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The inter- and intra-event rain dropsize distribution variability of intense rain events in the Cevennes-Vivarais region, France.

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The Cévennes-Vivarais region situated in the southern part of France is prone to heavy and long lasting rainfall events which occasionally lead to severe flashfloods. In order to gain an improved understanding of these severe rainfall events the Cévennes-Vivarais Mediterranean Hydrometeorological Observatory (OHM-CV) has set up a rainfall observation system consisting of a network of three operational weather radars, a dense network of raingauges and a disdrometer situated at a distance of about 57 km from the nearest radar [Delrieu et al., 2005].
The current study extends the DSD analysis results obtained by Chapon et al. (2008) with almost 2.5 years of disdrometer data. For a series of intense rainfall events, Chapon et al. (2008) show that the intra-event characteristics of precipitation has a dominant effect on the Z-R parameterization compared to inter-event variability.
The study presented here applies the general scaling for raindrop size distributions as developed by Sempere Torres et al. (1994) which states that the different integral rainfall variables are related by power functions. For heavy rainfall, drop growth and breakup are balanced and a so called equilibrium condition occurs. As a result, characteristic raindrop sizes are constant and the different moments are proportional. Uijlenhoet et al. [2003] found this type of equilibrium conditions for rainfall intensities > 100 mm/h. In case of the Cévennes-Vivarais, analyzing the overall dataset shows that such equilibrium conditions already start to occur for intensities > 50 mm/h. It is relevant for the development of radar rainfall retrieval algorithms to find out how the different DSD properties (such as rain rate and radar reflectivity) are related to each other in such heavy rainfall events and how they change at different temporal aggregation scales and threshold values.
The next step considers the volume-scanning radar data and DSD measurements for a selected set of heavy rain events, in order to establish a link between the micro-physical properties of rainfall at ground level and radar reflectivities in the atmosphere. For this purpose, analysis of the vertical profile of reflectivity is conditioned on rain typing defined from both radar and DSD data.

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