



Dmi
Vejr, klima og hav

SMHI



Arctic Climate Predictions: Pathways to Resilient, Sustainable Societies (ARCPATH)

Leader: Yongqi Gao, NERSC
Co-Leader: Astrid Ogilvie, SAI



Photo (Astrid Ogilvie): Western Iceland

Partners

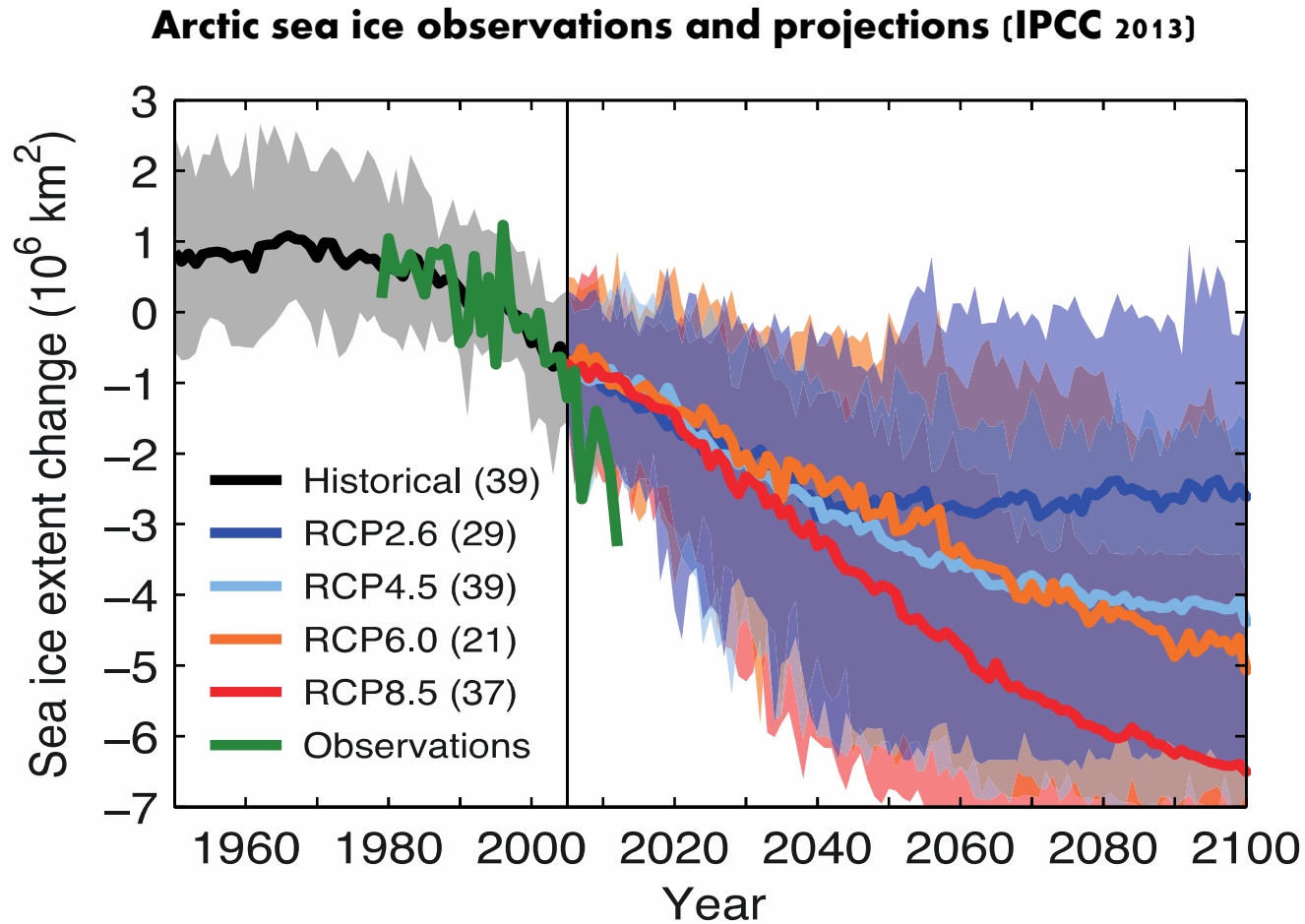
1. **Nansen Environmental and Remote Sensing Centre (NERSC) (Project Leader)**
2. **Stefansson Arctic Institute (SAI) under the Ministry of the Environment in Iceland (Project Co-leader)**
3. **University of Bergen (UiB)**
4. **Arctic University of Tromsø (UiT)**
5. **Danish Meteorological Institute (DMI)**
6. **Swedish Meteorological and Hydrological Institute (SMHI)**
7. **University of Iceland (UoI) - the Institute of Sustainable Studies and the Research Centre in Húsavík**
8. **Nansen-Zhu International Research Centre, Institute of Atmospheric Physics, Chinese Academy of Science**
9. **Institute of Arctic and Alpine Research (INSTAAR) University of Colorado, USA**
10. **P.P. Shirshov Institute of Oceanology of the Russian Academy of Sciences (IO RAS)**
11. **Royal Roads University (Canada)**

