

# **Radar characteristics of a tornadic low topped mini-supercell in Finland**

**J. Teittinen** (1), J. G. LaDue (2), H. Hohti (1) and R. A. Brown (3)

(1) Finnish Meteorological Institute, (2) NOAA, Warning Decision Training Branch (3) NOAA, National Severe Storms Laboratory

In the afternoon of 18 August 2004, a tornado developed with a supercell in southern Finland only 20 km from the Anjalankoski Doppler radar. Based on a ground survey the tornado caused a 2.3 km long damage path damaging several buildings and blowing down trees. The cyclonic vortex was of F1 intensity. No severe storm or tornado warning was issued. However the signs of a supercell thunderstorm were present well before the tornado formation and with close monitoring of individual storms, a severe thunderstorm warning could have been given.

During 18 August an occluded low over Finland was weakening and moving northeast. The warm and humid air mass stretched from south of the Baltic Countries to the southern coast of Finland. Cold advection in western Finland forced the occluded front of the cyclone to bend back and move southeast. Strong near-surface convergence along the southeast moving bent back occlusion initiated the tornado producing storm. South of the front winds were from the southwest and on its northern side, from the north or northwest. At the tornado location, the wind profile was characterized by southwest winds at surface, veering of the wind in lowest 1500 meters to westerly and close to unidirectional winds above. Deep layer shear was growing as the westerly upper level jet intensified over the area. Before the tornado's parent supercell formed, another storm with mini-supercell features developed along the surface boundary. No severe weather was observed within this storm.

The parent storm started as a northeastward propagating multicell storm transforming into a supercell as an outflow boundary of a nearby storm reached the inflow area of the parent storm. The supercell turned to the right and had a distinct bounded weak echo region 40 minutes before the tornado formation. There was a pronounced hook echo before and during the tornado. The tornado was situated in the tip of the hook. The diameter of the storm defined by 15 dBZ reflectivity contour was 20 km and the visible cloud top generally below 8 km. While the echo top was initially above the strongest reflectivity gradient above the storm main core, it moved over the bounded weak echo region during the time of the tornado. Shifting of an echo top toward the updraft flank is an indication of a storm becoming severe.