The Application of Disdrometers and Present Weather Detectors to Improve the Automated Measurement of Solid Precipitation

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ABSTRACT

There are many advantages for automating precipitation measurement including remote operation, cost efficiencies, and increased measurement frequency that may not be realized with manual observation practices. However, the unsupervised observation of precipitation often increases the level of uncertainty in regards to quality assurance. In addition, key precipitation parameters, such as precipitation type, are unobserved. Popular automated all-weather weighing gauges used in cold regions generally depend on user-defined signal processing or require the user to trust on-board proprietary filtering algorithms to determine interval precipitation amount from bucket weight differential. Either of these techniques can benefit from ancillary information derived from disdrometers or present weather detectors. Two disdrometers (one optical and one radar based) were installed at two Canadian precipitation supersites (the Bratt's Lake and Caribou Creek Solid Precipitation Inter-Comparison Experiment sites) as a proof-of-concept for Environment and Climate Change Canada's (ECCC) operational networks and to support ongoing instrument intercomparison efforts. Although no practical automated reference exists at these sites to assess the accuracies of the two disdrometers, an ensemble approach incorporating the Double Fence Automated Reference (DFAR) for solid precipitation measurement is used to show their capabilities for improving precipitation detection, removing false precipitation reports, and deducing precipitation type for calculating rain:snow ratios and applying wind-bias transfer function adjustments.

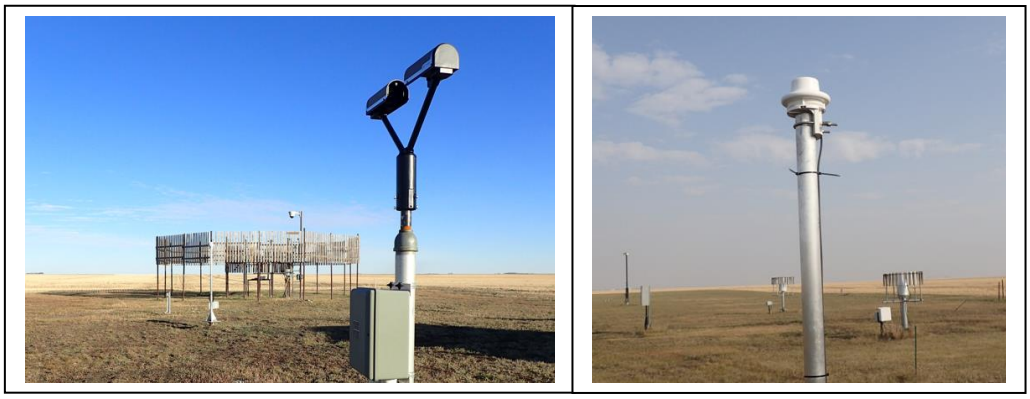

Figure 1. Two disdrometers installed at the ECCC Bratt's Lake precipitation intercomparison supersite in Southern Saskatchewan Canada. Left: OTT Parsivel[2] optical disdrometer with the DFAR in the background. Right: Lufft WS100 Doppler radar disdrometer.

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