

Supplementary materials

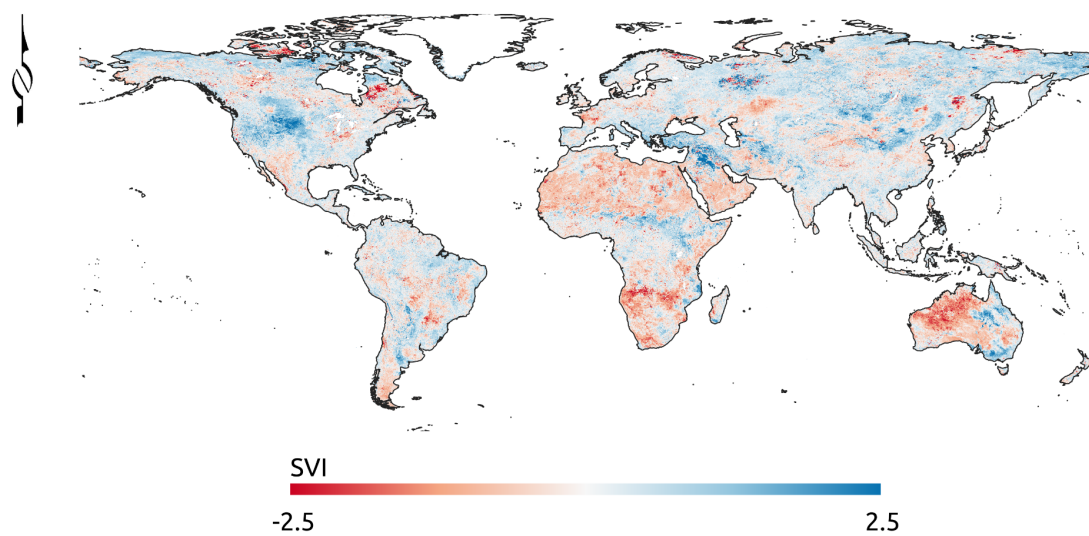


Figure S1. SVI map for July 2019.

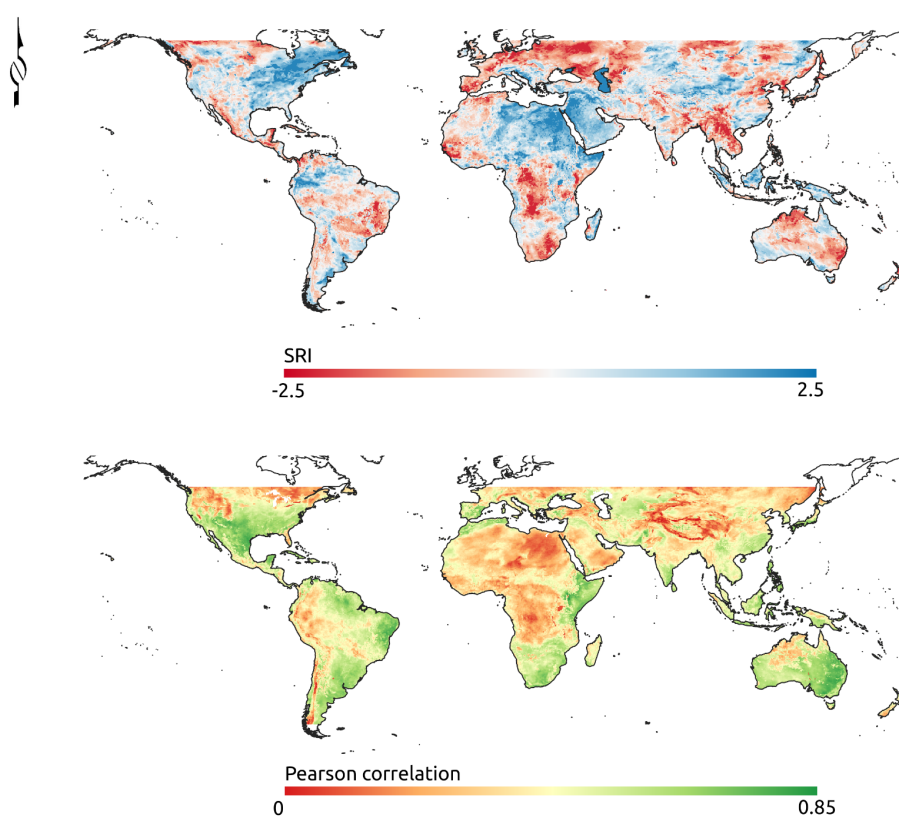


Figure S2. SRI map for July 2019 (above) and correlation between SPEI and SRI (below).

