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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Temporal and spatial scaling impacts on extreme precipitation" *by* B. Eggert et al.

Anonymous Referee #2

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The paper deals temporal and spatial dependencies of precipitation in a data set derived from rain radar observations. This work is highly relevant and the analysis is done well (with exception of a few probably minor concerns as discussed below). The text is in general clear. However, considering that this is a rather advanced and difficult analysis, some more explanation might improve the readability for a more general public. Also the practical implications of this research in terms of the "optimal temporal resolution" were not always entirely clear, and may be improved or better explained. Overall I would like to stress that these points are relatively minor, and that I think this is very good paper, with lots of relevant information, which deserves to be published.

1. Considering that the average reader who is interested in this work (and this work has potentially many practical users) it would be nice to explain in general terms what a

self affine process is. The references mentioned deal with rather specific papers, with detailed mathematical analysis which are not easy to read, and general information on a self affine process was not specific enough. Finally, I understood this as a change from more linear precipitation structures at larger scales to more circular structures at small scales. If this is the case, or else, it would be nice to show this with a conceptual figure.

2. In general I have difficulties in understanding to concept of optimal resolution, and I also do not fully understand the implications for this in term of model resolution and model output. This may be my misunderstanding, but I think the manuscript may benifit from explaining a number of points more clearly. I few points where I am puzzled are:

* In the discussion, I do not see the points made at page. 2178, lines 12 to 20. I may have missed the point here, but you are arguing that the statistics of the 11 km, 5 minute output is similar to the statistics of 1 km and 25 minute output, right ? In general, there is a similarity between the statistics at different time and spatial aggregation as shown also in Figures 9 and 10. I agree to that, but I do not see the point that this implies that the combination of 11 km and 25 minutes is optimal. Optimal in the sense that it follows Eq. 6 appears a mathematical construct and I do not fully understand how these practical implications follow from this.

* Also, at page 2171 line 10 you are stating that the optimal temporal resolution of stratiform events should be 3.6 times higher resolved than in the original data set to yield consistency between temporal and spatial information. I am not sure what you exactly mean by this. Somehow this goes against intuition as stratiform events are characterized by both relatively small spatial and temporal dependencies.

* Finally, I do not understand why a_tilde (as defined in eq 6) is not 1, since the ARF and DRF are equal at the reference resolution (1 km, 5 minutes) by construction. Does this perhaps imply that the effective resolution of the rain radar data is not 1 km and 5 minute, or that there is a mismatch between spatial and temporal scale in the radar

data too. Is this what you want to say with Figure 6b? And is this also the reason why in Figure 9 the lower left point does appear to be an outlier (or is characterized by a very strong decay in pdf overlap at lower time and larger spatial resolution).

Minor points:

p 2163, l 27: I did not understand "convective together with mixed conditions"

p 2165, line 26 and further. This is a nice example of explaining why these statistics are similar. But, the argument of the propagation speed should not enter the spatial averaging in this simple example since the averaged intensity over the grid cell (as long as the cell is within the grid box, and this is only where the propagation speed is important) does NOT depend on the propagation speed (at any time the area of precipitation is 10x10 km).

p 2172, line 18. I thought the optimal temporal resolution is smaller (not larger) for stratiform events, which is what you get when dividing the two optimal curves.

Eq. 7: isn't there a root of b missing here?

p 2178, line 14: a model resolution of 11 km does not imply that precipitation at that scale is realistically simulated as you seem to imply here.

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 2157, 2015.