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A SEVERE WEATHER EVENT ASSOCIATED WITH A "BOWECHO" RADAR SIGNATURE

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There are several radar signatures of thunderstorms, which are associated with specific types of severe weather events. Some have to do with echo top and intensity, while others deal with the movement of the thunderstorm. The following is an account of the observations, during a severe convective outbreak over northwest Ohio, on the afternoon of August 14, 1985

DEFINITION

A "bowecho" is an inducer of strong macrobursts and microbursts. Usually, high winds push out from the position of an arrow attached to a bow. During the Mature stage of a "bowecho", both tornadoes and microbursts could occur simultaneously. During the dissipation stage of outburst winds, hydrometeors are blown out very rapidly, drying out the echoes in the source region. (Fujita 1985)

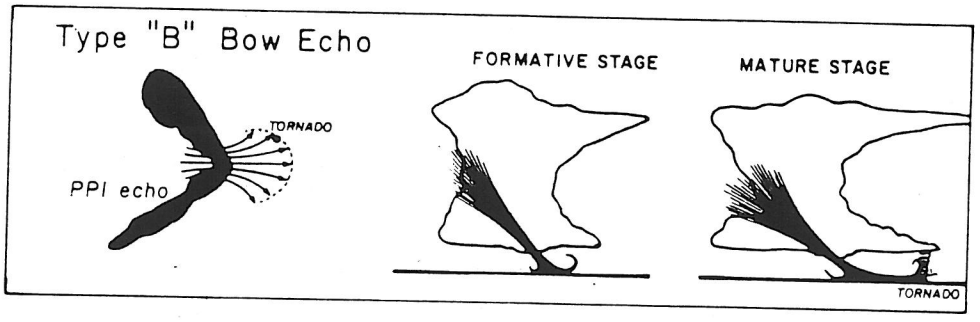

Fig. 5.9 Schematic diagram showing the shape of the bow echo and microbursts in formative and mature stages.

Figure 1: Radar signature and stages of a "bowecho"

SEQUENCE OF EVENTS

At 1800 GMT a scattered area of very heavy thunderstorms began moving into the western counties of northwest Ohio, from northeast Indiana. (Figure 2) They consisted of vip levels up to 5 and the maximum top was 60,000 feet. The storms were moving east at 30 mph. At 1833 GMT, the town of Defiance reported very heavy rain, frequent lightning, and winds of 25 mph.

By 1900 GMT the storms had moved east and merged into a north-south oriented line of vip level 5s. (Figure 3) The maximum top was 61,000 feet, just southwest of Napoleon. At 1855 GMT, the Henry county sheriffs department reported very heavy rain, along with 1/2" hail and 30 to 35 mph wind, in Napoleon. At 1930 GMT, wind damage was reported 5 miles southeast of Napoleon.

A few minutes later the line began to form, what looked like, a "bowecho" radar signature. The maximum vip level was 4 and the line was moving east at 30 MPH. At 1945 GMT, the head of the "bowecho" increased rapidly to a large vip level 5 with a maximum top of 55,000 feet. Hail was also indicated. (Figure 4) This position was about 10 miles west of Fostoria. At 1958 GMT, the Seneca county sheriff reported 3/8" hail in western parts of Fostoria.

The vip level 5 moved over Fostoria around 2000 GMT with a speed of 40 mph and the Seneca county sheriff reported 3/4" to 1" hail and wind damage in northern Fostoria. This position was where the "bowecho" was best defined.

During the next hour the storm began to slowly decrease in intensity, but still held its shape. As the storm moved through southeastern Seneca county, other reports of less severe wind damage were reported. (Figure 5)

SPECIFIC SEVERE WEATHER EVENTS

There were 3 distinct places which received wind damage and/or large hail. All of these occurences were directly associated with the strongest part of the storms and the most severe damage was associated with the "bowecho" at its peak of development.