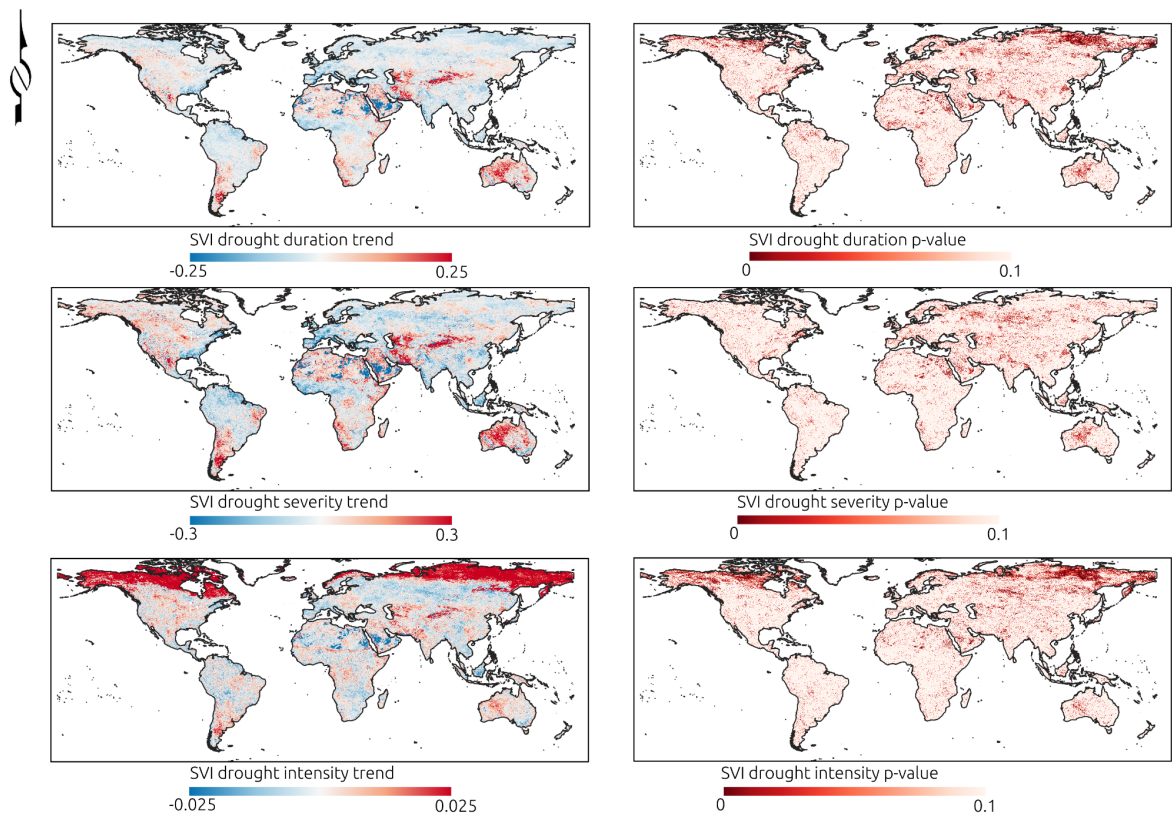


Figure S3. Annual trends (left panels) and significance (right panels) of agricultural/ecological drought characteristics based on the 3-month SVI.

