Supplementary Material

Table S1. Mean and Variance[1] of US Yields under ODCV

	PDO-TAG-WPWP-	PDO-TAG-WPWP+	PDO-TAG+WPWP-	PDO-TAG+WPWP+	PDO+TAG-WPWP-	PDO+TAG-WPWP+	PDO+TAG+WPWP-	PDO+TAG+WPWP+
Corn (Bu/acre)	93.9 (1224.2)	92.6 (1995.8)	73.9 (1619.6)	64.1 (1690.5)	100.3 (891.2)	117 (1019.8)	103 (1012.1)	90.6 (2242.1)
Cotton (lbs/acre)	608.8 (69957.3)	626.7 (70989)	535.2 (60930)	516.4 (72602)	602.8 (59550.5)	679.9 (60750.4)	611 (67830.9)	634.9 (76895.1)
Hay (ton/acre)	2.35 (0.85)	2.26 (0.95)	2.06 (0.72)	1.88 (0.71)	2.48 (0.93)	2.57 (1.16)	2.46 (0.93)	2.25 (0.98)
Sorghum (Bu/acre)	55.4 (324.6)	54 (366.7)	49.4 (487.3)	40.5 (493.1)	57.9 (304.2)	60.2 (386.6)	56.4 (324.4)	51.7 (481.9)
Soybeans (Bu/acre)	28.3 (48)	28.1 (84.6)	24.8 (62.7)	22.9 (74.8)	28.3 (44.1)	31.2 (43.5)	28.9 (60.4)	28.6 (88.4)
Spring Wheat (Bu/acre)	37.9 (243.6)	37.1 (340.9)	30.7 (219.5)	28.8 (249.2)	43.5 (281.7)	44.9 (372.7)	43.3 (325.8)	37.8 (324.4)
Winter Wheat (Bu/acre)	40 (258.9)	40.3 (293.9)	35.1 (227.4)	31.2 (219.4)	41.7 (231.1)	47.6 (280.4)	43.1 (237.5)	40 (300.9)

[1]Variance is given in parenthesis.

Table S2. Regression Results for Effect of ODCV Phase Combinations on Spring Climate Variables

Climate Var.	DT90_S	DT00_S	DP10_S	TPCP_S	MNTM_S
PDO-TAG-WPWP-	-3.015 (0.793)**	0.266 (0.108)*	0.220 (0.112)	0.461 (0.278)	-0.536 (0.073)**
PDO-TAG-WPWP+	0.119 (0.541)	-0.284 (0.080)**	-0.137 (0.074)	-0.407 (0.195)*	0.070 (0.071)
PDO-TAG+WPWP-	-0.369 (1.126)	0.127 (0.106)	-0.384 (0.092)**	-1.352 (0.246)**	-0.068 (0.078)
PDO-TAG+WPWP+	3.438 (0.643)**	0.207 (0.086)*	-0.085 (0.104)	-1.008 (0.289)**	0.083 (0.080)
PDO+TAG-WPWP-	0.512 (0.627)	0.108 (0.092)	-0.130 (0.120)	-0.428 (0.398)	-0.097 (0.091)
PDO+TAG-WPWP+	3.501 (0.916)**	0.772 (0.197)**	-0.109 (0.101)	-0.772 (0.249)**	-0.354 (0.057)**
PDO+TAG+WPWP-	-0.387 (0.708)	0.193 (0.075)*	-0.168 (0.088)	-0.653 (0.219)**	-0.420 (0.054)**
Year	-0.054 (0.015)**	-0.016 (0.005)**	0.007 (0.002)**	0.025 (0.007)**	0.022 (0.002)**
Constant	140.086 (28.987)**	32.864 (9.107)**	-8.909 (4.850)	-27.153 (13.366)*	18.704 (3.762)**

Note: * p<0.05; ** p<0.01

Table S3. Regression Results for Effect of ODCV Phase Combinations on Winter Climate Variables

Climate Var.	DT90_S	DT00_S	DP10_S	TPCP_S	MNTM_S
PDO-TAG-WPWP-	0.037	2.692	0.069	0.342	-0.369
	(0.103)	(0.665)**	(0.138)	(0.338)	(0.199)
PDO-TAG-WPWP+	-0.031	2.110	-0.196	-0.862	-0.125
	(0.069)	(0.414)**	(0.087)*	(0.231)**	(0.073)
PDO-TAG+WPWP-	0.154	0.775	-0.796	-2.591	-0.409
	(0.146)	(0.451)	(0.131)**	(0.337)**	(0.121)**
PDO-TAG+WPWP+	0.348	1.148	0.374	0.121	-0.194
	(0.106)**	(0.320)**	(0.088)**	(0.249)	(0.107)
PDO+TAG-WPWP-	-0.235	4.749	0.112	-0.043	-1.204
	(0.092)*	(0.736)**	(0.096)	(0.244)	(0.140)**
PDO+TAG-WPWP+	0.069	1.817	-0.249	-1.085	-0.344
	(0.073)	(0.409)**	(0.136)	(0.330)**	(0.118)**
PDO+TAG+WPWP-	0.125	2.147	0.360	0.739	-0.453
	(0.070)	(0.435)**	(0.091)**	(0.234)**	(0.100)**
Year	-0.007	-0.062	0.008	0.023	0.012
	(0.003)*	(0.010)**	(0.002)**	(0.006)**	(0.002)**
Constant	15.05	131.746	-10.458	-25.574	17.327
	(5.742)*	(20.187)**	(4.833)*	(12.127)*	(3.770)**

Note: * p<0.05; ** p<0.01

Table S4. Regression Results for ODCV Phase Combination Effects on Spring Climate Variables in Corn Belt

Climate Var.	DT90_S	DT00_S	DP10_S	TPCP_S	MNTM_S
PDO-TAG-WPWP-	2.819	0.019	-0.446	-0.817	-0.369
	(1.070)	(0.291)	(0.139)*	(0.425)	(0.151)
PDO-TAG-WPWP+	3.792	-0.425	-0.437	-1.060	0.373
	(0.583)**	(0.115)*	(0.375)	(0.873)	(0.066)**
PDO-TAG+WPWP-	6.006	-0.252	-1.105	-2.877	0.078
	(1.596)*	(0.136)	(0.309)*	(0.681)*	(0.096)
PDO-TAG+WPWP+	7.299	0.052	0.043	-0.195	0.378
	(1.741)*	(0.482)	(0.354)	(0.969)	(0.159)
PDO+TAG-WPWP-	4.311	-0.112	0.114	0.736	0.384
	(1.517)*	(0.138)	(0.441)	(1.325)	(0.146)
PDO+TAG-WPWP+	12.352	0.838	-0.596	-2.024	-0.326
	(1.554)**	(0.654)	(0.361)	(0.769)	(0.106)*
PDO+TAG+WPWP-	6.307	0.035	-1.020	-2.243	-0.318
	(2.134)*	(0.130)	(0.362)*	(0.904)	(0.194)
Year	-0.170	-0.035	0.023	0.059	0.012
	(0.021)**	(0.025)	(0.004)**	(0.010)**	(0.003)*
Constant	355.736	68.882	-38.225	-90.243	39.041
	(41.387)**	(49.960)	(7.848)**	(20.473)*	(5.760)**

Note: * p<0.05; ** p<0.01

Table S5. Regression Results for ODCV Phase Combination Effects on Winter Climate Variables in Corn Belt

Climate Var.	DT90_S	DT00_S	DP10_S	TPCP_S	MNTM_S
PDO-TAG-WPWP-	0.117	3.369	0.596	1.703	-0.788
	(0.105)	(1.164)*	(0.110)**	(0.484)*	(0.305)
PDO-TAG-WPWP+	-0.099	4.114	0.331	0.386	-0.333
	(0.063)	(0.856)**	(0.187)	(0.576)	(0.199)
PDO-TAG+WPWP-	0.040	1.939	-0.032	-0.823	-0.216
	(0.109)	(0.718)	(0.129)	(0.473)	(0.230)
PDO-TAG+WPWP+	0.353	2.4	0.601	0.717	-0.498
	(0.126)*	(0.494)**	(0.189)*	(0.437)	(0.124)*
PDO+TAG-WPWP-	0.050	9.786	0.909	2.185	-2.012
	(0.056)	(1.183)**	(0.268)*	(0.372)**	(0.132)**
PDO+TAG-WPWP+	-0.081	2.838	-0.098	-0.732	-0.861
	(0.053)	(0.707)*	(0.205)	(0.653)	(0.106)**
PDO+TAG+WPWP-	0.046	4.937	-0.123	0.159	-1.076
	(0.095)	(0.625)**	(0.144)	(0.295)	(0.088)**
Year	-0.001	-0.072	0.014	0.041	0.006
	(0.001)	(0.030)	(0.004)*	(0.008)**	(0.002)
Constant	2.914	149.030	-24.907	-62.193	28.218
	(1.109)	-58.527	(7.302)*	(15.921)*	(4.957)**

Note: * p<0.05; ** p<0.01

Table S6. Regression Results for ODCV Phase Combination Effects on Spring Climate Variables in Great Plains

Climate Var.	DT90_S	DT00_S	DP10_S	TPCP_S	MNTM_S
PDO-TAG-WPWP-	-2.304	0.712	-0.517	-1.176	-0.519
	(0.963)	(0.660)	(0.208)	(0.891)	(0.183)
PDO-TAG-WPWP+	0.943	-1.133	-0.147	-0.267	0.228
	(2.127)	(0.307)*	(0.167)	(0.553)	(0.290)
PDO-TAG+WPWP-	1.125	0.311	-0.468	-1.466	-0.049
	(2.562)	(0.780)	(0.149)	(0.801)	(0.542)
PDO-TAG+WPWP+	0.657	0.119	0.251	0.168	-0.339
	(2.545)	(0.640)	(0.205)	(0.633)	(0.419)
PDO+TAG-WPWP-	-3.747	-0.652	0.652	2.529	0.004
	(1.92)	(0.176)*	(0.303)	(0.653)*	(0.300)
PDO+TAG-WPWP+	7.581	2.691	-0.878	-2.569	-0.419
	(0.457)**	(1.337)	(0.109)**	(0.535)*	(0.163)
PDO+TAG+WPWP-	2.917	0.376	-0.641	-1.565	-0.174
	(1.49)	(0.638)	(0.220)	(0.776)	(0.200)
Year	-0.171	-0.037	0.012	0.040	0.012
	(0.028)**	(0.017)	(0.004)	(0.011)*	(0.006)
Constant	374.313	75.465	-19.148	-58.880	36.843
	(56.615)**	(34.075)	(7.581)	(20.762)	(11.958)

Note: * $p<0.05$; ** $p<0.01$

Table S7. Regression Results for ODCV Phase Combination Effects on Winter Climate Variables in Great Plains

Climate Var.	DT90_S	DT00_S	DP10_S	TPCP_S	MNTM_S
PDO-TAG-WPWP-	0.065	8.850	-0.301	-0.968	-1.807
	(0.076)	(4.215)	(0.181)	(0.569)	(0.718)
PDO-TAG-WPWP+	-0.197	3.621	0.159	0.122	-0.227
	(0.134)	(1.233)	(0.201)	(0.431)	(0.300)
PDO-TAG+WPWP-	-0.345	3.887	-0.580	-1.919	-1.366
	(0.322)	(2.729)	(0.413)	(1.309)	(0.722)
PDO-TAG+WPWP+	0.557	4.687	0.059	-0.458	-1.485
	(0.233)	(2.411)	(0.170)	(0.529)	(0.448)*
PDO+TAG-WPWP-	-0.068	11.207	0.220	0.874	-2.302
	(0.212)	(1.954)*	(0.256)	(0.706)	(0.205)**
PDO+TAG-WPWP+	-0.085	6.027	-0.672	-2.428	-1.302
	(0.170)	(2.116)	(0.247)	(0.858)	(0.483)
PDO+TAG+WPWP-	0.120	7.131	0.016	0.021	-1.398
	(0.057)	(1.673)*	(0.208)	(0.695)	(0.393)*
Year	-0.011	-0.160	0.008	0.040	0.015
	(0.008)	(0.062)	(0.004)	(0.014)	(0.011)
Constant	21.958	334.366	-13.298	-69.734	6.299
	(15.907)	(120.379)	(7.402)	(27.001)	(22.297)