The first severe weather event took place 5 miles south of the town of Napoleon, where straight line winds blew a truck into a car. This was associated with a thunderstorm with a vip level 5 and top of 61,000 feet. Damage to trees was also reported in the vicinity.

The second and more severe damage was in the northern portion of Fostoria. 3/4" to 1" hail was reported along with straight line winds which blew over a house trailer. This severe weather event was associated with the "bowecho" at its peak of development. This thunderstorm was a very large, in areal coverage, vip 5 and was located at the tip of the "bowecho". Also, this thunderstorm had the fastest speed, of 40 mph, for all the storms on that day.

The third area of damage occured in southeastern Seneca county, where tree damage was reported. This was associated with the "bowecho" during its dissipation stage. The thunderstorm, at this time, was a small vip level 5 and decreasing in intensity. Movement was also slower, at 35 mph.

DISCUSSION

When comparing this event with the definition and drawings from T. Fujita, a very close resemblance is found. There are three specific severe weather events, and each is directly related to the three stages of development of a "bowecho". These stages are: formation, maturity, and dissipation.

Another interesting bit of information was found in the time span between the areas of damage. This time span was between 30 and 45 minutes, which closely coincides with the time span of damage producing thunderstorms in northern Ohio. (Eastern Regional Technical Attachment No. 85-7(B))

Even though this one type of radar signature does not always produce damage, a "bowecho" should be monitored closely during severe weather situations, as it has one of the highest probabilities of producing damage.

REFERENCES

1. Fujita, Theodure T., "The Downburst", pp. 76, 83-84, 90-92, 1985.

2. Maximuk, Lynn P., "Some radar signatures during northern Ohio severe convective storm events", Eastern Region Technical Attachment, No. 85-7B, National Weather Service, Garden City, N.Y., 1985.

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Attachment (Figures 2 - 5)