OBJECTIVE OF ARCPATH

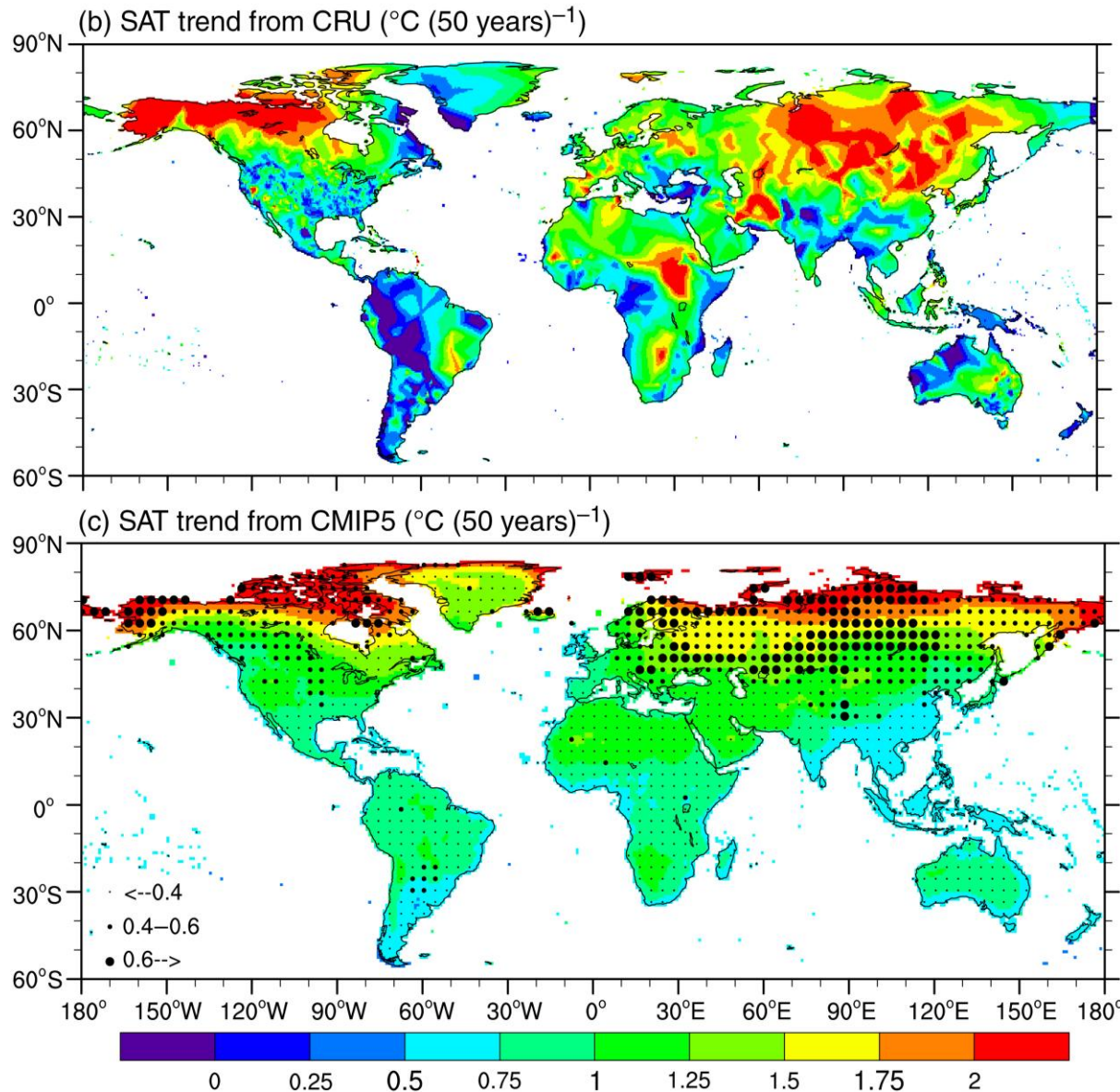
To supply new knowledge on Arctic “pathways to action” by combining improved regional climate predictions with enhanced understanding of environmental, societal, and economic interactions.

Photo (Astrid Ogilvie): Lofoten, Norway

Introduction (Climate)



