

## ANNUAL SUMMARY

### The Tornado Season of 1983

EDWARD W. FERGUSON, FREDERICK P. OSTBY, PRESTON W. LEFTWICH, JR., WILLIAM E. CARLE,  
STEVEN F. CORFIDI, RICHARD G. CUNDY AND WILLIAM D. HIRT

*National Severe Storms Forecast Center, Kansas City, MO 64106*

#### ABSTRACT

Tornado events of 1983 are reviewed. Significant and interesting aspects of the 931 reported tornadoes are noted. Synoptic patterns associated with four noteworthy tornado days are examined.

#### 1. The year 1983 in statistics

During 1983 the number of tornadoes reported across the United States remained high, while tornado-related deaths remained relatively low. A total of 931 tornadoes represents an 11% decrease from the near-record 1047 in 1982, but is 26% above the 30-year (1953–82) annual average of 739. Tornado-related deaths totaled 34 during 1983, well below the annual average of 104.

Distributions of tornadoes were sporadic in both time and space. May continued to have the highest monthly total (249). More than twice the respective monthly averages were recorded in February (41) and November (49), while December (58) had more than three times its monthly average. Twenty-two tornadoes occurred in southeast Texas as Hurricane Alicia made landfall on 17–18 August. October had the lowest monthly total (13). Table 1 gives the monthly details of tornado activity.

For the year, Texas was the state that recorded the highest number of tornadoes (186), followed by Oklahoma with 92. Louisiana, with 64 tornadoes, broke its previous annual record of 55 established in 1974. Alabama tied its annual record number of 45, which last occurred in 1973. Also, Washington and Oregon tied their records with annual maxima of four and three, respectively. Florida reported an unusually high annual total of 85 tornadoes of which 21 occurred during February. The geographical distribution of tornadoes in 1983 is depicted in Fig. 1.

Information concerning the 27 killer tornadoes of 1983 is listed in Table 2. More than one-half of the 34 fatalities (18) resulted when tornadoes struck mobile homes or occupied vehicles. The highest number of fatalities (eight) occurred in Texas, while five and four occurred in Louisiana and Florida, respectively.

Frequencies of tornadoes in 1983, according to intensities classified as “weak,” “strong” or “violent” (Fujita, 1981), are given in Table 3. As usual, most tornadoes were classified as “weak.” Although “strong” and “violent” tornadoes together represented slightly more than 22% of the annual total, they resulted in almost 80% of the recorded fatalities. The geographical distributions of “strong,” “violent” and “killer” tornadoes are given in Fig. 2. Four violent tornadoes were reported during 1983. Details of these events are given in Table 4.

#### 2. The year 1983 by month

##### a. January

After a record-breaking month in December 1982, 1983 got off to a slow start and no tornadoes were reported during the first 28 days of January. However, at 2215 CST 29 January, a waterspout moved onshore near Panama City, Florida and became the first tornado of 1983. This weak (F1) tornado demolished 47 mobile homes and did considerable damage to houses and power lines, but no injuries were reported.

Two days later, on 31 January, a strong weather system raked southeast Texas and southern Louisiana. Heavy rainfall of more than 30 mm in southeast Texas produced local flooding, and property damage from straight-line winds was extensive. A strong (F2) tornado developed in Sealy, Texas (about 48 km west of Houston) and injured four people as it produced a 5 km long damage path. At about 1400 CST, another strong (F3) tornado struck the west side of Beaumont, Texas. Twenty units of an apartment complex were demolished and a woman was injured when her apartment was badly damaged by the tornado. Texas reported a total of five tornadoes before the storm moved east into southern Louisiana.

TABLE 1. Monthly distribution of tornadoes, tornado fatalities and killer tornadoes.

Month	Number of tornadoes			Number of fatalities			Number of killer tornadoes	
	1983	1982	Mean 1953-82	1983	1982	Mean 1953-82	1983	1982
January	13	18	15	2	1	3	2	1
February	41	3	20	1	0	7	1	0
March	71	60	48	0	6	7	0	6
April	65	150	108	6	30	37	3	10
May	249	329	162	14	14	23	12	4
June	178	196	149	2	4	15	2	4
July	99	95	82	4	0	1	3	0
August	76	34	54	0	0	2	0	0
September	19	38	38	0	2	2	0	2
October	13	9	23	0	0	2	0	0
November	49	19	21	0	0	2	0	0
December	58	96	19	5	7	3	4	5
Totals	931	1047	739	34	64	104	27	32

The first tornado in Louisiana touched down at 1741 CST along the southwest coast between Holly Beach and Johnson Bayou. A strong tornadic thunderstorm about 48 km southwest of Lafayette produced at least three tornadoes near Kaplan. One of these moved northeast and claimed the life of a woman in the community of Lelieux when her residence was destroyed shortly after 2100 CST.

A second strong (F3) tornado on this day struck about 3 km south of Bunkie, Louisiana at 2130 CST.

The tornado moved northeast for about 8 km, causing considerable damage to farm buildings. It destroyed a mobile home, killing one child and injuring two persons.

This episode of severe weather brought the total number of tornadoes for the month to 13. Although this figure is close to the normal frequency of 15 for January, five tornadoes in Texas and seven in Louisiana exceeded monthly averages of one in each state.

