

## **Abstracts**

### **Plan your Cities and Engage your Communities using Interactive Web-based GIS Solutions**

*Christine Ma - Account Executive for Smart Cities at Esri*

### **New Methods for Data Collection, Processing, Tracking, and Analysis**

*David Hertle - South Dakota DANR*

The Department of Environment and Natural Resources has modernized some of our methods for data collection, processing, tracking, and analysis. The Survey123 smart forms provide a new means of collecting data, while staff using the downloaded application gain the ability to do offline data collection. Survey123 Connect allows for dynamic calculations and configuring the data to write to the DENR database. Operations Dashboard allows for at a glance tracking of the project status and includes filters to query the data for locations where we found fish and bivalves. Power BI is utilized to summarize the data, create visuals, and export data. DENR has eliminated hundreds of pages of paperwork on the Use Attainability Analysis project enabling staff to apply their time more effectively.

### **Survey123 Tips & Tricks**

*Jordan Miller - Esri*

Join us to review Survey123 and how-to best author effective surveys. We will review the base functionality of the web designer as well as Survey123 Connect. We will also cover working with feature services, advanced form functionality, and extending the application to best suit your data collection needs.

### **Using JavaScript API to Extend Survey123 Capabilities**

*Kray Freestone - North Point Geographic Solutions*

Kray will demonstrate how to take your Survey123 forms to the next level by utilizing custom JavaScript files. With this extension, you can perform complex calculations on data, connect to external APIs, and even pull information directly from feature layers on ArcGIS Online. Survey123 brings the power of smart-forms right to your organization. You can build powerful, logic-based forms in Survey123's web designer and in their desktop application, Survey123 Connect.

## **South Dakota Department of Health's Vaccine Locator**

*Jeffrey Earl - South Dakota Department of Health*

Shortly after the COVID-19 vaccine was released for distribution, the South Dakota Department of Health needed a way to maximize vaccination rates by helping the public locate a vaccination site. ESRI's ArcGIS Solutions for Coronavirus Vaccine Outreach had all the tools necessary to get a web app up and running in a short time frame. This presentation takes you through the workflow of populating your hosted feature layer with location data and going through basic configurations. There are additional widgets that can be used to customize the app.

## **Texas as Art: Imaging State Lands for STEAM Education Outreach**

*Rebecca L. Dodge - TexasView/Midwestern State University*

Texas as Art is an exhibit of Landsat imagery processed in the style of the U.S. Geological Survey's Earth as Art collections. The exhibit is designed to engage the public with satellite imagery showing Texas landscapes, ecoregions, geology, and natural resources, as works of art. Imagery from the Landsat satellites – observing our world for almost 50 years - is enabling protection and management of our natural resources. Two themes connect the scenes chosen for the 2021 exhibit. The first is Texas' natural ecoregions; scenes also show the human footprint on our natural landscapes. The second theme connects us to our State Parks, Historic Areas, Natural Areas, and Wildlife Management Areas that are scientifically managed, conserved, and restored by the Texas Parks and Wildlife Department. Each artwork is anchored by one or more of these state-managed units. Educational resources keyed to landscapes and ecoregions in each area have been developed to address state knowledge and skills standards for grades 3 – 12, enabling student understanding of erosion, deposition, mountain-building, landforms, natural hazards, water resources and energy, geospatial technology, ecoregions, human impacts, and change over time.

## **EDGE Collaborative (Ethnically Diverse GeoSpatial Engagement)**

*Heidi Fish & Carolyn Adams - North Point Geographic Solutions*

The primary purpose of EDGE is to build a network of people involved with geospatial enterprises from all walks of life who care about making a difference by assisting individuals and companies founded by people from disenfranchised ethnic groups. The collective goal is for the aspiring applicants and opportunity seekers to become more aware and prepared to take advantage of jobs, internships, and projects within the geospatial industry. The network is open to all no matter your ethnic background or socioeconomic standing. The only criteria to join is to possess in the united goal and sincere desire to contribute and be a part of changing the narrative. Let's take the mapping world to the EDGE.

## **South Dakota as Art**

*Bruce Millett - South Dakota View/SDSU*

The South Dakota as Art Online Workshop for K-12 teachers was developed to be a localized version of the USGS Earth as Art program. This is a one-day workshop was held on May 25th, 2021 and did not require any previous experience in remote sensing or art. South Dakota as Art used remote sensing to make educational art for K-12 students. It is integrating science and art to create imagery that showed natural or human features on the landscape and included narrative descriptions of places in South Dakota. The workshop was designed for STEAM (Science, Technology, Engineering, the Arts and Mathematics Education) applications to develop new perspectives, cultivate creativity, and advance critical thinking. The primary goal for the workshop was to provide methods and techniques for teachers to use remote sensing in their classrooms by using open-source software. Another goal was to display the diverse beauty of the state of South Dakota, to visualize the geography and natural resources in the state, and to demonstrate one of the many values of satellite and aerial imagery.

