

MS-GIST Online  
 Master Projects 2020 Cohort  
 Thursday April 30<sup>th</sup> – May 1<sup>st</sup> – Livestream via Zoom

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

\*\* Zoom links available on a per request basis. Contact: atgrogan@email.arizona.edu

<b>Date/Time</b>	<b>Title</b>	<b>Person *</b>
04/30/2020 1:00 – 1:30 pm	<a href="#"><u>Mapping Sinkhole Susceptibility in Central and Eastern Counties of Kentucky</u></a>	Tanner Polen
04/30/2020 1:30 – 2:00 pm	<a href="#"><u>Creating a Street Alias Address Locator for Emergency Response Services in Arizona</u></a>	Dakota Stolz
04/30/2020 4:30 – 5:00 pm	<a href="#"><u>Spatial Planning for Cross-Boundary Forest Restoration Treatments in the Upper Chama, San Juan and Rio Grande Watersheds</u></a>	Melissa Ryan
05/01/2020 1:00 – 1:30 pm	<a href="#"><u>Opioid Treatment Accessibility in Maricopa County, Arizona: A Network Analysis of Certified Opioid Treatment Programs and Buprenorphine Providers</u></a>	Amanda Jacobs
05/01/2020 2:00 – 2:30 pm	<a href="#"><u>Multispectral Imaging and Identification of Mine Tailings Deposits from the Nacozari Mining District, Northwestern Mexico</u></a>	Mayra Pena
05/01/2020 2:30 – 3:00 pm	<a href="#"><u>Assessing Perception of GIS Visualizations Depicting Differential InSAR Ground Deformation Measurements</u></a>	Crystal Weststad
05/01/2020 3:00 – 3:30 pm	<a href="#"><u>The Residual Effects of Redline Districts from 1940 – 2017</u></a>	Mallory Stermon
05/01/2020 4:00 – 4:30 pm	<a href="#"><u>The Spread of Good Family Values and Pita in the Tri-State Area</u></a>	Matt Brahm

## Mapping Sinkhole Susceptibility in Central and Eastern Counties of Kentucky

Tanner Polen

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### **Abstract:**

Sinkholes are a significant cause of concern in the state of Kentucky due to the vast amounts of karst topography throughout the landscape. Sinkholes can cause major damage to overlying structures and cause major property damage. These sudden collapses of overlying soil cannot be stopped, but actions can be taken to relieve some of the damage. There are many factors found to contribute to sinkhole development, and this paper looks at four: underlying geologic features, overlying soil thickness, soil permeability, and proximity to faults. The varying features of these variables were given weights based on the favorability for a sinkhole to form. These weighted variables were then overlaid and added together to form a sinkhole susceptibility map for the central and eastern areas of Kentucky. Finally known sinkholes were joined with this map to analyze which rating the majority of these sinkholes fell in. It was found that 97% of these sinkholes were in areas with a 9 or higher rating as well as areas of soluble bedrock. It appears the underlying geologic units (more than overlying soil thickness, soil permeability, and proximity to faults) seems to have the most effect on the development of sinkholes

### **Keywords:**

Susceptibility, Sinkhole, Permeability, Faults, Karst

## **Creating a Street Alias Address Locator for Emergency Response Services in Arizona**

Dakota Stolz

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### **Abstract:**

There are many streets in Arizona that go by multiple names, and unfortunately when emergency services are called, they may be unable to locate an address if an alias name is not indexed. To help emergency services find such addresses, this project executed the creation of a workflow document and tool that can be used to find aliases more effectively. The data for this project was provided by Terra Systems in Tucson, AZ. Navajo County was chosen as a beta county in this project due to a high volume of rural communities with alias street names, in combination with limited resources available to the county. The tool automates the process of creating an alias street name address locator and was created using pyscripter for use in Esri software. This project was broken down into 3 phases: a manual phase, an automation phase, and a testing/ debugging phase. The results showed the tool was able to successfully geolocate addresses using alias street names in Navajo county and can be implemented for use in other Arizona counties.

