

# WWRP Polar Prediction Project

Thomas Jung

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Some statements from the report:

- The Arctic is likely to attract substantial investment over the coming decade (\$100 bn)
- The environmental consequences of disasters in the Arctic are likely to be worse than in other regions
- Significant knowledge gaps across the Arctic need to be closed urgently



PPP constitutes the hours-to-seasonal research component of the emerging WMO Global Integrated Polar Prediction System (GIPPS). A closely related WCRP Polar Climate Predictability Initiative covers GIPPS research on seasonal-to-decadal time scales.

## 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.

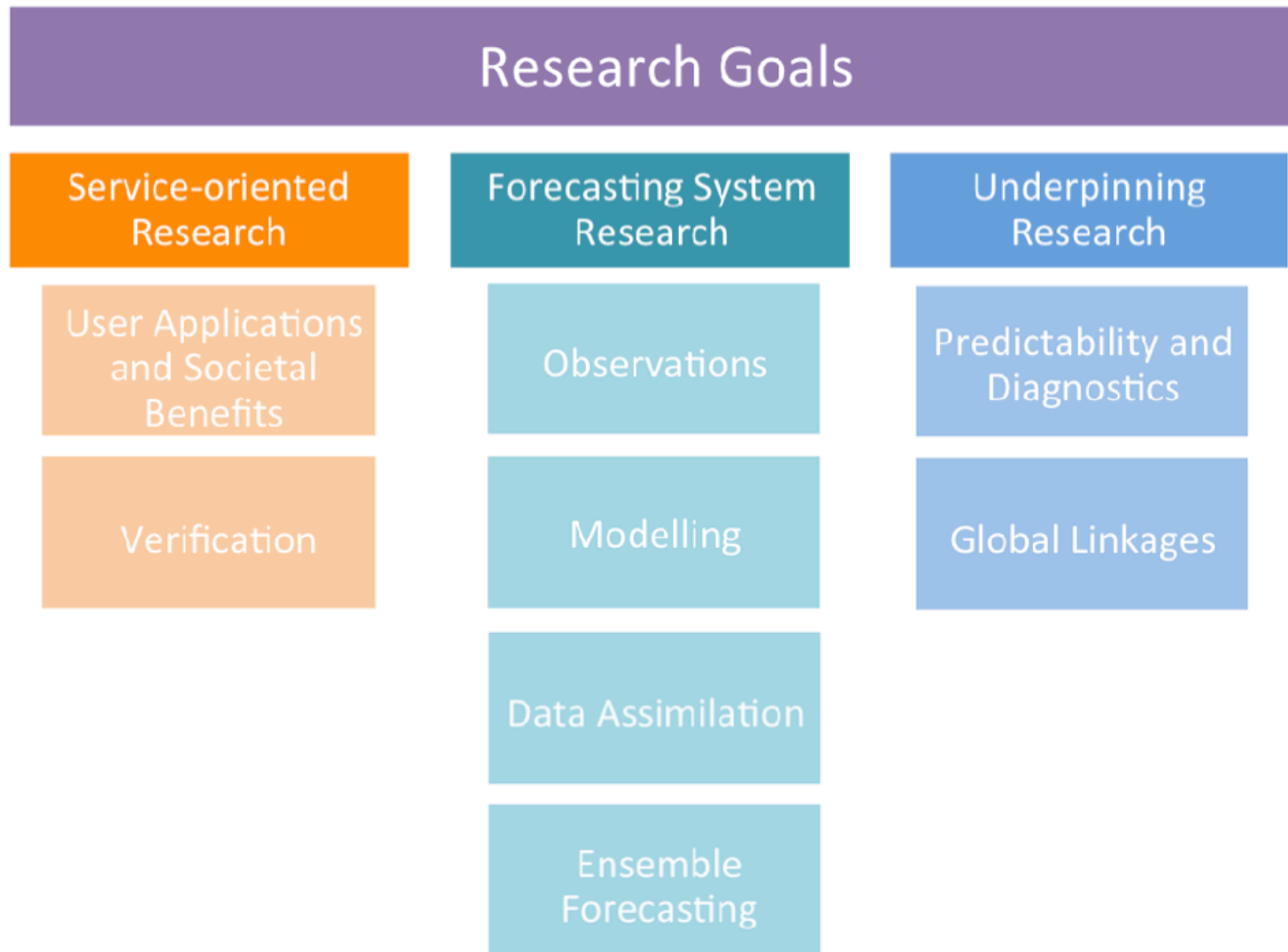
- \*Formation of Science Steering Group (Dec 2011)
  - \*6 meetings so far. Plans include
    - Montreal, Aug 2014
    - \*Science and YOPP meeting at ECMWF June 2013
- \*Science Plan, Implementation Plan, Year of PP Plan (Draft)
  - Report of Science Symposium working groups
- \*Project Office (Thomas Jung, AWI)
  - \*Funding from AWI
  - \*Trust fund via WMO
- \*Web Site: <http://polarprediction.net/>
- \*Coordination with WCRP PCPI (Climate effort)
- \*Series of briefings at WMO/WCRP, national agencies