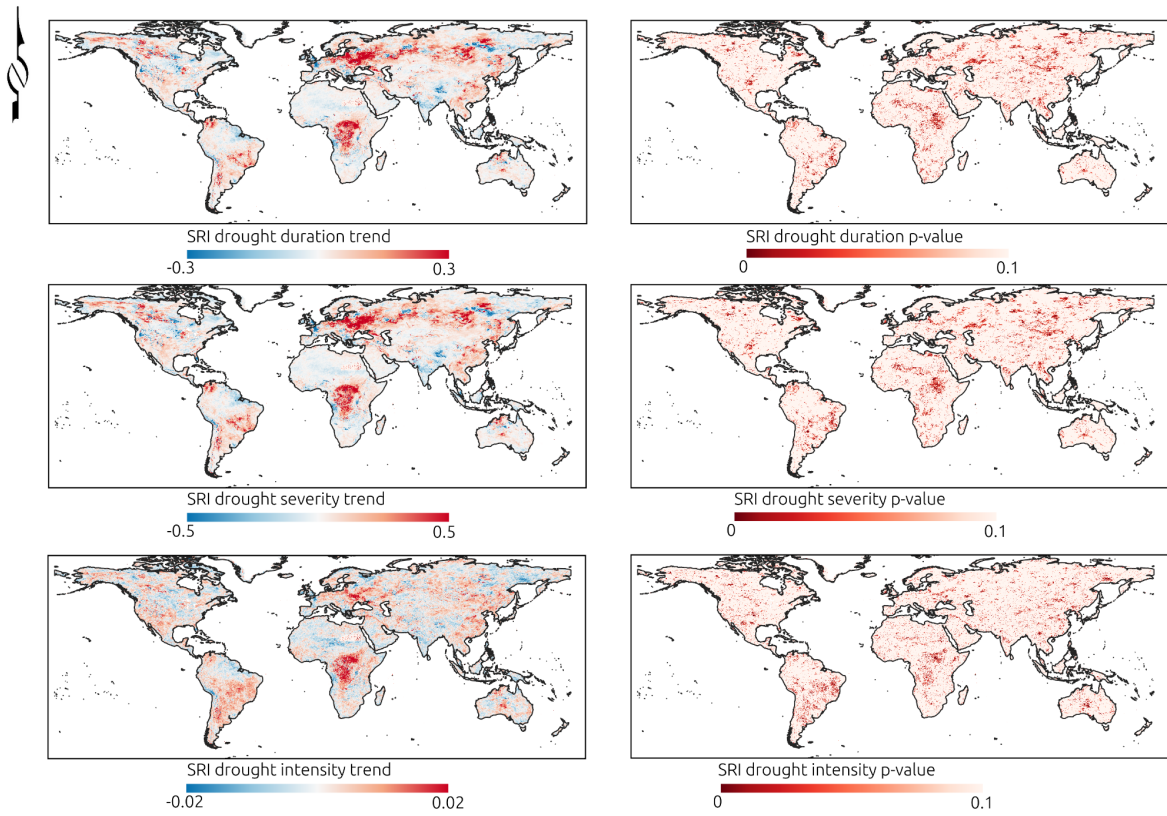


Figure S4. Annual trends (left panels) and significance (right panels) of hydrologic drought characteristics obtained using 3-month SRI.

