

# Supplementary Information

**Characteristics of aerosol and effect of aerosol feedback in Handan, an industrialized and polluted City in China in haze episodes.**

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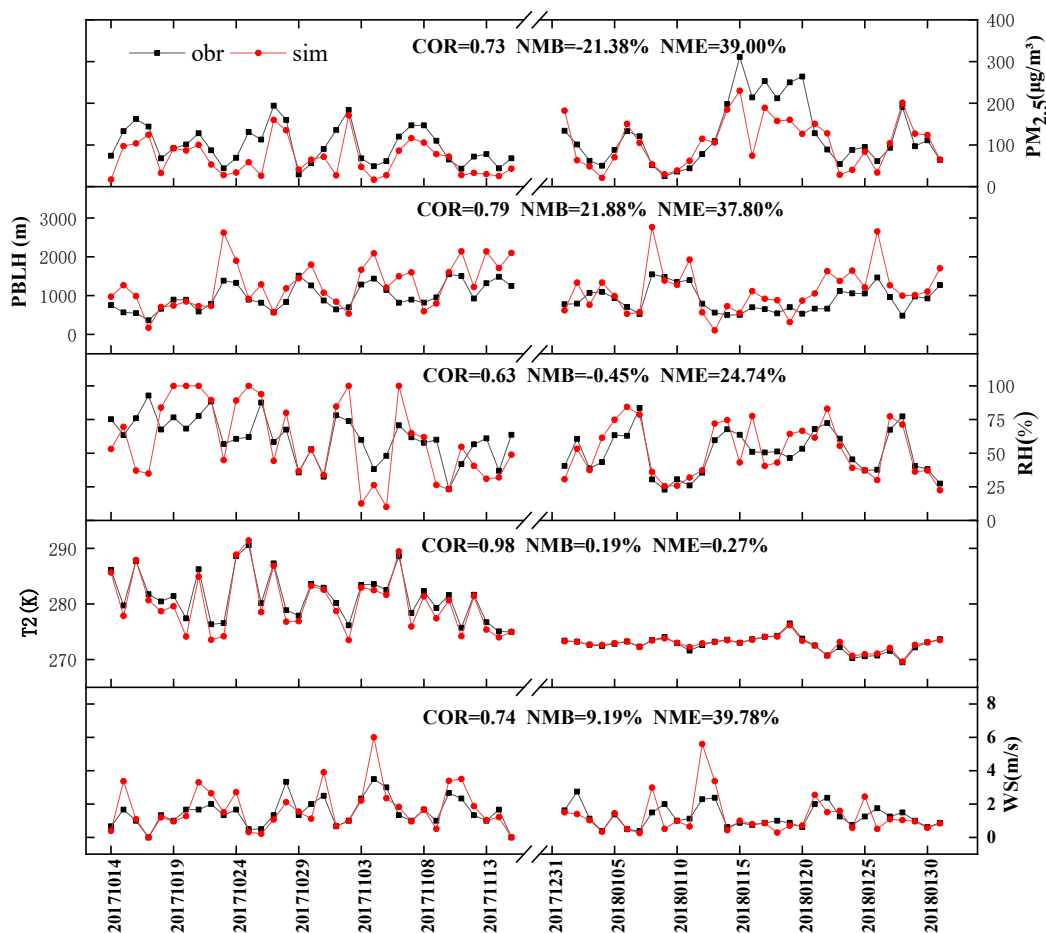
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To evaluate the performance of the WRF-chem in simulating both PM<sub>2.5</sub> concentrations and meteorological variables, the statistical metrics are implemented, including correlation coefficient (COR), normalized mean bias (NMB) and normalized mean error (NME). Fig. S1 presents the time series of the observed and predicted PM<sub>2.5</sub> results. Regarding PM<sub>2.5</sub> concentrations, WRF-Chem model can well capture the average concentrations of PM<sub>2.5</sub>, with NMB of -21.38%, with NME of 39.00%, and with COR of 0.73, respectively. Note that obvious underestimation in PM<sub>2.5</sub> concentrations occurred in some heavy pollution periods, which could be caused by the lack of the secondary pollutant reaction mechanism in the model, the underestimate of emission inventory and the errors from the meteorological field. In terms of the meteorological parameters, the COR values were all above 0.60. The model presented good performance in simulating planetary boundary layer height (PBLH), relative humidity (RH), and surface temperature (T2), with NMB of 21.88%, -0.45% and 0.19% with NME of 37.80 %, 24.74% and 0.27%. Besides, wind speed (WS) agreed well with monitor data, with NMB ranging of 9.19 %, with NME ranging of 39.78 %. Considering the comparison of the above simulations with the observations the simulation results were acceptable.



**Figure S1.** Daily variation of observed data with simulated data during research period in Handan during the investigation period..