

Table S1. Location of 30 meteorological stations.

	Station	Latitude (°N)	Longitude (°E)	Altitude (m)	Location
WTS	Kashgar	39.47	75.98	1289.4	plains
	Akqi	40.93	78.45	1984.9	mountains
	Wuqia	39.72	75.25	2178.0	mountains
	Turgart	40.52	75.40	3507.0	mountains
	Bachu	39.80	78.57	1116.5	plains
	Kalpin	40.50	79.05	1161.8	plains
CTS	Zhaosu	43.15	81.13	1851.0	mountains
	Baluntai	42.73	86.30	1739.0	mountains
	Byanbulak	43.03	84.15	2458.0	mountains
	Yining	43.95	81.33	662.50	plains
	Yanqi	42.08	86.57	1055.3	plains
	Aksu	41.17	80.23	1103.8	plains
	Baicheng	41.78	81.90	1229.2	plains
	Kuqa	41.72	82.97	1081.9	plains
	Korla	41.75	86.13	931.50	plains
	Alar	40.55	81.27	1012.2	plains
	Wusu	44.43	84.67	478.00	plains
	Luntai	41.78	84.25	978.00	plains
	Jinghe	44.62	82.90	320.10	plains
ETS	Barkol	43.60	93.05	1677.2	mountains
	Yiwu	43.27	94.70	1728.6	mountains
	Urumqi	43.78	87.65	935.00	plains
	Dabancheng	43.35	88.32	1103.5	plains
	Shisanjianfang	43.22	91.73	721.40	plains
	Qitai	44.02	89.57	793.50	plains
	Kumux	42.23	88.22	922.40	plains
	Naomao Lake	43.77	95.13	479.00	plains
	Turpan	42.93	89.20	37.000	plains
	Caijiahu	44.20	87.53	441.00	plains
	Hami	42.82	93.52	737.20	plains

Table S2. Parameters of the downscaling models.

Month	b0	b1	b2	b3	b4	b5
1	0.23	0.40	0.01	0.01	-1.32	-0.87
2	0.23	0.64	0.03	0.01	-1.59	0.11
3	0.18	0.64	0.06	0.01	-1.52	0.12
4	0.03	0.53	0.07	0.01	-0.26	-0.81
5	-0.04	0.59	0.09	0.01	0.11	-0.75
6	-0.17	0.92	0.15	0.01	0.54	-0.90
7	-0.19	0.75	0.15	0.01	0.86	-0.79
8	-0.15	0.68	0.15	-0.01	0.91	-0.67
9	-0.08	0.54	0.11	-0.01	0.35	-0.24
10	0.02	0.45	0.05	0.01	-0.39	-0.17
11	0.14	0.50	0.02	0.02	-0.99	-0.95
12	0.24	0.37	0.01	0.01	-1.53	-0.85
Month	b6	b7	b8	b9	b10	b11
1	-0.35	2.13	5.50	-1.68	-0.68	-3.82
2	-0.55	1.86	3.25	-1.09	-0.56	-2.68
3	-0.49	1.93	2.32	-0.84	-0.66	1.81
4	-0.35	0.49	4.08	-1.00	-0.12	-2.77

5	-0.36	-0.16	3.71	-0.90	0.20	-2.56
6	-0.50	-0.81	4.24	-0.87	0.51	-3.03
7	-0.32	-1.48	3.34	-0.58	0.85	-2.36
8	-0.17	-1.83	2.98	-0.43	1.03	-2.19
9	-0.22	-0.93	1.89	-0.32	0.55	-1.47
10	-0.32	0.50	2.20	-0.62	-0.15	-1.60
11	-0.45	1.76	5.62	-1.68	-0.56	-3.77
12	-0.31	2.66	5.43	-1.76	-0.99	-3.66

Table note: The equations are expressed as: $P = b_0 + b_1 \times A + b_2 \times B + b_3 \times C + b_4 \times D + b_5 \times E + b_6 \times A^2 + b_7 \times D^2 + b_8 \times E^2 + b_9 \times D \times E + b_{10} \times D^3 + b_{11} \times E^3$. where, A is elevation, B is aspect, C is slope, D is longitude, and E is latitude.

