

INITIATING A NEW PARTNERSHIP FOR THE 21<sup>ST</sup> CENTURY: NOAA/NWS AND JSU PROMOTING  
DIVERSITY IN ATMOSPHERIC SCIENCE THROUGH RESEARCH, APPLICATION, AND IN  
PARTNERSHIP WITH THE NWS (PDAS-RAP)

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## 1. INTRODUCTION

The National Weather Service (NWS) and the Jackson State University Meteorology Program (JSU-MP) have a shared, long-term interest in expanding the number of minority professionals in meteorology and related fields. They also share a common vision of improved operational prediction and dynamic understanding of the Gulf of Mexico Coastal Zone and Gulf States weather.

This has included both formal and informal study and collaboration such as COMET research grants, student internships (e.g., through SCEP, ORISE), web-based MM5 output and products, the local AMS chapter, a workstation loan, co-sponsored seminars (e.g., Winter Weather Workshop), several map discussions, campus weather observations, and other activities. Each of these has contributed to faculty and student development and enhanced the opportunities for under-represented groups to be involved in atmospheric science.

Both basic and applied operations-based research has included diagnostic and predictive studies of tropical cyclone intensity (NASA, ONR, and Waterways Experiment Station in Vicksburg MS), convective initiation (COMET Partners Project with MOB NWS), air-sea interaction (NASA-Stennis Space Center MS), fog occurrence (cooperative work between JSU and JAN, MOB, SIL NWS offices), and snowfall (COMET Partners Project JAN NWS).

Many of these have included undergraduate students and have resulted in publications with operational relevance (and in some cases direct application). In addition, the JSU-MP initiated limited real-time operational meso-scale model runs, in some cases inclusive of alternative data assimilation, and hosted a two-day seminar/workshop (April 2000) for atmospheric scientists (including the

NWS). There has also been cooperation on various research and development aspects and an operational suite of models being developed by the JSU-MP.

For 25 years the JSU-MP has prepared atmospheric scientists for a variety of careers and is in a unique position to encourage and develop minority atmospheric scientists (National Advisory Committee Report, 1997; sponsored by the University Corporation for Atmospheric Research). The Bachelor's Degree Program in Meteorology is the only such program offered in the state of Mississippi and the only undergraduate program of its kind (i.e., offered at an HBCU) in the region (i.e., AL, AR, LA, and TN).

The Program is part of the Department of Physics, Atmospheric Sciences, and General Science and part of the School of Science and Technology. The program is housed in Just Hall of Science and includes three meteorological laboratories as well as electronic classrooms. Students have come from all parts of the United States to attend the program (e.g., California, Texas, Pennsylvania, and Indiana) and have graduated to successful careers (including the NWS). Meteorology majors have included a variety of under-represented groups and non-minorities.

## 2. A NEW PARTNERSHIP: PDAS-RAP

As a federal agency that plays a leading role in the atmospheric sciences community in the United States, NOAA/NWS supports diversity in the workforce that contributes directly to serving all Americans with world class forecasts and warnings and a continuing program of applied research. This is in keeping with the Department of Commerce's efforts within the Minority Serving Institutions (MSI) Initiative that strives to increase dramatically the diversity within NOAA/NWS.

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It is well known, and well documented, that there has been a prolonged and persistent under-representation of minorities in the atmospheric sciences. It is also well known that a majority of those under-represented groups receive their education through an MSI. Thus initiation of a new partnership between NOAA/NWS and the JSU-MP with the goal of Promoting Diversity in Atmospheric Science through Research, Application, and in Partnership with the NWS (PDAS-RAP) is critical.

The National Weather Service (NWS) and Jackson State University (JSU) have a shared, long-term interest in improved operational prediction and dynamic understanding of the Gulf of Mexico Coastal Zone and Gulf States weather. This region, which is prone to the highest national frequency of severe weather problems accompanied by economic loss, has not enjoyed the fruits of an integrated approach to a clear and comprehensive understanding of the region's "weather dynamics" and their relevance to weather across the nation.

The NWS and JSU-MP also have a common interest in Promoting Diversity in Atmospheric Science through Research, Application, and in Partnership with the NWS (PDAS-RAP) through under-represented student undergraduate experiences. In combination, these create a strategy to address these issues that meets the NWS Vision 2005 goals: Operational Forecast and Detection of Significant Weather Systems, Diversity, and Professional Development.

