ALFRED-WEGENER-INSTITUT
HELMHOLTZ-ZENTRUM FÜR POLAR- UND MEERESFORSCHUNG

WWRP Polar Prediction Project

Thomas Jung

Chair of the WWRP Polar Prediction Project

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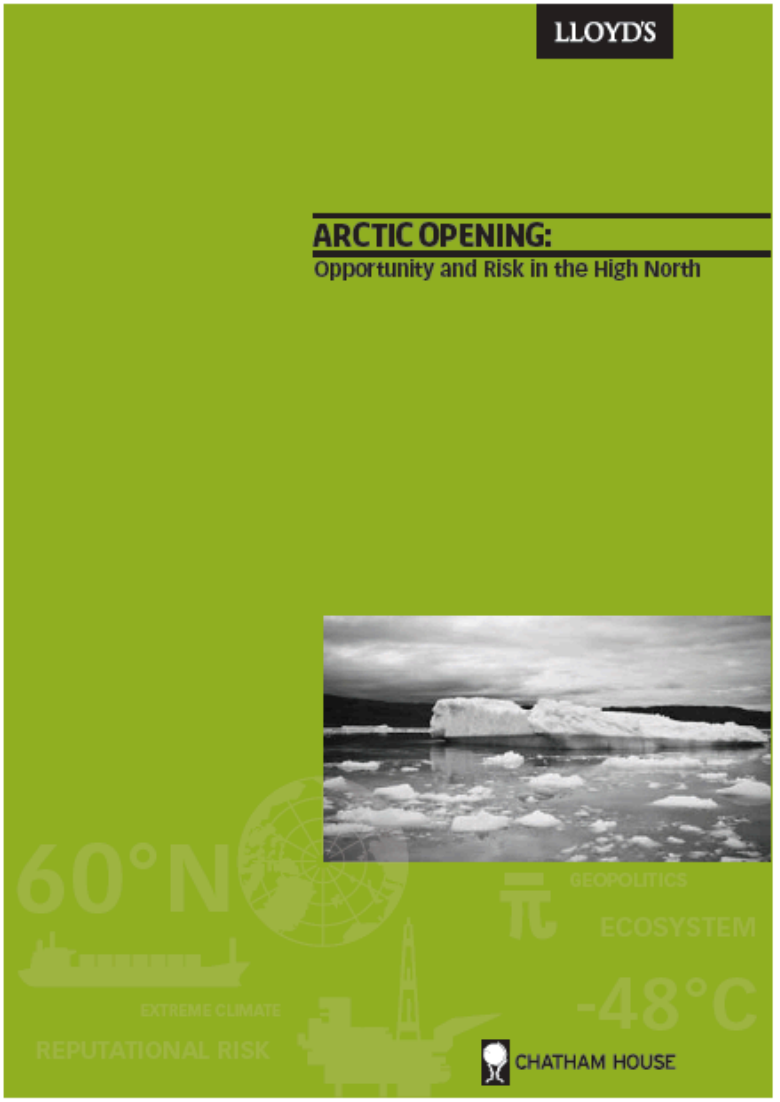
Germany

HELMHOLTZ GEMEINSCHAFT

Opportunity and risk

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



Background

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.

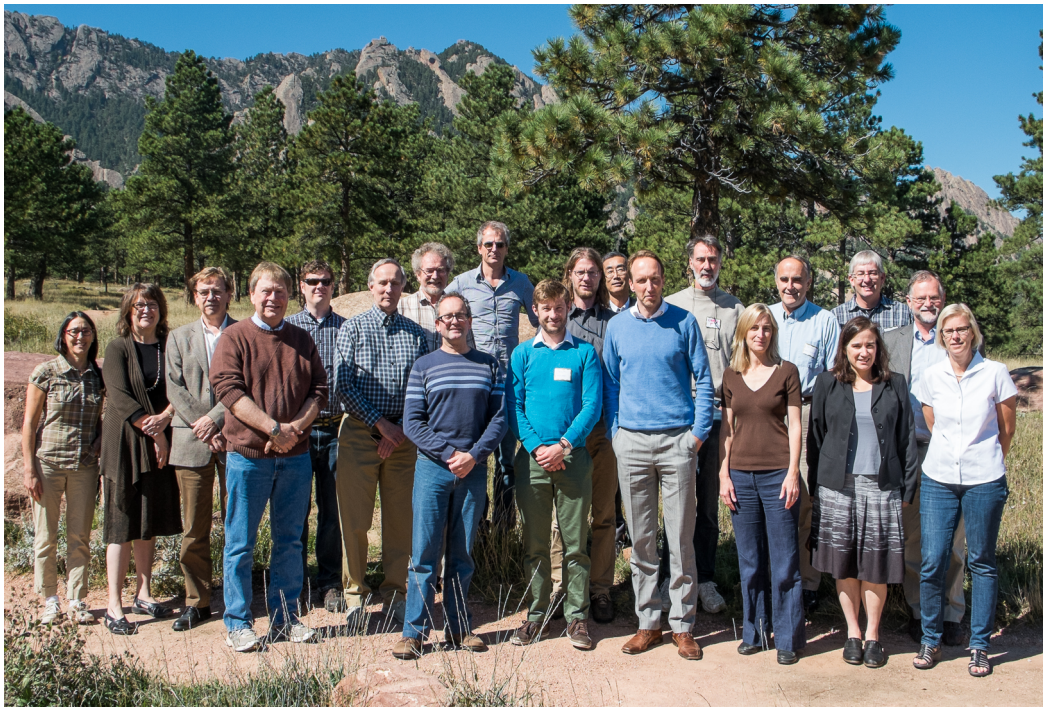
Progress

*Formation of Science Sterring 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

