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Atmospheric Measurement Techniques Discussions

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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This paper presents an analysis of a set of disdrometer data (from 2008-2014) processed to yield a 1 minute rainfall series. This was then grouped into 545 simple rainfall events using an inter-event time of 30 minutes (page 3 line 31). Half of the events were used for 'learning' using some grouping methods, and the other half for testing the grouping methods.

From the literature, 17 characteristics of rainfall events (such a duration, depth, or mean rainfall rate) were explored as criteria for characterizing events. Since some of the characteristics are correlated, the authors sought to identify a smaller set of more parsimonious variables that might be sufficient to characterise rainfall events.

In terms of method and approach, the paper seems to be generally sound and to employ useful methods that are well applied. An aspect that I found to be missing was a discussion of the purpose for which rainfall events might need to be characterized. After all, it seems reasonable to think that this should guide the selection of parameters that might be meaningful for particular applications. For instance, in hydrology, it is well known that rainfall events cannot be characterized adequately through the use of simple descriptors such as average rainfall rate or peak intensity. Rather, measures of the time-distribution of rain and no-rain periods within an event are important, as is the position of the intensity peak(s) within the event – either early or late, for instance. These characteristics in turn affect the partitioning of water when rain arrives at the soil surface (e.g., far more of the rain tends to become overland flow if the largest intensity peak occurs late in the rainfall event, and much less becomes overland flow if the intensity peak is early).

A useful typology of 5 classes of event emerges from the numerical analyses presented in the paper, and I thought that this formed a significant and useful contribution of the paper. The link to convective and stratiform precipitation is well explored. However, here again, I felt that material was missing that might have been included in the paper. For instance, orographic rainfall can exhibit very different characteristics from other forms of precipitation, such as convective rain. This can include very long event durations and very prolonged rain of consistent or rising intensity. The authors give the impression that they only recognize convective and stratiform rainfall as end members. Likewise, they don't consider rainfall over the oceans, which has some temporal characteristics that distinguish it from terrestrial rainfall. As a result, I felt that the authors should offer some caveats about the extent to which they argue that their approach and conclusions might, or might not, be more widely applicable than to the single geographical location (and rainfall climate) represented by their disdrometer data. These caveats should be reflected in the title of the paper, which should be less sweeping, and perhaps refer to stratiform and convective rainfall, and/or to the particular study region (France) and its particular rainfall event characteristics. Of course, the authors

also neglect seasonal and inter-annual changes in rainfall event character, and this also warrants mention and possibly some discussion. The authors seem to consider that their results are in some way definitive and universally applicable. I doubt this, and would like them to consider how their results might have changed had they used a larger data set, including data from different rainfall climates.

I recommend some minor revision to address the above points.

The written English could be improved in places. For instance, ‘criteria’ is the plural form; when referring to a single parameter the word to use is ‘criterion’ (singular). ‘Dysfunction’ (page 3 line 36) should be ‘malfunction’.

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