Geophysical Research Abstracts, Vol. 9, 08706, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-08706

Unexpected CO, NO_x and HCl mixing ratios above the TTL derived from balloon measurements at 5˚S: a signature of air mass injection from the troposphere into the tropical stratosphere ?

Y. Mébarki (1), V. Catoire (1), V. Marecal (1), N. Huret (1), S. R. Freitas (2), K. M. Longo (2), M. Pirre (1)

(1) Laboratoire de Physique et Chimie de l'Environnement, CNRS and University of Orléans, France (2) Centro de Previsao de Tempo e Estudos Climaticos, INPE, Brazil (yassine.mebarki@cnrs-orleans.fr)

In the framework of the ENVISAT validation campaigns, the balloon borne instrument SPIRALE using infrared absorption spectrometry by tunable laser diodes was launched from Teresina (5˚S, 43˚W, Brazil) on June 22^{nd}, 2005. During this period, deep convection is usually sparse but can be locally intense. We present in situ vertical profiles of O_3, CO, HCl and NO_x with high vertical resolution within the Tropical Tropopause Layer (extending between 14 and 18 km) and the lower stratosphere. The measurements have been compared with a climatology for June compiled from HALOE data from 1997 to 2003 and with simulations of the MOCAGE 3-D Chemical Transport Model. MOCAGE simulations and SPIRALE measurements show maximum CO mixing ratios of the same order (100 ppbv) but SPIRALE maximum is located 2 km above MOCAGE (14 and 12 km, respectively). MOCAGE simulations show maximum NO_x mixing ratios (0.3 ppbv) at 16 km. Such value is also measured by SPIRALE but 3 km above. Moreover, in the 18-21 km altitude layer, the comparison results reveal that HCl mixing ratios measured by SPIRALE are in the lowest range of those derived from HALOE climatology. These results could be the signature of convective activity injecting air masses from the troposphere into the lower tropical stratosphere. The differences could be due to deep convection simulated by MOCAGE which could be not intense enough.3-D trajectories computed by the BRAMS 3-D mesoscale model including deep convection are used to discuss those assumptions.