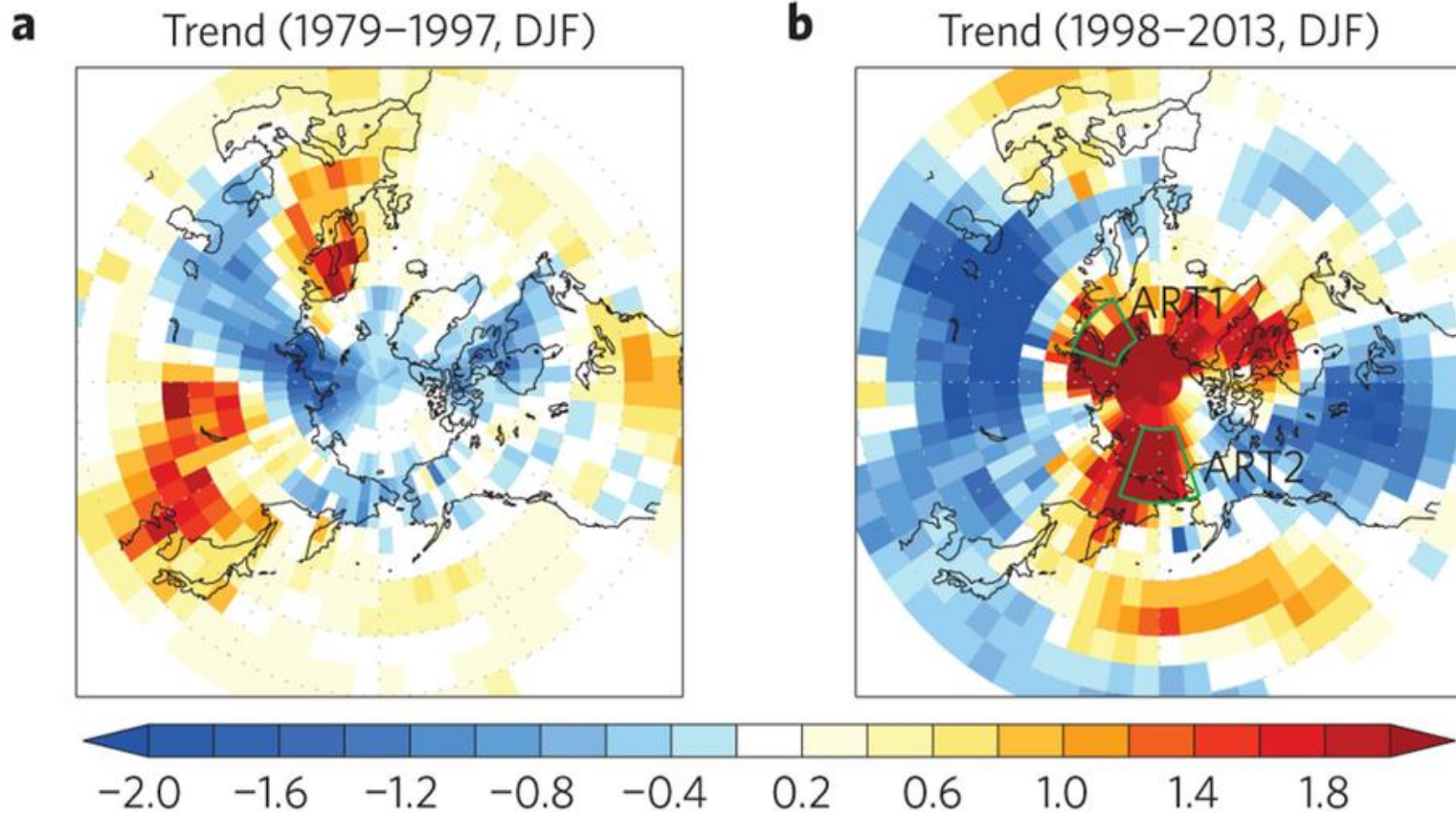
Introduction (Climate)



**Arctic warming
(overestimated)
and mid-latitude
warming
(underestimated)
by CMIP₅**

Xie et al. 2016, *Int. J. Climatol.*

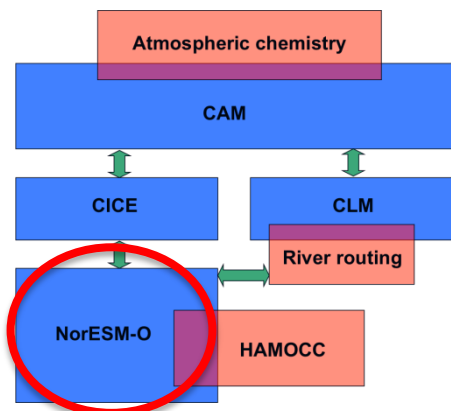
Surface Temperature (Arctic)



Kug et al. 2015.

Norwegian Climate Prediction Model (NorCPM)

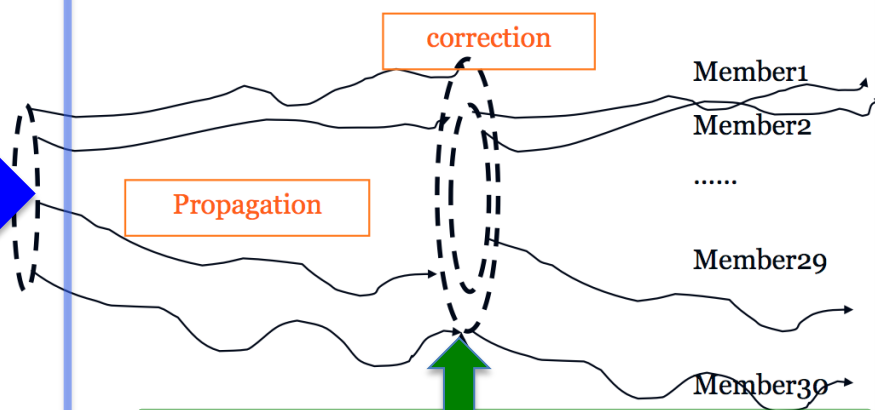
Earth System model (NorESM1-M)



atm 2°; ocean+ice 1°

30
members

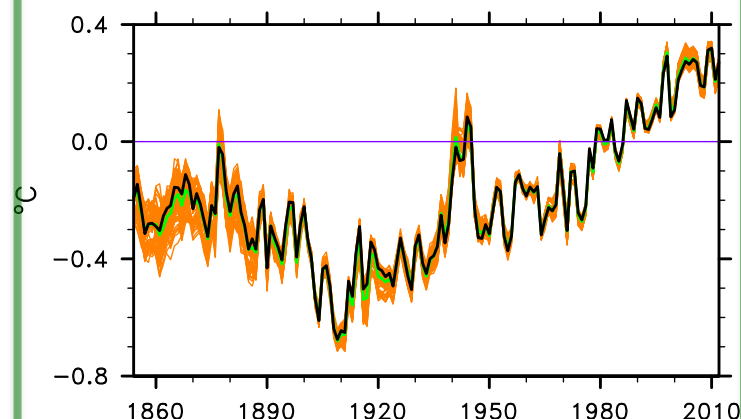
Data assimilation (EnKF)



