

## Supplementary Material

**Table S1.** Parameter estimates for generalized linear models analyzing the relationship between regional > EF0 tornado frequency and tri-monthly climate indices. Bold indicates significant values ( $\alpha < 0.05$ ).

EUS April									

NAO_FMA	0.495	0.4972	-0.479	1.470	0.992	1	0.319
NAO_MAM	-0.140	0.3335	-0.793	0.514	0.176	1	0.675
MJO_JFM	-0.311	0.5452	-1.379	0.758	0.325	1	0.568
MJO_FMA	0.652	0.8262	-0.967	2.271	0.623	1	0.430
MJO_MAM	-0.704	0.5416	-1.765	0.358	1.688	1	0.194
ONI_JFM	1.148	0.8666	-0.551	2.846	1.755	1	0.185
ONI_FMA	-0.824	1.5639	-3.889	2.242	0.277	1	0.598
ONI_MAM	0.134	0.9360	-1.701	1.969	0.020	1	0.886
PDO_JFM	0.094	0.7832	-1.441	1.630	0.015	1	0.904
PDO_FMA	0.183	1.1999	-2.169	2.535	0.023	1	0.879
PDO_MAM	-0.231	0.4815	-1.174	0.713	0.229	1	0.632
PNA_JFM	0.325	0.2053	-0.077	0.728	2.510	1	0.113
PNA_FMA	0.112	0.2822	-0.441	0.665	0.157	1	0.692
PNA_MAM	-0.531	0.2978	-1.115	0.052	3.183	1	0.074
ASOI_JFM	0.244	0.3489	-0.440	0.928	0.488	1	0.485
ASOI_FMA	-0.250	0.4208	-1.075	0.574	0.354	1	0.552
ASOI_MAM	0.529	0.2734	-0.007	1.064	3.738	1	0.053
(Scale)	.497 <sup>a</sup>	0.1075	0.326	0.760			

Probability Distribution: Tweedie (1.77)

Omnibus Value: 0.376

a. Maximum likelihood estimate      Link Function: Log

EUS June

Parameter	B	Std. Error	95% Wald Confidence Interval		Wald Chi-Square	Hypothesis Test	
			Lower	Upper		df	Sig.
(Intercept)	3.930	0.1821	3.573	4.287	465.819	1	0.000
AO_JFM	-4.304E-05	0.2885	-0.566	0.565	0.000	1	1.000
AO_FMA	0.422	0.4885	-0.536	1.379	0.745	1	0.388
AO_MAM	0.122	0.3493	-0.562	0.807	0.122	1	0.727
NAO_JFM	-0.044	0.3237	-0.679	0.590	0.019	1	0.891
NAO_FMA	-0.167	0.4782	-1.104	0.770	0.122	1	0.727
NAO_MAM	-0.187	0.3210	-0.816	0.443	0.338	1	0.561
MJO_JFM	-1.353	0.5431	-2.417	-0.288	6.205	1	<b>0.013</b>
MJO_FMA	1.228	0.8451	-0.429	2.884	2.110	1	0.146
MJO_MAM	-0.219	0.5191	-1.237	0.798	0.179	1	0.672
ONI_JFM	0.642	0.8889	-1.101	2.384	0.521	1	0.470
ONI_FMA	-1.066	1.6214	-4.244	2.112	0.432	1	0.511
ONI_MAM	1.041	1.0049	-0.928	3.011	1.074	1	0.300
PDO_JFM	0.695	0.7989	-0.871	2.260	0.756	1	0.385
PDO_FMA	-1.065	1.2451	-3.505	1.376	0.731	1	0.393
PDO_MAM	0.300	0.5033	-0.686	1.286	0.355	1	0.551

PNA_JFM	0.124	0.2014	-0.271	0.518	0.377	1	0.539
PNA_FMA	0.250	0.2947	-0.327	0.828	0.722	1	0.395
PNA_MAM	0.332	0.3037	-0.263	0.928	1.197	1	0.274
ASOI_JFM	0.506	0.3575	-0.194	1.207	2.007	1	0.157
ASOI_FMA	-0.651	0.4185	-1.471	0.169	2.420	1	0.120
ASOI_MAM	0.497	0.2767	-0.046	1.039	3.224	1	0.073
(Scale)	.498 <sup>a</sup>	0.1075	0.326	0.760			
Probability Distribution: Tweedie (1.75)					Omnibus Value: 0.121		
a. Maximum likelihood estimate		Link Function: Log					

#### GPUS April

			95% Wald Confidence Interval		Hypothesis Test		
Parameter	B	Std. Error	Lower	Upper	Wald Chi-Square	df	Sig.
(Intercept)	3.093	0.1421	2.815	3.372	473.599	1	0.000
AO_JFM	-0.057	0.3472	-0.737	0.624	0.027	1	0.870
AO_FMA	-0.658	0.5496	-1.736	0.419	1.435	1	0.231
AO_MAM	0.581	0.4525	-0.305	1.468	1.651	1	0.199
NAO_JFM	0.383	0.4511	-0.501	1.267	0.720	1	0.396
NAO_FMA	0.408	0.5550	-0.680	1.496	0.540	1	0.462
NAO_MAM	-0.404	0.4310	-1.249	0.440	0.880	1	0.348
MJO_JFM	-0.039	0.5508	-1.119	1.040	0.005	1	0.943
MJO_FMA	0.492	0.6129	-0.709	1.693	0.644	1	0.422
MJO_MAM	-0.004	0.5880	-1.157	1.148	0.000	1	0.994
ONI_JFM	-0.017	1.1573	-2.285	2.252	0.000	1	0.988
ONI_FMA	0.020	2.5389	-4.956	4.996	0.000	1	0.994
ONI_MAM	0.088	1.5277	-2.906	3.083	0.003	1	0.954
PDO_JFM	1.225	0.9065	-0.552	3.002	1.826	1	0.177
PDO_FMA	-2.186	1.4502	-5.028	0.657	2.271	1	0.132
PDO_MAM	0.940	0.6777	-0.389	2.268	1.922	1	0.166
PNA_JFM	0.036	0.3177	-0.587	0.659	0.013	1	0.910
PNA_FMA	0.051	0.4316	-0.795	0.897	0.014	1	0.906
PNA_MAM	-0.710	0.5005	-1.691	0.271	2.012	1	0.156
ASOI_JFM	-0.245	0.2308	-0.698	0.207	1.129	1	0.288
ASOI_FMA	0.553	0.3375	-0.109	1.214	2.683	1	0.101
ASOI_MAM	-0.454	0.2258	-0.897	-0.012	4.044	1	<b>0.044</b>
(Scale)	.773 <sup>a</sup>	0.1518	0.526	1.136			
Probability Distribution: Tweedie (1.77)					Omnibus Value: 0.403		
a. Maximum likelihood estimate		Link Function: Log					

