OXBOW APRIL, 2004

Brief Description of Microburst/Downbursts

Microbursts (also known as downbursts) are powerful downdrafts associated with thunderstorms. Identification of Microbursts has resulted from the investigation of wind shear aircraft related accidents and from meteorological research. But, what is wind shear? Wind shear is any rapid change in wind direction or velocity that can result from a large variety of meteorological conditions, temperature inversions, sea breezes, frontal systems, strong surface winds and thunderstorms. Severe wind shear is a rapid change in wind direction or velocity causing airspeed changes greater than 15 knots (~17mph) or vertical speed changes greater than 500 feet per minute (around 5-6 mph in the vertical direction).

Microbursts can occur anywhere convective weather conditions (thunderstorms, rain showers, and particularly hail or virga) occur. Virga is rain that evaporates before it reaches the ground and is associated with a dry Microburst. The weight of large hail can accelarate downward winds to very high velocities as it falls from the upper levels of the atmosphere. Both, hail and virga, contribute also to accelerate the downdraft as they evaporate while falling thus cooling the environment and increasing the weight of the falling airmass. Observations suggest that approximately five percent of all thunderstorms produce a microburst and significant wind damage can be related to them. Although microbursts are more common in the West, they certainly occur in the Southeast.

Downdrafts associated with Microbursts are typically only a few hundred to a few thousand feet across. When the downdraft reaches the ground, it spreads out horizontally and may form one or more horizontal vortex rings around the downdraft. The outflow is typically 6-12 thousand feet across and the vortex ring may rise 2 thousand feet above the ground. Fig. 1 shows a diagram of a Microburst. This picture shows the Microburst coming straight down, which is a symmetric Microburst.

As you all know, thunderstorms are normally moving and the Microburst can have an uneven shape. Fig. 2 shows an asymmetric Microburst. The outflow is greater in one direction than the other. This is the type of microburst that caused the damage in Duval county on May 27, 1997.

The Microburst can occur without rain ever reaching the ground as in the case of virga. The rain will evaporate and cause a cooling in the air, which causes the downdraft. Fig. 3 demonstrates a virga caused Microburst.

Finally, Fig. 4 shows the typical life span of a downburst. As you can see, the life cycle of a downburst is usually between 15 to 20 minutes. This corresponds fairly well with most of the damage reported across Riverside, San Marco, and NAS Jax between 530 and 600 pm.

Fig. 1 Symmetric Microburst

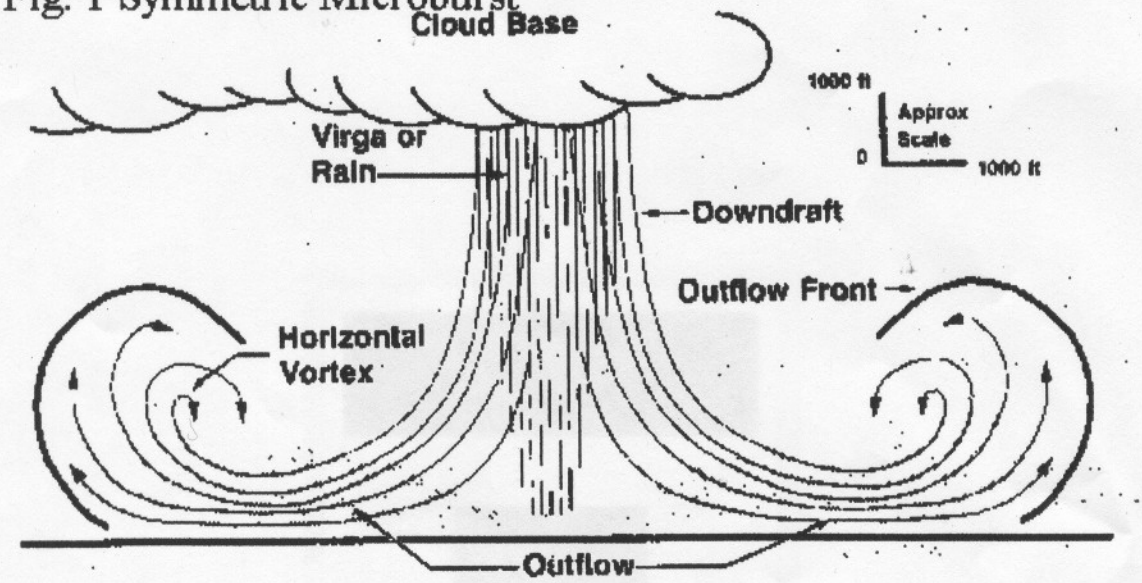

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Fig. 2 Asymmetric Microburst