This late January weather system continued to be

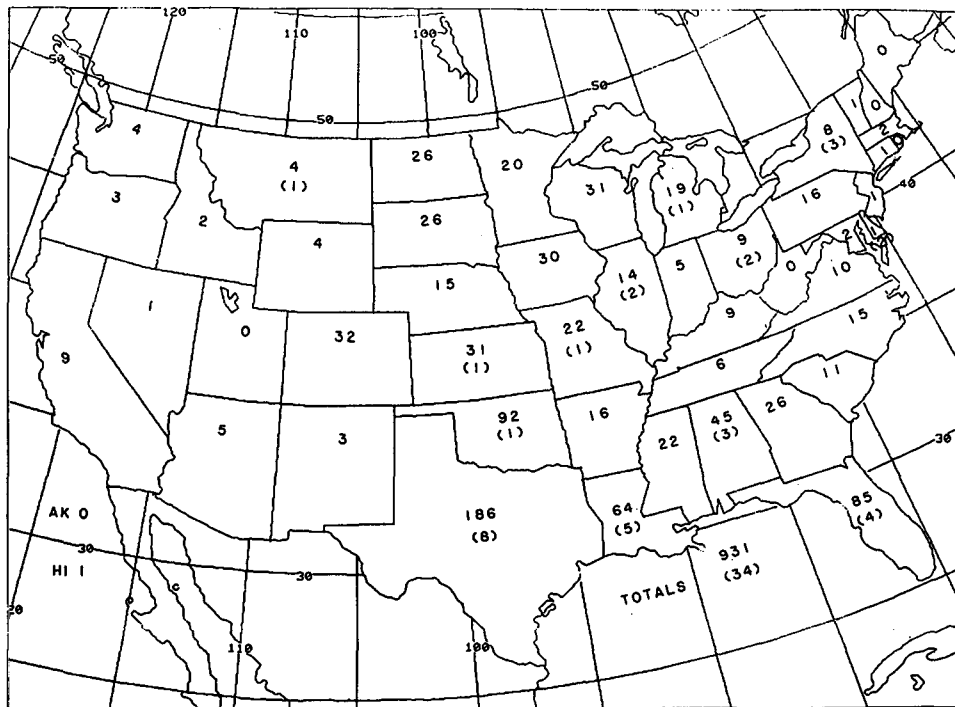


FIG. 1. Geographic distribution of tornadoes in 1983. Totals summed over states give 935 due to border-crossing tornadoes. Numbers in parentheses are tornado-related deaths.

TABLE 2. Killer tornadoes during 1983.

Date	Time (CST)	Location	Number of deaths	Intensity	Remarks
31 Jan	2105	Lelieux, LA	1	F3	
31 Jan	2130	Bunkie, LA	1	F3	Mobile home
2 Feb	0820	DeSoto City, FL	1	F2	Mobile home
1 Apr	1635	Collinston, LA	2	F4	
9 Apr	1150	Inverness, FL	3	F3	Vehicle
29 Apr	2023	Springfield, MO	1	F3	
1 May	2200	Edgewood, IL	2	F0	Mobile home
2 May	1049	Weston, OH	1	F3	Mobile home
2 May	1455	Broadview Heights, OH	1	F3	
2 May	1505	Chautauqua, NY	2	F3	
2 May	1915	Meridian, NY	1	F3	Mobile home
6 May	1751	Topeka, KS	1	F3	Mobile home
19 May	2305	Urania, LA	1	F3	
20 May	0030	Phillipsburg, TX	1	F1	Mobile home
20 May	0120	Klein, TX	1	F2	Mobile home
20 May	0130	Houston, TX	1	F2	
20 May	1345	Nederland, TX	1	F2	
20 May	1400	Crosby, TX	1	F2	Mobile home
9 Jun	2245	Fritch, TX	1	F1	Mobile home
27 Jun	2215	Collinsville, OK	1	F2	Mobile home
9 Jul	1937	Vida, MT	1	F1	Vehicle
21 Jul	1850	Hartly, DE	2	F2	Mobile home
21 Jul	2050	Saugatuck, MI	1	F2	Drowning
3 Dec	1837	Oxford, AL	2	F3	Shopping Center
6 Dec	0251	Selma, AL	1	F3	
10 Dec	1600	Washington, TX	1	F1	
10 Dec	1805	Evergreen, TX	1	F1	

quite active and produced numerous reports of severe weather that will be discussed in the February account of events.

#### b. February

The storm that moved through Texas and Louisiana in late January spawned numerous tornadoes in Florida during the first two days of February. In the period from 0500 CST 1 February to the early afternoon of 2 February, a total of 18 tornadoes were reported in the state. Around midmorning on 2 February, a tornado struck a mobile home park in DeSoto and caused the only February tornado fatality when the twister overturned a mobile home. This was only the second February killer tornado in Florida since records began in 1916. The situation was made more serious by numerous events of hail, heavy rain, intense lightning and downburst thunderstorm winds.

Major property damage occurred in northeast Florida on 2 February from downburst winds that struck Hawthorne (about 19 km east of Gainesville) and Orange Park (16 km south of Jacksonville). A wind recorder at the Jacksonville Naval Air Station measured a peak wind gust of  $50 \text{ m s}^{-1}$  when the downburst passed. Florida reported three more tornadoes on 10 February, bringing the monthly total to 21. This was more than double the February record of 10 that was set in 1975.