Based on these a one-year program was initiated to form the basis of a long-term commitment and partnership with NOAA/NWS. This partnership will be focused on the direct interaction between JSU and the Jackson NWS Office. This agreement will (1) formally establish the operational research and applications environment between the JSU-MP and NOAA/NWS; (2) perform operations-based research for direct forecast applications; (3) support under-represented undergraduate students through both research experiences and professional development opportunities; and (4) promote dissemination and coordination of activities within the community.

### **2.1 Planning and Delivering Diversity**

The JSU Meteorology Program has enjoyed a variety of institutional partnerships over the years, both locally and nationally, which augment its research and applications program and in which undergraduate students have the opportunity to work on "real-science" projects rather than "canned"

demonstrations or problem sets. Partners have included the Army High Performance Computing Research Center, the Army Corps of Engineers Waterways Experiment Station, NASA's Stennis Space Center, the National Data Buoy Center (Bay St. Louis, MS), Marshall Space Flight Center, and the National Center for Atmospheric Research.

Grant support received by faculty often provides students with paid training (e.g., CHARC and NASA JOVE, NASA FAR, DARPA, and RCMS) while advancing the state-of-the-art understanding of Gulf Coastal Atmospheric Processes based on scientific investigations. Some of these have been detailed in the JSU-MP summary report "Operational Meteorology Research for the Gulf Coastal States & Gulf of Mexico...& Diversity in the Atmospheric Sciences" (2000).

The efforts with NOAA/NWS include direct interaction in research and operational collaborations (including real-time delivery of operational MM5 modeling and forecast products for the forecast region). These include computer system accounts for the NWS at JSU. Interactions for research are targeted by JSU/NWS and fashioned to provide at least one operational application. Operational interactions, forecaster information exchange, co-sponsorship of workshops and seminars, technology transfer, and real-time consultation during severe and other weather events (including the development of a spotter/observer network).

### **2.2 Activities and Facilities**

Interactions with JAN NWS staff include technical and scientific assistance according to operational research and forecasting needs. Both established and new links have been developed to promote the JSU-MP as a cost-effective "satellite-cooperative-field office" in the Jackson Metropolitan area. In addition, steps are underway to provide appropriate instrumentation to establish a fully functional cooperative observation site on campus. This site is monitored by meteorology majors and provides the Jackson NWS Office local weather information from the southwest corner of the city of Jackson in real-time.

Each of these enhances and builds the current working relationship between the JSU-MP and the Jackson NWS Office. The measurement of outcomes and "value-added" features of this arrangement is evaluated according to student and faculty experiences (i.e., the nature, quality, and number affected) and verification of real-time

benefits. The establishment of this environment will serve as a prototype for interaction with other offices and define the experiential aspects necessary for involvement of under-represented students in real scientific activities.

Computational and laboratory facilities available to the JSU-MP include state-of-the-art computer platforms and standard meteorological equipment. The computer labs within the parent department and school include Sparc-20, SGI, IBM RISC/6000, and Linux workstations and numerous Windows-based computers. Access to the Mississippi Center for Supercomputing Research, through the Minnesota Supercomputing Center, and the JSU Army High Performance Computational Lab. These also provide for high level modeling and visualization of atmospheric processes using the Cray T3E, IBM SP and other computers on campus.

Laboratories include the JSU Weather Lab (weather instrumentation, observation, and analysis), Physical Meteorology (environmental meteorology including air quality), and the High Performance Computational Lab (numerical weather modeling and visualization). Each meteorology laboratory provides the necessary infrastructure for student involvement in professional meteorological work. The Remote Sensing and GIS laboratory (through the Center for Spatial Data Research and Applications), TV-23, and WJSU Radio on campus are also available.

### 3. STUDENT EXPERIENCES

As part of their professional development the students participated in severe storm verification, the development of a spotter/observer network, deployment and/or reading of upper air and surface observational equipment, NOAA weather-radio, short-term forecasting, television forecast support (JSU Channel 23), and other opportunities. All research and professional experiences were designed to assist and encourage students to pursue a career with NOAA/NWS. All participants completed and submitted SCEP applications and were encouraged to take appropriate certification exams (e.g., surface and upper air observation).

In these activities, both the hired students and fellow meteorology majors benefited from professional interactions. Students were clearly witness to, and participated in, the operational environment and could see the need for improved forecast and warning capabilities. The hired students also interacted with JSU-MP alumni employed within the NOAA/NWS framework as a form of mentoring

and professional development during the summer. Each of these activities promoted community among minority atmospheric science majors and scientists.

