

Kinnvika: Arctic warming and impact research - Change and variability of Arctic Systems, with focus on Nordaustlandet, Svalbard

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Kinnvika was a project within the International Polar Year 2007-2008 that focuses on Arctic warming and impact research. It's a multinational and multidisciplinary initiative to enhance the understanding of the Arctic climate systems, to monitor environmental change due to global climate warming and to study effects of human activity in the Arctic. Kinnvika is also a logistic platform for scientists to manage research, with a base at the old Kinnvika station in Svalbard.



There were 25 working packages in the project and the science involves several disciplines in the Earth Sciences including studies among others on atmosphere, biosphere, lithosphere and glaciers, but Human Sciences are also represented. All together 69 people are working in the project of which 62 participates in the Kinnvika expeditions. In August 2007 fifteen Finnish high school students spend a week at Kinnvika in order to get a realistic and multidisciplinary picture of the Arctic.

Historical Kinnvika station

The Kinnvika station was built for the International Geophysical Year 1957-58 by a Swedish-Finnish-Swiss expedition. The buildings are made from wood and in the main building there is room for 15 people, electricity was produced by generators, and there were separate storage and research buildings as well as a sauna. All together there are ten buildings and some of them were also used during the expeditions in 2007 and 2008. For example the sauna was heated in 2008 and the temperature went up to 50 degree Celsius.

The last time the station was used during 1959 and after that there was no funding to keep the station running. Since then research and field work has carried out sparsely, but the station has never been forgotten and there are plans to protect the Kinnvika station as a part of the cultural and science history of the Svalbard.

Why Kinnvika?

Modeling of the future weather of the Arctic predicts that the average warming over the High Arctic will probably be in the range of 5-7°C during this century. Since Svalbard is the northernmost land in the European sector of the Arctic, and Nordaustlandet is the northernmost large terrain in Svalbard, changes taking effect here will most likely propagate southwards. Nordaustlandet is climatically more affected by Arctic air and therefore more extreme than the other parts of Svalbard.

Kinnvika has been chosen as the study site for several reasons:

- Being the northernmost sizeable terrestrial platform in the European sector of the Arctic, Nordaustlandet will be the first to experience large sets of changes due to present warming which is expected to continue in the future.
- Being farthest away from Eurasian pollutant sources and from the influence of the north-eastern Atlantic Drift, Kinnvika can provide unique conditions for monitoring of meteorological and environmental parameters.
- Being sparsely studied, Nordaustlandet is relatively poorly mapped with respect to ecosystems, terrestrial deposits and geological sequences.
- Svalbard plays an important part in Nordic polar history, and Nordaustlandet has been at the centre of whaling and hunting activities, as well as of early polar exploration efforts.

Expeditions and challenges of the Arctic weather

The research was carried out during six research expeditions to Kinnvika during the spring and summer seasons of 2007-2009. The preparations for last season, spring 2009, are now on the way. All together 62 persons will participate in the Kinnvika expeditions.

The first expedition took place in 2005 when a Finnish-Swedish-Norwegian group of eight researchers travelled to the most northerly part of Svalbard, Nordaustlandet and visited the Kinnvika station to make a feasibility study and assessment of the possibilities to reactivate the station.

The largest obstacle for work and travel in winter conditions is not temperature. It is the wind that sets the limit for how successful a field work is. Even moderate wind creates snow drift that blurs the vision, and at higher speeds creates a visibility of a few meters. Snow gets in everywhere, and the best is to wait for calmer conditions to manage travel and work. A problem with northern Svalbard is that snow drift is the norm, and thanks to reliable navigation GPS some transports can be performed fairly safe at least in moderate winds. Our weather station on Vestfonna reported that the annual average wind speed is 6 m/s, with gale force winds occurring frequently.

Nice weather occurs perhaps just a few hours in a week, and in a field season the weather allows outdoor work only about 10-20% of the total time spend there. These conditions make it impossible to land with helicopters on white surfaces. Winds were also a setback for the 2007 summer expedition, high wind speeds and waves along the fiords made it difficult to navigate with Zodiacs.

Another problem during 2008 was the drift ice from the east that jammed the straits between the Spitsbergen and Nordaustlandet islands. This made the waters impossible to pass, and the summer 2008 expedition had to be cancelled.

Expected outcomes from the Kinnvika initiative

Research focus in this area will significantly advance our understanding of past, present and future environmental changes in the North Atlantic and Arctic regions. The main expected outcomes of the project are:

- Five year records of measured climatic variability and environmental parameters from the high Arctic.
- Improved knowledge of the history of climatic and environmental variability using various archives.
- Better understanding of processes active in the Arctic.
- Enhanced picture of the history of human activity in the region.
- Assessment of the state of global change in the Arctic.

Preliminary results

Since the data collection started in 2007 there are only limited results to convey at the moment. The biology team reports that they found more insects on the High Arctic tundra around Kinnvika than they had expected. The geology team has reported on horizons of loose material in front of the Vestfonna ice cap that gives proof of glacial advances during the ice age some 100.000-20.000 years ago. The glaciology team has found that the Vestfonna ice cap seems to be in balance with the present climate, and that the ice cap is not rapidly losing mass, as most other Svalbard glaciers. The climate team has now collected one year of climate data of the Vestfonna ice cap, which they are working on in order to find how the local climate is connected to larger scale weather patterns.



*Olli-Pekka Mattila trying to persuade the snowmobile to climb up a hill covered in thick soft snow.
Photo by: Gerit Rotschky*

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To get a better picture of the nature and fieldwork in Kinnvika see photos from the [expeditions](#).