- Thomas Jung (chair)
- Peter Bauer
- **David Bromwich**
- Paco Doblas-Reyes
- **Chris Fairall**
- **Marika Holland**
- Trond Iversen
- Brian Mills
- Pertti Nurmi
- **Don Perovich**
- Phil Reid
- Ian Renfrew
- Gregory Smith
- Gunilla Svensson
- Mikhail Tolstykh

SG4, Boulder, 1-3 October 2013

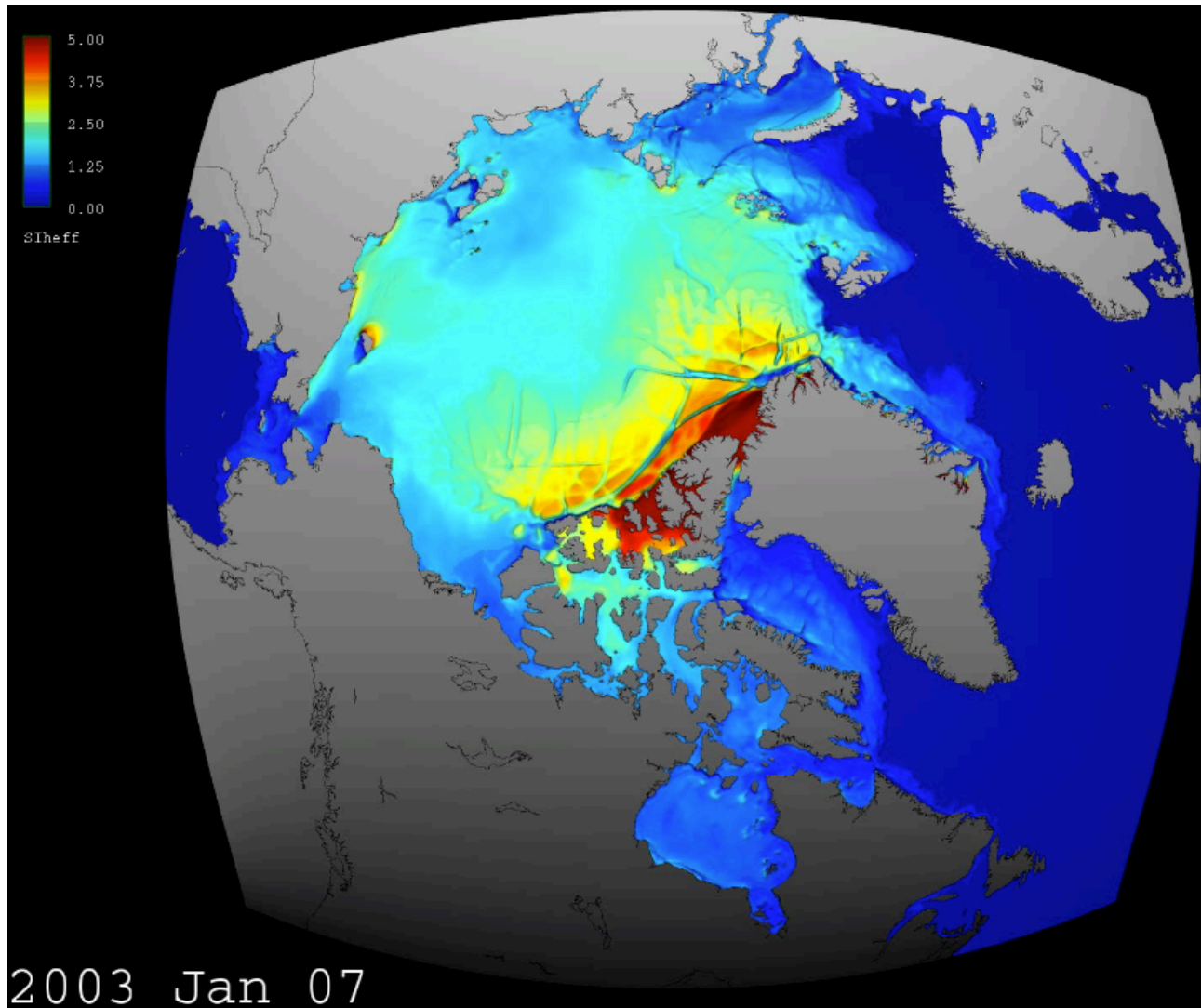


- Jonny Day (APECS liasion)
- Neil Gordon (WMO consultant)



