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 2014 Research Abstracts :: 2014-2015 Program Highlights

The AaA REU/RET program is an intensive eight-week summer program held on three campuses (ECSU, KU and IU). REU/RET student schedules vary by campus. Activities include tutorials (e.g. MatLab), professional development seminars and working on their supervised research projects under faculty mentors and graduate research assistants. The vision for AaA REU/RET is driven by the compelling need to draw on the integration of research and education to attract a diverse pool of talented students into careers related to polar science and cyberinfrastructure (CI), including teaching and education research. The 2014 Glacial Exploration Project (GEX) is funded as a supplement to the AaA REU/RET grant from NSF.

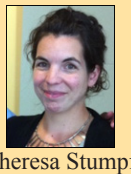
CReSIS Glacial Exploration Project (GEX)

The CReSIS-GEX project provides students with genuine research experiences,augmented by mentoring and sustained engagement with the polar community. This has been shown to be a highly effective strategy for STEM retention in general and CReSIS in particular. Past REUs who have engaged in a field experience number among the ranks of those PhD students who garner prestigious national fellowships.

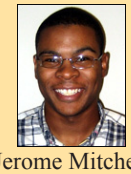
Student Field Experience Objective: To provide a diverse group of past REU students with the opportunity to complete a glacier expedition.

Past students taking part in increasing diversity in polar science included by study region:

Antarctica


Theresa Stumpf


Carolyn Branecky


Jerome Mitchell


Randy Justin

Arctic


Emma Reeves


Je'aime Powell


James Headen


Ryan Lawrence


Karitsa Williams


Andrew Brumfield

Juneau, Alaska


Maya Smith


Arianna Varuolo-Clark


Ya'Shonti Bridgers

2014 GEX

In 2014 the CReSIS Education team accessed the facilities available at the Icefield Research Program in Alaska and the Brathay Exploration Group in Norway.

Two students participated in the Juneau Glacier Exploration and three students participated in the Norway Glacier Exploration during the summer of 2014. Reports made during the 2014 Geological Society of America annual meeting in Vancouver, British Columbia in October included: *Isotopic Signatures of Rain and Snow in the Juneau Icefield Snowpack,* and *Geodetic Assessment of Volume and Surface Change of the Lemon Creek Glacier between 1948 and 2000.*

Maya Smith – WSSU

Mentor: Dr. Alexander Zinck

Geodetic Assessment of Volume and Surface Change of the Lemon Creek Glacier between 1948 and 2000

Climatic shifts in southeast Alaska are likely to result in changing weather patterns across the Juneau Icefield. Glaciers in this region will be threatened by an increase in temperature and frequency of rain events during the accumulation season, undergoing changes that vary based on their elevation and distance from the coast. Rain and snow events affect the glacier snowpack differently, but the possible influence of a changing rain-to-snow ratio has not been investigated on the Juneau Icefield. However, recent mass balance deficits have drawn attention to the importance of changing weather conditions in southeast Alaska. In this study, we will use stable water isotopes ($\delta 18O$ and δD) to trace the deposition and modification of precipitation during its lifetime in the annual snowpack on the Juneau Icefield. Ice lenses in snow pits dug for mass balance estimates have already been constrained as either resulting from rain events or melt-refreeze cycles, but isotopic analysis of water from these layers provides the high-precision method necessary to determine the relative contribution of each formation process. In addition to comprehension of physical processes occurring within the snowpack in response to different precipitation events, the data collected during this trans-icefield study will contribute to the understanding of trends in isotopic fractionation of precipitation across geographical gradients.

Tatyana Mattews – ECSU

Mentor: Scott McCaulay

Apache Big Data Stack

The Apache Big Data Stack is representative of a large spectrum of numerous open-source software programs provided through Apache projects. The term Apache refers to the Apache Software Foundation (ASF), which provides support for open-source software projects and attracts a large community of users. This mass group of users is what ultimately generates enormous amounts of data ---Big Data. Accordingly, this enormous digital volume consists of data that cannot be captured and organized by traditional tools, thus presenting an obstacle. It is vital to utilize computing power and storage in order to organize such data; however, this presents economic concerns due to costly affects.

