



## Undergraduate Research Experience

Center of Excellence in Remote Sensing Education and Research

### Summer 2008 Research Abstracts :: 2008-2009 Program Highlights

#### *A Comparison of Passive Microwave Derive Melt Extent to Melt Intensity Estimated From Combined Optical and Thermal Satellite Signatures over the Greenland Ice Sheet For 2002*

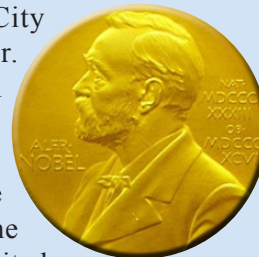
**Unquiea Wade** - Senior, Computer Science, ECSU  
Mentor: Dr. Derrick Lampkin

Remote Sensing of surface melt extent and surface melt magnitude is important in studying ice sheet's mass balance and climatic changes in polar regions. In this project, passive microwave Special Sensor Microwave/Imager data was used to monitor and study surface melt extent of the Greenland ice sheet. Optical and thermal satellite signatures, calibrated by melt water content derived from a physical snowmelt model was used to study the melt intensity (magnitude) of the Greenland ice sheet. Results were evaluated and showed a prominent correlation between surface melt extent and surface melt magnitude across the Greenland ice sheet.



#### Dr. Mohan Munasinghe

On July 21, 2008, Elizabeth City State University welcomed Dr. Mohan Munasinghe, 2007 Nobel Peace Prize Co-Winner to speak at the Chancellor's Distinguished International Visiting Lecture Series luncheon. Dr. Munasinghe is the Vice Chairman of the United Nations Intergovernmental Panel on Climate Change (IPCC) in Geneva, co-winner of the 2007 Nobel Peace Prize for work on global warming.



Currently, he is Chairman, Munasinghe Institute of Development (MIND), Colombo; Honorary Senior Advisor to the Sri Lanka Govt.; and Visiting Professor, United Nations University, Tokyo. The Distinguished Lecture was included as part of the 2008 Undergraduate Research Experience closing program. URE students are shown below with Dr. Munasinghe.



Mr. Charles Luther, past president of IEEE-GRSS,  
Dr. Linda Hayden, Dr. Ali Khan, Dr. Mohan Munasinghe,  
Dr. Willie Gilchrist, ECSU Chancellor



## Internship Roundtable

November 11, 2008

The Internship Roundtable is a chance for students to hear from other students about their internship experiences and provide guidance for future interns. Various students and faculty presented research experiences, upcoming internship opportunities, methods of obtaining internships, and the rewards of a good internship experience. The ECSU IEEE-GRSS student chapter organized the event and student chapter president, Mr. Je'aime Powell led the event. Ms. Sandra Gibson, of ECSU Career Services spoke on the opportunities and resources provided by her office. Dr. Darnell Johnson, Chair of the Math & Computer Science Department, encouraged students to apply to internships as they are the path to further opportunities.



On July 6-11, 2008 representatives from Elizabeth City State University attended the 2008 IEEE Geoscience and Remote Sensing Symposium in Boston, Massachusetts. The 28th annual symposium for GRSS which brought together world-class scientists, engineers and educators engaged in the fields of geoscience and remote sensing.

The IGARSS'08 technical program contained traditional IGARSS topics and a broader program to reflect the theme "Geoscience and Remote Sensing: the Next Generation." The theme was chosen to emphasize the opportunities for the next generation of remote sensing researchers and innovators.

Students were shown the challenges and global responsibilities to map, evaluate, and observe the Earth's environment through interactive workshops and displays. Several hands-on events were held specifically for students in the K-12 grades to increase their awareness of remote sensing and how it will affect their future. URE students attended remote sensing sessions, assisted with outreach activities and presented their research findings.

Outreach co-coordinators for this event were Dr. Barry Rock of the University of New Hampshire and Dr. Linda Hayden of Elizabeth City State University.

