Electronic Supplementary Material to: Impacts of Future Changes in Heavy Precipitation and Extreme Drought on the Economy over South China and Indochina*

Bin TANG[1,2], Wenting HU[1,2], Anmin DUAN[3,1,2], Yimin LIU[1,2], Wen BAO[4,5], Yue XIN[1,2], and Xianyi YANG[3]

[1]*State Key Laboratory of Numerical Modeling for Atmospheric Sciences and Geophysical Fluid Dynamics (LASG), Institute of Atmospheric Physics, Chinese Academy of Sciences, Beijing* 100029, *China*

[2]*University of Chinese Academy of Sciences, Beijing* 101408, *China*

[3]*State Key Laboratory of Marine Environmental Science, College of Ocean and Earth Sciences, Xiamen University, Xiamen* 361005, *China*

[4]*Chinese Academy of Sciences, the CAS Institutes of Science and Development, Beijing* 101408, *China*

[5]*School of Public Policy and Management, University of Chinese Academy of Sciences, Beijing* 101408, *China*

ESM to: Tang, B., W. T. Hu, A. M. Duan, Y. M. Liu, W. Bao, Y. Xin, and X. Y. Yang, 2024: Impacts of future changes in heavy precipitation and extreme drought on economy over South China and Indochina. *Adv. Atmos. Sci.*, **41**(6), 1184–1196, https://doi.org/10.1007/s00376-023-3158-7.

The specific steps for the bias correction method (namely, the variance scaling method) are as follows:
(1) Obtain the first corrected extreme precipitation indices by using "delta change" method:

$$P_{i,j}(t) = P_{\mathrm{sim},i,j}(t) \times \left(\frac{\overline{P}_{\mathrm{obs},i,j}(t)}{\overline{P}_{\mathrm{ref},i,j}(t)} \right), \tag{1}$$

where $P_{i,j}(t)$ represents the first corrected extreme precipitation indices at each grid (i, j) for time t; $\overline{P}_{\mathrm{obs},i,j}(t)$ and $\overline{P}_{\mathrm{ref},i,j}(t)$ are the climatological mean extreme precipitation indices for the observations and model simulations during the reference period (1995–2014), respectively; and $P_{\mathrm{sim},i,j}(t)$is the model-simulated extreme precipitation indices including simulations from both historical and future projections for time t. It should be mentioned that the extreme precipitation indices of each CMIP6 model are corrected based on each model's own run.

(2) Remove the long-term mean [expressed as $\overline{(\,)}$] of the first corrected historical $P_{\mathrm{ref},i,j}(t)$ and projected [$P_{\mathrm{SSP},i,j}(t)$] extreme precipitation indices to calculate the corresponding anomalies [expressed as ( )'] :

$$P'_{\mathrm{ref},i,j}(t) = P_{\mathrm{ref},i,j}(t) - \overline{P}_{\mathrm{ref},i,j}(t) \ , \tag{2}$$

$$P'_{\mathrm{SSP},i,j}(t) = P_{\mathrm{SSP},i,j}(t) - \overline{P}_{\mathrm{SSP},i,j}(t) \ . \tag{3}$$

Then, scale the anomalies in Eqs. (2) and (3) to obtain $P'^{*}_{\mathrm{ref},i,j}(t)$ and $P'^{*}_{\mathrm{SSP},i,j}(t)$ in Eqs. (4) and (5) by using the ratio of the standard deviations of the observed (expressed as $\sigma(P_{\mathrm{obs},i,j}(t))$ and model-simulated [expressed as $\sigma(P_{\mathrm{ref},i,j}(t))$] values:

$$P'^{*}_{\mathrm{ref},i,j}(t) = P'_{\mathrm{ref},i,j}(t) \times \left[\frac{\sigma\left(P_{\mathrm{obs},i,j}(t)\right)}{\sigma\left(P_{\mathrm{ref},i,j}(t)\right)} \right], \tag{4}$$

$$P'^{*}_{\mathrm{SSP},i,j}(t) = P'_{\mathrm{SSP},i,j}(t) \times \left[\frac{\sigma\left(P_{\mathrm{obs},i,j}(t)\right)}{\sigma\left(P_{\mathrm{ref},i,j}(t)\right)} \right]. \tag{5}$$

(3) Add the scaled anomalies to the climatological mean to obtain the corrected historical and future projected extreme precipitation indices:

---

*The online version of this article can be found at https://doi.org/10.1007/s00376-023-3158-7.

$$P_{\mathrm{refcor},i,j}(t) = P'^{*}_{\mathrm{ref},i,j}(t) + \overline{P}_{\mathrm{ref},i,j}(t) \ , \tag{6}$$

$$P_{\mathrm{SSPcor},i,j}(t) = P'^{*}_{\mathrm{SSP},i,j}(t) + \overline{P}_{\mathrm{SSP},i,j}(t) \ . \tag{7}$$

Table S1. The mean value of spatial absolute error and spatial correlation coefficient of Rx5day in South China before and after bias correction.

