

CHARACTERISTICS OF THE RED RIVER VALLEY TORNADOES

as of April 15, 1979

by

Ted Fujita

On April 12 Fujita and Wakimoto used two Cessna 172s concurrently, flying about 12 hours each. Wakimoto's Cessna returned to OKC at 720 PM. Similar flights were repeated on April 13, following paths of a total of six tornadoes.

Preliminary results of these six tornadoes are as follows:

1. VERNON TORNADO FFP = 4,4,3

Visible path started at 9 ENE Crowell as a narrow line which changed into cycloidal, suction-vortex swaths in the open field. Peak intensity of F4 (low) was reached to the south, through the east of Vernon.

This tornado crossed the Red River with F1 intensity, uprooting about one hundred trees along the river bed. The path continued toward the east-northeast past Davidson. The total path length was 39 miles, 23 miles in Texas and 11 miles in Oklahoma.

2. HOLLISTER TORNADO FFP = 2,2,1

The path started at 1 S Hollister and continued toward the east-northeast. The peak intensity of F2 occurred at the 5 mile path mileage. The total path length was 8 miles.

3. FAXON TORNADO FFP = 1,2,1

Path beginning at 1 NW Faxon extended northeastward with the peak intensity of F1 at the location just to the north of Faxon. The path length was 6 miles.

4. LAWTON TORNADO FFP = 3,2,2

This tornado started $\frac{1}{2}$ mile north of the terminal building of the Lawton Municipal Airport. The path extended toward the northeast to Lee Blvd. and 2nd Street where the path made a gentle right turn.

Tornado moved eastward across the Interstate, leaving beautiful suction-vortex marks in a wheat field before it crossed the Cache Creek, north of OKL-7. Then the tornado repeated rather complicated left and right turns before the path from the air was lost in an area covered with low bushes which did not respond to F0 wind.

The maximum intensity in Lawton was F3 (middle), however the peak intensity, as estimated from the air, occurred on both sides of the Interstate, where a car was blown off the OKL-7 access road. The estimated peak intensity is F3 (upper). The total path length was 4 miles.

5. GRANDFIELD TORNADO FFP = 2,4,5

The first damage of this tornado was seen in Harrold. The path, at least one-half mile wide, continued northeast toward the Red River. Tornado crossed the river with F0 intensity and began intensifying afterwards. There were several suction-vortex marks between the river and the Grandfield airfield where the first peak intensity of F2 was reached.

Then, the tornado weakened to F1 as it crossed OKL-5. The path crossed US 281-277 about 11 miles south of the Lawton Airport and continued northeast. Just to the east of the Cache Creek, a 1.5-mile section of telephone/power lines running N - S, was pushed over.

The second peak intensity of F2 was reached at about 12 miles southeast of Lawton. Then, the path continued northeast past OKL-7. On both sides of the highway the tornado demolished the same houses which were damaged by the April 5, 1978 tornado. I will confirm this by examining the areal photos I took last year. If so, it would appear that lightning struck the same location again.

Marlow was affected by F0 to F1 winds. Roger Wakimoto suspected that the nature of the winds was not that of a tornado but a downburst. In our information exchange at Lawton during a refueling, I decided to re-examine the Marlow area.

The Marlow storm was a 3-mile wide downburst, almost identical in pattern to Figures 7.2 and 7.3 of Fujita's "Manual of Downburst Identification." (SMRP Res. Paper 156). The downburst started where the Grandfield tornado made the final left turn and extended past Marlow toward an area between Alex and Lindsay. The area of the Marlow downburst(s), probably a conglomerate of downbursts and microbursts, was an elongated ellipse, some 40 miles long.

The Grandfield tornado was a wide-end (WE) tornado with a length of 64 miles. Downburst damage of F0 - F1 extended further toward the northeast, as far as 30 miles from the end point of the tornado damage. The first 9-mile path was in Texas and the rest, 55-mile, was in Oklahoma.

6. SEYMOUR TORNADO FFP = ? ? ?

The NSSL chase team confirmed a tornado moving east, to the north of Mabelle. Both Fujita and Wakimoto flew around Diversion Lake and Lake Kemp. No tree damage has been found.

Another attempt will be made to survey the area, both on the ground and from the air within the next 10 days.

7. WICHITA FALLS TORNADO FFP = 4,4,4

The first indication of high wind was spotted about 3 miles east-northeast of Holliday. The tornado crossed the Archer-Wichita county line along the Fort Worth and Denver Railroad track.

Two oil-storage tanks in an oil field were uprooted and blown off, leaving periodic black spots of crude-oil spills. Six high-tension steel towers to the southwest of the Memorial Stadium were damaged;

three were laying flat on the ground. The Stadium is located near the 4-mile mileage from the first damage point.

The tornado intensified rapidly to F4 (uppermost) as it passed to the south of the Stadium and maintained this peak intensity for the next 11 miles. The width of the tornado in this 11-mile section, including an 8-mile section in the residential districts of Wichita Falls, was extremely wide. The F0 damage was about $1\frac{1}{2}$ mile wide; F1, $3\frac{1}{4}$ mile; and F3, $\frac{1}{2}$ mile.

Whether the peak intensity was F4 (uppermost) or F5 (lower) is debatable at the present stage of the F-scale assessment. We took about 500 aerial photographs from 1500 to 3000 ft AGL over Wichita Falls. The Texas Tech survey team headed by Jim McDonald and Joe Minor has been performing an analysis of their ground and engineering survey. We will be reaching a joint decision on the final F scale. This is being coordinated by Bob Abbey of NRC.

As soon as our color pictures are processed by Kodak in Chicago, we will assign an F-scale value to every structure within the four sectional maps extending from Memorial Stadium to McKinney Road.

This tornado, as inspected from the air, was not as intense as the Xenia tornado of April 3, 1974. However, its width through an 11-mile section, including 8 mile length through the residential area, was much wider than that of the Xenia path. Apparently, this tornado traveled slower than the Xenia tornado. During its weakening stage, from F3 to F2, the path made a turn toward the north-northeast, followed by a sharp right turn toward the east.

We encountered serious difficulties in maintaining our research flights, due to the fact that the area was to the southeast extension of the Sheppard AFB runway which had a number of training flights descending through our survey altitude.

One of the most interesting aerial views was that of the Red River crossing of this tornado, to the east of Byers. The river water was red indeed, being fed by the run-off water from the red-soil regions of Oklahoma and Texas. Over one hundred trees on both sides of the running river water were uprooted, showing the direction of tree falls in cyclonic swirl patterns.

After the river crossing, the path made a gradual left turn toward the north-northeast, ending its F1 damage in an open field north-northeast of Waurika. Although the circulation pattern and F1 damage ended there, F0 damage continued for at least the next 30 miles toward the northeast.

Wakimoto tracked this 30 mile section beyond Wildhorse Creek, east of Duncan. He confirmed that damage was F0 category everywhere. There were weak damages, mostly to trees and irrigation pipes, inside the triangle connecting Waurika and Ratliff City with the point 10E Duncan.

An F0 downburst, up to 10 mile wide, is suspected in this large area. This damage pattern is very similar to that of the Marlow downburst. After evaluation of the aerial photographs, I will ask Wakimoto and another graduate student to cover this area again, more thoroughly, in an attempt to help my final decision. Wakimoto had considerable

experience with Greg Forbes in mapping wind effects on corn fields. This time, however, he experienced considerable difficulty in mapping wind effects on low bushes which did not respond to F0 wind by virtue of their strength and low heights.

The total path length of the Wichita Falls tornado depends upon the outcome of the proposed second survey. My present guess is

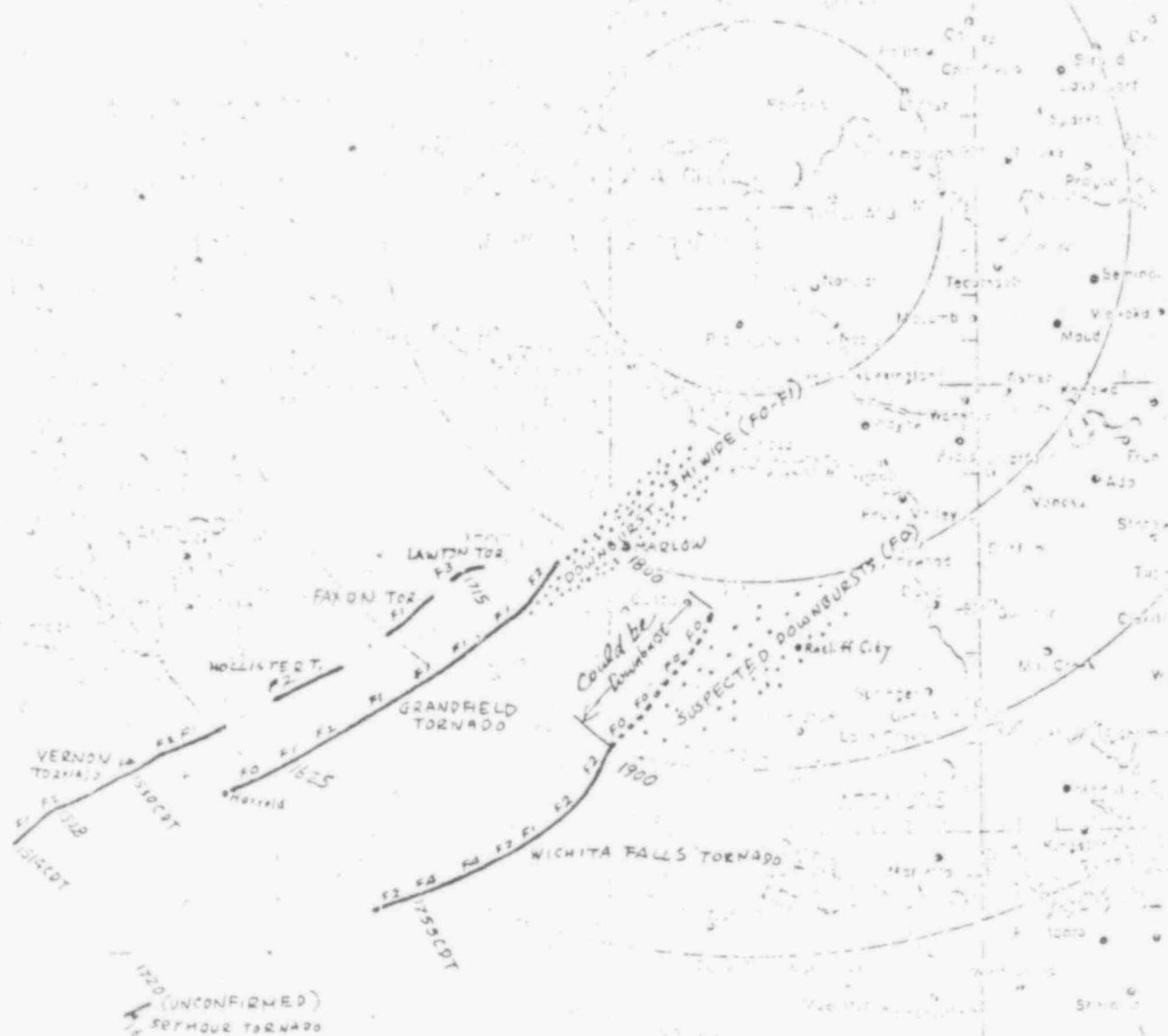
47 miles (tornado) + 28 miles (downburst)

with a combined path length of 75 miles. Refer again to Figure 7.2 of my "Manual of Downburst Identification". The first 36-mile section of this tornado was in Texas and the second 11-mile section was in Oklahoma.

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Red River Valley Tornadoes, Apr 10, 1978

Aerial Survey by Fujita and Wakimoto
on April 12 and 13

Preliminary result
as of April 15, 1978 9



480 318

POOR ORIGINAL-

0 10 20 30 40 50 60 70 Miles