Source: PPP Implementation Plan

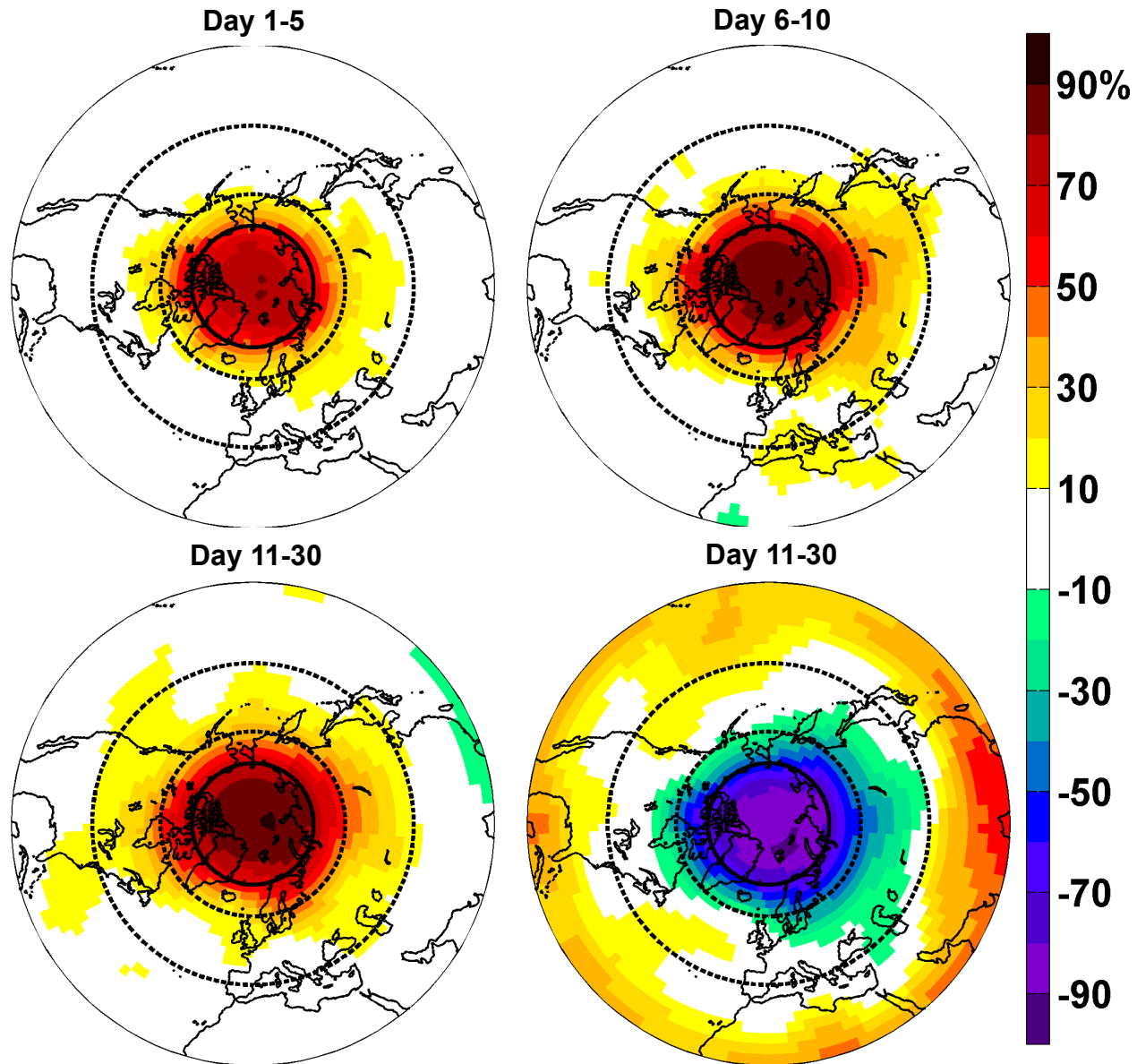
- **Sea ice** prediction
  - Explore predictability
  - Develop of coupled prediction systems
- **Linkages** between polar regions and lower-latitudes
  - Determine mechanisms and strengths
  - Implications for predictions in middle latitudes
- Improved availability of **observations** from polar regions
- The Year of Polar Prediction (**YOPP**) 2017-2019

