Supplementary material for " **Strategizing Emission Cuts in China to Mitigate Short-term Warming from Clean Air Policies**"

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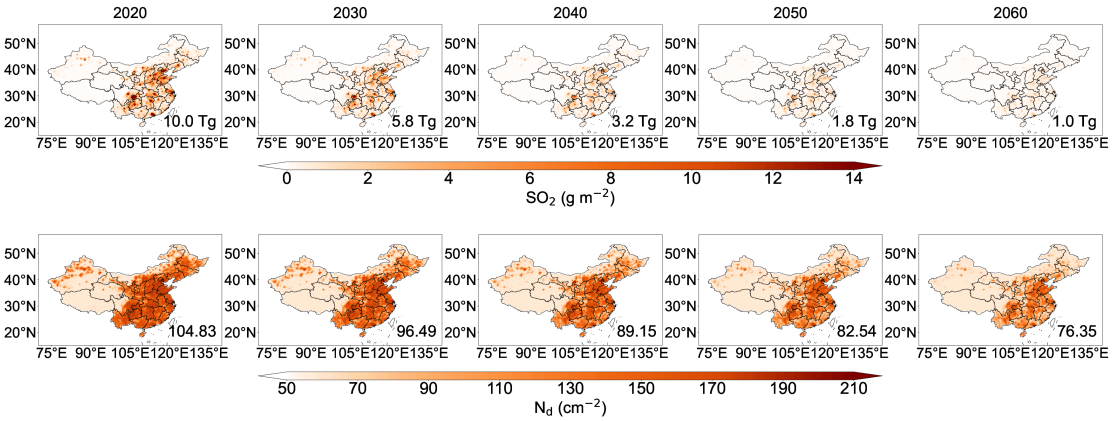
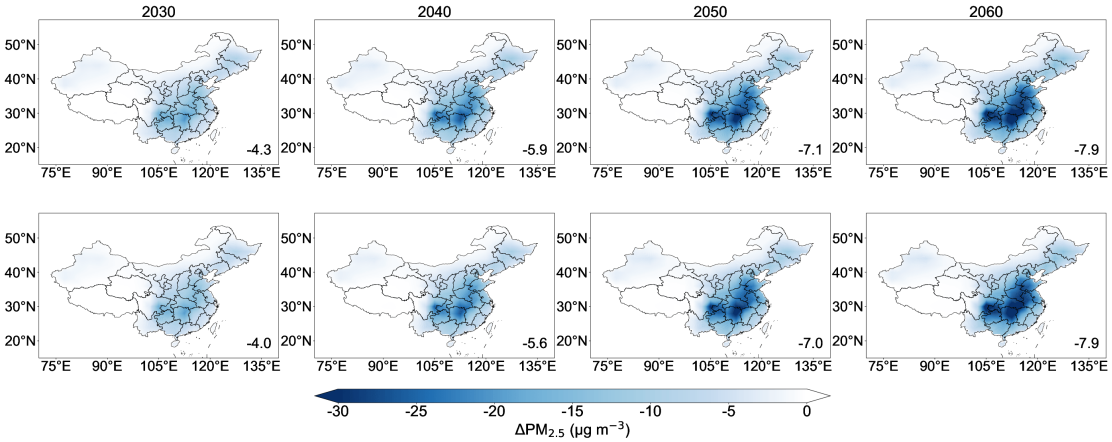
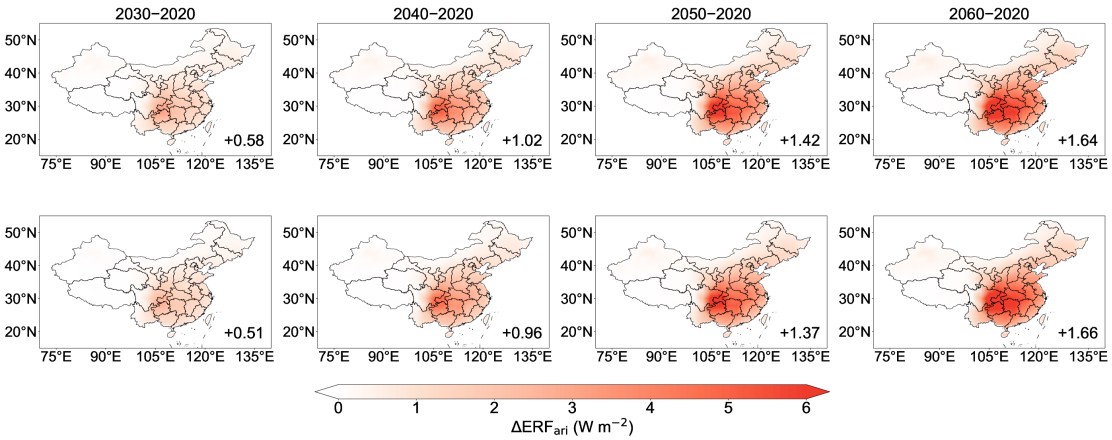


