The ARCPATH project:

If you want to go fast, go yourself.
If you want to go far, go together

Astrid Ogilvie and Yongqi Gao†.

NORDFORSK NCOE SESSION
Arctic Science Summit Week, Tromsø
27 March 2022

YONGQI GAO (1965-2021)

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Our dear and valued colleague, Yongqi Gao, passed away in Bergen, on 23 July 2021. He was an extremely productive scientist, and his work will live on in many ways. The legacy of ARCPATH is also his legacy. His phrase “If you want to go fast, go yourself. If you want to go far, go together” sums up, not just his working life in general, but has truly reflected the work of ARCPATH. As a project team, we have all “gone together.”

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

A Nordic Centre of Excellence

norden

NERSC

ARCPATH´s home and leadership has been shared by:

- The Nansen Environmental and Remote Sensing Centre (NERSC) in Bergen, Norway
  (Formerly Dr Yongqi Gao, now Dr François Counillon)
- The Stefansson Arctic Institute (SAI) in Akureyri,Iceland
  (Dr Astrid Ogilvie).
- Project Manager: Kjetil Lygre, NERSC

PROJECT PARTNERS

- University of Bergen (UiB)
- Arctic University of Tromsø (UiT)
- Danish Meteorological Institute (DMI)
- Swedish Meteorological and Hydrological Institute (SMHI)
- University of Iceland (UoI) - the Institute of Sustainable Studies and the Research Centre in Húsavík
- Nansen-Zhu International Research Centre, Institute of Atmospheric Physics, Chinese Academy of Science
- Institute of Arctic and Alpine Research (INSTAAR) University of Colorado, USA
- P.P. Shirshov Institute of Oceanology of the Russian Academy of Sciences (IO RAS)
- Royal Roads University (Canada)

CONTEXT OF THE PROJECT

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

THE MAIN 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.

