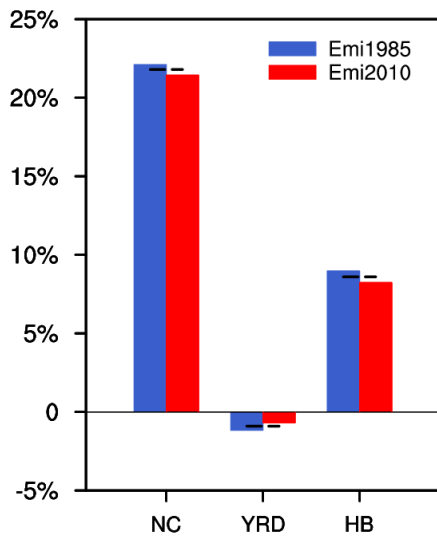
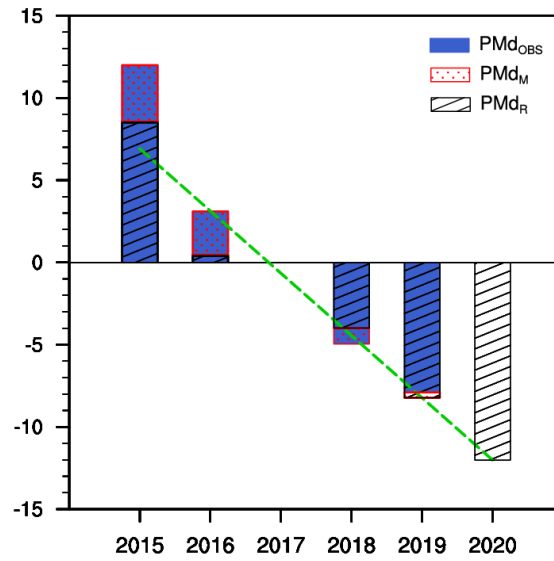


1
 2 **Figure S1.** Observed $PM_{2.5}$ concentrations (black, unit: $\mu g/m^3$), and simulated $PM_{2.5}$ concentrations
 3 under 2010 emission (red) and 1985 emission (blue) in February 2020 in North China (NC), Yangtze
 4 River Delta (YRD) and Hubei Province (HB).

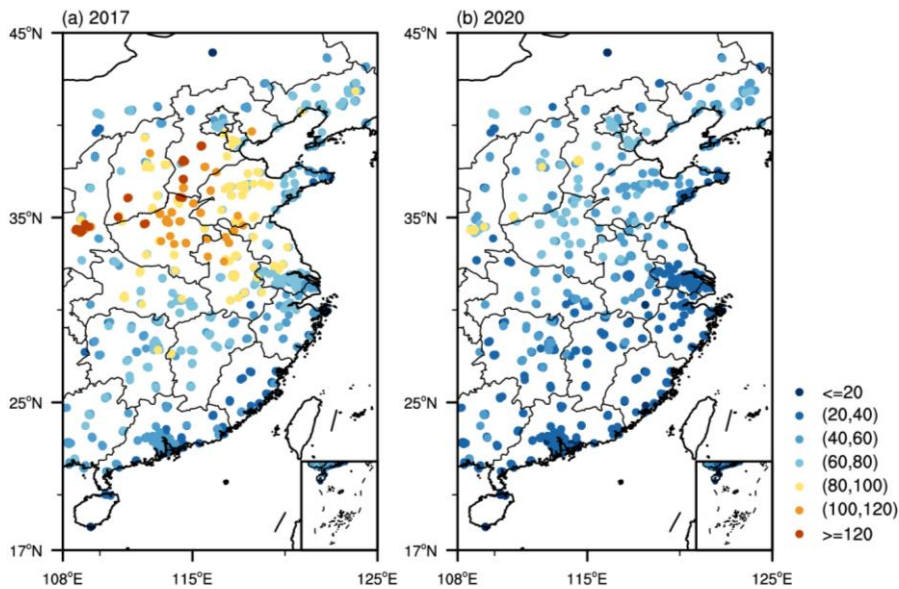


5
 6 **Figure S2.** The ratio of the simulated $PM_{2.5}$ difference (between 2020 and 2017) to those in 2017. The
 7 dashed lines were the mean ratio under emissions in 1985 and 2010. The GEOS-Chem simulations were
 8 driven by meteorological conditions in 2017 and 2020 under fixed emissions in 1985 and 2010.