### **Keywords:**

Alias Address Locator, Arizona, Automation, Emergency Services, Geolocation

## **Spatial Planning for Cross-Boundary Forest Restoration Treatments in the Upper Chama, San Juan and Rio Grande Watersheds**

Melissa Ryan

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### **Abstract:**

In Northern New Mexico and Southwestern Colorado, several organizations are working to promote fuel reduction treatments across large landscapes to help reduce the risk of uncharacteristically large and severe fires. Coordinating forest health treatment activities and promoting forest health across public/private boundaries are priority objectives. To help guide these efforts, this report provides spatial information for forest types in the study region, determines sites where fuels reduction treatments may be appropriate, creates an easy-to-use tutorial for land management agencies in New Mexico to identify priority areas for treatments, and determines private lands that are within or directly adjacent to priority treatment areas for land management agencies. While information has not been collected from all the administrative land managers in the region, two sets of landscape priority information was collected from US Forest Service lands in Northern New Mexico. This report identifies 38,000 acres of private lands that may be suitable for treatment and are within or adjacent to priority areas for US National Forests in New Mexico.

### **Keywords:**

Forest Restoration, Cross-Boundary, Chama, San Juan, Rio Grande Watershed

## **Opioid Treatment Accessibility in Maricopa County, Arizona: A Network Analysis of Certified Opioid Treatment Programs and Buprenorphine Providers**

Amanda M. Jacobs, MPH  
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### **Abstract:**

The United States opioid epidemic has been at the forefront of national response efforts. Despite tightening regulations on opioid prescribing, opioid addiction continues to be problematic. This study was designed to analyze opioid treatment accessibility in Maricopa County, Arizona, one of the most populous counties in the U.S. Based on data from the Substance Abuse and Mental Health Services Administration, 656 buprenorphine providers and 182 certified opioid treatment center locations in Maricopa County were incorporated to evaluate for treatment accessibility. Using GIS network analyst tools, distance to the closest treatment location was determined for each Maricopa County census tract. To further visualize accessibility, 2.5, 5, and 10-mile service areas were also located. The analysis demonstrated route distances increased moving outwards from the urban city areas of Maricopa County. Likewise, service areas also tended to branch outward from the urban city core. Spatially, rural areas are disproportionately impacted with regards to opioid treatment accessibility and populations living in these areas are at higher risk for encountering barriers to opioid treatment. These findings provide key information that may assist in population health outreach services and potentially useful data for public health policy efforts aimed at improving access to opioid addiction treatment.

**Keywords:** Opioid Treatment, Substance Abuse and Mental Health Services Administration (SAMHSA), Buprenorphine, Network Analysis, Maricopa County

## **Multispectral Imaging and Identification of Mine Tailings Deposits from the Nacozari Mining District, Northwestern Mexico**

Mayra Pena  
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### **Abstract:**

Mining-related environmental problems are associated with surface landscape destruction, landform changes, and pollution by potentially toxic elements in soils and water. Nacozari is the second most important copper production district in Sonora, Mexico, which has produced a large amount of mine tailings derived from mining activities. Rapid and efficient evaluations of mine tailings spatial distribution are important for effective resource utilization and environmental progress. The aim of this study is to create an inventory of the mine tailings located in the Nacozari district. A Normalized Difference Tailing Index (NDTI) was developed from the Normalized Difference Vegetation Index (NDVI) using spectral imaging from Sentinel-2A in both rainy and dry seasons. A confusion matrix was used to test the accuracy of the process and it was determined that the best season to carry out the process is during the rainy season, with an average 80% user/producer accuracy and a 0.8 kappa coefficient. The accuracy of the results suggests that the proposed methodology is useful for the detection of active and abandoned mine tailings.

### **Keywords:**

Mine Tailings, Sentinel-2A, Multispectral Imaging, Normalized Difference Tailing Index, Remote Sensing

# Assessing Perception of GIS Visualizations Depicting Differential InSAR Ground Deformation Measurements

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## Abstract:

The ground surface of the Earth is dynamic, and elevation changes caused by drought, water recharge, and human activities can be detected and accurately measured using radar technologies. This work seeks to measure ground deformation over a five-month period within an active oil field in southeastern New Mexico and visualize deformation in an understandable manner. The sample site included two evident deformation centers which subsided and later rebounded upwards. Differential Interferometric Synthetic Aperture Radar analysis, which quantifies changes in radar wave measurements observed by a satellite at two different times for the same location, produces centimeter-scale measurements but can be difficult to understand for those not familiar with the technology. A survey compared how effective interferograms, vertical deformation maps, cross-section profiles, and 3D visualizations of elevation change were for conveying ground deformation over time. The latter three visualization types were also displayed in three forms: raw monthly elevation changes, difference from the geographic average of these raw changes, and as ordinal sums of the deformation from over time. Results of the survey indicate that the different visualization types were each useful for answering particular types of questions, so the visualization type should be chosen based on its intended purpose and audience.

