**Atmospheric
Chemistry
and Physics
Discussions**

Interactive
Comment

Interactive comment on "Rayleigh lidar observations of double stratopause structure over three different northern hemisphere stations" *by* V. Sivakumar et al.

V. Sivakumar et al.

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Specific Comments: 1. Now, it has been edited and corrected wherever needed.

2. Mostly, 90 % of the observations correspond to the period of ˜ 4 hrs.

3. Table-2 gives about the overall data sets. Whereas, the figure-3 gives only about the 40 day observation cases in which we are concentrated at the double stratopause cases where the LDS and UDS occurred. Now, we mentioned clearly in the text and also corrected the sentence in accordance with the reviewer.

4. We agree with the reviewer. We are planning for a "Part-2" research paper to address more on the wave activity and using mechanistic model.

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5. The figure-1 is to illustrate examples of occurrences of double stratopause at different locations. The profiles are averaged over for the period of ˜4 hrs. In order to improve the reading of that figure, we added for each plot a legend showing the dates of LiDAR profiles. The grey lines show normal stratopause cases, while the black lines depict examples of double stratopause structures.

6. The LiDAR datasets are all made of nocturnal observations, with typical periods of observation of about 4-6 hours, and height resolution of 300m for both Gadanki and OHP sites and 480m for Mt. Abu. With regard to the 40-day period, only 5% of data are missed and they are interpolated in order to have a continuous dataset.

7. The double stratopause cases are found when the temperature values are greater than two sigma of the mean normal stratopause. The GW analysis was performed individually for the different stations. Thereby, the relative effect of GW is expected to vary with season and location.

8. T' is calculated as a deviation from the third order polynomial fit. T0 is the temperature obtained from the polynomial fit (reference one). Each profile corresponds to 250 sec and the time period of observations varies from 4 to 6 hrs. Since, the source and propagation property of GW varies with latitude; we do expect the GW variations in the temperature fluctuation.

9. We agree with the reviewer. Tidal amplitudes are greater in the mesopause in comparison with the stratopause region (˜ 1-2 K). Though, the sampling period is not enough to reveal GW and PW perturbations, we are interested to find the relative role between the two (GW and PW). The subsequent work will address more detailed study on the GW and PW role using mechanistic model analysis. Now, we have included sentences in the end of the discussion section that the obtained results are limited to night-time lidar measurements and there would be a possible tidal contribution as suggested by the reviewer and in the published references.

Technical Corrections:

1. Table 1: It is changed now.

2. Table 2: It is added now.

3. It is removed now

4. It is modified now

5. It is given now.

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 6933, 2006.

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