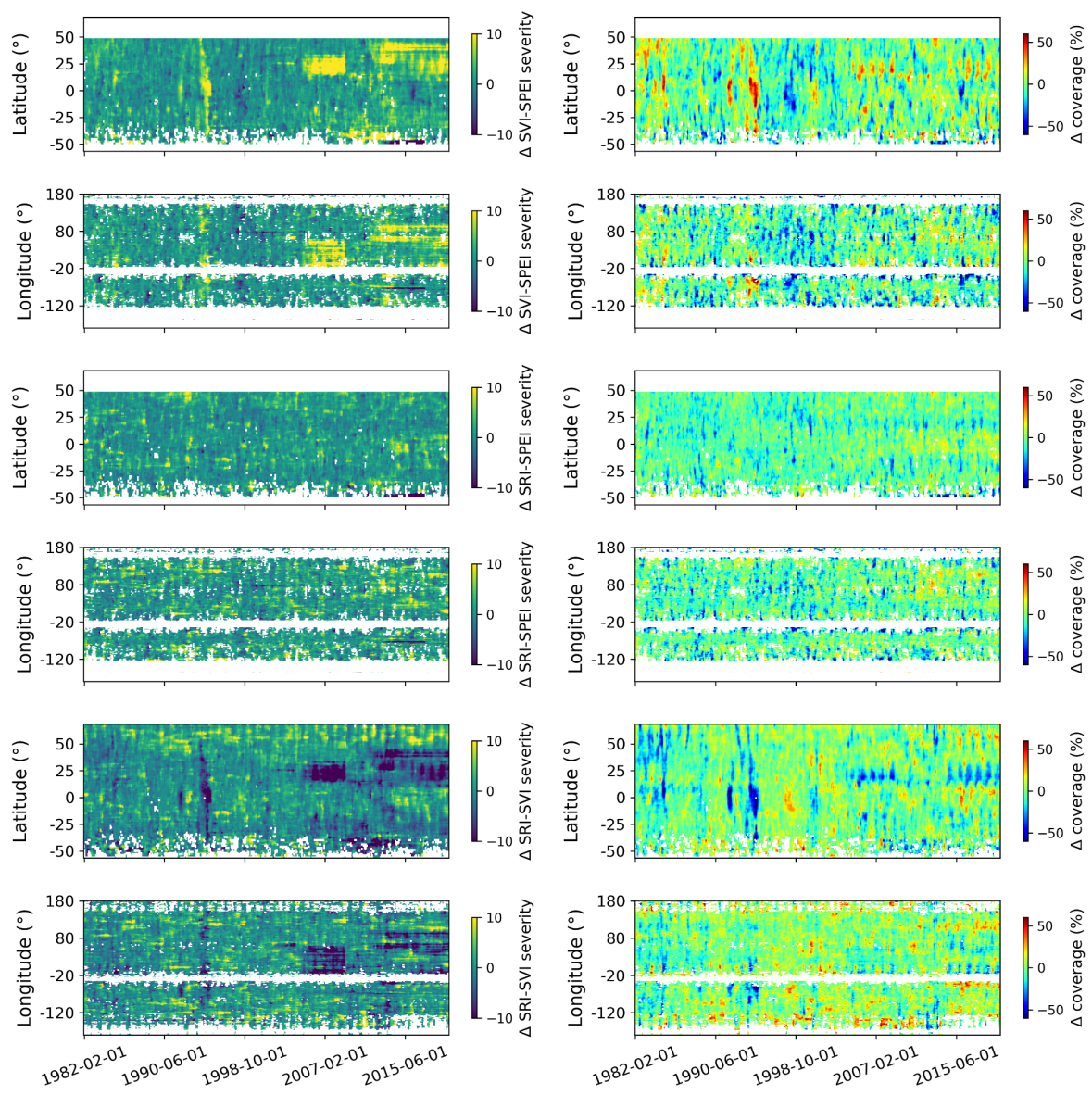


Figure S5. Latitudinal and longitudinal drought severity differences between indices.

