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Comparison of measured and modelled stratospheric BrO profiles: The need for short-lived bromo-organic source gases

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Since 1996, stratospheric BrO measurements have been performed on the LPMA / DOAS (Limb Profile Monitor of the Atmosphere / Differential Optical Absorption Spectroscopy) balloon gondola at mid- and high-latitudes during different seasons and recently also in the tropics during an EnviSat / SCIAMACHY validation campaign in northeastern Brazil. From the UV/vis/near IR solar occultation measurements, vertical profiles of O3, NO, NO2, HNO3, BrO, ClONO2, OClO, HCl, IO, OIO and of some source gases (N2O and CH4) can simultaneously be inferred. The present understanding of the stratospheric BrO photochemistry, with an emphasis on the lowermost stratosphere, and the total Bry budget are tested by comparing measured with photochemically modelled BrO slant column amounts and profiles. The photochemical modelling is performed with a stacked 0-D photochemical model initialised and constraint with 3-D CTM (Chemical Transport Model) SLIMCAT model output and DOAS measurements (e.g. NO2 and O3). The comparison with the model indicates that in addition to the known trend of organic bromine source gases (CH3Br and halons) in the troposphere, short lived bromo-oganic source gases with a lifetime < 0.5 years contribute to total reactive bromine (3.5 to 5 pptv), which is especially evident from the tropical measurements. Reactive bromine is rapidly released in the lowermost stratosphere from the short lived bromo-oganic source gases and signifi-

cantly influences global ozone loss.