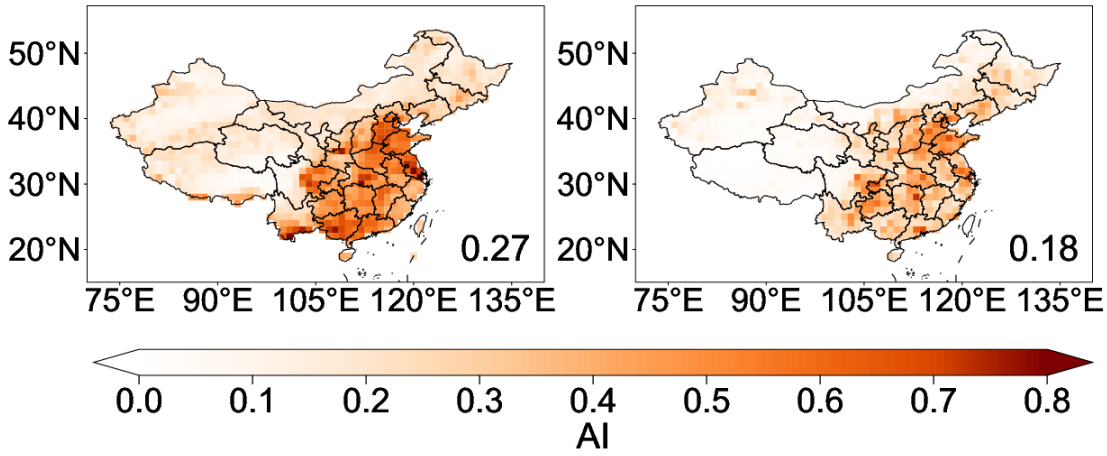
Supplementary Figure 1. Spatial distributions of anthropogenic SO_2 emissions and N_d. Spatial distribution of anthropogenic SO_2 emissions (g m^{-2}) and N_d (cm^{-2}) (from top to bottom) in China in 2020, 2030, 2040, 2050 and 2060 (from left to right). Anthropogenic SO_2 emissions following the carbon neutral pathway are adopted from DPEC. N_d is calculated based on the Equation 2. Regional average value over China is shown in bottom right of each panel.



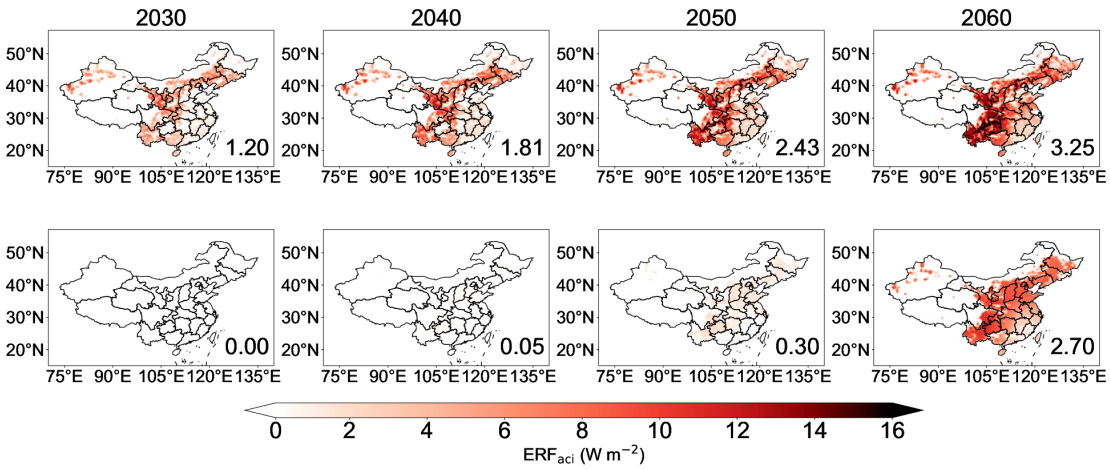
Supplementary Figure 2. Changes in near-surface $PM_{2.5}$ concentrations. Spatial distribution of changes in GEOS-Chem simulated near-surface $PM_{2.5}$ concentrations (μg m^{-3}) over China in 2030, 2040, 2050 and 2060 relative to 2020 (from left to right) from the original emission scenario and the dynamic emission reduction scenario (from top to bottom). Regional averaged value over China is shown in bottom right of each panel.



