



# AMS

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## Supplemental Material

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Spatiotemporal Analyses of Lightning and Tornado Exposure to Large Outdoor Gatherings in the  
Conterminous United States

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**Table S1.** The top 10 percentile ranking for *air show or water show* LOGs as calculated using LOG<sub>LT</sub>.

LOG Venue	City, State	Month	Maximum Capacity or Attendance	Mean Daily CG Stroke Count	LOG <sub>LT</sub> Percentile Rank
Thunder Over Louisville	Louisville, KY	Apr	625,000	95	95 <sup>th</sup>
Chicago Air and Water Show	Chicago, IL	Aug	500,000	55	94 <sup>th</sup>
Thunder Over the Boardwalk	Atlantic City, NJ	Aug	375,000	53	92 <sup>nd</sup>
Guardians Of Freedom Air Show	Lincoln, NE	Aug	175,000	93	90 <sup>th</sup>
Milwaukee Air and Water Show	Milwaukee, WI	Jul	200,000	53	87 <sup>th</sup>
AirVenture Oshkosh	Oshkosh, WI	Jul	96,714	30	87 <sup>th</sup>
Dayton Air Show	Vandalia, OH	Jun	42,500	79	75 <sup>th</sup>
Sun 'N Fun	Lakeland, FL	Apr	33,333	26	71 <sup>st</sup>
Battle Creek Field of Flight Air Show	Battle Creek, MI	Jul	22,000	38	67 <sup>th</sup>
Cleveland Air Show	Cleveland, OH	Sep	33,333	35	64 <sup>th</sup>

**Table S2.** The top 10 percentile ranking for *amphitheater* LOGs as calculated using LOG<sub>LT</sub>.

LOG Venue	City, State	Month	Maximum Capacity or Attendance	Mean Daily CG Stroke Count	LOG <sub>LT</sub> Percentile Rank
Mid-Florida Credit Union	Tampa, FL	Jul	20,000	307	88 <sup>th</sup>
Mid-Florida Credit Union	Tampa, FL	Aug	20,000	286	88 <sup>th</sup>
Ithink Financial Amphitheater	West Palm Beach, FL	Aug	20,000	230	86 <sup>th</sup>
Ithink Financial Amphitheater	West Palm Beach, FL	Jul	20,000	229	86 <sup>th</sup>
AT&T Summit Stadium	Glen Jean, WV	Jul	80,000	55	86 <sup>th</sup>
Ithink Financial Amphitheater	West Palm Beach, FL	Jun	20,000	202	85 <sup>th</sup>
Riverbend Music Center	Cincinnati, OH	Jul	20,500	194	85 <sup>th</sup>
Cynthia Woods Mithcell Pavilion	Woodlands, TX	May	16,500	224	84 <sup>th</sup>
Mid-Florida Credit Union	Tampa, FL	Jun	20,000	175	84 <sup>th</sup>
Grand Casino Hinkley Amphitheater	Hinckley, MN	Jul	65,000	52	84 <sup>th</sup>

**Table S3.** The top 10 percentile ranking for *amusement park* LOGs as calculated using LOG<sub>LT</sub>.

LOG Venue	City, State	Month	Maximum Capacity or Attendance	Mean Daily CG Stroke Count	LOG <sub>LT</sub> Percentile Rank
Magic Kingdom	Lake Buena Vista, FL	Jul	53,000	298	100 <sup>th</sup>
Magic Kingdom	Lake Buena Vista, FL	Aug	53,000	250	99 <sup>th</sup>
Magic Kingdom	Lake Buena Vista, FL	Jun	53,000	245	99 <sup>th</sup>
Busch Gardens Tampa Bay	Tampa, FL	Jul	33,000	307	99 <sup>th</sup>
Hollywood Studios	Lake Buena Vista, FL	Jul	39,000	298	99 <sup>th</sup>
Epcot	Lake Buena Vista, FL	Jul	33,000	298	99 <sup>th</sup>
Hollywood Studios	Lake Buena Vista, FL	Aug	39,000	250	99 <sup>th</sup>
Busch Gardens Tampa Bay	Tampa, FL	Aug	33,000	286	99 <sup>th</sup>
Hollywood Studios	Lake Buena Vista, FL	Jun	39,000	245	99 <sup>th</sup>
Animal Kingdom	Lake Buena Vista, FL	Jul	30,000	298	99 <sup>th</sup>

**Table S4.** The top 10 percentile ranking for *fair, festival, and/or parade* LOGs as calculated using LOG<sub>LT</sub>.

