Abstract ID : **147**

Bipolar volcanic ice-core synchronization of the last glacial cycle

Content

Precise synchronization of climate records is essential for deducing the mechanisms of the climate system. Ice cores from the Greenland and Antarctic ice sheets have been synchronized by the use of cosmogenic isotopes, gas concentrations, and traces of large volcanic eruptions. Identification of identical sequences of volcanic sulfate depositions at both poles have been applied to synchronize ice cores in the Holocene, in the deglacial period, in Marine Isotope Stage 3 (MIS3) and around the Indonesian Toba eruption occurring close to 74 ka. We now extend this inter-hemispheric volcanic synchronization approach to also cover MIS2 (16.5-24.5 ka), MIS4 and part of MIS5 (60-110 ka) allowing for a precise bipolar synchronization of the entire last glacial cycle. In MIS2, where ice core synchronization is particularly difficult, there is now support for the proposed volcanic matching from independent 10Be matching. Similar to previous work, the identification of volcanic sequences at the two poles is supported by annual layer counting in both Greenland and Antarctica although the identification of annual layers becomes increasingly difficult with depth. To support the synchronization we investigate the deduced annual layer thicknesses (not requiring layer counting) and the inferred depth-depth relation between synchronized ice cores. The precise bipolar synchronization allows to determine the exact inter-hemispheric phasing of abrupt climate change during the last glacial, and to investigate a possible relation between abrupt climate change and volcanism. Furthermore, the frequency and magnitude of large volcanic eruptions of the last glacial can be established.

Primary authors: SVENSSON, Anders (University of Copenhagen); BIGLER, Matthias (University of B ern); BUIZERT, Christo (Oregon State University); COOK, Eliza (Centre for Ice and Climate, Niels Bohr Institute, University of Copenhagen); DAHL-JENSEN, Dorthe (CPH); FISCHER, Hubertus (University of Bern); HVIDBERG, Christine (University of Copenhagen); KIPFSTUHL, Sepp (Alfred Wegener Institute , Bremerhaven, Germany); KJÆR, Helle Astrid (Niels Bohr Institute, university of Copenhagen); LANDAIS, Amaelle (Laboratoire des Sciences du Climat et de l'Environnement, LSCE/IPSL, CEA-CNRS-UVSQ, Université Paris-Saclay, Gif-sur-Yvette, F rance); LIN, Jiamei (University of Copenhagen); LOHMANN, Johannes (University of Copenhagen); MCCONNELL, Joseph (Desert Research Institute); MULVANEY, Robert (BAS); PARRENIN, Frédéric (CNRS/IGE); RASMUSSEN, Sune Olander (University of Copenhagen); SEVERI, Mirko (Department of Chemistry Ugo Schiff, University of F lorence); SIGL, Michael (University of Bern); SINNL, Giulia; STEFFENSEN, Jorgen Peder (Physics of Ice, Climate and Earth, Niels Bohr Institute); VINTHER, Bo M. (Physics of Ice, Climate and Earth, Niels Bohr Institute, University of Copenhagen); WILHELMS, Frank (Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung and Geowissenschaftliches Zentrum Universität Göttingen, Göttingen, Germany); WOLFF, Eric (University of Cambridge, UK)

Presenter: SVENSSON, Anders (University of Copenhagen)

Track Classification: Rapid changes and teleconnections