Model name	Absolute error (before correction)	Absolute error (after correction)	Spatial correlation coefficient (before correction)	Spatial correlation coefficient (after correction)
ACCESS-CM2	57.74095	1.655426	0.6169692	0.9739775
ACCESS-ESM1-5	27.30472	1.536058	0.7589018	0.9845538
AWI-ESM-1-1-MR	19.4918	2.791499	0.6780734	0.9774204
BCC-CSM2-MR	48.0565	1.869804	0.2758342	0.9632159
CanESM5	38.36168	1.8732	–0.5275015	0.975464
CNRM-CM6-1-HR	16.35172	2.248446	0.6628953	0.9769937
CNRM-CM6-1	18.38995	1.869137	0.6602383	0.9822901
CNRM-ESM2-1	22.11402	1.692135	0.7540346	0.9805307
EC-Earth3	–4.014875	1.306955	0.7281026	0.9769277
EC-Earth3-Veg	–3.914102	2.319014	0.7013491	0.9777166
EC-Earth3-Veg-LR	2.138593	2.507424	0.401566	0.9773613
FGOALS-g3	26.40511	0.4754093	0.7617828	0.9744868
GFDL-ESM4	19.4918	2.791499	0.6780734	0.9774204
HadGEM3-GC31-LL	52.75331	1.062171	0.7575923	0.9715878
UKESM1-0-LL	–0.4852304	1.930955	0.6437993	0.9797351
INM-CM4-8	14.54943	1.440171	0.560504	0.9875699
INM-CM5-0	5.286869	1.479117	0.5788875	0.9828599
IPSL-CM6A-LR	–9.451856	2.382894	0.6832281	0.9827502
MIROC6	25.89456	3.956034	0.6635724	0.9836395
MIROC-ES2L	–7.668128	2.299458	0.4822971	0.9719636
MPI-ESM1-2-HR	–16.48408	1.942505	0.5045188	0.9785167
MPI-ESM1-2-LR	–9.109777	1.554717	0.731963	0.9790224
NESM3	–3.278615	1.571035	0.7492579	0.983
NorESM2-LM	7.676034	2.761131	0.7576278	0.9783812
NorESM2-MM	54.20134	1.602322	0.6896071	0.9705038

Table S2. The mean value of spatial absolute error and spatial correlation coefficient of Rx5day in Indochina before and after bias correction.

Model name	Absolute error (before correction)	Absolute error (after correction)	Spatial correlation coefficient (before correction)	Spatial correlation coefficient (after correction)
ACCESS-CM2	32.10773	−1.777346	0.4898104	0.961086
ACCESS-ESM1-5	19.22511	1.32789	0.4858881	0.9683822
AWI-ESM-1-1-MR	43.94781	−0.6322097	0.1557889	0.9587297
BCC-CSM2-MR	140.1172	0.1408061	−0.1347689	0.9626353
CanESM5	48.6973	−0.2797553	−0.2037025	0.9635536
CNRM-CM6-1-HR	15.4709	0.2482279	0.3060478	0.969514
CNRM-CM6-1	17.85882	−0.5579863	0.3280941	0.9729507
CNRM-ESM2-1	21.88791	2.879673	0.4673935	0.9643873
EC-Earth3	−4.587245	−0.3763718	0.5645831	0.9581457
EC-Earth3-Veg	−5.46476	−0.1404523	0.6990853	0.9674241
EC-Earth3-Veg-LR	33.57386	1.556171	0.04329807	0.972325
FGOALS-g3	28.22808	−0.5407841	0.4217187	0.9668675
GFDL-ESM4	43.94781	−0.6322097	0.1557889	0.9587297
HadGEM3-GC31-LL	31.00262	−0.2829944	0.5192609	0.9640402
UKESM1-0-LL	−5.361852	0.9630335	0.1184215	0.966118
INM-CM4-8	21.52138	1.090049	0.08576261	0.9729986
INM-CM5-0	22.78297	0.607371	0.2506291	0.9741336
IPSL-CM6A-LR	−18.96515	1.2088	0.3741073	0.9714287
MIROC6	13.90007	3.299891	0.2839518	0.9667328
MIROC-ES2L	−20.10441	0.6413279	0.403497	0.9606686
MPI-ESM1-2-HR	−23.56926	−0.3630366	0.5627398	0.9663522
MPI-ESM1-2-LR	−11.19266	−0.1623373	0.5247872	0.9724711
NESM3	3.799905	−0.368626	0.3671907	0.9701257
NorESM2-LM	11.66036	−1.26097	0.4452145	0.9538898
NorESM2-MM	33.07359	0.4744595	0.4148739	0.9551322

Table S3. The mean value of spatial absolute error and spatial correlation coefficient of CDD in South China before and after bias correction.

Model name	Absolute error (before correction)	Absolute error (after correction)	Spatial correlation coefficient (before correction)	Spatial correlation coefficient (after correction)
ACCESS-CM2	0.3350908	0.9775155	−7.28027	0.680595
ACCESS-ESM1-5	0.5095609	0.975101	−7.969784	−2.744071
AWI-ESM-1-1-MR	0.5872711	0.9792207	−2.615085	−0.4394505
BCC-CSM2-MR	0.2247281	0.9856638	0.9740037	0.400352
CanESM5	0.5482375	0.9850072	0.7678209	−0.3668079
CNRM-CM6-1-HR	0.1851368	0.9839066	−1.567303	−1.586024
CNRM-CM6-1	0.1734906	0.9830636	−0.4876926	−1.899913
CNRM-ESM2-1	0.4625266	0.9765114	3.812475	−0.1132272
EC-Earth3	0.648469	0.9787328	−4.194771	0.3430507
EC-Earth3-Veg	0.6110156	0.9826324	−5.033385	−0.2502468
EC-Earth3-Veg-LR	−0.0719284	0.9825252	9.586937	−0.3108825
FGOALS-g3	0.5039852	0.9857257	1.350612	−0.003496802
GFDL-ESM4	0.5872711	0.9792207	−2.615085	−0.4394505
HadGEM3-GC31-LL	0.5581728	0.9694044	−6.065763	−0.1693272
UKESM1-0-LL	−0.4694106	0.9814625	−16.96109	−2.299683
INM-CM4-8	−0.414645	0.9822593	−15.14037	0.2745874
INM-CM5-0	−0.1043748	0.984256	8.305988	−0.4040014
IPSL-CM6A-LR	0.2576246	0.9735978	−2.559417	0.765831
MIROC6	0.6617341	0.9705032	−2.967401	0.2790459
MIROC-ES2L	0.4199671	0.981943	15.26404	−0.3906665
MPI-ESM1-2-HR	0.5500803	0.9610927	8.318018	0.7162333
MPI-ESM1-2-LR	0.5233435	0.9758044	−5.756377	0.1211936
NESM3	0.3375021	0.9826368	5.872551	−1.280399
NorESM2-LM	0.4891596	0.9801461	4.000305	−0.2847483
NorESM2-MM	0.5556884	0.984632	−5.167197	−1.286423

Table S4. The mean value of spatial absolute error and spatial correlation coefficient of CDD in Indochina before and after bias correction.

