

Interactive comment on “New Aura Microwave Limb Sounder observations of BrO and implications for Br_y” by L. Millán et al.

Anonymous Referee #4

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General comments:

The paper reports about MLS satellite measurements and a new inversion algorithm for the retrieval of BrO down to lower altitudes compared to previous versions. Although the paper is well written, I recommend publication only after some major revisions.

Like indicated in the title already, the paper wants too much at the same time, i.e. good observations of BrO and a reliable estimate of Br_y. As I understand, AMT is meant for the first task, i.e. the more technical part of a robust BrO retrieval. Here the paper lacks a proper validation of the BrO observations. All comparisons with models and other satellite observations are qualitative only. Some of these shortcomings are even mentioned by the authors themselves, e.g. on page 334, line 17 ff, or page 336, line 14. A reliable and quantitative validation is necessary though, in order to convince the

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readers of the robustness of the MLS BrO observations.

The second topic of the paper, i.e. the estimate of total Br_y and therefore the contribution of brominated VSLs to total stratospheric Br_y, is handled vaguely too. The error of plus minus 4.5 ppt for the VSLs contribution seems to be underestimated. Most of the errors sources are mentioned in the text, but not handled adequately - see e.g. page 335, line 17 ff.

I want to encourage the authors to revise the manuscript. So far, the scientific community mainly relies on estimates of Br_y from BrO based on the DOAS (Differential Optical Absorption Spectroscopy) technique - see e.g. WMO 2011, table 1.14 - therefore an independent method is highly appreciated.

Specific comments:

Page 326, line 13: What year does this result of total Br_y refer to.

Page 326, line 21: 'The fact that bromine depletes stratospheric ozone 45 to 66 times more efficiently than ...' is this true throughout the stratosphere, or which part of the stratosphere are you referring to?.

Page 327, line 7: 'current estimates for the Br_y loading from VSLs vary from 3 to 8 pptv WMO (World Meteorological Organization, 2010, Chapt. 1)'. The wording is a bit misleading, since individual estimates actually vary much larger than 3 to 8 ppt. Also it is not clear which method is referenced, i.e. the estimate of the VSLs contribution to Br_y from BrO, or the estimate based on VSLs source gas and product gas measurements/modelling - see e.g. page 1.3 in WMO 2011.

Page 327, line 17: Please define Br_yVSLs.

Page 332, line 16: How would the use of the latest JPL recommendations change the SLIMCAT output? And why does SLIMCAT use JPL 2002, while WACCM uses JPL 2006 (page 333, line 3), i.e. how would the intercomparison between the two models change? .

Page 335, line 7: From Figure 10 and the text, it is actually not clear to me how you end up with these errors, i.e. plusminus 4.5 ppt.

Technical comments:

1. Page 341 ff: Capitalise all captions in the Figures for unification. Like, Radiance in Fig.1, or Pressure in Fig.2
2. Page 337, line 1: The reference Bovensmann et al. (1999) is not used in the text.
3. Page 337, line 26: The reference Lamarque et al. (2011) is not in alphabetical order.

References:

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

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