Northeast Arc Users Group

Spring Spatial Technologies Conference

Surveying the landscape of spatial technologies from ArcGIS to the Web

Conference Schedule

Tuesday, May 13, 2014, from 8:00 AM until 5:30 PM

University of Massachusetts Amherst   Campus Center

Map it: 72° 31' 37.46" W, 42° 23' 29.57" N

Sponsors: GroundPoint Technologies — KAPPA Mapping — Latitude Geographics — Maine Technical Source

[Hide All Abstracts]

Monday 7:00 PM	**Pub Meetup**
	High Horse Brewing, 24 N. Pleasant St., Amherst, MA, just down the road from UMass.
	For those of you in town the night before the conference, please join a group of GIS locals and other attendees for conversation and good cheer.

Tuesday 8:00 AM	**Registration & Refreshments**
	Campus Center 1st Floor
	Register online here: $45 in advance — $55 after April 30 — Current Students $20/$30 — Student Presenters & Student Volunteers Free

9:00 – 10:15   Session 1

Campus Center Auditorium

Welcome and Opening Remarks

Niels la Cour

University of Massachusetts Amherst, Campus Planning

Darren Mackiewicz, GISP
NEArc President
CDM Smith

The State of Esri: Where We Are, and Where We Are Headed

Seth van Aken and Mark Scott

Esri

These are exciting times at Esri, as the ArcGIS Platform continues to grow and mature. This platform has never been more accessible to GIS and non-GIS users alike. This has brought the power of geographic knowledge to users, at all levels, of an organization. Esri representatives will discuss the current state of the company, and offer insights as to where we are heading in technology, products, and vision.

10:15 – 10:30   Refreshment Break and Poster Session

Campus Center 1st Floor Concourse

10:30 – 12:00   Session 2

	Geodatabases	Planning	Academic Applications	ArcGIS Online Workshop
	Campus Center Auditorium	Campus Center 168	Campus Center 176	DuBois Library Learning Commons
	Moderator: Mike Olkin	Moderator: Esther Olson-Murphy	Moderator: Shane Bradt	Coordinator: Melanie Johnson
❖ 10:30 AM	**Postgres Geodatabase Administration** Jim McAbee	**UMass Amherst Campus Hardscape Assessment: Methods, Means, and Outcomes** Joe Wanat and Gordon Daring	**Geostatistical Variance** Andy Anderson Academic Technology, Amherst College	**ArcGIS Online Hands-on** Mark Scott and Sam Berg Esri

ESRI

This session will address a variety of Postgres-specific configuration and optimization techniques for experienced enterprise geodatabase administrators. You will learn how the geodatabase interacts with the DBMS and the parameters the database administrator needs to be aware of to effectively tune and optimize the geodatabase. The workshop will include the following topics: advanced configuration, administration, and maintenance.

VHB/Vanasse Hangen Brustlin

In the summer and fall of 2013, the University of Massachusetts Amherst commissioned VHB pavement management staff to complete a campus-wide hardscape inventory, capturing the following elements:

- roadways under the jurisdiction of UMass (18.8 miles);
- sidewalk and walkways (2.8 million square feet);
- curbing (44.7 miles);
- surface parking lots (95 lots covering 6 million square feet); and
- driveways, ramps, and stairs.

Through the fall and winter of 2013, a Geographic Information System (GIS) database was developed and populated with material types and condition assessments. UMass will integrate the hardscape data with other infrastructure data through GIS to facilitate comprehensive decision making and use the information gathered to:

- Support project selection and development decision making; and
- Help establish proper funding levels to achieve campus hardscape condition goals;
- Integrate a capital plan for maintenance and rehabilitation of the campus hardscape along with capital plans for future campus expansion or modernization.

Jack Finn

Environmental Conservation, University of Massachusetts Amherst

Jane Garb

Epidemiology, Baystate Health

Spatial data obeys the first law of geography: locations that are close to each other will generally have characteristics that are more similar than locations that are far apart, and as such the variation of these characteristics is distinguishable from random positioning. Geographic statistics use this behavior to reduce the unexplained variance in data, describing geographic patterns more precisely and providing better fits to models. The panelists will demonstrate three software packages that can employ geostatistics — ArcGIS, R, and SatScan — along with three applications — historical housing policy, animal movement and behavior, and epidemiology.

If you have an ArcGIS for Desktop license, or your organization has an ArcGIS Online Subscription, you have access to a key component of the ArcGIS Platform. See how ArcGIS Online can help your organization leverage its authoritative data, exposing GIS capabilities to your entire user base. Esri representatives will be there to help you with a set of hand-on exercises involving creating and sharing web maps, building an editing application, using maps inside of Microsoft Excel and Powerpoint, and working with the Operations Dashboard.

❖ 11:00 AM

Putting Cambridge GIS Data on GitHub

Sean Sweeney

City of Cambridge

Open data is all the rage at all levels of government these days. There are a number of ways to provide GIS Open Data online, each one targeted to a specific audience. One of the ways Cambridge GIS is sharing their data is through the social coding site GitHub.

For developers, GitHub is a familiar place where they already share code. Commercial companies such as Esri have embraced GitHub as a platform for their open source software offerings. To facilitate the sharing of data as well as code, GitHub has built in a number data management and visualization features, including map-based visualizations for GIS data.

