

Interactive comment on “Multifractal evaluation of simulated precipitation intensities from the COSMO NWP model” by Daniel Wolfensberger et al.

Anonymous Referee #2

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General comments

This study presents an analysis of simulated precipitation spatial and temporal variability in the context of universal multifractal analysis, examining the influence of topography and different microphysics schemes. The authors compare the results for both simulations and radar observations. The use of universal multifractals is intriguing and has the potential to advance the field of model evaluation and forecast skill. However, there are two major drawbacks to the manuscript in its current form: 1) the concept of multifractals is likely a bit abstract for the ACP audience, and so more care should be given in this work to conveying the physical meaning of the analysis, and 2) the results are presented in a very qualitative, lacking in depth analysis to explain differences other

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than a cursory observation that such differences exist. I do believe that this work has the potential to be a very good publication, although it will require quite a bit of effort on the authors' part.

Major comments

1) As noted above, universal multifractals is something not seen in most ACP publications. Thus, I would highly recommend a table outlining the variables of interest and how they are tied to the analysis. In the text, it would be very beneficial to include a subsection that outlines what each variable means in terms of increases and decreases and relate this back to the physical context of the systems of interest.

2) Again, as noted above, much of the analysis is cursory at best, leaving the reader scratching his/her head for an explanation. For example, Lines 15-19 on Page 21 and Lines 10-11 on Page 22. There are many more. I kept asking myself “why”? I realize that the paper is already a bit long and so adding more analysis will make it cumbersome to read. However, perhaps it is worth excluding the effects of topography and microphysics and focus more on the model-observation comparison? Leave the effects of topography and microphysics for a subsequent publication once the groundwork is published, especially since the results for these aspects seem case-dependent.

3) A follow on to the previous point is that there are many instances where I felt as if there should have been a figure to reference and yet nothing was referenced. For example, the paragraphs beginning on Line 4 of Page 15, Line 33 of Page 17, and Line 1 on Page 21. There are other instances as well where it was not clear if a figure in the text was intended to be referenced or if analysis was conducted and not presented in the text. Along the same lines, some of the figures are very difficult to read due to the small font. Moreover, while I realize that the observations are difficult to retrieve at low elevations, the model can and does simulate such levels. I was a bit puzzled as to why these levels were removed from the initial analysis. Perhaps they should be included why just examining the model and then removed for comparisons with observations.

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Lastly, I could not understand Table 2; some background and explanation is clearly warranted.

Minor comments 1) The organization is quite nice; however, there are several grammar errors (especially punctuation), and there are issues with figure and equation referencing. Moreover, units are inconsistent (e.g., g versus mg).

2) Consider not capitalizing words like east and west.

3) I would recommend including references throughout section 2.1 for all assumptions that go into the model.

4) Consider using section instead of chapter.

5) In equation 1, the variables do not match with the subsequent descriptions.

6) Line 29 on Page 3: Should this be “number” concentration?

7) Line 30 on Page 3: Should this be “mass mixing ratios”?

8) Table 1: Consider writing out “number”.

9) Line 8 on Page 5: What is meant by “size being a power of two”?

10) Line 4 on Page 7: Correct the definition of PPI.

11) Lines 6-7 on Page 17: Reword to improve clarity.

12) Line 2 on Page 20: What is meant by “opposite of the slope”.

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