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Recent developments in Fire Emission Monitoring in MACC-II using Fire Radiative Power Observations

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We will present the latest developments of the Global Fire Assimilation System (GFAS), which has been implemented by the MACC-II project in order to provide accurate fire biomass burning emission estimates for the real time and retrospective Copernicus/GMES atmospheric monitoring and forecasting services. Accurate fire emissions have been shown to be a crucial input for air quality forecasts even when satellite-based atmospheric observations are being assimilated. On the other hand, comparisons of the simulated smoke plumes and atmospheric observations provide information on the accuracy of the bottom-up fire emission estimates.
The emission estimates of GFAS are generally consistent with those of the GFED inventory, but they are available with 1-day temporal resoution and in real time. There are also a few small systematic differences between the emission estimates of the two inventories. The general consistency is achieved by assimilating Fire Radiative Power (FRP) observations from the MODIS instruments, and by a conversion of the daily FRP to dry matter combustion rate that depends on the fire type. Emission rates for forty smoke constituents are subsequently calculated from the dry matter combustion rate. The emisson estimates have been validated against atmospheric observations of aerosol optical depth, carbon monoxide, ozone, nitrogen dioxide and formaldehyde using the atmospheric models of MACC.
The GFAS data are currently produced with resolutions of 1 day and 0.1 deg, and a time lag of seven hours. They cover the period since January 2003 and are publicly available. In the future, the inclusion of FRP products from the geostationary satellites Meteosat-9, GOES-East, and GOES-West will lead to a finer temporal resolution as well as to an improved accuracy of the daily emission estimates. Estimates of smoke injection height will also become available