Modeling the impact of mobile source emissions on urban air quality in Seoul

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The mobile emission is the major source of air pollution in most cities[1]. Along with chemical reactions, dispersion, dilution and deposition processes of emitted air pollutants result in urban air pollution varying with regard to time and space[2]. In this study, the impact of mobile source emissions on urban air quality were quantified by analyzing the difference between model-predicted concentrations derived from two sets of simulation scenarios : (1) the WRF (Weather Research and Forecasting)-CMAQ (Community Multiscale Air Quality) simulation for a 1 month (June, 2014) with (i.e., BASE case) and (2) without the mobile emissions (i.e., ExME case). To evaluate the model validation for the BASE case, a statistical comparison was made between the observed and simulated values of air pollutants at several urban air quality monitoring sites in Seoul. Overall, the simulated values show good correlation with the observations and indicate that atmospheric chemistry and dynamics are generally well captured by the CMAQ model (MBE of -0.6 ppb and -4.8 $\mu g/m^3$ for NO_2 and PM_{10}, respectively). The differences between two simulations (BASE case minus ExME case) are up to 17.2 ppb and 27.6 ppb for NO_2 and NO, respectively.

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