Modernizing the Management of Your Buildings and Campuses

Sheila Steffenson

Esri

Whether you manage a single building, an entire campus, or a global portfolio of buildings/campuses, GIS can help you to better plan, design, utilize, and manage your assets. Used throughout the facility lifecycle, GIS enables faster/more holistic decision support by tying together disparate facilities information from different systems (e.g. CAD, IWMS, CMMS, CAFM, and ERP) into a more complete picture. Our solution includes facility-specific templates and applications that enable you to easily stand up your facility/campus base map and begin using it to better manage your spaces. During this session we will hone in on the 3 aspects of Facilities and Real Property Management…that of Portfolio, Operations, and Safety and Security to look at how GIS can enable facilities workflows from site selection, to space management, to safety and security, to sustainability.

❖ 11:30 AM

Identifying and Validating Spatial and Attribute Changes between

Construction Documentation and GIS Data Collection

Evaluating Casino Impacts on Property Values: A Spatial

Dataset Vintages with Python
D. Russell Sands

AIR Worldwide

Identifying changes between different versions of a dataset through time can be a time-consuming and frustrating process. In order to facilitate repeatable, timely, and automated comparison of datasets, a set of python tools were developed that compare spatial and attribute records from two datasets based on a shared ID value. These tools can also validate changes, and generate Microsoft Excel documents summarizing the results. This talk will focus on the general logic of the spatial and attribute checks, and then discuss the process of working with Microsoft Excel in Python.

Shawn Herrick and
Samuel Lingeman

University of New Hampshire Facilities - Campus Planning

This presentation will give an overview of how the University of New Hampshire leverages classic data capture methodologies as well as new and emerging technologies to substantiate and enhance their enterprise GIS. The presentation will focus on utilizing existing hard copy and digital construction documents as well as field data collection techniques. Additional emphasis will address the use of numerous tools including pipeline videography, GPS data collection, construction site photography (including the use of quad-copters), radio detection, thermal imaging, etc. The presentation will review trials, challenges, successes, and lessons learned.

Econometric Framework
Henry Renski

University of Massachusetts Amherst

Following the legalization of casinos in Massachusetts, the state Gaming Commission worked to establish a process for monitoring the economic and social impacts of casinos on their host communities and surrounding areas. Part of the comprehensive evaluation strategy includes examining their impact on residential and commercial property markets. Many fear that increased traffic, crime, and late-night activity associated with a casino may reduce home values, and hurt established retailers and restaurants if local patrons shift their spending patterns. However, if the casino successfully attracts more visitors to the area, there may be an offsetting complementary effect for existing businesses, contributing to area revitalization and having a net positive impact on the real estate market.

Further complicating matters is that the effects are likely to vary greatly by location: houses closet to the casino and along major thoroughfares may see negative impacts while those farther away may benefit from broader revitalization efforts.

This presentation will review a proposed system for the ongoing monitoring and evaluation of casinos. It integrates publicly collected data on property sales, parcel attributes, and neighborhood conditions to track market conditions both before and after the development. A mixed quasi-experimental / spatial-hedonic regression approach will help distinguish treatment effects from other possible influences and causes of inferential bias.

Although no casinos have yet been built in Massachusetts, I demonstrate the feasibility, design, and implementation of this system using data for the City of Springfield and its surrounding neighborhoods — the proposed site for the MGM Grand Resort Casino.

12:00 – 1:15	**Lunch**

Campus Center Auditorium

❖ 12:15   **Lightning Talks**

Campus Center Auditorium

Moderator: Mike Olkin

Making Use of Query Layers and Spatial Views
Michael Olkin

Town of Amherst, MA

Do you ever have the need to directly connect to a "non-spatial" database and display this data in a spatial format? Are you tired of copying and converting data in order to show it on a map? Query Layers and Spatial Views provide

Identifying High-Crash Roadway Corridors
Jennifer Gazzillo

UMassSafe Traffic Safety Research Program

The goal of this research effort was to produce a ranked list of Massachusetts roadway corridors, weighted by crash frequency and severity. An Equivalent Property Damage Only (EPDO) crash

Estimating Impervious Cover and Riparian Zone Condition in New England Watersheds
Jessica Morgan

University of Rhode Island/U.S. EPA

Naomi Detenbeck and
Steven Rego

U.S. EPA

Y.Q. Wang

University of Rhode Island

HERE Community Mapping
Spencer Walker

HERE

Location-based devices and services are all around us—they've become a vital part of culture. From smart phones to navigation devices to enterprise applications, all are likely powered by a commercial map. And because the masses use these devices and services, they're

some powerful ways to directly display enterprise data in a spatial format. The purpose of this presentation is to demonstrate how to make use of these methods for spatially empowering your data.

weighting formula was derived to equate the cost to society by using the maximum personal injury level in the crash. Analysis was conducted across all major Massachusetts roadways in one-mile segments, followed by the completion of a rolling-corridor statistical analysis which looked at ten consecutive one-mile segments. Tools that had been utilized previously for similar analysis were not successful in this case, so the research team developed a unique methodology, requiring the manual splitting of all roads into similarly sized segments, then using a "join" command to sum the EPDO value of any crash within the designated buffer. Although improvements of the methodology are ongoing, the research team is successfully implementing the results in a targeted enforcement safety campaign being undertaken by the state police.

