

Article

Supplementary Information for ‘Potential Driving Factors on Surface Solar Radiation Trends over China in Recent Years

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This supplementary file contains:

Figure S1–S4: Validation of seasonal average surface solar radiation (SSR) and their corresponding trends under all-sky conditions from CERES satellite-derived product using ground-based observations

Figure S5: Map of provinces in China

Figure S6: Annual mean distributions of different driving factors from various satellite-derived products

Figure S7: Annual mean trends of different types of cloud cover from CERES-derived product

Figure S8–S11: Same as Figure 6, but for seasonal means.

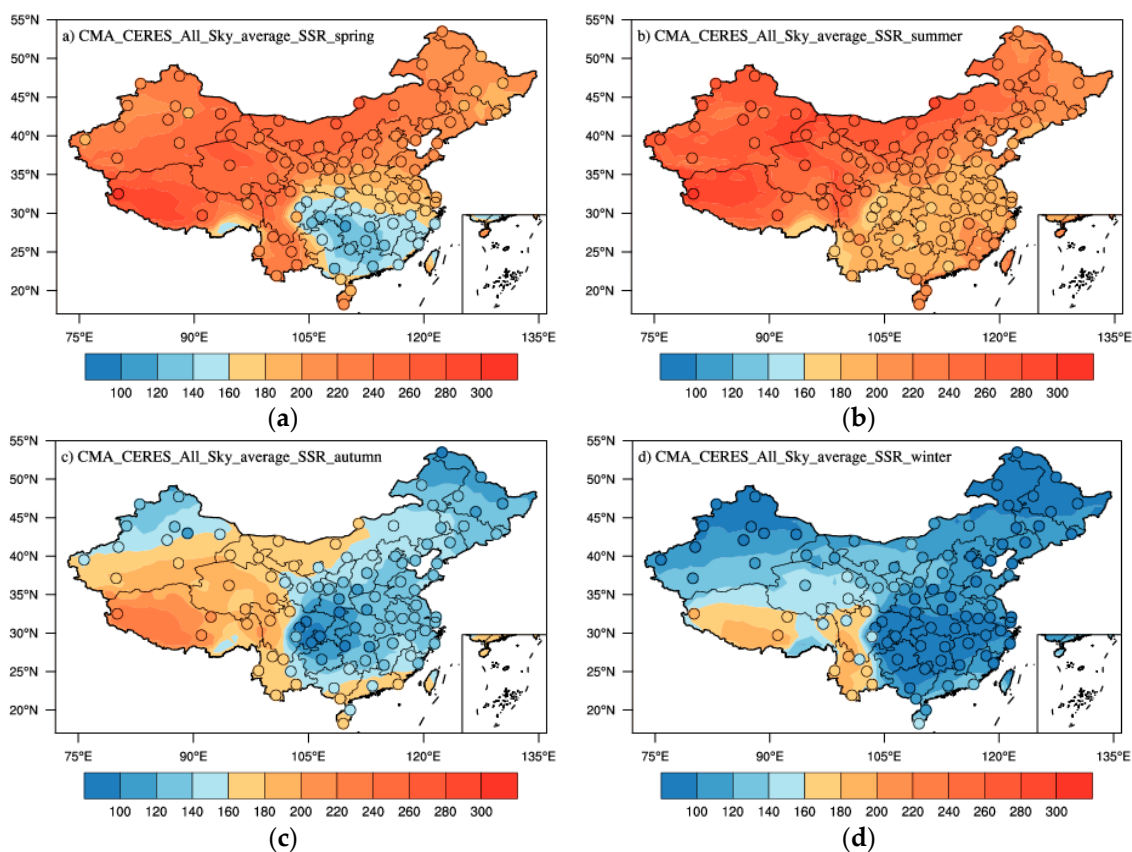


Figure S1. The (a) spring, (b) summer, (c) autumn, and (d) winter mean SSR (unit: $\text{W m}^{-2} \text{ yr}^{-1}$) under all-sky conditions for the period 2005–2018 over China. The black circles and contour plots represent the CMA ground-based observations and CERES satellite-derived product, respectively.