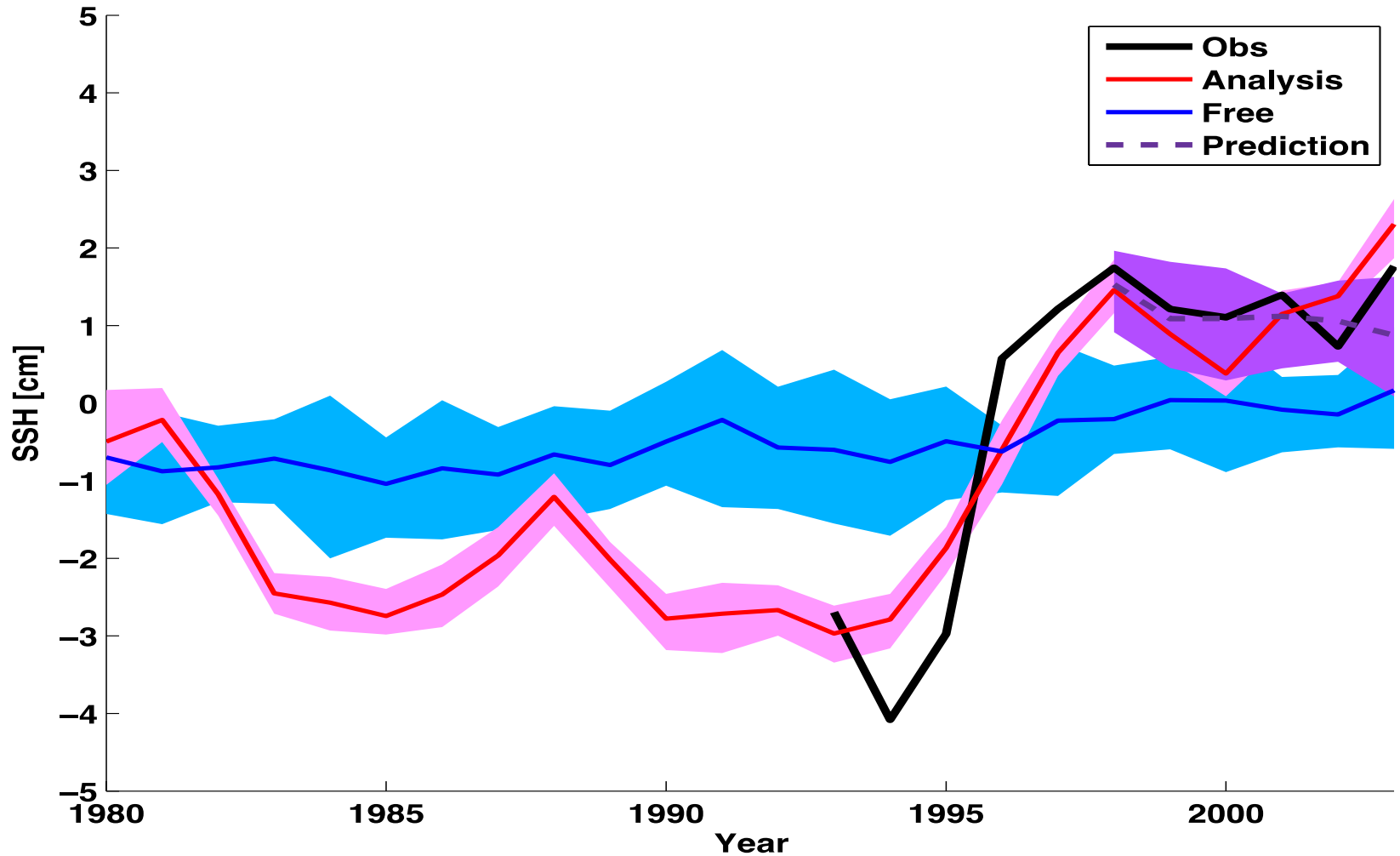
Long term objectives:

- Seasonal-to-decadal prediction (CMIP6,)
- Long term reanalysis (1850 – present)
 - Here from 1950-2010 !

Stochastic observations HadISST2



NorCPM prediction (SST assimilation only)
"Predicting the Sub-Polar Gyre shift"



SOCIO-ECONOMIC FOCUS OF ARCPATH

- The Arctic has seen dramatic changes in environmental, social, and economic spheres during the last decade.
- *This requires the consideration of numerous complex developments, not just with regard to climate change.*

