ECRA
European Climate Research Alliance

@ECRA_Climate
www.ecra-climate.eu

Arctic Climate Change –

Perhaps the most visible consequence of Global Warming

Arctic Climate Stability and Change

ECRA General Assembly 2017 - "Climate Change and Vulnerable Regions"

March 7-8, 2017, Square Brussels Meeting Centre

Co-chairs:

Lars H. Smedsrud, Bjerknes Centre, Norway

Thomas Jung, AWI, Germany (On the way out)

Richard Bintanja, KNMI, Netherland (On the way in)

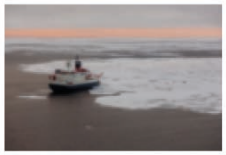
Bjerknes Centre
for Climate Research

Arctic ECRA - since 2012

A number of workshops resulted in recommending that the EU fund collaborative research aiming to answers these questions:

More information

Why is Arctic sea ice disappearing so rapidly?



More information

What are the local and global impacts of Arctic climate change?

More information

How to advance environmental prediction capabilities for the Arctic and beyond?

Milestone in 2014:

Arctic ECRA

Strategy and Work Plan

30 pages

"Advancing European Arctic climate research for the benefit of society"

www.ecra-climate.eu

Resent achievements:

- **Recomendations played a role for Horizon 2020 call**

- **Coordination for applications:**

  - Resulted in «the Big 3» projects:

