E L I Z A B E T H C I T Y S T A T E U N I V E R S I T Y

REU Site: Arctic and Antarctic Project with Research Experience for Teachers Component

Center of Excellence in Remote Sensing Education and Research

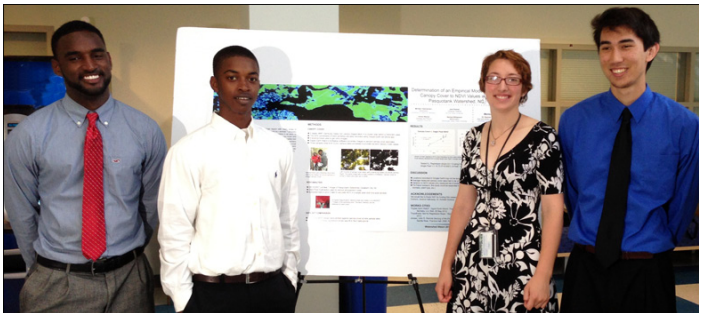
Summer 2013 Research Abstracts :: 2013-2014 Program Highlights

Zazie Lumpkin, Dorias Brown - SC
Donquel Davis - WSSU
Mentor: Mr. Jerome Mitchell

Estimating Surface and Bedrock layers in Polar Radar Imagery using Active Contours



Global climate change is an imminent threat to sea levels. Earth's ice sheets continuously melt due to greenhouse gases. If both the Greenland ice sheet and the Antarctic ice sheet were to completely melt, the sea level would rise 66 m according to the National Snow and Ice Data Center. With the constant melting of these two ice sheets, glaciologists need to detect either their melting rate or rate of depreciation. The problem is that glaciologists often spend extensive hours 'ground truthing' or manually detecting and outlining desired layers of ice sheets within echograms. Is there a way that this process can be modified in order to produce accurate results in a fraction of the time? Using an active contour methodology, we will compare several different approaches including levelsets, snakes, and a hidden markov model to the previously outlined ground truth layers. We will then use these results to answer the question: "What is the best method to use in finding/creating an automated system for ice sheet layer detection?" In addition, we used genetic algorithms to find the optimum layer detection parameters. With genetic algorithms, each individual image will be able to gather a set of its very own optimum parameter data for desired layer outlines. We continued this research and began our work with coding the snakes' approach and next, we used genetic algorithms to modify this approach. At the end of our research project, we found an automated process to accurately and efficiently identify distinct ice sheet layers (e.g. bedrock, surface, etc.). Our research efforts will revolutionize the glaciology community by no longer requiring hours of ground truthing, but allowing easy identification of the glacier's rate of depreciation from any given echogram.



Emma Reeves - HU
Michael Chamberlain - UC-B
Mentor: Mr. Peter Burkett - PSU

Using CReSIS airborne radar to constrain ice-volume influx across the lateral shear margins of the Northeast Greenland Ice Sheet


The Greenland Ice Sheet (GIS) is one of the largest ice sheets on Earth. Movement of large volumes of ice from stable interior regions to rapidly flowing, calving, or melting margins of this ice sheet can have a significant impact on sea level. The Northeast Greenland Ice Stream (NEGIS) is an unusual ice stream that extends farther inland than any stream on the GIS. NEGIS is widening downglacier due to an influx of ice across its shear margins. The margins of NEGIS are underlain by de-watered zones that restrict the volume of entering ice and maintain the stream's relative stability. Removal of these restricting bands could lead to a major influx of ice into NEGIS and a significant drawdown of GIS. Through the use of airborne radar, we develop a method to quantify the ice-volume influx across the stream's lateral shear margins. These constraints on ice-volume influx establish a baseline for future studies interested in monitoring NEGIS' margins and understanding its stability.

