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1. INTRODUCTION

The Jackson State University Meteorology Program, resident within the Department of Physics, Atmospheric Sciences and General Science and contained within the university's College of Science, Engineering and Technology, prepares minority meteorology majors for careers in the atmospheric sciences. The Meteorology Program is designed to enhance the number of minority professional meteorologists and boost the number of those professionals available to pursue advanced studies within the atmospheric sciences. Since the program's humble beginnings in the mid 1970's, the Jackson State University (JSU) Meteorology Program has grown in both students and capabilities. After some thirty years and fifty-five graduates, there are over thirty majors actively pursuing a Bachelor's Degree in Meteorology. The Department of Physics, Atmospheric Sciences and General Science is very productive in minority degree production in the areas of physics and meteorology. According to recent statistical data from the American Institute of Physics, JSU ranks eighth among departments producing African-American physicists with an average of 3 bachelor degrees conferred annually. Since 1975, JSU has been the only HBCU offering an undergraduate degree in atmospheric science (meteorology). Over the six year period from 1995 – 2001, a total of 2,698 bachelor degrees in meteorology and atmospheric science was awarded with only 45 of them being earned by African-Americans. In the last five years, JSU produced 11 bachelors in meteorology. While the absolute number is small, it is significant because it indicates that JSU is producing about 1 out of 4 of all bachelor degrees earned in atmospheric science in the U.S. by African-Americans.

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During the past thirty years, members of underrepresented groups have made tremendous strides in becoming advanced degreed scientists within the numerous professional scientific fields; African-Americans within the atmospheric sciences, however, have not been nearly as successful. Over the period, African-Americans comprise less than four percent of the master's degrees earned and less than two percent of the doctoral degrees confirmed. Various factors contribute to the lack of African-American participation – persistent stereotyping and bias, very few readily available role models, lack of graduate faculty interest or faculty support, only a small group of truly interested/understanding mentors, and economic constraints of both students and historically black colleges and universities. However, the preparation of minority atmospheric scientists is not a trivial matter, as underrepresented groups will become the majority within the United States over the next twenty-five years.

The JSU Meteorology Program is designed to help minority students overcome both real and perceived negativity. Through active recruitment and retention, innovative academic, professional and operational training, and government sponsored research and internship initiatives the capacity of the Meteorology Program continues to expand and increase student opportunities for future success in professional weather forecasting and meteorology occupations and advanced atmospheric sciences education.

2. DIVERSITY IN ATMOSPHERIC SCIENCES

Recruitment of minorities into technical, engineering and science based university degree granting programs is made more difficult due to high school graduates either entirely lacking or possessing poor backgrounds in mathematics and science. These factors contribute to disproportioned

low numbers of minority students initially enrolling in the professional meteorology and atmospheric science programs; however, minority recruitment and initial enrollment only begins the process. Once enrolled, minority students must be retained within these atmospheric science programs until completion of their degree.

According to statistics compiled through 2002 by the Mississippi (MS) Institute of Higher Learning, only one half of all MS students who initially enroll in community college, college or university ultimately complete a four-year degree. The percentage for African-Americans who complete a four-year degree is less, at only approximately thirty-five percent. In mathematics, engineering and science this number is appreciatively less, at only eight percent.

2.1 JACKSON STATE UNIVERSITY METEOROLOGY PROGRAM HISTORY

In 1975, the MS State Board of Trustees of Higher Education authorized Jackson State College to offer a program in Meteorology leading to a Bachelor of Science Degree. President John A. Peoples charged Dr. Charlie Smith, Chair of the Department of General Science to develop the Meteorology Program. Through the efforts of the college, the University Corporation for Atmospheric Research (UCAR), the American Meteorological Society (AMS), and the National Oceanic and Atmospheric Administration (NOAA) a curriculum was finalized and approved by the MS Institute of Higher Learning. In the fall of 1978, renowned National Weather Service (NWS) Meteorologist, Dr. Keith W. Johnson joined the faculty through a cooperative agreement between the college and NOAA. Except for an extended sabbatical during 1981 to 1983, Dr. Johnson was the influence behind the success of the Meteorology Program until his retirement in 1995.

Since the inception of the Meteorology Program, early faculty members also included Drs. Pieter J. Feteris, Lonzy J. Lewis, and Arthur C. Pike. Dr. R. Suseela Reddy joined the faculty in 1994 and was joined in 1995 by Dr. Paul J. Croft and Dr. Patrick J. Fitzpatrick in 1996.

