Atmos. Chem. Phys. Discuss.,
doi:10.5194/acp-2016-1075-SC1, 2017

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Uncertainty assessment and applicability of an inversion method for volcanic ash forecasting" *by* Birthe Marie Steensen et al.

S. Barsotti

sara@vedur.is

Received and published: 30 March 2017

General comments:

The paper treats an important issue which has become topical for the entire meteo/volcanological community since the eruption at Eyjafjallajökull (Iceland) in 2010. The argument is treated by using proper approach and state-of-the-art numerical modelling. Overall the paper merits attention, but there is a key element that should be better treated and discussed before building the conclusions.

It is well known the problem of constraining and quantifying the eruptive source conditions when we need to model and, eventually, forecasts the dispersal of volcanic ash

Printer-friendly version

Discussion paper

cloud in the atmosphere. It is so important that an approach to obtain them is by inverting the semi-quantitative information retrieved by satellite images. On the other hand in this paper the a-priori scenario is built on data obtained by applying the Mastin et al. (2009) relationship to the plume height radar observations in order to assess a-priori values of the mass flow rate over the entire eruption. But several published papers clearly stated that the first few days of the eruption were characterized by a very strong wind that bent down the plume (see Petersen at al. 2012). In such conditions the Mastin et al. formula cannot be applicable because would underestimate the mass flow rate. Actually, revised mass flow rates obtained from both empirical and modelling approaches have been published in Gudmundsson et al. 2012 (for the entire eruption) and in Folch et al. 2011 (for the first week of activity) and both agree on mass flow rate values for the first days of the eruption to be on the scale of 10E6 kg/s. This paper, by assuming Mastin formula, get values for the mass flow rate up to 3x10E5 kg/s (Fig. 3, section 2.4). This would imply one third of the erupted mass has been assumed in input for the model simulations performed for this paper. So, my question here is: 1) why not to use the best assessment for mass flow rate when it is available and already published?, 2) how the results and the conclusion of this paper would change if the a-priori scenario would be built on these "more constrained" values of mass flow rates? I think the authors should comment to these questions to make the methodology and the conclusion more robust.

Additionally, Mastin et al. 2009 paper is adopted to assess the fraction of fine ash and as explained in section 2.2 the simulations in this paper have been using ash particle bins from 4 to 25 micron. So, the question here is: how did you extrapolate the information provided by Mastin et al. 2009 which provide an indication for fraction of material smaller than 63micron to assess the amount of ashes smaller than this size?

Interactive comment on Atmos. Chem. Phys. Discuss., doi:10.5194/acp-2016-1075, 2017.