Geoscientific Model Development

Supporting Information for

Robustness of simulating aerosol climatic impacts using regional model (WRF-Chem v3.6): the sensitivity to domain size

[1]Xiaodong Wang, [1,2,3]Chun Zhao*, [1]Mingyue Xu, [1]Qiuyan Du, [1]Jianqiu Zheng, [1]Yun Bi

[1]School of Earth and Space Sciences, University of Science and Technology of China, Hefei, China

[2]CAS Center for Excellence in Comparative Planetology, University of Science and Technology of China, Hefei, China

[3]Frontiers Science Center for Planetary Exploration and Emerging Technologies, University of Science and Technology of China, Hefei, China

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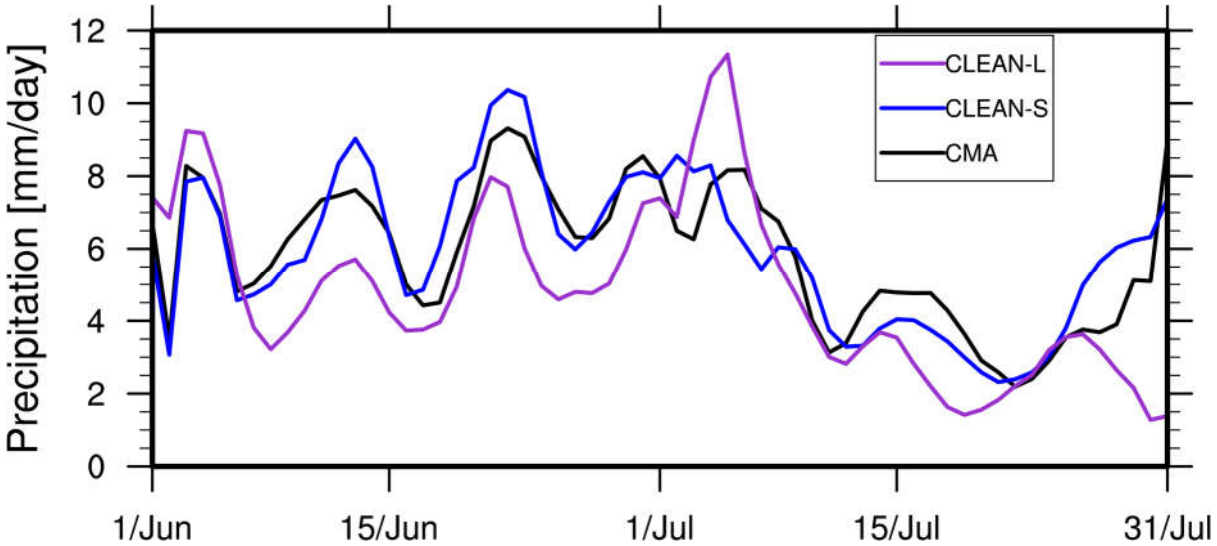

Figure S1. Daily mean time series of precipitation in eastern China (20°N-42°N, 105°E-122°E). The data are smoothed by five day average. The simulated data are interpolated to the CMA station by means of neighborhood interpolation.