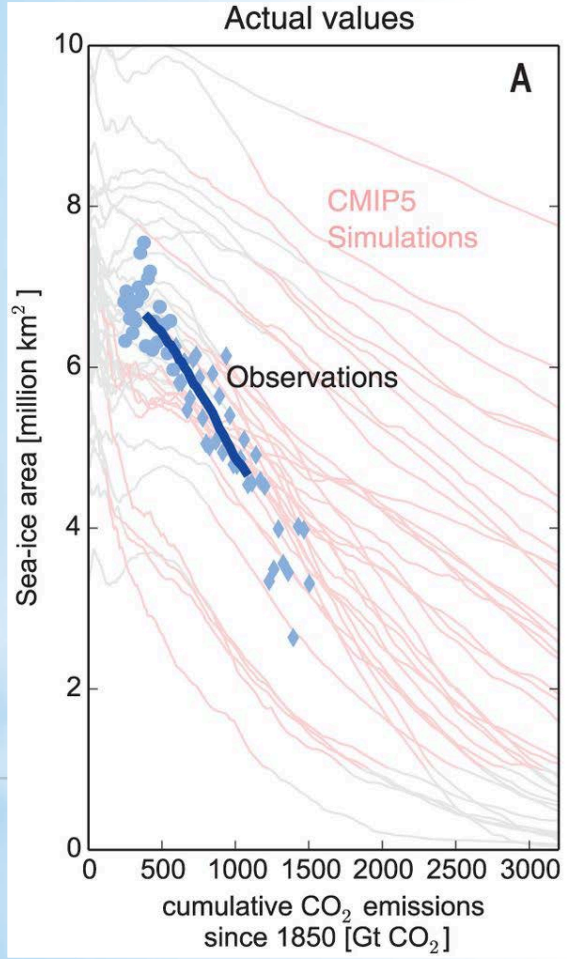
  INTAROS, Blue-Action & APPLICATE

- **Response and input to EU-Polar Net**

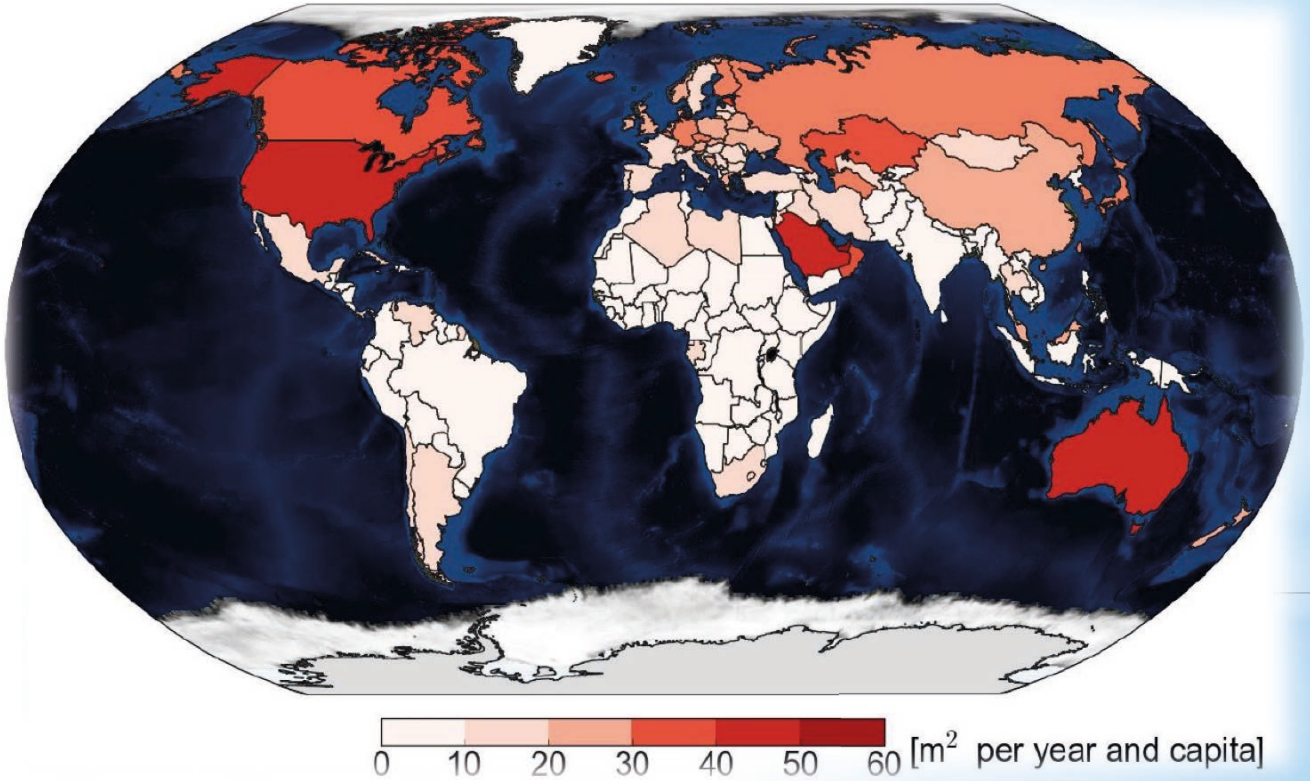
  Dedicated workshop in February 2016

Google: Arctic Climate Change

Arctic sea ice decline is caused by you and me …



Annual mean loss of Arctic September sea-ice area caused by average emissions of each citizen



Talk tomorrow 15:30
Julienne Stroeve

3 m² Arctic September sea ice loss = 1 ton anthropogenic CO2 emission
Notz & Stroeve (2016)

Arctic talks tomorrow: 15:30

- Julienne Stroeve (CPOM, UK)

  Arctic sea ice loss and the response from CO_2

- Richard Bintanja (KNMI, NE)

  Observed Arctic sea ice loss and Arctic amplification

- Ralph Döscher (SMHI, SE)

  Arctic climate change scenarios and consequences

- Lis L. Jørgensen (IMR, NO)

  Effects of multiple stressors on the benthic ecosystem in the Barents Sea

INTAROS (2016 – 2021) € 15.5 mill

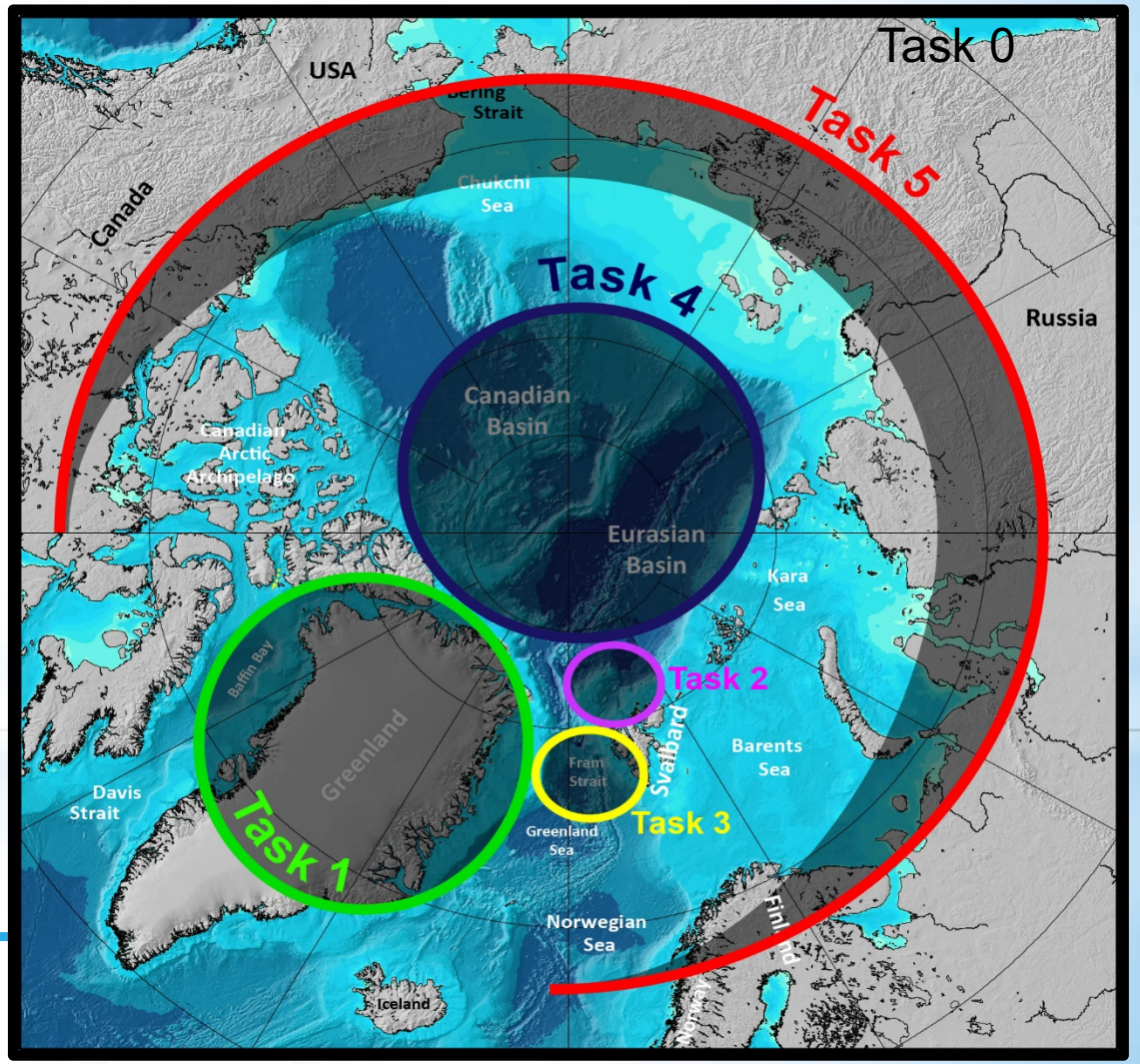
Main goal: Improving and unifying existing Arctic Observation systems

