2005-2006 ONR Research Teams

Deploying Wireless Technology in Lester Hall and Dixon Hall on the Campus of ECSU
Mentors: Mr. K. Hayden, Mr. D. Wilkins

Jerome Mitchell Karitsa Williams

Biological Response to Coastal Upwellings
Mentor: Dr. Malcolm LeCompte

Jamika Baltrop Kevin Reynolds Erica Pinkney

TeraScan Satellite Data Images
Mentor: Mrs. Keisha Wilkins

Cheniece Arthur Brandi Brehon Jamison Gibbs

CReSIS - Modeling Ice Sheet Data
Mentor: Dr. Malcolm LeCompte

Demetrus Rorie TreAsia Fields

Automated Approach of Cataloguing TeraScan Images Utilizing Active Server Pages
Mentor: Mr. Jeff Wood

Kaiem Frink Garry Cameron Danielle Wright
Lee Smalls Jr Shaquera Mosley

Geoscience
Mentor: Dr. Lloyd Mitchell

Brian Campbell Sharon Halmon

UNIX Network Administration
Mentor: Mr. Chris Edwards

Unquiea Wade Bryce Carmichael Gregory Brown
Anthony Anderson

Office of Naval Research

One Liberty Center
875 North Randolph Street, Suite 1425

Dates to Remember

http://nia.ecsu.edu/events.html

March 7, 2006
IEEE-GRSS Distinguished Lecture Series
Dr. Ken Jezek, Ohio State University
Meeting of the Eastern North Carolina Chapter of the IEEE Geoscience and Remote Sensing Society (GRSS)
Dixon Hall, Elizabeth City State University

May 18-21, 2006
ADMI Conference
Orlando, Florida

May 31-July 21, 2006
Undergraduate Research Experience in Ocean and Marine Science
Elizabeth City State University

June 12 - 23, 2006
CReSIS Ice Sheet Modeling Workshop for Undergraduates
Dr. Terence J. Hughes, University of Maine
Dixon Hall, Elizabeth City State University

June 19-30, 2006
Remote Sensing Explorers - Faculty Development Workshop
Dixon Hall, Elizabeth City State University

July 31-Aug 1, 2006
2006 International Geoscience & Remote Sensing Society Symposium
Denver, Colorado

September 6-8, 2006
Symposium on North Carolina Coastal Change: "You and the Future"
Wilmington, North Carolina

December 11–15, 2006
2006 AGU Fall Meeting
San Francisco, California

March 2007
IEEE GRSS Distinguished Lecture Series
Dr.Robert Bindschadler, NASA GSFC
Meeting of the Eastern North Carolina Chapter of the IEEE Geoscience and Remote Sensing Society (GRSS)
Dixon Hall, Elizabeth City State University

For more information visit our web site: http://nia.ecsu.edu/onr/onr.html
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Grant Numbers: ONR - URE in O/M Science N00014-01-1-0529 AVHRR SST N00014-01-1-1070

NERT
2004-2005 Program Highlights
Summer 2005 Research Abstracts
Nurturing ECSU Research Talent

Karitsa Williams - Senior, Computer Science
Mentor: Dr. Don Field and Dr. Jud Kenworthy
Internship: NOAA Center for Coastal Habitat and Fisheries Research, Beaufort, North Carolina
Title: Mapping the Seagrass Resources of North Carolina's Core and Back Sound