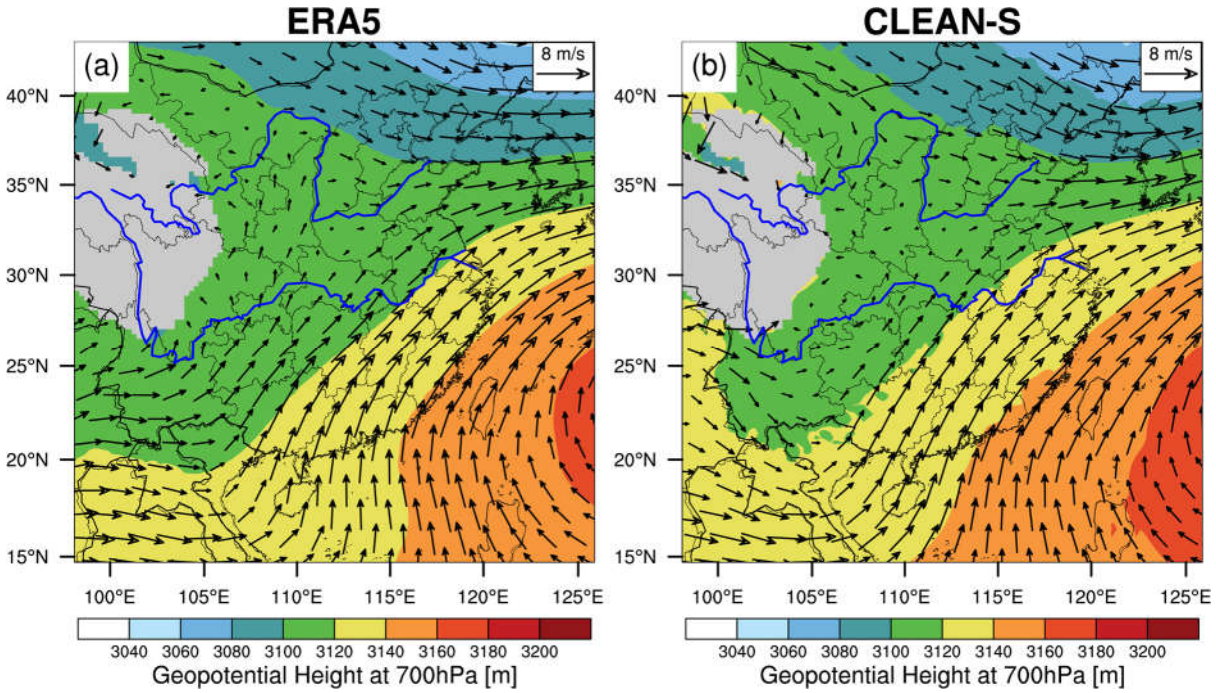

Figure S2. Spatial distribution of mean 700 hPa Geopotential Height and winds of June and July 2017 from (a) ERA5, and (b) CLEAN-S.

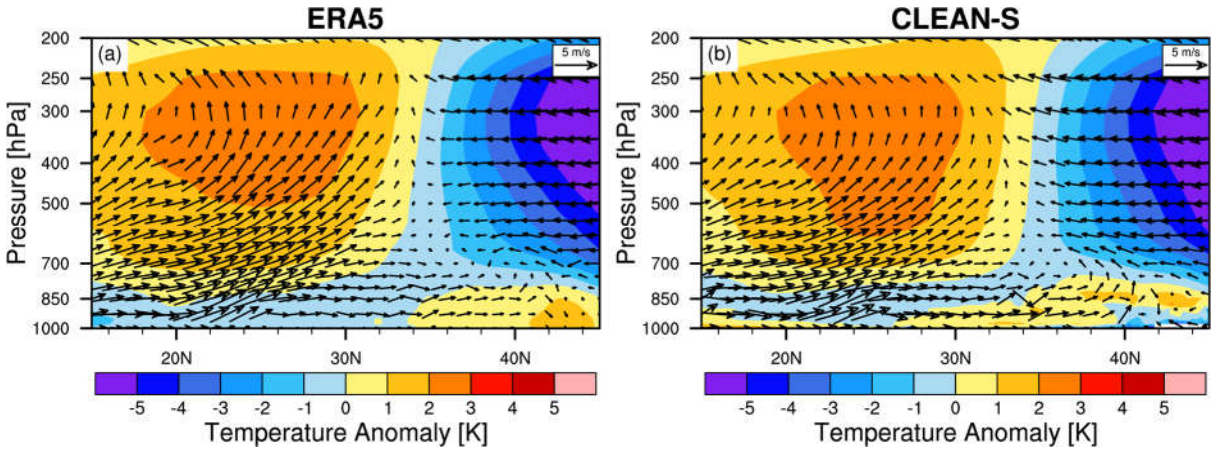

Figure S3. The cross-section of meridional temperature anomalies and wind averaged for 105°E and 122°E from the ERA5.

