

Interactive comment on “Observations of volcanic SO₂ from MLS on Aura” by H. C. Pumphrey et al.

Anonymous Referee #3

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1 General comments

The paper provides very useful data on SO₂ injections into stratosphere and upper troposphere by medium and even smaller strength volcanic eruptions. The data are consistent with other observations concerning total injected mass. The instrument can measure plumes with volume mixing ratios of SO₂ enhanced by 2 to 3 orders of magnitude against the background, has, however, a latitude and time dependent bias prohibiting useful measurements for background SO₂. Table 1 lists a lot more eruptions than most other references which is useful for the modeling community. Figures 3 and 4 suggest that this can be even expanded, for example by eruptions early in 2007 and 2011 which are 'observed' several times. The paper should be published after some corrections and additions.

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2 Specific comments

Page 7887, line 22: I.e. the whole latitude range?

Page 7888, line 4: Say explicitly that this is 2 to 3 orders of magnitude above background.

Page 7888, line 7f: Here the latitude and time dependent bias should be mentioned explicitly.

Page 7889, section 3: Why the daily maxima are selected in Fig. 4? Please expand, or better, correct the data by the seasonal bias in the figure and show the maxima only if they are over the threshold for Fig. 3. Fig. 4 like it is suggests that there are volcanic (or anthropogenic) events available all the time raising maximum SO₂ almost 2 orders of magnitude above the background. If the authors think that this is the case this should be said in the text. Also in Fig. 4 the data for 316 and 46 hPa might be skipped.

Page 7890, line 25: There was also an eruption of Soufrière Hills in 2010.

Page 7891, line 14ff: Seasonal bias mentioned late. The correction function should be given somewhere (Appendix or supplement).

Page 7892, line 1: Point to log_e axis in Fig. 12.

Page 7894, line 18: The MLS column should be between the STL and TRM OMI products.

Page 7895, line 6: For which units (SI?) are the equation and the conversion factor? Is f volume or mass mixing ratio? The notation in the brackets is very special and requires more explanation since the given reference is difficult to access (link available?).

Page 7897, section 6.3.3: This should be expanded.

Table 2: For the use with model simulations and better comparison with the other estimates it would be good to provide additionally the values for 147 hPa and 100 hPa

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for all volcanoes where it is available.

3 Technical corrections

Page 7898, line 21: This should be *ppbv* or is line 10 on page 7888 wrong?

Page 7901, line 1: Typo.

Page 7904, caption, line 4: Something missing. Last column of table: ';' missing between references (2 times).

Figure 13: Better use legend to explain colors. Refer at least to Table 1.

Figure 15: Remove '+' symbols. What is '*'?

Figure 16: I don't see data for 68.1 hPa.

Interactive comment on Atmos. Meas. Tech. Discuss., 7, 7883, 2014.