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## Simulating organic species with the global atmospheric chemistry general circulation model ECHAM5/MESSy1: a comparison of model results with observations

A. Pozzer, P. Jöckel, H. Tost, R. Sander, L. Ganzeveld, A. Kerkweg, and J. Lelieveld

Air Chemistry Department, Max-Planck Institute of Chemistry, P.O. Box 3060,  
55020 Mainz, Germany

**Abstract.** The atmospheric-chemistry general circulation model ECHAM5/MESSy1 is evaluated with observations of different organic ozone precursors. This study continues a prior analysis which focused primarily on the representation of atmospheric dynamics and ozone. We use the results of the same reference simulation and apply a statistical analysis using data from numerous field campaigns. The results serve as a basis for future improvements of the model system. ECHAM5/MESSy1 generally reproduces the spatial distribution and the seasonal cycle of carbon monoxide (CO) very well. However, for the background in the Northern Hemisphere we obtain a negative bias (mainly due to an underestimation of emissions from fossil fuel combustion), and in the high latitude Southern Hemisphere a yet unexplained positive bias. The model results agree well with observations of alkanes, whereas severe problems in the simulation of alkenes and isoprene are present. For oxygenated compounds the results are ambiguous: The model results are in good agreement with observations of formaldehyde, but systematic biases are present for methanol and acetone. The discrepancies between the model results and the observations are explained (partly) by means of sensitivity studies.

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