Variability and trends in carbon monoxide for the period 2003-2016 from the CAMS interim reanalysis and model simulations

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The emerging reanalysis data sets of global atmospheric composition are a new opportunity to detect and understand current trends of atmospheric composition. The reanalyses combine observations of atmospheric composition from satellite instruments, such as CO retrievals from MOPITT and IASI, with atmospheric composition models in a consistent way by means of data assimilation techniques.

Within the Monitoring Atmospheric Composition and Climate (MACC) project, ECMWF produced a first reanalysis of atmospheric composition. Now, as part of the Copernicus Atmosphere Monitoring Service (CAMS) a further re-analysis of CO, ozone and aerosol at a resolution of about 110 km has been completed. This reanalysis was carried out "interim" in preparation of a more comprehensive CAMS reanalysis.

We use the CAMS interim re-analysis to present recent trends (2003-2016) in CO, which were mainly driven by the El-Nino events in conjunction with land-use induced changes in biomass burning as well as trends in anthropogenic emissions. We compare the MACC and CAMS re-analysis with independent in-situ ground-based and aircraft observations of CO and discuss the temporal consistency between the two re-analyses and their usefulness for inferring realistic trends. The comparison of the CAMS re-analysis with a model run without assimilation (control run) is used to show the impact of the data assimilation both with respect to biases but also to spatial variability and trends.