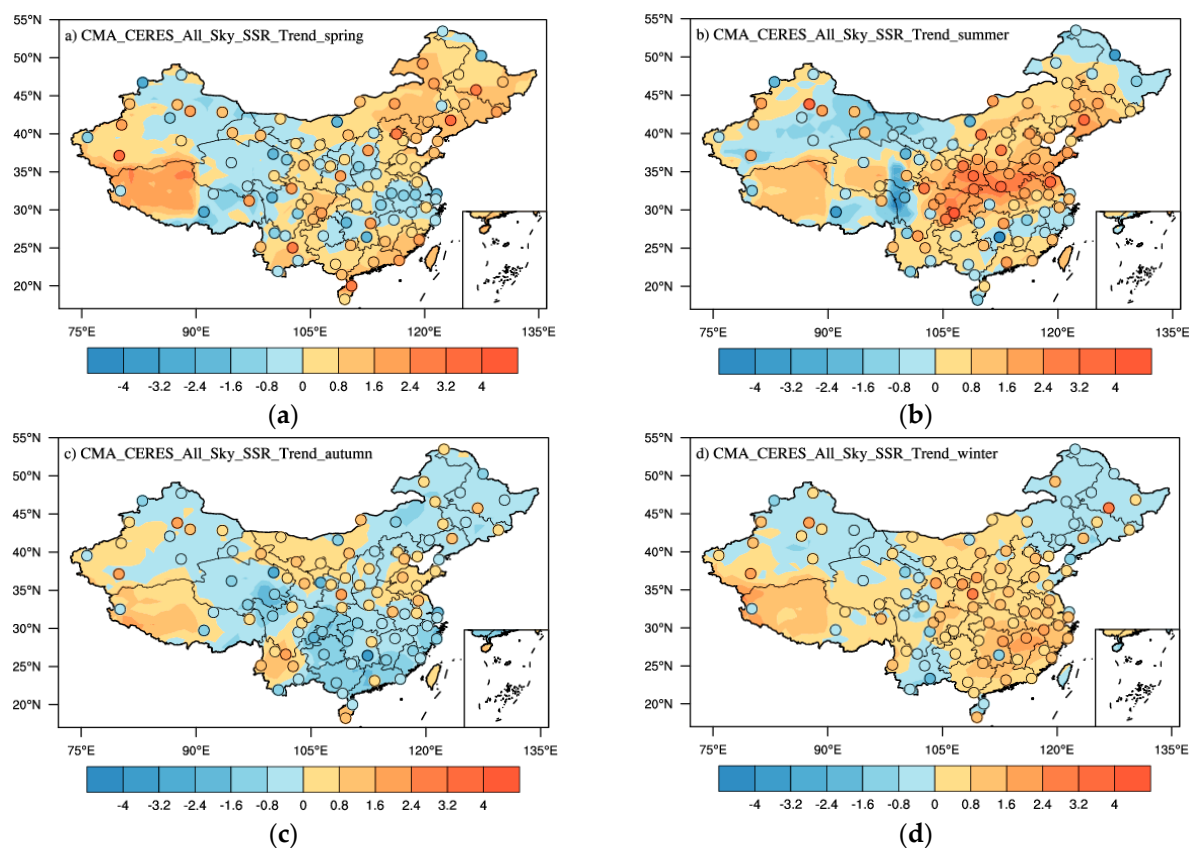


Figure S2. Same as Figure S1, but for SSR trends.