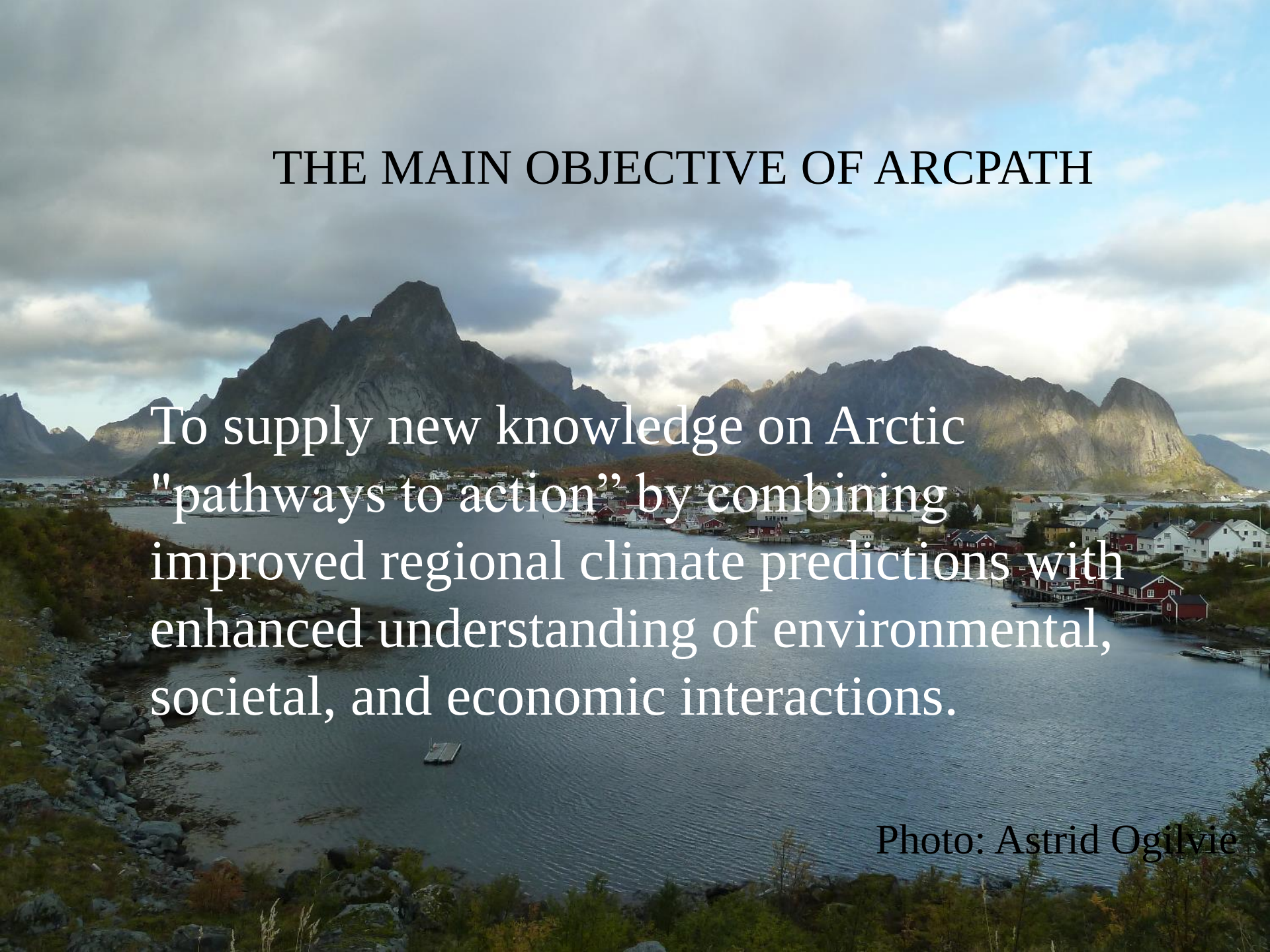


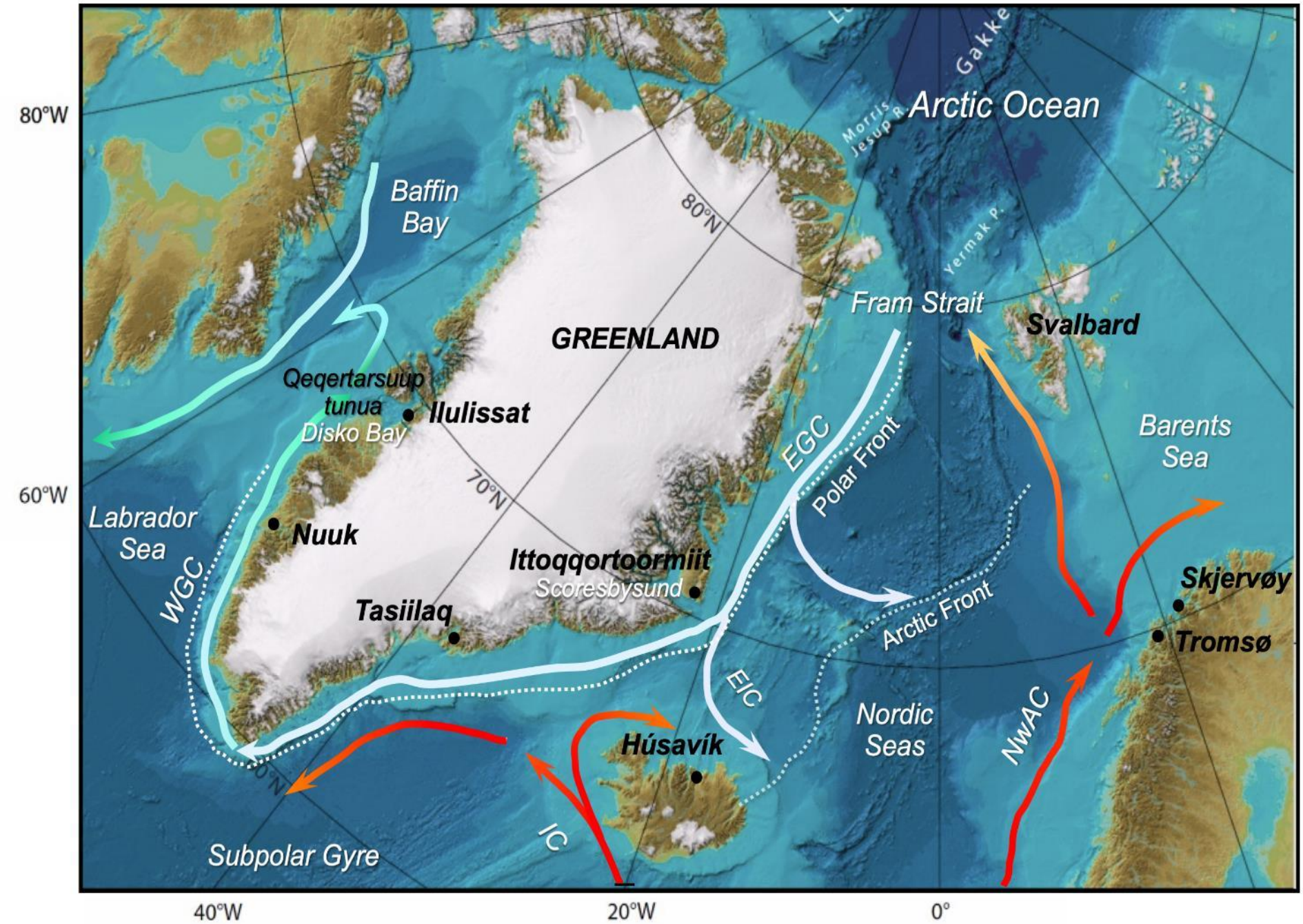
Photo: Astrid Ogilvie

ARCPATH MAIN RESEARCH LOCATIONS

- Iceland (coastal and fjord communities mainly in the northeast).

- Greenland (Ittoqqortoormiit (Scoresbysund) in eastern Greenland, also Queqertarsuaq (Disko island) and Ilulissat in the west).

- northern Norway (in particular the Tromsø region).


80°W
60°W
40°W
20°W
0°
80°N
70°N
60°N
Arctic Ocean
Morris Jesup R.
Gakkel
Yermak P.
Baffin Bay
GREENLAND
Fram Strait
Svalbard
Barents Sea
Qeqertarsuup tunua
Disko Bay
Ilulissat
Labrador Sea
Nuuk
Ittoqqortoormiit
Scoresbysund
Tasiilaq
WGC
EGC
Polar Front
Arctic Front
Skjervøy
Tromsø
EIC
Nordic Seas
NwAC
Húsavík
IC
Subpolar Gyre

PROJECT FOCUS AREAS

INTERDISCIPLINARY, INTERNATIONAL RESEARCH

Focus Area 1

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

This part of the project was **designed** to form an historical context for the project as a whole, in that it is exploring and establishing linkages between changes in climate, social-ecological systems, and marine systems.

FOCUS ON ICELAND

Marine systems - historical

ARCPATH aims to use historical data to build a comprehensive picture regarding how climatic fluctuations have influenced marine ecosystems, fisheries, and society in the past.

As systematic meteorological records only extend for a limited period back in time it is necessary to find other methods of learning about past climates. One method is to use historical records.