LOG Venue	City, State	Month	Maximum Capacity or Attendance	Mean Daily CG Stroke Count	LOG <sub>LT</sub> Percentile Rank
New Orleans Jazz & Heritage Festival	New Orleans, LA	May	475,000	191	100 <sup>th</sup>
Ohio State Fair	Columbus, OH	Jul	91,000	111	98 <sup>th</sup>
Iowa State Fair	Des Moines, IA	Jul	117,038	93	98 <sup>th</sup>
Texas State Fair (Dallas)	Dallas, TX	Aug	97,560	50	98 <sup>th</sup>
Texas State Fair (Dallas)	Dallas, TX	Oct	97,560	33	96 <sup>th</sup>
Indiana State Fair	Indianapolis, IN	Jul	46,944	90	96 <sup>th</sup>
Indiana State Fair	Indianapolis, IN	Aug	46,944	83	96 <sup>th</sup>
Ohio State Fair	Columbus, OH	Aug	91,000	62	96 <sup>th</sup>
Mardi Gras	New Orleans, LA	Mar	1,500,000	45	96 <sup>th</sup>
Sturgis Bike Rally	Sturgis, SD	Aug	96,409	63	95 <sup>th</sup>

**Table S5.** The top 10 percentile ranking for *sports* LOGs as calculated using LOG<sub>LT</sub>.

<b>LOG Venue</b>	<b>City, State</b>	<b>Month</b>	<b>Maximum Capacity or Attendance</b>	<b>Mean Daily CG Stroke Count</b>	<b>LOG<sub>LT</sub> Percentile Rank</b>
Great American Ball Park	Cincinnati, OH	Jul	42,319	194	98 <sup>th</sup>
Oriole Park at Camden Yards	Baltimore, MD	Jul	48,187	143	97 <sup>th</sup>
Indianapolis Motor Speedway Road Course (Indy Car)	Speedway, IN	Jul	325,000	90	97 <sup>th</sup>
Busch Stadium	Saint Louis, MO	Jun	45,494	132	96 <sup>th</sup>
Globe Life Park in Arlington	Arlington, TX	May	48,114	118	96 <sup>th</sup>
Kauffman Stadium	Kansas City, MO	Aug	37,903	138	96 <sup>th</sup>
Busch Stadium	Saint Louis, MO	Jul	45,494	112	96 <sup>th</sup>
Nationals Park	Washington, DC	Jul	41,339	121	96 <sup>th</sup>
Oriole Park at Camden Yards	Baltimore, MD	Aug	48,187	102	96 <sup>th</sup>
Globe Life Park in Arlington	Arlington, TX	Jun	48,114	92	95 <sup>th</sup>

**Table S6.** The top 10 percentile ranking for *air show and/or water show* LOGs as calculated using LOG<sub>EF0+</sub>.

LOG Venue	City, State	Month	Maximum Capacity or Attendance	Mean Monthly EF0+ Count	LOG <sub>EF0+</sub> Percentile Rank
Thunder Over Louisville	Louisville, KY	Apr	625,000	0.96	96 <sup>th</sup>
AirVenture Oshkosh	Oshkosh, WI	Jul	96,714	0.95	95 <sup>th</sup>
Milwaukee Air and Water Show	Milwaukee, WI	Jul	200,000	0.94	94 <sup>th</sup>
Chicago Air and Water Show	Chicago, IL	Aug	500,000	0.87	87 <sup>th</sup>
Thunder Over the Boardwalk	Atlantic City, NJ	Aug	375,000	0.82	82 <sup>nd</sup>
Sun 'N Fun	Lakeland, FL	Apr	33,333	0.82	82 <sup>nd</sup>
Wings Over Houston	Houston, TX	Oct	50,000	0.80	80 <sup>th</sup>
Guardians of Freedom Air Show	Lincoln, NE	Aug	175,000	0.78	78 <sup>th</sup>
Dayton Air Show	Vandalia, OH	Jun	42,500	0.74	74 <sup>th</sup>
Battle Creek Field of Flight Air Show	Battle Creek, MI	Jul	22,000	0.74	74 <sup>th</sup>

