

Interactive comment on “Aircraft observations and model simulations of concentration and particle size distribution in the Eyjafjallajökull volcanic ash cloud” by H. F. Dacre et al.

Anonymous Referee #1

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In this paper NAME simulations are compared with in-situ measurements of ash concentrations and particle size distributions (PSD) in the distal ash cloud observed by the FAAM aircraft. The aim was to determine the fine ash fraction and the factors controlling the variability in concentration and particle size distribution in the distal ash cloud, which was reached in general. The authors point out the difficulties with the NAME simulations because of the uncertainties in the PSD and DFAF in the near-source region. This work is comprehensive and of good quality. These results are of general interest, and I recommend publication subject to addressing the minor points below.

Specific comments

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Partly, the author's style doesn't read smoothly because the sentences are too long and insertions made in brackets, e.g. P22608, L17-21.

P22589, L13-14: The term 'ash' is not defined; perhaps better use 'particles' which is explained few sentences before.

P22589, L20: What is meant by 'near-source mass'? Particle mass distribution, total particle mass or ...?

P22590, L5: 'PSD' not defined

P22590, L20: For better understanding, the extent of the near-source region should be explained in more detail.

P22591, L11: 'NWP' not defined

P22592, Chapter 3: Is it possible to abridge the text? Satellite measurements and comparison with NAME simulations is not the subject of this paper. A short summarize of the meteorological conditions these days are sufficient but the comparison studies should be discussed elsewhere.

P22594, L1-3: 'Each of these ...' a reference or figure, e.g. atmospheric sounding, would be nice here to verify the absence of water or ice clouds.

P22596, L17: What is the particle size range of the "distal fine ash"? The term DFAF should be explained in more detail.

P22599, L5, 6: What is meant by 'meteorological errors', errors in the model meteorology in comparison to the real meteorological conditions?

P22600, Chap. 6.1: The meteorological conditions are already described in chapter 3. To repeat them is not necessary here and only lengthen the paper. Or the description in chapter 3 can be abridged.

P22601, L3-5: It seems that a verb or something is needed to complete the sentence.

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'The aircraft observations on 14 May were taken close to the central ash cloud axis in a region in which the ash had travelled for an average of 26 h from the volcano and a column integrated mass of 969mg m⁻².'

P22602, L24-28: The insertion in the brackets is unclear to me and should be set after 'concentrations'. A long sentence with insertion in brackets is difficult to read and understand.

P22605, L1: 'asl' not defined

P22608, L19-20: The insertion in brackets is not necessary because DPSD is explained elsewhere but it could be repeated in Chap. 5.2. The insertion makes it more difficult to comprehend the text.

P22608, L23: A reference would be fine here, e.g. S. R. Gislason, T. Hassenkam, S. Nedel, N. Bovet, E. S. Eiríksdóttir, H. A. Alfredsson, C. P. Hem, Z. I. Balogh, K. Dideriksen, N. Oskarsson, B. Sigfusson, G. Larsen, and S. L. S. Stipp (2011). Characterization of Eyjafjallajökull volcanic ash particles and a protocol for rapid risk assessment. PNAS 108, 7307-7312.

P22611, L8: The title of the reference is incorrect, it shall be: 'Grain-size analysis of volcanic ash for the rapid assessment of respiratory health hazard' doi: 10.1039/B710583P

P22612, L8: The reference is incorrect. doi:10.1029/2011JD016762 refers to Petersen et al., 2011. 'The impact of the atmosphere on the Eyjafjallajökull 2010 eruption plume.' Possibly the correct reference should be here doi:10.5194/essd-3-9-2011 (Arason et al., 2011, 'Observations of the altitude of the volcanic plume during the eruption of Eyjafjallajökull, April–May 2010')

P22612, L11: The reference is incorrect. The journal title shall be 'J. Geophys. Res.' and not 'J. Volcanol. Geoth. Res.'

P22617, Fig 3: For a better understanding the text could be shortened to '... Name
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simulation using distal particle size distribution 1 (dotted) and 2 (solid).' Furthermore, to emphasise the observations solid lines should be used, but dashed lines for DPSD 2.

Technical corrections

P22558, L18: change 'by small (< 30 μ m diameter) particles.' to 'by small particles (< 30 μ m diameter).'

P22589, L10-13: split the sentence into two sentences

P22590, L1: extra 'the'

P22592, L4: wants 'respectively' at the end of the sentence

P22594, L18: typing error: 'sun' in lower case

P22592, L15, L22 and P22596, L5, L7: Numbers could be rounded.

P22603, L15: extra space before comma

P22604, L6: Somewhere in this section the link to a figure is missing, which is explained here.

P22607, L8, L9: need blanks before the bracket

P22621, Fig. 7; P22624, Fig. 10: It is hard to find the crosses in the plots. Perhaps they should be of different colour/shape/size.

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 22587, 2012.