

End of Project Report

COMET Partner's Project

University: University of Missouri-Columbia

Name of University

Researchers Preparing Report:

Dr. Neil I. Fox

Dr. Patrick S. Market

National Weather Service Office:

New Braunfels, TX

Name of National Weather Service

Researcher Preparing Report:

Mr. Jon Zeitler

Partners Project:

*Analysis of the 22 July 2002, San Antonio, TX,
Anomalous Rain Event*

UCAR Award No.: S04-44688

Date: 30 June 2005

1. PROJECT OBJECTIVES AND ACCOMPLISHMENTS

1.1

Progress has been good in spite of a slow budgetary start, which will be discussed further in Section 5.1. Brian Pettegrew, a master's student at the University of Missouri-Columbia (UMC) has finished his thesis on comparing methods of precipitation efficiency. The San Antonio case was one of those used by Brian for his analysis.

Thus, tasks A, and B are effectively complete. Output from the Rapid Update Cycle (RUC) was acquired for the period of the event (Task A). Calculations of precipitation efficiency (PE) were then completed using moisture calculations from the RUC fields as well as the model-derived precipitation. This is a slight departure from the proposed work, but was believed useful, and even necessary, so that we might be able to deal with numerical fields that were internally consistent. This preliminary work suggested that there is no robust method for *estimating* the PE of a rain system. Thus, Task B is nearly complete. Without a reliable method for estimating the PE for a number of storm systems over multiple days, actual calculations of the PE must be made. The simplest approach to this problem is to return to our RUC-derived moisture calculations and compare them to the actual precipitation. These values may then be compared to those in the existing literature to assess if they do truly constitute an anomaly. Therefore, Objective 1 is nearly met.

1.2

Mr. Zeitler and Dr. Market met to discuss the project in Boulder, CO, on 12 November 2003. Both were attending the COMET Mesoscale Analysis and Prediction Course -- Mr. Zeitler as a student and Dr. Market as an instructor. Also, Drs. Market and Fox met with Mr. Zeitler and staff from NWS Austin/San Antonio and NWS Corpus Christi, in New Braunfels, TX, on 6 August 2004. In addition to extensive discussion on the work completed and potential extensions into new research, Drs. Market and Fox provided seminars on precipitation efficiency (PE), and mesoscale convective systems' (MCS) motion and its impact on quantitative precipitation estimates.

2. RELATED ACCOMPLISHMENTS

2.1

Brian Pettegrew enlisted the aid of two undergraduate students in order to finish some of the MCS PE calculations. While the system is largely automated, some human calculation is still necessary at this point. Messrs. David Jankowski and Justin Glisan were instrumental in completing tasks, especially area integration of eliminated precipitation and moisture flux divergence fields. Additionally Ms. Liz Heiberg was enlisted to work with the WATADS software in order to complete cell tracking for two of the events studied.

2.2

Mr. Zeitler contacted researchers at the University of Georgia and the NWS Southeast River Forecast Center (SERFC) about their recent PE studies as part of a literature review. The NWS SERFC provided a forecast procedure easily utilized on the NWS AWIPS workstations for one method of PE calculation.

2.3

Mr. David Jankowski was employed as a graduate research assistant to extend the work on storm cell motion and precipitation duration that began as an adjunct to the work in this project. This work is concerned with the related topic of forecasting end times to precipitation which are important for many forecast users. Preliminary work on this aspect of the project was reported at the NWA Annual Meeting in October, 2004 and at the Missouri Academy of Sciences meeting in April 2005. Mr. Jankowski has subsequently been

employed to complete this work on University of Missouri Research Council funding leveraged using the early results of the COMET project. He is working toward a MS degree and, therefore, a further thesis and papers can be expected based on the work of this project.

3. SUMMARY OF BENEFITS

3.1

This collaborative effort has been excellent for the Department of Soil, Environmental, and Atmospheric Sciences at the University of Missouri-Columbia. We have strengthened our existing ties with the National Weather Service through the office in New Braunfels, TX, which continues to be a crucial partner in our scientific pursuits. Also, several of our undergraduate students, David Jankowski, Elizabeth Heiberg, and Justin Glisan, have been valuable assets to the project, assisting Dr. Market and Mr. Pettegrew with some of the manual tasks involved in PE calculation. Results of this research are being incorporated into Dr. Market's course offering on Mesoscale Meteorology and Dynamics.

3.2

The NWS Austin/San Antonio staff benefited by the background review of PE and MCS motion provided by Drs. Market and Fox. A number of forecast staff previously uninterested in applied research have offered to assist with the project. In addition, staff from the NWS Corpus Christi office benefited from same meeting (6 August, 2004). This is important as NWS Corpus Christi is the primary service backup office for NWS Austin/San Antonio; common conceptual models (e.g. the role of PE in heavy precipitation and flash flooding) is important for inter-office collaboration of digital, gridded forecasts.

3.3

The work on cell motion and storm duration forecasting as tools in flash flood forecasting that began as an offshoot of the main body of this project has progressed and been presented in a number of forums. It has generated some interest and positive comment from operational forecasters.

4. PRESENTATIONS AND PUBLICATIONS

4.1

Pettegrew, B.P., N.I. Fox, P.S. Market, J. Zeitler, 2004: Precipitation efficiency comparison for a mid-summer heavy rain event over the Texas Hill Country. Presented to the Missouri Academy of Science annual meeting, Rockhurst University, Kansas City, MO, 17 April 2004.

Pettegrew, Brian P., 2004: *Comparing Methods of Precipitation Efficiency Estimation*. Master's Thesis, University of Missouri-Columbia, 103 pp.

Pettegrew, B.P., P.S. Market, N.I. Fox, J. Zeitler, 2004: On Methods of Precipitation Efficiency Estimation. NWA Annual Meeting, Portland, OR, October 2004.

Fox, N.I., E.A. Hatter, 2004: Watching Your Back Side- The Importance of Storm Cell Rear-edge Motion. NWA Annual Meeting, Portland, OR, October 2004.

Fox, N.I., D.M. Jankowski, E.A. Hatter and E.R. Heiberg, 2005: Forecasting storm duration. World Weather Research programme Symposium on Nowcasting and Very Short Range Forecasting, Toulouse, France, 5-9 September 2005.

5. SUMMARY OF PROBLEMS ENCOUNTERED

5.1

Scientific problems have been almost non-existent. Our only real problem has been administration at UMC. As is customary, the accounting system at UMC is ponderously slow with new grant creation and administration. As a result, we were unable to access the grant funds to travel and pay student personnel until late June 2004. Consequently, we requested a 6-month no-cost extension which was granted.