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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Impact of land convection on the thermal structure of the lower stratosphere as inferred from COSMIC GPS radio occultations" *by* S. M. Khaykin et al.

Anonymous Referee #1

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General comments

The authors evaluated the impact of deep land convective systems on the thermal structure of the lower stratosphere using the temperature profiles derived from GPS radio occultations and comparing the results with some independent measurements (i.e. TRMM). The results are interesting, but I would like to suggest revision of the work before publication.

Specific comments

1) Section 2, page 7, line 6-7: According to Kuo et al. 2004 and Scherllin-Pirscher et al. 2011 (http://atmos-meas-tech-discuss.net/4/2599/2011/amtd-4-2599-2011.pdf

and http://www.atmos-meas-tech-discuss.net/4/2749/2011/amtd-4-2749-2011.pdf) the highest accuracy of GPS RO soundings is between 5 and 25 km of altitude, I suggest to correct the vertical window from 5-35 to 5-25 km and to add the citations.

All the paper is based on the study of temperature anomaly between 10 and 35 km of altitude a.s.l. The temperature anomalies above 30 km reported in the paper are the same order as the GPS RO temperature error (Scherllin-Pirscher, B., et al. 2011). How reliable are the results at these altitudes?

2) Section 2, page 7, line 19-25: it is not correct to state that the wetPrf is obtained by 1DVar technique. The temperature profiles are derived using a ("not traditional") 1DVar approach where refractivity observations are weighted in the way that the temperature is the same as the dry-temperature in the regions with insignificant water vapor content (Biondi et al., 2011, http://www.atmos-meas-tech.net/4/1053/2011/amt-4-1053-2011.pdf). I suggest to reformulate the sentence and to add the citations as: "As in the work by Biondi et al. 2012 (http://www.atmos-chem-phys.org/12/5309/2012/acp-12-5309-2012.pdf), the data analyzed here are the COSMIC GPS RO Level 2 data products called wetPrf (wet profile) which is an interpolated product of 100 m vertical resolution obtained by the one dimensional variational (1DVar) technique (Biondi et al. 2011) ..."

3) Section 2, page 8, line 1: I suggest to move here the info reported in the section 3.3 page 12 lines 1-2 "The COSMIC profiles are binned into 5x5 boxes, each comprising over 300 profiles on average". This sentence is much more connected to the general methodology.

4) Section 3.3, page 12, lines 4-5: Could you evaluate the "nearly perfect" coincidence in DJF with numbers? From figure 5, I actually do not see such a perfect coincidence in the northern Australia and Indonesia.

Technical corrections

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Figure 1: black and grey dashed lines are not clearly distinguishable

Figure 2: it could be useful to report also the colorbar

Figure 3: again the black and grey dashed lines are not clearly distinguishable

Figure 5: line 2 of the caption (2nd and 4th panels)

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 1, 2013.