Note: * $p<0.05$; ** $p<0.01$

Table Sup8. Regression Results for ODCV Phase Combination Effects on Spring Climate Variables in Lake States

Climate Var.	DT90_S	DT00_S	DP10_S	TPCP_S	MNTM_S
PDO-TAG-WPWP-	0.896	1.599	-0.055	0.559	-1.053
	(0.175)*	(0.743)	(0.209)	(0.595)	(0.112)*
PDO-TAG-WPWP+	1.715	-1.081	0.419	1.309	0.498
	(0.525)	(0.278)	(0.385)	(0.832)	(0.090)*
PDO-TAG+WPWP-	5.283	-0.115	-0.750	-1.708	0.295
	(0.690)*	(0.544)	(0.108)*	(0.382)*	(0.172)
PDO-TAG+WPWP+	1.338	-0.022	0.320	1.156	-0.083
	(0.427)	(0.335)	(0.272)	(0.532)	(0.205)
PDO+TAG-WPWP-	-0.169	0.392	0.644	3.348	-0.086
	(0.271)	(0.103)	(0.101)*	(0.321)**	(0.155)
PDO+TAG-WPWP+	8.031	2.376	-0.682	-1.480	-0.606
	(0.344)**	(0.779)	(0.302)	(0.742)	(0.084)*
PDO+TAG+WPWP-	3.448	0.507	-0.324	-0.531	-0.356
	(0.990)	(0.267)	(0.378)	(1.064)	(0.273)
Year	-0.070	-0.039	0.011	0.032	0.024
	(0.019)	(0.009)*	(0.005)	(0.013)	(0.002)**
Constant	144.501	80.221	-16.193	-42.448	7.352
	(37.574)	(17.465)*	(10.354)	(24.503)	(3.981)

Note: * $p<0.05$; ** $p<0.01$

Table S9. Regression Results for ODCV Phase Combination Effects on Winter Climate Variables in Lake States

Climate Var.	DT90_S	DT00_S	DP10_S	TPCP_S	MNTM_S
PDO-TAG-WPWP-	-0.040	11.970	0.326	1.782	-2.416
	(0.057)	(3.362)	(0.251)	(0.303)*	(0.678)
PDO-TAG-WPWP+	-0.043	9.360	0.220	0.624	-0.819
	(0.042)	(0.684)**	(0.037)*	(0.040)**	(0.054)**
PDO-TAG+WPWP-	-0.075	7.324	0.193	1.483	-1.256
	(0.057)	(3.096)	(0.279)	(0.371)	(0.719)
PDO-TAG+WPWP+	0.038	3.328	0.192	1.006	-0.738
	(0.001)**	(1.406)	(0.141)	(0.313)	(0.485)
PDO+TAG-WPWP-	0.005	14.276	0.458	2.223	-2.522
	(0.022)	(2.638)*	(0.139)	(0.198)**	(0.252)**
PDO+TAG-WPWP+	-0.019	7.504	0.019	0.339	-1.921
	(0.034)	(1.656)*	(0.125)	(0.297)	(0.455)
PDO+TAG+WPWP-	0.031	6.751	0.271	1.487	-1.331
	(0.024)	(1.964)	(0.154)	(0.112)**	(0.310)
Year	0.000	-0.179	0.006	0.032	0.033
	(0.000)	(0.045)	(0.004)	(0.009)	(0.004)*
Constant	0.356	377.221	-10.073	-52.349	-34.277
	(0.907)	(88.084)	(7.511)	(17.816)	(7.974)

Note: * p<0.05; ** p<0.01

Table S10. Regression Results for ODCV Phase Combination Effects on Spring Climate Variables in Northeast

Climate Var.	DT90_S	DT00_S	DP10_S	TPCP_S	MNTM_S
PDO-TAG-WPWP-	0.692	0.160	0.740	1.620	-0.378
	(0.323)	(0.194)	(0.198)**	(0.473)**	(0.073)**
PDO-TAG-WPWP+	3.446	-0.036	-0.116	-0.077	0.238
	(0.397)**	(0.102)	(0.133)	(0.369)	(0.061)**
PDO-TAG+WPWP-	4.397	0.425	-0.037	-0.425	-0.296
	(0.485)**	(0.265)	(0.209)	(0.630)	(0.110)*
PDO-TAG+WPWP+	3.531	0.350	0.407	0.140	0.049
	(0.545)**	(0.162)	(0.128)**	(0.305)	(0.099)
PDO+TAG-WPWP-	1.538	0.654	0.099	-0.301	-0.222
	(0.462)**	(0.251)*	(0.194)	(0.501)	(0.109)
PDO+TAG-WPWP+	5.959	0.463	-0.167	-1.073	-0.363
	(0.564)**	(0.173)*	(0.213)	(0.504)	(0.079)**
PDO+TAG+WPWP-	1.994	0.363	0.141	-0.270	-0.544
	(0.452)**	(0.205)	(0.156)	(0.410)	(0.061)**
Year	-0.010	0.000	0.026	0.076	0.026
	(0.017)	(0.003)	(0.004)**	(0.011)**	(0.003)**
Constant	28.391	0.499	-44.480	-122.937	7.403
	(33.784)	(5.309)	(7.413)**	(21.102)**	(6.252)

Note: * p<0.05; ** p<0.01

Table S11. Regression Results for ODCV Phase Combination Effects on Winter Climate Variables in Northeast

Climate Var.	DT90_S	DT00_S	DP10_S	TPCP_S	MNTM_S
PDO-TAG-WPWP-	-0.293	0.422	-0.561	-0.501	-0.122
	(0.144)	(0.703)	(0.206)*	(0.383)	(0.204)
PDO-TAG-WPWP+	-0.103	1.801	-0.562	-1.619	-0.364
	(0.066)	(0.803)*	(0.088)**	(0.348)**	(0.109)**
PDO-TAG+WPWP-	-0.375	-1.661	-1.578	-4.165	-0.393
	(0.263)	(0.372)**	(0.236)**	(0.543)**	(0.115)**
PDO-TAG+WPWP+	0.235	-0.661	0.501	0.765	0.329
	(0.273)	(0.249)*	(0.173)*	(0.410)	(0.080)**
PDO+TAG-WPWP-	-0.124	2.471	-0.180	-0.933	-0.796
	(0.049)*	(0.928)*	(0.146)	(0.352)*	(0.117)**
PDO+TAG-WPWP+	0.080	0.472	-1.280	-3.384	-0.113
	(0.121)	(0.304)	(0.151)**	(0.257)**	(0.101)
PDO+TAG+WPWP-	-0.004	0.549	0.581	0.881	-0.167
	(0.109)	(0.432)	(0.204)*	(0.424)	(0.086)
Year	-0.009	-0.039	0.023	0.054	0.014
	(0.010)	(0.011)**	(0.004)**	(0.009)**	(0.003)**
Constant	17.641	86.831	-39.230	-81.995	9.936
	(20.143)	(21.355)**	(8.337)**	(17.729)**	(6.285)

Note: * p<0.05; ** p<0.01

Table S12. Regression Results for ODCV Phase Combination Effects on Spring Climate Variables in Pacific Northwest

Climate Var.	DT90_S	DT00_S	DP10_S	TPCP_S	MNTM_S
PDO-TAG-WPWP-	-3.584	0.023	0.069	-0.741	-1.428
	(1.159)	(0.015)	(0.022)	(0.625)	(0.092)*
PDO-TAG-WPWP+	-2.587	-0.047	-0.305	-1.220	-1.100
	(0.706)	(0.015)	(0.014)*	(0.668)	(0.067)*
PDO-TAG+WPWP-	0.292	0.096	-0.513	-2.165	-1.136
	(1.420)	(0.031)	(0.005)**	(0.850)	(0.256)
PDO-TAG+WPWP+	-2.880	0.029	0.086	-0.897	-1.092
	(0.059)*	(0.019)	(0.276)	(0.746)	(0.096)
PDO+TAG-WPWP-	-3.625	-0.015	0.183	0.892	-1.273
	(1.161)	(0.028)	(0.185)	(0.063)*	(0.075)*
PDO+TAG-WPWP+	-0.009	0.002	0.175	-0.382	-0.844
	(1.401)	(0.013)	(0.082)	(0.246)	(0.191)
PDO+TAG+WPWP-	-5.307	0.031	-0.085	-0.264	-0.738
	(0.417)*	(0.011)	(0.026)	(0.507)	(0.032)*
Year	0.025	-0.003	-0.004	-0.002	0.028
	(0.036)	(0.001)	(0.000)	(0.012)	(0.000)**
Constant	-26.321	5.629	9.223	18.826	1.321
	(70.859)	(1.072)	(0.704)*	(23.981)	(0.688)

Note: * p<0.05; ** p<0.01

Table S13. Regression Results for ODCV Phase Combination Effects on Winter Climate Variables in Pacific Northwest

Climate Var.	DT90_S	DT00_S	DP10_S	TPCP_S	MNTM_S
PDO-TAG-WPWP-	-0.078	1.414	1.520	4.249	-1.478
	(0.051)	(0.695)	(0.146)	(0.286)*	(0.048)*
PDO-TAG-WPWP+	-0.093	0.643	1.177	2.344	-0.500
	(0.070)	(0.233)	(0.314)	(0.580)	(0.415)
PDO-TAG+WPWP-	-0.127	-1.048	-0.896	-2.854	-0.960
	(0.093)	(0.621)	(0.156)	(0.785)	(0.081)
PDO-TAG+WPWP+	-0.107	0.746	1.923	4.251	-1.039
	(0.075)	(0.286)	(0.169)	(0.084)*	(0.299)
PDO+TAG-WPWP-	-0.028	2.640	-0.770	-2.978	-2.210
	(0.113)	(0.682)	(0.121)	(0.960)	(0.156)*
PDO+TAG-WPWP+	-0.018	0.192	2.306	4.985	-0.197
	(0.018)	(0.045)	(0.127)*	(0.012)**	(0.269)
PDO+TAG+WPWP-	-0.036	0.754	1.532	4.196	-0.734
	(0.026)	(0.250)	(0.032)*	(0.180)*	(0.319)
Year	-0.001	-0.044	-0.021	-0.047	0.026
	(0.000)	(0.011)	(0.012)	(0.038)	(0.008)
Constant	1.189	89.513	46.841	123.257	-10.325
	(0.225)	(22.818)	(23.149)	(75.085)	(15.456)

Note: * p<0.05; ** p<0.01

Table S14. Regression Results for ODCV Phase Combination Effects on Spring Climate Variables in Pacific Southwest

Climate Var.	DT90_S	DT00_S	DP10_S	TPCP_S	MNTM_S
PDO-TAG-WPWP-	-3.242	0.042	-0.254	-1.135	-0.867
	(3.218)	(0.403)	(0.556)	(1.702)	(0.519)
PDO-TAG-WPWP+	-2.452	0.023	-0.656	-2.525	-0.510
	(3.413)	(0.427)	(0.589)	(1.805)	(0.550)
PDO-TAG+WPWP-	1.231	-0.020	-0.839	-2.587	-0.377
	(4.024)	(0.503)	(0.695)	(2.128)	(0.649)
PDO-TAG+WPWP+	-1.322	0.379	-0.754	-3.281	-0.555
	(3.029)	(0.379)	(0.523)	(1.602)*	(0.489)
PDO+TAG-WPWP-	-1.357	0.050	-0.415	-1.742	-0.332
	(3.745)	(0.469)	(0.647)	(1.981)	(0.604)
PDO+TAG-WPWP+	0.968	0.126	0.352	0.356	-0.302
	(3.836)	(0.480)	(0.662)	(2.029)	(0.619)
PDO+TAG+WPWP-	-4.438	0.066	0.244	0.815	-0.551
	(3.159)	(0.395)	(0.546)	(1.671)	(0.510)
Year	-0.041	-0.009	-0.017	-0.036	0.031
	(0.053)	(0.007)	(0.009)	(0.028)	(0.009)**
Constant	137.697	18.168	34.774	80.499	3.682
	(104.557)	(13.080)	(18.054)	(55.302)	(16.862)

