remote sensing

MDPI

Supplementary Materials:

Table S1 Relationship between the temperature, precipitation and the Atmospheric Circulation Index.

No.	Atmospheric Circulation Index	Tem(r^2)	Pre (r^2)
1	Northern Hemisphere Subtropical High Area Index	0.678**	0.870**
2	North African Subtropical High Area Index	0.660**	0.764**
3	North African-North Atlantic-North American Subtropical High Area Index	0.678**	0.805**
4	Indian Subtropical High Area Index	0.472**	0.880**
5	Western Pacific Subtropical High Area Index	0.674**	0.848**
6	Eastern Pacific Subtropical High Area Index	0.642**	0.939**
7	North American Subtropical High Area Index	0.640**	0.903**
8	Atlantic Subtropical High Area Index	0.709**	0.668**
9	South China Sea Subtropical High Area Index	0.572**	0.907**
10	North American-Atlantic Subtropical High Area Index	0.692**	0.839**
11	Pacific Subtropical High Area Index	0.672**	0.906**
12	Northern Hemisphere Subtropical High Intensity Index	0.679**	0.897**
13	North African Subtropical High Intensity Index	0.678**	0.838**
14	North African-North Atlantic-North American Subtropical High Intensity Index	0.695**	0.850**
15	Indian Subtropical High Intensity Index	0.470**	0.866**
16	Western Pacific Subtropical High Intensity Index	0.652**	0.888**
17	Eastern Pacific Subtropical High Intensity Index	0.608**	0.940**
18	North American Subtropical High Intensity Index	0.648**	0.914**
19	North Atlantic Subtropical High Intensity Index	0.738**	0.717**
20	South China Sea Subtropical High Intensity Index	0.570**	0.908**
21	North American-North Atlantic Subtropical High Intensity Index	0.711**	0.857**
22	Pacific Subtropical High Intensity Index	0.643**	0.929**
23	Northern Hemisphere Subtropical High Ridge Position Index	0.006	0.142**
24	North African Subtropical High Ridge Position Index	0.054	0.240**
25	North African-North Atlantic-North American Subtropical High Ridge Position Index	0.103*	0.002
26	Indian Subtropical High Ridge Position Index	0.024	0.028
27	Western Pacific Subtropical High Ridge Position Index	0.065*	0.029
28	Eastern Pacific Subtropical High Ridge Position Index	0.220**	0.131**
29	North American Subtropical High Ridge Position Index	0.324**	0.154**
30	Atlantic Sub Tropical High Ridge Position Index	0.477**	0.663**
31	South China Sea Subtropical High Ridge Position Index	0.289**	0.260**
32	North American-North Atlantic Subtropical High Ridge Position Index	0.515**	0.237**
33	Pacific Subtropical High Ridge Position Index	0.041	0.022
34	Northern Hemisphere Subtropical High Northern Boundary Position Index	0.471**	0.432**
35	North African Subtropical High Northern Boundary Position Index	0.610**	0.702**
36	North African-North Atlantic-North American Subtropical High Northern Boundary Position Index	0.530**	0.615**
37	Indian Subtropical High Northern Boundary Position Index	0.575**	0.512**
38	Western Pacific Subtropical High Northern Boundary Position Index	0.310**	0.203**
39	Eastern Pacific Subtropical High Northern Boundary Position Index	0.158**	0.333**
40	North American Subtropical High Northern Boundary Position Index	0.493**	0.399**
41	Atlantic Subtropical High Northern Boundary Position Index	0.255**	0.710**
42	South China Sea Subtropical High Northern Boundary Position Index	0.344**	0.209**
43	North American-Atlantic Subtropical High Northern Boundary Position Index	0.374**	0.509**
44	Pacific Subtropical High Northern Boundary Position Index	0.332**	0.208**
45	Western Pacific Sub Tropical High Western Ridge Point Index	0.571**	0.238**

46	Asia Polar Vortex Area Index	0.636**	0.509**
47	Pacific Polar Vortex Area Index	0.631**	0.702**
48	North American Polar Vortex Area Index	0.613**	0.576**
49	Atlantic-European Polar Vortex Area Index	0.583**	0.731**
50	Northern Hemisphere Polar Vortex Area Index	0.713**	0.737**
51	Asia Polar Vortex Intensity Index	0.640**	0.647**
52	Pacific Polar Vortex Intensity Index	0.700**	0.719**
53	North American Polar Vortex Intensity Index	0.607**	0.341**
54	Atlantic-European Polar Vortex Intensity Index	0.653**	0.683**
55	Northern Hemisphere Polar Vortex Intensity Index	0.759**	0.677**
56	Northern Hemisphere Polar Vortex Central Longitude Index	0.228**	0.077*
57	Northern Hemisphere Polar Vortex Central Latitude Index	0.001	0.047
58	Northern Hemisphere Polar Vortex Central Intensity Index	0.501**	0.313**
59	Eurasian Zonal Circulation Index	0.187**	0.090*
60	Eurasian Meridional Circulation Index	0.072*	0.001
61	Asian Zonal Circulation Index	0.067*	0.002
62	Asian Meridional Circulation Index	0.001	0.038
63	East Asian Trough Position Index	0.002	0.007
64	East Asian Trough Intensity Index	0.666**	0.584**
65	Tibet Plateau Region 1 Index	0.628**	0.682**
66	Tibet Plateau Region 2 Index	0.621**	0.597**
67	India-Burma Trough Intensity Index	0.504**	0.652**
68	Arctic Oscillation, AO	0.172**	0.313**
69	Antarctic Oscillation, AAO	0.593**	0.616**
70	North Atlantic Oscillation, NAO	0.338**	0.178**
71	Pacific/ North American Pattern, PNA	0.543**	0.401**
72	East Atlantic Pattern, EA	0.674**	0.662**
73	West Pacific Pattern, WP	0.293**	0.504**
74	North Pacific Pattern, NP	0.362**	0.297**
75	East Atlantic-West Russia Pattern, EA/WR	0.569**	0.594**
76	Tropical-Northern Hemisphere Pattern, TNH	0.143**	0.204**
77	Polar-Eurasia Pattern, POL	0.311**	0.243**
78	Scandinavia Pattern, SCA	0.581**	0.511**
79	Pacific Transition Pattern, PT	0.359**	0.313**
80	30hPa zonal wind Index	0.110	0.006
81	50 hPa zonal wind Index	0.000	0.020
82	Mid-Eastern Pacific 200mb Zonal Wind Index	0.014	0.004
83	West Pacific 850mb Trade Wind Index	0.531**	0.252**
84	Central Pacific 850mb Trade Wind Index	0.004	0.002
85	East Pacific 850mb Trade Wind Index	0.483**	0.204**
86	Atlantic-European Circulation W Pattern Index	0.001	0.074*
87	Atlantic-European Circulation C Pattern Index	0.001	0.074*
88	Atlantic-European Circulation E Pattern Index	0.002	0.001

