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Distinct responses of Asian summer monsoon to black carbon aerosols and greenhouse gases

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Table 1 and Figures S1 to S4.

Introduction

This supporting information provides additional table (Table S1) and figures (Figure S1 to Figure S4) to add in the understanding of the main article.

Table S1: Models used for the present study as summarized in Myhre e t al., (2017).

Model	Version	Horizontal resolutions	Vertical resolutions	Ocean setup	Aerosol emissons
CanESM2	2010	2.8x2.8	35 levels	Coupled	Emissions
GISS-E2R	E2-R	2x2.5	40 levels	Coupled	Fixed concentration
HadGEM2	6.6.3	1.875x1.25	38 levels	Coupled	Emissions
HadGEM3	GA 4.0	1.875x1.25	85 levels	Coupled	Fixed concentration
IPSL-CM5A	5A	3.75 x1.875	19 levels	Coupled	Fixed concentration
MIROC-SPRINTARS	5.9.0	T85	40 levels	Coupled	Emissions
NCAR-CESM1-CAM4	1.0.3	2.5x1.9	26 levels	Slab ocean	Fixed concentration
NCAR-CESM1-CAM5	1.1.2	2.5x1.9	30 levels	Coupled	Emissions
NorESM1	1-M	2.5x1.9	26 levels	Coupled	Emissions