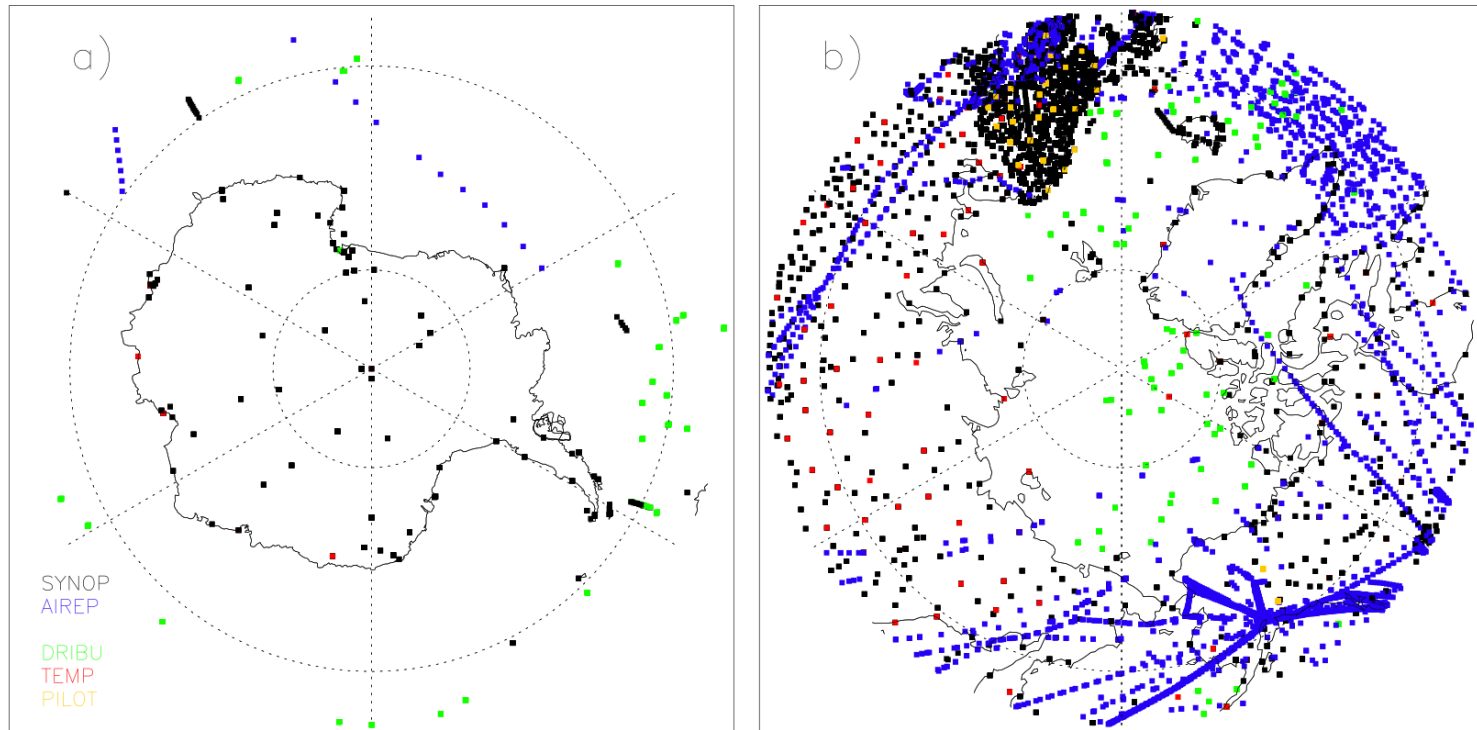


MITgcm @ 4km resolution

Simulation described in Nguyen et al (2012) and Rignot et al. (2012)