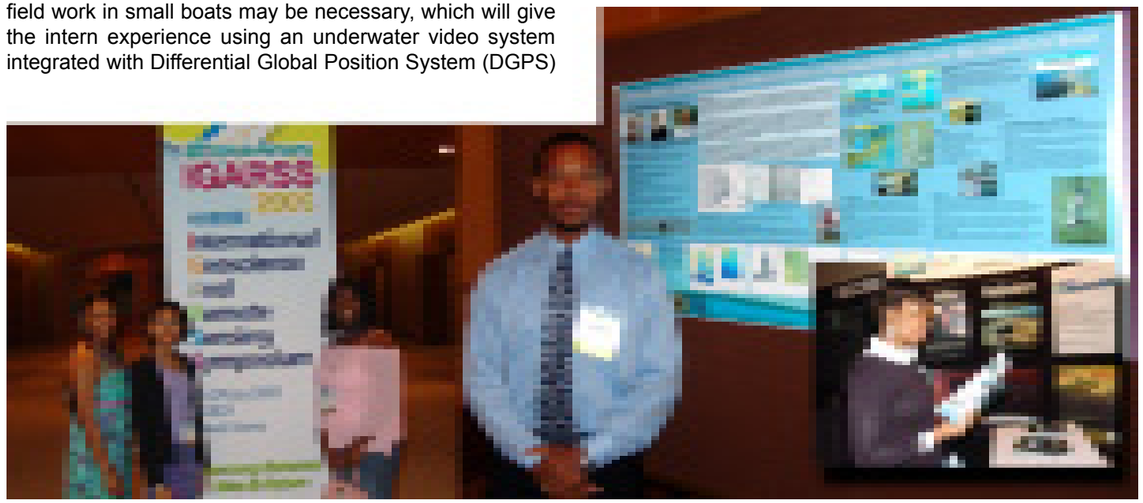
The primary objective of this project is updating our knowledge of the distribution and extent of seagrass in the Core and Bogue Sounds areas of North Carolina, and comparing these data tko existing seagrass maps created in the late 1980's and early 1990's to identify areas of change. These two sounds also present an excellent opportunity to examine the impacts on seagrass of two divergent coastal development regimes: the relatively pristine conditions of Core Sounds versus the typical high beach and coastal community development pressures in Bogue Sound.

Weather and water quality conditions permitting, digital, aerial multi spectral imagery will be acquired in the spring/ early summer of 2005. This will provide the intern with experience handling the latest in digital aerial multi spectral imagery. Unlike air photos that are hard copy and need to be scanned and rectified to be useful in a GIS format, these imagery products are provided by the vendor in 1 meter spatial resolution, digital, rectified format. The acquisition of the imagery, the ground data collection that will support the classification of that imagery, and processing the imagery will provide the intern with a full spectrum of experience of being involved in a remote sensing based mapping and change detection effort for submerged habitats. Considerable field work in small boats may be necessary, which will give the intern experience using an underwater video system integrated with Differential Global Position System (DGPS)

Demetrus Rorie - Senior, Computer Science
Mentor: Dr. Glen Williams
Internship: Texas A&M University
Title: Autonomous Ground Vehicle (AGV) Project

The goal of this project was to construct an autonomous mobile vehicle for research in autonomous controls. The guidelines for the DARPA Grand Challenge contest, sponsored by DARPA (Defense Advance Research Project Agents) were used as the specification goal for the vehicle performance. The contest requires an autonomous vehicle to travel one hundred and seventy primarily off-road miles from Los Angeles to Las Vegas in ten hours. The autonomous truck will operate using a software controller and is equipped with sensors such as: a SICK Laser Measurement System (LMS) and a Global Positioning System (GPS).

I was responsible for writing software that simulated vehicle dynamics, GPS signal, heading, and environmental response data that was used to test the software controller. The simulated data was used in conjunction with the software controller to ensure a successful traversal along the designated route. The simulator imitates digital data from the SICK LMS and GPS and sends this data to the controller. The controller then decide whether to use the brake, throttle or whether to change the heading of the vehicle and sends control information back to the simulator. The simulator generates SICK data eight times a second and GPS latitude and longitude twenty times per second.



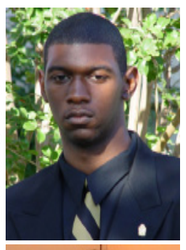
Garry Cameron - Junior, Math Education
Internship: NASA Goddard Space Flight Center
Title: Pre-Service Teacher Evaluation of NASA Educational Resources

As an Education major, concentrating in Math, it's important that I take extra steps in gaining the knowledge necessary to effectively communicate messages to my students. To me, apart of being an educator requires that I first gain my students trust and attention. In doing this, it will allow me to connect with my students and also secure their attention to be receptive to the message. Second, make sure that students understanding the message and finally show them that everything around them is a window of opportunity to further their understandings.