PPP Steering Group

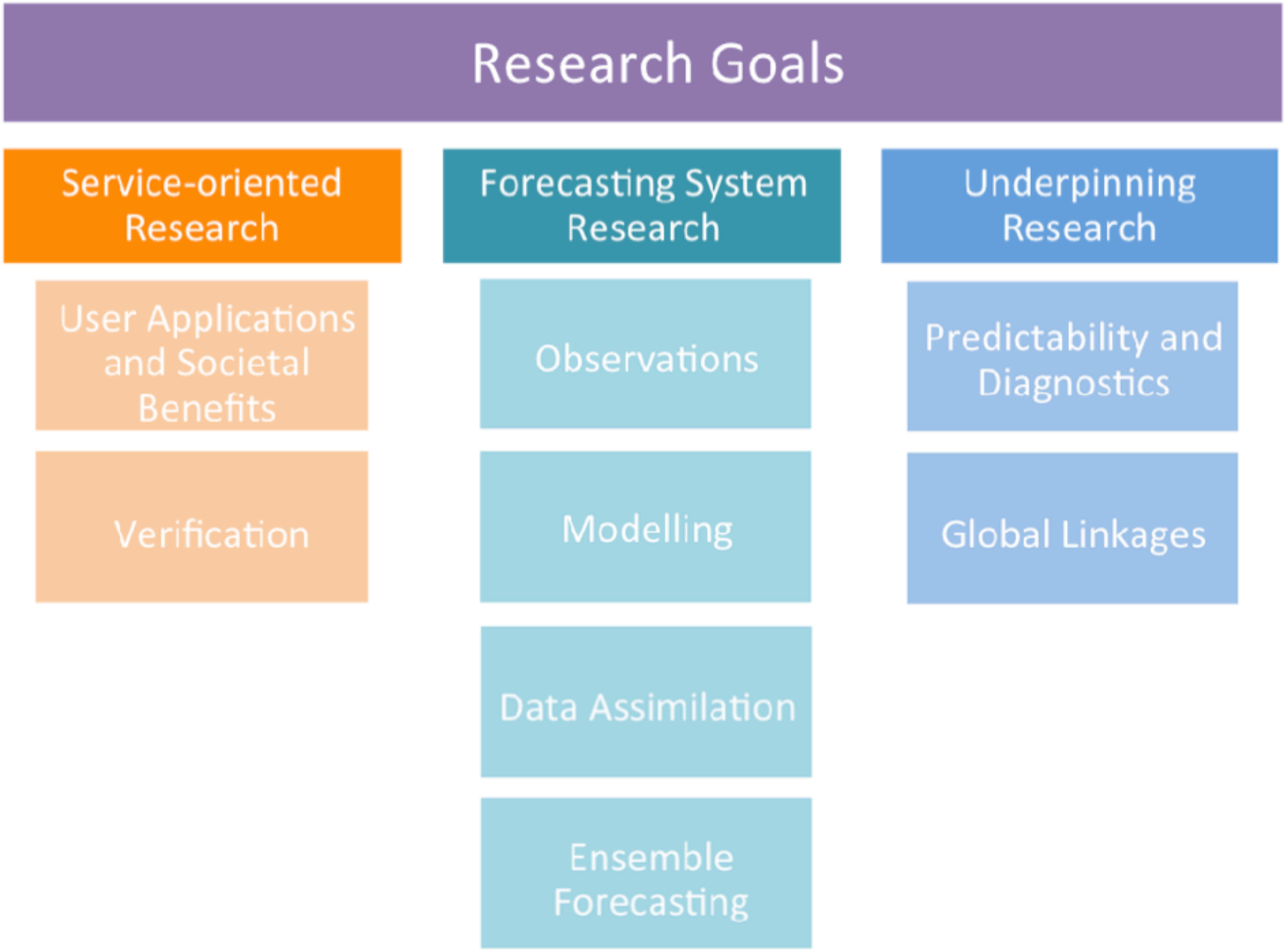
- Thomas Jung (chair)
- Peter Bauer
- David Bromwich
- Paco Doblas-Reyes
- Chris Fairall
- Marika Holland
- Trond Iversen
- Brian Mills
- Pertti Nurmi
- Don Perovich
- Phil Reid
- Ian Renfrew
- Gregory Smith
- Gunilla Svensson
- Mikhail Tolstykh

