

Interactive comment on “A global catalogue of large SO₂ sources and emissions derived from the Ozone Monitoring Instrument” by Vitali E. Fioletov et al.

Anonymous Referee #2

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The authors present a very impressive global catalogue of point sources of SO₂ with additional annual emission estimates, based on a well-documented methodology that uses OMI columnar SO₂ data. Concerning the methodology the authors present additionally in this paper uncertainty estimates relevant to the choice of the satellite algorithm, the AMF calculation, the estimation of mass and the fitting procedures. They conclude that their methodology is sensitive to sources stronger than 30 kt/yr with an overall uncertainty close to 50%. The paper should be accepted for publication almost as it is, considering the correction of few minor typos and some comments below:

We would like to thank the reviewer for the evaluation and comments that helped us improve the manuscript.

Page 3, line 26. The authors use the period 2005-2007 for the identification of the sources. What about sources that could appear after this period? Can this be excluded? Please comment on that.

The 2005-2007 period was used as the main period to detect the sources. We performed a similar check for the 2008-2010 and 2011-2014 periods, but not as thoroughly as for the 2005-2007 since these data were affected by the row anomaly after 2006. As a result, the noise was increased and the criteria used for the 2005-2007 data could not be applied any longer. The following sentence was added: “We also looked at the 2008-2010 and 2011-2014 periods and identified sources that appeared at that time, although the source detection limit began to deteriorate after 2006 due to the row anomaly and its continued expansion (see e.g., (Krotkov et al., 2016) for details) “

Page 4, line 6. Check the equation. There is no exponent.

Corrected

Section 2. After reading section 2 the reader is confused concerning the differences in AMF estimations between the two algorithms and their consistency. Please provide some more information for the BIRA algorithm on that.

We agree that the text creates some confusion, although more details are given later in Section 4. To help clarify, we added a sentence “ However, for the purpose of comparison between OMI PCA and BIRA DOAS algorithms in this study, we converted slant columns into vertical columns using a constant AMF”.

Section 7. In this section it could be good to provide a comment on the uncertainty of the bottom-up inventories and compare this to the uncertainty of the retrieved emissions

We added a sentence about the bottom-up inventory uncertainties; “It should be mentioned that the bottom-up inventories also have some uncertainties. Smith et al., (2011) estimated the uncertainty bounds (as 95% confidence interval) in $\pm 11\%$, $\pm 21\%$, and $\pm 14\%$ for the coal, oil and gas and smelting industries, respectively.”