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1. INTRODUCTION

During the spring semester of 2003 the University of Louisiana at Monroe (ULM) instituted President Cofer's "Emerging Scholars Program" for first (and ultimately second) year undergraduate students. The intent of this initiative is to improve retention of students, enhance the educational process, provide professional development (through direct mentoring), and to encourage and broaden the on-going interaction between undergraduate students and faculty.

Within the Atmospheric Science Program (Department of Geosciences), three new majors were selected to participate with two members of the meteorology faculty. The students' projects were based on severe weather occurrences in and near northeast Louisiana and included summer hailstorms, severe weather characteristics, and cool season tornadoes. All student projects involved collection of data from the Storm Prediction Center website and synoptic weather regimes and base data as provided by the Louisiana Office of the State Climatologist.

The nature of each project was designed so as to include various meteorological and climatic principles and skills studied during their first academic year and the application of various summary statistics and graphs/plots for data examination. Participation in, and completion of a report on their project, earned the students a stipend and an opportunity for real professional development as well as direct mentorship. The mentoring provided the faculty with a greater opportunity for interaction with the students and an opportunity to expand their research topics for undergraduates.

2. PROJECTS AND DEVELOPMENT

Project selection was developed by the two faculty mentors in order to provide a common basis for the students. This allowed them to share insights and difficulties encountered in the research process. The projects were focused on the Gulf States region,

and in particular in the vicinity of northeast Louisiana. As part of their efforts, students were given a broad topic and were allowed an opportunity to define and focus it according to their interests.

As part of the process, the students were obligated to pose questions, find sources, and consider the viability of data, resources, and their approach to the topic. Data gathering and organizational skills, including statistical summaries and descriptive measures, were developed in this process. These also afforded students an opportunity to view applications of classroom material outside of the classroom setting. In addition, they needed to become more familiar with data management, the use of spreadsheets, statistics, and data manipulation.

Following data collection and summary, students proceeded to consider relational aspects and interpret their initial findings. This required consideration of alternative data sources and interpretations of a variety of analyses through graphs and plots of their data. At times it also required partitioning of data in order to more precisely examine relationships between variables. The results obtained by the students were then considered with regard to their scientific use as well as by extension to answering other questions.

3. RESEARCH OUTCOMES

The characteristics of summer hailstorms (defined as the occurrence of hail from June 21 through September 23) in northern Louisiana were considered for the period 1990-1999. The purpose was to determine whether different summer season synoptic weather patterns (or types) were relevant in the prediction of hailstorm occurrence and/or frequency and provide insight as to the spatial distribution of the events.

The study region included northern Louisiana, southern Arkansas, northeastern portions of Texas, and southwest Mississippi. This decision was made in order to limit any biases due to nearby

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events and/or the observed synoptic types and based on specific locations in Louisiana. The emphasis was to document the total number of days for each synoptic type and compare it to the total number of days that each synoptic type produced hail (as determined from Storm Data).

In a separate project, the occurrence and characteristics of cool season tornadoes was considered for the lower Mississippi Valley region. This project was considered since the majority of tornadoes occur in the spring season (or at the end of the cool season). This included portions of Arkansas, Louisiana, and Mississippi. The period of study was for December 1989-1999.

Preliminary review of the data revealed that although not of high frequency, there are various periods of outbreaks and isolated tornadoes. Many of these were found to occur in association with certain synoptic types. Many of the tornadoes in the database were found to occur during a frontal gulf return synoptic pattern. When the entire ten-year period was considered, it was observed that there was a gradual increase in the number of tornadoes reported.

An increasing trend was also evident when considering all intensities of tornadoes (from F0 to F4). There are slight variations within the ten year period, but over the entire period, the frequency of the tornadoes increased.

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