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WD2014: A new reference chronology for ice cores from Antarctica?

Michael Sigl (1,2), Joseph R. McConnell (1), Mai Winstrup (3), Taylor J. Fudge (3), Jihong Cole-Dai (4), David Ferris (5), Kendrick Taylor (1), Christo Buizert (6), Rachael Rhodes (6), Ken McGwire (1), Kees C. Welten (7), Thomas E. Woodruff (8), Nelia Dunbar (9), Nels Iverson (9), Olivia J. Maselli (1), Daniel R. Pasteris (1), and Raimund Muscheler (10)

(1) Desert Research Institute, Reno, United States (msigl@dri.edu), (2) Paul Scherrer Institute, Villigen, Switzerland, (3) Department of Earth and Space Sciences, University of Washington, Seattle, USA, (4) Department of Chemistry and Biochemistry, South Dakota State University, Brookings, USA, (5) Dartmouth College Department of Earth Sciences, Hanover, USA, (6) College of Earth, Ocean, and Atmospheric Sciences, Oregon State University, Corvallis, USA, (7) Space Science Laboratory, University of California, Berkeley, USA, (8) PRIME Laboratory, Purdue University, West Lafayette, USA, (9) New Mexico Bureau of Geology & Mineral Resources Earth and Environmental Science Department, New Mexico Tech, Socorro, USA, (10) Department of Geology, Lund University, Lund, Sweden

Here we present a chronology (WD2014) for the upper part (0-2850 m, 31.2 ka BP) of the West Antarctic Ice Sheet (WAIS)-Divide ice core which is based on layer counting of distinctive annual cycles preserved in the elemental, chemical and electrical conductivity records. These cycles are caused by the seasonally varying impurity concentrations in snowfall reflecting source strength of emissions, transport and deposition efficiency.
A new ice core chronology has been developed using manual interpretation as well as by using a layer detection algorithm based on Hidden Markov Models taking advantage of the large suite of sub-annually resolved and co-registered aerosol records from high-resolution continuous measurements. The age model is validated against the absolute dated radiocarbon calibration curve IntCal13 using ice-core Be-10 measurements for proxy synchronization. These records reveal an unprecedented accuracy of the new ice core chronology since the Last Glacial Maximum. The new chronology can become a reference chronology for ice cores with synchronization to other ice cores achievable through the unique high-resolution sulfur record indicating hundreds of volcanic signals common to many other deep ice cores in Antarctica.
A developing tephra framework for ice cores from West Antarctica will allow to better integrating Antarctic ice cores and the marine and terrestrial records from the southern hemisphere in the future, thus gaining a detailed chronologic picture of climatic changes and environmental consequences for the region over the past 31,000 years. This southern hemisphere perspective is a fundamental step in developing a detailed global understanding of the effects of past climate changes, and its implications for the future.
Due to a small ice-age gas-age difference (delta-age) at WAIS Divide - because of high annual snowfall rates at this site - and a new high-resolution WAIS CH4 record, this new ice core chronology provides also independent, precise ages for abrupt climate transitions in the northern hemisphere (e.g., GS1-GI1 warming; 14,580 $\pm$ 50 years) during the last deglaciation. Thus, WD2014 provides a new perspective on the variability of global sea-level, climate and ice-sheet histories.