



## **Capturing the wind-induced rain drop trajectory deviations in dedicated wind-tunnel experiments**

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Catching-type precipitation gauges are affected by wind-induced undercatch due to the modification of the airflow around the gauge body. The wind speed-up and updraft above the gauge orifice induces variations of the particle trajectories and, in some cases, leads them out of the measuring area; this produces an underestimation in precipitation measurements. The aerodynamic behaviour depends on the gauge geometry and impacts on the hydrometeors trajectory and on the resulting collection performance.

This study presents the results of the experiments conducted jointly by the University of Genoa and Politecnico di Milano (POLIMI) in the wind tunnel facility available at POLIMI within the Italian project PRIN 20154WX5NA “Reconciling precipitation with runoff: the role of understated measurement biases in the modelling of hydrological processes”. The objective is to quantify the effect of the aerodynamics on the particle trajectories above the gauge orifice of three different precipitation gauge shapes. The cylindrical and “chimney” shapes, typical of most common catching type gauges, were tested as well as the performance of an aerodynamic gauge with inverted conical shape. Water droplets were generated above and upstream of the gauge collector using a calibrated nozzle and a precision dispensing pump. A special backlight system was prepared in order to ensure the capturing of the drop trajectories while traveling close to the collector by means of a high-speed camera ( maximum speed in full resolution 600 frames per second, maximum frame rate 204100 fps ), equipped with 1600x1600 CMOS sensor and optical lens

The size of the dispensed droplets and the associated velocity were measured for different wind speed conditions. Trajectories were detected at 10 and 1000 frames per second. The results are presented in terms of deviations of the drop trajectory against the undisturbed one for each geometry and wind speed.