



Leap Year Tornado Outbreak 2012

Satellite Image Location: Harrisburg, Illinois
Date: March 5, 2012
Source: WorldView-2: Natural Color

The Outbreak

The Leap Year Tornado Outbreak 2012 was part of a violent system that ravaged the Midwest and South that began on February 28th, killing at least 13 and injuring 200 people in four states. The Leap Year tornadoes struck Nebraska, Kansas, Illinois, Missouri, Tennessee, and Kentucky beginning before midnight February 28th and continuing until almost midnight February 29th.

Tornado Synopsis

Tornadoes are violent storms that come from powerful thunderstorms. They appear as a funnel- or cone-shaped cloud with winds that can reach up to 300 miles per hour. Tornadoes cause damage when they touch down on the ground. They can damage an area one mile wide and 50 miles long. Tornado season commonly occurs during the months of March through August, but they can occur at any time. Tornadoes can happen in any state but are most common for Arkansas, Iowa, Kansas, Louisiana, Minnesota, Nebraska, North Dakota, Ohio, Oklahoma, South Dakota, and Texas—an area of which is commonly called "Tornado Alley".

The most destructive and deadly tornadoes occur from supercells, which are rotating thunderstorms with a well-defined circulation. Supercells can also produce damaging hail, severe non-tornadic winds, unusually frequent lightning, and flash floods.

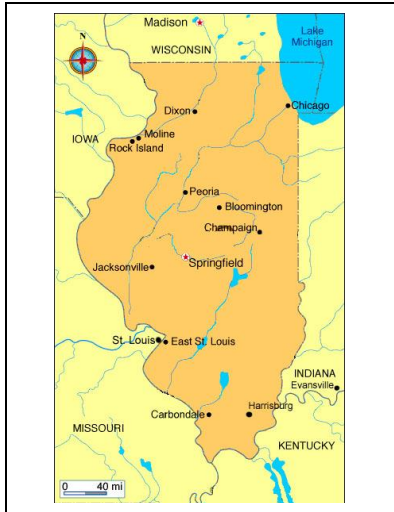
Harrisburg Tornado Facts

Date: February 29, 2012
Time: Pre-dawn at 4:56am
Wind: EF4 Estimated Wind speeds up to 170mph.
Path: 8 miles long and 200 – 300 yards wide.

More than 300 structures were damaged or destroyed, including 25 businesses. At least 10 homes and other buildings were leveled completely and several structures were displaced from their foundations. Early estimates indicated that nearly 40% of the city was damaged or destroyed. The southwestern part of the city was hit the hardest.

Seven people were killed and 110 injured when a tornado swept through Harrisburg. Six of the seven people who died lived on Brady Street in a series of duplexes.

The National Weather Service has given the tornado an EF4 rating, the second-highest rating given to twisters. The Enhanced F-scale is a damage scale for winds, including tornados. The Enhanced F-scale classifies F0-F5 damage as calibrated by engineers and meteorologists across 28 different types of damage indicators, mainly various kinds of buildings, but also a few other structures as well as trees.



The city of Harrisburg is the county seat of Saline County, Illinois. Harrisburg is located about 57 miles (92 km) southwest of Evansville, Indiana, 111 miles (179 km) southeast of St. Louis, Missouri. The Harrisburg 2010 population was 9,017.

WorldView-2 Satellite Image:

The natural color WorldView-2 satellite image, taken on March 5, 2012 and courtesy of DigitalGlobe, shows the structures that were totally destroyed by the EF4 tornado of February 29th. The destroyed strip mall on the right side of the image can be referenced by before and after ground photos. Debris from structures is left behind after the tornado passes over the structure, thus providing a good indicator of the tornado track. Also, the path of destruction can be documented in the image by the blue tarps on structures that sustained roof damage giving a decent indication of the width of the base of the tornado.



Before



After

WorldView-2 was successfully launched on October 8, 2009, by DigitalGlobe of Longmont, Colorado. WorldView-2 can rapidly swing precisely from one target to another, allowing extensive imaging of many targets, as well as stereo, in a single orbital pass. Operating at an altitude of 496 kilometers, WorldView-2 has an average revisit time of 1.1 days and is capable of collecting up to 975,000 square kilometers per day. WorldView-2 provides high-resolution 8-band multispectral images with a resolution of a half-meter in the panchromatic and 2 meters in the multispectral bands.

Second Outbreak

Two days later on March 2 and 3, 2012 a severe storm system wreaked havoc in five states in the Midwest and South, and has been blamed for 39 deaths: 21 in Kentucky, 13 in Indiana, three in Ohio and one each in Alabama and Georgia.

