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# Towards Improved High-Resolution Image-Based Characterization of Hydrometers with Small Diameters

Martin Schwinzerl, Michael Schönhuber, and Günter Lammer
JOANNEUM RESEARCH Forschungsges mbH, DIGITAL, Graz, Austria (martin.schwinzerl@joanneum.at)

Distrometers are instruments employed in the measurement of precipitation, especially towards characterizing the statistical distribution of properties like volume, diameter, oblateness, fall velocity and shape. Ongoing advancements in the field of image sensors and camera systems allow the development of optical distrometers with higher spatial and time-domain resolutions (i.e. higher numbers of pixels per unit of length and faster scan rates) and conversely promise improved captures of particles with fine-grained features like snow-flakes or ice-needles and small rain drops with diameters in the range of 0.5 mm or even below.

In this publication, we will use modifications recently applied to the optical components of the 2D-Video-Distrometer (2DVD), manufactured and developed by JOANNEUM RESEARCH (JR), as an example of how the measurement of fine-grained or small diameter hydrometers is influenced by the introduction of such sensors with higher resolutions. The 2DVD system in question is based on two orthogonally arranged and vertically displaced high-speed line-scan cameras and allows the direct measurement of, among other parameters, shape/contour information on a per-particle basis. Procedures to further improve the quality of measurement for small scale objects in pre- and post-processing algorithms, illumination and calibration are introduced and suitable testing routines to assess the impact of these measures are described.

Subsequently, measurement results obtained by the 2DVD are compared with data sets captured by the 1D-Video-Distrometer (1DVD), a recently introduced and operationally simplified optical instrument also developed by JR. The 1DVD is similar in principle to the 2DVD but utilizes a single high-speed line-scan camera, thus requiring some modifications to the procedures outlined. The presentation is concluded with an outlook towards planed measurements involving non-liquid precipitation, most notably in the form of snow flakes.