

Computational time step of winter water balance for snow losses at United States meteorological stations

Steven R. Fassnacht

Watershed Science Program, College of Natural Resources, Colorado State University

Abstract. When estimating the water balance for a cold region watershed, i.e., one that receive a substantial portion of its annual precipitation as snow, accumulation and other winter hydrological processes must be considered. For many of these watersheds, all but the most fundamental meteorological data, i.e., temperature and precipitation, are either not measured, or not measured at a reasonable time step. Of particular importance are wind data, as wind influences losses of snow from the snowpack, specifically, gauge undercatch, snowpack sublimation, and the occurrence and magnitude of blowing snow.

This paper examines the variation in computed snowpack mass losses using data at hourly, daily, monthly and seasonal time steps. Trace events are important for determining input precipitation, and their significance at hourly and daily time steps are examined. Finally, the relative rate of gauge undercatch is compared to sublimation and blowing snow losses together with monthly average climatological data to attempt to generalize the ratios. These snowpack losses are considered at six National Weather Service sites.