Stein Sandven (leader),
Nansen Centre, Bergen, Norway
+ 49 partners in 20 countries

INTAROS will work in:

- Coastal Greenland
- North of Svalbard
- Fram Strait
- The central Arctic Ocean
- Selected sites across the Arctic land areas

http://www.intaros.eu/



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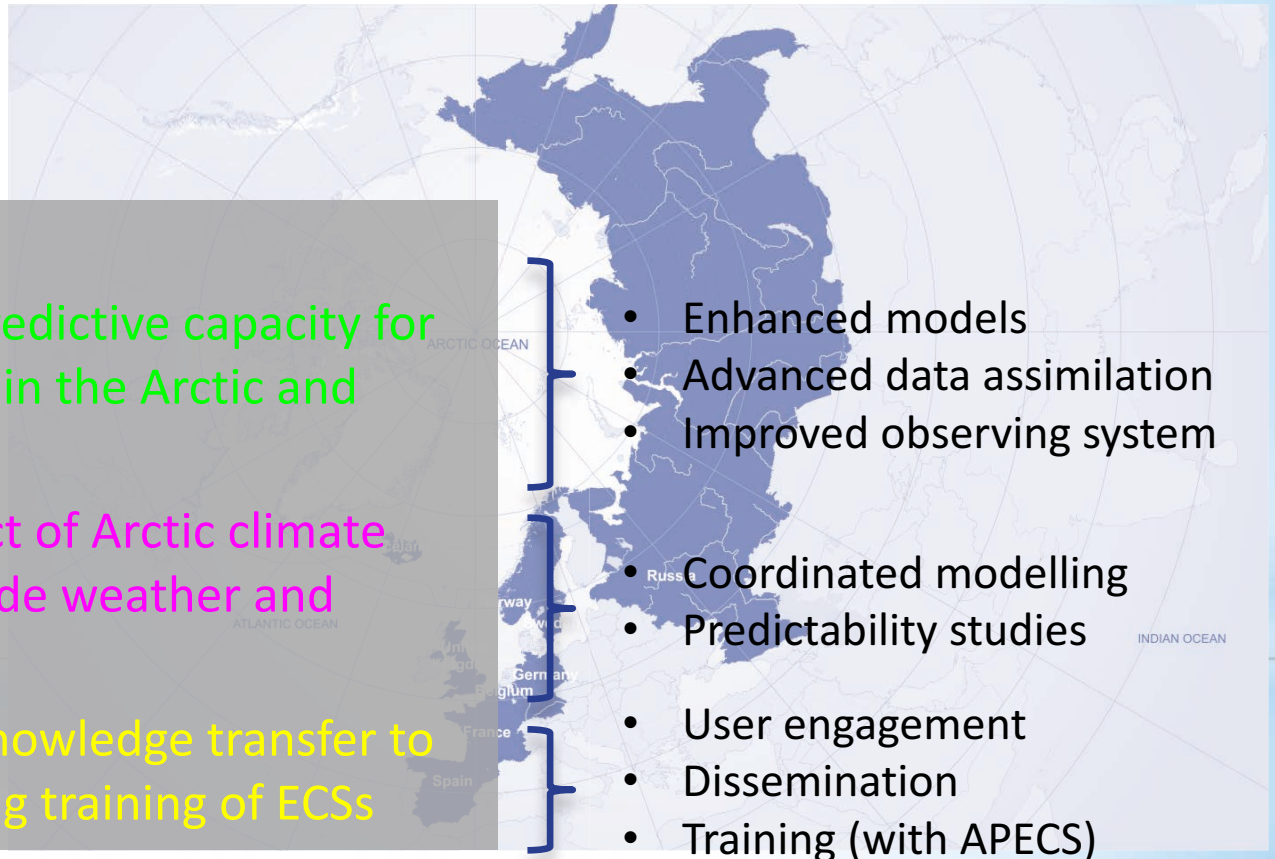
APPLICATE (2016 – 2020) € 8 mill

Advanced Prediction in Polar regions and beyond: modelling, observing system design and LInkages associated with a Changing Arctic climaTE

Thomas Jung (leader),
AWI, Germany
+ 16 partners in 9 countries

APPLICATE will:

- Develop advanced predictive capacity for weather and climate in the Arctic and beyond
- Determine the impact of Arctic climate change on mid-latitude weather and climate
- Carry our effective knowledge transfer to stakeholders including training of ECSs



