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Impacts of reductions in non-methane short-lived climate forcers on future climate extremes and the resulting population exposure risks in eastern and southern Asia

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Supplementary method

Signal-to-noise ratio calculation

To quantitatively characterize the confidence of the multi-model ensemble (MME) signal, we also introduced the signal-to-noise ratio (S_{NR}), which was the ratio between the climate change signal and the noise (Shi et al., 2018), defined as the ratio of the absolute value of the multi-model ensemble (MME) mean to the deviation among the models:

$$S_{NR} = \frac{|x_e|}{S_x}, \quad (1)$$

$$S_x = \sqrt{\frac{1}{n}\sum_{i=1}^{n}(x_i - x_e)^2}, \quad (2)$$

where S_x denotes the deviation among the models, x_e denotes the MME mean, x_i denotes the variable simulated in individual model, and n is the number of models used. $S_{NR} > 1$ indicates that the climate change (signal) from the MME is greater than the deviation (noise) among the models, which means the projected results of the models has a higher confidence level. On the contrary, $S_{NR} < 1$ means that the noise among the models is greater than the signal from the MME, representing a lower credibility (Li and Zhou, 2010).

In addition, we also performed the test of confidence level on the MME result. The regions with significance at ≥ 95 % confidence level from the t-test were broadly in line with those with signal-to-noise ratio larger than 1. So we only show the results of the signal-to-noise ratio here.

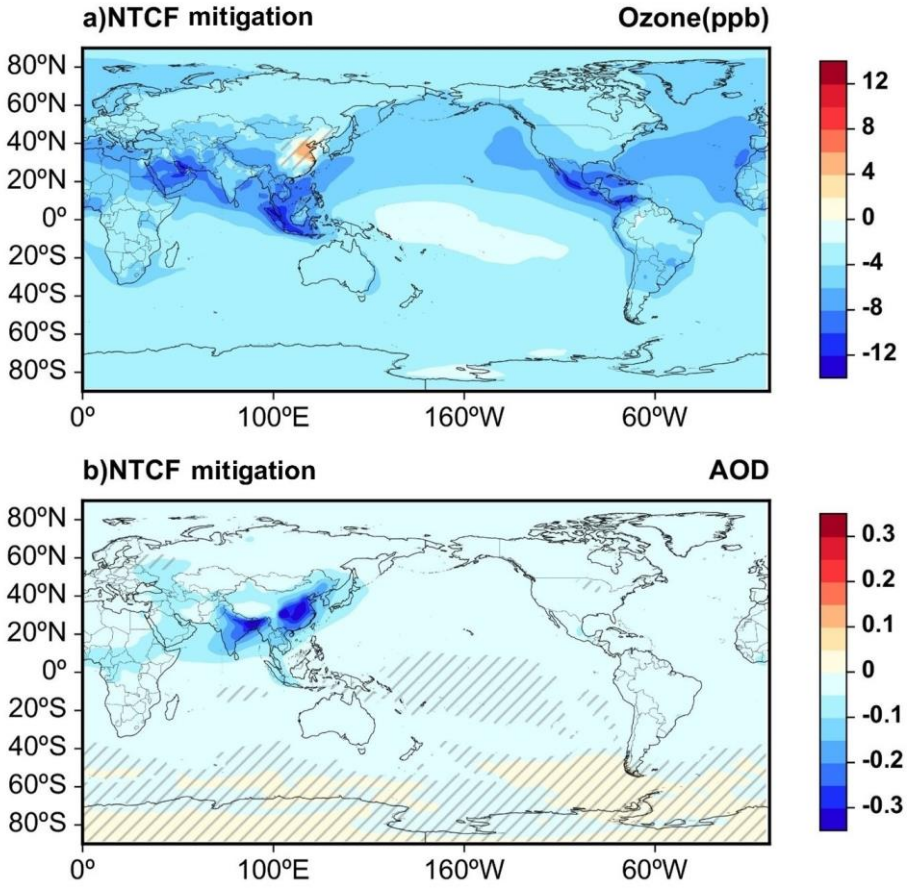

Figure S1: Spatial patterns of changes in ground-level ozone concentration and aerosol optical depth at 550 nm during 2031-2050 caused by non-methane SLCFs mitigation. The areas with hatching indicate that signal to noise ratio (S_{NR}) is less than 1.

