Review comment of Anonymous Referee # 2 on:

Retrieval of Water Vapor using Ground-based Observations from a Prototype ATOMMS Active cm- and mm- Wavelength Occultation Instrument
Dale M. Ward et al.

General Comments:

The paper is a very interesting and indeed necessary contribution to investigate the atmosphere based on occultation measurement technique by exploiting the microwave capacity. It describes in detail the ground based experiment by detecting water vapour with microwave signals under clear too very turbulent conditions as pre-study to a microwave occultation satellite mission. Besides a detailed results description an error and validation discussion was done. The discussion in the appendix about the difficulty or even impossability to in-situ validate such an experiment rounds up the paper. I recommend the paper for publication with minor revisions.

In this paper the low band signal is only used to determine whether there are small water particles present or not but it apparently is not used for the retrieval of water vapor, which is done only for the high band signal (Fig. 2). It is though claimed that to derive the water vapor content under stormy conditions when the high band becomes opaque, the low band is needed but it is not done for this experiment.
Did you get results on the 8 fixed frequencies at the 22 GHz region to investigate the heavy rain situation at 15:30, since for such heavy weather situation sufficiant attenuation occured?

Specific Comments:

p. 2, line 16—20: Please give a reference to the RO technique including the specifications/limits of this remote technique. Please give references for other studies on microwave occultation technique pre-studies too.

p. 3, line 710: Please give a reference to this statement.

p. 5, line 1—4: Did you do investigations in terms of distance of frequency to the calibration frequency and the remaining error if unwanted sources (scintillation, ..) of errors show a frequency dependency?

p. 5, line 7: If the demonstration of these key aspects are published please give a reference.

p. 5, line12: Please determine here already on wich of these locations the transmitter and receivers are located.

p. 7, line 8: What is the reference period exactly. For a faster understanding it would helpt too if the reference period is marked in Fig. 2.

p. 8, line 15: Please mark the second reference period in the Fig.2 too.

p. 8, line 22: Please give a clear acronym for your Atmospheric Model, version 7.2 e.g. AM7.2 and make the notation consistent in the entire document.

p. 9, line 5: Please give the color code in the text too you are using in the figures for a faster understanding. It is not explained in the text what „raw“ in the figure label means? Why is the blue line not always higher then the black line? To my understanding the blue lines contains all atmospheric effects and the black line only the liquid optical depth part.

p. 9, line 19: Please give a reference to this publications.

p. 10, line 3: Why where the tempearature sensors so close to the ATOMMS instruments positioned? Why not in a seperate small tent, if protection due to heavy rainfall was needed, to avoide temperature bias due to lost heat by the ATOMMS instrument?

p. 10, line 19: Please use the color code of the graph when explaining the figures to gurantee no confusion with the graphs.

p. 10, line 19: How do the aire pressure graphs look like including the one hour running mean of the air pressure?

p. 11, line 25: Did you estimate the residual error due to turbulences?

p. 12, line 8: How did you get the value of -0.17 hPa/C? Could you give a short explanation to this?

p. 13, line 11: Please give a reference to the Mie cloud model you where applying?

p. 14, line 22: Do you have information/graphs on the wind speeds correlating with the shift in time too e.g. by using the radar data?

p. 15, line 2: Do you have a reference on the Tucson WSR-88 RADAR?

p. 15, line 20: What was the horizontal distance of the radiosond to the actual microwave path, when passing through the mountain height levels of Mt. Bigelow and Mt. Lemmon? Was the radiosond actually passing the microwave path or was it very close or even far away from the microwave path?

p. 19, line 25. Please explaine shortly the other colored lines according to the altitude levels. It is not clear why e.g. the black and red lines show a less high ratio than the green and pink lines and they show even different linear dependencies within the length of the integration path.

Fig. 1: Is it possible to mark the position of the radiosond when passing through the altitude level of the two mountains?

Typo Comments:

p. 2, line 9--10: I would recommend to be consistence with the entire paper to write everything in hPa than in mb.

p. 4, line 30: Please change hydrometers to hydrometeors.

p. 7, line 21: Please make the notation for the time consistence in the entire document and figures. Sometime 4:30, then 4,5 or even the 12 hour notation is used.

p. 10, line 25: The +-1% signe is underlined. Please remove the underline.

p. 14, line 24 – 27: Please make the time consistent. They do not agree with the given times in the legend of Fig. 8B.

p. 15, line 19: Please make the notation of the Tucson radiosond consistent with legend in Fig. 7.

Fig. 3A: Please use the consisten units e.g. hPa instead of mb and h instead of hours (in Fig 3A and 3B)

Fig. 3B: What is the strong peak at about 14.6? In the text % is used but in the figure you use fraction for the right y-axes. Please make it consistent.

Fig. 8B: Please make the time in the label, legend and text consistent. Please give units?

Fig. A1: Please remove the title of the plot or make the symbols for standard deviation and mean value consistent. Please correct the x-axes label.