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Evaluation of the Copernicus Atmosphere Monitoring (CAMS) Reanalysis

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The Copernicus Atmosphere Monitoring Service (CAMS) is a component of the European Earth Observation Programme Copernicus, which has been established to meet the needs of policy makers and stake holders for data and information related to environmental issues, such as climate change, air pollution and other atmosphere-related hazards like volcanic eruptions (http://atmosphere.copernicus.eu). It operationally provides air-quality data, forecasts and processed information on atmospheric composition, as well as retrospective atmospheric composition data records for recent years (reanalyses). Such reanalysis data sets can be used to compute climatologies, study trends, evaluate models, or serve as boundary conditions for regional models for past periods.
The CAMS production team has produced a new reanalysis dataset in 2018, consisting of 3-dimensional atmospheric composition fields of aerosols and chemical species. The previous MACC (Monitoring Atmospheric Composition and Climate) reanalysis data set has been downloaded by around 3000 users since its release in 2013. The CAMS reanalysis builds on the experience gained during the production of the MACC reanalysis and comes with updated chemistry and aerosol modules, newer reprocessed satellite retrievals and changes in emission data sets. The CAMS validation team has evaluated this new reanalysis data set for the period 2003-2016 with respect to reactive gases (O_3, CO, NO_2, HCHO) and aerosols. The evaluation focuses on the longer-term mean performance of the model, the performance of the data assimilation system and the comparison to the previous MACC reanalysis data set. Results show, that the CAMS reanalysis has smaller biases compared to ozone, carbon monoxide, nitrogen dioxide and aerosol optical depth observations than the MACC reanalysis. It also shows a more consistent behavior in time. Limitations include, amongst others, the absence of a stratospheric chemistry scheme, which implies that the stratospheric concentrations apart from ozone need to be considered with caution. The CAMS reanalysis data set is available to the public free of charge and can be downloaded on the CAMS homepage (http://atmosphere.copernicus.eu/copernicus-releases-new-global-reanalysis-data-set-atmospheric-composition).