Abstract ID : **206**

Basal ice – a rich source on ice dynamics and ice sheet history

Content

As we dig deeper into the large ice sheets, it becomes possible for us to reach new and innovative goals for understanding the flow of ice and the history of the ice sheets. This presentation will give an overview of new findings and visions based on radar data, borehole logging and access to basal material.
At the bottom of the ice sheets, there is typically a basal layer of ice sometimes including embedded basal material that shows atypical ice flow behavior located at the ice and rock or silt interface under the ice sheet. Within this layer, ice flow models fail to reconstruct observed layer thicknesses and ages correctly, and the ice near the base often turns out to be stratigraphically disturbed.
The basal layer is often recognized in the radioechograms by the disappearance of the systematic near parallel and horizontal lines which normally indicate isochrones. In the basal layer, however, sometimes internal structures can still be detected. An example of this is from the NEEM drill site on the Greenland ice sheet where radio-echo layers, borehole-logging and ice core observations all show consistent evidence of large-scale folding. NEEM ice core observations show how the rheology and ice crystal shapes and sizes change ice dynamics and how this plays an important role in the formation of basal layers. Another example is basal layers found in large regions of Antarctica. An intensive study has been done on the basal layer in relation to the selection of the European and Australian deep drill sites for oldest ice near Dome C and the ice there is believed to be a passive component in the ice deformation. Borehole data and ice core data are included in the discussion of the basal layer near Dome C. Data from the Camp Century, GRIP and Dye3 ice cores are also presented and discussed.
Even disturbed, the basal layer contains the oldest ice and through development of methods to interpret this ice, there is a way to extend the knowledge for deep ice cores beyond the zones of preserved stratigraphy. For Greenland sites, direct macrofossils have been found at Camp Century and NGRIP, while DNA traces have been identified at Dye3, NEEM and Camp Century. When compared to the wide span of possible dating methods, the Greenland results point towards a resilient ice sheet needing 10 deg C warming before the central ice sheet vanishes and a forest again covers Greenland.

Primary authors: DAHL-JENSEN, Dorthe (University of Copenhagen); Dr PEDERSEN, Mikkel Winther (University of Copenhagen); Prof. STEFFENSEN, Joergen Peder (University of Copenhagen); Prof. SVENSSON, Anders (University of Copenhagen); Prof. TISON, Jean-Louis (Universite Libre de Bruxelles); Prof. WILLERSLEV, Eske (University of Copenhagen)

Presenter: DAHL-JENSEN, Dorthe (University of Copenhagen)

Track Classification: Ice dynamics, ice sheet instability and geophysics