SG4, Boulder, 1-3 October 2013



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

Research areas



Source: PPP Implementation Plan

Flagship themes

- 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

Sea ice prediction

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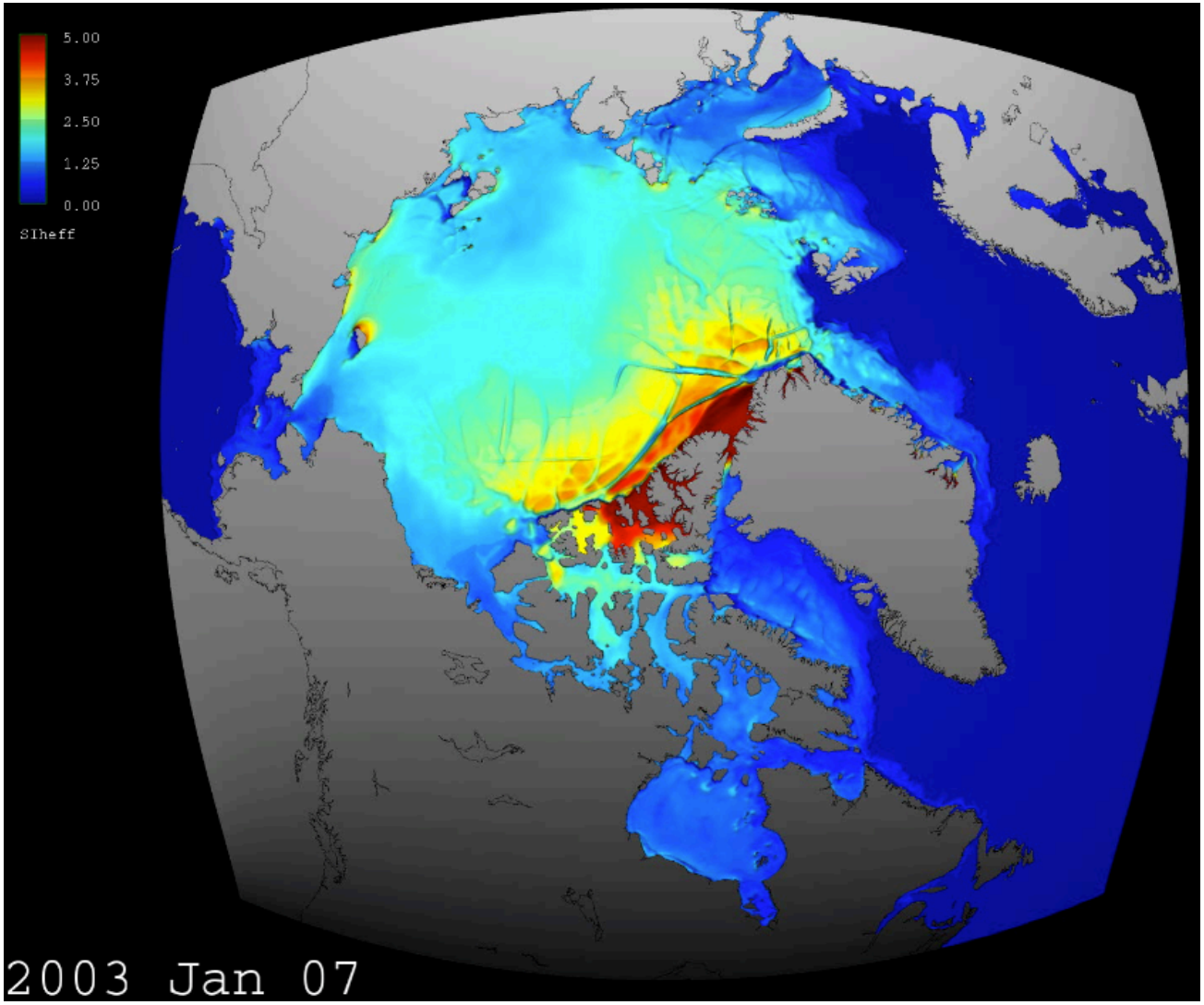
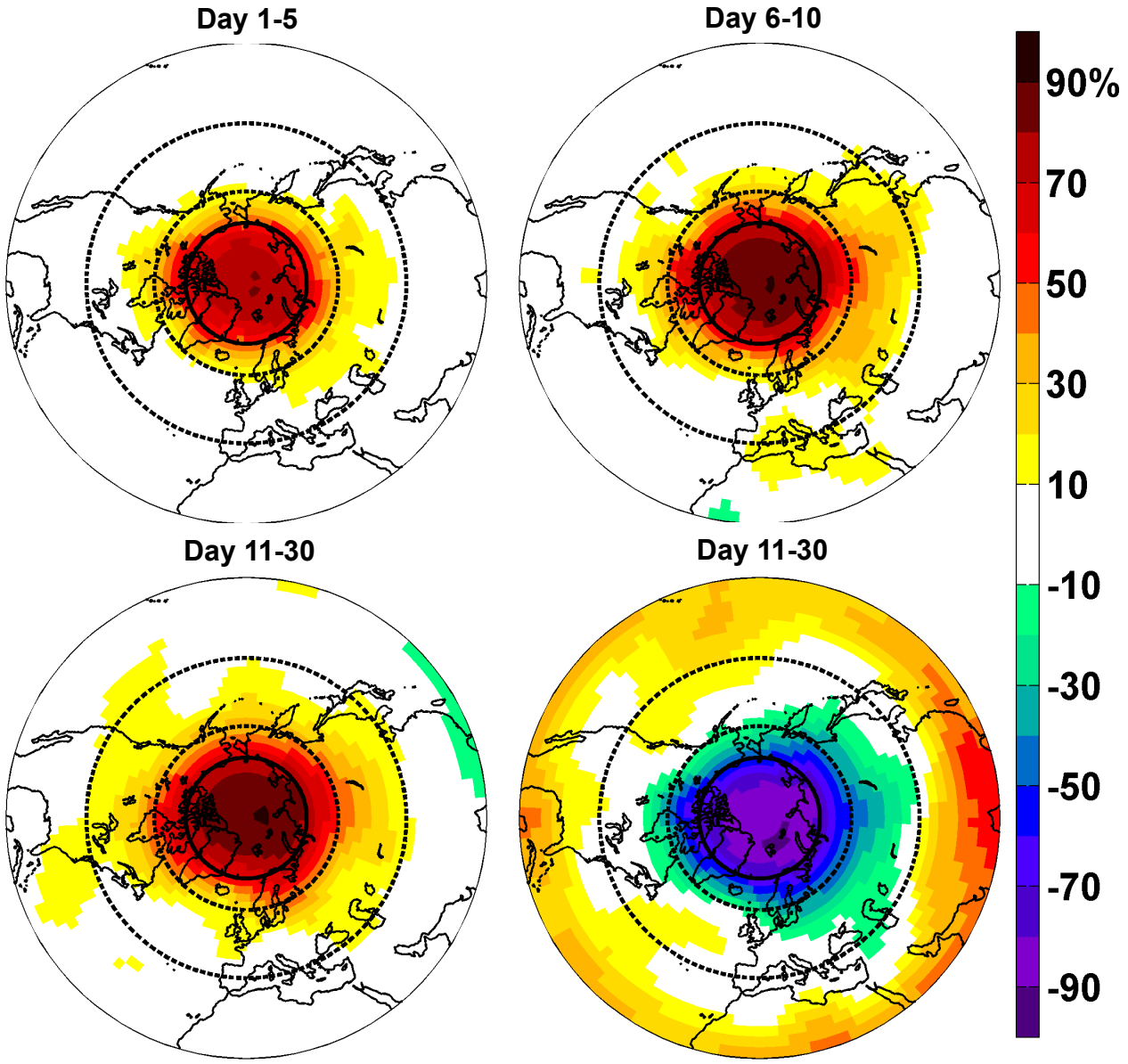


