

Estimation and Evaluation of COSMIC Radio Occultation Excess Phase Using Non-Differenced Measurements

The article titled 'Estimation and evaluation of COSMIC radio occultation excess phase using non-differenced method' presents the non-differenced technique to calculate atmospheric excess phase (AEP), and compare the refractivities using these AEP to those obtained from UCAR/CDAAC, which uses single differenced method. Overall, the article has scientific merit and needs minor grammatical corrections for clarity. It is suitable for publication after minor corrections.

General comments and suggestions:

- The references need to be reorganized. They are not listed in alphabetical or chronological order, and in-text citation of the reference is ambiguous in some cases.
- In the 'Results validation and analysis' section, the authors compare collocated measurements and retrievals with UCAR/CDAAC. Does the collocated imply that the same pair of GNSS transmitters and LEO receivers are used? If the same transmitter-receiver pair is used, then it would be easier to the reader if this information is mentioned in the text instead of just stating collocated measurements.
- A comparison of the AEP from ND technique with 'atmPhs' would be interesting because it looks like refractivity difference between Ref_ND and Ref_Phs has a positive bias of $\sim 0.5\%$ in setting occultation case (Fig 1) and a negative bias of $\sim -0.5\%$ in the rising occultation case (Fig 2). Is there a similar bias in the AEP from the ND method and 'atmPhs'?
- The average differences (Table 4) show $>1.5\%$ difference between refractivities derived using AEP from ND technique and AEP from 'atmPhs' using the ROPP software for the retrieval. In the troposphere, the difference is $\sim \pm 0.5\%$ in both the rising and setting cases (Fig 4 and Fig 5). What can be the contributing factor for this difference? Just by comparing the figures, one of the factors seem to be the excess phase difference. However, the difference between the ROPP and UCAR retrievals for the same excess phase also have differences of 0.51 and 0.93 % for setting and rising occultations, respectively, indicating the role of factors other than the excess phase.

Specific comments:

P6L148 – acronym ‘COD’ is not defined in the text.

P6L157 – ‘experience force’ is this typographical error?

P6L169 – Replace ‘3th’ with ‘3rd’.

P13L295 – ‘ecmPrf’ is repeated. One of them should be changed to ‘echPrf’.

P18L384 – Reference is not used in the text.

P18L386 – Reference is not used in the text.

P19L412 – This reference is already listed in P18L408, with less co-authors.

P20L442 – This reference does not appear in the text.

P20L448 – This reference does not appear in the text.