Derivation of a Transfer Function For a Precipitation Gauge within a 16 Inch Single Alter Shield

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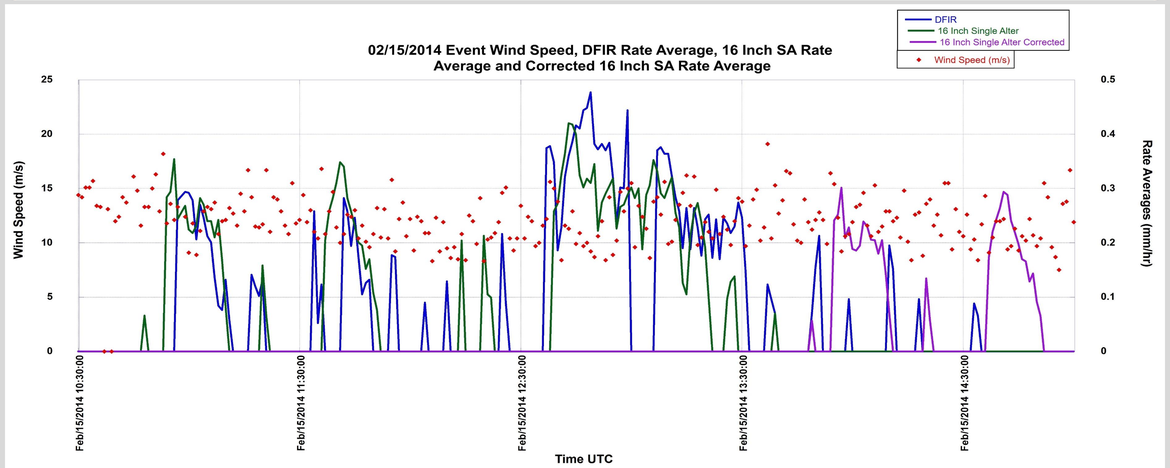
Introduction

Precipitation is an exceptionally difficult meteorological parameter to measure accurately. However, it is crucial for proper reporting of precipitation for use in weather reports, road and airport safety, water resource management, agriculture, and more. High wind speeds can blow precipitation horizontally relative to measurement gauges and cause bias in reporting. One way to improve the accuracy of measurements is with a transfer function tailored to a specific precipitation gauge and wind shielding combination. In this study, a transfer function that accounts for precipitation lost due to high wind speeds was derived for a Geonor weighing bucket precipitation gauge within a 16 inch Single Alter shielded gauge.

Methods

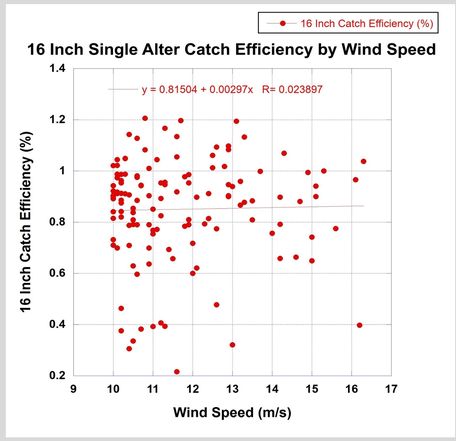
- Data from a gauge within a 16 inch shield and a gauge within a DFIR as well as wind speed data from instrumentation at NCAR's Marshall field site was analyzed.
- Events that met the criteria for high wind events, sustained speeds of 10 meters per second or more for more than one minute, were parsed into a new data set.
- Next, the difference in catch amounts between the gauges in the DFIR and the 16 inch SA gauge were compared.

Data and Results



Analysis

- The rate averages for the 16 inch SA gauge were then converted into percentages relative to the DFIR gauge as the reference gauge.
- The data was then plotted as a function of wind speed, and a linear curve fit was applied.
- The resulting equation from this curve fit was used to derive the final transfer function.



Conclusions

Although a working transfer function was derived, when applied to case studies it unfortunately did little to correct any precipitation bias. This is likely due to precipitation rates for both gauges being too variable due to turbulence affecting precipitation collection in both the DFIR and 16 inch Single Alter shielded gauges. Future work could include analysis of data over a longer period to refine the transfer function and attempt to make it more effective.

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