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Evaluating the performance of collocated optical disdrometers: LPM and PARSIVEL

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Optical disdrometers are present weather sensors with the ability of providing integrate information of precipitation like intensity and reflectivity together with discrete information of drop sizes and velocities distribution (DSVD) of the hydrometeors crossing the laser beam sampling area. These sensors constitute a step forward in comparison with pluviometers towards a more complete characterisation of precipitation. Their use is spreading in many research fields for several applications. Understanding the differences from one another helps in the election of the sensor and point out limitations to be fixed in future versions. Four collocated optical disdrometers, two Laser Precipitation Monitors (LPM-Thies Clima) and two PARSIVEL, 1-minute measurements of 800 natural rainfall events were compared. Results showed a general agreement in integrated variables, like intensity or liquid water content. Nevertheless, comparing raw data, as the number of particles and DSVD, great differences were found. LPM generally measures more and smaller drops than PARSIVEL and this difference increases with rainfall intensity. These results may affect especially the reflectivity value every disdrometer provide. A complete description of the measurements obtained, quantifiying the differences is provided, indicating their possible sources.