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Interactive comment on "Variability of Bulk Water Vapor Content in the Marine Cloudy Boundary Layers from Microwave and Near-Infrared Imagery" *by* Luis F. Millán et al.

Anonymous Referee #1

Received and published: 19 March 2019

General:

An interesting contribution on the synergetic use of different satellite measurements to monitor some PBL characteristics. I have a few major concerns, and various minor questions comments that I'd like to see addressed in an update. I rated the manuscript as Major Revision, mostly to leave the authors more time if any of my comments require larger work.

Major Issues:

- I am missing some more information on the systematically different sonde data vs. the RO data. Figure 2 and 3 seem to show different conditions, thus potentially sampling

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Discussion paper

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different areas, with RO data having CWV data up to 3cm, while the sonde data extends only up to about 1.5cm. Is the RO sharpness primarily identifying regions that are more humid while the sonde data is in less humid areas? Is there any chance to also compare RO to sonde to improve the understanding? Or to include more data?

- Page 2, Line 31 (P2/L31): points to systematic issues in the December months. Just "removing" a month because it does not seem to fit, and use a another data version that fits, would need a much more substantiated justification. Thus I'd like to see more info on what might cause this issue and why the version 6.1 was used now. And then, why 6.1 is not used throughout.

Minor / Editorial Issues:

- Section 2: would it be worthwhile to point out that MODIS measures around 1:30pm?

- P2/L27/L33: the estimated errors are mentioned here, could you include also whether this is a systematic or random uncertainty / error?

- P3/L11: "as the number of the number": correct?

- P4/L7: "data below 200m or above 4km": I could of course look at the cited article, but maybe it can be better explained here. Does this mean if the inversion layer is below/above, the sonde is not used? Or is this data below 200m not used in the integral (which would be more of an issue)?

- P4/L8: How much data is removed in these screening steps? And did you try to loosen the threshold of the three methods to be within 200m to increase the sample size?

- P4/L24: The RO processing articles seem rather outdated, I assume that the processing uses some more recent algorithms, e.g. 1DVar (I might be wrong though). And where does the data come from, UCAR? The version 2.6 though is not a UCAR identifier as far as I can see. It would also be interesting to get more info on the humidity background if a 1DVar was used. Otherwise, RO will not provide very accurate info

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on humidity in the mid troposphere.

- P6/26: When using ERA-I data, is exactly the same data at the same time used, or is this a larger data set?

- Figure 1: Please use different color range for BL-CWV and its std dev, to allow more visualization of the std dev values.

- Table 2: What is the last column? It seems not the number of obs.

- Figure 4: There appear to be also negative CWV in this plot, is that found in certain regions/for low CWV values? Any reason why this is not excluded from the data set? Seems to point to the MODIS overestimation you mentioned.

- Figure 5: These rectangular/boxes are from a publication in 1993. Some question on that: Why is the Australian not included? Why not use all identified regions in that article(or at least the mid-lat marine stratus ones)? And last, is there a good reason to update the boxes with the latest data available? We have a better, higher resolution picture of our planet compared to 1993.

- Figure 6, 7, 8, 9: my color print out shows almost exactly the same colors for Peruvian and Namibian. I cannot distinguish them at least. On screen it is okay. We do have high end color printers, thus I assume this might also happen for others printing it out. When zooming into Figure 5, I noted that the boxes have the same color, but I think that is not really necessary and limits your color options.

- Figure 6: Maybe I missed it somewhere in the discussion, but this has no NH/SH shift, but that is found in Figure 7 and others. In 6, it seems they all peak around July/August.

- Figure 6: Is the result better visible if it is normalized to the total in the area? Also, these regions are different in size and cover different subsidence, does that have any impact?

- Generally, is there any impact visible of the different AMSR instruments used here?

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