MAGIC's Connecticut Digital Air Photography Collection

Bill Miller

MAGIC, Homer Babbidge Library, University of Connecticut

I plan to show developments in MAGIC's collection of digital air photography. This will be done using a computer presentation featuring side by side viewer and street address searching.

Under EPA's Green Infrastructure Initiative, research activities are underway to evaluate the effectiveness of green infrastructure in mitigating the effects of urbanization and stormwater impacts on stream biota and habitat. Preliminary analyses, using impervious cover estimates from the 30-meter resolution National Land Cover Database (NLCD), have indicated that biotic communities are impacted at lower levels of watershed imperviousness than those traditionally reported in the literature. However, NLCD data are likely underestimating impervious cover, particularly in suburban areas where impervious surfaces can be masked by tree cover. Concurrent analyses have found that the condition of forested buffer zones can help to mitigate the effects of urbanization, even when the natural functions of riparian zones are altered by stormwater drainage infrastructure. Higher resolution estimates of impervious cover and riparian zone condition may provide a more accurate depiction of stream ecosystem responses to urbanization. However, fine scale classifications are difficult at broad spatial extents.

Methodologies were developed to improve classification accuracy using imagery from the National Agricultural Imagery Program (NAIP) program, LIDAR data, GIS, and genetic algorithms. An accuracy assessment was conducted and compared to classifications of previously established estimates from state and local high-resolution data sets. These improved estimates will be used to evaluate riparian zone widths required for mitigation of urbanization effects at varying spatial resolutions, and to evaluate if prior biotic community thresholds change. This presentation focuses on a case study in Burlington, VT and highlights the challenges of working with high-resolution spatial data over broad spatial extents.

relying on the accuracy and validity of commercial maps. As a result, more and more communities and government entities are contributing their local knowledge and sharing data with commercial data vendors, in order to maximize the use and application of the data and make the map in their locale as accurate as possible.

Perhaps the most well-known and trusted commercial map vendor today is HERE, formerly known as NAVTEQ. The HERE Map is found in a wide array of places, including online map applications, in-dashboard and personal navigation systems and is used by companies in all walks of life, ranging from fleet management operations to emergency management. This talk will describe HERE's map and how it's updated through contributions via their community program and local GIS data acquisition channels.

1:15 – 2:45	Session 3			
	Map Services	**Emergency Management**	**Geospatial Education**	**ModelBuilder Workshop**
	Campus Center Auditorium	Campus Center 168	Campus Center 176	DuBois Library Learning Commons
	Moderator: Melanie Johnson	Moderator: Kara O'Neill	Moderator: Andy Anderson	Coordinator: Alexander Stepanov
❖ 1:15 PM	**Vermont's Natural Resources Atlas**	**Emergency Management Decision Support: Marrying a Model to a GIS**	**After the MOOC: What Did I Learn from Teaching "The Basics of GIS" as a Massive Open Online Course?**	**Introduction to ModelBuilder**
	Erik Engstrom	Mark Zito	Peggy Minnis	Guido Stein
	Vermont Agency of Natural Resources	CDM Smith	Pace University	Applied Geographics
	The Vermont Agency of Natural Resources Atlas is an online, web mapping tool for creating usable maps of the agency's GIS data. The general nature of the application allows an array of professionals to create personalized maps to aid in making decisions that require our	The frequency and intensity of flooding has steadily been increasing, causing communities to reevaluate their current emergency management plans. This problem prompted an investigation into the development of an Emergency Management System that will	I developed and taught a massive open online course (MOOC) in the fall of 2013 and reported on the first four weeks at the fall NEARC meeting. This will sum up what was learned in the process of teaching this twelve-week course	ArcGIS ModelBuilder is a tool for managing geoprocessing workflows. It takes advantage of the Esri tool environment allowing you to create repeatable solutions using a graphical interface. This session will provide an introduction to using ModelBuilder and share some tips and tricks for

data. This talk will act as an orientation to our Atlas and provide tips and methods for creating your own map and querying our data using this incredibly useful tool.

To try out the Atlas, visit anrmaps.vermont.gov/websites/anra/.

provide cost-effective guidance for floods within a given study area, providing appropriates actions to mitigate losses in the unfortunate time of a catastrophic event. The requirements for this system is that it must be capable of providing emergency management actions in response to both predicted and measured rainfall, and address the timing, depths and velocities of flooding at critical locations.

To address the criteria a detailed hydrologic and hydraulic model was developed using XP-SWMM software. The case study that will be explained covers a 47,000 km^2 study area. While the model provides the information necessary to make informed decisions, it does not provide an easy-to-use interface to interpret the results. Therefore a Decision Support System (DSS) was developed to run using an ArcGIS Desktop Add-in. The DSS allows the user to build a storm event using direction, velocity, and rainfall information supplied from meteorological data. This storm event can quickly be processed through the model and the results are brought back in to the DSS for evaluation using custom tools and existing standard GIS tools. The DSS allows the user to select the appropriate actions from the emergency management plan using the depth of flooding and the time at which the storm will reach each critical elevation.

— the education level of the enrollees, the ages, how many people completed the course, and the comments made by the people who finished.

building useful workflows, including converting from a ModelBuilder model to a reusable Python script.

