A stepwise-clustered heat stress downscaling approach to analyze future variations of heat stress in East China

Bizheng Yu[1], Guohe Huang[1,2*], Xiong Zhou[3], Shuguang Wang[1], Yongping Li[3], Yinghui Wu[2], and Jiayan Ren[3]

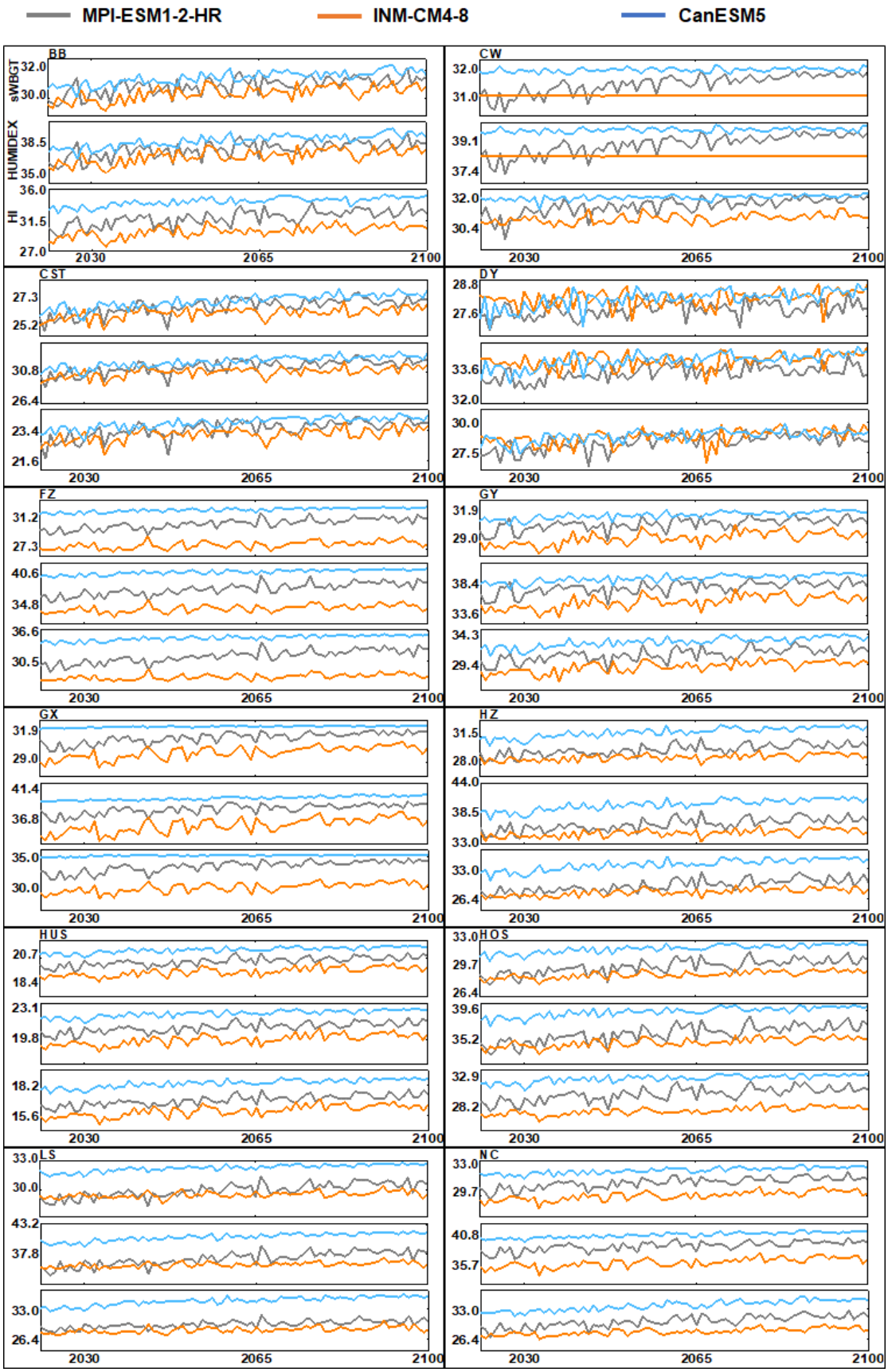
[1] School of Environmental Science and Engineering, Shandong University, Qingdao 266237, China

[2] Institute for Energy, Environment and Sustainable Communities, University of Regina, Regina, Saskatchewan S4S 0A2, Canada

