

A CASE STUDY OF THE 24 JUNE 2003 BOW ECHO EVENT IN IOWA DURING  
BAMEX

by

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A THESIS

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**ABSTRACT**  
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An analysis of a bow echo even that occurred on 24 June 2003 over northwest Iowa is described with analyses of Doppler radar observations, plus special data sets acquired by the Mobile Integrated Profiling System (MIPS) and the Eldora Doppler radar on board the Naval Research Laboratory P-3 aircraft. Two primary goals are addressed: (1) The nocturnal boundary layer in advance of the bow echo, and the changes to the NBL produced by the bow echo, are defined. (2) A description of the internal storm structure from an analyses of the Doppler radar and profiler observations is presented.

The emergence of the bow echo was correlated with the arrival of an inferred gravity wave that originated from intense deep convection on the west edge of the MCS, and then moved eastward through the low-level cold pool. The maximum radial velocity (exceeding  $40 \text{ m s}^{-1}$ ) was measured by the Des Moines WSR-88D radar immediately after this wave reached the main convective line. The peak updraft within deep convection,  $\sim 20 \text{ m s}^{-1}$ , occurred about 10 minutes after the gust front arrival while the peak down draft of  $\sim 8 \text{ m s}^{-1}$  occurred 15 minutes after the gust front. The maximum surface wind gust of  $24 \text{ m s}^{-1}$  was measured 2 minutes after this down draft. Airborne Doppler radar documented a shallow outflow layer with radial velocities approaching  $30 \text{ m s}^{-1}$  at 1 km AGL, as well as strong rotations within the gust front and anvil during the decaying stages of the bow echo.

Abstract Approval:	Committee Chair	_____
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