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Undercatch of Tipping-Bucket versus Vibrating-Wire Accumulations in High Rain Rate Events

C. E. Duchon and C. J. Biddle
University of Oklahoma, School of Meteorology, Norman, OK USA

We examine the differences among rainfall accumulations for high rain rate events from three gauges: a Geonor T-200B vibrating-wire weighing gauge with a 16 cm (6.3 in) collection diameter and two MetOne tipping-bucket gauges with 30.5 cm (12 in) diameters. The Geonor gauge and one tipping-bucket gauge are located in a pit such that their collection orifices are positioned about 1 cm above the surrounding anti-splash material at ground level. Thus the measured rainfall accumulation is minimally affected by wind speed. The other tipping-bucket gauge is located 105 m from the two gauges in the pit and is enclosed by an Alter-type slatted wind screen. Its collection orifice is positioned 1 m above ground level.

The results from numerous cases of high rain-rate events show that the tipping-bucket gauges systematically underestimated storm event rainfall totals relative to the weighing-gauge when 1-minute rain rates exceeded around 50 mm/h (2 in/h). We will show time series of differences in rain rates among the three gauges during high rain rate events. A procedure will be introduced this year to correct the undercatch of the tipping-bucket gauges based on time between successive tips, for which verification will be rainfall accumulation from the Geonor weighing gauge.

High wind speed also results in undercatch by the aboveground tipping-bucket gauge. As time permits, we will show time series of three-way comparisons of rain rates for high wind rain events using measurements in the pit as the reference.