

Dear Editor,

We would like to thank you and the three referees you appointed for the constructive review of our paper. The comments by Marc von Hobe, Simon Carn, and an anonymous referee helped us improve the clarity – and in some cases, the correctness – of our manuscript.

The replies to the referee comments and the relevant changes to the manuscript can be found on the discussion site of the journal, and will not be repeated here. But we do want to shortly address the two major points of discussion raised by Simon Carn: (1) The precise composition of the volcanic plume and (2) OMI UVAI data sets.

- (1) We cannot determine the exact composition of the aerosol plume from SCIAMACHY, GOME-2, or OMI data, therefore we revert to other satellite and ground-based data sets. As detailed in our reply to Simon Carn, MODIS visible and IR data identify a significant amount of ice in the volcanic plume on June 13, but there is no evidence for ice on June 14. Similarly, CALIOP lidar measurements of Nabro's eruption plume (starting on June 15) show low depolarization ratios characteristic of sulphate aerosols. In addition, ground-based sun-photometer measurements at the AERONET station in Sede Boker provide evidence for an aerosol layer with a high fraction of fine-mode particles with an effective radius on the order of 0.1 micrometer. We conclude that "ice contributed substantially to the negative UVAI signal detected on June 13, but that the UVAI signal on June 14 was caused by sulphate aerosols". (Quote from the revised manuscript)
- (2) There are, as Simon Carn notes, three UVAI products from OMI data available from NASA. In the original manuscript, we did not clearly state which product we used, and this may have caused some confusion, as there are significant differences (e.g. in viewing angle dependence) between the different products. These differences are addressed in our reply to the referee, but we consider them not within the scope of the current study and we prefer to describe them in more detail in a forthcoming paper. In the revised manuscript, we clearly state that we use the "OMAERUV" product, which is determined from reflectances at 340 nm and 380 nm. We also added a more extensive description of the UVAI to the Methods Section, as it plays an important role in our study.

We have included most of the referees' suggestions into the revised manuscript, and wherever we have not followed the referees' advice, we have given detailed reasons in the respective "Authors' replies".

Kind regards,
Marloes Penning de Vries and co-authors