

Title:

Characterisation of microbial communities of seasonal snowpack in the Swiss Alps

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Abstract (300 words maximum): :

Snow is an interface between the ground and the atmosphere, accumulating dust, microorganisms and other biological particles. The microorganisms can originate both from local sources and transport over long distances, depending on seasonal and meteorological conditions. The origin of microorganisms in the atmosphere varies greatly with geography and might include different aquatic, terrestrial, animal, and plant surface sources. Snow microbial communities have a unique composition that varies with geographical location. As adjacent alpine valleys are affected by the same atmospheric events, the variations in community composition of the surface snow come from variations in short-distance transport and variations in snow accumulation patterns, with differences in elevation and terrain features. The objective of the study is to assess microbial community composition in the snowpack of three Swiss alpine valleys and distinguish potential ecological factors shaping microbial communities composition of snowpack in the Swiss Alps.

To achieve this, we collected snow samples from 19 sites located in three valleys in the Valaisan Alps (Val Ferrert, Val de Valsorrey, Val de Bagnes) at elevations ranging from 1798 to 2578 m.a.s.l. Sampling took place on April 18-19, 2023. For each site, we collected the top 2 cm of snow and mixed underlying bulk snow (15 cm). All samples were collected in triplicates (N = 114). Snowpack microbial community structure and diversity were assessed using full-length 16S rRNA sequencing. Bacterial abundance in the snow was estimated with the flow cytometry, and CFU counts of culturable microorganisms were calculated using M9 and R2A agar plates after a one-month incubation at 0°C. In addition, 110 cold-adapted microorganisms were isolated from the samples, and the genomes of five isolates were fully sequenced.