2009 SEDAAG MEETING

POSTER ABSTRACTS

Spatio-temporal change analysis of land-use and land-cover in and around the Bannerghatta National Park, India.

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The Bannerghatta National Park (BNP) and the surrounding landscape, situated south of Bangalore, India has experienced immense land-use and land-cover change in the last two decades since the development of Bangalore as the core Information Technology center of India. Population increase, urban development, agricultural expansion, infrastructural development and forest cover change are some of the transformations taking place in the region. The present paper uses remote sensing methods of change detection analysis using multi-temporal Landsat and IRS LISS III imagery (1973-2007) to describe the rate and extent of spatio-temporal changes in and around the Bannerghatta National Park. The study shows most of the natural forest loss in the northern part of the park boundary which is nearest to Bangalore. There is a lot of forest regeneration in the study region outside the park boundary; however, this forest regeneration mostly an increase in plantation of eucalyptus and palm trees rather than natural forest regeneration. Natural forest cover inside the park has been maintained, suggesting that protectionism has played an important role in the conservation of forest cover in the study area.

Indian Woods, North Carolina: Mapping historical artifacts through GIS

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This research uses maps, photographs, oral interviews, and archival materials to complete a detailed community history of Indian Woods in North Carolina that covers over 400 years of recorded history. Native sites such as villages, burial grounds, trading posts, ceremonial grounds and battle sites are identified. As we explore and understand more about Indian Woods and the creolization that occurred there, we will begin to understand more about what it means to be American, Native American and African American. This work will serve as a model for how local histories can be written through GIS and demonstrate a higher conceptual level of knowledge surrounding vital aspects of historical understanding, such as geography and map reading; identifying visual characteristics of a particular time period, such as dress, architecture, and landscape; distinguishing between primary and secondary sources; as well as understanding the crucial intersections between the disciplines of history and geography. This access becomes invaluable when provided at the web-based or virtual level as it captures both existing materials as well as reconstructed fragments of foregone historical artifacts through GIS.

MULTISCALE APPROACH TO FIRES AND DEFORESTATION IN LAGUNA DEL TIGRE NATIONAL PARK, GUATEMALA

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Wildfires are usually related to land use changes in the tropics; this is the case for Laguna del Tigre National Park in Guatemala. To improve our understanding on the relationship between fires and deforestation, we analyzed if fires led to deforestation at a regional and local scales, and if farmers considered burnt forest in land use decision making. We analyzed deforestation after 1998 and 2003 fires using classified Landsat imagery as well as in-depth interviews and parcel visits. These mixed methods allowed us to link the land manager to its plot and improve our understanding of patterns of land use change. We found that most of 1998 deforestation occurred in previously unburned forest while in 2003 half of deforestation took place in burned forest. Although preliminary , interviews with farmers indicate that they will more likely clear a forest depending on terrain conditions (access, soil characteristics) and pre-fire plans for plot use, rather than the fact that forest is burned. The land user would consider clearing a burnt forest only when most of its valuable species had been burnt. These results show the importance of multi-scale approach to improve our understanding of fire and deforestation.

A Markov Chain Model in GIS to Analyze Tornado Occurrences in Mississippi

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Tornadoes cause multiple fatalities every year and millions of dollars in damages. Mississippi has the highest number of tornado deaths per capita in the US. Therefore, more predictable a tornado; the more likely it will be to avoid fatalities and damage. In this study, a Markov chain model is used to understand the spatial patterns of tornado occurrences and to predict the probability of tornado occurrences in counties of Mississippi. The results showed the probabilities of occurrence or non occurrence for the each county of Mississippi. The Markov Chain analysis method proved to be a useful method to predict tornado occurrences based on the data on tornado occurrences in the past.

Radial growth responses of three hardwood species to small canopy openings: an intra- and interspecific examination

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Recent research has highlighted the importance of gap-scale disturbance events in mature secondary forests of the Central Hardwood Region. In this study, we analyzed the radial growth responses of sugar maple, red maple, and yellow-poplar growing in 39 canopy gaps in a mature secondary hardwood forest on the Cumberland Plateau. These species were selected because they had the highest density and dominance values of trees in canopy gaps and were the most abundant species in intermediate crown classes in gap environments in the studied forest. We dated, measured, and analyzed radial growth patterns for 234 total individuals from the three selected species. Specifically, we quantified the raw growth increase over the previous year, percent growth increase over the previous year, duration of the release, and lag to response. The raw growth increase of yellow-poplar over the prior year was significantly higher than the growth increase of the maple species although differences were noted when all individuals were grouped and when analyzed by crown and gap positions. No systematic differences were noted in the other variables. Our results, indicate that yellow-poplar has the greatest probability of capturing gap environments based its physiological response to the canopy disturbance.

Protecting Our Coast: strategies of responsible urban design for the southeastern coast

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The southeastern United States possesses a unique resource that provides millions of dollars annually in total revenue for states with traditionally weak economies such as the Carolinas, Mississippi and Louisiana – the barrier island ecosystem of its shores. The marshes, lagoons and beaches of the southeastern coastline, created by the barrier islands that flank it, are some of the most economically beneficial natural resources in the nation for the states that oversee them. Furthermore, they fuel primary and secondary economic activities such as beach-based tourism, commercial fishing, and a whole host of water-based recreation: the coastal environment of these states is an invaluable asset to their economic vitality. By region, the southeastern United States are experiencing the fastest population growth rates in the nation. This growth has placed considerable strain on the processes that keep the ecosystems alive and well. Governmental agencies and organizations, along with urban planners, community leaders, and residents, should strive to protect the natural environment of our coast by encouraging *sustainable* planning, zoning, and building strategies. As a result, we may enjoy continued economic growth along with a healthy environment.

A Holocene Pollen Record Recovered From a Guano Deposit: Round Spring Cavern, Missouri.

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This study presents the first fossil pollen record from a stratigraphic profile of insectivorous bat guano. The goals of this research are to reconstruct vegetation history at Round Spring Cavern, Missouri and to provide a better understanding of bat guano's usefulness as an archive of fossil pollen for paleoecological study. An 85-cm sequence was recovered from a guano deposit in Round Spring Cavern with a basal date of 8,155 +- 50 BP. Results show that pollen is well-preserved throughout the guano profile, with less than 10% indeterminable pollen for most samples. Pollen concentrations range from 0 to 371,660 grains/ml, with wind pollinated taxa better represented than insect-pollinated taxa. Oak and pine are the dominant pollen types, consistent with the oak-hickory-pine forest of the local area. However, the pollen record of the guano profile does not appear to match lake-sediment pollen records from nearby Buttonbush Bog and Cupola Pond. Several possible explanations are given such as local-scale vegetation change, cave dynamics, the influences of the bats themselves on the pollen assemblage, and the role insects could have in shaping the pollen assemblage. Bats are likely the most important factor and more work needs to be done to establish the relationship between different bat species and the pollen assemblages they are transporting to the guano.

A Remote Sensing Approach to Monitoring Industrial Forests in Butler County, Alabama

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Industrial forests affect surrounding environments, impacting water and air quality, causing ecosystem fragmentation, and influencing local and regional economies. This study analyzed industrial forest growth in three areas of Butler County, Alabama from 1989 to 2009: Greenville, Forest Home and Industry. Normalized Difference Vegetation Index (NDVI) images were derived from 30 m Landsat Thematic Mapper imagery and were used to distinguish between deciduous and coniferous trees during the leaf off season. Within ArcGIS, polygon data was created by digitizing six sets of DOQQs. This heads-up digitizing was also used to delineate parcels of loblolly pine into harvested area, reforested area, and 'miscellaneous' industrial forest. Harvested areas were defined as parcels where industrial pine had been removed. Reforested areas identified plots of new forests or growth from previously harvested areas. The 'miscellaneous' industrial forest classification was given to areas which showed indication of industrial forestry, but did not show significant harvesting or reforestation. Determining net growth from these parcels was deemed unsuccessful, due to the prevalence of "miscellaneous" parcels and limited temporal coverage of data. Temporal frequency and higher spatial resolution would be needed to conduct significant studies on the harvesting and reforestation rates of industrial pine forests.

Comparison of WRF Model Outputs and MODIS Image Products for Cloud Presence for the High Latitudes: A Case Study

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The ability to accurately predict cloud presence in the high-latitudes is of importance and necessity for aviation. The Weather Research and Forecasting model (WRF) is designed to predict cloud cover for the mid-latitudes. The purpose of this project was to develop software to assess WRF's ability to predict cloudiness. A case study over a section of central Alaska was performed by comparing the WRF model predicted cloudiness to the MODIS satellite imaging cloud mask product. The images for March 13, 2008 were compared using ENVI and ESRI ArcGIS software packages at the accepted MODIS and WRF threshold values. A sensitivity analysis was also performed to determine if these values were appropriate for use in the high-latitudes. It was found that the stated MODIS threshold value of 95% is suitable for use while the WRF cloud water mixing rations and snow mixing rations needed to be combined and set to 10^{-23} kg/kg and 10^{-6} kg/kg accordingly. This case study only suggests that these are acceptable threshold values however more data sets and dates need to be investigated in order to determine appropriate threshold values.

Using Public Domain Software Programs in the Development of a K-12 Curriculum

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This project introduces the use of GIS on a K-12 curriculum for climate change. Public domain software programs can be effective in teaching both GIS and global warming concepts. The goal is to provide connections between climate change and content taught in geographic, physical, and life sciences. University geography professors were teamed up with local school district teachers to teach and learn the use of GIS and other related software in order to create new lessons plans at middle and high school levels for implementation in classrooms and to enhance existing K-12 standards. The outcome to students will be a better understanding of geography, GIS techniques, and the effects of climate change on humans.

Key words: Public domain software, GIS, Climate Change, K-12 Lesson plans

HIGH-PRECISION DATING OF SALTPETER MINE SITES
IN THE SOUTHEASTERN U.S. USING DENDROCHRONOLOGY

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Prior to the development of modern gunpowder technologies in the early 20th century, the U. S. relied heavily on the importation of saltpeter, a vital ingredient in gunpowder, from British India. However, fluctuations in the overseas market, due in part to European military campaigns, the often unstable relations among the United States and European powers, and domestic conflicts (i.e., the American Civil War), interrupted the supply of imported saltpeter for munitions; thus, sustainable domestic production of saltpeter became essential. Because nitrate minerals naturally occur in some caves, these subterranean locales became valuable sources of saltpeter for the domestic munitions industry. As a result, caves throughout the karst plateaus of the Southeast U.S. became sites for both large- and small-scale saltpeter-mining operations. The dry environment of typical of many saltpeter caves allows for excellent preservation of the material record, thus a number of saltpeter-mining sites still contain the equipment used in the mining operations, much of it *in situ*. Here we briefly highlight the dendrochronological dating of historic saltpeter-processing features from Cagle Saltpetre Cave in the Cumberland Plateau region of Tennessee and discuss the need for further research in the region's impressive saltpeter caves.

Dendrochronological Approaches to Late Prehistoric Archaeology in Tennessee

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During the 1930s several federal legislative measures were aimed at stimulating the American economy. Many of these New Deal reforms provided federal aid in the form of large construction projects. Several of these projects included hydroelectric dams by the Tennessee Valley Authority. These dams were built to control flooding and produce energy, while also providing jobs to an area hard struck by the economic recession. Funding for archaeological research was often provided as part of these projects, as the inundation of archaeological sites was inevitable. Florence Hawley was hired by the Works Progress Administration to employ the first ever Dendrochronological studies in the eastern United States. While Hawley was unsuccessful in publishing absolute dates for archaeological sites in the Southeast, she made a massive collection of tree-ring samples from Tennessee during the 1930s. Samples from protohistoric and prehistoric sites in several reservoirs were analyzed by the authors to construct a floating chronology, and acquire dates for samples from protohistoric sites. A master chronology dating back to the fourteenth century developed at Columbia University has enabled us to begin assigning calendar dates to some samples. This poster discusses preliminary results and provides an overview of the historical context of these samples.

