

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

**WWRP POLAR PREDICTION PROJECT**  
**STEERING GROUP**  
**THIRD MEETING**

**READING, UNITED KINGDOM**

**12–13 December 2012**



**FINAL REPORT**



## **1. OPENING**

The third meeting of the WWRP Polar Prediction Project Steering Group (WWRP-PPP SG) was opened by its Chair, Thomas Jung, at 0830 on Wednesday 12 December 2012 (12/12/12), at the European Centre for Medium Range Weather Forecasts (ECMWF) in Reading, United Kingdom.

Erland Källén (Director of Research at ECMWF) welcomed the group. He emphasized the importance of Polar Regions to ECMWF, including for their extended range monthly and seasonal predictions, as well as reanalysis, and therefore ECMWF's support of and interest in the Polar Prediction Project.

In his opening remarks, Gilbert Brunet (Chair of the WWRP-JSC) outlined the expected changes to WWRP following the conclusion of the THORPEX ten-year research programme in 2014. The Polar Prediction Project was one of several important new crosscutting activities that would draw on the working groups within WWRP, and should have strong collaboration with the related WCRP Polar Climate Predictability Initiative (PCPI). He stressed the need for a strategy to promote WMO Member contributions to the PPP Trust Fund in order to implement activities under the almost finalised Implementation Plan. Informally, he indicated that both the United Kingdom and Canada were already very interested in providing such contributions.

Tetsuo Nakazawa (Chief of World Weather Research at WMO) advised the SG that letters had gone out to WMO Permanent Representatives in November seeking contributions to the PPP Trust Fund, and urged the SG members to individually promote this within their own countries.

The full list of participants in the meeting is given as Annex 1 to this report. Although two members of the Steering Group (Greg Smith and David Bromwich) were unable to be there in person, they did participate in parts of the meeting via conference phone as well as contributing through emailed comments.

## **2. ORGANIZATION OF THE MEETING**

The meeting agenda was adopted with minor amendments, and is given as Annex 2 to this report. Working arrangements were agreed for the session.

## **3. WCRP POLAR CLIMATE PREDICTABILITY INITIATIVE (PCPI)**

Ted Shepherd from the Department of Meteorology at Reading University briefed the meeting on this initiative. His presentation is available via the WMO website at [http://www.wmo.int/pages/prog/arep/wwrp/new/documents/PCPI\\_for\\_PPP\\_SG3\\_Dec2012.ppt](http://www.wmo.int/pages/prog/arep/wwrp/new/documents/PCPI_for_PPP_SG3_Dec2012.ppt).

He outlined the scientific context and history of the initiative, noting that polar climate predictability cuts across all elements of WCRP. He stressed the existing work already being undertaken under programmes including IASC for the Arctic, and SCAR for the Antarctic. In his view, WCRP brought a unique global perspective and strength in global modelling to such activities. Within WCRP, the PCPI will constitute a sub-initiative of the "Cryosphere in a Changing Climate" Grand Challenge. The PCPI can also be an 'incubator' to generate community research efforts that could be adopted, in the longer term, by more permanent components of the WCRP or of partner organizations.

There was general agreement that close collaboration between PPP and PCPI was essential. All at the meeting, including Ted Shepherd, felt that having a joint International Coordination Office for both projects would provide an excellent foundation for such collaboration, and facilitate jointly organized activities. It was noted that PCPI administrative support was expected to be available from Diane Pendlebury who is based in Toronto, funded by the Canadian Space Agency.

After discussion, the SG agreed that it would be good to concentrate collaboration on a small number of focussed activities that could best be conducted jointly:

- Reanalysis including coupled systems
- Model error (e.g., via Transpose AMIP or CMIP)
- Focussing on subseasonal to seasonal predictability

In terms of observational aspects, it was recognised that the results of such joint activities could assist in providing justification for polar observing systems that are largely research oriented.

#### **4. INTERNATIONAL COORDINATION OFFICE**

The SG reviewed the Terms of Reference for the International Coordination Office (ICO) as contained in the draft Implementation Plan.

Thomas Jung informed the meeting that the Alfred Wegener Institute for Polar and Marine Research, in Bremerhaven, Germany, would be formally offering to host the ICO. Their support would include funding one full-time scientist and a half-time administrative assistant. However, the offer would be conditional on sufficient committed contributions to the PPP Trust Fund also being made, in order to ensure the success of the project.

