

Interactive comment on “PM₁₀ measurements in urban settlements after lava fountain episodes at Mt Etna, Italy: pilot test to assess volcanic ash hazard on human health” by D. Andronico and P. Del Carlo

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Dear Authors,

This paper makes a very valuable contribution towards raising the awareness of the hazards posed by fine-grained volcanic ash. In particular, the observations presented highlight effectively the role of ash remobilisation in prolonging the longevity of ash hazards beyond the phase of primary fallout. I think this paper is very timely, and presents a very interesting dataset that forms an excellent foundation for future research.

C1332

The data is presented well, and the paper is very clearly written. However, I have several minor comments, which I hope you will find constructive:

Page 3926 Line 26: It may be useful here to define ‘aerodynamic equivalent diameter’, as not all readers may be familiar with this term.

Page 3926 Line 26: Throughout the paper ‘micron’ and ‘ μm ’ interchangeably. Be consistent in the style of units.

Page 3930 Line 5: Should SEC be NSEC?

Page 3930 Line 24: The choice of sample names is very confusing (PM1, PM2, PM3), as they are in the same form as abbreviations for particle size ranges such as PM10 and PM4. I suggest modifying the sample names to make this distinction more clear.

Page 3930 Line 28: Here you refer to grain size analysis at $\frac{1}{2}$ phi intervals, and yet all other references to grain size in this paper are given in units of microns or millimetres. Perhaps either define the relationship between phi and mm here, or accompany measurements in mm with the equivalent phi values in brackets (and on Fig. 4).

Page 3932 Line 17: Figures 5 and 6 show ash particles several hundred microns to a millimetre in size. It may be useful to include SEM images of the finer size fractions for comparison, especially when you later discuss the possibility that the PM10 material is derived from breakage of coarser grains.

Page 3933: Section 5.1 is for the most part a review of previous literature; consider placing some of this information in the introduction as it sets up quite nicely the motivation for this study. Page 3932 Line 27: Should be 24 h for consistency?

Page 3935 Line 5: The phrasing of this sentence does not make sense to me, I suggest rephrasing for clarity (e.g., ‘The grain size distributions of collected tephra show that X % of the mass is coarser than 1mm. . .’ or words to that effect). Also, the values given here for the percentage of material <1 mm do not seem to agree with those given earlier in Section 4.2?

C1333

Page 3936 Line 13-15: I am not sure what you mean by the sentence 'We are aware that the methodology adopted does not...'. Please clarify this sentence or provide additional detail.

Page 3936 Line 24: You make the good point here that enhanced vehicular or foot traffic may amplify the airborne PM10 concentrations. Just a thought on this... do you think that in areas of very high traffic, the resulting intense remobilisation could actually reduce the time of exposure by redistributing (and therefore removing) ash deposits on the ground?

For comparison, it may also be worthwhile to consider some of the literature on ash remobilisation in Iceland (see suggested references), which discuss the influence of deposit remobilisation on local and regional PM10 concentrations. E.g:

1. Leadbetter, S. J., Hort, M. C., Löwis, S., Weber, K., & Witham, C. S. (2012). Modeling the resuspension of ash deposited during the eruption of Eyjafjallajökull in spring 2010. *Journal of Geophysical Research: Atmospheres* (1984–2012), 117(D20). 2. Thorsteinsson, T., Jóhannsson, T., Stohl, A., & Kristiansen, N. I. (2012). High levels of particulate matter in Iceland due to direct ash emissions by the Eyjafjallajökull eruption and resuspension of deposited ash. *Journal of Geophysical Research: Solid Earth* (1978–2012), 117(B9). 3. Arnalds, O., Thorarinsdóttir, E. F., Thorsson, J., Waldhauserova, P. D., & Agustsdóttir, A. M. (2013). An extreme wind erosion event of the fresh Eyjafjallajökull 2010 volcanic ash. *Scientific reports*, 3.

I hope that you find these comments helpful, and please feel free to get in touch if you have any questions.

Best wishes, Emma Liu, University of Bristol, UK

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