

Interactive comment on “The contribution of natural and anthropogenic very short-lived species to stratospheric bromine” by R. Hossaini et al.

Anonymous Referee #3

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General comments:

The paper uses a 3-D CTM to estimate the contribution of 9 VSLs to total stratospheric bromine. It partly builds on a previous study (Hossaini et al., 2010) by the main authors and compares modelled profiles of brominated VSLs with recent aircraft observations in the tropics. This paper is well structured and the data and results are presented clearly in the figures and tables. The results certainly add to the ongoing discussion about the role VSLs play for total stratospheric bromine. The work is suitable for publication in ACP and I recommend publication after addressing the following minor comments.

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Specific comments:

Page 23860, line 3 and line 25, and title: WMO ozone assessments 2007 and 2011 use 'substances' instead of 'species' for VSLs.

Page 23862, line 6/7: Where and when have the Laube et al. measurements been taken? I guess that is important to repeat here.

Page 23862, line 13 to 15: Can you provide some more details on the HIPPO-1 campaign and the NOAA measurement programs. Probably most readers are not familiar with them.

Page 23863, line 21/22: Why don't you provide the chemical formulas of the halons like for all other species, instead of writing the abbreviation (H1211 etc.) in brackets?

Page 23865, line 13 to 15: Can you provide longitude and latitude for these stations. That would help the reader.

Page 23869, line 23 and around this paragraph: Do you have an error estimate for your range of 4.9–5.2 ppt? Did you perform sensitivity runs to investigate the main sources of error in your model? Or could you just list the main uncertainties and in which way they would probably influence your result. Instead of just saying on page 23871, line 16 to 18, that more measurements of VSLs are needed, you then could maybe also suggest, which meteorological parameters or other observations (or even laboratory measurements) would be most useful to improve your model predictions.

Page 23869, line 25: What type of measurement is the Dorf et al. (2008) study based on, and where and when were the data taken. That might explain why you

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compare your results with this study and not any others?

Page 23876, Table 2: The lifetimes of CH₂Br₂, CH₂BrCl and EDB that you provide in table 2 are longer than 6 months. VSLs are by definition substances with a lifetime shorter than 6 months, WMO (2007) and (2011). Do we need a new classification, or are we at a point where we can say that these substances should be grouped together with CH₃Br and the halons? Can you comment on that.

Technical comments:

1. Page 23859: Add place after NOAA in the 4th affiliation.
2. Page 23861, line 26: Should be Hoyle et al., 2011 (instead of 2010), like in the reference list.
3. Page 23863, line 6 and 13: ERA-interim: use capital letters.
4. Page 23865, line 28, page 23866, line 3 and reference list: It should be Montzka and Reimann et al. (2011) and not 2010.
5. Page 23867, line 8: Remove one 'the'.
6. Page 23867, line 10: Remove the 'with'.
7. Page 23868, line 8: Remove one 'to'.
8. Page 23868, line 11: You need to define SGI, since it has not been mentioned before.
9. Page 23869, line 12: '... than the our....' - remove 'the' .

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10. Page 23872, line 24 to 26: Remove the Gettelman et al. reference, since it is not used in the text.
11. Page 23877, Fig. 1: Enlarge Figure 1 for better readability.
12. Page 23879, Fig. 3: Enlarge Figure 3 if possible, or at least the axis labels for better readability.
13. Page 23882, Fig. 6: Enlarge tick marks, since they are overlayed by the lines in the bottom of the plot.
14. Fig. 2, Fig. 5, Fig. 6: 'mb' as a unit is not wrong, but I think it is more common to use hPa, or mbar.

References:

Hossaini, R., Chipperfield, M. P., Monge-Sanz, B. M., Richards, N. A. D., Atlas, E., and Blake, D. R. (2010): *Bromoform and dibromomethane in the tropics: a 3-D model study of chemistry and transport*, Atmos. Chem. Phys., 10, 719–735, doi:10.5194/acp-10-719-2010.

WMO (2007), Scientific assessment of ozone depletion: 2006, *World Meteorological Organization Global Ozone Research and Monitoring Project, Report 50*.

WMO (2011), Scientific assessment of ozone depletion: 2010, *World Meteorological Organization Global Ozone Research and Monitoring Project, Report 52*.

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