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Atmospheric Measurement Techniques Discussions

Interactive comment on "Meteorological information in GPS-RO reflected signals" *by* K. Boniface et al.

Anonymous Referee #1

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This is a very interesting paper, on the possibility of using interferometric phase of the difference between direct and reflected signal present in an occultation to improve the retrieval accuracy of the atmospheric refractivity profile. The authors summarize a lot of research, in various degrees of detail, not always consistent across sections. However, the authors are not always clear as to what was done and why, perhaps due to a poor choice of language.

The authors examine two inversion procedures used to retrieve the refractivity profiles, but do not discuss explicitly why or whether two are even necessary. It would be useful to summarize what was learned from this aspect of the work. Similarly, it is not discussed why the sensitivity study leading to the results of Fig. 5 represents a realistic assumption, that is to say why 1% is a useful number. In principle the authors should

consider the impact of the retrieval uncertainties on the error in determining ultimately temperature and water vapor.

Figure 6 is intriguing: what happens at the lowest heights, where the $\frac{\Delta n}{n}$ has a significant jump? Was this height near the surface, do we have a topographic feature, or was this a loss of track?

My pdf file of the article contains 7 figures, but the authors seem to refer to two additional figures (at the end of page 1219) where the comparisons between the two approaches are discussed. These figures appear key to the paper but they were not provided here and I feel that I cannot properly assess this work.

Is the method presented above suitable to handle strong gradients of refractivity, such as those found in the boundary layer? The paper leaves the impression that the refractivity is assumed as a smoothly varying field, and first order variations are considered. A discussion of this aspect would be very helpful.

Only one COSMIC occultation, containing a reflection, was examined. This makes it difficult to assess the usefulness of the methodology presented here. I would strongly recommend that the authors consider expanding the set of tests with additional measured occultations. Ideally, I would like to see a test where retrievals with and without the reflected signal are produced, using interferometric phase in one case and not in the other, and the improvements are discussed as they relate to the lower troposphere.

Interactive comment on Atmos. Meas. Tech. Discuss., 4, 1199, 2011.