Application for Undergraduate Research Support

Name: Kim Kinzler

Project Title: An Unusual Outbreak of Severe Weather in Minnesota, July 2003: A Case Study

Purpose of the Project: As a person passionate about tornadoes and severe weather, I have for many years been a ‘storm chaser’ during severe weather outbreaks. This last summer was no exception. On July 14, 2003 the Storm Prediction Center (SPC) in Norman, OK issued Watch Boxes for anticipated storms that would center over Waterloo, IA. Upon doing in-depth mesoscale analysis of hourly data from the SPC and WALTER, I came to the crossroad decision that the best point for severe weather outbreak would occur over south central Minnesota. I positioned myself to be near the maximum convection point and was rewarded by one of the more spectacular thunderstorm experiences I have had. This project will focus on an examination of the maps, the soundings, and the information that related to this storm and see why the theoretical location of the outbreak was inaccurately forecasted. This has been a puzzle amongst meteorologists in general and I believe a careful examination would be helpful to all weather observers in the region.

Significance of the Project: Nobody in the weather business can claim being without fault – no less the SPC. So, this case would be of significance to all weather professionals and certainly to anyone interested in weather. To be able to come to the conclusion that some small factor (say unusually high K-Indices\(^1\)) in southern Minnesota were overlooked, or that there was a sudden change in upper air advections, were the cause or even played a role, would be a significant step towards understanding this event. With both in-the-field observations and video available, I believe that this project will throw some light on the reasons for the Minnesota outbreak and will be a valuable addition to training media. In conversations with Mr. Edwards of the NWS in Chanhassen, he was very encouraging for me to do this and said that he would have put someone from his office on the analysis of this outbreak, if they were not so short staffed.

Proposed Methodology for Attaining Project Goals: I have in a past semester done the Introduction to Weather course, and am presently taking the Advanced Weather course. From these I am receiving good background knowledge in weather forecasting and development. I have become familiar with convective laws and processes and am excited to put these to good use in tackling a project in which I was actually involved watching happen. Among the things I will do are:

1. Retrieve the Model Data from the database archives for the AVN, ETA and NGM models for the 12-14 July 2003 (MSU’s WALTER has these in storage). This will enable me to become familiar with database searching and graphical translation.

\(^1\) K-Index – a stability index that is used to measure thunderstorm potential.
2. Obtain the Convective Outlooks Forecast Discussions, and SPC Watch Information (Made available by the SPC Online Database)

3. Obtain satellite, radar and water-vapor imagery from a friendly weather vendor (perhaps Meteorologix from whom MSU buys satellite services) and the National Weather Service (NWS) in Chanhassen, MN so that I can show and contrast my ground video with this imagery.

4. In order to be sure of my analyses, I would like to interview and discuss these with persons at the NWS in Chanhassen before finally writing up my project results.

5. I would like to collect this information in a form that I can use in a PowerPoint presentation. This I would like to use both to show locally in a class, to the Minnesota Storm Intercept Association (MSIA), and perhaps to the NWS. If possible I would like to give this as a paper in the student section of the local American Meteorological Society meeting.

I am very interested in this project because I believe it will help me to obtain not only additional skills in weather analysis and forecasting, but it will give me an opportunity to share my video and surface observations with other interested persons – perhaps even helping to better forecast such storm systems.

**Anticipated Project Outcomes:**

- I will learn techniques of forecasting and evaluating weather data and understanding the different ways of analysis and interpretation thereof.
- I will learn skills of displaying and visualizing weather data by actually using real data I will have collected in a visualization modeling program (EWB).
- I will learn how to make the data I collect applicable for presentation in an electronic format (PowerPoint).
- I will learn ‘people-skills’ in presenting my findings to other weather professionals.
- I will seek to undertake this research project for independent study credits so that I can benefit from this research on my transcript.
- This research should be of use to most weather observers and forecasters and I hope to present this at a student AMS Conference.

**Proposed Timeline:**

**Week 1:** Contact NWS and setup appointment to acquire data and conduct interviews.

**Week 2:** Familiarize myself with the Environmental Work Bench software in the Weather Laboratory.

**Week 3:** Learn how to manipulate data and how to import and convert data in the Environmental Work Bench program.

**Week 4:** Review and edit video and digital stills from July 14, 2003 field research to be used in this presentation.
Week 5: Start analysis of all data, imagery, and chase footage. Discuss with advisor.

Week 6: Continue analysis.

Week 7: Create JPG images and QuickTime Movies of model data, imagery, and chase footage to be incorporated into presentation.

Week 8: Work on any additional suggestions or alternatives. Start putting together presentation of results.

Week 9: Complete write up of project develop a PowerPoint presentation.

Week 10: Complete presentations and test presentation methods for anticipated presentation at Undergraduate Research Conference.

**Detailed Supplies and Equipment Budget:**

- 10 weeks of work at 10 hrs per week at $8.00 per hour = $800.00
- Visits to Chanhassen, MN to collect data/interviews (1 x 140 miles @ 0.35c/mi) = $49.00
- Data Storage – Fuji 30-Pack 24x CD-R Disc Spindle = $12.99
- 3 DV Mini Tapes for Video Transfer/Achieving = $21.77
- Sony 128 MB Memory STick for Digital Stills/Storage = $99.99
- Telephone and miscellaneous costs = $16.25
- **TOTAL** = **$1000.00**