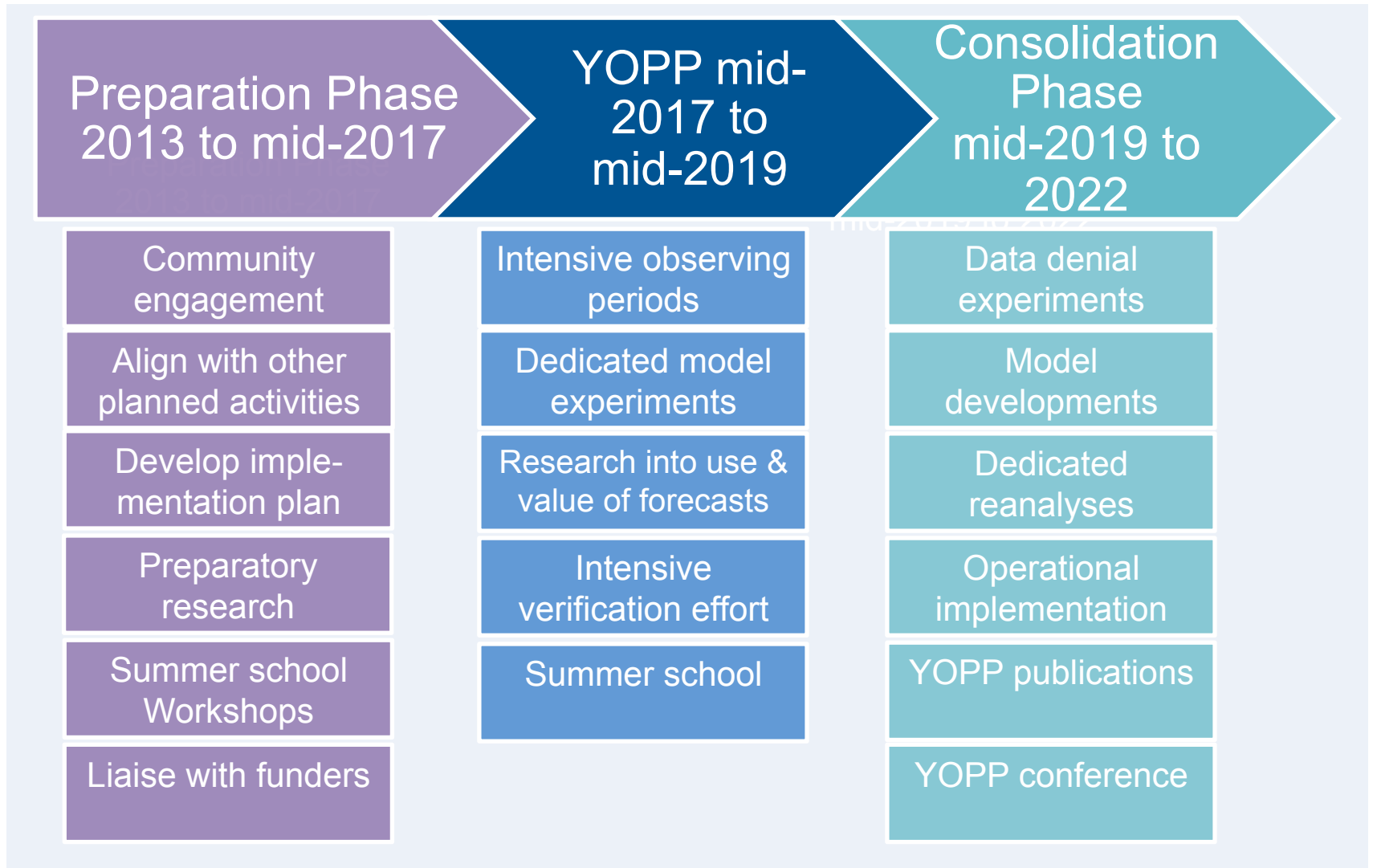




**Synop (Surface stations), AIREP (Airline), DRIBU (Drifting buoys), TEMP (Rawindsonde) and PILOT (Pilot balloons)**

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

- Comprehensive observational snapshot
  - In situ and satellite data
  - Observing system design (data denial experiments)
  - Supersites (model grid boxes → **MOSAiC**)
- Model development (e.g. Transpose-CMIP)