Seven tornadoes were reported in Texas, and five in Alabama during the month. Three tornadoes in Georgia were the most in February since 1976, when three also were reported; no tornadoes had been observed in that state during February since 1977.

A total of 41 tornadoes was reported in the nation during the month. Although this was slightly more than twice the normal of 20, there was only one tornado fatality, well below the normal of seven.

#### c. March

Seventy-one tornadoes in March resulted in 73 injuries, but no fatalities were reported. Thirty of the injuries were caused by a single strong (F2) tornado that struck the south-central area of Los Angeles, California on 1 March. This storm passed near the Convention Center and damaged approximately 50 homes and seven businesses along a 5.6 km track. Later that day, a second tornado touched down briefly in San Marino, California. It seriously injured

TABLE 3. Tornado frequency and deaths by intensity category, 1983.

Category	F scale	Approximate wind speed ( $\text{m s}^{-1}$ )	Tornado frequency (%)	Number of tornado deaths
Weak	0-1	<51	77.7	7
Strong	2-3	51-93	21.9	25
Violent	4-5	93-143	0.4	2

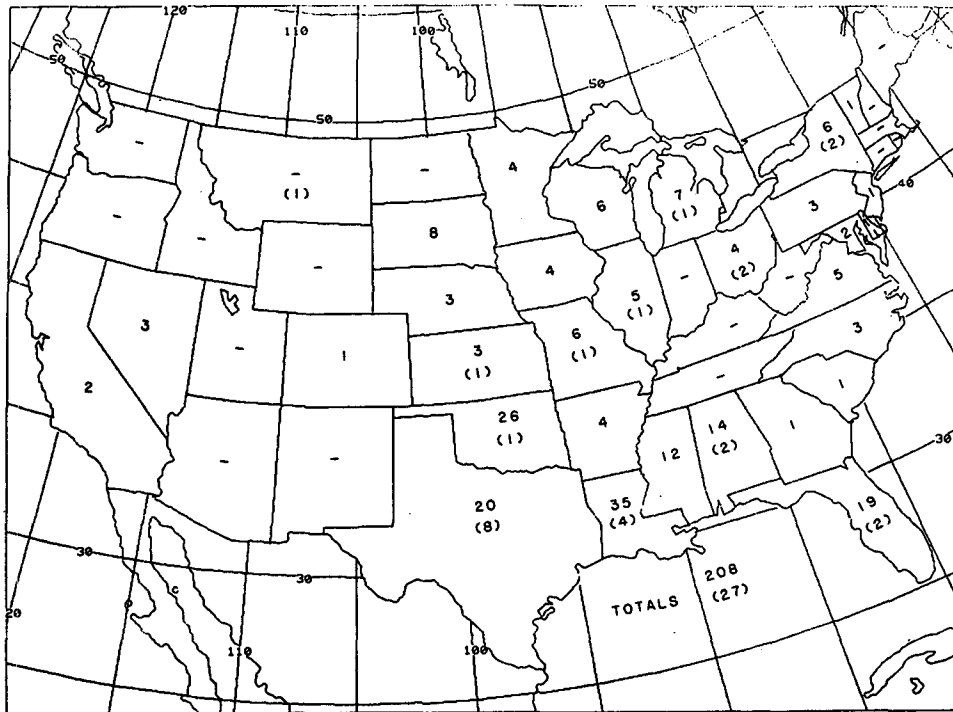


FIG. 2. Geographic distribution of "strong" and "violent" (intensity F2 or greater) tornadoes in 1983. Totals summed over states give 210 due to border crossings. Numbers in parentheses are killer tornadoes.

the driver of a large automobile that was lifted about 5 m off the ground and hurled across a highway. California reported two additional tornadoes during the month, but no injuries were reported.

Texas led the nation with 24 tornadoes, followed by nine in Florida. The strongest tornado (F3) ever documented in the lower Rio Grande Valley occurred near Harlingen, Texas on 15 March. Ten persons were injured as this twister moved in a rather erratic fashion over a course more than 9 km long and 800 m wide in places.

As the first quarter of 1983 closed, a total of 125 tornadoes and three tornado fatalities had been reported. These figures represent 51% more tornadoes than normal and a death total 18% of normal.

*d. April*

The month began with a strong outbreak of severe weather in northern Louisiana and Arkansas. Loui-

siana reported seven tornadoes on 1 April. Five of these were rated as strong (F2 and F3), and the first violent tornado (F4) of the year was reported about 16 km northeast of Monroe, Louisiana. This tornado moved northeast and produced a 14.5 km track. Two persons were killed, 20 injured and 34 houses destroyed as the tornado moved through the town of Collinston at 1635 CST.

Although tornadoes were reported on 17 days in April, the outbreak on 1 April was the strongest. On 9 April, an intense thunderstorm produced three tornadoes in northern Florida. One of these, a strong (F3) twister, did considerable damage when it touched down about 11 km south of Lecanto. The tornado continued northeast for 16 km to a point just west of Inverness. There it picked up an automobile with four occupants, lifted it 15 m into the air, and hurled it into a wooded area 100 m distant. Three of the passengers in the automobile were killed and the

TABLE 4. Violent tornadoes in 1983.

