Lightning occurrences and intensity over the Indian region: Long-term trends and future projections

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Supplementary Material

Sl No.	Name	Spatial resolution	Symbol
1	ACCESS 1.3	1.2500 X 1.8750	A
2	CSIRO MK 3.6	1.8750 X 1.8750	B
3	FGOALSS 2	1.6667 X 2.8125	C
4	HADGEM 2	1.2500 X 1.8750	D
5	IPSL CM5 AMR	1.2500 X 2.5000	E
6	MIROC 5	1.4063 X 1.4063	F
7	MRICGCM 3	1.1250 X 1.1250	G
8	NORESM 1ME	1.8750 X 2.5000	H

Table S1: Brief description of the 8 models used for the study, highlighted ones indicate those which have been selected for the lightning projection analysis.
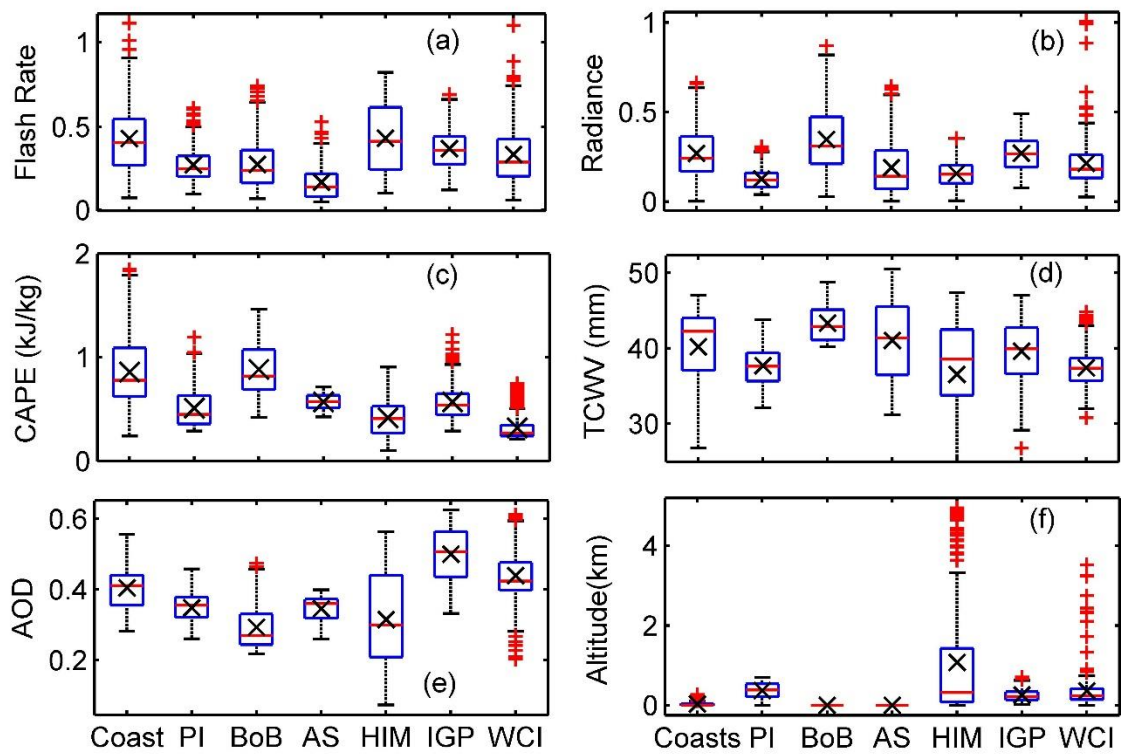
Figure S1: Spatial distribution of various parameters along 7 Indian regions used: (a) Lightning frequency, (b) Lightning radiance, (c) CAPE, (d) TCWV, (e) AOD and (f) Altitude
