Northeastern Section - 50th Annual Meeting (23–25 March 2015)

Paper No. 1
Presentation Time: 1:35 PM

METEORIC ^{10}BE FLUX RECORDS POTENTIALLY SYNCHRONIZE NORTH AMERICAN VARVED SEDIMENTS WITH GREENLAND ICE

DEJONG, Benjamin D., The Johnson Company, 100 State Street, suite 600, Montpelier, VT 05602, BALCO, Greg, Berkeley Geochronology Center, 2455 Ridge Road, Berkeley, CA 94709, ROOD, Dylan H., AMS Laboratory, Scottish Universities Environmental Research Centre (SUERC), East Kilbride, G75 0QF, United Kingdom, RIDGE, John C., Department of Earth and Ocean Sciences, Tufts University, Medford, MA 02155 and BIERMAN, Paul, Department of Geology and Rubenstein School of Environment and Natural Resources, University of Vermont, Delehanty Hall, 180 Colchester Ave, Burlington, VT 05405, bdejong@uvm.edu

We investigate the time relationship between the North American Varve Chronology (NAVC) and Greenland ice cores using atmospherically-produced (meteoric) ^{10}Be. The NAVC is a 5700-year sequence of lake varves deposited in a proglacial lake that occupied the Connecticut River Valley (northeastern North America) ~18,000-12,500 years ago. This annually resolved record includes details of regional climate and ice-marginal processes at 40-45° N latitude, both near to and distant from the margin of the retreating Laurentide Ice Sheet (LIS).

Age calibration for the NAVC based on radiocarbon-dated plant macrofossils in individual varves implies several relationships between climate events in North America and Greenland, such as an increase in the retreat rate of the LIS during the Bolling warming in Greenland and a re-advance of the LIS margin during the Older Dryas cold period. However, the uncertainty in the radiocarbon calibration is ~± 200 years, so testing these relationships at finer resolution requires a more robust metric for synchronization. We explore the use of meteoric ^{10}Be flux records for this purpose. Meteoric ^{10}Be production and delivery rates in any given year are directly related to solar variability, which is globally synchronous. Thus, a ^{10}Be flux record for NAVC varves can, in principle, be used to align the NAVC with existing ^{10}Be flux records from Greenland ice cores that exhibit solar variability on a range of time scales.

We test this potential by generating ^{10}Be flux records at two different timescales. First, we use 2-year, amalgamated varves to determine the existence of short-period variability (11-year Schwabe cycle) in two 80-year sequences. We analyze flux estimates using multi-taper spectral analysis, and complimentary analyses including grain size and seasonality help discriminate the effects of climate from these high-resolution records. Second, we test a 1700-year record of ^{10}Be flux at decadal resolution (15-year amalgamated samples) for comparison with Greenland ice core records at centennial timescales. No definitive correlation is discernible from preliminary data, but results show promise to that end.

Session No. 16

S4. Contributions of Cosmogenic-Nuclide Geochronology to Glacial Geology and Geochronology in Northeastern North America—and Vice Versa
Monday, 23 March 2015: 1:30 PM-5:30 PM

Grand Ballroom North (Omni Mount Washington Resort)

Geological Society of America *Abstracts with Programs.* Vol. 47, No. 3, p.62

Back to: S4. Contributions of Cosmogenic-Nuclide Geochronology to Glacial Geology and Geochronology in Northeastern North America—and Vice Versa

Previous Abstract | Next Abstract >>