Geophysical Research Abstracts
Vol. 14, EGU2012-2848-1, 2012
EGU General Assembly 2012

First results from the TRO-pico campaign aiming at studying the impact of convective overshooting on the stratospheric water budget

E. D. Rivière (1), J.-P. Pommerau (2), G. Held (3), N. Amarouche (4), M. Ghysels (1), S. Khaykin (2), J.-J. Berthelier (2), J.-B. Renard (5), F. Cairo (6), G. Durry (1,2), and G. Di Donfrancesco (7)

(1) Groupe de Spectrometrie Moléculaire et Atmosphérique (GSMA), Université de Reims Champagne Ardenne and CNRS, Reims, France, (2) LATMOS, CNRS, Université de Versailles St Quentin, Guyancourt, 78280 France, (3) Instituto de Pesquisas Meteorológicas (IPMet)/Universidade Estadual Paulista (UNESP), Bauru, S.P. BRAZIL, (4) Division technique de l'Institut National des Sciences de l'Univers (DT-INSU), CNRS, Meudon , France, (5) Laboratoire de Physique et Chimie de l'Environnement et de l'Espace CNRS and Université d'Orléans, Orléans, France, (6) ISAC-CNR, Rome, Italy, (7) Agenzia Nazionale Per Le Nuove Tecnologie, L'energia E Lo Sviluppo Economico Sostenibile (ENEA), UTA, Rome, Italy

Two processes are competing in the control of water vapor concentration in the tropical stratosphere: i) The so-called cold trap that is the slow ascent of water vapour in the TTL (Tropical Tropopause Layer) followed by ice crystal freezing and sedimentation leading to the drying of air entering the stratosphere and ii) convective overshooting that injects ice crystals sublimating in the stratosphere, eventually followed by further condensation and sedimentation. In contrast with the large-scale cold trap mechanism, overshooting towers are small in size and fast, but relatively frequent processes. Even if the first is frequently thought to be the main process controlling the amount of water in the stratosphere, the importance of overshooting, highly dependent on the frequency of the events, is still unknown. The aim of the TRO-pico project, funded by the French ANR, is to characterize the variability and frequency of convective water injections, its contribution at the regional wet season timescale, and to improve the understanding of their role with respect to the cold trap at a wider scale. The project is based on a small balloon campaign in Bauru (22.3 S) in Southeast Brazil, from the end of January 2012 to December 2012, involving a series of light-weight payloads, including Pico-SDLA laser (H_2O or CH4) and FLASH Lyman alpha hygrometers, a mini-SOAZ spectrometer for O_3, NO_2, H_2O, and BrO, an AICEP (Electric field and Lightning) sensor, and COBALD and LOAC aerosol instruments, combined with ground based radar and lidar measurements, satellite observations from CALIPSO, MLS, Megha-Tropiques and adequate modeling, that is, of all parameters sensitive to convective intensity. TRO-pico is a two time-scale campaign: i) a Six Month Observation Period (SMOP) covering a complete wet season during which water vapour profiles will be measured regularly for studying its variability and seasonal change, and ii) an intensive observation period (IOP) during the most convectively intense summer period of measurements of all above parameters next or above thunderstorms. After a short presentation of objectives and instrumentation involved, the first results of the IOP campaign during the most severe convective season will be shown.