

# Mitigation Effect of Dense "Water Network" on Heavy PM<sub>2.5</sub> Pollution: A case Model of the Twain-Hu Basin, Central China

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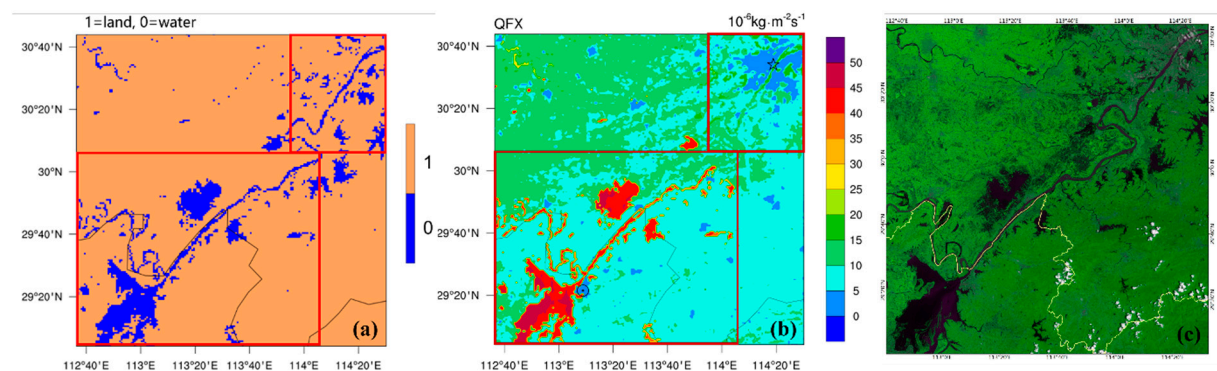
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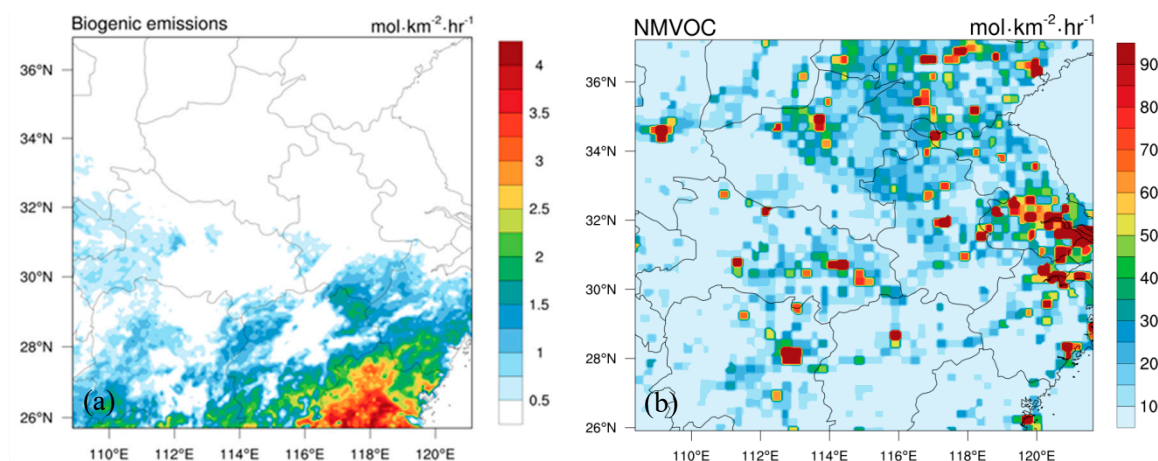
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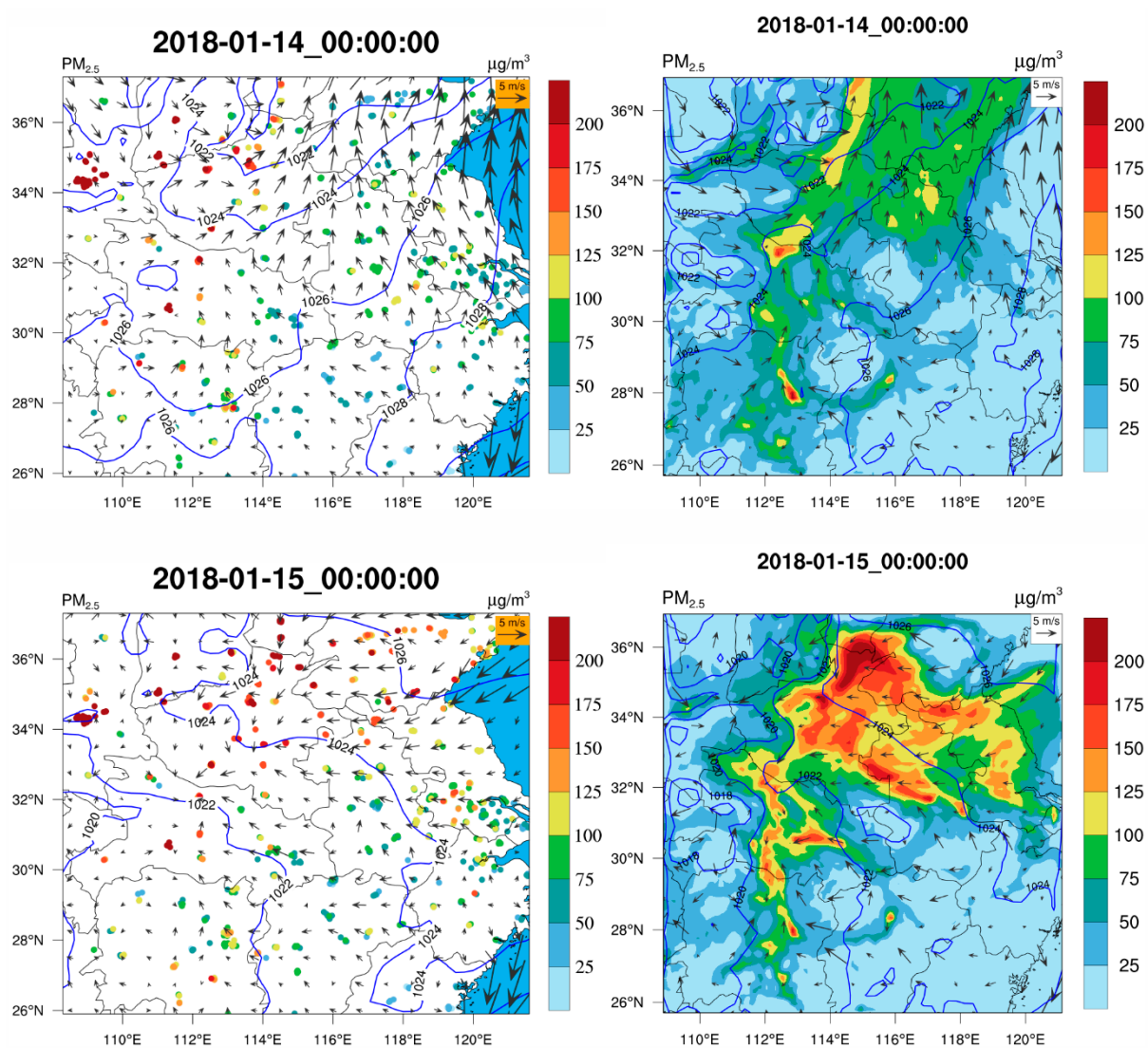
## Supplementary Materials



