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Atmospheric Measurement Techniques Discussions

Interactive comment on "Improved model for correcting the ionospheric impact on bending angle in radio occultation measurements" *by* Matthew J. Angling et al.

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The authors thank Dr Jakowski for his review and for this recommendation that our paper should be published.

We also note that Dr Jakowski refers to our statement that remaining kappa biases at nighttime can be ignored in practical applications due to the smallness of the consequent bending angle errors. He goes on with an interesting discussion on the possible reason for a residual nighttime bias and we agree that a likely cause is the difference in vertical profile shape between day and night. However, we would make three points:

1. The comment concerning the small bending angle errors at night refers to the scalar kappa value, not to the func-kappa. The functional kappa exhibits very little bias difference from day to night and the resultant bending angles errors can be seen to be reasonable symmetric about zero for day and night (fig17 and 18)

2. We have tried including an explicit dependency on local time in the model. It does not provide any additional model skill, suggesting that it does not do a better job of capturing the local time variability than the solar zenith angle.

3. It is important to remember that we are building our model by fitting kappa derived from NeQuick. NeQuick is based on the standard CCIR databases of foF2, foE and M3000F2, and therefore provides a reasonable median model of F and E regions' peaks. However, it is not certain that NeQuick is a good median representation of the layer shapes. Our approach, therefore, is to model kappa with minimal complexity to try to avoid a close fitting to NeQuick that may be inappropriate in reality. It would be fair to say that our results are indicative that a simple kappa model may be used, but that further testing with real data must be used to validate this. This will form the basis of a subsequent paper, but we have tried to be clearer in this point in the discussion section.

Technical corrections: P6, l19: there is only one subsection, therefore should be cancelled There was an error in the section numbering. This has been corrected

P6 equation 8: the term dh looks like an increment of h, perhaps the coefficient symbol could be changed Agreed. Changed to "e"

P9, l4: GPS instead of Gps Agreed. Now changed

Figure 9: unit of kappa missing Agreed. Now added

Figures 8, 10-15: Axis font size too small Agreed. Increased size

Please also note the supplement to this comment:

https://www.atmos-meas-tech-discuss.net/amt-2017-162/amt-2017-162-AC1-supplement.pdf

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