Geophysical Research Abstracts
Vol. 14, EGU2012-13284, 2012
EGU General Assembly 2012

Tracing isotopes through ice: Integration of passive tracers in a three-dimensional ice sheet model

J. Sutter, G. Lohmann, M. Thoma, D. Barbi, and M. Werner
Alfred-Wegener-Institute for Polar and Marine Research, Bremerhaven, Germany

Isotopic distributions conserved in ice cores provide valuable information about past climate. Isotopes like ^{18}O, included as passive tracers into ice sheet models visualize transport of the surface signal into the ice sheet interior and reveal isochrones in the ice sheet. The integration of passive tracers is pursued in the three-dimensional ice sheet model RIMBAY based on Pattyn (2003). As a first step, the Greenland and Antarctic ice sheet models are driven by simple parameterizations of temperature, precipitation as well as ^{18}O for the last glacial cycle. The ^{18}O signal of the ice core simulated within the model is compared to ice core reconstructions. As a next step, the ice model is driven by an atmospheric circulation model equipped with an explicit isotopic water cycle. We pursue an evaluation of the potential of the model to derive regional characteristics of accumulation through statistical downscaling. Our results are compared to long-term instrumental data as well as reanalysis data sets. We propose that our approach based on the isotopic distribution in polar ice sheets provides a valuable tool to investigate past circulation changes.