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Interactive
comment

Interactive comment on "SCARLET-1.0: SpheriCal Approximation for viRtuaL aggrEgaTes" *by* Eduardo Rossi and Costanza Bonadonna

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Thanks for the opportunity to review this interesting paper. The paper presents a model for the simulation of the 3D shapes of irregular particles generated through the collision of simpler shapes. The paper highlights the potential of the model to be generically applicable to various aggregation problems and demonstrates this in the context of the aggregation of volcanic ash. For this reason, I expect the paper to be of interest to GMD. I think that the application examples provided are clear and can potentially confirm the usefulness in the context of volcanology despite the fact that the results do not appear to fit the observations very well. The model is implemented in SCARLET, an open-source package written in the MATLAB language. The software is well coded, it comes with sufficient documentation, and seems easy to use.

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Discussion paper

My field of expertise is snowflake aggregation. Considering this, I think that many of my concerns could come from a misunderstanding of the volcanic ash aggregation dynamics. The authors are invited to consider my background when reading my comments. However, I think that the authors are going along a path already taken by the snow scientific community and some of the discrepancies they find in the results might be explained by errors in the modeling assumption that snow scientists (including me) have already committed. For this reason, I think that the authors could benefit from my review in an attempt of making a truly interdisciplinary knowledge-transfer.

My main point of concern is the aggregation dynamics. The SCARLET model assumes a central particle that grows by a collection of other individual particles. The only evidence that I was able to find in the paper in support of this is the observation of volcanic ash aggregates composed of one piece much larger than the others. I do not think this is sufficient evidence for neglecting the existence of an aggregation kernel (basically also the colliding particle can collide before being collected by the large one). If the authors can explain better the rationale behind their model design I think the paper would be greatly improved and I will learn something.

My full review is attached as a separate document.

Please also note the supplement to this comment:
https://gmd.copernicus.org/preprints/gmd-2020-346/gmd-2020-346-RC2-supplement.pdf

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