## Habitat Conservation Division SCEP Appointment

**Lee Smalls, Jr.** - Senior, Computer Science, ECSU  
Mentor: Dr. Kevin Chu

The cooperative education program student assisted staff of the Habitat Conservation Division to:

- 1) identify coastal dams on rivers currently or historically supporting diadromous finfish in the Northeast Region;
- 2) using GIS, establish a base map for the location of each structure and include information for each barrier including (location information, type of structure, owner, facility type, license info, etc.); and
- 3) incorporate other GIS map layers including watersheds, waterways, towns and cities, and environmental data as available. In Maine through CT, GIS maps included designated Essential Fish Habitat for Atlantic salmon. Final map product will be made available for use by staff in Arc View or similar desk top application. These tasks were performed in support of Essential Fish Habitat consultation activities currently underway in the region.



## An Investigation of the Possible Effects of Global Warming on Forest Fires in Kentucky During the Years of 1945 to 2004

**Jamika Baltrop** - Senior, Computer Science, ECSU  
Mentor: Dr. Jamiiru Luttamaguzi

This investigation sought to find a relationship between the frequencies of forest fires with acreage burned affecting the state of Kentucky and the factors of global warming. Under global warming, we focus on the components climate change and precipitation rate in hopes of establishing this relationship. While delving deeper into the effects of forest fires, or wildfires, we explore a mathematical model offered as a solution to optimally contain these disasters while minimizing the costs of resources and eventually recovery.



### ***Designing and Developing a Portal for the Polar Grid High Performance Computing System at ECSU***

**Patrina Bly** - Sophomore, Mathematics, ECSU  
**Justin Deloatch** - Sophomore, Computer Science, ECSU  
**Camden Hearn** - Junior, Computer Science, MVSU  
**Jonathan Henderson** - Sophomore, Comp. Sci., MVSU  
Mentor: Mr. Jeff Wood

Polar Grid is a National Science Foundation Major Research Instrumentation program funded partnership of Indiana University and Elizabeth City State University (ECSU) to acquire and deploy the computing infrastructure needed to investigate the urgent problems in glacial melting. The grid will be comprised of laptops and computer clusters deployed in the field in the Polar Regions and two large scale computing clusters for detailed analysis in the U.S. – one to be installed at IU, and the other at ECSU. This installation will give ECSU a 5 Teraflop MSI High performance computing system, building on its distance education and undergraduate laboratory infrastructure to create tremendous outreach capabilities.



Accessing this cluster will entail the development of a grid portal to provide security, access to data, and the ability to process data along with education and outreach functions. Development of this portal started with the documentation of terms, processes and software needed to develop a portal and understand what the grid is. The project then progressed to producing XML page structures to display processed data acquired during expeditions in Greenland and Antarctica. Another aspect was the development of “IGoogle Gadgets” simulating the portal user environment and the process of converting that gadget into an RSS feed.

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### ***High-Speed Data Collection for Wireless Seismic Sensor Networks***

**Chelsea Vick** - Sophomore, Computer Science, ECSU  
Mentor: Dr. Albert Harris III, Mr. Jerome Mitchell

The purpose of this research was to set up wireless communication between nodes with development and testing of a data storage logger for seismic monitoring of ice sheets. Seismic data can provide a detailed picture of the nature of the ice at a given location. This is especially important in order to understand and predict the role of polar ice sheets in



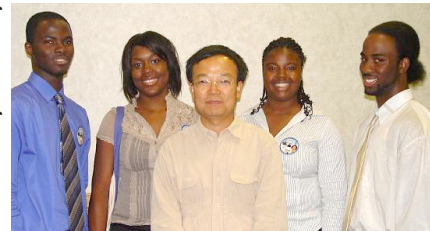
sea level change. The urgency of addressing the impact of climate change makes it imperative that the scientists receive data quickly. This project consisted of the development of a wireless sensor network with a removable device that would be able to store an abundance of data rapidly using a small platform. The development of a small embedded system that can be easily deployed, which stores data onto a USB drive was the main goal. Included in this design is the implementation of a data logger. The USB drive inserted into the data logger would inevitably be connected to a computer for viewing and analyzing of the seismic data collected. This research emerged from the need for high-speed data collection and storage of seismic data, which has resulted from the high collection rate of 240 Kbps per node being processed. Implementing a wireless network with a USB connection for data storage instead of through a serial port will allow for more data transfer, less maintenance, and will facilitate more technological advances.

