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Reanalysis of the chemical composition of the troposphere for the period 1980-2005 using the chemistry aerosol general circulation model ECHAM5-HAMMOZ

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The global composition of the troposphere is highly influenced by the total amount and geographical distribution of trace gas and aerosol emissions, which have changed significantly during the last 30 years. While Europe and the US started to define and to apply strategies to enhance air quality, the emission rates in economically emerging countries, such as China and India, increased significantly. Understanding past trends of the concentrations and distributions of trace gases and aerosols in the troposphere is a key point to evaluate the efficiency of the existing strategies to reduce air pollution and to define more efficient strategies for the future. We performed a simulation of the period 1980-2005 with the chemistry aerosol general circulation model ECHAM5-HAMMOZ to understand and assess long term changes and interannual variability of the chemical composition of the troposphere. The model includes simulations of the NOx-Ox-hydrocarbon chemistry and of the aerosol chemistry and microphysics, the two simulations being embedded into the well established general circulation model ECHAM5. We used the ERA40 reanalysis data to reproduce the meteorological conditions and mainly the RETRO emission inventory, which provide gridded (0.5° x 0.5°) data sets of global anthropogenic and wildfire emissions for both trace gases and aerosols. In this work we present the first results from this simulation. In particular, we analyze the long term changes and interannual variability of the chemical composition of the troposphere comparing these also to the multi model results provided by

the RETRO project. The models used during the RETRO project did not include coupled aerosol simulations, therefore these results allow us to understand and asses the impact of the trace gas-aerosol interactions on the global concentrations, distributions, and long term changes of tropospheric gases and aerosols.