

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

**K. Eguchi et al.**

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First of all, we want to express our sincere thanks for your very careful reading of our manuscript. We will revise our manuscript according to your valuable comments.

Reply to comments:

1. "In this paper, the results of three-dimensional aerosol transport model (SPRINTARS) showed a good agreement with the CALIOP observations. However, the short-coming and future improvement of this model should be discussed."

Your suggestion is important. As indicated in the paper, extinction coefficients by SPRINTARS are underestimated during the long-range transport compared with

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CALIOP observations. We will include further discussion about the improvement of the model on the conclusions.

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."

We used the depolarization ratio of 0.2 in order to discriminate non-spherical particle from spherical one based on the analysis results of Shimizu et al. (2004). We will add a brief description in section 2.

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 May8217;"

Your comment is correct. We will correct it.

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."

The scale of 500 km mentioned in the paper is derived from CALIOP observations. The CALIOP observations for the northern part (40N or northern) of the CALIPSO path of 05-05T190734 are missing because of thick clouds, so I phrased the scale as 8216;greater than 500 km8217; in the paper. As your commented, the horizontal dust scale is about 1000 km if it is judged form the SPRINTARS dust extinction coefficients (blue solid contours), and this value is appropriate to mention the total scale of the dust layer. We will improve the expression of the dust scale based on the evaluated one from the SPRINTARS.

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

Your comment is correct. We will correct it.

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 28N to 35N, and the cold front accompanying this low-pressure system are located from 42N to 45N. It does not make sense. Please explain more detail."

The aim of the discussion on the Page 4019 line 5 - line 8 is to mention that the dust plume is trapped on the dry-slot behind the cold front. The horizontal scale of the main body of the low-pressure system is 42N to 60N and that of the accompanying cold front is 28N to 35N based on the CALIPSO cloud discrimination (shaded by light blue on Fig. 2b). It is consistent with the modeled cloud distribution (Fig. 1c gray scale) and the location of the low-pressure system (indicated as symbol "L" near 50N, 160E on Fig. 1c). We will revise the discussion to clarify the aim and to become easy for understanding.

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? Need more explanation."

As indicated in the Fig. 3a, the main transport height of air pollutants (about 2 km) is less than that of dust (about 4 km) over the eastern Pacific. Wind fields of these heights differ from each other. The height of Trajectory-A corresponds approximately to main transport height of dust. So the air pollutants goes different path from Traj-A. We will explain more detail in the revise paper.

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,

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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."

We will refer to the Huang et al. (2008) on the section 1.

#### References:

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.

Shimizu, A., N. Sugimoto, I. Matsui et al. (2004), Continuous observations of Asian dust and other aerosols by polarization lidars in China and Japan during ACE-Asia, *Journal of Geophysical Research*, 109(D19S17), doi: 10.1029/2002JD003253.

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