

## General comments

This paper describes a new catalog of annual emissions from anthropogenic and natural sulfur dioxide sources based on Fioletov et al.'s (2016) original 2005-2014 OMI-based catalog. It incorporates OMPS and TROPOMI data as they became available during this extension to 2021. It uses updated OMI/OMPS algorithm results and, with TROPOMI's higher ground resolution, has resulted in the detection of more sources. Rationalizing differences between the three instruments is not trivial, particularly for smaller sources or clustered sources, as described in the text.

This paper is an important contribution to the global identification and monitoring of sulfur dioxide emissions. The global changes over the 16-year period are particularly interesting, showing significant decreases in the major producers, China, the USA, and Europe, while other regions are unchanged or show lesser decreases. India is the outlier in showing an increase. Volcanic degassing has also decreased although not as rapidly as industrial sources. Maps of sources and the distribution by source type and region and their changes between 2005 and 2021 are valuable products.

The industrial power plants, smelters, and oil and gas sources and their changes over the years are described in some detail, demonstrating the power of the satellite monitoring capability. The discussion of new sources is particularly interesting, such as the detection of ship-borne power plants in several ports.

We would like to thank the reviewer for his favorable comment.

## Specific comments

The authors have addressed the primary issues raised by the reviewers. For example, the replacement of the group "former USSR countries" with "northern Eurasia countries" is appropriate. Editorial corrections to some lesser issues fail to fix the problems and in one case even made them more confusing. In response to R#2's question about the 22% adjustment to TROPOMI data the "added additional explanation" does nothing to elucidate the matter. In fact, the original text is preferable. Even the references do not explain how the cross sections are adjusted for temperature differences. It appears that the 22% value comes from Theys, et al. (2016) Figure 6 value of the "SO<sub>2</sub> SCD effect" for the 312-326 nm window at 293K. This paper may not be the best place to clear up this issue. If another paper is available, please cite it.

Indeed, the correction is based on Theys, et al. (2017), their Figure 6. We added a reference to that figure and removed the sentence about COBRA VCD to avoid potential confusion mentioned by the Reviewer. However, this is not a new adjustment. We only implemented the correction introduced and discussed in previous publications.

## Technical corrections

Line 80. "the whereas newest" likely should read "whereas the newest"

Corrected

Line 231. The response to R#2's question about a 10% correction contains a typo: "measures" should read "measured" emissions.

Corrected

Line 145 – 6. "the calculated in this study TROPOMI SO<sub>2</sub> VCD values...", probably should read: "the TROPOMI SO<sub>2</sub> VCD values calculated in this study..."

Corrected