

Measuring Snowpack Sublimation in the Upper Colorado River Basin using the Bowen Ratio Energy Balance Method

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Abstract. In the western United States, where most precipitation falls as snow, the majority of annual streamflow originates from seasonal mountain snowmelt. Thus, quantifying key components of the water balance in these high elevation regions is important for improving hydrologic models used for forecasting water availability. The transfer of water from land to the atmosphere through snowpack sublimation is thought to be an important, but poorly quantified, component of the water balance. Moderate resolution models providing estimates of snowpack sublimation, such as the NOAA SNOW Data ASSimilation (SNODAS) model, may provide a path to improved basin-scale water balance calculations, however few ground-based sublimation measurements are available for model validation. Of the few turbulent flux measurements made over snow, most have been obtained using either the eddy covariance or aerodynamic profile methods. The Bowen ratio energy balance method, common for calculating evapotranspiration, is simple in theory and instrumentation requirements but has seldom been used to calculate water vapor fluxes between the snowpack and atmosphere due to the challenge of measuring internal snowpack energy storage. In this study, we use the Bowen ratio energy balance method to monitor sublimation at two sites within the Upper Colorado River Basin, Colorado, during the 2012 and 2013 water years. This presentation will outline both the strengths and weaknesses of the Bowen ratio method for measuring snow sublimation and provide results from the ground-based measurements of sublimation within this region.