## **NG9-1-1 GIS in South Dakota: What's Coming**

*Jessica P Frye - Geo-Comm, Inc.*

NG9-1-1 in South Dakota will begin transitioning to geospatial call routing in the next couple of months. GIS data to support NG9-1-1 call routing is vitally important. This presentation will provide information to the South Dakota GIS community on what the requirements are and how to handle critical errors before they impact the NG9-1-1 system.

## **Geographic Information Systems (GIS) Solutions: Supporting a Pandemic Response**

*Lauri Sohl (Civic Analytics Manager),  
Christopher Anderson (Civic Analytics Specialist),  
Austin Brynjulson (Civic Analytics Specialist),  
Aileen Profir (Civic Analytics Specialist) - City of Sioux Falls*

The Civic Analytics division of the City of Sioux Falls is an enterprise analytics and spatial resource for Sioux Falls and the region that uses data and evidence to drive effective change and to deliver results for residents. In the event of an emergency, Civic Analytics may be called upon to support the Emergency Operations Center (EOC) and its partners to provide expertise and make information available to the public. Throughout the COVID-19 pandemic, we have had and continue to pivot and innovate over time based on evolving circumstances and authoritative guidance. Highlights consist of internal intelligence including analysis, PPE monitoring, workforce status, and modeling using a variety of simulation and visualization tools including ArcGIS Pro, ArcGIS Dashboards, Tableau, and CHIME. External guidance will cover our extensive use of ArcGIS Hub, Open Data Sharing, Survey123, Web Mapping Applications, and more.

## **The Effects of Urban Land Cover Dynamics on Urban Heat Island Intensity and Temporal Trends**

*George Xian - USGS (EROS Center) & Hua Shi - ASRC (EROS Center)*

Assessments of surface urban heat island (UHI) have focused on using remote sensing and land cover data to quantify UHI intensity and spatial distribution within a certain time period by including land cover information. In this study, we implemented a prototype approach to characterize the spatiotemporal variations of UHI using time series of Landsat land surface temperature products and annual land change information. We analyzed UHI distribution and change in Sioux Falls, South Dakota, in the north-central United States and found that the mean UHI intensity in the region was as large as 2.2°C during the period 1986-2017 with an increasing trend of 0.02°C per year within the area with a 5-km non-urban extent. The UHI intensity associated with high intensity urban land cover usually is stronger than with low intensity urban land cover. We evaluated the impact of different non-urban reference extents on UHI variation using different non-urban buffers. The result also suggests that the overall temporal trends of UHI intensity are almost the same when using a 5-km or 10-km non-urban buffer surrounding the urban core. The prototype approach provides a framework to consistently quantify UHI and monitor its change to a large geographic extent.

## **Landsat in the Cloud over Waubay, SD**

*Nathan Roberts - KBR Inc. (EROS Center)*

Released in December 2020, Landsat Collection 2 marks the second major reprocessing of the Landsat archive by the U.S. Geological Survey (USGS). Collection 2 includes Landsat Level-1 data for all sensors since 1972, along with a standing inventory of global surface reflectance and surface temperature data from 1982-present. Collection 2 products are processed in a Cloud-Optimized Geospatial Tagged Image File Format (GeoTIFF) (COG) format and stored unbundled. This allows users to download only the band files including metadata of the product they need. Collection 2 products are distributed via EarthExplorer and other familiar data access tools. In addition, Collection 2 products are discoverable via the Amazon Web Services (AWS) commercial cloud environment. In this presentation we will communicate how users can leverage cloud data storage, data discovery and processing tools in their workflows, using a case study near Waubay, South Dakota as a use case exam.

## **EROS Fire Research in the Black Hills**

*Christopher Woody - ASRC (EROS Center)*

Since 2005, the Monitoring Trends in Burns Severity (MTBS) project has provided consistent mapping of large fires across the continental United States, Alaska, Hawaii, and Puerto Rico. In addition to this ongoing effort, the team at the Earth Resources Observation Science (EROS) Center has been working to better understand the fire effects at the Legion Lake fire in the southern Black Hills region. This talk focuses on both the ongoing MTBS efforts as well as details on a few aspects of the Legion Lake fire scar, including terrestrial Lidar and Composite Burn Index (CBI) analysis. A discussion of where this data is publicly accessible will also be included.