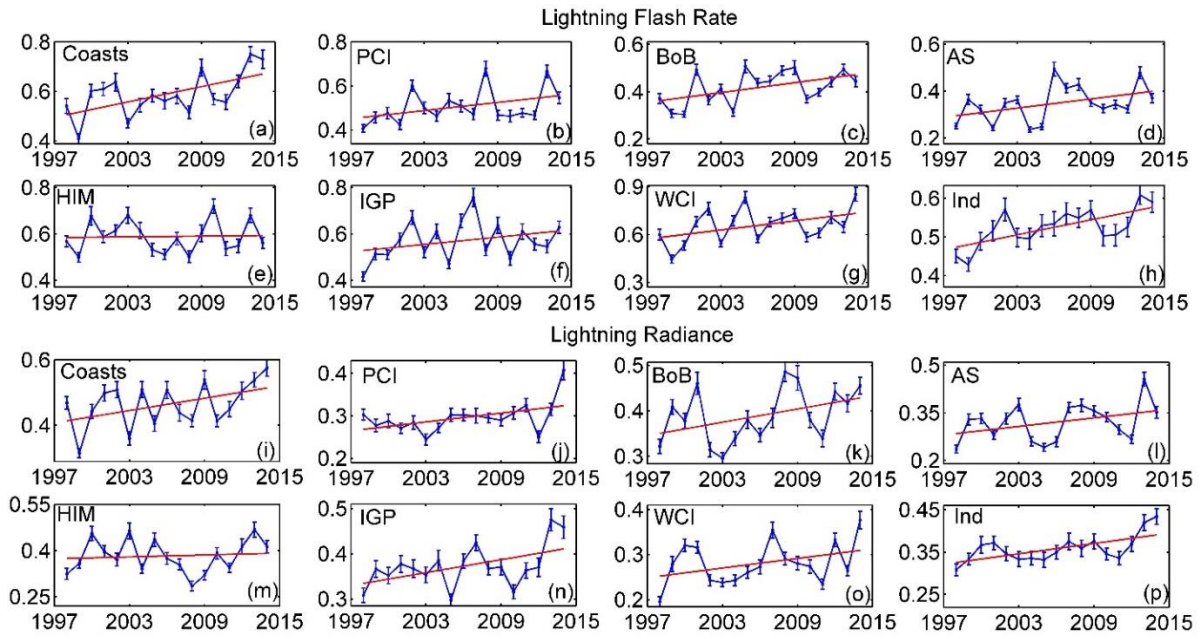
Figure S2: 17-year time series of lightning frequency and radiances with a fitted robust regression line (depicted by red line) for lightning frequency and radiance in (a,i) Coasts, (b,j) PI, (c,k) BoB, (d,l) AS, (e,m) HIM, (f,n) IGP, (g,o) WCI and (h,p) all India
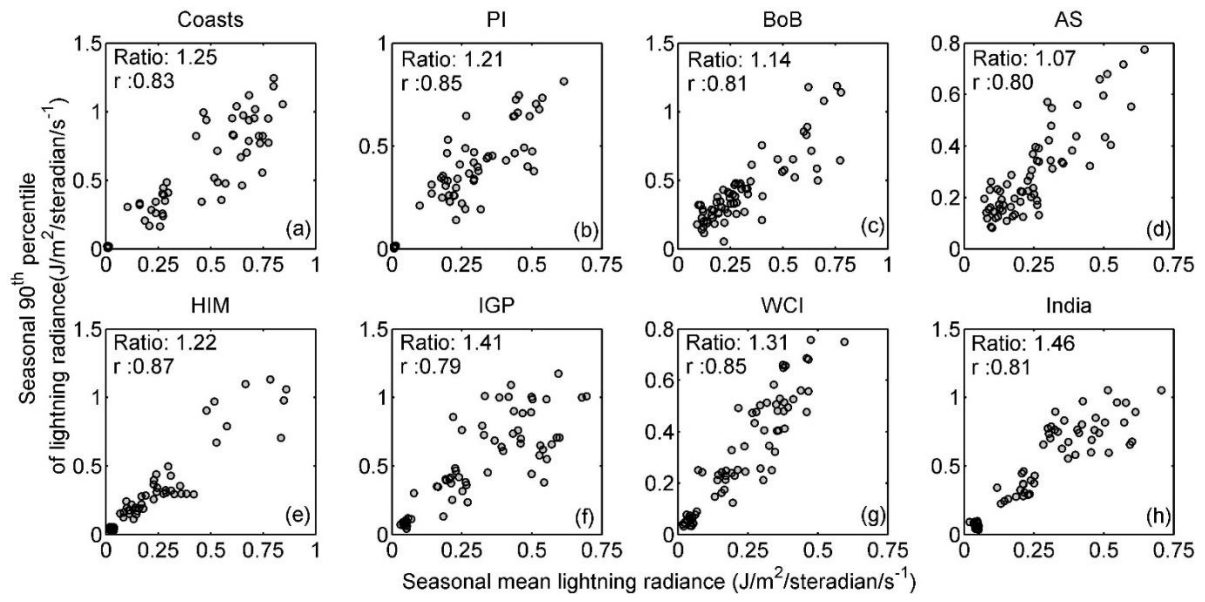
Figure S3: Comparison between mean and 90th percentile of seasonally