Note: * p<0.05; ** p<0.01

Table S15. Regression Results for ODCV Phase Combination Effects on Winter Climate Variables in Pacific Southwest

Climate Var.	DT90_S	DT00_S	DP10_S	TPCP_S	MNTM_S
PDO-TAG-WPWP-	0.149	0.497	-1.360	-3.672	-1.039
	(1.622)	(0.723)	(1.287)	(3.891)	(0.577)
PDO-TAG-WPWP+	-0.189	0.229	-1.144	-3.700	-0.071
	(1.720)	(0.767)	(1.365)	(4.126)	(0.612)
PDO-TAG+WPWP-	-0.956	0.042	-1.260	-3.360	-1.314
	(2.029)	(0.904)	(1.610)	(4.865)	(0.722)
PDO-TAG+WPWP+	-0.069	0.722	-0.516	-2.973	-0.559
	(1.527)	(0.680)	(1.212)	(3.662)	(0.543)
PDO+TAG-WPWP-	-0.765	0.373	-0.455	-2.281	-0.211
	(1.888)	(0.841)	(1.498)	(4.528)	(0.672)
PDO+TAG-WPWP+	0.344	0.250	0.342	0.312	0.412
	(1.934)	(0.862)	(1.534)	(4.638)	(0.688)
PDO+TAG+WPWP-	-0.434	0.090	1.002	2.551	-0.218
	(1.593)	(0.710)	(1.264)	(3.820)	(0.567)
Year	-0.030	-0.020	-0.030	-0.048	0.016
	(0.027)	(0.012)	(0.021)	(0.064)	(0.009)
Constant	64.167	40.083	67.036	120.662	20.190
	(52.709)	(23.485)	(41.821)	(126.404)	(18.751)

Note: * $p<0.05$; ** $p<0.01$

Table S16. Regression Results for ODCV Phase Combination Effects on Spring Climate Variables in Rocky Mountains

Climate Var.	DT90_S	DT00_S	DP10_S	TPCP_S	MNTM_S
PDO-TAG-WPWP-	-4.264	0.571	-0.060	-0.534	-1.051
	(0.735)**	(0.183)*	(0.081)	(0.242)	(0.138)**
PDO-TAG-WPWP+	-2.321	-0.171	-0.003	-0.283	-0.555
	(0.607)**	(0.154)	(0.084)	(0.241)	(0.122)**
PDO-TAG+WPWP-	1.670	0.439	-0.156	-0.941	0.156
	(1.820)	(0.191)	(0.085)	(0.223)**	(0.204)
PDO-TAG+WPWP+	1.017	0.468	0.155	-0.725	-0.184
	(0.775)	(0.130)**	(0.105)	(0.263)*	(0.170)
PDO+TAG-WPWP-	-4.938	0.056	0.129	0.680	-0.831
	(0.758)**	(0.210)	(0.135)	(0.283)*	(0.193)**
PDO+TAG-WPWP+	3.651	1.136	-0.129	-0.826	-0.376
	(1.287)*	(0.563)	(0.055)	(0.198)**	(0.200)
PDO+TAG+WPWP-	-5.174	0.239	0.062	0.437	-0.690
	(1.134)**	(0.087)*	(0.072)	(0.194)	(0.116)**
Year	0.063	-0.024	-0.001	0.004	0.038
	(0.020)*	(0.008)*	(0.002)	(0.007)	(0.004)**
Constant	-82.697	47.792	2.548	2.338	-16.881
	(39.509)	(15.357)*	(3.291)	(14.346)	(7.920)

Note: * $p<0.05$; ** $p<0.01$

Table S17. Regression Results for ODCV Phase Combination Effects on Winter Climate Variables in Rocky Mountains

Climate Var.	DT90_S	DT00_S	DP10_S	TPCP_S	MNTM_S
PDO-TAG-WPWP-	-0.136	4.507	-0.038	-0.433	-1.168
	(0.138)	(0.961)**	(0.054)	(0.528)	(0.292)**
PDO-TAG-WPWP+	-0.039	1.799	0.024	-0.424	0.044
	(0.073)	(0.488)**	(0.051)	(0.424)	(0.114)
PDO-TAG+WPWP-	-0.227	1.976	-0.110	-1.201	-0.730
	(0.174)	(0.660)*	(0.052)	(0.291)**	(0.229)*
PDO-TAG+WPWP+	0.101	2.167	0.151	-0.734	-0.530
	(0.063)	(0.443)**	(0.093)	(0.411)	(0.213)*
PDO+TAG-WPWP-	-0.539	6.252	0.129	0.311	-1.532
	(0.357)	(1.607)**	(0.103)	(0.190)	(0.351)**
PDO+TAG-WPWP+	0.057	2.218	0.005	-0.608	0.024
	(0.183)	(0.937)*	(0.058)	(0.509)	(0.273)
PDO+TAG+WPWP-	-0.154	2.735	0.125	0.633	-0.545
	(0.132)	(1.126)*	(0.041)*	(0.416)	(0.193)*
Year	0.001	-0.085	-0.003	0.002	0.018
	(0.003)	(0.023)**	(0.002)	(0.008)	(0.003)**
Constant	-0.716	179.291	6.720	4.117	1.957
	(5.396)	(44.323)**	(4.682)	(16.501)	(6.560)

Note: * $p<0.05$; ** $p<0.01$

Table S18. Regression Results for ODCV Phase Combination Effects on Spring Climate Variables in South Central

Climate Var.	DT90_S	DT00_S	DP10_S	TPCP_S	MNTM_S
PDO-TAG-WPWP-	-10.695	-0.220	0.770	1.984	-0.380
	(2.408)**	(0.193)	(0.312)*	(0.621)*	(0.123)*
PDO-TAG-WPWP+	-2.537	-0.357	-0.141	-0.678	0.220
	(1.724)	(0.332)	(0.205)	(0.402)	(0.117)
PDO-TAG+WPWP-	-10.713	-0.281	-0.164	-0.989	0.080
	(3.473)*	(0.228)	(0.259)	(0.562)	(0.155)
PDO-TAG+WPWP+	7.923	0.163	-0.988	-3.438	0.551
	(2.566)*	(0.215)	(0.164)**	(0.438)**	(0.088)**
PDO+TAG-WPWP-	2.071	-0.192	-0.773	-2.655	0.266
	(1.903)	(0.165)	(0.104)**	(0.420)**	(0.112)
PDO+TAG-WPWP+	-3.076	0.005	0.403	0.189	-0.328
	(2.773)	(0.054)	(0.329)	(0.771)	(0.145)
PDO+TAG+WPWP-	-2.814	-0.016	-0.045	-0.476	-0.383
	(2.029)	(0.033)	(0.227)	(0.440)	(0.085)**
Year	-0.133	-0.022	-0.008	-0.013	0.013
	(0.027)**	(0.022)	(0.003)*	(0.008)	(0.003)**
Constant	331.432	43.981	25.705	57.460	45.821
	(54.466)**	(43.021)	(4.942)**	(15.750)*	(5.424)**

Note: * p<0.05; ** p<0.01

Table S19. Regression Results for ODCV Phase Combination Effects on Winter Climate Variables in South Central

Climate Var.	DT90_S	DT00_S	DP10_S	TPCP_S	MNTM_S
PDO-TAG-WPWP-	0.440	-0.146	1.018	2.037	0.771
	(0.254)	(0.147)	(0.590)	(1.522)	(0.089)**
PDO-TAG-WPWP+	0.260	-0.024	-0.553	-1.879	0.156
	(0.348)	(0.334)	(0.261)	(0.602)*	(0.135)
PDO-TAG+WPWP-	1.440	-0.240	-0.344	-2.320	0.465
	(0.608)	(0.245)	(0.186)	(0.672)*	(0.246)
PDO-TAG+WPWP+	1.053	0.420	0.603	0.144	0.163
	(0.410)*	(0.254)	(0.194)*	(0.611)	(0.133)
PDO+TAG-WPWP-	-0.633	1.066	-0.205	-0.863	-0.807
	(0.262)	(0.482)	(0.141)	(0.388)	(0.107)**
PDO+TAG-WPWP+	0.091	0.270	0.501	0.208	-0.364
	(0.349)	(0.176)	(0.336)	(0.837)	(0.150)
PDO+TAG+WPWP-	0.731	0.209	0.617	0.930	-0.329
	(0.277)*	(0.106)	(0.334)	(0.975)	(0.074)**
Year	-0.011	-0.031	0.012	0.028	0.001
	(0.002)**	(0.023)	(0.006)	(0.018)	(0.003)
Constant	23.786	61.067	-14.657	-25.476	50.106
	(3.439)**	(44.672)	(12.334)	(34.35)	(5.041)**

Note: * p<0.05; ** p<0.01

Table S20. Regression Results for ODCV Phase Combination Effects on Spring Climate Variables in Southeast

Climate Var.	DT90_S	DT00_S	DP10_S	TPCP_S	MNTM_S
PDO-TAG-WPWP-	-9.072	-0.023	0.427	1.026	0.167
	(3.549)	(0.015)	(0.591)	(1.492)	(0.169)
PDO-TAG-WPWP+	-3.136	-0.019	-0.303	-0.982	0.382
	(1.246)	(0.013)	(0.301)	(0.784)	(0.079)**
PDO-TAG+WPWP-	-11.744	-0.020	-0.684	-2.242	-0.080
	(2.504)**	(0.018)	(0.300)	(0.753)*	(0.119)
PDO-TAG+WPWP+	5.171	-0.004	-0.973	-3.674	0.608
	(0.765)**	(0.028)	(0.375)	(0.923)*	(0.114)**
PDO+TAG-WPWP-	6.992	0.012	-1.767	-6.053	0.686
	(1.084)**	(0.009)	(0.316)**	(0.821)**	(0.153)*
PDO+TAG-WPWP+	-3.914	-0.001	0.376	0.871	0.142
	(2.081)	(0.017)	(0.136)	(0.612)	(0.160)
PDO+TAG+WPWP-	-3.208	-0.014	-0.096	-1.260	0.067
	(1.730)	(0.010)	(0.269)	(0.713)	(0.180)
Year	-0.059	0.000	-0.014	-0.034	0.017
	(0.050)	(0.000)	(0.005)*	(0.018)	(0.003)**
Constant	173.592	0.913	37.032	99.953	36.316
	(100.056)	(0.649)	(8.965)*	(34.759)*	(5.831)**

Note: * p<0.05; ** p<0.01

Table S21. Regression Results for ODCV Phase Combination Effects on Winter Climate Variables in Southeast

Climate Var.	DT90_S	DT00_S	DP10_S	TPCP_S	MNTM_S
PDO-TAG-WPWP-	0.665	0.080	-0.040	-0.106	1.941
	(0.848)	(0.114)	(0.587)	(1.346)	(0.233)**
PDO-TAG-WPWP+	0.036	0.134	-0.542	-2.098	0.551
	(0.494)	(0.112)	(0.397)	(0.796)	(0.145)*
PDO-TAG+WPWP-	0.868	-0.096	-1.998	-5.885	0.105
	(0.347)	(0.134)	(0.321)**	(0.584)**	(0.188)
PDO-TAG+WPWP+	0.260	0.305	-0.050	-1.515	0.583
	(0.396)	(0.257)	(0.347)	(0.774)	(0.063)**
PDO+TAG-WPWP-	0.167	0.447	0.525	-0.373	0.357
	(0.413)	(0.166)	(0.523)	(0.899)	(0.165)
PDO+TAG-WPWP+	0.415	0.187	-0.277	-0.794	0.462
	(0.382)	(0.148)	(0.266)	(0.636)	(0.236)
PDO+TAG+WPWP-	0.312	0.131	0.319	0.066	0.649
	(0.332)	(0.139)	(0.263)	(0.509)	(0.203)*
Year	-0.011	-0.011	-0.006	0.066	0.649
	(0.008)	(0.008)	(0.004)	(0.509)	(0.203)*
Constant	24.118	21.332	19.550	82.752	38.364
	(16.383)	(15.633)	(8.186)	(23.276)*	(7.516)**