The Apache Big Data Stack and the product Chef were investigated and applied to resolve such an issue. Research involved installing and testing as many open-source software packages as possible on FutureGrid machines and later making them accessible utilizing Chef. In order to accomplish this, software packages deriving from the Apache Big Data Stack spectrum were installed on to a virtual machine to create application packages. These packages were built into projects and Chef was used to transform the infrastructure of a project's code and bring it to life so that it can be made accessible through a network of servers. Finally, research demonstrated how use of the Apache Big Data Stack and Chef can be applied to contribute to the evolution of innovation in the Big Data field.

Diversity in the Computational Geosciences Workshop

The Workshop Organizing Committee hosted the first Diversity in the Computational Geosciences Workshop at the National Center for Atmospheric Research in Boulder, Colorado. The goal of this workshop was to bring together diverse stakeholders from the computer science, geosciences, and STEM education communities to create a robust national community dedicated to broadening participation in 21st century geoscience.

One of the intended outcomes of this workshop was to jointly draft a report that captured the shared visions, knowledge, and experiences to help develop and examine research, curricula, and best practices. This report will be distributed to relevant NSF Directorates and Programs and Offices to inform and influence NSF policy and to disseminate best practices.

The Organizing Committee included:

- Dr. Richard D. Loft, Dir. of Tech Dev. & Outreach, CISL, NCAR
- Dr. Denise Barnes, NSF Section Head for EPSCoR
- Dr. Shela Aboud, Senior Research Scientist, Stanford Univ.
- Dr. Linda Hayden, Prof. of Comp. Sci., Elizabeth City State Univ.

This workshop was made possible with funding from NSF, NCAR, and the University of Wyoming.

Derek Morris – ECSU

Mentor: Dr. Xiaofeng Wang

Analyzing the Security Infrastructure of the Android Operating System

Smartphones are used for practically everything, from text messaging to emails. The design of the Android operating system is based on a set of unprotected shared resources, some of which are inherited from Linux. These unprotected shared resources, along with the extensive development of Android applications, such as Twitter, makes available a large amount of background information, which can potentially turn harmless resource sharing into serious privacy breaches In our study, we discovered that zero-permission applications can reveal a user's identity or location through the following ways: the app's network-data usage statistics, the public address resolution protocol, and the speaker status of the device. Because of the public resources available on Android, some of a user's sensitive information can be discovered through the applications on their phones by a few inference techniques. The study reveals that highly sensitive data of smartphone user, such as his/her identity, interest condition, geo-location, driving route and more can actually be reliably inferred from researching popular apps.

Nigel Pugh, Tori Wilbon – ECSU

Mentor: Saliya Ekanayake

Evaluating the Performance of MPI Java in FutureGRID

Message Passage Interface (MPI) has been the common choice among developers when developing tightly coupled parallel High Performance Computing (HPC) applications and the majority of such applications are based on either C, C++, or Fortran. The recent advancement in processing big data, however, has brought attention towards Java. Effort has also been put on Java's support for HPC with flavors of MPI such as OpenMPI Java and FastMPJ. We evaluated these against native C based MPI on a set of micro-benchmarks from the standard Ohio MicroBenchmark suite from Ohio State University. The results show a promising future with Java and MPI for HPC applications.

Ground Penetrating Radar Survey of Edenton

REU Elizabeth City State University, Summer 2014

The objective of this study was to determine the shape, extent, and depth of any unknown subsurface remnants. Two types of software applications were used for the processing three kinds of data including colonial maps, USGS digital aerial photographs and Ground Penetrating Radar survey data. Maps and aerial photographs were geographically co-registered using EnviClassic 4.7, while the the GPR data was processed for analysis and display using GSSI's RADAN 6.6. The GPR was the primary instrument used in the field along with a Garmin 60xs GPS and a standard magnetic compass.

