



Vertical and horizontal transport of water vapour and aerosol in the tropical stratosphere from high-resolution balloon-borne observations

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We present the results of accurate balloon-borne observations of water vapor and aerosol obtained during a field campaign held in March 2012 in Bauru, Brazil (22.3 S) in the frame of a TRO-pico project. The aim of the TRO-pico project, supported by the French ANR, is to characterize the variability and frequency of water convective injections, their 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 balloon payloads flown during the campaign included Pico-SDLA IR laser hygrometers, FLASH-B fluorescence Lyman-alpha hygrometers, COBALD aerosol backscatter sondes and several other instruments for the measurement of gas-phase and particle constituents. A S-band radar operating on the site provided the information on cloud tops.

The series of vertical profiles obtained show well correlated enhancements in water vapor and aerosol in the lowermost stratosphere at 430 K in some of the soundings. Trajectory analysis links these features to horizontal transport from Southern Hemisphere extra-tropical stratosphere. Another sounding performed on a convectively active day revealed water vapor enhancements above the cold point tropopause at 385 and 400 K without coincident aerosol enhancements. These are unambiguously associated with local convective overshoots as shown by an overshoot tracking analysis making use of backward trajectories and a sequence of echo tops radar images of echo tops. The relative contributions of long-range horizontal and local vertical transport on the stratospheric composition will be discussed.