Bernard Aldrich Jr. - JSU
Mentor: Dr. John Paden

Implementing a Snake Tool to Track the Ice Surface and Ice Bottom in a Radar Echogram

The Center for Remote Sensing of Ice Sheets (CReSIS) has collected hundreds of terabytes of radar depth sounder data over the Greenland and Antarctic ice sheets. This data has multiple purposes in the field of glaciology, including the measurement of ice bottom elevation which is used in the input-output method for estimating the mass balance and in ice sheet models. To do this, the ice surface and ice bottom need to be tracked in the radar echograms. An algorithm that is written in Python provides an accurate and efficient tool for tracking the ice surface and the ice bottom and will be converted and imported into native MATLAB code so that it can be used with CReSIS's image browser and picker tool which is MATLAB based. This Python algorithm is based on a global snake method with simple cost functions. With the implementation of this function in MATLAB, tracking and picking the surface and the ground under the ice will make for a faster process than manually tracking the surface.

International Symposium on Radioglaciology

The Center for Remote Sensing of Ice Sheets (CReSIS) at the University of Kansas hosted the International Glaciological Society's (IGS) International Symposium on Radioglaciology in Lawrence, Kansas, September 9-13, 2013. Representatives from the Center of Excellence in Remote Sensing Education and Research (CERSER) at Elizabeth City State University (ECSU) gave presentations on their research. CERSER Director and CReSIS Associate Director of Education and ECSU Operations Dr. Linda Hayden led the ECSU contingent at the symposium.

The IGS Symposium included presentations from international researchers and provided a forum for participants from around the world to exchange scientific information. The symposium involved technological improvements in radars and signal processing techniques for exploring ice-sheets, glaciers, and their geophysical settings. CReSIS co-hosted the symposium with the University of Kansas, the KU School of Engineering, and the National Science Foundation (NSF).

Maya Smith - WSSU

Mentor: Dr. John Paden

Analysis Functionality to enhance MATLAB default interpolation schema using mGstat

The Center for Remote Sensing of Ice Sheets (CReSIS) has a large database that is examined by many researchers. This project consists of two enhancements to the CReSIS toolbox. The first, addressed the need for extended analysis functionality in MATLAB. The objective of this project was to enhance MATLAB's default interpolation schema by using the mGstat package for the interpolation of point data. To accomplish this, we needed to download and install the mGstat package then review the mGstat documentation and functionality. We then tested the mGstat interpolation methods by using the mGstat examples and later tested the mGstat interpolation methods using CReSIS data. The second project is a JavaScript viewer for echogram data that will be integrated into the web interface for the CReSIS geospatial database.

Change the World: Education Outreach

On September 27 and 28, 2013, representatives from Elizabeth City State University's Center of Excellence in Remote Sensing Education and Research (CERSER) presented at the National Science Foundation's "Change the World" Science and Engineering Career Fair as part of the Center for the Remote Sensing of Ice Sheets (CReSIS) Education Outreach program. CERSER staff and students presented interactive lessons ranging from "Ice, Ice, Baby" lessons utilizing "goo" to represent glacier movement to online tutorials and quizzes presenting knowledge of the Antarctic, Arctic, and Greenland ice masses. Dr. Linda Hayden, director of the CERSER program and CReSIS Associate Director - Education and ECSU Operations, supervised the presentation and assisted a group of teachers, elementary, high school, and college students from the Elizabeth City area who arrived on Saturday for the presentations.

Research Experience for Teachers

Malcolm McConner, Jessica Hathaway - ECSU (RET)
Ricky Dixon - MVSU (RET)
Mentor: Dr. Darnell Johnson, ECSU
Using Common Core State Standards of Seventh Grade Mathematics in the Application of NXT LEGO® Robotics for CReSIS Middle School Students

In 2010, Common Core Standards included critical content for all students in American education for forty-five states. Previously, every state had its own set of academic standards, and students in each state were learning at different levels. In the new global economy, all students must be prepared to compete on a global basis. Students are expected to develop a deeper mastery of content and demonstrate what they know through writing and other projects. The North Carolina Department of Public Instruction's (NCDPI) current curriculum and instruction are more student-centered with a greater focus on skills, abilities, and a shift towards more performance assessments. This research was designed to focus on the mathematical processes of the Common Core Standard in mathematics lesson plans for seventh grade students. A group of seventh grade students from two Elizabeth City Public Schools middle schools in northeastern North Carolina were selected for this research at Elizabeth City State University (ECSU) for the Center of Remote Sensing of Ice Sheets (CReSIS). Pre and post test data were collected through student assessments and teaching observations to evaluate student growth in content knowledge, understanding, and application. The Research Experience for Teachers (RET) Team used mathematical strategies to teach various scientific, mathematical, and design concepts through designing and programming NXT LEGO® Robotics for the seventh grade level. The students received hands on experience in robotics construction and programming with the application of mathematics, motion, and problem solving in a collaborative group setting.

