Since 1993, the Center for Remote Sensing of Ice Sheets (CReSIS) has been gathering ice thickness data in Greenland. This information is in various formats such as Postscript Document Format, Joint Photographic Expert Group, Keyhole Markup Language, and Comma Separated Values. These formats display data in individual visualizations while another format, Matrix Laboratory, displays multiple sources of data. The goal of this project was to combine the non-MATLAB visualizations into one window utilizing the PHP Hypertext Preprocessor scripting language and Google Earth. These product files would be simple in their construction, easily adaptable to new data formats, and provide continued display of newly acquired data. The PHP Hypertext Preprocessor language was used to modify the Keyhole Markup Language files to add description tags in order to display data from other formats. The combined files were displayed in the geographical program Google Earth available as a free download to users.

SEAPAC 2012, Seattle, WA
February 27-Mar 2, 2012
National Center for Atmospheric Research (NCAR), Boulder, Colorado
The SEAPAC 2012 conference focused on issues of science and education for the Pacific. The conference gathered scientists and students from the Pacific Basin and beyond.

Elizabeth City State University
Center for Remote Sensing of Ice Sheets (CReSIS)
The University of New Hampshire Center for Remote Sensing Education and Research (CReSIS) was established in 2002 as a Center of Excellence within the Department of Earth Science at the University of New Hampshire. The mission of CReSIS is to provide opportunities for undergraduate students to conduct research in remote sensing and related disciplines. CReSIS is supported by a grant from the National Science Foundation and by the University of New Hampshire.

Elizabeth City State University
Cobbs Point Culpeper Rebellion Archaeology Project
The Cobbs Point-Culpeper Rebellion Archaeology Project is a joint initiative between the Center for Remote Sensing Education and Research (CReSIS) at the University of New Hampshire and the Cobbs Point History Project at Elizabeth City State University. The project is funded through a grant from the National Science Foundation and is led by Dr. Malcolm LeCompte, ECSU, and Dr. Robert Taft, UNH.

Elizabeth City State University
Summer Research Experience (SURE)
The Summer Research Experience (SURE) program is a six-week summer research program for undergraduate students at Elizabeth City State University. The program provides students with hands-on research experience and helps them develop the skills needed for a successful career in science.

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The Pine Island Glacier region of Antarctica is an area of great interest due to its sensitivity to climate change. Pine Island Glacier is located in Western Antarctica and drains a large portion of the West Antarctic Ice Sheet. It has shown to be particularly vulnerable to glacial ablation [1]. The 2012 Research Experience for Undergraduates (REU), Ocean Marine Polar Science (OMPS), Penn State Team analyzed CReSIS radar data to identify the ice-surface and ice-bottom features. From this, both elevation and ice thickness at Pine Island Glacier were determined. The team utilized MATLAB along with an add-on picker program; The Pennsylvania State Environment for Seismic Processing (PSESP), developed at Pennsylvania State University. MATLAB is a programming environment that analyzes data as well as many other technical processing applications. With the picker program the team selected specific, maximum-strength radar peaks on individual radar traces and applied a formula to compute the distance traveled by the signal. The distance traveled from the surface and bottom features was calculated to produce an ice thickness map. The results will provide data that will aid in modeling of the Pine Island Glacier.

CReSIS is developing state-of-the-art ice penetrating radars to study ice sheets and how they are changing, but they need a way to move the radars across these very large areas of ice. The radars must travel very close to the surface, and always point straight down toward the center of the earth to maximize data accuracy. This research project provides a solution by implementing the engineering design process to design a sled on which multiple radar antennas can be mounted so that they may be towed across glaciers. Design parameters that must be included for the sled are: the cost and ease of constructing the sled, the freezing temperatures, the size of the sled, the structural integrity of the sled with respect to the stresses and strains experienced during handling and operation. After the sled is created in a computer-aided design (CAD) model to meet all the specifications, it will be analyzed for structural efficiency, verified for antenna performance, and given time fabricated based on the CAD specifications. Once available to CReSIS researchers and collaborators, this sled will be used in ground field expeditions, traversing long distances in subzero temperatures to help CReSIS research large, complicated glaciers and how they are changing.