- Community data sets (reforecasts, special archiving etc.)
- Frontier experiments (e.g. high-resolution modelling)
- See draft YOPP Implementation Plan



# MOSAIC

*Multidisciplinary drifting Observatory  
for the Study of Arctic Climate*

*Matthew Shupe – U. of Colorado*

*Ola Persson – U. of Colorado*

*Michael Tjernström – Stockholm U.*

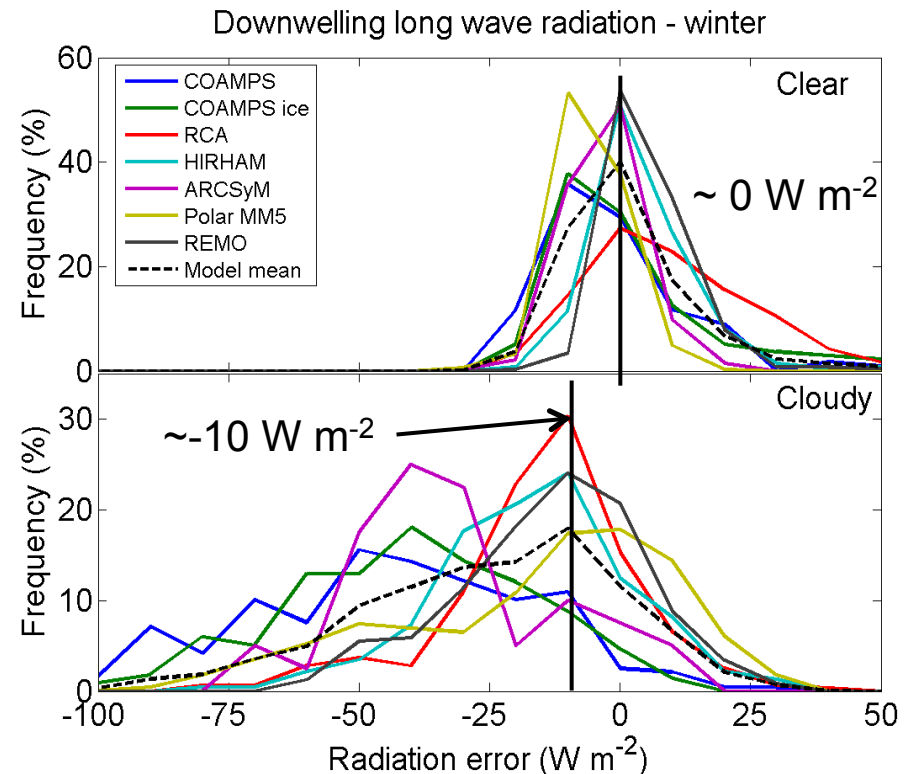
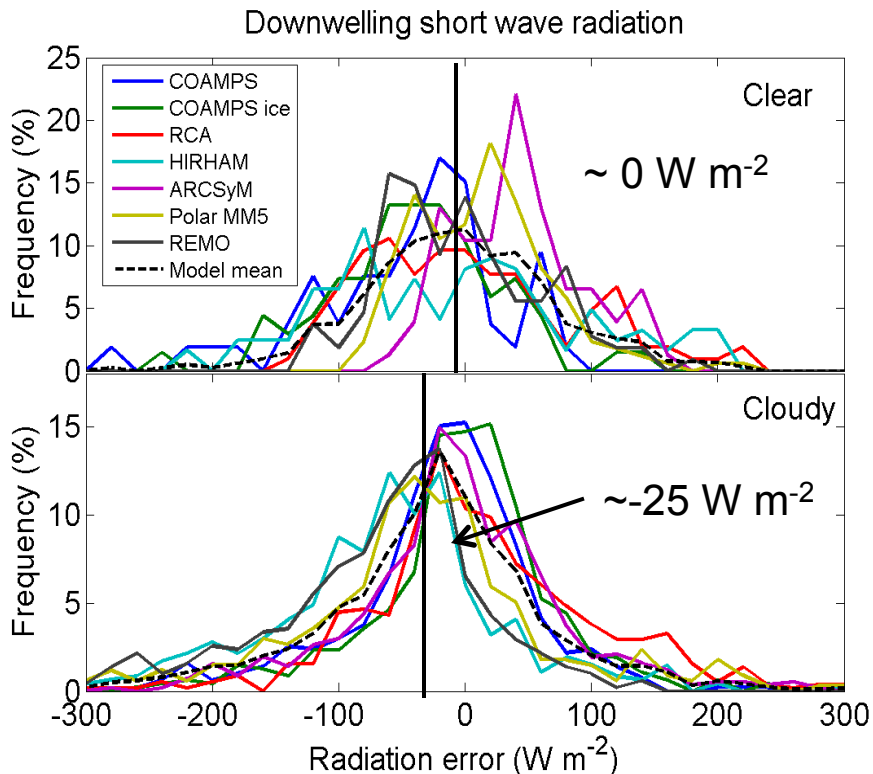
*Klaus Dethloff – Alfred Wegener Inst.*

