A (Simple) Probabilistic Approach for Solid Precipitation Undercatch Adjustment

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ABSTRACT

The undercatch of solid precipitation is bound to the uncertainty of the gauge's measurement. This is recognized as a complex phenomenon, which is often adjusted using deterministic transfer functions depending mainly on wind speed and air temperature. The deterministic approach cannot consider or quantify the uncertainty inherent to each meteorological event. This presentation proposes an original mix between calibration of deterministic equations and probabilistic application that enables: i) to quantify the error and variance related to the precipitation gauge measurement ; ii) to validate that error and variance both increase with the wind speed when recording solid precipitation events ; iii) to rank the wind shield types efficiency for different wind speed levels. Data comes from the Neige meteorological station hosted in Montmorency Forest, from 2014 to 2018.

The data, collected automatically and manually by several gauges, are aggregated by type of windshields (Bush, single-Alter, double-Alter, Tretiakov, Nipher, and unshielded devices). Results showed first that the unshielded dataset seemed not large enough to be considered representative of the solid precipitation undercatch phenomenon. Second, 70% (standard deviation ± 3%) of the adjustments made using the probabilistic method corresponded to the reference.

Finally, non-adjusted and adjusted solid precipitation data are implemented in 20 hydrological models, revealing the impact of the adjustments on hydrological simulation and water balance over a boreal watershed. Hydrometeorological data used for validation comes from the Bassin Expérimental du Ruisseau des Eaux Volées (BEREV) from 2003 to 2018.

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