Atmospheric
Chemistry
and Physics

Discussions

Open Access

Interactive comment on "Multi-source SO$_2$ emissions retrievals and consistency of satellite and surface measurements with reported emissions" *by* Vitali Fioletov et al.

Anonymous Referee #1

Received and published: 28 June 2017

Comments on "Multi-source SO2 emissions retrievals and consistency of satellite and surface measurements with reported emissions" (acp-2017-485) by Fioletov et al.

This paper developed an algorithm to estimate multiple sources SO2 emissions from OMI SO2 VCD. The work is an extension of single SO2 source retrieval from the OMI satellite measurements by the same group. The identification of multiple SO2 emission sources from OMI retrievals has been a challenge. This study moved forward from single source retrieval and made an important contribution to the OMI data applications in a top-down approach to identify and verify the emission sources of criteria and precursor air pollutants. The paper is well-written and publishable in ACP.

C1

I have only several minor questions and comments to the paper as outlined below.

1. pg.7, line 13-15. Does Gaussian point source model take into account atmospheric advection? 2. pg. 7, line 17-18. "a well-developed quasi-steady planetary boundary layer", do you mean a neutral boundary-layer or Ekman layer?

3. pg. 8. line 23. "This grid-based approach can be potentially used for area sources...", Gaussian point source model differs from the area source model. If SO2 emissions derived from Gaussian model, it might not be appropriate to apply Gaussian point source model (Eq. A1) in an area source problem 4. pg 15, line 21, SO2 mass is expressed as 'alpha' after the first equal sign and becomes 'a' after the 2nd equal sign 5. pg 15, line 11-12, ' if the wind speed is zero, the distribution of SO2 near the source is governed by diffusion...'. Diffusion should also depend on the wind and be parameterized by wind. So diffusion should be zero if the wind speed is zero. 6. pg 18., line 9. " Polynomials up to the 6th degree were used for each one-year or one-season fit". Why use the 6th Legendre polynomial? What is difference of retrieved emissions between, say, 6th and 2nd polynomialsïij§