Workshop on Climate Prediction in the Arctic-Atlantic sector

13-14 June 2016, Auditorium A at Allégaten 66, Bergen (Norway)

There have been a series of extreme weather events in the past years. Both winter cold snaps and summer heat waves have been linked to the dramatic loss of sea ice coupled with warming in the Arctic, and to increases in Eurasian autumn and winter snow cover. At the same time, extreme weather events have been linked to sea surface temperature variations over the globe. However, there is controversy over the magnitude of the impact of SST, sea ice, and snow cover on the atmosphere and the underlying mechanisms. The predictability of the SST, sea ice, and snow cover changes also remains unknown, as the contributions from anthropogenic global warming and internal climate dynamics are not well understood.

Addressing these issues is the focus of the Research Group 2 at the Bjerknes Centre for Climate Research, and of three funded projects:

GREENICE (Impacts of sea ice and snow cover changes on climate, green growth and society, www.greenice.no), funded by the NordForsk Top-level Research Initiative, aims to **improve our understanding of the atmospheric response to sea-ice and snow-cover changes in the northern hemisphere climate system** and our **ability to predict both anthropogenic and naturally-driven changes on 10-30 year timescales**, ultimately providing knowledge relevant to the welfare and green growth of northern communities;

EPOCASA (Enhancing seasonal-to-decadal Prediction Of Climate for the North Atlantic Sector and Arctic, www.epocasa.no), funded by the Research Council of Norway, has the primary objective of **building up a dynamical climate prediction system to assess predictability on seasonal-to-decadal timescales in the North Atlantic Sector and Arctic**. This will be the first seasonal to decadal climate prediction model in Norway, paving the way for operational climate prediction, of direct benefit to Norwegian society, economy and progress.

PARADIGM (Prediction And RegionAl DownscalInG Models), one of the strategic projects at Centre for Climate Dynamics at the Bjerknes Centre for Climate Research where the objectives of the project are to establish a framework for generating, evaluating and improving **regional predictions on land and in the ocean over time scales of seasons to decades** by combining regionally focused analyses of the predictive potential, and dynamical downscaling of climate predictions.

The aim of this joint workshop is to harvest the synergy between these projects and also to exploit their networks in order to better address these critical questions.

Scientific Committee

Noel Keenlyside, Camille Li, Tor Eldevik (GFI-UiB & BCCR); François Counillon (NERSC & BCCR); Anne Britt Sandø, Øystein Skagseth (IMR & BCCR), Astrid Ogilvie (SAI & CU-Boulder)

Local Organising Committee

Noel Keenlyside, Mandy Kong, Mahaut de Vareilles (GFI - UIB & BCCR)

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Top-level Research Initiative

Bjerknes Centre for Climate Research

The Research Council of Norway

Programme

Monday, 13th June

08:30-09:00 Registration and Welcome talk by Noel Keenlyside (UiB)

Session 1 - Mechanisms for climate variability and predictability. Chairs: Tor Eldevik (UiB) & Øystein Skagseth (IMR)

09:00-09:30 Mechanisms for low frequency variability and predictability in the North Atlantic Sector and Arctic (Rong Zhang, NOAA)

09:30-10:00 Bjerknes Compensation and the Multi-Decadal Variability of Heat Transport in the Arctic (Stephen Outten, NERSC)

10:00-10:30 Delayed multidecadal variability in the coupled stratosphere/troposphere/ocean system (Nour-Eddine Omrani, UiB)

10:30-11:00 **Coffee break**

11:00-11:30 On anomalous ocean heat transport toward the Arctic and associated climate predictability (Marius Årthun, UiB)

11:30-12:00 Variability in the Nordic Seas heat content (Kjell Arne Mork, IMR)

12:00-12:30 The Atlantic Water pathway in the Norwegian Earth System Model (Anne Britt Sandø, IMR)

12:30-13:30 **Lunch** *(5min walk to Studentkafeen Høyteknologisentret, Thormøhlens gate, 55)*

Session 2 - Climate Prediction. Chairs: François Counillon (NERSC) & Anne Britt Sandø (IMR)

13:30-14:00 An overview of the CESM-DART coupled ocean-atmosphere data assimilation system: status and plans (Alicia Karspeck, NCAR)

14:00-14:30 Flow dependent assimilation of SST in isopycnal coordinate with the Norwegian Climate Prediction model (François Counillon, NERSC)

14:30-15:00 Optimising assimilation of hydrographic profile in isopycnal ocean model with ensemble data assimilation method (Yiguo Wang, NERSC)

15:00-15:30 **Coffee break**

15:30-16:00 Climate predictions of the subpolar North Atlantic and Nordic Seas using the Community Earth System Model (CESM) (Stephen Yeager, UCAR)

16:00-16:30 Global skill of SST initialised hindcasts today and 10-years ago. (Noel Keenlyside, UiB)

16:30-17:00 *Open Discussion (Led by sessions chairs)*

- How can we better constrain mechanisms and initialisation of climate predictions to enhance predictability of the Nordic Seas/Arctic?
- What governs the sea ice cover of the models in the first place, incl. realism/predictability?

19:00 **Dinner at Jacob Aall Brasserie & Bar (only for those registered for the dinner)**

Tuesday, 14th June

Session 3 - Atmospheric teleconnections. Chairs: Hoffman Cheung (UiB), Martin King (UniResearch)

09:00-09:20 Uncertainty of the recent surface temperature trends related to internal atmospheric variability (Vladimir Semenov, IAPRAS)

09:20-09:45 Extratropical Ocean Warming and Winter Arctic Sea Ice since the 1990s (Yongqi Gao, NERSC)

09:45-10:10 Impacts of sea ice / SST changes for the observed climate change -GREENICE project (Fumiaki Ogawa, UiB)

10:10-10:30 Extra-tropical cyclones, precipitation and turbulent fluxes in the GREENICE experiments

(Sergey Gulev, IORAS)

10:30-11:00 **Coffee break (GROUP PHOTO :))**

11:00-11:30 A first result of AFES AMIP-type simulation for the recent past (Tetsu Nakamura, Hokkaido University)

11:30-12:00 The influence of autumnal Eurasian snow cover on climate and its links with sea ice cover (Guillaume Gastineau, UPMC)

12:00-12:30 Can we link the cold European winters 2009/2010 and 2010/2011 to Arctic sea ice Reduction? (Torben Koenigk, SMHI)

12:30-13:30 **Lunch** *(5min walk to Studentkafeen Høyteknologisentret, Thormøhlens gate, 55)*

13:30-14:00 The atmospheric impact of Arctic sea ice thickness (Shuting Yang, DMI)

14:00-14:30 Investigating possible Arctic - midlatitude teleconnections in a linear framework (Stefan Sobolowski, Uni Research)

14:30-15:00 Sea-ice free Arctic contributes to the projected warming minima in North Atlantic (Lingling Suo, NERSC)

15:00-15:30 **Coffee break**

Session 4 - Climate impacts. Chairs: Astrid Ogilvie (SAI; CU-Boulder) & Noel Keenlyside (UiB)

15:30-16:00 Impacts of Climate and Socioeconomic Changes in Northern Communities (Astrid Ogilvie

16:00-16:30 Hydropower production in southern Norway: challenges in a changing climate (Tarjei Breiteig, Agder Energi)

16:30-17:00 *Open Discussion (led by sessions chairs):*

- How important are Arctic sea ice for recent and near-term NH climate change?
- How useful are the coordinated model experiments for involved end users and stakeholders?
- What future time-slice experiments will be of most interest for end users and stakeholders?