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Severe Weather

WORKING SEVERE WEATHER WITHOUT RADAR: THE OCTOBER 13, 1983 FALLS CHURCH TORNADO

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ABSTRACT

On October 13, 1983, a tornado touched down in the city of Falls Church, Virginia. With no significant radar coverage and severe weather expected, the prospect of issuing any meaningful warnings was questionable. It was still possible to issue timely warnings with the aid of good severe weather reports and clear thinking.

1. INTRODUCTION

On October 13, 1983, a tornado produced major damage in the city of Falls Church, Virginia. There was a warning issued for this tornado and it was done without any significant radar support. The following is a description of how this was accomplished.

2. THE SYNOPTIC SITUATION

At 12Z October 13, a strong low pressure system and its associated cold front were located in the midwest (see Figure 1). The system had good upper support (see Figures 2 a-c) and was moving eastward. The front passed through the Washington, D.C. area shortly after 00Z (see Figure 3).

The forecasters on the swing shift came on duty between 18Z and 19Z, and they were given the news. The NWS radar at Patuxent Naval Base was out of service because of a burned out variac component, (a burned out what?), and there was a good chance of severe thunderstorms.

At 1848Z, the National Severe Storms Forecast Center issued a Severe Thunderstorm Watch which included much of the responsible warning area for the Washington WSFO (Figure 4a).

Although DCA was reporting overcast cloud conditions, a close view of the 2030Z satellite picture (Figure 5) showed breaks in the clouds over the greater Washington metropolitan area. This additional heating was acting to further destablize the airmass over the area. This, combined with the NWS radar at Volens, Virginia reporting VIP level 6 thunderstorms approaching from the southwest, (Figure 4), the forecasters were expecting things to heat up (figuratively speaking).

There was little if any radar coverage. The radar at Atlantic City, New Jersey, is about 150 miles away from Washington, D.C., the radar at Volens is about 250 miles away, and the radar at Andrews Air Force base (the backup to Patuxent River radar) is unreliable for intensities (2). Thus the forecasters had to rely totally on observations/reports to determine the onset of precipitation and to detect possible severe weather.

3. THE SEVERE WEATHER

The first indication of severe weather came over the Virginia NAWAS (NAtional WArning System), when a report of a possible tornado in Goochland County (See Figure 6, location 1) at approximately 2110Z.

The following additional reports were received and are shown on path A of Figure 6:

> At approximately 2115Z possible tornado in Louisa County; (location 2).
>
> By 2130Z Sate Police confirmed both tornadoes in Goochland and Louisa Counties.
>
> At 2252Z, a waterspout reported on the Potomac River near Quantico, Virginia. (This was apparently well ahead of the thunderstorm activity.)
>
> During the next half hour the NSSFC called to say that the most intense activity would be in the Washington,

D. C. area. (The forecast office received a number of calls from NSSFC during the course of events consisting of extremely helpful information. This special attention was probably due to the fact that there was no local radar coverage. This information helped the forecasters to mentally and physically prepare for the impending severe weather).

At 2355Z, citizen reported a possible tornado touchdown in the south part of Fairfax County (location 3). Only tree damage reported. This report was received in the forecast office at about 0000Z.

During many severe weather episodes in this area, reports similar to this are common and usually turn out to be straight line wind damage. In most cases only a severe thunderstorm warning would have been issued and probably would have verified. The past history of this weather system, however, indicated a relatively high probability of a tornado touchdown. There was no hesitation on part of the forecasters in the issuing of a tornado warning.

A tornado warning was on the NOAA Weather Wire at 0005Z, and an EBS broadcast was completed at about 0008Z.

A second possible tornado touched down in central Fairfax County at 0012Z (location 4).

A third tornado reported in Falls Church, Virginia at 0015Z (location 5), produced damage estimated at one million dollars. (To some midwestern forecasters, this may not be considered major damage, but given the relative infrequency of true severe weather in the Mid Atlantic states, this is considered major.)

4. THE RESPONSE AND ACTIONS OF THE FORECASTERS

The primary reasons the forecasters were able to provide adequate warning for this event without the use of radar coverage were: 1) timely and good quality severe weather reports (including the two confirmed reports from counties outside the warning area); and 2) keeping a clear mental picture of the track of the thunderstorms that had a history of producing severe weather, and what type (in this case tornadoes).

