



Supplement of

Dynamic analysis of drought propagation in the context of climate change and watershed characterization: a quantitative study based on GAMLSS and Copula models

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Table S1 The correlation between AMO-1 and precipitation series during 1961-2014 (M=1 month) (The bold numbers represent the series shows a significant trend.)

Region	Time (months)											
	1	2	3	4	5	6	7	8	9	10	11	12
ZL	0.118	0.034	0.260	0.292	0.177	-0.110	-0.267	-0.282	-0.115	0.211	0.281	-0.026
DL	0.105	0.042	0.268	0.305	0.182	-0.116	-0.281	-0.300	-0.116	0.211	0.272	-0.012
GY	0.125	0.077	0.276	0.306	0.203	-0.101	-0.295	-0.321	-0.118	0.273	0.320	0.004
FN	0.075	0.067	0.278	0.322	0.203	-0.105	-0.302	-0.332	-0.116	0.228	0.279	-0.009
WC	0.049	0.016	0.262	0.300	0.171	-0.111	-0.274	-0.279	-0.109	0.132	0.188	-0.101
LH	0.013	0.029	0.281	0.302	0.197	-0.072	-0.265	-0.292	-0.110	0.121	0.167	-0.123
LP	0.014	0.053	0.308	0.324	0.234	-0.034	-0.257	-0.311	-0.128	0.140	0.193	-0.104
CDS	0.005	0.039	0.316	0.315	0.236	-0.009	-0.226	-0.283	-0.122	0.111	0.156	-0.117
CDX	0.005	0.034	0.314	0.309	0.226	-0.007	-0.215	-0.266	-0.115	0.095	0.135	-0.128
PQ	0.000	0.016	0.303	0.291	0.204	0.009	-0.173	-0.217	-0.102	0.057	0.082	-0.146
KC	0.006	0.029	0.309	0.299	0.221	0.017	-0.173	-0.223	-0.105	0.075	0.116	-0.133

Table S2 The correlation between AMO-1 and precipitation series during 1961-2014 (M=2 months) (The bold numbers represent the series shows a significant trend.)

Region	Time (months)											
	1	2	3	4	5	6	7	8	9	10	11	12
ZL	-0.029	0.242	0.331	0.149	-0.132	-0.242	-0.257	-0.057	0.288	0.285	0.037	0.025
DL	-0.030	0.253	0.348	0.149	-0.140	-0.255	-0.273	-0.059	0.293	0.279	0.052	0.005
GY	0.004	0.263	0.370	0.173	-0.136	-0.263	-0.302	-0.075	0.342	0.327	0.045	0.014
FN	-0.019	0.270	0.377	0.164	-0.141	-0.266	-0.304	-0.078	0.312	0.291	0.049	-0.023
WC	-0.064	0.260	0.332	0.131	-0.131	-0.249	-0.252	-0.063	0.214	0.190	-0.019	-0.030
LH	-0.063	0.275	0.342	0.145	-0.096	-0.229	-0.262	-0.089	0.203	0.178	-0.049	-0.054
LP	-0.039	0.305	0.371	0.170	-0.071	-0.211	-0.267	-0.123	0.210	0.206	-0.049	-0.051
CDS	-0.053	0.303	0.358	0.171	-0.038	-0.182	-0.238	-0.125	0.182	0.169	-0.071	-0.069
CDX	-0.061	0.295	0.348	0.163	-0.032	-0.173	-0.224	-0.117	0.170	0.146	-0.081	-0.076
PQ	-0.081	0.271	0.322	0.152	-0.007	-0.138	-0.181	-0.107	0.136	0.091	-0.103	-0.102
KC	-0.061	0.277	0.334	0.169	-0.005	-0.134	-0.180	-0.115	0.156	0.128	-0.099	-0.102

Table S3 The correlation between AMO-1 and precipitation series during 1961-2014 (M=3 months) (The bold numbers represent the series shows a significant trend.)

Region	Time (months)											
	1	2	3	4	5	6	7	8	9	10	11	12
ZL	0.108	0.282	0.177	-0.146	-0.269	-0.225	0.015	0.328	0.298	0.121	0.104	-0.049
DL	0.109	0.296	0.179	-0.153	-0.276	-0.236	0.010	0.323	0.294	0.133	0.087	-0.042
GY	0.115	0.318	0.209	-0.154	-0.283	-0.267	-0.018	0.367	0.347	0.129	0.094	-0.014
FN	0.107	0.320	0.195	-0.156	-0.275	-0.258	-0.022	0.315	0.312	0.117	0.055	-0.017
WC	0.118	0.278	0.164	-0.144	-0.255	-0.212	-0.005	0.231	0.209	0.045	0.049	-0.061
LH	0.117	0.279	0.172	-0.118	-0.214	-0.215	-0.053	0.192	0.212	0.004	0.017	-0.046
LP	0.133	0.306	0.195	-0.095	-0.192	-0.213	-0.093	0.188	0.240	-0.006	0.011	-0.026
CDS	0.131	0.284	0.194	-0.061	-0.152	-0.188	-0.105	0.163	0.211	-0.025	-0.014	-0.048
CDX	0.124	0.270	0.186	-0.057	-0.141	-0.176	-0.099	0.154	0.193	-0.031	-0.022	-0.057
PQ	0.104	0.235	0.172	-0.029	-0.101	-0.141	-0.096	0.127	0.147	-0.048	-0.052	-0.086
KC	0.109	0.248	0.186	-0.026	-0.099	-0.137	-0.100	0.145	0.178	-0.038	-0.056	-0.080

Table S4 The correlation between AMO-1 and precipitation series during 1961-2014 (M=24 month) (The bold numbers represent the series shows a significant trend.)

