

Interactive comment on “Systematic residual ionospheric errors in radio occultation data and a potential way to minimize them” by J. Danzer et al.

Anonymous Referee #1

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This work is a careful study of the impact of large-scale, solar cycle and diurnally dependent ionospheric residual on radio occultation atmospheric profiles. The study combines actual data and simulation. A correction factor is derived to correct for the ionospheric residual. This is a high quality study that is a significant contribution to the literature.

Additional information and analysis should be provided prior to final publication. This is a plot of the MSIS bending angle, since the correction is derived relative to that. The paper's approach can be justified a little more strongly as suggested in the detailed comments below.

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Detailed comments:

p. 3: refractivity is defined, preferable to “obtained”.

p. 4: the statement that the second order term is weakly dependent on solar activity is hard to justify since it depends on Ne. Either provide a reference or clarification, or consider revising the sentence.

p. 6: What does this sentence refer to? Smallest compared to what? Smallest in a fractional sense compared to refractivity of temperature? “Their studies show that the effect of the residual error is smallest in the bending angle data.”

p. 7: Are the results of the present work consistent with Foelsche et al. 2008? This question should at least be considered. That work accounts for ionosphere but does not separate the ionosphere contribution from others. Is the magnitude of the residual in this work consistent with the prior simulation (e.g. 0.2 K combined observation and sampling errors)? This can be discussed here or somewhere else in the paper.

p. 10: It would be very helpful to plot the MSIS bending angle separately to help interpret these results (Fig. 3). Plotting the MSIS results over the cycle would provide great insight into these results and help the paper overall.

p. 11: Bullet 3. I don't see this summer maximum except for the northern latitudes. Is this also true in the Southern latitudes?

p. 13, paragraph 2: It is interesting to know how the ECMWF result compares to MSIS, another reason to plot the MSIS contribution separately.

p. 14: Why is the correction factor based on simulation and not the actual data (possibly smoothed)? Please explain this choice.

p. 14: Please justify why it is appropriate to shift the entire profile by a single number. Can this be justified via simulation or another means? A recent publication by Mannucci et al. (Atmos Meas Tech, 2011) suggests that orbital altitude can affect ionospheric

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residual error. Would this be a factor also?

P. 22: A color bar would aid readability.

Interactive comment on Atmos. Meas. Tech. Discuss., 6, 1979, 2013.