averaged lightning radiance in (a) Coasts, (b) PI, (c) BoB, (d) AS, (e) HIM, (f) IGP, (g) WCI and (h) all India.
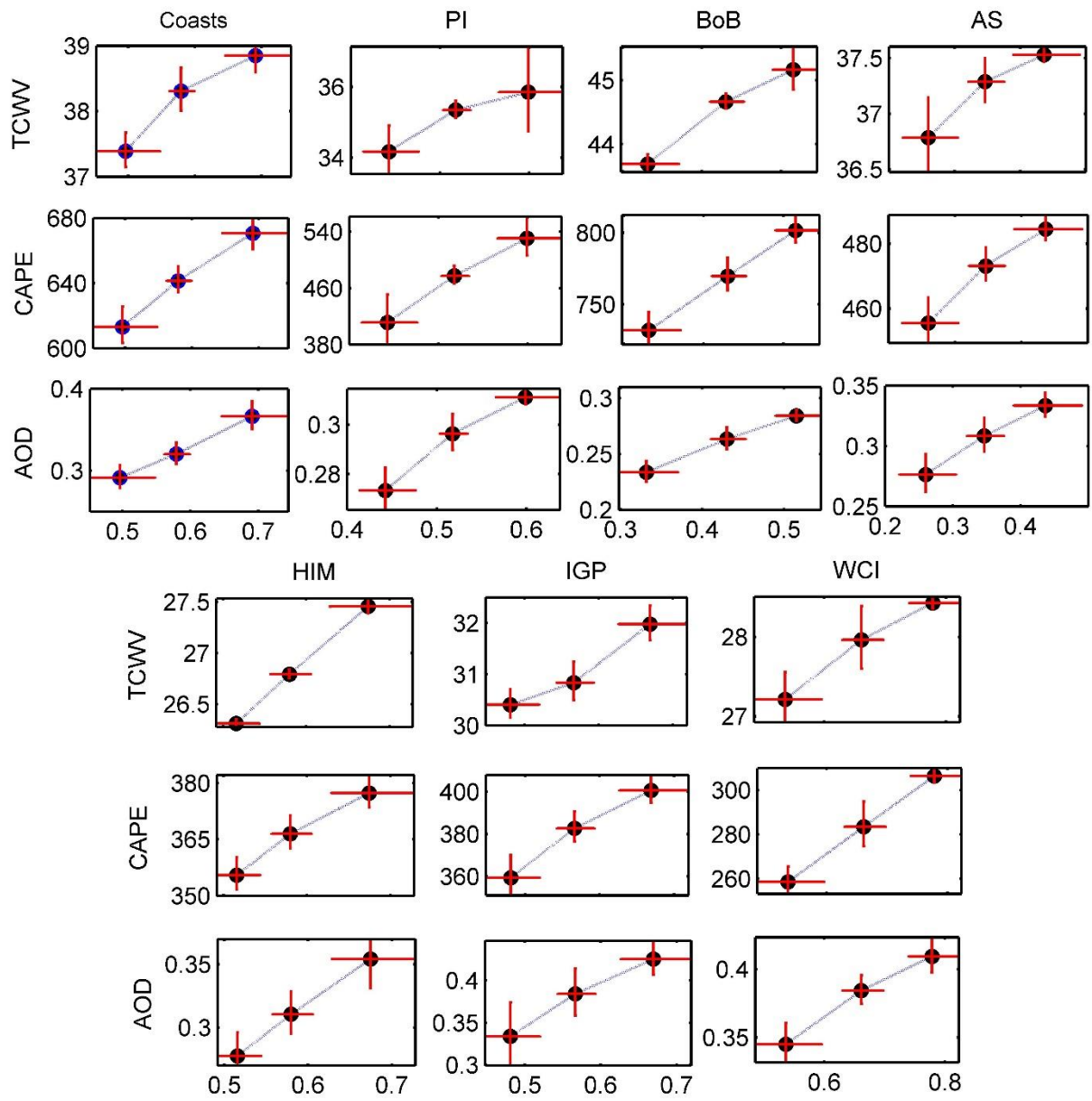
Figure S4: Temporal dominance cluster analysis results of lightning frequency with respect to TCWV, CAPE and AOD for all 7 Indian regions.
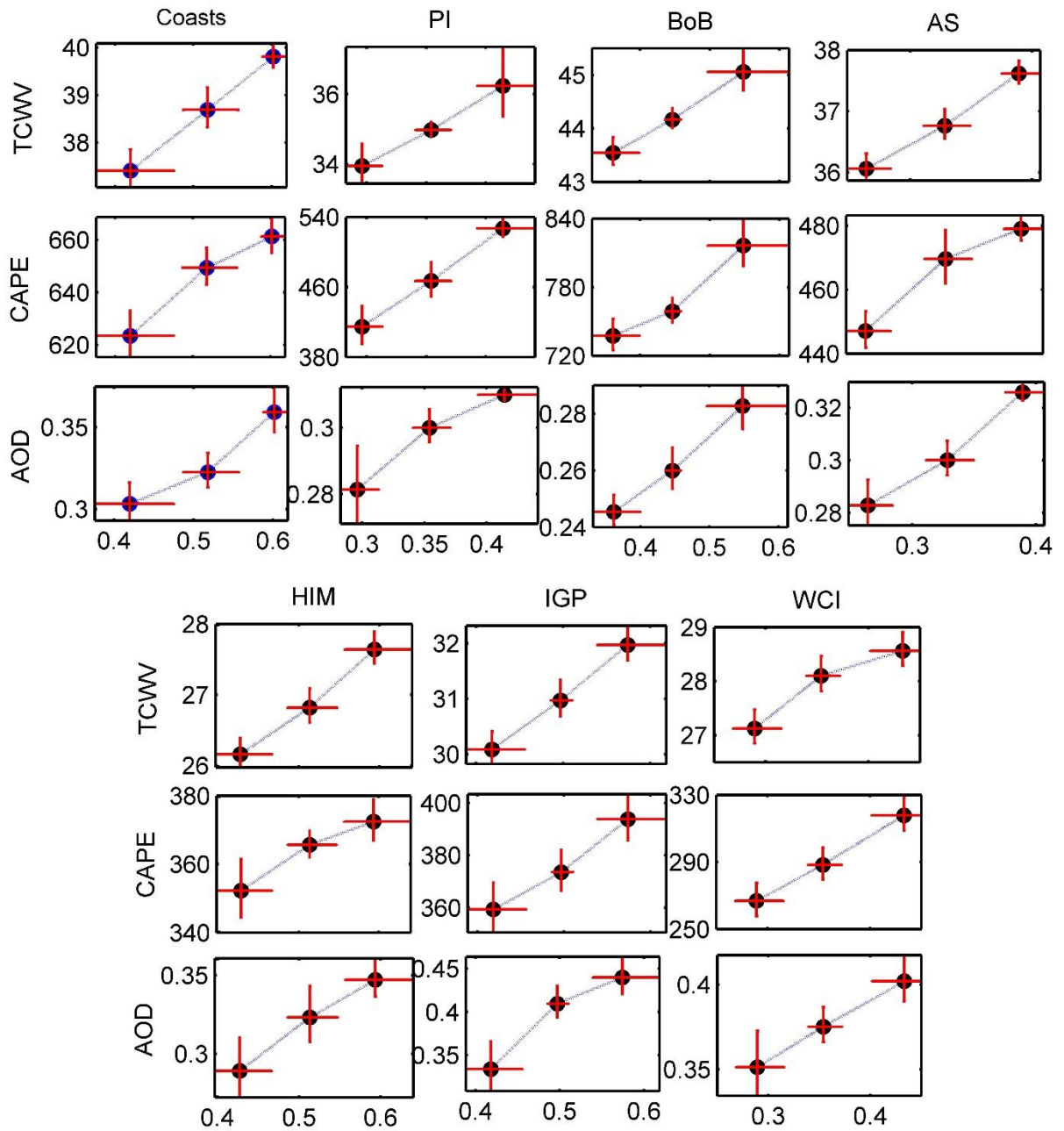
Figure S5: Temporal dominance cluster analysis results of extreme lightning radiance with respect to TCWV, CAPE and AOD for all 7 Indian regions.
