Atmospheric Measurement Techniques Discussions

Atmos. Meas. Tech. Discuss., referee comment RC2
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Comment on amt-2022-252

Anonymous Referee #2

Referee comment on "The Virga-Sniffer – a new tool to identify precipitation evaporation using ground-based remote-sensing observations" by Heike Kalesse-Los et al., Atmos. Meas. Tech. Discuss., https://doi.org/10.5194/amt-2022-252-RC2, 2022

The study introduces a new tool: the virga-sniffer, this is a tool which is used to detect virga from vertically pointing radar and ceilometer observations. The authors outline the methodology of the virga-sniffer and present case studies to show the output or the virga classification and cloud base and cloud top height detection. Radar pixels that are found to contain virga are compared against Cloudnet classifications and statistics of the virga observations from the entire EUREC^{4}A campaign are discussed. A key point is that the tool works on multiple levels of cloud and is able to detect virga between levels of cloud. This study is largely an introductory study to this new tool and outside of some preliminary results does not conduct much analysis of the virga that has been detected and its relationship with the wider atmosphere. It is my opinion that this study should be accepted after some minor revisions.

General points:

There are a large number of thresholds used within the study, how sensitive is the output of the virga-sniffer to these thresholds? Some discussion of the parameters that the tool is sensitive to is necessary. Why are they set at their current values? How does changing them effect the results?

There is some mention that the tool works without the inclusion of the LCL and the surface precipitation measurements. Some discussion of the differences in the results with and without these parameters would be useful.

Minor comments:

L98: Are roll and pitch angles allowed to be negative? If so replace this with absolute angles. If not, why is the standard deviation so much greater than the mean, this implies a very skewed distribution?

L100: Together with the previous point, if there is a sizeable inclusion of horizontal wind the pointing is relevant for the Doppler velocity. Is there any treatment or removal of Doppler velocity at large roll/pitch angles?

L196-198: In this situation it is possible to have rain from another section of cloud blown in to the column and giving the impression of rain reaching the surface. Any consideration of this situation? Use of horizontal wind e.g.?

L199: How frequently do these special cases occur and how frequently does the virga detection work with little or no complications?

L201: Is this step included when the clutter filter described earlier is also in use? Is it necessary if there is already a clutter filter?

L208-209: As previous comment about wind-blown rain detected at the surface.

L237: Include some discussion of how frequently these limitations occur and the impact they are likely to have on the overall data quality.

L252-253: Could neighbouring columns be included to mitigate this? Allowing a large vertical gap for virga seems to lead to unlikely results at times (e.g. part of the lower cloud being labelled as virga at 3.45 in Fig. 5)

L263: Due to what?

L280: If I understand this correctly the categories on the inner ring are a subset of the outer ring? If so, why do they not align for aerosols?

Fig. 6: Annotate the larger classes in the inner ring with the percentages

L313: What are the horizontal lines on Figure 8?

L313: Given the large number of virga reaching 300m it would be interesting to see any meteorological observations both surface based or radio/dropsondes to look at profiles of humidity and temperature.

L325: By eye there appears to be a loose trend along a line from approx. (0, 0.2) to (1, 1.5). Have you looked at any statistics for these data?

Fig. 8, 9b: The y-axis scale is irregular, I assume it should be 250 m per label. Add the extra sig fig to make this clearer

Fig. A1: needs colorbar

Spelling/Grammar/Typos:

L19(x2), 20, 31, 197: Using above/below is ambiguous when talking about the atmosphere, especially in relation to temperature which changes with height. Use greater than, less than etc.

L112: Define MPI before use

L154: less -> fewer

L261: remove the comma

L334: 1.5 m -> 1.5 km

L357: pixel -> pixels

L363: “As application”, I’m not sure what was intended here

L403: suses -> uses

L404: remove comma

L457: remove paragraph