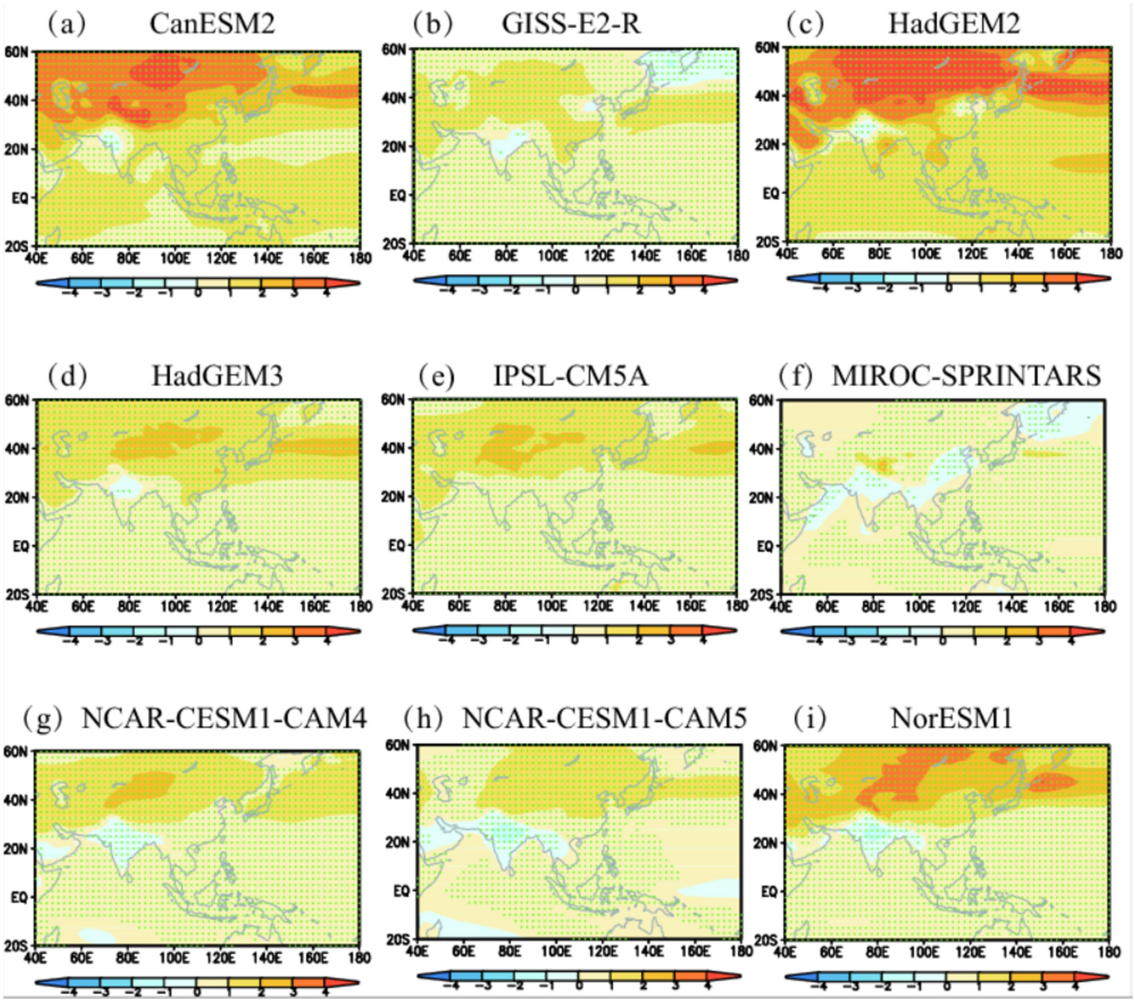

Figure S1, Changes in MJJAS surface atmospheric temperature at 2m (^{o}C) for individual models under increasing BC. Dotted regions indicate represent the grid points where the changes pass the two-tailed t test at the 5% significance level.

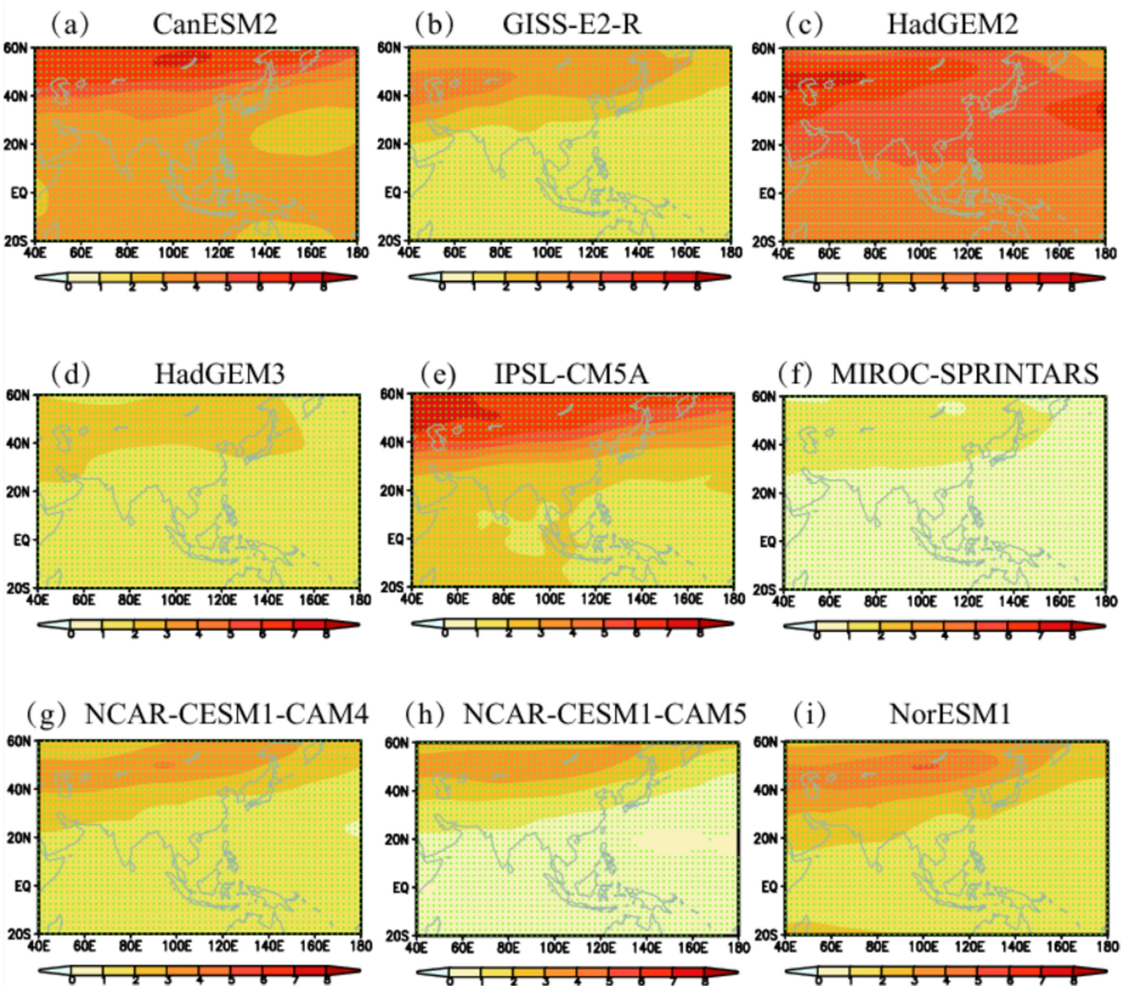

Figure S2, Changes in MJJAS 200 hPa atmospheric temperature (^{o}C) for individual models under increasing BC. Dotted regions indicate represent the grid points where the changes pass the two-tailed t test at the 5% significance level.

