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Atmospheric Measurement Techniques Discussions

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 #2

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Review of "Errors in GNSS radio occultation data: relevance of the measurement geometry and obliquity of profiles" by U. Foelsche et al.

In general, remote sensing by GPS radio occultation (RO) determines atmospheric profiles of bending angle, refractivity, (dry) temperature, etc. These profiles are not vertical profiles, but may be strongly tilted. Using an end-to-end simulation study the authors study the implications of this fact, which is probably not well-known outside the RO community.

This well-written paper is an interesting contribution to the field of RO, I recommend publication in AMT with minor revisions. I have one general question and several minor comments / remarks described below:

If I understand correctly, the forward (ray-tracing) modeling uses the ECMWF refractivity field which, in general, deviates significantly from spherical symmetry in the lower troposphere. I wonder if the authors could comment on the magnitude of the error contributions originating from deviations from spherical symmetry and those stemming from profile obliquity which is the focus of the present study.

Minor comments / corrections:

Page 4265, line 25:
Quote: "Overall, there is a uniform distribution in latitude [...]"
On the basis of the data set considered here the meridional distribution appears to be flat; with better statistics, however, this turns out not to be strictly true. I suggest to rephrase this sentence to clarify that the apparent uniform distribution is an artefact of the limited data set (in terms of numbers of occultation events) generated for this study.

Page 4265, section 3, line 21:
Quote: "[...] and the TPT is obtained from (1) by repeating the calculations for each pair of satellite positions during the occultation event."
I don't understand how Eqn. (1) is used to derive $\vec{r}_T$ (page 4269, line 21). I would expect that $r_T \equiv |\vec{r}_T|$ is obtained from $a = n(r_T) \cdot r_T$ (Bouguer's law), where $n(r)$ denotes the refractive index at radius r. $n(r)$ doesn't appear to be used in Eqn. 1, 2 or 3, though.

Page 4270, section 4 "Results", line 22:
Quote: "[...] the ray tracer stops when severe superrefractive or multipath structures are encountered."
For clarity, I suggest to add a remark already in section 2.2 "Forward modelling" that the forward model excludes profiles (or segments of profiles) affected by multipath / critical refraction.

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Interactive Comment

Page 4276, table 1:
I assume section 1 includes the range of azimuth angles between 170 and 180 degrees (setting events) as well, (similarly for sections 2 to 7).

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