From the events preceding the actual tornado touchdowns that occurred between 2355Z and 0015Z, it was relatively easy to formulate the picture of what to expect with the thunderstorms that produced the most severe weather.

First, the nearest radar and satellite data were used to get the speed and estimate an intensity. Second, using the severe weather reports coming in from counties outside the warning area, it was possible to come up with a model of the day, (i.e., get an idea of what type of phenomenon to expect with the thunderstorms in question.) From the damage path of the thunderstorms represented in Figure 6, one can distinguish a definite track.

It should also be noted that after being accustomed to having radar coverage, it is initially a lonely feeling to have to work severe weather without it. The best thing to do is to forget about the fact that you don't have any local radar coverage and concentrate on the other data available.

Ideally, this mental approach should be used with radar coverage. To illustrate this point, in Figure 6, a second damage path can be discerned (see locations 6, 7, and 8 on path B). This damage was probably done by another group of severe thunderstorms (see Figure 7). Unfortunately, the damage reports were not received until it was too late for any action. The strength of these thunderstorms was virtually unknown to the forecasters. If radar had been available, these thunderstorms would probably have been given close attention.

5. CONCLUSION

Several things are obvious: 1) it is immensely desirable to have effective radar coverage during severe weather; 2) reports will not always be as good as they were in this case; 3) every case will not work out this well; and 4), with good reports, it is still possible to do an effective job of warning even without radar coverage.