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### ***Temporal and Spatial Variations of Sea Surface Temperature and Chlorophyll a in Coastal Waters of North Carolina***

**Brittany Maybin** - Sophomore, Mathematics, Spelman  
**Chelsea Goins** - Sophomore, Mathematics, ECSU  
**Yao Selom Messan** - Sophomore, Mathematics, NCAT  
**Phillip Moore** - Junior, Biology, St. Augustine’s College  
Mentor: Dr. Jinchun Yuan

Temperature and chlorophyll a are two fundamental properties of seawater. Traditionally, both temperature and chlorophyll a are determined by shipboard sensors that can only provide limited temporal and spatial coverage. Consequently, the distribution of temperature and chlorophyll a in coastal waters of North Carolina is a poorly known. In this study, satellite remote sensing was used to study the temporal and spatial variations of the coastal waters of North Carolina. The region of our study included Chesapeake Bay, Albemarle Sound, and part of Northeast North Atlantic Ocean. Two sets of data, sea surface chlorophyll a and sea surface temperature were used for this study. Monthly sea surface chl a concentration based on 10 years of Sea-viewing Wide Field-of-view Sensor data and SST data based on 5 years of Aqua-MODIS data were obtained from NASA website. The monthly climatology of sea surface chl a was calculated from monthly remote sensing data; Temporal variation of area averaged chl a and SST for selected regions were also be calculated; Temporal variations of both chl a and SST distribution animation were also be created.



# S U M M E R 2 0 0 8

## UNDERGRADUATE RESEARCH EXPERIENCE IN OCEAN, MARINE, AND POLAR SCIENCE

The URE OMPS program objective is to promote the professional development of minority undergraduate students through their participation in ocean, marine and polar science research. The program consists of undergraduates assigned to specific research teams where they work closely with the faculty. In addition, seminars, lunch meetings, and social functions are organized to facilitate undergraduate interaction. The project was conducted for eight weeks during summer 2008, with on-line mentoring and follow-up during academic year 2008-09. The current program also supports the participation of students from Ghana, Nigeria, and Senegal.



Fourteen students from seven universities participated in the Summer 2008 URE program.

Participating universities included:

Spelman College

North Carolina A&T

Saint Augustine's College

University of Lagos, Nigeria

Elizabeth City State University

Winston Salem State University

Mississippi Valley State University



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:: ONR - URE/OMS N00008-1-0832 NSF - CI-TEAM OCI-0636361 CRISIS - NSF FY 2005-108CM1 ::



The Center of Excellence in Remote Sensing Education and Research presented its 2008 Fall Distinguished Lecture Series with guest speaker Dr. Gerald Bernitz, Electrical Engineering, University of Wisconsin–Madison. He presented his research into Synthetic Aperture Radar (SAR) and the advances being made in Adaptive Signal Processing. His presentation was titled “Adaptive SAR Results with the LiMIT Testbed” and dealt with the formation of images and increasing their resolution through multiple signals versus larger antennas.



Representatives from Elizabeth City State University joined Polar Grid Team members from Indiana University and the University of Kansas for the 2008 Greenland Research Expedition in Ilulissat, Greenland. Dr. Eric Akers, ECSU professor and Mr. Je’aimé Powell, ECSU graduate student, travelled in support of the project from the Center of Excellence in Remote Sensing Education and Research. The goals were to provide backup facilities for all data collected on the CRESES flights, provide processing facilities to test data in the field and lastly to send processed images to the University of Indiana for geographical based image feeds.