This emphasised, again, the importance of contributions to the PPP Trust Fund. The meeting was made aware that the project was already favourably perceived in a number of countries, including Canada and the UK, and that contributions were actively being considered. It recognised that now was the time to translate that consideration to formal commitments.

The Chair was requested to write to all EC-PORS members, once the AWI offer had been conveyed to WMO, to advise them of the situation and to seek their assistance in encouraging committed contributions to the PPP Trust Fund. Such a communication should include as resource material the finalised Implementation Plan, its executive summary, and the PPP brochure ([http://www.wmo.int/pages/prog/arep/wwrp/new/documents/WMO\\_PPI\\_flyer\\_EN\\_18sep2012.pdf](http://www.wmo.int/pages/prog/arep/wwrp/new/documents/WMO_PPI_flyer_EN_18sep2012.pdf)) which had been prepared in October. The WMO Consultant, Neil Gordon, was also requested to use his own contacts to encourage contributions.

The SG reviewed the prototype website which had been quickly set up as a demonstration at <http://polarprediction.wordpress.com> and agreed that in general it reflected the type of content and format that should be implemented. It was felt that the official PPP website was best set up via the institution which would host the ICO, provided this allowed for sufficient flexibility and ease of updating of the information. Such a website should also be complementary to the information already available via [http://www.wmo.int/pages/prog/arep/wwrp/new/polar\\_prediction\\_research\\_project\\_main\\_page.html](http://www.wmo.int/pages/prog/arep/wwrp/new/polar_prediction_research_project_main_page.html) and should include outreach components such as presentations, as well as a special YOPP section which could be updated as that was developed.

## 5. IMPLEMENTATION PLAN REVIEW

The Implementation Plan had been prepared from material considered at the previous meeting of the Steering Group in Montréal in March 2012. The draft as at early October 2012 was sent to almost 100 partners and stakeholders, and had subsequently been updated based on around twenty-five responses. It was distributed to Steering Group members on 4 December 2012.

The Group thanked those who had worked on the Implementation Plan, and expressed general satisfaction with the draft.

There were a number of issues which had been raised during the consultation that were then addressed.

One concern was whether the Plan lacked focus. The SG recognised that the draft Implementation Plan was very ambitious, covering a relatively large number of activities on a wide range of time scales (hours to a season). Yet, interestingly, some of the feedback obtained from the polar research community was asking to add more activities (e.g., space weather, aerosols, sea levels) rather than less. Taking into account this concern, it was agreed not to add any such new activities.

Furthermore, the SG agreed that the mission of the PPP should be sharpened, by clarifying that nowcasting would not be covered. It was therefore agreed to change “hourly” to a “few hours” in the mission, which would then become:

*“Promote cooperative international research enabling development of improved weather and environmental prediction services for the polar regions, on time scales from a few hours to seasonal.”*

Another issue raised was the apparent lack of a focused measurable goal in the Implementation Plan. There was general agreement that it was difficult to define measurable goals such as “...improving forecasts of ... by ... days per decade...” for a research project such as the PPP, which was intended to add value through coordinated international activities. By comparison, funded research experiments which will contribute to the PPP might have their own goals and targets. It was decided that the final version of the Implementation Plan should more prominently highlight the existing key-milestones, by which progress of the PPP could be measured. This should include incorporating some in the Executive Summary.

There had been a question raised over whether the term “stakeholder” was appropriate for the list contained in “Annex 2 – Related Initiatives, Organizations, Stakeholders, Partners”; it was agreed to clarify this definition in the Implementation Plan.

The SG agreed that the Implementation Plan could now readily be finalised, addressing these issues, and incorporating further small edits which had been recently provided. It should then be sent out to the same organizations who had earlier been consulted, with particular thanks to those who had provided feedback.