The Microclimate of Bryant-Denny Stadium

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The microclimate of Bryant-Denny Stadium, on the campus of the University of Alabama, is examined in this study. Temperature and dew point data are collected at 24 locations throughout the stadium to determine the relationship between conditions inside the stadium during football games and the official first-order weather station maintained by the National Weather Service. Additionally, locations inside the stadium are evaluated via heat index values to determine areas of possible heat stress for spectators and athletes. Results indicate more stable temperature and humidity conditions within the concourse areas, while locations in the seated areas responded to exposure to sunlight and prevailing winds. Initial results highlight locations within the bowl of the stadium to be warmer and more humid than those in the upper-deck. These data will be used to develop a model to represent conditions during future events in Bryant-Denny stadium and to compare to conditions once the expansion of the stadium to the 102,000 person capacity is completed.

Anthropogenic Landscape Changes in Florida from 1974 – 2004

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As the population of Florida continues to grow, areas that were once rural are rapidly becoming urbanized. This study looks at land cover changes across Florida, addressing landscape alterations from 1974-2006 and the implications of these changes on climate regimes. GIS land cover datasets from various government agencies (USGS and the Florida Department of Environmental Protection) are used in the analysis. The land cover data were reclassified to 7 classes, based on the Florida Land Use / Land Cover Classification System; these classes include water, agriculture, urban, shrubland / grassland, wetland, forest, and bare lands. Land cover trajectories quantified the amount of natural vegetation maintained throughout the study period, the conversion of natural lands to urban, agricultural to urban, and agricultural to natural vegetation. Results indicate a large percentage change in agriculture, urban, shrubland / grassland, and wetlands. The urban class increased by approximately 10% and only 50% of natural vegetation remains. Coastal regions had the highest natural vegetation to urbanization conversion rate, agricultural lands decreased and shifted south, and conversion of agricultural lands to urban is highest in North Central Florida. Major processes influencing such changes are discussed within the context of current economic, climate, and demographic change in Florida.

Tobacco Growers and Production in the South

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The tobacco industry is in a state of transition. As a mature industry, there is external pressure to change in order to economically viable. The federal government eliminated the Tobacco Allotment program which relied on a system with productions quotas and a highly codified relationship between tobacco farmers and the tobacco industry. Many federal data collection agencies have greatly remediated or eliminated datasets that provide valuable data to industry professionals. The Center for Tobacco Grower Research (CTGR) has instituted a annual mail survey that provides various types of information that is helpful to assessing the tobacco industry, from the grower perspective. This poster relies on both NASS and CTGR datasets to assess the present situtation of farmers in tobacco producing regions in the South.

Resisting Financial Contagion: The Faroe Islands and Financial Turbulence in the North Atlantic

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Islands face unique vulnerabilities to externalities, yet possess physical and economic buffers to the outside world. To help manage exposure and dependency, island jurisdictions have established unique and innovative political and economic arrangements with larger metropolitans. One jurisdiction is the Faroe Islands, a highly autonomous province of Denmark. Despite being surrounded by close partners and neighbors severely hit by the global financial crisis, such as Iceland and the United Kingdom, Faroese banks remain relatively healthy and solvent. This research project looks at the exposures and protection experienced by the Faroese financial sector during the crisis, as well as the utilization of the unique autonomous arrangement with Denmark to best safeguard the local banking industry. Interviews with Faroese banking leaders and policy-makers provide the basis for qualitative analysis, supplemented with quantitative analysis of firm and sector performance before and during the global financial crisis. A mixture of factors has protected the sector. Strong internal forces such as the legacy of a local banking crisis in the 1990s made Faroese banks highly risk-averse, as well as external forces such as the drive to financially integrate into a larger Europe, prevented the Faroese banks from going down Iceland's path.

Mobile Home Resident Behavior during the Super Tuesday Tornado Disaster at Lafayette, TN

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This paper investigates mobile home resident preparedness and response to warnings during the Super Tuesday tornado disaster at Lafayette, TN, on February 5, 2008. The tornado (EF3) left 13 dead (7 in mobile homes). A post-disaster survey was conducted on February 9-15, 2008. The study group included 127 local residents who were present during the tornado. Thirty-five percent of the participants lived in a mobile home, 61% lived in a site-built permanent home, and 4% lived in an apartment or non-traditional home. There was little difference in mobile home and permanent home resident responses to the tornado warnings. However, permanent home residents were better prepared than mobile home residents in all categories. Although most mobile home residents sought shelter after receiving the warnings, over 50% did not reduce their risk of harm because they sought shelter inside the mobile home. Perception of danger, previous participation in a tornado drill, understanding of a tornado warning, and having a plan for seeking shelter had little or no influence on the rate at which mobile home residents sought shelter; however, each of these factors increased the rate at which people evacuated to a safer location.

Spatial Modeling of Mosquito Abundance using a GIS in Chesapeake, Virginia

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The increase in mosquito populations following extreme weather events poses a major threat to humans owing to their ability to carry disease-causing pathogens. In areas with reservoirs of disease, mosquito abundance information can help identify the areas at highest risk of disease transmission. Using a Geographic Information System (GIS), mosquito abundance is predicted at various locations across Chesapeake, Virginia. The developed model uses mosquito light trap observations and environmental variables in order to predict the abundance of the species *Culiseta melanura,* as well as the combined abundance of the ephemeral species *Aedes vexans* and *Psorophora columbiae*. Abundance is predicted for each month within the optimal breeding period for the year 2003, which includes effects of Hurricane Isabel. While the final model is still in development, initial results illustrate unique patterns of habitat suitability. It is expected that summer mosquito abundances will have the highest numbers due to the favorable climatic variables and habitat during this time of year. When combined with results in the next phase of the research, evaluating vulnerable human populations, the project will have produced a portable, reproducible model that can ultimately aid in detecting areas at highest risk of mosquito-borne disease transmission.

Textile Mills of Cabarrus County, NC

Laura Coppola

UNCC

The aim of this project was to locate and document every textile mill in Cabarrus

County, North Carolina. Four sources of data were utilized to find the mills, and they

were entered into a GIS database. Documenting the mills is important because they

are a large part of the history in Cabarrus County. Kannapolis, in the north of the county

is a quintessential mill town, with everything from downtown shopping to the local high

school under control of the mill in its heyday.   With easier, cheaper, and faster means of

transportation, much of the manufacturing of textiles has moved to less developed

countries, as labor was cheaper. Because of this move, many of the mills of our past

are abandoned, vandalized, and forgotten. As with documenting other movements in

history, its important to document the textile industry and what it meant to the south.

Mountains of Light: Classification and Visualization of the Urban to Rural Continuum for the Conterminous US.

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An urban-to-rural continuum characterizes a gradient of human settlement intensity on the landscape. Past remote sensing research of urban environments has classified urban regional land-use and cover typically using moderate or fine resolution data products. The research presented here differs from prior urban classification efforts in two ways: (1) it aims classify an urban-to-rural continuum for the entire conterminous US, and (2) it uses coarser resolution night time lights satellite imagery fused with a population density surface. 2-D and 3-D visualization products are generated to demonstrate qualities of the source data and resulting classification. DMSP-OLS "stable lights" data for the year 2000 covering the conterminous US were obtained via web download from the NDGC. A 3-band image composite was constructed as follows: (1) Band 1 corrected night time lights, (2) Band 2 population density, and (3) Band 3 night time lights texture. Principal components analysis (PCA) was applied to the 3-band set with results and used as input for a 20-class unsupervised classification. Spectral signatures were merged to six classes representing the urban-to-rural continuum. The resulting product represents the first attempt to map an urban-to-rural continuum at the continental scale through the fusion of night time lights and population density data.

North Carolina View

Richard Curran and Dr. Yong Wang
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The USGS AmericaView (AV) Program is a national network of university lead, state based consortia for remote sensing education, research, and applications. The AV Program seeks to overcome the difficult and often expensive hurdle at the local level of accessing remote sensing data. As part of the AV Program, we have recently established a North CarolinaView (NCView) consortium to help remove barriers between willing cooperating providers and users, to promote and expand the further development of applied remote sensing for local issues and problems, to cooperatively nurture the intellectual and technical capacity of users through higher education and outreach, and to engage with and educate the public about remote sensing through outreach activities. The creation of the NCView will enable remote sensing data users in North Carolina to:

- utilize a more efficient and effective means to locate, access, and retrieve existing and future remotely sensed data and applications statewide,
- develop and enhance collaborative relationships of academic, federal, state, county, city, and public and private sector users, and
- further the use of remote sensing in the State of North Carolina to address critical issues facing the State, with emphasis on land use change and environmental and coastal resources.

User friendly applications of free remote sensing software packages for elementary school teachers

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Children develop concepts of space and place early in life. Activities involving local community analysis from an aerial perspective, using free software and remotely sensed imagery, can be incorporated into the elementary school environment more easily than ever. An undergraduate college level remote sensing class researched national education standards and created multidisciplinary, relevant, remote sensing lesson plans for 4th-6th graders in Tennessee. Post judging by education professionals, the three most engaging lesson plans were showcased in a poster. The elements of which will be used as visuals for an article entitled "Modern and Engaging Ways to Learn about Space and Place in the 4th-6th Grade Classroom."

Wildfires as a Product of Multi-Decadal Oscillations in Central Appalachian Yellow Pine Stands

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The future of forest and fire management in Appalachian forests lies in the understanding of multi-decadal oscillations. Such broad-scale climate patterns, including El Nino-Southern Oscillation (ENSO), Pacific Decadal Oscillation (PDO), Atlantic Multi-decadal Oscillation (AMO), and the North Atlantic Oscillation (NAO), have a larger influence over continental forests than previously thought, including the initiation of drought events that lead to fires and possible increases in fuel loadings. A yellow pine (Pinus spp.) tree-ring chronology was created from four study sites in the Jefferson National Forest, Virginia. Superposed Epoch Analysis (SEA) was used to identify relationships between fire events at the study sites and the oscillations. Analyses showed significant relationships between fire occurrence and NAO and ENSO events. Although not always significant at the $p < 0.05$ or higher level, the pattern of drought occurrence the year of fire showed up consistently. This suggests that precipitation in preceding years should not be used when trying to predict fire events; in other words, there is not clear evidence of preconditioning.

Atmospheric Characteristics Conducive to High-Ozone Days in the Atlanta Metropolitan Area

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The purpose of this paper is to identify the atmospheric conditions associated with elevated ground-level ozone concentrations during June-August of 2000-2007 at 11 ozone-monitoring stations in the Atlanta, Georgia USA metropolitan statistical area (MSA). Analyses were confined to high-ozone days (HODs), which had a daily maximum 8-hour average ozone concentration in the 95th percentile of all June-August values. Therefore, each station had 36 HODs. The southeastern and far northern portions of the MSA had HODs with the highest and lowest ozone concentrations, respectively. HODs at nearly all Atlanta-MSA ozone-monitoring stations were enabled by migratory anticyclones. HODs for most stations were hot, dry, and calm with low morning mixing heights and high afternoon mixing heights. All sets of HODs had daily mean relative humidities and afternoon mixing heights that, respectively, were significantly less than and significantly greater than mean values for the remaining days. Urbanized Atlanta typically was upwind of an ozone-monitoring station on its HODs; therefore, wind direction on HODs varied considerably among the stations.

