Chemical Sample Analysis for the IGLUNA Project. G. C. Vaessen[1], B. de Winter[2], M. V. Heemskerk[3], B. H. Foing[3,4,5], [1]VU Amsterdam (guidovaessen@hotmail.com) ,[2]VU Amsterdam (dewinterbram@hotmail.com)), [3]VU Amsterdam, (marczijnmailadres@gmail.com), [4]ESA ESTEC, [5]ILEWG

Introduction:

IGLUNA will focus on building a habitat in a glacier in Zermatt to simulate the construction of a habitat on the south pole of the moon [1]. There will be teams of different backgrounds working on this project, including the VU team, VUSE (VU Science Experiments)[2].

The VU IGLUNA team will focus on geological and glaciological studies that can be executed from the habitat without sample return missions to other research facilities or universities [3]. An important aspect of geological studies is doing chemical analysis on samples to discover details about the rocks and minerals. The important thing about this project is that all the analysis has to be done in the habitat, this means that the instruments have to be as light and small as possible to be able to set up the lab without much difficulty.

The habitat will be inside the Glacier Palace, to simulate the harsh environments as they are found in the crater on the south pole of the moon. Most of the sample analysis will be done on ice samples, which will be acquired using a drill.

Goals:

pH-measurements

One of the things that can be done on ice is measuring the pH of the molten ice by using a pH-meter. This will measure the amount of dissolved H^+ particles and thus calculate the acidity of the water. From there the amount of CO_2 that was captured in the ice and then dissolved into the water can be calculated.

Dust concentrations

The amount of dust in the ice gives information about paleoclimate, since different amounts of dust in different layers of ice can give information about the wind-direction and wind-speed at the time of deposition. The lithology of the dust gives information about its origin . To quantify the amount of dust per sample, the ice sample can be molten and filtered or the mixture can be heated until all the water has evaporated, the residue will only contain dust and this can be weighed to determine the amount of dust.Furthermore, microscopic analysis will give details about the lithology of the dust.

Electrical conductivity

The electrical conductivity (EC) of molten ice can be measured using an EC meter (figure 1). The electrical conductivity of water is dependent on the activity of dissolved ions in the water. When water freezes its dissolved ions (e.g. Na^+ and Cl^-) will not freeze along with the ice, this means that when water freezes, most ions will stay dissolved in the liquid water. Data from the EC meter could therefore be interesting because electrical conductivity would mean that there are dissolved ions present in the molten ice somehow.

Figure 1. Example of a Model 1152 Digital Conductivity Meter used to measure the conductivity of a liquid.

Raman spectroscopy

Raman spectroscopy is a spectroscopic technique which relies on inelastic scattering of light through molecules due to their vibration [4]. This technique can determine the structure of organic molecules and find the crystallographic orientation of minerals. Using this technique would give great insight to the composition and structure of organic molecules and minerals.

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References

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Additional information

If you have any questions or require additional information, please contact me at (guidovaessen@hotmail.com)