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Discussions

Interactive comment on "Use of polarimetric radar measurements to constrain simulated convective cell evolution: A pilot study with Lagrangian tracking" *by* Ann M. Fridlind et al.

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Response to Anonymous Referee #2

The study aims to illustrate the polarimetric weather radar observations, derived KDP and retrieved rain properties, can provide additional constraints to atmospheric model simulations. Cells observed in a single case study are first tracked, examined and compared with cells in regional model simulation. Then three-year climatology of isolated cell tracks is provided using Houston KHGX data. Overall, this manuscript is well written. I recommend it for publication in AMT if the authors take into account the following comments.

Response: We appreciate the concise summary and helpful comments.

1. How did you define the initiation of a convective cell? Can S-band radar be used to define the initiation without any observations from satellite or X-band radar measurements?

Response: Clarification added to methodology: "We note that this procedure serves to objectively identify a 'trackable' cell without requiring a definition of cell initiation." This approach therefore does not address observability of initiation in a manner that would be helpful for nowcasting or other applications where all times are not in hand prior to analysis.

2. Line 190. Explain the retrieval uncertainty is only 5 to 10% estimated from a 2012 paper, but the retrieval algorithm (for Dm and Nw) was developed in 2014.

Response: Thurai et al. (2012) examine the error characteristics of the underlying retrieval methodology specifically for drop size distribution parameters, including comparison with values calculated from ground-based observations, whereas Ryzhkov et al. (2014) demonstrate other aspects of retrieval robustness using a specific instantiation of that methodology as applied for this study.

3. Have difficulty in understanding the colorful lines in Figure 3. What is the meaning of different colors?

Response: Clarification added to caption: "An example of TINT-generated cell tracks from 7 July 2013 (lines randomly colored)."

4. Would you like to summarize the differences between observations/retrievals and model simulations by providing quantity comparisons using all your tracked cases? How about generating a table or a summarized figure to discuss which variables model simulated best/most reasonable, which variables/cell signatures model cannot simulate well? How to improve the model simulations using radar measurements?

Response: We would like to make such detailed comparisons when we have

in hand additional measurements provided by the upcoming TRACER field campaign, for which this pilot served as a planning tool. Appended to acknowledgments: "Results of this pilot study were used to inform design of the Tracking Aerosol Convection Interactions Experiment (TRACER) field campaign (https://www.arm.gov/research/campaigns/amf2021tracer)."

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