#### GPUS May

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test		
			Lower	Upper	Wald Chi-Square	df	Sig.
(Intercept)	3.929	0.0936	3.745	4.112	1761.581	1	0.000
AO_JFM	0.353	0.2252	-0.089	0.794	2.451	1	0.117
AO_FMA	0.205	0.3211	-0.424	0.834	0.407	1	0.524
AO_MAM	-0.224	0.2910	-0.794	0.346	0.593	1	0.441
NAO_JFM	-0.942	0.2802	-1.491	-0.393	11.302	1	<b>0.001</b>
NAO_FMA	0.604	0.3411	-0.065	1.273	3.135	1	0.077
NAO_MAM	-0.321	0.2783	-0.867	0.224	1.333	1	0.248
MJO_JFM	0.153	0.3532	-0.539	0.845	0.188	1	0.665
MJO_FMA	0.034	0.4184	-0.786	0.854	0.007	1	0.935
MJO_MAM	-0.619	0.3355	-1.276	0.039	3.403	1	0.065
ONI_JFM	0.609	0.7709	-0.902	2.120	0.624	1	0.430
ONI_FMA	-1.487	1.6618	-4.744	1.770	0.801	1	0.371
ONI_MAM	0.680	0.9786	-1.238	2.598	0.483	1	0.487
PDO_JFM	-0.946	0.5572	-2.038	0.146	2.880	1	0.090

PDO_FMA	1.200	0.9118	-0.587	2.987	1.731	1	0.188
PDO_MAM	-0.301	0.4556	-1.194	0.591	0.438	1	0.508
PNA_JFM	0.462	0.2029	0.064	0.859	5.178	1	<b>0.023</b>
PNA_FMA	-0.570	0.2763	-1.111	-0.028	4.254	1	<b>0.039</b>
PNA_MAM	0.230	0.3299	-0.416	0.877	0.487	1	0.485
ASOI_JFM	-0.179	0.1511	-0.475	0.117	1.402	1	0.236
ASOI_FMA	0.066	0.2140	-0.354	0.485	0.094	1	0.759
ASOI_MAM	0.049	0.1428	-0.231	0.329	0.117	1	0.733
(Scale)	.559 <sup>a</sup>	0.1128	0.377	0.831			

Probability Distribution: Tweedie (1.68)

Omnibus Value: 0.077

a. Maximum likelihood estimate Link Function: Log

95% Wald Confidence Interval					Hypothesis Test		
Parameter	B	Std. Error	Lower	Upper	Wald Chi-Square	df	Sig.
(Intercept)	3.525	0.0691	3.390	3.661	2601.965	1	<b>0.000</b>
AO_JFM	0.858	0.1584	0.547	1.168	29.299	1	<b>0.000</b>
AO_FMA	-0.871	0.2515	-1.364	-0.378	11.992	1	<b>0.001</b>
AO_MAM	0.412	0.2221	-0.023	0.847	3.440	1	0.064
NAO_JFM	-0.937	0.2065	-1.341	-0.532	20.581	1	<b>0.000</b>
NAO_FMA	0.828	0.2535	0.331	1.325	10.677	1	<b>0.001</b>
NAO_MAM	-0.209	0.2001	-0.601	0.183	1.092	1	0.296
MJO_JFM	0.390	0.2480	-0.096	0.876	2.469	1	0.116
MJO_FMA	0.311	0.2902	-0.257	0.880	1.151	1	0.283
MJO_MAM	-0.435	0.2497	-0.925	0.054	3.040	1	0.081
ONI_JFM	0.542	0.5393	-0.515	1.599	1.010	1	0.315
ONI_FMA	-2.295	1.1473	-4.544	-0.046	4.001	1	<b>0.045</b>
ONI_MAM	2.012	0.6687	0.701	3.322	9.053	1	<b>0.003</b>
PDO_JFM	0.747	0.4121	-0.060	1.555	3.290	1	0.070
PDO_FMA	-1.808	0.6732	-3.128	-0.489	7.213	1	<b>0.007</b>
PDO_MAM	0.946	0.3355	0.288	1.603	7.945	1	<b>0.005</b>
PNA_JFM	0.213	0.1524	-0.086	0.512	1.952	1	0.162
PNA_FMA	0.317	0.2142	-0.103	0.736	2.185	1	0.139
PNA_MAM	-0.628	0.2435	-1.105	-0.150	6.640	1	<b>0.010</b>
ASOI_JFM	0.030	0.1125	-0.190	0.251	0.072	1	0.788
ASOI_FMA	0.182	0.1633	-0.139	0.502	1.236	1	0.266
ASOI_MAM	0.012	0.1066	-0.197	0.221	0.012	1	0.913
(Scale)	.515 <sup>a</sup>	0.1053	0.344	0.768			

Probability Distribution: Tweedie (1.5)

