

Interactive comment on “Errors in GNSS radio occultation data: relevance of the measurement geometry and obliquity of profiles” by U. Foelsche et al.

Anonymous Referee #1

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The presented manuscript investigates the impact of the slant ray path on the occultation profile. It is an extension to other studies already performed in this area, looking more in depth at the actual characteristics with a state of the art occultation simulator. It is relevant in the application of radio occultation (RO) data in the climate field and in the numerical weather prediction (NWP) field.

I give it a major revision rating since I have strong doubts on some of the results, not questioning them in principle but wondering if there is an incorrect azimuth angle calculation performed. In addition, I'd like to see more low level data evaluation, not

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just temperature.

General Remarks:

1. Experimental setup: why only focus on dry temperature? Such an investigation has also relevance for bending angle and refractivity, and these are the data assimilated into NWP models. And the processing to temperature severely smoothes the data. This becomes even more relevant when considering that the main impact of the slant occultation is found at lower altitudes, where the data use is primarily in the NWP area.
2. Measurement geometry: I somehow have trouble with the azimuth angles going all the way to +/- 70 degrees. GRAS measures up to +/- 55 degrees and when looking at the data, only very few occultations appear at absolute angles larger 50 degrees. You however claim that more than 10% are located between absolute angles of 60 and 70 degrees (Table 1). I wasn't able to confirm your results even with EGOPS, where I used a simple azimuth angle calculation based on the position of LEO, GNSS and the velocity direction. Can you check this. I might be wrong here though.
3. Measurement geometry: It might be instructive to also include the duration of the event into Table 1. The ones at high sectors are likely also rather long in time.
4. Observation system modelling ...: Why did you include a realistic receiver model, wouldn't it be more instructive to exclude that and look at the impact of the slant profile separately? One could then show one plot / a short discussion on what the realistic receiver model adds in errors. And as far as I remember EGOPS, this can be done without doing the time consuming ray tracing again.
5. Results: The impact of the local radius of curvature selection is mentioned in the discussion of absolute bias. Can you comment on whether there are better ways to select the reference point for this radius calculation, e.g. as a function of the azimuth angle?
6. Results: The tangent point movement tends to be mainly in the North-South direc-

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tion I guess (polar orbit). Can you comment on the potential impact for climate assessments, in particular for occultations at high absolute azimuth angles? Also, when a lot of occultations are recorded at certain latitude ranges in one specific sector, what is the climate data impact? What about the antenna characteristics impact?

Minor Remarks:

- Page 4266, Line 12: remove , after 2007

Interactive comment on Atmos. Meas. Tech. Discuss., 3, 4261, 2010.

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