



Scaling features of polarimetric radar parameters retrieved from 3 disdrometers and an X-band radar

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Rainfall fields exhibit scaling features over wide range of spatio-temporal scales. The only device providing high resolution rainfall fields in space and time is radar which does not measure rainfall directly. Here we suggest to investigate scaling features of quantities directly observed with polarimetric radars such as the horizontal reflectivity (Z_h) and specific differential phase (K_{dp}). Results will be interpreted in light of the commonly used power-law relations between these quantities and rainfall rate which interests hydro-meteorologist. DSD parameters such as the total drop concentration (N_t) and the mass-weighted diameter (D_m) will also be investigated

Two types of data from devices installed in the vicinity of Ecole des Ponts ParisTech are used: (i) outputs from three optical disdrometers of two different types (Campbell Scientific PWS100 and OTT Parsivel2) from which radar parameters are computed with the help of a T-Matrix code, providing 30 s time steps series since September 2013; (ii) outputs of a dual polarization X band radar (METEOR 60DX) installed in December of 2014, providing fields with a resolution of 100 m in space and 2.5 min in time.

Analyses are performed in the Universal Multifractal framework which has been extensively used to analyse and simulate geophysical fields extremely variable over wide ranges of scales. Only three parameters are used to characterize variability across scales: C_1 the mean intermittency, α the multifractality index and H the non-conservative exponent.

Event based analyses are carried out and it appears that the studied K_{dp} time series exhibit a unique scaling regime on the whole range of available scales (30s-2h) with UM parameters consistent with values reported in the literature for rainfall. The results are more contrasted for Z_h whose scaling is worse. The scaling of DSD parameters series only holds down to few minutes. Finally these results are compared with the observations in space provide by the X-band radar.

Authors acknowledge the financial support of the Interreg IV NEW RainGain project (www.raingain.eu) and the chair "hydrology for resilient cities" sponsored by Véolia.