Abstract ID : **178**

Simulating the effect of post-depositional exchange processes on the climate signal recorded in ice cores using a regional and a global isotope-enabled model

Content

In recent years, observations have documented that the isotopic composition of the initial snowfall changes due to post-depositional processes during the time the surface snow is in contact with the atmosphere. However, it is still unclear which role these post-depositional processes play in the formation of the climate signal recorded in ice cores. To constrain the consequences of this post-depositional change, we simulate the change of the snow isotopic composition caused by water vapor exchange at the surface of the Greenland Ice Sheet by combining vapor and snow isotopes from the global climate model ECHAM-wiso with high-resolution water vapor flux simulations from the regional climate model MAR for the current climate (2015-2020, ERA-5). Our results show that water vapor fluxes have the largest impact on the snow surface isotopes during summer, when the water vapor exchange is a major driver of the surface mass balance of the interior Greenland Ice Sheet. We trace the isotopic signal formed at the surface by vapor exchange processes through the uppermost meter of a snowpack simulation and estimate the total effect that water vapor exchange processes have on the climate signal imprinted into the firn below. We show that in addition to the intermittent climate signal captured in snowfall, water vapor fluxes imprint a continuous climate signal into the surface snow. Understanding how the role of water vapor exchange processes varied throughout the past climate is key for interpreting isotopic records from ice cores more accurately.

Primary authors: DIETRICH, Laura J. (Geophysical Institute, University of Bergen); STEEN-LARSEN, Hans Christian (University of Bergen); FETTWEIS, Xavier (University of Liège); WAHL, Sonja (University of Bergen, Alfred Wegner Institute); WERNER, Martin (Alfred Wegener Institute (AWI))

Presenter: DIETRICH, Laura J. (Geophysical Institute, University of Bergen)

Track Classi ication: Progress in proxy development and interpretation