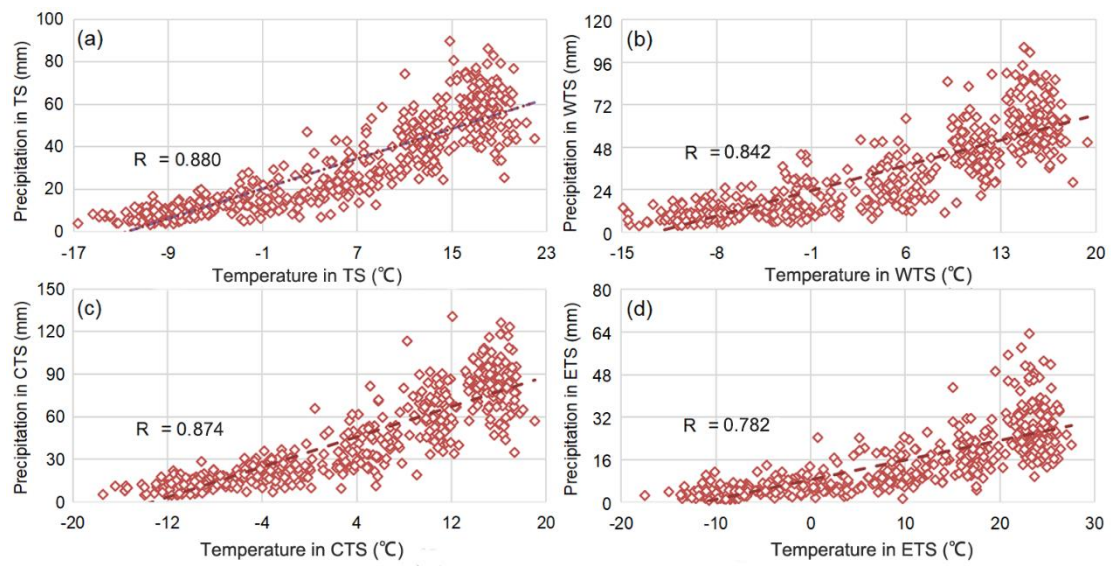


Figure S1. Scatter plots between monthly precipitation and local temperature: (a) Tianshan, (b) WTS, (c) CTS, and (d) ETS.

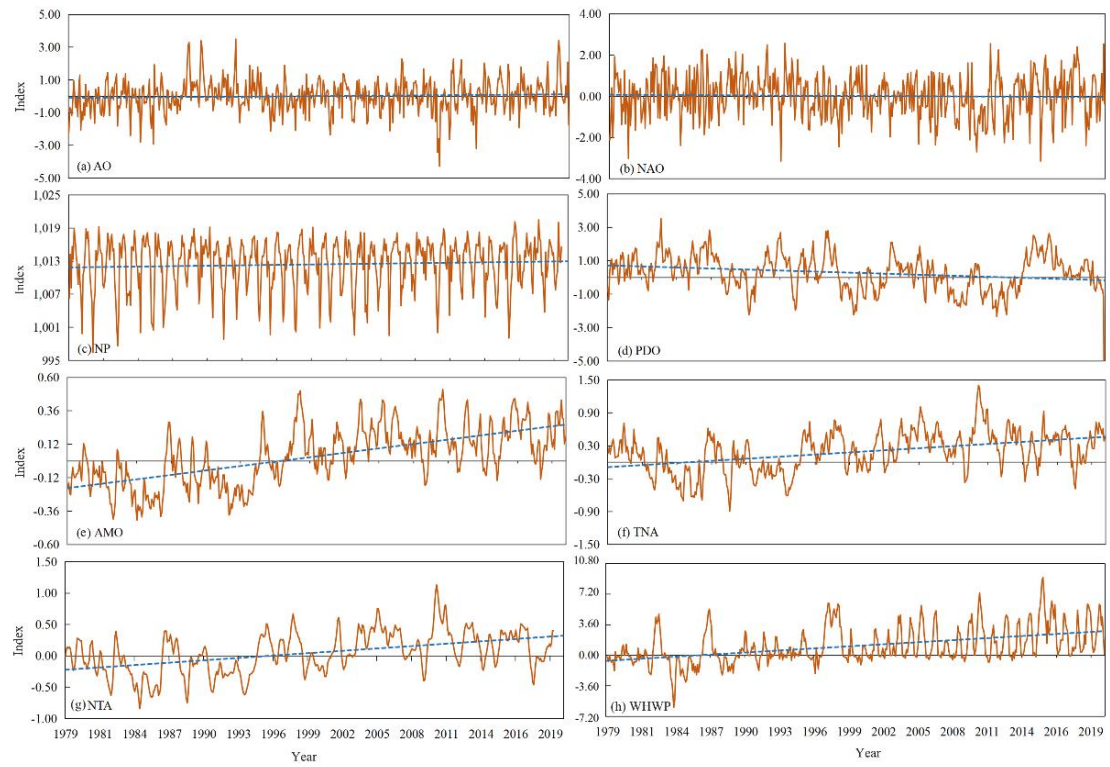


Figure S2. Changes in atmospheric circulation indexes: (a) AO, (b) NAO, (c) NP, (d) PDO, (e) AMO, (f) TNA, (g) NTA, and (h) WHWP.