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Deposition of Organic Compounds on Alpine Snow

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Currently, little is understood about the deposition and re-volatilisation of organic matter (OM) in snow. Understanding this balance for individual organic compounds has the potential to provide important information about present and past atmospheric conditions. This research investigates in detail the deposition and re-volatilisation rates for specific atmospheric OM that are present in alpine snow. Captured in the blank canvas of snow, any dissolved organic matter (DOM) in surface snow will reflect the relative abundances in the atmosphere once their deposition and re-volatilisation rates are known. Likewise, DOM effectively preserved in glacial ice will also express relative atmospheric composition of past climates. A recent pilot study by D. Materić et al.[1] investigates the post-precipitation change of OM in snow near the Sonnblick Observatory in the Austrian Alps. Using proton transfer reaction mass spectrometry, surface snow samples taken over several days were analyzed, and any organics found were grouped by their similar dynamics. This research expands on this study by analyzing snow samples over a larger spatial domain around Sonnblick during the course of five days in conjunction with long-term snow sampling currently underway at the observatory. Together, analysis of these samples will reveal changes in OM in surface snow over the course of the entire melt season. This research also considers both filtered and unfiltered snow samples to differentiate and identify OM of different sizes that are present within each sample. Long-term measurements of post-precipitation OM in surface snow will provide more coherent trends for deposition and re-volatilisation rates of organics, which can be used to tie future measurements of DOM in surface snow to atmospheric OM.