The Year of Polar Prediction

Overview and Update

Presented by Steffen M. Olsen
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- based on input from
Helge Goessling and the PPP/YOPP ICO
Alfred Wegener Institute, Bremerhaven, Germany
Arctic-Subarctic Ocean Fluxes meeting, March 20 - 22, 2017, Sopot, Poland
PPP and YOPP

WMO = World Meteorological Organization
EC-PHORS = Executive Council – panel of experts on Polar and High mountains Observations, Research, and Services
GIPPS = Global Integrated Polar Prediction System
WWRP = World Weather Research Program
PPP = Polar Prediction Project
YOPP = Year Of Polar Prediction
PPP mission statement

Promote cooperative international research enabling development of improved weather and environmental prediction services for the polar regions, on time scales from hourly to seasonal
1. Significant gaps in the polar observing systems

Synop, AIREP, DRIBU, TEMP and PILOT

Polar data coverage of conventional observations in the ECMWF operational analysis on 1 January 2012

P. Bauer (ECMWF)
Why?

2. Emphasis of previous international efforts on lower latitudes

Tropics: Ocean-only (DJF)

Arctic: Sea ice-covered ocean (DJF)

S. Serrar (AWI)
Why?

1. & 2. result in deficient forecasts

TIGGE* analysis spread (Oct-Nov 2010)

- 2-meter temperature (K)
- 500hPa geop. height (m)

* UKMO, ECMWF, NCEP, CMC, CMA

Hamill 2012, (pers. comm.)
Why?

3. Arctic opening

Source: NSIDC
Why?

4. Antarctic Logistics and Safety

- Antarctica is a harsh environment
- Logistical support for research is expensive – more accurate predictions are needed
  - Typical cost is USD100k if a flight from NZ to McMurdo Station has to turn around because of unforecast poor weather at McMurdo
- Tourist expeditions are vulnerable to weather and ice

Photo: Andrew Peacock / www.footloosefotography.com
Why?

5. Potential for advanced predictions in middle latitudes

How?

Steering Group:

- Thomas Jung (Chair)
- Peter Bauer
- David Bromwich
- Barbara Casati
- Matthieu Chevallier
- Jackie Dawson
- Jonny Day
- Chris Fairall
- Jun Inoue
- Trond Iversen
- Daniela Liggett
- Alexander Makshtas
- Steffen Olsen
- Don Perovich
- Phil Reid
- Ian Renfrew
- Gregory Smith
- Gunilla Svensson
- Mikhail Tolstykh
- Qinghua Yang

SG7 Meeting, May 2016, Beijing, China
PPP/YOPP International Coordination Office @ AWI:

Tasks:
- Inform
- Promote
- Coordinate
- Oversee implementation

Staffing:
- Helge Goessling (Director)
- Kirstin Werner (Project Officer)
- Winfried Hoke (Outreach/Stakeholders)
- Katharina Kirchhoff (Admin)
- Richard Swinbank (WMO consultant)

http://polarprediction.net
How?

★ Develop Strong Linkages with Other Initiatives
★ Strengthen Linkages Between Academia, Research Institutions and Operational Centres
★ Establish and Exploit Special Research Datasets
★ Link with Space Agencies
★ Promote Interaction and Communication Between Research and Stakeholders
★ Foster Education and Outreach
★ Link with Funding Agencies
YOPP Modelling Plan—Components

Reference datasets
- Core datasets
- Supplementary datasets

Experimental datasets
- Atmospheric modelling and process studies
- Sea ice and coupled modelling
- Predictability studies
- Teleconnections and linkages
- Observing system design

Model evaluation
- Verification research
- Model diagnostics

Model output data

Draft v0.11, by Richard Swinbank et al.
Year of Polar Prediction

Goal:
„Enable significant improvement in environmental prediction capabilities for the polar regions and beyond, by coordinating a period of intensive observing, modelling, prediction, verification, user engagement and education activities.“
Year of Polar Prediction

Preparation Phase
2013 to mid-2017

- Community engagement
- Alignment with other planned activities
- Development of Implementation Plan
- Preparatory research
- Summer school Workshops
- Fundraising & Resource mobilization

YOPP mid-2017 to mid-2019

- Intensive observing periods & satellite snapshot
- Dedicated model experiments
- Coupled data assimilation
- Research into use & value of forecasts
- Intensive verification effort
- Summer school

Consolidation Phase
mid-2019 to 2022

- Data denial experiments
- Model developments
- Dedicated reanalyses
- Operational implementation
- YOPP publications
- YOPP conference
YOPP Summit