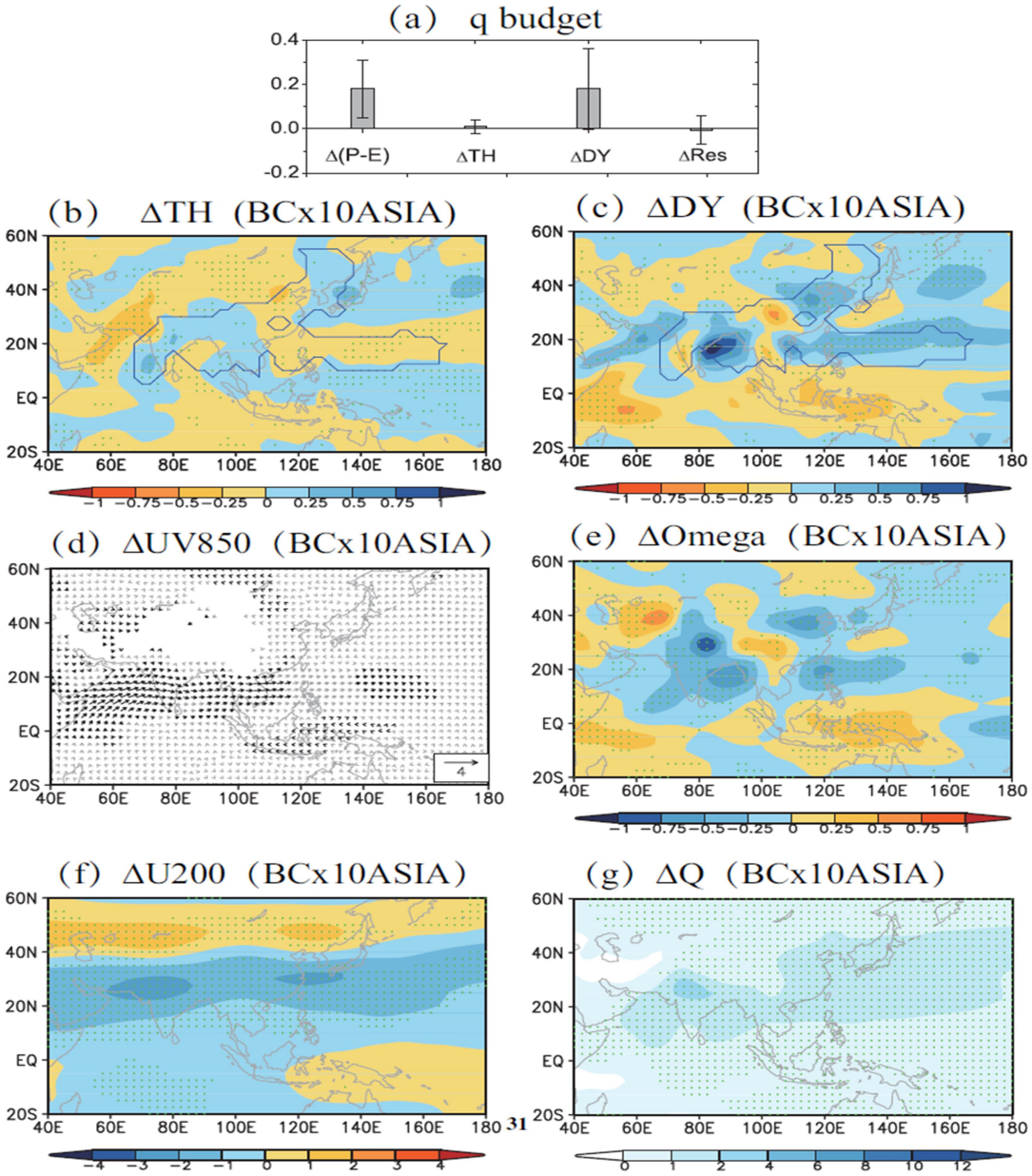

Figure S3, (a), MJJAS domain-averaged changes (mm day^{-1}) in multi-model mean (MMM) precipitation minus evaporation (△(P-E)), the thermodynamic term (△TH), the dynamic term (△DY), and residual term (△Res) of moisture budget equation under increasing Asian black carbon. (b) Spatial distribution of MMM MJJAS △TH, (c) △DY, (d) 850 hPa wind field (△UV850, m s^{-1}), (e) 500 hPa vertical velocity (△Omega, 0.01xPa s^{-1}), and (f) vertically integrated water vapor (△Q, g m^{-2}) under increasing Asian BC. Error bars (a) of MMM represent the standard deviation. Dotted regions (b, c, e, f, and g) and black arrows (d) indicate where MMM is more than 1 standard deviation away from zero, and the areas (b, c) within the blue line represent the Asian monsoon region.