**Table S7.** The top 10 percentile ranking for *amphitheater* LOGs as calculated using LOG<sub>EF0+</sub>.

LOG Venue	City, State	Month	Maximum Capacity or Attendance	Mean Monthly EF0+ Count	LOG <sub>EF0+</sub> Percentile Rank
Fiddler's Green Amphitheater	Greenwood Village, CO	Jun	18,000	0.96	90 <sup>th</sup>
Hollywood Casino Amphitheater	Tinley Park, IL	Jun	28,739	0.95	89 <sup>th</sup>
Somerset Amphitheater	Somerset, WI	Jul	40,000	0.94	85 <sup>th</sup>
Alpine Valley Music Theater	East Troy, WI	Jul	37,000	0.87	84 <sup>th</sup>
Red Rocks Amphitheater	Morrison, CO	Jun	10,000	0.82	84 <sup>th</sup>
Dos Equis Pavilion	Dallas, TX	Apr	20,000	0.82	83 <sup>rd</sup>
Dos Equis Pavilion	Dallas, TX	May	20,000	0.80	83 <sup>rd</sup>
Alpine Valley Music Theater	East Troy, WI	Aug	37,000	0.78	83 <sup>rd</sup>
Fiddler's Green Amphitheater	Greenwood Village, CO	Jul	18,000	0.74	82 <sup>nd</sup>
Ruoff Music Center	Noblesville, IN	Jun	24,790	0.74	82 <sup>nd</sup>



**Table S8.** The top 10 percentile ranking for *amusement park* LOGs as calculated using LOG<sub>EF0+</sub>.

LOG Venue	City, State	Month	Maximum Capacity or Attendance	Mean Monthly EF0+ Count	LOG <sub>EF0+</sub> Percentile Rank
Six Flags Over Texas	Arlington, TX	Apr	37,000	1.00	100 <sup>th</sup>
Six Flags Over Texas	Arlington, TX	May	37,000	1.00	100 <sup>th</sup>
Kings Island	Mason, OH	May	40,000	1.00	100 <sup>th</sup>
Busch Gardens Tampa Bay	Tampa, FL	Jul	33,000	1.00	100 <sup>th</sup>
Magic Kingdom	Lake Buena Vista, FL	Jun	53,000	1.00	100 <sup>th</sup>
Busch Gardens Tampa Bay	Tampa, FL	Jun	33,000	1.00	100 <sup>th</sup>
Six Flags St. Louis	Eureka, MO	May	45,000	1.00	100 <sup>th</sup>
Six Flags St. Louis	Eureka, MO	Apr	45,000	0.99	99 <sup>th</sup>
Six Flags Over Georgia	Austell, GA	May	47,000	0.99	99 <sup>th</sup>
Six Flags New England	Agawam, MA	Jul	43,000	0.99	99 <sup>th</sup>

**Table S9.** The top 10 percentile ranking for *fair, festival, and/or parade* LOGs as calculated using LOG<sub>EF0+</sub>.

LOG Venue	City, State	Month	Maximum Capacity or Attendance	Mean Monthly EF0+ Count	LOG <sub>EF0+</sub> Percentile Rank
New Orleans Jazz & Heritage Festival	New Orleans, LA	May	475,000	1.00	100 <sup>th</sup>
Texas State Fair (Dallas)	Dallas, TX	Oct	97,560	1.00	99 <sup>th</sup>
Iowa State Fair	Des Moines, IA	Jul	117,038	0.99	99 <sup>th</sup>
Wisconsin State Fair	West Allis, WI	Aug	100,000	0.99	99 <sup>th</sup>
Texas State Fair (Dallas)	Dallas, TX	Sep	97,560	0.99	99 <sup>th</sup>
New York City Pride	New York, NY	Jun	2,000,000	0.97	97 <sup>th</sup>
Indiana State Fair	Indianapolis, IN	Jul	46,944	0.96	96 <sup>th</sup>
Macy's Thanksgiving Day Parade	New York, NY	Nov	3,000,000	0.95	95 <sup>th</sup>
Chicago Pride	Chicago, IL	Jun	1,000,000	0.93	93 <sup>rd</sup>
Ohio State Fair	Columbus, OH	Jul	91,000	0.93	93 <sup>rd</sup>

