

# Ecosystem monitoring - Nuuk BioBasic

Paul Henning Krogh<sup>1</sup>, Peter Gjelstrup<sup>2</sup>, Helena Wirta<sup>3</sup>, Tomas Roslin<sup>3</sup>, Zdenek Gavor<sup>1</sup>, Elin Jørgensen<sup>1</sup>, Niels Martin Schmidt<sup>4</sup>, Henning Petersen<sup>5</sup>, Katrine Raundrup<sup>6</sup>, Jose Nymand<sup>6</sup>, Peter Aastrup<sup>4</sup>

## Background

Nuuk Basic is an extensive cross-disciplinary ecological monitoring programme in low Arctic West Greenland. The effect of climate change and variability on terrestrial and marine ecosystems are monitored. The study area is situated in Kobbefjord (64°07'N / 51°21'W), approximately 20 km from Nuuk, the Capital of Greenland. Nuuk Basic is coordinated with the monitoring programme Zackenberg Basic, in Northeast Greenland.

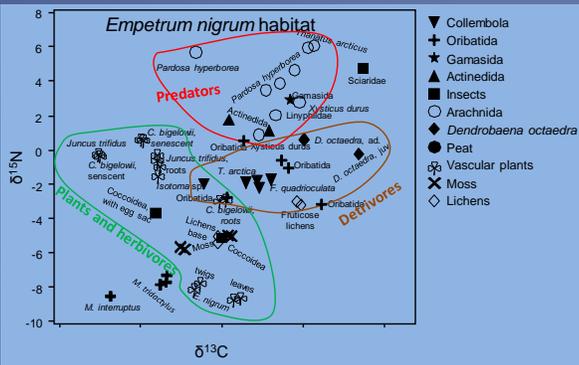
## Objectives – the soil ecosystem

- Characterize biodiversity and functioning of the soil ecosystem
- Create base-line data for terrestrial ecosystems in Greenland
- Predict how expected changes in climate will affect terrestrial ecosystems
- Contribute to predictive models of climate scenarios
- Introduce DNA techniques for biodiversity assessment
- Describe the soil trophic networks of an arctic tundra

The BioBasis monitoring programme studies the ecological processes. There are three other programme topics: ClimateBasis, GeoBasis and MarineBasis.

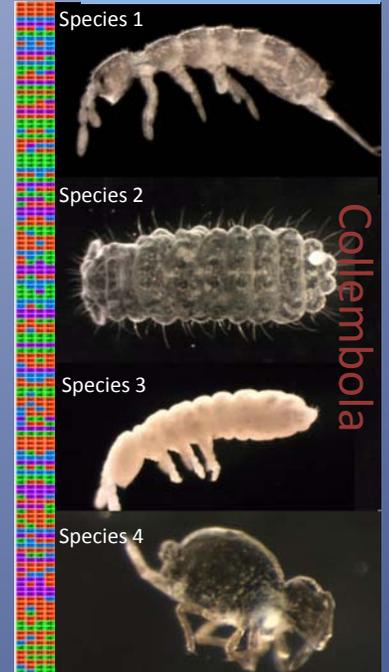
## Present and future monitoring

The monitoring programme is running annually, but due to adjustment and adaption to new ecological approaches the soil monitoring has included analysis of trophic structure with stable isotopes and barcoding of soil arthropods. The trophic structure could be a monitoring tool in its own right, but can also be used as input to ecosystem models. Below the present trophic structure of soil invertebrates and plants in a Kobbefjord habitat as reflected by the isotopic signatures  $\delta^{15}\text{N}$  and  $\delta^{13}\text{C}$ .



The DNA barcoding campaign will be a transition to employment of DNA based biodiversity assessment. Thus, it is anticipated that near future biodiversity assessment will use eDNA, environmental DNA, which is degraded DNA extracted from the soil, organic turf and the foerne layer. The huge amount of sequences obtained in this manner will be translated into species diversity using bioinformatics and databases of barcoded soil invertebrates. Barcoding has a two-fold purpose: It verifies the biodiversity assessment done hitherto by checking barcodes with databases such as www.BOLD.org and it prepares for the future application of eDNA, that relies on the barcode databases to translates the molecular taxonomic units into true species.

COI minibarcode  
Species 1 2 3 4  
A COI minibarcode of 140 bp can separate collembolan families or even species!



Contact soil ecology: [pnh@dmu.dk](mailto:pnh@dmu.dk)  
BioBasis Nuuk: [pja@dmu.dk](mailto:pja@dmu.dk)



<sup>1</sup> Department of Bioscience, Vejlsøvej 25, 8600 Silkeborg, Denmark  
<sup>2</sup> Sognevejen 5, 8420 Knebel, Denmark  
<sup>3</sup> Spatial Foodweb Ecology Group, University of Helsinki, Department of Agricultural Sciences PO Box 27  
<sup>4</sup> Department of Bioscience - Arctic Ecosystem Ecology, Frederiksborgvej 399, 4000 Roskilde, Denmark  
<sup>5</sup> Natural History Museum, Mols Laboratory, Strandkaervej 6-8, Femmeløkke, 8400 Ebeltoft, Denmark  
<sup>6</sup> Greenland Institute of Natural Resources, Box 570, 3900 Nuuk, Greenland