Antonio Guion, Anthony Meadows – ECSU

Mentor: Andrew Brumfield

Site Preparation for 3.6m X/L Band/3.7m C-Band Ground Station

On February 7, 2012 a Memorandum of Understanding was signed between Elizabeth City State University and SeaSpace Corporation. The memorandum led to the installation of three direct-broadcast satellite receiving ground stations and a training site at ECSU. The receiving stations include a 3.6m X/L band system and a 3.7m C-band system. The 5.0m L band system was installed in the summer of 2012. The purpose of this project was to document the installation requirements and internal processes at ECSU for the ground stations, as well as generate a report of training site physical requirements. Dixon-Patterson Hall was chosen as the most ideal location for the 3.6 meter X/L band and 3.7-meter C-band ground stations. Data acquisition is established from horizon to horizon for these particular ground stations and therefore limited building and tree obstruction is essential.

Jefferson Ridgeway IV – ECSU

Mentor: Gregor Von Laszewski

Django For Cloudmesh

The cloud computing system Cloudmesh currently uses flask, however because of the low usage of the web framework. Installation of django, a similar framework has proven to be more productive, efficient, and easier to use and apply than flask. The purpose of this project was to develop a prototype django server that will have sets of functions that will make Cloudmesh easier for user to interact with. This includes attaching bootstrap theme to the django server and list of virtual machines on various clouds that currently use Cloudmesh databases.

James Headen – ECSU

Mentor: Dr. Tim Kidd

Calibration of hyperspec VNIR imaging sensor, to assist in nanopartical predictions

Within the nanotechnology research community, possibilities for new breakthroughs are endless. This study presented preliminary calibration results on the use of hyperspectral imaging applied in a lab setting along with mathematical simulations for predicting nanostructure particles on a surface. Researchers have discovered that the use of e-beams on layered surfaces induce a unique nanostructure growth. Layered materials such as graphite, noval superconductors, and topological insulators present defined patterns when induced with e-beams that are useful in remote sensing. E-beams contribute to growth on sample surfaces, which result in forming crystal structures simplified into carbon. "These carbon nanoparticles have strong broad-wavelength interactions in the visible light range, making the nanoparticles detectable in an optical microscope and of interest for a range of nanoscale electro-optical devices". The induced growths are formed during the process called electron beam induced disposition. Knowledge on predicting and controlling nanostructure growth will surely benefit all areas of the future exponentially.

Dominique Marshall - JSU
Shanecia Beckworth - MVSU

Mentors: Dr. Malcolm LeCompte & Ryan Lawrence

Ground Penetrating Radar Survey of Edenton Green for Early Structural Remains

The historic town of Edenton, NC was established in 1712; however there have been indications of earlier colonial presence, perhaps dating back to 1658. Recent unauthorized excavation by a utility company on the Edenton Green, Edenton, NC unearthed the presence of a layer of thin red bricks, presumably the flooring or fireplace apron for a former structure at the site. An early, circa-1767, colonial map depicted a small building on the upper green near the present courthouse; however, no physical aboveground structure remains. The objective of this study was to determine the shape, extent, and depth of any unknown subsurface remnants. A 16 x 21m ground penetrating radar survey consisting of 32 half-meter parallel, unidirectional (South to North) transects revealed the presence of significant belowground features.

Raveen McKenzie, Jamal Stevenson - MVSU

Mentor: Jeff Wood

A comparative study to the 2011/2013 water quality assessments in the Pasquotank Watershed in Northeastern North Carolina with a sea level rise component

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. Due to indications of rising global temperature and the monitoring of melting ice sheets, these coastal watersheds could be a leading indicator of rising sea levels as their chemical compositions changes. The effects of sea-level rise were also taken into consideration for future monitoring.

The 2014 REU Pasquotank River Watershed Team completed two sets of tests of five tributaries and the river itself. Results were compared with previous readings utilizing a Water Quality Index. The streams tested were the Pasquotank River, Newbegun, Knobbs, Areneuse, Mill Dam, and Sawyers Creeks. These streams, along with the river, cover a large portion of the watershed and provide a wide area of study for the watershed. The results collected were placed online and displayed in correlation to their position utilizing Google Maps. The data were then compared to the 2011 and 2013 project results and examined for any variations or similarities.

Ya'Shonti Bridgers – ECSU

Mentor: Kelly Hughes

Isotopic Signatures of Rain and Snow in the Juneau Icefield Snowpack

Climatic shifts in southeast Alaska are likely to result in changing weather patterns across the Juneau Icefield. Glaciers in this region will be threatened by an increase in temperature and frequency of rain events during the accumulation season, undergoing changes that vary based on their elevation and distance from the coast. Rain and snow events affect the glacier snowpack differently, but the possible influence of a changing rain-to-snow ratio has not been investigated on the Juneau Icefield. However, recent mass balance deficits have drawn attention to the importance of changing weather conditions in southeast Alaska. In this study, we used stable water isotopes ($\delta 18O$ and δD) to trace the deposition and modification of precipitation during its lifetime in the annual snowpack on the Juneau Icefield. Ice lenses in snow pits dug for mass balance estimates have already been constrained as either resulting from rain events or melt-refreeze cycles, but isotopic analysis of water from these layers provides the high-precision method necessary to determine the relative contribution of each formation process. In addition to comprehension of physical processes occurring within the snowpack in response to different precipitation events, the data collected during this trans-icefield study contributes to the understanding of trends in isotopic fractionation of precipitation across geographical gradients.

2013-2014 REU Closing Program

The Research Experience for Undergraduates Academic Year program came to a close on April 15th and 17th, 2014.

SeaSpace Terascan GOES Multispectral Animations
Mentor: Dr. Malcolm LeCompte
K. Burton, M. Cobb, J. Headen, K. Satchell

Successful Transition from Math Eight to Math I
Mentor: Dr. Darnell Johnson
A. Meadows, Y. Bridgers, C. Farmer, A. Reynolds, J. Hathaway, R. Williams, B. Williams

Configuring and Customizing the HubZero Experience
Mentors: Je'aime Powell, Justin Deloatch
A. Guion, T. Matthews, N. Pugh

Multimedia Team
Update of the CERSER TeraScan Cataloguing System and TeraScan Image Processing Scripts
Mentor: Mr. Jeff Wood; D. Morris Jr., J. Ridgeway, T. Wilbon

Jacquelynne Vaughan – UCLA

Mentor: Dr. Fernando Rodriguez-Morales

Design and construction of a driver circuit for a T/R switch in ice penetrating radar systems

In electrical circuits and systems switches are used to change the state of the system between different modes of operation. In the Multichannel Coherent Radar Depth Sounder and other ice penetrating radars used by the Center for Remote Sensing of Ice Sheets (CReSIS) a single antenna is used for transmission and reception of radar signals, unlike other systems which use one antenna for transmission and one antenna for reception. In this case, a switch must be used in this radar system in order to transfer between these two modes of operation. To collect as refined data as possible when flying close to the ice surface the "lag time" of the T/R switch must be minimized. The T/R switch is controlled by a driver circuit, which translates a logic timing signal from the radar into the voltages and currents required by the switch to change states. For optimum operation of the radar system, the driver must be capable of switching states in less than 1.5 us including driver delays.

Positive-Intrinsic-Negative diodes are commonly used as control elements of high-power T/R switches capable of handling more than 1kW of RF power. Switching speeds of about one tenth of the diode's carrier life time have been reported in the literature for the fastest diode drivers. For my project I built and tested a new circuit driver provided by Aeroflex Microelectronic Solutions, which is expected to provide switching speeds better than 500 ns. The project involved capturing a schematic diagram on the computer using a printed-circuit-board computer aided-design program; fabricating the circuit; testing it; and comparing with simulations to verify the performance of the driver with a T/R Switch.

IEEE Geoscience & Remote Sensing Symposium

On July 13-18, 2014 REU past participants and mentors attended the 2014 IEEE Geoscience and Remote Sensing Symposium/ Canadian Symposium on Remote Sensing in Québec, Canada. This 35th 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 "Energy and our Changing Planet" focused on the development of new and renewable sources of energy in the context of a changing planet. Several representatives from universities presented oral and poster presentations during the symposium.