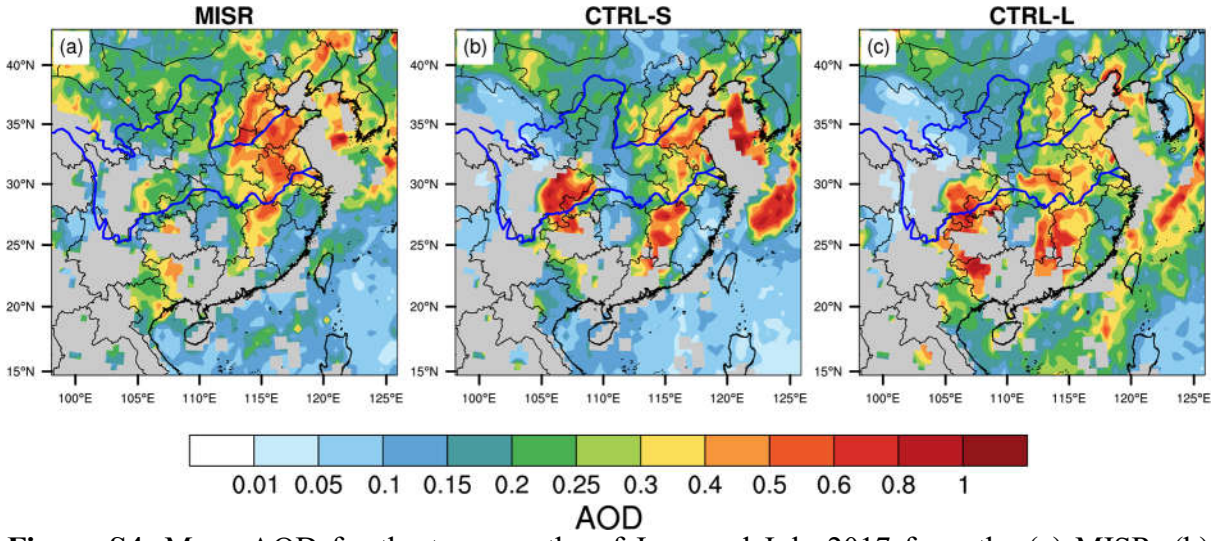

Figure S4. Mean AOD for the two months of June and July 2017 from the (a) MISR, (b) CTRL-S and (c) CTRL-L simulation.