Region	Time (months)											
	1	2	3	4	5	6	7	8	9	10	11	12
ZL	0.181	0.070	0.115	0.114	0.055	-0.151	-0.329	-0.363	-0.239	0.046	0.195	0.085
DL	0.138	0.074	0.120	0.128	0.057	-0.158	-0.342	-0.372	-0.231	0.061	0.192	0.065
GY	0.126	0.094	0.146	0.147	0.065	-0.159	-0.348	-0.380	-0.242	0.114	0.232	0.080
FN	0.052	0.088	0.135	0.153	0.061	-0.172	-0.363	-0.382	-0.217	0.104	0.198	0.013
WC	0.071	0.059	0.139	0.132	0.062	-0.163	-0.355	-0.367	-0.231	-0.006	0.095	-0.048
LH	0.008	0.075	0.153	0.135	0.062	-0.162	-0.353	-0.360	-0.228	0.004	0.085	-0.104
LP	-0.022	0.083	0.171	0.172	0.067	-0.169	-0.359	-0.362	-0.227	0.036	0.106	-0.114
CDS	-0.027	0.074	0.172	0.161	0.076	-0.144	-0.325	-0.340	-0.234	0.004	0.069	-0.128
CDX	-0.021	0.073	0.169	0.149	0.075	-0.134	-0.309	-0.328	-0.233	-0.014	0.050	-0.132
PQ	-0.016	0.063	0.155	0.124	0.082	-0.102	-0.255	-0.290	-0.231	-0.061	-0.005	-0.145
KC	-0.030	0.059	0.153	0.145	0.089	-0.109	-0.261	-0.291	-0.226	-0.039	0.016	-0.145

Table S5 The correlation between AMO-24 and precipitation series during 1961-2014 (M=2 months) (The bold numbers represent the series shows a significant trend.)

Region	Time (months)											
	1	2	3	4	5	6	7	8	9	10	11	12
ZL	0.079	0.113	0.104	0.049	-0.148	-0.332	-0.371	-0.245	0.039	0.190	0.100	0.137
DL	0.082	0.118	0.117	0.051	-0.155	-0.345	-0.380	-0.238	0.056	0.187	0.077	0.089
GY	0.100	0.145	0.138	0.058	-0.159	-0.352	-0.388	-0.249	0.108	0.225	0.089	0.075
FN	0.094	0.133	0.143	0.054	-0.171	-0.367	-0.390	-0.225	0.099	0.192	0.019	0.000
WC	0.067	0.138	0.122	0.057	-0.160	-0.360	-0.376	-0.238	-0.010	0.091	-0.035	0.033
LH	0.083	0.152	0.127	0.056	-0.162	-0.360	-0.370	-0.237	0.002	0.081	-0.095	-0.024
LP	0.090	0.170	0.165	0.059	-0.173	-0.368	-0.371	-0.237	0.035	0.102	-0.108	-0.054
CDS	0.081	0.170	0.155	0.067	-0.149	-0.335	-0.350	-0.245	0.002	0.066	-0.122	-0.060
CDX	0.081	0.167	0.143	0.067	-0.139	-0.319	-0.338	-0.244	-0.016	0.047	-0.125	-0.054
PQ	0.072	0.153	0.118	0.075	-0.107	-0.265	-0.300	-0.242	-0.064	-0.007	-0.138	-0.049
KC	0.067	0.151	0.141	0.081	-0.116	-0.272	-0.302	-0.237	-0.042	0.013	-0.140	-0.070

Table S6 The correlation between AMO-24 and precipitation series during 1961-2014 (M=3 months) (The bold numbers represent the series shows a significant trend.)

Region	Time (months)											
	1	2	3	4	5	6	7	8	9	10	11	12
ZL	0.110	0.093	0.039	-0.147	-0.335	-0.380	-0.258	0.032	0.185	0.109	0.143	0.082
DL	0.115	0.105	0.041	-0.154	-0.348	-0.389	-0.251	0.049	0.182	0.083	0.093	0.086
GY	0.142	0.126	0.046	-0.159	-0.354	-0.395	-0.263	0.101	0.219	0.094	0.078	0.105
FN	0.129	0.130	0.044	-0.172	-0.371	-0.398	-0.239	0.092	0.186	0.021	0.002	0.101
WC	0.135	0.109	0.049	-0.160	-0.365	-0.387	-0.253	-0.015	0.089	-0.028	0.037	0.076
LH	0.149	0.115	0.047	-0.165	-0.368	-0.380	-0.252	-0.002	0.079	-0.091	-0.022	0.093
LP	0.166	0.155	0.048	-0.179	-0.378	-0.382	-0.251	0.032	0.098	-0.106	-0.053	0.100
CDS	0.166	0.146	0.057	-0.156	-0.346	-0.361	-0.259	0.000	0.062	-0.120	-0.057	0.092
CDX	0.163	0.134	0.058	-0.145	-0.329	-0.350	-0.259	-0.020	0.044	-0.122	-0.050	0.093
PQ	0.150	0.110	0.067	-0.113	-0.275	-0.313	-0.257	-0.069	-0.009	-0.134	-0.043	0.085
KC	0.147	0.134	0.072	-0.124	-0.283	-0.314	-0.251	-0.047	0.010	-0.138	-0.065	0.076