## 6. SUB-SEASONAL TO SEASONAL PREDICTION PROJECT

Frederic Vitart, the co-chair of the Sub-seasonal to Seasonal Prediction (S2S) Planning group, briefed the meeting on this WWRP project. His presentation is available via the WMO website at [http://www.wmo.int/pages/prog/arep/wwrp/new/documents/S2S\\_for\\_PPP\\_SG3\\_Dec2012.ppt](http://www.wmo.int/pages/prog/arep/wwrp/new/documents/S2S_for_PPP_SG3_Dec2012.ppt)

Similarly to the PPP, the Executive Council in June 2012 had approved the establishment of an S2S Trust Fund and an S2S International Coordination Office. The S2S project will last 5 years, starting in 2013, with the option to extend based on a review of progress, achievements and remaining gaps.

The SG concurred with Frederic Vitart's proposal that potential collaborative activities between S2S and PPP were:

- Sub-seasonal to seasonal prediction of sea-ice cover
- Teleconnections from the polar regions
- Model errors in the polar regions (where PPP could assist S2S)

It was felt that one good way of proceeding could be for the PPP Steering Group to define a dedicated case study for the S2S group to include in their activities – an example cited was the strong winds in August 2012 which resulted in a large loss of Arctic sea ice.

The S2S project had defined a set of data to be archived. Groups including PPP had provided input on this list, and further input was welcomed. The SG noted that the current list included sea ice cover, but not sea ice thickness, which could be useful to support the Polar Prediction Project. It was also noted that for PPP purposes data at higher frequency than daily could be useful, but the database was restricted to daily data because of data volumes. However, it could be possible for special periods such as YOPP to archive more frequent data, and perhaps to provide more frequent runs.

## **7. YOPP PLANNING SESSION**

The SG reviewed the Year of Polar Prediction (YOPP) Section of the Implementation Plan and discussed how this component of the PPP could best be implemented. It was agreed that while YOPP was significant and would support achievement of PPP objectives, the overall project was more than just YOPP planning, implementation and consolidation. In particular, much research could be already conducted using existing datasets and information rather than waiting for datasets to be produced by YOPP.

It was felt that lessons could be learned from what happened during IPY in terms of how YOPP should be promoted, and engagement built – e.g., through website information and interactions (see also Item 4 on the ICO).

It was recognised that there needed to be clear focus on objectives for each phase of YOPP just as there was with the overall project. After considerable discussion it was agreed that the following should be the key “headline” objectives, while also recognizing that there should be some flexibility in the definition of later objectives depending on findings from earlier phases and input from related initiatives.

### **YOPP PREPARATORY PHASE**

1. Know which model and data assimilation experiments we want to run (and what variables we want to archive - and what additional observations would be valuable) – this requires a comprehensive assessment of the skill of forecasting systems in polar regions), e.g.,
  - Identifying what forecast models do well or poorly in polar regions
  - Identify the importance of model resolution

- Identify important of coupling and sea ice, etc.
2. Know what are the best case studies to be looked at during YOPP on polar-mid-latitude linkages (requires assessment of those linkages)
  3. Better understand the use of predictions by users in polar regions
  4. Work to make existing less accessible observations (e.g., from the Arctic Observing Network) available during the YOPP period

The SG noted that, if operational centres could make data readily available for universities and research institutions to analyse, this would facilitate items 1 and 2 above, as well as helping achieve the PPP strategic objective to “Strengthen Linkages Between Academia, Research Institutions and Operational Centres”. A candidate technological framework cited for this was the Earth System Grid (<http://www.earthsystemgrid.org>). Care is needed with data volumes, though – it was noted that the central archive for CMIP3 was around 30 terabytes but CMIP5 needed to be distributed and was 3 petabytes (3,000 terabytes).

In addition, work during this phase could be carried out by “tasking” groups such as WGNE, JWGFVR and GASS, as well as operational centres, to undertake specific studies rather than just calling for generic “collaboration”.

Other relevant events during this phase would include:

- (a) WWRP Open Science Conference (OSC) in August 2014 in Montréal. This will be on coupled NWP systems, which is relevant but not polar specific. There could be some early career scientists who “graduate from that” and become leaders in 2016:
- (b) YOPP Summer School - 2016 – the overall objective is to encourage early career scientists to become involved and thereby well prepared for participating in YOPP and later data analysis and exploitation.