Blue-Action (2016 – 2020) € 7.5 mill

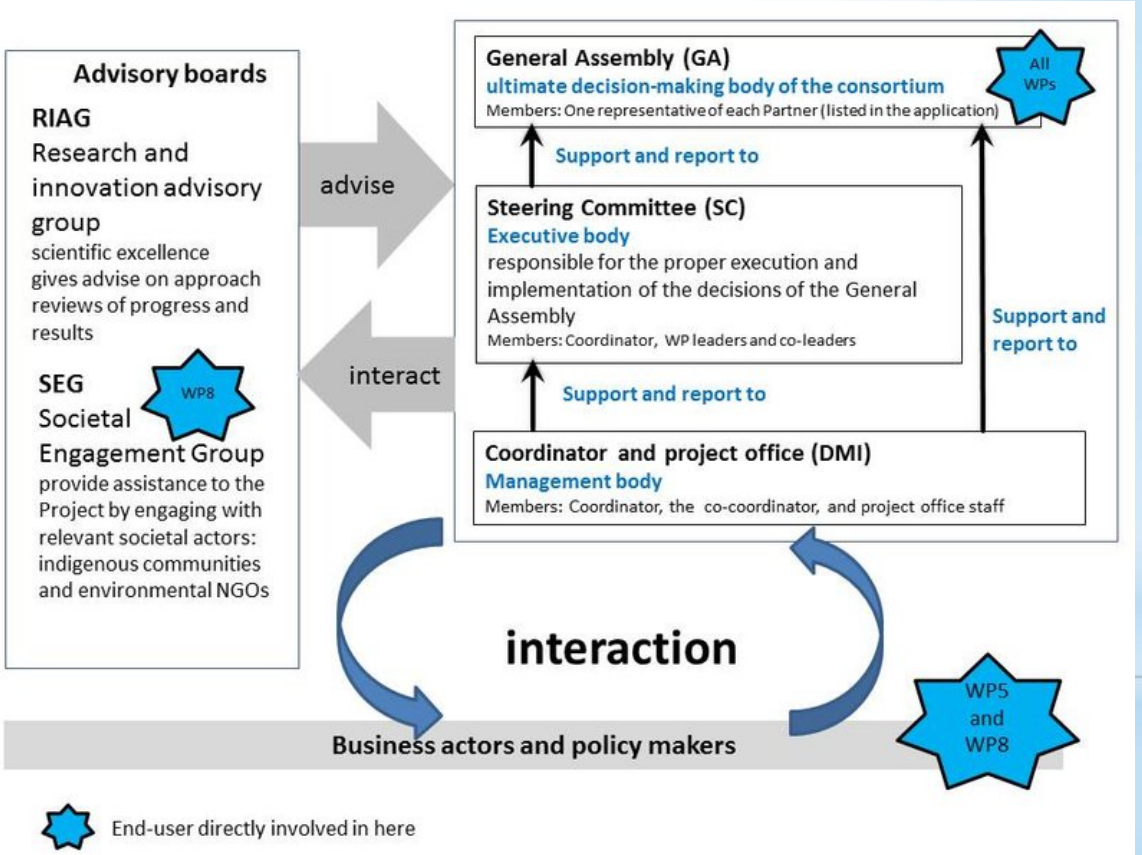
Main goal: Quantify the role of a changing Arctic in predictive capability of weather and climate of the Northern Hemisphere

Steffen M. Olsen (leader)
Danish Met Office (DMI)
+ 40 partners in 17 countries

Will cover:

- Extreme Events
- Model Improvements
- Coordinated Experiments
- Climate Service

http://www.blueaction.eu/



EU-PolarNet

www.eu-polarnet.eu

2015 – 2020

- Sustain an **on-going dialogue** with the European Commission on Polar topics
- Develop an integrated **European polar research programme** co-designed with all relevant stakeholders

Report on prioritised objectives finalized in July 2016
Example "Key Question":
What are the key ocean-atmosphere-ice-land interactions?

- Design a resource-oriented European **infrastructure access and usage plan**
- Improve and strengthen **international cooperation** and implement the **Transatlantic Research Alliance**

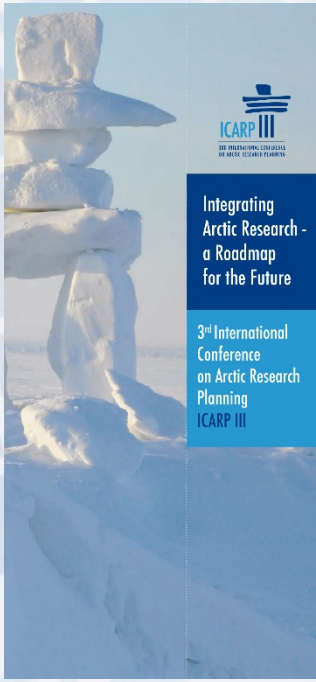
EU-PolarNet

White Papers by selected experts:

- **Formulate** urgent polar research questions for:
  1) People 2) Climate and cryosphere 3) Sustainable management
  4) Polar Biodiversity 5) New technologies

- **Co-created** by stakeholders and scientific experts during a five day **Workshop in Madrid - October 2017**.

- **Nomination of experts** is ongoing.



Key Arctic topics for the future:

- ***How rapidly will Arctic sea ice decline in the future?***
- ***What long-term observations are essential for future predictions?***
- ***What are the impacts of Arctic climate change – both locally and globally?***
- ***How can we best advance environmental prediction capabilities?***

Summary

- Arctic ECRA is a network of leading climate research institutions and operational centres in Europe
- Arctic ECRA has been very active since 2012

  (documents, meetings, applications, ….)
- Arctic ECRA has attained a high level of visibility
- A new phase => 2020

  - work is happening in EU-PolarNet and

  in the three main projects

  (INTAROS, APPLICATE & Blue-Action).

Our strengths...

- Breadth of expertise including observations, modelling, theory and logistics
- Leading role in various national and international committees
- Flexible and responsive to new ideas
- Access to large-scale infrastructures (research icebreaker, polar stations, aircraft, HPC facilities ...)
- Availability of some of the most advanced regional and global earth system models

Our mission...

Mission statement:

Advancing Arctic climate research in Europe for the benefit of society...

... through

- international cooperation (e.g. shared infrastructure),
- Identification of key topics (research priorities), and
- providing advice (policy makers, funding agencies...)

