

Atmos. Chem. Phys. Discuss., referee comment RC2
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Comment on acp-2021-202

Qing Liang (Referee)

Referee comment on "Organic and inorganic bromine measurements around the extratropical tropopause and lowermost stratosphere: insights into the transport pathways and total bromine" by Meike K. Rotermund et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2021-202-RC2>, 2021

Rotermund et al. presented a comprehensive analysis of the contribution of VLSL-Br to stratospheric bromine budget combining recent airborne measurements and CTM simulation results. This is definitely one of the top papers, likely the best paper, I have reviewed in the recent few years. The paper is well written, with thorough analysis of aircraft measurements, great design of a set of helpful model simulations, and adequate discussion of the derived results in the context of previous literature on VLSL-Br.

I recommend publication in ACP, and I only have some minor editorial comments:

- Would it be better to say "aged air" instead of "former air"?
- "one min time resolution" $\hat{=}$ one minute temporal resolution
- Suggest changing to "nine **distinct** 3-D domains in the entire model atmosphere: the tropical troposphere, ...
- L300 & L599. Suggest change south-eastern Asia to Southeast Asia
- Suggest change to "corresponding O3 loss"
- Suggest replacing "off-line model" with TOMCAT model.
- Here, you assume everyone reads this paper knows about equivalent latitude, which is likely not the case with most people. I suggest you add a few sentences here explaining "what is equivalent latitude? What is the benefit of analysis in equivalent latitude coordinate?" for the benefits of general audience.
- L391 & L393. I suggest you add here the potential temperature range you would define as UTLS and LS. (You did mention the range of LS in L407, but it makes more sense to move it here). It might also be helpful to add horizontal lines on Figure 4 for clear identification of these regimes. Figure 4, please make the black solid line thicker so that it is easy to see.

- L423-424. Is it fair to conclude based on your WISE analysis of in situ measurements that Br(tot) remain approximately constant vertically, implying as altitude increases, there are little change (loss) in total Br, but rather a gradual conversion from organic Br to inorganic Br? To me, this is actually a very important message for the Bromine community.
- I think "Impact on LMS O3" might be a better title. Consequences to me has a bit of negative tone.
- You may consider redefine some of the acronyms here for those readers who come straight to the Conclusions section, e.g. NH, UTLS, LMS.