

Review of the manuscript: "Version 2 of the global catalogue of large anthropogenic and volcanic SO₂ sources and emissions derived from satellite measurements" by Fioletov et al.

General comments:

The manuscript presents an update of the SO₂ emission catalogue based on SO₂ satellite observations. The new dataset includes updates in the retrieval algorithm, more accurate wind information and synergistic use of different satellite observations. Such update is very welcome since this emission dataset is quite useful for both scientific and societal applications. The method is scientifically sound, and I recommend publication after addressing the following minor issues.

Specific comments:

- Concerning the merging of the different emissions, it was not completely clear how the different instruments contributions are applied when you have only one or two instruments/estimations available. I mean before TROPOMI for example, are the estimates mostly based on OMI? And do you see a bias when introducing TROPOMI estimates into the merged estimates compare to OMI+OMPS only? Please clarify.
- Connected to question n.1, what happens to sources you only detect with TROPOMI: do you have zero emission before the TROPOMI period, or do you attempt the fitting with OMI/OMPS anyways even if the detection limit is higher? For example, the two Russian arctic sites you mention have emission estimates in the database also before the TROPOMI period, even though you write that those are not reliable: can you clarify?
- Is there a chance to attribute some of the time series flattening in India to COVID-related issue?
- Is there a reason you put together former USSR countries? Do for example trends in eastern Europe or Central Asia look the same than Russia? I would expect different policies in terms of emission regulation in these different countries.

Technical comments

Line 114 "epy": what do you mean?

L183 "fund" -> "found" or "find"