Michael Cobb - Elizabeth City State Univ.
Remote Sensing and Ground Penetrating Radar Survey Results for Possible Relocation Site of Roanoke Lost Colony

Alicia Reynolds - Elizabeth City State Univ.
Utilizing ArcGIS in Education to Map a Glacier and its Changes Over Time

Kalyx McDonald - Mississippi Valley State Univ.
TeraScan Curriculum Development and Integration of SeaSpace Technology into the Classroom

Robin Brice - Fayetteville State Univ.
A Comparative Study of the 2011/2013 Water Quality Assessments in the Pasquotank Watershed in NE NC

Nicholas Riqueros – PSU

Mentor: Dr. David Braaten

Analysis of Near-Surface Snow Radar Internal Layer Patterns and Accumulation Rate in the Siple Coast Region

Snow radar data from the Siple Coast was collected during the month of December 2013/ January2014 field season. The goal of this study was to characterize internal layer patterns over the Siple Coast region that can be used to determine snow accumulation rate. Darker and thicker layers seen from snow radar images seem to align with volcanic events, providing a dating constraint to the layers that can be used to establish accumulation rates. Six layers were analyzed within the data set. Ice core data in the region is used to estimate the dates the layers were formed. The findings of this study established changes in the accumulation rate over the Siple Coast region and the spatial extent that these patterns of snow layers cover. They also explain what events caused each layer to form.

UCAR Software Engineering Conference

The University Corporation for Atmospheric Research (UCAR) Software Engineering Assembly (SEA) recently organized a technical conference to assist in collaboration between National Center for Atmospheric Research (NCAR)/UCAR and their peer institutions. This was also a time to share up-to-date practices and was meant to appeal to software engineers and computational scientists focused on scientific disciplines.

Justin Deloatch, Michael Jefferson, and Andrew Brumfield, graduate students from ECSU, took part in this conference. These students are part of the Center of Excellence in Remote Sensing Education and Research (CERSER) program under the direction of Dr. Linda Hayden.

Omar Owens, Anthony Scott - WSSU

Mentor: Michael Jefferson

Validation of the basal stress boundary utilizing Satellite Imagery along the George VI Ice Shelf, Antarctica

The majority of ice shelves are fed by inland glaciers. Together, an ice shelf and the glaciers feeding it can form a stable system, with the forces of outflow and backpressure balanced. Warmer temperatures can destabilize this system by increasing glacier flow speed and by disintegrating the ice shelf. Without a shelf to slow its speed, the glacier accelerates. After the 2002 Larsen B Ice Shelf disintegration, nearby glaciers in the Antarctic Peninsula accelerated up to eight times their original speed over the next 18 months. Similar losses of ice tongues in Greenland have caused speed-ups of two to three times the flow rate in just one year.

Rapid changes occurring in regions surrounding Antarctica are causing concern in the polar science community to research changes occurring in coastal zones over time. The team completed a study on George VI Ice Shelf located on the western coast of the Antarctic Peninsula, which included a validation of the Antarctic Snow and Ice Accumulation Discharge Basal Stress Boundary (ABSB) vs the natural basal stress boundary (NBSB) along the George VI Ice Shelf. The ASAID BSB was created by a team of researchers headed by the NASA Goddard Space Flight Center with an aim of studying coastal deviations as it pertains to the mass balance of the entire continent. The point data file was aimed at creating a replica of the natural BSB. Select cloud free Landsat satellite imagery from satellites 1 through 7 was used to detect changes occurring over the span of 19 years. These were documented in the form of a table with the change that occurred along with the geographic coordinates.