A Mixed-Methods Approach to Increase Healthcare Access for the Hispanic Population

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The Hispanic population in Mecklenburg County, North Carolina is growing at a rapid pace. Previous studies utilizing geographic information systems (GIS) and community-based participatory research (CBPR) have shown that this community experiences barriers to primary care access and, as a result, over-utilizes emergency departments (ED). Interventions are needed to improve this community's access to primary care services. The objectives of the research are listed below:

1. Display the fundamental CBPR principles utilized by the Mecklenburg Area Partnership for Participatory Research (MAPPR) network.
2. Evaluate the current project's effectiveness in increasing primary-care access for Mecklenburg County's Hispanic population.

The research takes place within Mecklenburg County, North Carolina. The study population is Hispanics who access healthcare within the county. The project involves three stages: 1) The planning process and collection of baseline data (identifying barriers); 2) The development of interventions to improve primary-care access; and 3) The implementation and evaluation of the interventions through CBPR processes. The project is currently in stage one, which is accomplished through a mixed-methods design that utilizes GIS, focus groups, and key informant interviews.

Predicting urbanization–conservation conflicts at the edge of metropolis

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The rapidly expanding metropolises of Charlotte, Raleigh, and Greensboro, North Carolina are placing significant pressure on the diverse natural areas of the North Carolina Piedmont. This primarily rural and agricultural region is projected to grow in population to over one million residents by the year 2030. It is inevitable that conflicts will arise between demands for developed land and protection of valuable natural resources and ecosystem services. This project utilizes predictive land change modeling techniques to identify locations where these conflicts are most likely to occur. According to this analysis, if development patterns continue according to historic trends 30% of land developed between 2010 and 2030 will in some way conflict with existing conservation priorities. The expected locations of these conflicts have been determined, and an alternative future presented that reduces the amount of conflict observed by 75% without hindering urban growth. These landscape-level visualizations of urban growth patterns are being used to motivate local planning and guide strategies for preservation of the region's valuable natural resources. It may also be important to focus immediate conservation efforts in these areas of competing priorities.

Dendroarchaeological Dating of the Etowah Indian Mounds in Cartersville, Georgia, USA.

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The Etowah Indian Mounds are located in Cartersville, Georgia at the junction of the Etowah River and Pumpkinvine Creek. This mound site was created by Moundbuilders in 950 BCE. Many years later, while the site was in decline, it was visited and partially destroyed by Hernando De Soto around 1540 and left to perish. During the 1960's, the Georgia Department of Natural Resources excavated Mound C and recovered numerous charred wood samples. These samples were measured and dated using dendroarchaeological techniques to determine when individual structures at the mound site were built. Using dendroarchaeological techniques, the charred wood samples from Etowah can be dated to determine whether or not the settlement is pre-contact. The Etowah floating chronology was compared to a nearby oak (Quercus spp.) chronology from the Rossville, Georgia area. Our results show that the charred samples were made of pine (Pinus spp.), red cedar (Juniperus virginiana L.), and oak.

Keywords: Dendroarchaeology, Moundbuilders, Etowah

An Analysis of Reforestation at Three Sites in Greenbrier County, West Virginia

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This paper is an analysis of trends in reforestation of three separate Regions of Interest (ROIs) in Greenbrier County in southeast West Virginia. For two sites, the city of Lewisburg and Greenbrier State Forest, Normalized Difference Vegetation Index (NDVI) calculations were generated from Landsat TM data from October 1987 and June 2000 in ENVI+IDL for each ROI, respectively. Seasonal differences were accounted for in the analysis. For the third site, covering isolated surface mine sites in western Greenbrier County, aerial photography provided predominantly by the US Geological Survey (USGS) through Google Earth Pro was digitized on-screen into vector format from keyhole markup language (.kml) files. The images utilized for the twelve selected mine sites represent dates in 1990, 1997, 2003, and 2007. This study found small differences in reforestation versus deforestation in the Greenbrier State Forest ROI, moderate levels of reforestation within the city of Lewisburg accompanied by moderate levels of deforestation in the surrounding area, and high levels of deforestation in the surface mine sites examined. Further studies will need to be performed to more effectively identify reforestation and deforestation patterns and their causes in Greenbrier County and other Central Appalachian locations.

Two Case Studies from Central North Carolina

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Winter precipitation is a major forecast challenge across the Southeast United States. Many winter storms in the region are often near a tipping point with regard to temperature, meaning that subtle changes in the vertical thermal profile can lead to significant changes in precipitation type and intensity. The objective of this poster presentation is to illustrate that the major processes and features associated with complex winter storms in the Southeast can be conceptually understood through analysis of atmospheric trajectories. This will be accomplished using three-dimensional air parcel trajectories produced from the NOAA-ARL "HYSPLIT" model interface for two case study events (one moderately heavy snowstorm and one major ice storm) in central North Carolina. The results of this work will illustrate the utility of atmospheric trajectory analysis in determining the physical processes that contribute to complex winter storms in the region, particularly those that evolve under similar background synoptic settings.

Habitat use by large mammals along the Chobe riverfront, Chobe National Park, Botswana.

Timothy Fullman, Cerian Gibbes, Mike Hyman, Dan Neal, and Dadan Xu.

University of Florida.

Animals distribute across a landscape based on a variety of factors including habitat characteristics such as elevation, slope, and distance to water; food quantity and quality; and presence of competitors and predators. Understanding how processes change across various scales provides a better understanding of the behavior and ecology of particular species, as well as what conservation priorities and management actions may be most effective. Remote sensing enables habitat mapping at larger spatial and temporal scales than possible with field studies alone. This project combines remotely sensed datasets with field-collected data to map habitat use and species interactions by large mammals in Chobe National Park, Botswana. Game drives were conducted between June and July 2008. Animals were spatially located, counted, and identified to species. Habitat variables were derived from Landsat Thematic Mapper. A generalized additive model was used to link species presence/absence with predictor variables. Preliminary analyses suggest strong differences between habitat use by common large mammals varying primarily due to body size and feeding strategy. This information is used to suggest management policies in the face of an increasing elephant population and proposed vegetation shifts from climate change.

Preliminary results from an NSF collaborative field project measuring the aerodynamic interactions between atmospheric boundary layer turbulence gusts and tree-sway motions

Jonathan Furst & Hong-Bing Su

Department of Geography, East Carolina University, Greenville, NC

Work presented here is part of an NSF funded collaborative research project titled "Measurement and Modeling of Aerodynamic Interactions between Tree-Sway-Motion and Turbulence in and above a Forest Canopy". This project utilizes a cutting edge high resolution 3-D computational fluid dynamic model (LES), carried out at ECU and NCAR, and a labor intense field experiment at AmeriFlux site in Howland, ME. The focus of this poster is on quantifying the spatial and temporal characteristics of and the relations between canopy roughness sublayer (CRSL) coherent gusts and group tree-sway, using a space-time correlation technique. The effects of tree morphology on the aerodynamic interactions between turbulence gusts and group tree-sway are examined. The analyses are based upon high frequency data collected from simultaneous measurements of a large array of tree-sway and CRSL turbulence this summer. The broader impact of this research is to improve parameterizations of exchanges of greenhouse gases and heat between forests and the atmosphere in large scale weather and climate models.

Potential Human Impacts on Atlantic Sturgeon Habitat.

Ursula Garfield, Michal Lynn Jones, Kevin Ash (UF / USGS) and Ann M. Foster (USGS)

The Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) is an anadromous fish occurring along the eastern seaboard of North America, entering coastal rivers to spawn in the spring. Upon reaching a size of 76-92 cm, subadult Atlantic sturgeon transition to a marine existence. They potentially undertake extensive migrations along the inshore and estuarine coastal areas out to the edge of the continental shelf. Adult Atlantic sturgeon return to their natal river at age 8-15 and swim upstream every 4-8 years to reach suitable streambed spawning locations (gravel and cobble). Remaining Atlantic sturgeon riverine habitat may be threatened by anthropogenic influences. Using phenomena point data and Kernel Density analysis in a GIS, the densities of power plants, wood pulp plants and coal tar contamination sites were determined to identify areas of concern for species recovery.

Sensitivity of MM5 and RAMS Meso-scale Models to Soil Moisture Variations

Astrid Gonzalez, Arturo Quintanar, Rezaul Mahmood, Adriana Beltran-Przekurat, and Roger Pielke Sr.

Colorado State University Regional Atmospheric Model System (RAMS) version 4.4 and Penn State/NCAR's Mesoscale Model (MM5) were used in order to assess the sensitivity of planetary boundary layer variables to varying soil moisture. The models were coupled with the Land-Ecosystem–Atmosphere Feedback Model (LEAF2) and NOAH Land Surface Model respectively. The study elaborates on the findings of Quintanar et al (2008), following a similar experimental design. Three synoptic events were study during June of 2006 with varying synoptic forcings: June 11, June 17, and June 22. For each event, six simulations were conducted in which volumetric soil moisture was increased and decreased from 0.05 to 0.15 (m^3m^{-3}) every 0.05 (m^3m^{-3}). The simulations were initialized with 1°x1° FNL-Reanalysis data and conducted with a horizontal grid resolution of 12 km. The simulations were individually analyzed. Ensemble means were also computed from wet and dry experiment (increased and decreased soil moisture respectively) and compared to each other and to the computed controls. The findings from the individual runs were consistent with Quintanar et al study. Overall, MM5 ensemble simulations presented a greater sensitivity and variability when forecasting precipitation and potential temperature, while RAMSv4.4 ensemble comparison presented greater variability resolving surface winds.

Cultural trends in the Biloxi cemetery: a Necrogeography

Kenneth H. Gregory

The University of Southern Mississippi Gulf Coast

Burial practices are as much a cultural identifier as food, language and religious practices. The type of funeral and procedures to prepare the body for its final resting place is varies among cultural groups. Some groups choose elaborate celebrations, while other groups choose more subdued rituals and mourn the life lost. For instance, the Natchez Native Americans in the 1600s buried their deceased inside large mounds of nutrient rich soil on the banks of the Mississippi River, while the Hopi Native Americans buried their deceased under a simple stone mound. Religious and cultural groups around the world have iconography that literally leaves their mark even after the body is laid to rest.

Walking through an active cemetery like the Biloxi Cemetery, which dates back to the 1800s, one can see differences in grave marker styles as they traverse from the old section to the new section. The differences in styles and iconography follow cultural trends of the time, allowing researchers to establish timelines of cultural movements in an area of interest. These trends and movements can be localized phenomenon or part of a national trend. Simple icons in wood or stone mark the landscape of the dead, from simple shapes to great works of art laser-etched color images on quarried granite or massive statues are placed to commemorate the life lived and lost. Regional differences occurring within a larger cultural group gives the smaller sect of the larger group its on collective identity. Laura Leibman, associate professor of English and Humanities at Reed College writes, "Scholars have argued persuasively that the shift from the Calvinist "death's head," to the Arminian Cherub, to the Unitarian "Urn and Willow" reflect when and how individual communities made the transformation from Calvinism to more liberal forms of Christianity." Along with ethnic or religious differences one can see some economic trends within the cemetery. Wealth is a determining factor in the types and amount of resources available to a family caring for their deceased. One with limited economic abilities would not have the resources to construct a massive monolith to mark the final resting place of their deceased family member, but a very rich person would have the resources available to commission an artist to chisel a life size statue of an African lion to mark their grandiose life.

This poster will illustrate variations in care for the deceased visually and spatially, in the Biloxi Cemetery in Biloxi, Mississippi. This poster will follow the changes in iconography of the grave markers across this cemetery from its older to section to its newer active section. The idea is that the cultural trends of Biloxi since 1800s will be recorded by the stones marking the deceased's final story.