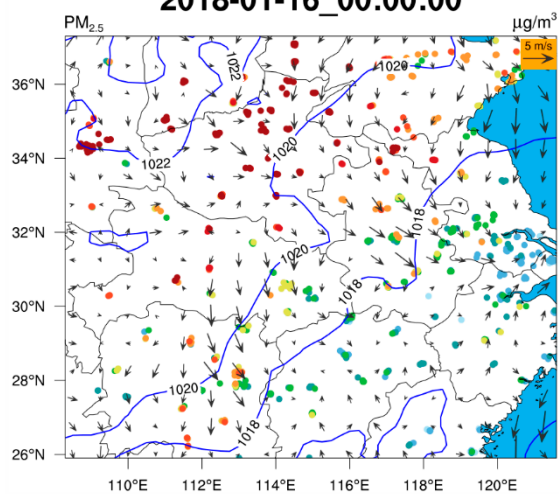
**Figure S1.** The distribution of (a) land and water, (b) simulated water vapor flux (QFX), and (c) raster pixel image of CCD2 Level2 on HJ1A Satellite (horizontal resolution of 30 m) in the modeling domain d03. The small box indicates the DSLs, the large box indicates the CBLs.



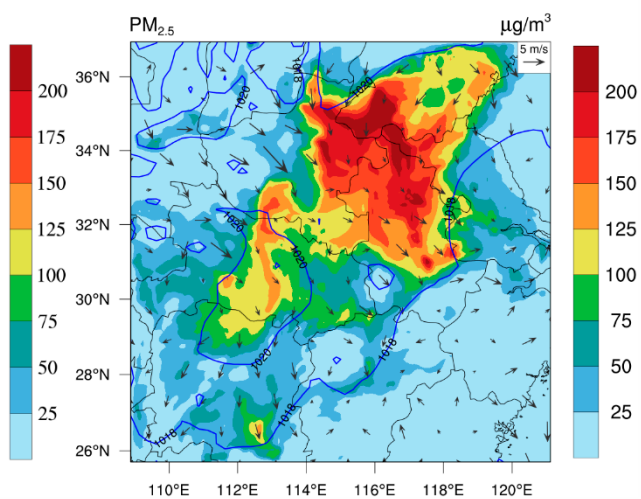
**Figure S2.** The spatial distributions of (a) biogenic VOC emissions from MEGAN, and (b) NMVOC emissions from MEIC in the modeling domain d01 averaged for the simulation period.