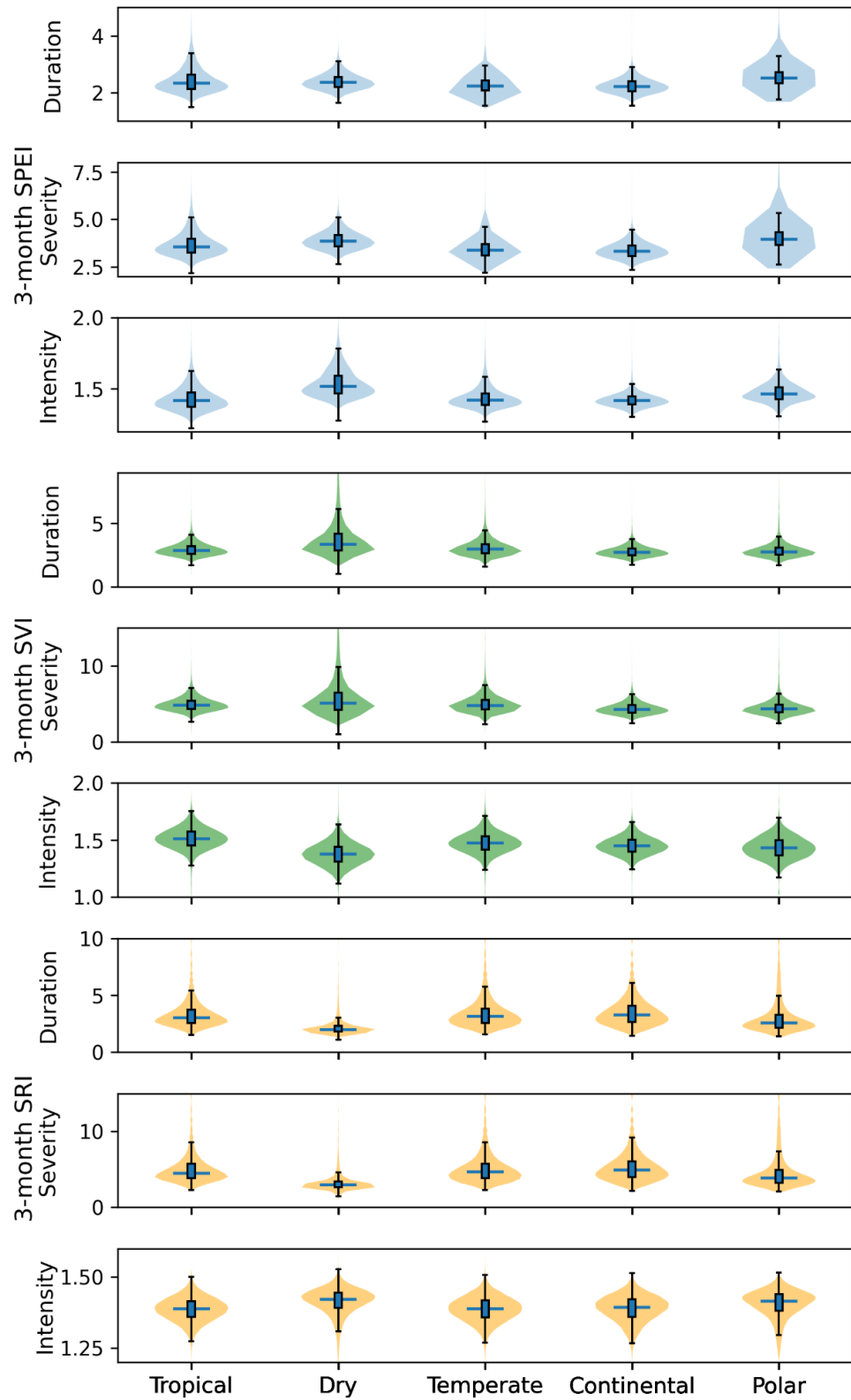


Figure S6. Standardized index distributions from average drought characteristics taken from major Köppen climate groups.

Table S1. Dunn's multiple comparison results for mean 3-month SPEI duration.

	Tropical	Dry	Temperate	Continental	Polar
Tropical	1.000000e+00	1.342233e-20	0.000000e+00	0.000000e+00	1.334254e-252
Dry	1.342233e-20	1.000000e+00	0.000000e+00	0.000000e+00	6.197660e-209
Temperate	0.000000e+00	0.000000e+00	1.000000e+00	9.079373e-19	0.000000e+00
Continental	0.000000e+00	0.000000e+00	9.079373e-19	1.000000e+00	0.000000e+00
Polar	1.334254e-252	6.197660e-209	0.000000e+00	0.000000e+00	1.000000e+00

Table S2. Dunn's multiple comparison results for mean 3-month SPEI severity.

	Tropical	Dry	Temperate	Continental	Polar
Tropical	1.0	0.000000e+00	0.000000e+00	0.000000e+00	0.000000e+00
Dry	0.0	1.000000e+00	0.000000e+00	0.000000e+00	4.061834e-20
Temperate	0.0	0.000000e+00	1.000000e+00	1.229764e-39	0.000000e+00
Continental	0.0	0.000000e+00	1.229764e-39	1.000000e+00	0.000000e+00
Polar	0.0	4.061834e-20	0.000000e+00	0.000000e+00	1.000000e+00

Table S3. Dunn's multiple comparison results for mean 3-month SPEI intensity.

