

# **PROGRAM**

## **2023 Annual Meeting of the North Carolina Geographical Society**



**Hosted by the North Carolina Central University  
Mary M. Townes Science Building, Rooms 1223 and  
1221**

**1900 Concord St, Durham, NC 27707**

**March 17, 2023**

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## **Zoom Information**

**Join Zoom Meeting:**

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## PROGRAM AT A GLANCE

<b>Friday, March 17, 2023</b>		
9:00 am	Welcome Address: Joyce Clapp and Jesse M. Lane	In-Person
<b>Paper Session   Room 1223 and Room 1221</b>		
9:05 am	“COVID and the ballot box: Spatial and aspatial associations between by-mail voting rates and COVID-19 rates in the 2020 North Carolina general election,” Timothy Mulrooney and Christopher McGinn	In-Person
9:25 am	“Transition to a Low-Carbon Economy: Residential Receptivity to Solar Panels in Saudi Arabia,” Sami Alwulayi	In-Person
9:45 am	“Utilizing Field Apps and Geospatial Statistics to Assess and Evaluate the Quality of Commercially Available Data Representing the Food Environment,” Isabel Gutierrez	In-Person
10:05 am	“Utilizing Spatial Analysis Techniques to Encapsulate the Effects of Sea-Level Rise in Carteret County, North Carolina,” Sarah J. Radel	In-Person
10:25 am	“COVID-19 Rates and Proximity to Meat and Poultry Processing Plants in North Carolina,” Mike Wallace	In-Person
10:45 am	“Measuring Low-Income and Minority Communities' Access to Grocery Stores and Convenience Stores in Durham County,” Quinton Butler	In-Person
11:05 am	“Utilizing MISLE (Marine Information of Safety and Law Enforcement) data to construct a spatial database of maritime incidents,” Lauren Johnson	In-Person
11:25 am	“Illegal timber tracking: Using BioScience, Citizen Science and Geospatial Science,” Jerry Griffith, Lindsay Wancour, and Michelle Toshack	In-Person
<b>Lunch and Keynote   Room 1221</b>		
11:50 am	Jeff Essic, GIS and Data Librarian, NC State University	In-Person

<b>Poster Session   Room 1221</b>		
12:30 pm	"Meteorology and Myth Part IV: The Elusive and Ephemeral Sprites," Dennis J. Edgell	In-Person
	"Mapping the Effects of Covid-19 Virus on Cattle by County in North Carolina," Michael Berryann	In-Person
	"A Study of Food Distribution Service Range by Block Group in Durham County," Benjamin Williams	In-Person
	"Utilizing the term 'Dashboard' and viewing its many applications to analyze and display real-time data," Mackenzie Mackey	In-Person
	"Mapping the increase of egg prices," Getanew Lemons	In-Person
	"Sub-surface lithological control of arsenic pollution in groundwater along a 10 km NE-SW traverse in Haringhata block, Nadia district, West Bengal," Ayush Chaudhuri	In-Person
	"Viticulture Problems and Prospects in a Changing Climate," Ellissa DeFeyer	In-Person
<b>Business Meeting and Conference Closing   Room 1221</b>		
1:30 pm	See Detailed Program	

# DETAILED PROGRAM

**Friday, March 17, 2023**

**9:00 am** Welcome Address from NCGS Vice President Joyce Clapp, University of North Carolina at Greensboro, and President Jesse M. Lane, Northwest Missouri State University

## **Paper Presentations | Room 1223**

**9:05 am** “COVID and the ballot box: Spatial and aspatial associations between by-mail voting rates and COVID-19 rates in the 2020 North Carolina general election,”

