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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Volcanic SO_2 fluxes derived from satellite data: a survey using OMI, GOME-2, IASI and MODIS" *by* N. Theys et al.

Anonymous Referee #2

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General comments:

This paper presented a survey of four techniques for deriving volcanic SO2 flux form satellite measurement of dispersed volcanic plumes, and provided an informative summary on the advantages and weaknesses of each technique. The authors analyzed the SO2 column density maps of three selected (to represent different types) volcanic eruptions from multiple satellite sensors by applying some or all these loading-to-flux conversion techniques. They provided clear and easy-to-understand comparisons among the many combinations of volcanic events, satellite sensors, and conversion techniques, to illustrate main findings of this paper: SO2 emission flux can be derived with < 50% error using just once a day full coverage of a volcanic plume, and the measured mass and the derived flux from the four satellite sensors (OMI, GOME2, IASI,

and MODIS) are consistent even with the differences in measurement sensitivity, pixel sizes (spatial resolutions), and time of observations. These comparisons also highlighted the importance of volcanic plume height information in improving the accuracy of satellite SO2 data. This is a well-written paper for publication in ACP.

Since this paper emphasized that these techniques mainly worked for 'dispersed and large-scale' plumes, the authors probably need to include the area sizes (in square kilometer) for the sample cases shown in this paper, and discuss how they are selected and if automatic processing is possible.

Also this paper needs to include the description of the SO2 mass (or the total burden) calculation for a plume, whether a threshold SO2 value is used to select the pixels or all the pixels inside a bounding box were included. How to treat the background SO2 pixels may have a significant impact on the total burden, hence the derived flux, especially when a plume is well dispersed.

Specific comments:

1. Figures 5, 10, and 12 are too small see without enlargement.

2. Rightmost panel of figure 12 seems to be mislabeled.

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 31349, 2012.