

Interactive comment on “A multi-scale risk assessment for tephra fallout and airborne concentration from multiple Icelandic volcanoes – Part 1: Hazard assessment” by S. Biass et al.

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Dear Editor,

We hereby send you a revised version of our manuscript entitled A multi-scale risk assessment for tephra fallout and airborne concentration from multiple Icelandic volcanoes – Part 1: Hazard assessment, which was greatly improved by the reviewer's comments. Individual comments and corrections were directly addressed in the manuscript. Here we only mention the general comments and the main issues raised by both reviewers: - We have substantially shortened the length of the paper by mov-

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ing the detailed stratigraphic/geologic description of the 4 target volcanoes to the supplementary material. This shorter version is sufficient to introduce the concepts of i) developing eruption scenarios based on a comprehensive review of the deposits of all target volcanoes; ii) probabilistic approaches and iii) numerical modelling. However, we do not explain in detail each model as these are already published; - The concept of stratified sampling was removed from the text as it was not relevant for this particular case-study and added an unnecessary level of confusion. For each scenario, 1000 runs were performed with both models using the same eruption source parameters; - Details were added on the setup of the FALL3D model; - The height of the tropopause (i.e. fixed at an altitude of 10 km) was only used to calculate an average wind speed in order to apply the method for the calculation of the MER described by Degruyter and Bonadonna (2012), with little impact on the models results; - The discussion was shortened.

Reviewer #1 1. Details of the model setup of FALL3D were added (Sect. 3.1.2) 2. The introduction of Sect. 3 was reworked to better explain the concepts used in the final hazard assessment. 3. Clarifications were added to Sect. 4.2.2 regarding the discrepancies in arrival time from the selected volcanoes. 4. We better state the scenario-based nature of our hazard assessment from the introduction and throughout the text, meaning that the resulting probabilities are conditional given that an eruption is occurring.

Reviewer #2 1. Clarifications were added in Sect. 3 to better define first arrival time and persistence. Here, the first arrival time for a given concentration threshold C_t is the difference between the release time and the first detection of C_t at a coordinate (x,y,z). 2. As rightly suggested, references to the paper of Leadbetter and Hort (2011) were included. 3. We feel that the schemes pictured in Figure 2 are close enough to the definition of an algorithm to be called as such (i.e. sequence of logical steps). The caption was reworked to include more details on the sampling process. 4. For consistency purposes, all TEPHRA2 simulations were re-run using the ECMWF ERA-

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Interim database for the same time period (i.e. Figs 8-11).

Please find attached the final manuscript in Latex format as well as the updated figures and Supplement. We hope that this revised version of our manuscript will meet the requirements to be published in your journal. We would be grateful if this paper could be published simultaneously with the part 2 of Scaini et al.

Best regards,

Sébastien Biass, Chiara Scaini, Costanza Bonadonna, Arnau Folch, Kate Smith & Armann Höskuldsson

Please also note the supplement to this comment:

<http://www.nat-hazards-earth-syst-sci-discuss.net/2/C1319/2014/nhessd-2-C1319-2014-supplement.zip>

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