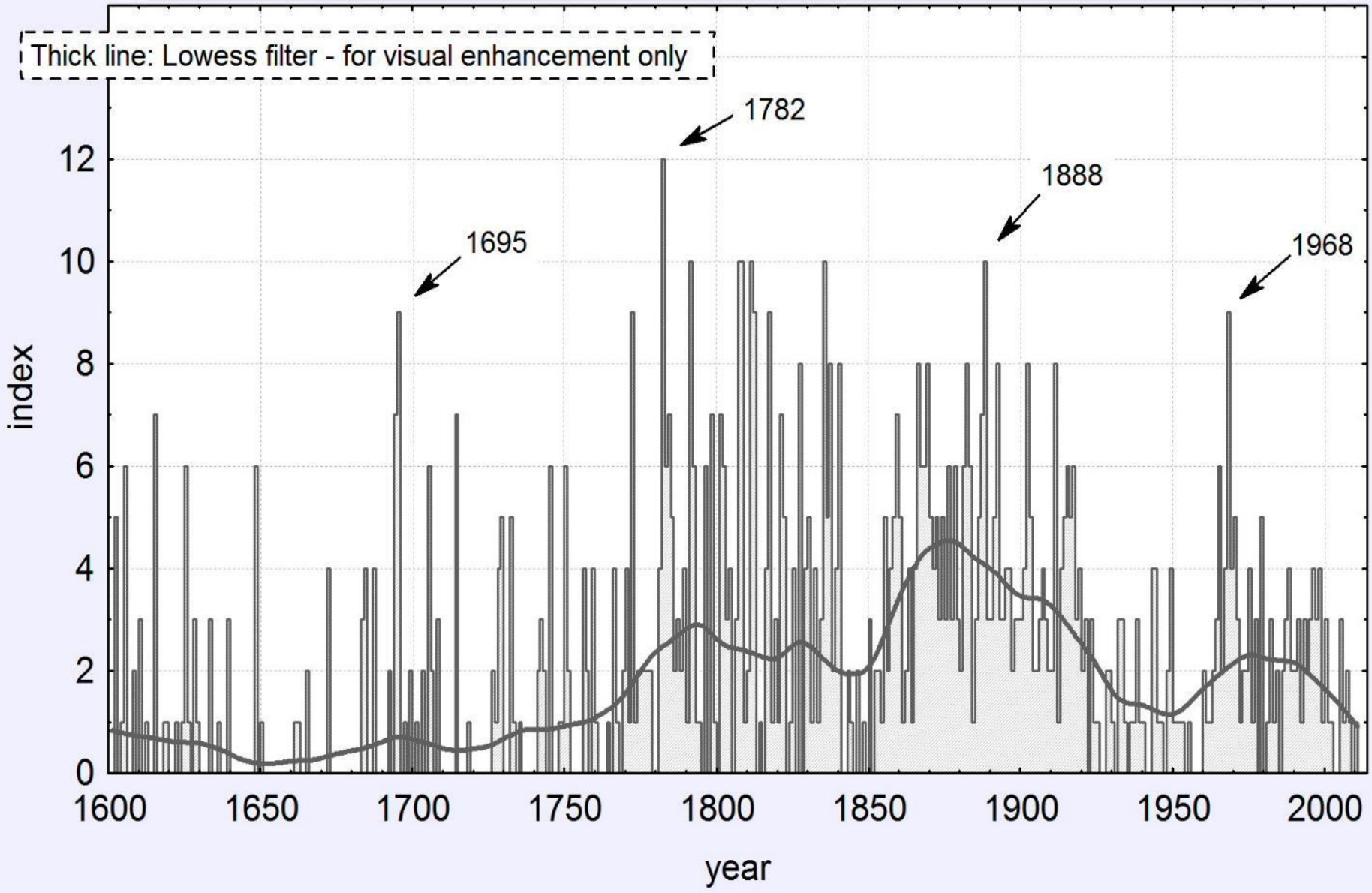
In Iceland these are particularly detailed and extensive, allowing us to reconstruct time series of temperature and sea-ice incidence.

- Satellite observations show the dramatic sea-ice loss accompanying recent warming, but less is known concerning changes during earlier periods.