Date	Time (CST)	Location	Intensity	Path length (km)	Path width (m)	Number of deaths	Number of injuries
1 Apr	1635	Collinston, LA	F4	14.5	917	2	20
3 Jul	1205	Andover, MN	F4	1.6	64	0	4
3 Jul	1915	Dodgeville, WI	F4	0.8	46	0	0
6 Dec	0105	La Place, LA	F4	11.3	61	0	25

fourth was critically injured. These fatalities represent the most lives claimed by a single tornado in 1983.

On 29 April, a strong (F3) tornado struck the southern part of Springfield, Missouri. A 16-year-old girl was killed by flying debris as she left her car at the time the tornado hit. Her companion was among the 19 injuries caused by this storm. This brought the total tornado fatalities for the year to nine. The normal number of fatalities for the first four months is 54.

Only 65 tornadoes were reported during April. This was just 60% of the mean of 108 for the month; not since 1962 had fewer been reported in April. Florida had the greatest number with 13, followed by 12 in Oklahoma and 11 in Louisiana. It is interesting that only one tornado occurred in Texas, where the average number in April is 20. Not since 1951 have so few been reported in the state.

#### e. May

After a relatively quiet April, May was extremely active, with 249 tornadoes reported (Figs. 3 and 4 show two examples). Two tornado fatalities occurred on the first day of the month when a weak (F0) tornado touched down just east of Edgewood, Illinois, destroying a mobile home and killing the two inhabitants. This weather system moved east and intensified on 2 May, when 21 tornadoes were reported in Michigan (5), Ohio (7), Pennsylvania (3) and New York (6). There were three tornado fatalities in New York and two in Ohio.

Of the 249 tornadoes reported in May, 41% (102) occurred in Texas and Oklahoma. Texas had 62 (Fig. 3) with five fatalities. This was the highest number of fatalities reported in May since 1970. Almost one-third (20) of the tornadoes and all five deaths occurred

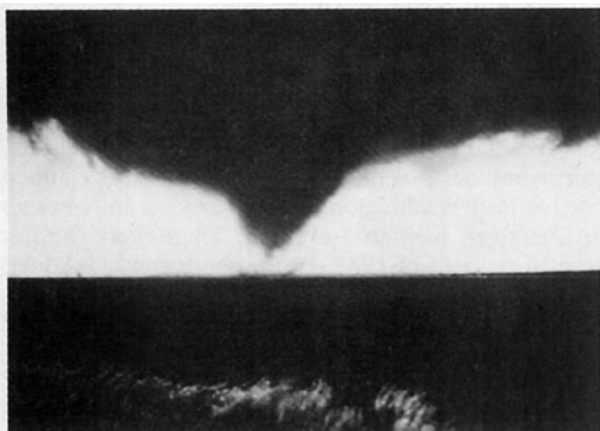


FIG. 3. A tornado touches down 4 km south of Dodson, Texas on 13 May 1983. An F2 tornado from this storm destroyed a barn, travel trailer and small buildings, as well as damaging five farm houses, as it moved to northeast of Hollis, Oklahoma. Photo by David Hoadley.



FIG. 4. An F0 tornado that remained in open country after touching down approximately 16 km southwest of Medicine Lodge, Kansas on 17 May 1983. Photo by Jim Leonard.

on 20 May when very strong thunderstorms moved across southeast Texas.

In Oklahoma 40 tornadoes were reported, twice the average for May, but there were no fatalities. A total of six tornadoes in New York set a new record for the greatest number in May and tied the all-time record for any month, established in June 1976. Three fatalities on 2 May not only set a record for the greatest number for any month, but also were the most reported in any year since reliable records began in 1916.

In Louisiana, a total of 17 tornadoes broke the previous May record of 12 which was set in 1975, and tied the all-time record for any month that was established in April 1975. A tornado death in Urania on May 19 brought the state's fatality total for the year to five.

On 6 May a strong (F3) tornado struck Topeka, Kansas and produced a 31 km intermittent path that closely paralleled the track of the 8 June 1966 tornado. This track was about 5 km south of the 1966 track and was described as being considerably more narrow. Two mobile-home parks received the worst damage and one mobile home parks resident was killed. In all, 70 houses and 55 mobile homes were destroyed, while 25 persons were injured.

#### f. June

As the season progressed, tornadic activity advanced northward in the central part of the nation. Before the month ended, Minnesota, Wisconsin, Wyoming and North Dakota each reported its first tornado in 1983.

There were 178 tornadoes reported during June, two of which were killer storms. One occurred in Fritch, Texas on 9 June when a weak (F1) tornado destroyed a double-wide mobile home, killing one of the occupants and injuring another. The second

fatality occurred in Collinsville, Oklahoma on 27 June when a strong (F2) tornado struck a trailer house and claimed the life of a woman.

Texas again led the nation in number of tornadoes with 35, Oklahoma reported 23, Colorado 20, Minnesota 16, and South Dakota and Kansas 13 each.

#### *g. July*

In July the number of tornadoes was above normal (99 compared with 82), and for the first time in 1983 fatalities exceeded the monthly average (4 versus 1).

On 9 July, a tornado near Vida, Montana picked up a vehicle and carried it 0.4 km before dropping it into a field. Both occupants were thrown from the vehicle and one suffered fatal injuries. This was the first tornado fatality in Montana since 1952 and only the sixth since 1916.