Omnibus Value: **0.001**

a. Maximum likelihood estimate Link Function: Log

## MWUS April

95% Wald Confidence Interval					Hypothesis Test		
Parameter	B	Std. Error	Lower	Upper	Wald Chi-Square	df	Sig.
(Intercept)	1.572	0.2816	1.020	2.124	31.169	1	0.000
AO_JFM	-0.290	0.3893	-1.053	0.474	0.553	1	0.457
AO_FMA	-1.460	0.6094	-2.655	-0.266	5.742	1	<b>0.017</b>
AO_MAM	1.080	0.5936	-0.083	2.244	3.311	1	0.069
NAO_JFM	0.519	0.4716	-0.405	1.444	1.213	1	0.271
NAO_FMA	2.610	0.7186	1.202	4.019	13.192	1	<b>0.000</b>
NAO_MAM	-1.399	0.6834	-2.738	-0.059	4.189	1	<b>0.041</b>
MJO_JFM	-1.716	0.8578	-3.398	-0.035	4.004	1	<b>0.045</b>
MJO_FMA	0.889	1.0497	-1.169	2.946	0.717	1	0.397
MJO_MAM	0.527	0.7933	-1.028	2.082	0.441	1	0.506
ONI_JFM	1.865	1.3394	-0.761	4.490	1.938	1	0.164
ONI_FMA	2.054	2.8799	-3.590	7.699	0.509	1	0.476
ONI_MAM	-6.727	3.2853	-13.166	-0.288	4.192	1	<b>0.041</b>
PDO_JFM	0.508	1.0854	-1.619	2.635	0.219	1	0.640
PDO_FMA	3.922	1.9173	0.164	7.679	4.183	1	<b>0.041</b>

PDO_MAM	-5.547	1.4990	-8.484	-2.609	13.692	1	<b>0.000</b>
PNA_JFM	-1.197	0.3942	-1.970	-0.425	9.223	1	<b>0.002</b>
PNA_FMA	0.382	0.5893	-0.773	1.537	0.420	1	0.517
PNA_MAM	2.709	0.5642	1.604	3.815	23.061	1	<b>0.000</b>
ASOI_JFM	0.120	0.5662	-0.990	1.229	0.045	1	0.833
ASOI_FMA	1.491	0.7164	0.087	2.896	4.334	1	<b>0.037</b>
ASOI_MAM	-1.204	0.5402	-2.263	-0.145	4.967	1	<b>0.026</b>
(Scale)	.446 <sup>a</sup>	0.0975	0.291	0.685			
Probability Distribution: Tweedie (1.76)							Omnibus Value: <b>0.000</b>
a. Maximum likelihood estimate.							Link Function: Log

MWUS								
May								
95% Wald Confidence Interval					Hypothesis Test			
Parameter	B	Std. Error	Lower	Upper	Wald Chi-Square	df	Sig.	
(Intercept)	3.044	0.2891	2.477	3.611	110.869	1	0.000	
AO_JFM	0.570	0.3969	-0.208	1.348	2.060	1	0.151	
AO_FMA	1.010	0.7325	-0.426	2.446	1.901	1	0.168	
AO_MAM	-1.202	0.6675	-2.510	0.107	3.241	1	0.072	
NAO_JFM	-0.785	0.4603	-1.687	0.117	2.911	1	0.088	
NAO_FMA	-0.750	0.7854	-2.289	0.790	0.911	1	0.340	
NAO_MAM	1.780	0.7383	0.333	3.227	5.812	1	<b>0.016</b>	
MJO_JFM	0.376	0.8163	-1.224	1.976	0.212	1	0.645	
MJO_FMA	1.750	1.1174	-0.440	3.940	2.452	1	0.117	
MJO_MAM	-1.901	0.7752	-3.420	-0.381	6.012	1	<b>0.014</b>	
ONI_JFM	3.397	1.3601	0.731	6.063	6.237	1	<b>0.013</b>	
ONI_FMA	-8.289	3.0814	-14.328	-2.249	7.235	1	<b>0.007</b>	
ONI_MAM	9.552	3.4871	2.717	16.386	7.503	1	<b>0.006</b>	
PDO_JFM	-0.655	1.0140	-2.642	1.332	0.417	1	0.518	
PDO_FMA	1.183	1.7558	-2.258	4.624	0.454	1	0.500	
PDO_MAM	0.683	1.4519	-2.162	3.529	0.222	1	0.638	
PNA_JFM	0.456	0.3951	-0.318	1.230	1.332	1	0.248	
PNA_FMA	0.232	0.5079	-0.763	1.227	0.209	1	0.648	
PNA_MAM	-1.818	0.5867	-2.968	-0.668	9.603	1	<b>0.002</b>	
ASOI_JFM	0.854	0.5819	-0.287	1.994	2.151	1	0.142	
ASOI_FMA	-1.372	0.7240	-2.791	0.047	3.590	1	0.058	
ASOI_MAM	1.077	0.5222	0.053	2.100	4.251	1	<b>0.039</b>	
(Scale)	.270 <sup>a</sup>	0.0589	0.177	0.414				
Probability Distribution: Tweedie (1.85)							Omnibus Value: <b>0.008</b>	
a. Maximum likelihood estimate.							Link Function: Log	

MWUS								
June								
95% Wald Confidence Interval					Hypothesis Test			
Parameter	B	Std. Error	Lower	Upper	Wald Chi-Square	df	Sig.	
(Intercept)	2.646	0.2165	2.221	3.070	149.301	1	0.000	
AO_JFM	0.088	0.3315	-0.562	0.737	0.070	1	0.792	
AO_FMA	-0.128	0.5339	-1.175	0.918	0.058	1	0.810	
AO_MAM	0.436	0.5098	-0.563	1.435	0.731	1	0.392	
NAO_JFM	-0.765	0.3784	-1.507	-0.023	4.089	1	<b>0.043</b>	
NAO_FMA	1.319	0.5820	0.178	2.459	5.134	1	<b>0.023</b>	
NAO_MAM	-0.952	0.5790	-2.087	0.183	2.702	1	0.100	
MJO_JFM	0.690	0.7578	-0.795	2.176	0.830	1	0.362	
MJO_FMA	-0.361	1.0410	-2.401	1.679	0.120	1	0.729	
MJO_MAM	0.849	0.6828	-0.489	2.187	1.547	1	0.214	
ONI_JFM	-1.028	0.9984	-2.984	0.929	1.059	1	0.303	
ONI_FMA	-1.259	2.2213	-5.613	3.094	0.321	1	0.571	
ONI_MAM	1.600	2.7753	-3.839	7.040	0.332	1	0.564	
PDO_JFM	2.730	0.8507	1.063	4.398	10.299	1	<b>0.001</b>	
PDO_FMA	-4.771	1.4567	-7.626	-1.916	10.726	1	<b>0.001</b>	
PDO_MAM	3.317	1.2079	0.950	5.685	7.541	1	<b>0.006</b>	

