

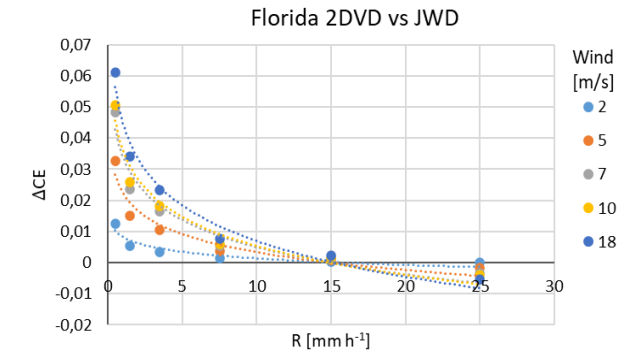
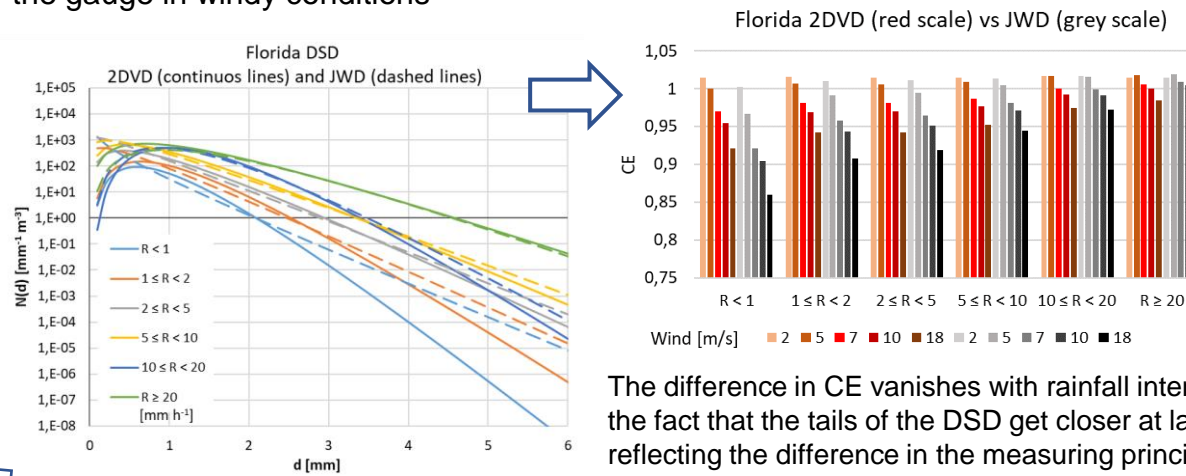
The link between the drop scale, high resolution measurements and precipitation estimates at the catchment scale

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- Precipitation measurement biases propagates through the hydrological modelling chain and may result in significant errors in assessing the forcing input of hydrological processes at the catchment scale
- Measurements taken at high temporal resolution allow to limit the impact of instrumental biases, while wind-induced biases also affect precipitation gauges, depending on the design of their outer shape
- The Collection Efficiency (CE) of catching type precipitation gauges is a function of wind speed and the microphysics of individual drops, and the Drop Size Distribution (DSD) therefore controls the response of the gauge in windy conditions

The same catching-type gauge can perform quite differently in different climatology and/or under various microphysical structures of the rain process.

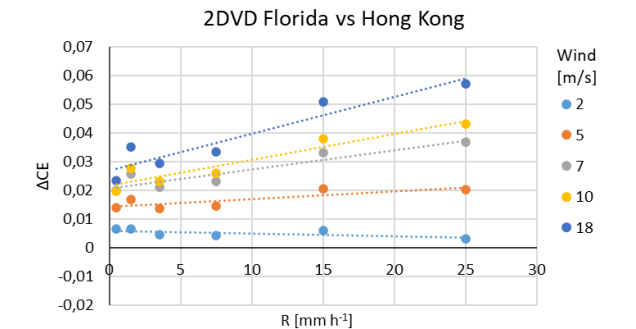
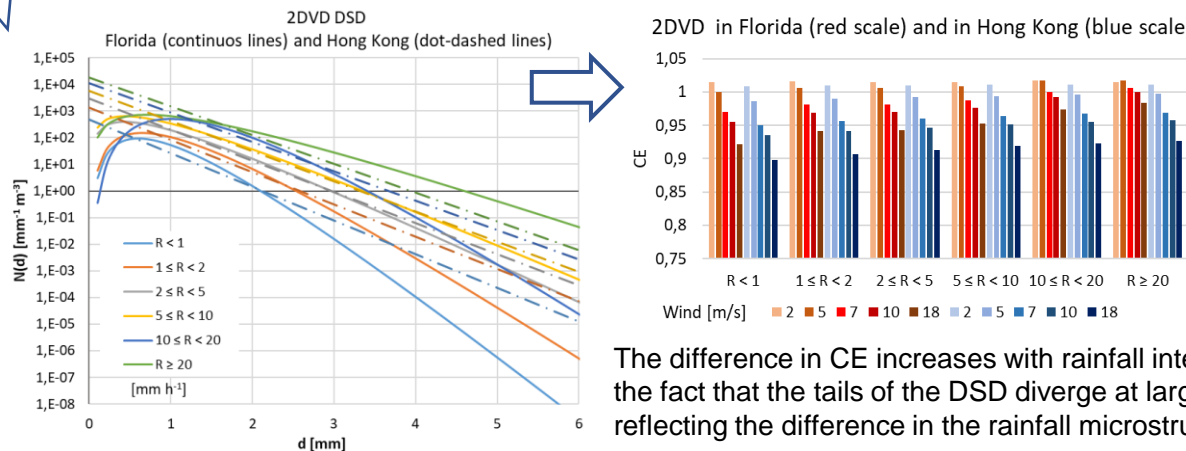
We assume the catch ratios of a cylindrical catching type gauge per each individual diameter are provided by CFD simulation and a particle tracking model as in Cauteruccio and Lanza (2020).



The difference in CE vanishes with rainfall intensity, i.e. with the larger diameter fraction, reflecting the fact that the tails of the DSD get closer at large R , while they differ in the small diameter fraction, reflecting the difference in the measuring principle adopted.

We calculate the CE based on the DSD for two sample conditions:

- Same location (Florida) but two different principles for the DSD measurements (2DVD and JWD)
- Same measuring principle for the DSD (2DVD) but different locations (Florida and Hong Kong)



The difference in CE increases with rainfall intensity, i.e. with the larger diameter fraction, reflecting the fact that the tails of the DSD diverge at large R , while they still differ in the small diameter fraction, reflecting the difference in the rainfall microstructure at the two sites.