

Interactive comment on “On the comparisons of tropical relative humidity in the lower and middle troposphere among COSMIC radio occultations, MERRA and ECMWF data sets” by P. Vergados et al.

Anonymous Referee #1

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The authors investigate the spatial and seasonal variability of COSMIC GPS RO relative humidity in the tropical troposphere. As validation data sets they use ECMWF reanalysis and MERRA climatologies, where the latter has the decisive advantage of not assimilating GPS RO into their data. The work is thoroughly structured, clear written and well argued. My recommendation is to publish the paper with minor revision.

Scientific questions:

p 523, paragraph after Eq 1: What kind of ECMWF temperature is used (forecast or
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analysis) in Eq. 1? Why is the temperature not used from the wetPrf? Furthermore, why is the humidity not used from the wetPrf instead from Eq 1. What is the specific advantage of using Eq.1 instead of the wetPrf humidity?

How much are the GPS RO relative humidity results effected by deriving them from the ECMWF temperature? Furthermore, ECMWF reanalysis assimilates GPS RO data since Nov 2006. I was wondering why the agreement between ECMWF RH and GPS RO RH is not closer, see e.g., Fig. 1 and Fig. 2?

Can the authors explain again why they use a three-years average? Furthermore, are there any natural effects (El Nino, La Nina) which affect the data in this period of time. Are such effects might better captured by GPS RO than reanalysis model ERA-interim? Could natural variability have an impact on the results?

Technical corrections:

p 522, line 14 and line 15: in the data sets description the data is described to be used from 2006 until 2009. In the plots later on, data is shown averaged over 2007 until 2009. Typo?

p 523, Eq. 1: there is no space/no arrow between refractivity and water vapor pressure

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