Regional assessment of climatic variability for SCANNET stations

Photo: Jack Kohler

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Work Package 5
Regional assessment of climatic variability

Front cover photo:
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Summary

This report compiles key climatologic parameters for the SCANNET network. The parameters have been chosen to be relevant for biodiversity, ecosystem function and biological and physical resources of human use, with focus on climate variability. The data are displayed by station and are compared to each other.

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Background

SCANNET is a EU 5th Framework Thematic Network with the following overall objective:

To establish a network of North European terrestrial[1] field sites which can facilitate comparative and regional environmental research activities, especially in the fields of the impacts of environmental changes on Biodiversity, Ecosystem Function, and Biological and Physical Resources of Human Use.

The specific objectives are:

- To establish a network of existing field sites, covering main environmental conditions in northern Europe, to provide improved information on the effects of spatial and temporal variation in environmental change on terrestrial and hydrological systems.
- To compile and assess existing data and information from field sites and research to address key questions: Where are ecosystems and natural resources most susceptible to changes in Biodiversity, Ecosystem function, Resources for Human use? How are these changes related to specific environmental conditions? What are the most important drivers of change? What are the consequences of change for local stakeholders? What are the main methodological and spatial constraints to improving information?
- To improve comparability and coverage of long-term observations and experiments within the network.
- To improve access and relevance of data and information on the effects of climate and other drivers of change to Global Terrestrial Observing System (GTOS), the Arctic Monitoring and Assessment Programme (AMAP), Conservation of Arctic Flora and Fauna (CAFF) and the European Environmental Agency (EEA), in addition to national organisations.

Participating institutions and sites are:

Royal Swedish Academy of Science/Abisko Scientific Research Station
Norwegian Polar Institute/Ny-Ålesund Large Scale Facility
University of Turku/Kevo Subarctic Research Institute
Natural Environmental Research Council/ Institute of
Terrestrial Ecology, Banchory Research Station
Norwegian Institute for Water Research
Danish Polar Center/Zackenberg Station
University of Helsinki/ Kilpisjärvi Biological Station
Faroes Museum of Natural History
Icelandic Institute of Natural History/Litla-Skard

The field sites and stations have been selected to cover the main range of climatic variation from Greenland (arctic), through Iceland, Faroes and Scotland (with strong ocean influence), to Svalbard (high arctic) and the Fennoscandia Peninsula (with continental effects). This initial regional focus is intended to be preliminary - if the network is successful, a widening of the geographical scope will come naturally.

[1] Note the term terrestrial here includes aquatic environments

1 Preface - SCANNET

SCANNET is a network of field site leaders, research station managers and user groups in northern Scandinavia and Europe (see Fig 4.1.1 for an overview). The network aims to improve collaboration and access to information on environmental change in the North. SCANNET partners provide stability for research and facilitate long term observations in terrestrial and freshwater systems.

2 Purpose of the SCANNET work package 5

Climate is a key factor determining the distribution, structure and function of the ecosystems and species. In this respect local climate variation is important, both in space (laterally and vertically) and in time (diurnal to decadal time-scales). Measurement of climate is a routine and well-established process and meteorological information is generally available from existing networks.

The SCANNET region covers a large part of Scandinavia and northern Europe, from the high arctic to coastal maritime settings. Work Package 5 aims to make a climatic overview of parameters relevant for the different stations and field sites. It seeks geographical coverage and comparability of long-term observations and experiments related to environmental change. The work has focused on both identifying and exploring long-term regional observations as well as short-duration observation at the local site, to increase the geographical coverage.

3 Key climatic parameters for SCANNET

To estimate climatic variability homogenized time series of reasonable length are needed. In some cases these have not been available and shorter series have then been used to estimate statistics at the station site. Parameters are chosen not only on the basis of their scientific value, but also on the availability and quality of the series among the field sites and stations. We have identified and analyzed climate parameters relevant to various environmental change impacts such as phenology, winter damage to vegetation, etc.

The key primary parameters used in our analysis of the SCANNET stations are temperature and precipitation. Other crucial parameters such as snowpack thickness, humidity, wind speed, wind direction and air pressure have also been processed when available.

We compile and present a series of diagnostic statistics for these climatologic parameters. The statistics have been chosen to be relevant for biodiversity, ecosystem function and biological and physical resources of human use, with focus on climate variability. The statistics include the customary means over different time-scales. For biological processes, extremes and frequency of different thresholds are often of more interest than simple means. Extreme events are especially interesting, as they tend to leave their footprints on a wide range of variables, and also in some situations over a large area. Triggering through extreme events is also more important in impact analysis than the effect of slowly evolving changes in average conditions. Finally, two simple models have been used to simulate snow cover and lake ice, and give information on mean snow and winter lake ice thicknesses and the length, start and finish of the winter season as quantified by the presence of modelled snow cover.