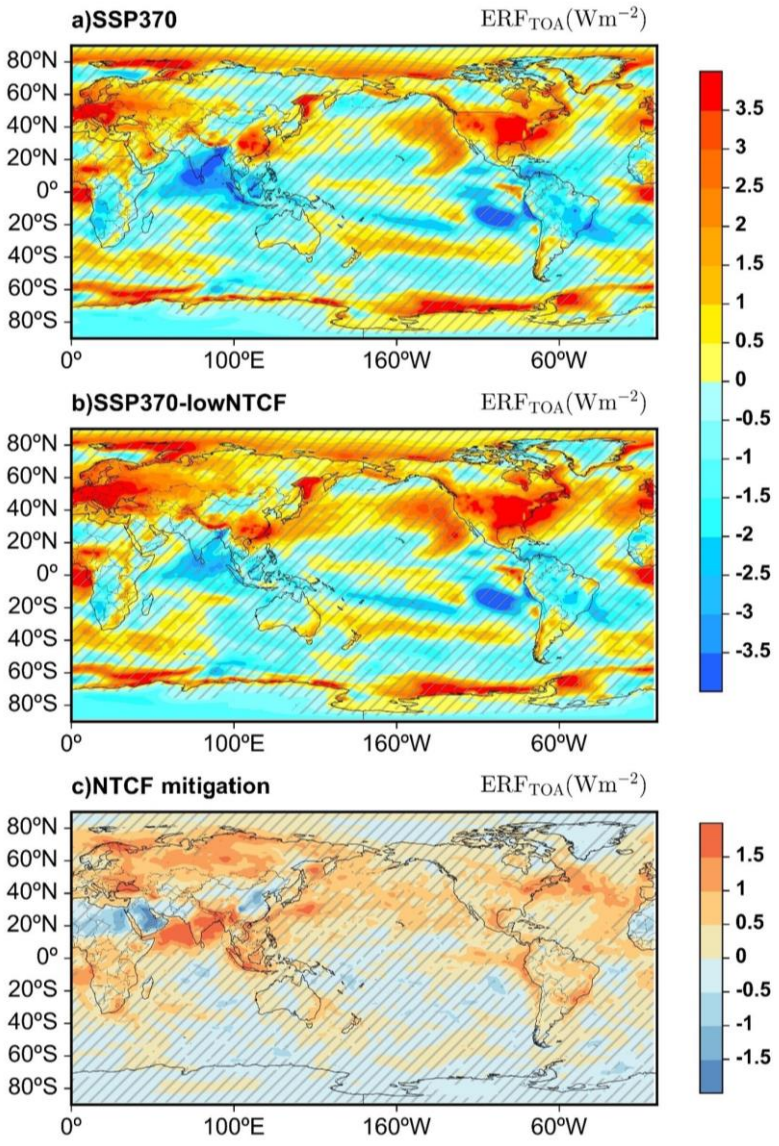

Figure S2: Spatial patterns of effective radiative forcing (ERF) during 2031-2050 under the (a) SSP3-7.0 and (b)SSP3-7.0-lowNTCF scenarios and (c) only caused by the non-methane SLCFs reductions relative to 1995-2014 (units: W m^{-2}). The areas with hatching indicate that signal to noise ratio (S_{NR}) is less than 1.

