**Atmospheric
Measurement
Techniques
Discussions**

Interactive comment on "A simplified approach for generating GNSS radio occultation refractivity climatologies" *by* H. Gleisner and S. B. Healy

Anonymous Referee #2

Received and published: 25 September 2012

This is a well-written paper on a new approach of generating refractivity climatology from GPS RO measurements. It covers similar territory as the GRL paper by Ao et al. (2012) but in my opinion offers sufficiently new results that warrant its publication. Overall, I recommend its publication with minor revisions addressing the comments below.

(1) L84-L86: The Ao et al. paper has now been published, so the citation should be updated to reflect its status. In addition, it would be helpful to remark on the key difference(s) between that paper and the present paper.

(2) The nonlinearity of the Abel transform was briefly mentioned in L221-L122 and L235-L237. It would be more informative to provide a quantitative estimate rather than

simply stating it was "an order of magnitude smaller".

(3) The error associated with the discretization of the Abel transform is rather large (0.1%) [L125]. First, what discretization level was used here? Second, given that the difference between the single-profile and average-profile processing is within 0.1% over a wide altitude range, the large Abel discretization error prevents us from probing the difference in more details. I am not advocating that the processing should be redone (I realize this would involve substantial reprocessing), but the authors should make clear that the 0.1% structural uncertainty from the numerical evaluation of the Abel transform is not an inherent limit of the technique and can in fact be easily reduced (numerical integration of the Abel integral is rather fast using an adaptive quadrature method, for example).

(4) I am surprised at the large difference between the mean and median bending angles for 5-degree latitude bands given the large number of profiles in each band (Figs. 1 and 3). Is this due to the presence of "outliers"? What kind of quality control was used on the measurements? While the use of median is more robust, it is theoretically not as appealing as using the mean (which does not introduce nonlinearity in the mean refractivity even if the distribution is not symmetric). Could elimination of the "outliers" make the use of mean as robust as the median?

(5) The Eq. 3 reference on L154 and L235 should be either Eq. 1 or Eq. 5.

(6) Appendix: In Eq. A7, k should be replaced by $1/h$.

Reference:

Ao, C. O., A. J. Mannucci, and E. R. Kursinski (2012), Improving GPS Radio occultation stratospheric refractivity retrievals for climate benchmarking, Geophys. Res. Lett., 39, L12701, doi:10.1029/2012GL051720.

Interactive comment on Atmos. Meas. Tech. Discuss., 5, 5245, 2012.