IEEE GEOSCIENCE & REMOTE SENSING SYMPOSIUM

Elizabeth City State University students and researchers attended the 2012 IEEE Geoscience and Remote Sensing Symposium in Munich, Germany. This 32nd 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 2012 Symposium theme was “Remote Sensing for a Dynamic Earth” focusing on the characterization of dynamic Earth processes, assimilation, integrated Earth observing systems and current as well as the next generation of satellite missions. Supported students are listed below.

Joel Dushock: Elizabeth City State University: The Spectral Reflectance of Ship Waves between 400 and 500 Nanometers

Michael Jefferson: Elizabeth City State University: Temporal Reduction and Loss of an Ice Shelf in Pine Island Bay, Antarctica 1972 - 2003

Nurzeyze Dykes: Spelman College: Charles Creek Flood Zone Modeling: A Correlation Study of Environmental Conditions versus Water Level in the Pasquotank Watershed


Ignatius Williams: University of Ghana: Development of an Algorithm to Predict Coastal Buoy Temperature from Advanced Very High Resolution Radiometer

Mamadou Tiar-Tiendume: Kwame Agyeke: University of Ghana: Development of an Algorithm for Automatic Detection of Oil Sticks from Synthetic Aperture Radar Imagery in the Gulf of Guinea


Warick Abdulla: Jackson State University: Ocean-Atmospheric Interactions, Heavy Precipitation, and Hurricane Predictive Index Associated With Land-Falling Eolian Inputs Over the Eastern Coast of the United States

CReSIS (Center for Remote Sensing of Ice Sheets) designs several radars for use in remote sensing the cryosphere. This work involves modifying the frequency modulated continuous wave (FMCW) radars. Our radars are designed to operate at altitudes centered on 1500 feet. We are testing to see if we can calibrate them to improve the side lobe and dynamic range performance in a way that will allow operation up to 65,000 feet. With FMCW radars, distortion in the signal after transmission is expected. However, the distortion in the signal can be measured and is predictable. Predistortion of the signal before transmission should be opposite to the distortion of the system so that the two cancel each other out when the signal is returned, ending with a clear, easy to transmit signal. We will be calculating the distortion received from the signal at 65,000 feet and testing whether predistortion of the transmit signal and recombining the receive signal to clean the signal is possible or not.

SCIENCE CLOUD SUMMER SCHOOL

Ten faculty, graduate students and IT professionals from ADMI institutions participated in the Virtual School of Computational Science and Engineering Cloud Summer School July 29 – August 3, 2012 held at Indiana University. The participants represented seven minority serving institutions and one majority institution. ADMI Inc. provided transportation, stipends and housing for the participants using funds from their CReSIS grant. The Science Cloud Summer School targeted education and training of the fostered and surrounding the topic around the cloud of computational sciences in science. Because cloud computing systems and technologies provide a considerable departure from traditional models and evolve at a rapid pace, this event provided a basis for participants’ intensive curriculum to learn fundamentals and experiment with these technologies in practice. Current CReSIS Ph.D. candidate, Jerome Mitchell served as one of the VSCSE instructors during the workshop which was organized by Dr. Geoffrey Fox.
Kwame Agyekum, Amadu Alfa Sefah-Twerefour
University of Ghana

Mentors: George Wiafe, Kwame Adu Agyekum, UG
Development of an Algorithm for Automatic Detection of Oil Slicks from Synthetic Aperture Radar Imagery in the Gulf of Guinea
The week’s activities also included the signing of a Memorandum of Understanding between ECSU’s Center of Excellence in Remote Sensing Education and Research and the SeaSpace Corporation. This signing involved Dr. Linda Hayden (CDERS Director), Dr. Willie Gilchrist (ECSU Chancellor), Mr. Hyong Osui (President/CEO SeaSpace Corporation), and Mr. Charles Luther (Past President of the IEEE-GRSS).

Pollution in the marine environment caused by oil spills is of great concern to coastal states due to its ecological, environmental and socio-economic impacts. The main objective of this research was to develop an adaptive oil spill detection algorithm for the Gulf of Guinea, and to estimate the location and spatial extent of oil slick in an acquired SAR image. The relevance of the use of space borne data for oil slick monitoring is evident in increased vessel traffic and oil drilling activities off the coast of West Africa. Image processing of acquired SAR image of the region involved the application of a median filter, local thresholding, classification, area calculation, and location extraction. Two dark spots were classified as slicks on Radarsat-2 imagery acquired on 18 May, 2008. The information derived from this research is essential for automatic processing and future implementation of oil slick detection and monitoring programme in the Gulf of Guinea.