Selected activities...

- Arctic ECRA workshops (4 since 2012)
- Arctic ECRA documents
  - Briefing documents
  - Strategy and Work Plan
- High-level side events
- Parliamentarian lunchtime events
- General Assemblies
- Organsation and co-sponsoring of conferences and meetings

Who we are...

25 participating institutions from 10 European countries

Conferences

International workshop on *Polar-lower latitude linkages and their role in weather and climate prediction*. 10-12 December 2014, Barcelona; Spain

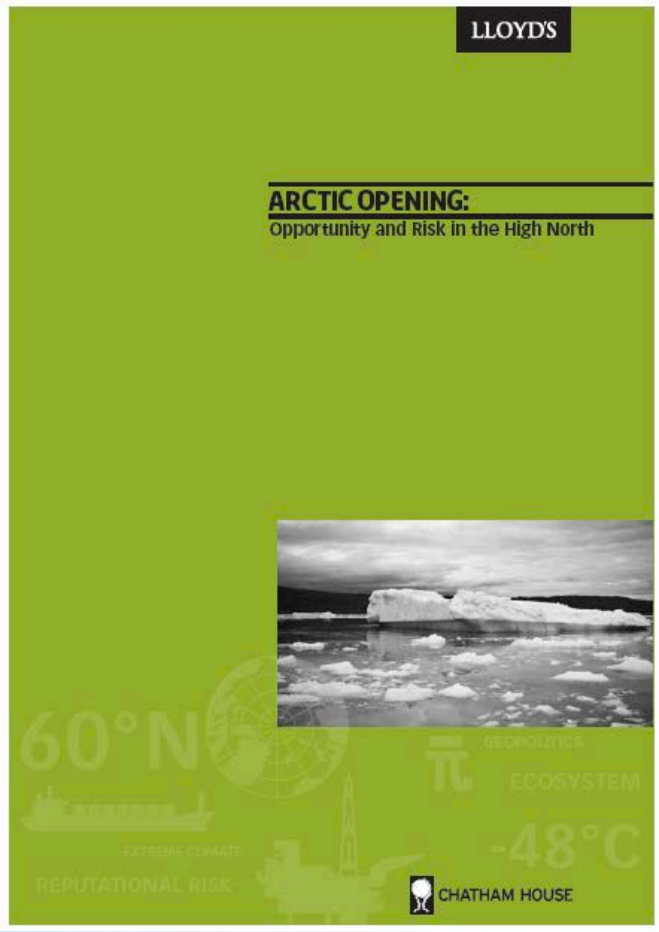
What we do…

- Arctic ECRA workshops (4 since 2012)
- Arctic ECRA documents
  - Briefing documents
  - Strategy and Work Plan
- High-level side events
- Parliamentarian lunchtime events
- Organsation and co-sponsoring of conferences and meetings
- Contribution to the implementation of the Galyway statement ➔ Coordination of the theme *Arctic-Atlantic interplay*