MITgcm @ 4km resolution
Simulation described in Nguyen et al (2012) and Rignot et al. (2012)

Linkages



Improved observational coverage

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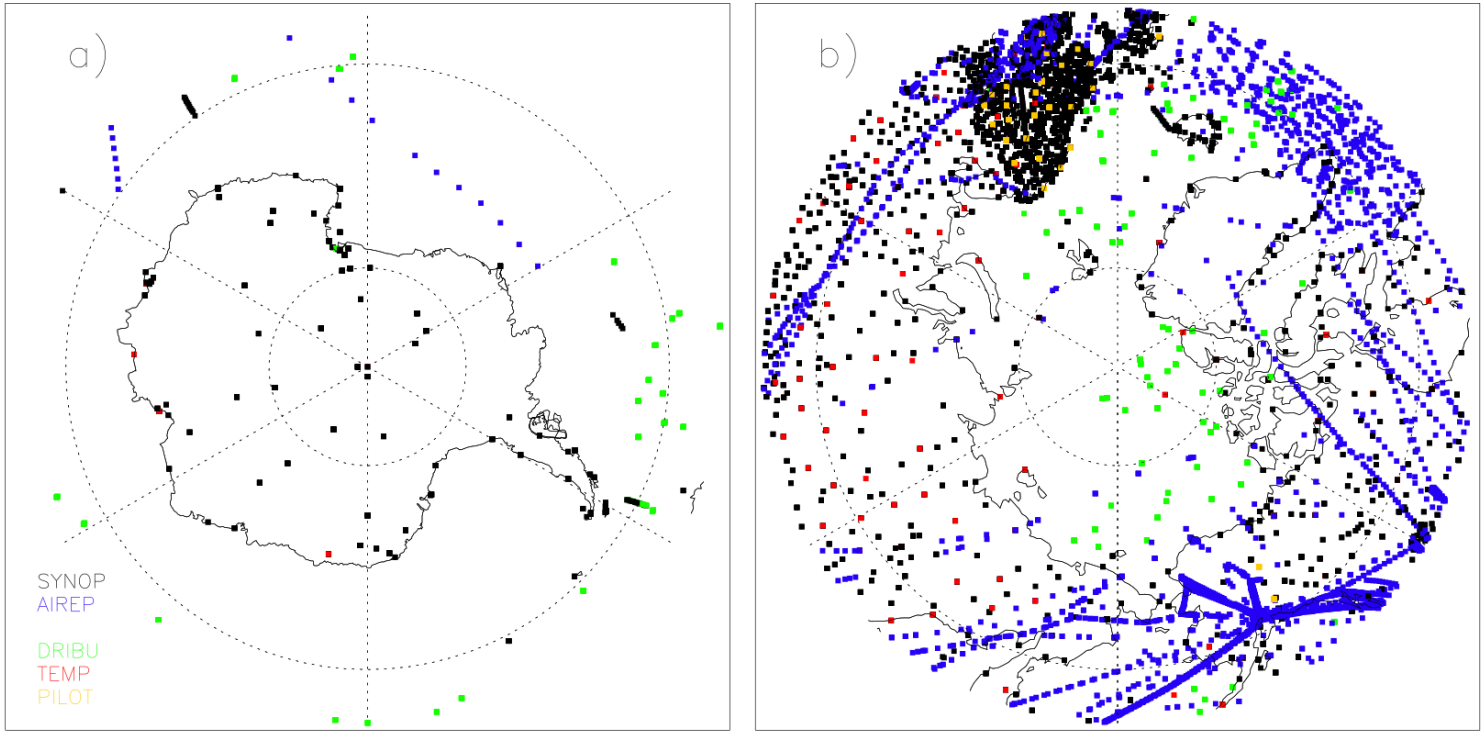