### **YOPP PHASE**

1. Obtain extra observations which aid verification, allow data denial experiments, and support coupled model development
2. Run model and data assimilation experiments (designed during preparatory phase, and making use of the extra observations and satellite data, and include Transpose CMIP runs and comparison with Transpose AMIP)
3. Evaluate forecast systems and the user benefits of enhanced products as compared with “normal” systems

### **YOPP CONSOLIDATION PHASE**

1. Observing system design (making use of data denial experiments, etc., from YOPP)
2. Operational implementation of improved forecasting systems
3. Ongoing innovation based on what has been learned, with proven benefits through prediction experiments, etc.

#### 4. A legacy of YOPP data which can be used for ongoing work

To progress YOPP, It was decided to establish a small YOPP Planning Committee (YPC) which would include a subset of the PPP SG. It was recommended that this comprise in the first instance:

- Thomas Jung (Chair of both the SG and the YPC; represents the modelling community; cross-member of EC-PORS; link to WGNE and the like)
- Pertti Nurmi (member of the SG; member of the JWGFVR)
- Ian Renfrew (member of the SG; representing observational/modelling crossover)
- Peter Bauer (member of the SG; representing numerical experimentation; from the operational community)
- Jonny Day (representing APECS)
- Wanqiu Wang (representing NCEP; from CPC; operational community; provides link to S2S via Kumar in his group)

The SG felt that further members of the YPC should be selected based on an open process of involvement in a Planning Workshop on YOPP. The concept was to invite around 30 people or so from various potential partners / initiatives to participate in the workshop; this would provide a pool of those who could be involved, and also assess their interest in being part of a smaller planning committee. Such a Planning Workshop would also serve to raise interest, awareness and enthusiasm for involvement in YOPP whether or not individuals were on the YPC, and also provide a larger pool of potential members to draw from when replacement YPC members were needed.

The Chair was requested to draw up a list of potential invitees for such a workshop, taking into account proposals from the Steering Group. Suggestions and lists to draw on at this stage included:

- Those working with surface or Argo real-time data
- SAON
- SCAR
- SOOS
- Some of the 50-ish participants at the MOSAiC workshop in June 2012
- Oceanographers who took part in the Toronto PCPI meeting
- PCPI representative
- S2S representative
- Ensure both Arctic and Antarctic representation

The SG discussed the possible timing for such a YOPP Planning Workshop, in the light of various upcoming related meetings (including the Arctic Observing Summit and the AMS 12<sup>th</sup> Conference on Polar Meteorology and Oceanography) as well as the likely funding sources. A preferred option would be to plan for a 1.5 day event to take place at ECMWF immediately after the ECMWF-WWRP/THORPEX Polar Prediction Workshop from 24-27 June 2013 (see the next Item 8). It would run from the afternoon of Thursday 27 June to the end of Friday 28 June. The Chair and WMO Consultant were asked to finalise the timing in discussions after the meeting, and to progress planning for this.

## 8. PLANNING FOR JUNE 2013 WORKSHOP AT ECMWF

Peter Bauer presented the current status of planning for the ECMWF-WWRP/THORPEX Workshop on Polar Prediction, to be held at ECMWF from 1400 on Monday 24 June 2013 to the morning of Thursday 27 June. This would follow the typical format of such an ECMWF workshop, with a series of invited talks followed by breakout working groups covering key topics and then reporting back to a plenary. There could be advantages to having parallel streams with two separate working groups each covering the same topic – a kind of two-member ensemble where the consistency or otherwise between their recommendations was also of interest.

The draft outline programme for the talks as given in Annex 3 to this report reflects the subsequent discussion on the programme and potential speakers. Steering Group members were asked for further feedback on this, since the chosen speakers would need to be invited in early January.

Steering Group members were asked to submit (to the Chair and Peter Bauer) proposals for scientists who could be invited to this invitation-only workshop. Such proposals should include email addresses.

They were also asked to separately propose early career scientists to be invited. Funding may allow for around 10 to participate. It was agreed that there should be a small poster session, confined to posters prepared by these early career scientists, and that time should be allowed on the programme for brief (1-2 minute) formal presentations of each of the posters.

ECMWF typically allow for a budget of around GBP8k for the hosting of the workshop and some travel support. As a co-sponsor, WWRP/THORPEX would also provide support for some attendees, including developing country representatives.