#### 3.1 Spring Semester 2001 Activities

Student activities were varied during the spring semester 2000 as each participant completed ten hours of work at the NWS JAN and ten hours of work within the JSU-MP each week (total 20 hours). A work plan was used in which students first became familiar with NWS duties and responsibilities and then progressed to surface and upper air observations and forecasting. Their experiences are best presented in their own words. "Working with NOAA is the best thing that could have happened to a student and future researcher of meteorology. While at the NWS JAN and LZK [Little Rock, AR], I met some great people and learned valuable information from them."

During the spring semester "my time was spent at the National Weather Service in Jackson, Mississippi. The time out there was balanced between school and other obligations. During this experience, I had an opportunity to see the work environment and interact with professional meteorologists. Working hands-on with employees of the weather service enhanced my learning environment at school."

"A lot of what I was doing in my meteorology classes were related to my time out there. If I had any questions, I could ask them of a professional meteorologist in addition to some of my professors or anyone else. I would have to say that the greatest benefit from working out at the weather service in Jackson was that I saw what to expect of that type of working environment." In addition, "...I gained further insight on the evolution of severe weather events, the mathematical value of forecasting, and the actions of NWS meteorologists during significant and non-significant weather."

Basic skills were also evident through activities such as "During the time in the Jackson National Weather Service, I learned how to release and track the weather balloon. I also had a chance to complete a few training modules about writing a forecast and Fire Weather Forecasting. I also learned how to operate the public service area of the NWS."

#### 3.2 Summer 2001 Activities

Student activities in the summer varied as students worked in the NWS Offices in Little Rock, AR; Memphis, TN; and Shreveport, LA. Again, their

experiences are best presented in their own words. “During the summer of 2001...I had an additional opportunity to work at the NWS in Memphis. I started work at the beginning of June through the end of July. This experience was the opposite of my time spent at the weather service in Jackson. Instead of doing a lot of intern work, my time in Memphis was research-oriented.”

“I worked on a project to determine tornado risk for the United States. For the period 1970 through 1999 I gathered data such as tornado frequency, mobile home percentage, population density, and number of casualties as a result of tornadoes for each state in the country. This data was ranked to determine which states are more susceptible to deaths and injuries as a result of tornadoes. Although the project has not been completed, preliminary results show the southeastern United States, with Mississippi in particular, as the most prone to casualties.”

“My time at the weather service in Memphis was not limited to just research. I also had the opportunity to see the work environment of people who weren't meteorologists. I got to work with some of the electrical technicians and see their roles with the weather service. I went inside a radar dome, and a lot of technical things behind the scenes were explained to me. Also, a few television stations came out to the weather service and I got to see how they collaborate with the weather service for some of their feature stories pertaining to weather.”

“Other activities at the weather service in Memphis included going to a severe weather conference in Nashville and accompanying some of the meteorologists on child safety severe weather talks. My time at the national weather service offices has been a very productive learning experience.” For the student in Little Rock, AR “...their excellent staff provided me with the necessary tools to create a research paper concentrating on tornado events in Arkansas. With these experiences, I have become a better, wiser, and advantaged student with an increased potential to contribute to the scientific community and the world.”

In Shreveport, LA “I got to expand on my experiences in Jackson. I got a chance to learn about the different operations in the office, for example: What the forecasters, hydrologists, and public service contacts are and do. Most of my time was spent in the public service area of the WFO. While working in public service, I learned how to write a radar summary and an Area Weather Summary. I also

continued learning about the release and tracking of the Weather Balloon.”

“While in Shreveport, one of the Forecasters (Bill Parker, a JSU alumnus) arranged a trip to the Weather Forecast Office in Dallas/Fort Worth and the Southern Region Headquarters. This taught me that there are more operations in Meteorology than simply broadcasting and the Weather Service. I also had a chance to visit the Barksdale Air Force Base near Shreveport. This experience also gave me another outlook on other careers in Meteorology.”

“I also had an opportunity to work on a research project. This project was based on MOS temperature forecast verifications for late June through late July for the Shreveport forecast area. This project was to determine how well the newer MAV temperature guidance performs against not only the NGM but also against the forecasters maximum and minimum temperature forecasts for the five cities in the Shreveport forecast area of responsibility. This study helped determine if any bias or trend existed in the modeling or forecaster predictions, especially during a change of air mass.”

### 3.3 Fall Semester 2001 Activities

The student participants resumed their work at the JAN NWS and were scheduled to complete observer certification exams during the fall semester 2001. In addition, the students were developing a local spotter network for training, establishing a weekly weather summary, and linking their professional development activities with the student led meteorology club. Plans were also considered for a spring workshop on regional weather in cooperation with the JAN NWS office.

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