

Interactive comment on “More evidence for very short-lived substance contribution to stratospheric chlorine inferred from HCl balloon-borne in situ measurements in the tropics” by Y. Mébarki et al.

Anonymous Referee #3

Received and published: 23 September 2009

General comments:

The paper reports on in-situ measurements of HCL in the TTL, and lower and middle stratosphere. Observations were performed in northeastern Brazil with the balloon-borne SPIRALE spectrometer in June 2005 and 2008. Combined with VSL chlorinated source gas measurements (Laube et al. 2008) at the same location, and the contribution of the main intermediate product gas Phosgene, the authors infer the contribution of VSLS to total stratospheric chlorine. Furthermore, the HCL profiles in the lower and middle stratosphere are compared with the MLS satellite instrument

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observations. This paper is well structured and the data and results are mostly presented clearly in the figures and tables (see comments below). The work is suitable for publication in ACP. However, I would suggest some additions and alterations to the work:

Specific comments:

Issue 1: Page 16166, line 20: It would be useful to list here the most important VSL SGs measured by Laube et al. and which species mainly contributed.

Issue 2: Page 16166, line 29: Why don't you cite the original studies instead of WMO (2007).

Issue 3: Page 16170, line 18: Why are two different MLS data versions used for the comparison? Please explain, or change and compare both flights with the newer version.

Issue 4: Page 16174, line 17 and the whole paragraph: When calculating the uncertainties and making the conclusion that 85 ± 35 ppt of VSLS contribute to total stratospheric chlorine, it should also clearly be stated that this estimate is based on: only 2 SPIRALE balloon observations at the same location and during the same season (more observations are needed), one measurement of VSLS from the Laube et al. study, and a maximum contribution from phosgene of 45 pptv (what might the real uncertainties of this number be?). Therefore, the error bars of 35 ppt are probably too low, but the real value is also difficult to estimate.

Issue 5: Page 16179, line 1 to 6: I guess that the uncertainties in the satellite measurements are larger than the 100 pptv contribution of VSLS derived with the help of the model. This should be stated in the text, besides possible model uncertainties (which are probably unknown).

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Technical comments:

1. Page 16164, line 8: 'globally' is probably not the right term here, maybe reword and use something like 'overall'.
2. Page 16165, line 2: 'Active chlorine...' instead of 'Chlorine active...' .
3. Page 16165, line 24: 'source gase' instead of 'source gases'.
4. Page 16166, line 2: 'very short-lived substances' - add the 's' , according to WMO (2007).
5. Page 16166, line 21 and throughout the text: 'VSLS SG' - I guess you mean just 'VSL SG' , according to WMO (2007).
6. Page 16167, line 9 and page 16168, line 3: The text in the parentheses is different, please unify, i.e. capitalize 'French' on page 16167 and use 'laser diodes'. Why don't you cite the French acronym. Furthermore, I guess you can skip the parentheses in the second occasion, since the acronym has already been mentioned by then.
7. Page 16167, line 14: I don't think that present perfect is the right tense here. You can also omit 'at three year interval'.
8. Page 16167, line 17: change '...allowing for indicating...' to '... which indicate...'.
9. Page 16167, line 21: '...from the MLS' add 'the'.
10. Page 16168, line 9: '(Berthet et al., 2006, 2007)' - As far as I know both references are from 2007, so they should be labelled 2007a and 2007b.

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11. Page 16168, line 10 and following lines: Add 'the' before the instruments names, e.g. '...such as **the** Sub-Millimeter...'. Why is the acronym ACE-FTS not explained?
12. Page 16168, line 20: 'sampling rate'
13. Page 16169, line 6: ' ... **on** 9 June ...'
14. Page 16169, line 22 and throughout the text and Figures/Tables: 'total uncertainties' might be a better term instead of 'global'
15. Page 16172, line 12: Just write ' ...for both flights.
16. Page 16172, line 21: Briefly describe the BONBON instrument, e.g. what does the acronym mean?
17. Page 16174, line 22: '... 16.78 km' - add the 'km'.
18. Page 16174, line 23: '... with altitude, resulting'
19. Page 16174, line 25: '... rising into the'
20. Page 16178, line 28: Better begin the sentence with 'In summary...'.
21. Page 16183: I don't find the references from Lefèvre and Levington in the text. Please remove them. Also check the order of the references starting with 'M'.
22. Page 16187 and 16188: You could combine the tables, since the structure, caption and footnotes are basically the same.
23. Page 16189, Figure 1: The lower panel is missing an x-axis. Furthermore, the labelling on the y-axis is hardly readable and the zero position of the left and right axis are off.

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24. Page 16191, Figure 3: The upper left panel is missing a scale. The units of the colour-scale is not given in the Figure, nor in the caption. Maybe you can enlarge the figure, or at least the axis labels, and indicate the position of Teresina in the right panels.
25. Page 16193, Figure 5: The white cross in the lower panel is hardly visible. You should use another colour. The black background is also very unusual. Same for Figure 6.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 16163, 2009.