❖ 1:45 PM

Deploying GIS in the Cloud: No Longer the Future

Christopher Kobos, PMP

Bowne Management Systems

Cloud computing is everywhere. iCloud. Office 365. Windows Azure. Amazon Web Services. Google Cloud. The list goes on and on. There are many fundamental reasons why cloud computing is becoming so popular with the world's population. GIS is no exception. ArcGIS Online. Google Maps Gallery. AutoDesk 360. GISCloud. Sure, the cloud is a place to "house" the various nuts and bolts that make GIS work. More importantly, it is the place to collaborate, publish data, and to provide access to geospatial services. Will there be a GIS as a service (GISaaS)?

This presentation will provide some insight into why some organizations have chosen the cloud, not only for Infrastructure as a Service (IaaS), but for the consumption and publishing of geospatial products.

Vermont Local Road Information System

Ivan Brown

Vermont Center for Geographic Information

The Vermont Local Road Information System (VLRI) is an emergency-management GIS system that fosters easy and efficient mapping, updating, monitoring, and dissemination of closure statuses of local roads (roads that are not maintained by Vermont Agency of Transportation). VLRI has a web-mapping editor that allows authenticated users to select road segments and attribute closure statuses and comments to those segments. ArcGIS for Server technology collects data entries from the web mapping editor into an ArcSDE geodatabase and serves data from that geodatabase to read-only systems and clients.

The presenter will share the project management approach and the technical approach that were taken for implementation of VLRI.

Historians to Geographers: Using Maps to Illustrate Hartford's Cultural Heritage

Zachary Raslan and
Michael Howser

University of Connecticut

Hartford's rich cultural heritage involves a number of events which have a spatial connection, a connection which is illustrated with the Virtual Hartford project. This presentation will explore ideas and concepts that connect history with spatial location using maps, archives, and content. Utilizing collections from the Hartford History Center, Connecticut Historical Society, and the UConn Libraries MAGIC, this project connects archival content to maps to enable student and prospective researchers to reinterpret the history of Hartford, CT based on primary sources. Join us as we explore how to leverage ArcGIS, Google Maps, and Omeka Neatline to connect users with primary sources based on locations in Hartford, Connecticut.

❖ 2:15 PM

Mobile Workflows Using Collector and Operations Dashboard for ArcGIS

Mark Scott

Esri

Collector and Operations Dashboard are two parts of the ArcGIS platform that work with ArcGIS Online to help you to

Re-evaluating Hurricane Evacuation Zones on the North Shore

David Breeding and Peter Lemack

Applied Geographics

The US Army Corps of Engineers is in the process of developing new evacuation zone maps and evacuation routes for coastal

The Importance and Examples of Openness in Geospatial: GeoForAll, PublicLab

Charlie Schweik

Environmental Conservation and CPPA, University of Massachusetts Amherst

In this talk, I will cover three topics. First, I will provide a short overview of what "open source" is,

extend the reach of your GIS. See how to collect information in the field, whether in an online, or offline mode, using the latest March 10.2.2 release. Visualize the results of that data collection in a dashboard, and share those dashboards across multiple devices. Demonstrations will focus on using an ArcGIS Template for Damage Assessment.

communities. The City of Gloucester, Massachusetts and Applied Geographics have re-evaluated the Army Corps evacuation zones given the original expansive evacuation recommendation. Using the most current Army Corps hurricane evacuation zone data and city imagery, assessing and parcel data, the City of Gloucester produced a new evacuation zone map that they believe provides more locally informed evacuation guidance. Planning is also underway to use the evacuation analysis to help create a hurricane evacuation contact list, allowing decision makers to more quickly inform those households who are at risk of an impending storm.

and argue for why universities and colleges should be providing opportunities to students to learn about these technologies. Second, I will describe a relatively new international collaborative effort, called GeoForAll.org, with more than 70 research and education labs established worldwide. Third, I will provide a very short overview of how openness is expanding into the geospatial hardware sector, using PublicLab.org as the example.

| 2:45 – 3:00 | **Refreshment Break and Poster Session** |
| | Campus Center 1st Floor Concourse |

| 3:00 – 4:30 | **Session 4** |

	Geospatial Data Processing	**3D GIS**	**Conservation**	**Python Workshop**
	Campus Center Auditorium	Campus Center 168	Campus Center 176	DuBois Library Learning Commons
	Moderator: Darren Mackiewicz	Moderator: Niels la Cour	Moderator: Jane Garb	Coordinator: Andy Anderson

❖ 3:00 PM

LiDAR Return on Investment: It's All About the Data!

Benjamin Houston and Karen Kwasnowski

GroundPoint Technologies

LiDAR data are becoming increasingly ubiquitous across the Northeast. However, using that data effectively to support projects and achieve real benefits is still a challenge to many local governments and agencies. Do we need additional software and training? Is the data "ready to go" when we download it? What format or data types do we need to support our program goals? Unfortunately, while the data that might be immediately available could be phenomenal, they might not be exactly what is needed to support a particular application. This talk will explore the intersection between the range of applications that can be supported with LiDAR data and the types of derivative data products that might be necessary to make it all happen.

3D Cities with the ArcGIS Platform

Patrick Gahagan

Esri

In 2014 Esri is transforming the entire concept of 3D GIS by releasing new applications and developer resources that make 3D one of the most powerful components of the ArcGIS platform. 3D is now the forethought, rather than the afterthought. Will you be able to build 3D web and mobile applications using the same Javascript you are familiar with? Yes, even through ArcGIS Online. 3D Labels? Yes, flat or billboard. From ArcGIS Professional and the 3D City Template to ArcGIS Scene Services, this presentation will look at all of the exciting new 3D functionality in the ArcGIS platform coming out of Esri's R&D centers around the world. Demos of Scene Services and ArcGIS Professional will take up the remaining time.