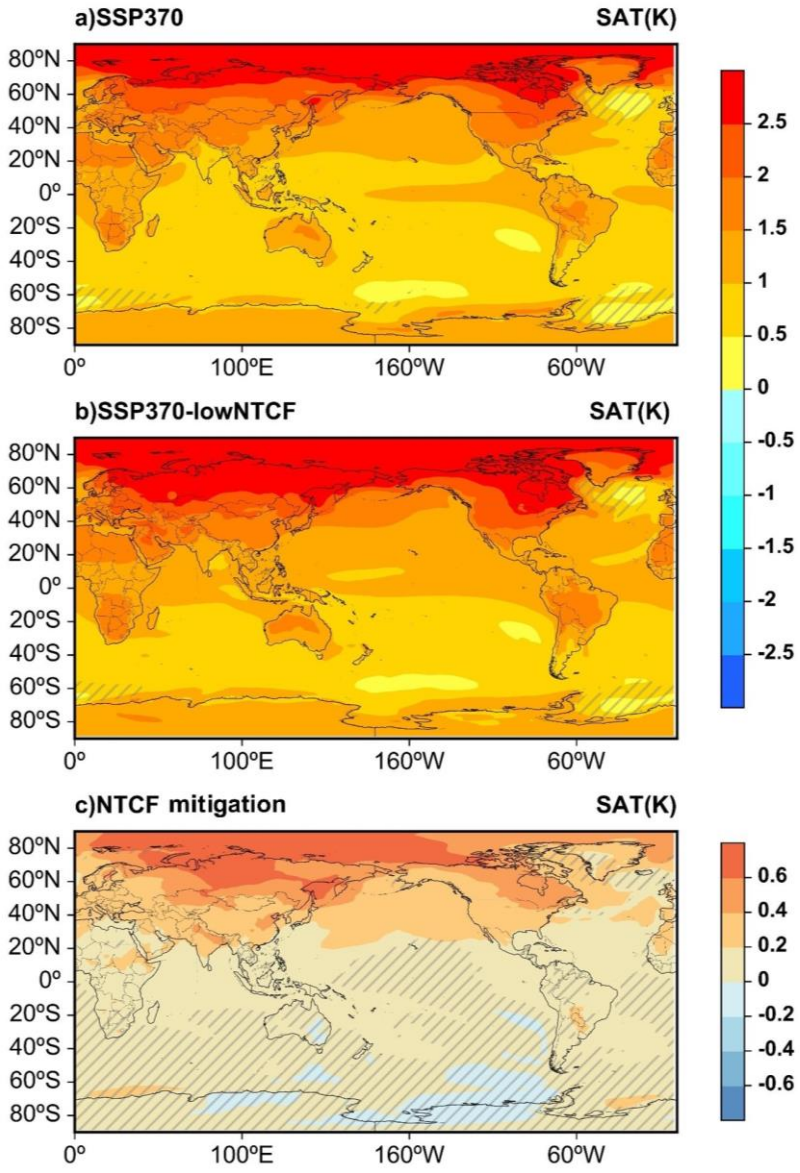

Figure S3: Spatial patterns of changes in surface air temperature (SAT) during 2031-2050 under the (a) SSP3-7.0 and (b) SSP3-7.0-lowNTCF scenarios and (c) only caused by the non-methane SLCFs reductions relative to 1995-2014 (units: K). The areas with hatching indicate that signal to noise ratio (S_{NR}) is less than 1.

