

# MS-GIST Projects Spring 2023

## Monday, May 01

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*\* There will be 5 minute breaks between each back-to-back presentation to facilitate transitions in Zoom.*

*\*\* Zoom links are available on request. Please contact Andrew Grogan - [atgrogan@arizona.edu](mailto:atgrogan@arizona.edu)*

Date/Time	Presentation Title	Student Name
05/01/23 09:30 - 09:55 AM	<a href="#">INTERGRATING LOCAL MINE GRIDS WITH REAL WORLD COORDINATES AND FIELD VERIFICATION</a>	Cassandra Hall
05/01/23 11:00 - 11:25 AM	<a href="#">Precontact Pathways from Walhalla Plateau to Unkar Delta</a>	Michelle Neathammer
05/01/23 01:00 - 01:25 PM	<a href="#">Assessing National Parks for Emerging Climate Trends using Space-Time Pattern Mining</a>	Kaitlyn Etienne
05/01/23 01:00 - 01:25 PM	<a href="#">Exploring the Spatial Relationship between Potholes and Socioeconomic and Demographic Characteristics in Tucson, AZ</a>	Akila Mathis-Adams
05/01/23 02:00 - 02:25 PM	<a href="#">Site Suitability for New Grocery Store Locations within Baltimore City, Maryland</a>	Corey Brewer
05/01/23 04:30 - 04:55 PM	<a href="#">HABITAT SUITABILITY FOR WHITE-NOSE SYNDROME OF BATS IN THE UNITED STATES</a>	Carry Tran

# INTERGRATING LOCAL MINE GRIDS WITH REAL WORLD COORDINATES AND FIELD VERIFICATION

Cassandra Hall  
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05/01/23, 09:30 - 09:55 AM

## **Abstract:**

The Colosseum Gold Mine was a historic gold mine that still had gold deposits when the project stopped drilling in 1992. In March of 2021, investors bought the mine in hopes of drilling the remaining gold ore left in the area. One of the first things that happens when a company takes on a new project is the compilation and verification of the existing data. The data had to be shipped over from the old mine offices that were now closing. The data arrived in boxes completely unorganized and there was a mixture of paper maps and files with lists of drill holes coordinates and assay data. The 3 different companies that had worked in the Colosseum area had created 3 different mine grids to map out the mine and drilling activities. Most of the mapping was done before total stations and GPS units were readily available. The challenge and purpose of this Master's Project was to use these 3 local mine grids to integrate them to real world coordinates and field verify the results. Once the real-world projection is integrated, the data originally mapped historically can be used digitally in different mapping software applications including Datamine Discover 3D and MapInfo Professional. The verification of the projection is critical in this project because the drill hole locations and gold ore deposits are not very big and miscalculating this projection can result in the loss millions of dollars. This project is still on-going and Colosseum Mine is still drilling for gold.

**Keywords:** Colosseum Mine, Mine Grids, Drilling, Gold, Real World Coordinates

# Precontact Pathways from Walhalla Plateau to Unkar Delta

Michelle Neathammer  
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05/01/23, 11:00 - 11:25 AM

## Abstract:

The Grand Canyon is a magnificent environment of contrasting terrain. At first glance, the canyon may appear inaccessible, challenging, and feel like a complete barrier. Despite the environmental outlook of both Unkar Delta and Walhalla Plateau, it has long been home to precontact occupations. These individuals lived and thrived in this environment for many years, and successfully managed to navigate the canyon's terrain season after season.

The goal of this study is to better understand and quantify how precontact populations seasonally traveled from Walhalla Plateau near the north rim of the Grand Canyon to Unkar Delta along the banks of the Colorado River. Many factors contribute to the movement in and out of the Grand Canyon, and from this a couple research questions arise. First, was there an optimal path of travel for precontact populations? Second, which aspects of landscape will affect travel cost?

This report describes an array of information that is pertinent to the understanding of precontact human foot travel. Using techniques derived from Geographic Information Systems (GIS), a visualization is constructed to further conceptualize this topic. The key themes discussed in the study are the geologic strata that poses the most hindrance to human movement, the culture and history of Unkar Delta as well as Walhalla Plateau, and finally the maps that are generated.