Courtney Farmer - ECSU (RET), Kalyx McDonald - MVSU
Mentor: Mr. Je'aime Powell, ECSU
TeraScan Curriculum Development and Integration of SeaSpace Technology into the Classroom

Seaspace and Elizabeth City State University (ECSU) signed a Memorandum of Understanding (MOU) in February of 2012. Seaspace is the world's leading provider of satellite ground stations and processing software for remote sensing applications. The MOU stated that ECSU would provide a training site for Seaspace's technology and data products along with integration of the products into classroom curriculum. In return, Seaspace would provide ground stations for receiving direct broadcast data from various telemetries. The ground stations include a 3.7 m X/L band, a 3.6 m C band, and a 5.0 m L band dishes, along with accompanying computing hardware. The purpose of this project was to generate a training curriculum focused on the K-12 classroom, along with college courses and outside governmental agencies. The curriculum contains one hour modules that can be presented as a 10-hour course that qualifies as one continuing education unit (CEU) for K-12 teachers and administrators. Example modules for "Introduction to Remote Sensing" and "Introduction to the TeraScan" were also created.

Ya'Shonti Bridgers - ECSU (RET)
Mentor: Dr. Geoffrey Fox, IUB
X-Informatics MOOC: Web Development and Design

Online learning is an upcoming trend in the education world today. As technology improves, additional institutions are developing online classes using sites such as Massive Open Online Course (MOOC) and Coursera.

Indiana University, school of Informatics and Computing, is one of the many schools that have chosen to get students enrolled in online classes. One of these classes is the Big Data X-informatics MOOC, on which our research is based. We are currently exploring methods to make online learning more effective for the students.

Therefore, we are to invent ideas to create features that will improve interaction between the educational content and the user (students and professors). First, surveys were made on other online educational sites like Coursera, Udemy, edX, Udacity, Duolingo, course builder, and Khan Academy. This was to observe features on these sites that enabled effective interaction with the different calibers of students and the sites and features that did otherwise. Our findings enabled us to create new features or modify old features that enhance student-service interactivity. Furthermore, having gained knowledge from articles like "Design Principles for Visual Communication," "Visual Communication," and "Peer Instruction in CS: Research and Experience," we are using AXURE to create the near-perfect design/wireframes with the observed features that will interact effectively with the student catalyzing efficient learning.

Dorothy Brice - VUU, Robin Brice - FSU
Anthony Lynn - WSSU

Mentor: Mr. Jeffrey Wood, ECSU

A comparative study of the 2011/2013 water quality assessments in the Pasquotank Watershed in Northeastern North Carolina



The Pasquotank River Watershed is found in Northeast North Carolina beginning in the Great Dismal Swamp at the Virginia/North Carolina border and flows into the Albemarle Sound. The watershed provides a transition between spawning grounds and the waters of the Albemarle Sound. The sound serves as a nursery area for many fish species and is home to numerous sport and commercial species. The watershed is supplied by tributaries enclosed by various landforms, such as swamp, farmlands, and housing development. These landforms make both negative and positive contributions to the water quality of the watershed.

The research team completed tests of five tributaries and the river itself. These test points were derived from a 2012 research project in order to compare the results. Streams tested were Newbegun Creek, Knobbs Creek, Areneuse Creek, Mill Dam Creek, and Sawyers Creek. This test area covered a large portion of the watershed and provided a variety of shorelines.

Tests performed on this year's samples included measurements of pH, salt, total dissolved solids, and conductivity. Air/water temperature, dissolved oxygen, wind speed/direction, and turbidity/clarity measurements were taken in the field. The results from these readings were placed in an online database and correlated to the location of the sample using Google Maps®. The data were then compared to the 2011 project data and analyzed for any variations or similarities.

