

Atmos. Meas. Tech. Discuss., referee comment RC2
<https://doi.org/10.5194/amt-2022-3-RC2>, 2022
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Comment on amt-2022-3

Claudia Acquistapace (Referee)

Referee comment on "Climatology of estimated liquid water content and scaling factor for warm clouds using radar–microwave radiometer synergy" by Pragya Vishwakarma et al., Atmos. Meas. Tech. Discuss., <https://doi.org/10.5194/amt-2022-3-RC2>, 2022

Overall preprint quality:

The presented manuscript describes a retrieval technique for LWC which is within the scope of AMT. Even if the approach is not brand new, the paper applies the known retrieval techniques to fog, which is still a relatively unexplored type of cloud. It presents interesting results for the scientific community. The conclusions are relevant for focusing on new research directions and are thus worth publishing, after some major revisions.

The methodologies applied are clearly stated and outlined. I could not find a clear indication regarding the data and code availability, but the methodology can be followed and understood theoretically. The paper is well structured, and the writing is plain and clear, with a concise abstract and a proper title to describe the manuscript's content.

As a general comment, there is a predominance of passive tenses in the text, which I do not recommend using in favor of active sentences to make understanding easier. In addition, I recommend avoiding sentences with too many subordinates, which often recur. The paper is quite long, some parts can be shortened and/or condensed, and some figures can be put together and/or removed.

Specific comments and technical comments:

Please find all the specific and technical comments in the attached pdf. Here, I just list the main specific comments I have.

- I think that the research gap you want to fill needs to be stated more clearly, in the abstract and the introduction. From my understanding, it is that you apply the LWC retrieval to fog and aim to have a method that also works when MWR is not working. You should state these characteristics (or the ones you think are the main ones of your algorithm) clearly when you introduce the work and why it is crucial.
- I think that the paper is too long and that you have too many (nice) figures. For example, you can merge figure 1 and 3 into a single figure with two subplots. I hardly looked at figure 3. Think If it is really needed. Maybe figure 4 can go in the supplementary material, as well as figure 6? Can you make a single figure of figure 7 and 8? Regarding the paragraphs, can you maybe shorten section 3? The methodology you explain (in detail and very clearly) is well known in literature, so maybe you can just point out what you do differently from the standard theory? These are just some suggestions.
- I need some clarifications on what you call Doppler velocity. If you are talking about mean Doppler velocity, the second moment of the Doppler spectrum, you would need to consider this measurement as a convolution of hydrometeor properties with air motion, turbulence etc. For this reason, I have some difficulties in agreeing with what you wrote on the interpretation of the radar Doppler velocity values throughout the text. See the detailed comments in the text for more.
- It would greatly help the reader to have a table with the radar mode characteristics, in particular min/max range gate, time resolution, Doppler resolution, min/max Doppler range, at least.
- I had some problems understanding your I_{na} . The variable is not properly introduced and only quite late you describe what it really is...Please, introduce it clearly at the beginning, once and for all, and then refer to that definition.
- In general, when there is a figure in the text, there is no need to state in the main text of the publication what the figure contains. You should write what readers should see or find in terms of results in the figure, followed by the "(figure n)" in parenthesis. I tried to correct this for every figure, please check.
- I wonder if you ever considered using the skewness of the Doppler spectra to distinguish drizzle from non-drizzle profiles. I commented on that a couple of times in the text. I am happy to contribute more in this respect, if you think it is an interesting approach.

You can find the comments above, additional comments, and the technical corrections in the pdf.

Please also note the supplement to this comment:

<https://amt.copernicus.org/preprints/amt-2022-3/amt-2022-3-RC2-supplement.pdf>