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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Global distribution and radiative forcing of soil dust aerosols in the Last Glacial Maximum simulated by the aerosol climate model" *by* T. Takemura et al.

T. Takemura et al.

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Dear Reviewer,

Thank you very much for taking your time to review our paper. Your comments are very helpful to making our manuscript better. We tried to revise our manuscript so as to answer to your comments. We wish this revised manuscript deserves to publication.

1. [Comment] One thing that I would like to comment is in the part of discussion of radiative forcing, i.e., Section 4. During LGM, the area covered by ice or snow is much larger than that in the present, and thus surface albedo is supposed to be larger than the present. The aerosol direct radiative forcing is discussed with underlying high surface albedo due to ice cover and underlying low clouds. However, the direct

and indirect radiative forcings of aerosols should be compared with radiative forcing of surface albedo change; otherwise it is difficult to evaluate how much aerosol radiative forcing is important among radiative forcing agents in LGM.

[Answer] As mentioned in Introduction, the total radiative perturbation at the LGM relative to the pre-industrial climate is estimated to be -4 to -7 W m^{-2} by PMIP2, which includes a change in surface albedo (about -3.2 W m^{-2}) due to extended continental ice and lower sea level. The radiative forcing of dust due to the direct plus indirect effects at the LGM relative to the pre-industrial climate is estimated to be -0.9 W m^{-2} in this study. Therefore it is suggested that atmospheric dust might contribute to the cold climate during the glacial periods relative to the interglacial periods as mentioned in Abstract.

2. [Comment] Page 20464, line 20: It is assumed that... "assumed" is appropriate?

[Answer] No. "It is assumed that" has been deleted.

3. [Comment] Page 20470, line 20-21: The meaning of this sentence is "... higher dust emission flux in the LGM than PRE"? What is the reference to be compared with the result of Werner (2002)?

[Answer] This sentence has been revised as follows: "Werner et al. (2002) estimated a 2.2-fold higher dust emission flux in LGM than PRE, which is close to this study, though their estimation of the total flux in LGM was smaller (2383 Tg/yr)."

4. [Comment] Page 20471, line 6-8: Does the precipitation change contribute to the increase in dust emission?

[Answer] Yes. The contribution of the precipitation change is included in a change in the meteorological condition. "less precipitation" has been added as a reason for an increase in the dust emission in the revised manuscript.

Thank you very much for reviewing our manuscript.

ACPD

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Sincerely yours,

Toshihiko Takemura, Dr.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 20463, 2008.

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Interactive Comment