

General comments:

Check the Methodology section and consider a different section structure. This section is quite long and I have the feeling it contains already part of the results. At least different sections should be used for the data and methods used. Thus, Section 2 should “Data” and Section 3 “Methodology” or “Calculation of stratospheric lifetimes”

Figure captions: The text should generally start with a capital letter and the same font style and size as in the text should be used. Only “Figure” and the respective figure number are written in bold face.

Title: Adjustment of title according to the author guidelines (https://www.atmospheric-chemistry-and-physics.net/policies/guidelines_for_authors.html) needed. The title should also reflect the in the study derived results. In your case these are the consistent estimates of lifetimes of COS and CH₄.

Specific comments:

P2, L41: converted to sulfate stratospheric aerosols -> converted to stratospheric sulfate aerosols

P3, L72: The results not clear. Which exactly? Do you mean the lifetimes or the correlations?

P3, L74: “the same methodology” is also not clear. To which methodology exactly are you referring to?

P3, L64ff: Please check the entire paragraph for me this paragraph was a bit confusing.

P3, L75: See my general comment. The description of the data sets should be put in an own section or subsection called “Data sets” or “Observational data”.

P5, L177: compared to what? Do you mean intercompared?

P5, L120: Here you use the terms “species” and “tracer” in the same paragraph, but you are meaning essentially the same, thus I would rather use either the term “species” or “tracer”.

P6, L139: will be described in Sect. 2.4.1, 2.4.2, and 2.4.3, respectively -> will be described in Sect. 2.4.1-2.4.3, respectively

P6, L164: Montzka et al., 2007, updated not clear. You mean the updated database that is described in it its original form in Montzka et al. (2007)? If yes, you should write it like this.

P7, Figure 1 title: I would suggest to change the figure title to either just “Average tropical (MLO, SMO) tropospheric ratios” or “Average tropical (MLO, SMO) tropospheric ratios of COS; N₂O and CH₄”. I also would suggest to either add the term “time series” or the time period, thus 1990-2025 to the figure title.

P7, Figure 1 caption: averaged -> Averaged (start caption text with a capital letter). The text should be shortened and focusing on what is shown in the figure. Explanations should be provided in the main text.

P9, L205: after this flight -> during this flight?

P9, L215: add “e.g.” before listing the references

P13, L294: For me, while quickly reading through your manuscript, it is not clear what the previous method is. Could you please be more precise and either name the method or give a reference to a manuscript or section.

P14, L307-308: Change ranging “32–39 GgS yr⁻¹” to “Ranging from 32 to 39 GgS per year”

P14, L310: Figure 6 -> Fig. 6. Check this throughout the manuscript Figure in the tex should be abbreviated as Fig. Unless it appears at the begin of the sentence.

P14, Figure 6 caption: This may be a matter of taste, but I would instead of “singled” rather use the term “denoted” or “marked”.

P17, L352: across the boundary the tropics and mid-latitudes -> “of” missing? Do you mean across the boundary “of” the tropics and mid-latitudes?

P17, L362-362: instead of “different using each method” I would suggest to rather write “between the two methods”.

P18, L380: Change “cover altitudes roughly between 15 and 22 km” either to “cover altitudes between roughly 15 and 22 km” or to (maybe better) “altitudes of around 15 to 22 km”.

P19, L410: Referencing to Equations not done the same way, here number in parentheses before without parent thesis. Check the ACP guidelines for the correct referencing and use this style constantly throughout the manuscript

P23, L499: Here and other occasions in the text. For better readability it would be better to use in the text the stations location names instead of their abbreviations.

P24, L508: Sentence “Stratospheric tracer-tracer correlation was found among flights, including within the same campaign” not clear, please rephrase.

Technical corrections:

P3, L80: locations -> Locations

P14, L310: method -> methods

P16, L336: lifetime -> lifetimes

P17, L347: Equations -> Eqs. Check this also throughout the manuscript.

P18, L400: Add “in” -> As reported in Table 2

P20, L433: Change “on Top of that” to “Additionally”

P20, L433: Error message since reference is not found.

P22, L458: followed -> used

P22, L460: following -> using

P22, L469: Northern Hemisphere Summer -> northern hemisphere summer

P23, L499: Notably, is interesting to notice -> Notably “it” is interesting to “note”