Timothy Mulrooney and Christopher McGinn, North Carolina Central University

Adding to the already polarizing 2020 general election was the COVID-19 pandemic. One way in which this pandemic greatly impacted the election was through an increased participation in by-mail, or mail-in ballots. The state of North Carolina experienced a 316% increase in by-mail votes between 2016 and 2020, when approximately 977,186 by-mail votes were cast. It is no surprise this increase is due to the COVID-19 pandemic; however, these by-mail voting patterns are spatial in nature and vary across the state. This research measures to what degree COVID-19 rates impacted by-mails voting rates. Using GIS data developed from robust tabular files provided by the North Carolina State Board of Elections, by-mail votes were calculated and mapped at zip code scale and compared to COVID-19 rates taken at different dates. By-mail rates taken from final absentee tallies for the highest and lowest COVID-19 zip codes saw no significant differences across multiple dates (9/30/2020 and 10/31/2020) when COVID-19 data were collected. COVID-19 hot spots (high COVID-19 rates surrounded by other high COVID-19 rates) were extracted using geostatistical techniques and compared to COVID-19 cold spots (low COVID-19 rates surrounded by other low COVID-19 rates). It was found the lowest by-mail rates actually occurred in these COVID-19 hotspots across both dates, as well a metric that expressed percent change in COVID-19 rates in the month before the 2020 election. This will be an oral presentation.

**9:25 am** “Transition to a Low-Carbon Economy: Residential Receptivity to Solar Panels in Saudi Arabia,”

Sami Alwulayi, University of North Carolina at Greensboro

Due to the low adoption of solar panels by the population in Saudi Arabia, this research focuses on the spatial variation in the willingness to adopt and willingness to pay for rooftop solar panels in three different geographical scales. From the economic aspect, understanding the willingness of people to adopt new products or technology, such as solar energy technology, is important to determine the size and limitations of the market. This research will focus on the willingness to adopt and willingness to pay for rooftop solar panels of the residents in Saudi Arabia in three different geographic scales which are large cities, medium-sized cities, and rural areas based on different factors which are socio-economic predictors, built environment, social information networks, and institution’s context and pricing. An online questionnaire was used to collect 1975 online participants from three different areas which are Riyadh City, Buraydah City, and Al-Qassim rural areas.

**9:45 am** “Utilizing Field Apps and Geospatial Statistics to Assess and Evaluate the Quality of Commercially Available Data Representing the Food Environment,”

Isabel Gutierrez, North Carolina Central University

Through the use of GIS (Geographic Information Systems) one can map the food environment. Various analyses can be done using geospatial statistics to map QA/QC analysis. QA/QC (Quality Assurance/Quality Control) can help improve the accuracy of current food desert data to explore the spatial complexion of the food environment using data provided by vendors versus what really exists in the field using field techniques. The Jaccard Index can then be run to compare the food environment before QA/QC and the food environment after QA/QC. The purpose of this project is to create a geostatistical tool using ArcGIS Pro Python capabilities to compare the ‘old’ food environment with the ‘new’ food environment using a custom tool. In order to successfully conduct this research, QA/QCed data of grocery stores, convenience stores and farmers markets in Chatham, Alamance, Caswell, Person and Orange counties will be compared to current USDA food atlas data using Jaccard analysis and other geostatistical analytics. This will be done using Python in ArcGIS Pro to create a tool that will compare the two datasets and explore differences between those who are mapped to be food needy against those who are

truly food needy based on field methods and the Jaccard Index describing the entire dataset.

**10:05 am** “Utilizing Spatial Analysis Techniques to Encapsulate the Effects of Sea-Level Rise in Carteret County, North Carolina,”

Sarah J. Radel, North Carolina Central University

The correlation between land cover loss and sea-level rise is of the utmost concern in Carteret County, NC. This study quantifies and illustrates the loss of various land classifications due to sea-level rise. As sea levels rise and overwhelm Carteret County, there will be extensive loss of agricultural lands, coastal forests, developed lands, and wetlands. Coastal forests will succumb to saltwater intrusion and transition to ghost forests. Ghost forests are the dead and dying remains of a once viable coastal forest that has succumbed to saltwater intrusion. Spatial analysis utilizing Esri software was used to encapsulate data representing the extent of sea-level rise and its explanatory factors. National Landcover Data was obtained from the Multi-Resolution Land Characteristics Consortium from the recent year of 2019. Sea-level rise (SLR) scenarios procured from the National Oceanic and Atmospheric Office for Coastal Management, depicting 2ft, 4ft, 6ft, 8ft, and 10ft sea-level rise were utilized to aid in the identification of areas most vulnerable to sea-level rise. Spatial analytics was run to show the percentage loss of various land cover classifications due to sea-level rise. Preliminary results show there are substantial shifts in land cover implicated by sea level rise. For instance, coastal forests will decrease by 12% and agricultural lands will decrease by 5% at a 4ft sea-level rise. Projections show a decrease in land classifications and potential changes in demographics within the county, signifying their transition to open water.

