

Methodology

How does the atmosphere respond to changes in ocean heat, sea ice and snow cover? Combining analysis of observed climate data with global and regional climate models GREENICE will contribute to address this question and thus enhance our ability to predict both anthropogenic and naturally-driven change on 10-30 year timescales.

Stakeholder partners from e.g. the hydroelectric sector will incorporate this information for coping with future change.

GREENICE will undertake case studies in selected northern communities to increase understanding of the present and historical adaptation of these communities to both climate and social change. The project will include their local knowledge, fostering a mutual dialogue between researchers and stakeholders. All results will be shared with local communities. A more comprehensive understanding of future changes will facilitate the ability of Arctic societies to adapt to climate and other changes, and to address problems of green-growth development.

Expected results

Improved forecasts of regional climate, added to greater understanding of the human dimension and stakeholder interests, will give important input to community adaptation, public management, transport and industry development, and prospects for resource exploitation (e.g., hydropower production, fisheries management, Arctic shipping, oil and gas exploitation, and climate adaptation). **GREENICE** results will help to build strategies and provide input for socio-economic development in the Arctic in the 21st century.



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www.greenice.no



The Project

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NordForsk

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Project Consortium

The GREENICE partnership includes 9 partners from Norway, Denmark, Sweden, Iceland and Russia.



Involving climate and social scientists, and stakeholders from the hydroelectric sector, GREENICE actively seeks to involve more stakeholders.

Why GREENICE ?

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.

Most of these recent changes in the cryosphere are likely to be a result of global warming, and may thus accelerate.

Studies indicate that such cryospheric changes can impact the large-scale atmospheric circulation and weather extremes significantly. However, there is controversy over the magnitude of these impacts and their underlying mechanisms. To what extent the observed extreme events are caused by the loss of Arctic sea ice remains an open question.

How will Earth's climate respond to future changes in sea ice and snow cover?

In spite of many advances in climate science, great uncertainty remains concerning how much climate change to expect in the future. This is particularly crucial with regard to the interactions between changes in the climate system as a whole, and changes in sea ice and snow cover.



Southern China, 2008. © Xinhuanet



Sisimiut, Greenland. © Niels Einarsson, SAI

While the topic of change is much emphasized in GREENICE, rapid change is not new to northern communities, and Arctic residents should be seen as creative actors rather than passive, vulnerable victims of external forces. This viewpoint will illuminate GREENICE research

as we explore the complex processes that are occurring in our study locations, and as we document how small communities cope with both climate and social change. **GREENICE will place considerable emphasis on facilitating local community participation in this research process.**

GREENICE Objectives

How does the atmosphere respond to sea ice and snow cover changes?

GREENICE will address this key uncertainty in the northern hemisphere climate system, and thus provide knowledge relevant to the welfare and green growth of northern communities.

Our specific objectives:

- ❄ Better understand the impact of sea-ice and snow-cover changes on atmospheric circulation and weather extremes.
- ❄ Provide more constrained predictions of near-term changes in climate and associated weather extremes.
- ❄ Better quantify the uncertainties of climate change for northern communities and other stakeholders.
- ❄ Contribute to the prediction and understanding of extreme weather and sea-ice events in order to help northern communities prepare for such events.
- ❄ Develop solid interdisciplinary and policy-relevant knowledge on northern human and biophysical systems with particular emphasis on the dynamic interplay and linkages between climate, resource governance and sustainable development in the context of both historical processes and contemporary issues.
- ❄ GREENICE also aims to strengthen cooperation across Nordic countries and with Russia.