

***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.**

Anonymous Referee #3

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Synopsis: This manuscript reports on the effect of dust aerosols on microwave radiation over the Taklamakan desert on the basis of satellite observations and modeling capabilities. Eight cases have been analyzed. The major findings of this study are 1) the brightness temperatures at high frequencies can be depressed by dust scattering, and 2) dust particles also lead to weak depolarization of surface microwave emission. Overall, the manuscript is well organized and clearly presented. No major technical errors are observed. I recommend that the manuscript be accepted after minor revisions. However, there are some minor ambiguities and grammatical errors in the manuscript, which need to be clarified and corrected before the manuscript is formally published. Below are my specific comments/suggestions for the authors' consideration

in the revision process.

1) 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., 23.8, and 89GHz so that";. But it is not clear which physical quantities observed at these channels are used.

2) 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).

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 nonspherical 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.

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?

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

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".

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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 0.002-0.2 mm".

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.

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

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