Investigation of the Driving Forces for the Recent Trends in Surface Fine Particulate Matter Concentrations in Nanjing, China

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Meteorological conditions and emissions play very important roles in the formation of $PM_{2.5}$ pollution. PM2.5 concentrations in Nanjing have been decreasing rapidly from ~70 μg/m3 in 2013 to ~50 μg/m3 in 2016. The contributions of inter-annual variation of meteorological conditions and emissions to the rapid PM2.5 reduction remain unknown. In this study, we used several methods to quantify the contributions. First, we established a generalized linear regression model (GLM) based on meteorological parameters to assess the effect of meteorological conditions and pollution control strategies on reducing the air pollution level in Nanjing. Second, we conducted sensitivity simulations with the WRF/CAMQ model, in which we perturb seven major meteorological parameters, i.e., wind speed, wind direction, temperature, humidity, boundary layer height, precipitation, and cloud cover, and then simulate the changes of PM2.5 concentrations to analyze its sensitivity to meteorological variations. Third, we simulated $PM_{2.5}$ concentrations in Nanjing in 2013 and 2015 using different years of emissions to investigate the impacts of emissions change and meteorological variations on PM2.5 concentrations. The results using the three methods will be compared and discussed.

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