FOCUS ON SEA ICE

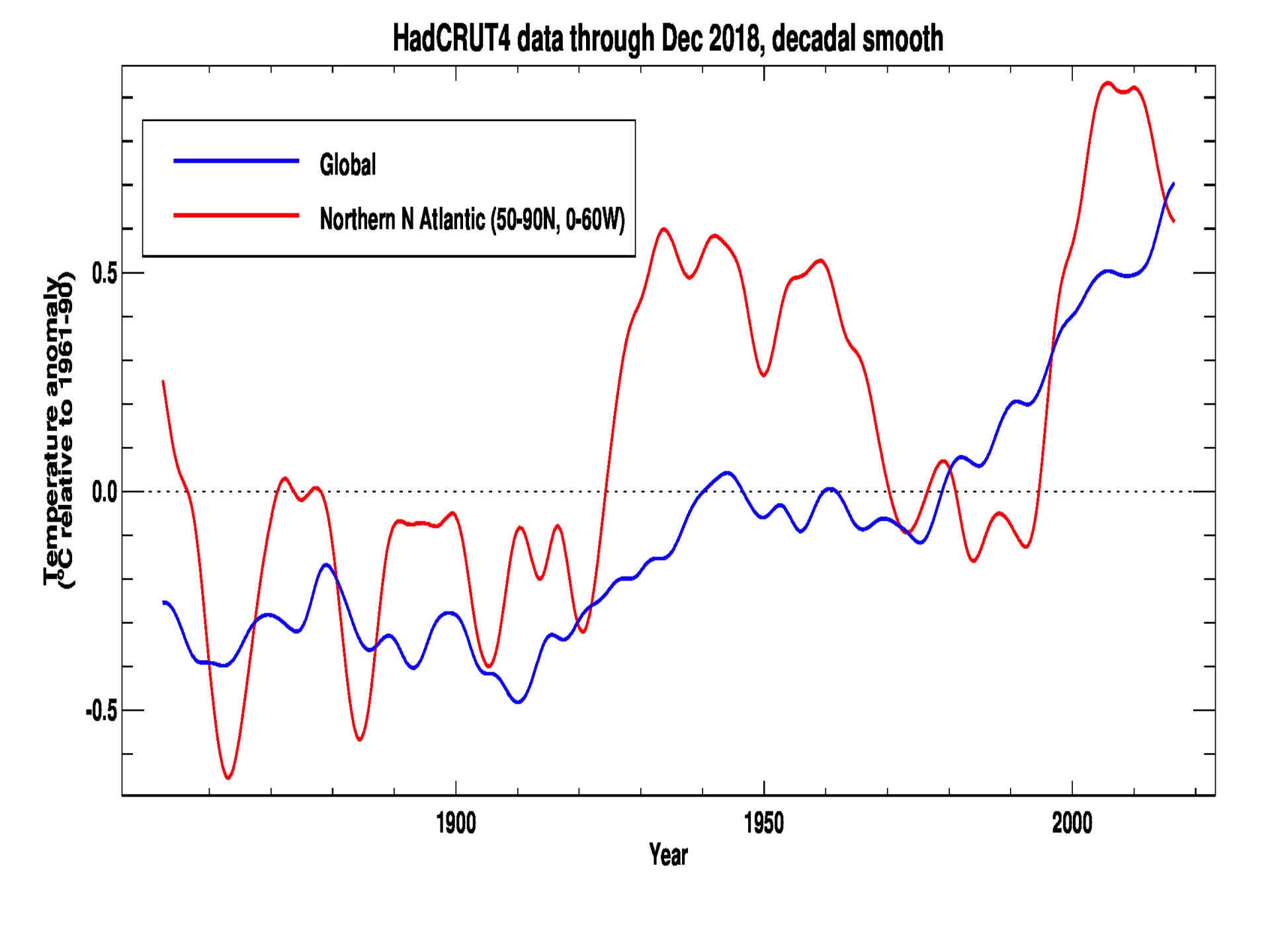
SEA-ICE INCIDENCE ALSO GIVES A GOOD INDICATION OF TEMPERATURE VARIATIONS

Ogilvie Iceland sea-ice index 1601-2018



Focus Areas 2 and 3

- Global Climate Prediction to ca. 2030
- Arctic Climate Prediction to ca. 2030


HadCRUT4 data through Dec 2018, decadal smooth
Global
Northern N Atlantic (50-90N, 0-60W)
Temperature anomaly
(°C relative to 1961-90)
0.5
0.0
-0.5
1900
1950
2000
Year

Focus Area 4
Climate, Socio-Ecological Systems, Cetaceans and Tourism

Hypothesis: Climate change, tourism, and industrial development will put cetaceans and human societies dependent on their use under increasing pressure.

Four whale-watching companies are currently running from Húsavík and there are 50 daily departures of whale-watching vessels in the peak season.