**Table S10.** The top 10 percentile ranking for **sports** LOGs as calculated using  $\text{LOG}_{\text{EF0+}}$ .

<b>LOG Venue</b>	<b>City, State</b>	<b>Month</b>	<b>Maximum Capacity or Attendance</b>	<b>Mean Monthly EF0+ Count</b>	<b><math>\text{LOG}_{\text{EF0+}}</math> Percentile Rank</b>
Coors Field	Denver, CO	Jun	46,897	1.00	100 <sup>th</sup>
Coors Field	Denver, CO	Jul	46,897	0.99	99 <sup>th</sup>
Globe Life Park in Arlington	Arlington, TX	Apr	48,114	0.99	99 <sup>th</sup>
Globe Life Park in Arlington	Arlington, TX	May	48,114	0.99	99 <sup>th</sup>
Texas Grand Prix (Indy Car)	Fort Worth, TX	Apr	200,000	0.99	99 <sup>th</sup>
Busch Stadium	Saint Louis, MO	May	45,494	0.98	98 <sup>th</sup>
Indianapolis Motor Speedway	Speedway, IN	May	325,000	0.98	98 <sup>th</sup>
Indianapolis Motor Speedway Road Course (Indy Car)	Speedway, IN	May	325,000	0.98	98 <sup>th</sup>
Kauffman Stadium	Kansas City, MO	May	37,903	0.98	98 <sup>th</sup>
Busch Stadium	Saint Louis, MO	Apr	45,494	0.97	97 <sup>th</sup>

**Table S11.** The top 7 percentile ranking for *air show and/or water show* LOGs as calculated using LOG<sub>EF2+</sub>. Note: Only seven air show and/or water show LOG events have historical EF2+ tornadoes within the respective climatological hazard grid cells.

LOG Venue	City, State	Month	Maximum Capacity or Attendance	Mean Monthly EF2+ Count	LOG <sub>EF2+</sub> Percentile Rank
Thunder Over Louisville	Louisville, KY	Apr	625,000	0.90	98 <sup>th</sup>
AirVenture Oshkosh	Oshkosh, WI	Jul	96,714	0.56	91 <sup>st</sup>
Milwaukee Air and Water Show	Milwaukee, WI	Jul	200,000	0.37	87 <sup>th</sup>
Guardians Of Freedom Air Show	Lincoln, NE	Aug	175,000	0.30	86 <sup>th</sup>
Chicago Air and Water Show	Chicago, IL	Aug	500,000	0.27	85 <sup>th</sup>
Wings Over Houston	Houston, TX	Oct	50,000	0.17	83 <sup>rd</sup>
Thunder Over the Boardwalk	Atlantic City, NJ	Aug	375,000	0.16	83 <sup>rd</sup>

**Table S12.** The top 10 percentile ranking for *amphitheater* LOGs as calculated using LOG<sub>EF2+</sub>.

LOG Venue	City, State	Month	Maximum Capacity or Attendance	Mean Monthly EF2+ Count	LOG <sub>EF2+</sub> Percentile Rank
Hollywood Casino Amphitheater	Tinley Park, IL	Jun	28,739	0.43	89 <sup>th</sup>
Dos Equis Pavilion	Dallas, TX	Apr	20,000	0.40	88 <sup>th</sup>
AT&T Summit Stadium	Glen Jean, WV	Apr	80,000	0.40	88 <sup>th</sup>
Hollywood Casino Amphitheater	Tinley Park, IL	Apr	28,739	0.40	88 <sup>th</sup>
Providence Medical Center Amphitheater	Bonner Springs, KS	May	18,000	0.35	87 <sup>th</sup>
Alpine Valley Music Theater	East Troy, WI	Jun	37,000	0.30	86 <sup>th</sup>
Jiffy Lube Live	Bristow, VA	Sep	25,262	0.29	86 <sup>th</sup>
Ruoff Music Center	Noblesville, IN	Apr	24,790	0.26	85 <sup>th</sup>
Slater Center Of Performing Arts	West Lafayette, IN	Apr	20,000	0.25	85 <sup>th</sup>
Somerset Amphitheater	Somerset, WI	Jul	40,000	0.25	85 <sup>th</sup>

