

Rainfall and Snowmelt Rates at Montane Elevations across the Southern Rocky Mountains, U.S.A.

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Abstract. Erosion in forested areas has been observed to occur when ground cover is less than 35%, and much of the sediment movement is attributed to rainfall on unpaved roads. However, most of the existing studies have focused on elevations lower than 2300 meters, where summer convective events are the main source of large precipitation events. At higher elevations, snow is the dominant phase of precipitation and snowmelt is the main source of streamflow. Daily snow water equivalent (SWE) and precipitation from 90 automated Natural Resources Conservation Service (NRCS) snow telemetry (SNOTEL) stations were analyzed for the Southern Rocky Mountains (southern Wyoming, Colorado and northern New Mexico). The annual time series from stations with at least 27 years of record (1987 to 2013) were used; these stations are located at elevations between 2300 and 3500 meters. The maximum daily precipitation for the entire year, the maximum daily rainfall when no snow was present on the ground, and the maximum daily snowmelt from the decrease in SWE were used to determine the 10 year 24-hour and 100 year 24-hour events for three types of water input for erosion (using the Pearson Type III probability distribution). At most locations daily snowmelt contributed significantly more water to the mountain hydrological system than rainfall, and the annual maximum daily precipitation often occurred during the accumulation period. These estimates of snowmelt and precipitation were up to twice as much as those from the NOAA Atlas 14 precipitation frequency estimates.