THE INFLUENCE OF A DUST EVENT ON SNOWPACK CHEMISTRY

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In mid February 2006, windstorms in Arizona and Utah distributed a layer of dust across the surface of the snowpack throughout much of the Colorado Rockies. The 1-2 cm thick aeolian deposit formed a distinct stratigraphic layer that remained visible throughout the winter. We studied the influence of the dust event on snowpack chemistry and stratigraphy at multiple sites in northern Colorado. We quantified the dissolved inorganic constituents of snow collected in precipitation collectors during the event, of snow isolated from the dust layer and of cores that sample the dust layer within a composite of the entire snowpack. At the Fraser Experimental Forest, we compare precipitation and snow cores associated with the dust event to fifteen-year precipitation and snow core chemistry records. With the exception of H+, ion concentrations (NH4+, Na+, K+, Mg2+ Ca2+, Cl-, SO42-, NO3-) in dust event precipitation were higher than bulk or wetfall collected before or after the event. Wetfall pH increased by three units to 8.1 during the event, and then declined to pre-event levels. The chemical composition of dust layer snow also differed markedly from snow deeper or shallower in the pack. Typical of clean Rocky Mountain snow, acid neutralizing capacity (ANC) of deep and shallow snow was negative; in contrast, eq L-1. The conductivity of dust layerμdust layer ANC reached as high as 170 snow was 3.3-fold higher than earlier or later snow on average and pH was 1.8 units higher. The chemical signature of the dust layer was evident in 1m deep cores collected in subalpine and alpine areas at Fraser. For most constituents, post-event cores differed from long-term snow chemistry, however for some anions, differences occurred only in the alpine. We will also monitor if this dust event modifies Fraser streamwater relative to average snowmelt chemistry.

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