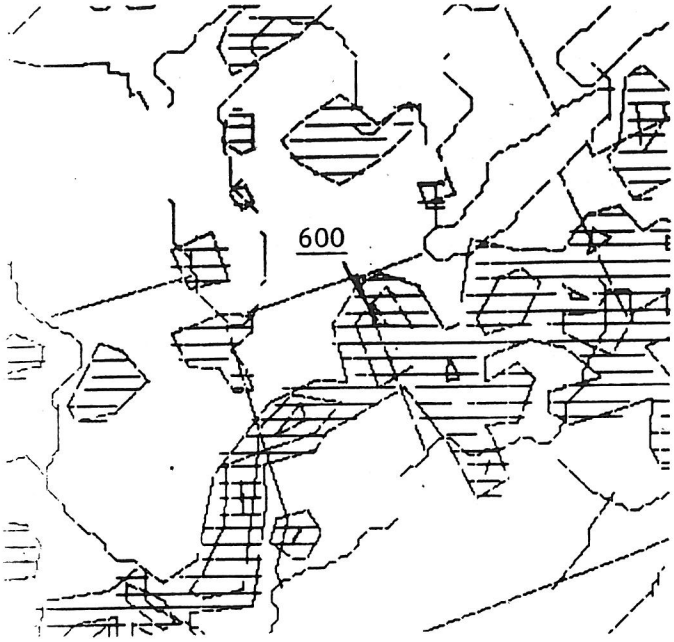

Figure 2: Radar summary 1800 GMT 8/14/85

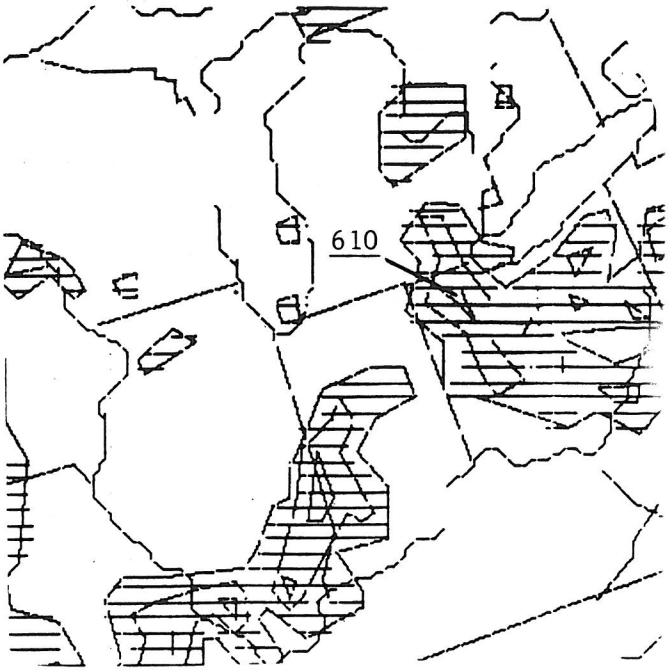

Figure 3: Radar summary 1900 GMT 8/14/85

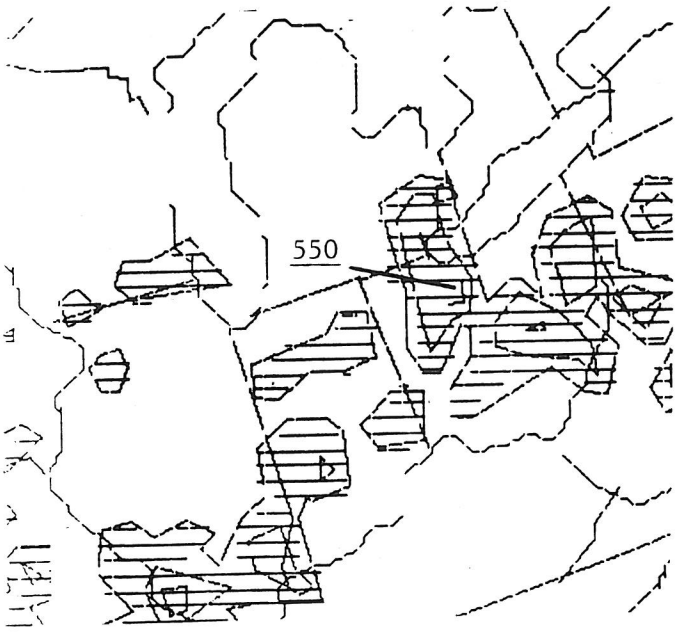

Figure 4: Radar summary 2000 GMT 8/14/85

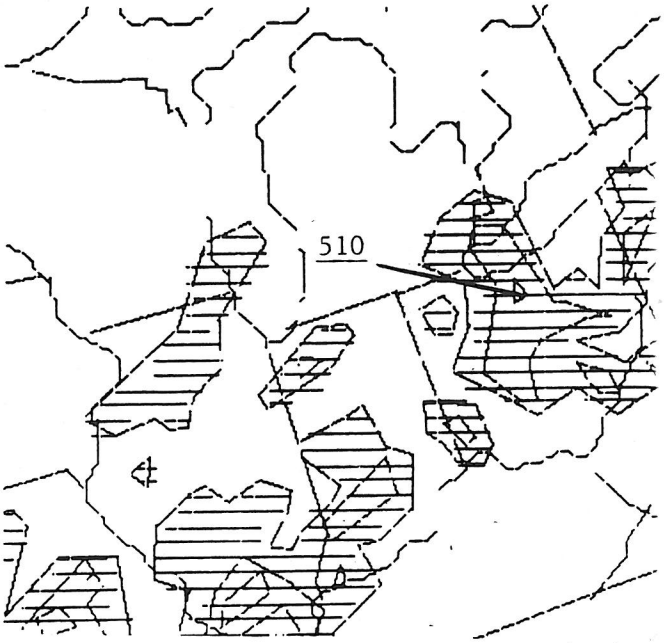

Figure 5: Radar summary 2100 GMT 8/14/85