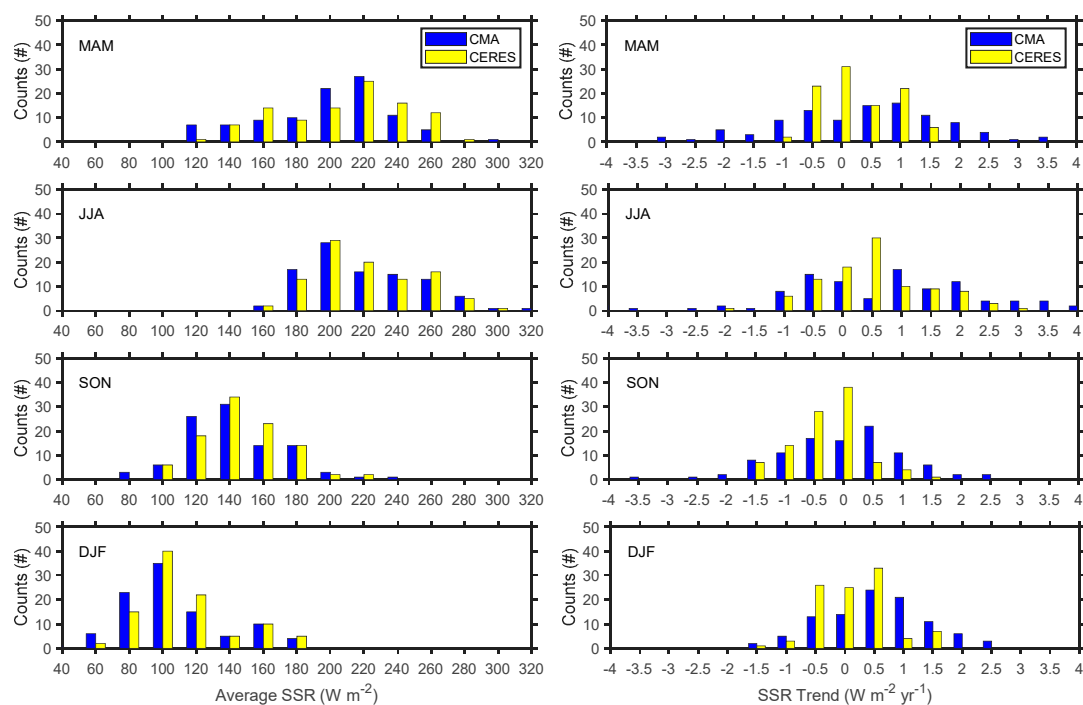


Figure S3. Seasonal mean histograms of average SSR (left column) (unit: W m^{-2}) and its corresponding trends (right column) (unit: $\text{W m}^{-2} \text{ yr}^{-1}$) (counts on the vertical axis represent numbers of surface sites (a total of 99 sites)) under all-sky conditions during the period 2005–2018 over China from the CMA (blue color) and CERES SYN1deg product (yellow color), respectively.

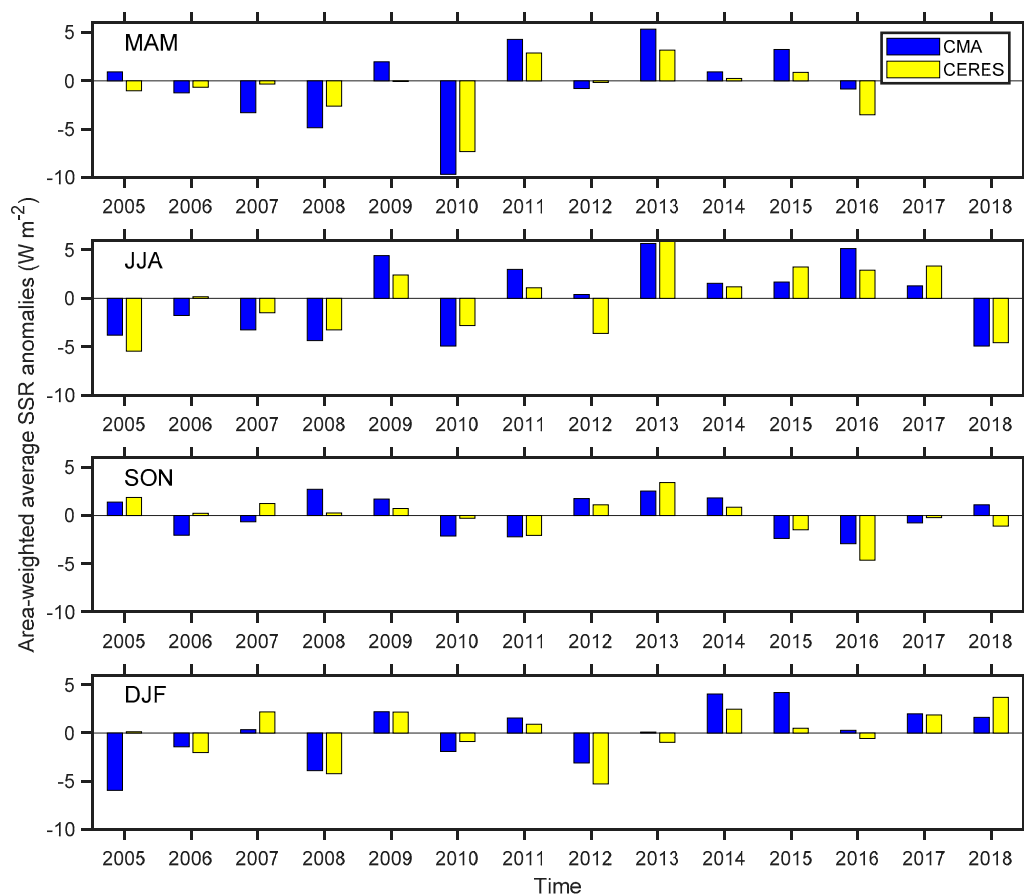


Figure S4. Seasonal time series of area-weighted average SSR anomalies (unit: W m^{-2}) under all-sky conditions during the period 2005–2018 over China from the CMA (blue color) and CERES SYN1deg product (yellow color), respectively.