The Geography of Major College Baseball Player Origins

Theodore L. Goudge, Brett R. Johnson, Brooks R. Swanson and Kyle L. Davis,
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Earlier studies by Goudge and Northwest undergraduate researchers have identified spatial patterns of baseball player origins at the professional, and major college level (1999). The purpose of this project was to re-examine the geography of college baseball origins ten years later to determine what similarities and differences have taken place during the past decade. A geographic database consisting of the 300 teams competing in NCAA Division I Baseball was be generated. The database comprised of team rosters collected through college team websites and then geocoded at the hometown/high school level.   An attempt to measure success at the Division I level was also be made (All-Americans, Attendance, Post-Season Success and Rankings). The findings of the player origins study combined with the success data to determine the degree of movement (recruitment) assessed through the mapping of the origin and destination of players with respect to successful programs. The resulting maps provided insight into the regionalization of baseball involvement and comparisons drawn from the earlier work regarding the geography of American baseball.

The Geography of College Football Player Origins: Division III

Theodore L. Goudge, Jacob R. Goving and Matthew D. Jundy, Department of Geography, Northwest Missouri State University, Maryville, MO 64468. E-mail: tgoudge@mail.nwmissouri.edu.

Sport and geography share a common spatial bond. Boundaries, delineation, demarcation, territorial control, spatial interaction, distance decay, etc. are essential elements of both. The role sport plays in the American way of life is inescapable. How many ESPN channels are there? Thus, academic investigation into the cultural geography of sport, sport landscape and sports impact on society is a data-rich subfield that poses unlimited possibilities. College football provide a significant focus for such investigations.

Earlier studies (Rooney, Goudge) have identified spatial patterns of football player origins at the professional, major college, small college (Div. II) and high school level. The purpose of this project is to examine the geography of college football at a different level to determine if similarities and/or differences exist. A geographic database consisting of the Division III Football teams was generated. A first time attempt to measure success at the Division III level was also constructed. The variables that were assessed to determine program success included: attendance, poll rankings, and post-season success. The resulting maps provided insight into the regionalization of football involvement and comparisons drawn from the earlier work regarding the geography of American football.

Still a "Variety Vacationland"? Measuring Historical Changes in Vacation Costs for North Carolinians

William Graves

UNC Charlotte

Rapid escalations in land costs in North Carolina's mountains and coast have caused traditional land-uses to disappear from the landscape. One of the most significant land use changes has been the loss of small beach hotels which provided low-cost, short-term accommodation for visitors of all income levels. Press reports suggest that between 30% and 50% of North Carolina's beach hotels disappeared between 2000 and 2005 (Barrett 2005) will be tested. Archived tour book information (AAA guide books) for hotel rates, a sample of realtor records for short-term hose rental rates and census data for home price information were used to measure the cost of coastal vacations for the 1980-2008 period. These cost figures were indexed to median income figures of North Carolinians during this period. Initial analysis revealed mixed results in terms of accessibility change. The income adjusted cost of weekly house rentals increased substantially along the cost while the income adjusted price of hotel accommodations fell during the observation period.

Vegetation Dynamics of Endangered Pine Rockland Communities in the Lower Florida Keys

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Pine rockland communities are considered globally endangered. In South Florida these communities are characterized by a single canopy species, South Florida slash pine (*Pinus elliottii* var. *densa*), a diverse subcanopy of West Indian hardwoods and palms, and a variety of endemic herbs. This research uses dendrochronology to investigate the structure and disturbance history of declining pine rockland communities in the Lower Florida Keys. We aim to reconstruct the spatial and temporal variability of past fire regimes in pine rocklands and understand how fire affects the structure and extent of these communities. We also examine the interaction between regional climate oscillations (*e.g.* El Niño Southern Oscillation) and wildfire activity. Results from this research will contribute to the understanding of how climate oscillations affect the region, particularly south Florida, and advance understanding of the complex dynamics of pine rocklands that will aid management efforts aimed at preserving these declining communities. Although dendrochronology can be seldom applied in tropical regions, our preliminary results indicate that South Florida slash pine produces one unambiguous growth ring per year and that accurate crossdating of specimens is possible.

Sinkhole Flooding in Cookeville, TN, 1998-2009
Evan A. Hart
Tennessee Tech University

In Cookeville, TN all stormwater drains through numerous sinkholes and caves beneath the city. As development has proceeded, runoff rates have increased, exacerbating the problem of sinkhole flooding. Furthermore, trash and debris from the urban environment clogs sinkholes reducing drainage rates. In 1998 the city commissioned a study to investigate sinkhole flood heights and frequencies. Data from this study have guided stormwater management decisions, however, development within sinkholes has continued, putting many structures at risk. Beginning in 2007, Cookeville funded an additional study to establish 100-year floodplains for 213 sinkholes in the urban growth boundary. This analysis was completed using runoff modeling software and GIS. Observed flow and rainfall data were collected using a network of automated recorders. Results show that 230 structures lie within a 100-year sinkhole floodplain. Storm events in the summer of 2009 served as a test of the recently completed floodplain map. Observed flood heights after a 6-hour, 100-year rainfall in September 2009 showed good agreement with the predicted 100-year floodplain for many sinkholes. However, over-prediction of the 100-year floodplain elevation occurred for sinkholes with large swallets and high drainage rates.

Exploratory Analysis of Storm Generated 'Wave Events' from 1997-2007 at Duck, NC

Stephanie Hill
East Carolina University

It is well known that storms generate increased wave heights, which in turn, cause beach erosion. Past studies have focused on storm surge rather than wave height in producing change on the beach. This study takes the first step to understanding the distribution and probability of occurrence for wave events between 1997 and 2007 at Duck, NC. Individual events were extracted and characteristics were derived for each of the events so that the total energy per event could be determined using a created wave energy function. Waves 1.5m or greater were considered for analysis as was proposed by Dolan and Davis (1992) to focus on both large and small wave events. The following equation was used to determine total energy of a wave event: $E_e = 1/8 pg H_s^2$ * Duration/T, where E_e is the total event energy, p is the water density, g is gravity, H_s is the significant wave height, and T is the significant wave period of the event. An energy index was then created to facilitate the manipulation of the energy data and most events have an index of 3 or less. The Weibull distribution was then applied and 99% of the wave energies were predicted to an index of 2 or less. The events were then grouped by seasons and it was found that the greatest wave energies occur during the fall and winter months because of the occurrence of hurricanes in the late summer and fall and of northeasters during the winter.

An exploration of uncertainty in urban commute metrics: a simulation study in Tallahassee, FL

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Utilizing excess commuting/jobs-housing methodologies in policy analyses is of growing interest to urban and regional researchers. Because of their propensity for uncertainty, difficulty arises when using network-based travel time estimates in such commuting analyses. This poster explores how commuting metrics react to changes in their input network times. A simulation study is designed for the city of Tallahassee, FL. The model results reveal variation in the metrics' outcomes as a function of how uncertainty is parameterized.

Understanding urban landscape of housing with real estate submarkets: A spatial expansion model approach

Zhuojie Huang, Timothy Fik, Department of Geography, University of Florida

This research reviews the evolution of the urban landscape of Gainesville by exploring sub-station concepts in the housing literature and attempts to decompose single family housing market in two dimensions: the structural submarket and the spatial submarket. We find out that there is still a substantial gap for linking the spatial aspects of the patterns of housing valuation as they relate to the process of urban change and development, structural attributes, and the local context in which individual properties are affected or unaffected by that change. It is proposed that two-dimensional segmentation of the housing market could provide reference for the transition of the price according to their site/situational attributes. By analyzing the means within or between different structural and spatial submarkets, we could construct a variable surface for reflecting urban isotropy pricing islands. The object of this study is not only to integrate a strategy to model trends in real estate submarkets to local and city-wide trends (including infrastructure development), but to present a model for the estimation of housing values (a hedonic price valuation model).

The role of urban vegetation on surface temperature of its surrounding areas,

Won Hoi Hwang,
Department of Geography and Division of Applied Science and Technology, Marshall University

Since Urban Heat Island research has been conducted for the past 40 years, the benefits of trees and other vegetation on the urban environment, such as energy savings, atmospheric pollutants reduction, and air-quality improvement, have been well documented. It is also well known that the higher the proportion of vegetated areas, the lower the temperatures. This study examined the effect of urban vegetation on the surface temperature of its surrounding areas as estimated from Landsat Thematic Mapper images in each season using buffer analysis and high resolution images. There were no significant differences of the surface temperatures between the buffer zones. However, one small study area, the only vegetated area in downtown, produced significant results. Through the year, the surface temperatures of the vegetated downtown block were the lowest, increasing with distance. The effect was particularly strong in August with 28.23 °C in the study area, 29.65 °C in the adjacent 0-60m, 30.79 °C in the 60-120m buffer zone, and 31.30 °C from 120 to 180m away.

Presentation Title: Is Lynchburg the Most Disadvantaged City in the Country due to Lack of Interstate Access?

Orrin Konheim
George Mason University, School of Public Policy

Although Lynchburg, Virginia is situated at the confluence of four US Highways (as opposed to state or county highways), the city remains isolated from much of the rest of the state due to its lack of accessibility to the nearest interstate highways: I-81 and I-64. As a result, they have not enjoyed the same level of growth as the two main population centers of Virginia located in Eastern and Northern Virginia. In 1950, Lynchburg was the sixth biggest city in the state and it has been eclipsed by Eastern Virginian cities such as Newport News as well as cities that were not even incorporated in 1950 such as Hampton and Chesapeake.

Darrell Laurant, local columnist and city historian, has even made the claim that Lynchburg is the least accessible city to the interstate highway system of its size. Part of the reason that Laurant and others are fuming over the lack of connectivity to other cities is that twice in the early formation of the interstate system, there were plans to reroute Interstate 64 in a manner that would have benefited the city as the result of a rare occurrence when the national government overruled the state government in decisions over where to put a highway.

The aim of my study was to examine whether this claim is true through geographic tools and to examine whether this affects Lynchburg significantly through geographic theory and study of the city itself.

Assessing the Climate Information Gap in the Public Health Sector

Submitted by: Maggie M. Kovach
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Research Associate, Southeastern Regional Climate Center (SERCC)

Co-Authors/Hosts: Christopher M. Fuhrmann (SERCC), Jeffrey T. Lutz (SERCC), David R. Easterling (NCDC), Peter J. Robinson (SERCC)

Institutional affiliations: University of North Carolina-Chapel Hill; Southeastern Regional Climate Center

The public health community realizes that weather and climate have an impact on human health in numerous ways, and that climate change has the potential to create major challenges. The climate community has a large amount of data and understanding concerning past and future climates. Current activities linking climate and health commonly demonstrate that the creation of useful knowledge requires a closer collaboration between the two communities. This must be fostered through cooperation at all stages in the information generation process, from problem definition to results dissemination. The September 22-24, 2009 workshop on "Climate Change and Human Health: Assessing the Climate Information Gap" was designed to bring together a small number of experts from both the climate and health communities, representing various stages of information generation and utilization, to explore in depth those areas where cooperation is possible and where it is likely to be most fruitful.   In this poster, we illustrated a realistic action plan for future work, including specific recommendations for projections and proposals where collaboration can lead to near term gains in understanding and the application to the public health well-being.

Spatial Variation of Mercury in the Virginia Bald Eagle Population

David E. Kramar[1] Bill Carstensen[1], and Jim Fraser[2]

Department of Geography, Virginia Polytechnic Institute and State University[1]

Department of Fisheries and Wildlife, Virginia Polytechnic Institute and State University[2]

We collected blood, feather, and talon samples from juvenile bald eagles (*haliaeetus leucocephalus)* in the coastal plain, Piedmont and Mountain regions of Virginia to determine which areas of the state and what landscape characteristics contribute to mercury (Hg) levels found in the individuals. We analyzed the samples for total mercury in all blood, feather, and talons. Samples collected from the juvenile bald eagles located in the coastal reaches of the state exhibited low concentrations of mercury (mean blood Hg = 0.05013 mg/kg) suggesting that areas within the tidal reaches of the Chesapeake Bay are less susceptible to methylation, transport, and availability of Hg. Samples collected from the inland population exhibited statistically higher concentrations of Hg (mean blood Hg = 0.2717 mg/kg), suggesting that environmental and anthropogenic mechanisms in freshwater environments provide a more effective method of Hg methylation, subsequent transport, and availability to high trophic level species, such as bald eagles. Further analysis of individual land cover characteristics as they are associated with each nest indicate that spatially explicit variations of both physical and anthropogenic patterns further impact Hg availability in Virginia.

