Hydrology and Earth System Sciences

Supporting Information for

Future shift of the relative roles of precipitation and temperature in controlling annual runoff in the conterminous United States

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Supplementary Tables

Table S1. Comparison of percent changes (%) in mean annual precipitation (mm yr^{-1}) during historical period (from 1961-1985 to 1986-2010) and in the future scenarios (from Baseline scenario to S1~S4 scenarios) in 18 WRRs and CONUS.

WRR	Historical change		Future change				
	1961-1985	1986-2010	Baseline	S1	S2	S3	S4
1	1109	+6	1148	+6	+9	+7	+12
2	1066	+4	1102	+5	+7	+5	+10
3	1337	-2	1324	+2	+4	+3	+1
4	852	+3	862	+5	+7	+6	+10
5	1118	+2	1143	+3	+5	+4	+7
6	1388	-2	1400	+2	+4	+3	+4
7	853	+2	856	+4	+5	+4	+7
8	1404	+1	1408	+0	+1	+0	-3
9	534	+5	544	+5	+6	+5	+8
10	526	+3	537	+3	+5	+4	+7
11	762	+8	795	+1	+1	+1	-1
12	794	+4	809	-2	-1	-2	-7
13	357	+5	367	-0	+1	-1	-4
14	373	+1	392	+3	+7	+4	+7
15	325	-5	321	+0	+4	+2	+1
16	318	-4	313	+2	+6	+4	+11
17	854	-4	862	+3	+5	+3	+8
18	610	-4	589	+0	+2	+2	+5
CONUS	777	+1	786	+2	+4	+3	+4

Table S2. Comparison of changes (℃) in mean temperature during historical period (from 1961-1985 to 1986-2010) and in the future scenarios (from Baseline scenario to S1~S4 scenarios) in 18 WRRs and CONUS.

WRR	Historical change		Future change				
	1961-1985	1986-2010	Baseline	S1	S2	S3	S4
1	5.9	+0.5	6	+1.9	+3.2	+2.1	+5.6
2	9.9	+0.6	10	+1.8	+3.0	+2.0	+5.2
3	17.7	+0.3	18	+1.5	+2.4	+1.6	+4.3
4	6.9	+0.5	7	+2.0	+3.3	+2.2	+5.8
5	11.3	+0.5	12	+1.8	+2.9	+2.0	+5.1
6	13.5	+0.5	14	+1.6	+2.6	+1.8	+4.7
7	8.1	+0.5	9	+2.0	+3.4	+2.2	+5.8
8	17.3	+0.3	18	+1.6	+2.6	+1.8	+4.7
9	3.7	+0.7	4	+2.1	+3.6	+2.4	+6.2
10	7.5	+0.5	8	+1.9	+3.1	+2.1	+5.5
11	13.9	+0.2	14	+1.7	+2.8	+2.0	+5.1
12	18.7	+0.3	19	+1.6	+2.6	+1.8	+4.8
13	13.8	+0.5	14	+1.7	+2.9	+1.9	+5.1
14	6.9	+0.6	6	+1.9	+3.2	+2.1	+5.6
15	14.8	+0.7	15	+1.7	+2.9	+1.9	+5.1
16	8.5	+0.6	8	+1.9	+3.2	+2.1	+5.5
17	6.9	+0.6	6	+1.7	+3.0	+2.0	+5.2
18	13.6	+0.7	13	+1.4	+2.6	+1.7	+4.6
CONUS	11.2	+0.5	11	+1.8	+2.9	+2.0	+5.2

Table S3. Comparison of percent changes (%) in mean annual potential evapotranspiration (mm yr^{-1}) during historical period (from 1961-1985 to 1986-2010) and in the future scenarios (from Baseline scenario to S1~S4 scenarios) in 18 WRRs and CONUS.