Model name	Absolute error (before correction)	Absolute error (after correction)	Spatial correlation coefficient (before correction)	Spatial correlation coefficient (after correction)
ACCESS-CM2	0.6840087	0.9811649	−5.207489	−2.0818
ACCESS-ESM1-5	0.7897477	0.9808846	5.400397	−3.189637
AWI-ESM-1-1-MR	0.8896384	0.9667378	18.40622	−2.160712
BCC-CSM2-MR	0.7212597	0.9762945	−6.488799	−0.7859479
CanESM5	0.8239021	0.9809655	−3.745924	−1.140517
CNRM-CM6-1-HR	0.8653675	0.9855867	10.68679	−2.268377
CNRM-CM6-1	0.9011985	0.9720826	8.409301	−3.267078
CNRM-ESM2-1	0.8096876	0.9799916	6.568249	−1.333828
EC-Earth3	0.9047278	0.9667071	8.959908	−1.697143
EC-Earth3-Veg	0.8985742	0.9830939	11.98137	−0.7155738
EC-Earth3-Veg-LR	0.8261912	0.9775113	11.6125	−1.847214
FGOALS-g3	0.765743	0.9796873	6.473341	−0.5160312
GFDL-ESM4	0.8896384	0.9667378	18.40622	−2.160712
HadGEM3-GC31-LL	0.7912995	0.9818725	−3.2111	−3.191748
UKESM1-0-LL	0.6646023	0.9794096	−32.78781	−3.86504
INM-CM4-8	0.7003552	0.9836313	−29.04802	−1.973481
INM-CM5-0	0.8207539	0.9686168	3.827079	−2.421176
IPSL-CM6A-LR	0.7878992	0.9715728	−3.29472	−1.246245
MIROC6	0.6471978	0.9875103	−2.324847	−0.6749547
MIROC-ES2L	0.7025868	0.9841486	30.25139	−2.400903
MPI-ESM1-2-HR	0.7535812	0.9819683	20.4777	−0.1426366
MPI-ESM1-2-LR	0.7887181	0.9812538	−3.77737	−1.137928
NESM3	0.7566797	0.9825867	6.394895	−3.285075
NorESM2-LM	0.8198127	0.9816648	3.734899	−0.2970726
NorESM2-MM	0.7936136	0.9790614	−4.435026	−1.285807

Table S5. The affected GDP fractions (units: %) by a certain change in Rx5day under SSP5-8.5 relative to 1995–2014 (units: %) in each province of South China and each nation of Indochina.

	Changes in Rx5day (%)							
Nation(province)	0	5	10	15	20	30	40	50
1.5°C global warming level								
Myanmar	44.52	34.00	25.92	20.78	13.31	5.18	2.86	1.54
Thailand	74.42	30.14	19.51	16.46	9.03	5.00	3.20	1.40
Vietnam	37.09	30.25	19.30	14.31	11.57	4.02	3.35	2.99
Laos	53.12	47.30	40.33	29.67	19.82	6.94	3.78	0.84
Cambodia	58.61	31.85	24.73	8.78	5.05	2.46	0.00	0.00
Malaysian Peninsula	42.84	31.83	23.61	14.51	10.86	6.35	0.72	0.02
Yunnan, China	71.65	58.92	41.62	23.42	17.51	3.88	1.11	0.10
Jiangxi, China	70.04	52.81	34.31	27.54	11.67	3.35	0.75	0.00
Guizhou, China	30.15	22.23	14.91	9.45	7.94	4.89	1.80	0.38
Hunan, China	80.28	58.60	34.95	20.54	13.59	4.53	0.59	0.00
Fujian, China	44.10	28.97	20.82	17.59	12.33	4.64	1.53	0.63
Guangdong, China	18.42	10.94	6.77	6.77	4.84	0.15	0.00	0.00
Guangxi, China	52.02	39.67	31.06	26.47	21.15	8.01	2.71	0.00
Hainan, China	35.47	22.00	22.00	13.96	3.68	0.00	0.00	0.00
2°C global warming level								
Myanmar	31.57	30.07	17.36	10.34	7.53	3.44	1.05	0.56
Thailand	73.65	23.32	18.97	15.49	12.83	7.43	5.73	3.30
Vietnam	58.55	32.54	24.62	21.24	16.29	9.53	6.05	3.02
Laos	56.27	42.98	39.12	37.26	30.13	19.53	7.01	4.89
Cambodia	61.23	35.89	23.96	18.79	11.93	7.27	2.44	0.85
Malaysian Peninsula	62.65	42.75	16.27	6.66	5.33	2.94	0.95	0.72
Yunnan, China	72.19	63.84	49.02	40.15	27.19	12.37	5.97	0.90
Jiangxi, China	66.82	46.14	35.69	28.14	20.80	8.06	2.26	0.00
Guizhou, China	80.49	60.54	49.05	26.46	15.55	7.29	2.05	0.00
Hunan, China	44.16	35.01	22.69	14.26	7.59	2.45	0.58	0.00
Fujian, China	57.72	35.61	33.08	19.30	12.85	1.83	0.00	0.00
Guangdong, China	72.08	56.61	33.46	22.81	12.96	5.45	4.30	0.26
Guangxi, China	62.99	49.53	36.83	27.36	19.73	8.65	4.17	1.62
Hainan, China	32.78	20.12	13.66	8.61	8.61	3.68	0.00	0.00
3°C global warming level								
Myanmar	78.53	69.11	59.52	37.65	35.03	13.22	9.29	5.63
Thailand	71.68	23.08	16.85	14.00	11.43	6.26	4.15	1.51
Vietnam	44.03	36.38	32.60	30.09	23.93	10.79	6.55	3.89
Laos	48.46	46.13	36.16	30.12	20.37	11.27	3.35	1.98
Cambodia	60.96	57.29	28.58	24.61	16.97	3.29	0.31	0.00
Malaysian Peninsula	66.94	56.17	51.65	27.58	18.54	9.66	6.18	4.05
Yunnan, China	88.41	81.91	70.96	58.94	44.25	20.76	10.59	4.61
Jiangxi, China	53.58	44.79	29.32	27.79	22.60	13.25	3.65	0.57
Guizhou, China	88.04	70.44	62.75	55.95	37.33	16.81	5.95	2.75
Hunan, China	64.27	54.25	41.40	22.77	20.60	9.50	2.69	1.39
Fujian, China	49.73	43.74	41.43	33.68	28.87	19.32	9.78	5.52
Guangdong, China	55.05	34.85	30.29	22.57	15.05	4.78	3.46	1.81
Guangxi, China	74.87	66.30	58.43	49.82	41.22	21.85	10.31	7.00
Hainan, China	9.50	3.68	0.00	0.00	0.00	0.00	0.00	0.00
4°C global warming level								
Myanmar	74.48	67.56	62.80	48.22	34.26	19.92	11.10	6.65
Thailand	87.01	70.15	21.76	16.84	14.12	9.30	5.31	5.17
Vietnam	74.91	61.73	42.94	31.56	21.57	6.89	4.42	3.41
Laos	71.67	64.73	56.98	48.12	41.72	27.22	21.39	11.95
Cambodia	60.39	58.59	34.17	23.70	17.58	1.79	0.21	0.00
Malaysian Peninsula	77.52	59.59	32.70	25.91	23.87	16.80	10.01	6.16
Yunnan, China	79.15	69.30	52.03	40.64	32.96	19.72	7.73	4.44
Jiangxi, China	59.61	51.63	42.54	30.08	25.16	10.48	6.17	3.76
Guizhou, China	67.32	51.95	35.76	31.10	26.36	14.46	8.45	3.72
Hunan, China	69.33	46.09	42.14	32.46	30.55	13.76	6.36	0.82
Fujian, China	75.36	69.36	59.17	51.11	46.48	34.62	11.41	8.03
Guangdong, China	84.95	78.36	57.21	48.61	16.29	12.77	8.14	5.39
Guangxi, China	79.00	68.38	63.09	53.48	47.94	28.59	15.57	6.28
Hainan, China	39.38	28.66	20.12	20.12	17.56	4.16	0.00	0.00