The second killer tornado moved through Delaware during the evening of 21 July, causing the deaths of two persons who lived in separate mobile homes in Hartly. These were the first tornado fatalities in Delaware since 21 August 1888 when a tornado struck Wilmington and killed 12 people.

Later that same day, a tornado struck near Saugatuck, Michigan. A wall of water created by the tornado moved up Kalamazoo Lake and swamped a boat that was moored to a bridge. One of the men occupying the boat was thrown into the water and drowned. This was the first tornado-related fatality during July in Michigan since 1926.

Wisconsin reported 25 tornadoes in July. This total not only exceeded the July record of 16 (set in 1980) but was the highest reported in the state for any month. North Dakota was the only other state to have more than ten tornadoes, with a total of 11. Three tornadoes in South Carolina tied the earlier July record established in 1962.

#### *h. August*

A total of 76 tornadoes was reported in August. Texas had the largest number with 22, and all of these occurred in less than 24 hours on 17–18 August as Hurricane Alicia came ashore near Galveston. Surprisingly, no deaths were caused by this extremely dangerous episode of severe weather.

On 11 August, two tornadoes did considerable damage (estimated \$10 million) to aircraft and hangars at the Allentown–Bethlehem–Easton Airport in Pennsylvania.

Florida reported six tornadoes in August, bringing its total for the year to 69. For the first time since 1972, an August tornado was reported in Vermont.

#### *i. September*

For the first time since January, the monthly tornado total was less than normal. Only 19 were

reported, half of the September average of 38. Not since 1957 have so few been reported in September, but two tornadoes in South Dakota tied the all-time record for the month. Texas reported five, the most in the nation, followed by Florida with four.

#### *j. October*

Severe weather continued to wane during October, and only 13 tornadoes were reported. Seven of these occurred in Virginia, exceeding that state's previous October record of two, which was set in 1979. To have assumed that the 1983 severe weather season had ended at this time would have been incorrect, as illustrated by the following discussions of November and December events.

#### *k. November*

Forty-nine tornadoes were reported in November. This was more than twice the average of 21 and the most reported since November 1973. Eleven tornadoes in Alabama was the second highest total on record for November and the most in November since 1957, when 17 were reported. One of the most active days of 1983 occurred on 22 November. The Severe Local Storms Unit of the National Severe Storms Forecast Center issued 10 watches, and 94 reports of severe weather were received from the areas of Texas and Louisiana north to Kansas and Missouri.

#### *l. December*

A strong weather system produced numerous reports of severe weather in the Gulf coastal states on 3 December. There were two fatalities and 51 injuries in Oxford, Alabama when a tornado struck a shopping center. These were the first December tornado deaths in Alabama since 1967.

During the early morning hours of 6 December, a strong thunderstorm produced a tornado that struck Selma, Alabama. This tornado caused extensive property damage, killed one person and injured 19.

Numerous tornadoes, strong winds and hail struck east Texas on 10–11 December. On 10 December, storms injured several people, and tornadoes claimed one life near Washington in the afternoon and another in Evergreen later that evening. These were the last killer tornadoes of 1983, and raised tornado fatalities for the year to 34.

While record low temperatures were being reported over much of the eastern two-thirds of the nation, severe local storms occurred along the northeast Gulf coast through northern Florida and southern Georgia. These storms caused extensive property damage and several injuries on 27, 28 and 29 December. A tornado in Sopchoppy, Florida early in the morning of 28 December damaged homes and trees.

The last tornado of 1983 occurred 3 km east of

Kissimmee, Florida at 1206 CST 29 December, precisely 11 months after the first tornado of 1983.

### 3. Noteworthy tornado outbreaks

Analysis of relative positions of atmospheric features is essential to severe local storm prediction (Miller, 1972). As documented by Ferguson *et al.* (1983), numerous studies have related various parameters, such as vertical wind shear, atmospheric stability, low-level jets, and temperature and moisture gradients, to tornado development. Such important parameters and their relative distributions are depicted on composite charts for four noteworthy tornado outbreaks during 1983. A brief discussion of the progression of synoptic features is added for each case.

#### a. 2 February 1983

For two days prior to 2 February, killer tornadoes had occurred from Texas eastward to extreme northwest Florida as squall lines formed along an east-west quasi-stationary front. A deepening surface low pressure system had moved northeastward from northern Texas while an upper-level low moved across Texas and Arkansas.

By 0600 CST 2 February, the surface low was located in central Illinois. A strong cold front extended southeastward, then southward, across central Georgia

and northern Florida into the Gulf of Mexico. Although the surface low was far to the north, strong dynamics had moved over the Florida peninsula. A southerly low-level (85 kPa) jet of  $20 \text{ m s}^{-1}$  was evident at both Key West and West Palm Beach, and the upper-level flow remained diffluent over the area. Surface dew points were above  $20^\circ\text{C}$  in south Florida, while values of  $18^\circ\text{C}$  extended into central Florida. This tropical air mass was very unstable, with a lifted index of  $-9$  reported at West Palm Beach. In addition, a strong push of drier air was entering northern Florida at 70 kPa. These features are depicted by the composite chart in Fig. 5.

An intense squall line formed during the early morning ahead of the cold front from southeastern Georgia southwestward to the northeastern Gulf of Mexico. Under the influences of strong dynamics and a very unstable air mass, this squall line moved rapidly southeastward down the Florida peninsula during the daytime hours.

Although outbreaks of severe weather across the Florida peninsula are most often associated with the passage of a surface low-pressure system through the area, this was not the case on 2 February. The intensities of both thermodynamics and dynamics supported the development of severe storms that produced 14 tornadoes and 16 incidents of wind damage; four fatalities and 25 injuries were recorded. This episode of severe local storms ended as the

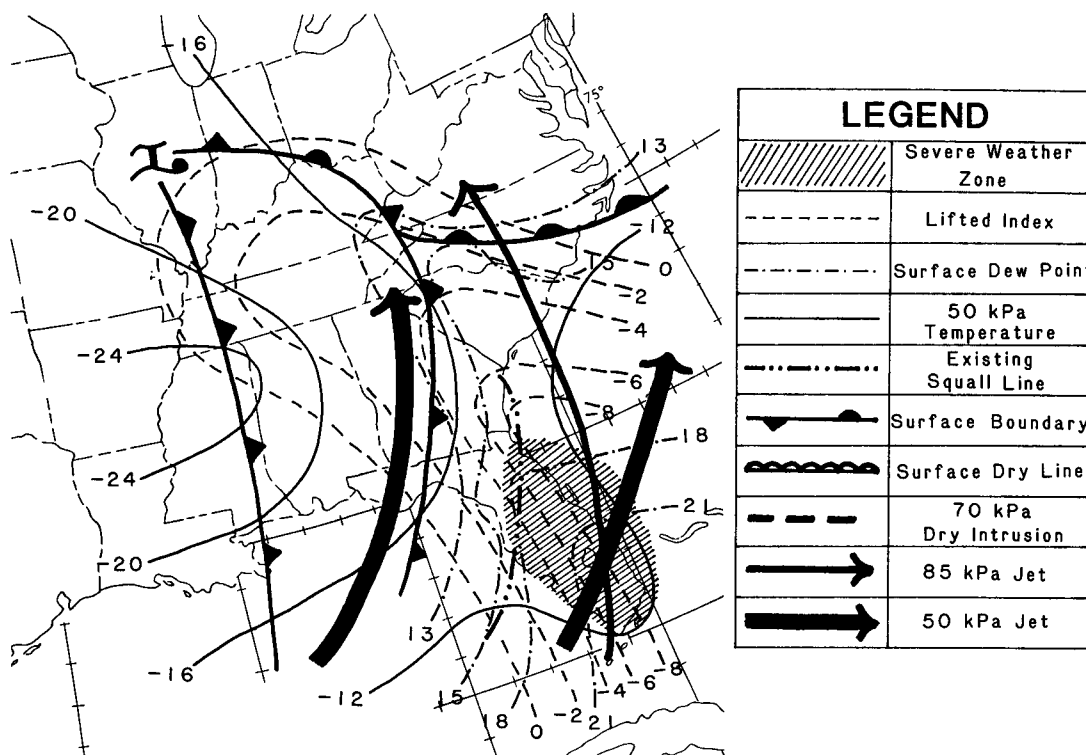


FIG. 5. Composite chart depicting significant synoptic features for 0600 CST 2 February 1983.

intense squall line exited the south Florida coast around 1500 CST 2 February.

*b. 1 April 1983*

A major outbreak of tornadoes occurred in the lower Mississippi Valley on 1 April. Sixteen tornadoes were reported in Arkansas (3), Louisiana (7) and Mississippi (6). This outbreak included the F4 (Fujita, 1981) tornado that caused two fatalities at Collinston, Louisiana and a quartet of F3 tornadoes in northeastern Louisiana. Also, 21 reports of hail at least 2 cm in diameter were received from Louisiana.

A "classical" pattern favorable for tornado development is shown by the composite chart for 1800 CST 1 April (Fig. 6). A deepening surface low pressure system had moved out of the lee of the Rockies across northeastern Oklahoma during the morning of 1 April. In response to an increasing surface pressure gradient, strong southerly winds brought tropical moisture northward ahead of a cold front. In fact, surface dew points of 12°C extended as far north as southeastern Missouri. At upper levels a short-wave trough was moving through a longer-wave trough, producing a negative (northwest-southeast) tilt and

favorable upper diffluence over the lower Mississippi Valley.

Two squall lines developed around 1200 CST. One formed in central Louisiana along the axis of deepest moisture, and the other formed just ahead of a surface dryline that extended from southeastern Oklahoma to eastern Texas. Each line maintained its organization throughout the afternoon and into the evening hours. As with many early spring severe local storm episodes, available moisture from the Gulf of Mexico was limited in areal extent, thus confining severe storm activity to a small area.

The strongest tornado activity of the day occurred across northern Louisiana and central Mississippi near the intersection of the strongest 85 kPa flow ( $25 \text{ m s}^{-1}$ ) and the nose of a midlevel (50 kPa) jet. Although the last tornado was reported in central Mississippi at 2200 CST, wind damage continued throughout the night across northern Alabama, eastern Tennessee and western Virginia as the midlevel wind maximum tracked northeastward.

A secondary area of severe local storm activity occurred in Arkansas. Three tornadoes occurred during the afternoon in the southwestern part of the state. This area was north of the midlevel jet under

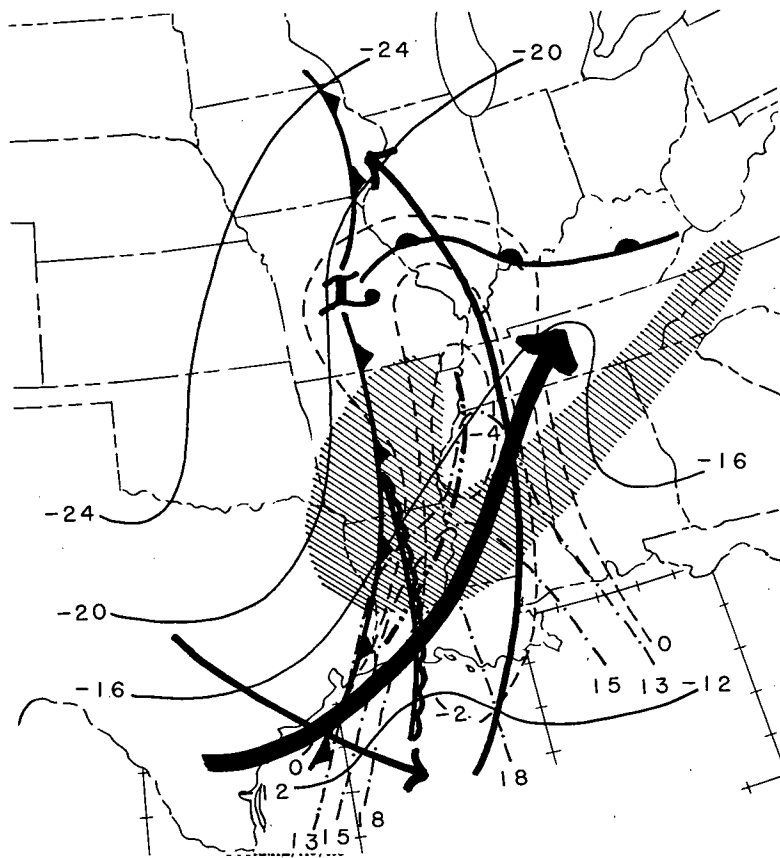


FIG. 6. As in Fig. 5 but for 1800 CST 1 April 1983.



a strongly diffluent region aloft. Additionally, 52 reports of wind gusts of at least  $25 \text{ m s}^{-1}$  were received. Included was a surface wind gust of  $45 \text{ m s}^{-1}$  near Little Rock.

*c. 2 May 1983*

Another significant tornado day occurred on 2 May as 21 tornadoes left five fatalities and a broad swath of damage from central Indiana to eastern New York. Synoptic features associated with this episode are depicted by Fig. 7.

Strong instability, midlevel drying and strong vertical wind shear spread from the upper Ohio Valley into the eastern Great Lakes region as an upper low moved to Wisconsin. At the surface, there were southerly winds of  $12\text{--}18 \text{ m s}^{-1}$  ahead of a 92 kPa surface low center over Lake Huron. Surface dew points rose to above  $15^\circ\text{C}$  across eastern Indiana, Ohio and western New York. Lifted index values were generally from  $-4$  to  $-6$  in this region.

Although locally heavy storms formed along a warm front near an upper-level vorticity maximum, by far the greatest concentration of violent weather occurred near the leading edge of a pronounced dry intrusion. One dry surge pushed eastward to Pennsylvania by midmorning and to northeastern New

York by night. Another crossed the region during the afternoon and evening. Intense thunderstorms developed across eastern Indiana into Ohio as the midlevel drying swept well ahead of the surface front. These storms finally weakened late at night as they reached more stable air over northern New England.

*d. 18 May 1983*

From the morning of 18 May until the early hours of 19 May, 80 severe local storms were reported from Missouri to Alabama, and 21 tornadoes occurred of which nine were in Mississippi and six in Louisiana.

As depicted by the composite chart for 0600 CST 18 May (Fig. 8), a polar jet curved cyclonically northward ahead of a midlevel low in the central Plains. A subtropical jet curved anticyclonically across the Gulf Coast states. As a result, pronounced upper-level diffluence was evident through the Mississippi Valley; low-level convergence was strong. At 85 kPa, 20 and  $25 \text{ m s}^{-1}$  winds (at Jackson, Mississippi and Nashville, Tennessee, respectively) blew into weaker winds farther north. Also, a surface cold front was moving eastward into the lower Mississippi Valley. Ahead of this cold front, a squall line formed beneath the upper-level diffluence, moved eastward, and caused tornadoes and high winds from Texas to Alabama.

