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Interactive comment on "Data driven clustering of rain events: microphysics information derived from macro scale observations" *by* M. D. Dilmi et al.

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The authors present an interesting study on data driven clustering of rain events based on the analysis of characteristics related to rain rates or rain accumulation (macro physical information) and to the raindrop size distribution (microphysical information).

The research results are interesting, relevant and timely.

Some questions, and possibly suggestions for future work, are however presented hereafter:

1) the authors adopt a Minimum Inter-event Time (MIT) of 30 minutes. Did they perform any sensitivity of the presented results versus lower (15 minutes) and higher (60 and

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120 minutes) threshold?

2) a total of 23 indicators for macro physical description of rain events were defined, however the references provided in order to support their choices are rather limited. Please improve.

3) also the details provided about the 23 indicators computation are rather poor. Please improve

4) by checking the position of the test site, namely “Site Instrumental de Recherche par Télédétection Atmosphérique” (SIRTA1) in Palaiseau (France), i noticed that it is not far from the Trappes sounding site. Then i was wondering if the authors plan to explore possible relationship between the identified characteristics related to rain rates or rain accumulation (macro physical information) and to the raindrop size distribution (microphysical information) versus the vertical thermodynamical structure observed for the identified events in the period 2008-2014.

For example

Molini, L., Parodi, A., Rebora, N., Craig, G. C. (2011). Classifying severe rainfall events over Italy by hydrometeorological and dynamical criteria. Quarterly Journal of the Royal Meteorological Society, 137(654), 148-154.

For about 81 events, a time-scale for convective adjustment was computed, based on gridded hourly precipitation rates derived from rain-gauge data and ECMWF analysis (ERA-Interim) of convective available potential energy (CAPE). Values of the convective adjustment time-scale, τc, shorter than 6 h indicate convection that is responding rapidly to to the synoptic environment (equilibrium), while slower time-scales indicate that other, presumably local, factors dominate.

It would be interesting to see if and how a local convective adjustment time-scale (computed using Trappes data) is related to the results of this study.

5) in a recent paper

Bühl, J., Leinweber, R., Görsdorf, U., Radenz, M., Ansmann, A., Lehmann, V. (2015). Combined vertical-velocity observations with Doppler lidar, cloud radar and wind profiler. Atmospheric Measurement Techniques, 8(8), 3527-3536.

it is explored the potential of combined vertical-velocity observations with Doppler lidar, cloud radar and wind profiler.

In this respect, even if the sodar located at the Charles de Gaulle Airport is relatively far away (50 km), did the authors consider as possible to explore relationship (if any) between updraft and downdraft velocity versus the microphysical analysis performed in this study?

I would be very curious to test, in a real-word situation, the results we got years ago in these papers about the relationship between raindrop diameter and updraft velocities:

Parodi, A., Emanuel, K. (2009). A theory for buoyancy and velocity scales in deep moist convection. Journal of the Atmospheric Sciences, 66(11), 3449-3463.

Parodi, A., Foufoula Georgiou, E., Emanuel, K. (2011). Signature of microphysics on spatial rainfall statistics. Journal of Geophysical Research: Atmospheres, 116(D14).

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