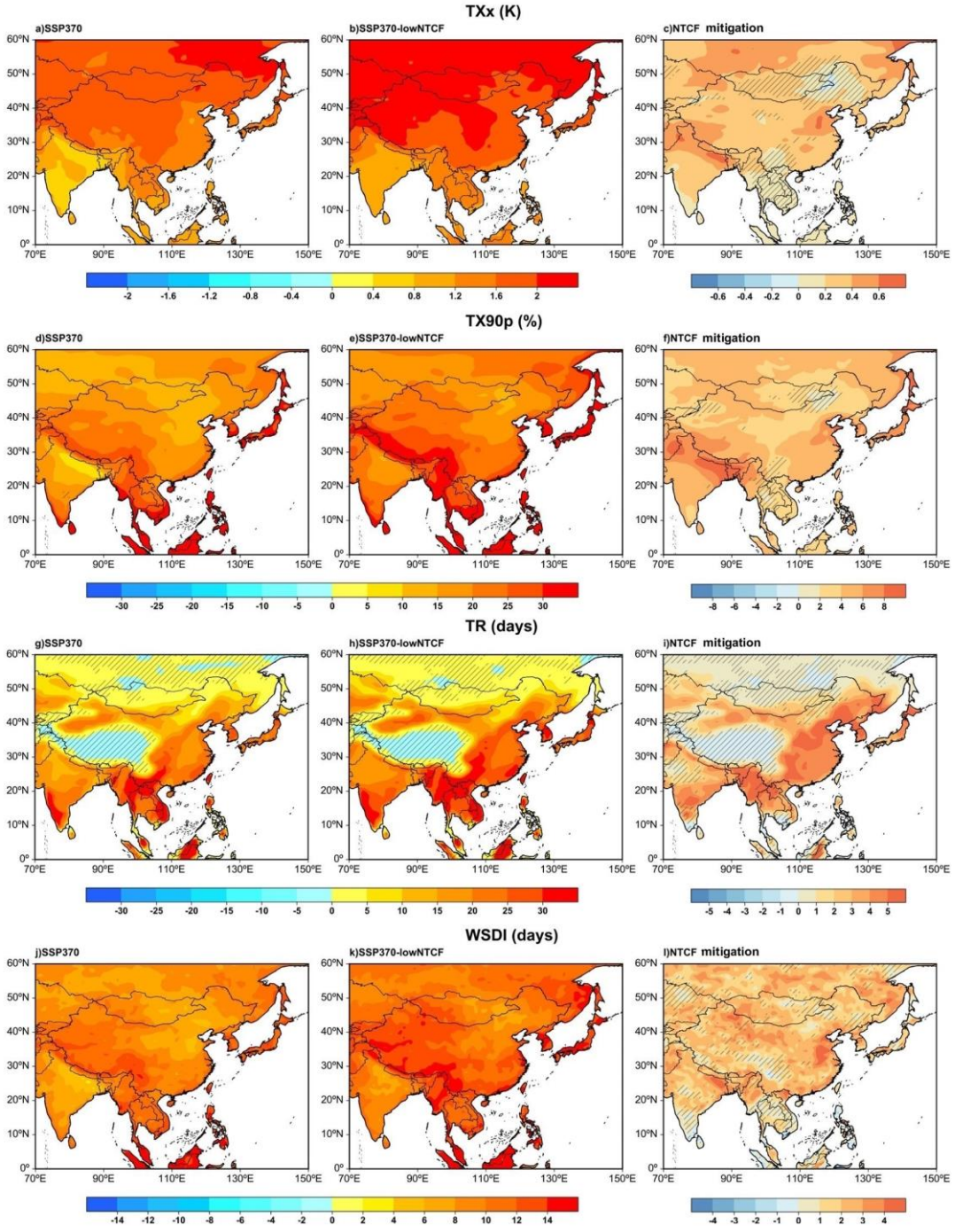

Figure S4: Spatial patterns of changes in the hottest day (TXx), warm days (TX90p), tropical nights (TR), and warm spell duration (WSDI)during 2031-2050 in Asia under the SSP3-7.0 (left column) and SSP3-7.0-lowNTCF (middle column) scenarios relative to 1995-2014. The right column represents changes caused by the non-methane SLCFs mitigation. The areas with hatching indicate that signal to noise ratio (S_{NR}) is less than 1.