Biogeography of dogwood anthracnose disease in northwestern North Carolina

Lindsay Kvasnak & Gabrielle Katz

Department of Geography and Planning, Appalachian State University

Cornus florida (flowering dogwood) is an ecologically important and culturally valued native tree in Appalachian forests. *Cornus florida* is currently being affected by dogwood anthracnose disease, caused by the fungal pathogen *Discula destructiva.* We documented patterns of infection of naturally occurring *C. florida* in order to assess the ecological and physical factors influencing disease severity. Ten research sites were established within Watauga County, North Carolina and *C. florida* populations were surveyed for dogwood anthracnose in August, 2009*.* For at least 10 *C. florida* individuals within each population, dbh was measured and disease severity was determined based on visible evidence of foliar infection, limb dieback, and the presence of stem cankers. The point center quarter method was used to assess forest structure (species composition, tree basal area, stem density, and total coverage) within each stand. We used GIS to determine site elevation and aspect, and to visualize *C. florida* population infection rates. Site elevations ranged from 843 m to 1085 m and the dominant aspect was south-west. We modeled the prevalence rate of dogwood anthracnose as a function of physical environmental factors and forest stand structure.

Stand Dynamics of Xeric Mixed Hardwood/Pine Forests, Great Smoky Mountains National Park, Tennessee, U.S.A.

Lisa B. LaForest, Henri D. Grissino Mayer, Charles W. Lafon, and William T. Flatley

University of Tennessee, Knoxville

Disturbance and change are a natural part of any forest ecosystem. When disturbance regimes are altered, the dynamics of the stand will reflect those changes. Southern Appalachian xeric pine-oak woodlands are one forest type that has experienced such change, primarily in the form of fire suppression. We selected 3 sites in the western portion of the Great Smoky Mountain National Park, an area with large stands of older-growth yellow pines and oaks. Our objectives were to determine stand composition and age structure and their relation to past disturbances. We found that the stands are converting to fire-sensitive species, strongly driven by red maples. Yellow pine regeneration is weak and is dominated by Virginia pine. The longer-lived, shortleaf pines are not successfully reproducing under the current disturbance regime. A large cohort of shortleaf pines that established in the 1860s was probably associated with a moderate-severity fire. The appearance of dense clusters of mixed hardwoods, white pine, and maple coincide with park establishment in the 1930s. Oaks will likely maintain some presence in all stands. The data show that fire suppression has had a considerable impact on these forest stands, and that if no mitigation is taken, they will trend toward mesophication.

Spatial variation of above-ground forest biomass in heterogeneous landscapes

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Regional scale analyses have shown that ecological and physiographic variations affect forest biomass distribution, but less is known about forest biomass variations across highly heterogeneous landscapes. We employed statistical and geostatistical methods to assess spatial variation and uncertainty of above-ground forest biomass distribution across highly heterogeneous landscapes of the Big Sur ecoregion in California. Forest biomass density distribution, estimated at 280 long term monitoring plots (plot size 500 sq m), was highly variable and spatially autocorrelated up to ~1.8 km suggesting univariate kriging to be unsuitable for mapping biomass across heterogeneous landscapes. Biomass prediction models were developed from ecologic and physiographic variables using ordinary least squares regression (OLS) and regression trees (RT). RT models had better fit to the data but were more sensitive to the selected samples compared to OLS models. Therefore, RT models developed from small datasets may fail to reproduce heterogeneity in biomass distribution. Prediction residuals were spatially independent suggesting that localized biomass spatial autocorrelation had resulted from ecological and physiographic variables that influence biomass. Therefore, mapping models developed using samples that represent ecologic and physiographic gradients are likely to capture localized biomass spatial variability structures that may not be evident with sparsely collected data.

Mental Mapping and Gender Peculiarities

Heidi Lannon and Joe Bryant
Santa Fe College

Gender variations in spatial abilities are the subject of amusement in the media. This research investigates whether mental maps prepared by geography students at Santa Fe College would produce traditional map characteristics and exhibit traits based on gender. Variations in gender-related abilities, such as female attention to detail and mapping inaccuracies have been noted by Ferber (2008), Palermo et al. (2008), and Waterman and Gordon (1984).

As anticipated by Lynch (1960) paths, nodes and landmarks dominate the maps. Maps contain road references and intersections, and landmarks include grocery stores, traffic signals, gas stations and banks. Familiar origin and destination area are depicted in greater detail (Clump, 2005, Pinheiro, 1998). Campus destination details include buildings, parking areas and room numbers. Maps segregated by gender, reveal males are more likely to use color and three-dimensional art to depict landmarks. Males note restaurants and females are more likely to put shopping destinations on their maps. Remarkably males are 6 times more likely include compass directions. Students at Santa Fe College approach mental mapping in ways that were anticipated and have spatial abilities consistent with college age students, including the use of classic map characteristics and identifiable gender peculiarities.

Atmospheric Influences on New Snowfall Characteristics Associated with Northwest Flow Snowfall in the Southern Appalachians

John L'Heureux
Appalachian State University

Northwest Flow Snowfall (NWFS) is a synoptic level phenomenon where low-level moisture and cold air from the northwest impinge upon the northwestern (or windward slopes) of the southern Appalachian Mountains (Keighton et. al 2009). NWFS events are a common occurrence at higher elevations and along the windward slopes of the southern Appalachian Mountains. Low level northwest flow transports cold and moist air masses into the region, leading to orographic enhancement and enhanced snowfall along windward slopes in particular. NWFS represents up to 50% of mean annual snowfall at higher elevations and along windward slopes. Of particular note is the relationship between the maximum ice crystal growth temperature range (-12 °C to -18 °C) and the snowfall density, the relationship between the snow water equivalent (SWE) and snow density to the antecedent upper air trajectory, and the temporal pattern of SWE and snowfall density throughout a NWFS event.

This poster analyzes the vertical structure of NWFS in the southern Appalachian Mountains using sounding data from Poga Mountain, NC, and Johnson City, TN, from 2007-2009. Snowfall totals, snow water equivalent (SWE), and snowfall density measured on Poga Mountain are analyzed for each system at 6-hour intervals. The height and thickness of the moist layer (RH > 80%) was identified for each sounding. We also noted whether an inversion layer was located above the moist layer for each sounding. The location of the capping inversion was particularly important as it highlights the significance of the small vertical height extent of a NWFS event. The mean temperature of the moist layer was calculated by averaging the temperatures between the bottom and top of the moist layer. Of particular notice was the location of the maximum snow growth temperature range within the moist layer (-12°C to -18°C). The National Oceanic and Atmospheric Administration's Hybrid Single-Particle Lagrangian Integrated Trajectory (HYSPLIT) tool was used to calculate the 72-h backward trajectory for air parcels at 1450 m, or approximately the 850-hPa level.   We defined whether an antecedent trajectory had a Great Lakes Connection (GLC). We used data from a vertically pointing METEK Micro Rain Radar to analyze the vertical structure of snowfall and to identify the period of heaviest precipitation during each event. Our objective was to look at the atmospheric conditions that affect the snowfall amounts, snow water equivalent (SWE) values, and the snow density for a NWFS.

The Impact of Oceanic-Atmospheric Oscillation Change in the Southeastern United States Abstracted from Tree-Ring Network Data

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Three ring width chronologies from coastal plain region, eastern and western Great Smoky Mountains are used to represent tree growth in these three featured regions, and to examine gradient responses of tree growth to regional climate and oceanic oscillations along the longitudinal transect in the Southeastern United States. Tree species include table mountain pine (*Pinus pungens* Lamb.), longleaf pine (*Pinus palustris* Mill.) and shortleaf pine (*Pinus echinata* Mill.). Response function analyses between ring width and climatic variables, such as temperature, precipitation, North Atlantic Oscillation (NAO) and Atlantic Multidecadal Oscillation (AMO) indices, reveal the strongest climate signal recorded in tree-ring data. In addition, a comparison of response results among different sites can tell the existence of a gradient change of the magnitude of limiting factor influence spatially and temporally. Reconstruction of the significantly responsive climatic variable makes a long-term evaluation of NAO and AMO effects on land to be possible. This study aims to provide a better understand of the association and interaction between climate and ecosystem, especially from a perspective of circulation and landform performance.

THE FOOD RETAIL HIERARCHY AND FOOD IMPORT DEPENDENCY IN A DOMINICAN TOWN

Heather N. Lee, *Department of Geography, Virginia Tech*
Lawrence S. Grossman, *Department of Geography, Virginia Tech*

This study compares the percentage of foods sold that were imported in stores at three levels of the food retail hierarchy—small-sized retail food stores, known locally as *colmados*; medium-sized food retail stores, or *super-colmados*; and the large supermarkets, or *supermercados* —in the Dominican Republic. It also considers variations in sources of imported foods for the three types of stores. Data were collected over a three-week period in 2009 in Verón, a small town in La Altagracia, the easternmost province of the Dominican Republic. The research includes data from a stratified random sample of 15 stores located along the primary highway in Verón. Colmados had the lowest percentage dependence on imported foods, while supermarkets had the highest percentage dependence, with super-colmados in between the two. Thus, food import dependency increased as the level in the food retail hierarchy increased. Thus, the highest level in the food retail hierarchy had the greatest dependence on the sale of imported foods. The source of imported foods also varied by store size. For supermarkets the primary source was the U.S.; for super-colmados, it was South American and European countries; and for colmados, it was Mexico and Central American countries.

COMPARISON OF MODIS LST AND SSM/I MELT DETECTION PRODUCTS ON THE GREENLAND ICE SHEET

Jordan Lieberman and Thomas Mote
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The Greenland ice sheet has experienced an increase in surface melt of snow and ice during the past two decades, and previous research has examined many different remote sensing techniques to detect and measure the extent of melt and mass balance of the ice sheet. Passive microwave and thermal infrared satellite data products are compared based on their ability to detect melt occurrence on the Greenland ice sheet. The 2007 Greenland melt season is examined; comparing sensitivity differences of the two products melt onset and duration, and their effectiveness of detection over different ice drainage basins and glaciological zones of the ice sheet.

"The Mass Migration Induced by Hurricane Katrina: A Study on Socio-Economical Effects on Metropolitan Areas Selected by Refugees"

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Not all of the effects of Hurricane Katrina are fully understood, especially regarding the exodus of 1.5 million Americans from the Gulf Coast to the interior U.S. The mass migration and subsequent permanent relocation of over half a million Americans to other metropolitan areas changed how America responded to such an exodus. Local economies, government funding and leadership, and crime rates were all affected. A lack of stable income, increase in "Katrina crimes," and strains on social systems, including schools, hospitals, and housing, has led to many evacuation cities to continue to feel the impact years after the hurricane passed. U.S Census, IRS, and FBI reports analysis and comparisons will provide the number of refugees who remained in host cities, those who returned to the New Orleans parishes, and the initial social costs.

Multi-Temporal Analysis of the Relationships between WNV Dissemination and Environmental Variables in Indianapolis, Indiana

Hua Liu
Old Dominion University

West Nile Virus (WNV) is a mosquito-borne disease. This study developed a multi-temporal analysis of the relationships between environmental variables and WNV dissemination using the integration of remote sensing, geographic information systems (GIS), and statistical methods.