Note: * p<0.05; ** p<0.01

Table S22. Regression Results for ODCV Phase Combination Effects on Spring Climate Variables in Southwest

Climate Var.	DT90_S	DT00_S	DP10_S	TPCP_S	MNTM_S
PDO-TAG-WPWP-	-6.809	-0.028	-0.207	-0.562	-0.317
	(1.213)	(0.015)	(0.309)	(0.839)	(0.165)
PDO-TAG-WPWP+	-2.908	-0.027	0.289	0.580	0.019
	(1.486)	(0.023)	(0.120)	(0.505)	(0.067)
PDO-TAG+WPWP-	-6.686	-0.012	-0.568	-1.501	0.436
	(3.311)	(0.005)	(0.374)	(0.829)	(0.309)
PDO-TAG+WPWP+	0.411	-0.003	-0.022	-0.857	0.488
	(0.156)	(0.043)	(0.092)	(0.488)	(0.018)*
PDO+TAG-WPWP-	0.255	-0.035	-0.157	-0.349	0.353
	(0.317)	(0.012)	(0.542)	(2.008)	(0.017)*
PDO+TAG-WPWP+	-6.685	0.012	0.422	0.400	-0.830
	(4.792)	(0.001)*	(0.704)	(1.826)	(0.286)
PDO+TAG+WPWP-	-5.496	-0.022	-0.179	-0.634	-0.511
	(0.957)	(0.023)	(0.414)	(1.285)	(0.181)
Year	-0.180	-0.001	0.005	0.027	0.003
	(0.062)	(0.000)	(0.003)	(0.001)*	(0.008)
Constant	446.817	1.478	-2.357	-30.928	67.013
	(123.901)	(0.896)	(6.252)	(1.759)*	(15.422)

Note: * p<0.05; ** p<0.01

Table S23. Regression Results for ODCV Phase Combination Effects on Winter Climate Variables in Southwest

Climate Var.	DT90_S	DT00_S	DP10_S	TPCP_S	MNTM_S
PDO-TAG-WPWP-	0.566	0.272	-1.062	-3.661	0.773
	(1.402)	(0.229)	(0.316)	(1.278)	(0.143)
PDO-TAG-WPWP+	0.981	0.548	-0.572	-2.001	0.562
	(1.381)	(0.486)	(0.373)	(1.338)	(0.047)
PDO-TAG+WPWP-	3.110	0.153	-0.676	-2.924	1.044
	(1.827)	(0.496)	(0.141)	(0.119)*	(0.649)
PDO-TAG+WPWP+	1.943	0.350	-0.128	-2.377	0.405
	(1.310)	(0.172)	(0.066)	(0.531)	(0.405)
PDO+TAG-WPWP-	-1.003	1.173	0.474	0.579	-0.824
	(0.813)	(0.923)	(0.926)	(2.365)	(0.291)
PDO+TAG-WPWP+	0.827	0.277	-0.554	-2.898	-0.033
	(1.375)	(0.146)	(0.434)	(1.072)	(0.151)
PDO+TAG+WPWP-	1.173	0.525	-0.536	-2.201	-0.279
	(0.789)	(0.484)	(0.153)	(0.435)	(0.028)
Year	-0.029	-0.010	0.021	0.074	-0.003
	(0.012)	(0.002)	(0.003)	(0.010)	(0.011)
Constant	61.322	19.374	-36.818	-127.645	57.394
	(24.315)	(3.623)	(5.565)	(19.663)	(22.168)

Note: * p<0.05; ** p<0.01

Table S24. Regression Results for Climate and ODCV Phase Combination Effects on US Crop Yields

	Corn	Cotton	Hay	Sorghum	Soybeans	Spring Wheat	Winter Wheat
$Yield_{t-1}$	0.522 (0.087)**	0.318 (0.054)**	0.440 (0.039)**	0.457 (0.056)**	0.215 (0.040)**	0.413 (0.042)**	0.361 (0.036)**
$Yield_{t-2}$			0.346 (0.029)**			0.351 (0.066)**	0.345 (0.026)**
Year	2.089 (6.389)	-416.923 (94.474)**	0.417 (0.111)**	27.001 (6.901)**	-5.249 (2.456)*	-0.877 (3.495)	3.089 (2.267)
$Year^2$	-0.000 (0.002)	0.106 (0.024)**	-0.000 (0.000)**	-0.007 (0.002)**	0.001 (0.001)*	0.000 (0.001)	-0.001 (0.001)
DT90_S	-1.163 (0.111)**	-3.148 (1.341)*	-0.009 (0.001)**	-0.478 (0.075)**	-0.305 (0.027)**	-0.301 (0.002)	
DT90_S^2	0.004 (0.001)**	0.000 (0.010)	0.000 (0.000)	0.001 (0.001)	0.001 (0.000)**	0.000 (0.002)	
DT90_W							-0.381 (0.217)
DT90_W^2							0.012 (0.010)
DT00_S	0.210 (0.324)	24.041 -30.792	0.010 (0.007)	-0.344 (0.549)	-0.112 (0.212)	-0.113 (0.375)	
DT00_S^2	0.055 (0.029)	-1.084 (11.530)	-1.001 (0.001)	0.086 (0.079)	0.035 (0.016)*	0.025 (0.036)	
DT00_W							-0.098 (0.051)
DT00_W^2							0.002 (0.001)**
DP10_S	1.626 (1.185)	12.913 (21.629)	-0.020 (0.022)	3.857 (1.380)**	0.605 (0.477)	-0.435 (2.002)	
DP10_S^2	-0.248 (0.092)**	-0.262 (1.145)	0.000 (0.001)	-0.197 (0.090)*	-0.053 (0.029)	-0.007 (0.168)	
DP10_W							-0.855 (0.505)
DP10_W^2							0.020 (0.044)
TPCP_S	-0.433 (0.586)	-12.524 (9.093)	0.037 (0.014)**	-0.774 (0.466)	0.309 (0.297)	0.528 (0.401)	
TPCP_S^2	0.021 (0.013)	0.110 (0.147)	-0.000 (0.000)	-0.008 (0.011)	-0.001 (0.005)	-0.007 (0.009)	
TPCP_W							0.494 (0.280)
TPCP_W^2							-0.010 (0.007)
MNTM_S	17.274 (5.464)**	174.058 (66.054)*	-0.029 (0.057)	0.811 (4.352)	8.016 (0.935)**	-6.726 (5.38)	
MNTM_S^2	-0.121 (0.046)*	-1.142 (0.488)*	0.000 (0.000)	-0.001 (0.032)	-0.056 (0.007)**	0.065 (0.049)	
MNTM_W							2.169 (0.619)**
MNTM_W^2							-0.026 (0.007)**
Planted Acres	0.002 (0.001)*	-0.013 (0.006)*		0.001 (0.001)*	0.001 (0.000)**		-0.000 (0.000)
PDO-TAG-WPWP-	0.741 (0.737)	-17.096 -15.790	-0.022 (0.011)*	-3.048 (0.827)**	-0.313 (0.224)	-2.419 (0.686)**	-1.185 (0.394)**
PDO-TAG-WPWP+	0.139 (0.677)	-12.368 (10.904)	-0.020 (0.014)	-1.111 (0.624)	-0.764 (0.289)*	-2.375 (0.859)*	-1.619 (0.416)**
PDO-TAG+WPWP-	0.197 (0.741)	-49.529 (8.621)**	0.015 (0.016)	-1.504 (0.862)	-0.611 (0.316)	-1.190 (0.588)	-1.331 (0.496)*
PDO-TAG+WPWP+	0.439 (0.613)	-16.944 (10.136)	-0.011 (0.012)	0.472 (0.400)	-0.479 (0.285)	-0.661 (0.543)	-1.222 (0.275)**
PDO+TAG-WPWP-	-1.763 (1.142)	-17.869 (12.194)	-0.051 (0.019)*	-2.453 (0.947)*	-0.689 (0.416)	-2.046 (1.128)	-1.447 (0.493)**
PDO+TAG-WPWP+	-2.571 (0.738)**	-61.864 (14.685)**	-0.044 (0.020)*	-4.972 (0.988)**	-1.139 (0.378)**	-2.350 (1.036)*	-2.285 (0.524)**
PDO+TAG+WPWP-	-0.386 (0.925)	-31.586 (13.405)*	-0.028 (0.013)*	-4.085 (0.772)**	-0.668 (0.323)*	0.031 -1.158	0.192 (0.505)
Constant	-3,428.184 (6,299.883)	402,231.122 (93,265.311)	-415.016 (110.809)**	-27,129.921 (6,877.268)	4,740.413 (2,439.505)	3,453.640 (3,453.640)	-3,257.577 (2,229.985)

Note: * $p<0.05$; ** $p<0.01$

Table S25. Regression Results for Climate and ODCV Phase Combination Effects on Northeast Crop Yields

	Corn	Hay	Soybeans	Winter Wheat
$Yield_{t-1}$	0.067 (0.036)	0.309 (0.029)**		0.188 (0.080)
$Yield_{t-2}$	-0.044 (0.043)	0.382 (0.032)**		
$Yield_{t-3}$	-0.022 (0.038)			
Year	-8.983 (10.241)	0.684 (0.090)**	3.298 (5.206)	-3.252 (2.299)
$Year^2$	0.003 (0.003)	-0.000 (0.000)**	-0.001 (0.001)	0.001 (0.001)
DT90_S	-1.036 (0.362)*	-0.010 (0.003)*	-0.598 (0.093)**	
DT90_S^2	-0.008 (0.007)	0.000 (0.000)	0.007 (0.002)**	
DT90_W				-3.245 (0.709)**
DT90_W^2				0.815 (0.300)*
DT00_S	1.171 (0.563)	-0.010 (0.015)	0.673 (0.420)	
DT00_S^2	-0.238 (0.111)	-0.096 (0.002)	-0.018 (0.043)	
DT00_W				0.193 (0.117)
DT00_W^2				-0.003 (0.005)
DP10_S	-5.069 (2.464)	-0.096 (0.044)	-0.576 (0.784)	
DP10_S^2	0.293 (0.146)	0.006 (0.003)	0.007 (0.040)	
DP10_W				0.532 (1.611)
DP10_W^2				-0.046 (0.138)
TPCP_S	3.153 (1.64)	0.073 (0.023)**	1.385 (0.527)*	
TPCP_S^2	-0.045 (0.025)	-0.001 (0.000)*	-0.017 (0.008)	
TPCP_W				-1.748 (1.827)
TPCP_W^2				0.027 (0.039)
MNTM_S	2.534 (8.695)	-0.090 (0.131)	19.688 (4.274)**	
MNTM_S^2	-0.002 (0.070)	0.001 (0.001)	-0.153 (0.037)**	
MNTM_W				0.273 (0.655)
MNTM_W^2				0.009 (0.008)
Planted Acres	-0.005 (0.004)		0.008 (0.005)	0.009 (0.006)
PDO-TAG-WPWP-	0.203 (1.254)	-0.028 (0.009)*	-0.054 (0.447)	0.046 (0.468)
PDO-TAG-WPWP+	0.816 (1.143)	0.019 (0.028)	0.554 (0.411)	-1.534 (0.847)
PDO-TAG+WPWP-	2.387 (1.577)	0.103 (0.028)**	0.115 (0.465)	0.612 (1.14)
PDO-TAG+WPWP+	3.345 (0.877)**	-0.008 (0.022)	-0.058 (0.613)	0.226 (0.629)
PDO+TAG-WPWP-	3.198 (1.856)	-0.021 (0.025)	-0.659 (0.853)	-0.880 (0.934)
PDO+TAG-WPWP+	-2.276 (2.098)	0.098 (0.021)**	-2.306 (0.504)**	-2.789 (1.143)
PDO+TAG+WPWP-	3.612 (1.515)*	0.041 (0.025)	-1.591 (0.468)*	0.186 (0.590)
Constant	7,523.293 (10,141.987)	-676.056 (89.894)**	4,168.272 (5,025.921)	2,706.621 (7,681.108)

