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Atmospheric Measurement Techniques Discussions

Interactive comment on "Shallow Cumuli Cover and Its Uncertainties from Ground-based Lidar-Radar Data and Sky Images" *by* Erin A. Riley et al.

Anonymous Referee #2

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Review of the article titled "Shallow cumuli cover and its uncertainties from ground-based lidar-radar data and sky images" by Riley and coauthors for publication in Atmospheric Measurement Technique.

The authors have continued their work on the data collected at the ARM site during shallow cumulus cloud conditions. This seems to be a follow-on article to the Kleiss et al. 2018 article. Here the authors have compared the cloud fraction and cloud cover statistics from the vertically pointing active remote sensors (lidars and radars) with those from the sky imager. The results are robust and largely suggest that the scientists should use the TSI derived cloud statistics rather than those from the vertically

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Discussion paper

pointing instruments. The article is well-written, will be of interest to the general cloud community, and is suitable for publication in this journal. However, the article can be improved further by incorporating suggestions mentioned below.

Major suggestion

End of Page 5 and the beginning of page 6 you have mentioned the differences in the field of view of the instruments. This is good. However, the effective field of view of the radar and lidar is essentially FOV plus dwell-time times the wind speed (advection). I suggest you add few sentences to describe this effect. When you are generating the 15-min or 30-min statistics, then the differences from the two methods will largely governed by the wind speed.

In a similar vein, it will be good if you can make a figure of the CF from radar-lidar and FSC as a function of the wind speed. You already have the wind speed from the radar wind profiler, and the other two are shown in Figure 3. A figure like this will tell us how much high or low wind contributes to the differences in the two methods. Thanks.

Lastly, the lane approach is very novel. If incorporated properly, it will tell us how the clouds are organized within a cloud field and move in relation to each other. Such an analysis is outside the scope of this article. However, I suggest you add a paragraph on the potential scientific usage of the statistics derived by this approach. Thanks.

Minor Suggestions

Page 2 line 5: I think you mean “partitioning” and not “proportioning”. Thanks.

Page 2 line 17: Might be better to refer to the ARM monograph in the AMS

Page 2, line 22: Remove “for example, a recent report” and just say “Zhang et al. (2017) suggested ..”

Page 3, Line 2 and Line 16: Also, at other locations. Please either use radar-lidar or lidar-radar for consistency.

Page 3, line 30: “height is used here”

Page 7 line 5: Figure B1 not 1B

Figure 1 caption: I suggest using “vertical bars” rather than “error bars” to avoid confusion.

Figure 2: As the brown and blue bars are on top of each other, maybe it will be better to show them as line plots. It will be good to know how far apart they are for low CF values. Also, I see light brown bars in (a) and (b), and a dashed red line in (d). Both of these have not been explained in the caption.

Figure 3-6: It will be good if you can bin the shades in bins of 10% and use only one color for each bin. It is difficult to identify the actual values in the current versions. There are also dashed magenta lines in some of the panels.

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