## **Using Web GIS to Map COVID-19 Risk at the ZIP Code Level in the United States**

*Courtney Lusk - SDSU*

Mapping COVID-19 risk is imperative to protecting the public from contracting the virus. Web applications are an efficient tool to provide the public with information about COVID-19 risk because many people have access to the internet. The purpose of this research project is to develop two interactive Web GIS applications showing COVID-19 predicted risk at the ZIP code level in the United States. The first web application will utilize Esri ArcGIS Web AppBuilder to develop an interactive Web GIS application. The second application will utilize ArcGIS JavaScript API and other JavaScript libraries to develop a customized Web GIS application. The two Web GIS applications will be compared to see the difference in their customization properties. The result of this research project will provide a resource for first responders, the general public, and researchers will a tool to view COVID-19 predicted risk by ZIP code in the United States.

## **GIS in Education: Climate Classification**

*Brice Hanberry - Forest Service*

Climate classifications supply convenient units to visualize climate and infer general vegetation types. The Köppen classification system is widely used, but classification rules are too complex to be easily accessible. Instead, I used thermal classes based on thresholds in growing degree days (base 0°C) and aridity index classes to develop a climate classification system that is available for all users, and indeed, would be a useful basic exercise to learn about GIS applications. The streamlined and consistent ruleset for thermal classes maintained well-accepted primary Köppen temperature classes. Classes based solely on number of growing degree days > 0°C matched 86% of the equivalent Köppen primary thermal classes. To display effectiveness of the classification, I applied the classification system to near present climate and climate of 6000 years ago (ka), the Mid-Holocene, and 22 ka, the Last Glacial Maximum. Instead of complex rules, the simplified classification system and climate classification tool are useful for visualizing climate and detecting climate change and ideal for introductory geographic information system (GIS) and geography classes.

## **Why do We Need a National Address Point Database to Improve Wildfire Public Safety in the U.S.?**

*Dapeng Li - SDSU*

Open national GIS datasets have huge potential in building more scalable information systems in the U.S. This paper aims to advance understanding of the value of national address point databases in improving wildfire public safety in the U.S. The paper covers two primary national address point datasets—the National Address Database and the OpenAddresses project. We examine the existing and potential uses of address point data in wildfire evacuation research and practice. Specifically, we cover the following four primary applications: wildland-urban interface mapping, wildfire evacuation warnings/zoning, wildfire evacuation traffic simulation, and house loss

assessment/notification. We find that address point data has the potential to significantly improve these applications and a national address point database can help enhance wildfire public safety in the U.S. Finally, we conclude with a discussion of the challenges and future research directions. This review proposes an agenda for further research on the potential use of address point data in wildfire evacuation and sheds light on the development and applications of the two national address point database projects.

### **The Drone Data Deluge**

*Jarlath O'Neil-Dunne - Director of Spatial Analysis Laboratory*

Drones are a disruptive technology that have inserted remote sensing into applications ranging from bridge inspections to mapping aquatic species to disaster response. As drone technology has taken off, organizations find themselves awash in data even as they struggle to manage the imagery and LiDAR they have acquired by more traditional means. Drones are transforming, revolutionizing, confusing, and complicating what we do. From cutting-edge applications to barriers to success, we will examine the crucial role geospatial professionals play in maximizing the successful implementation of drones in their organizations.

### **Change Detection using Point Cloud Data**

*David McKittrick - Blue Marble Geographics*

The increase in the availability of high-resolution lidar and other point cloud datasets has given rise to the use of this data for detecting change in the environment over time. Continual improvements in airborne technology and the miniaturization of the requisite sensors has cultivated a nimble new branch of the industry that provides cost-effective data collection services virtually on demand. This ability to employ temporal analysis of the geospatial landscape has applications in forestry, agriculture, mining, urban planning, civil engineering, and many other fields. In this presentation, we will use Global Mapper to explore two scenarios in which change has occurred at different scales, and subsequently we will consider two different procedures for identifying this change.

### **Leveraging SQL Views and Dashboards: Bridge the Gap between Field Work Deployment and Front End Users**

*Chelsea Krause & Darin VanDeBerg - City of Sioux Falls*

With advancements in mobile devices, data collection in the field is increasingly becoming the primary method of capturing information and deploying workforce. The City of Sioux Falls uses VUEWorks, an Enterprise Asset Management software, to capture work resource usage and activities across the city. With any data collection software, there is generally a back end database and the need for reporting on multiple levels. One way to bridge the gap between databases and front end reporting are leveraging SQL views. This talk will discuss how to link multiple SQL databases and building SQL views to utilize in ArcGIS Dashboards to better summarize and track real time workforce deployment.

## **Leveraging Microsoft Power Automate and ArcGIS**

*Nikholai O'Hara - South Dakota Game, Fish and Parks*

Microsoft Power Automate lets users automate tasks in low-code, no-code guided experience. By utilizing Survey123 and the ArcGIS REST API in unison with Power Automate, we can extend the capabilities of our GIS to do more for us, no coding required. We can do basic things such as sending an email to the individual that filled out our Survey123 automatically. In contrast, we can also use it to run Python scripts over the web or even edit GIS data. The possibilities are endless on the type of workflows you can develop. After doing a deep dive into Power Automate, we will look at a few examples on how South Dakota Game, Fish, & Parks are utilizing Power Automate. Power Automate doesn't stop at ArcGIS and through this session you will see so many more uses for it.