	Tropical	Dry	Temperate	Continental	Polar
Tropical	1.000000e+00	0.0	3.245057e-18	5.196962e-33	0.000000e+00
Dry	0.000000e+00	1.0	0.000000e+00	0.000000e+00	0.000000e+00
Temperate	3.245057e-18	0.0	1.000000e+00	2.589177e-76	3.204927e-257
Continental	5.196962e-33	0.0	2.589177e-76	1.000000e+00	0.000000e+00
Polar	0.000000e+00	0.0	3.204927e-257	0.000000e+00	1.000000e+00

Table S4. Dunn's multiple comparison results for mean 3-month SVI duration.

	Tropical	Dry	Temperate	Continental	Polar
Tropical	1.000000e+00	0.0	6.041526e-118	2.911475e-276	7.872093e-30
Dry	0.000000e+00	1.0	0.000000e+00	0.000000e+00	0.000000e+00
Temperate	6.041526e-118	0.0	1.000000e+00	0.000000e+00	4.503759e-104
Continental	2.911475e-276	0.0	0.000000e+00	1.000000e+00	4.194645e-15
Polar	7.872093e-30	0.0	4.503759e-104	4.194645e-15	1.000000e+00

Table S5. Dunn's multiple comparison results for mean 3-month SVI severity.

	Tropical	Dry	Temperate	Continental	Polar
Tropical	1.000000e+00	1.898613e-291	1.476633e-02	0.000000	4.411538e-246
Dry	1.898613e-291	1.000000e+00	5.234473e-298	0.000000	0.000000e+00
Temperate	1.476633e-02	5.234473e-298	1.000000e+00	0.000000	1.120087e-225
Continental	0.000000e+00	0.000000e+00	0.000000e+00	1.000000	4.893282e-05
Polar	4.411538e-246	0.000000e+00	1.120087e-225	0.000049	1.000000e+00

Table S6. Dunn's multiple comparison results for mean 3-month SVI intensity.

	Tropical	Dry	Temperate	Continental	Polar
Tropical	1.0	0.000000e+00	0.000000e+00	0.000000e+00	0.000000e+00
Dry	0.0	1.000000e+00	0.000000e+00	0.000000e+00	4.752565e-249
Temperate	0.0	0.000000e+00	1.000000e+00	1.840837e-181	1.393150e-161
Continental	0.0	0.000000e+00	1.840837e-181	1.000000e+00	6.287959e-25
Polar	0.0	4.752565e-249	1.393150e-161	6.287959e-25	1.000000e+00

Table S7. Dunn's multiple comparison results for mean 3-month SRI duration.

	Tropical	Dry	Temperate	Continental	Polar
Tropical	1.000000e+00	0.0	4.734582e-08	5.156874e-42	2.242249e-148
Dry	0.000000e+00	1.0	0.000000e+00	0.000000e+00	0.000000e+00
Temperate	4.734582e-08	0.0	1.000000e+00	1.288887e-18	2.712638e-174
Continental	5.156874e-42	0.0	1.288887e-18	1.000000e+00	3.740028e-220
Polar	2.242249e-148	0.0	2.712638e-174	3.740028e-220	1.000000e+00

Table S8. Dunn's multiple comparison results for mean 3-month SRI severity.

	Tropical	Dry	Temperate	Continental	Polar
Tropical	1.000000e+00	0.0	4.860164e-08	4.072728e-41	7.514908e-147
Dry	0.000000e+00	1.0	0.000000e+00	0.000000e+00	0.000000e+00
Temperate	4.860164e-08	0.0	1.000000e+00	4.609287e-18	1.250389e-172
Continental	4.072728e-41	0.0	4.609287e-18	1.000000e+00	2.642604e-217
Polar	7.514908e-147	0.0	1.250389e-172	2.642604e-217	1.000000e+00

Table S9. Dunn's multiple comparison results for mean 3-month SRI intensity.

	Tropical	Dry	Temperate	Continental	Polar
Tropical	1.000000e+00	0.000000e+00	1.224341e-02	5.784285e-27	5.369195e-243
Dry	0.000000e+00	1.000000e+00	0.000000e+00	0.000000e+00	3.098480e-28
Temperate	1.224341e-02	0.000000e+00	1.000000e+00	3.299845e-17	3.386141e-222
Continental	5.784285e-27	0.000000e+00	3.299845e-17	1.000000e+00	5.562616e-146
Polar	5.369195e-243	3.098480e-28	3.386141e-222	5.562616e-146	1.000000e+00

Table S10. Dunn's multiple comparison results for SVI-SPEI duration difference.

