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Two Record Long Tornadoes in Illinois and Their Major Impacts

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ABSTRACT

The nation's two longest and most deadly tornadoes occurred in Illinois early in the 20th Century. One crossed central Illinois in 1917 and killed 211 persons while the other crossed southern Illinois in 1925 and killed 695, the nation's greatest loss of life from a tornado. These were the greatest natural disasters ever in Illinois. The 1917 tornado covered 293 miles and the 1925 storm covered 219 miles, both national records. Property damages in 1917 totaled $51.5 million (2008 dollars) and those in 1925 were $134.2 million (2008 dollars).

INTRODUCTION

The nation's two longest and most deadly tornadoes occurred in Illinois early in the 20th Century. In May 1917 a tornado began near Quincy and moved east across Illinois, killing 211 persons before moving on into Indiana. In March 1925 a tornado began in southeastern Missouri, moved across southern Illinois and entered southwestern Indiana, leaving 695 dead in Illinois. The loss of lives in 1925 still ranks as the highest ever by a tornado in the United States. These two storm events and their impacts are the worst natural disasters experienced in Illinois during the 20th Century. Both storms created long lasting impacts on society, science, and technology, and they are an interesting part of the state's history. The storms and their losses are described first, and this is followed by descriptions of the post-storm impacts and lessons learned in ensuing decades.

Illinois averages 26 tornadoes per year but is not part of the nation's center of tornado activity which is in Kansas, Oklahoma, and Texas (Grazulis, 1993). Yet, Illinois has experienced the nation's two longest track and most damaging tornadoes (Fujita, 1987). The first in 1917 covered 293 miles and the second in 1925 covered 219 miles, and both had wide tracks that varied from 1/4 to 1 mile wide. The average size of a tornado in Illinois has a length of 14 miles and a width of 1/16 mile (Wilson and Changnon, 1971). Although aerial photography was not available to do post-storm assessments in 1917 or 1925, detailed field studies of both storms by weather scientists and engineering groups gave proof the storms were continuously touching the ground, resulting in the record distances.

The two long track tornadoes had near record forward speeds, 40 mph in 1917 and 62 mph in 1925. Both storms were extremely deadly and damaging. Their large funnel sizes, high-speeds, and long path lengths from beginning to end were factors leading to many deaths and large damages. Illinois normally experiences only three tornado deaths each year (Changnon and Kunkel, 2006). Property losses in 1917 amounted to $8.6 million (1917 dollars) and those in 1925 amounted to $24.4 million (1925 dollars). The 1917 losses expressed in 2008 dollars are $51.5 million, while the 1925 losses are equivalent to $134.2 million in 2008 dollars.

The two storms occurred at a time when there was no scientific understanding of atmospheric conditions that formed tornadoes; hence, no forecast skills existed. Further, there was no detection nor warning system in place. Tornadoes were detected solely by visual sightings of the funnel.

1917 MATTOON TORNADO

The funnel of the tornado on May 26, 1917 first appeared at noon just west of a small town southeast of Quincy (Wilson and Changnon, 1971). It moved east along a remarkably straight line creating damages in several small towns (Fig. 1) and many farms. At times along its path the tornado was accompanied by large hailfalls, with hailstone diameters of 3 inches. The tornado then struck and badly damaged both Mattoon and Charleston.

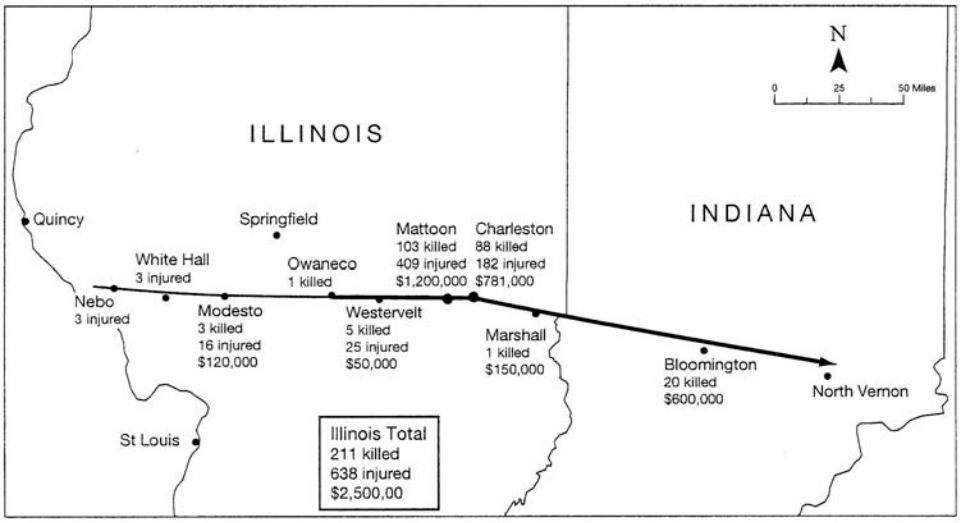

Figure 1. The track of the Mattoon tornado on May 26, 1917. The track was 1/4 mile wide from Nebo to Owaneco, and then expanded to ½ mile wide.

