

Reply to Reviewer #2 of the manuscript “The enhanced capabilities of mid-infrared limb emission sounding to observe stratospheric aerosol injection geoengineering interventions”, Sellitto et al., second phase

Dear Editor, dear anonymous Reviewer #2,

Many thanks for the time taken to evaluate our review first stage. Please find our replies to the three comments of Reviewer #2 in this second review stage (Reviewer's comments are in black and our replies in blue). We refer to specific text sections pointing at specific lines intervals (Lxxx-yyy, with xxx and yyy the starting and ending lines) of the revised manuscript.

Thank you very much,

Pasquale Sellitto on behalf of all co-authors

Reviewer #2

SC1) My main concerns are leftovers from the first review. As written, the paper is difficult to follow and some of the figures are difficult to interpret because the authors refuse to provide details on their model. Granted, the authors provide a reference that contains model details, but why not include these details in the paper? A simple table containing injection rates, locations, and dates would suffice. This information would instantly allow the reader to appreciate what is presented in multiple figures.

We added the following text at lines L178-182: “The SAI deployment is tailored using a feedback injection algorithm, determining the time series of the SO₂ injection rates at the four latitudes to reach the aforementioned targets. More specifically, for an entire year, the same injection rate was used, and then adjusted in the next year. We note that in the first year (2034), which is the main temporal interval targeted in this paper, the feedback algorithm chose to inject only at 15°N, 15°S while it continued with injections also at the other latitudes in the following years.” and the following at L191-196: “For the year 2034, the average SO₂ emission flux is 0.035 Tg/year (0.00015 Tg/month or ~1.1 kg/s), at 15°N, and 0.005 Tg/year (0.00015 Tg/month or 0.16 kg/s), at 15°S. Then, global amounts of the injected SO₂ rises from less than a tenth Tg of SO₂ per year to a few Tg of SO₂ per year in the 2040s. Due to the increasing surface temperatures until 2050, the injection rates increase dramatically and reach their maximum around 2050, before decreasing afterwards to intermediate values. Individual daily SO₂ injections are of only a few hundreds of tonnes of SO₂ (~150 tonnes at 15°S and ~1000 tonnes at 15°N).”

SC2) Second, Figure 1 (d) remains a mystery to me. Almost the entire manuscript is dedicated to January/February 2034. Reference to Figure 1 (d) holds not information regarding this time period. Even within the context of section 3.1, the conversation focuses on the 2034 time period. Are you just trying to show that the SA formed in 2034 is small compared to the out years?

Exactly, as stated at L211-213.

SC3) From my first review and the authors' response:

My comment: "SR16) line 235: Per a previous comment, here the authors state the injections were at 15 N/S, no mention of 30. Please clarify."

Authors' response: "As said before, the SAI rates varied over time. The very first injections in January-February 2034 are indeed at 15°N and 15°S."

The fact that injection rates change with time is fine, but if I cannot understand this from the information you present in the paper then that is a problem. Why not include enough information to allow the reader to understand what you are presenting?

[Please see our reply to SC1.](#)