Dr. Croft assumed coordination of the program in the late 1990's and lead the program toward the university's goal of becoming research intensive through various governmental sponsored grants. Dr. Fitzpatrick departed JSU in the summer of 2001 followed by, the departure of Dr. Croft the following summer. Dr. Loren D. White became Assistant Professor of Meteorology in the spring of 2002 and Dr. Heping Liu joined the faculty as an Assistant Professor of Meteorology in the spring of 2004.

In the summer of 2003, Dr. Quinton L. Williams became Chair of the Department of Physics, Atmospheric Sciences and General Science. Recently elected President of the National Society of Black Physicists (NSBP), he has supported the university's goal of being a research-intensive university and actively leads the Meteorology Program faculty in the pursuit of numerous professional, research and operational opportunities within the atmospheric sciences. Current faculty members include Drs. R. Suseela Reddy, Loren D. White and Heping P. Liu. Associate Professor Reddy has over twenty-five years of teaching experience at the college level and has been published primarily in the research areas of tropical cyclones, hurricane structure and dynamics, climatology, solar variations, air-ocean interfaces and numerical modeling. Assistant Professor White's teaching focus has been in the areas of atmospheric dynamics, synoptic and mesoscale meteorology with research concentrations in environmental data collection and networking (Mesonet), and numerical modeling. Assistant Professor Liu has research experience in micrometeorology and biosphere-atmosphere interaction.

A cadre of professional meteorologists and technical staff supports the faculty and has been critical in assisting course instruction, research efforts and individual student development since early 2001. Mr. Duanjun Lu, Meteorological Research Associate, is responsible for the programming and data assimilation efforts for the various numerical weather prediction models run daily within the Meteorology Program. (Visit the JSU Meteorology Program website at <http://weather.jsums.edu> for specific model output and other general program information.). Ms. Monesa Watts, a

1999 JSU Meteorology Program graduate and currently Meteorologist/Research Assistant and Weather Laboratory Coordinator, oversees the daily observational and forecast training within the laboratory and coordinates all student research and work-study activities. Mr. John Shoemake, Weather Laboratory Assistant and former Naval Meteorologist, assists students with weather observation, basic weather forecasting and satellite interpretation skill development and submission of summer internship applications. Mr. Rafael Mahecha, a 2000 JSU Meteorology Program graduate and presently Meteorologist/Systems Information Technical Assistant, maintains the daily operations of the eight computer server platforms hosted within the program and maintains all personal computers and printers used by faculty, staff and students.

In 1978, Dr. Johnson began the JSU Meteorology Program with three initial students. The first graduate, Ms. Patricia Brown, currently Senior Hydrologist with the National Weather Service Forecast Office (NWSFO), Slidell, LA, received her degree in August 1980. Through 2005, JSU remains the only historically black college or university that offers a professional undergraduate degree in meteorology.

Of the fifty-five who have received degrees in meteorology from JSU, one quarter are government employees with NWS and another quarter are broadcast weather personnel with television stations. Approximately one eighth are currently teaching science at the secondary level or higher. About one fifth have attended graduate school and 1999 graduate, Ms. Andrea Sealy will receive her Ph.D. in Atmospheric Sciences from Howard University in December 2005. The most recognized graduate of the JSU Meteorology Program is 1986 graduate, Ms. Vivian Brown, who can be seen weekday afternoons on "The Weather Channel".

Notable other JSU Meteorology Program graduates in the broadcast field are 1993 graduates, Mr. David Tillman, Weekend Meteorologist with Houston's ABC affiliate, KTRK-TV13; Mr. Ken South, Morning Meteorologist with Jackson's CBS affiliate, WJTV-TV12, and Mr. Paul Williams, Morning Meteorologist with Jackson's NBC affiliate, WLBT-TV3. Also, 1997 graduate,

Ms. Tomeica Moore and 1998 graduate, Ms. Eboini Cannon are employed off camera with "The Weather Channel".