Note: * p<0.05; ** p<0.01

Table S26. Regression Results for Climate and ODCV Phase Combination Effects on Lake States Crop Yields

	Corn	Hay	Soybeans	Spring Wheat	Winter Wheat
$Yield_{t-1}$		0.568 (0.081)*	0.151 (0.082)		
Year	-11.659 (6.288)	1.497 (0.240)*	6.508 (5.559)	0.985 (5.699)	-23.466 (7.650)
$Year^2$	0.003 (0.002)	-0.000 (0.000)*	-0.002 (0.001)	-0.000 (0.001)	0.006 (0.002)
DT90_S	-0.294 (0.228)	0.003 (0.016)	0.248 (0.074)	-0.165 (0.166)	
$DT90\_S^2$	-0.044 (0.011)	-0.001 (0.000)	-0.018 (0.005)	-0.009 (0.009)	
DT90_W					-11.236 (4.366)
$DT90\_W^2$					9.417 (2.606)
DT00_S	1.274 (0.470)	0.010 (0.023)	-0.129 (0.229)	-1.178 (0.764)	
$DT00\_S^2$	-0.081 (0.067)	0.000 (0.002)	0.014 (0.014)	0.109 (0.059)	
DT00_W					0.209 (0.070)
$DT00\_W^2$					-0.002 (0.001)
DP10_S	-3.308 (7.011)	0.251 (0.346)	0.122 (2.542)	-12.313 (10.912)	
$DP10\_S^2$	0.338 (0.567)	-0.017 (0.028)	0.007 (0.238)	1.032 (0.727)	
DP10_W					-0.863 (1.639)
$DP10\_W^2$					-0.127 (0.089)
TPCP_S	4.640 (4.166)	0.086 (0.160)	1.154 (2.365)	2.645 (3.232)	
$TPCP\_S^2$	-0.102 (0.085)	-0.002 (0.003)	-0.022 (0.053)	-0.057 (0.044)	
TPCP_W					-0.947 (1.106)
$TPCP\_W^2$					0.030 (0.026)
MNTM_S	40.127 (3.729)**	0.089 (0.204)	-8.879 (6.9)	37.649 (35.008)	
$MNTM\_S^2$	-0.319 (0.035)*	-0.000 (0.002)	0.091 (0.058)	-0.336 (0.312)	
MNTM_W					-6.606 (0.684)*
$MNTM\_W^2$					0.124 (0.013)*
Planted Acres	0.001 (0.001)		-0.001 (0.001)		-0.000 (0.006)
PDO-TAG-WPWP-	1.261 (1.333)	0.088 (0.029)	0.008 (0.456)	-0.779 (0.953)	0.634 (0.874)
PDO-TAG-WPWP+	1.265 (1.492)	-0.008 (0.058)	-0.903 (0.727)	1.966 (1.480)	1.224 (0.297)
PDO-TAG+WPWP-	2.392 (2.284)	0.145 (0.054)	-1.254 (0.999)	1.306 (2.401)	2.449 (1.609)
PDO-TAG+WPWP+	1.248 (0.693)	0.038 (0.046)	0.311 (0.928)	0.242 (0.120)	0.510 (0.605)
PDO+TAG-WPWP-	-5.528 (3.211)	0.051 (0.049)	-0.722 (1.084)	4.315 (1.363)	4.656 (1.824)
PDO+TAG-WPWP+	-3.112 (1.832)	-0.037 (0.033)	-0.451 (1.565)	-2.465 (0.316)	-2.539 (0.348)*
PDO+TAG+WPWP-	1.525 (1.246)	0.054 (0.054)	1.517 (0.970)	0.144 (0.251)	2.110 (1.555)
Constant	8,718.631 (6,097.558)	-1,491.337 (239.188)*	-6,608.744 (5,678.921)	-2,368.469 (4,778.721)	22,762.983 (7,681.108)

Note: * $p<0.05$; ** $p<0.01$

Table S27. Regression Results for Climate and ODCV Phase Combination Effects on Corn Belt Crop Yields

	Corn	Cotton	Hay	Sorghum	Soybeans	Winter Wheat
$Yield_{t-1}$			0.374 (0.141)			
Year	-13.767 (10.814)	-966.856 (444.496)	1.115 (0.499)	40.812 (22.469)	-8.213 (1.467)**	2.207 (5.727)
$Year^2$	0.004 (0.003)	0.246 (0.112)	-0.000 (0.000)	-0.010 (0.006)	0.002 (0.000)**	-0.000 (0.001)
DT90_S	-1.002 (0.062)**	-5.019 (1.204)	-0.015 (0.004)*	-0.155 (0.217)	-0.140 (0.066)	
DT90_S^2	0.002 (0.001)	-0.005 (0.010)	0.000 (0.000)	-0.006 (0.002)	-0.000 (0.001)	
DT90_W						1.260 (0.581)
DT90_W^2						-0.081 (0.075)
DT00_S	0.430 (0.315)	-5.091 (46.097)	0.029 (0.034)	0.553 (0.781)	0.013 (0.089)	
DT00_S^2	-0.007 (0.004)	24.508 (18.565)	-0.004 (0.005)	-0.010 (0.010)	-0.001 (0.001)	
DT00_W						0.077 (0.083)
DT00_W^2						-0.000 (0.001)
DP10_S	-2.773 -5.609	62.938 (89.979)	-0.060 (0.049)	8.913 -8.279	-0.281 -1.495	
DP10_S^2	0.135 (0.394)	-3.829 (6.475)	0.009 (0.006)	-0.387 (0.557)	0.030 (0.101)	
DP10_W						0.007 (0.802)
DP10_W^2						-0.033 (0.072)
TPCP_S	4.929 -3.692	-55.461 (40.938)	0.202 (0.088)	-5.496 (3.655)	1.161 (0.961)	
TPCP_S^2	-0.094 (0.068)	0.840 (0.783)	-0.004 (0.002)	0.071 (0.067)	-0.023 (0.017)	
TPCP_W						-1.457 (0.552)
TPCP_W^2						0.024 (0.013)
MNTM_S	21.819 (21.164)	1,118.613 (19.687)*	0.694 (0.386)	-12.291 (9.291)	4.458 (2.669)	
MNTM_S^2	-0.154 (0.174)	-8.137 (0.140)*	-0.005 (0.003)	0.113 (0.067)	-0.029 (0.021)	
MNTM_W						5.962 (1.609)*
MNTM_W^2						-0.072 (0.020)*
Planted Acres	0.002 (0.000)**	-0.310 (0.105)		0.016 (0.003)*	0.000 (0.000)	-0.003 (0.001)*
PDO-TAG-WPWP-	1.605 (1.606)	91.909 (42.942)	0.012 (0.042)	2.326 (1.195)	-0.790 (0.416)	0.464 (1.314)
PDO-TAG-WPWP+	3.332 (1.104)*	44.929 (13.689)	-0.035 (0.044)	3.433 (2.624)	-1.215 (0.281)*	-0.753 (1.078)
PDO-TAG+WPWP-	2.954 (2.047)	21.713 (35.378)	0.020 (0.047)	2.046 (1.905)	-1.462 (0.449)*	2.230 (0.723)*
PDO-TAG+WPWP+	3.145 (1.690)	98.342 (31.537)	-0.036 (0.031)	3.417 (3.936)	-0.125 (0.246)	-1.811 (0.932)
PDO+TAG-WPWP-	1.897 (3.214)	24.896 (15.148)	0.086 (0.045)	-5.413 (3.661)	0.361 (1.19)	-0.767 (1.279)
PDO+TAG-WPWP+	-6.687 (1.086)**	65.922 (25.464)	-0.141 (0.036)*	-1.571 (2.982)	-3.960 (0.599)**	-3.247 (0.386)**
PDO+TAG+WPWP-	3.657 (1.759)	27.145 (35.607)	0.011 (0.036)	-2.587 (1.594)	0.602 (0.461)	0.936 (0.950)
Constant	11,237.651 (10,131.749)	912,118.744 (440,051.494)	-1,139.664 (503.711)	-40,899.956 (22,603.498)	7,631.837 (1,506.9)**	-2,845.434 (5,656.319)

Note: * $p<0.05$; ** $p<0.01$

Table S28. Regression Results for Climate and ODCV Phase Combination Effects on Great Plains Crop Yields

	Corn	Hay	Sorghum	Soybeans	Spring Wheat	Winter Wheat
$Yield_{t-1}$	0.473 (0.067)**	0.290 (0.062)*		0.194 (0.036)*	0.163 (0.040)	0.192 (0.052)*
$Yield_{t-2}$					0.005 (0.117)	-0.029 (0.102)
Year	23.559 (24.42)	0.882 (0.188)*	88.048 (17.598)*	-2.965 (2.388)	7.382 (10.626)	3.802 (10.721)
$Year^2$	-0.006 (0.006)	-0.000 (0.000)*	-0.022 (0.004)*	0.001 (0.001)	-0.002 (0.003)	-0.001 (0.003)
DT90_S	-0.802 (0.212)*	-0.002 (0.002)	-0.412 (0.398)	-0.196 (0.124)	-0.214 (0.088)	
DT90_S^2	0.001 (0.003)	-0.000 (0.000)	-0.001 (0.004)	-0.001 (0.001)	0.001 (0.002)	
DT90_W						-1.993 (0.218)**
DT90_W^2						0.210 (0.033)**
DT00_S	0.531 (0.926)	0.024 (0.013)	1.285 (0.276)*	0.053 (0.534)	-0.216 (0.259)	
DT00_S^2	0.043 (0.052)	-0.002 (0.001)	0.019 (0.144)	0.023 (0.032)	0.020 (0.023)	
DT00_W						-0.231 (0.106)
DT00_W^2						0.003 (0.002)
DP10_S	-9.612 (2.630)*	-0.040 (0.131)	3.347 (0.911)	-4.156 (0.374)**	-0.071 (5.117)	
DP10_S^2	1.150 (0.515)	0.005 (0.014)	-0.219 (0.116)	0.410 (0.071)*	-0.036 (0.362)	
DP10_W						0.845 (3.232)
DP10_W^2						0.322 (0.645)
TPCP_S	8.135 (3.189)	0.147 (0.059)	1.655 (2.049)	2.909 (0.503)*	-0.867 (1.875)	
TPCP_S^2	-0.234 (0.098)	-0.003 (0.002)	-0.036 (0.050)	-0.072 (0.014)*	0.023 (0.035)	
TPCP_W						2.426 (1.255)
TPCP_W^2						-0.111 (0.067)
MNTM_S	23.860 (4.205)*	0.007 (0.110)	5.572 (12.506)	4.205 (3.283)	-5.054 (1.72)	
MNTM_S^2	-0.180 (0.033)*	-0.000 (0.001)	-0.024 (0.095)	-0.023 (0.025)	0.041 (0.016)	
MNTM_W						3.214 (1.528)
MNTM_W^2						-0.051 (0.020)
Planted Acres	0.000 (0.001)		-0.001 (0.002)	0.000 (0.001)		0.001 (0.000)
PDO-TAG-WPWP-	-3.581 (2.511)	-0.120 (0.036)*	-6.653 (0.250)**	-1.893 (0.732)	-3.843 (1.051)	-1.950 (0.835)
PDO-TAG-WPWP+	-3.381 (1.644)	-0.074 (0.017)*	1.499 (0.689)	-1.306 (0.956)	-1.974 (1.445)	-1.213 (1.219)
PDO-TAG+WPWP-	-5.843 (3.235)	-0.067 (0.028)	-2.555 (2.329)	-2.242 (1.085)	-1.396 (0.963)	-1.128 (1.582)
PDO-TAG+WPWP+	-2.629 (1.563)	-0.073 (0.039)	0.735 (1.801)	-1.224 (1.084)	-1.241 (1.142)	-2.059 (1.589)
PDO+TAG-WPWP-	-2.249 (1.229)	-0.096 (0.032)	-7.448 (2.239)	-1.367 (0.731)	-1.466 (0.559)	-3.253 (1.388)
PDO+TAG-WPWP+	-8.262 (1.744)*	-0.143 (0.046)	-12.125 (0.756)**	-2.767 (0.771)*	-7.894 (1.338)*	-4.570 (1.899)
PDO+TAG+WPWP-	-8.074 (2.355)*	-0.064 (0.022)	-3.846 (1.074)	-0.836 (0.970)	-4.956 (1.602)	-4.007 (2.182)
Constant	-25,009.520 (24,110.169)	-884.059 (188.527)*	-88,153.294 (17,921.24)*	2,531.209 (2,409.913)	-7,524.143 (10,429.724)	-4,094.485 (10,582.914)

