

Interactive comment on “Long-range transport of mineral aerosols and its absorbing and heating effects on cloud and precipitation: a numerical study” by Y. Yin and L. Chen

Anonymous Referee #1

Received and published: 14 April 2007

This numerical study by Yin and Chen is an important contribution to understanding the complexities of impact of tropospheric aerosols on climate change. The authors show the interesting results on absorbing and heating effects of transported dust aerosol on cloud and precipitation from their cloud model. This study represents a major research effort on interaction of clouds/precipitation and aerosols. Generally this paper was clearly written and well structured. I recommend it to be published after the following revisions:

1. The title, e.g. “the absorbing and heating effects of transported dust aerosol on cloud and precipitation: a numerical study” could be more appropriate.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

2. In Abstract, the last sentence should briefly point when the existence of dust layer can increase cloud optical depth and albedo, or when it can decrease them, and how to depend on the concentration and chemical composition of the absorbing components, or the time the mineral aerosols suspended in the atmosphere.

3. You summarized that when the mineral layer is located above the -5C level, the dust layer may promote the development of cloud and precipitation (the last sentence of summary and conclusions), which should be, as an important conclusion, added in the abstract.

4. Please correct the English grammar and improve the descriptions.

5. Because cloud condensation nuclei and ice forming nuclei were referred as CCN and IFN in abstract, it could be better to use CCN and IFN instead of “cloud condensation nuclei and ice forming nuclei” in the following sections.

6. Please give the unit of Ri in table 1.

7. The following references from for the recent publications could be useful for the discussion in your paper:

a) K.-M. Lau and K.M. Kim: observational relationships between Aerosol and Asian monsoon rainfall and circulation. Geophysical Research Letters, Vol. 33, doi:10.1029/2006GL027546, 2006.

b) Zhao, T. L., Gong, S. L., Zhang, X. Y., Blanchet, J. P., McKendry, I. G. and Zhou, Z. J.: A simulated climatology of Asian dust aerosol and its trans-Pacific transport. Part I: Mean climate and validation. Journal of Climate, 19, 88-103, 2006.

c) Daniel Rosenfeld, et al.: Inverse Relations between amounts of air pollution and orographic precipitation. Science 315, 1396(2007), doi:10.1126/science.1137949.

In paper a, the “elevated heat pump” is presented, although it is in the large scale; Paper b found that the Asian dust aerosol transport peaked below 3km over Asian

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

subcontinent and higher than 3km over north Pacific; The observational precipitation can be decreased by 30 to 50 percentage during hazy conditions in northwest China (paper c).

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 3203, 2007.

Interactive
Comment

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper