THE TRI-STATE TORNADO OF MARCH 18, 1925

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In the course of years tornadic storms in the middle west exact a heavy toll of life and property. Fortunately, the average path is but twenty-five miles in length and, unless the tornado strikes a populous community or drives across country over a considerable distance, little attention is given to it by the general public. The storm of March 18, 1925, was unusual both as to length of path and devastating results. In its course it caused 742 deaths, the injury of 2,756 persons, and estimated property losses of $16,500,000. These figures create new records for American tornadoes. In the St. Louis tornado of May 27, 1896, the loss was $13,000,000, but this probably represents more physical damage to property because of the greater value of the dollar at that time.

At 7 a.m. of the 18th an active low pressure area was central near Ft. Smith, Arkansas. At 7 p. m. it had reached western Indiana. Tornadoes, when they occur, are usually found in the southeast quadrant of such disturbances, sometimes several hundred miles distant from the center. The tornado under discussion was quite close to the track of the center of low barometer as will be explained later. A steep temperature gradient obtained in this region. At Springfield, Illinois, the maximum temperature was 48°, with northerly winds and almost continuous rain. At St. Louis the maximum temperature was 51°, with northerly winds, but the temperature was somewhat lower at the time of the tornadic storm. At Cairo the maximum, occurring about the time of the tornado, was 75°, with strong southerly winds. The maximum temperature at some of the cooperative stations, from north to south, were: Greenville, 54°; Mt. Vernon, 66°; Sparta, 61°; McLeansboro, 64°; Carbondale, 69°; Anna, 75°. The tornado passed between St. Louis and Cairo and between Terre Haute and Evansville, and undoubtedly the low pressure center did likewise, but farther to the north. At some place between these cities the cold northerly winds met the warm southerly winds.

The paths of the tornado and of the center of low pressure were nearly parallel, but diverged somewhat as they advanced eastward, the average distance between them being about 60 miles. In an effort to show the correlation between the time of the tornado and that of the passage of the center of the low barometer area, lines were projected at right angles from the tornado track to the regular Weather Bureau stations and other places with barographs. This was done on the assumption that in general the center of low barometer of the general disturbance, or rather the lowest point on the barograph would be the same at a given point on the tornado track and at a station to one side but at right angles to it. Some of the records could not be used because the low point was masked by thunderstorm effects. On this assumption it would appear that the tornado preceded the passage of the center of the LOW by about forty minutes.

At the time of the 1917 tornado a barogram was secured from the State Normal School at Charleston, one mile south of the tornado path. In the present instance the barogram at the State Normal School at Carbondale, five miles from the tornado, showed nothing of interest and it was feared that there would be no pressure record of this unusual storm. However, there has come into our possession a record from West Frankfort made at the office of a coal mine about one mile south of the center of the path. After correction by our Cairo office, it was found that the barometer at West Frankfort fell steadily after 9 a. m. to 29.10 inches at the time of the tornado, 2:54 p. m., then dropped suddenly 0.23 inch to 28.87 inches, recovering the 0.23 immediately and continuing to rise steadily until after midnight. The barogram could not be likened to the familiar curved "V". The steady fall of the barometer during the hours that preceded the tornado and the steady rise during the remainder of the day cannot be attributed to the tornado, but rather to the passage of the general low pressure area across Illinois. According to this barogram the tornado occurred at exactly the time of the passage of the center of the LOW, apparently refuting the statement earlier in this report that the tornado appeared to have preceded the center about 40 minutes. Unfortunately, no hourly wind records are available near the tornado path, but persons who were interviewed stated that it turned cold after its passage. At Cairo the temperature fell rapidly after 4 p. m. and at Evansville after 6 p. m., but the veering of the wind to northwest required several hours at both of these places.