Note: * p<0.05; ** p<0.01

Table S29. Regression Results for Climate and ODCV Phase Combination Effects on Southeast Crop Yields

	Corn	Cotton	Hay	Sorghum	Soybeans	Winter Wheat
$Yield_{t-1}$			0.267 (0.074)*	0.105 (0.045)		
Year	-31.219 (30.822)	-427.994 (262.127)	1.674 (0.592)*	19.085 (6.017)	-0.326 (1.307)	5.987 (3.324)
$Year^2$	0.008 (0.008)	0.110 (0.066)	-0.000 (0.000)*	-0.005 (0.002)	0.000 (0.000)	-0.001 (0.001)
DT90_S	-1.569 (0.298)**	-4.508 (0.898)**	-0.002 (0.003)	-0.514 (0.099)*	-0.172 (0.096)	
$DT90\_S^2$	0.007 (0.002)*	0.019 (0.009)	-0.000 (0.000)	0.001 (0.000)	0.000 (0.001)	
DT90_W						-1.036 (0.269)*
$DT90\_W^2$						0.041 (0.024)
DT00_S	-30.918 (6.193)**	-16.656 (78.042)	-1.539 (0.413)*	-0.548 (15.846)	-3.139 (1.235)	
$DT00\_S^2$	15.296 (3.599)*	-36.019 (42.867)	3.863 (0.978)*	10.621 (33.309)	0.881 (0.583)	
DT00_W						-0.675 (0.338)
$DT00\_W^2$						0.029 (0.029)
DP10_S	-3.463 (3.016)	-111.558 (46.465)	-0.318 (0.081)*	1.644 (3.088)	1.249 (1.289)	
$DP10\_S^2$	0.059 (0.144)	4.647 (2.469)	0.012 (0.004)*	-0.102 (0.160)	-0.080 (0.069)	
DP10_W						-3.131 (0.978)*
$DP10\_W^2$						0.204 (0.046)*
TPCP_S	2.037 (1.173)	59.231 (23.038)	0.203 (0.042)**	-0.268 (1.995)	0.226 (0.686)	
$TPCP\_S^2$	-0.020 (0.015)	-0.770 (0.330)	-0.002 (0.001)*	0.005 (0.032)	0.000 (0.010)	
TPCP_W						1.522 (0.515)*
$TPCP\_W^2$						-0.034 (0.515)*
MNTM_S	-17.070 (5.205)*	324.666 (32.547)**	-0.061 (0.240)	15.822 (18.644)	2.167 (4.821)	
$MNTM\_S^2$	0.119 (0.039)*	-2.371 (0.184)**	0.000 (0.002)	-0.117 (0.136)	-0.017 (0.035)	
MNTM_W						4.881 (2.467)
$MNTM\_W^2$						-0.056 (0.024)
Planted Acres	-0.011 (0.003)*	-0.009 (0.048)		0.033 (0.016)	0.001 (0.001)	-0.003 (0.003)
PDO-TAG-WPWP-	-1.231 (3.458)	5.578 (37.141)	0.014 (0.056)	-0.511 (0.741)	-0.571 (0.503)	2.374 (1.112)
PDO-TAG-WPWP+	-0.346 (1.734)	-38.473 (18.184)	0.003 (0.040)	2.550 (0.573)*	-0.802 (0.390)	0.193 (0.661)
PDO-TAG+WPWP-	-3.116 (3.722)	-50.472 (24.354)	-0.015 (0.050)	1.745 (1.471)	-0.725 (0.363)	-0.341 (1.022)
PDO-TAG+WPWP+	-0.541 (1.133)	-15.626 (16.071)	0.042 (0.042)	2.589 (1.237)	-0.177 (0.580)	0.232 (0.943)
PDO+TAG-WPWP-	0.702 (2.361)	36.570 (40.06)	-0.069 (0.095)	-1.594 (1.162)	-1.033 (0.351)*	-2.770 (1.281)
PDO+TAG-WPWP+	-2.972 (1.992)	-104.510 (34.108)*	-0.034 (0.020)	-2.340 (1.218)	-0.612 (0.677)	-0.277 (1.210)
PDO+TAG+WPWP-	3.422 (3.642)	-18.652 (33.125)	-0.078 (0.069)	-2.139 (1.744)	-1.759 (0.538)*	1.250 (1.099)
Constant	30,499.504 (30,557.069)	403,736.579 (259,809.851)	-1,674.063 (590.712)*	-19,794.677 (6,156.664)*	77.778 (1,190.063)	-6,545.544 (3,290.458)

Note: * $p<0.05$; ** $p<0.01$

Table S30. Regression Results for Climate and ODCV Phase Combination Effects on South Central Crop Yields

	Corn	Cotton	Hay	Sorghum	Soybeans	Winter Wheat
Yieldt-1	0.339 (0.141)	0.284 (0.063)**	0.223 (0.030)**	0.478 (0.126)**	0.218 (0.045)**	
Year	0.779 (10.177)	-389.895 (156.953)*	0.640 (0.251)*	13.043 (8.737)	-22.287 (5.948)**	-2.811 (10.552)
Year^2	0.000 (0.003)	0.099 (0.040)*	-0.000 (0.000)*	-0.003 (0.002)	0.006 (0.002)**	0.001 (0.003)
DT90_S	-0.778 (0.123)**	-0.773 (2.479)	-0.006 (0.002)*	-0.114 (0.129)	-0.282 (0.049)**	
DT90_S^2	0.001 (0.001)	-0.021 (0.018)	-0.000 (0.000)	-0.000 (0.001)	0.001 (0.000)	
DT90_W						0.565 (0.357)
DT90_W^2						-0.042 (0.022)
DT00_S	-29.548 (9.295)*	-110.857 (21.666)**	0.182 (0.085)	-15.010 (11.496)	6.682 (1.595)**	
DT00_S^2	17.923 (7.210)*	93.008 (16.741)**	-0.099 (0.060)	6.562 (7.035)	-4.926 (1.069)**	
DT00_W						-0.154 (0.389)
DT00_W^2						0.002 (0.005)
DP10_S	5.188 (3.797)	-42.939 (36.103)	-0.144 (0.037)**	2.764 (2.005)	1.374 (1.299)	
DP10_S^2	-0.326 (0.193)	2.373 (1.683)	0.007 (0.002)*	-0.141 (0.107)	-0.084 (0.060)	
DP10_W						1.571 (0.807)
DP10_W^2						-0.089 (0.050)
TPCP_S	-0.043 (1.988)	13.800 (17.154)	-0.002 (0.000)**	0.004 (0.017)	0.009 (0.011)	
TPCP_S^2	0.002 (0.030)	-0.298 (0.254)	0.123 (0.016)**	-0.417 (1.061)	-0.446 (0.730)	
TPCP_W						-0.325 (0.353)
TPCP_W^2						0.002 (0.007)
MNTM_S	-5.622 (9.897)	-9.728 (105.569)	0.087 (0.264)	-15.571 (6.475)	0.931 (3.515)	
MNTM_S^2	0.044 (0.070)	0.256 (0.794)	-0.000 (0.002)	0.107 (0.046)	-0.005 (0.025)	
MNTM_W						0.680 (1.920)
MNTM_W^2						-0.013 (0.017)
Planted Acres	0.011 (0.005)*	-0.016 (0.004)**		0.002 (0.001)*	0.001 (0.000)	-0.001 (0.001)
PDO-TAG-WPWP-	1.087 (1.46)	-18.012 (20.271)	0.029 (0.037)	-2.140 (0.906)	-1.127 (0.419)*	-1.809 (1.425)
PDO-TAG-WPWP+	1.530 (0.984)	-22.737 (21.145)	-0.010 (0.037)	-0.043 (0.658)	-1.150 (0.483)	0.103 (0.382)
PDO-TAG+WPWP-	1.029 (1.44)	-50.648 (14.419)*	0.017 (0.005)**	-0.332 (1.708)	-0.772 (0.535)	0.426 (0.734)
PDO-TAG+WPWP+	2.169 (0.904)	-10.745 (13.676)	0.005 (0.030)	0.667 (0.693)	-0.513 (0.384)	-0.995 (0.256)**
PDO+TAG-WPWP-	1.507 (2.034)	-26.169 (11.434)	0.029 (0.029)	-0.493 (1.307)	-0.238 (0.989)	-3.031 (0.698)**
PDO+TAG-WPWP+	-2.698 (0.969)*	-20.950 (18.487)	-0.011 (0.010)	-2.334 (1.339)	0.652 (0.540)	-0.863 (1.273)
PDO+TAG+WPWP-	2.180 (1.495)	-16.578 (15.743)	-0.026 (0.051)	-2.853 (1.339)	-1.394 (0.554)*	-0.404 (0.548)
Constant	-1,863.680 (10,238.509)	382,123.139 (155,488.930)*	-651.787 (251.235)*	-12,848.012 (8,825.542)	21,928.041 (5,900.704)**	2,231.463 (10,452.579)

Note: * p<0.05; ** p<0.01

Table S31. Regression Results for Climate and ODCV Phase Combination Effects on Rocky Mountain Crop Yields

