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# Evaluation of chemistry transport model simulations in the MACC project: comparison with satellite and in-situ data

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The distribution and variability of tropospheric ozone and precursors are being assessed within the European project MACC using the MOZART chemistry transport model coupled with the ECMWF integrated forecasting system (IFS). Reanalysis simulations were performed for the 2003-2008 period providing information on global tropospheric composition and regional air quality. With the aim to improve forecasting system of the tropospheric ozone and precursors, several validation exercises of model results were performed using independent in-situ and satellite data. Model simulations were compared with surface data from NOAA-GMD, EMEP and other surface networks as well as with tropospheric NO2 and CO retrievals from SCIAMACHY and MOPITT instruments. This provides an evaluation of the model performance regarding long-range transport of pollutants and air quality over polluted regions such as Asia, Siberia, Europe and North America. Simulations were also performed with assimilation of satellite data from different sensors and without coupling with ECMWF IFS. Model results are improved when ECMF IFS assimilation modules were used to constrain the tropospheric CO by satellite measurements. Uncertainties in satellite retrieval techniques could explain some biases found in model results compared to measurements. Indeed, changes in MOPITT retrieval algorithm resulted in important changes in CO observations leading also to strong impact on modeled CO in runs using assimilation. Assimilation of surface and airborne measurements could reduce the discrepancy between the model and some surface measurements in particular over the northern latitudes, although uncertainties in anthropogenic and biomass burning emissions inventories may explain a part of the discrepancy. Comparisons with MOZART simulations performed within the CityZen project will also be discussed particularly in order to assess sensitivity of model results to emissions.