- 116 participants from 20 nations
- Considerable stakeholder involvement
- A number of high-level commitments
- Decision to establish a YOPP endorsement process
- Advances in YOPP data strategy
- Various input for revisions of the YOPP Implementation Plan
- Preliminary definition of Special Observing Periods (SOPs)

Meeting Summaries

Paving the Way for the Year of Polar Prediction

by Helen F. Grossinger, Thomas Jung, Stephan Kleber, Janna Haskew, Peter Baker, Peter Chen, Matthew Chan, Randall Dole, Nick Gosdon, Paulo Ruff, Alice Bradby, David H. Bromwich, Barbara Casati, Dmitry Gurevich, Jonathan J. Day, Francois Massonnet, Brian Mills, Ian Readhead, Gregory Smith, and René Tarduno

Polar prediction has never been as high on the international weather and climate research agenda as today. Growing human interest in the polar regions fueled by climate change and its polar amplification, and the realization that significant knowledge gaps in terms of observational coverage and process understanding exist, have stimulated the World Meteorological Organization (WMO) to address the existing forecasting capabilities at the polar. Major efforts by the Environmental Prediction Project (EPP) and the Year of Polar Prediction (YP) project have been undertaken to improve the validation and verification of polar prediction, through the development of an integrated framework for polar prediction, verification, user engagement, and education activities from mid-2017 to mid-2019.
Since the YOPP Summit Geneva 2015
Since the YOPP Summit ...

Workshop on Sea Ice Data Assimilation and Verification, 5-7 April 2016, Frascati, Italy; jointly by PPP & IICWG
Since the YOPP Summit ...

Polar Prediction School 2016, 5-14 April 2016, Abisko, Sweden jointly organised by PPP, CliC/PCPI, Bolin Centre
Since the YOPP Summit ...

2nd meeting of PPP-SERA group, 18-22 Apr 2016, NZ
Meeting report available; follow-up publication in BAMS
Stakeholder engagement during YOPP

Intensify dialogue between users and providers/scientists (ICO & PPP-SERA)

- Users of forecasts
  - impact/needs regarding weather/sea ice conditions in everyday (work and/or personal) lives
  - information behaviour
  - effect of improved forecasts

- Providers of forecasts & scientists
  - feedback to providers and scientists the user needs for implementation

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Communication and Outreach

Who:
- general public
- different groups of stakeholders (users and providers of forecast information, scientific community)

Why:
- create awareness/impart knowledge on need for improved forecast skills in polar regions

How:
- Joint effort by ICO, AWI, and WMO
- Current activities: mailing list, website, twitter, news/newsletter
- media kit (list of experts for journalists, image/video material from operational centres)
- opportunities for journalists
- launch of YOPP (May 2017)
Since the YOPP Summit ...
Since the YOPP Summit ...
YOPP-endorsed projects

Atmosphere (incl. Land)
- ICECAPS
- CIRRUS-HL
- GRAB
- OASIS
- ACAS
- UUSSPL
- (AC)^3
- AppliCatE
- BlueAction
- WGNE
- GEO-CRI

Ocean (incl. Sea Ice)
- INtaros
- TurbFlux
- MOSAIC
- ERSIP
- A+5
- IABP/IPAB
- MIDO

Legend
- observations
- modelling
- network/initiative
- funded
- partly funded
- not yet funded

state 5th September 2016
Special and Intensive Observing Periods

Filling the observational gaps (temporarily) to:

- better understand polar physical processes
- improve models and data assimilation
- understand observation impacts on forecasts
- optimise the future polar observing system
- advance prediction capabilities in polar regions (and beyond)
Special and Intensive Observing Periods

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Proposed deployments of barometric fitted drifters for the YOPP Arctic SOP 2018 (EUMETNET)
The Year of Polar Prediction (YOPP)

Improving Polar Weather and Sea Ice Forecasts

Predictive skill is lagging behind in polar regions. And what happens at the poles affects the entire globe. That is why the World Meteorological Organization and partners have launched the Year of Polar Prediction to advance polar prediction capabilities. During Special Observing Periods between mid-2017 and mid-2019, the polar observing gaps will be filled. Researchers and forecasting centres worldwide will analyse the unique data with the goal to better predict, navigate and protect the pristine polar environment and its inhabitants.

Weather and Sea Ice Modeling

To predict weather and sea ice, scientists use weather and climate models — computer programs that divide the Earth’s atmosphere, ice, land and oceans into a network of grid boxes. After being fed with actual meteorological and oceanographic observations, the models calculate how the physical state changes step by step into the future.