Andrew Brumfield, Autumn Luke - ECSU

Mentors: Mr. Je’aine Powell – ECSU, Eric Baptiste, Karen Dubey, Jane Zeer – SeaSpace
ICSU Research Experience for Undergraduates in Ocean, Marine and Polar Sciences
Analyzing Long-Term Drought Effects on Land Surface Temperature and Vegetation Using Aqua-I Satellite Data

According to the State Climate Office of North Carolina, since 2007 the northern coastal plain of North Carolina has been experiencing a long-term summer drought. The primary goal of this research was to find a correlation between land surface temperature and vegetation due to long-term drought using satellite data. The team collected imagery data through the SeaSpace© TeraScan® system in order to produce land surface temperature and normalized difference vegetation index products. The data products were averaged into monthly and yearly composites so that the team could use TerraVision to depict the differences of values for the products.

ECU Research Week 2012
The School of Mathematics, Science and Technology sponsored the 8th Annual Research Week to enable the university and the citizens of Elizabeth City an opportunity to observe the research projects students have been conducting this past year. This week gave the opportunity to observe many accomplishments of the students and their mentors who together are making a significant contribution to the scientific community.

This year’s theme was “Viking STEM”. Oral and poster presentations representing original research, lecture, panel presentations for academic exchange, and prominent keynote speakers including CMSGT Grant Williams one of the original Tuskegee Airmen, took place during this week.

Carolyne Branecky - Rice University
Mentors: Leigh A. Stearns, C.J. van der Veen, John Paden, KU
Geothermal Heat Flux beneath the Greenland Ice Sheet Calibrated for Observed Basal Meltwater Conditions
The presence of meltwater at the base of an ice sheet can reduce basal friction and cause an increase in ice velocity, and is therefore critical for understanding ice sheet dynamics. While the production of meltwater due to pressure-melting can be modeled using direct measurements of ice thickness, surface slope, accumulation and surface temperature, the contribution of geothermal heat to basal melting is largely unconstrained. Models of the Greenland Ice Sheet (GrIS) approximate geothermal heat flux as uniform at all locations in Greenland, but this is unlikely given probable volcanoes (Fahnestock et al. 2001) and the variety of lithologies observed in ice-free regions. This study undertakes a comparison of the meltwater distribution beneath the GrIS as computed by simple force-balance methods with observed meltwater locations. A technique for the detection of meltwater by radar measurements has only recently been developed (Siegenthaler et al. 2000) and applied to flightlines over the GrIS (Oswald et al. 2008). Direct measurements of subglacial melt and basal temperatures are available at the location of several ice cores in Greenland. This study aims to constrain previous geothermal heat flux maps for Greenland by incorporating measurements of observed melt (from ice cores and airborne radar observations) into a numerical model. Considerations of the relation between meltwater production and meltwater storage given meltwater evacuation and basal freeze-on are relevant for future research on the basal conditions of ice sheets.

NASA NICE Climate Change Workshop
Elizabeth City State University currently operates a TeraScan Grounding station capable of receiving and processing imagery data collected by satellites managed by the National Oceanic and Atmospheric Administration. The imagery received in the Infrared spectrum both measures of surface temperatures and cloud cover for the eastern coast of North Carolina. Once the data sets were collected, they were statistically analyzed using the analysis of variance methodology and regression. Strong correlations were observed during the AVHRR-Bravo campaign for two of the three areas under the study. The NOAA-16 AVHRR SST emerged as the most consistent with the in situ data from the ORI7 Buoy, due to its high coefficient of determination.

Common Core Standards includes critical content for all students in American education. Forty-eight of the fifty states have adopted the standards as of 2012. 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 with students from around the world. Students are expected to develop a deeper mastery of content and demonstrate what they know through writing and other projects. Changes to curriculum and instruction are more student-centered with greater focus on skills, abilities, and a shift towards more performance assessments. This research designed to apply mathematical processes of the Common Core Standard in a lesson plan for fourth through tenth. The team used NXT LEGO® robots to teach various scientific, mathematical, and design concepts, through designing, building, and programming the robots at each level. The students’ received hands on experience with physics, mathematics, motion, environment and good research in a collaborative group setting. The data was collected through observations.