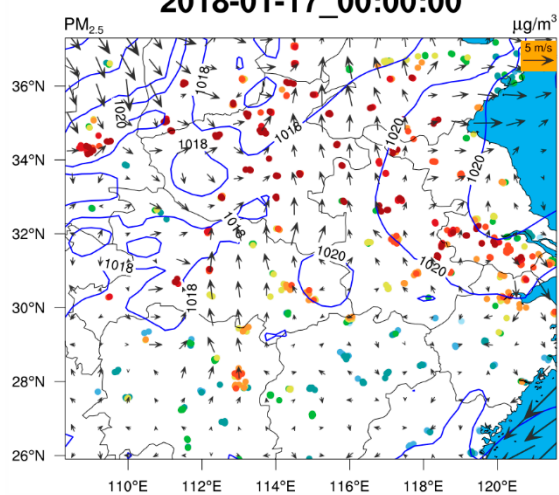
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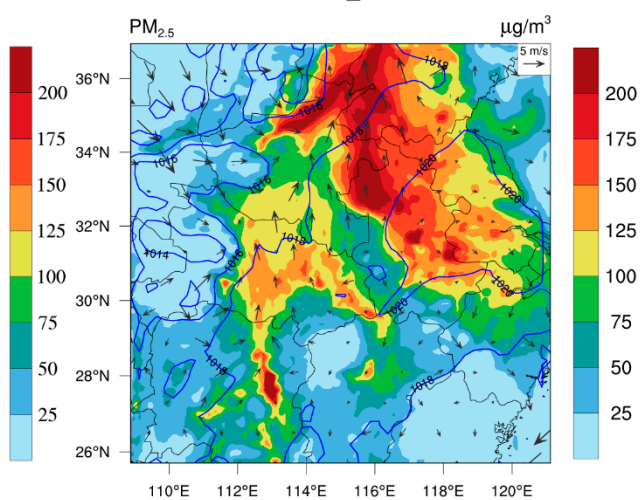
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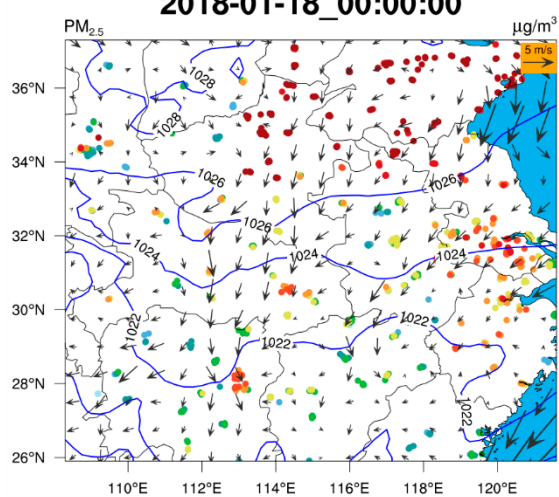
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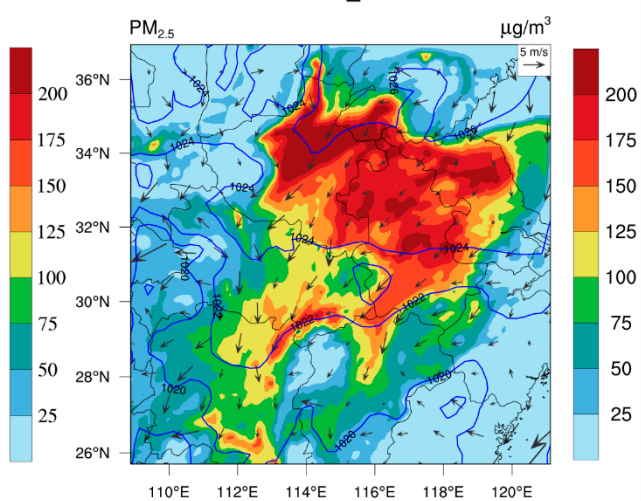
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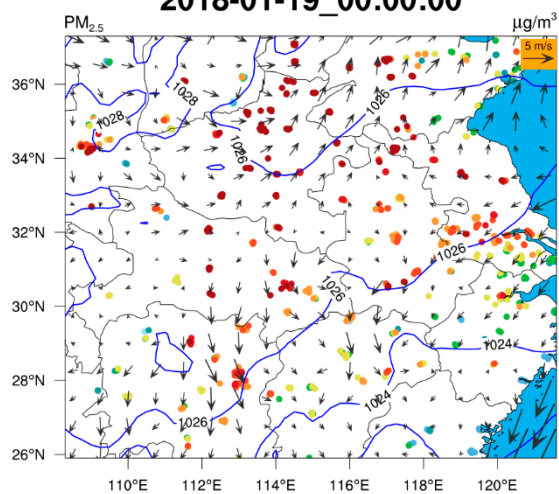