Current governmental employees with JSU degrees include 1987 graduate, Ms. Cindy Woods at NWS Headquarters, 1994 graduates, Mr. William Parker at NWSFO Shreveport and Mr. Freddie Zeigler at NWSFO Slidell, 1996 graduate, Mr. Preston Heard with Office of Budget and Management, 1997 graduate, Mr. Al Matson at NWSFO Tallahassee, 1998 graduates, Ms. Latrice Maxie at NWSFO Jackson and Ms. Alana McCants at River Forecast Center, Fort Worth, and 2000 graduates, Ms. Michelle Webb at NESDIS Headquarters. Mr. Ronnie Guyton, Naval Oceanographic Office and Captain John Hurley, USAF stationed in Japan are also 2000 graduates of the JSU Meteorology Program.

Since 2002, over half of the JSU Meteorology Program graduates have been pursuing master's degree studies throughout the nation. Mr. Kantave Greene is enrolled in Utah State University's Atmospheric Science Program, Ms. Aisha Reed is enrolled in Purdue University's Department of Earth and Atmospheric Sciences Education Program, Ms. Michelle Farver and Ms. James Sims are enrolled in Howard University's Atmospheric Science Program and Mr. Ashton Robinson is enrolled in Oklahoma University's School of Meteorology.

3. TRAINING AND RESEARCH

The JSU Meteorology Program faculty and staff provide significant student support through academic course work, individual mentoring, professional operational and research opportunities, club activities, state-of-the-art facilities and outreach efforts. When combined, these efforts provide a strong framework for preparing minority atmospheric scientists. They also help provide a level of camaraderie and community that is essential and necessary for a scientist to both operate and communicate within today's professional environment. In tandem, these efforts are designed to develop a well-versed meteorologist for both the scientific community and public in general.

3.1 THE COURSES

Meteorology coursework is designed to expose students to general scientific concepts, basic theories and principles in atmospheric sciences, “real-world” applications and current operational skills. This is accomplished through intense lecture, laboratory and seminar sessions and individual self-study as well as undergraduate research under the supervision of instructors. Every opportunity is made to pose particular scientific problems, allow for critical thinking and foster the growth of problem-solving skills for all students. Often, this involves either an individual assignment or group session in which decisions must be made and occasionally adjusted as new or updated information is revealed.

Coursework is current, relevant and offered through various media. For example, simple thought experiments provided to utilize the World Wide Web, specialized computer workstations, and other video materials and applications enhance the learning process. However, these do not supplant good reading skills or individual study habits that every student must eventually possess. The requirement for student development of individual speaking and briefing techniques, document and presentation preparation, and other computer intensive training demand that students combine today’s information technology skills with scientific knowledge. This allows students to develop themselves as a “complete professional” capable of delivering meteorology and weather information upon request.

3.2 MENTORING

Mentoring is strongly emphasized and focuses on student learning and professional development. These are accomplished through frequent student-scientist interactions and individual research opportunities under the direction of faculty and/or professional staff. However, the mentoring role is more than merely providing role models or standard scientific investigative framework. The mentor and mentee are expected to form a professional partnership in which both investigate and learn about a specific area of meteorology or

atmospheric science while “doing – gathering data, evaluating and drawing conclusions, etc.”. This approach is tested by having the student endure the rigors of manuscript and presentation preparations, and culminates when students learn to stand on their own.

All mentoring activities require a significant amount of time and the use of departmental and university resources. The relationship quite often is much more than just scientific, as a strong professional bond is typically forged between the atmospheric scientist and neophyte meteorologist. Students gain an appreciation of “what is required to be a scientist” and the mentor gains an appreciation for the difficulties faced by new and minority atmospheric scientist aspirants. Students are given opportunities and are challenged to perform to the best of their individual abilities.

3.3 PROFESSIONAL OPPORTUNITIES

Aside from opportunities within faculty and staff research projects, students are provided a variety of other professional opportunities throughout the year. These include direct effort and/or consultation with researchers, operational meteorologists or broadcasters with UCAR through the Significant Opportunities in Atmospheric Research and Science (SOARS) Program; various components of NOAA including the National Data Buoy Center (NDBC), NESDIS and NWS; the Army High Performance Computing Research Center (AHPARC); and, local television stations and/or independent networks. For example, students have had internships or part-time employment with local television stations WLBT, WAPT, WJTV and the WeatherVision Network in Jackson during the academic year and over the summers. At WeatherVision and two of the stations, students have had the occasion to interact with alumni of the JSU Meteorology Program (Edward St. Pe, Ken South and Paul Williams). Students who have had recent experiences at AHPARC are Ms. Georgette Holmes, Ms. Markeitta Benjamin, Ms. Imani Morris and Mr. Brandon DeShields. Ms. Laurita Brown, Ms. Kimberly Coleman, Ms. Ashley Hayes, Ms. Saavedra Ivey, Mr. Terrence Hartwell, Mr. Douglas Gavin, Mr. Christopher Luckett, Mr. Jamal

West and Mr. Kenneth Hair have had recent summer internships with NWSFO's or other NWS components. Mr. Roberto Cancel, III is a SOARS protégé and consults throughout the year with his mentors and research advisors on the UCAR staff.

