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Quantifying the role of post-depositional processes on the isotopic composition of surface snow – new findings from the SNOWISO project

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The goal of the SNOWISO project is to quantify the role of the post-depositional processes, which are influencing the isotopic composition of the surface snow and hence the ice core water isotope climate signal. Here we are reporting on findings from field campaigns carried out at EastGRIP over the four summers 2016-2019. We have collected a suite of observations containing the isotopic composition of the surface snow and the snowpack, together with direct observations of atmospheric water vapor isotopes and fluxes between the snow surface and the atmosphere. To support the analysis of the isotopic data we also collected meteorological observations comprising of atmospheric temperature and humidity gradients alongside with sub-surface and snow surface temperature along with atmospheric temperature and humidity gradients. With this dataset we are able to document significant changes in the snow isotopic composition, which are driven by post-depositional processes. The changes in the snow surface isotopic composition is observed to occur on time scales ranging from diurnal to several days. The changes in the snow surface isotopic composition is observed to occur on time scales ranging from diurnal to several days. We can show that the changes in the snow surface is consistent with the flux of the isotopologues between the snow surface and the atmosphere. This gives us confidence that we will be able to develop parameterizations of post-depositional effects, and model their influence on the ice core isotopic climate signal.