When I was given the opportunity to work with NASA, I was amazed at all the wonderful and informative resources that were made available to me. I knew that this would be a great place to start in my quest to prepare myself for the task and challenges I will face in my efforts to become a successful educator.

NASA offered me various levels of training and learning experiences, ranging from CORE (Central Operation of Resources for Educators) to SHARP (Summer High School Apprenticeship Research Program). As you read on you will gain a better understanding of all the educational materials that I have evaluated this summer.

Anthony Anderson - Senior, Computer Science
Kaiem Frink - Sophomore, Computer Science
Mentor: Michael Prager, Ph.D.
Internship: NOAA - Center for Coastal Fisheries and Habitat Research
Title: NOAA Stock Assessments



This internship involved the development of a graphical user interface between two software packages, AD Model Builder (ADMB) and the statistics package R. The ADMB software was used to fit models and then R was used to graph them. ADMB generates a large amount of data that must be graphed in order to obtain representative results. The interface developed allows an ADMB program to output data in a format readable by R. The interface also contains a set of graphic functions in R that formulate many common graphs.

The benefits to NOAA and the Population Dynamics Team is an improved graphics function. This internship increased familiarity in general with scientific programming and particularly with the R language.

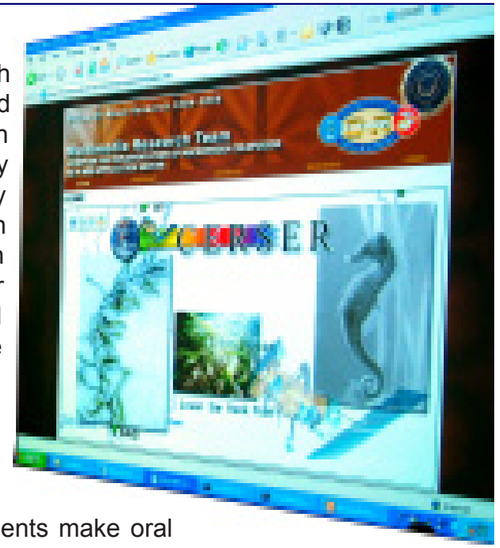
Joanelle Baptiste - Graduate, Mathematics
Mentor: Dr. Daniel Roman
Internship: National Ocean Service-National Geodetic Survey-Geosciences Research Division
Title: Analysis of Southern Louisiana Subsidence Model using Geodetic Control

The Southern Louisiana Subsidence Model is a model of the United States Global Positioning System Bench Marks (USGPSBM) in the sinking region of Southern Louisiana.The subsidence in this area affects the height of a bench mark over time.Bench marks are usually assumed to be stable and unchanging. In GEOID03-a previous model that measured the global mean sea level, subsidence was not well modeled. Subsequently, an updated subsidence model has been developed. An analysis will be conducted to determine if this model represents improvements over previous ones.

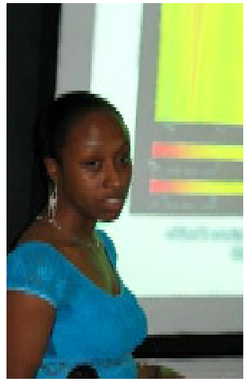
Jameson Gibbs - Senior, Computer Science
Mentor: Anthony S. Overton, East Carolina University
Internship: ECSU URE OMSS 2005
Title: Spatial-Explicit Growth Rate Model of Young Striped Bass in Albemarle Sound: Implications on Essential Fish Habitat (EFH) Using GIS