**7th International Conference of the African Association of Remote Sensing of the Environment**

**“Application of Earth Observation and Geoinformation for Governance in Africa”**

On October 27-31, 2008, Dr. Linda Hayden, Director of the Center of Excellence in Remote Sensing Education and Research and Mr. Anthony Adade, ECSU Chief Information Officer, attended the 7th International Conference of the African Association of Remote Sensing of the Environment in Accra, Ghana. This event was sponsored by the African Association of Remote Sensing of the Environment (AARSE) which is the organization responsible for all GIS remote sensing activities in Africa.

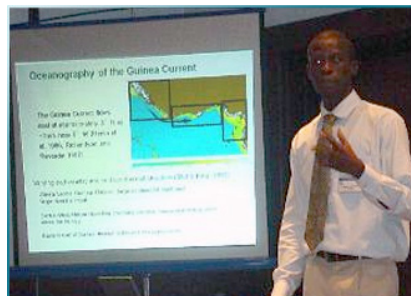
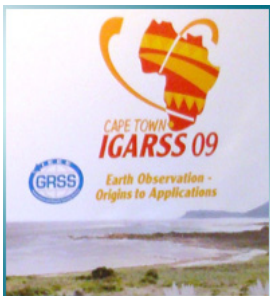
AARSE conferences are attended by professionals, researchers, educators, and students from around the world. Participants discussed the role of Earth observation technologies and geoinformation sciences in production of affordable geospatial data sets for good government driven development and environmental sustainability.

Dr. Hayden and Mr. Adade jointly presented “Implementing Cyberinfrastructure In Support of Greenland and Antarctic SAR Data Sets”. Dr. Geoffrey Fox of Indiana University was a co-author on this paper. AARSE African student participation was supported by ONR. These students included: Kwame Agyeku (Ghana), Omotilewa Oluwatoba (Nigeria), and Tabou Ba (Senegal).

***The Modeling of Beach Erosion and Shoreline Changes Supported by Prior Research Based on Video Image Processing in Duck, North Carolina***

**Michael Jefferson** - Sophomore, Computer Sci, ECSU  
**William Shannon** - Senior, Computer Science, WSSU  
**Omotilewa Oluwatoba** - Senior, Geoinformatics, University of Lagos, Nigeria  
 Mentor: Mr. Ernst Wilson

Climate change affecting the North Carolina coastal environments and coastal hazards have already taken place in the area. Significant adverse impacts in the form of frequent storms and higher rates of beach erosion have been registered, thus, making compelling the necessity of a current understanding of the vulnerability of coastal zones. Studying this vulnerability in Duck, North Carolina utilized the work of the Army Corps of Engineers at the Field Research Facility. Our interest in their work lies in the use of video imagery based techniques (researched, designed, experimented and developed by the Coastal Imaging Lab of Oregon State University) implemented for the capture and understanding of changes of near shore morphology since beaches are continuously changing from geological materials shifted by waves, tides, and currents moving sediments and eroding shorelines; this phenomenon carries very challenging and devastating outcomes on coastal communities. We were most interested in the intolerant and dramatic periods of storms and hurricanes (when sediment transport is more energetic and shoreline changes are more rapid).



Dr. Peter Nwilo - Nigeria & Dr. Hayden



Nigerian Student, Dr. Gilbert Rochon - Purdue University  
 Mr. Omotilewa Oluwatobum - Nigeria, Mr. Taibou Ba - Senegal



Dr. Linda Hayden, Mr. Anthony Adade,  
 Mr. Charles Luther - Past GRSS President, Dr. Gilbert Rochon