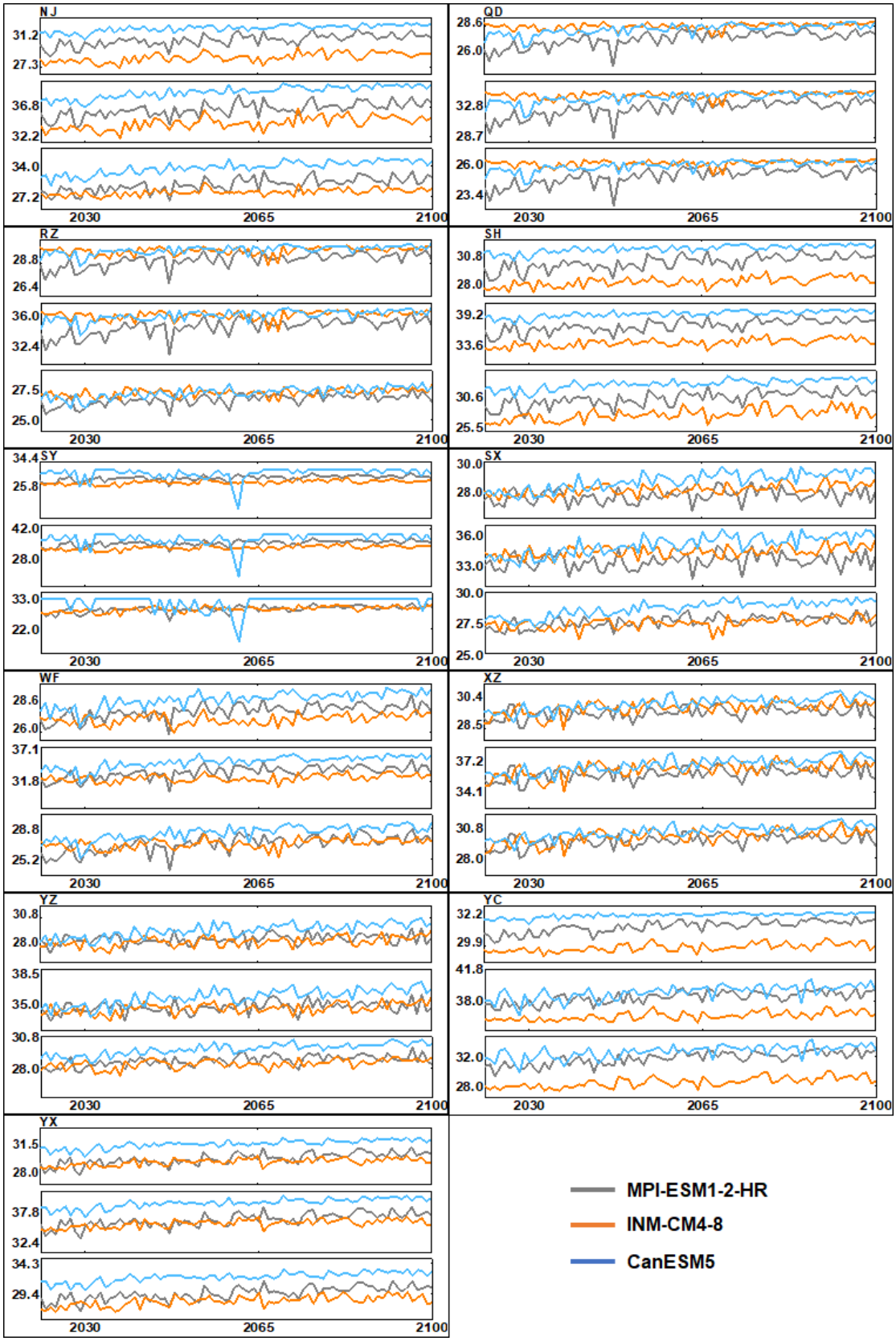
[3] State Key Joint Laboratory of Environmental Simulation and Pollution Control, China-Canada for Energy, Environment and Ecology Research, UR-BNU, School of Environment, Beijing Normal University, Beijing 100875, China

[*] Corresponding author G H Huang (Email: huangg@uregina.ca)

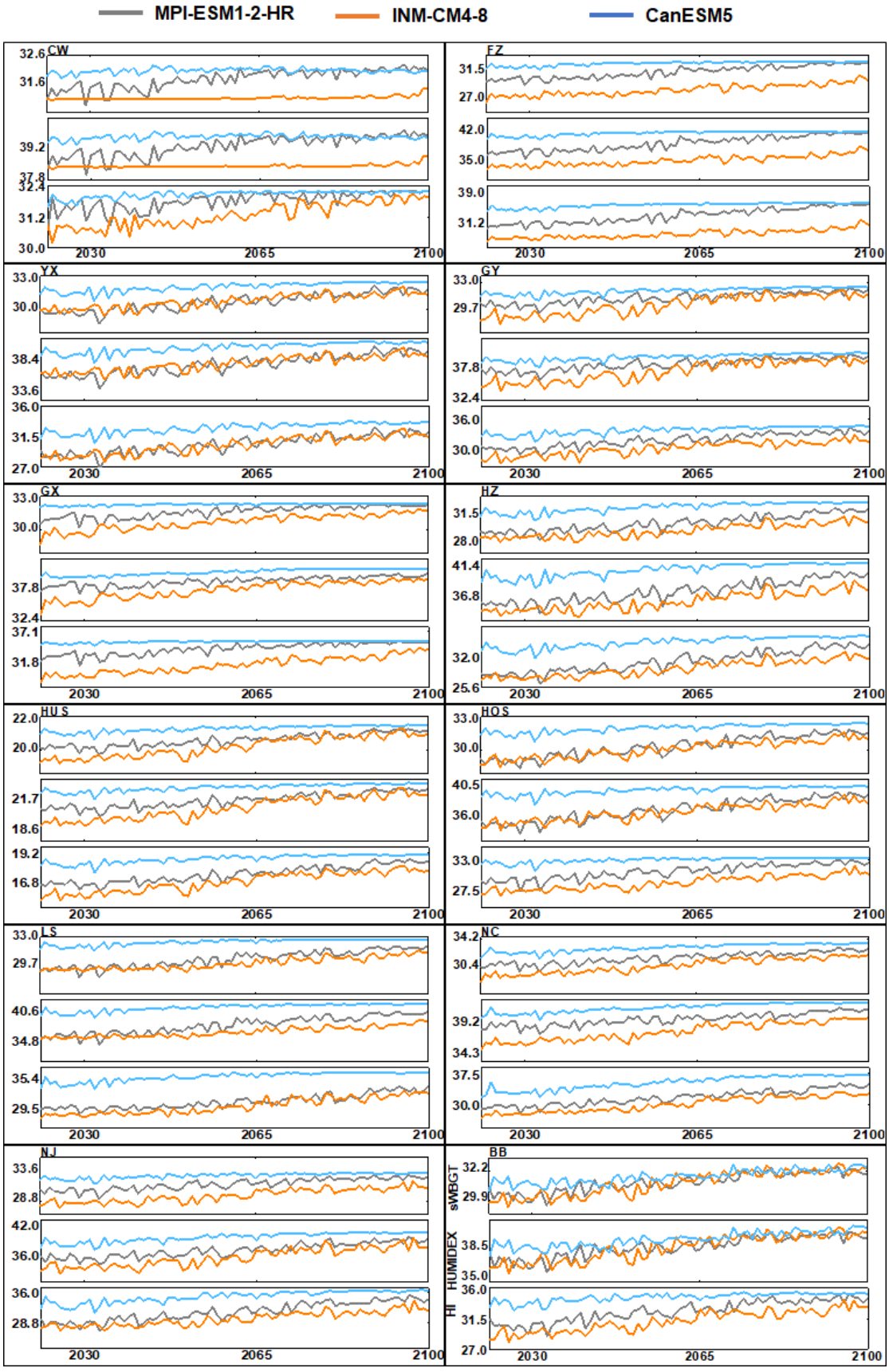
SI contents:
Supplementary Figures: 10
Supplementary table: 01