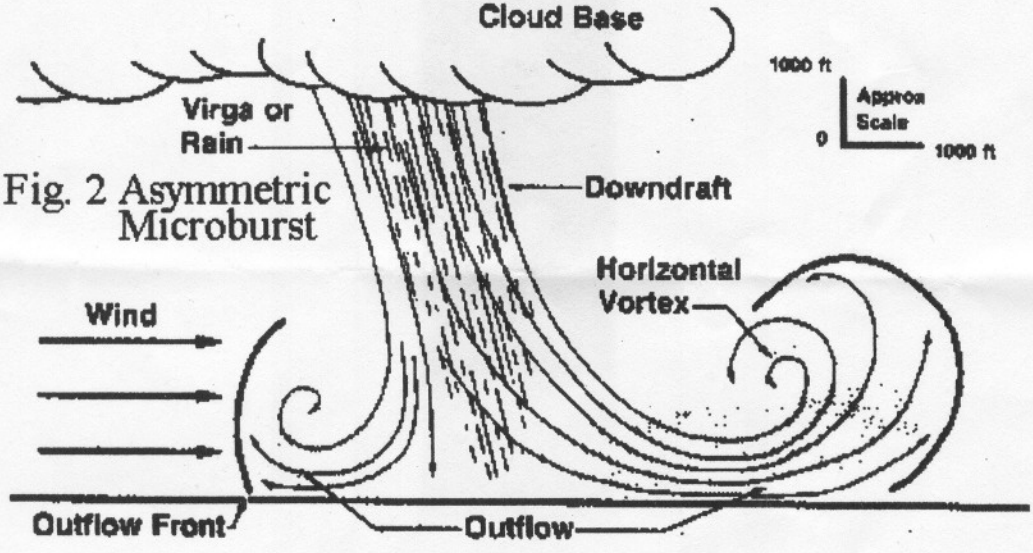

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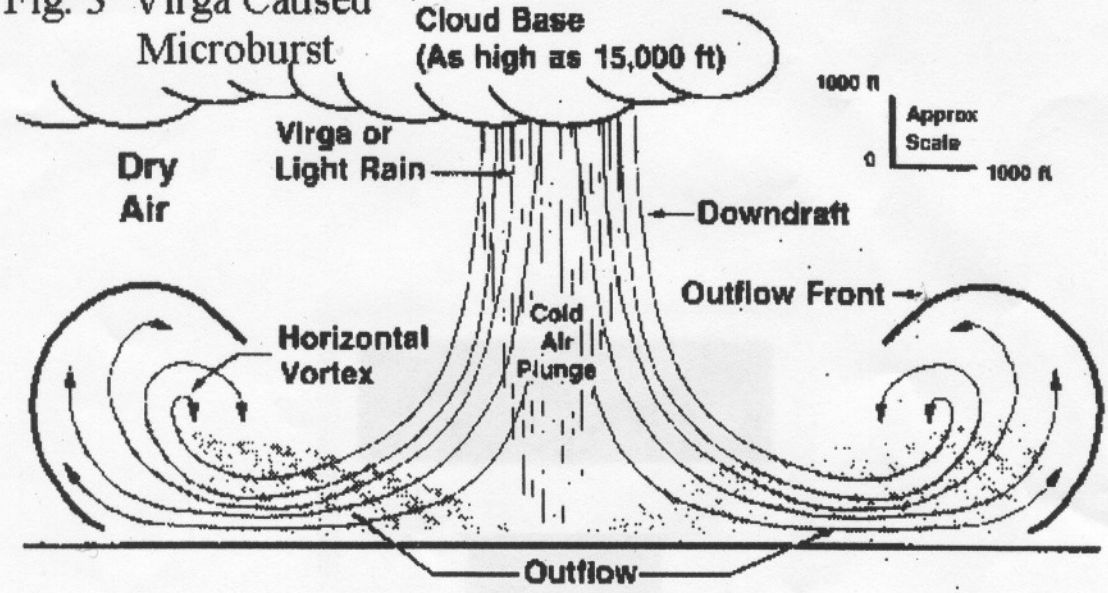
Fig. 3 Virga Caused Microburst



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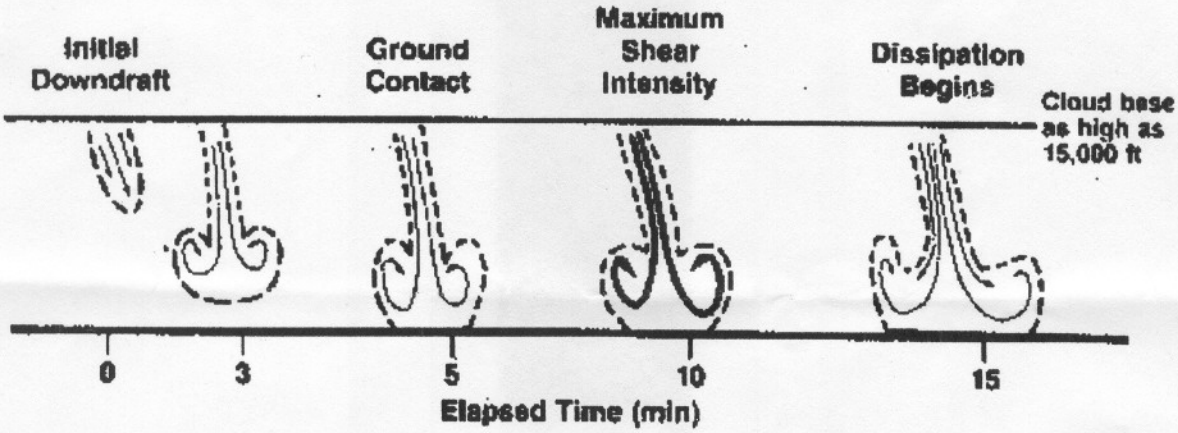

Fig. 4 Lifecycle of a typical Microburst.

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