Contribution ID: **293** Type: **Oral presentation**

Story-telling the last glacial inception: CO2, AMOC weakening and orbital triggers

Friday 7 October 2022 14:00 (20 minutes)

The transition from glacial to interglacial periods has been deeply studied, largely relying on the last deglaciation and its associated availability of a vast array of precisely dated high-resolution climate indicators. Its counterpart transition, glacial inception, has received much less attention, mostly due to the lack of a sufficient number of well-resolved proxies covering the last glacial inception at the end of the last interglacial (129–116 ka). As a consequence, there are significant knowledge gaps concerning overall driving mechanisms, lead/lag relationships and the role of each orbital parameter. Specifically, a long-standing issue has been why does CO2 lag Antarctic Temperature by five thousand years during glacial inception, in sharp contrast to an otherwise strong correlation throughout the 800 ka record.
Here, using a dry-extraction technique, we present a reconstruction of past atmospheric CO2 concentrations from the EDC ice core for the period 135–105 ka at centennial resolution. Focusing on the glacial inception, we suggest that the CO2 drawdown at the end of the last interglacial was triggered by a weakening of the Atlantic Meridional Overturning Circulation (AMOC). After cascading events in the Northern Hemisphere that led to an unusually mild climate amidst growing ice sheets, a sudden reduction in North Atlantic Deep Water formation possibly triggered the establishment of a glacial AMOC. The northward expansion of Antarctic Bottom Water that likely followed may have helped create the necessary conditions for enhanced deep ocean storage of CO2. A coeval quick expansion of the Northern ice sheets and associated positive feedback mechanisms possibly helped to sustain the CO2 decrease. We suggest that the establishment of a deep ocean reservoir was a necessary condition for CO2 to drop from the long and stable plateau that we observe during the last interglacial, ultimately explaining the lag between CO2 and Antarctic temperature.

Author: SILVA, Lucas (Climate and Environmental Physics, University of Bern)

Co-authors: NEHRBASS-AHLES, Christoph (University of Cambridge); SCHMIDELY, Loic (University of Bern); SCHMITT, Jochen (University of Bern); FISCHER, Hubertus (University of Bern); STOCKER, Thomas (University of Bern)

Presenter: SILVA, Lucas (Climate and Environmental Physics, University of Bern)

Track Classification: Glacial / interglacial dynamics, interglacials, and sea level