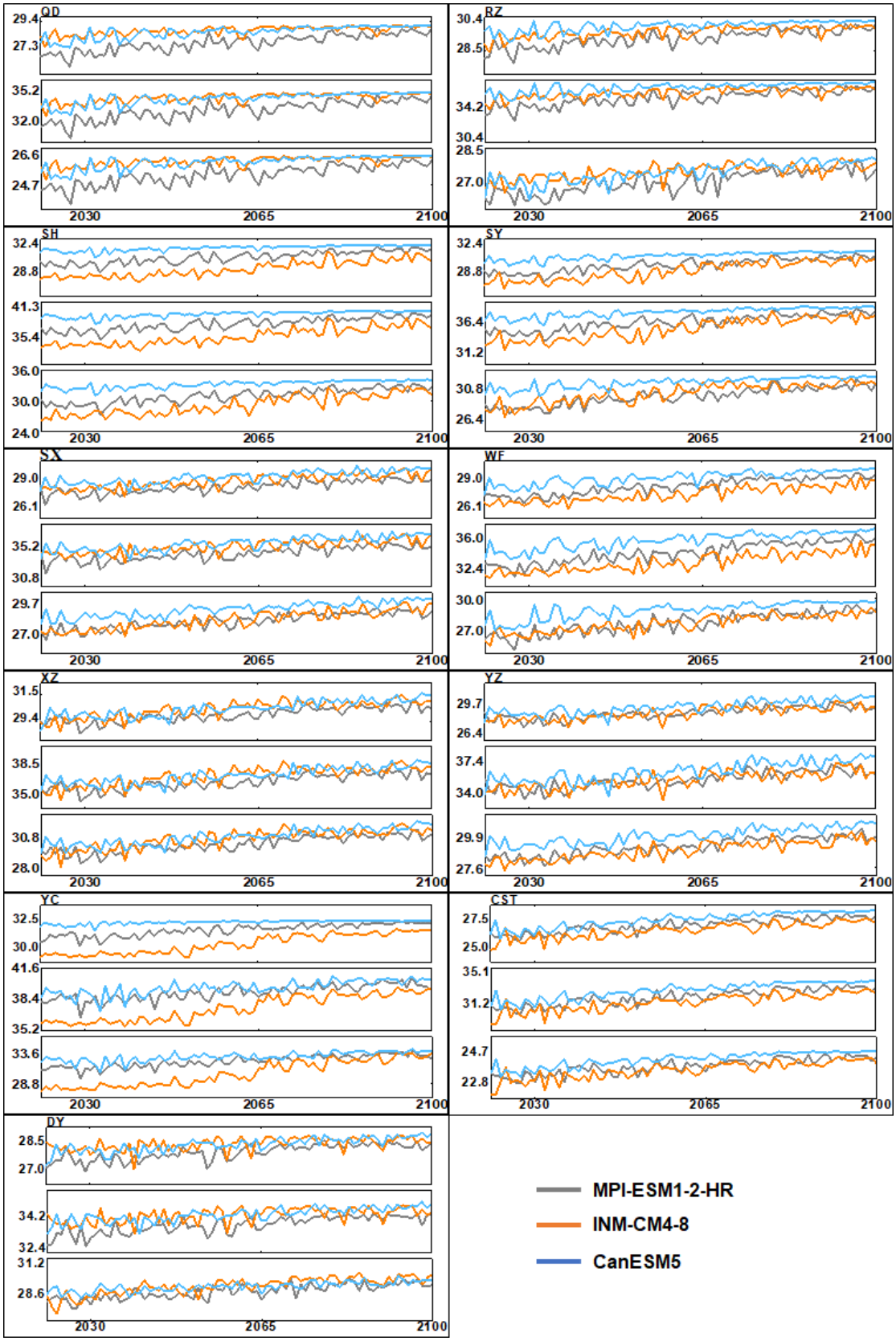
Supplementary Fig 1 The annual mean changes of sWBGT, HI and HUMIDEX in East China during the period of 2021-2100 under SSP245