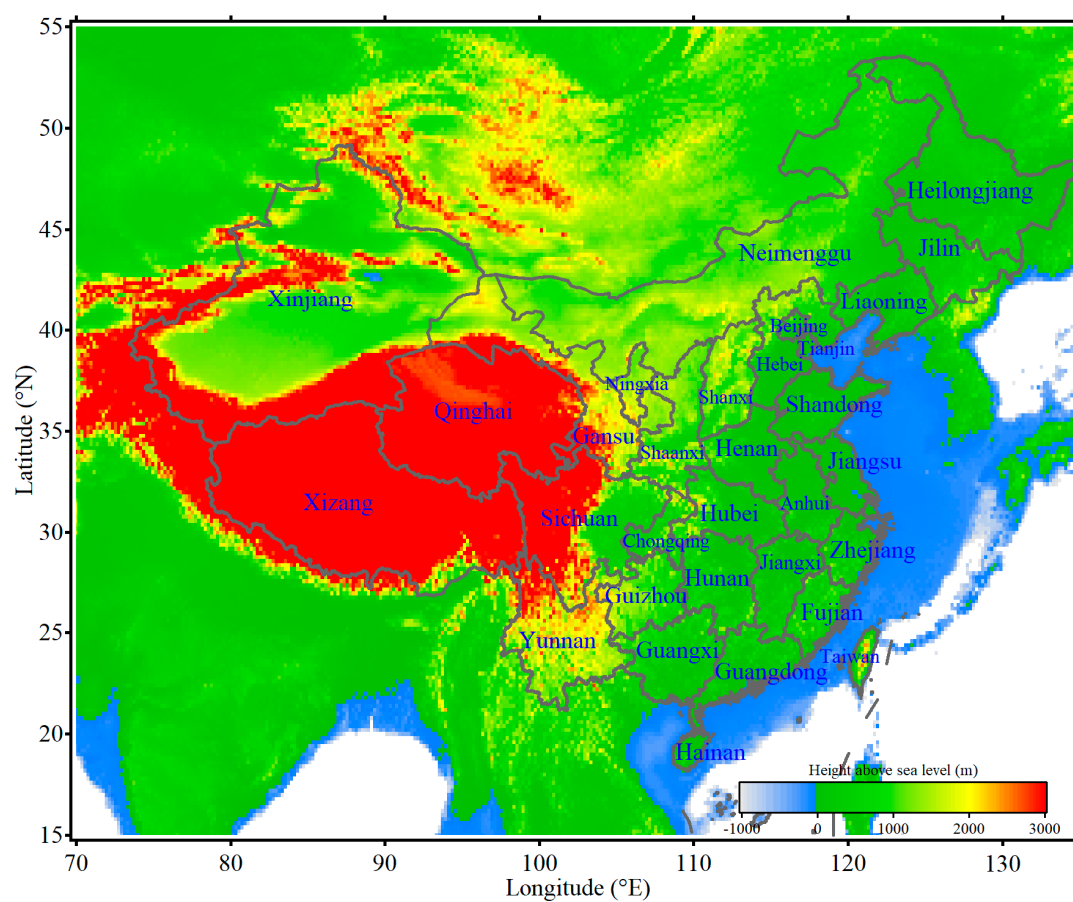


Figure S5. Spatial distribution of the provinces in China. Color in the map represents height above sea level (Unit: m).

