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Mixing of overshooting air in the TTL during the SCOUT-O3 Aircraft Campaign

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We present data obtained during the SCOUT-O3 Tropical Aircraft Campaign conducted from Darwin, Australia (12˚S, 130˚E) in November/December 2005. During eight (mostly northbound) flights in situ trace gas measurements were made within the tropical tropopause layer (TTL) and the lower stratosphere (up to 20 km) on board the M55 Geophysica aircraft. The University of Frankfurt's High Altitude Gas Analyzer (HAGAR) measured a suite of long-lived tracers (N_2O, CO_2, F12, F11, H-1211, SF_6), CO was measured by the Cryogenically Operated Laser Diode (COLD) instrument, and O_3 by the Fast Ozone ANalyzer (FOZAN).

The campaign included both survey flights designed to sample the background TTL and flights sampling the plume, turret, and outflow of the deep convective cell "Hector" frequently appearing north of Darwin and reaching up close to the tropopause. A focus of our study will be the irreversible mixing of the convectively overshooting air with the background TTL. Observations of the background TTL will be contrasted against data from two flights on November 30, when measurements were made both during and after the convective system. The influence of convection is studied by examining the profiles and correlations of CO2, CO and O3. The two latter flights exhibit elevated ozone and CO levels in the tropopause region, consistent with mixing of overshooting air. Although these signatures appear to be present already before the development of Hector on November 30, they are likely caused by (possibly remote)

convection, given that long-lived tracers show no detectable influence of mixing from the extra-tropical stratosphere. Backward trajectories and simulations with the Chemical Lagrange Model of the Stratosphere (CLaMS) will be used to identify the regions of origin of these signatures.