Synop (Surface stations), AIREP (Airline), DRIBU (Drifting buoys), TEMP (Rawindsone) and PILOT (Pilot balloons)

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

P. Bauer (ECMWF)

The Year of Polar Prediction

- 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

The Year of Polar Prediction

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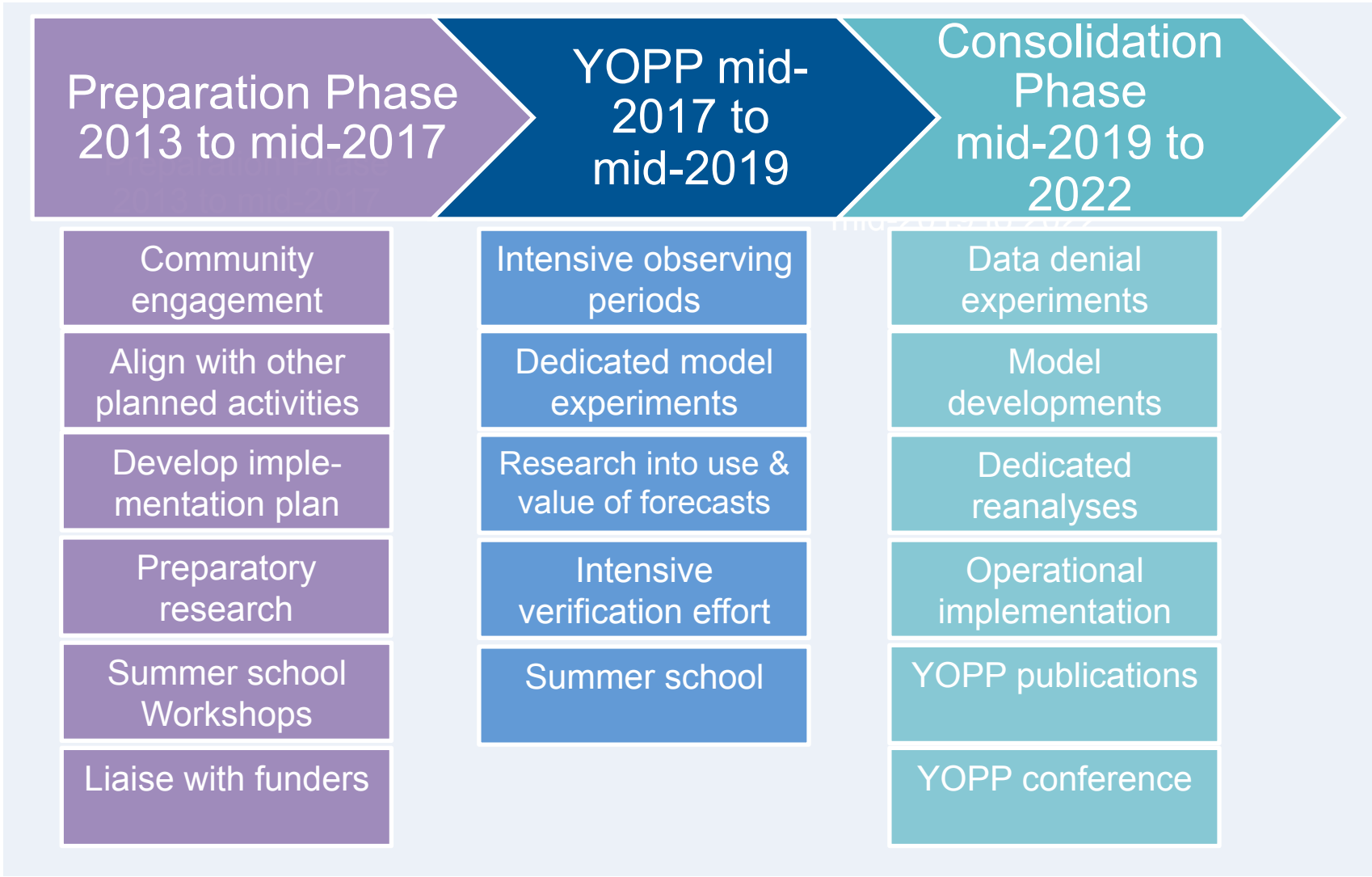