**Table S13.** The top 10 percentile ranking for *amusement park* LOGs as calculated using LOG<sub>EF2+</sub>.

LOG Venue	City, State	Month	Maximum Capacity or Attendance	Mean Monthly EF2+ Count	LOG <sub>EF2+</sub> Percentile Rank
Six Flags Over Texas	Arlington, TX	Apr	37,000	1.00	100 <sup>th</sup>
Kings Island	Mason, OH	Apr	40,000	1.00	100 <sup>th</sup>
Six Flags Over Texas	Arlington, TX	May	37,000	0.99	100 <sup>th</sup>
Magic Kingdom	Lake Buena Vista, FL	Mar	53,000	0.99	100 <sup>th</sup>
Kings Island	Mason, OH	May	40,000	0.99	100 <sup>th</sup>
Magic Kingdom	Lake Buena Vista, FL	Apr	53,000	0.98	100 <sup>th</sup>
Hollywood Studios	Lake Buena Vista, FL	Mar	39,000	0.97	99 <sup>th</sup>
Six Flags St. Louis	Eureka, MO	May	45,000	0.97	99 <sup>th</sup>
Six Flags New England	Agawam, MA	Jul	43,000	0.96	99 <sup>th</sup>
Six Flags New England	Agawam, MA	Aug	43,000	0.96	99 <sup>th</sup>

**Table S14.** The top 10 percentile ranking for *fair, festival, parade* LOGs as calculated using  $\text{LOG}_{\text{EF2+}}$ .

LOG Venue	City, State	Month	Maximum Capacity or Attendance	Mean Monthly EF2+ Count	$\text{LOG}_{\text{EF2+}}$ Percentile Rank
Texas State Fair (Dallas)	Dallas, TX	Sep	97,560	0.98	100 <sup>th</sup>
Texas State Fair (Dallas)	Dallas, TX	Oct	97,560	0.95	99 <sup>th</sup>
Iowa State Fair	Des Moines, IA	Jul	117,038	0.87	97 <sup>th</sup>
New York City Pride	New York, NY	Jun	2,000,000	0.81	96 <sup>th</sup>
Oklahoma State Fair (Oklahoma City)	Oklahoma City, OK	Sep	90,000	0.81	96 <sup>th</sup>
Minnesota State Fair	Falcon Heights, MN	Sep	150,000	0.78	96 <sup>th</sup>
Indiana State Fair	Indianapolis, IN	Aug	46,944	0.75	95 <sup>th</sup>
Wisconsin State Fair	West Allis, WI	Aug	100,000	0.74	95 <sup>th</sup>
Chicago St. Patrick's Day	Chicago, IL	Mar	1,000,000	0.70	94 <sup>th</sup>
Chicago Pride	Chicago, IL	Jun	1,000,000	0.70	94 <sup>th</sup>

**Table S15.** The top 10 percentile ranking for *sports* LOGs as calculated using  $\text{LOG}_{\text{EF2+}}$ .

LOG Venue	City, State	State	Month	Maximum Capacity or Attendance	Mean Monthly EF2+ Count	$\text{LOG}_{\text{EF2+}}$ Percentile Rank
Globe Life Park in Arlington	Arlington, TX	TX	Apr	48,114	0.99	100 <sup>th</sup>
Texas Grand Prix (Indy Car)	Fort Worth, TX	TX	Apr	200,000	0.98	100 <sup>th</sup>
Indianapolis Motor Speedway	Speedway, IN	IN	May	325,000	0.97	99 <sup>th</sup>
Indianapolis Motor Speedway Road Course (Indy Car)	Speedway, IN	IN	May	325,000	0.97	99 <sup>th</sup>
Kauffman Stadium	Kansas City, MO	MO	May	37,903	0.96	99 <sup>th</sup>
Coors Field	Denver, CO	CO	Jun	46,897	0.96	99 <sup>th</sup>
Busch Stadium	Saint Louis, MO	MO	Apr	45,494	0.94	99 <sup>th</sup>
Globe Life Park in Arlington	Arlington, TX	TX	May	48,114	0.93	99 <sup>th</sup>
Busch Stadium	Saint Louis, MO	MO	May	45,494	0.92	98 <sup>th</sup>
Coors Field	Denver, CO	CO	May	46,897	0.90	98 <sup>th</sup>