	Tropical	Dry	Temperate	Continental	Polar
Tropical	1.000000e+00	0.0	0.0	9.842599e-02	3.527056e-129
Dry	0.000000e+00	1.0	0.0	0.000000e+00	0.000000e+00
Temperate	0.000000e+00	0.0	1.0	0.000000e+00	0.000000e+00
Continental	9.842599e-02	0.0	0.0	1.000000e+00	4.057404e-107
Polar	3.527056e-129	0.0	0.0	4.057404e-107	1.000000e+00

Table S11. Dunn's multiple comparison results for SVI-SPEI severity difference.

	Tropical	Dry	Temperate	Continental	Polar
Tropical	1.000000e+00	8.648823e-43	1.026924e-169	8.537115e-194	0.000000e+00
Dry	8.648823e-43	1.000000e+00	4.108409e-69	0.000000e+00	0.000000e+00
Temperate	1.026924e-169	4.108409e-69	1.000000e+00	0.000000e+00	0.000000e+00
Continental	8.537115e-194	0.000000e+00	0.000000e+00	1.000000e+00	3.920562e-206
Polar	0.000000e+00	0.000000e+00	0.000000e+00	3.920562e-206	1.000000e+00

Table S12. Dunn's multiple comparison results for SVI-SPEI intensity difference.

	Tropical	Dry	Temperate	Continental	Polar
Tropical	1.000000e+00	0.0	2.513516e-282	0.000000e+00	0.000000e+00
Dry	0.000000e+00	1.0	0.000000e+00	0.000000e+00	0.000000e+00
Temperate	2.513516e-282	0.0	1.000000e+00	1.341972e-16	2.708411e-255
Continental	0.000000e+00	0.0	1.341972e-16	1.000000e+00	1.039219e-173
Polar	0.000000e+00	0.0	2.708411e-255	1.039219e-173	1.000000e+00

Table S13. Dunn's multiple comparison results for SRI-SPEI duration difference.

	Tropical	Dry	Temperate	Continental	Polar
Tropical	1.000000e+00	0.0	4.828040e-145	4.109617e-247	6.419200e-212
Dry	0.000000e+00	1.0	0.000000e+00	0.000000e+00	0.000000e+00
Temperate	4.828040e-145	0.0	1.000000e+00	7.723520e-34	0.000000e+00
Continental	4.109617e-247	0.0	7.723520e-34	1.000000e+00	0.000000e+00
Polar	6.419200e-212	0.0	0.000000e+00	0.000000e+00	1.000000e+00

Table S14. Dunn's multiple comparison results for SRI-SPEI severity difference.

	Tropical	Dry	Temperate	Continental	Polar
Tropical	1.000000e+00	0.0	1.505238e-116	5.107751e-223	8.619614e-271
Dry	0.000000e+00	1.0	0.000000e+00	0.000000e+00	0.000000e+00
Temperate	1.505238e-116	0.0	1.000000e+00	1.613614e-36	0.000000e+00
Continental	5.107751e-223	0.0	1.613614e-36	1.000000e+00	0.000000e+00
Polar	8.619614e-271	0.0	0.000000e+00	0.000000e+00	1.000000e+00

Table S15. Dunn's multiple comparison results for SRI-SPEI intensity difference.

	Tropical	Dry	Temperate	Continental	Polar
Tropical	1.000000e+00	0.000000e+00	1.390007e-21	6.493532e-30	3.301884e-92
Dry	0.000000e+00	1.000000e+00	0.000000e+00	0.000000e+00	1.976704e-190
Temperate	1.390007e-21	0.000000e+00	1.000000e+00	4.892944e-77	1.387004e-56
Continental	6.493532e-30	0.000000e+00	4.892944e-77	1.000000e+00	1.465863e-140
Polar	3.301884e-92	1.976704e-190	1.387004e-56	1.465863e-140	1.000000e+00