MOSAiC

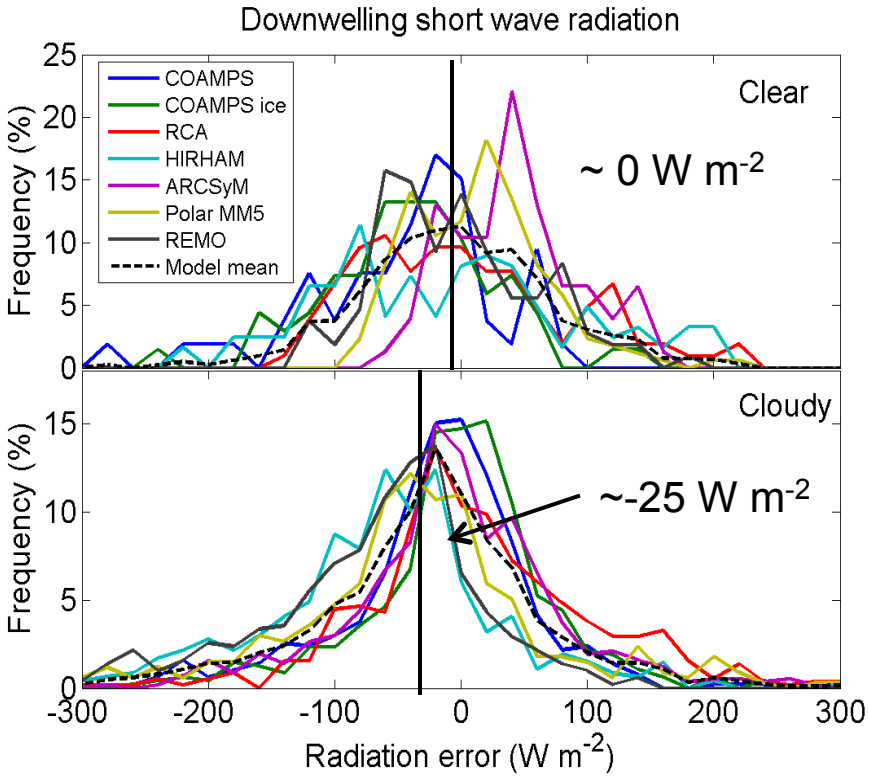
Multidisciplinary drifting Observatory for the Study of Arctic Climate

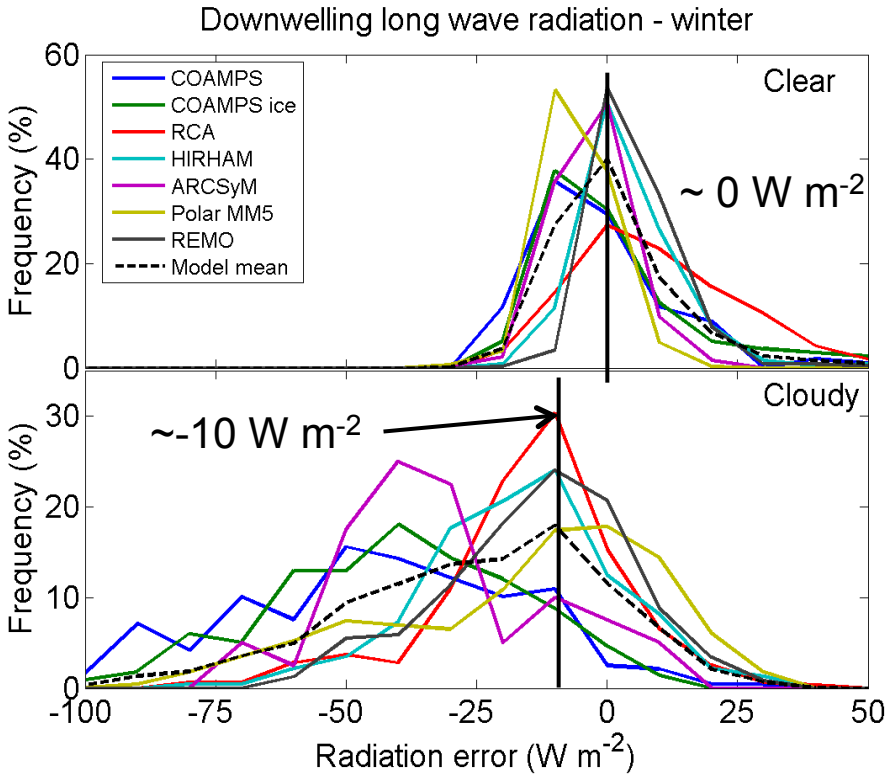
Matthew Shupe – U. of Colorado
Ola Persson – U. of Colorado
Michael Tjernström – Stockholm U.
Klaus Dethloff – Alfred Wegener Inst.
And many others

