

Airborne Doppler radar analysis of an Oklahoma supercell

David C. Dowell
Howard B. Bluestein
School of Meteorology, University of Oklahoma
Norman, Oklahoma
and
David O. Blanchard
David P. Jorgensen
NOAA/National Severe Storms Laboratory
Boulder, Colorado

Introduction

On May 26, 1991, airborne Doppler radar data were collected on a severe thunderstorm complex in northwestern Oklahoma as part of COPS-91. The goals of COPS (Cooperative Oklahoma Profiler Studies) program included the examination of the initiation of convective storms along the dryline and their subsequent evolution. Radar data were obtained using a NOAA P-3 aircraft equipped with a 3-cm Doppler radar mounted in the tail of the plane (Jorgensen et al. 1983). The radar was operated using the fore/aft scanning technique of FAST (Jorgensen and DuGranrut 1991).

By late afternoon on May 26, one storm that had formed along the dryline near the Texas Panhandle/Oklahoma border had developed into a supercell, producing a large tornado east-southeast of Woodward in northwestern Oklahoma. This tornado became visible to storm intercept crews in the area at 2350 UTC as it emerged from a rain core, and the tornado dissipated at 0003 UTC (K. Brewster and H. Stein, personal communication.)

Airborne Doppler sampling of the storm complex commenced at 0002 UTC and continued for approximately one hour and 45 minutes. The cell that had produced the tornado was sampled shortly after the tornado had dissipated. Flying at an altitude of around 5 km MSL, the aircraft made seven passes on the south and west sides of the thunderstorm complex (Hane 1992). Although no further tornadic activity was observed, the storm that had produced the tornado maintained supercellular characteristics through the data-gathering period. A companion storm that formed to the northwest of the tornadic storm also developed supercellular characteristics during data collection.

This paper is a presentation of an analysis of data collected during the first pass of the tornadic storm. This case is one of several of the first supercell datasets collected using airborne Doppler radar.

The next section describes the characteristics of the P-3 radar data and the techniques used to analyze these data. Then, examples of the horizontal wind field analysis are presented and discussed. Finally, results are summarized and future work discussed.

The dataset of the first pass of the storm has also been independently edited and analyzed (Blanchard 1992) using software developed at NOAA. A comparison of results using both analysis approaches will be presented at the conference.