Potential Effects of Declining Water Levels on Island Ecosystems: A Spatiotemporal Analysis

Kim Diver and Emilie Sinkler

Wesleyan University

Ryan Edgley

California State Polytechnic University

Global and regional environmental change has resulted in water-level changes in the world's oceans and large lakes. The Great Lakes have a history of water-level fluctuations but have been experiencing declining water levels over the past decade. The trend is expected to continue due to differential rates of isostatic rebound within the basin, human-driven diversion and depletion of water from the drainage basin, and climatic changes related to reduced snowpack in the Lake Superior basin, as well as feedbacks between climate processes and reduced lake ice cover. This project investigated spatiotemporal changes in island shoreline configuration within the Massasauga Provincial Park on the eastern shore of the Georgian Bay. Existing data on island area in the Massasauga is based on high-water stages of the lake. Project objectives included (1) creating accurate island shoreline GIS data from aerial photo and satellite imagery for periods corresponding to existing plant species richness inventory data, (2) analyzing the influence of water level changes on shoreline modifications and island ecosystems (plant species richness), and (3) modeling future changes in island area based on existing long-term water level projections. Thirty percent of the variation in non-

Python + ArcGIS BootCamp

Guido Stein

Applied Geographics

Andy Anderson

Academic Technology, Amherst College

Python scripting has become an important tool to have in every GIS analyst's toolbox. This seminar will introduce some basic Python concepts and guide you through the Python environment within ArcGIS, from the field calculator to the toolbox to ModelBuilder-generated scripts.

native plant species richness is due to the difference in island area in that there were more non-native plant species on islands that had a greater increase in size. Modeling predicts increased connectivity among islands and mainland areas, which will allow for greater mobility of animals and plants, both native and non-native, throughout the park.

❖ 3:30 PM

Planimetric Updates for Municipal GIS Databases using the 2014 MassOrtho Imagery

Claire Kiedrowski

KAPPA Mapping

Learn how you can maximize your Municipality's investment in the new 2014 Massachusetts Orthoimagery by updating your GIS's planimetric features. Updated maps can be generated via stereo photogrammetric techniques, using the raw data provided to participating Massachusetts municipalities. The final outcome is an up-to-date ArcGIS database.

Topics will include:

- an overview of the 2014 Massachusetts Orthoimagery Project;
- who has access to the imagery and how it can be used;
- the typical mapping workflow and variations for this year's Ortho Project;
- and the types of features that can be updated and/or collected.

Also included:

- advanced topics such as issues with updating features in an existing ArcGIS database;
- 2D vs. 3D mapping updates;
- impacts on mapping update costs/labor;
- and maintaining topology and attribution during the process.

Don't miss this opportunity to make the most of your new Orthoimagery by learning about planimetric updates to your GIS.

High-Fidelity 3D Buildings: A Move to the "Cloud"

Kevin DeVito

CyberCity 3D

A burgeoning number of businesses now turn to the "cloud" to enhance their products and workflow; 3D content is no exception. How is the cloud revolution affecting state and local GIS and redevelopment agencies? It's a game changer, improving data quality, data transfer, and workflow as it creates new opportunities for GIS and planning agencies everywhere. Cloud services offer high fidelity data that can be disassembled and delivered browser to browser. The format of choice, 3D GeoCOLLADA™, is an open specification and allows for 3D to be optimized in an interchangeable format.

The Geospatial Condition Analysis: A New Tool to Assess the Condition of Northeast Terrestrial and Aquatic Habitats

Alexandra Jospe

The Nature Conservancy

We created a GIS tool to assess the condition of 116 terrestrial and aquatic habitats in the Northeast at state and regional scales. The tool is based on the newly released Northeast Terrestrial Habitat Map and the Northeast Aquatic Habitat Classification and their accompanying datasets. It allows each habitat to be evaluated across its entire range in the region or within a single state for condition factors such as predicted loss to development, securement from development, forest stand age, habitat patch size, amount of core area and others. For aquatic systems, users can summarize the number of dams, length of connected network, impervious surfaces in the watershed and other factors. The talk will illustrate how the tool works and summarize some of the findings for the fourteen ecological condition metrics, and comparative results of the metric as applied to the terrestrial and aquatic habitats across the region.

❖ 4:00 PM

High Resolution Impervious Surface Data: Stories from the Field

Benjamin Houston and
Karen Kwasnowski

GroundPoint Technologies

Jarlath O'Neill Dunne

Spatial Analysis Laboratory, University of Vermont

Using two examples of recent projects requiring high-resolution (~1 sq. m) impervious surface data development we will investigate the accuracy of such data for mapping over large areas (>2000 sq. mi.), and compare the quantity and distribution of high-resolution data with lower resolution data (~30 sq. m) available for free via

Bridging Urban Design and 3D GIS Infrastructure

Jeff Amero

City of Cambridge, Massachusetts GIS

Paul Cote

pbcGIS

The City of Cambridge GIS Department has completed a pilot for a city-wide 3D model. Our first use-case is for visualization and site design review within several proposed neighborhood master-planning projects that are currently active in the City. This presentation will share many of the lessons learned from the pilot, including:

- our schema and workflows for development and maintenance of the 3D model as a component

GIS in the Surveillance and Management of Invasive Aquatic Plants

Jordan Gibbons and
Gregory Bugbee

CT Agricultural Experiment Station

Invasive aquatic plants pose serious threats to Connecticut lakes and ponds. The Connecticut Agricultural Experiment Station's Invasive Aquatic Plant Program (CAES IAPP) has performed complete vegetation mapping of over 200 water bodies. Over 100 plant species have been documented. Fourteen of the species are classified as non-native invasive. One or more of these species were found in approximately two-thirds of

the NLCD and C-CAP programs. We will also discuss the implications of scale in assessing total impervious area, spatial distribution, and connectivity/fragmentation.

of the city's GIS infrastructure;

- workflows for developing and exchanging 3D models with architects and developers;
- City Engine training for staff;
- and many lessons learned for quality assurance specifications for 3D data.

Connecticut's lakes and ponds. CAES IAPP has also performed management studies involving biocontrols, herbicides, drawdowns, and harvesting. Critical to this work is mapping and data analysis using capabilities offered by today's geospatial technology. This presentation will give an overview of the techniques employed, including data gathering using Trimble® GPS units, GPS integrated with an underwater camera, and mapping and analysis using ArcGIS® 10.2. Potential future uses of GIS in our program will also be discussed. More details on this work can be obtained at the CAES IAPP website http://www.ct.gov/caes/iapp.

4:30 – ? **NEARC User Group Forum / Open Discussion / Poster Contest Winner Announcement**

Campus Center U-Pub (First Floor)

All Day **Posters — Please Vote for Your Favorite!**

Campus Center 1st Floor Concourse

Coordinator: Pam Brangan

Land Management

Presenters will be at their posters at least at these designated times:

10:15 AM – 10:30 AM

2:45 PM – 3:00 PM

and optionally

8:00 AM – 9:00 AM

1:00 PM – 1:15 PM

Monitoring Land Surface Temperature Variability Across an Urban-Forest Gradient in Worcester, Massachusetts Using In-Situ and Multi-Platform Satellite Data

Michelle Andrews, Dr. John Rogan, and Dr. Deborah Martin

Clark University

Dr. Verna DeLauer

George Perkins Marsh Institute

The benefits urban forests provide to urban residents include lowered home-energy costs, improved air quality, reduced precipitation runoff, decreased urban noise levels and seasonal wind break. Development, storm damage, the shortened life spans of urban trees and invasive species reduce the number of trees and the benefits provided. This study examines how the benefits of trees vary across the urban-forest gradient, specifically in residential areas. We examine the spatio-temporal trends in land surface temperature in Worcester (MA) using in situ iButton temperature measurements and thermal data from Landsat-7 and ASTER sensors. Since 2008, Worcester lost over 30,000 host trees to eradicate the invasive Asian Longhorned Beetle (A. glabripennis) and also endures the spread of new development, timber harvest, and severe weather events. The research quantifies how tree-cover loss has impacted land surface temperatures in tree-removal locations compared to locations that did not experience tree-cover loss.

Spatial Analysis of Anthropogenic Wildfire Ignition

Land Cover of the TL2 Region in the Democratic Republic of the Congo

Virginia Brink and Zach Davidson

Paul Smith's College

The TL2 project is located in the remote tropical forests in the Democratic Republic of the Congo where the Tshuapa, Lomami, and Lualaba rivers meet. This area is the home to numerous wildlife species, including the recently discovered Lesula monkey. Existing land cover maps did not accurately depict the habitat types. In order to create accurate land cover maps, we first produced a cloud-free mosaic from multiple Landsat scenes, followed by image classification using ENVI and ArcGIS 10.2. These land cover maps can be used to identify habitat associations using GPS point locations of wildlife species.

Geospatial Analyses of Watershed Drainage Network Structures

Matt Porter, Elizabeth Caprotti, and Katherine Meierdiercks

Siena College

Traditionally, the percent impervious of a watershed has been the focus of examining altered flood response due to urbanization. However, other elements of the urban environment, particularly those associated with the drainage network, can also play a role in altered flood response in urban watersheds. In this study, students in an intermediate GIS course characterize the geomorphic and drainage network properties of a subwatershed of the Kromma Kill watershed located in Albany

Ecology

Do Naturalizations of Ornamental Plant Species Indicate Broader Climatic Tolerance than What Is Expected by Their Native Ranges?

Tierney Bocsi

University of Massachusetts Amherst

Jesse Bellemare

Smith College

Bethany Bradley

University of Massachusetts Amherst

Assumptions of niche conservationism lead to the belief that species are restricted to the climatic thresholds observed in their native fundamental niches, or the full range of conditions and resources a species can occupy and use (Biology Online). However, many exhibit tolerance for conditions outside of these limits in their realized, or actual, nonnative ranges. It is evident that there is a chasm between the fundamental and realized niches of nonnative plant species, particularly those introduced for horticultural purposes. Many species have demonstrated a capacity to expand beyond the climatic niche indicated by their natural range, defying predictions based on ecological niche models. While the mechanisms behind this phenomenon remain largely undefined, it is valuable to attempt to identify patterns in niche shift and expansion in order to understand the behavior of species in their nonnative ranges. This study aims to explore the differences between the native and introduced ranges of ornamental plant species versus those of non-ornamental plant species endemic to the United States using county-