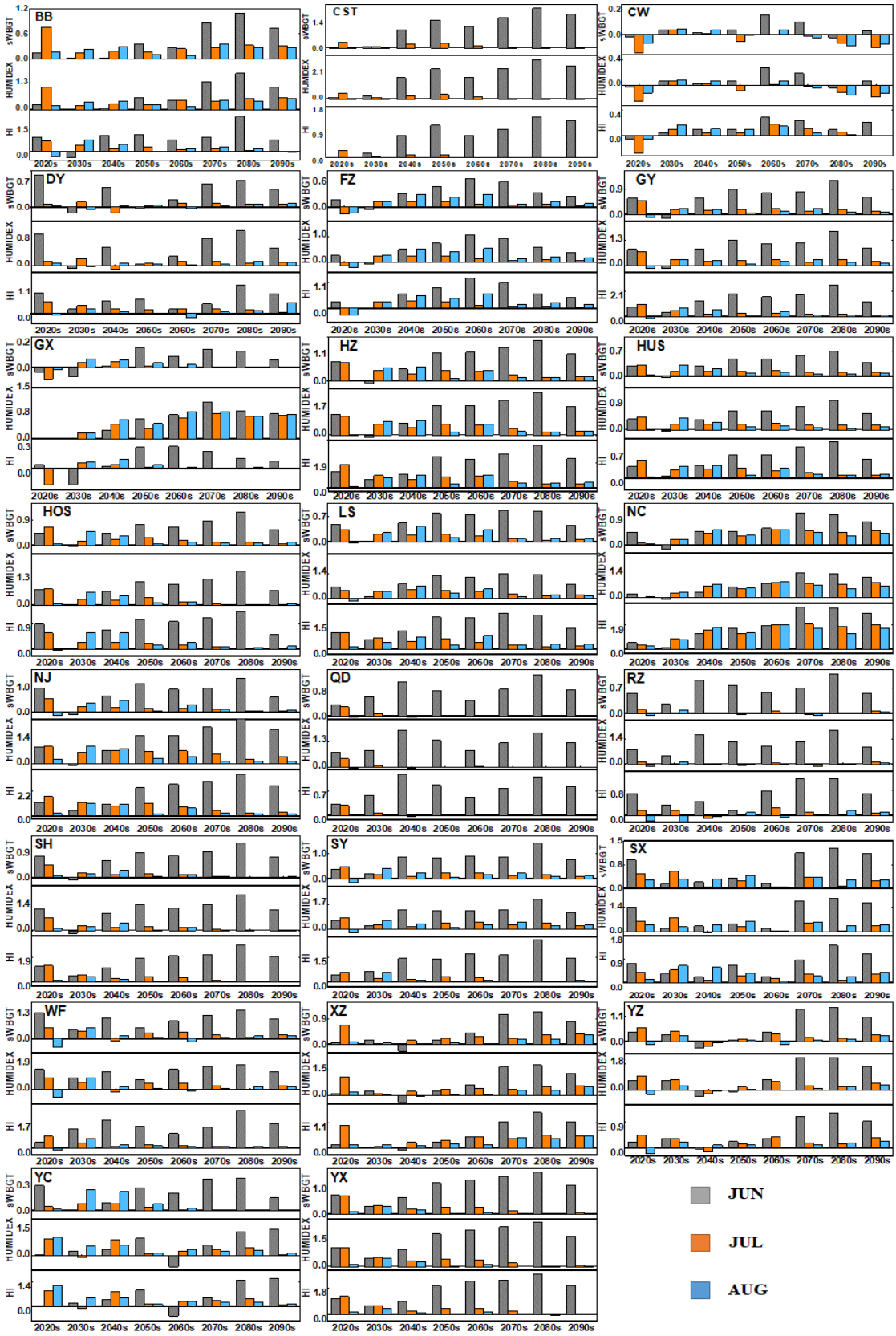
Supplementary Fig 2 The annual mean changes of sWBGT, HI and HUMIDEX in East China during the period of 2021-2100 under SSP245



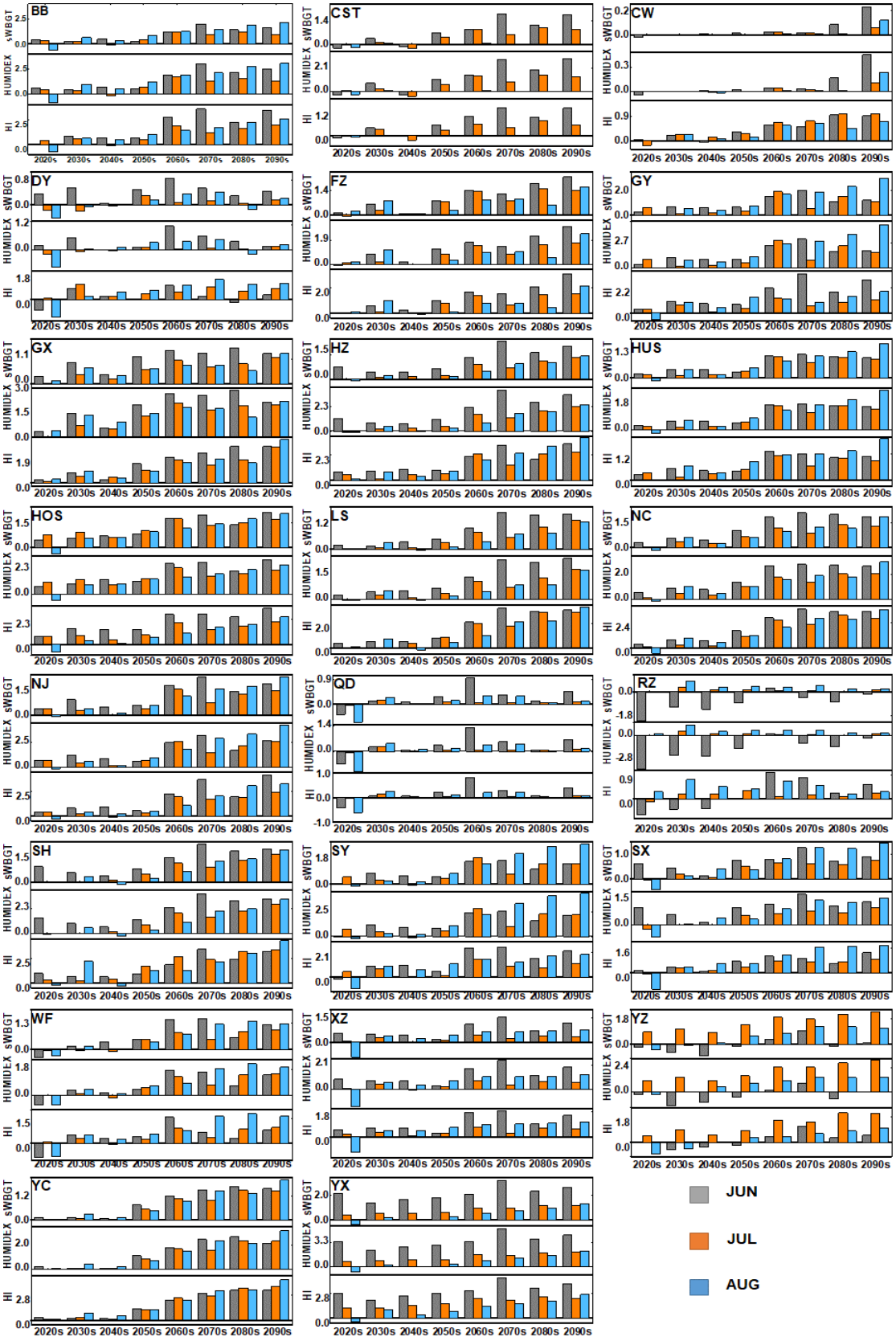
Supplementary Fig 3 The annual mean changes of sWBGT, HI and HUMIDEX in East China during the period of 2021-2100 under SSP585



