

Interactive comment on “Global impacts of tropospheric halogens (Cl, Br, I) on oxidants and composition in GEOS-Chem” by T. Sherwen et al.

Anonymous Referee #2

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This manuscript describes modeling of the global impacts of tropospheric halogens on oxidants (ozone and its photoproducts). The manuscript is well written and expands upon prior modeling work that examined one or two halogens by including all three atmospherically relevant halogens (Cl, Br, and I). The coupling of these species is of interest because cross reactions between the halogens could have significant impacts on the chemistry. The results of the modeling are compared to available observations. The paper nicely summarizes the results of the modeling efforts in figures and tables. The paper is appropriate for ACP and I recommend publication following minor revisions.

Minor comments:

On page 3, near the bottom, the photolysis of I₂O_x species is discussed. The section

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is not very clear with regard to "recent work". This phrase seems to refer to work other than the present ACPD paper. If so, please indicate what "recent work" is and where the "unpublished spectrum" is from.

On page 6, the discussion of general lifetimes reads well. It might be valuable to add a bit more detail on the relative XO_x lifetimes. Specifically, which reaction is the major control on the XO_x lifetime would be of interest. The lifetime variation (short for IO_x, longer for BrO_x, and then very short for ClO_x) would also be interesting to be discussed in terms of chemical principles.

Page 7, line 10, Tropospheric repeats twice in the same sentence.

Page 8, line 12, hijer misspelled

Page 8, line 23, "is dominate" needs rewording

Page 9, line 14, "at the surface concentrations" maybe "at" is the wrong word?

Page 9, line 26, With regard to ozone as a greenhouse gas, it seems like a discussion of the free tropospheric loss of ozone should be put in the context of the altitude range where ozone is greenhouse active.

Page 10, line 5, it is interesting to note that coupling of halogens (cross reactions) appear unimportant. In some literature, they point to fast rates of cross reactions, but I think the cross rates differ between measurements / evaluations; could this be discussed more fully.

Interactive comment on Atmos. Chem. Phys. Discuss., doi:10.5194/acp-2016-424, 2016.

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