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Airborne nitrogen oxides observations from CARIBIC

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A unique set of airborne in situ observations of nitrogen oxide (NO) and the sum of all reactive nitrogen species (NO_y) has been performed in the tropopause region. These data have been acquired within the CARIBIC project (Civil Aircraft for the Regular Investigation of the Atmosphere Based on an Instrument Container, www.caribic-atmospheric.com). Since December 2004 NO and NO_y data have been obtained on a monthly base during more than 100 flights using a Lufthansa Airbus A340-600. Most of the CARIBIC flights have been performed between Germany and South America (Sao Paulo and Santiago de Chile) and between Germany and the East Asia (Guangzhou and Manila).

Nitrogen oxides play a key role in atmospheric photochemistry, particularly in controlling the cycling of OH and the production of ozone in the upper troposphere and lower stratosphere (UTLS). The budget of nitrogen oxides in the UTLS is controlled by a variety of different sources and processes, chiefly: long-range transport, lofting from the boundary layer, lightning, and air traffic emissions.

In this study the nitrogen oxide data are analysed along with species as CO, O_3, aerosol particles, and others. The large scale distribution of NO and NO_y in the UTLS is presented. Tracer correlations are used to investigate the contribution of different sources on the nitrogen budget. Attempts have been made to assess the seasonal variation of nitrogen oxides in the probed UTLS region. Nitrogen oxides data obtained during the 2002 measuring period (CARIBIC Phase I) are compared with the simulations of the

global atmospheric chemistry general circulation model ECHAM5/MESSy.