According to the Section Director for Missouri the tornado had its origin in the western part of Reynolds County at about 1:00 p. m., and then moved east-northeast through the counties of Iron, Madison, Bollinger, and Perry. Fortunately, one-half or more of the country the storm passed over in Missouri is sparsely settled. It struck Annapolis, Iron County, at 1:15 p.m., causing damage in the town and vicinity of $400,000, but only two persons were killed and twenty five injured. The total losses in Missouri are as follows: killed, 11; injured, 141; property loss, $564,000. It left Missouri about three miles north of Wittenberg and crossed into Illinois. A detailed account of the Missouri part of the tornado appears in the March number of Climatological Data, Missouri Section, published by the Weather Bureau Office, Columbia, Mo.

The writers of this report were authorized by the Chief of the Weather Bureau to visit the storm area in Illinois, and in Indiana if necessary. By using an automobile for the journey it was possible to cover the entire course of the tornado from the Mississippi River to its termination in Indiana, keeping as close to the storm track as the roads would permit. Surveys were made in the cities and towns, and many persons in the rural sections were interviewed and their damaged property inspected. Seven days were employed in this work.

After crossing the Mississippi River the tornado continued in a direction between east and northeast over a remarkably straight course through the counties of Jackson, Williamson, Franklin, Hamilton, and White in Illinois, and the counties of Posey and Gibson in Indiana, terminating some 16 miles beyond Princeton. The first place encountered in Illinois was Gorham. This village of 500 people occupies a level site about one-half mile square near the famous Fountain Bluff and one and one-half miles from the Mississippi River. All of the one hundred and twenty buildings in the town were damaged or destroyed and only ten are worth rebuilding. Houses were mostly small frame cottages without basements. Fire followed in some of the ruins. The two-story brick school was wrecked. There were 170 pupils in the school at the time. Nearly every one was injured and 7 deaths resulted. Several freight cars were blown over at this place. Thirty four lost their lives here, about two hundred were injured, and the town suffered a property loss of $150,000. The country is hilly between Gorham and Murphysboro; the rural properties in this section were damaged to the extent of $100,000, with four deaths and eleven injured.

Murphysboro, a city of 13,000 population, suffered the greatest total damage of any community in the path of the storm. A line drawn diagonally from the southwest corner of the city to the northeast roughly divides the devastated area of the northwest part from scattering damage in the southeast part. In the more northwest portion, where small homes were the rule, the destruction was complete. Only in the west part of Murphysboro were there fine residences in the path of the tornado through Illinois and Indiana; every one of these was damaged or destroyed, and but fifty per cent of them can be restored. Twelve hundred dwellings in the city were damaged

night. The tornado fall and recovery was so sudden that it

are in condition to be rebuilt. The storm covered 152 city blocks, representing seventy per cent of the residence section and sixty per cent of the entire city. After the storm, fire consumed eleven blocks, besides four additional blocks where there had been very little damage. Several large schools were wrecked by the wind, resulting in considerable loss of life. The Mobile and Ohio shops were demolished by the tornado and then burned. The total loss to the railroad company in Murphysboro is estimated at $1,500,000. The business section suffered twenty per cent damage, but there were no serious losses except that several business buildings on West Walnut Street were destroyed by fire. The ruin in this city threw 2,000 industrial workers out of employment and rendered 8,000 persons homeless. At this writing the deaths are 234, 800 were injured, and information from the best authoritative source places the total money loss in the city at $10,000,000.

From Murphysboro the tornado pursued its destructive course to De Soto, on the main line of the Illinois Central Railroad. In the intervening country there was a property loss of about $100,000, with eight deaths and fifteen injured. De Soto had a population of 900. The path of severe damage was about one-half mile wide. The store buildings were badly damaged, and of the 177 dwellings about 40 along the south edge of the path will be rebuilt. Only three structures in the town were not injured. The property loss is estimated at $300,000. From the wreck of the two-story brick school 38 children were taken out dead. In De Soto township, including the town and rural sections, there were 72 deaths, and 97 out of about 175 who were injured were taken to hospitals.

