A Multiscale Examination of the 31 May 1998 Mechanicville, New York, Tornado

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On 31 May 1998, an F3 tornado struck Mechanicville, New York, injuring 68 people and causing $71 million in damage. The tornado was part of a widespread, severe weather outbreak across the northeast United States. The synoptic conditions that caused the outbreak and the mesoscale and storm-scale environments that produced the tornado are discussed.

The coupling of two strong upper-level jets and a very strong low-level jet, in association with an unseasonably strong surface cyclone, created a synoptic-scale environment favorable for severe weather. As the result of these jet interactions, a very warm, moist air mass was transported into the Northeast with an associated increase in the wind shear in the lower troposphere. A terrain-channeled low-level southerly flow up the Hudson Valley may have created a mesoscale environment that was especially favorable for tornadic supercell development by increasing storm-relative helicity in the low levels of the atmosphere and by transporting warm, moist air northward up the valley, leading to increased instability.

A broken line of locally severe thunderstorms moved eastward across New York several hours prior to the tornado. The storm that produced the Mechanicville tornado developed over central New York ahead of this line of storms. As the line of storms moved east, it intensified into a solid line and bowed forward down the Mohawk Valley of New York. These storms were moving faster than the isolated supercell to the east and overtook the supercell where the eastern end of the Mohawk Valley opens into the Hudson Valley. Based on limited observational evidence and the results of simulations of idealized quasi-linear convective systems reported elsewhere in the literature, it is hypothesized that backed low-level flow ahead of a bookend vortex at the northern end of the bowing line of storms over the Mohawk Valley may have contributed to the tornadogenesis process as the squall line overtook and interacted with the intensifying supercell.