Response to review of "*New-generation NASA Aura Ozone Monitoring Instrument (OMI) volcanic SO2 dataset: Algorithm description, initial results, and continuation with the Suomi- NPP Ozone Mapping and Profiler Suite (OMPS)*" (doi:10.5194/amt-2016-221).

Referees' comments in *Italic*, Responses in blue

Anonymous Referee #1

Review of "New-generation NASA Aura Ozone Monitoring Instrument (OMI) volcanic SO2 dataset: Algorithm description, initial results, and continuation with the Suomi-NPP Ozone Mapping and Profiler Suite (OMPS) " by Li et al.

Li et al. present a variant on their very successful PCA boundary-layer SO2 retrieval algorithm, aimed here at retrieving volcanic SO2, and apply it to OMI and OMPS. For larger SO2 loading they utilize long wavelengths in their retrieval. The authors find greatly reduced retrieval noise, and removal of a high bias, with this product. Its successful application to OMPS will help ensure a continuation of the OMI volcanic SO2 data record. This is clear and well written and represents an advance in the retrieval of SO2 from UV/vis satellite spectra. I recommend it be published once the reviewers address the points given below:

We thank the referee for the review and suggestions. Following these suggestions, we have made changes to the revised manuscript. Please see below our responses to the specific comments.

Page 12, line 24: "In the absence of information on SO2 plume height . . ." - OMI should have information on plume height in its spectra, at least for larger eruptions. What about retrieving SO2 plume height? This was demonstrated previously for OMI by Yang et al. (2009). Presumably this knowledge would greatly reduce one of the larger sources of error for users. Please address this.

Yang, K., X. Liu, N. A. Krotkov, A. J. Krueger, and S. A. Carn (2009), Estimating the altitude of volcanic sulfur dioxide plumes from space borne hyper-spectral UV measurements, Geophys. Res. Lett., 36, L10803, doi:10.1029/2009GL038025.

We agree that for large volcanic eruptions, OMI radiances may contain some information about the height of the volcanic plume as demonstrated by *Yang et al.* (2009). We also note that the plume height retrievals rely on shorter wavelengths (< 313 nm) and also require extensive on-line radiative transfer calculations, given the large potential interpolation error at these wavelengths. With the associated computational cost and execution time, the plume height retrievals are, for now, probably best done for case studies instead of as a part of an operational global product. We have added this discussion to the revised manuscript.

Section 3: More detailed/quantitative/spatial comparisons should be made with GOME-2. E.g., Figure 5 and figure 7. GOME2 is mentioned in passing but real comparisons would provide additional confidence in this new product (different sensor + different

algorithm). Provide GOME2 VCD maps for one of the eruptions studied.

Thank you for the suggestion. We have added a figure of GOME-2A SO_2 from the GDP (GOME Data Processors) retrievals from DLR in the supplemental information (Figure S4). In the revised manuscript, we have also added relevant discussion on the total SO_2 loading derived from the GOME-2A retrievals. We feel that detailed comparison between OMI and GOME-2A spatial distribution would be difficult, given the large differences in pixel size and overpass time.

Page 5, line 11: change "computationally too expensive" to "too computationally expensive"

Changed.