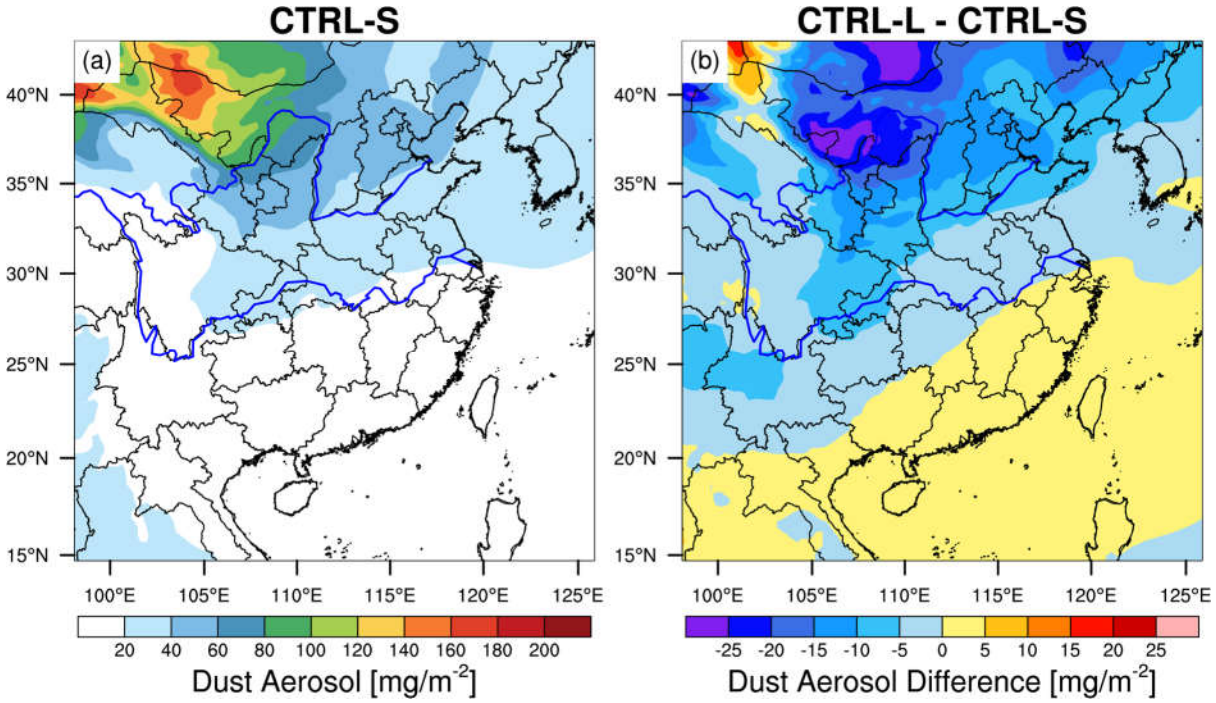

Figure S5. The spatial distributions of column integrated total (a) PM2.5 dust concentration averaged for June and July of 2017 from the CTRL-S simulation, and (b) the difference between CTRL-L and CTRL-S.

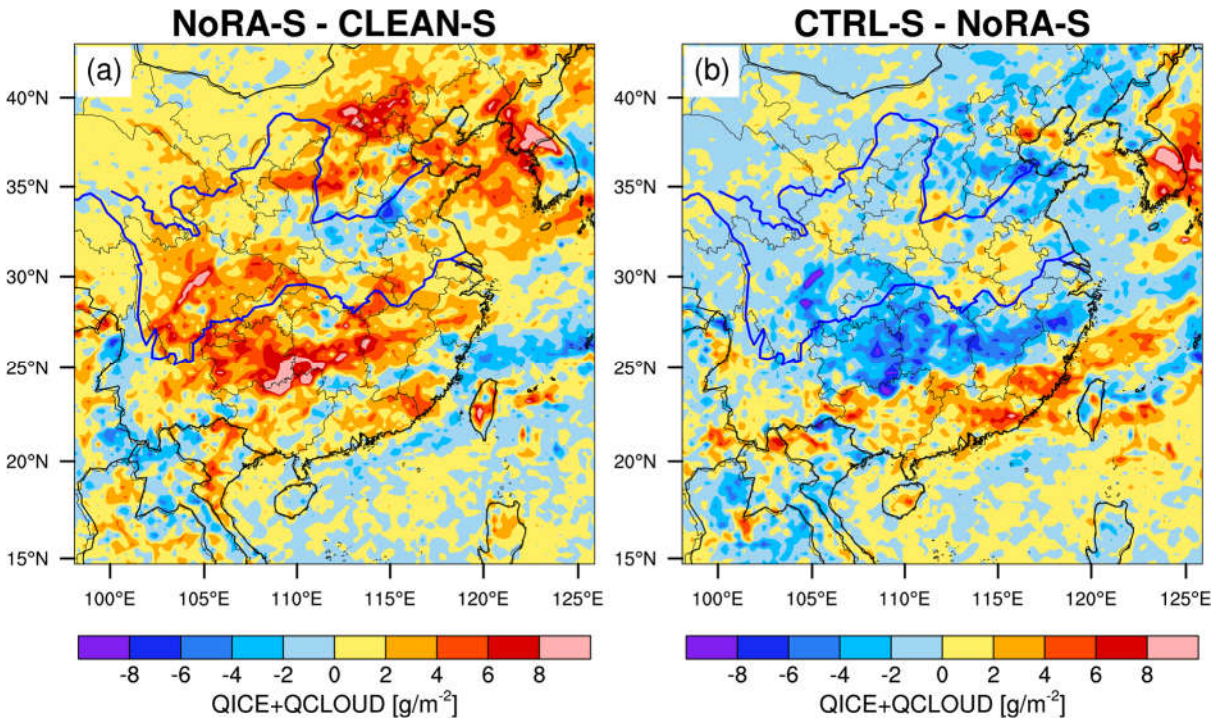

Figure S6. The spatial distributions of (a) Aerosol-Cloud interactions and (b) Aerosol-Radiation interactions induced difference of cloud amounts, respectively.

