Variability Among Snow Course and Snow Telemetry Measurements Across Colorado

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Abstract. The United States Department of Agriculture has been collecting snow data since the mid-1930s. These data were originally biweekly or monthly snow course measurements of snow depth and snow water equivalent (SWE) taken at 10 to 15 stations over a 100 to 300 meter transect. These data were reported as average snow depth, SWE, and density for a particular date. In the 1970s, numerous automated snow telemetry (SNOTEL) sites were established that report daily SWE.

Recent research efforts into the spatial distribution of snow data have used variogram and related analyses to understand the correlation structure of the data including the fractal characteristics. Focusing on the measurements, this paper examines the spatial structure at the transect scale for snow course data and at a larger scale for SNOTEL data. Different years of snow accumulation patterns are investigated for April 1 SWE at five snow courses and for five SNOTEL stations operating across the state of Colorado. Results from using all SNOTEL stations are compared to grouping stations based on annual accumulation patterns derived from a cluster analysis. The spatial structure of the SWE data are consistent temporally and to some extent across scales.