Abstract ID : **150**

Microstructure and air hydrate inclusions for paleoclimatic reconstructions in polar ice

Content

Climate change (i.e. global warming) affects all of humanity, therefore, understanding the climate system and its long-term response to increasing greenhouse gas concentrations in the atmosphere is one of the great challenges of our time. In this context, the investigation of the Mid-Pleistocene transition (MPT) in deep, old Antarctic ice is an important milestone to get a better idea of past climate dynamics and to infer future climate trends.

The integrity of climatic and environmental records in deep ice cores, however, can be challenged when e.g. inhomogeneous and localized deformation disturbs the stratigraphy of the highly thinned ice layers at large depths.

As part of the DEEPICE and Beyond EPICA – Oldest ice programs, this project aims to assist in creating high resolution climate records via studying the occurrence and interaction of secondary phases, in particular air hydrates, with ice. As most of the ancient air molecules in deep ice are stored in the air hydrate crystal lattice, the study of their various properties and interactions with the surrounding ice is an important contribution to improve climate reconstructions. The size, shape and distribution (geometric composition) of air hydrates will enable paleoclimatic reconstructions for the following reason: The air hydrate growth with time, via molecular diffusion of air through the ice crystal structure and subsequent Ostwald ripening, promises an independent dating tool.

To achieve this, systematic evaluations of existing data and generation of new data by inspecting available micrographs with combined analytical techniques (e.g. Image analysis, measurements of crystallographic–preferred orientations, Raman spectroscopy, Cryo-SEM) will be performed. The obtained information will then be combined with other climate-related ice core data.

Primary author: PAINER, Florian (Alfred Wegener Institute Helmholtz Center for Polar- and Marine Research, Bremerhaven)

Co-authors: WEIKUSAT, Ilka (Alfred Wegener Institute Helmholtz Center for Polar- and Marine Research, Bremerhaven and Department of Geosciences, Eberhard Karls University, Tübingen); DRURY, Martyn (Department of Earth Sciences, Utrecht University, Utrecht, The N etherlands); K IPFSTUHL, S epp (Alfred W egener Institute Helmholtz Center for Polar- and Marine Research, Bremerhaven)

Presenter: PAINER, Florian (Alfred Wegener Institute Helmholtz Center for Polar- and Marine Research, Bremerhaven)

Track Classification: Time scales and methods for ice dating