The Chair and Peter Bauer were requested to continue to take the lead in planning the workshop, including a short statement of its key purpose, budget preparation, finalization of the programme, a list of invited speakers, and list of other invitees.

## 9. EDUCATION AND OUTREACH

As a lead-in to discussion on this topic, Eleanor Darlington from the Association for Polar Early Career Scientists briefed the meeting on APECS, making use of the website at <http://apecs.is> as well as a presentation available via the WMO website at [http://www.wmo.int/pages/prog/arep/wwrp/new/documents/APECS\\_for\\_PPP\\_SG3\\_Dec2012.ppt](http://www.wmo.int/pages/prog/arep/wwrp/new/documents/APECS_for_PPP_SG3_Dec2012.ppt).

APECS is an international and interdisciplinary organization for undergraduate and graduate students, postdoctoral researchers, early faculty members, educators and others with interests in Polar Regions and the wider cryosphere. Their aims are to stimulate interdisciplinary and international research collaborations, and develop effective future leaders in polar research, education and outreach. They seek to achieve these aims by:

- Facilitating international and interdisciplinary networking to share ideas and experiences and to develop new research directions and collaborations;
- Providing opportunities for professional career development; and
- Promoting education and outreach as an integral component of polar research and to stimulate future generations of polar researchers.

In subsequent discussion on how early career scientists could become more involved in and contribute to the PPP, the following ideas were discussed:

- Invite early career scientists to PPP events (not just workshops; but also steering groups, etc.). Both the APECS representatives at this meeting had found it to be a valuable insight into the operation of groups like this, and contributed very positively.
- Run mentoring sessions at SG meetings and PPP workshops. These typically take around an hour and involve brief introductions from a panel of senior scientists, followed by a question and answer session. These sessions are usually chaired by an APECS member to ensure that the senior scientists do not monopolise the dialogue.
- Involve early career scientists in informal social settings such as icebreakers where they are encouraged to meet and talk with senior scientists
- Run skills training workshops to ensure that early career scientists are familiar with tools as well as operational in-house systems (e.g., models, and diagnosis and verification systems) and can more readily run models or analyse operational centre data. (Existing examples include twice yearly WRF workshops and verification workshops run by JWGFVR.)
- Run summer schools

It was agreed to:

- Invite local APECS representative(s) to take part in the next PPP-SG meeting (tentatively Boulder, Colorado, USA in October 2013)
- Run a mentoring session in association with the PPP-SG meeting. (Marika Holland to arrange, and keep Jonny Day in the loop. John Cassano should be useful in setting this up.)

In terms of outreach, it was noted that there can be many audiences to be communicated with, and it is desirable to have a communications plan and objectives. Audiences include scientists, decision-makers, users/customers, schools, and the general public. There are also educational aspects to communication with scientists, and SERA aspects in communications with users/customers.

The SG noted that there might, in any event, be outreach components to funded projects contributing to PPP; NSF has a very strong emphasis on outreach. As an “event”, YOPP was more interesting for audiences such as school children than a ten-year programme of research.

The SG agreed that there should be a set of resources such as the existing brochure produced in October 2012, and generic presentations at different levels, produced and made available via the PPP project website. It would be good to include case studies of science issues and user benefits as part of these presentations.

The SG also decided that COMET module(s) should be considered for production as a legacy of both YOPP and PPP.

More immediately, it was noted that the Arctic Observing Summit is to be held in Vancouver from 30 April to 2 May 2013 (see <http://arcticchange.squarespace.com/arctic-observing-summit-2013/>). The Chair was requested to ensure that a white paper was submitted by the deadline of 10 January 2013.

## 10. SCIENCE PLAN

The meeting considered a Science Plan, which had been compiled based on material from the previous much larger plan considered at the SG-2 meeting in Montréal, with subsequent edits and taking into account later material provided by a number of SG members.

The SG decided that, following further limited updates, this should be published as an electronic WMO/WWRP Report. (The Implementation Plan should also be published as an electronic WMO/WWRP Report.) Those updates would comprise a revised SERA section by Brian Mills, a revised Observations section by Chris Fairall assisted by Ian Renfrew, and a revised Global Linkages section by Thomas Jung, all to be completed by the end of January 2013. Neil Gordon would then finalise the plan, also taking into account any further editorial comments and suggestions submitted by SG members (as tracked changes to the draft) before the end of December 2012.

