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# Small-scale variability of the raindrop size distribution

Alexis Berne, Joel Jaffrain, and Marc Schleiss
EPFL, LTE, Lausanne, Switzerland (alexis.berne@epfl.ch, +41 21 693 8070)

The raindrop size distribution (DSD) is an important piece of information to understand rainfall variability. The DSD is controlled by the interactions between cloud microphysics and atmospheric dynamics. It is also crucial to quantitatively interpret measurements collected using remote sensing, and in particular by weather radar systems. The spatial variability of the DSD at small scales (*i.e.*, a few km) is not well documented and understood, mainly because of a lack of appropriate data. This variability and its structure in space and time are key factors for comparing observations/simulations at different scales taking into account the subgrid variability (*e.g.*, measurements vs model simulations) and for improving the conversion of radar observations into reliable rain rate estimates.

A network of 16 disdrometers covering a typical operational radar pixel ($1 \times 1$ km$^2$) has been designed and set up over EPFL campus in Lausanne, Switzerland, for about 16 months. The collected data set (with a temporal resolution of 30 s) is used to investigate the small-scale variability of the DSD. It is shown (i) that there exists a spatial variability within a typical radar pixel (which can not be solely explained by the sampling uncertainty associated with each disdrometer), (ii) that it is structured in space, and (iii) that it is different at point and pixel scales. This spatial structure must be taken into account when considering DSDs at different scales, in order to limit the uncertainties for example when comparing DSD measurements at point and larger scales or when using empirical power laws derived from point measurements to convert radar observations into rain rate estimates.