

Transport and scavenging of trace species in a deep convective cloud – results of the ACRIDICON tracer experiment

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We report results of a perfluorocarbon tracer experiment performed during ACRIDICON on 25 Sept. 2014 to study air mass transport and scavenging of trace species in a deep convective cloud. The tracer experiment included three steps: tagging of the pollution plume of the city of Manaus with the artificial gas tracer PMCH (C_7F_{14}), sampling of the tracer in the boundary layer downstream of the release site, and detection of the tracer in the outflow of a convective cloud at 12 km altitude which developed in the area of the dispersing Manaus pollution plume tagged with the tracer. The PMCH tracer was released from the top of a hotel in Ponta Negra, west of the city center of Manaus, and sampled on board of the HALO aircraft using adsorption tubes. The analysis of PMCH sampled with the tubes was conducted in the DLR laboratory using a combination of a thermo-desorption system and a GC-MS. The PMCH tracer was clearly detected during the HALO sampling in the boundary layer and convective outflow with mixing ratios up to a factor of seven above atmospheric background values. The PMCH measurements were analyzed using simultaneous HALO observations of the ambient tracer CO, simulations with the dispersion model HYSPLIT, and GOES infrared satellite data. First results indicate relatively direct transfer of air from the boundary layer to the cloud anvil. We will discuss the tracer experiment, the PMCH measurements, and observed ratios of PMCH to ambient trace species in the boundary layer and convective outflow.