Photo: Marianne Rasmussen

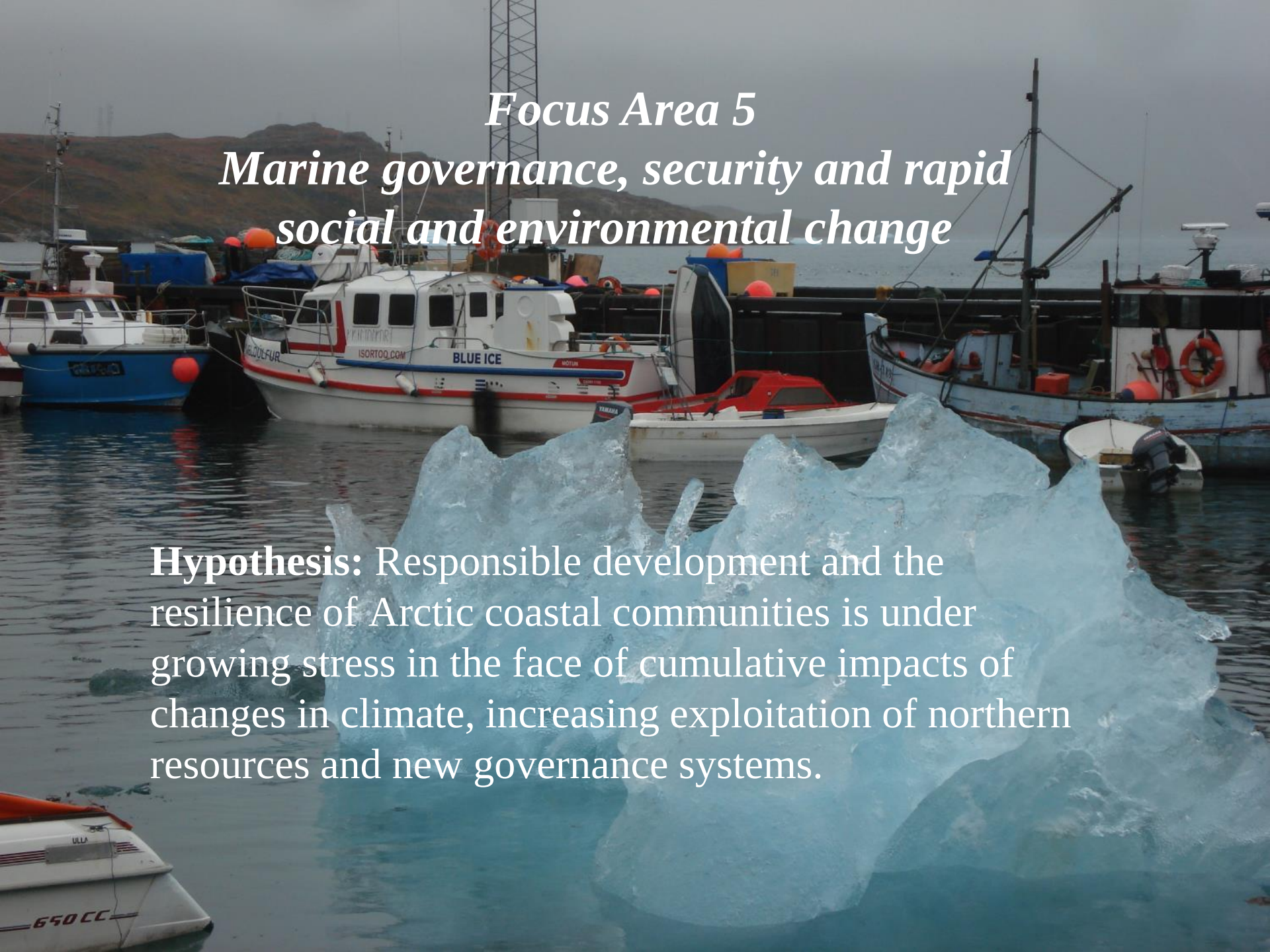
Part of the ARCPATH project has focused on marine mammal migration including the blue whales who come into Skjálfandi Bay in June

Photo: Marianne Rasmuss

- Blue whales have increasingly been moving north and currently come into Skjálfandi Bay every summer in June.

- We now have a photo-identification catalogue of 148 different individuals and for the first time we have matches of the same blue whales sighted off Svalbard and from Húsavík.

- This possible shift might be due to warming Arctic waters and climate change. It has been suggested earlier that blue whales are moving even further north for this reason



Focus Area 5
Marine governance, security and rapid social and environmental change

Hypothesis: Responsible development and the resilience of Arctic coastal communities is under growing stress in the face of cumulative impacts of changes in climate, increasing exploitation of northern resources and new governance systems.