	Corn	Cotton	Hay	Sorghum	Spring Wheat	Winter Wheat
$Yield_{t-1}$	0.549 (0.074)**		0.610 (0.061)**		0.405 (0.086)**	0.529 (0.039)**
$Yield_{t-2}$	0.283 (0.067)**		0.281 (0.033)**		0.403 (0.074)**	0.328 (0.036)**
Year	23.516 (9.483)*	-414.746 (417.059)	0.132 (0.082)	107.364 (13.656)*	-1.268 (5.301)	9.169 (5.744)
$Year^2$	-0.006 (0.002)*	0.106 (0.105)	-0.000 (0.000)	-0.027 (0.003)*	0.000 (0.001)	-0.002 (0.001)
DT90_S	0.186 (0.210)	6.783 (5.225)	-0.002 (0.003)	-0.526 (0.192)	-0.110 (0.127)	
$DT90\_S^2$	-0.008 (0.003)*	-0.096 (0.035)	-0.000 (0.000)	-0.006 (0.001)	-0.004 (0.002)	
DT90_W						0.135 (0.500)
$DT90\_W^2$						-0.022 (0.018)
DT00_S	-0.457 (0.758)	387.954 (79.648)*	0.007 (0.021)	5.173 (1.517)	0.801 (0.433)	
$DT00\_S^2$	0.034 (0.055)	-384.586 (49.559)*	-0.001 (0.002)	-0.830 (0.414)	-0.077 (0.047)	
DT00_W						-0.090 (0.208)
$DT00\_W^2$						-0.003 (0.004)
DP10_S	-14.382 (4.771)*	-346.510 (190.282)	-0.006 (0.111)	7.340 (5.077)	-1.517 (1.992)	
$DP10\_S^2$	5.160 (1.826)*	82.087 (33.11)	-0.026 (0.035)	-0.750 (0.664)	-0.005 (0.142)	
DP10_W						0.254 (2.601)
$DP10\_W^2$						-0.630 (0.543)
TPCP_S	2.739 (0.659)**	33.760 (56.733)	-0.001 (0.023)	-2.401 (1.509)	0.719 (0.357)	
$TPCP\_S^2$	-0.141 (0.039)**	-1.598 (2.066)	0.001 (0.002)	0.042 (0.055)	-0.005 (0.009)	
TPCP_W						1.478 (0.804)
$TPCP\_W^2$						-0.050 (0.025)
MNTM_S	-16.147 (6.955)	-252.777 (42.928)*	-0.144 (0.097)	-19.902 (8.707)	-18.318 (6.091)*	
$MNTM\_S^2$	0.159 (0.061)*	2.196 (0.280)*	0.001 (0.001)	0.186 (0.067)	0.173 (0.056)*	
MNTM_W						-2.391 (2.371)
$MNTM\_W^2$						0.032 (0.028)
Planted Acres	-0.005 (0.003)	-0.086 (0.101)		-0.004 (0.006)		0.000 (0.001)
PDO-TAG-WPWP-	-4.357 (1.128)**	-117.171 (81.362)	-0.057 (0.020)*	-4.534 (0.819)*	-3.340 (1.073)*	-1.410 (0.720)
PDO-TAG-WPWP+	-1.987 (1.241)	5.523 (2.562)	-0.069 (0.030)	0.276 (0.836)	-3.796 (0.986)**	-2.318 (1.38)
PDO-TAG+WPWP-	-1.564 (1.759)	-62.530 (38.611)	-0.073 (0.034)	-0.660 (2.211)	-2.117 (0.930)	-0.935 (1.004)
PDO-TAG+WPWP+	-1.835 (1.598)	-55.144 (25.499)	-0.049 (0.026)	5.395 (1.202)*	-1.964 (0.650)*	-1.296 (0.796)
PDO+TAG-WPWP-	-4.400 (1.114)**	-69.879 (81.631)	-0.078 (0.028)*	-7.771 (0.659)**	-4.307 (1.510)*	-2.070 (0.753)*
PDO+TAG-WPWP+	-2.197 (1.883)	-129.597 (43.648)	-0.079 (0.061)	-7.823 (3.351)	-4.033 (1.160)*	-2.732 (1.193)
PDO+TAG+WPWP-	-1.796 (1.276)	-110.717 (85.239)	-0.047 (0.019)*	-7.226 (0.757)*	0.046 (1.678)	-1.197 (0.931)
Constant	-23,221.503 (9,394.013)*	412,273.509 (413,799.724)	-128.277 (81.604)	-106,128.395 (13,203.053)*	1,618.164 (5,253.458)	-9,103.450 (5,659.681)

Note: * p<0.05; ** p<0.01

Table S32. Regression Results for Climate and ODCV Phase Combination Effects on Southwest Crop Yields

	Corn	Cotton	Hay	Sorghum	Soybeans	Winter Wheat
Yield_{t-1}	0.405 (0.050)	0.312 (0.124)	0.076 (0.018)	0.175 (0.009)*		
Yield_{t-2}			0.130 (0.071)			
Yield_{t-3}			0.273 (0.082)			
Year	85.889 (22.31)	-491.541 (167.98)	1.182 (0.235)	68.744 (7.893)	7.358 (4.003)	29.112 (0.415)**
Year^2	-0.021 (0.006)	0.125 (0.043)	-0.000 (0.000)	-0.017 (0.002)	-0.002 (0.001)	-0.007 (0.000)*
DT90_S	-1.581 (0.650)	-0.917 (3.707)	0.001 (0.000)	-0.517 (0.405)	-0.206 (0.043)	
DT90_S^2	0.007 (0.005)	-0.004 (0.023)	-0.000 (0.000)	0.001 (0.003)	-0.000 (0.000)	
DT90_W						0.155 (0.238)
DT90_W^2						-0.010 (0.010)
DT00_S	-91.224 (2.327)*	-484.917 (117.606)	0.277 (0.432)	27.085 (13.422)	20.463 (28.384)	
DT00_S^2	375.525 (50.217)	2,121.151 (691.066)	1.497 (2.775)	-50.293 (64.485)	-58.587 (90.14)	
DT00_W						0.032 (0.844)
DT00_W^2						0.095 (0.138)
DP10_S	-31.509 (30.822)	220.587 (44.078)	0.092 (0.506)	0.999 (2.214)	4.361 (1.198)	
DP10_S^2	2.096 (2.044)	-16.273 (1.553)	-0.011 (0.037)	-0.166 (0.147)	-0.285 (0.066)	
DP10_W						-2.410 (4.541)
DP10_W^2						0.169 (0.455)
TPCP_S	14.210 (13.928)	-92.680 (18.627)	0.002 (0.203)	-0.137 (1.961)	-1.818 (0.937)	
TPCP_S^2	-0.283 (0.287)	2.122 (0.213)	0.001 (0.005)	0.012 (0.039)	0.035 (0.018)	
TPCP_W						1.588 (2.04)
TPCP_W^2						-0.031 (0.062)
MNTM_S	32.739 (4.497)	348.883 (135.794)	0.458 (0.306)	23.674 (11.81)	-12.619 (3.548)	
MNTM_S^2	-0.213 (0.045)	-2.394 (0.922)	-0.003 (0.002)	-0.161 (0.084)	0.090 (0.024)	
MNTM_W						-4.633 (1.052)
MNTM_W^2						0.036 (0.009)
Planted Acres	0.005 (0.000)*	-0.012 (0.001)*		-0.000 (0.000)	-0.001 (0.000)	0.000 (0.000)
PDO-TAG-WPWP-	1.015 (7.272)	-99.598 (33.071)	0.105 (0.116)	-2.692 (1.382)	-0.718 (0.488)	-3.262 (0.197)*
PDO-TAG-WPWP+	2.459 (6.909)	-49.262 (35.566)	0.129 (0.039)	0.544 (2.422)	-1.848 (1.174)	-0.879 (0.550)
PDO-TAG+WPWP-	-5.455 (2.507)	-63.784 (0.909)**	0.020 (0.032)	-3.952 (2.702)	-3.976 (0.303)*	-2.965 (0.990)
PDO-TAG+WPWP+	4.243 (1.442)	-55.049 (12.972)	0.058 (0.024)	0.714 (1.145)	-1.350 (1.514)	-0.871 (0.519)
PDO+TAG-WPWP-	1.634 (5.277)	-66.546 (14.884)	0.067 (0.022)	-3.116 (0.308)	-1.560 (1.678)	-3.365 (1.493)
PDO+TAG-WPWP+	0.546 (0.274)	-104.325 (18.926)	-0.065 (0.096)	-5.693 (0.346)*	-2.423 (1.053)	-4.116 (0.265)*
PDO+TAG+WPWP-	5.049 (7.275)	-90.748 (0.016)**	0.055 (0.136)	-6.759 (2.127)	-2.837 (1.061)	-2.389 (0.320)
Constant	-87,381.006 (22,433.877)	470,140.873 (159,987.043)	-1,191.391 (246.486)	-69,274.734 (7,381.500)	-6,897.990 (4,055.223)	-28,954.357 (344.268)**

Note: * p<0.05; ** p<0.01

Table S33. Regression Results for Climate and ODCV Phase Combination Effects on Pacific Southwest Crop Yields

	Corn	Cotton	Hay	Sorghum	Winter Wheat
$Yield_{t-1}$	0.394 (0.104)**		0.340 (0.176)		
$Yield_{t-2}$	0.261 (0.111)*				
$Yield_{t-3}$	0.248 (0.136)				
Year	7.000 (17.465)	1,212.290 (415.007)**	1.230 (0.513)*	18.585 (20.296)	80.841 (16.165)**
$Year^2$	-0.002 (0.004)	-0.304 (0.105)**	-0.000 (0.000)*	-0.005 (0.005)	-0.020 (0.004)**
DT90_S	2.316 (2.148)	34.309 (69.13)	-0.006 (0.067)	1.177 (3.132)	
DT90_S^2	-0.023 (0.019)	-0.299 (0.595)	0.000 (0.001)	-0.011 (0.028)	
DT90_W					1.063 (1.397)
DT90_W^2					-0.078 (0.098)
DT00_S	-49.365 (49.869)	-7.014 (409.039)	-1.110 (1.32)	-31.935 (21.567)	
DT00_S^2	24.045 (198.654)	-20.092 (64.831)	3.272 (4.811)	5.617 (3.357)	
DT00_W					4.937 (3.436)
DT00_W^2					-0.237 (0.277)
DP10_S	-0.743 (7.995)	-4.748 (249.379)	-0.203 (0.244)	10.523 (13.167)	
DP10_S^2	2.728 (1.568)	34.850 (45.208)	0.052 (0.048)	-2.514 (2.913)	
DP10_W					-22.868 (8.176)**
DP10_W^2					1.452 (0.492)**
TPCP_S	-0.541 (2.75)	6.219 (82.869)	0.044 (0.085)	-3.237 (4.245)	
TPCP_S^2	-0.205 (0.137)	-3.509 (3.88)	-0.003 (0.004)	0.189 (0.231)	
TPCP_W					8.102 (3.026)*
TPCP_W^2					-0.154 (0.054)**
MNTM_S	1.698 (69.045)	-2,132.976 (1,946.723)	-0.736 (2.027)	-51.098 (122.089)	
MNTM_S^2	-0.028 (0.535)	16.653 (15.007)	0.006 (0.016)	0.399 (0.95)	
MNTM_W					-59.795 (51.534)
MNTM_W^2					0.588 (0.501)
Planted Acres	0.025 (0.011)*	-0.400 (0.082)**		0.031 (0.015)*	0.020 (0.005)**
PDO-TAG-WPWP-	1.455 (2.882)	-67.009 (85.752)	0.075 (0.085)	1.705 (4.142)	-2.749 (3.417)
PDO-TAG-WPWP+	-3.168 (2.811)	-2.339 (76.574)	0.108 (0.083)	-3.481 (4.225)	-2.848 (3.5)
PDO-TAG+WPWP-	2.344 (3.335)	-120.470 (105.352)	0.091 (0.099)	-0.199 (4.552)	-4.849 (4.124)
PDO-TAG+WPWP+	0.690 (2.788)	-23.085 (69.624)	-0.019 (0.078)	0.484 (3.97)	1.972 (3.039)
PDO+TAG-WPWP-	1.524 (3.188)	-52.725 (84.345)	0.076 (0.094)	4.699 (5.107)	5.552 (4.044)
PDO+TAG-WPWP+	-10.919 (3.213)**	-80.167 (86.304)	0.087 (0.098)	-1.825 (5.057)	-3.597 (3.801)
PDO+TAG+WPWP-	1.715 (2.86)	-24.617 (70.857)	0.078 (0.084)	2.667 (4.69)	0.141 (3.273)
Constant	-7,002.462 (17,355.032)	-1,138,034.630 (416,023.286)*	-1,217.307 (509.132)*	-17,447.900 (20,510.599)	-79,602.610 (16,174.864)**

Note: * p<0.05; ** p<0.01

Table S34. Regression Results for Climate and ODCV Phase Combination Effects on Pacific Northwest Crop Yields

