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Atmospheric Measurement Techniques Discussions

Interactive comment on "An experimental study on light scattering matrices for Chinese loess dust with different particle size distributions" *by* Jia Liu et al.

Anonymous Referee #3

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General Comments:

This study presents an original measurement of dust samples and therefore fulfils the criterion of novelty. As it additionally presents a combination of techniques that can be seen as a new method, it fits the scope of AMT. While the paper still needs some improvement, the methods are ultimately fine. There are some weaknesses as to the significance of the work and the conclusions that are drawn, but these can probably be targeted by clearly stating the limits and some more explanation. The language is mostly fluent and precise. However, there are a still lot of mistakes. These can be fixed easily. The manuscript would benefit from having a native speaker or professional En-

glish proofreader go over it in detail. If the comments can be addressed appropriately, I recommend publication.

- The complete analysis is based on one single sample. This is a major weakness of the study. Yet as this is unlikely to be corrected retroactively, I suggest to discuss this fact thoroughly and state the limitations of the study. How representative is this sample of the Chinese Loess Plateau? There must be local variations, and the fact that it was sampled from the middle (page 3, line 93) does not make it representative per se. The limitation of drawing and measuring just one single sample have to be stated clearly.

- The original sample is milled to produce smaller particles that may be transported further. Why is it milled to the given size, not larger and not smaller? The study shows significant change of dust properties with size, and the milled loess seems to be just an arbitrary size.

- It is not clear enough what the conclusion of the study is. Scattering matrices are reported, but what do they ultimately tell us about the Chinese loess dust?

Specific comments:

- page 2, line 34-35: Please rephrase "It is common knowledge that ...". Literature that proves the statement is provided in the next paragraph, so there is no need to rely on "common knowledge".

- page 2, line 38 it should be "...CLP is expected to have important influence" instead of "...CLP will have important influence", as the statement is not proven.

- page 2 and 3, literature values for scattering matrix: Please elaborate on what the scattering matrix tells us, which properties do Fij and their quotients describe? Explain either here or in section 3.1.

- page 4, line 120: SEM "images", instead of "photographs", as this is an imaging technique detecting electrons, not photons.

- Table 2 and paragraph 1 on page 5: Are the differences in the sample composition significant? What are the errors on this analysis?

- page 6, section 3.2: Add some more detail of how the analysis was done. How many measurement iterations were performed, how are the final results derived from these?

- page 7, section 4.1: Similar as in the introduction, it should be discussed what the physical meaning of the results are. This is partly attempted in line 199, but should be done more thoroughly.

- page 8, lines 216-217 Please add the units of the parameters.

- page 8, lines 235-240 The description is rather vague, please make it clear what your actual finding is.

- page 10, line 302: As in page 2, line 38: Rather write "is expected to affect" or similar instead of "will affect".

- page 11, paragraph 2: Please make it more clear what the scattering matrices tells us. This section is now more a summary than a conclusion.

- page 11, line 323: Data availability: You uploaded the data, which is great, this should be linked here.

- Table 1: Add units.

- Abstract and Conclusions: Please add: What do the results of that study actually tell us about light scattering by Chinese loess in one sentence?

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