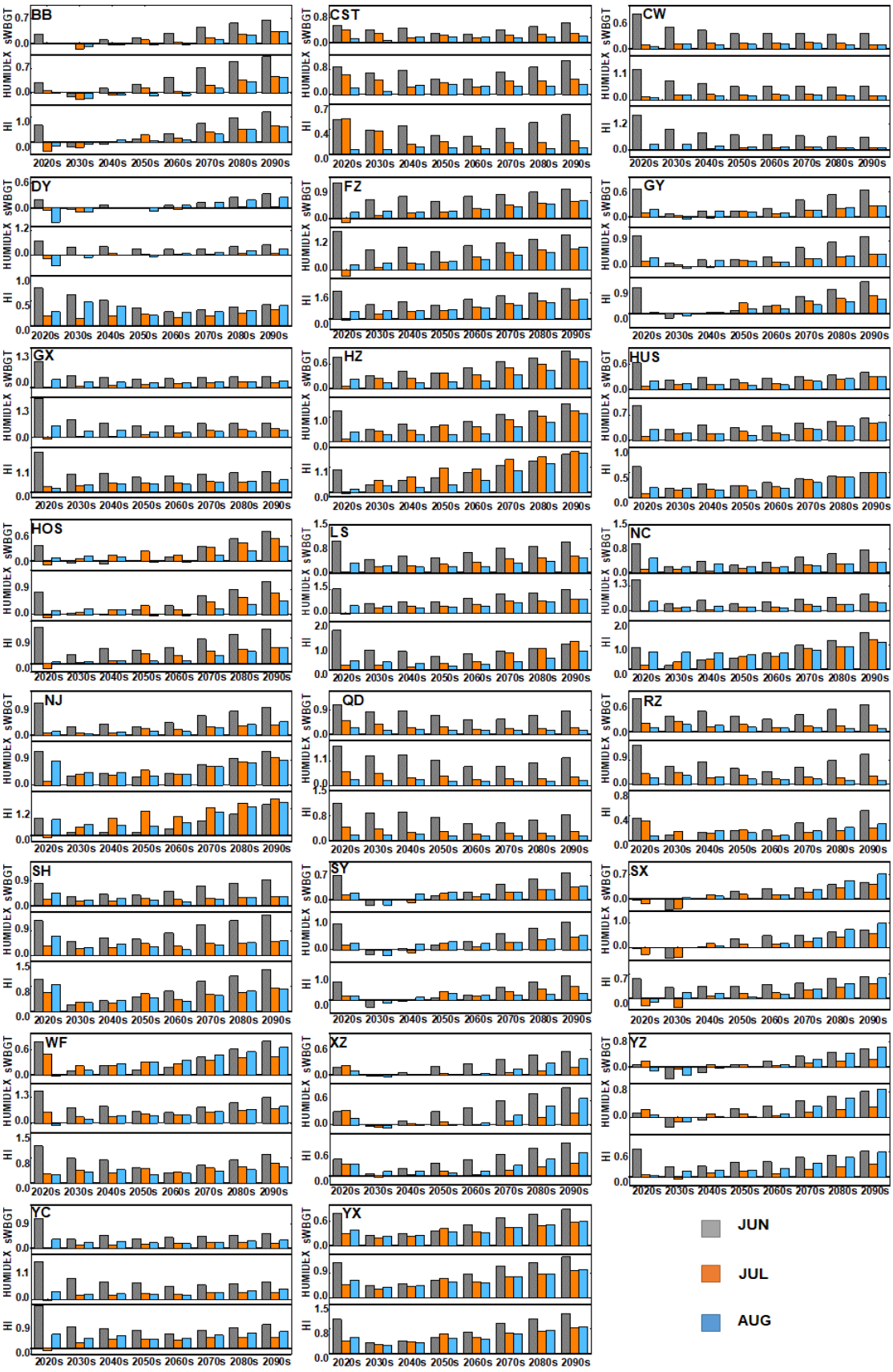
Supplementary Fig 4 The annual mean changes of sWBGT, HI and HUMIDEX in East China during the period of 2021-2100 under SSP585



