Contribution ID: **264** Type: **Oral presentation**

Synchronization of ice-core and speleothem records around Heinrich Event 2 using cosmogenic radionuclides

Tuesday 4 October 2022 11:40 (20 minutes)

Cosmogenic radionuclides are an excellent synchronization tool thanks to their globally synchronous production and modulation by changes of the helio- and geomagnetic fields. The cosmogenic isotopes of ^{10}Be are recorded in ice cores, while ^{14}C isotopes are recorded in speleothems; hence, these isotopes can be used to align chronologies from distant regions.
Here, new measurements of ^{10}Be in ice cores from Greenland (NorthGRIP; resolution ˜10 years/sample) and Antarctica (WDC; resolution ˜67 years/sample) allowed us to synchronize the two ice-core chronologies GICC05 and WD2014, aligning similar radionuclide production features mostly concentrated around 22 ka b2k. Moreover, the Hulu Cave speleothem U/Th chronology was synchronized to the ice-core datasets using carbon-cycle modelling and probabilistic wiggle matching.
The triangle of chronologies (GICC05, WD2014, and Hulu Cave U/Th) had not yet been tied together in the period from 20 to 25 ka b2k. We find our results confirming the previous GICC05-Hulu synchronization by Adolphi et al. (2018). Both ice-core chronologies present centennial offsets with respect to the U/Th timescale, both towards younger ages. In the case of GICC05, we investigated where the offset originated, finding an answer in the many unusually wide layers recorded during Greenland Stadial (GS) 2.
Our results indicate the almost synchronous occurrence of important signatures in the oxygen isotopes and dust records of the archives, providing new insights on the sequence of events around Heinrich Event 2 within GS 3. The new relative timing of the proxy data in this period could open new pathways for a better understanding of bipolar-seesaw-like mechanisms around Heinrich Events, as well as the influence of these on the Asian climate.

References:
Adolphi, F., Bronk Ramsey, C., Erhardt, T., Edwards, R. L., Cheng, H., Turney, C. S., ... & Muscheler, R.: Connecting the Greenland ice-core and U/ Th timescales via cosmogenic radionuclides: testing the synchroneity of Dansgaard–Oeschger events. Clim. Past, 14, 1755–1781, 2018

Primary author: SINNL, Giulia (Niels Bohr Institute)

Co-authors: ADOLPHI, Florian (Alfred Wegener Institute Bremerhaven); MUSCHELER, Raimund (Department of Geology, Lund University, Lund, Sweden); SVENSSON, Anders (Physics of Ice, Climate and Earth, Niels Bohr Institute, University of Copenhagen); Prof. CAFFEE, Marc (Department of Physics and Astronomy, Purdue University, Indiana, USA); Dr WELTEN, Kees C. (Space Sciences Laboratory, University of California, Berkeley, California, USA); Dr WOODRUFF, Thomas (Department of Physics and Astronomy, Purdue University, Indiana, USA); CHRISTL, Marcus (Laboratory of Ion Beam Physics, ETH Zürich, Zürich, Switzerland); RASMUSSEN, Sune O. (Niels Bohr Institute, University of Copenhagen)

Presenter: SINNL, Giulia (Niels Bohr Institute)

Track Classification: Time scales and methods for ice dating