From De Soto to Hurst and Bush, two adjoining towns, the farmers suffered a probable loss of $90,000. Hurst lay to the south of the path and was damaged not to exceed $10,000, but Bush suffered considerably. The Missouri Pacific roundhouse was partly destroyed, and the total railroad loss was $50,000. The damage was in the north and west parts of the town. Bush is a mining town and the only dwellings are miners' cottages. Of the 323 homes in the village, 33 were completely destroyed, and 158 were damaged. The mine company places the loss to these cottages at $55,000 Seven persons were killed and 80 injured. From Bush to West Frankfort 24 additional lives were taken, 18 were injured, and farm properties suffered to the extent of $170,000. In this stretch a railroad bridge was blown off its foundation.

West Frankfort, a coal mining center with a population of 20,000, is the largest city involved in this tornado, but only 20 per cent of its area was in the damage track. The tornado estimated at 450 of whom 117 were in hospitals. Aside from the loss to the mines and railroad, the damage to buildings and contents is estimated at $295,000. At Caldwell, northeast of of West Frankfort, the Industrial Coal Company mine tipple and engine room were wrecked at a loss of $200,000, and the company-owned cottages were damaged to the extent of an additional $50,000. The deaths and injuries at this suburb are included with those for West Frankfort.

Seven miles beyond West Frankfort, after killing 24, injuring 21, and tearing up $112,000 worth of farm property in the intervening territory, the tornado struck the town of Parrish, where about 275 people resided. Here 30 houses out of 34 were broken up, and no buildings escaped except the school and the church. Two families were entirely wiped out. There were 22 deaths, 80 injured, and the loss is estimated at $65,000. In the first half of the path across Illinois six cities and towns lay directly in the storm track; over the latter half not a single town was encountered. It continued its course, however, with unabated fury, destroying farm homes, fences, buildings—everything in its path. In eastern Franklin County 9 farm people were killed in a distance of two and one-half miles. From Parrish to the Hamilton County line the farm damage would run about $96,000, with 9 deaths and 12 injured. In crossing Hamilton and White counties the path lay about 5 miles south of McLeansboro, 1 mile south of Enfield, 3 miles northwest of Carmi, and just touched the south edge of Crossville. The path in Hamilton County averaged three-fourths mile in width. Two hundred families had losses in this county. In the Braden area 11 persons lost their lives in one mile, and in the Lick Creek neighborhood 17 farm people were killed in two and one-half miles. The killed, injured, and property losses for Hamilton and White counties are: 35, 100, $350,000; and 31, 100, $750,000, respectively. In White County 110 homes and 230 outbuildings were involved. A summing up of the results for the entire state of Illinois shows a toll of 631 lives, the injury of 2,062 persons, and a property loss of $13,193,000.

Crossing the Wabash River into Indiana the tornado struck Griffin, a village of 388 population. This was a few minutes after 4:00 p. m., three hours after its start in Missouri. Not a habitable structure remained and only about 9 of them are fit to rebuild. Consequently all were homeless. Three business buildings burned after being wrecked by the wind, and persons who could not be extricated were burned to death. The only physician was severely injured. People with broken arms assisted in the rescue work. A few days after the tornado

cut a swath across the northwest part of the city, occupied by small residences, mostly without basements. The path was one-fourth mile or more in width. At Orient No. 2 Mine, said to be the largest in the country, a steel tank was blown over, the conveyor and some of the buildings were wrecked, and the large modern steel tipple was damaged. Power is received from a distance, and when the cages and ventilators ceased to work the 800 men, 500 feet down in the mine, had to climb up the escapement. Had the storm occurred an hour or so later these men would have been above ground, many of them in their homes. The men knew there was a storm because the air was forced downward in both the up and down draft ventilating shafts. The section where the miners live, immediately south of the mine, was a shambles, and the superintendent's account of witnessing the women and children crawling out of the wreckage was most tragic. The mine property was damaged about $150,000, and the Chicago and Eastern Illinois Railway lost $100,000 in the destruction of a roundhouse, coal chute, etc. There are 700 blocks in West Frankfort. Of these, 144 were in the stricken area, 64 in the area of severe destruction, and 13 were entirely wiped out. Ten stores were included, 925 dwellings were damaged or destroyed, and 3000 people rendered homeless. The dead numbered 127 and the injured were