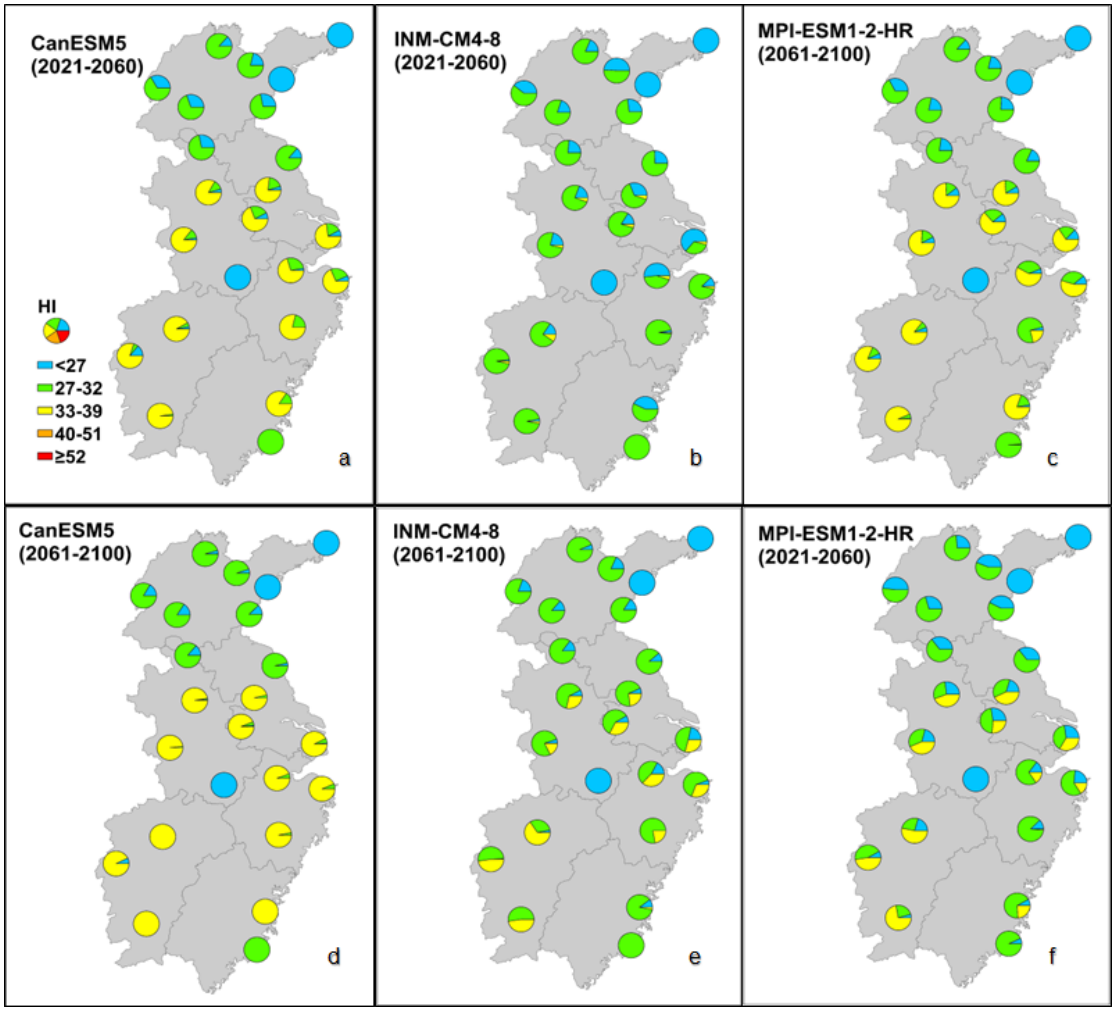
Supplementary Fig 5 The increase of monthly (June, July and August) mean HI, HUMIDEX and sWBGT for each decade of CanESM5 under SSP585 scenarios compared with that under SSP245 scenarios during the period of 2021-2100 in East China



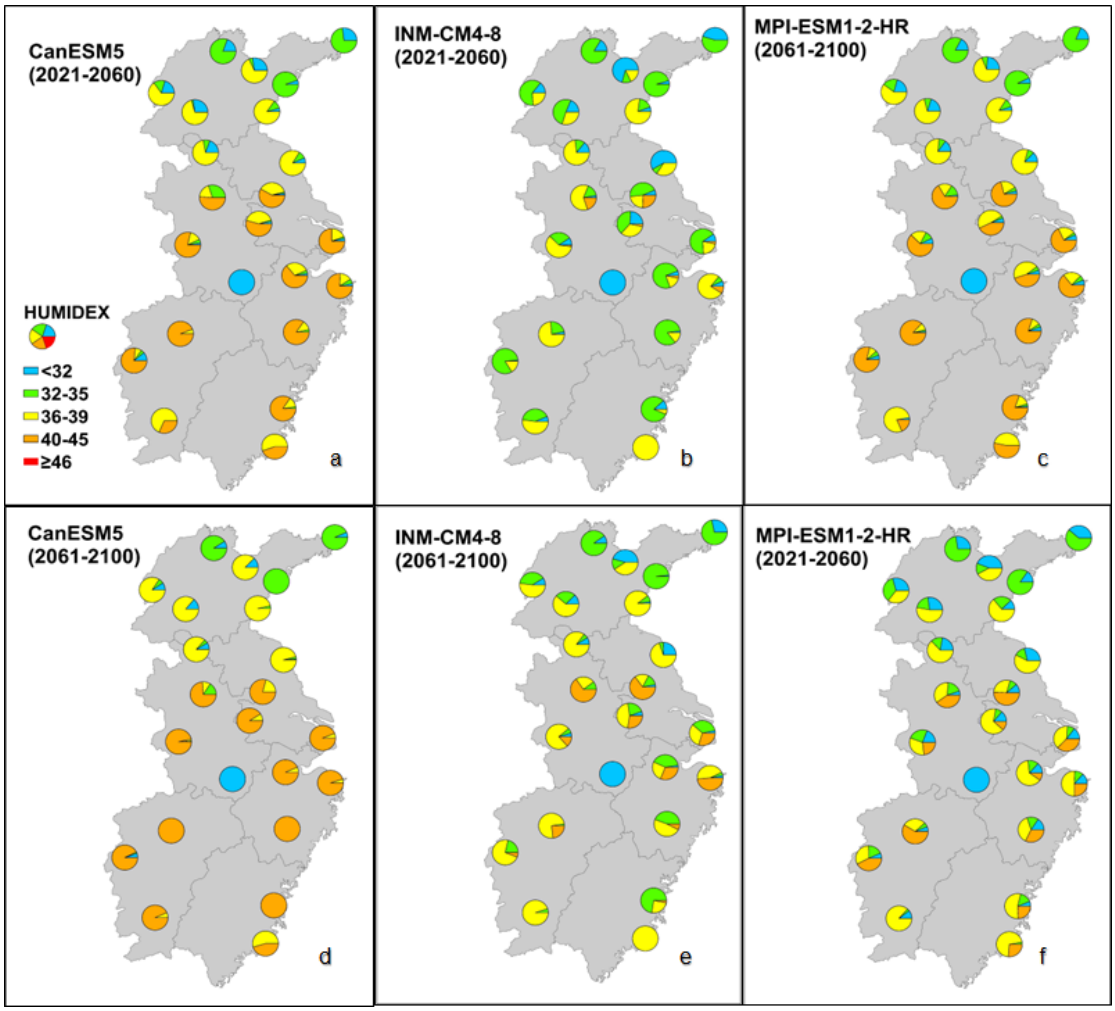
Supplementary Fig 6 The increase of monthly (June, July and August) mean HI, HUMIDEX and sWBGT for each decade of INM-CM4-8 under SSP585 scenarios compared with that under SSP245 scenarios during the period of 2021-2100 in East China



