

Nat. Hazards Earth Syst. Sci. Discuss., referee comment RC4
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Comment on nhess-2021-96

Ole Ross (Referee)

Referee comment on "An ensemble of state-of-the-art ash dispersion models: towards probabilistic forecasts to increase the resilience of air traffic against volcanic eruptions" by Matthieu Plu et al., Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2021-96-RC4>, 2021

General remarks

Improvement of volcanic ash dispersion forecasts is still highly relevant for civil aviation and the potential benefit of ensemble use is worth being investigated. Although the authors deal with a rather small and diverse ensemble the study is generally well designed. The manuscript is easily readable and understandable. The presented figures show the results nicely. I recommend publication after consideration of the referee comments.

Specific comments

Could you please comment on the following aspects for my personal understanding (not necessarily in the article if you think it is obvious for the community):

- The general purpose of spin-up phases is clear, although I thought about differences regarding their importance between meteorology models and externally driven LPDMs. Could you please comment how you chose the spin-up phase of 3 days in the specific situation? Have you looked internally for any features/differences of the models during spin up evolvment?
- The a posteriori source term was generated by inversion of satellite observations using flexpart, at least partially driven also by ECMWF analyses. The real plume somehow connected the satellite observations and the other measurements used in the present study. The ATM is connected by at least one similar setup, whereas the a posteriori source term seems to me rather free and independent. Could you briefly give some explanation why to assume "validity" of the a posteriori source term is justified in light of this potential model self-consistency issue?

Minor review points

L38

although it is of course true that longer routes have enhanced environmental and climate impact I cannot imagine that this consideration plays any significant role in the airline's decision on ad hoc rerouting. This is probably purely about safety / economic rational (including maintenance costs and passenger rights compensations).

L52

reconsider the expression "perfect models" – that they cannot be reached in "near future" is not only highly probable, it is systematically certain. Perhaps "with sufficient accuracy" or similar expression for reliable correctness / precise plume representation.

L103

ECMWF's vertical resolution of lower sigma-hybrid levels is surface pressure dependent, insert e.g. approximately/about/roughly