

Interactive comment on “Radio occultation bending angle anomalies during tropical cyclones” by R. Biondi et al.

Anonymous Referee #2

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Radio occultation bending angle anomalies during tropical cyclones by Biondi et al.

This is a very interesting idea, but some the results presented require further clarification before publication. If the following points can be addressed, the paper should be published.

Page 1372: line 23, GPS radio occultation measurements are unlikely to provide much useful information on UTLS water vapour. This should be clearer in the text.

Section 3, page 1376 line 5. Discussion of the CDAAC 1D-Var. A description of the CDAAC 1D-Var background and observation error model is required. In particular, (with relevance to Figure 11) what are the assumed background humidity errors in the stratosphere? The sentence “ derived temperature (T), pressure (P), and water

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vapour (e) are basically consistent with the observed refractivity (N)...” is too simplistic. All 1D-Var calculation attempt to find a solution that is consistent with the refractivity observations, given the assumed refractivity errors. I believe the CDAAC approach is to assume smaller errors than are generally justified by error propagation studies. Please revise this section.

Page 1378, last paragraph. Is it surprising that the double spike can be observed in the bending angles, but a double tropopause is not evident in the temperature retrieval, given that the temperature retrievals are expected to be quite accurate here? Can you be sure a double spike implies a double tropopause? Could it be a spherical symmetry issue?

Figure 2: This doesn't seem to add much to the paper.

Figure 3: Can the authors provide any explanation for the shape of the bending angle anomaly, in terms of typical TC characteristics (eg, surface pressure, water vapour).

Figure 9: The RO retrieval differs from the radiosonde by ~5K at 20 km. This seems to be a very large difference which requires some explanation.

Figure 10: It is surprising that the temperature and bending angle anomalies are so similar given that the bending angles are related to the density gradients in the stratosphere, and this will have a $1/T$ dependence. Please explain.

Figure 11: I am very sceptical about the value of the “RO” water vapour profile shown in this figure. I suspect that it is almost entirely provided by the of the ECMWF background used in the 1D-Var. Please investigate the differences between the water vapour retrieval and the ECMWF background.

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