Table S6. The affected GDP fractions (units: %) by a certain change in CDD under SSP5-8.5 relative to 1995–2014 (units: %) in each province of South China and each country of Indochina.

	Changes in CDD (%)							
Nation(province)	0	5	10	15	20	30	40	50
1.5°C global warming level								
Myanmar	43.21	39.45	19.49	12.57	11.71	5.32	4.35	2.78
Thailand	19.26	12.87	8.91	7.48	5.41	1.49	1.18	0.41
Vietnam	39.67	37.48	34.03	26.31	15.08	3.73	2.23	0.89
Laos	35.60	27.20	23.17	18.27	11.09	7.99	5.28	2.58
Cambodia	28.10	24.70	17.98	17.80	15.95	10.24	6.67	2.21
Malaysian Peninsula	11.16	7.66	6.45	6.45	5.19	4.33	1.82	1.39
Yunnan, China	30.92	21.12	18.30	17.54	13.89	8.19	2.44	0.84
Jiangxi, China	8.93	3.75	3.23	0.00	0.00	0.00	0.00	0.00
Guizhou, China	5.45	2.39	1.80	1.80	0.00	0.00	0.00	0.00
Hunan, China	5.71	3.99	0.76	0.00	0.00	0.00	0.00	0.00
Fujian, China	8.17	4.28	3.63	0.00	0.00	0.00	0.00	0.00
Guangdong, China	17.73	16.93	9.31	6.59	5.14	1.27	0.50	0.00
Guangxi, China	31.79	18.74	15.24	7.00	4.66	0.00	0.00	0.00
Hainan, China	71.34	58.53	7.85	3.68	0.00	0.00	0.00	0.00
2°C global warming level								
Myanmar	54.90	40.28	17.11	10.89	7.45	4.42	2.71	1.37
Thailand	18.15	11.61	6.55	5.96	5.21	3.25	1.37	0.59
Vietnam	34.98	31.43	25.66	10.73	6.68	3.65	2.25	2.25
Laos	31.65	27.14	22.30	11.97	11.46	6.39	6.09	0.64
Cambodia	10.39	9.64	4.46	4.46	4.46	2.48	0.55	0.00
Malaysian Peninsula	27.92	25.63	10.93	9.49	9.02	4.00	2.93	2.13
Yunnan, China	42.09	38.39	26.03	22.75	16.85	12.75	8.55	5.54
Jiangxi, China	50.69	27.38	14.26	2.21	0.00	0.00	0.00	0.00
Guizhou, China	44.01	37.95	22.45	7.42	5.71	5.17	0.35	0.35
Hunan, China	72.99	44.04	25.22	9.70	1.37	0.00	0.00	0.00
Fujian, China	25.99	15.13	6.95	1.29	0.00	0.00	0.00	0.00
Guangdong, China	13.64	7.23	6.84	5.15	3.78	0.96	0.00	0.00
Guangxi, China	44.76	28.21	20.02	16.02	11.38	5.65	0.38	0.00
Hainan, China	48.78	44.34	20.12	6.66	4.16	0.00	0.00	0.00
3°C global warming level								
Myanmar	30.67	20.38	15.15	12.43	7.92	5.12	3.30	2.05
Thailand	17.25	8.11	7.17	4.04	2.80	1.80	0.51	0.00
Vietnam	37.92	33.51	33.51	32.17	30.69	23.86	8.04	3.23
Laos	42.83	33.22	26.07	22.63	22.63	9.99	4.95	2.09
Cambodia	6.32	5.04	2.79	1.08	0.63	0.24	0.00	0.00
Malaysian Peninsula	11.52	9.21	7.44	7.01	6.33	2.73	2.21	2.21
Yunnan, China	45.57	34.20	27.81	24.58	21.77	13.80	8.87	4.77
Jiangxi, China	62.91	51.51	30.35	9.42	6.53	4.54	0.00	0.00
Guizhou, China	72.31	68.66	52.31	49.38	42.68	27.73	4.24	2.65
Hunan, China	76.41	54.47	30.89	9.30	4.60	0.00	0.00	0.00
Fujian, China	51.69	37.46	27.14	9.06	5.75	2.57	0.00	0.00
Guangdong, China	35.27	34.68	22.92	17.79	9.80	2.43	0.37	0.00
Guangxi, China	57.75	39.59	31.83	24.28	18.60	8.59	4.15	0.14
Hainan, China	20.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4°C global warming level								
Myanmar	42.58	33.68	20.77	10.10	6.79	3.44	2.80	2.39
Thailand	65.29	20.63	14.81	9.77	6.86	3.88	1.79	0.61
Vietnam	41.37	37.00	36.96	35.78	23.65	17.44	8.41	3.19
Laos	39.22	29.59	21.03	16.54	12.50	6.44	2.64	1.86
Cambodia	23.52	20.12	14.03	10.74	6.00	2.34	1.25	0.21
Malaysian Peninsula	58.56	37.60	27.11	21.80	12.92	4.58	3.82	3.26
Yunnan, China	60.02	47.33	35.36	31.75	29.19	24.00	11.79	4.57
Jiangxi, China	69.70	48.57	28.95	2.96	0.55	0.00	0.00	0.00
Guizhou, China	60.94	42.30	27.98	17.45	11.22	11.22	6.49	5.11
Hunan, China	54.20	32.91	13.63	4.60	1.92	0.00	0.00	0.00
Fujian, China	44.97	27.73	17.88	12.87	10.46	2.63	0.00	0.00
Guangdong, China	16.59	11.62	3.93	3.54	1.10	0.34	0.00	0.00
Guangxi, China	44.89	41.35	33.05	26.71	21.54	9.00	6.14	0.80
Hainan, China	73.88	40.18	26.78	12.29	6.66	0.00	0.00	0.00

