



How does sea ice influence the isotopic composition of Arctic precipitation?

Anne-Katrine Faber (1), Bo Vinther (1), Jesper Sjolte (2), and Rasmus Anker Pedersen (1)

(1) Centre for Ice and Climate, Niels Bohr Institute, University of Copenhagen, Copenhagen, Denmark, (2) Department of Geology, Lund University, Lund, Sweden

Stable water isotope records from Greenland ice cores have been used extensively to reconstruct regional past climate variations. Measurements of vapor and snow samples on the Greenland ice sheet have shown that the isotopic composition of precipitation is an integrated signal of several regional climate variables rather than a unique proxy for local changes in temperature. In order to improve our knowledge of past climate changes an improved understanding of the regional climate variations on the isotope signal is essential.

Here we investigate the influence of variations in sea ice cover on the isotopic composition of precipitation in present-day Arctic. We use the model isoCAM3, an isotope-equipped version of the National Center for Atmospheric Research Community Atmosphere Model version 3. Four simulations and one control simulation are performed with prescribed SSTs and sea ice using ERA-Interim data. Each of the four runs simulates the atmospheric and isotopic response to Arctic oceanic conditions for selected years within the satellite era (1979-2013).

Results show that the isotopic composition of Arctic precipitation is sensitive to changes in sea ice extent, with reduced ice extent causing more enriched isotopes and vice versa. Results also show that different configurations of sea ice cover yield different distributions of the isotopic response. However, the effects of the sea ice anomalies on the modeled isotope ratios in precipitation over the Greenland ice sheet are negligible.