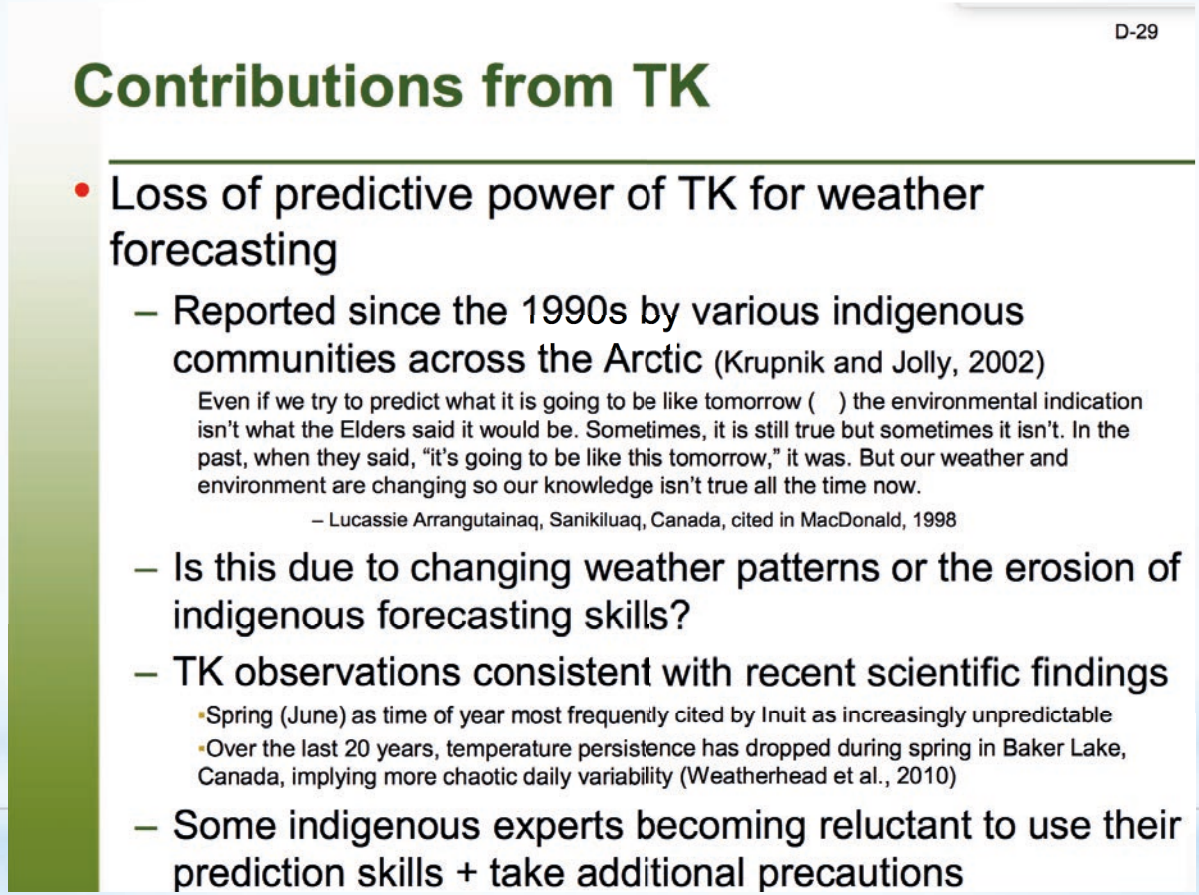
Scientific key-questions

- Why is Arctic sea ice declining so rapidly?
- What are the local and global consequences of Arctic climate change?
- How can polar prediction capabilities be improved?

Local consequences



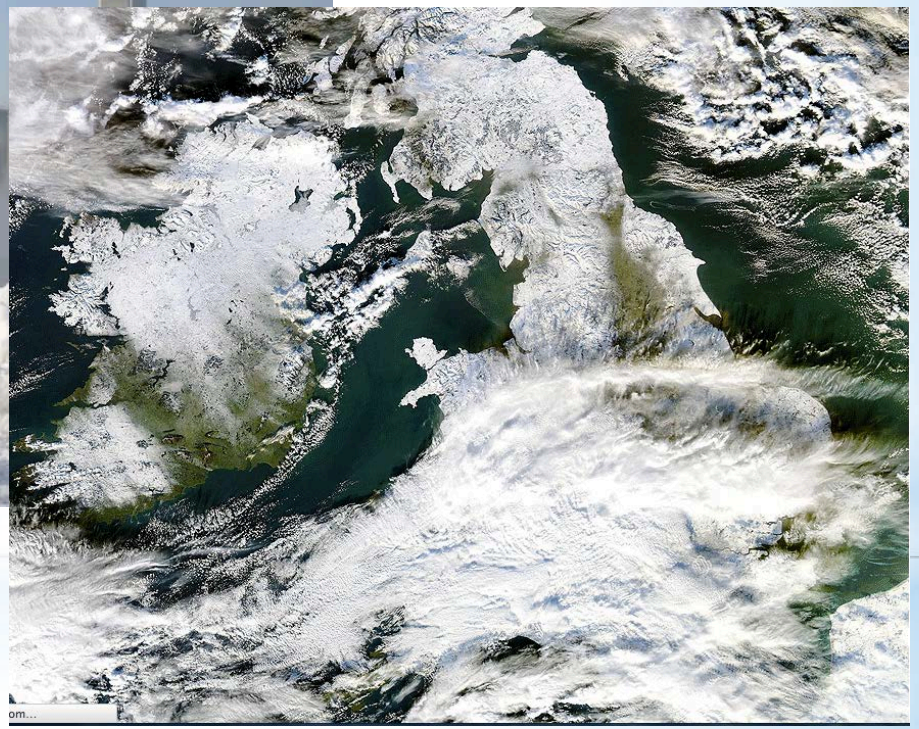
Traditional knowledge



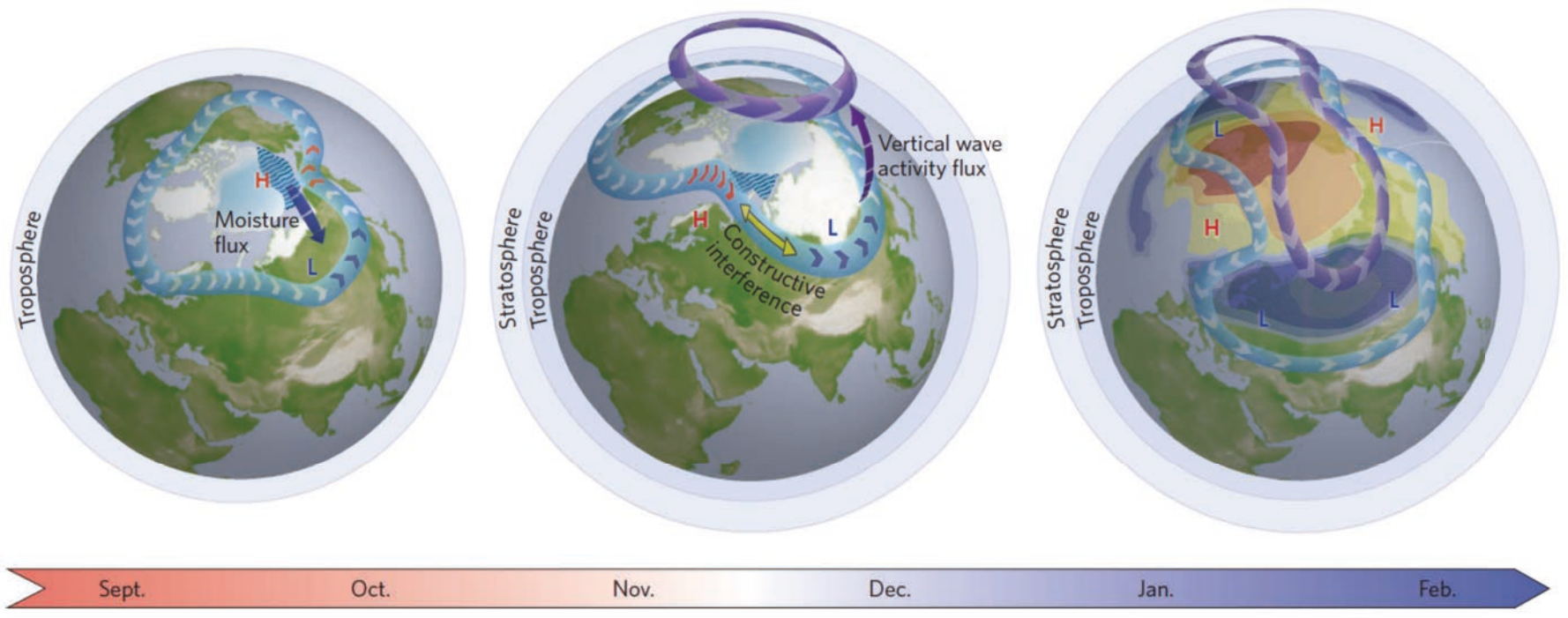
Slide from Dominque Henri, Environement and Climate Change Canada

