

Interactive comment on “Impact of biogenic very short-lived bromine on the Antarctic ozone hole during the 21st century” by Rafael P. Fernandez et al.

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The study by Fernandez et al. applies the CAM-Chem chemistry climate model to investigate the impact of oceanic emissions of very short-lived brominated source gases (VSL_S_Br) on the Antarctic ozone hole during the 21st century. This is a very thorough and well performed study and the paper is well written. Its analyses help to further understand results of previous studies and demonstrate the importance of oceanic VSL_S_Br emissions for stratospheric ozone. I suggest publication in Atmos. Chem. Phys. after consideration of the following comments.

Specific comments

C1

For the comparison to the results of the recent study by Oman et al., Table 1 is revealing, showing a difference of almost 10 years in return dates for different ensemble members using the same boundary conditions. (Hope I understood this correctly.) I suggest to make this point even clearer when discussing the differences to Oman et al.

The effect of VSL_S_Br maximizes in the late 1990s (e.g., Figs 4c and 6c), but there is a secondary maximum around 2030 (and following minor maxima around 2060 and 2090). Why is that? Is this an artifact from the 11-year smoothing?

p2,l20: Reference to Sinnhuber and Meul might be slightly misleading: They showed, that indeed the highest impact is during periods of high aerosol loading, but the strongest impact on ozone depletion is not at mid-latitudes, but at the Antarctic ozone hole.

p4,l28: "...the increase in SST and atmospheric temperature...is expected to ...additionally enhance the stratospheric injection of VSL_S_Br": This effect should already be included in the current simulations, so would not be additional, as I understand?

p5, ozone hole evolution: Do the model simulations include volcanic eruptions or not? Would be good to mention during the discussion of Fig.2, as Pinatubo may have played a role.

Fig. 3: The separation into different seasons is very helpful, but why is spring defined as AUG-SEP-OCT, instead of SEP-OCT-NOV, and why not include winter (JUN-JUL-AUG) for completeness?

p11,l18: "...or even more if the oceanic VSL_S_Br source strength and deep convection increases...": For the deep convection, I assume this is already considered here (see my comment above), while it should be acknowledged that the increase in oceanic source strength is largely speculative at this point.

Technical corrections:

C2

Sometimes reference is to Carpenter et al., 2014, sometimes to WMO, 2014 (e.g., p2,l10) with no obvious reason for the distinction.

p2,l13: Saiz-lopez -> Saiz-Lopez

p3,l31: "on 1950" -> "in 1950"

p7,l15: "at the lowermost" -> "in the lowermost" (?)

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