

Soil moisture variability beneath a melting snowpack

Ryan W. Webb¹ and Steven R. Fassnacht²

¹Department of Civil and Environmental Engineering, Colorado State University

²Department of Ecosystem Science and Sustainability, Colorado State University

Abstract. The melting of the winter snowpack often enters the soil surface prior to flowing to a stream. Spatio-temporal variability in snowmelt infiltration can impact lateral and vertical hydraulic gradients. Previous snow hydrology modeling efforts often model the snowmelt as a uniform precipitation (or input to the soil) event, which this is known to not be the manner which snowmelt actually occurs. To model the hydrologic processes occurring at the site, variable surface boundary conditions are necessary and were investigated. The Dry Lake campground near Steamboat Springs, CO was selected to study the variability in which melting snowpack infiltrates the soil. The Dry Lake study site contains a small watershed of approximately 0.2 km², and ranges in elevation from 2510 m to 2690 m containing deciduous and evergreen forests, and open grasslands. Both a Remote Automated Weather Station and Snow Telemetry site lie within the Dry Lake study site and provide meteorological, snow, and soil moisture and temperature data. During the spring of 2013, the variability in the snowpack was surveyed along with soil moisture beneath the snowpack. A time domain reflectometer was used at the bottom of snowpits and gravimetric samples were collected for calibration at the freezing temperatures. The results of the survey show the variability in the soil moisture and implicated infiltration variability which occurs. Such results may be used to improve modeling efforts through the inclusion of variable surface boundary conditions.