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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Direct observations of the atmospheric processing of Asian mineral dust" *by* R. C. Sullivan et al.

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Thank you for your comments.

Comment #1. The accumulation of sulphate in dust by non-atmospheric processes is a valid point. We have added the following to the revised manuscript in Section 3.1 to address this:

"These peaks provide evidence of the accumulation of secondary species by mineral dust, as discussed below. Some of these species could be present in the dust at the source as minerals such as halite (NaCl) and gypsum (CaSO4). Falkovich et al. (2001) found sulphate (not from gypsum) in Saharan dust particles which they determined was not due to atmospheric processing. Thus, they concluded that other sources of sulphate such as deposition by rain or runoff added sulphate to the dust's surface.

These processes could also be adding sulphate to the Asian dust described herein. As shown later, the ambient aged dust particles had very large ion signals and temporal variations for sulphate, indicating that the vast majority of the sulphate accumulated on the dust during atmospheric transport."

Comment #2. We have added two References (Kaufman et al., 2005; Rosenfeld et al., 2001) to the Introduction to discuss observations of the modification of cloud properties by mineral dust particles:

"The addition of water-soluble secondary species to a dust particle can affect its ability to act as a cloud or ice nucleus and thus influences the indirect climate forcing of dust (Cziczo et al., 2004; DeMott et al., 2003; Gibson et al., 2006; Levin et al., 1996; Levin et al., 2005; Matsumoto et al., 2006; Perry et al., 2004; Rudich et al., 2002; Yin et al., 2002). Mineral dust particles have been observed to increase cloudiness by producing more but smaller droplets, with potential reductions in precipitation (Kaufman et al., 2005; Rosenfeld et al., 2001)".

We elected not to add all the suggested References to reduce the already large number of citations in the manuscript.

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 4109, 2006.