Felipe Machini – KU

Mentor: Dr. Shawn Keshmiri

Modeling of environmental uplifts and thermals for soaring unmanned aerial vehicles

Soaring can be defined as flight in which an internal thrust mechanism is not present. It is known that some birds have developed some techniques of extracting energy from the atmosphere; for instance, Turkey Vultures make use of the uplifts to reduce their energy consumption, allowing them to migrate to distant places. Humans, observing this phenomenon from nature, developed aircraft (gliders) capable to similarly use this energy which comes from diverse sources. Basically, three types of soaring are known: thermal, orographic or dynamic, and previous work has provided physical models for them which can be incorporated to the aircraft dynamic model. Thus, the main objective of this project was to couple the existing models of environmental uplifts and thermals with the unmanned aerial vehicles dynamics in a manner that can reduce the aircraft fuel consumption and, consequently, enhance the UAV flight range and endurance. In addition, the goal is to have a model which can predict the total energy variation to predict of soaring instantaneously from different sources (thermal, orographic, dynamic or combination of them). Such model could be used in any geographic coordinate and would be applicable on many environments and aerodynamic configurations.

Kaylx McDonald – MVSU

Mentor: Dr. John Paden

Using a MATLAB/Photoshop Interface to Enhance Image Processing in the Interpretation of Radar Imagery

The Center for Remote Sensing of Ice Sheets (CReSIS) has developed many radars that operate over the frequency range from 140 to 230 MHz with multiple receivers developed for airborne sounding, and imaging of ice sheets. Understanding the echogram data depends on knowing the process of how radar waves interact with natural surfaces. With more data being retrieved along with thickening layers of ice, researchers look into new techniques to enhance their radar imagery for efficiency. The purpose of this project was to use the Bas Relief filter for image processing in order to improve the interpretation of radar imagery. The filter Bas Relief, currently in Photoshop, was once a sculpture technique in which figures or other design elements were just barely more prominent than the overall background. The University of Kansas CReSIS office heavily relies on the use of MATLAB along with Photoshop to perform several tasks. MATLAB is a high-level programming language and interactive environment with strong mathematical and graphics capabilities while Adobe Photoshop CC allows you to use advanced image processing algorithms that are not available in MATLAB. With Adobe Photoshop Extended we hoped to combine MATLAB commands with Photoshop's image editing features to further interpret imagery. With the implementation of this algorithm in MATLAB, it would allow researchers to conveniently retrieve and use the newly edited image. By comparing the original image versus enhanced, researchers would be able to improve tracking of features such as internal layers and the ice bottom.

Kaliq Satchell – ECSU

Mentors: Geoffrey Fox, Yang Ruan, Saliya Ekanayake

PlotViz: The next visualization tool in bioinformatics

The purpose of this project was to add parallelization support to the code for multithreading PlotViz3. The code in the software uses the C++ programming language, which is what was used to make improvements. In the end, adding this support will speed up the virtualization process in the software and make it less time consuming when looking for results quickly and efficiently. In biology there is a scientific field that develops methods and software tools for organizing and analyzing biological data. That field is bioinformatics and it combines computer science with other fields in order to study biological data and processes which in turn can provide meaningful information on genomic sequences. Currently, there is a software called PlotViz, a 3D data point browser, which is helpful for scientists in the field of bioinformatics. PlotViz was used to interactively discover intrinsic structures efficiently of which are high-dimensional and contain large volumes of data. This means that scientists will be able to find the correlations between the organisms they have data on more effectively than their previous methods such as phylogenetic trees. This software should be accessible to every scientist working in bioinformatics but has yet to be put out there for them because the process is not easily done. Once it is basic enough for simple execution then scientist will have a new and more efficient tool for analyzing organism's genomic sequences.

Research Experience for Teachers

Research Experience for Teachers (RET) provides opportunities for pre-service STEM teachers to participate in the AaA-REU program. This component is housed at ECSU and KU. RET interns are assigned to specifically-designed research teams led by members of the CReSIS Education staff. RET team members are undergraduate students with a major in STEM Education.