PNA_JFM	0.655	0.3349	-0.002	1.311	3.822	1	0.051
PNA_FMA	0.090	0.4439	-0.780	0.960	0.041	1	0.840
PNA_MAM	0.609	0.5118	-0.394	1.612	1.415	1	0.234
ASOI_JFM	-0.548	0.5057	-1.539	0.443	1.175	1	0.278
ASOI_FMA	0.605	0.5712	-0.515	1.724	1.120	1	0.290
ASOI_MAM	-0.261	0.3828	-1.011	0.490	0.464	1	0.496
(Scale)	.276 <sup>a</sup>	0.0607	0.180	0.425			

Probability Distribution: Tweedie (1.82)

Omnibus Value: **0.047**

a. Maximum likelihood estimate.

Link Function: Log

## SUES March

	95% Wald Confidence Interval				Hypothesis Test		
Parameter	B	Std. Error	Lower	Upper	Wald Chi-Square	df	Sig.
(Intercept)	2.842	0.1869	2.476	3.208	231.346	1	0.000
AO-DJF	0.761	0.4812	-0.182	1.704	2.501	1	0.114
AO-JFM	-1.006	0.8103	-2.594	0.582	1.542	1	0.214
AO-FMA	0.817	0.5705	-0.301	1.935	2.052	1	0.152
NAO-DJF	0.338	0.5152	-0.671	1.348	0.431	1	0.511
NAO-JFM	0.260	0.8214	-1.350	1.870	0.100	1	0.752
NAO-FMA	-0.837	0.5056	-1.828	0.154	2.742	1	0.098
MJO-DJF	0.084	0.6671	-1.223	1.392	0.016	1	0.899
MJO-JFM	-0.614	0.8460	-2.272	1.045	0.526	1	0.468
MJO-FMA	0.752	0.8027	-0.821	2.325	0.878	1	0.349
ONI-DJF	-0.296	1.6902	-3.609	3.017	0.031	1	0.861
ONI-JFM	-0.687	2.9733	-6.514	5.141	0.053	1	0.817
ONI-FMA	1.037	1.5815	-2.063	4.137	0.430	1	0.512
PDO-DJF	-1.546	0.9181	-3.346	0.253	2.836	1	0.092
PDO-JFM	3.508	1.5725	0.426	6.590	4.977	1	<b>0.026</b>
PDO-FMA	-1.824	0.9362	-3.659	0.011	3.796	1	0.051
PNA-DJF	0.467	0.3235	-0.167	1.101	2.083	1	0.149
PNA-JFM	-0.966	0.5396	-2.024	0.092	3.206	1	0.073
PNA-FMA	0.608	0.4102	-0.196	1.412	2.198	1	0.138
ASOI-DJF	0.010	0.3018	-0.581	0.602	0.001	1	0.972
ASOI-JFM	0.435	0.4254	-0.398	1.269	1.047	1	0.306
ASOI-FMA	-0.578	0.3000	-1.166	0.010	3.709	1	0.054
(Scale)	1.108 <sup>a</sup>	0.2148	0.757	1.620			

Probability Distribution: Tweedie (1.78)

Omnibus Value: 0.318

a. Maximum likelihood estimate.

Link Function: Log

## SEUS April

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test		
			Lower	Upper	Wald Chi-Square	df	Sig.
(Intercept)	3.004	0.1282	2.752	3.255	549.030	1	0.000
AO-DJF	1.018	0.3660	0.301	1.735	7.737	1	<b>0.005</b>
AO-JFM	-1.943	0.5978	-3.114	-0.771	10.562	1	<b>0.001</b>
AO-FMA	1.022	0.3972	0.243	1.800	6.619	1	<b>0.010</b>
NAO-DJF	-1.006	0.3720	-1.735	-0.277	7.315	1	<b>0.007</b>
NAO-JFM	2.130	0.6127	0.929	3.331	12.079	1	<b>0.001</b>
NAO-FMA	-1.056	0.3943	-1.829	-0.283	7.176	1	<b>0.007</b>
MJO-DJF	-0.201	0.4406	-1.064	0.663	0.208	1	0.648
MJO-JFM	-0.163	0.5586	-1.258	0.932	0.085	1	0.771
MJO-FMA	-0.034	0.5505	-1.113	1.045	0.004	1	0.951
ONI-DJF	1.787	1.1524	-0.472	4.046	2.404	1	0.121
ONI-JFM	-1.913	1.9731	-5.780	1.954	0.940	1	0.332
ONI-FMA	-0.004	1.0351	-2.033	2.025	0.000	1	0.997
PDO-DJF	0.117	0.6270	-1.112	1.346	0.035	1	0.852
PDO-JFM	-0.289	1.1240	-2.492	1.914	0.066	1	0.797
PDO-FMA	0.398	0.6585	-0.893	1.689	0.365	1	0.546
PNA-DJF	-0.087	0.2098	-0.498	0.324	0.172	1	0.678

PNA-JFM	-0.452	0.3241	-1.088	0.183	1.948	1	0.163
PNA-FMA	0.065	0.2611	-0.447	0.577	0.061	1	0.804
ASOI-DJF	0.038	0.2007	-0.355	0.431	0.036	1	0.850
ASOI-JFM	-0.386	0.2956	-0.965	0.193	1.705	1	0.192
ASOI-FMA	0.393	0.2045	-0.008	0.794	3.686	1	0.055
(Scale)	.582 <sup>a</sup>	0.1173	0.392	0.864			

Probability Distribution: Tweedie (1.77)

Omnibus Value: 0.191

a. Maximum likelihood estimate.

