



## Global Reactive Gases in the MACC project

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In preparation for the planned atmospheric service component of the European Global Monitoring for Environment and Security (GMES) initiative, the EU FP7 project Monitoring of Atmospheric Composition and Climate (MACC) developed a preoperational data assimilation and modelling system for monitoring and forecasting of reactive gases, greenhouse gases and aerosols. The project is coordinated by the European Centre for Medium-Range Weather Forecast (ECMWF) and the system is built on ECMWF's Integrated Forecasting System (IFS) which has been coupled to the chemistry transport models MOZART-3 and TM5. In order to provide daily forecasts of up to 96 hours for global reactive gases, various satellite retrieval products for ozone (total column and profile data), CO, NO<sub>2</sub>, CH<sub>2</sub>O and SO<sub>2</sub> are either actively assimilated or passively monitored. The MACC system is routinely evaluated with in-situ data from ground-based stations, ozone sondes and aircraft measurements, and with independent satellite retrievals. Global MACC reactive gases forecasts are used in the planning and analysis of large international field campaigns and to provide dynamical chemical boundary conditions to regional air quality models worldwide. Several case studies of outstanding air pollution events have been performed, and they demonstrate the strengths and weaknesses of chemical data assimilation based on current satellite data products. Besides the regular analyses and forecasts of the tropospheric chemical composition, the MACC system is also used to monitor the evolution of stratospheric ozone. A comprehensive reanalysis simulation from 2003 to 2010 provides new insights into the interannual variability of the atmospheric chemical composition.