Krystle Neal – HINU (RET)

Mentor: Cheri Hamilton

The "How" of Glacial Striations for 1st Graders

Glacial striations are scratches in the surface of the bedrock/parent rock resulting from rock fragments that are trapped in a glacier and being dragged at its basal point. Glacial striations can be various depths, lengths, and widths for a variety of reasons including the composition of the rock fragments, composition of the bedrock/parent rock, and the size of the glacier. Glacial striations are a useful resource in both modern glaciology and paleoglaciology in regards to mapping glacial movement. In education, students need to know that glaciers are capable of physically altering the face of the Earth in long-lasting ways. I developed a lesson plan for first graders that will introduce how glacial striations occur. The focus of the lesson is for students to gain an understanding of the relationship between the rock fragments at the basal point of a glacier and the bedrock/parent rock through analogous activities. Student progress will be informally assessed through the students completing the provided table handout and writing an explanatory paragraph in their science journals.

Deanna Mallard, Tayla Frizell - MVSU (RET)
Nyjah Grant - LU (RET)

Mentors: Dr. Darnell Johnson and Dr. Ervin Howard

Enhancing Parent Involvement in NC-CCSS for K-2 Mathematics

The 2014 REU math team developed and provided a workshop that assisted parents in understanding the North Carolina Common Core State Standards for K-2 Mathematics to assist. Parent involvement is defined as parent participating in the educational processes and experiences of their children. A chi-square analysis was used to analyze data collected from the pre survey and the post survey administered to participants in the workshop. The study revealed all of the individual components of parent involvement were positively and significantly related to educational goals. The study identified various aspects of parent involvement that yielded statistically significant results in affirming that parent involvement attributed to urban student achievement. These findings were particularly helpful for indicating which kinds of parent involvement influenced academic success.

Alicia Reynolds – ECSU (RET)

Mentor: Cheri Hamilton

Utilizing ArcGIS in Education to Map a Glacier and Its Changes Over Time

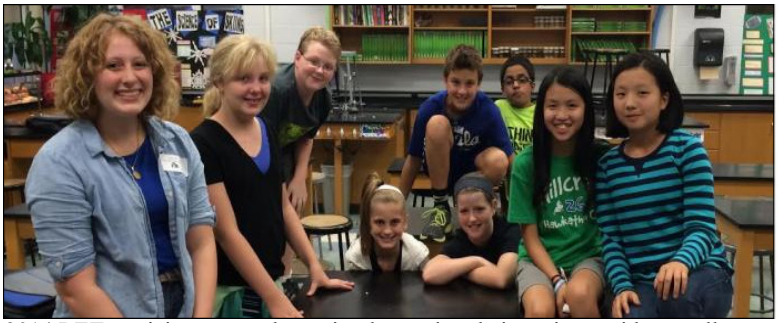
Glaciers are receding at a more rapid pace than predicted in previous years. Glacial retreat occurs when ice or snow is removed from glaciers through ablation. When ablation occurs faster than snow accumulates water is added to oceans, which, over time, will cause sea levels to rise. The complete melting of this land ice can affect sea level rise by 70 meters in the next century. This study focused on how the Jakobshavn Glacier is the fastest retreating glacier in Greenland and its impact on sea level rise. One way to raise awareness about climate change and its imminent impact on civilization is to incorporate Geographical Information Systems (GIS) in K-12 learning. ArcGIS software also advocates education reform by applying inquiry-based learning tools to develop students' critical thinking and problem solving skills. Using imagery collected from Landsat satellites 1-7 students will be able to utilize GIS mapping software to visualize and analyze these changes over time in relation to future sea level rise.

Steven Whitfield – HINU (RET)

Mentor: Cheri Hamilton

The Consequences of Sea Level Rise on Metropolitan Coastal Cities in America

Sea level rise has evolved from theory into fact and the consequences of this continual rise will have a profound effect on the infrastructure, economy, and weather patterns of major coastal cities. Current projections of sea level rise range anywhere from .5 meters to 2 meters globally by 2100 with more extreme projections showing up to 3 meters. As for the consequences in the United States, extreme weather poses a significant threat to New York City with the "100 Year Flood" becoming a much more frequent event. Despite these projections, many coastal cities continue to build which will result in a massive economic loss as the coastline diminishes. The purpose of this project was to inform young students about the issue of sea level rise. The objective was understanding how sea level rises, such as knowing the difference between an iceberg and glacier, and how sea level rise can affect a coastal city using the 5-E model. A hands-on activity was assessed through journal writings based from their findings.