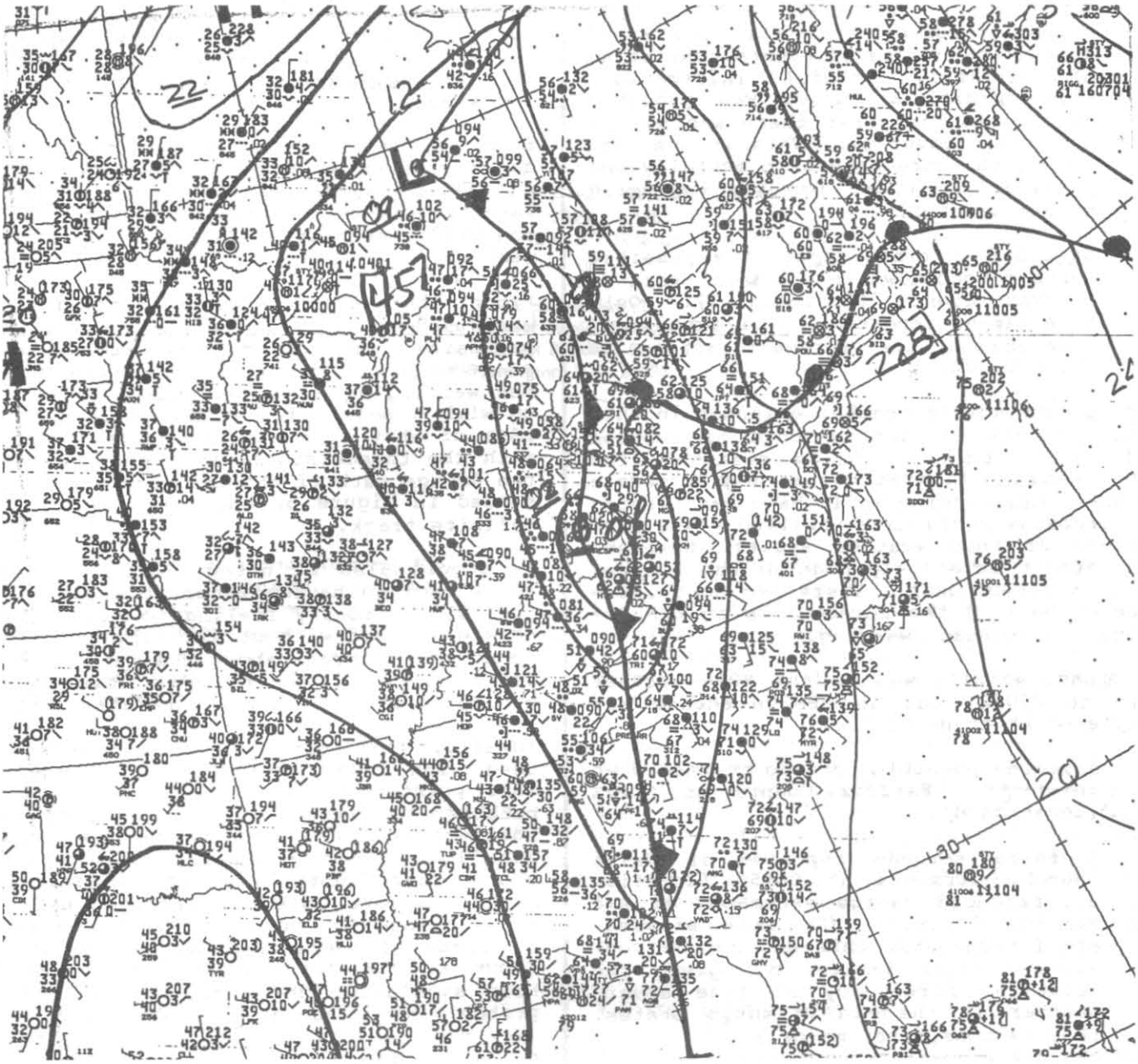
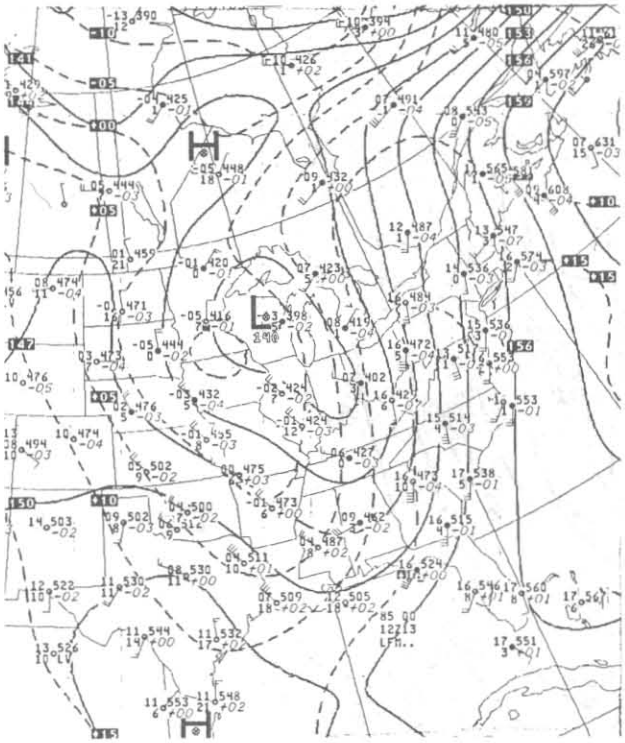
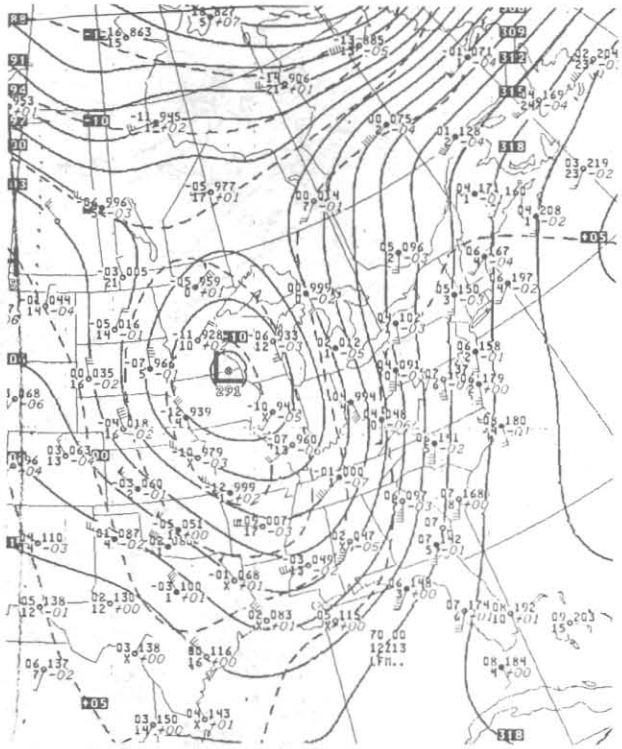