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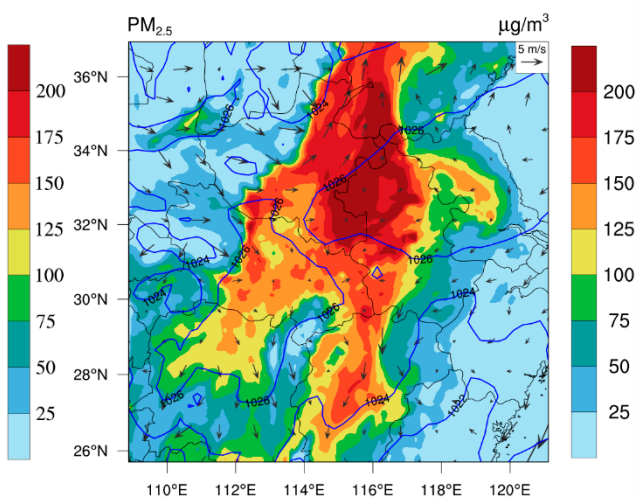




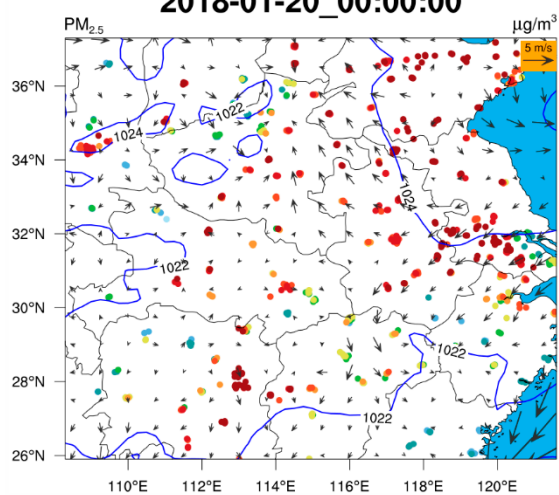
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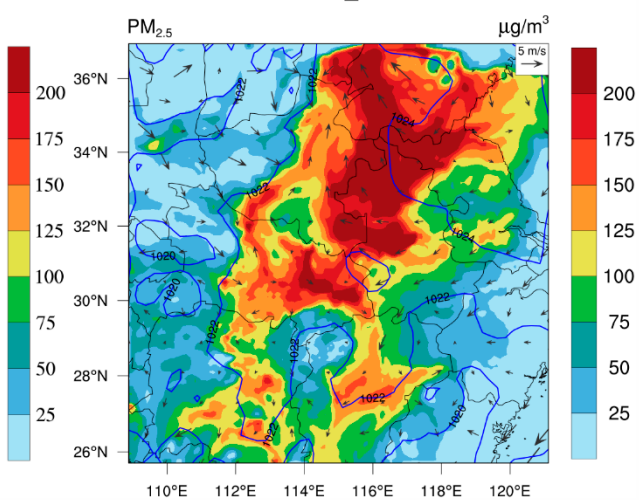
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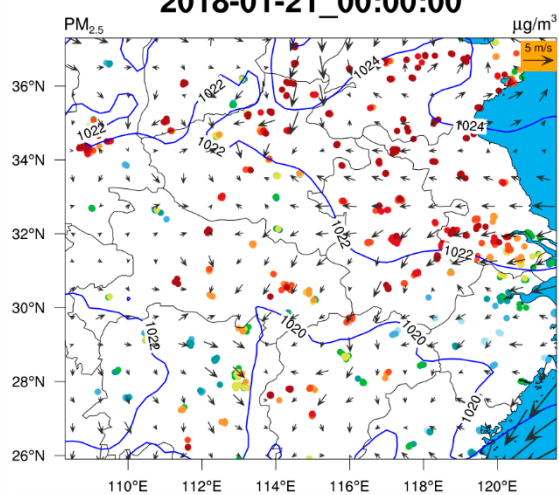
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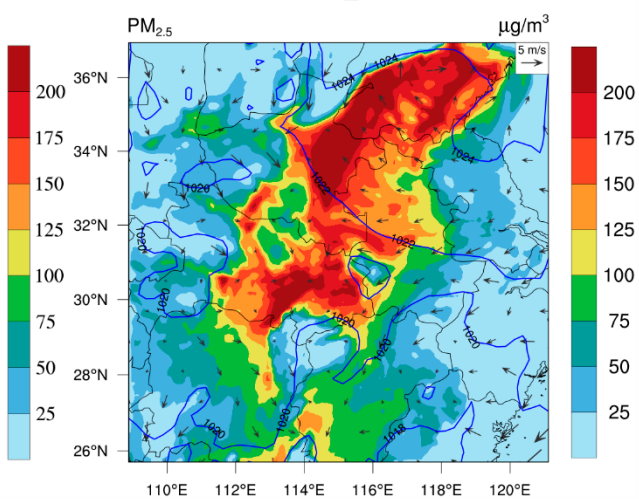
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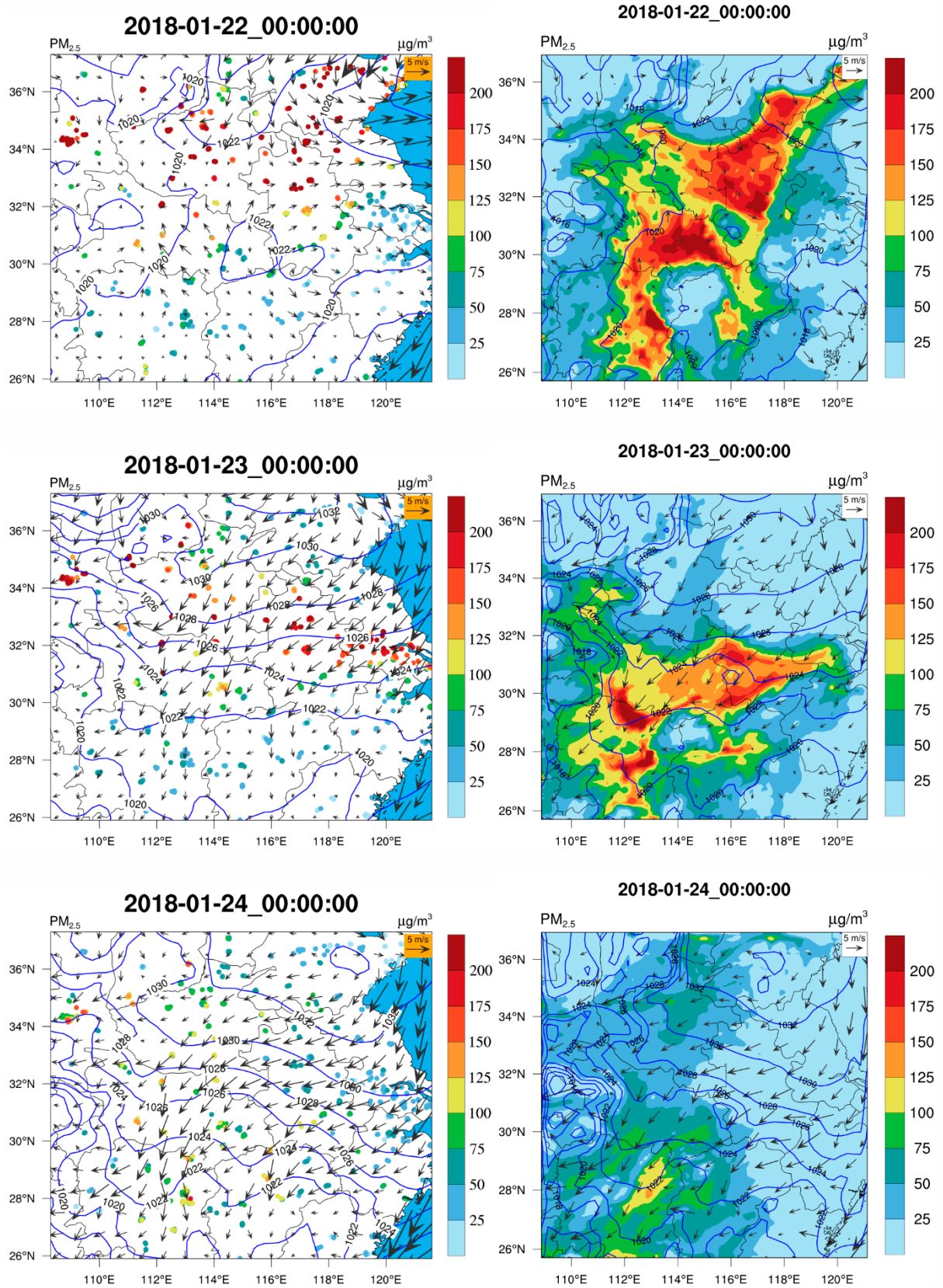


