Quantifying Precipitation Undercatch in a Citizen Scientist Weather Observation Network

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ABSTRACT

Precipitation undercatch is a phenomenon that occurs when the precipitation measurement taken from the gauge is less than the true amount of precipitation. Many studies have analyzed this, but few have estimated undercatch values for 4" rain gauges. The goal of this project was to analyze what factors contribute to significantly greater undercatch and to derive adjustment formulas that estimate gauge undercatch in 4" rain gauges. Using data collected from the Community Collaborative Rain, Hail, and Snow Network (CoCoRaHS) database, I compared the daily snow water equivalent (SWE) measurements taken from a 4" gauge to daily SWE measurements taken from a snowboard – a flat, white surface placed on the ground. Snowfall catch efficiencies can vary greatly from station to station, ranging from around 25% to above 90%. A catch efficiency means that for every inch of precipitation, a rain gauge will measure that percent of an inch of precipitation. After dividing the measurements into categories based on variables that could affect undercatch (wind, season, temperature, year), I concluded that wind and temperature significantly decrease catch efficiency. Adjustment formulas were derived to quantify undercatch. These results and formulas provide empirical data that can quantify gauge undercatch.

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