*And many others*

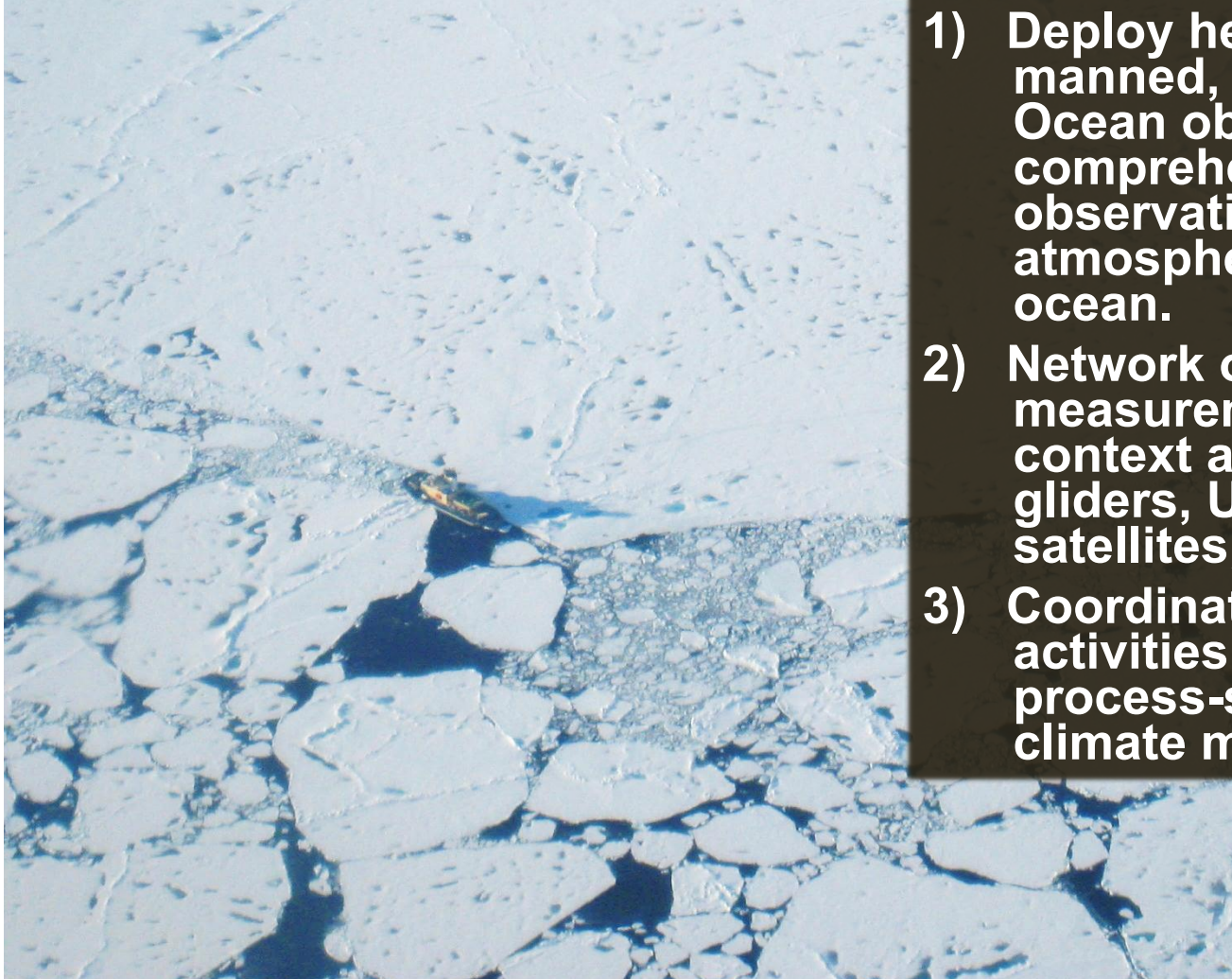


# Critical Model Shortcomings

Regional Climate Models evaluated against SHEBA radiative fluxes reveal major biases and spreads, especially under clouds. Such biases can have serious implications for sea-ice



# The MOSAiC Plan



## What:

- 1) Deploy heavily instrumented, manned, ship-based, Arctic Ocean observatory for comprehensive, coordinated observations of the Arctic atmosphere, cryosphere, and ocean.
- 2) Network of spatial measurements to provide context and variability (buoys, gliders, UAVs, aircraft, ships, satellites, ice stations).
- 3) Coordinated modeling activities at many scales from process-study to regional climate models.

# Measurements

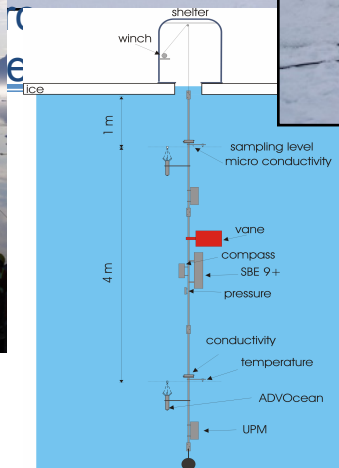
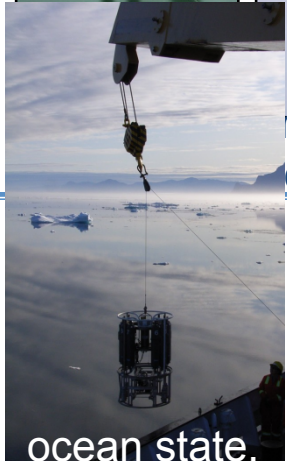
atmospheric  
profiling, BL,  
& dynamics



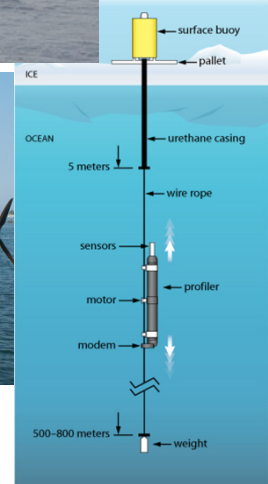
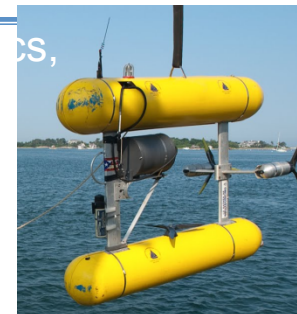
gases, aerosols,  
clouds & precip.



