---TITLE: **Climatic instability in interior Alaska from the isotopic record of Late Quaternary ground ice**

---AUTHOR(S):

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---DATA SET OVERVIEW:
-Introduction: The objective of this project is to document the growth and stable isotopic compositions of periglacial ice wedges from interior Alaska to constrain last glacial paleoclimate variability in a sensitive arctic region. Changes in isotopic composition of ground ice associated with thaw events during permafrost aggradation and within epigenetic wedge ice during periods of relative stability and extended cold may well reflect patterns of abrupt climate change evident in the Greenland ice core and North Atlantic records. We hypothesize that Arctic Alaska experienced such abrupt millennial-scale warming periods during Dansgaard-Oeschger events and further that the isotopic composition of ground ice preserved in permafrost sequences represents such decadal and millennial scale trends in climate. Such variability documented in Alaska would implicate a pan-hemispheric teleconnection of abrupt climate changes originating in the North Atlantic Ocean, and suggests that future changes in North Atlantic Ocean circulation may have drastic effects on high latitude climate. Surface waters were also collected to constrain modern controls on stable isotope values.

-Time period covered by the data: July, 2008 to December 2011
-Physical location of the measurement or platform (latitude/longitude/elevation): Location of the CRREL Permafrost Tunnel is 64.95135896, -147.621029.

-Data source, if applicable (e.g. for operational data include agency): NA

-Any World Wide Web address references (i.e. additional documentation such as Project WWW site): NA

---INSTRUMENT DESCRIPTION:
- All water samples were analyzed on a ThermoElectron Delta V Plus stable isotope ratio mass spectrometer, coupled to a high-temperature conversion elemental analyzer (TC/EA) using a continuous helium flow. Water sample isotope ratios were determined relative to in-house and international standards, such that the d18O and dD values are normalized on a scale where SLAP = -55.5 and -428 permil, respectively. Sample precisions are better than 0.2 and 2 permil for d18O and dD, respectively. Additional analytical details are available in Lachniet and Patterson (2009)

---DATA COLLECTION and PROCESSING:
-Description of data collection: Our method for stable isotopic analysis was developed to include 1) Subsampling of ice wedges exposed in the tunnel walls with an electric chainsaw; 2) removal of ice wedge blocks of dimensions of ~120 x 20 x 30 cm using chisels to break the ice along the planes cut by the chainsaw; 3) transport of ice wedges in coolers to the cold-room at CRREL, kept at -10ºC temperatures; 4) cleaning the outer surface of the ice wedges with metal chisels to remove surface contamination and to expose the internal ice wedge folia and stratigraphy, and to scrape a scale into the upper surface; 5) subsampling for stable isotopes (δ18O and δD) at

resolutions varying from 2cm to 2 mm using a modified Dremel Tool affixed to a movable stage that can be precisely located above the stationary ice wedge block. This apparatus, dubbed the 'wedgenator' allows us to precisely mill subsamples along the ice wedge horizontal growth axis. Subsamples were double-bagged and shipped frozen overnight to Las Vegas and stored in a -20ºC chest freezer purpose-bought for this project; 6) melting of ice subsamples and filling into 2 ml vials, or smaller 0.2 ml plastic inserts, a day or two prior to analysis for δ18O and δD on the TC/EA peripheral device at the Las Vegas Isotope Science Lab at UNLV. Surface waters were collected from flowing stream by dropping a bucket on a rope from a bridge.

---DATA FORMAT:
-Data file structure, format and file naming conventions (e.g. column delimited ASCII, NetCDF, GIF, JPEG, etc.)
       -Data format and layout (i.e. description of header/data records, sample records)
       Ice wedge data contain four fields: Sample ID (Internal number for isotope analysis), distance from left (distance from left edge of ice wedge, as exposed in the tunnel wall, in cm), and oxygen isotope (d18O) and hydrogen (dD) ratios.

       -List of parameters with units, sampling intervals, frequency, range: NA
       -Description of flags, codes used in the data, and definitions (i.e. good, questionable, missing, estimated, etc.): Missing data is referred to as "NA", either due to lack of information on sampling date, or insufficient material for analysis.
       -Data version number and date: NA

---DATA REMARKS: NA
       -PI's assessment of the data (i.e. disclaimers, instrument problems, quality issues, etc.)
       Missing data periods: NA
       -Software compatibility (i.e. list of existing software to view/manipulate the data) : NA

---REFERENCES:
       -List of documents cited in this data set description

Lachniet, M. S., and Patterson, W. P., 2009, Oxygen isotope values of precipitation and surface waters in northern Central America (Belize and Guatemala) are dominated by temperature and amount effects: Earth and Planetary Science Letters, v. 284, p. 435-446 (doi:410.1016/j.epsl.2009.1005.1010).