

Reply to review comments

We thank Editor Farahnaz Khosrawi for the time and effort spent on the revised manuscript and for providing detailed technical corrections. We considered all comments and corrected all suggested corrections. Please find our point-by-point replies below (colored in blue).

Editor Comments

P1, L2: applied -> apply

Corrected.

P2, L36: ".....both day- and nighttime near global coverage" does not sound correct. Please rephrase. Maybe you could write "near global coverage during both, day- and nighttime".

Corrected.

P2, L44: lagranto -> LAGRANTO

Corrected.

P3, L65: "from different studies". This text part does not seem to be at the right place in the sentence. I think you should rather write: For instance the estimation of SO₂ mass from the 2009 Sarychev eruption from different studies varies from 0.8 to 1.8 Tg (Fromm et al., 2014)."

Corrected.

P3, L89: "Finally, we discuss the results from our work comparing with previous studies in Sect.4.....". Sentence not correct. I would suggest to write it as follows: "Finally, in Sect.4 we discuss the results from our work by comparing to previous studies....."

Corrected.

P4, L94: used -> use

Corrected.

P7, L164: add "a" and "vertical" so that it reads: "...at a 31 km horizontal resolution and 137 vertical levels spanning from the surface up to 0.01 hPa."

Corrected.

P7, L165: interpolated to 0.3 x 0.3 horizontal resolution -> interpolated to a 0.3 x 0.3 horizontal resolution

Corrected.

P7, L177: of the SO₂ -> of SO₂

Corrected.

P8, L212. Delete "together"

Corrected.

P9, L219: troposphere -> tropospheric

Corrected.

P10, Fig 4 caption: Better to write "plot legend" than "plot key"?

Corrected.

P10, 224: Especially here the usage of retrieval is quite confusing. This paragraph should be reworked.

To clarify, we have used 'product' instead of retrieval here. We have also check throughout the text on the use of 'observation' and 'retrieval', and have changed to used 'product' when we think it is more appropriate.

P11, Fig 5 caption. Add "the" -> "... of the Raikoke SO₂....."

Corrected.

P12, Fig 6 caption, third line: add "an" so that it reads "an e-folding lifetime"

Corrected.

P12, L243: Investigating -> To investigate

Corrected.

P15, L277: add "a" so that it reads "we also performed a forward simulation....."

Corrected.

P15, L284: termolecular -> thermomolecular

Corrected.

P17, Fig. 10 caption: writing "1km thick layers between 21 June 2019 and 22 June" is rather confusing since you mix here the vertical layers with the time period you are considering. The altitude range should be given here as well.

Corrected. And the sentence now reads as '...between 0–25 km and from 21 June 2019, 18:00 UTC to 22 June 2019, 06:00 UTC.'

P18, L322: SO₂ injections separated -> SO₂ injections are separated

Corrected.

P18, L329: show -> shows

Corrected.

P18, L333: east of the Raikoke -> east of the Raikoke volcano

Corrected.

P18, 334: either write after the comma "we find that..." instead of "note that" or swap the two text parts, so that you start the sentence with "Note that....." and continue without comma continuing the sentence with "...comparing....."

Corrected.

P18, L340: by -> on

Corrected.

P19, L347: change "profile de Leeuw" to "profile shown in de Leeuw" or "shown by"

Changed to 'profile shown in de Leeuw'.

P19, L348: was over -> was located over

Corrected.

P19, 359: delete "the" so that it reads "of SO₂" or add "plume" so that it reads "of the SO₂ plume"

Corrected.

P23, Fig. 13 and P24, Fig. 14: Add x-axis title (-> "Date")

Corrected.

P31, L531: replace "the" by "a" so that it reads "considered in a future study".

Corrected.

Additionally, I would like to ask you to check again the occasions where you use "retrieval" in the text. I think simply replacing "observation" by "retrieval" is also not correct. You should for each instance carefully check if the term "observation" or "retrieval" is more appropriate.

We have also check throughout the text on the use of 'observation' and 'retrieval', and have changed back to use 'observation' or 'product' when we think it is more appropriate.