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

by

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A THESIS

Submitted in partial fulfillment of the requirements
for the degree of Master of Science
in
The Department of Atmospheric Science
to
The School of Graduate Studies
of
The University of Alabama in Huntsville

HUNTSVILLE, ALABAMA

2006

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We, the undersigned members of the Graduate Faculty of the University of Alabama in Huntsville, certify that we have advised and/or supervised the candidate on the work described in the thesis. We further certify that we have reviewed the thesis manuscript and approve it in partial fulfillment of the requirements of the degree of Master of Science in Atmospheric Science.

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ABSTRACT
School of Graduate Studies
The University of Alabama in Huntsville

Degree: Masters of Science College/Dept: Science/Atmospheric Science

Name of Candidate: Dustin W. Phillips

Title: A Case Study of the 24 June 2003 Bow Echo Event in Iowa during BAMEX

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 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, ~20 m s^{-1}, occurred about 10 minutes after the gust front arrival while the peak down draft of ~8 m s^{-1} occurred 15 minutes after the gust front. The maximum surface wind gust of 24 m s^{-1} was measured 2 minutes after this down draft. Airborne Doppler radar documented a shallow outflow layer with radial velocities approaching 30 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 _____

Department Chair _____

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ACKNOWLEDGEMENTS

The work described in this thesis would not have been possible without the assistance of a number of people who deserve special mention. First, I would like to thank Jesus, My Lord and Savior for helping me write the words in this thesis. Without Him none of this would have been possible. Second, I would like to thank Dr. Kevin Knupp for this research opportunity, for his suggestion of the research topic, and for his patience and guidance throughout all stages of the work. Thirdly, I would like to thank Dr. Wen-Chau Lee for his assistance and guidance with the editing and processing of the ELDORA data. Lastly, I would like to thank Justin Walters for helping out with programming, with discussions, and with anything I needed help with. Over the past few years many others have kindly offered background and discussions on various aspects of my research

This project was funded by the National Science Foundation under Grant ATM-0239889.

Thank you to my family and friends for their continued support and patience throughout this process.

To Nancy, Kirsty, Dad, and Mom for being there loving, supporting, and encouraging me along the way – I could not have done it without all of you!

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