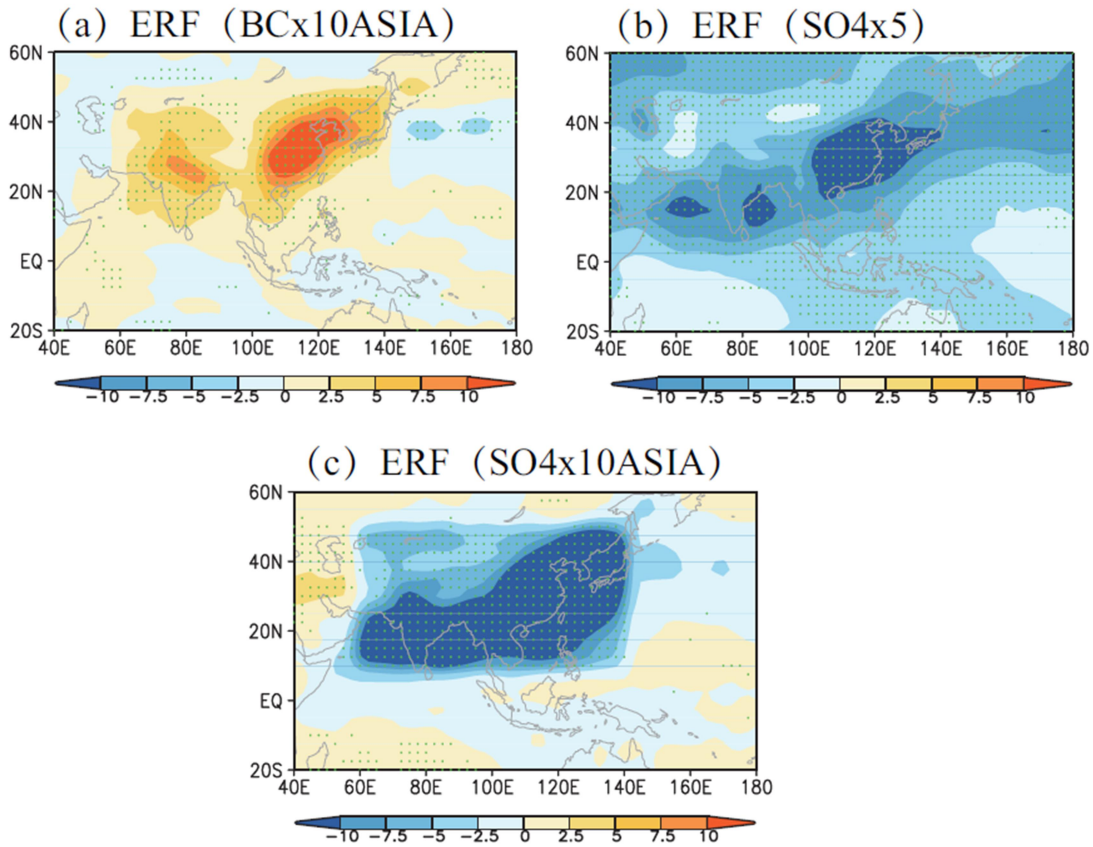

Figure S4, Changes in Multi-model mean (MMM) of MJJAS effective radiative forcing (ERF, W m^{-2}) under (a) increasing Asian BC, (b) global SO4, and (c) Asian SO4. Dotted regions indicate where MMM is more than 1 standard deviation away from zero.

References

Myhre, G., Forster, P., Samset, B., Hodnebrog, Ø, Sillmann, J., Aalbergsjø, S. G., Andrews, T., Boucher, O., Faluvegi, G., and Flächner, D.: PDRMIP: A precipitation driver and response model intercomparison project, protocol and preliminary results, B. Am. Meteorol. Soc., 98, 1185–1198, https://doi.org/10.1175/BAMS-D-16-0019.1, 2017.