Remote consequences

„What happens at the poles does not stay at the poles...“



Can it? Has it? Will it?

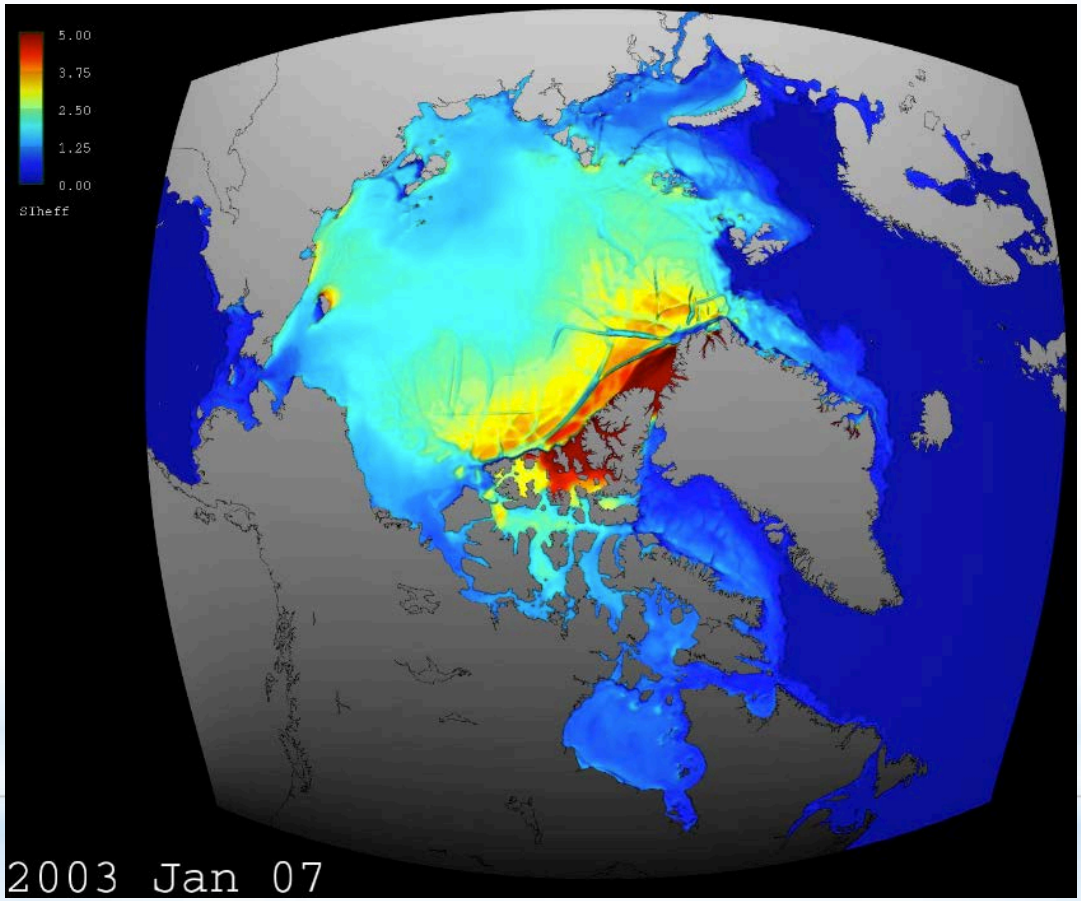


Cohen et al. (2014), Nature Geoscience

Sea ice prediction

Tactical use	Operation planning	Strategic planning
Hours to 2 weeks	subseasonal to interannual	decades