### ***Monitoring Glacial Advance and Retreat of the Skafafellsjökull Glacier, Iceland***

**Bryce Carmichael** - Senior, Computer Science, ECSU

**Amber Smith** - Junior, NC A&T

Mentor: Dr. Sridhar Anandakrishnan

Visual documentation of glaciers can provide daily, seasonal, and yearly statistics concerning their advance and retreat, as well as contribute to historical record. Recognizing how glaciers change will improve glacier models, which leads to a better understanding of climate and ice-sheet interactions. Obtaining frequent images of glaciers can be difficult since they are often located in remote locations with rugged terrain and harsh weather conditions. Access can be arduous even during warm weather months. To overcome this obstacle, we propose building an autonomous imaging device that is powered by solar panels and can withstand the harsh weather. The imaging device will have the ability to capture images of the glacier at specified times, store them for uploading, and send them over a radio link to an Internet access point. Then they will be sent back to Penn State for analysis and display at the Earth and Mineral Sciences Museum. The autonomous imaging system will contain a high-resolution digital camera, a low power Linux computer, used for the command and control of the camera, and a radio to communicate with the Internet access point. The system will be accommodated in an all-weather case designed specifically for this application.



### ***Younger Dryas Impact Study***

**MyAsia Reid** - Sophomore, Computer Science, ECSU

**Devina Hughes** - Sophomore, Computer Science, MVSU

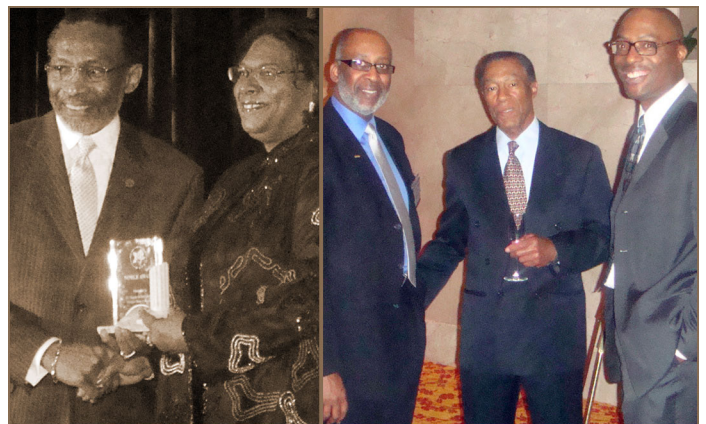
**Leroy Lucas** - Junior, Computer Science, MVSU

Mentor: Dr. Malcolm LeCompte

The events precipitating the dramatic, millennial long climatic cooling known as the Younger Dryas, that occurred approximately 13,000 years ago remain a mystery. Recent evidence suggests an extraterrestrial impact on the Laurentide ice sheet may have provided the trigger for a massive influx of fresh glacial melt water theorized to have flooded the North Atlantic and shut down the Thermohaline circulation that moderates climate in the northern hemisphere. The apparent absence of an easily identified impact crater has focused the search for evidence of an impact on a search for extraterrestrial markers embedded in the Earth's sedimentary record.



Association of an impact with coincident reduction in the numbers of megafauna species and human population of North America has suggested a strategy for the search for evidence of the impact. If an impact is responsible for initiating the onset of the Younger Dryas, the ultimate disappearance of megafauna species and the decline in human population, then the evidence should lie at the sedimentary boundary (YDB) separating the Younger Dryas from the preceding Bolling-Allerod at a depth corresponding to 12,900 years before present. The research project included an investigation of local paleo-lake depressions known to harbor impact markers and whose stratigraphy could have revealed a clearer understanding of the processes that shaped the coastal topography during the Younger Dryas. The research was carried out using a combination of Ground Penetrating RADAR (GPR) and sample coring to probe the subsurface deposits of selected depressions.

