**Atmospheric
Measurement
Techniques
Discussions**

Interactive comment on "Quantifying uncertainty in climatological fields from GPS radio occultation: an empirical-analytical error model" *by* B. Scherllin-Pirscher et al.

Anonymous Referee #1

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General comments

This paper outlines an empirically based error model for GNSS radio occultation (GNSS-RO) climate applications. The method appears sound and the results are consistent with the known GNSS-RO errors. It is a useful addition to the literature and should be published, subject to the minor revisions outlined below.

Specific points

Page 2751, Line 11: Steiner et al.(1999) reference. I do not think this is appropriate. A much better GPS/MET reference is the Kursinski et al (1996) Science paper.

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Line 22: "to investigate" should be "an investigation of".

Page 2752, first paragraph. The tracebility of the raw measurement is correct, but this is not the case for the retrieved quantities, such as bending angle, refractivity and temperature, used in the climatologies. The paper should make this clear.

Page 2760, line 8, "As stated by Lackner (2010), refractivity gradients refelect the mean bending angle for a layer". Can you quantify this statement? Eg, are they linearly proportional

"mean_bending_angle = constant * refractivity gradient"

What is the constant value?

Page 2766, line 15. Are the quoted temperature errors "(< 0.2K) below 30 km " valid generally or at high latitudes. How does this number compare with recent RO trend results at high latitudes?

Page 2766, horizontal gradient errors. The horizontal gradient error in bending angle can be written in terms of the horizontal refractivity gradients integrated along the ray path (Healy, JGR, 2001, vol 106, 11875-11889). It should be possible to estimate these errors for the polar vortex etc.

Page 2767 first paragraph. Horizontal gradients "challenging to signal tracking and processing". I agree that horizontal gradients will introduce inversion errors, but its not clear why they will make signal tracking above 4 km more difficult? Any references confirm this?

Page 2769, Line 10. Minor point, k1=77.643 (K/hPa) is not Rueger's (2002) recommended value. It is Rueger's value adjusted for use in a formula that includes non-ideal gas compressibility.

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