

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

Anonymous Referee #3

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The paper documents the cloud vertical distribution over a tropical Indian station, Gadanki using the long-term radiosonde measurements. The authors classify the clouds based on the occurrence altitude and discuss their variations for different season. Investigating the cloud vertical profile is an interesting research topic due to their role in earth's radiation budget and difficulty in parameterizations of clouds in models. One of my main concern is the cloud height estimation, which is not been compared with any other measurements and lack of discussion on the observed cloud structure with large-scale environments. The manuscript is publishable, but needs careful consideration of the points listed below.

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The authors mentioned “Cloud Vertical Structure in all the seasons including diurnal variation over Indian region is made for the first time.” Is the cloud variability observed over Gadanki can be considered as a representative over the Indian region?

Ln 223: Pandit et al. (2015) studied the cirrus clouds climatology over the same station from lidar measurement. Why authors have not compared the cloud height estimated from radiosonde with lidar measurements. The aim of this task is to verify the accuracy in cloud height estimation from radiosonde. What precaution the author has taken to estimate cloud height during the raining condition, especially during monsoon?

Ln 227: How many cases do you have CPS measurement with radiosonde? What threshold of cloud number concentration the authors consider to define cloud layer from CPS measurement? The number concentration is higher between 10 and 15 km not for the lower altitude.

Ln 240: homogeneous cloudiness..... How the authors defined it.

For Fig.4, please mention the latitude and longitudinal average the authors have considered.

Ln283: Change to ‘between 12 and 15 km’

Ln 311: Fig 5: Diurnal variability of cloud is difficult to understand as variability of one-, two-, three- and more-layer clouds are different. What could be the possible reason to have maximum occurrence of cloud during mid-night to early morning. Also bit surprising to see afternoon occurrence of cloud is less. Authors considered OLR as a proxy for convection. It will be interesting to see the OLR diurnal variation also.

Ln 371: Fig. 8c, the cloud thickness is up to 12 km for all season (even though the occurrence percentage is less). Under what thermodynamic conditions such tall clouds develop over the measurement site? Why such thick clouds are absent in fig 6 and fig. 7.

Ln 412: ‘The outflow caused by the deep convective systems could be responsible . . .’

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Do authors have any analysis to support their argument?

Ln 467: 'This could be due to interactions between the different layers of cloud'. What kind of interaction, authors want to infer? Please demonstrate.

Ln 502: Please mention the climatological onset date of monsoon over Gadanki. What criteria authors considered to define onset of monsoon.

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