Geophysical Research Abstracts
Vol. 14, EGU2012-4286, 2012
EGU General Assembly 2012

Interhemispheric ice-sheet synchronicity during the Last Glacial Maximum

M.E. Weber (1), P.U. Clark (2), W. Ricken (1), J.X. Mitrovica (3), S.W. Hostetler (4), and G. Kuhn (5)

(1) Institute of Geology and Mineralogy, Koeln, Germany (michael.weber@uni-koeln.de), (2) College of Earth, Ocean, and Atmospheric Sciences, Oregon State University, Corvallis, OR, USA, (3) Department of Earth and Planetary Sciences, Harvard University, Cambridge, MA, USA, (4) U.S. Geological Survey, College of Earth, Ocean, and Atmospheric Sciences, Oregon State University, Corvallis, OR, USA, (5) Alfred Wegener Institute for Polar and Marine Research, Helmholtz Association, Bremerhaven, Germany

The timing of the last maximum extent of the Antarctic ice sheets relative to those in the Northern Hemisphere remains poorly understood because only a few findings with robust chronologies exist for Antarctic ice sheets. We developed a chronology for the Weddell Sea sector of the East Antarctic ice sheet that, combined with ages from other Antarctic ice-sheet sectors, indicates the advance to their maximum extent at 29 –28 ka, and retreat from their maximum extent at 19 ka was nearly synchronous with Northern Hemisphere ice sheets (Weber, M.E., Clark, P. U., Ricken, W., Mitrovica, J. X., Hostetler, S. W., and Kuhn, G. (2011): Interhemispheric ice-sheet synchronicity during the Last Glacial Maximum. – Science, 334, 1265-1269, doi: 10.1126:science.1209299).

As for the deglaciation, modeling studies suggest a late ice-sheet retreat starting around 14 ka BP and ending around 7 ka BP with a large impact of an unstable West Antarctic Ice Sheet (WAIS) and a small impact of a stable East Antarctic Ice Sheet (EAIS). However, the Weddell Sea sites studied here, as well as sites from the Scotia Sea, provide evidence that specifically the EAIS responded much earlier, possibly provided a significant contribution to the last sea-level rise, and was much more dynamic than previously thought.

Using the results of an atmospheric general circulation we conclude that surface climate forcing of Antarctic ice mass balance would likely cause an opposite response, whereby a warming climate would increase accumulation but not surface melting. Furthermore, our new data support teleconnections involving a sea-level fingerprint forced from Northern Hemisphere ice sheets as indicated by gravitational modeling. Also, changes in North Atlantic Deepwater formation and attendant heat flux to Antarctic grounding lines may have contributed to synchronizing the hemispheric ice sheets.