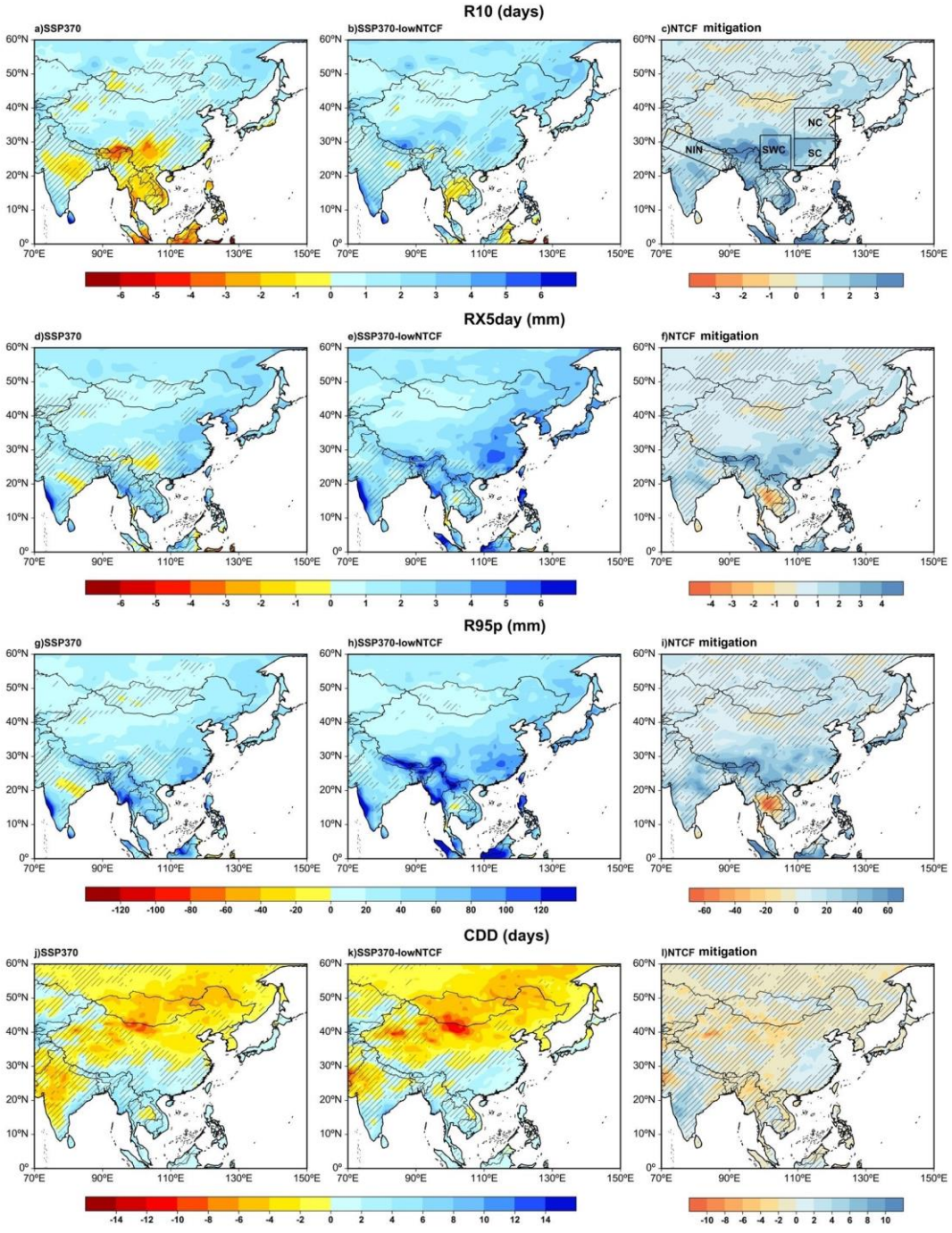

Figure S5: Spatial patterns of changes in heavy precipitation (R10), maximum consecutive 5-day precipitation (RX5day), days, total wet-day precipitation (R95p), and consecutive dry days (CDD) during 2031-2050 in Asia under the SSP3-7.0 (left column) and SSP3-7.0-lowNTCF (middle column) scenarios relative to 1995-2014. The right column represents changes caused by the non-methane SLCFs mitigation. The areas with hatching indicate that signal to noise ratio (S_{NR}) is less than 1.

References

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