In Mattoon an area 2.5 city blocks wide and 3 miles long was totally devastated. The destruction included 103 persons killed, 400 injured , and 496 houses were totally destroyed, leaving 2,500 residents homeless. The local damages totaled $4.2 million

(1917 dollars). These huge losses led to this tornado becoming named the "Mattoon Tornado." The storm was also very damaging to buildings in Charleston. There it passed through the business district causing great damage to commercial interests. In Charleston the storm killed 88 persons, injured 182, destroyed 221 homes, and left 385 persons homeless. The total local damages were $3.7 million. Other damages occurred in several small communities in Illinois (Fig. 1).

Persons in the Mattoon and Charleston area reported never seeing a funnel, just a large dark cloud reaching the ground. Hence, no one suspected a large and dangerous tornado was approaching. After passing through Charleston, the storm's track shifted to the east-southeast and it entered Indiana after a 188-mile trip across Illinois. The storm crossed three-fourths of Indiana and terminated near North Vernon, having a duration of 7 hours and 20 minutes. The tornado averaged 0.5 mile wide after reaching Owaneco (Fig. 1). Indiana had 20 citizens killed and damages that totaled $0.6 million (1917 dollars). Summation of the 2-state total damages shows that 231 persons were killed, 638 were injured, and property losses amounted to $8.6 million (1917 dollars).

1925 TRI-STATE TORNADO

The second long-track tornado in Illinois occurred eight years later on March 18, 1925. This tornado ranks above all other 16,730 tornadoes in the nation since 1915 as the single most devastating storm (Grazulis, 1993). After it occurred, it became labeled as the Tri-State Tornado (Changnon and Semonin, 1966). It began at 1 pm in southeastern Missouri, lasted 3.5 hours, and covered 219 miles across southern Illinois and into southwestern Indiana (Fig. 2). The resulting losses included 695 dead, 2,027 injured, and damages of $24.4 million (1925 dollars). This is the greatest death total ever from a tornado in the U.S. (the next highest is 306), and its losses rank as the nation's second largest financial loss from a tornado (Grazulis, 1993). The significant climatological aspects of the storm include: 1) second longest tornado on record, 2) near record fastest speed of movement (62 mph), and 3) unchanging production of extreme winds throughout most of its 3.5-hour duration. An important aspect of this tornado was the extreme width of its path. In Missouri the path was 1/4 mile wide, but in Illinois it became a mile wide and varied from ½ to 1 mile wide in Indiana (Fig. 2). Its forward speed of 62 mph ranks as the third fastest moving tornado ever.

Another important aspect of the tornado was the lack of a visible funnel, the cause of many deaths. In Missouri a large funnel was seen, but in Illinois none was apparent. In Indiana, a funnel became visible. The inability to see a funnel in Illinois was a result of its great width (½ to 1 mile) and the large volume of dust and debris in the air. To most viewers in Illinois the storm appeared to be a large and dark approaching thunderstorm. Hence, few sought tornado shelters.

The storm produced most of the damages during a 40-minute period as it moved from Gorham to Parrish, Illinois. In a 47-mile distance it killed 541 persons, injured 1,423, and produced $18.3 million in damages (1925 dollars). Building destruction in Murphysboro and West Frankfort was extensive and mainly in residential sections. In addition, tipples and buildings at five coal mines were badly damaged. The remainder of the storm's track across Illinois was largely through rural farmland with fewer major damages. The storm

struck the industrial section of Princeton, Indiana, resulting in 45 deaths and over $3.9 million (19925 dollars) in property losses. The large number of injured persons in Illinois could not be handled in local hospitals in Murphysboro and West Frankfort. As a result, hundreds of injured persons were shipped by special hospital trains to other hospitals in southern Illinois and Missouri (Akin, 2002).