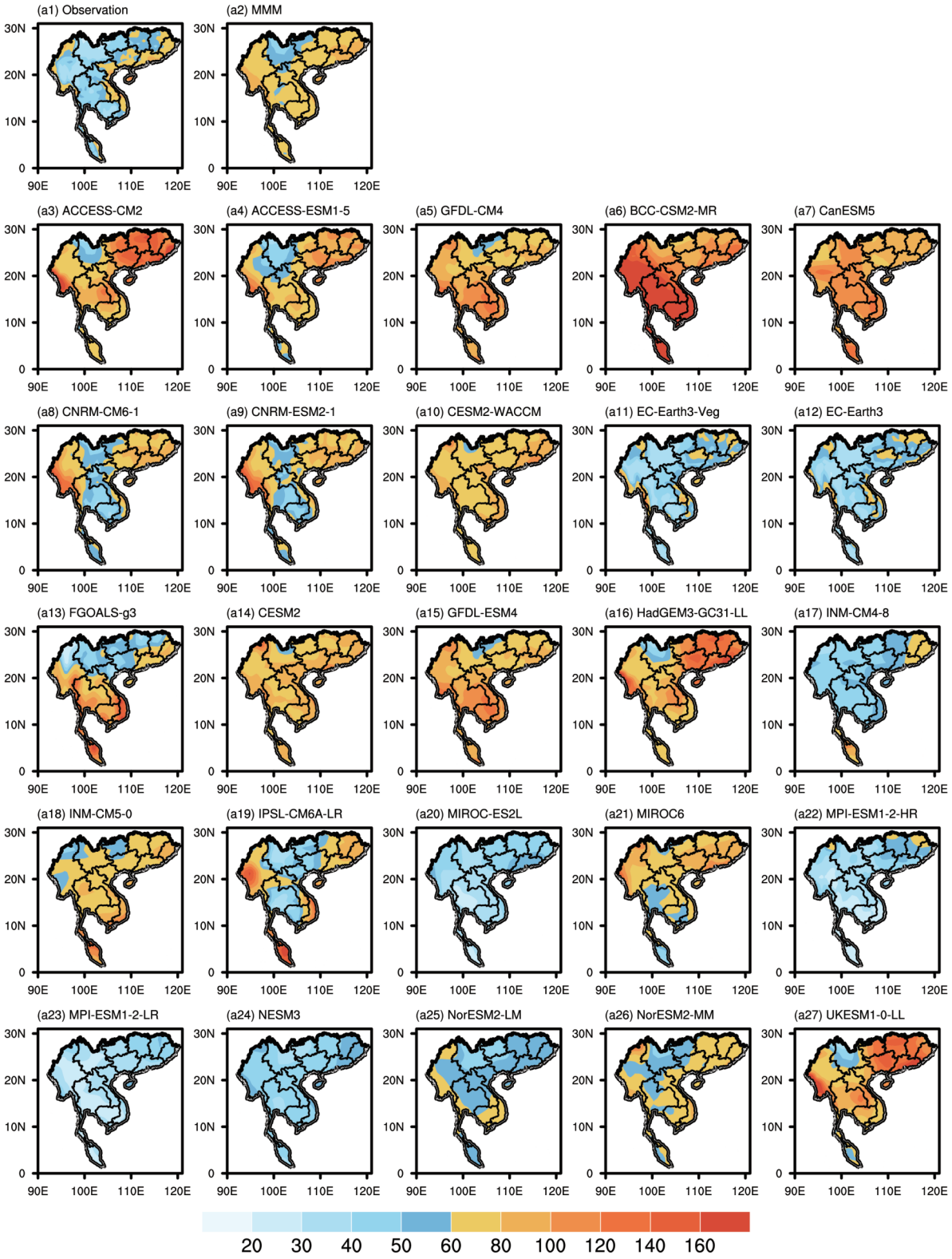

Fig. S1. Climatological spatial distribution (calculated for the period 1979–2014) of Rx5day for the observation, MMM, and 25 CMIP6 models over the INCSC region (units: mm).

