CONTROL ID: 1470817

TITLE: Synchronizing the North American Varve Chronology with Greenland ice core records using meteoric 10Be flux

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ABSTRACT BODY: The North American Varve Chronology (NAVC) is a floating 5700-year sequence of glacial lake varves deposited in the Connecticut River Valley of the northeast US ~18,000-12,500 years ago. The NAVC is an annually resolved record of regional climate and ice-marginal processes at 40-45° N latitude, near the margin of the retreating Laurentide Ice Sheet (LIS). NAVC deposition occurred at the same time as rapid and abrupt Arctic and North Atlantic climate changes that took place during the last deglaciation. An age estimate for the NAVC based on radiocarbon dated plant macrofossils in individual varves implies a relationship between ice-marginal events recorded by the NAVC and climate events recorded in Greenland ice cores. For example, the retreat rate of the LIS up the Connecticut River Valley increased during the Bolling warming in Greenland, a readvance of the LIS margin took place during the Older Dryas cold period, and a correlation between an outburst flood from glacial Lake Iroquois and the Intra-Allerod Cold Period supports the hypothesis that the flood affected North Atlantic thermohaline circulation. On the other hand, a doubling of the ice-margin retreat rate recorded by the NAVC around 16,000 years ago coincides with a relatively cold period in Greenland. Our goal is to investigate the precise time relationship between these events by synchronizing the NAVC with the Greenland ice core time scale using atmospherically-produced 10Be. Existing 10Be flux records, including those from Greenland ice cores, exhibit solar variability on a range of time scales. Because this variability is globally synchronous, a 10Be flux record for the NAVC can, in principle, be used to align NAVC and ice core timescales. We are generating such a record at present. First, we are analyzing short varve sections at high temporal resolution to evaluate the magnitude of solar variability signals; a single section analyzed so far displays interannual variability with a period consistent with the 11-year solar cycle. Second, we are investigating seasonal variability in 10Be concentrations in individual varves to learn about 10Be transport and deposition in proglacial lakes. Third, we will generate a long record of 10Be concentrations at decadal resolution for comparison with similar ice core records.

KEYWORDS: [0724] CRYOSPHERE / Ice cores, [1194] GEOCHRONOLOGY / Instruments and techniques, [3300] ATMOSPHERIC PROCESSES, [1600] GLOBAL CHANGE.

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