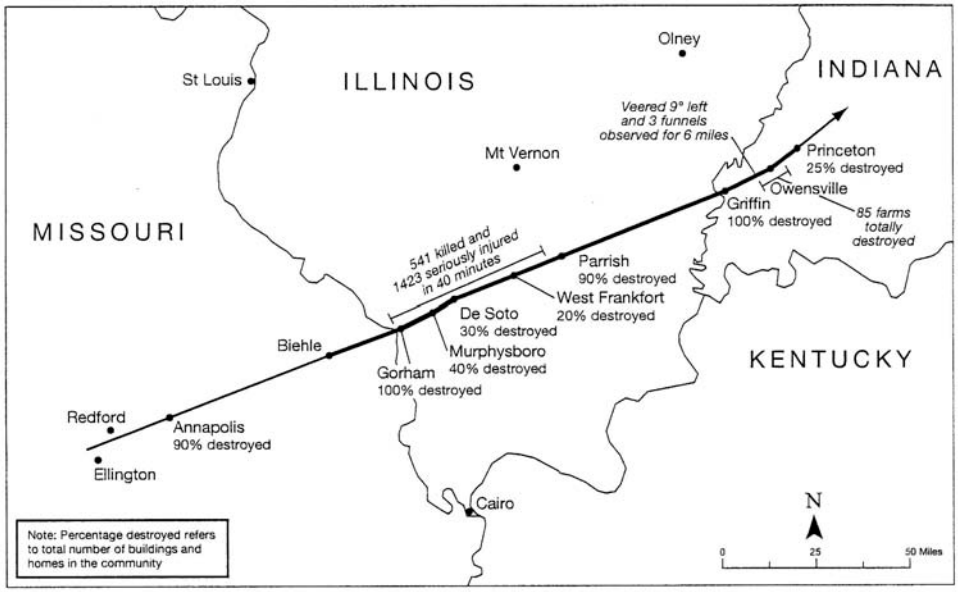

Figure 2. The track of the Tri-state tornado on March18, 1925. The path up to Biehle, Missouri, was 1/4 mile wide, then expanded to 1 mile wide, decreasing to ½ mile at Princeton, Indiana.

The storm's large loss of life and massive damages led an engineering society to assemble a team of engineers to survey the damages along the 219-mile path of the storm (Young et al., 1925). Their 1925 storm survey identified the primary factors leading to deaths and damages: 1) no tornado forecast, 2) no warnings of an approaching storm, 3) exceptionally fast forward speed, 4) unusually large storm size, 5) high wind speeds, 6) lack of adequate shelters, 7) lack of a tornado appearance, and 8) poor construction techniques in existing homes and structures. Many deaths and considerable property damage, aside from those due to the collapse of buildings when hit by the tornado funnel, were caused by flying debris, often of exceptional size. For example, walls of houses and roofs of barns were lifted aloft and then blown around by the big funnel.

POST STORM IMPACTS AND LESSONS LEARNED

The two tornadoes resulted in long-lasting and important impacts. These included effects on the Illinois public and their behavior, lessons about building design and construction requirements, and information for the scientific community.

The storms had long lasting impacts on the behavior of local citizens. Several decades after the Tri-State storm, persons in Murphysboro and West Frankfort were still going to shelters when a dark storm cloud appeared (Akin, 2002). Many did this even when the National Weather Service had not issued a tornado watch and when no local warnings were issued on the radio nor sirens sounded. Local memories of the Tri-State Tornado were revealed by local responses to a hailstorm in 1968, 43 years after the tornado. This damaging hailstorm had a 25-mile track along a portion of the Tri-State Tornado track in southern Illinois, and the coincidence of the hailstorm and famed tornado track was widely publicized by the regional news media (Changnon, 1970).

Another action widely noted in and around the storm areas was the construction of hundreds of storm shelters. People dug underground spaces large enough to hold their families so as to hide from falling walls or flying debris. A second result that was partially prompted by the Tri-State Tornado of 1925 was a change in Midwestern property insurance coverage. In 1930 the industry broadened existing property coverage in the Midwest to include "tornado insurance", something that had not been covered before (Kunreuther, 1998).

One positive outcome stemming directly from the tornadoes came as a result of the report issued by the engineering team that surveyed the Tri-State Tornado (Young et al., 1925). Their report noted many structural failures and recommended major changes in home and building construction techniques. These were adopted as local and state rules that led to improved and stronger construction techniques used in future house and business structures.

The storms also had long-term impacts on the scientific community. These two storms were an integral part of studies of thunderstorms (Byers and Braham, 1948). Later studies assessed long-track tornado formation and persistence. The advent of weather radars in World War II allowed post-war studies of tornadoes that produced long-track tornadoes. The first long-track tornado (covering 68 miles) detected and monitored by radar occurred in east-central Illinois on April 9, 1953 (Stout and Huff, 1953). Ensuing storm research discovered that a few thunderstorms producing long-track tornadoes develop in areas with unique atmospheric circulation patterns aloft; these have subsequently become labeled as "supercells" (Rauber et al., 2002). The two record long tornadoes of 1917 and 1925 and their record high losses have had major impacts on weather research. The price that hundreds of Illinois citizens paid nearly a hundred years ago has helped lead to the saving of thousands of lives in ensuing years.

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