

Snowcover Variability Due to Wind & Rangeland Shrub Interactions in North Park, Colorado

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Abstract. Snowpacks in high-altitude plateaus, such as North Park, Colorado, are subject to dramatic changes in depth and area on large and small scales. The shallow depth of snow cover enhances the effects of albedo-induced melt. Over a winter the snowpack can completely disappear and re-accumulate several times. Low night temperatures can help prolong a persistent shallow snowpack late into the spring. Wind contributes greatly to the variability of snowcover in this environment where the terrain is relatively flat and vegetative cover is small. The variability of the ground cover density and profile height provided by shrubs creates numerous, random depressions and isolated voids that can capture blowing snow. Spatial variability in snowpack cover can be observed between areas with different densities of vegetative cover. Dramatic snow drifts can appear behind larger shrubs due to high wind velocities.

Differences in albedo among varying densities of ground cover become most apparent during the initial accumulation and during snowmelt. These differences are also associated with variability in snow present: early in the snow season snow depths can be greater around shrubs while late in the season these depths can be less than the surrounding open areas. Early season snow depths can be misleading due to void space under more dense branches that have become prone due to the overlying snow mass. To assess net accumulation and snowmelt patterns, albedo, snow depth, and snow density were measured within and between two rangeland shrubs species, in particular big mountain sage (*Artemisia tridentata*) and cinquefoil (*Potentilla fruticosa*).