

Reply to reviewer #2's comments

We are very much grateful for encouraging comments for our manuscript. Our responses to specific suggestions are shown below.

1. One of the limitations in observing the atmosphere is the fact that an instrument can only see part of the gravity wave spectrum. The authors mention this in the last sentence of the conclusion (page 2085, line 18-22) in the context of horizontal wave number. I think that this could be expanded upon earlier in the paper to make it clear to readers that only part of the spectrum is observable. This will place these new GPS results in the context of other observations and therefore strengthen the manuscript.

[REPLY]

We added one paragraph in Introduction on the gravity wave analysis with GPS RO profiles.

2. A specific mention of the horizontal wavelengths or wavenumbers observable by GPS would be appropriate to make (based on e.g. Fig 9, Preusse et al. 2008). Recent COSMIC observations have demonstrated that differences in closely spaced (in space and/or in time) profiles of temperature can be attributed to real geophysical variability (i.e. gravity waves, McDonald et al. 2010), which may well account for some of the (minor) variability seen between radiosondes and GPS. These results point to the utility of extracting these gravity waves visible in GPS radio occultation data, thus lending further weight to the FSI extraction of high vertical resolution results presented here.

[REPLY]

Statements related to the horizontal wavenumber are included in the response to Comment 1.

We also added a reference to Preusse et al. (2008).

We added one paragraph in Introduction on the gravity wave analysis with nearby COSMIC profiles.

Technical Corrections:

[REPLY]

We revised the manuscript following the suggestions (1)-(7) and (9).

- 1) P2076, line 1: ‘: : : become a serious problem because of a sharp: : :’

- 2) P2078, line 22: ' :: : propagated northward over these sites.'
- 3) P2078, line 27: 'United'
- 4) P2082, line 14 :: : then the origin: ::
- 5) P2084, line 14. Remove the word 'quite' because GPS radio occultation has already been demonstrated by many authors to be very promising and useful.
- 6) Figure 4, LHS title spelling 'Number of Pairs'
- 7) Figure 4, RHS x-title add in 'Temperature Difference (K)'
- 8) Figure 7, caption first line: I think that it should be :: :20{deg}S: ::

[REPLY] This seems to occur during conversion of the manuscript.

- 9) Figure 8 box spelling should be 'wavelengths'
- 10) Figure 9. I suggest using a different colour for the number of profiles (e.g. black). Please mention in the caption which lines are which.

[REPLY]

It is difficult to reproduce this figure by using different color lines.

Figure captions are revised.