Indianapolis, U.S.A. was chosen as the study area. WNV epidemic records were provided by the Marion County Health Department. Multiple environmental variables were selected for the analysis, such as land use and land cover, elevation, and proximity to the waste industry sites. The research found that major environmental factors contributed to the outbreak of WNV include percentages of agriculture and water, elevation variations, mean slope, human population density, and distances to the closest pollutant and waste industry

A comparative analysis between convective and non-convective high-wind events

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High-wind events are frequent and dangerous phenomena responsible for widespread damages, injuries, and casualties across the U.S. each year. These events are commonly associated with severe convective storms (or convective wind events; CWEs) during the warm season. However, non-convective high-wind events (NCWEs) have been shown to produce hazardous outcomes similar in magnitude to hurricanes, particularly during the cool season. This study provides a descriptive comparison between CWEs and NCWEs. Both high-wind classifications occur throughout the year, with the highest frequency of occurrence for CWEs and NCWEs during the warm and cool-season months, respectively. Another important difference is NCWEs are typically synoptic in scale (widespread and longer-lived), while CWEs are more localized with shorter durations. However, both high-wind events are largely associated with the passage of mid-latitude cyclones (MLCs). CWEs commonly occur as pre-frontal events within the warm sector of MLCs, while NCWEs occur in the wake of advancing cold fronts. While not all high-wind events fit these conceptual models, this study shows that MLC dynamics plays an important role in the formation of a high frequency of both types of events. The impacts of both high-wind classifications are provided with a case investigation of two seiche events on Lake Erie.

The Coast as a Vernacular Region: Using GIS to Analyze and Visualize Regional Identity
Jennifer M. Mann
East Carolina University

The defining of regions is one of the cornerstones of the field of geography. Historically within regionally-based research, there has been interest in vernacular regions and the use of business names as a data source for mapping patterns in regional identity. However, few studies of regional identity and names have taken full advantage of digital methods and the use of powerful online databases and GIS/mapping software. This study explores and answers several different questions involving a popular yet under-analyzed vernacular region in the United States – the coast. ReferenceUSA, an electronic database was used to collect all business names in the United States that contain the term coast(al). Several analyses, distance calculation between the coastline and business locations and univariate local indicator of spatial association (LISA), were conducted to better understand the spatial patterns of people's identification with the coast. In addition to spatial analysis, several cartographic techniques were employed to creatively visualize the data and boundary of the coastal region.

Uncovering Ethnic Concentrations in Charlotte, North Carolina: Spatial Analysis of Hispanic and Latino Settlement

Paul N. McDaniel

University of North Carolina at Charlotte

The Charlotte, North Carolina, metro area is the fourth-ranked Hispanic Hypergrowth metro area in the country (Suro and Singer 2002). The purpose of this paper addresses three questions: (1) Are Hispanic/Latino ethnic neighborhoods present in Charlotte? if so, (2) where are Hispanic/Latino ethnic concentrations located in Charlotte? and (3) what factors contribute to the spatial pattern of Hispanic/Latino ethnic concentrations in Charlotte? Ultimately, the goal of this paper is to focus on whether or not there are any statistically significant indications that Latino neighborhoods either already exist or are on their way to forming within Charlotte. If there are ethnic clusters in Charlotte or in the broader Mecklenburg County, then the analyses in this paper will uncover where these clusters are located and why they are located in those areas of the county. Using a combination of quantitative methods and spatial analysis, this study attempts to address the subject of Hispanic/Latino ethnic residential settlement and clustering in Charlotte, using Mecklenburg County as a study area. This research subsequently informs the broader discussion of immigrant and ethnic settlement in cities across the U.S. South, community policy formation, and the connections between global restructuring and its local manifestations.

Geomorphic Evolution of a Montane Peatland at Whiteoak Bottoms, Nantahala River Valley, Western North Carolina

Jacob M. McDonald – University of Georgia

David S. Leigh – University of Georgia

This research focused on the geomorphic analysis of Whiteoak Bottoms (WOB), a Southern Appalachian bog in the Nantahala River valley of western North Carolina, to develop a better understanding of peatland evolution in the region. Radiocarbon dates of seeds and bulk peat directly above basal fluvial sediments at a depth of ~190 cm returned dates of ~14,000 cal yr BP. These dates indicate WOB is the oldest dated peatland in the Southern Blue Ridge Mountains and that such wetland bogs persisted throughout the Holocene. A topographic and stratigraphic survey with depth measurements taken at each survey point was conducted with an electronic total station to determine basal peat topography and areas of interest for further stratigraphic analysis. Coring and profile descriptions are being done along three transects which run from the hillslope across WOB to the river. Preliminary results indicate relict fluvial channels now buried beneath the peat, which initiated wetland development in the valley. Further analysis of macrofossils, sedimentology, spores and pollen will provide valuable information that spans the entire Holocene.   The results will provide insights toward Southern Appalachian bog formation, persistence, and response to changes in climate and land use in the region.

The untold story of hurricanes and human life: Direct and indirect mortality Florida following the 2004 tropical cyclones

Nathan McKinney and Klaus Meyer-Arendt
University of West Florida, Department of Environmental Studies

The study of hurricanes as hazards to human population has increasingly become viewed as a socially driven event rather than an inevitably catastrophic disaster. Studies on the effect of hurricanes on human life, however, frequently focus only on deaths which occur as the direct result of contact with wind or water. Instead, hurricanes should be seen as a sustained environmental hazard, triggering conditions to which populations may be at increased risk of death through indirect means. Neglect of indirect deaths in official reports seems to stem from the methodological difficulty of classifying causation without an apparent direct link between event and death.

This poster details the results of temporal and spatial statistical analyses on mortality data following the four 2004 hurricanes. Our study suggests that hurricane related social and environmental conditions lead to a substantially greater increase in mortality than can be explained by the official death counts and that this effect can last several weeks beyond the storm impact period. We also describe death causes most affected by post-storm conditions and spatial and demographic patterns.

ENSO forced changes in precipitation distributions and related global circulation patterns

Robbie Munroe
East Carolina University

The El Nino Southern Oscillation (ENSO) forced precipitation is well documented in several regions around the world. Mid-latitude atmospheric circulations contribution towards extreme precipitation during ENSO is less well understood. One area that has a strong ENSO signal in extratropical and tropical storminess is the Gulf of Mexico. This region is influenced by high SSTs, the subtropical jet, and even intrusions from the polar. The objective of this research is to improve understanding of the link between ENSO, extreme precipitation, and the role of regional atmospheric circulations.

The probability density function, cumulative density function, and Kolmogorov-Smirnov (KS) test are employed to explore the spatial and local precipitation distributions of the Global Precipitation Climatology Project one degree daily data set. KS derived plots are produced for each ENSO month for the study region. From these maps, grid boxes are selected based on significant precipitation distributions. From the selected grid boxes, significant precipitation events that drive the local distribution discrepancy are selected for synoptic analysis. It is anticipated that synoptic patterns will emerge during ENSO that partially explain differences in the precipitation distributions. Preliminary results indicate that the transition from summer to winter has the strongest ENSO signal in coverage and intensity.

Trees as Geomorphic Agents in Upland Environments.

Jonathan D. Phillips and Alice Turkington, Tobacco Road Research Team, Department of Geography, University of Kentucky; Daniel A. Marion, USDA Forest Service Southern Research Station, Hot Springs, Arkansas.

The significance of trees and forests in geomorphology is widely appreciated, but primarily in connection with fluvial and riparian environments, or the protective role of trees with respect to upland erosion. However, trees are important geomorphic agents of weathering, bioturbation, mass wasting, and erosion in upland environments. These effects are demonstrated based on field studies in the Ouachita Mountains, Arkansas. Direct geomorphic work of trees includes weathering and regolith deepening via exploitation of bedrock joints, uprooting of soil and bedrock by tree throw, displacement of regolith by root growth, infilling of stump cavities, and mass additions to the land surface. Indirect geomorphic work of trees includes the promotion and facilitation of chemical and microbial weathering, preferential moisture flux, and their role in biogeochemical cycles. Rates of geomorphically significant energy inputs via trees exceeds that associated with purely physical or mechanical fluxes. The geomorphological effects of trees in the Ouachita Mountains is consistent with a view of vegetation as a membrane which captures solar energy which would otherwise be dissipated, and employs some of this energy in performing geomorphic work.

A Comparative Remote Sensing Analysis of
Urbanization and Peri-Urban Agriculture of Southeast Asian Cities

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Appalachian State University
Boone, NC

Many cities throughout Southeast Asia are experiencing rapid growth and significant change to land use patterns which have often consisted of agricultural production with immediate vicinity of predominantly urban residential and industrial areas. In order to compare rates of urbanization and effects on urban agriculture, three major Southeast Asian cities were selected for spectral and spatial analysis given their similar development patterns and historical impacts of colonialism on urban morphology. Six Landsat 7 images covering the cities of Ho Chi Minh City, Hanoi, and Phnom Penh were used for analysis. Image processing with ERDAS Imagine was conducted on these images and land cover classification maps were produced to infer the manner in which the people of Indochina manage land use.

A Spatial Analysis of Violent Crime and Alcohol in Huntington, WV

Chad Pyles
Marshall University

It is a basic fact that alcohol consumption directly affects an individual's ability to make sound judgments and it is widely accepted in the field of criminal justice that this can lead to poor decisions and crimes being committed, most often a violent crime. This study examined the relationship between on-premise alcohol retail locations and violent crime locations in Huntington, WV during the year 2008. Using Nearest Neighbor Hierarchical Cluster Analyses revealed that areas with high densities of on-premise alcohol retailers in downtown Huntington correlate with areas of high density violent crime.

Unidentified Human Remains: Mapping of The Nation's Silent Mass Disaster

Bruce A. Ralston

Ling Yin

Department of Geography

University of Tennessee

In an effort to address what has been called the nation's silent mass disaster, the National Institute of Justice released this year the National Missing and Unidentified Persons System, or NamUs. For the first time, the public has access to searchable national level databases of missing persons and unidentified human remains. The latter database is drawn from police and medical examiner reports. While some reports contain GPS coordinates, most records had only indirect spatial information such as addresses. This poster presents our efforts to develop web-based mapping tools for exploration of the NamUs databases. Spatially enabling the unidentified remains database put the records in context so that users can see where remains have found. An unexpected benefit is that coding errors, inaccuracies and redundant database entries were easier to spot and correct when viewed on a map. The resultant rich internet application was built using free development tools and mapping services. The solution developed used Google Maps inside a FLEX application.

The Spatial and Temporal Interconnectivity of Fire Regimes Across Land-Ownership Boundaries in Northwestern New Mexico, U.S.A.

Monica T. Rother and Henri D. Grissino-Mayer, The University of Tennessee, Knoxville.

Our research examines the fire history of ponderosa pine (*Pinus ponderosa*) forests across land-ownership areas in northwestern New Mexico. We assess the degree of spatial and temporal interconnectivity of fire across our study area. Climate serves as a driver of wildfire and may have helped create existing similarities in historic fire regimes across a large spatial scale. The study area includes four sites: one at the boundary of El Malpais National Monument (ELMA) and three in the Zuni Mountains of Cibola National Forest (CNF). At each site, we collected cross sections from fire-scarred snags, stumps, logs, and living trees. We are presently using our samples to reconstruct fire history and then analyze the relationships between fire and climate. We expect to find that climate-driven surface fires occurred synchronously across the four sites, possibly spreading between land-ownership areas. Our research will answer important scientific questions while also informing land management decisions regarding fire behavior in the face of climate change.