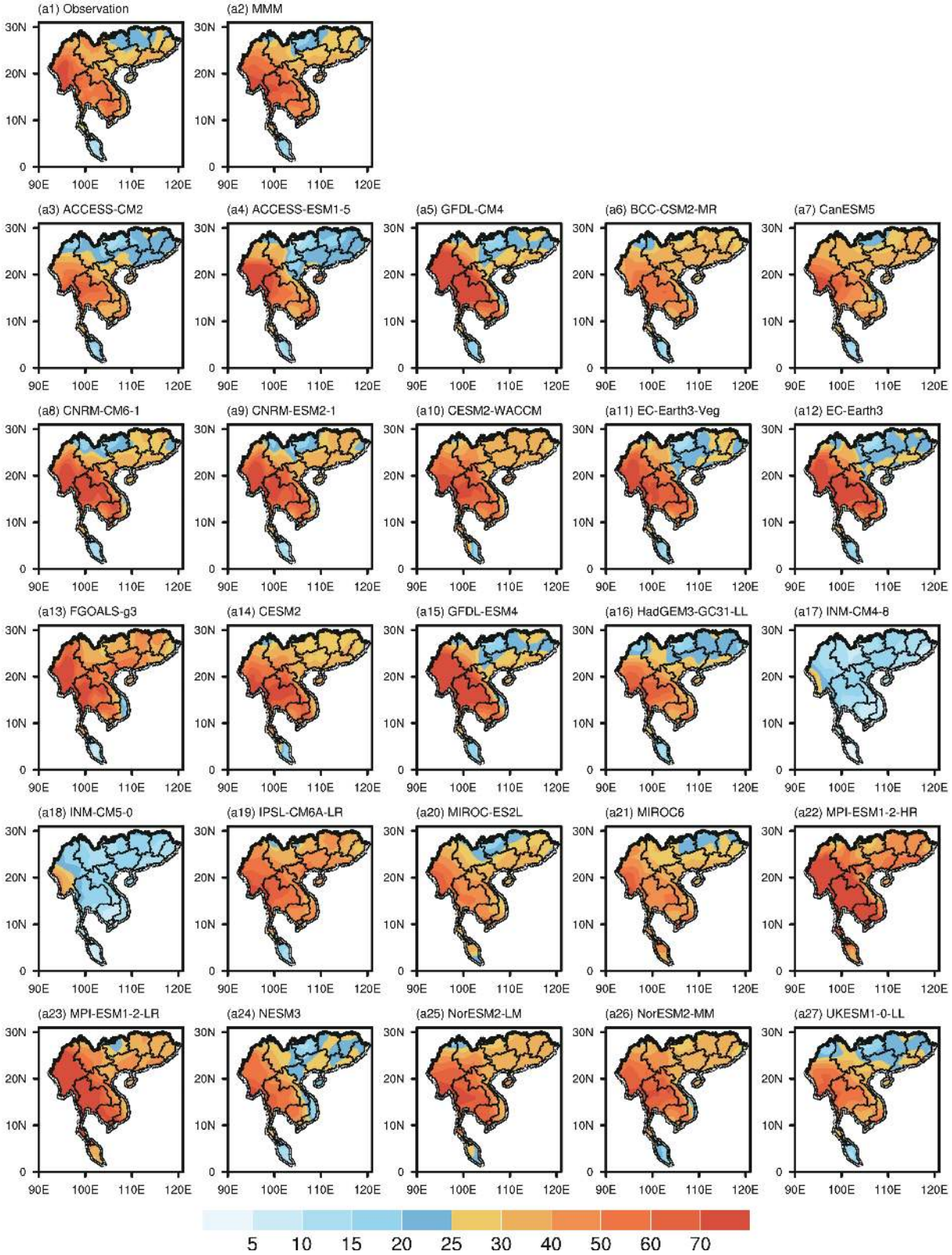

Fig. S2. As in Figure S1, but for CDD (units: days).