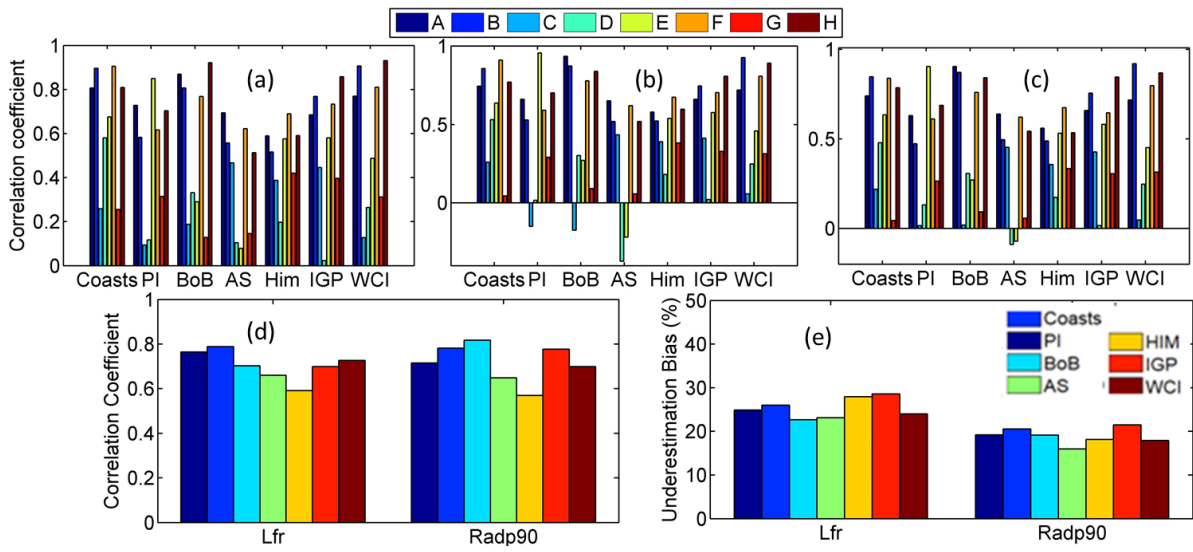
Figure S6: Correlation coefficient between modelled and observed meteorological parameters over 7 Indian regions for (a) TCWV, (b) CAPE and (c) AOD, (d,e) Correlation coefficient and underestimation bias % between regressed lightning flash rate (Lfr) and 90th percentile radiance (Radp90) with respect to observations.