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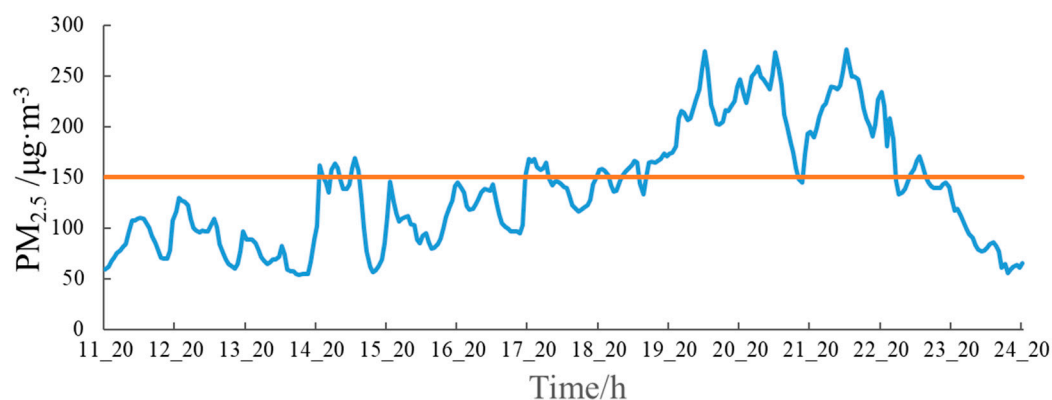