**Keywords:** Unkar Delta, Walhalla Plateau, Geographic Information Systems (GIS), Least Cost Path (LCP)

# Assessing National Parks for Emerging Climate Trends using Space-Time Pattern Mining

Kaitlyn Etienne  
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05/01/23, 01:00 - 01:25 PM

## **Abstract:**

The need for climate risk assessment is growing in both the private and public sectors. However, conducting a spatially focused physical climate risk assessment can be challenging, as climate data is often large and multidimensional. This project aims to explore whether US national parks are exposed to emerging changes in climate by analyzing historical temperature and precipitation data to identify patterns in spatial clustering over time. Historical precipitation and temperature time series data by county across the contiguous US was extracted at 10-year intervals between 1900 and 2020 for the months of June and December and used to generate space-time cubes. A hot spot analysis was conducted across the cubes leveraging the Getis-Ord  $G_i^*$  and Mann-Kendall statistics, and 16 classes of hot and cold spot patterns were created across the datasets, both for values and anomalies from the 1-month mean in the 1901-2000 base period. An analysis of total US national parks area coverage by space-time patterns shows that 6.4% was exposed to historical cold spot patterns for June precipitation values, 12.3% was exposed to consecutive hot spot patterns for December precipitation anomalies, and 6.5% and 3.2% was exposed to new hot spot patterns for June and December precipitation anomalies, respectively. The results of this study suggest some emerging precipitation patterns appear to occur in areas where national parks are situated. Understanding changes in climate patterns is important, especially in areas that are designated for conservation, as over time, these factors can have an influence on ecology and biodiversity.

**Keywords:** Climate, Precipitation, National Parks, Space-Time, Hot Spot

# **Exploring the Spatial Relationship between Potholes and Socioeconomic and Demographic Characteristics in Tucson, AZ**

Akila Mathis-Adams  
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05/01/23, 01:00 - 01:25 PM

## **Abstract:**

Potholes pose a significant threat to individuals, communities, and the economy, as they can cause accidents and damage to vehicles and bicycles, resulting in costly repairs. This study investigates the spatial relationship between pothole reports in Tucson, AZ, and the socioeconomic and demographic characteristics of the area. Using data collected from January 2019 to December 2022 and divided by census tracts, the study employs linear regression to analyze the relationship between the dependent variable, potholes, and the socioeconomics and demographics of the Tucson census tracts. The findings reveal that areas with higher percentages of minorities, lower median incomes, and lower levels of educational attainment have more reported potholes. These results are significant as they can inform future allocation of city funding for infrastructure management.

**Keywords:** Tucson, infrastructure, demographics, socioeconomics

# **Site Suitability for New Grocery Store Locations within Baltimore City, Maryland**

Corey Brewer  
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05/01/23, 02:00 - 02:25 PM

## **Abstract:**

Food scarcity is a growing problem in the United States but is a considerable problem for low-income urban areas. These areas are more likely to fall into food deserts, where it is difficult to find healthy, affordable food. With approximately twenty percent of its residents living below the poverty line Baltimore City, Maryland, has a potentially severe problem as Baltimore has several food deserts. This study looks to find suitable locations within Baltimore to place a new grocery store. If there are suitable locations, the study will identify the demographics that would most benefit from the new potential sites. Utilizing zoning, vacant parcel size, and drive distance from existing grocers, a Boolean suitability analysis was conducted to identify all potentially suitable sites within city limits. Afterward, a weighted suitability analysis was conducted to determine the best location by utilizing population, income, and crime rate in Business Analyst. Only four sites were deemed suitable for a potential grocery store, with one site falling within existing food deserts and another adjacent to two food deserts. All the sites have 10,000 people within 1.3 miles of their location and serve primarily low-income neighborhoods. These results show there are potential sites that can enable a better, healthier Baltimore.

**Keywords:** Food Desert, Baltimore City, Weighted Suitability, Site Suitability

# **HABITAT SUITABILITY FOR WHITE-NOSE SYNDROME OF BATS IN THE UNITED STATES**

Carry Tran  
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05/01/23, 04:30 - 04:55 PM

## **Abstract:**

There are many bat species in the world, and many of them play roles in providing services to the ecosystems where they live. They help with pest control, pollination, and nutrient recycling. Another service they provide is aesthetic value to ecotourism. A handful of common bat species have been facing a fungal disease that has led to massive population declines since 2005. The white fungus that causes the disease grows on the bats' muzzles, ears, and wings. It leads to behavior changes in hibernating bats which can cause death. The first North American occurrence of this disease was found in New York but is gradually spreading across the country. This project aims to perform a habitat suitability analysis for white-nose syndrome in the United States. The data for this analysis includes white-nose syndrome occurrences from 2005-2019 across the contiguous lower 48 states and environmental variables retrieved from the National Oceanic and Atmospheric Administration website. The environmental variables are from November-April (hibernating season) and include average temperature, maximum temperature, minimum temperature, and precipitation. The four variables were assigned a weight to design a suitability model in the order above. The results showed that areas in the western US have suitable habitats for the fungus. Determining suitable habitats may help implement conservation decisions that focus on preventing white-nose syndrome.

**Keywords:** white-nose syndrome, suitability modeler, bats, disease, conservation