

Interactive comment on “Trans-Pacific dust transport: integrated analysis of NASA/CALIPSO and a global aerosol transport model” by K. Eguchi et al.

Anonymous Referee #2

Received and published: 16 March 2009

General Comments: The dust aerosol has important effects on global and regional climate. The detailed structure of dust aerosols in horizontal and vertical will give us more information to estimate dust aerosols’ direct and indirect effect on radiation and cloud systems. This manuscript attempts to use CALIOP vertical-resolved measurements and SPRINTARS model to study the detailed 3D structures of Trans-Pacific Asian dust transport. In general, I found the paper well written and appropriate for ACP audience. I recommend accepted this paper for publication in ACP with addressing those comments listed below:

1. In this paper, the results of three-dimensional aerosol transport model (SPRINTARS)

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showed a good agreement with the CALIOP observations. However, the shortcoming and future improvement of this model should be discussed.

2. In the manuscript, the value of depolarization ratio are used to identify the non-spherical particles, spherical aerosols (pollution aerosol), dust, smoke aerosols, mixture of dust and pollution. What are the exact depolarization ratios did authors use to identify these aerosols? Please add table to list them.

3. Page 4017, line 25: ‘Figures 1a-1d correspond to every other day of 5-15 May’. Should be ‘Figures 1a-1f correspond to every other day of 5-15 May’

4. Page 4018, line 20 ‘The horizontal scale is greater than 500 km’. Is this scale means dust extinction coefficient (blue solid contours) in Fig2a? If it is, the horizontal scale should be about 1000Km.

5. Page 4019, line 3, ‘Judging from the depolarization ratio measurement (middle column in Fig. 1c)’. Fig.1c should be Fig. 2b.

6. Page 4019,line 5: High thick clouds (light blue regions) exist on both sides of the aerosol layer: the northern one is associated with a low-pressure system located on Kamchatka Peninsula; the southern one is associated with the cold front accompanying this low-pressure system.’ The horizontal scale of the low-pressure system is from about 28。N to 35。N, and the cold front accompanying this low-pressure system are located from 42N to 45N. It does not make sense. Please explain more detail.

7. Page 4022, line 1 to 4, Traj-A does not always follow the same air mass of pollutants.’ The transport of air pollutants undergoes a different path from that for the dust? Is this the results from trajectory analysis? Why the trajectory analysis is different from the transport? The calculation of trajectory is decided by the distribution of wind filed. But why does the air pollution and dust aerosol undergoes different path?

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Need more explanation.

8. Recently, JGR just published a paper about the Asia dust transport by using CALIPSO measurement (Huang, J., P. Minnis, B. Chen, Z. Huang, Z. Liu, Q. Zhao, Y. Yi, and J. K. Ayers (2008), Long-range transport and vertical structure of Asian dust from CALIPSO and surface measurements during PACDEX, *J. Geophys. Res.*, 113, D23212, doi:10.1029/2008JD010620.). Please reference this paper to increase reader understanding of the Asia dust transport.

Interactive comment on *Atmos. Chem. Phys. Discuss.*, 9, 4013, 2009.

ACPD

9, S830–S832, 2009

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