Link Function: Log

#### SEUS May

Parameter	B	Std. Error	95% Wald Confidence Interval		Wald Chi-Square	Hypothesis Test	
			Lower	Upper		df	Sig.
(Intercept)	2.779	0.1632	2.459	3.099	289.833	1	0.000
AO-DJF	1.225	0.4978	0.249	2.200	6.052	1	<b>0.014</b>
AO-JFM	-1.856	0.7966	-3.418	-0.295	5.432	1	<b>0.020</b>
AO-FMA	1.233	0.4959	0.261	2.205	6.181	1	<b>0.013</b>
NAO-DJF	-1.220	0.5265	-2.252	-0.188	5.367	1	<b>0.021</b>
NAO-JFM	2.051	0.8339	0.417	3.686	6.050	1	<b>0.014</b>
NAO-FMA	-0.937	0.4904	-1.899	0.024	3.653	1	0.056
MJO-DJF	0.431	0.5595	-0.665	1.528	0.594	1	0.441
MJO-JFM	-1.251	0.6654	-2.556	0.053	3.536	1	0.060
MJO-FMA	1.785	0.6471	0.517	3.054	7.612	1	<b>0.006</b>
ONI-DJF	-0.459	1.3541	-3.113	2.195	0.115	1	0.735
ONI-JFM	1.862	2.2873	-2.621	6.345	0.663	1	0.416
ONI-FMA	-1.720	1.1831	-4.039	0.599	2.114	1	0.146
PDO-DJF	-1.265	0.7465	-2.728	0.198	2.871	1	0.090
PDO-JFM	1.502	1.3288	-1.102	4.107	1.278	1	0.258
PDO-FMA	-0.029	0.7437	-1.487	1.428	0.002	1	0.969
PNA-DJF	-0.168	0.2487	-0.655	0.320	0.454	1	0.500
PNA-JFM	-0.413	0.3975	-1.192	0.367	1.077	1	0.299
PNA-FMA	0.479	0.3018	-0.112	1.071	2.522	1	0.112
ASOI-DJF	0.353	0.2346	-0.107	0.813	2.264	1	0.132
ASOI-JFM	-0.328	0.3613	-1.036	0.380	0.825	1	0.364
ASOI-FMA	0.231	0.2765	-0.311	0.773	0.698	1	0.403
(Scale)	.568 <sup>a</sup>	0.1127	0.385	0.838			

Probability Distribution: Tweedie (1.87)

Omnibus Value: **0.002**

a. Maximum likelihood estimate.

Link Function: Log

**Table S2.** Parameter estimates for generalized linear models analyzing the relationship between regional > EF0 tornado frequency and their corresponding tri-monthly climate index averages. Bold indicates significant values ( $\alpha < 0.05$ ).

EUS April									
Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test				
			Lower	Upper	Wald Chi-Square	df	Sig.		
(Intercept)	4.149	0.1361		3.882	4.416	929.272	1	0.000	
AO_JFM	-0.115	0.1725		-0.453	0.223	0.445	1	0.505	
NAO_JFM	0.013	0.2660		-0.508	0.534	0.002	1	0.962	
MJO_JFM	-0.199	0.3297		-0.845	0.447	0.364	1	0.546	
ONI_JFM	0.191	0.2382		-0.275	0.658	0.646	1	0.421	
PDO_JFM	-0.086	0.1245		-0.330	0.158	0.481	1	0.488	
PNA_JFM	-0.079	0.1401		-0.354	0.195	0.319	1	0.572	
ASOI_JFM	0.234	0.1149		0.009	0.459	4.142	1	<b>0.042</b>	
(Scale)	.755 <sup>a</sup>	0.1603		0.498	1.145				
Probability Distribution: Tweedie (1.75)					Omnibus Value: <b>0.004</b>				
a. Maximum likelihood estimate.		Link Function: Log							

EUS May									
Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test				
			Lower	Upper	Wald Chi-Square	df	Sig.		
(Intercept)	4.504	0.1042		4.299	4.708	1866.329	1	0.000	
AO_FMA	0.196	0.1965		-0.189	0.581	0.995	1	0.319	
NAO_FMA	-0.158	0.2478		-0.644	0.328	0.406	1	0.524	
MJO_FMA	-0.306	0.3851		-1.061	0.448	0.633	1	0.426	
ONI_FMA	0.418	0.2659		-0.104	0.939	2.465	1	0.116	
PDO_FMA	0.066	0.1304		-0.190	0.321	0.256	1	0.613	
PNA_FMA	0.076	0.1681		-0.253	0.406	0.207	1	0.649	
ASOI_FMA	0.238	0.1280		-0.013	0.489	3.459	1	0.063	
(Scale)	.741 <sup>a</sup>	0.1576		0.489	1.125				



Probability Distribution: Tweedie (1.77)

Omnibus Value: 0.566

a. Maximum likelihood  
estimate.

Link Function: Log

#### EUS June

<i>Parameter</i>	<i>B</i>	<i>Std. Error</i>	<i>95% Wald Confidence Interval</i>		<i>Hypothesis Test</i>			
			<i>Lower</i>	<i>Upper</i>	<i>Wald Chi-Square</i>	<i>df</i>	<i>Sig.</i>	
(Intercept)	4.033	0.1037		3.829	4.236	1511.630	1	0.000
AO_MAM	0.335	0.1678		0.006	0.664	3.982	1	<b>0.046</b>
NAO_MAM	-0.253	0.1559	-0.559	0.052	2.643	1	0.104	
MJO_MAM	0.087	0.3839	-0.665	0.840	0.052	1	0.820	
ONI_MAM	0.418	0.2993	-0.168	1.005	1.952	1	0.162	
PDO_MAM	-0.031	0.1384	-0.302	0.240	0.050	1	0.822	
PNA_MAM	0.479	0.2194	0.049	0.909	4.759	1	<b>0.029</b>	
ASOI_MAM	0.204	0.1520	-0.094	0.502	1.796	1	0.180	
(Scale)	.875 <sup>a</sup>	0.1857	0.577	1.326				

Probability Distribution: Tweedie (1.70)

Omnibus Value: 0.077

a. Maximum likelihood  
estimate.