WRR	Historical change		Future change				
	1961-1985	1986-2010	Baseline	S1	S2	S3	S4
1	649	-0	661	+12	+21	+13	+40
2	796	-0	816	+11	+19	+13	+37
3	1164	+0	1195	+9	+15	+10	+29
4	692	-0	710	+12	+22	+14	+41
5	855	-0	874	+11	+19	+13	+37
6	939	-0	957	+11	+18	+12	+34
7	773	-0	791	+12	+22	+14	+41
8	1161	-0	1185	+10	+17	+11	+32
9	639	-0	656	+13	+23	+15	+43
10	733	-0	745	+12	+21	+14	+40
11	1002	-0	1020	+11	+19	+13	+36
12	1244	-0	1271	+10	+17	+11	+31
13	972	-0	994	+11	+18	+12	+35
14	668	-0	665	+13	+21	+14	+41
15	1040	-0	1062	+11	+19	+12	+35
16	716	+0	721	+12	+22	+14	+41
17	638	+0	627	+12	+21	+14	+40
18	942	-0	940	+9	+18	+11	+32
CONUS	873	-0	887	+11	+19	+13	+36

Table S4. Comparison of percent changes (%) in mean annual evapotranspiration (mm yr^{-1}) during historical period (from 1961-1985 to 1986-2010) and in the future scenarios (from Baseline scenario to S1~S4 scenarios) in 18 WRRs and CONUS.

WRR	Historical change		Future change				
	1961-1985	1986-2010	Baseline	S1	S2	S3	S4
1	483	+2	495	+10	+17	+11	+30
2	587	+2	607	+8	+13	+9	+22
3	885	-1	887	+4	+6	+4	+8
4	463	+1	474	+10	+17	+11	+30
5	601	+0	611	+8	+13	+9	+22
6	808	-1	810	+5	+8	+6	+13
7	542	+1	552	+9	+15	+10	+26
8	880	+0	882	+3	+6	+4	+7
9	410	+2	420	+9	+14	+10	+22
10	408	+2	415	+7	+12	+9	+18
11	586	+5	600	+3	+5	+3	+5
12	618	+2	617	-0	+1	-0	-3
13	331	+5	336	+0	+2	+0	-2
14	274	+1	274	+7	+13	+8	+19
15	297	-3	295	+1	+4	+2	+2
16	267	-3	258	+5	+11	+7	+18
17	423	-2	410	+8	+14	+9	+23
18	352	-2	343	+2	+5	+4	+8
CONUS	508	+1	511	+5	+9	+6	+14

Table S5. Comparison of percent changes (%) in mean annual runoff (mm yr^{-1}) during historical period (from 1961-1985 to 1986-2010) and in the future scenarios (from Baseline scenario to S1~S4 scenarios) in 18 WRRs and CONUS.

WRR	Historical change		Future change				
	1961-1985	1986-2010	B	S1	S2	S3	S4
1	627	+8	654	+3	+2	+3	-1
2	478	+7	495	+1	-1	+1	-5
3	450	-4	437	-1	-1	-1	-12
4	387	+5	388	-2	-7	-2	-14
5	516	+4	532	-2	-5	-2	-10
6	580	-3	590	-3	-3	-0	-8
7	308	+5	305	-7	-14	-7	-26
8	523	+2	527	-5	-8	-5	-21
9	122	+16	124	-10	-21	-10	-37
10	117	+8	123	-10	-18	-11	-28
11	177	+19	197	-7	-11	-7	-22
12	179	+13	193	-5	-7	-6	-20
13	31	+10	35	-6	-8	-8	-24
14	99	+1	121	-7	-9	-7	-21
15	29	-11	29	-8	-6	-4	-10
16	53	-9	59	-13	-17	-12	-21
17	431	-6	455	-2	-4	-3	-6
18	259	-8	248	-3	-3	-1	+1
CONUS	269	+2	276	-3	-6	-3	-13

Table S6. Comparison of contributions (%) of precipitation (*P*), temperature (*T*), and interactions between *P* and *T* (*P&T*) to changes in runoff over the entire CONUS in the future scenarios S1~S4.

Land cover	S1			S2			S3			S4		
	P	*T*	*P&T*	*P*	*T*	*P&T*	*P*	*T*	*P&T*	*P*	*T*	*P&T*
Crop	30	64	6	31	64	4	35	61	4	30	65	5
Deciduous forest	28	65	7	32	64	4	35	59	5	30	66	4
Evergreen forest	29	64	6	34	62	4	36	59	5	30	65	5
Mixed forest	28	65	7	32	64	4	37	58	5	30	66	4
Grassland	29	63	8	30	64	6	34	61	5	30	64	6
Shrubland	32	61	7	35	60	5	37	58	5	32	62	6
Wetland	30	64	6	32	64	4	35	61	4	29	66	5
Open water	26	56	18	30	58	12	31	53	15	32	61	6
Urban	35	59	6	37	59	4	40	55	5	33	63	4
Barren	33	61	6	37	59	4	39	57	4	33	62	5