

Interactive comment on “Bromine in the tropical troposphere and stratosphere as derived from balloon-borne BrO observations” by M. Dorf et al.

Anonymous Referee #1

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The paper by Dorf et al. presents the first inner tropical BrO profile from balloon-borne observations with implications for the tropospheric and stratospheric bromine budget. The derived stratospheric inorganic bromine loading of 21.5 ppt implies a contribution of about 5 ppt from very short-lived substances (VSLs) or their degradation products (product gases, PG), in agreement with previous findings. In contrast to some previous studies, the current study finds only very low amounts of BrO (< 1 pptv) in the tropical troposphere.

The paper is generally well written and I recommend publication in ACP with only a few, mostly minor, changes and corrections.

General comments

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The measurements of the organic source gases by Laube et al. were performed 10 days earlier than the BrO measurement described here. As the chemical lifetime of most of the relevant VSLS is only a few days and deep convective transport is typically very sporadic in nature, I don't think these two measurements should be called "quasi-simultaneous" (e.g., p.13006). Is there any evidence for a change in meteorological conditions, e.g., intensity and frequency of deep convection, between the two balloon flights, that could explain any differences in BrO? Could you be more specific in the discussion of potential reasons for the discrepancy on page 13004? How much of the differences could be attributed to differences in the SG calibration scales?

An important finding of this paper is the observation of very low amounts of BrO in the tropical troposphere. It is stated that observed BrO is below detection limit. It would be good to give a bit more information here on the precise value and nature of the detection limit.

Specific comments

p.13001/2 comment: in the tropical tropopause region the concentration of O3 probably plays a more important role for the bromine partitioning than NO2.

p.13002, l.24: what precisely do you mean with "suggesting that reactive bromine is small there"? Couldn't it be that under low O3 conditions atomic Br concentrations are even larger than BrO concentrations?

Technical corrections

p. 13006, l.10: Remove "In order to explain our observations"

p.13009, l.6: The title of the Laube et al. paper is "Contribution of very short-lived organic substances to stratospheric chlorine and bromine in the tropics - a case study". M. Dorf and K. Pfeilsticker should be removed from the author list and K. Grunow need to be included.

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