

## ***Interactive comment on “Size-segregated fluxes of mineral dust from a desert area of northern China by eddy covariance” by G. Fratini et al.***

**G. Fratini et al.**

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Response to anonymous Referee #2

We have greatly appreciated the general positive comments of the Referee, and the specific questions raised because they have helped us to improve the quality of the paper.

The Referee is right in stating that the eddy covariance system with the OPC is unable to distinguish particles with different origin. Indeed, outside areas such the one we have investigated (desert lands far away from any other particle source), it is impossible to say whether or not particles are originated from wind erosion. To evaluate these aspects in areas in which also carbon and sulphate particles are present, a parallel system allowing accumulation of dust in filters followed by chemical analyses is

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definitively required.

As far as definition of the storm event is concerned, various definitions, based on wind speed, duration windy period and visibility reduction, are used to define an event. However, none of them unambiguously classifies storm intensities. By considering all factors, the event recorded in the last two days of our campaign at the GB1 site was classified by local meteorologists as a “weak dust storm”. Measured particle concentrations and NAAPS predictions indicate that it was a dust storm event of medium intensity. Because of these ambiguities the event cannot be better defined.

The Referee asks for more detailed information about the statistical significance of data obtained under different conditions, and the uncertainty associated with particle number counting. The paper has been modified, by reporting: a) the actual flow rate sent to the OPC, b) the number of particles reaching the detector under different conditions and, c) the uncertainty associated with flux determinations under low and high turbulent conditions. Data reported in the corrected Figures show that the uncertainty was 1-10%, during the storm event, whereas it reached values as high as several 100% in previous days, when concentrations were much lower. Based on these analyses, our previous conclusions that the dilution step should have been avoided under low turbulent conditions is fully justified, even though data obtained can still be used to get a general indication on the difference in particle fluxes existing under different conditions.

The Referee asks questions regarding the power of the instrumentation and the source used to run it. The system worked at 230 VAC, and required about 1.0 kW of power. In the field, the energy was supplied by a small gasoline generator. The impact of generator emissions was minimized by placing it downwind with respect to the prevalent wind direction, and at distances from the tower falling in a relatively negligible area of the footprint. During the storm event, the impact of the generator could have been safely neglected also because the emission of dust particles by wind erosion largely exceeded the one coming from internal combustion.

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The Referee argues that the paper is more a ‘technique’ rather than a ‘data and analysis’ paper. We believe that a ‘data and analysis’ paper is possible only after that the correctness of the technical approach is verified and the range of applicability of EC to particles assessed. According to our opinion, this part deserves a specific paper due to the critical aspects associated with the adoption of this technique in the determination of particle fluxes. Validation of models can be performed in separate and specific papers only when a substantial amount of data collected by EC will be available.

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Interactive comment on Atmos. Chem. Phys. Discuss., 7, 2133, 2007.

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