High-precision profiles of water isotopes in snow-cores measured by CFA; assessment of limitations and technical improvement

Content

Due to the low Signal-to-Noise ratio, in areas with low accumulation rate of snow the climatic component of isotopic records in the upper-meters of the firn column is still poorly inferred. However, statistical studies via extended arrays of vertical profiles have demonstrated improving the understanding of the formation, storage, and propagation of the isotopic signal in the snowpack. In order to cope with the numerous analyzes needed, in this study we modify a Continuous Flow Analysis system to analyze snow-cores. Such technique of analysis requires a careful measurement strategy due to the low density of the samples considered. We quantify the smoothing of the isotope signal and develop correction approaches, such as an improved Melt-Head which allows to match the analytical challenge of percolation imposed by these highly porous cores. The observed diffusion within the snow-cores during storage time in cold facilities underlines the need of near-time analysis using such a development.

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