Jazette Johnson - SC, Jimil Perkins - NSU

Mentor: Mr. Jerome Mitchell - IUB

Developing a Remote Sensing and Cloud Computing Curriculum for the Association of Computer/Information Sciences and Engineering Departments at Minority Institutions


In the past decade, online learning initiatives have become increasingly comprehensive and have allowed students to be unburdened from learning complex subjects in a traditional teach-learn environment. Universities have recognized the need to adapt new teaching-learning approaches to meeting students' diverse needs. Cloud computing, which offers a scalable and flexible approach to storing, processing, and analyzing big data, has benefited from a variety of science applications with the notable exception of remote sensing. The research explored the potential for a cloud computing and remote sensing curriculum through the use of video resources and hands-on assessments. This research discusses a curriculum for coupling two diverse research areas, cloud computing and remote sensing. The solution acquired information about cloud computing and remote sensing in order to develop five 15-20 minute self-contained modules. The challenges faced by minority serving institutions in adapting from a teaching-learning environment to an online environment were also explored.

NOBCChE 40th Annual Conference

On October 1-4, 2013 Dr. Linda Hayden, along with Dr. Sudhakar Pamidighantam, presented information on the Science Gateways Institute and how it could support chemistry research at the National Organization for the Professional Advancement of Black Chemists and Chemical Engineers (NOBCChE) Conference. Dr. Hayden, is Director of Elizabeth City State University's Center of Excellence in Remote Sensing Education and Research (CERSER) and leads the NSF Science Gateway Institute workforce development efforts. Dr. Pamidighantam is Senior Research Scientist at the National Center for Supercomputing Applications (NCSA) at the University of Illinois at Urbana-Champaign and leads GridChem Science Gateway development. Over 35 minority chemistry students and faculty from 14 universities along with industry leaders attended the leadership development workshop.

Tyler Berry - HINU

Mentor: Dr. Fernando Rodriguez-Morales

Dielectric measurements using a vector network analyzer

Sea level is strongly linked to the growth and shrinkage of the large ice sheets in Greenland and Antarctica. There is an urgent need to improve both knowledge of ice dynamics and accuracy of ice-sheet models to predict the ice-sheets' response to a warming climate and their contribution to sea level rise. A key component to improving the ice sheet models through the use and interpretation of radar data is knowledge of the dielectric properties of ice. Most of the measured data on the dielectric properties of ice available today is based on measurements performed at low frequencies with the technology available in the 1960s. In this project we designed and fabricated a set of test fixtures to characterize the permittivity of dielectric materials using a network analyzer. One technique relied on a planar transmission line in contact with the sample. The second technique relied on an open ended coaxial transmission line in contact with the sample. These methods will serve as a basis for dielectric measurements on dielectric materials in the 60-600 MHz range and will be used as a test bench for future measurements on ice cores.

Michael Cobb, Kelechi Onyiriuka - ECSU
Rashad Williamson - MVSU

Mentor: Dr. Malcolm LeCompte ECSU

Early North Carolina Colonial and Native American Ground Penetrating Radar Site Surveyal

The earliest English colonial populations in the new world spread rapidly through southeastern Virginia and northeastern North Carolina in the late 16th and early 17th centuries. These peoples had to overcome insufficient food sources, threat of attack by hostile indigenous peoples, and even hostile European powers. Early, mutually beneficial, contact and relations with non-hostile Native Americans were often sought by European colonists as a survival strategy. Sites characterized by close proximity between colonists and natives are well known in northeast North Carolina. Opportunities for participating in the archaeological investigations of early historic colonial sites became possible with a collaborative research effort undertaken with the Museum of the Albemarle (MOA) and the Elizabeth City State University's Center of Excellence in Remote Sensing Education and Research (CERSER) in June 2012. Students in a summer research program for undergraduates have engaged in a Ground Penetrating Radar (GPR) survey of a site related to the Culpeper Rebellion of 1677. This summer, in collaboration with MOA, a high-resolution GPR survey was performed of a known Native American settlement site that existed in close proximity to early colonial habitations near Edenton, NC, on the Chowan River. The survey was designed to reveal the presence of any buried remnant structures that might indicate adoption by Native Americans of cultural features of colonial life such as defensive fortifications, or structures that may have served either religious or commercial purposes such as a church or trading post. Alternatively, evidence for the presence of dwellings might indicate a closer affiliation between struggling colonists and the indigenous population. The survey team used the Geophysical Survey Systems SIR-3000 Utility Scan GPR and the associated RADAN 6.6 data processing software. It performed a GPR survey at 0.5 meter spatial resolution of the most promising areas for colonist and Native American interaction as defined by prior MOA archaeological studies in collaboration with the museum's archaeologist. Data collected was processed and examined for any evidence of buried structural features. Surveying such sites with GPR is important due to modern threats to the maintenance of their pristine state. Threats to such sites include residential development, forestry operations, agricultural, and increasing shoreline erosion.

