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Modelling the Impact of Biomass Burning on Atmospheric Aerosol and Greenhouse Gas Abundances

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Biomass burning (BB) emissions contribute significantly to the atmospheric composition in the domains of global green-house and reactive gases and frequently dominate aerosols and regional air quality. Due to its high variability on all time scales from hours to years, these emissions can often not be described with static inventories, but need to be derived from satellite-based fire observations of each individual situation.

The global GEMS systems use several versions of the BB emission inventory GFEDv2 as baseline. In addition, a dedicated fire assimilation systems based on the Fire Radiative Power (FRP) from SEVIRI, which EUMETSAT is currently developing, has been implemented for the aerosol and greenhouse gas in the African and Southern European domain.

By comparing different model and assimilation runs, we show that BB emission input is significant for both types of runs in the aerosol and greenhouse gas monitoring systems. A temporal resolution of the BB emissions of about a week appears sufficient for the greenhouse gas monitoring in GEMs, while the aerosol monitoring requires a temporal resolution of hours. The latter requirement can be generalised for reactive gases and regional air quality.

A case study of the forest fires ravaging Greece in August 2008 demonstrates the capability of real-time monitoring and forecasting of large fire plumes in the future GMES atmospheric service.

Complementary developments of fire assimilation systems based on observations by further fire observation from geostationary and polar orbiting platforms indicate a the

development path to a truly global and real-time fire assimilation system.