Link Function: Log

#### GPUS April

<i>Parameter</i>	<i>B</i>	<i>Std. Error</i>	<i>95% Wald Confidence Interval</i>		<i>Hypothesis Test</i>			
			<i>Lower</i>	<i>Upper</i>	<i>Wald Chi-Square</i>	<i>df</i>	<i>Sig.</i>	
(Intercept)	3.250	0.1358	2.984	3.516	572.751	1	0.000	
AO_JFM	-0.003	0.2032	-0.401	0.395	0.000	1	0.988	
NAO_JFM	-0.064	0.2947	-0.641	0.514	0.047	1	0.829	
MJO_JFM	0.134	0.3955	-0.641	0.909	0.115	1	0.735	
ONI_JFM	-0.068	0.1538	-0.369	0.233	0.195	1	0.658	
PDO_JFM	-0.011	0.1877	-0.379	0.357	0.004	1	0.951	
PNA_JFM	-0.171	0.1991	-0.562	0.219	0.741	1	0.389	
ASOI_JFM	-0.040	0.0676	-0.173	0.092	0.358	1	0.550	
(Scale)	1.072 <sup>a</sup>	0.2048	0.738	1.559				

Probability Distribution: Tweedie (1.77)

Omnibus Value: 0.717

a. Maximum likelihood  
estimate.

Link Function: Log

#### GPUS May

95% Wald Confidence Interval										Hypothesis Test		
Parameter	B	Std. Error	Lower	Upper	Wald Chi-Square	df	Sig.					
(Intercept)	3.926	0.0841		3.761	4.091	2179.677	1	0.000				
AO_FMA	0.034	0.1385	-0.238	0.305	0.059	1	0.807					
NAO_FMA	0.040	0.2020	-0.356	0.436	0.040	1	0.842					
MJO_FMA	0.055	0.2690	-0.472	0.582	0.042	1	0.838					
ONI_FMA	0.024	0.1330	-0.236	0.285	0.033	1	0.856					
PDO_FMA	0.142	0.1056	-0.065	0.349	1.801	1	0.180					
PNA_FMA	-0.266	0.1340	-0.529	-0.004	3.948	1	<b>0.047</b>					
ASOI_FMA	-0.103	0.0577	-0.216	0.011	3.157	1	0.076					
(Scale)	.833 <sup>a</sup>	0.1654	0.565	1.230								
Probability Distribution: Tweedie (1.68)					Omnibus Value: 0.143							
a. Maximum likelihood estimate.		Link Function: Log										

GPUS June								
			95% Wald Confidence Interval		Hypothesis Test			
Parameter	B	Std. Error	Lower	Upper	Wald Chi-Square	df	Sig.	
(Intercept)	3.485	0.0878		3.313	3.657	1575.063	1	0.000
AO_MAM	-0.066	0.1503	-0.361	0.228	0.194	1	0.659	
NAO_MAM	0.145	0.1621	-0.173	0.462	0.795	1	0.372	
MJO_MAM	0.181	0.2911	-0.390	0.751	0.385	1	0.535	
ONI_MAM	0.144	0.1434	-0.137	0.425	1.003	1	0.317	
PDO_MAM	-0.140	0.0996	-0.335	0.055	1.980	1	0.159	
PNA_MAM	0.038	0.1566	-0.269	0.345	0.058	1	0.810	
ASOI_MAM	0.047	0.0744	-0.099	0.193	0.396	1	0.529	
(Scale)	.835 <sup>a</sup>	0.1663	0.566	1.234				
Probability Distribution: Tweedie (1.63)				Omnibus Value: 0.884				
a. Maximum likelihood estimate.		Link Function: Log						

<b>MWUS April</b>								
<i>Parameter</i>	<i>B</i>	<i>Std. Error</i>	<i>95% Wald Confidence Interval</i>		<i>Hypothesis Test</i>			
			<i>Lower</i>	<i>Upper</i>	<i>Wald Chi-Square</i>	<i>df</i>	<i>Sig.</i>	

(Intercept)	2.475	0.2372	2.010	2.940	108.850	1	0.000
AO_JFM	-0.358	0.2950	-0.936	0.220	1.476	1	0.224
NAO_JFM	0.398	0.4474	-0.479	1.275	0.791	1	0.374
MJO_JFM	-0.957	0.5893	-2.112	0.198	2.639	1	0.104
ONI_JFM	0.498	0.4278	-0.340	1.337	1.356	1	0.244
PDO_JFM	0.331	0.2205	-0.101	0.763	2.250	1	0.134
PNA_JFM	-0.262	0.2583	-0.768	0.245	1.026	1	0.311
ASOI_JFM	0.500	0.2201	0.069	0.931	5.160	1	<b>0.023</b>
(Scale)	1.131 <sup>a</sup>	0.2277	0.763	1.679			
Probability Distribution: Tweedie (1.84)			Omnibus Value: <b>0.026</b>				
a. Maximum likelihood estimate.	Link Function: Log						

MWUS May								
			95% Wald Confidence Interval		Hypothesis Test			
Parameter	B	Std. Error	Lower	Upper	Wald Chi-Square	df	Sig.	
(Intercept)	3.011	0.1472	2.722	3.299	418.110	1	0.000	
AO_FMA	0.079	0.2841	-0.478	0.636	0.078	1	0.780	
NAO_FMA	0.000	0.3572	-0.700	0.700	0.000	1	0.999	
MJO_FMA	0.086	0.5006	-0.895	1.067	0.030	1	0.864	
ONI_FMA	1.039	0.4082	0.239	1.839	6.483	1	<b>0.011</b>	
PDO_FMA	0.208	0.1846	-0.153	0.570	1.274	1	0.259	
PNA_FMA	0.032	0.2496	-0.457	0.521	0.017	1	0.898	
ASOI_FMA	0.550	0.1878	0.181	0.918	8.564	1	<b>0.003</b>	
(Scale)	.937 <sup>a</sup>	0.1891	0.631	1.391				
Probability Distribution: Tweedie (1.83)				Omnibus Value: 0.162				
a. Maximum likelihood estimate.	Link Function: Log							