	Corn	Hay	Spring Wheat	Winter Wheat
$Yield_{t-1}$	0.724 (0.065)**	0.433 (0.089)**	0.552 (0.080)**	0.404 (0.085)**
$Yield_{t-2}$		0.452 (0.091)**		
Year	-19.965 (15.53)	0.320 (0.281)	-5.948 (8.975)	27.874 (11.594)*
$Year^2$	0.005 (0.004)	-0.000 (0.000)	0.002 (0.002)	-0.007 (0.003)*
DT90_S	-0.902 (0.714)	-0.015 (0.012)	-0.512 (0.414)	
$DT90\_S^2$	0.016 (0.017)	0.000 (0.000)	0.012 (0.010)	
DT90_W				11.154 (9.333)
$DT90\_W^2$				-8.915 (10.796)
DT00_S	1.295 (20.937)	0.072 (0.375)	8.435 (11.973)	
$DT00\_S^2$	6.713 (42.763)	-0.299 (0.743)	-9.375 (24.446)	
DT00_W				0.888 (1.064)
$DT00\_W^2$				-0.050 (0.124)
DP10_S	5.186 (10.231)	0.391 (0.184)*	11.057 (5.939)	
$DP10\_S^2$	-0.150 (2.485)	-0.110 (0.045)*	-1.953 (1.437)	
DP10_W				-1.654 (3.502)
$DP10\_W^2$				0.081 (0.197)
TPCP_S	2.045 (4.326)	-0.080 (0.078)	-3.482 (2.494)	
$TPCP\_S^2$	-0.098 (0.154)	0.004 (0.003)	0.115 (0.089)	
TPCP_W				2.645 (1.304)*
$TPCP\_W^2$				-0.035 (0.018)
MNTM_S	13.320 (51.553)	-0.172 (0.910)	4.412 (29.755)	
$MNTM\_S^2$	-0.101 (0.455)	0.002 (0.008)	-0.043 (0.263)	
MNTM_W				5.678 (20.83)
$MNTM\_W^2$				-0.057 (0.255)
Planted Acres	0.021 (0.023)			0.001 (0.001)
PDO-TAG-WPWP-	-1.146 (3.593)	0.038 (0.063)	-0.986 (2.071)	-4.154 (2.467)
PDO-TAG-WPWP+	1.548 (3.557)	-0.036 (0.064)	0.928 (2.077)	-4.902 (2.309)*
PDO-TAG+WPWP-	-1.458 (4.183)	0.025 (0.074)	-5.322 (2.415)*	-4.942 (2.873)
PDO-TAG+WPWP+	0.008 (3.181)	0.051 (0.055)	1.810 (1.824)	-1.114 (2.161)
PDO+TAG-WPWP-	6.848 (4.209)	-0.042 (0.074)	3.090 (2.385)	-1.293 (3.026)
PDO+TAG-WPWP+	1.703 (3.916)	0.111 (0.068)	1.535 (2.249)	0.169 (2.713)
PDO+TAG+WPWP-	6.667 (3.472)	-0.022 (0.062)	4.397 (2.007)*	-2.763 (2.328)
Constant	18,727.073 (15,308.106)	-314.601 (275.836)	5,582.893 (8,834.818)	-28,123.424 (11,458.093)*

Note: * p<0.05; ** p<0.01

Table S35. Total Effect of ODCV Phase Combinations on Northeast Crop Yields

	PDO-TAG-WPWP-	PDO-TAG-WPWP+	PDO-TAG+WPWP-	PDO-TAG+WPWP+	PDO+TAG-WPWP-	PDO+TAG-WPWP+	PDO+TAG+WPWP-
Corn	0.105	-1.94	-3.779	-1.482	0.235	-11.743	-1.034
Cotton	NA	NA	NA	NA	NA	NA	NA
Hay	0.046	-0.031	0.054	-0.079	-0.054	0.004	0.034
Sorghum	NA	NA	NA	NA	NA	NA	NA
Soybeans	-6.044	3.189	-8.508	-0.924	-5.983	-13.889	-13.725
Spring Wheat	NA	NA	NA	NA	NA	NA	NA
Winter Wheat	1.684	1.636	8.303	-1.596	1.339	2.484	-0.967

Table S36. Total Effect of ODCV Phase Combinations on Lake States Crop Yields

	PDO-TAG-WPWP-	PDO-TAG-WPWP+	PDO-TAG+WPWP-	PDO-TAG+WPWP+	PDO+TAG-WPWP-	PDO+TAG-WPWP+	PDO+TAG+WPWP-
Corn	-37.07	23.636	5.721	1.619	3.955	-34.853	-15.098
Cotton	NA	NA	NA	NA	NA	NA	NA
Hay	0.046	0.239	-0.192	0.208	0.467	-0.418	-0.103
Sorghum	NA	NA	NA	NA	NA	NA	NA
Soybeans	10.127	-3.249	-5.165	2.695	3.65	3.73	4.611
Spring Wheat	-40.415	20.11	16.529	-3.949	1.372	-24.655	-11.87
Winter Wheat	18.11	8.224	11.751	4.62	22.246	11.947	10.518

Table S37. Total Effect of ODCV Phase Combinations on Corn Belt Crop Yields

	PDO-TAG-WPWP-	PDO-TAG-WPWP+	PDO-TAG+WPWP-	PDO-TAG+WPWP+	PDO+TAG-WPWP-	PDO+TAG-WPWP+	PDO+TAG+WPWP-
Corn	-12.094	3.401	-13.13	3.102	9.185	-34.193	-18.082
Cotton	-319.203	480.023	173.722	496.463	399.152	-272.601	-300.954
Hay	-0.426	-0.037	-0.561	0.076	0.424	-0.918	-0.706
Sorghum	6.888	-0.11	5.879	-1.178	-13.953	6.039	3.327
Soybeans	-3.666	-1.221	-5.142	0.295	2.274	-9.401	-4.103
Spring Wheat	NA	NA	NA	NA	NA	NA	NA
Winter Wheat	-6.292	-3.115	2.354	-5.218	-15.328	-7.239	-5.357

Table S38. Total Effect of ODCV Phase Combinations on Great Plains Crop Yields

	PDO-TAG-WPWP-	PDO-TAG-WPWP+	PDO-TAG+WPWP-	PDO-TAG+WPWP+	PDO+TAG-WPWP-	PDO+TAG-WPWP+	PDO+TAG+WPWP-
Corn	-18.373	-0.003	-15.423	-12.181	13.836	-35.69	-21.027
Cotton	NA	NA	NA	NA	NA	NA	NA
Hay	-0.258	-0.138	-0.264	-0.059	0.224	-0.469	-0.272
Sorghum	-11.468	0.006	-7.009	-0.171	-0.681	-21.646	-10.454
Soybeans	-4.848	-0.727	-5.036	-3.305	3.706	-9.75	-4.022
Spring Wheat	0.224	-2.812	-0.107	0.146	-2.628	-5.357	-3.326
Winter Wheat	-12.54	-1.905	-11.2	-10.089	-10.76	-16.921	-10.266

Table S39. Total Effect of ODCV Phase Combinations on Southeast Crop Yields

	PDO-TAG-WPWP-	PDO-TAG-WPWP+	PDO-TAG+WPWP-	PDO-TAG+WPWP+	PDO+TAG-WPWP-	PDO+TAG-WPWP+	PDO+TAG+WPWP-
Corn	12.052	-2.232	15.995	-23.006	-28.708	1.351	5.555
Cotton	115.728	75.152	-78.766	43.095	52.274	-30.786	-47.128
Hay	0.132	-0.087	-0.196	-0.451	-0.845	0.024	-0.282
Sorghum	7.305	9.973	6.122	8.893	4.237	2.306	0.776
Soybeans	2.174	0.015	-0.214	-1.864	-4.619	1.027	-1.423
Spring Wheat	NA	NA	NA	NA	NA	NA	NA
Winter Wheat	10.876	1.152	-3.697	0.362	-3.662	1.071	3.109

Table S40. Total Effect of ODCV Phase Combinations on South Central Crop Yields

	PDO-TAG-WPWP-	PDO-TAG-WPWP+	PDO-TAG+WPWP-	PDO-TAG+WPWP+	PDO+TAG-WPWP-	PDO+TAG-WPWP+	PDO+TAG+WPWP-
Corn	22.757	14.401	17.932	-16.629	0.665	3.436	6.801
Cotton	15.027	24.999	-13.892	-45.295	-9.846	-30.426	-13.707
Hay	0.389	0.025	0.175	1.642	0.989	-0.073	-0.01
Sorghum	9.043	2.434	3.511	-18.867	-6.91	4.137	3.468
Soybeans	-0.789	-3.643	-0.501	-7.957	-6.315	1.782	-1.225
Spring Wheat	NA	NA	NA	NA	NA	NA	NA
Winter Wheat	-0.176	0.078	1.717	0.468	-4.168	-0.405	0.364

Table S41. Total Effect of ODCV Phase Combinations on Rocky Mountain Crop Yields

	PDO-TAG-WPWP-	PDO-TAG-WPWP+	PDO-TAG+WPWP-	PDO-TAG+WPWP+	PDO+TAG-WPWP-	PDO+TAG-WPWP+	PDO+TAG+WPWP-
Corn	10.979	5.885	-4.318	-3.049	8.017	3.576	8.435
Cotton	218.989	44.003	28.214	18.516	105.263	-49.259	91.112
Hay	0.109	0.015	-0.094	-0.022	0.051	-0.024	0.064
Sorghum	22.256	12.319	-1.411	13.644	10.955	3.544	9.756
Soybeans	NA	NA	NA	NA	NA	NA	NA
Spring Wheat	16.638	6.319	-5.273	0.895	11.816	2.833	13.636
Winter Wheat	0.281	-3.23	-1.277	-1.303	1.386	-3.912	0.763

Table S42. Total Effect of ODCV Phase Combinations on Southwest Crop Yields

	PDO-TAG-WPWP-	PDO-TAG-WPWP+	PDO-TAG+WPWP-	PDO-TAG+WPWP+	PDO+TAG-WPWP-	PDO+TAG-WPWP+	PDO+TAG+WPWP-
Corn	3.09	9.69	17.417	8.106	16.419	-24.218	-4.063
Cotton	-182.738	-16.012	113.301	191.857	73.218	-341.652	-233.433
Hay	-0.074	0.156	0.153	0.277	0.205	-0.413	-0.208
Sorghum	-7.577	1.937	9.12	12.039	3.968	-21.296	-16.739
Soybeans	4.193	-1.89	-8.099	-6.146	-6.897	10.795	4.665
Spring Wheat	NA	NA	NA	NA	NA	NA	NA
Winter Wheat	-10.201	-5.151	-10.572	-6.094	0.284	-7.301	-3.188

Table S43. Total Effect of ODCV Phase Combinations on Pacific Southwest Crop Yields

	PDO-TAG-WPWP-	PDO-TAG-WPWP+	PDO-TAG+WPWP-	PDO-TAG+WPWP+	PDO+TAG-WPWP-	PDO+TAG-WPWP+	PDO+TAG+WPWP-
Corn	-9.105	-9.261	8.084	-16.939	-3.538	-15.194	-13.71
Cotton	1671.972	983.752	716.885	1079.637	596.24	601.655	1000.66
Hay	0.697	0.501	0.458	0.455	0.289	0.166	0.44
Sorghum	42.127	20.393	20.235	19.386	19.92	13.102	23.325
Soybeans	67.306	75.344	69.053	98.682	59.963	0.791	14.147
Spring Wheat	NA	NA	NA	NA	NA	NA	NA
Winter Wheat	64.524	-1.71	76.014	25.686	10.568	-31.695	11.381

Table S44. Total Effect of ODCV Phase Combinations on Pacific Northwest Crop Yields

	PDO-TAG-WPWP-	PDO-TAG-WPWP+	PDO-TAG+WPWP-	PDO-TAG+WPWP+	PDO+TAG-WPWP-	PDO+TAG-WPWP+	PDO+TAG+WPWP-
Corn	-18.113	-15.068	-24.382	-13.353	-4.12	-9.493	1.077
Cotton	NA	NA	NA	NA	NA	NA	NA
Hay	0.431	0.164	0.185	0.394	0.233	0.354	0.175
Sorghum	NA	NA	NA	NA	NA	NA	NA
Soybeans	NA	NA	NA	NA	NA	NA	NA
Spring Wheat	-1.799	-2.124	-7.923	2.904	-1.768	1.024	4.398
Winter Wheat	-4.159	-4.146	-19.278	-0.006	-19.309	7.945	1.405