

## Dust on Snow Impacts to Alpine Areas

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### ABSTRACT

Dust is transported onto snow covered regions either via wind redistribution or from the atmosphere during a snowfall event. Dust particles carry microbial and chemical signatures from the dust source region to the deposition region. Microorganisms become incorporated into, and can greatly alter, snowpack physical properties including snow structure, pore structure, and resulting radiative and mechanical properties. These processes affect the surrounding hydrology on a macro-scale. In this interdisciplinary study, we examine microbial deposition on alpine snow through dust transport and the effects this deposition has on the snow matrix with the goal of further understanding microbial-associated dust-dependent melt effects on snow melt and snow strength predictions. Our research objectives are to examine the provenance of the dust and associated microorganisms found in the snowpack during the spring of 2017 during a period of widespread dust deposition events. We used molecular techniques to assess the microorganisms present in the samples and found that location is a driving factor of the snow microbial community, and that specific dust deposition events, originating from slightly different locations, can result in different microbial presence in the deposited snowpack. Microstructural analysis of the dust within the snow matrix suggests that for the case of the merged snow layer from late April that dust resides at the snow/pore interface so that it is open to air for respiration. We found that dust characteristics varied with site and that dust was generally located on the exterior of snow grains.

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