

Europlanet TNA Report

PROJECT LEADER

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COLLABORATORS

Name:	Affiliation:
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Date of TNA visit:	Aug 5 th to August 24 th 2010
Host laboratory:	Ny Alesund

Project Title Signatures of Life in Arctic Ice and Snow

- Report on the outcomes of the TNA visit (approx 1 page)

During August 2010, the PI and collaborator have investigated the organisms that thrive in the snow fields and glaciers around Ny-Ålesund, on the island of Svalbard. This work was part of the larger AMASE 2010 expedition where th Pi also contributed in situ FTIR analyses on all target samples collected. As part of the deliverable for this TNA a blog for part 1 of the field work was written and it is posted on the Europlanet website (http://www.europlanet-eu.org/outreach/index.php?option=com_content&task=view&id=259&Itemid=2).

As part of the snow and Ice work plan we have sampled 3 glaciers around Ny-Ålesund (*Midre Lovénbreen, Austre and Vestre Brøggerbreen*), 1 glacier in Bockfjorden (*Fridrichsbreen*) and a snow field on *Sigurffjell*. Samples retrieved include, 'clean' snow as a baseline for both geochemical, and microbiological activity as well as various samples of red and green snow algae, cryoconite samples as well as surface ice (cores) and runoff channel water samples (Table below). Depending on the site, samples were collected from the accumulation, ablation and superimposed ice zones of each glacier. On site we immediately recorded coordinates, pH, temperature, conductivity and in some cases also PAR levels and ATP and LAL content using portable instruments. The samples were transported back to the laboratory in the Marine Laboratory in Ny Ålesund and sub sampled for either immediate analyses (including DNA/ PCR as well as cell counts) or for later home laboratory analyses including inorganic and organic composition of the aqueous component after filtration through various 0.2 µm filters (DIC/DOC, ICP-MS/IC), isotope analyses of both the solids and solutions (N, C, O, to be done by collaborators in the US), analyses of pigments and lipids (to be done in Glasgow by the Collaborator Dominique Tobler) specifically in the cryoconite and snow algae samples as well as in some cases XRD and FTIR as well as further metagenomic analyses (specially bacterial 16S work, Leeds). A total of 21 samples (each with ~ 5-12

subsample sets) were collected, catalogued, sub-sampled, analyses on site or/and returned to Leeds. Some were also returned frozen in a cryo-porter (specially samples for further genomic analyses) to preserve the integrity of the samples. These analyses are all ongoing in different stages.

The overall aim of this work was to collect a representative set of samples that will allow us to quantitatively determine the coupled inorganic, microbiological and organic signals and derive a biogeochemical and ecosystem framework that defines cryo-life habitability parameters at these site. Learning more about the survival strategies that life adopts in extreme environments gives us a better chance of detecting life on other planets with similarly extreme conditions.

Site name – code / date	Sample type	Measured on site or in lab in Ny Ålesund	Sub-samples taken for home analyses
<i>Midre Lovénbreen – set ML-1 (6/08/10)</i>	Runoff / Cryoconite1 / Cryoconite2 / Red snow / Clean Snow / Glacial outflow	Coordinates, pH, T, Conductivity, cell count/DNA/PCR	DOC/DIC/isotopes. ICP-MS, IC/ Pigments/Lipids
<i>Midre Lovénbreen – set ML-2 (10/08/10)</i>	Runoff / Cryoconite / Glacial Outflow	Coordinates, pH, T, Conductivity, UVA/UVB/PAR, cell count/DNA extraction/ATP	DOC/DIC/isotopes. ICP-MS/ IC / Nutrients / Pigments / GFF Lipids
<i>Austre Brøggerbreen – set AB-2 (12/08/10)</i>	Runoff / Cryoconite / Glacial Outflow/Red snow algae	Coordinates, pH, T, Conductivity, UVA/UVB/PAR, /DNA extraction/ ATP/LAL	DOC/DIC/isotopes. ICP-MS / IC/ Nutrients / Pigments / GFF Lipids / FTIR / XRD
<i>Vestre Brøggerbreen – set VB (17/08/10)</i>	Runoff / Cryoconite / Glacial Outflow/Red snow algae / Green Snow Algae/Clean Snow	Coordinates, pH, T, Conductivity, cell count/DNA extraction/ATP/LAL	DOC/DIC / isotopes/ ICP-MS, IC/ Nutrients / Pigments / GFF Lipids
<i>Sigurfjell snow field SIG (18/08/10)</i>	Red snow algae	Coordinates, pH, T, Conductivity	DOC/DIC/isotopes. ICP-MS/ IC / Nutrients / Pigments / GFF Lipids
<i>Fridrichsbreen FB (22/08/10)</i>	Red snow algae / Clean snow	Coordinates / pH, T, Conduct	DOC/DIC/isotopes. ICP-MS/ IC / Nutrients / Pigments / GFF Lipids

Some of these samples will also be used as the starting sample set for a new PhD student project to be started in Leeds in Oct 2011.

Please include:

- Publications arising/planned (include conference abstracts etc)

- some of these results are scheduled to be presented at the UK – Arctic science conference to be organised in Leeds in 2011 and depending on progress with the analyses possibly also at EANA (July 2011 in Germany) or ISEB (Sept 2011 in Turkey).

- Host approval

This report gives an accurate account on the research performed during the Europlanet activities in Ny Alesund. The report is approved by the host laboratory FFI.