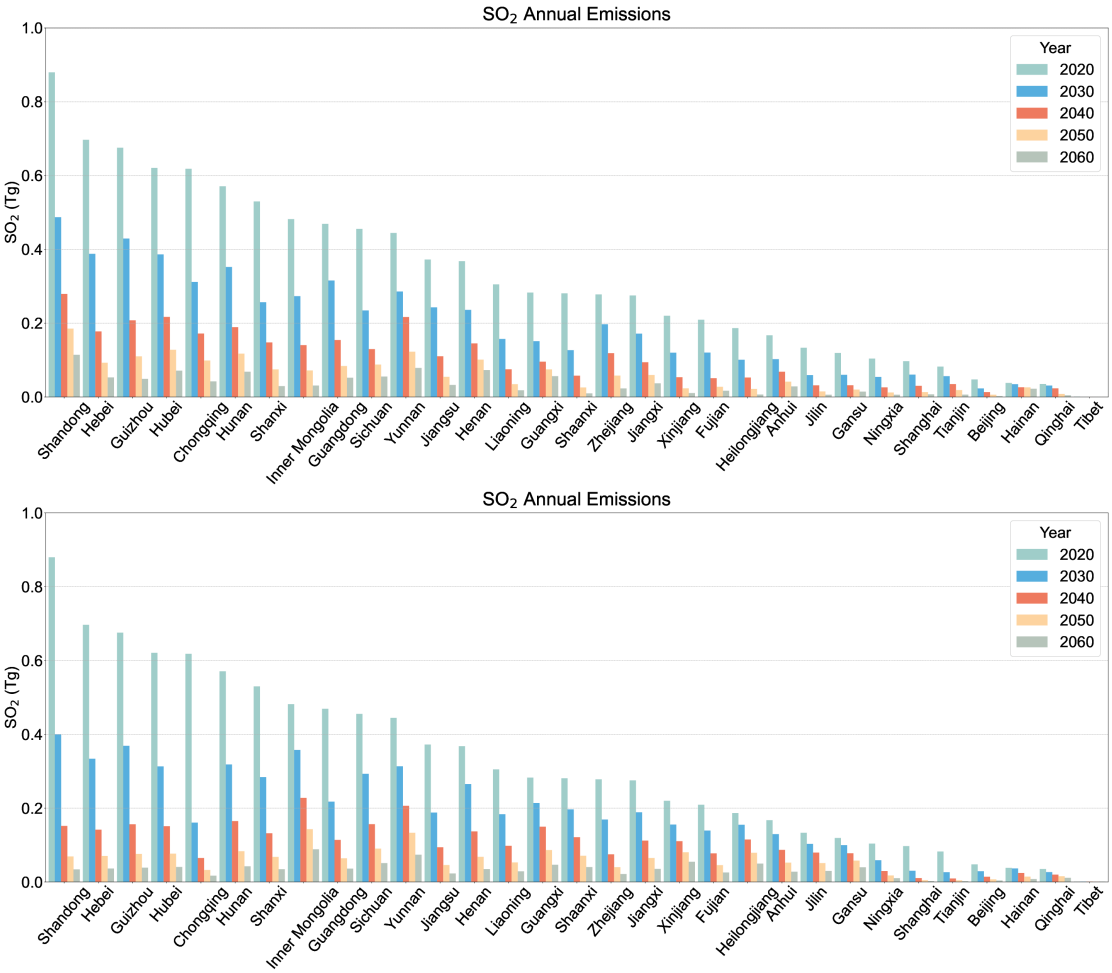
Supplementary Figure 3. ERF_{ari} changes under the original and dynamic emission reduction scenarios. Spatial differences in ERF_{ari} changes (W m^{-2}) over China under the original emission scenario (top) and the dynamic emission reduction scenario (bottom) in 2030, 2040, 2050 and 2060 relative to 2020 (from left to right) simulated by GEOS-Chem model. Regional average value over China is shown in bottom right of each panel.



Supplementary Figure 4.Satellite-derived and regression-predicted AI over China. Spatial distribution of annual mean AI (unitless) in 2020 derived from satellite observations (left) and predicted based on the regression relationship between AI and SO_2 in China (right). Regional average value over China is shown in bottom right of each panel.



Supplementary Figure 5. Changes in ERF$_{aci}$ driven by OC emission reductions. Spatial distribution of changes in ERF$_{aci}$ (W m^{-2}) in China in 2030, 2040, 2050 and 2060 (from left to right) relative to 2020 calculated via OC emission reductions from the original emission scenario and the dynamic emission reduction scenario (from top to bottom). Regional averaged value over China is shown in bottom right of each panel.



Supplementary Figure 6. Provincial SO_2 emissions under the original and dynamically optimized emission reduction strategies. Total annual emission of SO_2 (Tg) in individual provinces of China under the original emission scenario (top) and the dynamic emission reduction scenario (bottom) in 2020, 2030, 2040, 2050 and 2060.