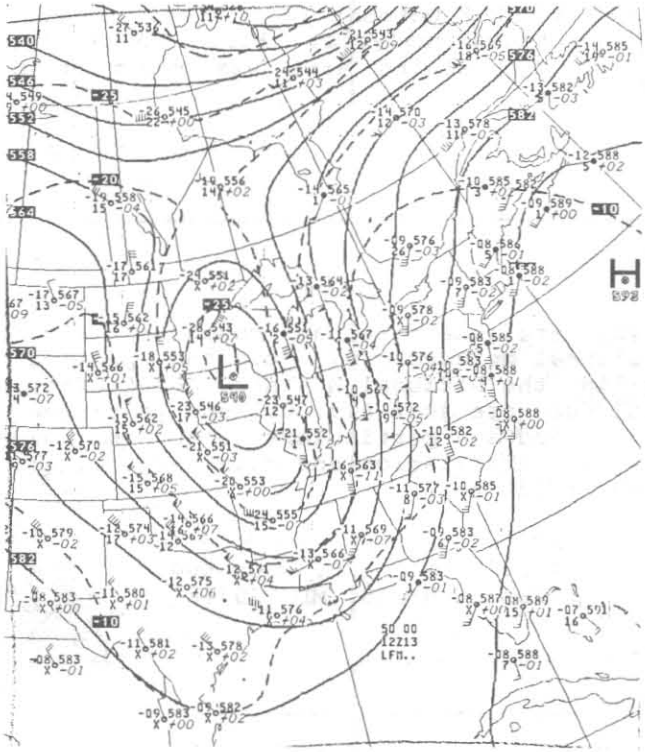
Figure 1. 12Z October 13, 1983 surface analysis.



(2a)



(2b)



(2c)

Figure 2. 12Z October 13, 1983 analysis: 850 mb (2a), 700 mb (2b), and 500 mbs (2c).

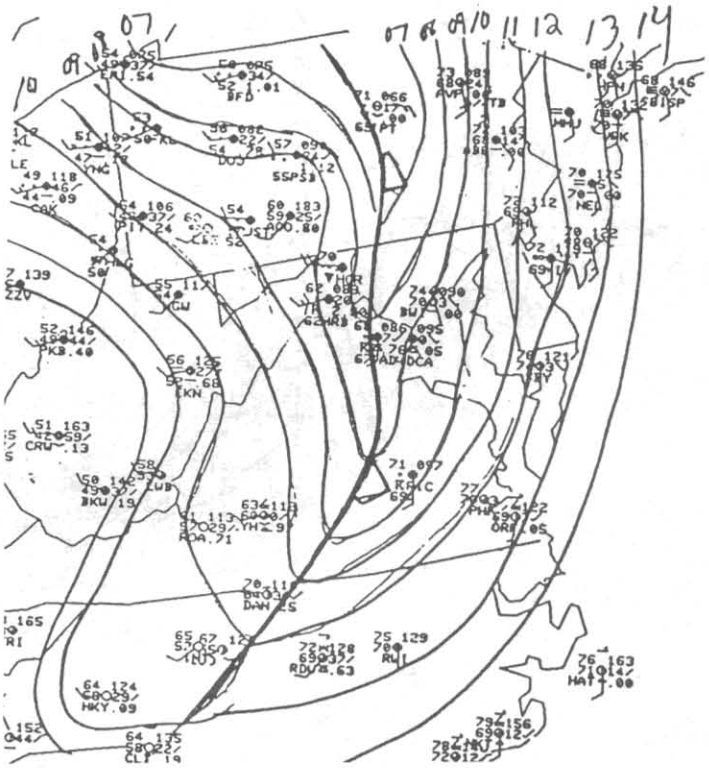


Figure 3. 00Z October 14, 1983 2 mb mesoscale surface analysis. First tornado in the county warning area was reported at 2355Z.

