

Atmos. Chem. Phys. Discuss., referee comment RC1  
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## Comment on acp-2022-631

Anonymous Referee #1

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Referee comment on "Heterogeneity and chemical reactivity of the remote troposphere defined by aircraft measurements – corrected" by Hao Guo et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2022-631-RC1>, 2022

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This paper is a resubmission of a previous paper under the same name (<https://acp.copernicus.org/articles/21/13729/2021/acp-21-13729-2021.pdf>), with two corrections made. As I have previously reviewed this paper, I will limit my comments to the corrections.

Changes in the analysis result from two separate corrected errors:

(1) A change is in the modeling data stream (MDS-2) NO<sub>x</sub> values resulting from new gap-filling protocols. The original version (MDS-2) had high NO<sub>x</sub> over the East Pacific, and the revised version has lower values due to a different method of gap filling.

This error has been clearly identified, explained, and corrected. The impacts on the analysis are explained well.

(2) Issues with the use of RDS\* protocol (which generates reactivity datasets based on HNO<sub>4</sub> and PAN corrections) in UCI (UCI2\*). I found this section more difficult to follow. It is not clear to me what the issues are, other than that either the CTM or the RDS\* protocol results in calculations that are irreproducible and inconsistent. I suggest careful rewording of this section with more detail, or eliminating references to the incorrect version. My points of confusion are below:

- What "calculations" is Lines 358 referring to—is it the statistics referred to in lines 342-345, or P/LO<sub>3</sub>, or everything in Table 2 and S8, or something else?
- How is the "Atom-specific version of the CTM" discussed on line 361 different than the "Atom-specific UCI CTM" mentioned on line 364? Table 4, bottom right, indicates that

reaction rates are changed—can you elaborate?

- Is the “updated RDS\*” protocol mentioned on line 371 the same as the RDS\* protocol in the prior paragraph, or is the RDS\* protocol now updated somehow?
- Is it meaningful to compare UCI2 and UCIZ\*, since both the MDS and UCI changed?
- It seems Table 4 bottom right still discusses UCI2\*, but that the data isn’t shown—should it be removed?

#### Minor comments

- Text in Figure 2Corr is too small to be legible.