

ICAT PhD School 2019



Monday 23 September 2019 - Saturday 28 September 2019

Niels Bohr Institute: Ice Climate and Geophysics

Scientific Programme

Course content

The PhD school will focus on the many aspects of climate reconstructions available from ice cores.

The PhD school will cover dating methods applied to ice cores, such as annual layer counting, volcanic and other dating markers, greenhouse gases, cross-core and cross-archive dating, as well as the uncertainties associated with the different dating methods.

We will include discussions regarding transport and deposition processes, such as different wind patterns of the past, dry and wet deposition, re-deposition and sastrugi influence, firnification and movement within the ice, diffusion and influence of the ice matrix as well as crystal boundary effects.

We will discuss the multiple proxies determined in ice cores, measurement methods, accuracy and precision. State-of-the-art measurement techniques such as ICP-MS, CFA, IC, IRMS, Picarro as well as sampling and cleaning methods. Also nondestructive methods such as ECM, DEP and borehole logging will be explained as well as laser ablation techniques. The methods will be compared in terms of measurement accuracy, but also in term of depth resolution and of cause the number of different proxies will be discussed, such as reconstruction of source areas, source changes, temperature, greenhouse gases, volcanic eruptions, biosphere, etc.

We will discuss the different ways to retrieve ice cores, differences and benefits of different ice core sites, drilling techniques, replicate drilling, shallow drilling, rapid access and the potential for borehole logging techniques.

Finally we will introduce how one can work with the ice core data. How to deal with missing data, data with variable resolution, we will discuss what can actually be learned from correlations, and the importance of including uncertainties and variability in reconstructions.

The applicants will be expected to give a short presentation of their own research topics, and thus we will update each other on the most recent research within ice cores. Further the course will include laboratory visits at the Centre for Ice and Climate and excursions within the Copenhagen area.

Topics include (depending on instructor availability):

Ice core drilling techniques

Ice core logging

ICP-MS, IC, IRMS, Picarro, with more ice core measurement techniques

Continuous flow analysis vs discrete measurements

non-destructive ice core methods, such as ECM, DEP, laser ablation, etc.

firnification

re-deposition and sastrugi influence

Transport and deposition processes

Timescales

Reconstruction of paleo climate from ice cores

Comparisons to other paleo archives

Telling who you are - Video introductions

We do not use badges for participants. Over the first two days of ICAT, all students will present a 3-min video of who they are and what their project is about.

Excursion

There will be a half-day excursion to a site of paleoscientific interest within the Sjælland region. Even in late September, conditions in Denmark can be wet and cold. Good rainproof clothing and a sweater are recommended.