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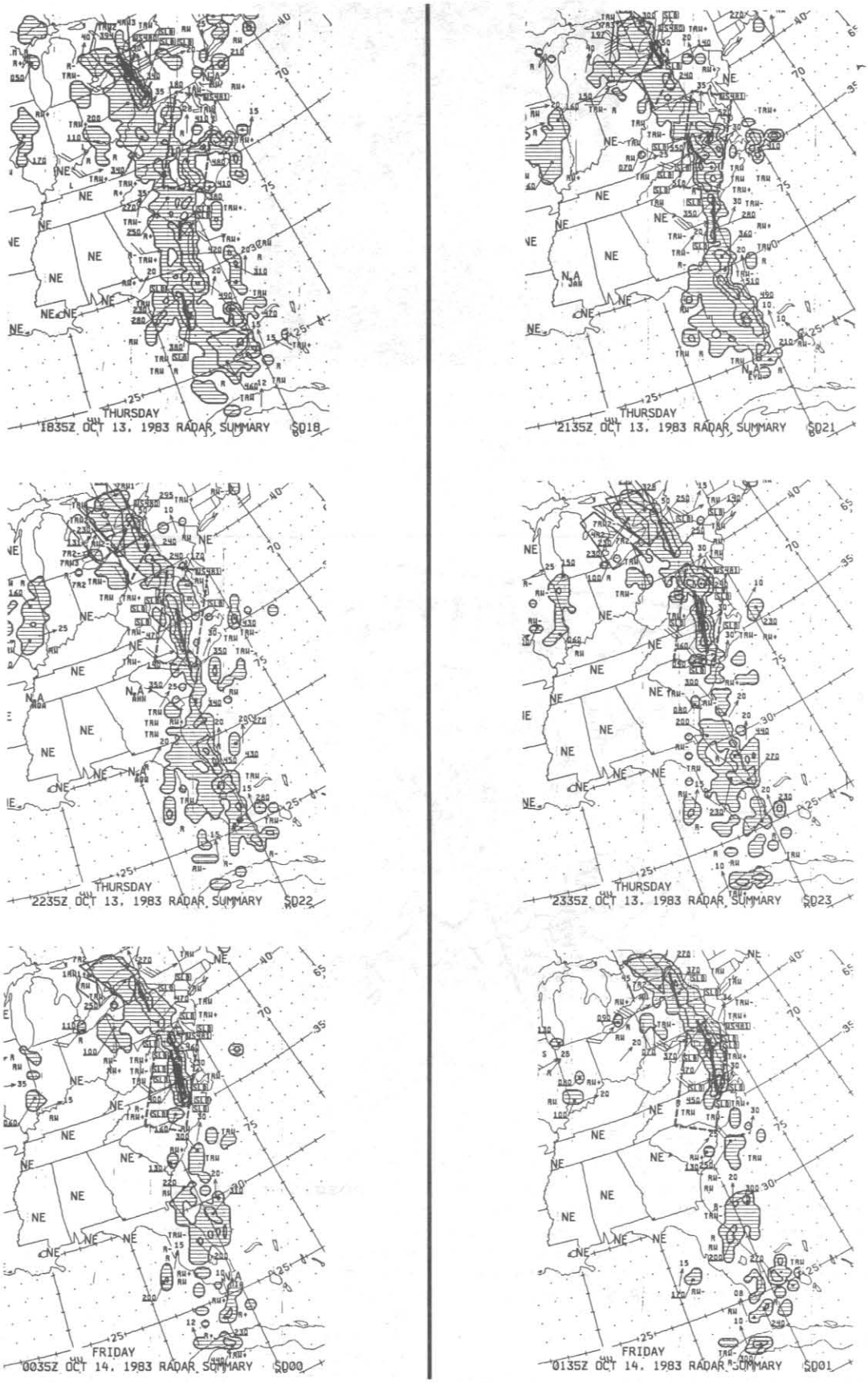

Figure 4. NMC radar chart sequence from the time the Severe Thunderstorm Watch was issued through 0135Z.

