



Observations of Aerosol Nucleation in the tropical UT/LS

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Ultrafine particle concentrations in the continental tropical upper troposphere/lower stratosphere region (UT/LS) were obtained in situ by aircraft-borne measurements as part of the TROCCINOX-2 campaign (Aracatuba, Brazil, Jan-Mar 2005). Measurements with a series of CN counters with different lower size cut-offs were conducted in the altitude range of 12.5-20.5 km onboard the high altitude research aircraft Geophysica and measurements at 0-11.5 km altitude were performed onboard the research aircraft Falcon. Ultrafine particle concentrations in the size range of 5-15 nm were derived from these measurements and several recent nucleation events were identified. For one event (24 Feb 2005, 13 km altitude) when recent convective lifting had influenced the probed air mass, ultrafine particle concentrations in the size range 6-14 nm reached up to 8000 particles cm⁻³ (ambient concentration). Nucleation during this event was strong above clouds but not inside clouds. The measurements are in reasonable agreement with calculated ultrafine particle concentrations using an ion induced nucleation model. Nucleation was generally confined to the troposphere and stratospheric CN concentrations were found to have a much lower variability at their respective isentropic levels. Our measurements confirm the hypothesis that the tropical upper troposphere and tropical transition layer is the dominant source region for stratospheric aerosol. Particle volatility was found to be high and on average only 10-25% of the particles in the UT/LS contained non-volatile inclusions when heating the particles to 250°C.