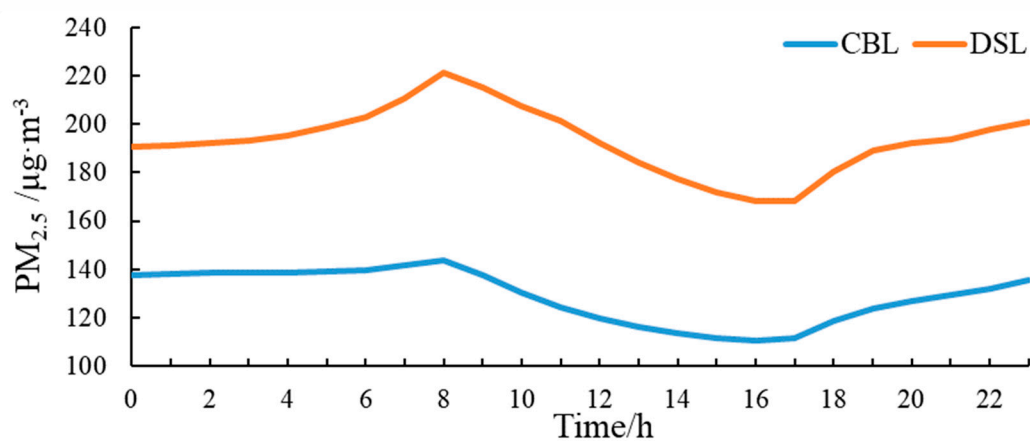
**Figure S3.** Spatial distributions of (left panel) observed and (right panel) simulated near-surface PM<sub>2.5</sub> concentrations (color dots (left panel), color contours (right panel),  $\mu\text{g}/\text{m}^3$ ), 10-m wind vectors (m/s) and sea level pressure (hPa) at 00:00 (UTC) during January 14–24, 2018. Blue lines indicate sea level air pressure. Blue area denotes the Pacific Ocean in the left panels.

**Table S1.** Statistical evaluation of 10-m wind direction at Wuhan and Yueyang station from 20:00 January 11 to 20:00 January 24, 2018.

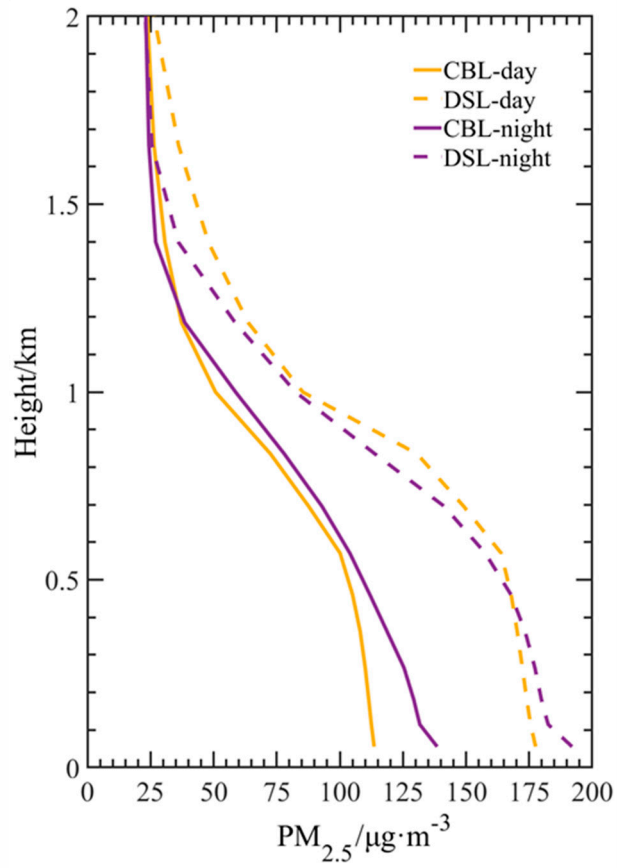
	Direction diff (°)	
	mean	standard deviation
Wuhan	0.37	72.39
Yueyang	−3.43	59.64