A GEOSTATISTICAL APPROACH TO DESCRIBE THE DYNAMICS OF THE DISTRIBUTION OF AN ECOLOGICALLY IMPORTANT SCALE INSECT IN THE TROPICAL MONTANE OAK FOREST OF MEXICO

Brandy Saffell and Heather Gamper

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Tropical montane forests of Mexico shelter rich biodiversity, including a honeydew producing scale insect that provides an important carbohydrate food source to birds and insects. Changes to the forest dynamics due to deforestation have affected the microclimate of the forest, and consequently, the density and distribution of the insects. We predict that insects will colonize trees in relation to access to incident sunlight; the top of trees in dense, undisturbed forest, as opposed to the entire tree on the forest edge. Mapping data was collected using Trimble GPS data dictionary feature to record insect density at the bottom, middle, and top of each tree in six forest plots. Linear regression methods were initially performed to identify trends in the data then subsequent tests for spatial autocorrelation were conducted. To aid in visualization of cause and effect of spatial autocorrelation, geovisualization tools in ArcMap were utilized. Moran's I statistic for spatial autocorrelation indicates that scale insect distribution is positively associated with neighboring tree locations (Moran's I = 1.5063, p<.002). Data suggest that scale insect colonies can colonize a greater surface area of trees located on forest edge. The implications of these findings are discussed in relation to forest restoration and conservation.

Fulbright Scholar Awards: A World of Opportunities for Faculty and Professionals

Fausto Sarmiento

University of Georgia

The Fulbright Scholar Program sends over a thousand U.S. scholars and professionals each year to lecture or conduct research in more than 125 countries and every region of the world. Fulbright Scholars have taught classes, helped with curriculum development, set up new programs, and engaged in collaborative work with colleagues around the world. They return to their campuses with new perspectives on their field, new materials for comparative courses, and fresh ideas for curriculum development.

Fausto Sarmiento, Fulbright International Education Administrator Scholar to Japan in 2004, will discuss his Fulbright experience and its institutional impact on his campus. His poster will include images of his time in Japan and feature information on the personal and professional outcomes of his grant. Dr. Sarmiento will also provide attendees information on how to find relevant CIES staff for any questions they have regarding the program. The poster session will be followed by a question and answer period.

GIS and Mixed Methods Analysis of Rural Gentrification Impacts on Rural Communities in Watauga County, NC

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Increasing affluence and attendant surge in demand for second and retirement homes or investment properties has had a significant impact on traditionally rural areas. Previous work has identified two distinct drivers of rural gentrification, one being amenity or recreation based and the other being primarily an extension of suburban sprawl. Most research on rural gentrification has focused on housing areas in the mountain west where patterns have been characterized by very low density developments or hobby farms. On the surface, patterns emerging in rural western North Carolina's Appalachian region appear to be similarly driven by natural amenities. However, rural landscape change in this region indicates more dense development patterns and stark land value contrasts. This research therefore uses mixed methods analysis to determine the nature of socioeconomic change to the primarily rural Watauga County.

Analyzing Repeated Photographs (1947-1981) by the Eminent Ecologist Alton A. Lindsey at El Malpais National Monument, New Mexico, USA: A 21st Century Perspective

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El Malpais National Monument (EMNM) preserves over 46,000 hectares of the arid tableland of northwestern New Mexico. The monument includes a variety of unique geologic features, Native cultural sites, and rich floral and faunal diversity on the Colorado Plateau. EMNM is dominated by sections of the Zuni-Bandera volcanic field, which is largely covered by a mosaic of mixed conifers, shrubs, herbs, and grasses. Previous studies have shown that many trees growing on the local basalt formations live to very old ages, suggesting that the volcanic badlands insulate resident vegetation from environmental impacts (including human activity) that would facilitate more frequent changes in species composition and stem density. We examined 395 photographs, taken by Alton A. Lindsey, of select ecological communities and geologic formations on the volcanic badlands in and around EMNM. Our objective was to qualitatively assess and classify pairs of initial and repeated photographs based on visible evidence of change. Seven pairs of photographs were qualitatively analyzed and three change classes were established. Three photograph pairs are presented as images representative of the three change classes. Changes in stand structure appeared greatest at locations near the edge of lava flows, while scenes captured in the interior of the basalt formations appeared less dynamic.

The Development of a Hispanic Enclave in Southwest Charlotte

Ronald Schumann, III, and John Chesser

University of North Carolina - Charlotte

Over the past three decades, Charlotte, North Carolina, a city with little experience as a gateway city, has emerged as a new destination for Latino immigrants. Previous studies have identified three expanding clusters of Hispanic settlement to the East, North, and Southwest of center city Charlotte. This study focuses on the southwest cluster, combining information collected during the Mecklenburg County Latino Needs Assessment with Census 2000 data, windshield survey data, and previous case studies to identify the causes and consequences of this Latino concentration. Based on these causes and their resultant consequences for the community at-large, the Latino experience of southwest Charlotte was then connected to and categorized within the broader commentary on ghettos, enclaves, *ethnoburbs*, and degrees of assimilation.

Findings indicate that patterns of Hispanic concentration in Charlotte seem to be driven by the availability of affordable housing, city form, and established kinship and social networks. Choice in Hispanic location is evident, providing a basis for comparing Charlotte's Latino districts with traditional enclaves and contemporary *ethnoburbs*. The co-location of a high proportion of white residents and a significant ethnic minority also qualifies the southwest cluster as a non-isolated host community.

A Space-Time GIS for Tracking and Analyzing Individual Activities

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Human activities interact and intertwine to create a complex social system to fulfill our physiological, economic, social and other needs. Recent advancements in information and location-aware technologies have made it feasible and affordable to collect individual-based tracking data over space and time. Such tracking data can either be collected using various location-aware technologies or be obtained from sources such as surveys. These individual-based tracking datasets present unique and valuable opportunities for researchers to gain insights of changing patterns and trends in a space-and-time context. This poster presentation shows a space-time GIS that implements Hägerstrand's time geography concepts for management, query, visualization, and analysis of individual tracking data in a space-and-time context. Two examples of visualizing and analyzing individual activity patterns based on cellular phone tracking data collected in France and activity/travel survey data collected in Beijing, China are illustrated in this poster to demonstrate the power of this space-time GIS. Spatiotemporal visualization and analysis functions available in this space-time GIS can be very useful for applications such as studies of urban activity patterns, spread of infectious diseases, social networking, homeland security, among others.

The human footprint: Quantifying spatio-temporal patterns of per-capita land consumption in

a rapidly growing metropolitan region.

Douglas A. Shoemaker and Ross K. Meentemeyer

Conversions of forests and farmlands to low-density built land-uses, pejoratively known as "sprawl," have compromised the sustainability and resilience of local ecosystems. Classic conceptual models of urban growth hypothesize sprawl as an ephemeral stage which transforms over time, from infill and densification, to "nonsprawl". There has been little evidence to support or refute this, and thus our objectives were to understand whether cities evolve along pathways of increasing density that transforms sprawl to nonsprawl, or do sprawling forms persist and resist densification despite pressures such as population increase?

Same-site comparisons of human footprint (HF), a spatially explicit measure of per capita land consumption, where made of the Charlotte (NC) region between 1976 and 2006 using satellite imagery. During this period over 340,000 ha were converted to development at a mean rate of 31 ha per day. Mean HF increased over 400%, from 0.07 to 0.366 ha per person. Multi-temporal analyses indicated increases in HF over 51% of the developed landscape, revealing a persistence of low density land consumption despite an almost doubling of population. Multivariate analysis indicates extant HF pattern is influenced by proximity to areas managed as open space, travel cost to amenities and weighted attraction of employment.

Fusion of LIDAR and Landsat Data for Regional-Scale Mapping of Spectrally Similar Land Cover along Urban-Exurban Gradients

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Worldwide conversions of natural and forested areas to agriculture and development have been blamed for a number of impacts ranging from climate change to loss of ecosystem function. Passive remote sensing is the primary data source for monitoring change at landscape to regional scales; however, spectrally similar vegetation types such as forests and farmlands are especially difficult to discriminate using moderate-resolution multispectral imagery such as Landsat TM and ETM+. The integration of a height-above-ground component derived from light detection and ranging (LIDAR) data would greatly improve the ability to discern vegetation types as well as provide information about vegetation structure. This study proposes methods for utilizing Landsat TM and LIDAR data to map patterns of forest and farmland in an urbanizing landscape. Classification methods included classification and regression tree (CART), and supervised maximum likelihood classifications. Classification results from fused data products were compared with that from Landsat imagery alone. Results show that fusing LIDAR data with moderate-resolution multispectral Landsat data significantly improves discrimination and mapping accuracy between forest and farmland types. Overall accuracy increases from 83% using supervised maximum likelihood classification of the original Landsat TM image to approximately 97% of the CART classification of the fused image.

Keywords: Light detection and ranging, data fusion and CART classification

Livelihood Change among the Basarwa in Mababe, Botswana

Hillary Smith
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Abstract

This poster studies how livelihoods have changed over time among the Basarwa of Mababe, Botswana. The Basarwa (Bushmen/San) traditionally practiced a nomadic and semi-nomadic lifestyle. They are some of the most marginalized people of Africa; they have been cut off from traditional land and resource use and have limited political representation (Bolaane, 2004). Livelihoods in Mababe have been affected by restrictive hunting legislation and the formation of Moremi Game Reserve. With limited access to hunting and natural resources the Basarwa were forced to adopt agriculture and livestock rearing. More recently involving the community in managing and receiving benefits from tourism, especially safari hunting, has significantly improved their livelihoods and wildlife conservation. Economic data was collected with household level surveys, where 35 of 54 households were interviewed (n=35). In addition focus groups were conducted including elders to get an in depth timeline for livelihood change and relative well being.

Frozen ocean or melted land? Competing materialities of the Northwest Passage.

Philip E. Steinberg (Florida State University), Sandra J. Fabiano (independent scholar), Rob Shields (University of Alberta), Mauro J. Caraccioli (Florida State University).

Increasing attention is being devoted to the Northwest Passage as a potential route linking the Atlantic and Pacific Oceans. However the prospect of this route becoming commercially viable introduces a new locus of geopolitical conflict. Canada asserts that the Passage is its internal waters and that therefore it should have extensive rights to exclude or regulate other nations' vessels. Other nations, led by the United States, hold that the Passage is an international strait, a piece of ocean that connects two other pieces of ocean, and that therefore high seas freedoms should prevail there.

This research holds that arguments about the status of the Passage are based not only on ideological visions of what the Passage should be, but also on interpretations of what it materially is: arguments for a specific juridical status are laced with assumptions and idealizations about the Passage's geophysicality. In general, U.S. officials – citing the Law of the Sea and the prevailing designation of ocean-space as beyond state territory – emphasize the Passage's liquidity while Canadians construct a more nuanced narrative of the Passage's materiality as they argue for extending Canadian sovereignty there. However, data from 31 interviews reveal a complex range of interpretations.

An Update on Textile Mill Reuse in Charlotte: Progress and Pause

Jamie L. Strickland, Tyrel G. Moore and Gerald L. Ingalls

University of North Carolina at Charlotte

Abstract**:** This poster depicts the reuse of five of Charlotte's historic mills built between 1881 and 1904.   A textual analysis of newspaper articles provide data that reveal locational attributes of each mill reuse project and illustrate the factors that promote reuse. Additionally, historic and contemporary photographs of mill sites are presented. In some places, successful projects succeed on the synergy of multiple positives: the attractions that come with heritage, local corporate-community partnerships that provide capitalization for investment and work with local governments and historic landmark commissions.   In other cases old mills are catalysts for the redevelopment of not only their sites, but also of more extensive revitalization of industrial corridors. Finally, brown field redevelopment sites use heritage and sense of place to leverage their place in a new economy.   All of these supportive environments exist in Charlotte and are integral elements of the geography of textile mill reuse here.   The discussion is organized around individual mill reuse projects and details the renovations of the Charlotte Cotton Mills, Atherton Mills, Highland Park No. 3 Mill, the nearby Johnston Mill and Mecklenburg Cotton Mill, and the Alpha Mill.

