Atmos. Chem. Phys. Discuss., 10, C1457–C1459, 2010
www.atmos-chem-phys-discuss.net/10/C1457/2010/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "The role of tropical deep convective clouds on temperature, water vapor, and dehydration in the tropical tropopause layer (TTL)" *by* J. H. Chae et al.

Anonymous Referee #1

Received and published: 9 April 2010

General comment

This paper presents a nice analysis of cloud, water vapor, ozone and temperature satellite observations near the tropical tropopause. Due to the complicated processes in the TTL, some of the conclusions are not firmly drawn. Some results are innovative and deserve to publish. The manuscript is fairly written. More descriptions are needed for the data, methods and some figures. Therefore, I recommend publishing this paper with some minor revisions. Please see detail comments below.

Major comment

1. May-Jan period does miss important active periods over Africa in Mar-Apr and over

Amazon in Feb. Dataset could be a little longer at least covering one -year cycle to remove some of the doubts on the representative of the results.

2. Showing anomalies of absolute value is important. But readers also deserve to know the relative change (e.g. in percentage) to get the picture of how large these anomalies are. There is no description of such in the whole paper.

3. One confusion is between Fig 3 and 4. Fig 3c shows cooling at 16-18 km over the regions with cloud. However, Fig 4a shows warming at the same altitude but with cloud top over 10 km. Figure 1 and 2 show that most of the clouds have tops over 10 km. So should not we expect Figure 3c and Figure 4a be close?

4. Ozone anomalies at 18-20 km is interesting indeed. However, authors forgot to mention that this anomaly is below 5%. Hypothesis of downward motion is proposed to explain this. However, could not this small anomaly also be from extra vertical mixing induced by gravity waves from deep convection?

5. Based on your schematic diagram Fig 11, the tropopause should be warmer over cloudy region. However, we know it is generally colder there, your Fig 3 shows this as well.

Minor comment

1. P8967, line 8, do you use night time dataset for MLS and CloudSat also?

2. P8968, line 18, this is a good example of comparing apples to pears for two reasons: a) different regions, MISR curve is analyzed 10 degree zone larger than CloudSat and included more dry areas such as Sahel, this potentially could lead to very different mean profile. b) if Calipso+ cloudsat is at 0130, MISR is at 1030 (or both 1030 and 2030?, you need to be specific), what the difference can be from the diurnal variation of the clouds, especially over land? If MISR dataset is not important in the paper, suggest remove Figure 2b.

3. P8969, line 3. Which zone? 15S-15N? There is no description on this in both text

ACPD

10, C1457–C1459, 2010

and figure caption. Though you mentioned this in section 2, it would be friendly to have full description in the figure caption.

4. P8969, Fig 3 and 4, what is the error bar and vertical resolution of the MLS temperature?

5. P8970, Fig 5. Do you have limit on the cloud top range? Please be specific in the caption.

6. P8972, Fig 6. Describe in the caption what NS and NW mean.

7. P8973, Fig 7. Change H2O to water vapor in Fig. H2O include water vapor and ice clouds.

8. P8973, line 18, remove “can”

9. P8973, line 26, deposited instead of condensed.

10. P8973, Do you have speculations on the slight increase of water vapor above cloud between 17.5-19 km?

11. P8973, what is happening over Africa at 14 km in Fig 8? Artifacts? Or some meaningful observations?

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 8963, 2010.