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Atmospheric Measurement Techniques Discussions

Interactive comment on "Characterising vertical turbulent dispersion by observing artificially released SO_2 puffs with UV cameras" *by* Anna Solvejg Dinger et al.

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This manuscript describes the results of a large scale experiment of to sample the three-dimensional (3D) concentration distribution of an atmospheric tracer (sulfur dioxide – SO2) in the atmospheric boundary layer at high spatial and temporal resolution, using a network of UV cameras. UV cameras are increasingly used in volcanology research to quantify SO2 emissions from a variety of eruptions. This application however, represents an innovative use for the instrument, and further demonstrates its advantages for atmospheric research in general. The uniqueness of the experiment makes their findings extremely valuable to the community, and the authors detail those findings

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Discussion paper

with very clear phrasing and comprehensive figures. I strongly recommend the publication of this manuscript and have only a few general comments and recommendations that could improve the general discussion.

General comments

Continuous release experiment. The authors mention experiments with continuous release of SO2 (both in the text Px,Lxx and in the abstract P1,L7). Yet no results are shown or even discussed from that set of experiments. Given the added value that such a dataset would represent, especially to members of the volcanology community, I would suggest the authors either include some results (even if they are not entirely conclusive) in their manuscript, or explicitly state why they will not be discussed.

On the use of tomography. The authors correctly state that to this day, no successful tomography has been reported with UV camera imagery. The presented study, though very compelling and entirely justified, still does not present tomography results. The imagery is used to project trajectories for the center of mass of each puff, and calculate spread and dispersion factors. The full inverse problem yielding a 3-D concentration map of a puff remains unsolved. Perhaps a clarification to this point could be added in the discussion?

Specific comments

P3, L15 – Just a small note. Although clear sky conditions will provide a higher UV signal, this signal remains non-uniform. Excellent acquisition conditions can be obtained on cloudy days if the cloud cover is uniform at a sufficiently high ceiling. Problems arise when the cloud cover is either very low or non-uniform (i.e. scattered clouds).

P9, L27 – What specific techniques were used for noise reduction of the images? This could be added to the Appendix.

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