**10:25 am** “COVID-19 Rates and Proximity to Meat and Poultry Processing Plants in North Carolina,”

Mike Wallace, North Carolina Central University

As COVID-19 first reached a pandemic level of prevalence in the U.S., state and local health departments issued specific guidance and protocols for schools and workplaces to mitigate viral transmission. Temporary closures in certain industries followed either by state mandate or voluntary shutdown. Among the essential infrastructure operations established in March 2020 by The State of North Carolina were meat and poultry processing facilities, which remained in operation. Plant operators and local officials were also

influenced to keep these facilities open by a federal mandate specifically related to meat packing and processing which contained language originally drafted by industry trade groups. A series of workplace outbreaks in meat and poultry plants were among the first in the state. Workers in these plants were particularly vulnerable to infection due to close working conditions and a lack of personal protective equipment. A geographic analysis of 2020-2022 Covid data from the NC Department of Health can show the broader community impact of Covid outbreaks at specific facilities. This project will employ spatial statistical methods to compare rates of COVID-19 cases by zip code in North Carolina within 20 miles of processing plants with all zip codes outside the 20-mile radius. Quantitative analysis, mapping and visualization of the available data will identify trends and any correlations between Covid rates, locations of facilities and populations surrounding them.

**10:45 am** “Measuring Low-Income and Minority Communities' Access to Grocery Stores and Convenience Stores in Durham County,”

Quinton Butler, North Carolina Central University

Many low-income communities in the United States have become victims of urbanization, which has caused the issue of food security to become more prevalent in society. The United Nations Committee on World Food Security defines food security as the economic, social, and physical access to food at all times that meets individual needs and preference. Consequently, this has created a divide within the confines of whether or not many low-income communities are considered an afterthought when it comes to their access to resources such as healthy food, healthcare, and transportation. What we have seen is that many people in high positions, such as politicians focus on everything but trying to make sure that everyone have access to these resources; however, statistical health and economic data proves that many low-income communities have more access to convenience stores, which have mostly unhealthy snacks and drinks compared to grocery stores which have better and healthier options. The purpose of this project is to provide the general population with information about how the quality and distance of food differentiates between communities within Durham County.

**11:05 am** “Utilizing MISLE (Marine Information of Safety and Law Enforcement) data to construct a spatial database of maritime incidents,”



Lauren Johnson, North Carolina Central University

This undergraduate research project will utilize MISLE (Marine Information of Safety and Law Enforcement) data to construct a spatial database of maritime incidents. This research project is an extension of risk management and analytics dashboard created for Sector New York of the US Coast Guard (USCG). For this project we are working with USCG Sector North Carolina to create a dashboard that will provide geospatial analysis of their MISLE data. This project will use ARCGIS and ESRI software to create the dashboard and display pertinent information. The dashboard will be composed of various charts, graphs, and data filters.

**11:25 am** “Illegal timber tracking: Using BioScience, Citizen Science and Geospatial Science,”

Jerry Griffith, University of North Carolina at Pembroke, Lindsay Wancour and Michelle Toshack, Adventure Scientists

Several hardwood species across the USA are valuable enough that they are being poached – illegally harvested for use as fine furniture, musical instruments and wood art. These include bigleaf maple (*Acer macrophyllum*), black walnut (*Juglans nigra*) and eastern white oak (*Quercus alba* L.). Illegal logging is widespread and impacts business and government finances and perception of the wood trade by the public. We present an overview of a program that incorporates an NGO (non-governmental organization), genetic scientists at the US Forest Service and citizen scientist volunteers. This system provides a cost-effective and quality-controlled method of acquiring samples (leaf, twig, tree core, acorns) across the range of each species on which to perform mass spectrometry-Data Analysis in Real Time (DART) and genetic analyses. These analyses enable identification of the geographic origin of wood samples and will increase the understanding of adaptations of the species to varying conditions throughout their ranges. The NGO, Adventure Scientists, recruits, trains and manages volunteers. The system of data collection is aided through geographic information systems and geospatial apps used on smartphones. From 2018 to 2022, volunteers collected samples from approximately 1,000 bigleaf maple, 932 black walnut trees, and 1200 eastern white oak trees. These samples will be analyzed and included in comprehensive chemical and genetic reference libraries. These genetic profiles have already been used in legal proceedings to help convict illegal timber poachers in Washington State’s Olympic National Forest.