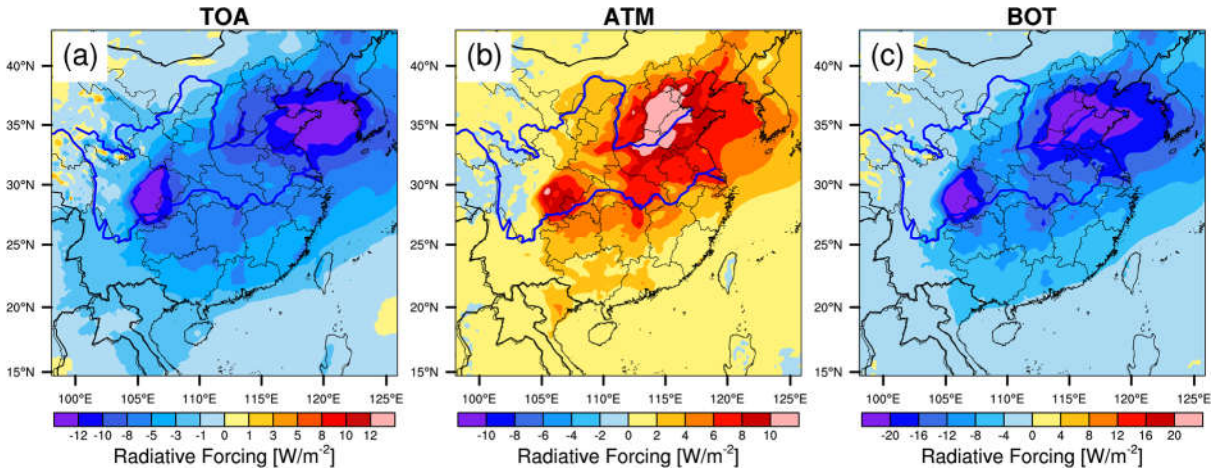

Figure S7. The spatial distributions of aerosol-induced difference of (a) top of atmosphere, (b) atmosphere and (c) bottom of atmosphere radiative forcing averaged for June and July of 2017 from the small domain simulation.