Summer 2013 Workshop for MSI Faculty

University of New Hampshire, July 29 - August 2, 2013

Elizabeth City State University joined with the University of New Hampshire under the NASA Innovations in Climate Education (NICE) Program to empower the faculty of education programs at Minority Serving Institutions to better engage their pre-service teachers in teaching and learning about global climate change through the use of NASA Earth observation sets. The workshop provided the faculty with approaches to understanding climate change and its impacts on terrestrial and ocean ecosystems. The faculty conducted field work that emphasizes place-based pedagogy. They worked with an ecological model in STELLA that utilizes authentic inputs from historical and future climate scenario parameters, studied NASA satellite imagery data from the MODIS and SeaWiFS sensors, and discussed the challenges and approaches to integrating all or some of the lessons into their courses.

Renee Butler - HINU

Mentor: Dr. David Braaten

Accumulation Layer Picking

Radar data collected with a FWCW CReSIS radar operated on a 375 km surface traverse along the ice divide in North-Central Greenland in 2007 are being used along with ice core data along the traverse to better understand the layers detected by radar. The layers being picked are from two 10 km segments of the radar data set. The segments are deeper than 30 m to a maximum depth of 100 m and date back more than 400 years. The layers are used in a similar manner as tree rings to understand whether or not annual layers are missing and if the vertical distance between layers (slab thickness) includes more than one year of snowfall. The slab thickness is related to the annual accumulation of snowfall; thicker slabs mean more snow and thinner slabs mean less snow during the year. Nearby ice core data were used to understand the chronology (the science of arranging events in their order of occurrence in time) of the layers. The ice core data also provided ice density profile measurements, which were used to more accurately calculate the radar signal propagation speed through the ice. This provided increased accuracy of determining the internal layer depths and is quantified in my paper.

Justin Deloatch - ECSU

Mentor: Dr. Geoffrey Fox, IUB

Utilizing HUBzero to Create an Educational Hub for CReSIS Educational Data Sets

HUBzero is an open source software package used to construct web sites for scientific research and educational activities. Hubzero was originally created by researchers at Indiana University – Purdue University Indianapolis (IUPUI) in conjunction with the National Science Foundation (NSF), who sponsored the Network for Computational Nanotechnology to support nanoHUB.org. The HUBzero platform currently supports over 40 hubs across a variety of disciplines, including cancer research, biofuels, climate modeling, water quality, and education.

This project utilized data from the Center for Remote Sensing of Ice Sheets (CReSIS), which was established by the NSF as a Science and Technology Center in 2005. CReSIS has a mission of developing new technologies and computer models to measure and predict the response of sea level change to the mass balance of the ice sheets in Greenland and Antarctica. Their website offers enormous amounts of ice sheet data, including information on thickness, dates, latitudes and longitudes. The website also offers educational data sets, which this project has utilized.

The goal of the project was to create a Hub that has the ability to access CReSIS educational data that has been stored on a server on the Elizabeth City State University (ECSU) campus. This Hub will allow students and educators to have access to this information for the purpose of educational and scientific collaboration. HUBZero requires that the administer use Joomla, HTML, CSS, and PHP code to create the template. HUBZero also uses an application called Raptture to create a Graphical User Interface (GUI) that is capable of deploying new tools without having to rewrite special code for the web. Tools in a hub have been created to be interactive, which means it's capable of zooming in on a graph, rotating a module, and probing surfaces of a 3D volume without having to download the application to the client's computer. Due to the fact that HUBZero supports Grid Data management, it is capable of sending jobs off to TeraGrid, DiaGrid, and RedCloud to process the data faster and more efficiently. This Hub is the first science gateway implemented at Elizabeth City State University that is meant for the public.

