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Estimation of biomass burning emissions over Turkey using SEVIRI fire characterization data: the Antalya fire, August 2008

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For regional air quality modeling purposes, the availability of information on forest fires and their gaseous and aerosol emissions becomes critical for specific regions and seasons. The recent improvements of air quality models, such as CMAQ, permit to simulate the chemical composition of the atmosphere at finer resolutions. Therefore also emission inventories must be provided with higher level of detail in terms of both spatial and temporal resolution. In particular forest fire emissions, due to their episodic nature, are characterized by high spatial and temporal variations. In order to better simulate the impact of fire emissions on air quality it is fundamental to better describe the entire evolution of the fires. SEVIRI-based Fire Radiative Power (FRP) can be directly linked to the biomass combustion and emissions and has sufficient time resolution (15 minutes) to observe the complete fire life cycle and thus capture fires when they reach their peak intensity. The Wildfire Automated Biomass Burning Algorithm (WF_ABBA) and the EUMETSAT Land SAF Fire Radiative Power provide operational fire radiative power products based on SEVIRI observations using different algorithms. In this presentation we present a case study of a large forest fire occurred in the province of Antalya, South of Turkey, in the beginning of August 2008, which burned an area of 4000-4500 hectares of forest land. The emission estimates of the principal pollutants from the two fire dataset based on SEVIRI can describe the entire evolution of the fire episode improving the temporal resolution. The new estimates are comparable with other available fire emission inventories, which are based on MODIS satellite observations, for example 3.2 Gg of PM2.5 and 27.1 Gg of CO are estimated for the entire Antalya episode from WF_ABBA, while the GFASv1.1 based on MODIS estimates are 2.2 Gg and 27.3 Gg for PM25 and CO, respectively. SEVIRI-based fire emission inventories, derived over a larger region of the Eastern Mediterranean Basin surrounding Turkey during Antalya fire life time, has been used as input in the Community Multiscale Air Quality (CMAQ) model, providing a more accurate description of fire contribution (hourly emissions at 10 x 10 km horizontal resolution) in determining the concentration of major contaminants in the study area and during the selected period. The variability of aerosol and gaseous species due to forest fire emissions will be quantified by comparing a set of simulations using two hourly emission inventories based on SEVIRI dataset and a daily emission inventory based on MODIS (GFAS).