

***Interactive comment on* “Effects of dust storms on microwave radiation based on satellite observation and model simulation over the Taklamakan desert” by J. Ge et al.**

J. Ge et al.

Received and published: 15 June 2008

Reviewer #3

We are very appreciative of the reviewer's thorough review of the paper and encouraging comments. The suggestions and comments are very helpful in improving the paper. The revised version has addressed the reviewer's concerns and made corresponding changes according to reviewer's comments and suggestions. The following are our point-by-point responses to the reviewer's comments:

Comment1: Notations in Eqs. (1) and (2) are not clearly. For example, does 18.7V indicate radiance at 18.7 GHz? In the manuscript, it is stated that "we further introduce an index that is based on the three vertical polarization channels at 18.7, 23.8, and

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper



89GHz so that"; But it is not clear which physical quantities observed at these channels are used.

Response: The physical quantities of introduced index are brightness temperature at 18.7, 23.8, and 89GHz. The 18.7V indicate the brightness temperatures of the vertical channel at 18.7GHz. We have added the clear statement in the revised paper.

Comment2: P. 7934, lines 3-4: change "radiation transfer"; to "radiative transfer". The term "dual polarized and discrete-ordinate" is not correct. When the polarization configuration is taken into account, the full phase matrix and the Stokes parameters are used in the radiative transfer calculation even through the final outputs are just radiances with parallel and perpendicular polarizations. Thus, it is suggested to use the term "vector discrete ordinate radiative transfer (V-DISORT)". In fact, "V-DISORT" has been commonly used for the vector RT model developed by Weng (1992).

Response: We have changed "radiation transfer" to "radiative transfer", and "dual polarized and discrete-ordinate" to "vector discrete ordinate radiative transfer (V-DISORT)" by following the reviewer's suggestion..

Comment 3: Dust particles are assumed to be spheres in this study. This may be a weakness of this study. A number of studies reported in the literature have confirmed that dust particles are non-spherical particles with an aspect ratio of 1.3~2.0 for the overall shapes. The mean aspect ratio is approximately 1.7. Although the size parameters are small at microwave frequencies, the particle shape effect may not be negligible. The authors are not suggested to carry out new calculations, but they should comment on this issue.

Response: We agree that, dust particles are non-spheres and have been confirmed by many research works. Because this study is the first step, we do not carry out new calculations, but we have added a statement for this important issue at the end of the paper and given some related references.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

Comment 4: Figs. 3 and 4 show that the PDFs for clear-sky and dusty pixels are significantly overlapped. How can they be effectively separated in practice?

Response: When the values of SCAT in a range of -5K to 5K in fig.3, the PDFs for clear-sky and dusty pixels are overlapped. We need to set a threshold to distinguish clear-sky and dusty pixels in practice. Actually, if we use a threshold of -5K for SCAT, we could separate most dusty pixels from clear-sky pixels over the Taklamakan desert, though about 4.9% clear sky pixels will be misidentified. The mean value of PTD of dust is slightly greater than of clear sky in fig.4. It shows a weak depolarization of surface emission caused by dust particles. We can hardly distinguish dust and clear sky if we only use PTD.

Comment 5: Table 2: a reference should be given for the surface emissivity data.

Response: we have added a related reference for the surface emissivity.

Comment 6: The manuscript should be carefully edited. There are some minor editorial errors. Listed below are a few examples: P. 7932, line 24: "(Lau, K.-M., and K.-M. Kim)" should be "(Lau and Kim, 2006)". P. 7934, line 11: change "in depth" to "in thickness". P. 7934, lines 5-6: change "The effect ... are computed" to "The effect are simulated". P. 7934, lines 8-9: change "in the range from 0.002-0.2 mm" to "in a range of 0.002-0.2mm". P. 7936, lines 24-25: change "East Asia often has a high aerosol concentrations" to "The aerosol concentration over East Asia is often high". P. 7936, line 10: change "When the dust storms occur"; to "When a dust storm occurs". The date format in Table 1 should be, for example, 03/15/2006.

Response: All of the errors listed above have been corrected. We have examined the whole paper again and made necessary corrections.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 7931, 2008.

[Full Screen / Esc](#)[Printer-friendly Version](#)[Interactive Discussion](#)[Discussion Paper](#)