Chronology of the Leap Year Tornado Outbreak 2012:

February 28 event

Reported Tornadoes: Nebraska				
EF#	Location	Time (UTC)	Path length	Comments
EF0	Gandy	2213	3 miles (4.8 km)	Remained over open fields; no recorded damage; first tornado to hit Nebraska in February since records began in 1950
EF0	W of Greeley	0100	4 miles (6.4 km)	Flipped irrigation pivot
Reported Tornadoes: Kansas				
EF#	Location	Time (UTC)	Path length	Comments
EF0	SE of Randall	2328	1 mile (1.6 km)	Damaged trees and outbuilding of a farm
EF0	NW of Jamestown	2338	Unknown	Downed trees; destroyed metal building; roof damage to barn; water tanks thrown
EF?	SSW of Hutchinson	0043	Unknown	Barn destroyed; downed fence; overturned truck
EF2	Harveyville	0302	5 miles (8.0 km)	Homes severely damage; vehicles flipped; approximately 60% of town damage; 12 people injured; one death
EF0	SE Globe	0411	Unknown	Trees uprooted; barns destroyed; mobile home damages; rv and trailer overturned
Reported Tornadoes: Missouri				
EF#	Location	Time (UTC)	Path length	Comments
EF1	SE Mindenmines	0452	16 miles (26 km)	Barns damage; trees snapped or uprooted
EF1	NNE Greenville	0526	18.6 miles (29,930 m)	Ten barns damaged or destroyed
EF2	SW of Buffalo	0558	10 miles (16 km)	Mobile home park destroyed; power poles snapped; 3 turkey barns destroyed; 12 people injured ; one death

(Sources: www.spc.noaa.gov; [SPC Storm Reports for 02/28/12](#); [NWS North Platte](#) ; [NWS Hastings, NE](#); [NWS Topeka](#); [NWS Wichita](#))

February 29 event

Reported Tornadoes: Missouri				
EF#	Location	Time (UTC)	Path length	Comments
EF1	NW of Phillipsburg	0618	11 miles (18km)	Multiple homes damaged; downed numerous trees; one person injured
EF1	SE of Bennett Springs	0622	0.25 miles (400m)	Struck a campground; damaging or destroying at least 20 RV's; one business damaged
EF2	N of Cassville	0640	Unknown	Multiple homes and mobile homes damaged and destroyed; one death
EF1	NW of Edgar Springs	0706	19 mile (31 km)	Home severally damaged; numerous trees snapped or uprooted
EF2	Branson area	0713	22 miles (25 km)	Long track tornado caused extensive damage in Branson-homes and businesses destroyed; 32 people injured in town; vehicles flipped
EF1	NE of Marquand	0910	20.75 miles (33.39 km)	Roof damage to homes; trees snapped and uprooted
EF2	W of Marquand	0911	Unknown	Home destroyed; several homes with roof damage; large oak trees snapped or uprooted
EF1	Patton	0925	Unknown	Houses and at least 10 barns damaged or destroyed; extensive tree damage
EF2	Oak Ridge	0947	32 miles (51 km)	Thousands of trees snapped or uprooted; several houses damaged—partial roof loss; barns and grain bins destroyed; many downed power lines; one person injured
EF3	Asherville area	1000	21 miles (34km)	25 houses, mobiles homes, and barns destroyed; 25 damaged; one death
EF1	E of Bell City	1024	17.5 miles (28.2 km)	Grain bins and silos destroyed; barns damaged; house sustained roof and siding damage; chicken houses destroyed
Reported Tornadoes: Illinois				
EF#	Location	Time (UTC)	Path length	Comments
EF2	SW of Marion	1028	14.5 miles (23.3 km)	Metal warehouse heavily damaged; many homes with minor roof damage; hundreds of trees snapped or uprooted; many downed power lines; several barns and outbuildings destroyed or damaged
EF4	Harrisburg area	1051	26.5 miles (42.6km)	Over 200 house destroyed including 10 homes flattened; over 25 business including strip mall destroyed; house s and business damages; tree and power line damage extreme; winds estimated at 180 mile per hour (290 km/h)
EF2	Metropolis area	1100	26.5 miles (42.6 km)	Crossed Ohio River twice along Illinois-Kentucky line; four mobile homes destroyed; many houses damages; barns and chicken house destroyed; hundreds of tress snapped or uprooted; four people injured

(Sources: www.spc.noaa.gov; [SPC Storm Reports for 02/28/12](#); [NWS North Platte](#); [NWS Hastings, NE](#); [NWS Topeka](#); [NWS Wichita](#))

February 29 event (continued)

