Numerical Simulation of PM2.5 Concentration in Xi'an by CAMx model: construction dust emission and improvement

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As a major city in the key area "Fen-wei Plain" for air pollution control in China, Xi'an is located in a typical basin, Guanzhong Basin, which is not conductive to the spread of air pollutant, resulting in more and more severe air pollution. In the previous study, which using an emission inventory without construction fugitive dust emissions by WRF-SMOKE-CAMx model system, the simulated three peaks values between 19 December 2016 and 20 January 2017 are much lower, which leads to the NME and NMB becoming negative, at -17% and -8%, respectively. And the PM2.5 concentration peak underestimated approximately 40% on Jan. 5th, 2017. But the construction fugitive dust emission of construction is large in Xi'an. In order to solve the problem of the simulated underestimation, this study builds the emission inventory of $PM_{2.5}$ from construction fugitive dust in Xi'an to update the local emission inventory. The results of estimating emission quantity and emission intensity of $PM_{2.5}$ from construction activities in Xi'an in 2017 indicate that: according to the emission factors determined by Beijing Municipal Research Institute of Environmental Protection, which based on the seasonal characteristics of construction fugitive dust, estimated total $PM_{2.5}$ emissions from construction fugitive dust 22 thousandtons per year. There was a significant seasonal variance in emissions of construction fugitive dust, that the emission is highest in spring, and the emissions in summer, autumn are slightly lower than that in winter. In terms of spatial distribution, the construction fugitive dust emission in the urban area accounts for about 72% of the total emissions. The emission intensity of construction fugitive dust in the urban area was relative high compared with surrounding areas, and it is about 29 times that of other suburban counties. The new emissions will be included in the WRF-SMOKE-CAMx modeling system to improve the simulation of the heavy pollution process of fine particulate matter ($PM_{2.5}$) pollution in Xi'an.