Opportunities also include involvement with local scientific chapters and/or organizations (e.g., the combined local chapter of the American Meteorological Society and National Weather Association (AMS/NWA) and the MS Academy of Science). Even the campus radio and television stations provide a professional opportunity for students to improve communication skills and weather briefing techniques. TV23, the Jackson educational cable station, is collocated on the JSU campus and provides students the opportunity to also develop news and programming talents. A few JSU Meteorology Program majors recently involved include Ms. Raushannah Jones, Ms. Shundra Stewart, Mr. Brandon DeShields and Mr. Lyvon Kennard.

All of the previously mentioned opportunities are critical to individual development, particularly when students author an abstract or preprint and/or brief their experience through a presentation (oral or poster) at a national meeting or conference (e.g., the American Meteorological Society and/or the National Weather Association Annual Meetings). Professional writing for and briefing skills at these meetings provide students with a chance to directly interact with the professionals in the meteorology community. In addition, our majors have also acted as worker/volunteers at these professional meetings. Some of the recent attendees include Ms. KaSair Davenport, Ms. Jameese Sims, Mr. Terrence Hartwell, and Mr. Ashton Robinson.

3.4 RESEARCH PROGRAMS

A variety of research projects are conducted within the JSU Meteorology Program which include educational and training components. Most projects involve hiring of undergraduate meteorology majors and graduate computer science majors to give these students research experience. Students are often given the opportunity to co-author an abstract, preprint, and deliver a

professional presentation (oral or poster) at a national conference (e.g. the American Meteorological Society or National Weather Association Annual Meetings). These provide students with an opportunity to discuss meteorology, atmospheric science and operational weather forecasting with recognized leaders in these scientific fields.

The JSU Meteorology Program has enjoyed numerous institutional partnerships over the past years. These partnerships help augment faculty research and student application programs and give students the opportunity to accomplish "real science". Recent partners have included NOAA's NWS; the Army High Performance Computing Research Center; the Army Corps of Engineers Waterways Experiment Station; NASA's Marshall Space Flight Center; NASA's Stennis Space Center; the National Data Buoy Center, Stennis Space Center; the MS Dept. of Environmental Quality, and the National Center for Atmospheric Research.

The JSU Meteorology Program currently receives grant support from DOD, EPA and NOAA. These grants are oriented towards advancing understanding of the near surface "boundary layer" and various numerical weather models that attempt to describe and predict atmospheric or weather conditions within this layer and/or over the Gulf Coastal Region. The principal grant is supported through Howard University's NOAA Center for Atmospheric Science (NCAS). All NOAA grants focus in three main areas of primary interest: 1) providing JSU Meteorology Program students the opportunity to interface with professional meteorologists through direct familiarization and hands-on operational experience at NWS sites, 2) utilizing forecast and climatic modeling in the evaluation of environmental data sets and measurement techniques, and, 3) utilizing a Geographic Information System (GIS) and/or Remote Sensing approach to analyze significant weather events for future forecasting technique and model development. These research grants have also resulted in a variety of pre-print and peer-reviewed publications, often co-authored with our undergraduate meteorology and graduate computer science majors. In addition, the grants also serve as both direct and indirect educational and

outreach initiatives for use within our local community.

These and other such projects are integral to the future development of a meteorology graduate program at JSU. New courses are being developed and graduate program planning is underway. It is expected a draft plan of action will be submitted for consideration within the next year or so. A meteorology graduate program would help provide a higher level of professional expertise for the JSU Meteorology Program and its students by increasing faculty research opportunities and active links with other such graduate programs already in existence.

3.5 STUDENT ACTIVITIES

Students matriculating under the JSU meteorology curriculum are also committed to carrying out activities for their own academic growth. Whether these activities are social, course study sessions or community related, students actively self-orient and direct their own and peers professional and personal development. These are readily apparent when observing the operation of the student-run meteorology club. Although the club requires faculty advisement, it functions in a nearly autonomous manner. This provides students with a strong sense of commitment and pride in establishing their own activities. It is also an opportunity for them to develop and hone skills in time management and planning.

