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# Microscale distribution of major ions in snow

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Impurity records of an ice core are used as a proxy for past climate change. However, the processes leading to the embedding of chemical compounds are not completely understood: The compounds from the atmosphere are deposited on the ground during snowfall. If the snow does not completely melt, like on polar and alpine glaciers, the impurities will be preserved in the snowpack and later incorporated into the glacier ice.
Especially the recrystallization of the snowpack during metamorphism processes can cause a redistribution of embedded compounds. We therefore investigated the transport of major ions of (NH4)2SO4, NaF and CaCl2 in the dynamic snow.
In an elution experiment, chemically homogeneous ice droplets were metamorphosed and rinsed with zero-degree water to determine the redistribution of ions. Hereby, we concentrated on the accumulation of ions on the surface of the ice crystals and their inclusion in the ice. This experiment was repeated with natural snow from a field site above Davos, Switzerland. Further, from January to June 2017, we monthly sampled the vertical distribution of major ions in the natural snowpack at the same field site.
First results show a strong separation of the ions during snow metamorphism. The concentration of sulfate and calcium on the outside of the ice crystals increased of up to 6 times with storage time. This project is a joint project between the Paul Scherrer Institute (PSI) and the WSL Institute for Snow and Avalanche Research (SLF).

## Significance statement

Impurity records of an ice core are used as a proxy for past climate change. However, the processes leading to the embedding of chemical compounds are not completely understood: Metamorphism processes in snow can cause a redistribution of embedded compounds.

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