

Implementation of Sentinel-5p data in the CAMS global data assimilation system

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The Copernicus Atmosphere Monitoring Service (CAMS) led by ECMWF will be one of the major users of Sentinel-5p data. The much-improved quality and spatial resolution of the S5p observations is expected to improve the CAMS analyses and forecasts. During the S5p commissioning phase ECMWF already started testing data and is providing valuable feedback on the data quality to ESA and the retrieval algorithm teams.

A global data assimilation system is a powerful tool to monitor the quality of satellite data because it provides continuous global coverage and allows us to build up statistics of the differences between the (new) observations and the model quickly. The model fields are interpolated in time and space to the location of the observations, statistical analyses of the differences between the model's first guess or analysis fields and the observations (the so-called departures) are calculated and their time evolution is monitored. When the observations are stable, the departures normally show a relatively smooth behaviour from day to day. A sudden jump on a global scale, which is larger than the instrument noise, is an indication of possible problems in the data or potentially the model. Long term monitoring statistics can also detect (regional) biases between the model, which is constrained by many different (satellite) data sets, and the S5p observations and between different satellite retrievals (e.g. between ozone retrievals from different instruments such as S5p, GOME-2 and OMI) and allows us to monitor S5p instrument and algorithm stability.

As a first step, the S5p data are included passively in the global CAMS data assimilation system. This means the data will be fed into the system and first-guess statistics will be calculated. However, the data will not be assimilated into the CAMS model and therefore not influence the model fields at this stage. This assessment can take several months to ensure the new observations can be safely used to improve the CAMS analyses and forecasts. Once the results look good, the new observations will be used to constrain the CAMS system as part of the various satellite data sets that are used each day.

In this presentation, we will show the methodology for the monitoring of S5p data with the CAMS system and present first results.