Derek Morris - ECSU

Mentor: Dr. Gregor van Laskewski, IUB

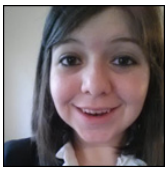
From 0 to 100: Cloud computing for the Non-Programmer

This project will be demonstrating that it is possible to use and program a cloud within seven weeks, even though the student has no prior research or programming experience. The student was faced with identifying what a cloud is as an abstract concept. The student was exposed to the absolute minimum level of programming needed to program the cloud. Small programming exercises and lessons were given allowing the student learn abstractly about the cloud and experience using the cloud in a production setting. We demonstrated that at the end of this period, the student was capable of using hundreds of virtual machines and controlling them from a program.

Tamara Gaynes - KU

Mentor: Dr. Fernando Rodriguez-Morales

Measurements and simulations for the optimization of a microwave FMCW radar



This project focuses on the optimization of a frequency-modulated continuous wave (FMCW) radar. This was accomplished by performing measurements using a vector network analyzer (VNA) and using computer simulations to characterize the response of both the radar components and the radar system. CReSIS uses FMCW airborne-radar to measure surface elevation, snow cover thickness over sea ice, and internal layers over land ice in Antarctica and Greenland.

Calibration measurements were performed using a target built with an electro-optical transceiver attached to fiber optic delay lines of various lengths. This was done to simulate operation at different elevations over the target and assess how the response of the radar changes with range. The measured response of the transmitter and receiver chains and delay line targets were imported into Agilent Advanced Design System and Genesys and used to simulate the actual response of the radar. The simulation results were compared with the measured results. This information was used to determine how to improve the operation and calibration of the radar to produce the most accurate measurements. This project required learning about radar systems and the use of the VNA, computer aided design tools, and simulations.

ADMI Introduction to Science Gateways

A Science Gateway is a community-developed set of tools, applications, and data collections that are integrated and exposed through a graphical user interface, typically a web application. Gateways provide access to a variety of capabilities, including workflows, visualization, resource discovery, and job execution services. This workshop introduced participants to common uses of Science Gateway, highlighted several approaches to modern gateway design, and walked them through the process of building and customizing science gateways using existing platforms while learning from others who are doing the same thing.

The ADMI Introduction to Science Gateways Workshop was held August 6-8, 2013 on the Elizabeth City State University campus in the Center of Excellence in Remote Sensing Education and Research. Featured speakers included Dr. Michael McLennan of Purdue University's Rosen Center for Advanced Computing, Dr. Rion Dooley of the Texas Advanced Computing Center, and Dr. Stephanie Barr of the National Center for Atmospheric Research.

IEEE Geoscience & Remote Sensing Symposium

On July 21-26, 2013 Dr. Linda Hayden, Principal Investigator of the Center of Excellence for Remote Sensing Education and Research (CERSER) at Elizabeth City State University attended the 2013 IEEE Geoscience and Remote Sensing Symposium in Melbourne, Australia. This 33rd annual symposium celebrated accomplishments over three decades of leadership in remote sensing instrumentation, techniques, and applications development. The Symposium brought together world-class scientists, engineers, and educators engaged in the fields of geoscience and remote sensing. The symposium theme was "Building a Sustainable Earth through Remote Sensing" and emphasized the issues that most affect the Earth's environment, as well as the human impact on the planet. This year's supported students are listed below.

Awo Manson - University of Ghana
Impacts of Shoreline Morphological Change and Sea Level Rise on Mangroves; the Case of the Keta Coastal Zone

Jerome Mitchell: Indiana University
A semi-automatic approach for estimating near surface internal layers from snow radar imagery

Delandria Jones: Alcorn State University
The linkages between stem education and homeland security sciences and management

2013 American Geophysical Union Fall Meeting

On December 9-13, 2013, representatives from various Historically Black Colleges and Universities attended the 2013 American Geophysical Union (AGU) Fall Meeting in San Francisco as representatives of the NASA Innovations in Climate Education (NICE) program. The AGU Fall Meeting is the largest conference in the geophysical sciences with earth and space scientists, students, teachers, and others in attendance.

