



Aerosol number concentrations in the upper troposphere over the Atlantic and Brazil and their relation to transport from continental sources and convective regions

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During the TROCCINOX campaigns in 2004 and 2005 two research aircraft were deployed in the state of Sao Paulo, Brazil, early in the year (Jan/Feb/Mar): the DLR Falcon (2004 and 2005) covering altitudes up to 12 km, and the Geophysica (2005 only), covering mainly the altitude range of 12-20 km. Measurements were taken also during the transfer flights between Germany and Brazil which crossed the Atlantic. Both aircraft were equipped to measure in situ a range of aerosol particle properties as well as trace gas concentrations. In this contribution, measured Aitken mode and total non-volatile particle concentrations shall be evaluated in context to the long-range transport history, in particular in cases where air originated from convective regions. We focus here on the results from the transfer flights but include examples from local flights in sub-tropical Brazil. The origin of air sampled by the aircraft is determined from the FLEXPART particle dispersion model. The latitudinal distribution of upper tropospheric aerosol particles is in general characterized by frequent situations with high number concentrations in the tropics and sub-tropics if compared to mid-latitudes. Enhanced concentrations of non-volatile particles, often in parallel with elevated carbon monoxide mixing ratios, can in many cases be attributed to transport from continental, deep convective regions, though not necessarily out of the BL. It appears that the air originating out of the fairly persistent, upper tropospheric Bolivian high constitutes an important source for particles in the upper troposphere also outside the tropics.