



Horizontal exchange between the tropical UTLS and the extratropical stratosphere over South America as observed by in-situ measurements on board the M55

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Within the "TROpical Convection, CIrrus and Nitrogen OXides Experiment II" (Troccinox II) aircraft campaign long-lived trace gases such as N₂O, CH₄, CFC-12, CFC11, H1211 and SF₆ up to around 20 km altitude were measured with the High Altitude Gas AnalyzeR (HAGAR) by gas chromatography. On the same platform ozone was obtained by the Fast Ozone ANalyzer (FOZAN). Transfer flights between Europe and South America as well as 8 local flights departing from Aracatuba/ Brazil (21°S, 50°W) were performed in January and February 2005.

The measured trace gas distributions show evidence of frequent horizontal air mass exchange, both above and below the tropopause, which was found between 375K and 385 K potential temperature. The subtropical mixing barrier was generally situated north of Aracatuba. We examine both, exchange above the tropopause across the subtropical mixing barrier and stratosphere-troposphere exchange (STE) across the subtropical tropopause, which can significantly affect the chemical composition of the Tropical Tropopause Layer (TTL). Such events of exchange are identified by inspecting vertical profiles and tracer correlations. Numerical simulations from the CLAMS and MIMOSA models are used to examine the dynamical situation for interesting cases, in particular one of a developing stratospheric intrusion into the TTL at 360 K.