

Wang et al. investigate the impact of halogens. The study is very interesting and I recommend publication in ACP after considering several minor changes as described below.

- p. 1, ll. 24-25: Change “less effective” to “less efficient”.
- p. 2, l. 54: Change “examines” to “examine” (plural).
- p. 2, l. 57: There is no version 12.9 at <http://www.geos-chem.org>. Did you mean version 12.9.0?
- p. 2, l. 64: The terms Cl_y , Br_y , and I_y have not been defined yet. Maybe refer to Tab. 1 for a definition?
- Bottom of p. 2: Why is $CHBr_3$ called “long-lived” and CH_3Br “short-lived”? What are the lifetimes of these species in your model?
- p. 4: It is said that “Reactions (R3) and (R4) are important only in clouds because dissolution of SO_2 depends on the liquid water content.” I think that the solution pH is another important factor. These reactions are not important in aerosols which have a low pH.
- p. 5, l. 152: I think that the texts S1 and S2 are important and concise enough to be included in the main text, instead of being hidden in the supplement.
- p. 6, l. 209: I find the statement “IO is higher in the upper troposphere” confusing because according to Figs. 2 and 3, most iodine is at the surface.
- p. 7, section 4: I think it would also be interesting to see the bromine enrichment factors (EF) in sea salt aerosols and a comparison to measurements. I am aware of the data presented by Zhu et al. (2019), however, after updating important reactions (as listed in Tab. 2), the results could be different now.
- p. 12: The Data availability section mentions that the model code is available at GEOS-Chem repository but only a general web page of the model is presented (<http://www.geos-chem.org>). Please provide the DOI where the exact version used in this study can be downloaded. Is 10.5281/zenodo.3950327 the correct DOI?
- Figs. 1a, 1b and 1c: Please explain what “etc.” means next to the red arrow converting XO to X.
- According to the IUPAC Recommendations (page 1387 of Schwartz & Warneck “Units for use in atmospheric chemistry”, Pure & Appl. Chem., 67(8/9), 1377-1406, 1995, <https://www.iupac.org/publications/pac/pdf/1995/pdf/6708x1377.pdf>) the usage of “ppb” and “ppt” is discouraged for several reasons. Instead, “nmol/mol” and “pmol/mol” should be used for gas-phase mole fractions. I suggest to replace the obsolete units.