

Atmos. Chem. Phys. Discuss., referee comment RC1  
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## Comment on acp-2021-767

Anonymous Referee #1

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Referee comment on "Biomass burning pollution in the South Atlantic upper troposphere: GLORIA trace gas observations and evaluation of the CAMS model" by Sören Johansson et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2021-767-RC1>, 2022

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Rewiew of Biomass burning pollution in the South Atlantic upper troposphere: GLORIA trace gas observations and evaluation of the CAMS model

by Johansson and colleagues.

### Overall comments

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This is a very nice paper describing a well-executed solid piece of research that exploits a very new highly innovative set of observations, compares them to a state-of-the art atmospheric chemistry modeling system, and draws useful conclusions that have the potential to improve the accuracy of such models in future. I believe this paper is in very good shape and happily recommend it for publication in ACP once a few minor comments of mine (mostly related to wording) are considered (along with those of other reviewers, naturally).

The standard of the presentation is excellent and the description of the work is laudably clear and well constructed.

### Minor comments

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Line 10: Suggest: "...pollutants likely originate from..."

Line 12: Suggest: "...In comparisons to results of the CAMS..." (think "simulations" disrupts the flow and is not needed).

Line 14: Suggest you delete "too".

Line 16: Move "discussed" to after "gases"

Line 23: "their" is a vague antecedent. Does it refer to Africa, South America, etc., or to the increase in biomass burning, or to the UTLS. Also the "too" (end of the line) is out of place as the preceding sentence does not talk about any "increase" just the ongoing importance of the UTLS. I suggest you re think these two sentences a bit.

Line 29: Suggest: "Typical biomass burning trace gases have different atmospheric lifetimes and atmospheric sinks. Further, they may have additional non-pyrogenic sources."

Line 36: Suggest: "Atmospheric model simulation of such pollution trace gases is challenging:"

Line 42: Suggest "to simulate" -> "the accurate simulation of", then "due to" -> "during".

Line 43: Suggest: "processes, which" -> "processes that".

Line 44: Delete comma after gases, change "like" to "such as". Change "For example" to "As an example" (the latter somehow feels better as the example refers to more than just the preceding sentence).

Line 38: Delete "Then" (and capitalize "The" as a result, naturally).

Table 2: Would be good to specify whether the estimated error is random/precision-like or systematic/accuracy-like, or some combination of the two.

Line 105: "this" -> "that"

Line 106: "estimate the" -> "estimates of the"

Figure 1 (and 2): I find the colored background (land/sea) in panel a distracting. I'm usually in favor of such things, but I think in this case there is simply too much else going on. I suggest you revert to a simple outlines as in Figure 3, or perhaps just shade the continents in pale grey.

Figure 1, also: I find the green contour particularly hard to spot (compared to the others). Perhaps, for this one, you could put a thicker white contour underneath it to make it stand out (or perhaps used a dashed green/white line for the counter, but that might make it stand out too much).

Figure 1/2: I imagine you considered this, but it might be preferable to use the same color bar ranges between the two plots. They're not that different (in some cases they're already identical), and it might make for easier comparisons. On the other hand, if your feeling is that it mutes the enhancements in Figure 1 too much, I'm fine if you opt to keep things as they are.

Line 153: Suggest you add a comma between "correlated" and "pointing"

Line 183: Suggest: "and their horizontal evolution is presented in Fig. 3"

Line 183/184: Suggest you swap "PAN" and "surface"

Line 184: Suggest "of" -> "from"

Line 186: My only semi-substantive point here. I'd avoid "origin". To me the "origin" is the place where the air masses left the surface, which is not constrained to lie along the trajectories. Rather I'd say "the point at which the air masses were injected into the UTLS",

"or reached UTLS altitudes" or something like that.

Line 206/207: Suggest: "...also illustrate enhancements in this region."

Line 230: Delete "correlation", change "is" to "are"

Line 233: Suggest "simulated too low" be changed to "underestimated" (even though you have "underestimation" in the next line, I think this is still preferable.

Line 237: Suggest: "to reproduce" -> "in reproducing"

Line 238: Suggest you insert "well" before "represented" (feel some word if needed, I'm fine with "fairly well" if you prefer)

Line 240: "In the" -> "The", "it is illustrated" -> "illustrate". Move "overall" to after "concentrations" on the next line.

Line 245: "accordingly" -> "in accordance"

Line 265: "large" -> "strong", "of" -> "with a"

Line 267: "too low" -> "smaller". Add commas before and after "below 200 pptv"

Line 268: "of" -> "in"

Line 285: "to reproduce" -> "in reproducing"

Line 287: "have" -> "be due to"

Line 288: Perhaps add "a priori" or something after "estimate", to indicate that you're not talking about the composition measured by GLORIA, but rather in the immediate vicinity of the fires.

Line 291: Suggest "high" -> "much"

Line 291/292: Move "overall" to after "concentrations"

Line 295: Move "discussed" to after "flights". Change "above" to "over"

Line 296: Change "discussed" to "multiple".

Line 300: suggest "retrieval" -> "measurements" (it's not just the retrieval that's doing well)

Line 302: "illustrated" -> "illustrate"

Line 303: "While during" -> "Although on",

Line 305: Delete "have"

Line 306: Delete the comma after "week" and change "have been" to "were"

Line 307-308: Suggest: "... which only were observed in some of the places where peaks in other measured pollution trace gases were found."

Line 327: Suggest "... are reproduced well overall..."

Line 328: "also" -> "the"

Line 329: "are able" -> "enable CAMS to"

Line 321: Change "should" to "could" and move "for these species" to just before "could"

References: Do you really need both the doi and Copernicus URLs?  
(More of a question for the copy-editor).