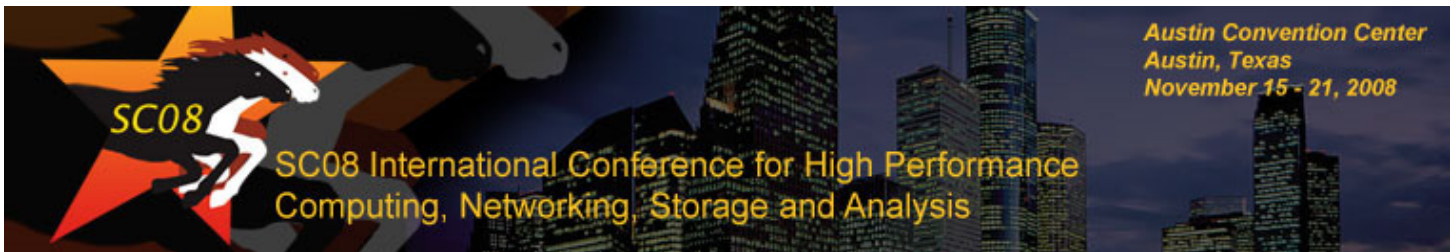


### **Linda Hayden**

#### **2009 NAFEO NOBLE Prize Laureate**

Dr. Linda Hayden was awarded the 2009 National Association for Equal Opportunity in Higher education NOBLE Prize award on April 4, 2009 at the 2009 NAFEO Conference in Atlanta, GA. Dr. Hayden received this award for her work in education and research as Director of the Center of Excellence in Remote Sensing Education and Research at Elizabeth City State University.

This award went to faculty members of HBCU's and PBIs who were distinguished as teachers or researchers in at least ten high need or growth disciplines: the sciences; technology; engineering; mathematics; health professions; law; economics; foreign languages or foreign affairs; teacher education; "peace, justice, equity or ecumenism."



Austin Convention Center  
Austin, Texas  
November 15 - 21, 2008



## 2008-2009 URE Academic Year Research Teams

### Examining the Utilization of the Polar Grid Resources to Help Scientists Research and Solve Real World Problems

Mentor: Dr. Eric Akers      Bryce Carmichael  
Unquiea Wade      Lee Godley, III

### Defining the Antarctic Ground Line

Mentor: Dr. Malcolm LeCompte  
Jamika Baltrop      MyAsia Reid

### Applying the National Aeronautics and Space Administration's Concepts to Virginia's Third Grade Mathematics Standards: Traveling to the Moon

Mentor: Dr. Darnell Johnson      Tiwana Walton      Patrina Bly

### Variations of Inherent Optical Properties of Seawater on a Transect from Elizabeth City to the Real-Time Albemarle Sound Observing Station

Mentor: Dr. Jinchun Yuan      Lee Smalls, Jr.      Justin Deloatch

### Installation of an Ubuntu-Based Condor Cluster

Mentor: Mr. Je'aime Powell  
Vernon Brown      Michael Jefferson      Chelsea Vick

### Evaluation and Implementation of Web 2.0 Technologies in Support of CReSIS Polar and Cyberinfrastructure Research Projects at Elizabeth City State University

Mentor: Mr. Jeff Wood      Michael Austin      Robyn Evans  
Jean Bevins      Tevin Baskerville      Joyce Bevins

### A Study of Ph, Salinity, and Clarity of Water Samples from Various Locations Around the World

Mentor: Mr. Kaiem Frink      JerNettie Burney      Ryan Winder  
Serenity Pender      Bernard Lynch, Jr.

### Traveling Back to the Moon with NASA's DLN

**Tiwana Walton** - Junior, Computer Science, ECSU  
Mentor: Caryn Long, DLN Assistant Manager

The project development of a new NASA Digital Learning Network (DLN) module was mathematically based and tied to NASA concepts/missions. This world of interactive learning with NASA's DLN is available to teachers and students across the country to learn more about our home planet. DLN Coordinators conduct modules to students across the country at various times convenient to schools throughout the year.



In order to understand the communication medium required to create a module and educate students, I trained with LaRC's DLN Coordinator and Assistant Manager to effectively present the module, Magnificent Sun, to several schools across the country using distance learning equipment at NASA LaRC and the school where the module was presented. The conduction of module presentations on a variety of K-12 student levels allowed me to practice/develop instructional and presentational skills through distance learning. Upon completion of the module presentation phase of my internship, inservice was conducted by DLN Coordinators at Kennedy Space Center and the Jet Propulsion Laboratory on how to develop a module.

For more information visit our web site: <http://nia.ecsu.edu/ur.html>

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