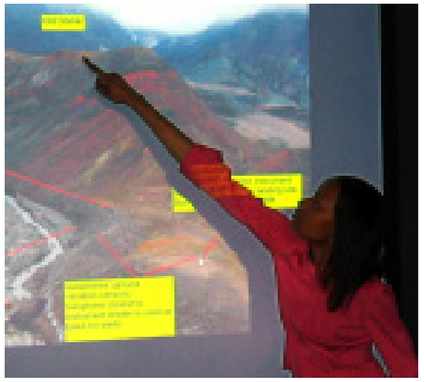
Production dynamics of fish may depend on local processes and can be strongly influenced by the physical habitats which they live. These habitats are often patchy which inhibits the use of system-wide models to examine fish production. We examined the growth rate potential of juvenile striped bass Morone saxatilis in Albemarle Sound, North Carolina, to identify essential fish habitat (EFH) for striped bass during the summer and early-fall months. Growth rate potential integrates a physiological-based model (bioenergetics) of fish growth with the physical environment. We integrated the growth rate potential model with Global Information Systems (GIS) to spatially map the growth gate potential of individual juvenile striped bass in Albemarle Sound. Water temperatures during the modeled period were within the "preferred" range 19 and 27oC, of juvenile striped bass except during June when water temperatures were above 28oC. Dissolved oxygen and salinity levels were at levels suitable for striped bass throughout the modeled period. Mean growth rate (g/g/d) was 0.023 during the modeled period. Our model predicted that the modeled areas all produced positive growth in the north Albemarle Sound, particularly in the Chowan and North rivers, the mouth of the Roanoke River provided physical habitats (based on water temperature) to support high growth rates of striped bass. These areas may be defined as EFH areas. Our approach shows the usefulness of integrating two technologies to predict fish production

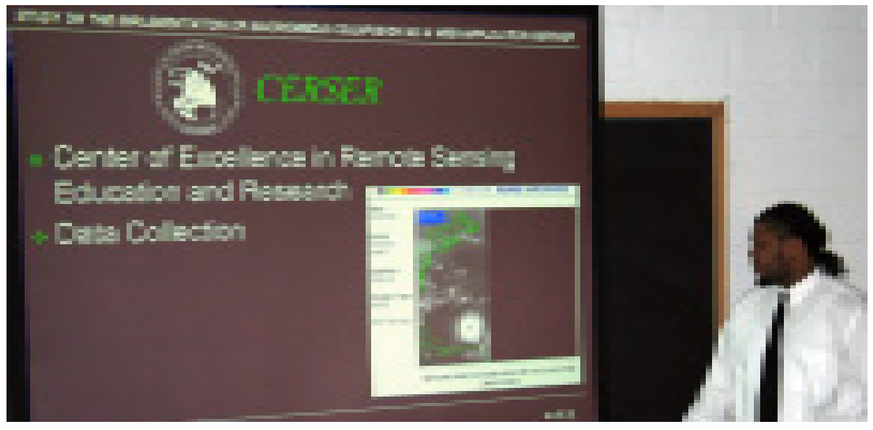
Photo Highlights



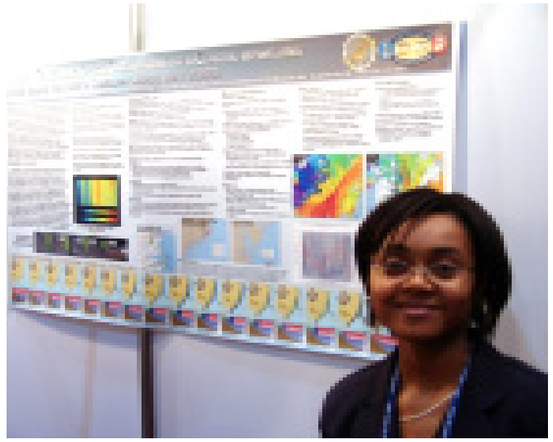
The Office of Naval Research Nurturing ECSU Research Talent program involves undergraduate mathematics and computer science majors in academic year team research activities. Research and training meetings began in early September and are held every Tuesday and Thursday 5-8 PM through mid April. Research meetings start with a 20-30 minute announcement period during which time students learn about internship opportunities, hear program announcements, give team reports, discuss travel logistics, and discuss goals of the program. Following the announcement period, students meet with faculty mentors or attend training on tools used for research. In addition, students spend 20 hrs/week in the undergraduate research computer laboratory completing task sheet requirements and research assignments. The closing program is held on two nights in April. During the closing program, students make oral presentations of their research activities. The research teams are also required to complete written reports and to maintain a team web page. Shown below are highlights from the 2004-2005