MWUS June										
<i>Parameter</i>	<i>B</i>	<i>Std. Error</i>	<i>95% Wald Confidence Interval</i>		<i>Hypothesis Test</i>				<i>Sig.</i>	
			<i>Lower</i>	<i>Upper</i>	<i>Wald Chi-Square</i>	<i>df</i>				
(Intercept)	3.222	0.1335	2.961	3.484	582.931	1			0.000	
AO_MAM	0.447	0.2042	0.047	0.847	4.802	1			<b>0.028</b>	
NAO_MAM	-0.572	0.2054	-0.975	-0.170	7.757	1			<b>0.005</b>	

MJO_MAM	0.372	0.5136	-0.634	1.379	0.525	1	0.469
ONI_MAM	0.177	0.3851	-0.578	0.932	0.211	1	0.646
PDO_MAM	-0.008	0.1835	-0.368	0.351	0.002	1	0.964
PNA_MAM	0.702	0.2845	0.144	1.259	6.083	1	<b>0.014</b>
ASOI_MAM	0.122	0.2025	-0.275	0.519	0.365	1	0.546
(Scale)	.883 <sup>a</sup>	0.1836	0.587	1.327			

Probability Distribution: Tweedie 1.78

Omnibus Value: **0.044**

a. Maximum likelihood estimate.  
Link Function: Log

#### SEUS March

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test			
			Lower	Upper	Wald Chi-Square	df	Sig.	
(Intercept)	2.777	0.1733	2.438	3.117	256.736	1	0.000	
AO-DJF	0.122	0.2289	-0.326	0.571	0.286	1	0.593	
NAO-DJF	0.184	0.2985	-0.401	0.769	0.379	1	0.538	
MJO-DJF	0.275	0.4949	-0.695	1.245	0.308	1	0.579	
ONI-DJF	-0.339	0.1604	-0.654	-0.025	4.469	1	<b>0.035</b>	
PDO-DJF	-0.184	0.2348	-0.644	0.276	0.613	1	0.434	
PNA-DJF	0.376	0.2166	-0.049	0.800	3.007	1	0.083	
ASOI-DJF	-0.007	0.0895	-0.182	0.168	0.006	1	0.938	
(Scale)	1.422 <sup>a</sup>	0.2670	0.985	2.055				

Probability Distribution: Tweedie 1.80

Omnibus Value: 0.262

a. Maximum likelihood estimate.  
Link Function: Log

#### SEUS April

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test			
			Lower	Upper	Wald Chi-Square	df	Sig.	
(Intercept)	3.039	0.1260	2.793	3.286	582.163	1	0.000	
AO-JFM	-0.321	0.1807	-0.676	0.033	3.163	1	0.075	
NAO-JFM	0.434	0.2692	-0.093	0.962	2.604	1	0.107	
MJO-JFM	0.002	0.3319	-0.649	0.653	0.000	1	0.995	
ONI-JFM	-0.028	0.1378	-0.299	0.242	0.043	1	0.836	
PDO-JFM	0.118	0.1775	-0.230	0.466	0.441	1	0.507	

PNA-JFM	-0.320	0.1830	-0.678	0.039	3.053	1	0.081
ASOI-JFM	0.049	0.0598	-0.068	0.166	0.680	1	0.410
(Scale)	.885 <sup>a</sup>	0.1734	0.603	1.299			

**SEUS May**

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test			
			Lower	Upper	Wald Chi-Square	df	Sig.	
(Intercept)	2.740	0.1357		2.474	3.006	407.388	1	0.000
AO-FMA	0.271	0.2213		-0.163	0.705	1.498	1	0.221
NAO-FMA	0.223	0.3213		-0.407	0.852	0.480	1	0.489
MJO-FMA	1.118	0.4721		0.192	2.043	5.603	1	<b>0.018</b>
ONI-FMA	-0.348	0.2063		-0.752	0.057	2.841	1	0.092
PDO-FMA	-0.155	0.1726		-0.493	0.184	0.804	1	0.370
PNA-FMA	0.661	0.2166		0.237	1.085	9.315	1	<b>0.002</b>
ASOI-FMA	0.230	0.0905		0.053	0.408	6.480	1	<b>0.011</b>
(Scale)	.902 <sup>a</sup>	0.1727		0.620	1.313			

Probability Distribution: Tweedie (1.84)

Omnibus Value: **0.001**

a. Maximum likelihood estimate. Link Function: Log

**Table S3.** Parameter estimates for generalized linear models analyzing the relationship between mesoscale > EF0 tornado frequency and seasonal tri-monthly climate index averages. Bold indicates significant values ( $\alpha < 0.05$ ).

Birmingham							
Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test		
			Lower	Upper	Wald Chi-Square	df	Sig.
(Intercept)	-0.197	0.615	-1.402	1.009	0.102	1	0.749
AO	-0.308	0.8692	-2.012	1.396	0.126	1	0.723
NAO	0.364	1.2759	-2.137	2.865	0.082	1	0.775
MJO	-0.703	1.4478	-3.541	2.134	0.236	1	0.627
ONI	0.172	0.9844	-1.758	2.101	0.03	1	0.861
PDO	-0.355	0.5202	-1.375	0.664	0.466	1	0.495
PNA	0.403	0.6028	-0.779	1.584	0.446	1	0.504
ASOI	0.379	0.4142	-0.433	1.191	0.838	1	0.36
(Scale)	1 <sup>a</sup>						
(Negative binomial)	1.25 <sup>a</sup>						
Probability Distribution: Negative Binomial (1.25)					Omnibus Value: 0.634		
a. Maximum likelihood estimate		Link Function: Log					

