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Greenland winter season stable isotope data – a proxy for annual average Greenland temperatures for the past 1400 years

B.M. Vinther (1), P.D. Jones (2), K.R. Briffa (2), H.B. Clausen (1), K.K. Andersen (1), D. Dahl-Jensen (1) and S.J. Johnsen (1)

(1) Centre for Ice and Climate, Niels Bohr Institute, University of Copenhagen, Denmark, (2) Climatic Research Unit, School of Environmental Sciences, University of East Anglia, U.K. (bo@gfy.ku.dk)

Twenty ice cores drilled in medium to high accumulation areas of the Greenland ice sheet have been used to extract seasonally resolved stable isotope records. Relationships between the seasonal stable isotope data and Greenland temperature conditions are investigated for the past 200 years and the winter season stable isotope data are found to be very closely related to SW Greenland annual temperatures. This observation is supported by a comparison with Greenland ice core borehole temperature inversions. The temperature inversions are found to correspond better with winter stable isotope data than with summer or annual average stable isotope data over the past 1400 years. Hence both Greenland instrumental temperature observations and Greenland borehole temperature inversions suggest that a strong Greenland temperature signal can be extracted from the winter season stable isotope data.
Winter season stable isotope data from three ice core records that reach more than 1400 years back in time suggest that the warm period that began in the 1920s raised southern Greenland temperatures to the same level as those that prevailed during the warmest intervals of the medieval warm period some 900-1300 years ago.