Geophysical Research Abstracts
Vol. 12, EGU2010-7346-5, 2010
EGU General Assembly 2010

Deglacial Climate Linkages Between Eastern North America and the North Atlantic Region: Insight from An Appalachian Speleothem

Harry Rowe (1), Ben Hardt (2), Gregory S. Springer (3), Hai Cheng (2), and R. Lawrence Edwards (2)

(1) Earth and Environmental Sciences, University of Texas at Arlington, Arlington, TX, USA (hrowe@uta.edu), (2) Department of Geology and Geophysics, University of Minnesota, Minneapolis, MN, USA, (bhardt@umn.edu; cheng021@umn.edu; edwar001@umn.edu), (3) Department of Geological Sciences, Ohio University, Athens, OH, USA, (springeg@ohio.edu)

A ^{230}Th-dated, 500-mm-long stalagmite from southern West Virginia, USA, reveals the timing and environmental response of the last deglaciation of the south-central Appalachian Mountains. While minor warming of the region occurred before the onset of Heinrich Event 1 (H1), stalagmite carbon isotope values do not show a significant increase in soil respiration (more depleted δ^{13}C) until the onset of H1 at $\sim$18 ky BP. The onset of H1 is also marked by an overall depletion in stalagmite δ^{18}O, punctuated by an abrupt depletion of 1.8‰ at $\sim$16.4 ky BP, which also marks the initiation of enhanced stalagmite growth rate and an even greater contribution of carbon from soil respiration. Throughout most of the period from 20 ky BP to the end of H1 ($\sim$15 ky BP), trace-metal ratios (Sr/Ca) suggest that wet/dry conditions oscillated on the multi-century timescale, with an overall increasing trend in the year-round contribution of atmospheric precipitation. Within the limits of age-dating it is hypothesized that previously identified melt-water pulses to the Gulf of Mexico may have influenced the regional moisture conditions.

The Bolling-Allerod (B/A) Period is characterized by a protracted Sr/Ca-defined trend toward drier conditions across the interval, and a change to sub-century-scale variability after $\sim$13.8 ky BP. The B/A is also characterized by the most stable δ^{13}C values of the entire record, a pattern that continues into the early half of the Younger Dryas (YD). The early YD (12.8 to 12.5 ky BP) is best defined by a pronounced depleted δ^{18}O values, followed by a well-defined enrichment trend that terminates with the YD.

Post-YD variability in δ^{18}O and δ^{13}C are largely coincident with climate-driven changes defined in the Cariaco Basin reflectance record. However, the well-defined 8200-Year Event, and the 9200-Year, as well as slightly older abrupt climate events are defined in the West Virginia stalagmite record, reveal a terrestrial hydrological (and perhaps biological) response to abrupt shifts in the climate system.