NASA NICE Representatives

- Dr. Linda Hayden - ECSU
- Dr. Darnell Johnson - ECSU
- Dr. Loretta Jaggers - GSU
- Dr. Edward Hill - FVSU
- Dr. Sheryl Bradford - ECSU
- Dr. Suseela Reddy - JSU
- Mr. Ervin Howard - ECSU
- Mr. Kaiem Frink - VUU

ORAL PRESENTATION

Dr. Linda B. Hayden, Dr. Stephen R. Hale, Dr. Darnell Johnson
Engaging Minority University STEM Education Professors in the Science of Climate Change: Recruitment, Implementation, Evaluation, and Dissemination

POSTER PRESENTATIONS

Dr. Loretta Jaggers
The NASA Innovations in Climate Education Project: Instructional Strategies for Expanding Climate Change Concepts within Reading/Literacy Skills

Dr. Darnell Johnson
The Impact of 2006-2012 CReSIS Summer Research Programs that Influence Student's Choice of a Stem Related Major in College

Mr. Kaiem Frink, Mr. Ervin Howard, Dr. Edward Hill
NASA NICE Climate Change Education: Best Practices for Incorporating Climate Change Pedagogy

ECSU Research Week 2013

The School of Mathematics, Science and Technology welcomed honored guests and participants to the 2013 9th Annual Research Week. This week enabled the Elizabeth City State University family, the citizens of Elizabeth City, and surrounding counties to participate in informative presentations by student researchers and their mentors, as well as workshops and seminars featuring government officials and private industry representatives. There were also outstanding demonstrations from departments within the School of Mathematics, Science and Technology and from scientific organizations.

This year's theme was "Celebrating STEM Success." Oral and poster presentations representing research, lectures, panel presentations for academic discussions, and prominent speakers, including Dr. Gamaliel Cherry of the NASA Langley Research Center, were all part of the week.

Gender Summit 3 North America

Dr. Linda Hayden, Director of the Center of Excellence in Remote Sensing Education and Research (CERSER) and Associate Director - Education and ECSU Operations for the Center for Remote Sensing of Ice Sheets (CReSIS), recently attended the Gender Summit sponsored by the National Science Foundation and others in Washington DC.

The aim of the 3rd Gender Summit is to join all relevant participants in a Call to Action to achieve positive change towards greater diversity in the Science, Technology, Engineering and Mathematics (STEM) workforce and leadership, as well as greater inclusion of biological sex and gender considerations, or the "gender dimension," in research content and process. The event was held from 13 - 15 November 2013 at the Washington Hilton in Washington DC.

Attendees pictured below left to right:
Linda Hayden, Elizabeth City State University
Loretta Moore, Jackson State University
Cynthia Winston, Howard University
Sonya Smith, Howard University
Kelly Mack, University of Maryland Eastern Shore

2010-2013 Participating Institutions

Minority Serving Institutions (MSI)

Elizabeth City State University (ECSU)
Fayetteville State University (FSU)
Hampton University (HU)
Haskell Indian Nations University (HINU)
Jackson State University (JSU)
Mississippi Valley State University (MVSU)
Norfolk State University (NSU)
Spelman College (SC)
St. Augustine's College (SAC)
Virginia Union University (VUU)
Winston-Salem State University (WSSU)

Non-Minority Serving Institutions (Non-MSI)

Cornell University (CU)
Dartmouth College (DC)
Gettysburg College (GC)
Kansas State University (KSU)
Macalester College (MC)
Rice University (RU)
Rochester Institute of Technology (RIT)
Texas A&M University (TAMU)
Towson University (TU)
University of Kansas (KU)
Unity College (UC)
University of Alaska Fairbanks (UAF)
University of California, Los Angeles (UCLA)
University of Maryland (UM)
University of Pennsylvania (UP)
University of Utah (UU)
University of Vermont (UVM)
University of Washington (UW)

For more information visit http://nia.ecsu.edu/ur.html or http://nia.ecsu.edu/ureomps2012/
Dr. Linda B. Hayden, Principal Investigator, Elizabeth City State University
Box 672 1704 Weeksville Road Elizabeth City, NC 27909 (252) 335-3696/voice (252) 335-3790/fax
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