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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Spatial evaluation of volcanic ash forecasts using satellite observations" *by* N. J. Harvey and H. F. Dacre

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This paper introduces a technique for assessing skill in volcanic ash (VA) forecasts or simulations that has an advantage (as the authors argue) over traditional point-focused methods. That advantage is realized in the case that the evaluator's goal is to quantify similarity in the horizontal footprint of an observed VA plume. My understanding of the problem is that it is important to quantify how well a simulated VA plume matches the size, shape, and location of a VA-plume retrieval by an imaging satellite (e.g. SEVIRI or MODIS). In a range of scores reflecting agreement between observation and simulation, from 0% (no agreement) to 100% (perfect agreement), there is said to be skill in the simulation at 50%. Hence this technique offers a continuous skill-score range and

a skill/no-skill threshold for the purpose of comparing different simulation assumptions or meteorological drivers within one model, different volcanic source terms, or model-model differences. As such, this topic and the authors' manuscript are appropriate for ACP and potentially beneficial to the community striving to improve VA forecasts and warnings.

The manuscript is well written and organized. It was easy to follow and understand. The results consist of a single demonstration of the proposed VA evaluation technique, which is necessary but perhaps not sufficient convince the reader of the utility and value of their spatial evaluation technique. Hence I would recommend this paper be published after consideration of adding at least one more example of a real VA plume simulation, and satisfactory response to the minor and technical comments listed below.

P24728, L18. Consider amending "The presence of. . ." to "The presence or threat of. . ."

P24733, L22. Please consider informing the reader of the initiation time of the NAME simulation shown and discussed here. IT may not be critical to the paper, but I was left wondering how many hours/days post initiation these results were.

P24734, L14. "satellite retrieved" should be hyphenated I think.

P24734, L18-24. Here the authors introduce the pixel-matching concept. An issue came to mind while reading this that may represent a flaw or at least some incompleteness in the pixel-matching construct. It seems to me that the number of pixels with a simulated VA amount exceeding the ash/no-ash threshold is directly tied to the source VA concentration. This has nothing to do per se with the VATD model itself. E.g. a relatively small initial dose of VA will lead to a relatively small plume at all forecast times. I would expect that this would or could impact the number of matching pixels but this plume size is unrelated to the model itself that is being assessed for skill. The authors discuss how an artificial cut off in the satellite-ash retrieval affects the pixel-

matching process but not the point raised here. Hence it would seem that there must be a discussion of this if indeed the authors agree that there is merit to it.

P24735, L9. “. . .gridbox are. . .” should be “. . .gridbox is. . .” I think.

P24737, L26. “assess” should be “assesses”

P24739, L2-3. This sentence is unclear because it is a comparison without invoking two points of comparison. It states that the "objectively...results" are "more similar" to "subjective...inspection" but doesn’t say with respect to what.

P24739, L17. Hyphenate “satellite-retrieved” Figure 4 legend. More space is needed between the dots to show the differing line types.

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