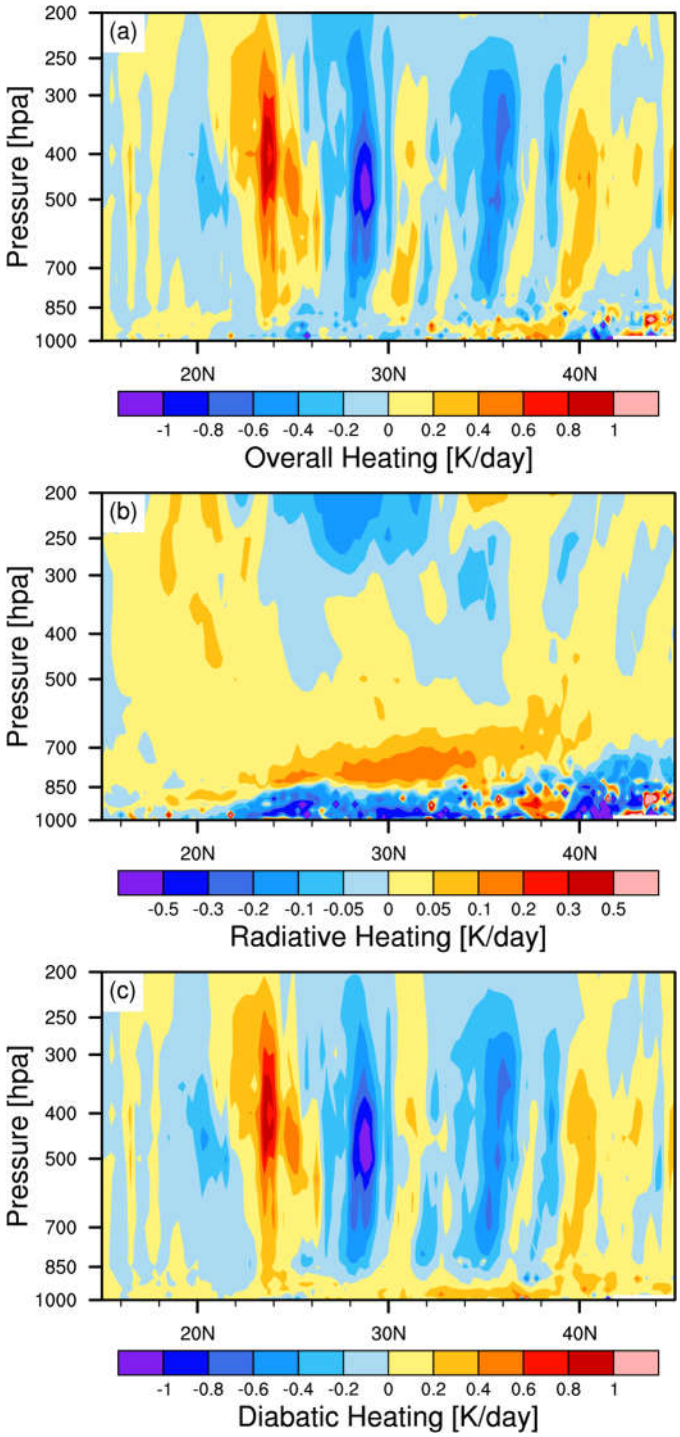

Figure S8. Aerosol induced (a) overall heating, (b) radiative heating, and (c) diabatic heating averaged between 105°E and 122°E for June and July of 2017 from the small domain simulation. The aerosol induced overall heating rate is defined as the aerosol induced changes of heating rate from cloud microphysics, convection, planetary boundary mixing, and radiation processes. The aerosol induced radiative heating rate is defined as the aerosol induced changes of heating rate from radiation and planetary boundary mixing processes. The aerosol induced diabatic heating rate is defined as the aerosol induced changes of heating rate from cloud microphysics and convection.

