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> Interactive Comment

Interactive comment on "Technical Note: Novel method for water vapor monitoring using wireless communication networks measurements" *by* N. David et al.

Anonymous Referee #2

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General Comments

The manuscript presents experimental evidence that the received power in telecommunication links contain information about the absolute humidity along the propagation path. Another interesting parameter to study would be the signal delay (and its variations) of the used communication links. An advantage of using the delay, which is caused by the real part of the refractive index, is that it is in practice insensitive to fog, clouds, and rain along the propagation path. A fact which is used in the application of inferring the atmospheric water vapour content from the signals from the GPS satellites. Although the presently available link data probably not provide any time delay





values this option could be mentioned in the introductory material.

Given that the presented method is restricted to weather conditions excluding rain and clouds containing liquid water (along the propagation path) I think that ought to be mentioned already in the abstract. The weather conditions in Israel are not applicable in many other areas where communication links are used. The calculated correlation coefficients - between the inferred water vapour from the attenuation measurements and the point measurements of absolute humidity - are convincing meaning that the method has the potential to be further investigated in order to conclude its usefulness in meteorological applications. However, I miss a quantitative analysis of the uncertainties. In order to make it more quantitative there is a need for an uncertainty analysis of the attenuation measurements, the ITU relations between attenuation and humidity, the local point measurements of the absolute humidity, and the impact of using different averaging periods (see further the specific comments below).

The reader may also want to know: how representative are the results from the four weeks of data? It is indeed important if the presented results are typical or if they are examples of cases demonstrating some kind of best agreements?

Specific comments

Abstract, line 17, page 11679 line 15, and page 11680 line 20: Avoid using subjective measures such as "excellent", "very good" and "good". They contain no extra information in addition to the correlation coefficients. (In fact you use these three different grades to describe the same results. Why are they "excellent" in the Abstract and only "good" in the Conclusions?)

Abstract, line 10: the phrase "... can provide moisture observations at high temporal and spatial resolution" is not supported by the results presented in the manuscript. What do you mean?

Abstract, lines 21 and 22: The acronym RMSE is not explained here and it is not clear

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which parameter the percentages are calculated for.

Page 11676, line 18: A resolution of 0.1 dB for the attenuation measurements seems a bit high. Using the facts given in the manuscript for the typical attenuation of 0,2 dB/km and a 4 km link indicates that the resolution is as large as 12.5%. This number cannot be neglected compared to the observed RMS differences of 20-30%.

Page 11677, lines 16-17: It is assumed that the contribution from oxygen to the attenuation can be ignored compared the water vapour. The oxygen attenuation varies with both temperature and pressure. It would be interesting to learn a specific a value for these variations given the typical temperature and pressure variations observed in the relevant area(s). This value can then be compared with the other uncertainties.

Page 11677, lines 22-23: I miss the expression for N" (which I think is much more relevant than are the present Equations (4)-(7) on how to calculate the absolute humidity from the relative humidity and temperature). Furthermore, the uncertainty for the expression of N" are of fundamental importance and shall be compared to the other uncertainties.

Page 11679, line 1: The expression RMSE is misleading since the two methods are measuring different volumes of air. I think RMS Difference (RMSD) would be more appropriate.

Page 11679, Equations (8) and (9): It would be informative to specify the averaging time used to infer the water vapour density from the two different methods.

Page 11681, line 1: It is unclear what you mean by "high resolution data". If it is the temporal resolution you are referring to why present only one data point per 24 hours?

Technical Corrections

British English?: vapour

Leave a space between a value and its unit (except for the units percent, %, and

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degree,°)

page 11674, line 24: the expression "economy of nature" is unclear. I suggest that the 1st sentence of the Introduction can be written: Atmospheric humidity has a cardinal part in a variety of environmental processes ...

page 11676, line 27: has a typical resonance line -> has a resonance line

page 11677, line 21: $C^{\circ} \rightarrow C$

page 11679, line 18: it is not clear to me what the "p value" refers to?

page 11680, line 2: data was -> data were

page 11680, line 13 (and page 11683, caption Fig. 1, four places): the acronym a.s.l. is not explained

page 11680, line 23: the wording "some disparities are caused." is unclear. Do you mean that some differences are expected?

page 11680, line 24-25: the wording "... the difference in altitudes which can be significant at night hours" indicate that the height of the sites varies between day and night - please rewrite.

page 11683: longitude and latitude scales would improve the maps.

- End of Comments

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