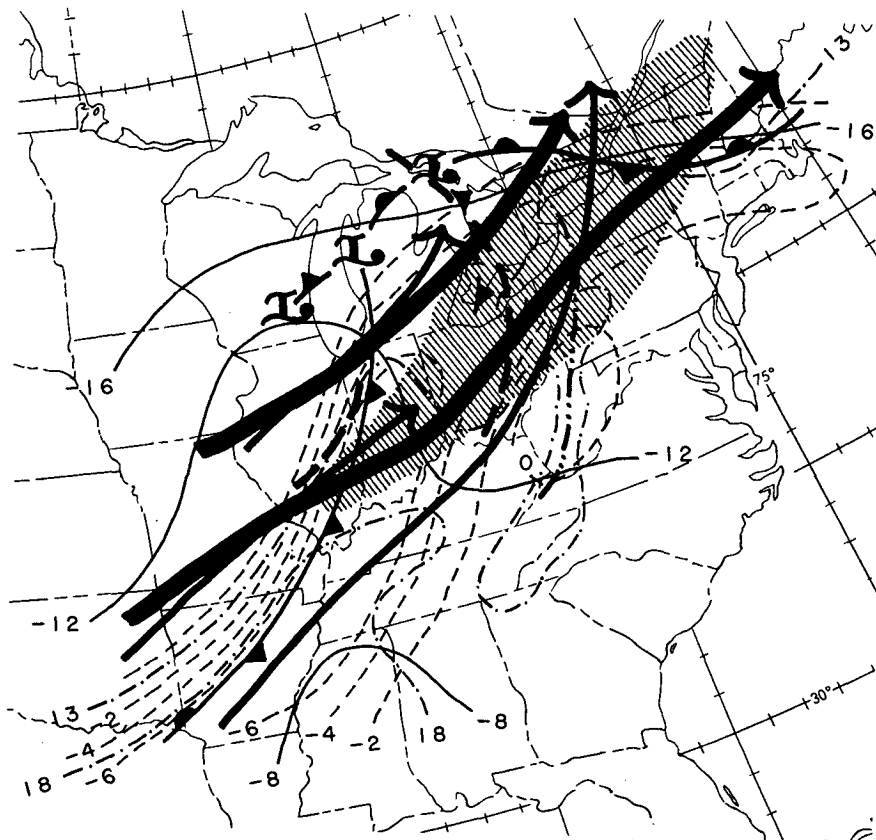


FIG. 7. As in Fig. 5 but for 1800 CST 1 May 1983.

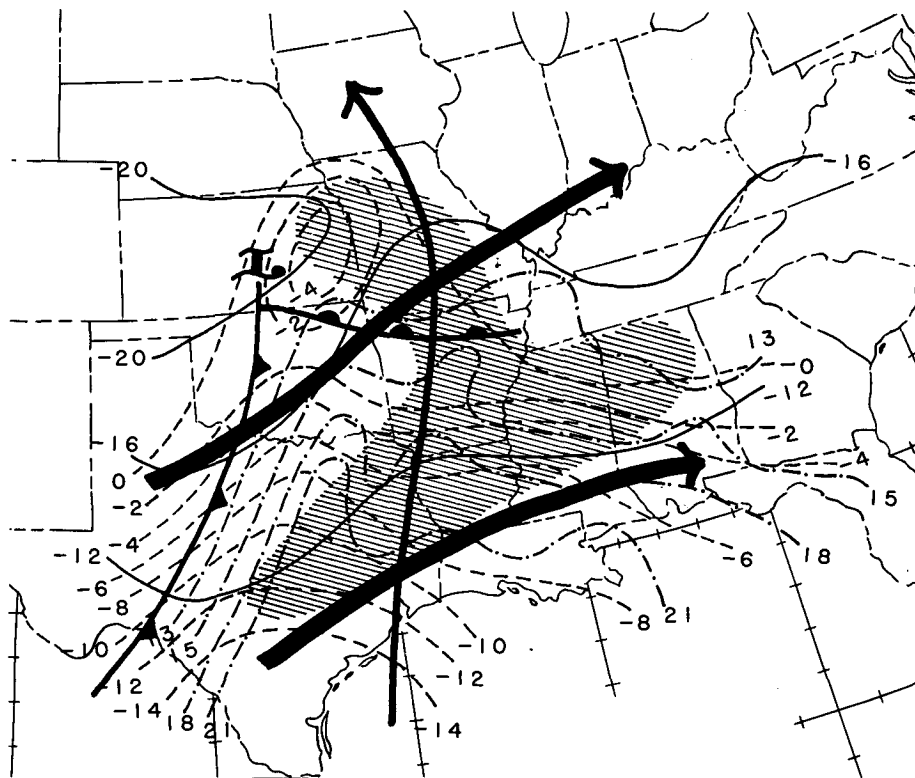


FIG. 8. As in Fig. 5 but for 0600 CST 18 May 1983.

Farther north, four tornadoes were reported in Kansas and Missouri as severe thunderstorms formed beneath a pool of colder air aloft that was associated with the upper-level low over the Central Plains.

*Acknowledgments.* The authors thank Dr. Frederick R. Mosher for helpful comments. Beverly D. Lambert provided technical assistance and typed the manuscript. Hugh M. Crowther drafted the composite charts.

#### REFERENCES

- Ferguson, E. W., J. T. Schaefer, S. J. Weiss, L. F. Wilson and F. P. Ostby, 1983: Tornado 1982: A near-record year. *Mon. Wea. Rev.*, **111**, 1665-1678.
- Fujita, T. T., 1981: Tornadoes and downbursts in the context of generalized planetary scales. *J. Atmos. Sci.*, **38**, 1511-1534.
- Miller, R. C., 1972: Notes on analysis and severe storm forecasting procedures of the Air Force Global Weather Central. AWS Tech. Rep. 200 (Rev.), Air Weather Service, Scott Air Force Base, IL 62225, 190 pp.