In Missouri the storm was reported to be one-fourth mile in width with the typical funnel-shaped cloud. From the Mississippi River to Princeton, Indiana, the path varied generally from one-half to one mile in width. Over the west half of Illinois, very few could be found who thought they saw anything like a funnel cloud. Farther east some thought they saw such a cloud, especially those out of the path of the storm to the north, but these people were not very definite. All agreed, however, that two clouds came together, one from the right and and one from the left. One witness said the cloud from the northwest passed behind the cloud from the southwest. Others said the two clouds seemed to collide, back away, and collide again. One mentioned a "fog" rolling toward him, and many described the cloud as a turbulent boiling mass. One or two advanced the theory that there was a funnel-shaped cloud lying on its side and boring forward like an auger. Others mentioned greenish or purplish colors. Two men at West Frankfort first noted birds flying at great speed, then noticed the greenish looking cloud and everything darkened.

There was very little evidence of the so-called explosive force, although one man reports seeing a house collapse after it had been lifted into the air. Particular attention was given, especially in the rural districts, to the direction in which trees lay and debris was scattered, using a compass in the hilly country where directions were in doubt. For the most part they lay forward and a little to the left of the direction of the storm, and in many instances at right angles to the right or left, but only rarely, even on the north side of the path, could trees be found lying backward in the direction from which the tornado had come. Because of the unusual width of the path, the rather general absence of evidence of a funnel-shaped cloud, and some of these other facts, the writers feel inclined to suggest, as one of them did in connection with the May, 1917, tornado (*), that the cloud was so close to the earth there was

(*) See Monthly Weather Review: June, 1917, p. 294; August, 1924, p. 396; November, 1924, p. 542.

the town became entirely surrounded by water as a result of the Wabash River flood and was accessible by railroad only. Under the auspices of the Red Cross and National Guard the relief and statistical work was found to be well organized at this place. The storm path was three-fourths of a mile wide. Most of the buildings were simply a mass of debris. There were 81 buildings in the town, including 4 churches and 14 business places. The school building was badly damaged, but school had been dismissed and most of the pupils had left. In the town there were 34 deaths, 150 injured, and a property loss of $225,000. For Posey County, including Griffin, there were 58 deaths and 233 injured. Twenty-six farm places were a total loss. This represented a value of $150,000.

Entering Indiana the storm changed its course slightly, bearing more to the north. It crossed Gibson County diagonally, just touching the north edge of Owensville. After leaving Owensville and throughout the remainder of its course the damage does not appear to have been quite so severe as had been the case to the westward. Up to this point whenever any part of a city or town was spared it had been on the south side of the storm track, but at Princeton it was the south part of the city that suffered. This area included two large business institutions and many small homes. The demolition of residential property was not so

(L. & N.); Crossville, 3:50 p. m. (Big Four); Griffin, Indiana, between 4:00 and 4:05 p. m. (I.C.); Princeton, 4:18 p. m. (Southern). It is not claimed that these times are exactly correct, but it is believed that they are approximately so.

The Mattoon tornado of May 26, 1917, with its 293 miles, is probably the longest of record. That storm and others with which the writers are familiar had an average velocity of translation of about 40 miles per hour. The tornado under discussion covered 86 miles in Missouri, 92 in Illinois, and 41 in Indiana, or a total of 219 miles. Omitting consideration of any slight meanderings, the velocity of translation in Missouri was 57 miles per hour, and across Illinois it averaged 59 miles. Every effort has been made to secure the correct time at Princeton, Indiana. It is given at 4:18 p. m. The passage across Missouri and Illinois was at a practically constant rate. If the time at Princeton is correct, the velocity of translation increased somewhat in Indiana, the storm advancing from Crossville, Illinois, to Princeton, Indiana, at the rate of 68 miles per hour.

