Geophysical Research Abstracts
Vol. 13, EGU2011-7885, 2011
EGU General Assembly 2011


# Importance of tropical convective overshooting on troposphere-to-stratosphere transport at the global scale

Jean-Pierre Pommereau (1), Jean-Paul Vernier (2), and Philippe Ricaud (3)

(1) CNRS, Université de Versallies, LATMOS France (jean-pierre.pommereau@latmos.ipsl.fr), (2) Laboratoire d'Aérologie, CNRS, Université de Toulouse, Toulouse, France, (3) NASA Langley Research Center, Hampton, VA 23666, USA

Deep convective overshooting of tropospheric adiabatically cooled air and moisture in the form of ice crystals up to 450 K or 60 hPa have been frequently observed during recent HIBISCUS and SCOOUT balloon and aircraft campaigns over tropical continents. However, though successfully captured by meso-scale cloud resolving models, the mechanism is still ignored in NWPs and CCMs models, partly because of the difficulty of including such small size and short time scale events in those models, but also because of the absence of clear observational demonstration of their impact on the lower stratosphere at the global scale. However, after the demonstration of the injection of CO, N2O, and CH4 rich tropospheric air in the lower stratosphere over Africa during the summer convective season from respectively MLS/AURA, ODIN/SMR, and HALOE/UARS, consistent with the maximum overshooting volume reported by the TRMM precipitation radar, a new estimation of the importance of such events is provided by the aerosols measurements of the CALIPSO lidar. Indeed, those are showing fast cleansings of the lower stratosphere to altitudes as high as 20 km during the Southern Hemisphere convective season, attributed to an injection of clean tropospheric air. The observed cleansing of the full 14-20 km equatorial belt within 1-2 months and the required tropospheric air mass flux 2 to 5 times larger than that expected from the vertical uplift by radiative heating, suggest that convective overshooting is the major contributor to troposphere-to-stratosphere transport in the tropics.