The SG also requested Thomas Jung to commence a dialogue with the Editor of the Bulletin of the American Meteorological Society (BAMS) with a view to the preparation and publication of an appropriate article in BAMS on the Polar Prediction Project. The fact that the PPP is a legacy to IPY which has been well represented in BAMS could be highlighted. There could be two articles – one on PPP science overall, and one on YOPP. The general requirements for such BAMS articles including “boxes” with attractive figures, and summaries of key aspects were noted.

## 11. NEXT STEPS AND CLOSING

### *Next SG Meeting*

It was proposed to hold the next SG meeting in Boulder, Colorado, USA, in October 2013. “Doodle” would be used to set the best time. All felt that following the completion of the Implementation Plan there should be more emphasis at the next meeting on research, with presentations on interesting relevant results.

### *Membership*

It was noted that, under the approved Terms of Reference for the Steering Group, members were appointed for terms of four years with the possibility of renewal for up to two years. It was considered that the initial four-year term had commenced from the first meeting of the SG in December 2011.

Various gaps in expertise and geographical representation were noted, including:

- Southern hemisphere and Asian representation
- Ocean analysis/reanalysis/simulation
- Waves in climate models
- Snow; cryosphere; hydrology

It was considered that, while these gaps on the SG could be addressed if there was an opportunity to do so, given funding constraints, they could also be partially addressed through appropriate membership on the YOPP Planning Committee

### ***Summary of Key Outcomes***

The Chair provided a brief overview of the key results of this meeting.

- Clarified relationship with PCPI - joint ICO, identified several topics for close coordination
- Trust Fund - more informal personal approaches to PRs is important at this stage
- Reviewed Implementation Plan, which should be finalised very soon
- Reviewed Science Plan which needs some more extensive updates to three sections (Observations, SERA, and Global Linkages. Both Science and Implementation Plans will then be published as WMO/WWRP reports (electronic)
- ECMWF-WWRP/THORPEX workshop in June 2013 – programme will be finalised in first week of January and invitations sent
- YOPP Planning initiated –important next step will be the YOPP Planning Workshop in association with the ECMWF-WWRP/THORPEX Workshop in June 2013
- Education and Outreach - good participation from APECS representations and discussion; ideas on involvement in next few meetings

### ***Closure***

Following the customary exchange of courtesies, the meeting closed at 1606 on 13 December 2012.

## ANNEX 1: LIST OF PARTICIPANTS

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## ANNEX 2: AGENDA

### 1. OPENING [0830-0850]

- 1.1 Welcome from Erland Källén (ECMWF) and the Chair, and Introductions
- 1.2 Outline of key issues from Chair

### 2. ORGANIZATION OF THE MEETING [0850-0900]

- 2.1 Adoption of the Agenda
- 2.2 Working Arrangements

### 3. WCRP POLAR PREDICTABILITY INITIATIVE [0900-0930]

*15 min presentation by Ted Shepherd, followed by discussion*

### 4. INTERNATIONAL COORDINATION OFFICE [0930-1000]

*Terms of reference*

*Staffing*

*Association with WCRP Polar Predictability Initiative*

*Website (prototype at [polarprediction.wordpress.com](http://polarprediction.wordpress.com) to facilitate discussion on content and purpose)*

*[Coffee break 1000-1015]*

### 5. IMPLEMENTATION PLAN REVIEW [1015-1200]

*[Lunch 1200-1330 – at [Black Boy Pub](#), since ECMWF restaurant is unavailable]*

### 6. SUBSEASONAL TO SEASONAL PREDICTION PROJECT [1330-1415]

*Presentation by Frederic Vitart with subsequent discussion*

### 7. YOPP PLANNING SESSION [1415-1730]

*Review of YOPP plans*

*Research aspects within YOPP*

*Establish YOPP planning committee*

*YOPP planning committee meetings*

*Identify partners*

*Develop strategy for YOPP*

*[Coffee break around 1530]*

*Joint dinner – 1900 – [Carluccio's Restaurant, Reading](#)*

### DAY TWO

### YOPP PLANNING SESSION CONTINUED [0830 – 1100]

*Discuss issues for possible YOPP implementation*

*Scope meeting of YOPP planning committee with key partners – tentatively March 2013*

