



## Top-down aerosol emission estimates for biomass burning between 2001 and 2010

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The emissions of black carbon (BC) and particulate organic matter (POM) from biomass burning are estimated at the global scale by assimilating daily total and fine mode aerosol optical depths (AOD) at 550 nm from the Moderate Resolution Imaging Spectroradiometer (MODIS) into a global aerosol model of intermediate complexity. Monthly emissions are fitted homogenously for each species over a set of predefined regions. Biomass burning regions were defined based on the Global Fire Database (GFED) regions. The performance is evaluated by comparing the AOD after assimilation against the MODIS observations and against AERONET data. The system has been applied to the year 2010 and shows effectiveness in forcing the model towards the observations, for both total and fine mode AOD. Significant improvements for the root mean square error and correlation coefficient against both the assimilated and independent datasets are observed. In addition the sensitivity and robustness of the inversion system to the choice of the first guess emission inventory have been investigated by using different combinations of inventories for industrial, fossil fuel and biomass burning sources. The study will be extended to the entire period 2001-2010. The performance of the inversion will be assessed and the estimated emissions will be presented and compared with different top-down and bottom-up estimates. The uncertainty of the estimated emissions will be evaluated and discussed. Special attention will be given to the seasonality of biomass burning aerosol emissions in the regions of Central South America, Southern South America, North Africa and Southern Hemisphere Africa.