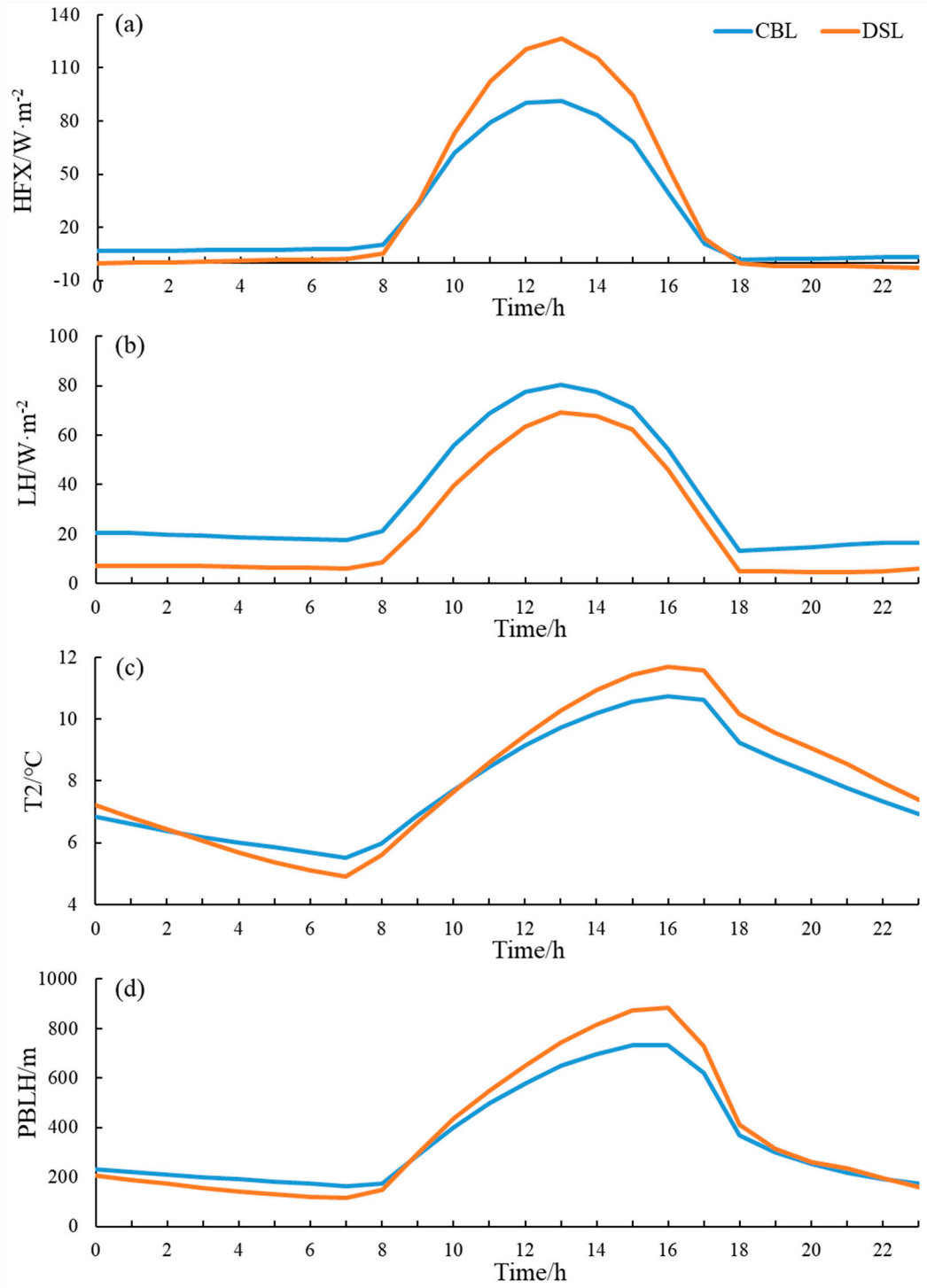
**Figure S4.** Time variations of simulated near-surface PM<sub>2.5</sub> concentrations at Wuhan station during the simulation period. Orange line shows the threshold of heavy pollution level.



**Figure S5.** Diurnal variations of PM<sub>2.5</sub> concentrations averaged over CBLs and DSLs during air pollution process from January 19–22, 2018 in the lake experiment of simulation.