From inquiries made among the country people it would seem that they had about five minutes warning after first noting the cloud. Asked as to the length of time in which the destruction took place, opinions varied but most persons thought about two minutes. If the whirl was round, the path of the storm one mile or less in width, and the velocity of translation about one mile a minute, then the tornado would pass a given point in one minute or less.

There was much sameness throughout, the amount of property damage simply depending on what was in the track. The tornado advanced across the country with undiminished intensity and none of the lifting and skipping commonly attributed to this type of disturbance. Topography seemed to have little effect on the action of the storm. All farm properties were damaged or destroyed, and in most cases there was complete demolition. Live stock were killed, fences blown down, automobiles and machinery damaged, grain and supplies scattered about, and in many cases entire orchards were uprooted. In

complete as in the other afflicted cities. Princeton is a county seat and has a population of 12,000. About one-fourth of the city was in the storm area, which was three-fourths of a mile wide at this place. The tornado was described as a blackness moving across the south end of the city, with the air full of timbers. Two hundred homes were destroyed, and 100 more damaged. The roundhouse of the Southern Railway was destroyed and the company shops were badly wrecked, as was the plant of the Heinz Company. The railroad loss was $1,000,000, and that of the Heinz people $300,000. Aside from the above the losses in Princeton will total about $500,000. There were 20 deaths, 200 injured, and 1500 were homeless.

One and one-half miles beyond Princeton the path narrowed to one-fourth mile in width, but the tornado continued severe for seven miles, then gradually diminished in intensity, and ended its course three miles southwest of Petersburg, Pike County. The Indiana Section Director mentions some straight-wind damage north of Crowthersville, some 88 miles beyond, in the same general direction. In Gibson County, outside of Princeton, there were 22 deaths and 120 persons received injuries, but east of the city there were no fatalities and only 20 were hurt; buildings were totally destroyed on 85 farms, and were more or less damaged on 135 others; the value of rural properties wrecked by the storm will reach $600,000. In Indiana 100 persons lost their lives, 553 were injured, and the property loss is estimated at $2,775,000.

After viewing the path of the tornado across two states certain general statements can be made with respect to the whole storm; others must be more specific. There are certain characteristics supposed to be common to tornadic storms, but this one is unusual because of the very absence of some of these characteristics. In the first place it occurred rather early, May being the month of maximum tornado frequency in Illinois. no room for the usual pendant portion. It might be likened to an inverted truncated cone.

Thunder was heard quite generally a few minutes in advance. Rain and hail fell at various places along the path, preceding, during, or after the tornado. The hail was moderately heavy at Gorham, West Frankfort, and Carmi, and east of Princeton irregular chunks of ice as large as goose eggs were reported. The sounds were likened to the noise of several freight trains or a large number of airplanes in action. The mine superintendent at West Frankfort described the noise as a whistling sound, rising and falling like a siren, and repeated. He and others mentioned a sensation of being lifted.

It can positively be stated that there was only one tornado in Illinois, and that it was continuous from Missouri to beyond Princeton, Indiana. Throughout Missouri and Illinois the direction was 21° north of east, apparently never varying from this path more than a mile or so. After crossing into Indiana the path began to gradually curve to the northward. It was 24° north of east from Griffin to Owensville, and 29° from Owensville to Princeton.

