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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 #1

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The authors use a detailed chemistry scheme and the TOMCAT/SLIMCAT models to describe the distribution of CHBr3 and CH2Br2 in the tropics and compare mixing ratios with those from airplane campaigns. With the calculated amounts reaching the lowermost stratosphere via the TTL authors give an estimate on the amount of Bry in the stratosphere, which could be attributed to CHBr3 and CH2Br2. Because of a severe shortcoming within the interpretation of model results I propose to accept the paper only after major revisions have been applied to the manuscript.

General remarks The paper is highly relevant for the justification of hitherto unexplained high Bry concentrations modeled from BrO-remote sensing measurements. Because a too low Bry concentration results from only using the long-lived gases (halons/CH3Br). A theory under examination to close the gap is that very short-lives substances (VSLS)

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Interactive Discussion
Discussion Paper

contribute to the amount of Bry. There is one severe shortcoming of the paper in this respect: Authors use the TOMCAT simulation as their point of reference (base run) throughout the paper. However, they also state many times within the manuscript that the SLIMCAT runs are better correlated with the actual measurements of CHBr3 and CH2Br2 from airplane campaigns in the higher troposphere/lower stratosphere region. Nevertheless, the SLIMCAT simulation is only used for sensitivity runs and resulting Bry contribution of these gases is only reported for the TOMCAT base run. This is to my opinion not justified and needs very thorough consideration by the authors. If SLIMCAT simulations would be the base runs, amounts of CHBr3 and CH2Br2 reaching the stratosphere would be much lower and discrepancy to the modeled Bry from remote sensing would be larger. A suggestion would be that authors treat the SLIMCAT simulations equal to the TOMCAT simulations and give a range of Bry contribution to the stratosphere from CHBr3 and CH2Br2 .However, then also SLIMCAT simulations should be made with different lifetimes. If model runs cannot be performed anymore it would maybe be a possibility to assume that the ratio between PGI and SGI does not change for the same lifetime in TOMCAT and SLIMCAT runs.

Specific remarks

Abstract L. 8: vmr: specify before you use the abbreviation

L. 15ff: For the reader not being precisely from the modeling community it is not easy to understand the p-levels and θ-levels. Please connect these nomenclatures with TOMCAT and SLIMCAT

L21: cold point tropopause

L. 27ff: SGI specify before you use the abbreviation (SG-injection)

1. Introduction P. 16814 L. 3 ...known... is possibly too strong. Scientific evidence is still too weak that it has been proven that this is true. So you could write ... expected...? At the end of the sentence you could cite the WMO 2007 report

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L. 6 substantial amounts of macroalgae?

L10 Also here poorly understood is too hard a statement to my opinion. Possibly write: . . .is under discussion. here you could cite papers from Fueglistaler (Reviews of Geophysics, 47, 2008RG000267, 2009) and from Krueger (ACP, 8, 813–823, 2008)

L. 13 pptv: mixing ratios are with v and sometimes without in the manuscript. I would omit and just write ppt

L. 14 due to . . .

3.2 Simulations P 16821 L. 20 Please cite literature to justify your choice of 1.2 ppt

P 16822 L. 6 σ-θ model = SLIMCAT

P 16823 L. 18, explain UT

P 16824 L. 9 above 350 K potential temperature?

L14: LS, lower stratosphere (SL)?

L. 28 explain WB-57, HCFC, HFC

L. 29 a transfer time in the TTL of 3-4 months seems to be very large in comparison to number provided e.g. in the review of Fueglistaler (2008).

P 16824 L. 8: θ-coordinate model = SLIMCAT

P 16826 . . .overestimation. . .

P 16831 L.1. Comment to the speculation about CH2BrCl, CHBr2,Cl and CHBrCl2. Kerkweg et al., show data from the PEM Tropics B campaign, where concentrations near the tropopause region are possibly to low to contribute significantly to the stratospheric Bry CH2ClBr: $\sim$0.2-0.3 ppb CHClBr2: $\sim$0.1 ppb and CHCl2Br: $\sim$0.15 ppb

L. 3. . .although poorly quantified. . . should be . . .although not quantified. . .as Laube et al., provide no concentration for unidentified peaks within their chromatograms.

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Fig.11 and 12: legend: Bry instead of Bry, include labels a-d into the figures

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