## **Deploying ArcGIS Solutions for Local Government**

*Carissa Choong & Kathy Andrade Ulloa - Sidwell*

Through the ArcGIS Platform, industry-specific solutions can be easily deployed to support mission-critical local government operations, provide new insight, and enhance services. This session will provide an introduction to ArcGIS configurable solutions and departmental implementations. It will then walk through a deployment of Esri's Fire Hydrant Inspection solution that leverages ArcGIS Field Maps and ArcGIS Dashboards. We will provide quick steps, tips, and tricks and review organizational controls (sharing and user types) needed to deploy this solution successfully.

## **Using structure location data to map the wildland-urban interface in Montana, USA**

*Alexander R. Ketchpaw – SDSU*

As wildfires increase in size and frequency, the risk of damage and destruction increases in communities built in and near wilderness areas prone to fire. The area that is at the highest wildfire risk is the wildland-urban interface (WUI). Researchers have used housing density derived from US census data and National Land Cover Database vegetation classifications to determine where the WUI exists in the U.S. The census-based method of mapping the WUI can be used for national WUI mapping but may not be very precise due to the limitation of the population data from the census. Other researchers have utilized high-resolution datasets such as parcel centroid or address point data to determine housing density in an area to bypass this limitation. These point-based methods allow for greater precision when determining where the WUI is delineated but only include one structure per parcel and buildings with an address, excluding some structures associated with those properties. To include these missing structures, a more detailed structure location dataset could be used. This paper aims to examine the efficacy of the national scale building footprint dataset from Microsoft in mapping the WUI in Montana and will generate WUI maps using the Microsoft building footprint and the Montana structure point datasets at varying buffer levels, validating the results against the established census-based WUI maps.

## **QGIS workshop**

*Randle Hale - North River Geographic Systems, Inc.*

This workshop is designed to introduce you to QGIS 3.x, an alternative Open Source GIS software for viewing, editing, and managing spatial data in a wide variety of commonly used vector and raster formats. It is lightweight, flexible, and can be installed on Windows, MacOSX, and Linux. Best of all, most will find QGIS to be extremely affordable while still providing a growing list of features and functionality. During the workshop we will cover the interface, vector and raster data, processing tools, and layouts.

## **Esri's Field Operations - Field Maps and ArcGIS Workforce**

*Phillip Julian – Esri*

In this webinar, we will demonstrate how you can use the power of location to improve coordination and operational efficiency in planning and managing field work. We will outline how you can eliminate or even reduce reliance on paper processes using modern workflows that save time and money while also boosting the flexibility of your field workforce.

## **An Introduction to Geocoding and Reverse Geocoding**

*Dapeng Li - SDSU*

Geocoding and reverse geocoding are widely used in various GIS projects. Online geocoding/reverse geocoding services have enjoyed great popularity in the past few years. This workshop covers the following aspects: 1) A brief introduction to the principles of geocoding/reverse geocoding; 2) A brief introduction to online geocoding/reverse geocoding services (e.g., Google Maps, U.S. Census, GeoNames, ArcGIS); 3) Several demonstrations on how to use online geocoding/reverse geocoding services in Python; 4) A demonstration on how to use PostgreSQL/PostGIS and open data from the Census TIGER project to do geocoding/reverse geocoding.

## **Python Workshop**

*Frank Parker - Banner Associates*

Using ArcGIS Online Notebooks, we will build a simple script to loop through a set of fire hydrant data where field staff collected new utility data and want the engineering staff to verify their information. The script will show attendees how to access, modify, and delete data based on conditional responses. Additionally, the code will include a way to automate the decision-making process for data management such as automatically rejecting incomplete information and sending emails to the staff who collected the data. The concept is to run an initial quality check of newly collected data, providing a way to reject data, and send information back to the field staff in an effective manner. The email response will contain rejection notices with suggestions including URL's to each of the incorrect hydrants, and a summary of approved hydrants

## **Supporting Local Governments of any Size with GIS**

*Jason Fetch - Esri Local Government Team*

Many local governments with small or rural populations historically have lacked the budget or internal resources to implement GIS at scale. Software-as-a-service (SaaS) GIS solutions are closing this “capability gap”. Governments of all sizes and jurisdictions can now take advantage of all communication and data analytics mediums to improve operations, address community challenges, and amplify engagement with citizens, just like larger governments. For local government users, new SaaS offerings are transforming the scope of departmental support, speed of implementation, and dissemination of spatial capabilities.