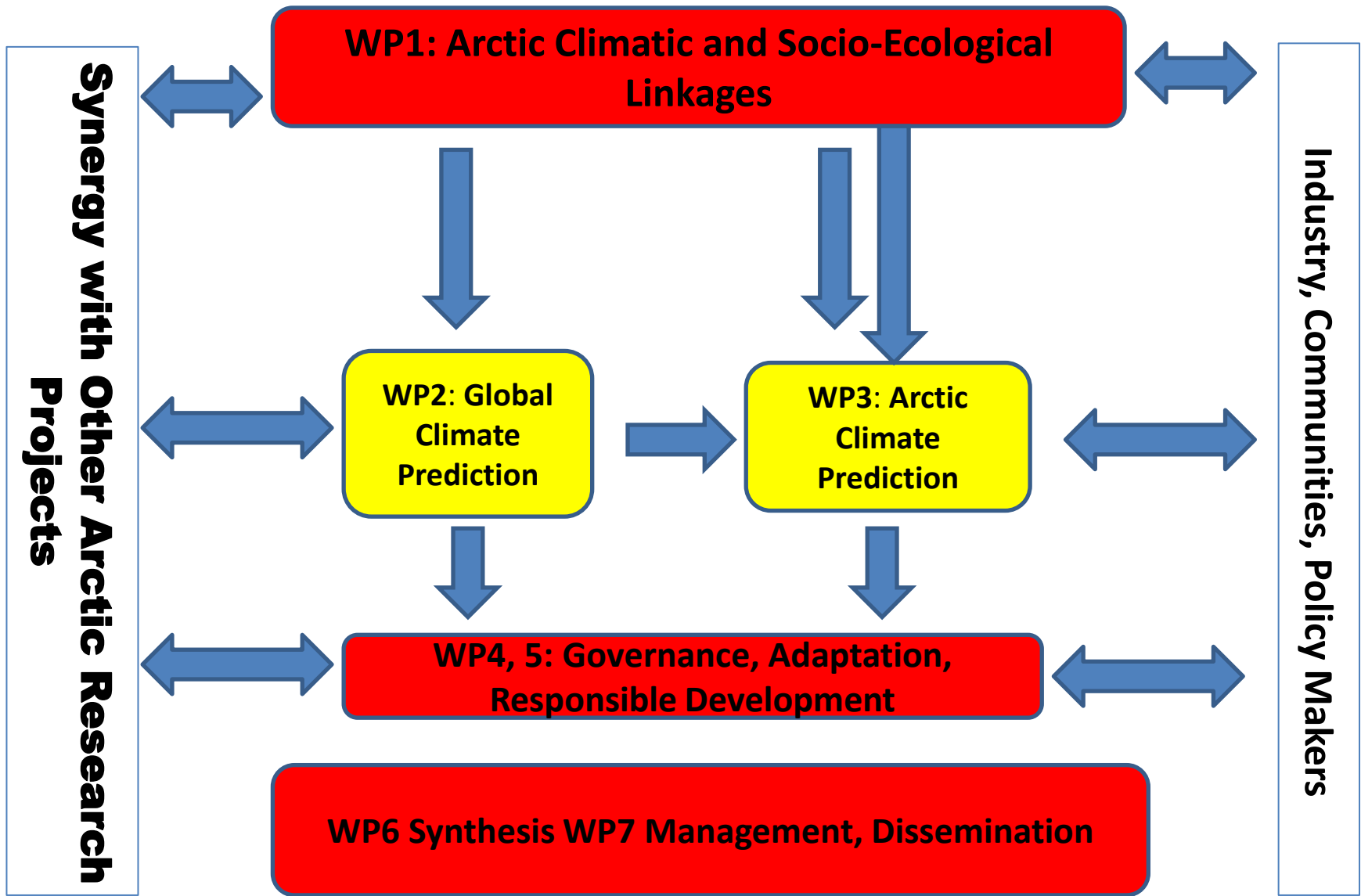
Photo (Astrid Ogilvie): Akureyri

ARCPATH MAIN RESEARCH LOCATIONS

ARCPATH will adopt a regional approach to consider how specific areas and communities in three Arctic countries are being affected by such changes. These are:

- **Iceland (coastal and fjord communities in the northeast).**
- **Greenland (Ittoqqortoormiit, formerly Scoresbysund, in eastern Greenland).**
- **northern Norway (in particular Honningsvåg and vicinity in Finnmark, and the Lofoten region).**

**ARCPATH has seven interlinking
Work Packages**





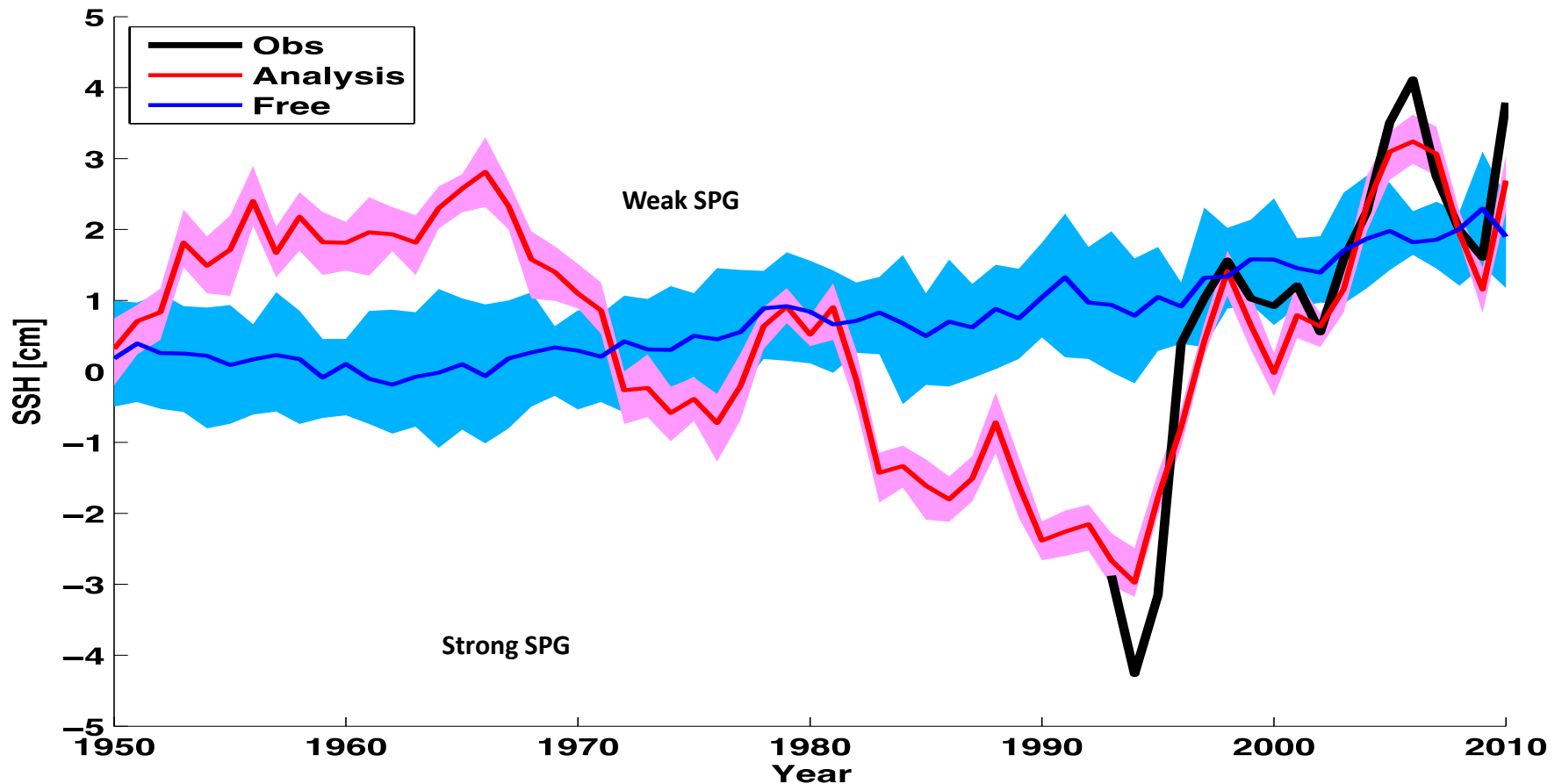
WP₁. Arctic Linkages: Climate, Environmental Change, and Human Eco-Dynamics

