Geophysical Research Abstracts,
Vol. 10, EGU2008-A-01220, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-01220
EGU General Assembly 2008

Quantification of chemical aging and mixing with the new atmospheric chemistry trajectory-box model CAABA based on airborne observations from CARIBIC

H. Riede, P. Jöckel, R. Sander, C. A. M. Brenninkmeijer and J. Lelieveld
Max Planck Institute for Chemistry, Mainz, Germany

Transport, mixing and chemistry are complicated key processes in the distribution of chemical species throughout the atmosphere. Given the concentrations of chemical species observed at a certain point in time and space, the deconvolution of the contributions of the respective processes is often only partially possible and forms a formidable challenge. Analysis of the correlations and lifetimes of shorter-lived species can help to assess the relative effects of "mixing" and "cooking" in simpler cases, but given the complexity of the atmospheric environment, modeling is required. We applied the atmospheric trajectory-box model CAABA, which is based on the atmospheric chemistry module MECCA, to back-trajectories calculated for CARIBIC aircraft flights. CARIBIC is an atmospheric chemistry and composition observatory based on commercial intercontinental passenger flights. The zero-dimensional model CAABA was constrained by the back-trajectory boundary conditions to calculate the chemical kinetics along these Lagrangian paths, initially without taking mixing into consideration. Results are compared to output from the three-dimensional global earth system model ECHAM5/MESSy1 as well as to CARIBIC flight observations in order to investigate the relative importance of the chemical history and the mixing of air masses that converge in the UTLS region.