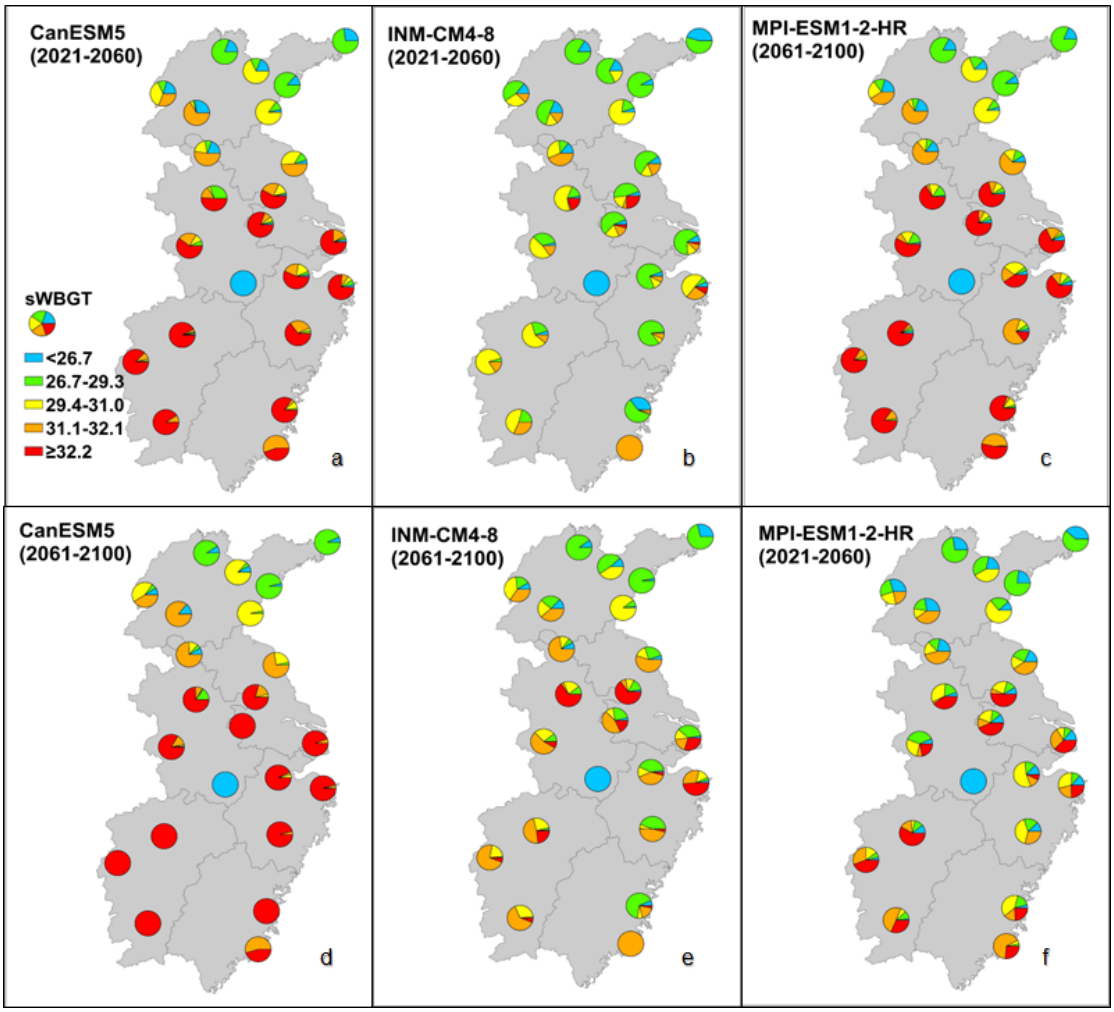
Supplementary Fig 7 The increase of monthly (June, July and August) mean HI, HUMIDEX and sWBGT for each decade of MPI-ESM1-2-HR under SSP585 scenarios compared with that under SSP245 scenarios during the period of 2021-2100 in East China



Supplementary Fig 8 The ratios of the number of days over different thresholds for HI at different sites in East China between the period of 2021-2060 and 2061-2100 for the three GCMs in SSP585 scenario



Supplementary Fig 9 The ratios of the number of days over different thresholds for HUMIDEX at different sites in East China between the period of 2021-2060 and 2061-2100 for the three GCMs in SSP585 scenario



Supplementary Fig 10 The ratios of the number of days over different thresholds for sWBGT at different sites in East China between the period of 2021-2060 and 2061-2100 for the three GCMs in SSP585 scenario

Supplementary Table 1: Average number of summer (JJA) days in each heat index category for the period of 2021-2060 (T1) and 2061-2100 (T2) under SSP585 scenarios (Couple the results of the 3 GCMs).