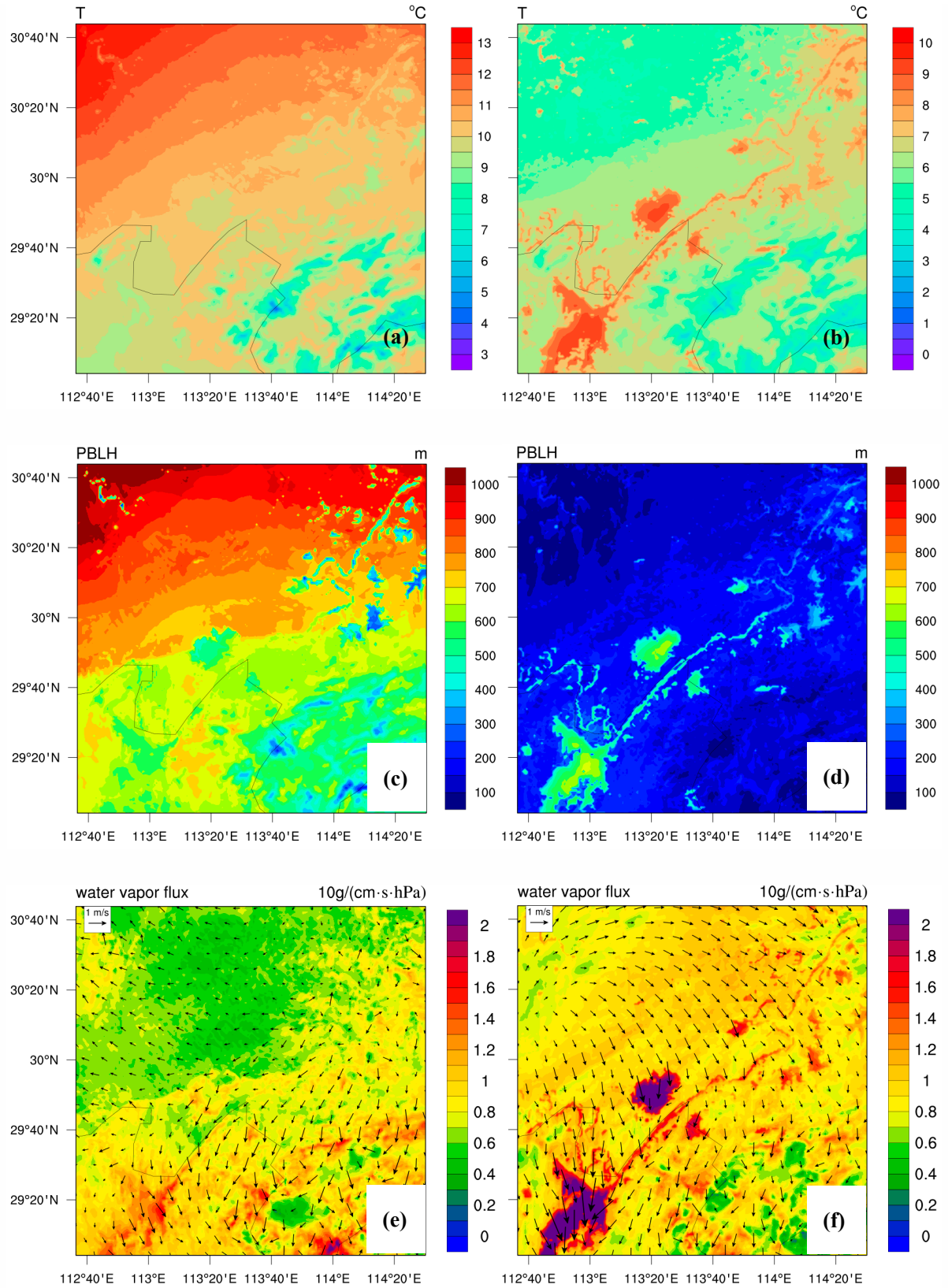


**Figure S6.** Vertical distribution of daytime (14:00 in local time) and nighttime (02:00 in local time) PM<sub>2.5</sub> concentrations below the height of 2 km in the atmosphere averaged over CBLs and DSLs during air pollution process from January 19 to 22, 2018 in the lake experiment of simulation.

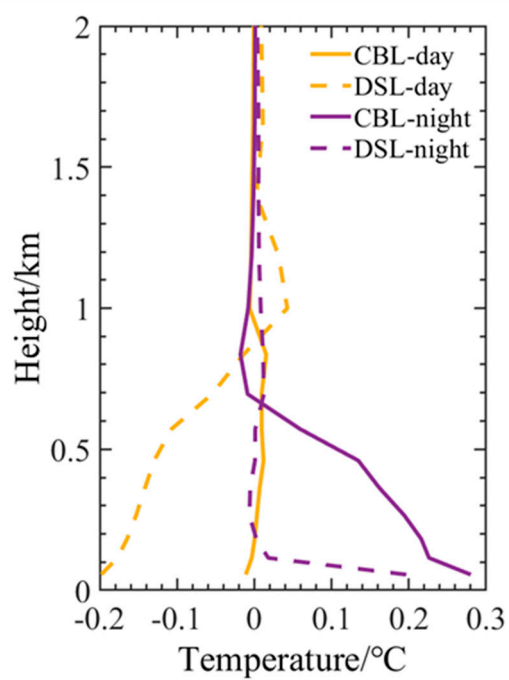


**Figure S7.** Diurnal variations (hourly Time) of (a) sensible heat flux (HFX,  $\text{W} \cdot \text{m}^{-2}$ ), (b) latent heat flux (LH,  $\text{W} \cdot \text{m}^{-2}$ ), (c) 2-m air temperature (T2,  $^{\circ}\text{C}$ ), and (d) planetary boundary layer height (PBLH, m) averaged over CBLs and DSLs during air pollution process over January 19–22, 2018 in the lake experiment of simulation.





**Figure S8.** Spatial distributions of (a, b) 2-m temperature, (c, d) atmospheric boundary layer height, and (e, f) water vapor flux transport in the horizontal direction averaged in the (a, c, e) daytime (14:00 in local time) and (b, d, f) nighttime (02:00 in local time) from the simulations of the lake experiment during the pollution process from January 19 to 22, 2018.



**Figure S9.** Vertical distribution of air temperature differences (Temperature) between the simulations of lake experiment and no-lake experiment averaged for CBLs and DSLs (Height) below 2 km in the atmosphere during the air pollution process from January 19–22, 2018.