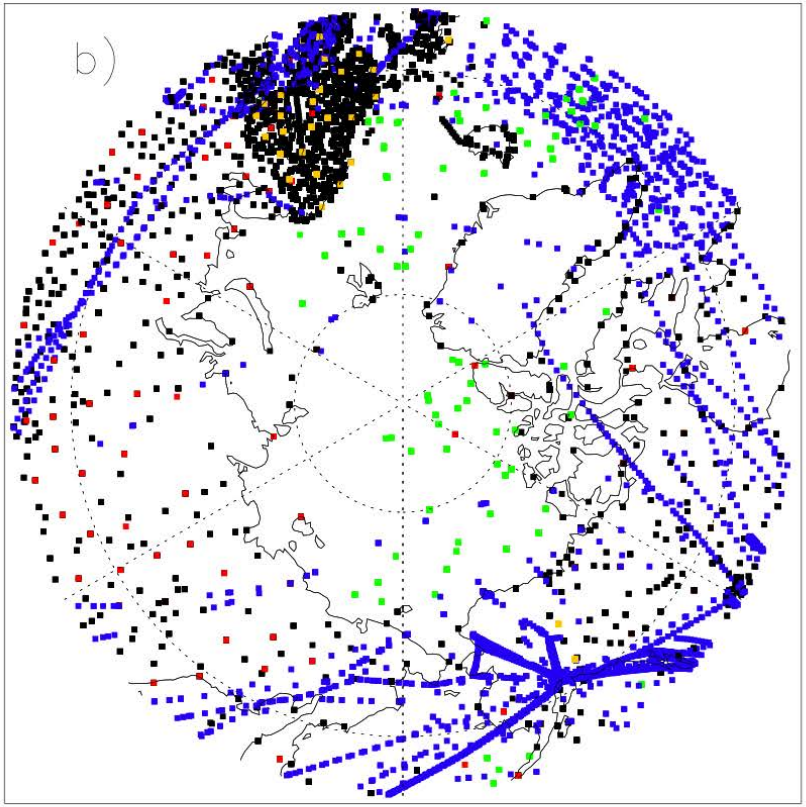
Sea ice prediction



MITgcm @ 4 km resolution, Nguyen et al. (2012)

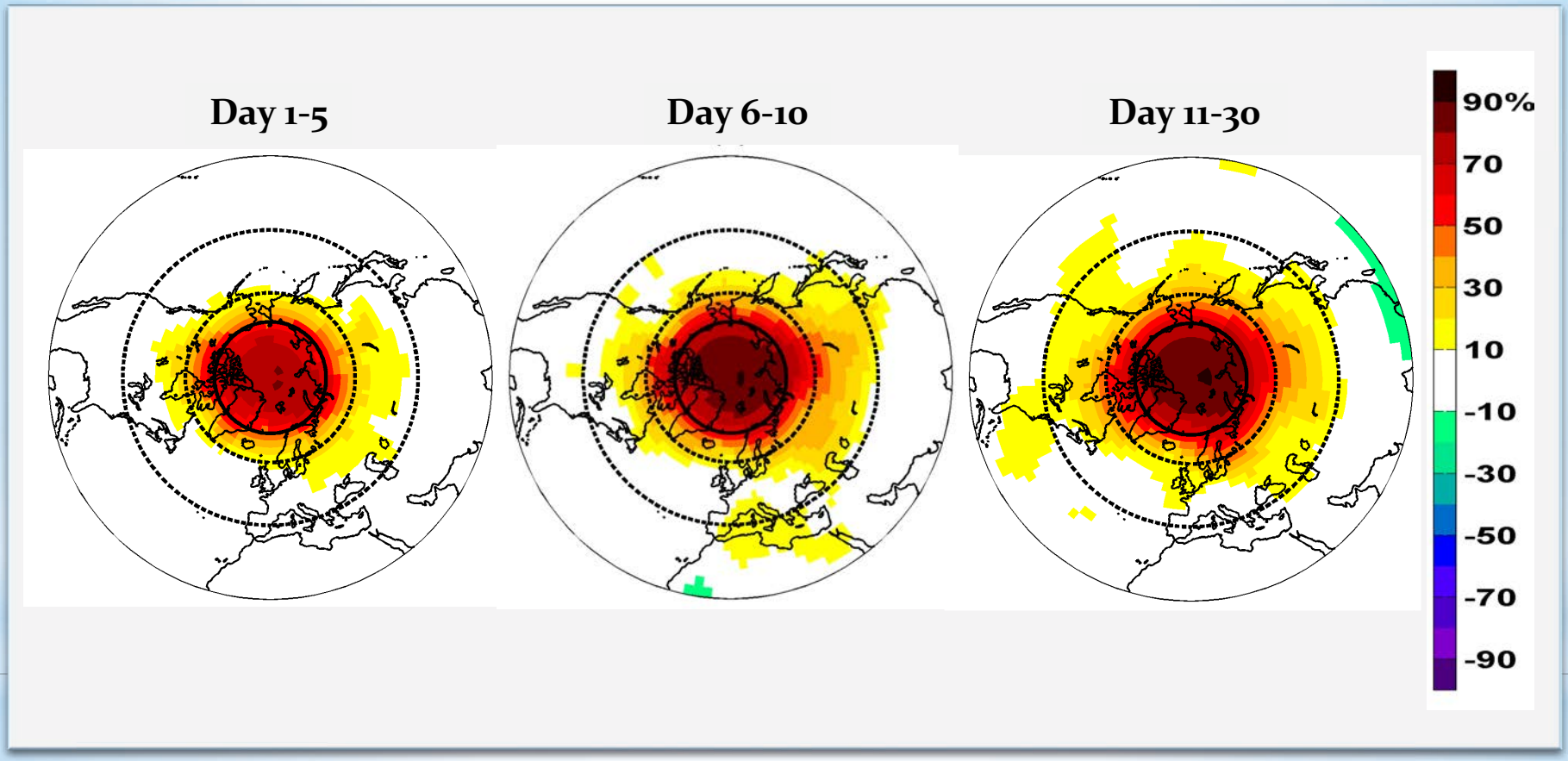
Global observing system

Synop
AIREP
DRIBU
TEMP
PILOT



Peter Bauer (ECMWF)

Arctic-lower latitude linkages



Jung et al. (2014)

Questions for the Arctic discussion

- Julienne: Why is this response from CO_2 so linear, when we also see an increased variability?
- Richard: Do you think that Arctic Amplification will continue with the same magnitude in the future? (What about when all the sea ice is gone?)