Derrick Jones-MVSU, Deezerae Little-SAC
Mentor: Dr. Darnell Johnson, ECSU
Applying Common Core State Standards in Grades 4th – 10th using LEGO Robotics

On Thursday, April 19, 2012, Dr. Reginald Fletcher of the USDA-Agricultural Research Service (ARS) in Weslaco, Texas presented “Mapping Invasive Weeds and Their Control with Spatial Information Technologies” as part of the continuing Distinguished Lecture Series sponsored by the IEEE-Geographic Remote Sensing Society. Dr. Fletcher is a soil agronomist studying the science of utilizing plants for food, fuel, feed, and fiber.
Dr. Fletcher’s research interests focus on the applications of airborne multispectral digital imaging systems, imaging processing techniques, global positioning systems (GPS), and spatial information systems for mapping of invasive weeds giant salvinia (Salvinia molesta) and Brazilian pepper (Schinus terebinthifolius) and for monitoring biological control of saltcedar (Tamarix spp.), in Texas.
Current studies have noted that there is a major increase in glaciers growing smaller over the past few decades. The cause of this is glacial retreat which happens when the exceeding of ablation is greater than accumulation. Ablation is the removal of snow and ice by either melting or evaporation from glaciers. Glacial retreat can eventually lead to rising sea levels. This study will focus on how the Jakobshavn Glacier has change over the years and include a development of a high school educational module. Using imagery collected from Space to Science, Technology, Engineering, and Mathematics Global Competitiveness Conference which took place in Washington, D.C., February 7-9, 2013. Students attended the career fair and met employers, took advantage of onsite resources designed to enhance job searches and academic careers, and received tools for a successful STEM career.

The BEYA Awards recognize the achievement of African-American leaders in the STEM fields. Mr. Je’aime Powell, of ECSU, was awarded the Student Leadership-Graduate Level award. Mr. Powell serves as the GRID Manager/Graduate Researcher/Network Analyst for the Center of Excellence in Remote Sensing Education and Research at ECSU under the direction of Dr. Linda B. Hayden.

INTERNATIONAL REMOTE SENSING CONFERENCE

On October 21-24, 2012, representatives from Elizabeth City State University attended SeaSpace’s 20th International Remote Sensing Conference in Coronado, California. The theme of this conference was “Building the Bridge to the Next Generation of Remote Sensing Scientists.” Those who attended were given information on current and future direct broadcast satellites such as NPP and GOES-R, and an introduction to the new APEX™ high resolution ground systems and products. Dr. Linda Hayden, Director of the Center of Excellence in Remote Sensing Education and Research (CERSER), Dr. Malcolm LeCompte, and Mr. Je’aime Powell along with Mr. Kwame Jeyekum and Dr. George Waile of the University of Ghana attended the conference. Dr. Hayden, Mr. Powell, and Dr. Waile delivered presentations during the conference. Chancellor Willie Gilchrist presented his congratulations to SeaSpace via video and two past interns from ECSU, Andrew Brumfield and Autumn Willie Gilchrist present his congratulations to SeaSpace via video and two past interns from ECSU, Andrew Brumfield and Autumn

ECSU has an ongoing relationship with SeaSpace which started in 2003 through the Office of Naval Research and Mr. Charles Luther who was also present at the conference. As part of this interaction ECSU will be receiving a 2.5m X 1m system in December 2012, a 3.7m C-band geostationary system which will ship in Feb 2013, and a 5.0m L Band the stationary system which will ship in June 2013.

Marvin L. Elder II-MSVU

Mentors: Dr. Latonya Garner, Cherri Hamilton, Brandon Gillette, CreSIS

Black and White in Remote Sensing

Temperature varies from location to location due to many factors, such as geographical differences, internal heat, and climate. Introducing this topic in secondary education can be a bit challenging; consequently this research is two-fold. Using a non-contact infrared thermometer, RYOBI, research was conducted to observe two t-shirts (black and white) absorbing and reflecting heat. Findings determined that these t-shirts reflected and absorbed heat differently. A hypothesis test performed at the 95% confidence interval rejected the null hypothesis that the average temperature on a sunny day of a black t-shirt was lower than the average temperature of the white t-shirt in the same condition. Data was gathered and constructed for secondary education purposes in the field of science, with some mathematics background in hopes of proving that math can provide further explanations in the assumption that black is hotter than white.