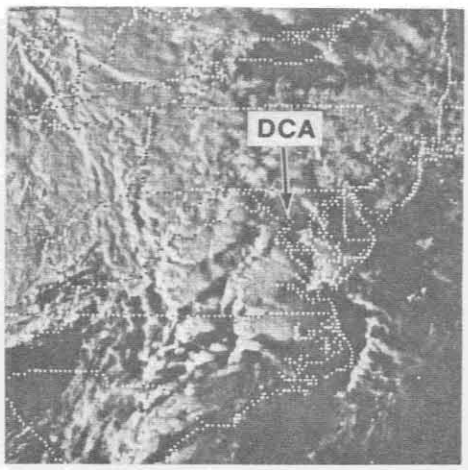

Figure 5. 2030Z October 13, 1983 satellite photograph indicating that heating continued over Washington, D.C. area while intense thunderstorms approached from the southwest.

Figure 6. County map indicating thunderstorm tracks from damage reports. Since the thunderstorms were moving toward the north and north northeast, track A and B appear to have been caused by two separate lines of thunderstorms (see Figure 7).

1) confirmed tornado 2110Z in Goochland County.
2) confirmed tornado 2115Z in Louisa County.
3) possible tornado 2355Z in southern Fairfax County.
4) possible tornado 0012Z in Fairfax County.
5) confirmed tornado 0015Z in the city of Falls Church.
6) severe thunderstorm damage in Orange County 2244Z (report received too late for any action).
7) severe thunderstorm winds near Loudon County-Fauquier County line (report received too late for any action).
8) extensive wind damage in Frederick County, Maryland (report received too late for any action).

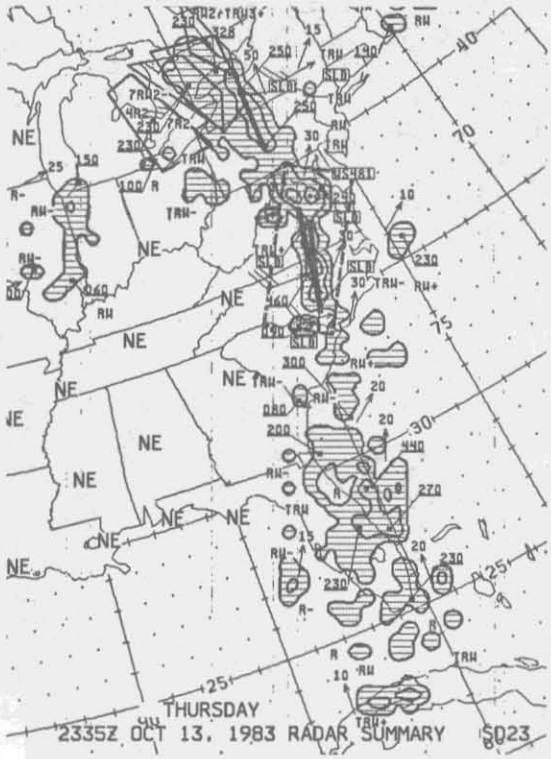

Figure 7. 2335Z NMC radar chart shows a solid line of thunderstorms with 2 branches. This supports the idea that separate areas of thunderstorms moved along damage paths A and B defined in Figure 6.

FOOTNOTES

1. David B. Caldwell received his B.S. Degree from the District of Columbia Teacher's College with majors in Mathematics and Science. He did post graduate study in Meteorology at Pennsylvania State University. He entered the National Weather Service in 1976. Before coming to the WSFO at Washington, D.C., David was a forecaster at the WSFO's St. Louis, Missouri and Omaha, Nebraska.

2. Andrews Air Force base has a 5 centimeter, FPS-77 radar without a Video Integrator Processor (VIP). It therefore requires an experienced radar operator to manually determine echo intensity levels. Most of the military operators are not experienced in handling severe weather operations in the same manner as the NWS personnel. The 5 centimeter radars are also subject to severe signal attenuation when the radar antenna dome gets wet. Finally, just seconds before the Tornado Warning was issued, the radar operator at Andrews, due to some of the aforementioned reasons, stated that he didn't see anything to worry about.