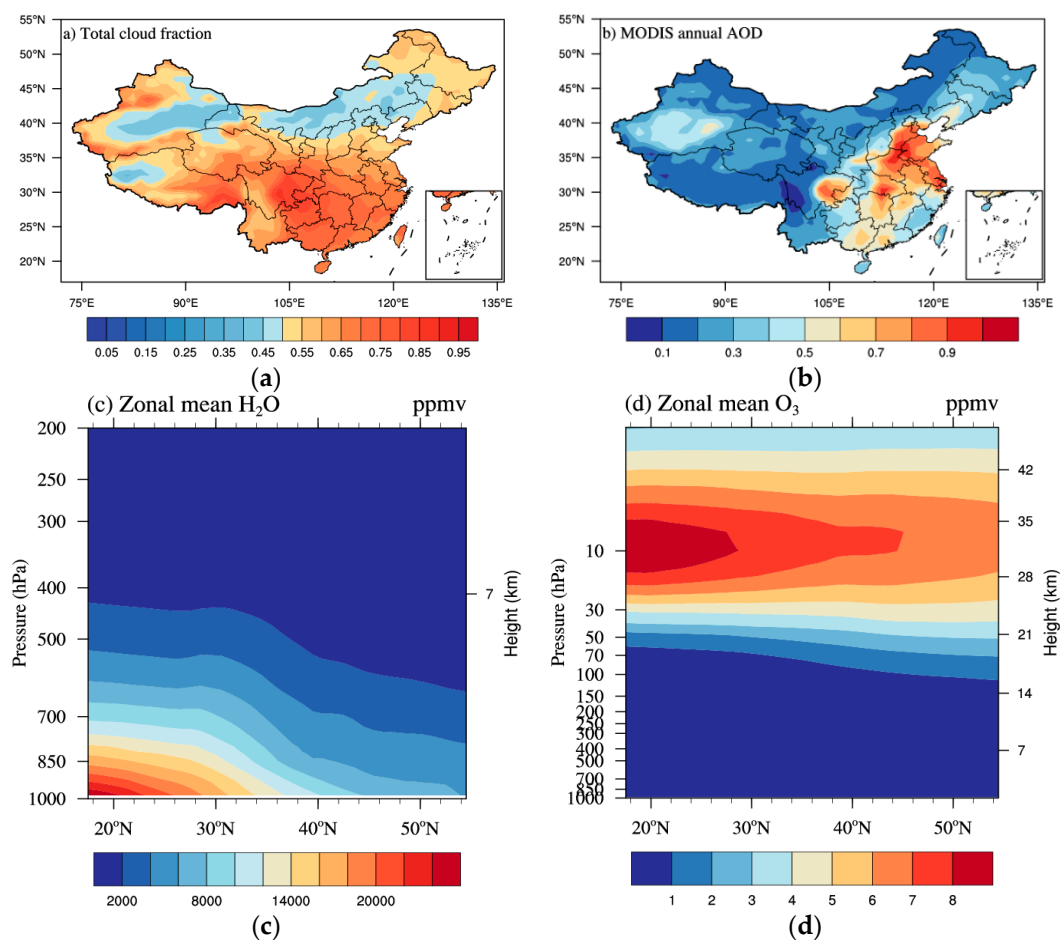


Figure S6. Annual mean (a) TCC (unit: unitless) from CERES, (b) AOD (unit: unitless) from MODIS, zonally averaged (c) water vapor (unit: ppmv) and (d) ozone (O_3) (unit: ppmv) from a combination of AIRS and MERRA2 products for 2005–2018 over China.

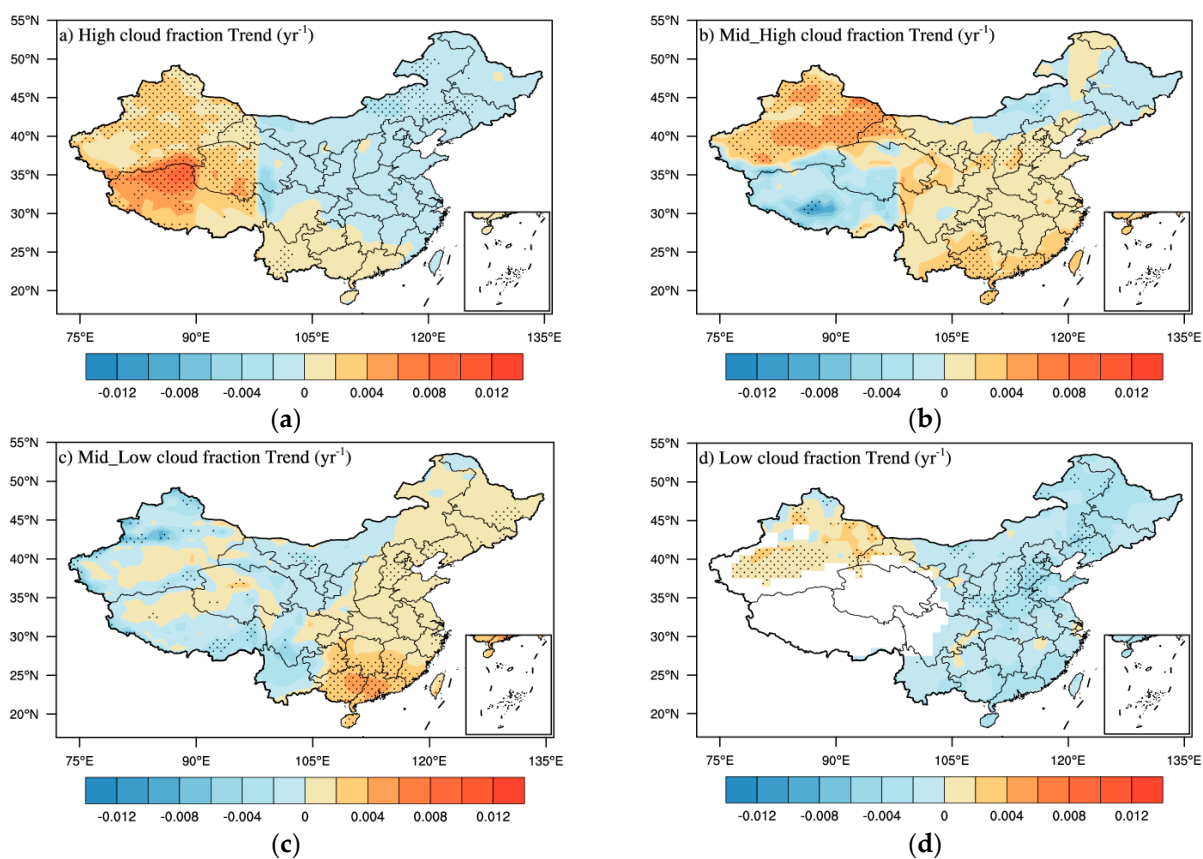


Figure S7. Annual mean trends of (a) High, (b) Mid-High, (c) Mid-Low, and (d) Low cloud fraction (unit: yr^{-1}) from CERES SYN1deg product during 2005–2018 over China. The dots represent significance at $\geq 95\%$ confidence level from the t-test.