*[Coffee break around 1030]*

**8. PLANNING FOR JUNE 2013 WORKSHOP AT ECMWF [1100-1200]**

*[Lunch 1200-1300 – ECMWF Restaurant]*

**9. EDUCATION AND OUTREACH [1300-1400]**

*Discuss education and outreach with representatives of the Association of Polar Early Career Scientists (APECS) (implementation plan, YOPP)*

*Start with 20 minute overview from APECS representative about APECS and their views on involvement in the project*

**10. SCIENCE PLAN [1400-1500]**

*Review and agree on the process for finalizing the Science Plan*

**11. NEXT STEPS AND CLOSING [1500-1600]**

*Presentation/tour of ECMWF Operations (optional) [1600-1700]*

**ANNEX 3:  
VERY PRELIMINARY DRAFT PROGRAMME FOR  
ECMWF-WWRP/THORPEX POLAR PREDICTION WORKSHOP  
Monday 24 (pm) to Thursday 27 (am) June 2013**

<b>Day</b>	<b>Theme</b>	<b>Topic</b>	<b>Subtopic</b>	<b>Potential Speaker (Bold is preferred)</b>
<b>Mon (1400 start)</b>	Overview	Welcome		Erland Källén
		WWRP Polar Prediction Project		Thomas Jung
		WCRP Polar Climate Predictability Initiative		Ted Shepherd
		Polar Prediction at ECMWF		<b>Peter Bauer</b> or Mark Rodwell or Linus Magnusson
	<b>Societal and Economic Research Applications</b>	(Optional – may be dropped)		Brian Mills or Juhani Damski
<b>Tue</b>	Predictability	<b>Coupled processes</b>	<b>Predictability of sea ice-ocean systems – shorter range</b>	Greg Smith
			<b>Predictability of sea ice-ocean systems – longer range</b>	<b>Cecilia Bitz</b> or Paco Doblado-Reyes or Adam Scaife
			<b>Land-surface, snow, ice</b>	<b>Herve Douville</b> or <b>Jee-Hoon Jeong</b>
			<b>Predictability of high impact events – including polar lows, etc.</b>	Trond Iversen
			<b>Teleconnections (polar-nonpolar, stratosphere-troposphere)</b>	<b>Adam Scaife</b> or <b>Mark Rodwell</b>
	<b>Observations</b>	<b>Overview talk</b>	<b>Polar observing systems, SAON, iAOOS</b>	<b>Barry Goodison</b> or <b>John Eyre</b>
		<b>Experience from field campaigns</b>		<b>Michael Tjernstroem</b>
		<b>Satellites</b>		<b>Mark Drinkwater</b>

	<b>Models</b>	<b>Atmospheric modelling</b>	<b>Physics of the polar atmosphere</b>	<b>Anton Beljaars</b>
			<b>Topographically modified flows and baroclinic systems</b>	<b>Ian Renfrew</b>
		<b>Coupled modelling</b>	<b>Experience with climate models</b>	<b>Helge Drange or David Salas</b>
			<b>Sea ice-ocean modelling - state-of-the-art and future developments</b>	<b>Elizabeth Hunke</b>
			<b>Sea ice-ocean modelling - wave sea ice interaction</b>	<b>TBA</b>
		<b>Land surface etc.</b>		<b>Victor Stepanenko</b>
	<b>Data Assimilation</b>	<b>Data assimilation in polar regions I</b>	<b>DA including ensemble approaches</b>	<b>Trond Iversen</b>
				<b>Florence Rabier</b>
		<b>Data assimilation in polar regions II</b>		<b>Dave Bromwich</b>
		<b>Coupled data assimilation (reanalysis)</b>	<b>Also to cover sea ice-ocean data assimilation</b>	<b>Mark Buehner</b>
	<b>Metrics, Verification and Diagnostics</b>	<b>Verification</b>		<b>Pertti Nurmi or Marion Mittermaier</b>
		<b>Ensemble system diagnostics</b>		<b>Linus Magnusson</b>
<b>Wed &amp; Thu</b>	<b>Working Groups</b>	<b>YOPP is one overarching theme</b>		