## Keywords:

Differential InSAR, Ground Deformation, 2D Visualization, 3D Visualization, Cross-Section

## The Residual Effects of Redline Districts from 1940 – 2017

Mallory Stermon

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### **Abstract:**

In the late 1930s, the Federal Housing Administration (FHA) used a process called redlining to section off districts in an attempt to systematically segregate communities, which allowed lenders to turn away non-white borrowers. This practice carried on through the mid 1960s, after which some communities attempted to gentrify neighborhoods with varying degrees of success. This paper analyzes the current demographics and trends in Boston, Detroit, and Los Angeles to determine to what extent the segregation that resulted from these redline districts has persisted. Redlining data and census data from 1940 and 2017 were obtained in order to compare the racial demographics over time; specifically, to compare the white vs. non-white population in the lowest-rated districts in each of these cities. LISA analysis was conducted to identify dense areas of minority populations. These districts were also analyzed using Community Analyst Online (CAO) to determine common trends throughout these areas. The results indicate that, out of the redlined districts, the lowest-rated districts can be expected to have the highest minority population in 2017; however, there appears to be little correlation between these districts when compared to city-wide demographics.

### **Keywords:**

Redline Districts, Redlining, Minority population, Demographics



## The Spread of Good Family Values and Pita in the Tri-State Area

Matthew Brahm

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### **Abstract:**

Focusing on the expansion of local businesses in America, this study highlights possible expansion of a 50 year old Mediterranean grocery store and café in Pittsburgh, PA. This study has aimed to identify areas around Pittsburgh and the Tri-State area that would benefit from this injection of family values and community. The project looked at demographic trends in the study area to identify regions that would benefit from the inclusion of this grocery store or café, provided a micro-analysis of the Greater Pittsburgh Area to highlight regions that would be benefit from the addition of a new café, and presented a macro-analysis of the Tri-State area to determine locations for new grocery stores. After analyzing the macro results, the study determined Monroe County, PA, Franklin County, OH, Monongalia County, WV, and Ohio County, WV, had all the characteristics for a new grocery store. The micro results around Pittsburgh, identified two new neighborhoods to open up a new café in the Greater Pittsburgh Area. This study delivered in-depth analysis on the certain trends in the demographic data available, and shows how site suitability research can be an asset to various industries around the world.

### **Keywords:**

Pitaland, Demographic Research, Micro Analysis, Macro Analysis, Tri-State

## **3-D Model of Commuter Rail Suitability Analysis for Austin, Texas to Simulate the Benefit and Accessibility of Public Transportation**

Evangeline Kyle  
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### **Abstract:**

Current transportation methods and infrastructure has not kept up with the growth of Austin. With such growth comes innumerable problems, one being lack of access to public transportation as well as traffic congestion. This study aims to provide a solution that is efficient, sustainable, adaptable, and changes the communities' current driving habits. A 3D model design of a new light rail was created and added to the current stagnant rail line routes to simulate a realistic model of Austin, with a functioning light rail system. Datasets from various agencies in Travis County and feedback from local participants were used to determine the relationship of how public transportation is being used and where the trend of urban growth is surging. The results revealed many Austin residents lack accessibility or do not agree with the city's current public transportation plan. The results also showed key locations of undeveloped or unused land that can be utilized for future rail line infrastructure. The 3D model results showed the decline in driver commute time within the city, improvement of transportation accessibility amongst all financial classes, and most importantly, succeeded in changing the communities' negative perception of using public transportation over personal vehicles.

**Keywords:** GIS, Austin Transportation, Public Transportation, Rail Line, Landsat,