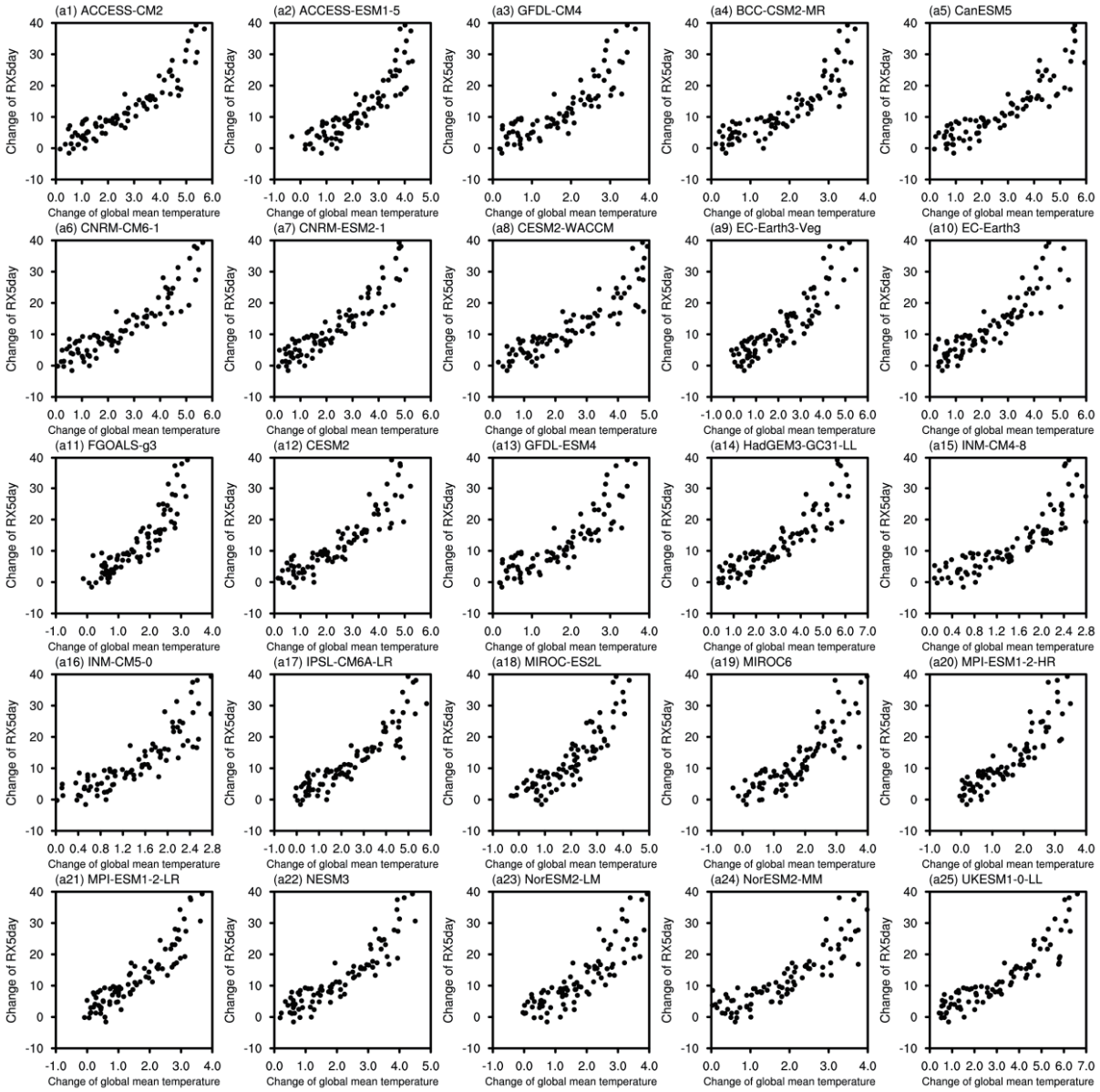

Fig. S3. Scatter plot to show the relationships between the change of global mean temperature and change of Rx5day of 26 CMIP6 models.

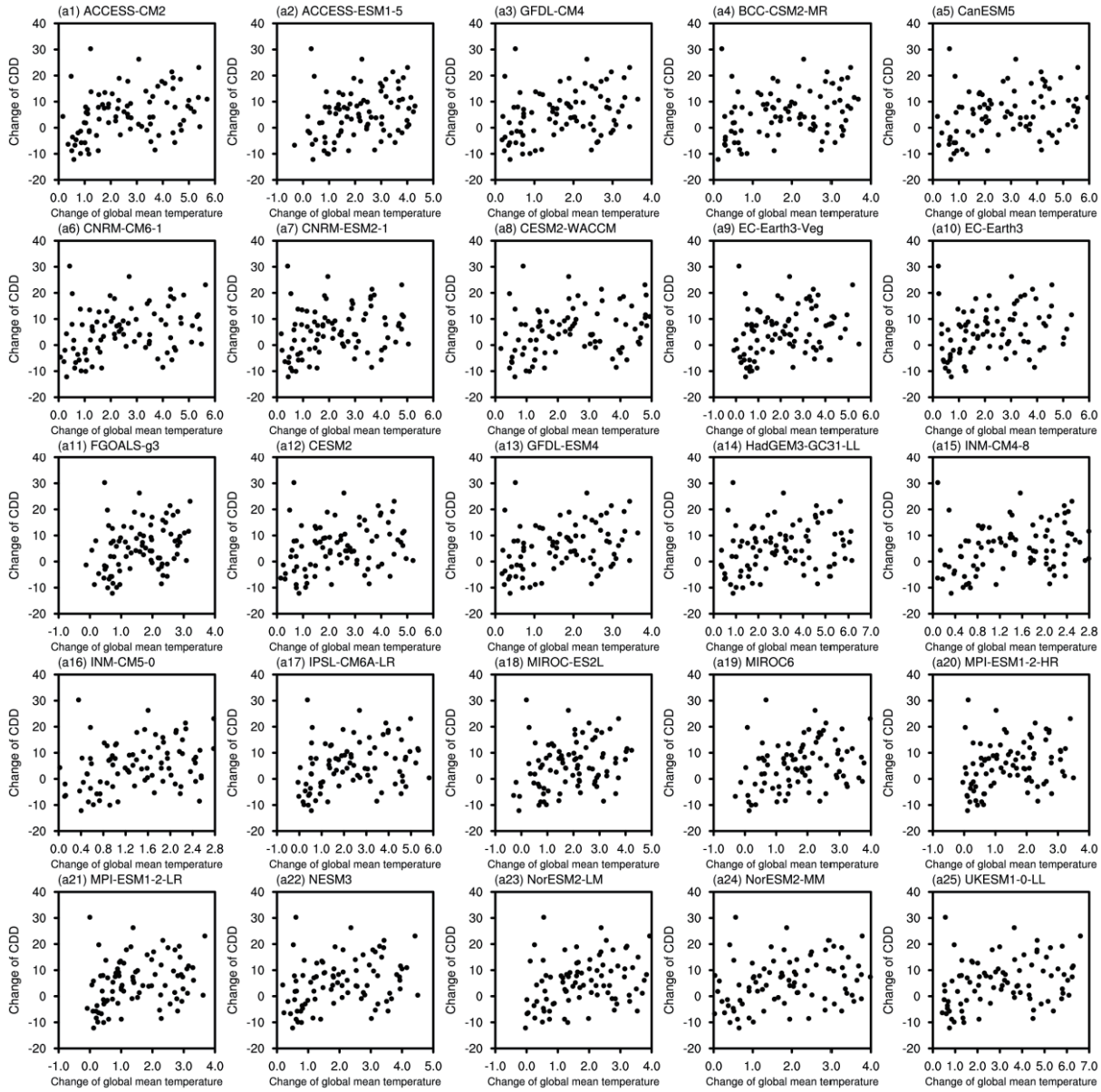

Fig. S4. As in Figure S3, but for CDD.

