

Interactive comment on “Constraints on inorganic gaseous iodine in the tropical upper troposphere and stratosphere inferred from balloon-borne solar occultation observations” by A. Butz et al.

Anonymous Referee #2

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This paper reports upper limits of IO and OIO in the tropical upper troposphere and stratosphere inferred from balloon-borne solar occultation observations in Northern Brazil. Photochemical modeling is also used to estimate the compatible upper limits for the total gaseous inorganic iodine burden (I_y).

Being clearly written and well structured, this paper is a relevant contribution for understanding and quantifying the ozone destruction by iodine species in the upper troposphere and stratosphere. I recommend the paper for publication in ACP after addressing the following comments:

Specific comments

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Page 14649, line 29: the authors should mention here the name of the station (Teresina).

Page 14650, lines 2-7: At this stage, the authors should elaborate a bit more on the ground-based measurements. It is only when reading the legend of Figure 1 we learn that the long-path DOAS technique is used. Also the site of the ground-based measurements is located at the Brazilian coast at about 350 km from the balloon launch site. Did the 2005 and 2008 balloons fly in the direction of the coast? This is an important point since the authors suggest that the sampling area is a source region of iodinated compounds.

Page 14651, lines 9-12: What are the assumptions used for the ray tracing (Earth sphericity, refraction, aerosols,...)? This should appear in the manuscript. Also the assumption is made that the absorber vmr is constant along individual lines-of-sight. Could the authors test the validity of this assumption?

Page 14652, lines 12-15 and page 14653, lines 20-27: The authors have selected the IO and OIO absorption cross sections as in Bösch et al. (2003). However, new cross section sets have been published since then. This point merits a more detailed and quantitative discussion since this can have a strong impact on the IO and OIO SCDs and therefore on the inferred inorganic iodine burden. A thorough error budget for IO and OIO SCDs including statistical and systematic errors would help.

Page 14666, lines 3-24: The impact of IO and OIO on stratospheric ozone is an important outcome of the present study but in the current version of the manuscript, it is mainly a short summary on what it has been discussed in Bösch et al. (2003) and WMO-2006. Could the authors elaborate a bit more on this with respect to their own findings and photochemical model, e.g. discussing the impact of using the JPL-2006 kinetics, which is a major change with respect to Bösch et al. (2003) and WMO-2006.

Technical corrections

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Page 14670, line 33: 2 should be in subscript in IONO₂.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 14645, 2009.

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