Main Objective: To form a historical context for the project as a whole, in that it will explore and establish linkages between changes in climate, socio-ecological systems, and marine systems.

Photo (Astrid Ogilvie)

WP₂: Global Climate Prediction

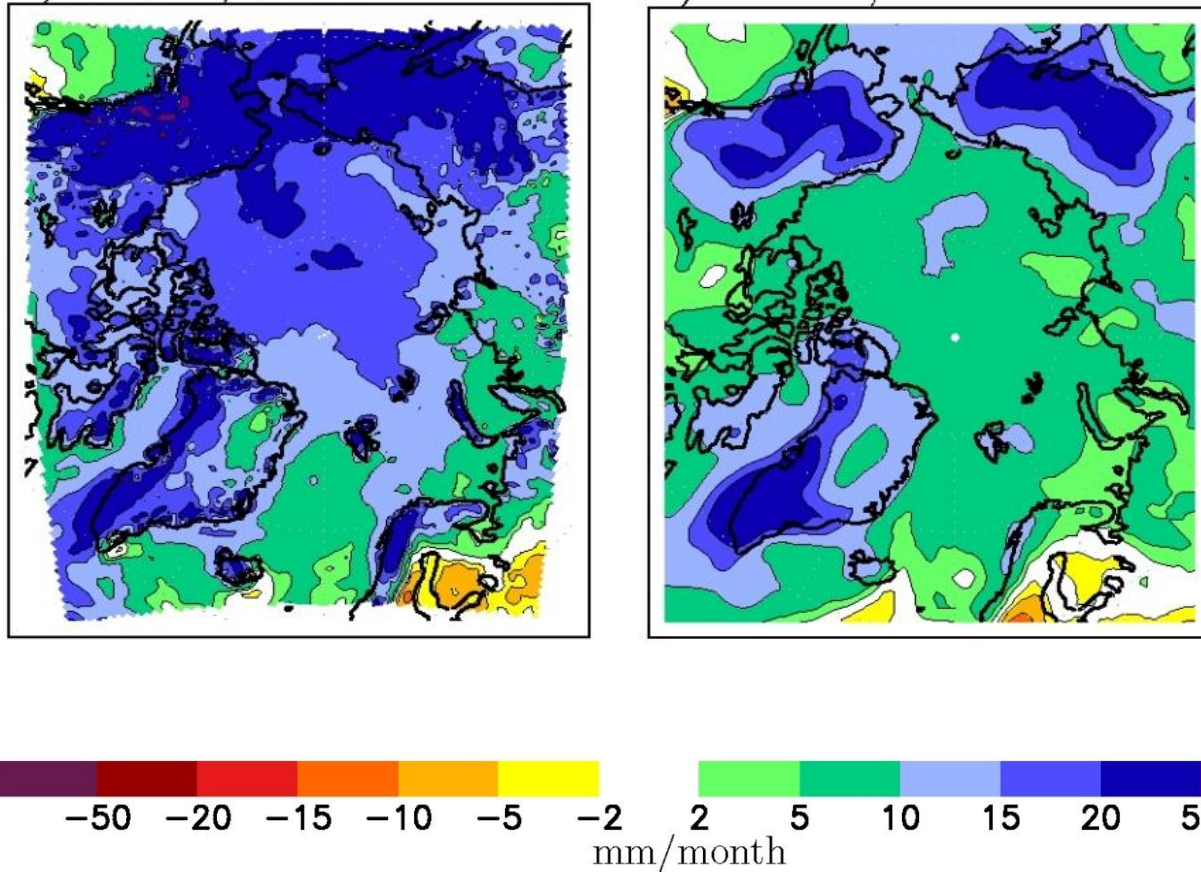
Subpolar Gyre index (NorCPM)



