



Model simulations of tropospheric NO₂ compared with GOME retrievals for the years 1996–2000

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We present a systematic comparison of tropospheric NO₂ from a number of atmospheric chemistry models with satellite measurements from the Global Ozone Monitoring Experiment (GOME) for the period 1996–2000. The model simulations have been performed as part of the EU project RETRO (REanalysis of the TROpospheric chemical composition over the past 40 years) and cover the period 1960–2000. All models apply the same anthropogenic and vegetation fire emissions of ozone precursor gases. These emission data sets have recently been constructed within RETRO and include seasonal as well as interannual variability and trends. The dynamical variability of the atmosphere is taken into account by driving the models with meteorological data from the ECMWF reanalysis ERA-40. For a proper comparison with GOME, the tropospheric NO₂ fields from the different models are analyzed daily at 10:30 local time, close to the overpass time of the satellite, and collocated with the measurements to account for sampling biases due to incomplete spatial and temporal coverage of the instrument. We present global maps of modeled and retrieved NO₂ column densities and analyze the seasonal and interannual variability in different regions of the world. Our study contributes to the evaluation of the emission data sets used in the RETRO long-term simulations. The results will also be related to the outcomes of a recent

comparison of the ACCENT/IPCC multi-model ensemble simulations with GOME
NO₂ retrievals for the year 2000.