## Keynote | Room 1221

**11:50 am** Presentation titled “Data Doesn't Just Happen: Stories Behind Some of our Most Used GIS Datasets”

Jeff Essic, GIS and Data Librarian, NC State University

North Carolina compares very favorably to other states for having a broad array of geospatial datasets that are openly accessible and regularly maintained. Examples include statewide seamless parcels, orthophotography, lidar, and flood zones. These data are the result of many years of planning and strong leadership, as well as response to storms and emergencies. I will discuss the history behind these, and other datasets, as well as share some things I've learned and experienced through my career so far in the GIS field, and what might lie ahead.

## Poster Presentations | Room 1221

**12:30 pm** “Meteorology and Myth Part IV: The Elusive and Ephemeral Sprites,”

Dennis J. Edgell, University of North Carolina at Pembroke

This poster presentation is part of my Geography and Science Education series: “Meteorology and Myth”. Red Sprites, Elves, and Pixies are types of Transient Luminous Events (TLEs). **SPRITE** stands for **Stratospheric/Mesospheric Perturbations Resulting from Intense Thunderstorm Electrification**. These ephemeral bursts of electricity are part of the Global Electric Circuit. The upper atmosphere was traditionally thought of as being largely inconsequential in affecting or influencing daily weather. Recent research on upper-air electricity suggests that TLEs have some impact on surface weather, atmospheric composition, and our ozone layer. High altitude aircraft and low orbit spacecraft may also be influenced by TLEs. TLEs contribute to variations in atmospheric chemistry, which may influence climate change. The purpose of this educational project is to stimulate interest in sprites and other TLEs in the context of weather education. Evocative stories combined with striking imagery are proposed to arouse student interest in learning about the atmosphere. Seldom considered, and still poorly understood, there is still significant research potential on TLEs for students at all levels. This project includes a literature review of some of the recently published understandings of TLEs, and concise generalizations derived from current research. Reference materials, including weblinks, are compiled for practical classroom use.

## “Mapping the Effects of Covid-19 Virus on Cattle by County in North Carolina,”

Michael Berryann, North Carolina Central University

COVID-19 has influenced every aspect of human life. The strain on farms and the food industry in North Carolina prior to COVID-19 was already increasing, with new regulations, labor shortages, and logistics challenged. COVID-19 has only exacerbated these issues. The cattle being raised on North Carolina farms has dropped ~1.88% since the pandemic started. While the change in the number of cattle has not changed dramatically, the cost of new regulations has caused the cost of beef and milk to rise with inflation and put more of a strain on the everyday person. This research is to compare the number of cattle on a county level in North Carolina and see what effects these changes may or may not have been influenced by COVID-19. COVID-19 has influenced every aspect of human life. The strain on farms and the food industry in North Carolina prior to COVID-19 was already increasing, adding in the new regulations, labor shortages, and logistics challenged. COVID-19 has only exacerbated these issues. The cattle being raised on North Carolina farms has dropped ~1.88% since the pandemic started. While the change in the number of cattle has not changed dramatically, the cost of new regulations has caused the cost of beef and milk to rise with inflation and put more of a strain on the everyday person. This research is to compare the number of cattle on a county level in North Carolina and see what effects these changes may or may not have been influenced by COVID-19.

## “A Study of Food Distribution Service Range by Block Group in Durham County,”

Benjamin Williams, North Carolina Central University

This research will focus on a single food distribution service operating in the 27713 zip code of Durham County and observing the service area of this operation. Spatial data will be used to gather information on block groups and gain insight on the kinds of people who require or choose to receive food from food banks. These block groups with high concentration of participation will be compared with low access low income areas and food desert classifications for Durham County with the intention of finding a correlation between the data. Additionally, the drive time from each block group to the distribution center will be compared with the drive to the closest

full service grocery store as well as seeing if there are any full service grocery stores on the way between the block groups and the distribution center. This data could be used in cooperation with other food bank data to find where a distribution center could be the most useful for the community, to know how far households are willing to drive to these services, and what kinds of similar households could potentially need these services.