Reported Tornadoes: Indiana				
EF#	Location	Time (UTC)	Path length	Comments
EF1	Newburgh	1203	2 miles (3.2 km)	Trees and telephone poles knocked down; homes and business with roof damage; garage destroyed
EF1	Henderson	1200	1 mile (1.6 km)	Four cabins destroyed; seven telephone poles downed
EF1	Greenville (1 st tornado)	1445	700 feet (210 m)	Apartment building and several homes damaged
EF2	Greenville (2 nd tornado)	1445	5.4 miles (8.7 km)	Mobile home destroyed and thrown; Muhlenberg South Middle Scholl and several homes damaged; one injury
EF2	S of Elizabethtown	1445	5 miles (8.0 km)	Homes significantly damages; working garage and a barn damaged; many trees uprooted, twisted, or knocked down
EF2	E of Clarkson	1542	2 miles (3.2 km)	Brick houses and a business damages; three mobile homes destroyed; one person injured
EF2	W of Hodgenville (1 st tornado)	1605	1.7 miles (2.7km)	Homes and roof damage; cars rearranged on top of each other; power lined knocked down; trees twisted, snapped, and or uprooted
EF2	W of Hodgenville (1 st tornado)	1612	0.9 miles (1.4 km)	Working garage and two homes damaged; dumpster thrown 75 yards; snapped one telephone pole
EF 2	Grassy Creek area	1842	5 miles (8.0 km)	Residential structure damaged
EF2	N of Russell Springs	1925	8 miles (13 km)	
EF1	WSW of Dabney	1953	1.5 miles (2.4 km)	One barn destroyed; other barns damaged; roof damage to homes
EF1	SE of Center	Unknown	0.75 miles (1.21. km)	Barns destroyed ; trees snapped
EF1	NE of Smithville	2150	13 miles (21 km)	House damaged or detruide; one house lifted form foundation and tossed off a cliff; trees and power lines downed; one death
EF2	E of Monterey	2230	5.1 miles (8.2 km)	Tractor trailer blown over; 60 -100 trees downed; two deaths
EF0	NE of Greenback	0030	.075 miles (1.21.km)	Trees downed and buildings damaged

(Sources: www.spc.noaa.gov; [SPC Storm Reports for 02/28/12](#); [NWS North Platte](#) ; [NWS Hastings, NE](#); [NWS Topeka](#); [NWS Wichita](#))

Interpretive Learning...

- 1) Using the maps of distribution of tornadoes across the United States found on the National Atlas or ESRI websites listed in Explore More, describe the pattern of where tornadoes are seen and not seen. Why are they prevalent in some areas and not in others?
- 2) Explain the weather conditions that tend to induce tornadoes.
- 3) What is a Tornado Watch, a Tornado Warning? What should you do if there is a Tornado Warning in your area? What should you do if you hear the Emergency Sirens go off during a Tornado Warning?

Explore More...

Spatial Distributions of Tornadoes:

The National Atlas: <http://nationalatlas.gov/mld/tornadx.html>

ESRI Story Map: <http://storymaps.esri.com/spring2012tornadoes/>

Investigating Tornadoes in USA Using ArcGIS Online, Part 1:

<http://www.youtube.com/watch?v=TIQTxXMdZ1U>

Active weather conditions:

NOAA National Weather Service: Active watch, warnings, advisories and short term forecasts in the lower 48 US states:

<http://www.nws.noaa.gov/view/largemap.php>

<http://www.spc.noaa.gov/climo/online/monthly/newm.html#2012>

Basic tornado concepts and understanding:

Scholastic: Severe Weather and Natural Disasters:

<http://teacher.scholastic.com/activities/wwatch/tornadoes/>

FEMA Facts: <http://www.ready.gov/know-facts>

Weather Wiz Kids: Tornos: <http://www.weatherwizkids.com/weather-tornado.htm>

National Geographic:

<http://video.nationalgeographic.com/video/kids/forces-of-nature-kids/tornadoes-101-kids/>

<http://environment.nationalgeographic.com/environment/natural-disasters/inside-tornadoes/>

Sources:

Harrisburg Tornado: http://en.wikipedia.org/wiki/Harrisburg,_Illinois#Tornado_of_2012

New Channel 5: Harrisburg, Illinois hardest hit after tornado, storm system ravaged Branson,

Missouri, Midwest: <http://www.wptv.com/dpp/news/national/harrisburg-illinois-hardest-hit-after-tornado-storm-system-ravaged-branson-missouri-midwest>

Huff Post, Green (The Internet Newspaper): http://www.huffingtonpost.com/2012/03/02/harrisburg-illinois-tornado-victims_n_1315501.html?ref=green

NOAA Internet Tornado Facts: <http://spc.noaa.gov/faq/tornado/>

Acknowledgements:

Satellite image of Harrisburg, Illinois courtesy of DigitalGlobe, Inc. Permission to use image granted by DigitalGlobe, Longmont, Colorado.

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