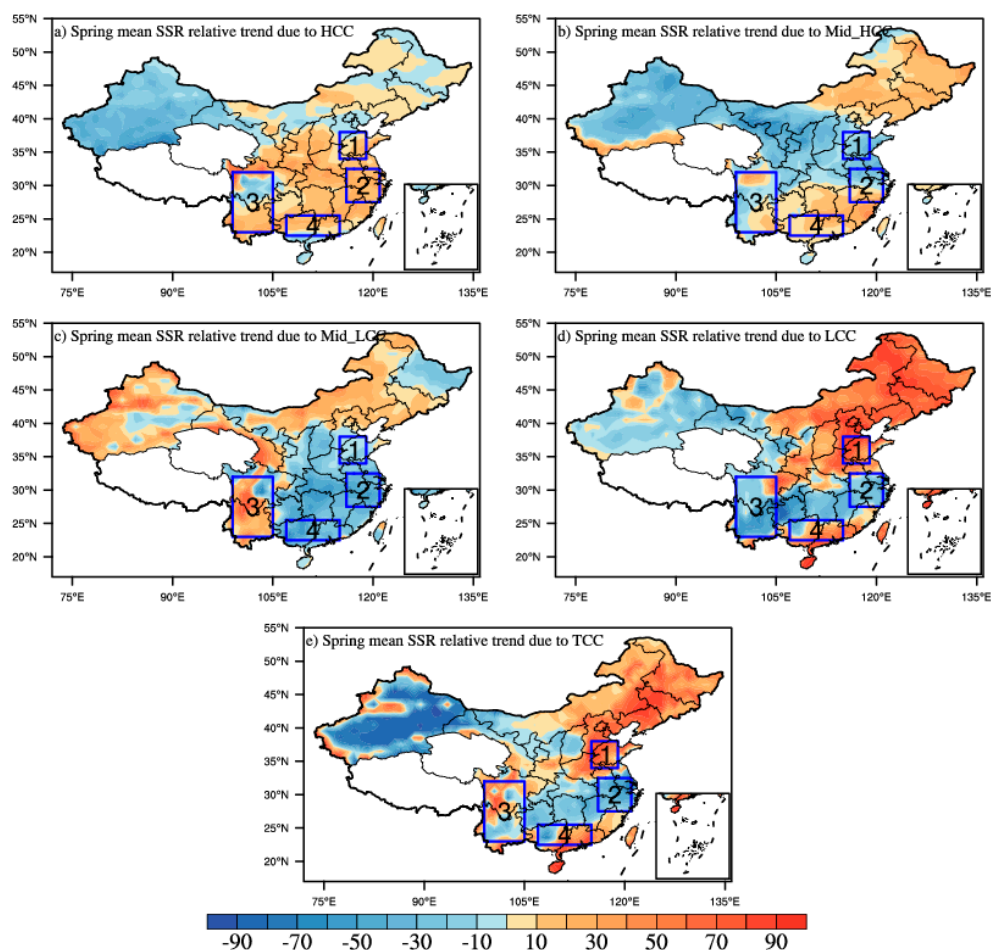


Figure S8. Spring mean simulated SSR trend percentages (unit: %) due to (a) HCC, (b) mid-HCC, (c) mid-LCC, and (d) LCC relative to the sum of absolute trends due to each type of cloud cover (ACC-induced SSR trends), as well as simulated SSR trend percentage (unit: %) due to (e) cloud cover from all cloud types relative to the sum of absolute trends due to each driving factor (total SSR trends) from 2005 to 2018 over China. The blue labeled sub-regions represent the (1) North China Plain, (2) East China, (3) southwestern China, and (4) South China, which occupy latitudinal ranges of 34–38 °N, 27.5–32.5 °N, 23–32 °N, and 22.5–25.5 °N, and longitudinal ranges of 115–119 °E, 116–121 °E, 99–105 °E, and 107–115 °E, respectively.

