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Comment on amt-2021-34

Anonymous Referee #1

Referee comment on "Rainfall retrieval algorithm for commercial microwave links: stochastic calibration" by Wagner Wolff et al., Atmos. Meas. Tech. Discuss., https://doi.org/10.5194/amt-2021-34-RC1, 2021

Review summary for “Rainfall retrieval algorithm for commercial microwave links: stochastic calibration”

In this paper, the authors address a known problem: many different algorithms and approaches to retrieve the rainfall via commercial microwave links have been presented in the past. However, most of the presented model-based approaches are sensitive to various design parameters of the specific algorithm. The authors return to a previously published algorithm - the RAINLINK, describe the problematic-sensitivity to specific design parameters, and suggest a methodology to pinpoint the most important parameters, and to better calibrate these parameters (which the authors did previously via empirical calibration).

The problem at hand is indeed important, and the results presented by the authors are encouraging. However, in my opinion there are two major issues that should be resolved prior to the publication of this paper:

- Focusing on model-based only approaches is limited. Once training data is available, and stochastic models are considered, many current deep-learning algorithms can be implemented, which can potentially solve the parameter-calibration problem by suggesting a data-driven solution. E.g., see [1], among others. Thus, the solution presented by the authors here should be compared to such updated tools, or at least be discussed regarding the disadvantages and advantages between the presented approach and such data-driven approaches.
- The authors emphasize that their approach gives at least a partial solution for different climate regions. However, in these cases, it is important to consider some physical parameters that might affect the accuracy of the outcome, such as the power-law coefficients themselves. Specifically, these parameters are climate-sensitive, as was presented in past studies. How the implementation of such parameters into the calibration scheme affect the results?

All in all, this paper provides an interesting approach, and is well written. However, it should relate also to recent advancement in this field that address the same general problem via machine learning tools.

[1] H. V. Habi and H. Messer, "Recurrent Neural Network for Rain Estimation Using Commercial Microwave Links," in *IEEE Transactions on Geoscience and Remote Sensing*, doi: 10.1109/TGRS.2020.3010305.