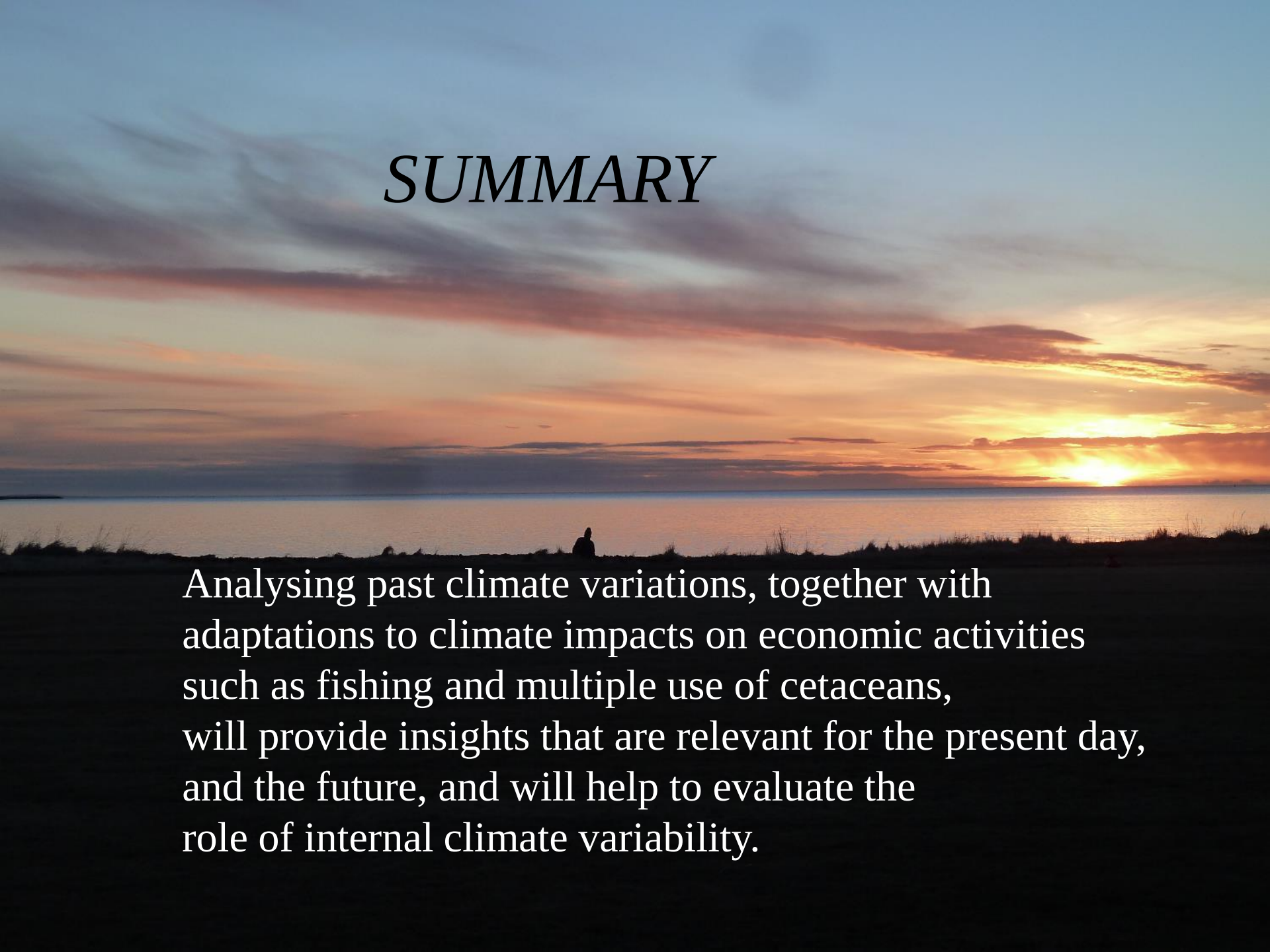
- We are finding that fisheries policy is a key driver of change in fisheries-dependent coastal communities.

- We have focused on the social, cultural, environmental and economic externalities related to the introduction of the ITQ system, concentrating on Icelandic fisheries (but also considering Norway) and how this management model continues to impact people's livelihoods and human development in fishing villages, especially in terms of opportunities of small-scale and local actors regarding fishing rights.

- One common outcome of ITQ systems is the consolidation of fishing rights or quotas in large companies and away from small communities.

- This can lead to decreased access for newcomers, reduced training opportunities for youth on the remaining vessels, and increased cost of quotas as a limited commodity.

- The lack of job opportunities in the fishing sector causes increased rates of outmigration by youth and women, which threatens the resilience of those communities.



SUMMARY

Analysing past climate variations, together with adaptations to climate impacts on economic activities such as fishing and multiple use of cetaceans, will provide insights that are relevant for the present day, and the future, and will help to evaluate the role of internal climate variability.

IN CONCLUSION

Taking its cue from the NordForsk call, the ARCPATH project has sought to combine improved regional climate predictions with enhanced understanding of environmental, societal, and economic interactions in order to supply new knowledge of Arctic "pathways to action". This goal has been achieved through extensive cross-disciplinary collaboration resulting in a truly synergistic Nordic Centre of Excellence with a focus on responsible and sustainable development in northern communities.

THANK YOU FOR YOUR ATTENTION
AND THANK YOU NORDFORSK!