* and ** represent statistically significant results at the 0.95 and 0.99 confidence levels, respectively.

Table S2 Symbols and Abbreviations Used in the Manuscript.

No.	Symbol/Acronym	Full Term/Explanation
1	NWC	Northwest China
2	CEEs	Compound extreme events
3	CMIP6	Coupled Model Intercomparison Project Phase 6
4	HE-D	hot extremes-dry
5	HE-HP	hot extremes-heavy precipitation
6	CMA	China Meteorological Administration
7	PCC	pattern correlation coefficient
8	NRMSE	normalized root-mean-square error
9	MME	multi-model ensemble
10	NAS	North Atlantic Subtropical High Intensity Index
11	NANA	North American-North Atlantic Subtropical High Intensity Index
12	NHA	Northern Hemisphere Polar Vortex Area Index
13	NH	Northern Hemisphere Polar Vortex Intensity Index
14	ESA	Eastern Pacific Subtropical High Area Index
15	ES	Eastern Pacific Subtropical High Intensity Index
16	NAM	North American Subtropical High Intensity Index
17	PS	Pacific Subtropical High Intensity Index

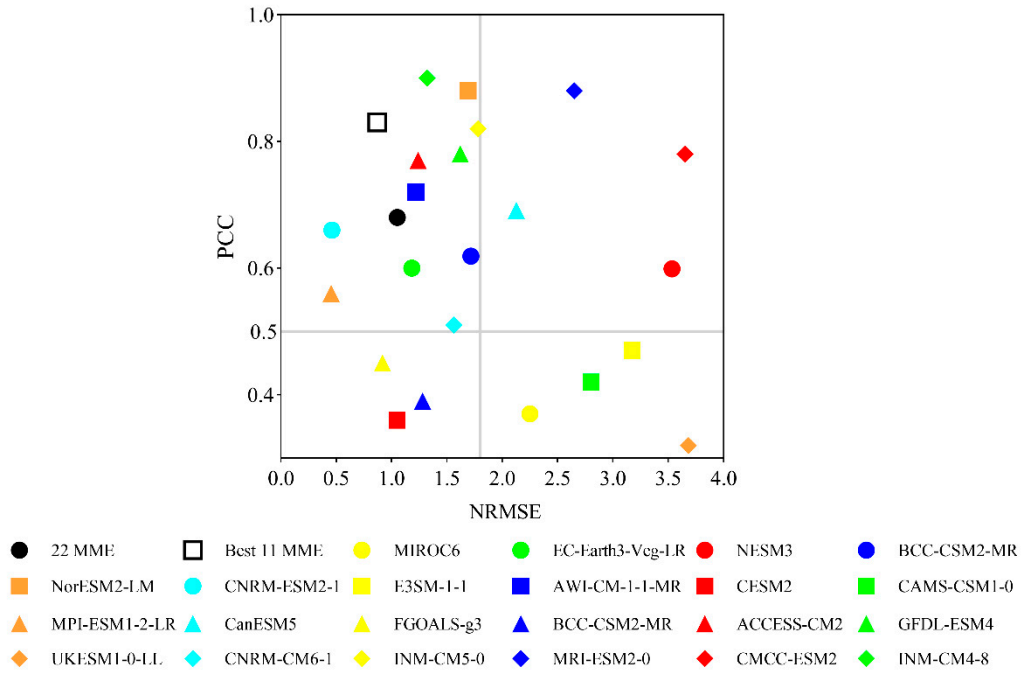


Figure S1 Performance of the 22 CMIP6 models and their MME (solid black dot) on simulating the observed monthly mean air temperature over the NWC during 1961-2015. The vertical and horizontal coordinates in Figure S1 are PCC and NRMSE, respectively. The horizontal gray line in Figure S1 indicates the PCC greater than 0.5. The vertical gray line in Figure S1 indicates the mean value of the NRMSE of 22 models. The hollow black square in Figure S1 depicts the MME of the selected best 11 models enclosed in the upper left quadrant.