In the confusion and fright people are not likely to notice the time of day. A plan was devised for the determination of the time of the tornado. By calling on the train dispatchers, either in person or through the agents, we ascertained the time the wires went out as the storm crossed the several railroads. The rail lines keep a record of wire trouble. In the following enumeration the source of the information is shown in parentheses: Annapolis, Mo., 1:15 p. m.; Gorham, Ill., 2:25 p. m. (M.P); Murphysboro, 2:34 p. m. (school clock stopped); De Soto, 2:38 p. m. (I. C., and school clock stopped); Bush, 2:45 p. m. (clock stopped); West Frankfort, 2:54 p. m. (Cent. Ill. Public Service Co.), 2:55 p. m. (C. & E. I.); Parrish, 3:07 p. m. (clock stopped); L. & N. R. R. west of Carmi, 3:40 p. m.

some cases residences were carried from the foundations with scarcely a board left in the immediate vicinity. The country was strewn with debris. Freight cars were turned over. The term "utter confusion" nicely illustrates conditions in the tornado zone. The national director of Red Cross disaster work declared that he had never witnessed such complete devastation and suffering, nor a disaster that embraced such a wide range of territory. War veterans likened it to the battle fields of France. The tornado did not cut a swath through the timber. In numerous places there was severe damage, many trees being broken off or uprooted; in other areas there was little destruction. Trees were down here and there in all parts of the storm track.

Until we reached the extreme eastern portion of Illinois nothing was heard or seen of such phenomena as straws sticking in poles. Near Crossville it was reported that straws were found in that position, and across the river in Griffin we saw a straw and a piece of thick wall paper driven into a tree; also a three-fourths inch board imbedded two and three-fourths inches in a tree. Later we heard of boards being driven into trees at Murphysboro; in one case it found a rotted place and in the other passed through the side of the tree.

Many instances were related of the force and carrying power of the wind. Some of these stories were impossible, others improbable, and only those within the realm of possibility are given credence in this report. A number of these occurrences are stated as follows: buildings destroyed, hen and chicks about place, not hurt; large touring car blown 225 feet from road, striking ground only at intervals; small house moved about 200 feet, practically intact; horse blown 300 yards out of wrecked barn, killed; baby carried 200 yards and killed; Plumfield school demolished, 85 pupils, only 2 killed, many unhurt; another rural school carried away, seats remained fastened to floor, pupils clung to seats, none hurt seriously; majority of boards lying in open fields were parallel with wind direction; chicken plucked, but lived; lid of compact carried 40 miles; trousers with $95 in pocket blown 39 miles; check and 500 calling cards lying on table, check found under porch, one card carried 125 miles; many papers blown 40 to 130 miles; shower of papers at Olney and Tamaroa, one was page from 1917 magazine describing Mattoon tornado; all above objects that were carried long distances moved due northeast and to the north of the storm path; 16 pupils blown 150 yards into field from country school, none killed; binder blown one-fourth mile; Mt. Carmel, 13 miles north of storm track, air full of stuff at 4 p m., going due east, as thick as flock of blackbirds; dead grass, corn stalks, sticks, etc., formed solid mat against farm fence, had appearance of hedge.

It may be wondered why the number of casualties was so great. In the first place the path was of great length and was wider than usual, thus embracing an unusual area. The tornado advanced at a rapid rate, with great destructive force. There are relatively few basements in this region and surprisingly few storm caves. Where could the people take refuge? Many did not realize the danger present, thinking it merely a severe thunderstorm. Some entered the houses to take shelter from the rain. Notwithstanding the great number killed or injured there were many remarkable and almost unbelievable escapes.

The military and relief work was well organized, and the usual American spirit brought help in man power, money, and supplies. In the cities few of the occupants were about their damaged homes, but in the country many of the farmers were found on the premises.

After viewing the path of the tornado there were several things that especially impressed the authors of this report. The fortitude of the people in the stricken area was wonderful. From those who had lost their homes, property, and even members of the family, not one word of complaint was heard, and the ones who had come through without casualties expressed their thankfulness of the outcome. It strikes one as remarkable that a meteorological phenomenon can be 219 miles in length and yet less than one mile in width. Equally strange is the fact that a mile on either side of such complete devastation can be found perfectly normal conditions and nothing harmed.