Environment Canada) for the local organisation of the meeting.

ANNEX 1 – LIST OF PARTICIPANTS

Name	Email Address	Affiliation	Connections
STEERING GROUP			
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ANNEX 2 – PROVISIONAL AGENDA

THURSDAY, 21 AUGUST [1500-1800]

VENUE: 400 Place d'Youville - EC Offices (Centre St-Laurent), Salle LaMontagne

1. OPENING [1500 - 1515]

- 1.1 Welcome from PPP-Steering Group Chair, Thomas Jung
- 1.2 Purpose of the Meeting
- 1.3 Introductions

2. ORGANIZATION OF THE MEETING [1515 - 1520]

- 2.1 Adoption of the Agenda
- 2.2 Working Arrangements

3. FLAGSHIP ACTIVITIES [1520-1645]

3.1 SEA ICE PREDICTION [1520-1610]

Greg Smith to take the lead on this item; report progress; agree on plans and next steps (detailed plans for 2 years; and vision to 2022)

3.2 POLAR-LOWER LATITUDE LINKAGES [1610-1625]

Thomas Jung and Paco Doblaz-Reyes to take the lead on this item; report progress, especially on Barcelona Workshop in December 2014; agree on plans and next steps (detailed plans for 2 years; and vision to 2022)

3.3 IMPROVED OPERATIONAL AVAILABILITY OF RESEARCH DATASETS FROM POLAR REGIONS [1625-1645]

Phil Reid to take the lead on this item; report progress on implementation at the Australian Bureau of Meteorology; agree on plans and next steps (detailed plans for 2 years; and vision to 2022)

4. COORDINATION WITH PCPI INITIATIVES [1645-1730]

Update from Gunilla Svensson and David Bromwich, in their capacity as co-leads of topics (Model Error; Assess reanalyses in polar regions) which are joint between PPP and WCPR Polar Climate Predictability Initiative. What are the next steps (detailed plans for 2 years; and vision to 2022)?

5. INTERNATIONAL COORDINATION OFFICE [1730-1800]

- 5.1 Coordination with PCPI and CliC
- 5.2 Website

Two SG members needed to review and provide suggestions

- 5.3 Staffing

EVENING NO-HOST INFORMAL DINNER

FRIDAY, 22 AUGUST [0830-1730]

VENUE: 400 Place d'Youville - EC Offices (Centre St-Laurent), Salle LaMontagne

6. YOPP PLANNING MEETING 3 (YPM-3) [0830-1200]

This item on the SG-5 meeting will constitute the third YOPP Planning Meeting

6.1 Review of Issues and Actions from YPM-2 [0830-0850]

6.2 Finalisation of YOPP Implementation Plan [0850-0920]

This will include discussion on how to deal with data archiving, funding sources, etc.

6.3 Future Planning and Management Mechanisms for YOPP [0920-0940]

6.4 YOPP Modelling Activities [0940-1000]

COFFEE BREAK [1000-1030] café across the street

6.5 YOPP Data Archiving [1030-1100]

6.6 Formal commitments from contributors [1100-1115]

6.7 YPM-4 [1115-1130]

6.8 Next steps (detailed plans for 2 years; and vision to 2022) [1130-1215]

LUNCH BREAK [1215-1330]

7. COORDINATION WITH S2S [1330-1430]

Frederic Vitart and Andrew Robertson, co-chairs of the Subseasonal to Seasonal project, will join the meeting.

7.1 General Discussion [1330-1400]

Covering the following points, with emphasis on subseasonal time scales

- *How is the skill of existing S2S systems in the Polar Regions?*
- *How well are polar processes represented in S2S systems? (What is holding us back?)*
- *What are the sources of skill in Polar Regions?*
- *Are there any interesting S2S case studies involving the Polar Regions?*

7.2 S2S Database [1400-1430]

A 10 minutes presentation from Frederic Vitart, followed by discussion.

7.3 Next Steps (detailed plans for 2 years; and vision to 2022)

8. MOSAiC SCIENCE PLAN [1430-1510]

The MOSAiC Science Plan has been released; input is requested by 1 September. Ian Renfrew, assisted by Don Perovich, will outline key aspects of the plan and lead discussion

on what feedback the PPP SG should provide, with emphasis on the science aspects and on the coordination with PPP and YOPP.

9. COORDINATION WITH SNAP [1510-1530]

Om Tripathi from SNAP will be present to give a brief presentation on SNAP, followed by discussion on coordination between PPP and SNAP.

COFFEE BREAK [1530-1600] café across the street

10. WWRP WORKING GROUP INVOLVEMENT IN PPP [1600-1700]

The World Weather Research Programme Working Groups are in transition, following the end of THORPEX, to include three relevant WWRP Working Groups.

10.1 Merged Mesoscale and Nowcasting Working Group [1600-1620]

Jeanette Onvlee from the Mesoscale Working Group will take part in the meeting

10.2 DAOS Working Group [1620-1640]

Mark Buehner from the DAOS Working Group will take part in the meeting

10.3 New Predictability, Dynamics and Ensemble Forecasting (PDEF) Working Group [1640-1700]

Craig Bishop from the GIFS-TIGGE Working Group will take part in the meeting

11. PPP KEY ACTIVITIES [1700-1730]

11.1 PPP-Verification [1700-1730]

Pertti Nurmi to take the lead on this item; report progress; discuss involvement of the JWGFVR; agree on plans and next steps (detailed plans for 2 years; and vision to 2022), Barbara Brown and possibly other members from JWGFVR will take part.

SATURDAY, 23 AUGUST [0800-1230]

DIFFERENT VENUE: Montreal Convention Centre (same as WWOSC), Room 513B, the main entrance is at 1001 Place Jean-Paul-Riopelle, Montréal, but there are also entrances on Viger, St. Urbain and St. Antoine streets

11.2 PPP-Education [0800-0830]

Jonny Day to take the lead on this item; report progress; agree on plans and next steps ((detailed plans for 2 years; and vision to 2022)

12. OTHER MATTERS [0830-1000]

12.1 Report from NOAA Workshop in Boulder, April 2014 [0830-0845]

Randy Dole

12.2 Arctic Test Bed at Anchorage WFO [0845-0900]

Eugene Petrescu, NWS Alaska Regional Scientist, will give a presentation on plans for an Arctic Test Bed that can be utilized to "operationalize" research products coming out of the PPP.

12.3 ONR Project Proposal– Possible Joint Bid [0900-0930]

Thomas Jung; also Don Perovich short presentation on how ONR proposals work

12.4 QJRMS Special Issue [0930-09035]

12.5 BAMS Paper [0935-1000]

COFFEE BREAK [1000-1030]

13. STEERING GROUP MATTERS (SG ONLY) [1030-1100]

13.1 Steering Group Composition

13.2 PPP Budget

14. WRAP-UP AND CLOSING [1100-1230]

14.1 Wrap-up

14.2 Next Steps (Consolidated plans for 2 years; vision to 2022)

14.3 Closure