

Review of the manuscript amt-2012-116

A simplified approach for generating GNSS radio occultation refractivity climatologies

by H. Gleisner and S. B. Healy

The authors introduce a new concept for the computation of (climatologically) averaged atmospheric refractivity from GPS Radio Occultation: Instead of computing refractivity from bending angle for each individual occultation (via Abel transform), and averaging these refractivity profiles, the authors propose to average already the bending angle profiles and to apply the Abel transform to this averaged refractivity profile.

The paper is very well written and the concept is certainly interesting, but there is one open questions, which I would like to see answered before the manuscript can be recommended for final publication (see my general comment below).

General comment:

All results are based on the dense distribution and the low noise of COSMIC data, obtained during a period with low solar activity. Actual climate monitoring based on RO data requires using the CHAMP data record in the pre-COSMIC time – with considerably higher noise and lower event density. Furthermore the COSMIC constellation is approaching the end of its lifetime and there will be a period with considerably fewer RO events before the launch of COSMIC II. The authors are fair enough to mention these possible limitations, but regard them as topics for future work. In my opinion the value of the manuscript would be considerably increased by answering the question, if this approach can also be used for the CHAMP data record. A “no” would certainly not mean that the approach itself is not good, but it would imply that it cannot yet be used for actual climate monitoring based on RO data, since the pure COSMIC record is certainly too short for such an endeavour.

Since DMI has processed CHAMP profiles for the ROTrends study it should be straightforward to apply the same approach to one month of CHAMP data (or preferably to two months – one with low, and one with high solar activity).

Specific comments:

(1) Page 5246, line 25: Please rephrase “.. high vertical resolution geophysical information in the vertical interval ..”.

(2) Page 5248, line 9: “differences .. is” --> “differences .. are”

(3) Page 5250 line 9: “some users prefer to work with retrieved geophysical parameters”: this is very reasonable, since bending angle data do not show changes (due to climate change) in some altitude intervals, while other parameters, like temperature, do.

(4) Page 5249, line 20 (and several other occurrences): “data .. is” --> “data .. are” (I am not sure about the AMT policy, but AGU journals explicitly ask for using “data” as a plural noun).

(5) Page 5250, line 6: There are about 45 000 profiles in March, but only about 30 000 in January and February – why?

(6) Page 5254, line 9: A scale height of 7.5 km near the Mesopause does not seem to be a very good choice.

(7) Page 5255, line 20: “A corresponding set .. were generated” --> “was generated”

(8) Page 5257, line 18: You mention larger ionospheric biases during high solar activity as a potential problem, but also higher ionospheric noise could be a problem, since the average bending angle profile will be less smooth.

(9) Figure 3: The “minus” signs for southern latitudes are missing.
