

GSA 2014



19-22 October | Vancouver, BC, Canada



[Start](#) | [View Uploaded Presentations](#) | [Author Index](#) | [Meeting Information](#) | ...

2014 GSA Annual Meeting in Vancouver, British Columbia (19–22 October 2014)

Paper No. 325-6

Presentation Time: 2:15 PM

SYNCHRONIZING NORTH AMERICAN VARVED SEDIMENTS WITH GREENLAND ICE USING METEORIC ¹⁰Be FLUX RECORDS

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, RIDGE, John C., Department of Earth and Ocean Sciences, Tufts University, Medford, MA 02155, ROOD, Dylan H., AMS Laboratory, Scottish Universities Environmental Research Centre (SUERC), East Kilbride, G75 0QF, United Kingdom and BIERMAN, Paul, Geology Department 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) ¹⁰Be. 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 distal 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. Meteoric ¹⁰Be production and delivery rates in any given year are directly related to solar variability, and this variability is globally synchronous. Existing ¹⁰Be flux records from Greenland ice cores exhibit solar variability on a range of time scales; thus, a ¹⁰Be flux record for annually resolved NAVC varves can, in principle, be used to align NAVC and ice core records.

We first test this potential by generating ¹⁰Be flux records for 2-year, amalgamated varves in two 80-year sequences to determine the existence of short-period variability (11-year Schwabe cycle). These results guided sampling for a 1700-year record of ¹⁰Be flux at decadal resolution (15-year amalgamated samples) for comparison with Greenland ice core records at centennial timescales. We analyze flux estimates using multi-taper spectral analysis, which has successfully identified climate signatures from NAVC accumulation rates. Preliminary results identify periodicities associated with El Niño Southern Oscillation (~4-6 yr) and may suggest that watershed processes influenced the retention and delivery of ¹⁰Be in the glaciated and freshly de-glaciated landscapes of the Connecticut River Valley and obscured the short-period (11-year) Schwabe cycle.

Session No. 325

[Recent Advances in Limnogeology](#)

Wednesday, 22 October 2014: 1:00 PM-5:00 PM

213 (Vancouver Convention Centre-West)

Geological Society of America *Abstracts with Programs*. Vol. 46, No. 6, p.784

© Copyright 2014 The Geological Society of America (GSA), all rights reserved. Permission is hereby granted to the author(s) of this abstract to reproduce and distribute it freely, for noncommercial purposes. Permission is hereby granted to any individual scientist to download a single copy of this electronic file and reproduce up to 20 paper copies for noncommercial purposes advancing science and education, including classroom use, providing all reproductions include the complete content shown here, including the author information. All other forms of reproduction and/or transmittal are prohibited without written permission from GSA Copyright Permissions.

Back to: [Recent Advances in Limnogeology](#)

[<< Previous Abstract](#) | [Next Abstract >>](#)