station	time	HI (℃)				HUMIDEX				sWBGT			
		27-32 caution	33-39 extreme caution	40-51 danger	≥52 extreme danger	32-35 alert	36-39 some discomfort	40-45 great discomfort	≥46 dangerous	26.7-29.3 alert	29.4-31.0 caution	31.1-32.1 potentially dangerous	≥32.2 dangerous
DY	T1	12.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	T2	12.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CST	T1	0.0	0.0	0.0	0.0	41.0	39.2	0.0	0.0	18.8	22.2	39.2	0.0
	T2	0.0	0.0	0.0	0.0	35.4	50.1	0.0	0.0	24.7	10.7	50.1	0.0
WF	T1	56.9	0.0	0.0	0.0	34.4	17.8	26.4	0.0	11.1	24.0	23.8	26.4
	T2	77.5	0.0	0.0	0.0	20.0	25.3	38.7	0.0	5.7	27.2	15.9	38.7
SX	T1	55.0	0.0	0.0	0.0	21.6	34.1	27.4	0.0	8.0	17.7	24.1	20.1
	T2	70.3	0.0	0.0	0.0	11.4	32.1	41.4	0.0	4.2	13.0	19.8	25.0
QD	T1	0.0	0.0	0.0	0.0	29.1	58.1	0.0	0.0	23.6	6.6	54.8	0.0
	T2	0.0	0.0	0.0	0.0	29.0	60.1	0.0	0.0	27.1	2.1	58.7	0.0
YZ	T1	67.5	0.0	0.0	0.0	20.3	32.6	30.8	0.0	6.1	18.1	28.7	5.8
	T2	75.5	0.0	0.0	0.0	10.8	29.5	44.8	0.0	2.7	10.0	27.7	7.1
RZ	T1	62.1	0.0	0.0	0.0	10.3	28.3	49.6	0.0	7.4	22.6	8.9	49.6
	T2	75.2	0.0	0.0	0.0	4.2	29.1	56.4	0.0	3.5	26.3	3.6	56.4
XZ	T1	65.2	0.0	0.0	0.0	14.9	25.7	44.5	0.0	4.5	15.7	20.4	15.1
	T2	75.6	0.0	0.0	0.0	8.0	26.6	52.1	0.0	2.6	9.2	22.9	7.3
SY	T1	69.1	0.0	0.0	0.0	24.2	22.9	36.1	0.0	7.4	9.8	33.1	15.1
	T2	81.0	0.0	0.0	0.0	10.3	26.6	50.4	0.0	3.7	6.7	27.8	11.7
BB	T1	35.7	40.7	0.0	0.0	6.6	25.2	36.8	21.6	5.6	11.3	15.0	31.4
	T2	24.3	61.0	0.0	0.0	4.4	13.2	30.7	42.3	4.3	4.1	9.2	27.0

GY	T1	36.5	38.3	0.0	0.0	5.6	23.1	34.1	25.6	3.7	9.3	16.6	25.4
	T2	27.5	58.6	0.0	0.0	2.5	10.6	33.3	43.6	1.8	4.0	7.6	25.9
NJ	T1	45.4	30.8	0.0	0.0	10.9	32.9	26.3	17.8	3.4	9.5	22.0	20.5
	T2	27.0	57.8	0.0	0.0	2.8	21.3	29.5	35.8	1.5	3.8	9.6	26.1
HOS	T1	37.5	40.7	0.0	0.0	11.4	20.0	30.1	24.7	11.5	9.8	14.4	24.0
	T2	28.8	58.3	0.0	0.0	4.8	8.3	42.6	33.4	4.6	5.2	6.3	26.1
SH	T1	27.6	34.0	0.0	0.0	6.9	32.8	23.7	24.1	2.9	7.0	30.0	15.8
	T2	23.2	57.0	0.0	0.0	2.2	17.4	32.2	37.4	1.1	2.0	16.4	25.0
HZ	T1	42.7	28.1	0.0	0.0	6.8	43.5	16.9	20.8	4.1	19.1	27.9	10.6
	T2	26.5	57.5	0.0	0.0	2.5	26.0	23.4	37.7	1.6	9.7	18.6	17.6
HUS	T1	0.0	0.0	0.0	0.0	61.3	0.0	0.0	0.0	0.0	61.3	0.0	0.0
	T2	0.0	0.0	0.0	0.0	60.8	0.0	0.0	0.0	0.0	60.8	0.0	0.0
YX	T1	51.7	27.1	0.0	0.0	6.4	19.7	35.8	26.0	3.3	12.1	10.6	25.0
	T2	31.5	54.2	0.0	0.0	3.0	8.5	34.5	43.3	1.9	4.2	5.4	24.4
NC	T1	32.4	47.5	0.0	0.0	2.9	16.0	42.3	28.8	3.4	3.6	12.5	36.3
	T2	12.2	76.1	0.0	0.0	0.9	3.4	49.1	37.3	1.0	1.2	2.2	33.8
LS	T1	62.1	24.8	0.0	0.0	5.3	38.0	18.1	25.8	5.5	13.3	35.5	3.1
	T2	47.0	42.7	0.0	0.0	1.4	16.7	39.0	32.5	1.7	3.5	33.3	6.1
YC	T1	44.3	40.2	0.0	0.0	9.5	36.5	20.4	23.5	2.0	5.0	11.4	38.4
	T2	19.4	67.2	0.0	0.0	3.7	9.9	46.0	29.9	1.0	1.1	3.6	31.3
FZ	T1	42.9	33.3	0.0	0.0	8.4	42.4	13.5	25.8	5.0	23.1	23.1	10.8
	T2	31.6	55.7	0.0	0.0	1.1	26.4	31.9	31.2	0.9	5.5	21.3	26.5
GX	T1	36.6	53.1	0.0	0.0	3.0	39.0	37.1	9.7	3.0	2.4	21.6	24.4
	T2	17.5	73.3	0.0	0.0	0.4	25.2	36.4	28.4	0.8	0.3	4.1	34.6
CW	T1	89.8	0.0	0.0	0.0	0.8	21.6	55.7	13.6	0.8	1.6	20.0	8.1
	T2	90.9	0.0	0.0	0.0	0.2	14.1	47.0	13.8	0.2	0.5	13.6	16.1