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The budget of bromine and iodine in the tropical UT/LS as derived from spectroscopic balloon observations

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Since 1996, solar occultation observations have been performed by the LPMA / DOAS (Limb Profile Monitor of the Atmosphere / Differential Optical Absorption Spectroscopy) balloon payload in the high, mid, and low-latitude upper troposphere and stratosphere during different seasons. Vertical profiles of O_3, NO, NO_2, HNO_3, BrO, $ClONO_2$, OClO, HCl, IO, OIO and of some source gases (e.g., N_2O and CH_4) can be inferred simultaneously from the UV/vis/near-IR solar occultation measurements. This study highlights results derived from DOAS BrO and IO measurements performed during the Envisat Stratospheric Aircraft and Balloon campaign (ESABC) in northeastern Brazil in June 2005.

The first tropospheric and stratospheric (4 to 33 km) BrO profile is presented for the inner tropics. In combination with photochemical modelling, total stratospheric inorganic bromine (Br_y) is deduced to be (21.5 +/- 2.5) ppt in 4.5-year-old air, probed in 2005. We derive a total contribution of (5.2 +/- 2.5) ppt from brominated very short-

lived substances (VSLS) and inorganic product gases (PGs) to stratospheric Br_y. Tropospheric BrO was found to be $<$1 ppt. Our results are compared to 3-D CTM SLIMCAT model runs and to bromine source gas measurements performed 10 days earlier, which indicate a lower Br_y of (17.5 +/- 0.9) ppt. Potential reasons for this discrepancy are discussed.

Inorganic gaseous iodine species could not be unambiguously detected in the tropical UT/LS. Given the current knowledge about iodine photochemistry, the inferred upper limits of IO and OIO constrain total reactive iodine ($I_y < 0.3$ ppt) to a minor important chemical agent in the tropical UT/LS.