Climate Change

Hydrologic Modeling of the Impacts of Climate Change in the Fenton River Basin

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The Fenton River is an upland tributary of the Thames River of southeastern Connecticut that supplies a portion of the University of Connecticut's water. The local water balance is expected to change in response to future climate change that is projected to bring higher temperatures and more precipitation, whereas the local climate during the last glacial maximum was cooler than the present with less precipitation. In order to assess the variation associated with these different climates, we developed a GIS-based model of current water movement calibrated with existing stream flow data. We then adjusted measures of precipitation and temperature to determine the impacts of past and future climates on the Fenton River Basin. It was found that warmer, wetter conditions result in much higher peak discharges compared to the current state than cooler, drier conditions do.

Glacier Recession on Kilimanjaro: A Comparison of Different Mapping Approaches

Sarah Pierce and Carsten Braun

Westfield State University

"The Snows of Kilimanjaro" and their current demise are arguably one of the most iconic images of the impacts of global climate change today. Glacier recession over the twentieth century on Mount Kilimanjaro (Tanzania) has been

in the Western US

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Although fire is a natural component of many ecosystems, anthropogenic ignitions are altering the frequency and magnitude of fires worldwide. Considerable fire research has focused on the effects of fires on landscapes, however few studies have evaluated the human influence on fire ignitions. Anthropogenic wildfire ignitions include discarded cigarette butts, campfires, or sparks from railroad tracks. It is estimated that human settlement near wildland areas in the United States will increase by 10% by the year 2030, which will likely create new opportunities for anthropogenic ignitions. Using the Moderate Resolution Imaging Spectroradiometer (MODIS) burned-area product, we examined fire events from 2000-2012 across eleven western states. We determined fire perimeters based on the burn date and location of each 500-m by 500-m burned pixel. Ignition pixels are those associated with the earliest burn date for each perimeter. We used GIS data containing features such as roads, powerlines, and agriculture, to test for a spatial relationship between fire ignition sites and anthropogenic disturbance features. By examining the relationship between humans and wildfire ignitions, we can better understand and predict wildfire occurrence.

County, NY. Analyses suggest that rather than percent impervious coverage, other elements of the urban landscape impact the timing and magnitude of flood response.

level distribution data from the Biota of North America Program.

Invasive Species Detection using Spectral Angle Mapper and Mixture-Tuned Matched Filtering

Devin Routh and Lindsi Seegmiller

Yale FES — Ucross High Plains Stewardship Initiative

Land management faces countless challenges, not the least of which is the spread of invasive vegetation. Solutions to address this issue and help managers to tackle this problem efficiently lie within the realm of spatial analysis. We propose a mechanism for wide-scale identification of invasive species distribution and abundance using two land-cover classification algorithms that operate on multispectral and hyperspectral data. We apply these methods, i.e. Spectral Angle Mapping (SAM) and Mixture-Tuned Matched Filtering (MTMF), first within ENVI remote sensing software and then within Google's (yet to be released) open-source spatial analysis platform known as "Earth Engine" (GEE). This pilot research, based on the high plains of Wyoming, focuses on leafy spurge (Euphorbia esula), a noxious invasive species that displaces native vegetation and decreases the quality and amount of forage for livestock. Our intent is to make complex discrete and mixture-based analysis capabilities available to land managers operating on tight budgets and with minimal training.

documented and quantified by researchers since the late 1990s. Measurements from June 2011 indicate an 85 percent decrease in glacier cover on Mount Kilimanjaro since 1912 (Cullen et al., 2013.) All previous studies have relied on sophisticated analytical procedures and expensive high-resolution aerial photographs and satellite images, often supported by ground-based GPS surveys.

Here we present the results of an alternative glacier mapping approach using publically available USGS Landsat archive (landsat.usgs.gov) and standard analytical procedures available via Esri ArcGIS 10.1. Our analysis focused on data from 1984 to 2013 on two glaciers located on the summit crater of Mount Kilimanjaro (Northern Ice Field and Furtwangler Glacier). We then compared our glacier area determinations to the available previous studies to assess whether or not our simplified glacier mapping approach produced comparable results.

We conclude that our glacier mapping approach yielded reliable and reproducible results comparable with those from specialized studies published in the peer-reviewed scientific literature. For example, we determined an area of 0.0495 km^2 for the Furtwangler glacier (2002) whereas Cullen et al. (2013) reported an area of 0.049 km^2 (2003). This type of "simple" glacier mapping from space is easily incorporated into undergraduate coursework in GIS or remote sensing and demonstrates the usefulness of undergraduate research.

Effect of Global Climate Change on Vector Diseases on the East Coast

Zhenning Yang, Heather Minott, Kate Loughlin, Shane Michniewicz, and Daniel Lindquist

University of Massachusetts Amherst

The purpose of this project is to investigate global climate change and potential effects on human health. Climate change leads to more extreme precipitation events (both floods and droughts) and increases in temperatures. Temperature and precipitation changes alter mosquito habitats which may cause changes in the locations and rates of mosquito-borne diseases such as Dengue Fever, Eastern Equine Encephalitis, and West Nile Virus. This is a relevant project because climate change is expected to increase in the upcoming decades and changes that have already occurred may help predict future changes and allow for preventative measures to be taken.