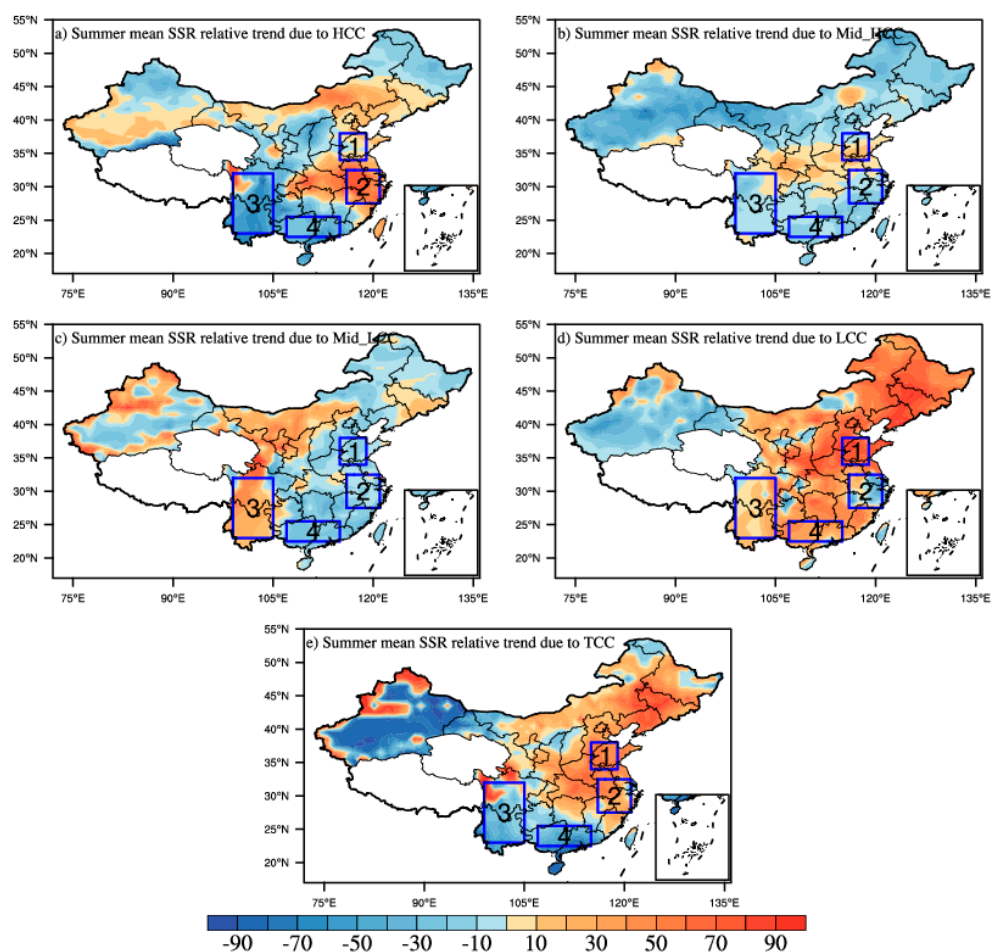


Figure S9. Same as Figure S8, but for summer mean.

