

## ***Interactive comment on “Cloud vertical structure over a tropical station obtained using long-term high resolution Radiosonde measurements” by Nelli Narendra Reddy et al.***

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Replies to Reviewer #1 Comments/suggestions

General comments: The manuscript shows the distribution of clouds in different seasons over the indian radiosonde station of Gadanki. A long term series of radiosonde measurements has been used for evaluating the cloud base and top heights and the cloud thickness. The study is interesting in terms of methodological approach and results. The manuscript is well written and structured. Reply: First of all we wish to thank the reviewer for going through the manuscript carefully, appreciating actual content of the manuscript and providing constructive comments/suggestions which made us to

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improve the manuscript content further.

Specific Comments:

1. Assuming that the methodology performs well for detecting the cloud base and top, the results are very promising. However, it could be useful a comparison with other measurements for validating the results: e.g. CALIPSO/Cloudsat for cloud tops, and/or ground based lidars for cloud base. I probably did not understand what the authors want to show with Figure 8 because it looks like the values are not consistent with those ones in Figures 6-7. Looking at Figures 6-7 the percentage of occurrences of cloud base and top heights during the monsoon season should be higher at higher altitudes than the other seasons (same for the cloud thickness). Reply: At measurement location, we have Boundary Layer Lidar and Mie Lidar. When there is occurrence of multi-layer configuration BLL does not give accurate cloud base altitude for higher layers. Whereas, Mie LIDAR gives the vertical structure of the cirrus clouds (occur at higher altitude). Present study, Cloud Vertical Structure is examined only up to 12.5 km altitude as the accuracy in RH measurements is poor at higher altitudes. Also, Mie LIDAR is operated mostly during cloud free conditions (only during cirrus cloud or clear sky conditions). Further, the timings of Radiosonde and LIDAR measurements are different. Hence we did not do inter comparison study with ground based LIDAR observations. On the other hand, CLOUDSAT/CALIPSO overpasses over experiment location are around 02 LT and 14 LT. Whereas regular radiosonde launches are around 1730 LT. Hence, we did not do inter comparison study between regular radiosonde and CLOUDSAT/CALIPSO measurements. However, we have three hourly radiosonde observations for continuous three days in every month during Tropical Tropopause Dynamics (TTD) campaigns. Unfortunately, we did not get collocated (space and time) measurements from CLOUDSAT/CALIPSO and Radiosonde during these campaigns. Figure 8 describes the CVS (Cloud base, Cloud top and cloud thickness) distribution with height observed over Gadanki location with long-term (11 years) radiosonde data at 1730 LT. From this we can understand the percentage occurrence of cloud base/cloud top

of a cloud layer from all cloud configurations (Single-, multi-layer clouds). Whereas Figure 6 and 7 are diurnal variations in one-layer and two-layer clouds using Tropical Tropopause Dynamics (TTD) campaigns data. During these campaigns, the radiosondes were launched every three hourly for continuous three days in each month during Dec. 2010 to Mar. 2014. Hence the results from Figure 6 and Figure 7 need not be consistent with Figure 8.

#### Technical corrections

1. Please write always water vapor or water vapour in the whole paper Reply: Corrected.
2. line 72  $\hat{z}$  CVS is Reply: Corrected.
3. line 161  $\hat{z}$  were launched every three hourly for 72 hour ?? Reply: Corrected.  
“During these campaigns, the radiosondes were launched every three hourly for continuous three days in each month during Dec. 2010 to Mar.2014 except in Dec. 2012, Jan., Feb., Apr., 2013”.
4. line 252  $\hat{z}$  375ma.m.sl.?? Reply: Corrected.
5. line 266  $\hat{z}$  Figure4a-d Reply: Corrected.
6. lines 270-289  $\hat{z}$  In the caption of Figure 4 is reported that the values are anomalies, however in the text it looks like the authors are talking about absolute values. Can you please clarify it? Reply: In Figure 4 only temperature is shown as anomalies (Figure 4a) and remaining parameters namely, Relative humidity, Zonal and Meridional winds are absolute values. As per reviewer suggestion the corrections are made in the text (Line 289-291).
7. line 320  $\hat{z}$  Figure 6 (a-d) describes Reply: Corrected.
8. line 525  $\hat{z}$  CVS has already been defined Reply: Since it is in the beginning of summary, we want to define CVS again.

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We once again thank the reviewer for providing detailed comments/suggestions for betterment of the manuscript.

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