Geophysical Research Abstracts,
Vol. 10, EGU2008-A-05248, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-05248
EGU General Assembly 2008

Greenland Holocene temperatures obtained by differential diffusion studies

L. G. van der Wel (1), B. M. Vinther (2), S. J. Johnsen (2) and H. A. J. Meijer (1)

(1) Center for Isotope Research, University of Groningen, the Netherlands, (2) Centre for Ice and Climate, Niels Bohr Institute, University of Copenhagen, Denmark, (L.G.van.der.Wel@rug.nl, Tel: +31 50 3633428)

Stable isotope profiles from ice cores are affected by diffusion: in the firn stage the profile is smoothed mainly due to water vapour transport through the pores of the firn.

The degree of smoothing can be expressed as a diffusion length and is a function of several parameters such as temperature, density and porosity of the firn. $H_2^{18}O$ and $HD^{16}O$ have different diffusion lengths as a consequence of the different fractionation factors for the isotopes. The difference between them is a function of temperature and accumulation rate of the site of deposition after correcting for the total strain since pore close off. This gives the opportunity to use differential diffusion as a tool to determine past temperatures.

Based upon high-resolution deuterium and oxygen-18 measurements on two sections of the NorthGRIP ice core we will present independent estimates of the mean annual temperatures for the early Holocene and the little ice age.