“Utilizing the term 'Dashboard' and viewing its many applications to analyze and display real-time data,”

Mackenzie Mackey, North Carolina Central University

Three aspects of Dashboards include analytical, operational, & strategic planning. The analytical part introduces trends, targets, and can be used to make a more accurate outcome. The operational aspect of a Dashboard is basically the monitor portion. This is where you can introduce perimeters/ measures to manage process in real-time. The strategic aspect is used to track progress towards an established target. The application of a Dashboard knows no bounds. With its applications limitless, you are already utilizing some today. Things like likes, shares, & different interactions are being used to track engagement across social media platforms. You can even track team workload, and personal contributions as well as hours (billable & unbillable) and project risk/ changes as they arise within a project. A geographic information system (GIS) is a system that creates, manages, analyzes, and maps all types of data. It is used to connect data to a map view many types descriptive information. GIS improves communication and efficiency across the network of data in which we all utilize. This presentation will seek to show how a common dashboard can apply real time data to GIS to improve not only accuracy but better planning for all projects involved.

“Mapping the increase of egg prices,”

Getanew Lemons, North Carolina Central University

The rise in egg pricing has left many Americans upset and disappointed. My project will discuss why the prices of eggs on the shelf have increased and how it has affected your grocery shopping. Using GIS, (Geographic Information Systems), the rise and decline of egg prices can be mapped at the state level to prioritize where and how this phenomenon can best be addressed. It is important to view these maps to understand the change in egg prices American families have seen.

“Sub-surface lithological control of arsenic pollution in groundwater along a 10 km NE-SW traverse in Haringhata block, Nadia district, West Bengal,”

Ayush Chaudhuri, University of North Carolina at Greensboro

The distribution of As-pollution in Bengal Basin has been postulated to be strongly controlled by the subsurface distribution of palaeo-channel (As-polluted) and palaeo-interfluvial (As-free) aquifers. The well platform colour can be used as a tool to locate As-polluted and As-free aquifers. Generally, it has been observed that areas with black wells are free from arsenic pollution while the areas with red wells are arsenic polluted, with respect to WHO guideline for Arsenic pollution, but exceptions are also present. To test the palaeosol model, secondary data of drilling at forty-three sites were considered, well platform color as a primary guide to identify arsenic polluted and non-polluted areas were used, laboratory analysis of about 286 groundwater samples from shallow as well as deep wells for As, Mn, Fe and Cl and observed colour of wells as a guide to As-pollution. The Shallow Palaeochannel (SPC) aquifer of grey sand contains groundwater that is usually As-polluted whereas Palaeointerfluvial aquifer of brown sand contains mainly As-free groundwater. The sub-surface lithology reveals that the study area represents an unconfined aquifer. The cheapest mitigation strategy is to convey to the local people and drillers the implication of the well platform colour and stratigraphy of the area i.e., the locations of palaeosol, grey sand and brown sand so that they can put new wells in As-free part of the shallow aquifer or to install only hand pump fitted wells at depth > 225 m to obtain arsenic free water for the foreseeable future.

“Viticulture Problems and Prospects in a Changing Climate,”

Ellissa DeFeyter, University of North Carolina at Pembroke

The purpose of this project is to describe the range of issues faced by viticulturists due to climate change. All types of wine sold in stores comes from a specific varietal. Each grape varietal requires a specific environmental terroir. This makes grapes a good climate change indicator species. The geographic distribution of where varieties can thrive is changing with the climate. There are also economic concerns to be considered in terms of how wine quality and production will be influenced. The primary goal of this project is to understand the problems faced by viticulturists as well as potential adaptive strategies and techniques. A secondary goal is to examine future outlook for the wine growing industry in a time of climate change. A literature review of these issues is presented.

## Business Meeting

### 1:30 pm Meeting Agenda

- I. Introduction
- II. Officer Reports
  - a. Secretary
  - b. Treasurer
  - c. Vice-President
  - d. President
- III. Old Business
  - a. Journal Report
  - b. Newsletter Report
  - c. Plans for 2022-2023
- IV. New Business
  - a. Plans for 2023-2024
  - b. Elections
    - i. President
    - ii. Vice-President
    - iii. Treasurer
    - iv. Steering Committee