The area of study for this project is the east coast of the United States. Sixteen states are included: Maine, New Hampshire, Vermont, Connecticut, Rhode Island,

Energy

Ideal Solar Panel Placement: A Case Study of Eastern Illinois University

George Cernetig

Eastern Illinois University

This work presents a method to determine the ideal locations for fixed-axis photovoltaic systems. The model allows the user to input solar panel specification properties in order to identify locations of maximum incoming radiation per panel within a study area. These locations are identified using a four-step process:

1. The incoming solar radiation values are calculated in one square foot increments over the study area;

2. The angles of the rooftops are correlated with the ideal solar panel angle to find the maximum radiation values per panel.

3. Roof planes are analyzed so that no solar panels are placed on more than one roof plane.

4. A shadow analysis is generated for newly constructed panels so that the shadow of one panel does not interfere with the potential radiation onto another.

This model originates with detailed LiDAR elevation measurements. The Earth's rotation and absorbed radiation is calculated using the ArcGIS Solar Analyst. This method is unique because roof planes, aspect, and inclination are all measured, analyzed, and accounted for when determining ideal installation locations. This use of micro-GIS results in an improved prediction of solar radiation potential, as well as display the possible effects that installed photovoltaic systems can have on each other. The results are displayed in a polygon format, highlighting optimum rooftop locations per panel.

This research uses the campus of Eastern Illinois University in Charleston, Illinois as a case study; however, the methodology can be replicated for any location. A fiscal perspective is also identified, demonstrating the electrical offset each panel endures per building.

Class Experiment: Using GIS and Structured Decision Making to Site Wind Energy in Coastal Maine

Economic Development

Characterizing Socio-demographic and Biophysical Drivers of Land Development through Periods of Economic Bubble and Bust: Using Landsat and Ancillary Data

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George Perkins Marsh Institute, Clark Universtiy

Stephen McCauley, Ph. D.
Interdisiplinary and Global Studies Division, Worcester Polytechnic Institute

Land development for residential use in highly-developed nations poses one of the largest threats to their remaining natural environment. Improved understanding of the drivers and impediments to land development is important because undeveloped land is a source of valuable ecosystem services, a point of articulation between humans and the environment and maintains wildlife habitat and biodiversity. The loss of undeveloped land cover in New England states, Massachusetts in particular is primarily driven by residential land use, albeit at rates and patterns that are not quantified. This study maps the change from undeveloped to developed land cover throughout the most recent economic bubble and bust (2000-2013) in central Massachusetts using time series Landsat-5, 7, and 8 data. Significant patches and area per town of undeveloped land-cover loss are compared between time periods using regression tree analysis in relation to presumed socio-demographic and biophysical factors. The findings of this research will enhance management of the drivers of land development and its ecological impacts in regions similar to this study area.

Transportation

Downtown Northampton, MA Bus Routes: Current and Prospective Routes for Pioneer Valley Transit Authority Buses

Evan Aird

Johns Hopkins University

A train station is scheduled to open in 2015 near the building housing the former Union Station restaurant in Northampton, MA. For this project, I looked at how existing bus routes would have to be redrawn to accommodate a stop at the future train station. The accompanying table shows estimates for how much longer each route will take with the added stop.

A GIS-based Approach to Identifying Optimal Locations for Variable Speed Limit Implementation in Massachusetts

Curt Harrington, David Burgess, Jonathan Freeman, and Roland Barbeito

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Variable speed limits (VSLs) are a sustainable active transportation management tool that can be used to facilitate safe and efficient travel on major roadways. In this paper, VSL "hotspots" are ranked in order of importance in Massachusetts after bottleneck congestion and crash data are overlaid in order to visually represent the most effective areas for VSL implementation. By identifying and spatially analyzing data that best represent problem locations in which VSLs can improve roadway safety and efficiency, a framework for statewide implementation can be made.

History

Underground Railroad History Story Mapping

Michele Golden, Evan Leahy, Colin Murphy, and Katherine Meierdiercks

Siena College

Students in an intermediate GIS course have partnered with students from the Myer Middle School to use story maps to highlight points within downtown Albany, NY of historic significance to the Underground Railroad and abolitionist movement. Story maps place the story of an event, issue, trend, or pattern within a geographic context. The maps are online, interactive, and include videos, photos, and audio. Much of the content for the story map — including these videos, photos, and audio — are generated by the middle school students with guidance from the Underground Railroad History Project. By highlighting areas of social and historic significance and downtown Albany's "lost history", the Underground Railroad story map can be used as a tool to encourage the preservation of the cultural environment of urban underserved communities.

Walt Jaslanek and John Post

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Geographic Information Systems were introduced as a critical spatial analysis tool in wind-energy siting and structured decision making. The complexity of where to site wind energy projects involves overlaying different scales of multiple spatially referenced data layers, and evaluating which criteria within each layer may yield preferred siting locations.

Municipal Mainline Electric: Critical Customers

John Hayes

National Grid

Over the past few years the US Northeast has experienced storms causing unprecedented damage. Tropical storms, hurricanes, and heavy snowfall have become the new norm. With hundreds of thousands of electrical service interruptions, we needed a plan to be more transparent with local government. Working closely with each of our territories' officials, we put a plan to provide targeted maps identifying our mainline circuits, substations, as well as critical customer locations into action. The results of this effort furthered our commitment to our customers.