Courtesy of Francois Counillon

WP₃: Arctic Climate Prediction

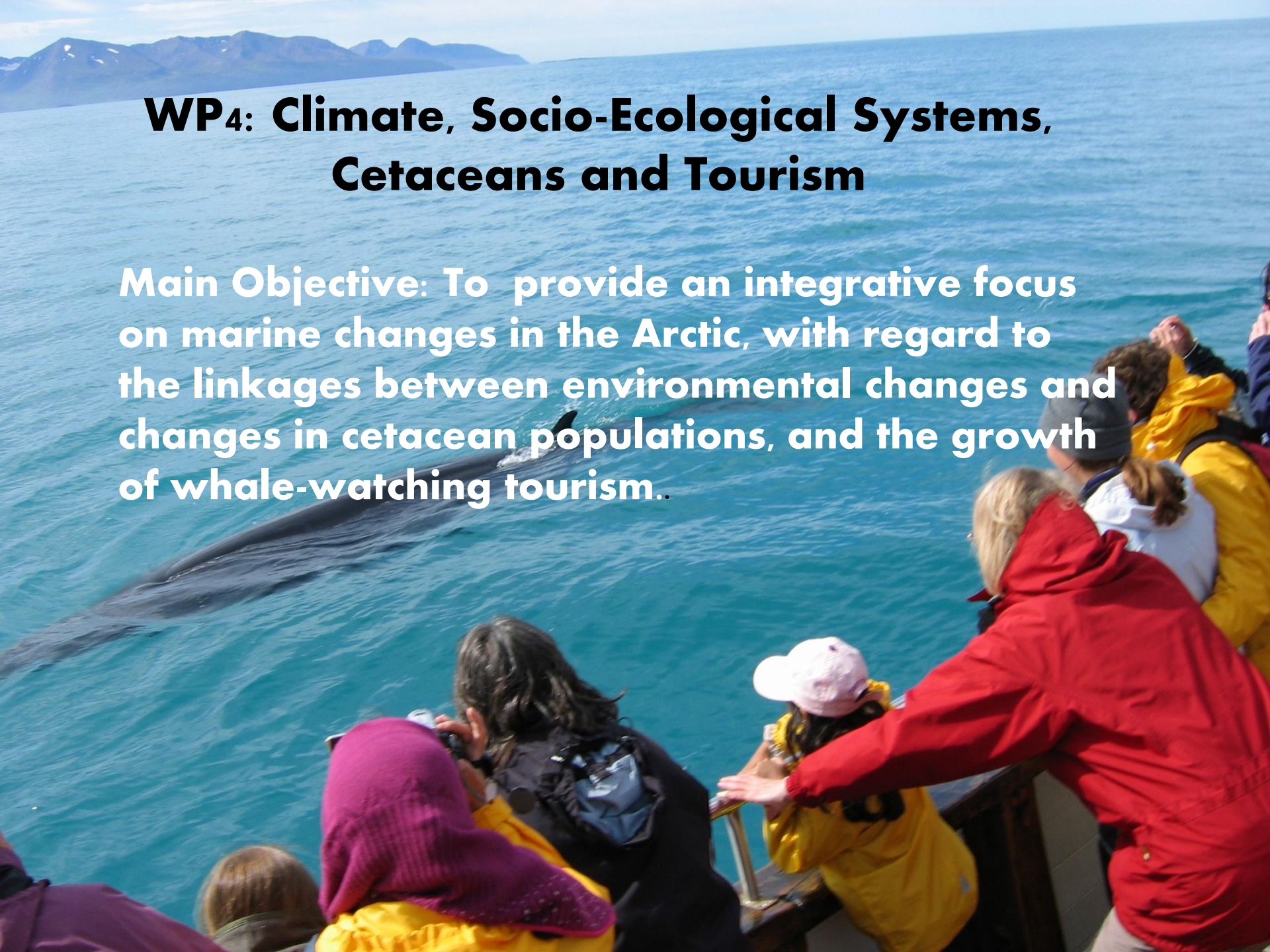
Projected difference in rainfall by the global climate model (right) and the Arctic regional model (left)



Courtesy of Torben Koenigk

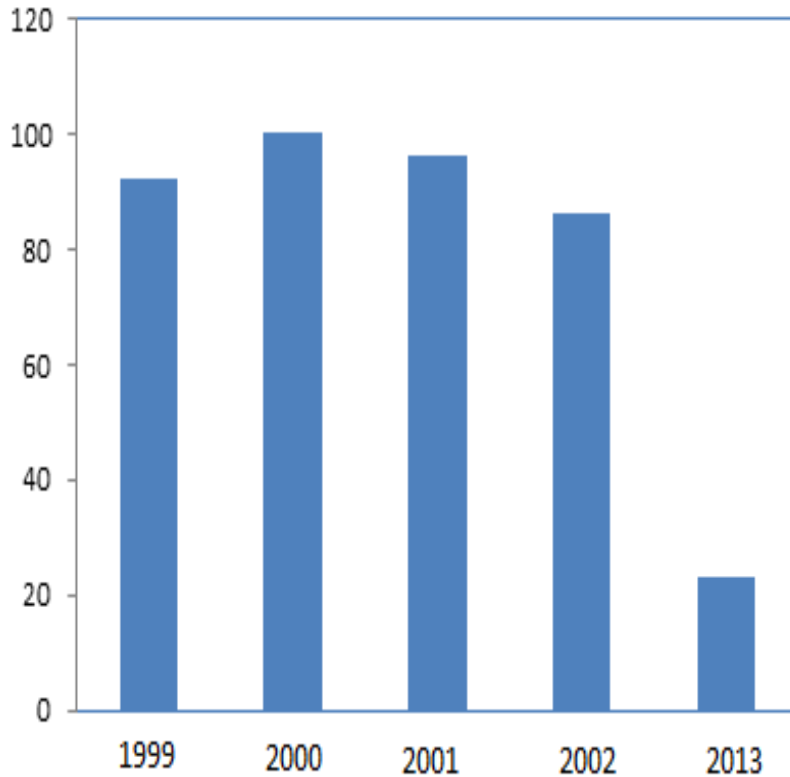
WP4: Climate, Socio-Ecological Systems, Cetaceans and Tourism

Main Objective: To provide an integrative focus on marine changes in the Arctic, with regard to the linkages between environmental changes and changes in cetacean populations, and the growth of whale-watching tourism..