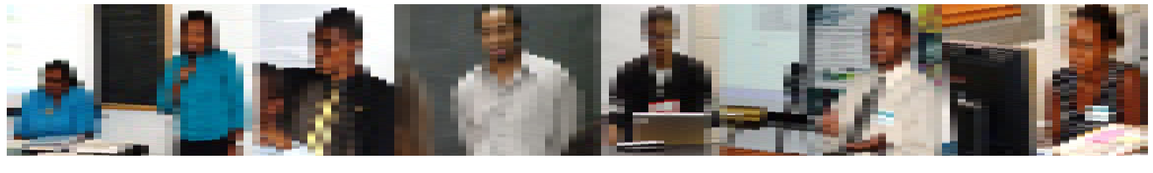




ONR Remote Sensing Team (L to R) Danielle Graves, Erika Pinkney, Demetrus Rorie, Dr. Malcolm LeCompte



ONR graduate student, Eunice Smith and her presentation poster at IGARSS 2005, Seoul, Korea



Ronesha Lucas - Junior, Biology
Mentors: Dr. A. Garland, Dr. M. LeCompte, Dr. F. San Juan, Mr. F. Willard, Dr. L. Zhang
Internship: ECSU Undergraduate Research Experience in Ocean, Marine, and Space Science
Title: Characterization of Environmental Attributes of Potential Lost Colony Archeology Sites using Satellite Based Optical Sensors, Synthetic Aperture Radar, Aerial Lidar, and Ground Penetrating Radar

Historical maps, archives, genealogies, and oral history indicate at least four sites in North Carolina's Dare, Hyde and Tyrrell Counties as Native settlements. One or more of these sites may have provided sanctuary for refugees from the ill-fated colony established on Roanoke Island in 1587.

The archaeological research design of the Lost Colony Center for Science and Research consists of a predictive model using traditional data but also remote sensing applications, that is, aerial, satellite and geophysical. Environmental studies with remote sensing assist in confirming the sites as habitable. Optical imagery and processing provided the initial results about the locales being habitable (2003 URE Lost Colony Team).

Prior study of high-resolution satellite imagery of the Buck Ridge site in Tyrrell County identified environmental characteristics conducive to habitation. The ridge vegetation of mixed trees was distinct compared to the surrounding wetlands. However, at the highest available spatial resolution (1m) the vegetative canopy obscured the ground at these sites. This study also did not address other factors related to habitation.

The current study correlates remote sensing imagery with historical geospatial information to evaluate the suitability for settlement at three locales. For this study, settlement suitability is based upon observable, interdependent, quantifiable environmental factors governing habitability (settlement size and area), arability (soils and vegetation) and defensibility (geographical location and elevation). To determine these factors, data from satellite based Optical and ISAR instruments and aerial LIDAR are compared to observe and quantify the terrain and environment of the historical locales.

Interferometric Synthetic Aperture RADAR (ISAR) data allows penetration of obscuring vegetative canopies, although at a spatial resolution (30 m.) insufficient to detect discrete cultural features. Light Detection and Ranging (LIDAR) data provides adequate spatial resolution (<1 m.) but is subject to statistical uncertainties over small areas.

For this study, ISAR data from NASA's Shuttle RADAR Topography Mission and LIDAR data from the North Carolina Floodplain Mapping Program were compared to improve the site elevation accuracy. The use of new, public, environmental data sets provided the opportunity to refine the requisite settlement characteristics of habitability, arability and defensibility. The proximate location of sites to ECSU yielded an opportunity to establish ground truth for measurements made remotely. Once remote elevation and environmental data are validated, each site will be the focus of further in-situ study to confirm settlement characteristics.

