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Interpretation of water isotopic records from shallow cores drilled in Adelie Land (ASUMA project)

Content

While water isotopic records from polar deep ice cores are usually interpreted in terms of local temperature, the isotopic signature recorded in shallow cores from Adelie Land (coastal East Antarctica) is less straightforward to decipher (Goursaud et al. 2017, 2019; Leroy-Dos Santos, PhD 2021). The isotopic signal recorded in firn cores in this region characterized by strong katabatic winds includes the combined effects of precipitation intermittency, blowing snow and redistribution, as well as sublimation. Nonetheless these firn cores are our tool to reconstruct the recent past climatic trend and variability in this area where meteorological monitoring is very sparse and recent. This will improve our understanding of the atmospheric water cycle and our estimation of the surface mass balance, a necessary step towards reliable modeling of their future evolution.

The ASUMA project permitted to drill several replicate shallow cores at different locations from coastal area to the plateau in Adelie Land. We present here the water isotopic profiles from firn cores (main ice core of 40-50 m, covering about a century, and two 20 m companion cores) drilled in 2016-2017 at two sites along the slope of the plateau, at 1500 m and 2500 m of altitude, 150 km and 420 km inland, respectively (so called "D47" and "Stop0"). This allows 1) to infer the signal-to-noise ratio, get rid of the noise associated to local variability and extract the most meaningful climatic signal and 2) to address the regional climatic variability.

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