IASC

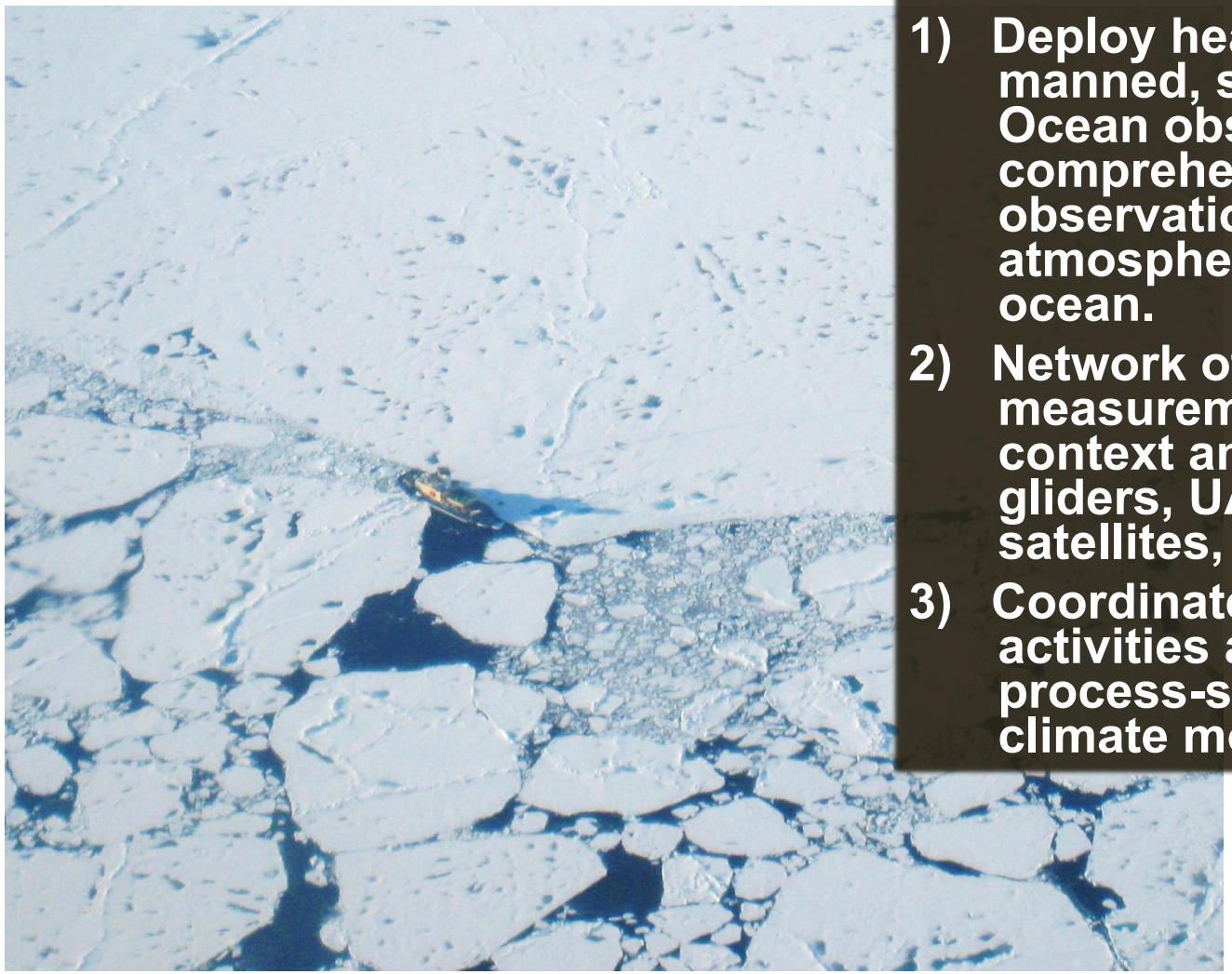
Critical Model Shortcomings

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



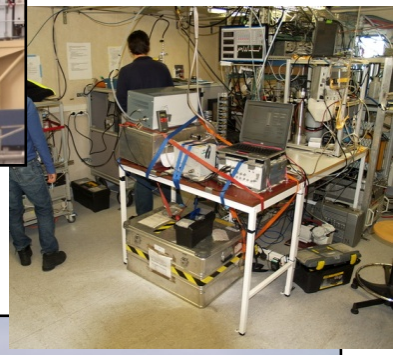
What:

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.

