Atmos. Chem. Phys. Discuss., 6, S5942–S5944, 2007
www.atmos-chem-phys-discuss.net/6/S5942/2007/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Isentropic advection and convective lifting of water vapor in the UT– LS as observed over Brazil (22° S) in February 2004 by in situ high-resolution measurements of H_2O, CH_4, O_3 and temperature" *by* G. Durry et al.

F. Immler (Referee)

franz.immler@awi.de

Received and published: 4 January 2007

Durry et al. use data measured by a balloon-borne diode laser spectrometer ('micro-SDLA') during the HIBISCUS campaign in February 2004 to discuss the origin of air in the upper troposphere (UT) and and lower stratosphere (LS) of that region. The datasets presented in this manuscript were obtained during two balloon flights (SF2 and SF4) and have already been explored by some other publications. Marécal et al (ACPD, 6, p. 8241) used them for the validation of a mesoscale model and Nielsen et al. (ACPD, 6, p.9003) used the SF4 data to support their findings on solid particles in the LS. There also seems to be a number of manuscripts in preparation by Huret et al which are not available at the moment. All theses papers appear in a special issue of ACPD, but to me it is not quite clear which publication treats which aspect of the observations (see also minor comments).

The paper under review by Durry et al. suffers from one basic conceptual problem, which is the use of the notion 'tropical tropopause layer (TTL)'. Even though there is to my knowledge no clearly agreed definition of this term, it was so far used for the layer around the tropopause in or near the ITCZ where air from the troposphere undergoes strong dehydration and enters the stratosphere. A typical tropical temperature profile has a minimum of about 190 K(-84°C) or less at about 17 km or higher which is reached more or less along a dry adiabat (see also minor comments). The temperature profiles in fig. 3 as well as the location of Bauru (22°S), far from the ITCZ, demonstrate, that the site is not typically tropical. Moreover, transport from the troposphere to the stratosphere does not seem to occur in both cases, neither SF2 nor SF4. This is evident by the low relative humidity in the LS which is of midlatitudinal stratospheric origin rather than of tropical tropospheric as pointed out by the authors and by Marécal at al. who used a mesoscale model to interpret the data.

Due to this misconception most of the conclusions of the paper are not convincing. In particular, it is rather useless to draw conclusions from a comparison of these measurements with other observations obtained at tropical oceanic conditions. Continental southern South America seems to be a very special region where tropical characteristics, like intense deep convection, meet with midlatitudinal features, like stratospheric intrusions deep into the troposphere.

In its current form I can't really recommend this paper for publication. I think it is necessary to focus on the special role of Southern America and the South Atlantic Convergence Zone (SACZ) and use the superb data obtained during HIBISCUS to shed some light on their potential impact on troposphere-stratosphere exchange. A closer cooperation between the different groups that work on this data could be very

ACPD
6, S5942–S5944, 2007

Interactive Comment

helpful for this purpose.

Specific comments:

p12477, l 25: I doubt that the WMO definition was used correctly to determine the Lapse rate tropopause for SF4. From a look at the temperature plot (Fig.3) it is obvious that the LRT is at ≈15.7 km, because the mean lapse rate between this level and any higher level within 2 km is always larger than -2 K/km.

p.12484, l.26ff: The case of convective transport into the TTL is not convincing, since the air in question (≈17 km) is strongly subsaturated. If air is transported into the TTL by convection I'd expect it to be saturated or supersaturated. The air mass is likely to be of tropospheric origin, but it must have been dehydrated earlier and warmed by (slow) descent and/or diabatic heating afterwards. It is also interesting to note that Marecal et al. sees convective transport for SF4 only at lower altitudes (10-14 km), while Nielsen et al. found traces of deep convection at 19 km altitude.

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 12469, 2006.

ACPD

6, S5942–S5944, 2007

Interactive Comment