Cincinnati							
Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test		
			Lower	Upper	Wald Chi-Square	df	Sig.
(Intercept)	-0.869	0.6384	-2.12	0.383	1.851	1	0.174
AO	0.097	1.2373	-2.328	2.522	0.006	1	0.937
NAO	1.072	1.7486	-2.355	4.5	0.376	1	0.54
MJO	-1.86	3.4339	-8.59	4.87	0.293	1	0.588
ONI	0.188	1.6593	-3.064	3.44	0.013	1	0.91
PDO	-0.336	0.7751	-1.855	1.183	0.188	1	0.665
PNA	0.692	1.5495	-2.345	3.729	0.2	1	0.655
ASOI	-0.004	0.8672	-1.703	1.696	0	1	0.997
(Scale)	1 <sup>a</sup>						
(Negative binomial)	1.01 <sup>a</sup>						
Probability Distribution: Negative Binomial (1.01)					Omnibus Value: 0.968		
a. Maximum likelihood estimate		Link Function: Log					

Kansas City							
Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test		
			Lower	Upper	Wald Chi-Square	df	Sig.
(Intercept)	-0.102	0.5209	-1.123	0.919	0.038	1	0.845
AO	1.004	1.3613	-1.664	3.672	0.544	1	0.461
NAO	-0.399	1.7614	-3.851	3.054	0.051	1	0.821

MJO	-0.275	3.0527	-6.258	5.709	0.008	1	0.928
ONI	-0.15	1.5094	-3.108	2.808	0.01	1	0.921
PDO	0.866	0.5592	-0.23	1.962	2.398	1	0.121
PNA	-0.312	0.8578	-1.993	1.37	0.132	1	0.716
ASOI	0.255	0.8138	-1.34	1.85	0.098	1	0.754
(Scale)	1 <sup>a</sup>						
(Negative binomial)	1.001 <sup>a</sup>						

Probability Distribution: Negative Binomial (1.001)

Omnibus Value: 0.682

a. Maximum likelihood estimate

Link Function: Log

#### Moore

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test		
			Lower	Upper	Wald Chi-Square	df	Sig.
(Intercept)	0.558	0.3468	-0.121	1.238	2.593	1	0.107
AO	-0.486	0.6896	-1.838	0.865	0.497	1	0.481
NAO	-0.678	0.9296	-2.5	1.144	0.531	1	0.466
MJO	-0.775	2.112	-4.914	3.365	0.135	1	0.714
ONI	-0.342	1.1385	-2.573	1.89	0.09	1	0.764
PDO	0.084	0.4464	-0.791	0.959	0.036	1	0.85
PNA	-0.076	0.8117	-1.667	1.515	0.009	1	0.925
ASOI	-0.229	0.5798	-1.366	0.907	0.156	1	0.693
(Scale)	1 <sup>a</sup>						
(Negative binomial)	1.15 <sup>a</sup>						

Probability Distribution: Negative Binomial (1.15)

Omnibus Value: 0.432

a. Maximum likelihood estimate

Link Function: Log

#### Tanner

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test		
			Lower	Upper	Wald Chi-Square	df	Sig.
(Intercept)	-0.012	0.606	-1.2	1.176	0	1	0.984
AO	-0.216	0.8936	-1.968	1.535	0.059	1	0.809
NAO	0.624	1.3936	-2.108	3.355	0.2	1	0.655
MJO	-1.695	2.1066	-5.824	2.434	0.647	1	0.421
ONI	2.214	1.2791	-0.293	4.721	2.996	1	0.083
PDO	-0.059	0.4765	-0.993	0.875	0.015	1	0.902
PNA	-0.754	0.9518	-2.619	1.112	0.627	1	0.429
ASOI	0.906	0.5655	-0.202	2.015	2.569	1	0.109
(Scale)	1 <sup>a</sup>						
(Negative binomial)	1.001 <sup>a</sup>						

Probability Distribution: Negative Binomial (1.001)

Omnibus Value: 0.614

a. Maximum likelihood estimate

Link Function: Log

**Tuscaloosa**

<i>Parameter</i>	<i>B</i>	<i>Std. Error</i>	<i>95% Wald Confidence Interval</i>		<i>Hypothesis Test</i>		
			<i>Lower</i>	<i>Upper</i>	<i>Wald Chi-Square</i>	<i>df</i>	<i>Sig.</i>
(Intercept)	-0.466	0.1448	-0.75	-0.182	10.364	1	0.001
AO	3.261	0.5058	2.27	4.253	41.581	1	<b>0</b>
NAO	-2.094	0.4355	-2.948	-1.241	23.122	1	<b>0</b>
MJO	-2.885	0.7802	-4.414	-1.356	13.676	1	<b>0</b>
ONI	1.823	0.4491	0.943	2.703	16.476	1	<b>0</b>
PDO	-0.092	0.168	-0.421	0.237	0.301	1	0.583
PNA	1.315	0.3649	0.6	2.03	12.988	1	<b>0</b>
ASOI	1.355	0.2171	0.93	1.781	38.955	1	<b>0</b>
(Scale)	.099 <sup>a,b</sup>						

Probability Distribution: Tweedie (1.001)

Omnibus Value: **0.000**

a. Maximum likelihood estimate

Link Function: Log

b. Maximum likelihood estimate.

**Wichita**

<i>Parameter</i>	<i>B</i>	<i>Std. Error</i>	<i>95% Wald Confidence Interval</i>		<i>Hypothesis Test</i>		
			<i>Lower</i>	<i>Upper</i>	<i>Wald Chi-Square</i>	<i>df</i>	<i>Sig.</i>
(Intercept)	-3.666	1.2631	-6.142	-1.19	8.423	1	0.004
AO	-1.846	0.863	-3.538	-0.155	4.576	1	<b>0.032</b>
NAO	2.046	1.0485	-0.009	4.101	3.807	1	0.051
MJO	-5.365	2.7786	-10.811	0.081	3.728	1	0.054
ONI	-1.185	1.1038	-3.349	0.978	1.153	1	0.283
PDO	-2.713	0.9448	-4.565	-0.862	8.249	1	<b>0.004</b>
PNA	5.322	2.1457	1.117	9.528	6.153	1	<b>0.013</b>
ASOI	-1.481	0.6751	-2.804	-0.158	4.815	1	<b>0.028</b>
(Scale)	1 <sup>a</sup>						

Probability Distribution: Poisson

Omnibus Value: **0.000**

a. Maximum likelihood estimate

Link Function: Log