aircraft  
+ UASs

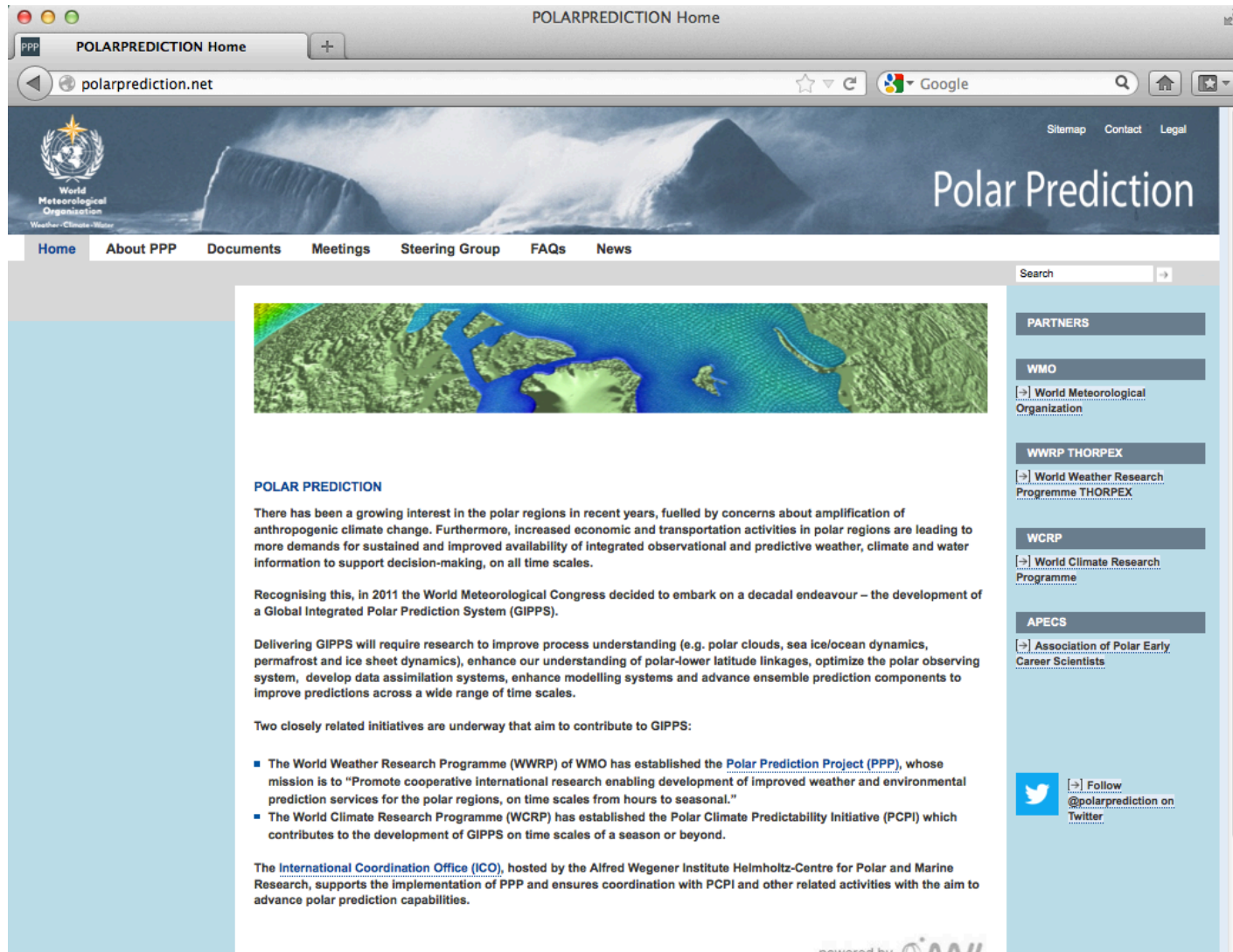


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ocean state.





The screenshot shows a web browser window with the URL [polarprediction.net](http://polarprediction.net). The page title is "POLAR PREDICTION Home". The browser's address bar shows "polarprediction.net" and the search engine is set to Google. The website header features the World Meteorological Organization logo and the text "Polar Prediction". A navigation menu includes "Home", "About PPP", "Documents", "Meetings", "Steering Group", "FAQs", and "News". A search bar is located in the top right corner. The main content area displays a map of the Arctic region with a color-coded overlay. Below the map, the text reads:

**POLAR PREDICTION**

There has been a growing interest in the polar regions in recent years, fuelled by concerns about amplification of anthropogenic climate change. Furthermore, increased economic and transportation activities in polar regions are leading to more demands for sustained and improved availability of integrated observational and predictive weather, climate and water information to support decision-making, on all time scales.

Recognising this, in 2011 the World Meteorological Congress decided to embark on a decadal endeavour – the development of a Global Integrated Polar Prediction System (GIPPS).

Delivering GIPPS will require research to improve process understanding (e.g. polar clouds, sea ice/ocean dynamics, permafrost and ice sheet dynamics), enhance our understanding of polar-lower latitude linkages, optimize the polar observing system, develop data assimilation systems, enhance modelling systems and advance ensemble prediction components to improve predictions across a wide range of time scales.

Two closely related initiatives are underway that aim to contribute to GIPPS:

- The World Weather Research Programme (WWRP) of WMO has established the [Polar Prediction Project \(PPP\)](#), whose mission is to "Promote cooperative international research enabling development of improved weather and environmental prediction services for the polar regions, on time scales from hours to seasonal."
- The World Climate Research Programme (WCRP) has established the [Polar Climate Predictability Initiative \(PCPI\)](#) which contributes to the development of GIPPS on time scales of a season or beyond.

The [International Coordination Office \(ICO\)](#), hosted by the Alfred Wegener Institute Helmholtz-Centre for Polar and Marine Research, supports the implementation of PPP and ensures coordination with PCPI and other related activities with the aim to advance polar prediction capabilities.

The right sidebar contains a search bar and several partner links: PARTNERS, WMO, WWRP THORPEX, WCRP, and APECS. At the bottom right, there is a Twitter follow button for @polarprediction.

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