Students often develop partnerships for studying and community service to improve individual skills, correct deficiencies and enhance experiences. Students, also, have established a local network where upper level meteorology majors provide advice and tutoring to incoming students. This network is based on a much wider one where current students seek advice from past graduates or students from other meteorology degree granting colleges and universities. These networking activities help maintain our students within the main stream of their meteorological studies and have proven useful in minority recruitment and retention and identification of potential financial support.

Students are also involved in direct professional developmental activities that

help increase their employability after graduation. These activities include daily routine experiences common to an operational governmental or military weather office. Students take various weather instrument readings; evaluate cloud cover, types and heights; estimate current wind direction and speed; read pressure instruments and encode this information into manual weather observations in support of the NWS Cooperative Weather Site on campus. In addition, during each weekday, students collect and analyze current and forecast weather maps, charts and satellite and radar imagery for daily display within the JSU Weather Laboratory. Also, students prepare and present a daily "Weather Briefing" where current and forecast MS weather, NWSFO Jackson's latest vertical atmospheric profile, regional satellite and radar data, and various numerical model performances are discussed. This briefing addresses MS aviation flight conditions and twenty-four hour aviation weather forecasts are critiqued.

3.6 FACILITIES

Facilities available to JSU Meteorology majors are resident within the Just Hall of Science centrally located on the JSU main campus. These facilities include standard meteorological and weather observing equipment, state-of-the-art computer platforms, general-purpose classrooms and laboratories, and departmental and faculty office spaces. The computer laboratories within the department and college include Sparc-20, SGI, IBM RISC/6000, seven Linux workstations and numerous "Window-based" Pentium personal computers. Access to the MS Center for Supercomputing Research, the MN Supercomputing Center, the JSU Army High Performance Computational Laboratory provide high level numerical modeling of various atmospheric models and/or specific processes by faculty, staff and students utilizing the Cray T3E, IBM SP and other computers. Three laboratories are available for Meteorology Program use. They include the Weather Lab where daily weather observational, analysis and forecasting are carried out by students; the High Performance Computing Lab where faculty staff and students adjust numerical

model outputs and students present the daily Weather Briefing; and, the Micrometeorology Lab where faculty and staff collect and/or research remotely produced micro-scale meteorological and air pollution data sets and analyze them. The Trent Lott Geospatial and Visualization Research Center located at the JSU E-Center, a near-by satellite campus, offers the Meteorology Program access to remote sensing and GIS specific platforms and applications.

Weather instruments, guidebooks, periodicals and other reference materials are available for student use within the Weather Lab. Climatological data; current meteorological charts and maps, satellite and radar data; and forecast products are available to students through Internet access and the JSU Meteorology Program Website: <http://weather.jsums.edu/>. These platforms provide for classroom training, individual studying and completion of assignments and preparation of forecasts. In addition, the Meteorology Program provides access to McIDAS and other software packages (e.g., GEMPAK and NCAR Graphics) for student coursework, research and presentation preparation.

3.7 OUTREACH

The JSU Meteorology Program is engaged in various outreach activities that actively involves faculty, staff and students. Activities cross all primary and secondary grade levels and include speaking to science classes, serving on scholarship and awards panels, and judging science fairs locally, regionally and at the statewide competition held annually on the JSU campus.

During the past summer a two-week "Weather Camp" was initiated with four high school students. The camp is planned to continue each summer and to supplement the School Visitation Program originally begun to support the Piney Woods Country Life School in rural Rankin County. This program currently provides science speakers and student role models for Piney Woods Country Life School, Blackburn Middle School adjacent to the JSU campus, and Smith and St. Theresa Elementary Schools within the local area.

In addition, JSU Meteorology Program faculty, staff and students are scheduled to speak at various middle schools across the state in support of the MS Academy of Science Teachers (MAST) initiative during the year. MAST is intended to increase the overall science knowledge of state teachers and help develop a renewed interest in science within middle school students. These visits are meant to be both educational and cross the various scientific disciplines whenever possible. More often than not, our meteorology students will be actively involved as both speakers and positive role models for the MAST effort.

JSU Meteorology Program students seek these opportunities to give back and provide support to their community. Individual involvement is recognized through the JSU Meteorology Club.

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