Erica T. Petersen-MSVU

Utilizing ARCGIS in Education to Map a Glacier and Its Changes over Time

A high school education module. Using imagery collected from glaciers. Glacial retreat can eventually lead to rising sea levels. This study will focus on how the Jakobshavn Glacier has change over the years and include a development of a high school educational module. Using imagery collected from glaciers.

Flow Dynamics of Nioghalvfjerdsfjorden (79north) Glacier, Greenland

Mentors: Leigh A. Stearns, C. J. van der Veen, and John Paden, KU

Nioghalvfjerdsfjorden Glacier (79North) is an outlet glacier in Northeast Greenland, which drains approximately 8.4% of the total Greenland Ice Sheet (GrIS) area (Mayer et al., 2000). The glacier terminates in a large floating tongue that is currently pinned on submarine islands approximately 70km in front of the grounding line. Up-glacier from the grounding line is a bedrock over-deepening that is below sea level and extends far into the interior of the ice sheet. Due to this overdeepening, 79North is potentially unstable, especially if there are changes to its current terminus configuration, which could be triggered by warming climate or basal heat flux (Reeh et al., 2001 and Thomsen et al., 1997). A change in the force budget of 79North Glacier could contribute significantly to the mass balance of GrIS in the future. In this study, remotely sensed data sets of surface velocity, bed topography, elevation, accumulation rates, and terminus position over time were used to calculate the mass budget and force balance of 79North Glacier. Preliminary results indicate that 79North currently has a slightly negative mass budget, which is supported by IceSAT measurements that show minor regional thinning (Cathro, pers. comm.).

Charniece Huff-SC, Bernard Aldrich Jr.-ECSU

Mentor: Je’aime Powell, ECSU

Spectroscopic Image Signature Classification of Land Cover Types using Multi-Spectral Data within a Neural Network

Through improvements in technology, high resolution multi-spectral imaging allows new capabilities to become available in the remote sensing field. Spectral signature classification technologies existed in the chemical spectroscopy field to identify minerals by way of active systems. The theory of this paper surrounded the premise that passive systems can provide spectroscopic images for the Earth from satellite platforms. This project targeted land cover types from the Kittyhawk, North Carolina area. Multi-spectral signals presented up to seven individual readings per pixel. As the decision support system, a neural network was trained to the decide type of land cover based on the band readings. In an effort to determine specific land cover types based on need, ground truthed spectral readings were also classified using a linear model to convert the readings into approximate satellite readings. The converted readings were then classified by the trained neural network. A minimal t-squared value of 98% was required to be considered a viable method of image classification. Spectral readings were taken from two locations in North Carolina, including the Sand Dunes of Jockey’s Ridge and the fields of the Wright Brothers’ Memorial Park. The spectral readings were saved with an integration time of 50ms. The coordinates were marked on the GPS device and later transferred to Google Earth. LandSat GeoTIF imagery was retrieved from the USGS Global Visualization Viewer website. In this specific case, four different bands of the possible seven readings were recorded for each pixel. This limitation occurred because the lab spectrometer’s upper wavelength limit was 65535 illuminant readings.

Charniece Jones-MSVU

Mentor: Dr. Raymond Williams, MVSU

What Effect Does the Math Redesign Lab have on Student’s Learning?

By changing existing programs, universities seek to impact the cost of serving first year students, particularly those programs addressing developmental education. This is the purpose of The Math redesign lab at Mississippi Valley State University. The math redesign lab will also enhance the students’ educational experience, making them more efficient and effective learners in school, and better prepared citizens in the work force. By identifying the effects the math redesign lab has on the students learning, and the correlation between time duration and test scores, the solution to these questions are employed through a linear regression incorporated with the SPSS program from the analysis of the data. The correlation between two or more variables, using the final exam as the dependent variable, to show the relationship each have. SPSS analyzed the data and the following results were reported.