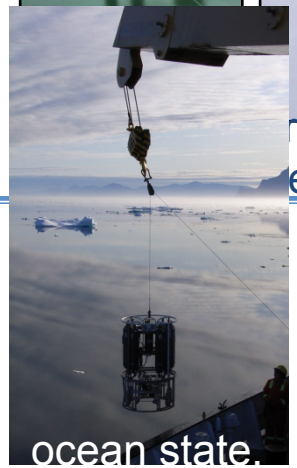
Measurements

atmospheric profiling, BL, & dynamics

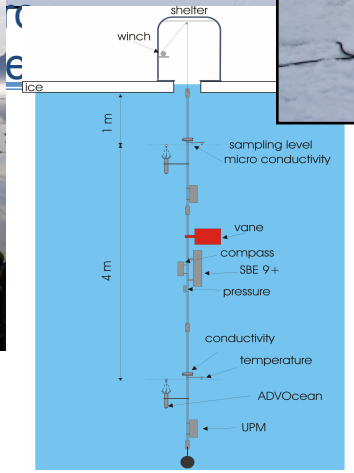
gases, aerosols, clouds & precip.

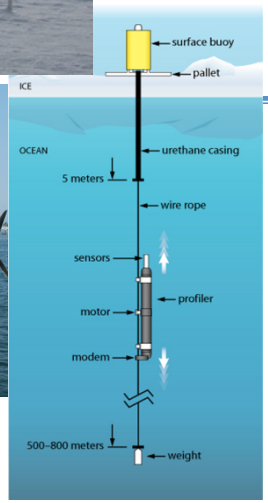


aircraft + UASs

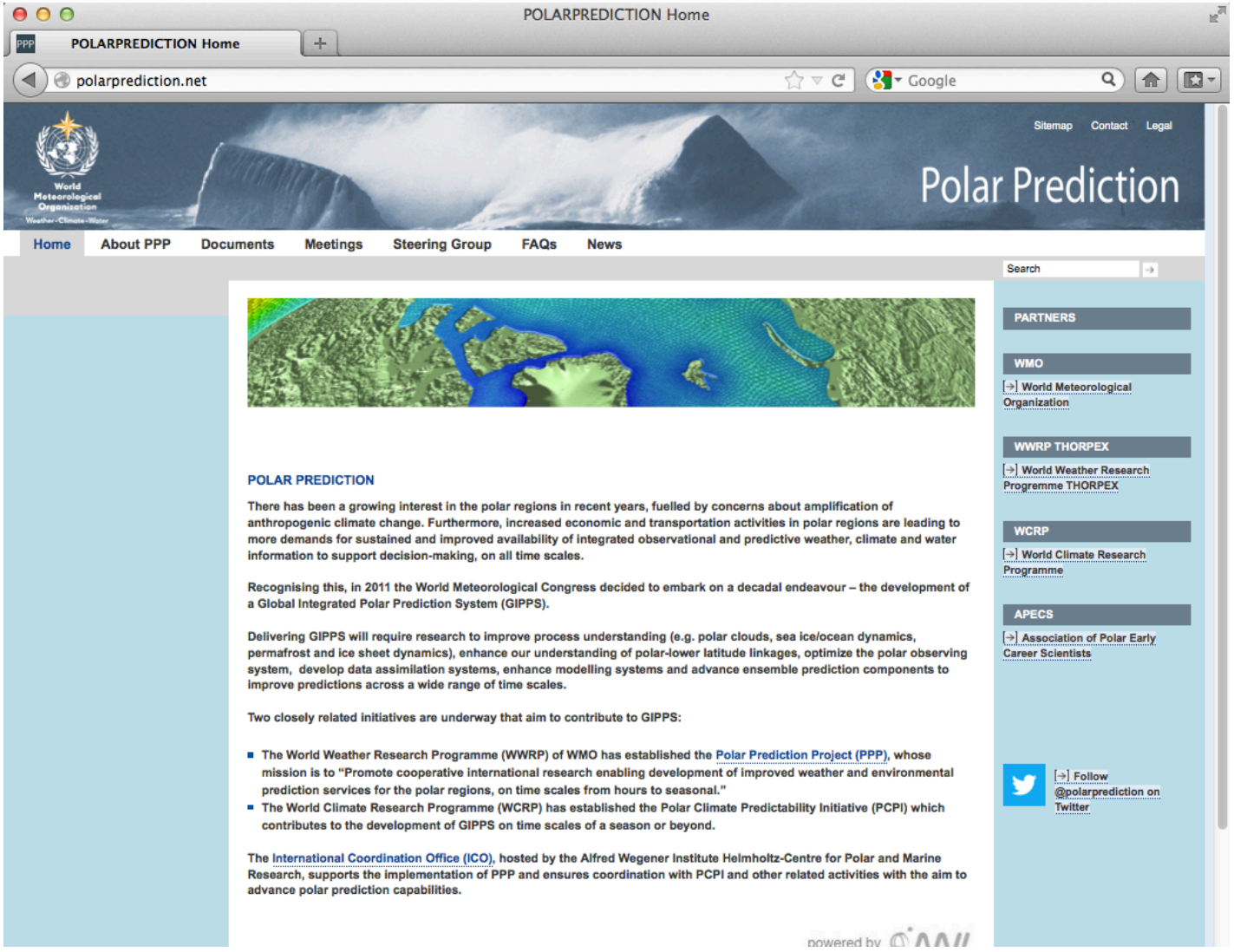


ocean state,





Further information



http://polarprediction.net