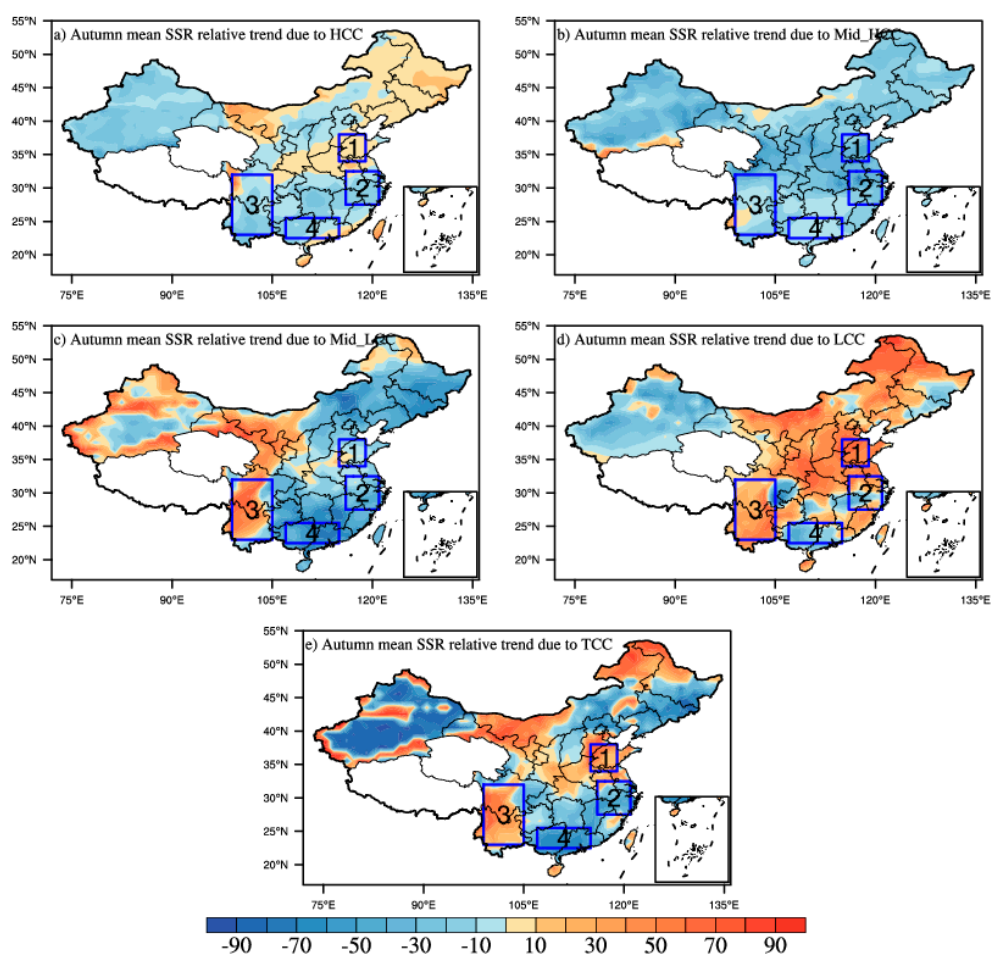


Figure S10. Same as Figure S8, but for autumn mean.

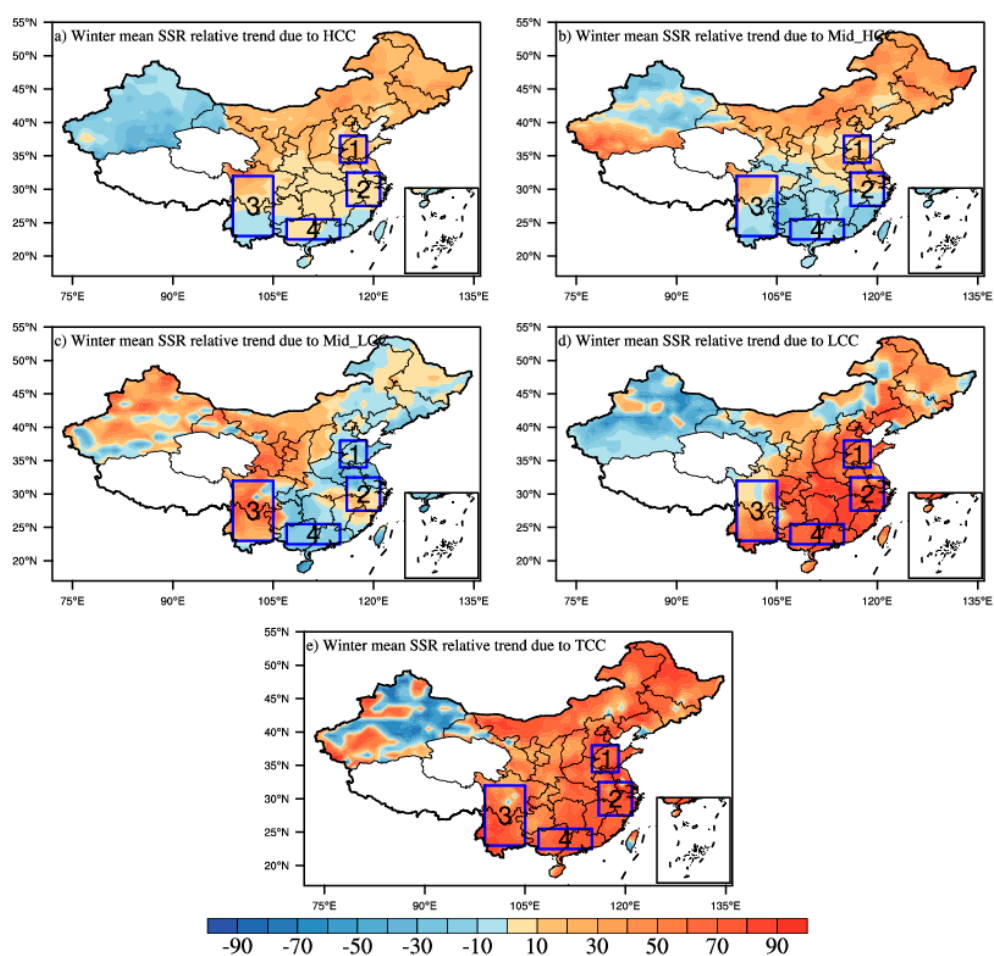


Figure S11. Same as Figure S8, but for winter mean.