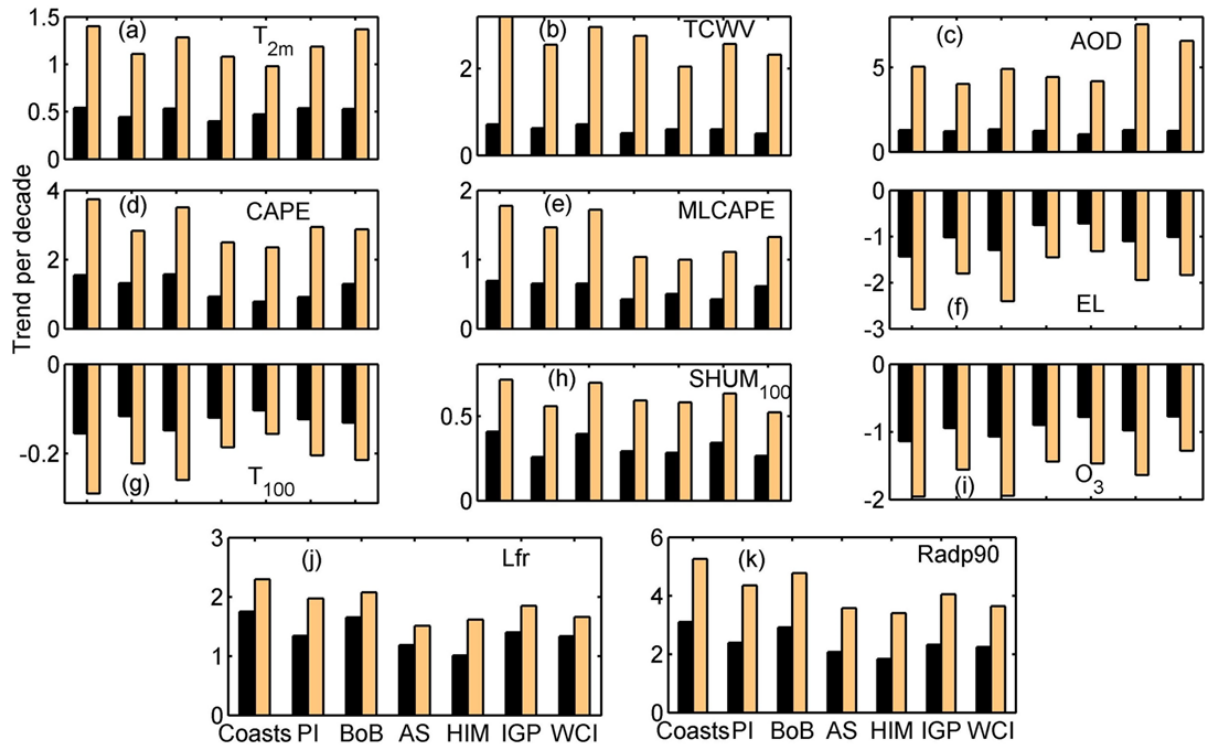
Figure S7: Zone-wise decadal % change of various parameters using RCP 2.6 (black) and RCP 8.5 (brown) scenarios for (a) 2 metre temperature, (b) TCWV, (c) AOD, (d) CAPE, (e) MLCAPE, (f) EL, (g) Temperature at 100 hPa, (h) Specific humidity, (i) Ozone mixing ratio, (j) Lightning frequency (Lfr) and (k) 90th