Mississippi and Alabama Barrier Island Migration 1990 to 2005 as measured by Landsat Satellite Imagery

Ryan Theel and *John Rodgers* (corresponding author; presenter)

Mississippi State University

Mississippi and Alabama Barrier Island Migration 1990 to 2005 as measured by Landsat Satellite Imagery. Ryan Theel, Department of Geosciences, Mississippi State University and John C. Rodgers III, Department of Geosciences, Mississippi State University. The Mississippi and Alabama barrier island size and vegetation cover are affected by hurricanes, longshore currents, and available sediment, yet these processes are difficult to quantify with traditional ground-based surveying. In this study Landsat satellite imagery was used to evaluate changes in barrier island area and centroid position form 1990 and 2005. When hurricanes are infrequent (1999 - 2003), barrier islands generally increased in total area and showed moderate repositioning of their centroid locations. However when hurricanes were more frequent (1994-1999 and 2004-2005), barrier islands showed substantial decreases in area and dramatic repositioning of island centroid locations. This was especially true following Hurricane Katrina (2005). From 1990 to 2005, the general movement of barrier islands was westerly and most islands experienced an overall reduction in area (-18%). These results compare to similar findings reported in the literature and illustrate the suitability of using Landsat imagery to study geomorphic changes.

Site identification and selection for the Kentucky Mesonet

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Kentucky Mesonet

Identification and selection of high-quality observing sites is fundamental to the integrity of an environmental monitoring system. Whether data are used for operational needs or research purposes, the value of observed data is a function of the modality {degree to which observing sites are representative} of the surrounding terrain, land use, and land cover. Site selection for a mesonet can be particularly challenging because the density of the network may be high enough to limit the number of potentially available sites, yet low enough that a given observing site may not be representative of nearby landscapes for which it is a nearest neighbor. An area that is predominantly flat and unobstructed offers the greatest flexibility when selecting sites at which to sample the area's climate. On the other hand, in regions of greater relief, the distribution of terrain, land use, and land cover may be multimodal, so that the identifying representative sites may become quite difficult. Under such circumstances, site identification and selection may be approached, not based on a site-by-site approach, but by joint location of pairs or triplets of sites.

The Kentucky Mesonet has been faced with extreme challenges of identifying and securing observing sites in a wide variety of settings, ranging from regions of relatively flat, uniform pasture and cropland, primarily in western and central Kentucky, to the chaotic landscapes of the dissected Cumberland Plateau at the western extent of the Cumberland Mountains in southeastern Kentucky. This presentation outlines the site identification and selection strategy employed in building the Kentucky Mesonet. Examples are provided to illustrate challenges that have been faced and solutions and have been implemented.

Urbanization and its impacts on precipitation around three Urban Centers in the Kentucky-Ohio River Valley

Ryan Torres
Joshua Durkee
Rezaul Mahmood
Kentucky Climate Center

It is well known that urbanization produces urban heat island (UHI) effect which resulted in higher air temperatures compared to outlying rural areas. This effect has the potential to alter convection and enhance precipitation in areas downwind of large cities. This is due primarily to urban and industrial development. This study was conducted to measure the degree of enhancement of precipitation in 3 cities: Evansville, Indiana; Louisville, Kentucky; and Cincinnati, Ohio. The scope of this research was from the months of June to August during the years of 1998-2009. Tropical Rainfall Measurement Data (TRMM) was used to provide time-series sensitive anomaly products that displayed evidence of possible enhancement of precipitation in and around these 3 urban areas. Initial results indicate potential modification of localized precipitation regime during the years of 1998, 2001, 2005, and 2006. We conclude that further investigation is needed to better understand these outcomes.

GIS Modeling to Improve Identification and Classification of
Carolina Bays along the Carolina Coastal Plain

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Carolina bays are unusual wetlands characterized by their elliptical shape, northwest orientation, and concentration within the Southern Atlantic coastal plain of the Carolinas. While they had been previously noted as local oddities, the true magnitude of their pronounced shape, orientation, and relative distribution was revealed in a series of aerial photographs produced in the 1930's. The discovery of these odd wetlands sparked a long running debate revolving around the circumstances of their origin. Research priorities for Carolina bays are structured toward preservation due to their unique value as ecosystems including supporting the venus flytrap, a species of federal concern. Additionally, due to their erratic hydroperiods, Carolina bays are healthy breeding grounds for declining populations of amphibians.

Bays were examined in the study area of Francis Marion National Forest located on the South Carolina coast. By selecting data to identify soil, land cover, and wetland type characteristics of known Carolina bays within the boundaries of Francis Marion, a weighted GIS cartographic model was developed to predict bay locations. The model was tested by visually selecting and digitizing bays on 2006 1-meter DOQQs, then comparing the user picked bays with model selections. Preliminary results within the Ocean Bay quad show that 76% of the bays identified through the GIS model matched user identified bays. Further analysis using this cartographic model was also conducted with higher resolution spatial data, including LiDAR DEMs and aerial photography, in a follow-up study area of Bladen County, NC. Preliminary results from the Dublin DOQQ show that the model positively identified 36.5% of Carolina Bays. The results of this study demonstrate the potential of cartographic modeling for automating inventory and offer a first step towards disambiguation of one of the most unusual physical features of the Atlantic Coastal plain.

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The reliability of AMS radiocarbon dating of *Nymphaea* macrofossils for chronological control of pond profiles in Cuatrocienegas, Mexico

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Sally P. Horn, Department of Geography, University of Tennessee, Knoxville

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Robust paleoenvironmental inference from natural archives preserved in sediment cores relies on the ability to accurately constrain the ages of records. For Late Quaternary sediments, AMS radiocarbon dating is used to determine ages of charcoal, wood, and leaf fragments, but such remains are sometimes rare. To constrain the ages of marsh and pond sediments from Cuatrocienegas, Mexico, that lack terrestrial macrofossils, we explored the potential for obtaining reliable AMS dates on macrofossils from the waterlily *Nymphaea ampla*. Radiocarbon assays of *Nymphaea* macrofossils in near-surface pond sediments collected in 2007 yielded exceptionally old dates (for example, 18740 14-C BP at 55 cm depth). This finding contradicted literature reports that *Nymphaea* is unable to use isotopically dead bicarbonate as a carbon source. Radiocarbon dates obtained from seeds of *Nymphaea ampla* at a depth of 20 cm in the same sediment core, however, indicated a much younger age of post AD 1950. Here we explore these findings, and their possible relation to our observations on modern *Nymphaea* plants and their flowering habits. Our interpretation is that corms and leaves of *Nymphaea* are not reliable material for radiocarbon dating, but that seeds may be reliable, owing to the requirements of reproduction for this genus.

CHESTNUT GRAVEYARD: FOREST SUCCESSION IN THE ABSENCE OF
CASTANEA DENTATA, BLUFF MOUNTAIN, NORTH CAROLINA

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Bluff Mountain is one of the most ecologically significant natural heritage sites in the southeastern United States. The plant communities present on Bluff Mountain include a Carolina hemlock forest, oak/hickory dominated forests, and a flat rock plant community. The purpose of this project is to assess how tree species composition and age structure have changed as a consequence of chestnut blight and 20th century fire exclusion in forest communities on Bluff Mountain. Tree rings are an important tool for understanding forest dynamics and climatic variability on a multi-century scale. As no prior dendroecological investigations have been conducted on Bluff Mountain, this research will fill an important gap in our understanding of the historical ecology and climate response of Bluff Mountain forest communities during the past 400 years. The Bluff Mountain chestnut chronology was anchored from 1628 to 1902 after crossdating the chestnut series with a Rocky Mount, Tennessee oak chronology. The average interseries correlation for 15 chestnut cross-section series was 0.472 with a mean sensitivity of 0.176, both relatively high values in comparison with other regional chronologies.

Close Range Hyperspectral Remote Sensing of Lake Eutrophication at Lake Martin, Alabama

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yperspectral signatures of water samples were collected at multiple locations on Lake Martin over the course of the growing season (April – October 2009) with the cooperation of Alabama Power Company and the Alabama Water Watch citizen volunteer monitor group Lake Watch at Lake Martin. The purpose of the study is to correlate *in situ* measurements of trophic state indicators, such as chlorophyll *a*, with spectral measurements obtained using a low-cost spectrophotometer. Two liter samples were collected at a 0.5 meter depth at sixteen sites, with nine sites being used for spectral analysis over 7 sampling events. The samples were then processed by pumping 1 liter of the sample through a pad using a vacuum pump. The pads are analyzed using the spectrophotometer and reflectance values are correlated with *in situ* lake trophic condition-indicators such as the planktonic algal (chlorophyll *a*) component of lake seston. The goal of the study is to provide a cost-effective means of producing water quality measurements using close range remote sensing methods in controlled radiometric conditions.

Comparison of Eastern Kentucky and West Virginia Summer Flash Flood Rainfall Events

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The Appalachian Mountains are subject to flash floods due to interactions between complex terrain and frequent rainfall. Previous studies have shown that a number of environmental factors can trigger flash floods, which can leave behind a variety of outcomes. However, there is a lack of research concerning flash floods in the Appalachian region. This study addresses these concerns by examining summer (June-August) rainfall frequency and intensity in connection with flash floods in the Appalachian region of eastern Kentucky and West Virginia during 1995-2005. Flash floods were identified using the National Climatic Data Center's (NCDC) Storm Database. Radar estimated rainfall data from the area National Weather Service Weather Forecast Offices were provided by the NCDC. In order to examine relationships between flash flood events and rainfall amounts for both states, the latter was categorized for: 0 to 24.99 mm, 25 to 49.99 mm, 50 to 74.99 mm, 75 to 99.99 mm, 100 to 124.99 mm, 125 to 150 mm, and 150+ mm. Subsequently, we have calculated flash flood frequencies based upon the afore mentioned categories, as well as examined relationships between moving and stationary systems, duration, and time of occurrence.

Change in ecosystem components (grass, trees, large mammals) on the Chobe riverfront, northern Botswana (1965-2007)

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Elephants are well-known to effect landscapes by converting woodland into shrub or grassland. This is the case along the Chobe riverfront in Chobe National Park, northern Botswana, where impala now maintain extensive tracts of shrubland which the world's largest elephant herd traverses on its daily trek to the regions only perennial water source. Two types of ecological transects developed specifically for the semi-arid savannas of southern Africa and historical accounts were used to assess temporal change (1965-2007) in riverfront ecosystem components: the herbaceous layer, the woody layer, and large mammal component.

Results demonstrate that the herbaceous layer in Chobe was already degrading by the 1960s, associated with extensive cattle grazing and high fire frequency. The shrub layer has expanded and simplified at the expense of woodland, and is now dominated by three species (*Combretum mossambicense, Combretum eleagnoides* and *Capparis tomentosa*). Animal composition and densities have changed dramatically. Selective grazers have decreased significantly with the loss of the grass sward, and non-selective browsers such as elephant, impala and kudu now dominate each site analyzed. Results indicate a simplification of the system and lead to questions about sustainability and whether this park is meeting its goals and objectives as a National Park.

A GIS-based Evacuation Model for a Football Stadium

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Three Mile Island spurred the development of evacuation models that would enable effective and efficient evacuation of people from the impact zone. Since then, considerable attention has been paid to reduce evacuation time or identify potential evacuation routes in the event of natural hazards. However, evacuating in the event of human-made hazards, such as chemical, biological, or radiological threats, and particularly at large gatherings, is still at its incipient stage of modeling. After 9/11, the U.S. government focused on protecting people from human-made hazards and has identified sports stadiums as key assets that are part of the nation's critical infrastructure. Therefore, the Department of Homeland Security (DHS) considers collegiate stadiums and arenas potential targets for terrorist attacks. The purpose of this ongoing DHS project is to identify potential evacuation routes from The M.M. Roberts Stadium at The University of Southern Mississippi in the event of a human-made hazard. Based on the number and location of evacuees, and percent requiring immediate medical attention, potential evacuation routes will be identified that would enable transporting evacuees to the nearest medical facility or allow them to travel toward their destinations.