2014 RET participants are shown implementing their projects with precollege students(left) and parents (right).

Rosemary Leone – Colorado School of Mines

Mentor: Dr. John Paden

Integration of Radar and Ice Core Data of the Northeast Greenland Ice Stream

The Northeast Greenland Ice Stream (NEGIS) is an important feature to study when looking at sea level change. Heat from geothermal sources causes basal melting at the base of these glaciers, causing them to slide towards the coast and refreeze inside the glacier. Geophysical methods allow us to observe and identify these processes. However, due to the rough environment and terrain of Greenland it is difficult to conduct most geophysical methods in this area. Center for Remote Sensing of Ice Sheets (CReSIS) uses airborne radar and ice core data collected from the Center for Ice and Climate to study the surface velocity and subsurface features. Radar data allows us to look at the dielectric properties of the subsurface by measuring the two way travel time and amplitude of the returning wave. Using MATLAB we created a depth profile of the subsurface in order to identify the main layers and features. This was compared to ice core drilling which provides actual measurements of the physical and chemical properties of the subsurface. Integrating the radar with ice core data allowed us to be more confident when characterizing the subsurface. Understanding the internal features of NEGIS is vital to studying how fast melting and sliding is occurring and the impact it will have on the sea level.

GEO REU Workshop 2014

The GEO REU Workshop sponsored by University Corporation for Atmospheric Research and the National Center for Atmospheric Research hosted REU leaders from more than sixty universities and organizations. Attendees discussed goals, challenges, and strategies to running an REU.

Topics included:

- Structuring an REU program & incorporating online tools
- Adapting REUs for community college students
- Creating inclusive REUs
- Using social media in an REU: what's the latest?

Dr. Linda Hayden, Director of the Center of Excellence in Remote Sensing Education and Research (CERSER) at ECSU, presented "Challenges and Solutions of Running an REU: Increasing Diversity", an overview of experiences in managing undergraduate research programs.

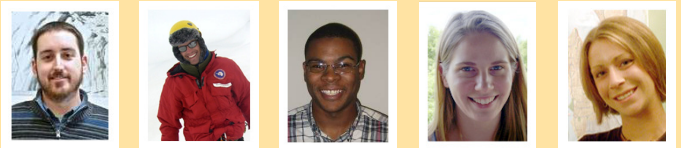

CSO Graduate Student Mentoring Award

The CSO award acknowledges Master's and Ph.D. graduate students at CReSIS institutions who have greatly contributed to the research and professional development of future scientists and engineers. Awardees receive a certificate and $500 from CReSIS Education.

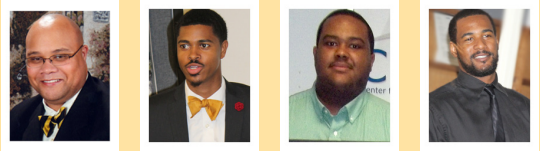
Requirements for the CSO Graduate Student Mentoring Award:

- Work collaboratively for four or more weeks with a team of one or more undergraduate students on a CReSIS related project.
- Recommendation of a CReSIS faculty member
- Give a talk with their mentees as part of the All-Hands lecture series.

CSO Graduate Student Mentoring Awardees



(L to R) Kyle Purdon, KU :: Brandon Gillette, KU :: Jerome Mitchell, IU :: Brooke Medley, UW :: Kristin Poiner, UW



(L to R) Je'aime Powell, ECSU :: Ryan Lawrence, UNH :: Michael Jefferson, ECSU :: Andrew Brumfield, ECSU

2010-2014 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)

Colorado School of Mines (CSM)
Cornell University (CU)
Dartmouth College (DC)
Gettysburg College (GC)
Kansas State University (KSU)
Longwood University (LU)
Macalester College (MC)
Pennsylvania State University (PSU)
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/reuomps2014/
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