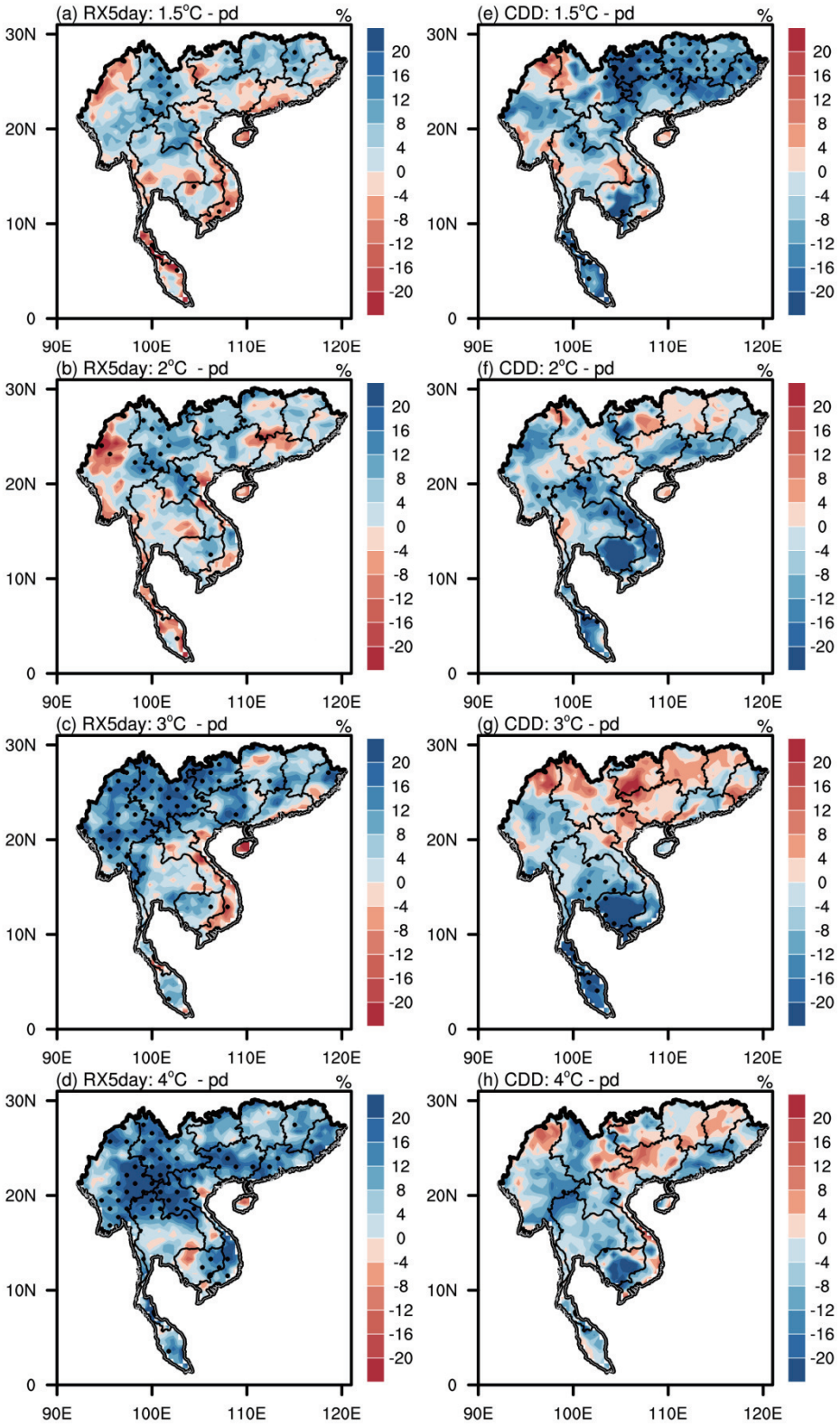

Fig. S5. Relative changes of (a–d) RX5day and (e–h) CDD at 1.5°C, 2°C, 3°C and 4°C of global warming under SSP5-8.5 relative to 1995–2014. Stippling denotes areas where at least 2/3 of the models agree on the sign of the change.

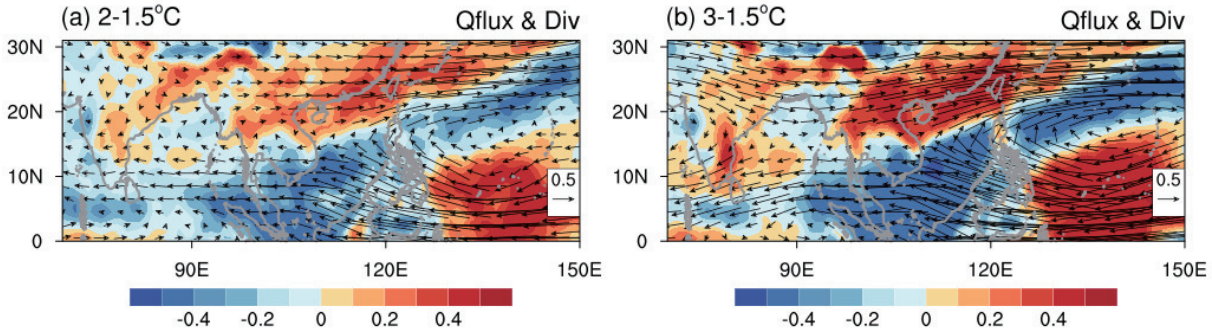

Fig. S6. Relative changes of vertically integrated water vapor flux (vectors; kg m^{-1} s^{-1}) and water vapor flux divergence (shading; 10^{-6} kg m^{-2} s^{-1}) from the surface to 100 hPa at (a) 2°C and (b) 3°C global warming levels compared with 1.5°C.