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Emission process and modeling of the aerosol in the urban.

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The Sparse Matrix Operator Kernel Emissions (SMOKE) model was applied to improve the emissions process of the aerosol in the urban Beijing, and provide the model-ready emissions for the Nested Air Quality Prediction Modeling System (NAQPMS) during CAREBeijing-2006. The regional emissions in East Asia from TRACE-P/INTEX-B and the local sources emissions database in North China were included in this study. In order to obtain the high resolution of the emissions, the emissions inventories (including dust, black carbon and primary organic carbon, etc) have been spatially allocated based on the related spatial factor, such as its population data, the road length density and the distribution of industrial plants. The model performance of the aerosol simulation in the urban Beijing has improved obviously after emission process updated. 1) The mean bias (MB) of the urban sites has improved from -87.4 μg/m3 ~ -43.2 μg/m3 to -31.0 μg/m3 ~13.4 μg/m3, with the averaged from -57.3 μg/m3 to -5.9 μg/m3; and the mean error (ME) reduced from 66.6 μg/m3 to 43.6 μg/m3. 2) The fraction of prediction within a factor of two of observation (FAC2) increased from 17% ~ 43% to 44% ~ 70%, with the averaged of the PM10 in the urban sites reached to 74%. 3) Except the suburban station Dingling, the normalized mean square error (NMSE) in the urban sites decreased from 1.030 ~ 3.447 to 0.370 ~ 0.867, with the averaged from 1.311 to 0.303.