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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Bromoform and dibromomethane in the tropics: a 3-D model study of chemistry and transport" *by* R. Hossaini et al.

Anonymous Referee #2

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The authors present a unique modeling study using a detailed chemical degradation scheme in the TOMCAT/SLIMCAT models to calculate the vertical distribution of bromoform and dibromomethane source gas and degradation gas mixing ratios in the tropics. The purpose of the study is to evaluate the amount of bromine entering the tropical stratosphere from these two trace gases and to speciate the organic contributions, e.g. source gases and organic product gases. The results for the source gases are compared to whole air sample measurements from several NASA sponsored campaigns using the DC8 and WB57 aircraft. This is a timely and important topic for improving our understanding of ozone in the lower stratosphere, which is needed for current and future scenarios of ozone depleting substances and climate change.

An important aspect of this approach is the accuracy of vertical transport to and through

the TTL. In the abstract and in section 4.1 the authors say that the vertical motion in the SLIMCAT model is more realistic but then use the TOMCAT runs as the basis for their estimates of the amount of bromine entering the stratosphere. The authors should be clear about their rationale for this choice.

Comments: Abstract: Line 21, clarify the use of cold point. Presumably the authors are using this as the tropopause definition. Line 27, define SGI.

Introduction: Line 3, this seems too strong of a statement. The current measurements suggest this, but there simply isn't enough data to make such a definitive statement.

Section 3.2 Simulations: p. 16821, Line 17, how do these profiles compare with measurements and/or previous estimates? Line 19/20, the choice of 1.2 ppt for both source gases needs to be justified, e.g. "seems reasonable" is incomplete. p. 16822, Line 6, use the model name.

There should be a section describing the measurements, e.g. collection techniques, analytical techniques, precision, accuracy, and errors.

Section 4.1 Source gas injection p. 16824, Line 27/28 explain HCFC and HFC and their relevance/use for this calculation.

Section 4.3 Total bromine It would be useful to include the SLIMCAT results in this section to get the full range of model estimations of total bromine, especially since the value of the SLIMCAT simulations are presented throughout the manuscript, including the conclusions.

Section 5 Conclusions Line 29/30, the 2.6 ppt shortfall could in part be covered by the SGs mentioned, but the authors should provide a reference for this. There are also a number of uncertainties in the measurements and model runs and the representativeness of the available data, so assigning the 2.6 ppt difference to other SGs, known or unknown, is only one of the possibilities.

Figures 7 and 11 define the horizontal lines.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 16811, 2009.