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Analyses of intercontinental transport of trace gases using a particle dispersion model

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The particle dispersion model FLEXPART was used to perform anthropogenic CO tracer forecasts and analyses during the CONTRACE measurement campaigns in November 2001 and July 2003. CONTRACE investigated the transport of pollution by deep convection and warm conveyor belts (WCBs) and its impact on the budget and chemistry in the upper troposphere over Europe. Based on the tracer forecasts the aircraft could successfully be guided into polluted air masses that were transported over large distances. The forecasts as well as the analyses confirm that WCBs are a key mechanism for intercontinental pollution transport. Age spectra of the tracer concentrations along the flight tracks were calculated and compared to measurement data. The FLEXPART results are generally in good agreement with the measurements and the tracer age spectra can be used to investigate chemical processes that took place in aged air masses. Important differences between the results for the November 2001 and July 2003 campaigns are discussed. In addition, backward simulations with FLEXPART are shown to be a useful tool to establish a detailed source analysis of the trace gases measured along the flight track.