9

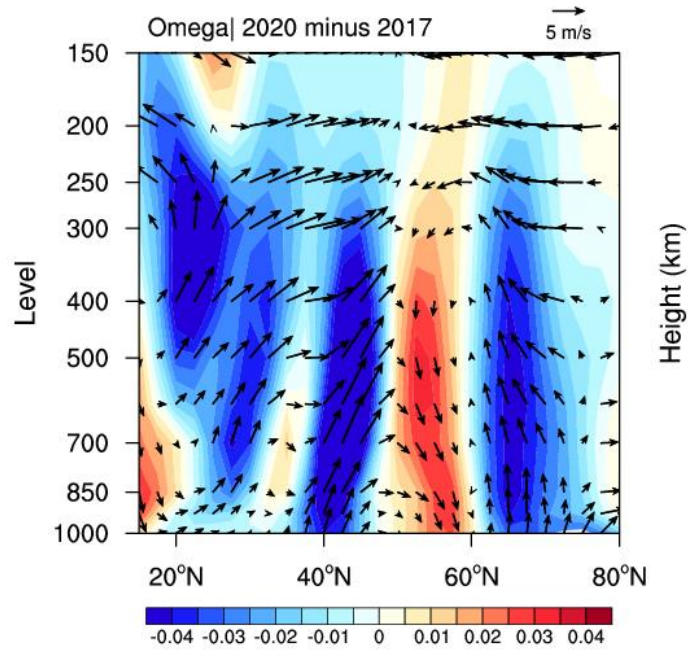
10 **Figure S3.** Observed February $PM_{2.5}$ difference (blue bars; unit: $\mu g/m^3$) in Shanghai from 2015 to 2019.
 11 The components related to meteorology (with respect to 2017) were marked by red dots, while the rests
 12 were indicated by hatchings. The green line was the linear trend of the $PM_{2.5}$ without changing
 13 meteorology from 2015 to 2019. The black hollow bar was the extrapolated $PM_{2.5}$ without changing
 14 meteorology with respect to 2017.



15

16 **Figure S4.** Observed $PM_{2.5}$ concentrations (unit: $\mu g/m^3$) in February 2017 (a) and 2020 (b).
 17

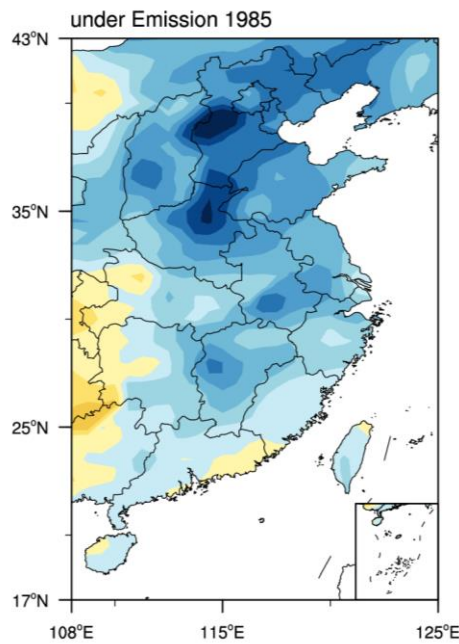
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18

19 **Figure S5.** Differences in the observed atmospheric circulation in February between 2020 and 2017,
 20 including 110°-120°E mean vertical wind (arrows; unit: m/s) and omega (shading, unit: pascal/s).

21



22

23 **Figure S6.** PM_{2.5} drops (unit: µg/m³) due to COVID-19 quarantines (PM_{dc}) that were calculated basing
 24 on the GEOS-Chem simulations with fixed emissions of 1985.