The study continues with Geophysical applications, especially Ground Penetrating Radar, and geologic core samples at the sites with the requisite environmental and terrain characteristics. The 2005 URE project initiated this in situ study at Croatan (Dare) and at Goshen Ridge (Hyde).

Brandi Brehon - Junior, Computer Science
Mentors: Hal Stanford, Larry Claflin, Felicity Burrows,
Internship: NOAA , National Center for Coastal Ocean Science
Title: Overview of Statistical Methods Used in Marine-Related Environmental and Toxicological Studies

The main objective of this project was to overview some statistical methods used in marine-related environmental and toxicological studies. The overview is based on 33 scientific papers on toxicology and environmental science. The papers were examined for the statistical methods that were used to yield accurate, robust, and comprehensible results. My research supported the mission of NCCOS (National Center for Coastal Ocean Science), which is to providecoastal managers with scientific information and tools needed to balance society's environmental, social, and economic goals.

ONR student Cheniece Arthur and Mr. Charles Luther during the 2005 URE-OMSS Poster Session.

The 2005 International Geoscience and Remote Sensing Symposium took place in Seoul, Korea on July 25-29. This year's symposium, entitled "Harmony between Man and Nature", focused on utilizing remote sensing as a tool to provide the world a way to view global economical and environmental change. The location of the symposium was especially appropriate as Asia is one of the fastest growing industrial societies in the world. Several individuals from Elizabeth City State University (ECSU) were able to attend and present research during this year's symposium.

Dr. Linda B. Hayden, Director of the Center of Excellence in Remote Sensing Education and Research (CERSER) joined with Dr. Ambrose Jearld, Jr., Director of Academic Programs with NOAA, National Marine Fisheries Service at the Northeast Fisheries Science Center, Woods Hole, Massachusetts. Their presentation, "Inter-agency Collaborations: Federal Agencies Working with Colleges and Universities to Offer Interdisciplinary Training in Remote Sensing, Ocean, and Marine Science", dealt with the results of interagency collaboration efforts to attract and retain students in engineering and limnological, ocean, marine, and atmospheric-related science through postdoctoral levels, and to retrain individuals with experience in other disciplines for careers in these fields. The question was asked as to how effective these collaborations over the past ten years have been in allowing NOAA to achieve its goals of a diverse scientific work force.

Also attending were Eunice Smith (ECSU), Tiffany Fogg of Fayetteville State University (FSU), and Erica Pinkney (ECSU). Eunice Smith presented research in the poster session entitled "Remotely Sensed and In-situ Observations of a Coastal Upwelling Event along the North Carolina Coast, Summer 2000". Tiffany Fogg presented "Dolphin Presence/ Absence Probabilities on the Virginia and North Carolina Coasts as Correlated with Sea Surface Temperature and Chlorophyll-A Levels". Erica Pinkney's research

The Geoscience and Remote Sensing Society seeks to advance geoscience and remote sensing science and technology through scientific, technical and educational activities. The Society strives to promote a high level of technical excellence among its members by exchange of information through conferences, meetings, workshops, publications, and through its committees to provide for the needs of its members. IEEE-GRSS has sponsored several lectures and workshops in CERSER's lab including the following:

- **Spring 2003 Dr. Sonia Gallegos,** "Optical Models Developed for the Yellow Sea between the Coasts of China and the Korean Peninsula"
- **Fall 2003 Dr. Malcolm LeCompte**, "Views & Visualization of Earth from Space"
- **Fall 2003 Dr. S. Gogineni,** "Microwave Remote Sensing and Applications"
- **Spring 2004 Dr. Keith Raney,** "Mapping Sea Bottom Topography with Radar Altimetry from Space"
- **Fall 2004 Dr. Glenn Prescott,** "Polar Research and Remote Sensing Education and Research Opportunities"
- **Fall 2004 Dr. Phillip Dustan,** "Remote Sensing of Coral Reefs and Change Detection"
- **Spring 2005 Dr. Scott Hensley,** "Mapping the World's Topography from Space – The Shuttle Radar Topography Mission."