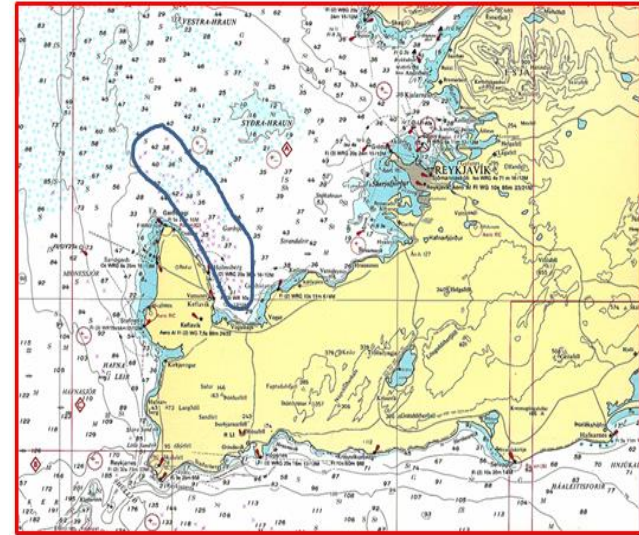


Sighting Data of White-beaked Dolphins

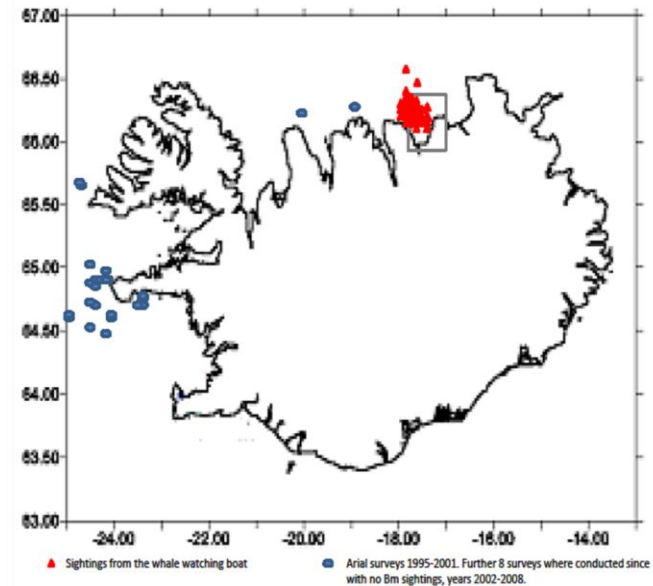
**Decreasing of Sighting Rate in the southwest of Iceland?
It maybe caused by climate change.**



**Changes in sighting percentage (%) of
white-beaked dolphins in July from 1999
to 2013 off Reykjanes Peninsula in the
southwest of Iceland. (Rasmussen, 2013)**



Sightings of Blue Whales



From **2000** to 2004, these giants were observed every year in west Iceland. They appeared in the northeast of Iceland in the summer of 2004. They were sighted from the whale watching boats starting from Húsavík and were viewed there every year (**2004-2016**) except 2005 (Iversen et al, 2009). This change of distribution might be because of climate change.

**Courtesy of Maria Iversen and Marianne Helene Rasmussen,
Project Blue whale, Húsavík Research Center**

WP₅: Responsible Governance, Security and Abrupt Climate Change in North Atlantic Arctic Coastal Communities.

Main Objective: To consider broad impacts of both rapid climate and socioeconomic changes on northern communities, with a specific emphasis on fisheries governance issues.

Photo (Niels Einarsson): Greenland, Ittoqortoormiit

WP₆: Project Synthesis:

- **i) Harvest the principal scientific findings of ARCPATH, and to generate new cross-cutting insights and concepts.**
- **ii) Explore the policy and action relevance of these findings.**
- **iii) Mobilize the knowledge generated (to the academic community, policy-makers, practitioners, NGOs, the media and the general public).**
- **iv) Identify lessons learned as well as remaining gaps in knowledge and directions for future research.**

WP7: Project Management and Dissemination.

- 1. The main project management will be undertaken by the Leader Yongqi Gao (NERSC) and Co-Leader Astrid Ogilvie (SAI) but with considerable input from all project members.**
- 2. An Executive Board will consist of the Leader and Co-Leader plus Noel Keenlyside (UiB) and Níels Einarsson (SAI).**
- 3. The project has an established and prestigious Advisory Board.**
- 4. Dissemination will be via the usual channels of peer-reviewed and popular articles, presentations, the media, webpage, etc.**

SUMMARY

ARCPATH research will build on, and improve, cross-disciplinary state-of-the art research in order to provide new insights and novel approaches to responsible development in the Arctic.



THANK YOU FOR YOUR ATTENTION!

TUSEN TAKK FOR OSS!



Photo (Astrid Ogilvie)

