

Interactive comment on “Laboratory analysis of volcanic ash particles using a 2D video disdrometer” by Sung-Ho Suh et al.

Anonymous Referee #1

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The paper presents a statistical analysis of physical parameters of volcanic ash particles, observed by a 2D video disdrometer in a controlled environment. Volcanic ash particles were separated into different categories depending on the particle morphology and a detailed examination for a number of physical quantities is presented for each group. Results presented are a significant step in interpreting weather radar observations of volcanic ash clouds.

I believe that the work presented is scientifically sound, interesting and is appropriate for eventual publication in AMT. However, I believe that there are several points of improvement. Although detailed work has clearly been carried out, the way the paper is written makes it look more like a laboratory report rather than a scientific paper – the thesis of the paper is not clearly shown and it lacks a strong discussion/concluding

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section that addresses the impact the results of the study have in a broader context. I appreciate that the nature and scope of the journal allows some freedom in this respect (and I feel makes it a better choice for the work than the previous journal choice), but I feel that in its current incarnation the manuscript is robbed of some of the potential impact.

I believe several points will need to be critically reviewed and certain sections will need to be reworked in order to make the manuscript fit for publication. I have written these points in detail in the following section and marked some comments in the accompanying manuscript.

I would like to wish the writers the best of luck with the revisions and I'm looking forward to seeing the revised manuscript.

Main comments

1. As noted in the introductory part my largest issue with the manuscript is the lack of a good discussion section to put the findings into perspective. I believe there are a number of key issues concerning ash dispersal that the results are relevant to (see other points 3 and 4) and I would like to see at least some of the discussed in more detail in a larger discussion section. This doesn't have to necessarily be a separate section from the conclusions (although it would be preferred), but at least a more complete version of what was included in the first iteration. Parts of the introduction feel overly long and repetitive so I would suggest tidying up the introduction and using the space for a more comprehensive discussion section.

2. Speaking about the introduction, at the end it is stated that one of the two goals of the paper is to “develop QAE methods for accurate detection of ash clouds by cloud radar” (ln158-161). Although I understand that this is one of the aim of the larger study presented it is not really addressed again in the paper aside from the concluding section (ln 610-615). I feel that at this point this is future work and mainly makes sense in the conclusions; usually the last paragraph of the introduction is reserved for topics

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that are actually addressed in the paper.

3. How would ash aggregation affect the results in real conditions? Aggregation changes the new particle density and size and thus affects vertical velocity (for example see Bagheri et al 2016 Timing and nature of volcanic particle clusters based on field and numerical investigations, *J. Volcanol. Geotherm. Res.*). What would the effect of that be in radar observations?

4. What would the results suggest for ash hazard simulations? How can this new knowledge be expected to impact results from volcanic ash simulations considering that volcanic ash is commonly represented as a single category with common geometry? I think that this represent an interesting point that could be touched upon to show the significance of the work.

5. Some of the paragraphs, especially in the introduction, are overly long and complicated. One paragraph should only discuss one idea, expressed by the first sentence and expanded in the following sentences. Ideally a reader should be able to have a good idea about what is written in the paper just by reading the first sentence of each paragraph. Overly long and complicated paragraphs can be very tiring to go through.

Minor and technical comments

See manuscript for minor (blue) and technical/language (green) comments. These don't have to be addressed in the response, unless the authors would like to refute them.

Please also note the supplement to this comment:

<https://www.atmos-meas-tech-discuss.net/amt-2019-88/amt-2019-88-RC2-supplement.pdf>

Interactive comment on *Atmos. Meas. Tech. Discuss.*, doi:10.5194/amt-2019-88, 2019.