

**Stable water isotopes on time scales from hours to decades at the new deep drilling site in NW Greenland - NEEM**

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We present here the first results to come out of the stable isotope program under the new deep drilling project in NW Greenland - NEEM. During the seasons of 2007, 2008, and 2009 shallow cores were drilled and precipitation and atmospheric water vapour were collected. From correlation studies on how well the water isotope record correlates with climate indicators we find that the water isotopes from the ice/firn cores are highly correlated with sea ice extent in the Baffin Bay region. This opens up for the possibility of reconstructing past sea ice extent in the Baffin Bay region before satellite remote sensing was introduced. Furthermore we surprisingly find that regional climate in terms of coastal temperatures are only very weakly correlated to the isotope content in the ice/firn. We furthermore also finds that the NAO signal is very weakly presented in the isotope record as demonstrated by climate models. Using the isotope record as a proxy for temperature we find that the mean annual temperature at NEEM as increased by ~3.0 degrees C over the last 40 years. From the precipitation samples, which were collected on event and sub-event basis, together with the collection of atmospheric water vapour we learn that the large majority of the water vapour comes from the local snow surface and not from external sources. This finding indicates that a large exchange of water is occurring between the snow surface and the lower part of the atmosphere. Such an exchange could have a large effect on post depositional processes affecting the climate signal as it is being buried in the firn. We use simple distillation modeling of the water isotopes measured in the precipitation and the mean annual cycle. From this we obtain information on the source region of the moisture and the processes governing the formation of the snow crystals. Based on our results there are indications that the super saturation function might need to be updated.