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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Overshooting of clean tropospheric air in the tropical lower stratosphere as seen by the CALIPSO lidar" *by* J. P. Vernier et al.

Anonymous Referee #2

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General comment:

This interesting paper tries to tie the seasonal variations of aerosols from CALIOP signals in the upper troposphere and the lower stratosphere to the seasonal variations of deep convection direct vertical transport. However, there are still some questions left I think need to be addressed. I recommend accepting this manuscript after some minor revisions.

Major questions in addition to those from reviewer 1:

1. I understand authors use TRMM instead of CloudSat to describe the deep convection to include the important deep convection over land, which A-Train misses due to

the diurnal cycle. However, TRMM PR only observe very large ice particles in the convective cores, it tends to emphasize more on the land convection with stronger updraft. The convection over ocean can also reach very high altitudes but with lower radar echo and they happen very frequent also. What are the impacts of those weak systems in your AI calculation? What would be the difference by using CloudSat cloud occurrence at 15 km to calculate AI? Can you predict the same trend as shown in Figure 7?

2. It is known that the deep convection reaches the maximum over the West Pacific in DJF. How would that relate to your cleansing? At least the convection over water has low aerosol sources. Could this high vs. low aerosol in the upper troposphere be just due to the seasonal cycles of convection over land vs. over ocean, just like the starting of CO tape recorder explained by Liu et al. 2008 (GRL)?

3. Please be clear on how you calculate AI. Did you use the daily mean AOD for each TRMM OPT cases or the monthly mean? Calculating AI using monthly mean of AOD and the individual cases of convection could be misleading if there is a large daily variation of AOD.

Minor comments:

1. P 3, line 27, Zipser et al. (2006), also it is not on the reference list.

2. P 4, line 10, Ekman et al 2006 missing from the reference list.

3. P 4, line 13, Fryod et al. 2009 missing from the reference list.

4. P 9, line 27-28, I am not sure what may indicate from these. You cannot claim that the cleansing is due to the OPT in SH, but pollution is due to the OPT in NH. Since TRMM OPTs are mainly from over land, it is hard to imagine Argentina OPTs would clean the air and but OPTs during Asian monsoon would pollute the air with aerosols.

5. P 10, line 22, Liu et al. 2008 is missing from the reference list.

6. P 10, line 24, I see cleansing in 18-20 km has about one-three month lag from

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below in Fig 1. Could this just be part of BD circulation? Why do we need another explanation?

7. Fig 7, why do not show all periods as Fig.5? Just emphasize on the period without the influence of volcanic aerosol in the discussion.

8. P15, line 20, The

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 163, 2011.