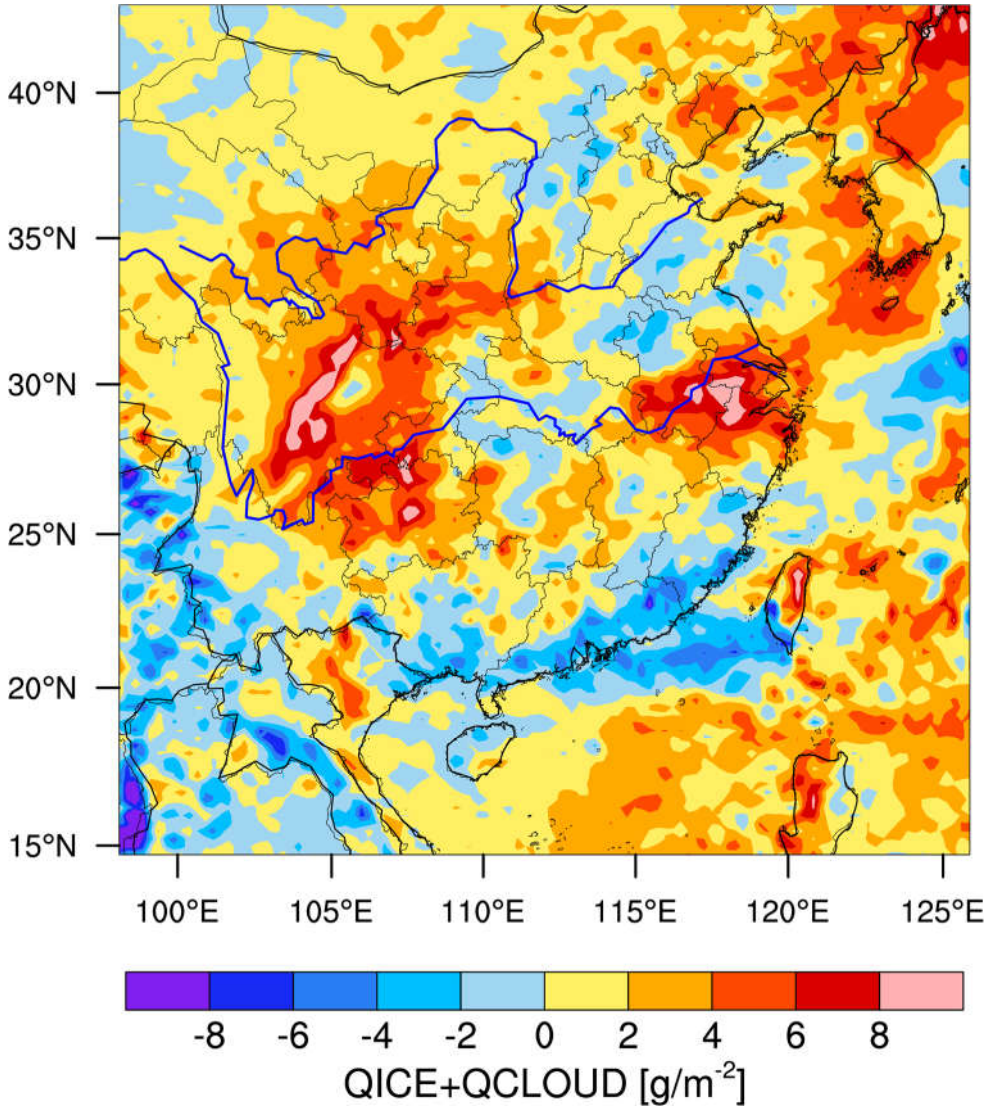

Figure S9. The aerosol-induced difference of cloud amounts average for June and July of 2017 from the large domain simulation.

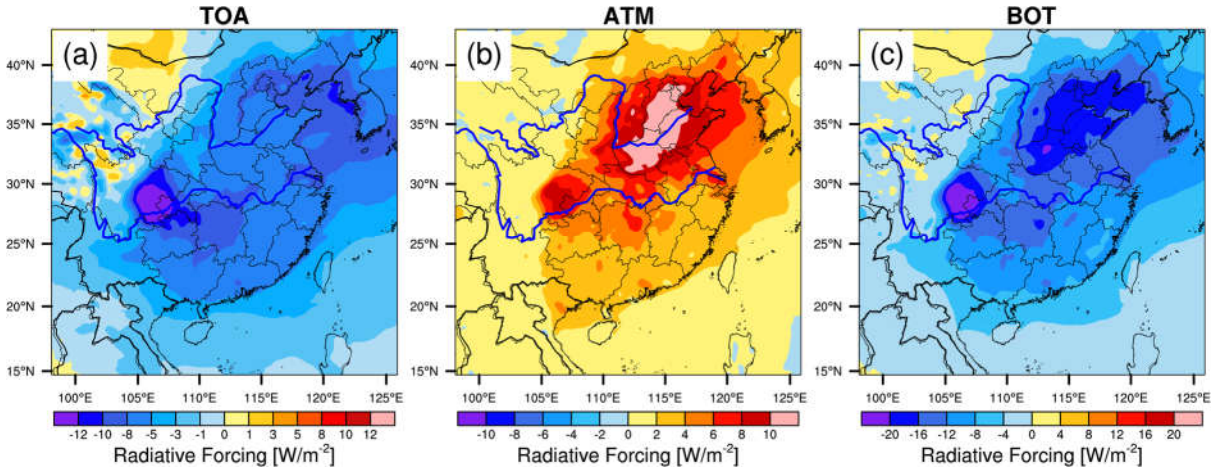

Figure S10. The spatial distributions of aerosol-induced difference of (a) top of atmosphere, (b) atmosphere and (c) bottom of atmosphere radiative forcing averaged for June and July of 2017 from the large domain simulation.