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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Asian dust outflow in the PBL and free atmosphere retrieved by NASACALIPSO and an assimilated dust transport model" *by* Y. Hara et al.

Y. Hara et al.

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First of all, we want to express our sincere appreciation for your very careful reading of our manuscript. We will revise our manuscript according to your valuable comments. We will also carefully revise Fig. 2, Fig. 3, and Figs. 6-7 to improve readers' understanding. We hope that our revisions satisfy the intentions of your comments.

Reply to comments:

Regarding your main suggestions (a), (b) and (c),

a) We will revise Fig. 2. We would like to prepare two columns of figures to improve readers' understanding: the first column presents the RC4 dust AOT and SYNOP dust

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code; the second column shows the MODIS cloud image and wind vector with indications of a low-pressure center and its associated fronts.

b) We believe that Figs. 6-7 provide unprecedented and important understanding of dust transport because observations over the dust source region or Pacific Ocean have not been done latitudinally and vertically yet, and because integrated analyses using both observations and model simulation have never been done before. We clearly see the position of the dust plume and clouds during transport, not only longitudinally but also latitudinally. For those reasons, we want to retain Figs. 6-7 in the manuscript. We will modify Fig. 6(e) with U-W wind vectors to depict the locations of clear vertical motions more clearly.

c) We analyzed Fig. 8 using CALIOP data between 30N and 44N. As portrayed in Fig. 4, the dust layer zone corresponds to the range of 30-44N. If we take anthropogenic particles only in the low latitude, the data should have small CRs indicating size information; however the CRs are greater than 0.5 in Fig. 8. Therefore, we believe that Fig. 8 shows the aging process of pure dust particles. We will add a statement related to the latitude range used in analyses to avoid confusion.

This manuscript was proof-read by a native English speaker before submission. Nevertheless, we shall revise our manuscript more carefully, and again have this paper proof-read by a native English speaker who is experienced in the preparation of scientific papers.

Reply to Specific Comments:

- Abstract

We will revise the Abstract to impart a better understanding.

- Dust emission/transport

We will add a description of the assimilation method used in this study.

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- Line 10

Your suggestion is important. We will revise the description of the simulation period. Actually, the simulation was performed from 1 May; data assimilation was performed during 16-31 May. In this paper, we presented model results only from 21-31 May 2007.

- Line 19-20

The total dust emission was calculated and accumulated from 16-31 May 2007 over the whole simulation domain.

- 3.1 Daily variation of meteorological

As explained in reply a), we will revise Fig. 2 according to your comments and thereby present significant meteorological features more clearly.

- 3.2 Time-height analysis

We will add a description of the interrelation between the low-pressure system and dust cloud based on Fig. 2. Moreover, we will add a time-height plot at the dust source region in Fig. 3 to present the evolutionary features of a dust storm.

- 3.3 Cross-section analysis along the cold front movement

We will add the potential temperature to Figs. 4-5 (middle column) with contour lines, and merge the relative humidity in Figs. 4-5 (left column) with a larger interval contour line to display them more clearly.

- 3.5 3-D structure of dust

As mentioned in reply b), we will add the U-W wind vector in Figs. 6-7(e) to provide better understanding.

- 3.6 Correlation of color ratio and PDR

As explained in reply c), we will add a description of the latitude range used in these

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analyses. We will also emphasize that we analyzed the CALIOP data in the dust layer zone to clarify dust aging.

Reply to Minor Comments:

We will revise the manuscript according to all of your appropriate comments. Thank you.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 8715, 2008.

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