MS-GIST Projects Summer 2023 Wednesday, August 02

**** 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***

Date/Time	**Presentation Title**	**Student Name**
08/02/23 01:30 - 01:55 PM	MODELING THE VEGETATION EFFECTS AFTER THE DIXIE FIRE USING CHANGE DETECTION	Brianne Lawrence
08/02/23 03:00 - 03:25 PM	THE 2012 PINE CREEK, MONTANA, WILDFIRE: A COMPARATIVE ANALYSIS USING THE NORMALIZED BURN RATIO AND NORMALIZED DIFFERENCE VEGETATIVE INDEX	Brad Beall
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MODELING THE VEGETATION EFFECTS AFTER THE DIXIE FIRE USING CHANGE DETECTION

Brianne Lawrence
briannel@arizona.edu

08/02/23, 01:30 - 01:55 PM

Abstract:

On July 13th, 2021, the Dixie fire was reported after a Pacific Gas and Electric employee who saw flames about the size of 600 square feet within the Feather River Canyon. The California Department of Forestry and Fire Protection, also known as Cal Fire, arrived within 25 minutes and began their efforts to contain the fire. The Feather River Canyon is known for having a scenic byway filled with large trees, steep canyons and high winds. The area had the perfect conditions for a wildfire due to exceptional drought causing moisture levels within the forest to be at historic lows. 963,309 acres were burned until the fire was contained on October 25th, 2021. Small towns and communities were destroyed leaving the area bare and without life. This study seeks to model vegetation responses after land cover changes following the Dixie Fire. The burn scar made on-the-ground measurements difficult and impractical so instead, the imagery from Landsat 8 is used to form the basis of the measurements. The vegetation changes are calculated using the normalized difference vegetation index (NDVI) and the normalized burn ratio (NBR) showing vegetation regeneration. This study can help local and federal agencies determine bare ground exposure which could lead to increased flooding, and to determine where vegetation regeneration has occurred.

Keywords: Dixie Canyon, wildfire, NBR, NDVI, ecosystem, vegetation

THE 2012 PINE CREEK, MONTANA, WILDFIRE: A COMPARATIVE ANALYSIS USING THE NORMALIZED BURN RATIO AND NORMALIZED DIFFERENCE VEGETATIVE INDEX

Brad Beall
bbeall@arizona.edu

08/02/23, 03:00 - 03:25 PM

Abstract:

Severe wildfires are an all-too-common feature of the Western American landscape. Worse still, the frequency of such fires is on the increase. Each year, new wildfires add hundreds of thousands of fire-damaged acres to the millions of acres of forests burned in previous years. While some of these areas can recover naturally, forests that suffer prolonged, severe burning may not recover without human assistance. Due to the increase in frequency of such events, America's reforestation needs have exceeded available reforestation resources (e.g., seedlings for replanting, forestry professionals experienced in wildfire remediation, labor for replanting and maintenance, etc.). Passage of the Federal REPLANT Act in November of 2021 means that more resources will be available in the future, but forestry managers must still decide which of the most severely damaged and at-risk areas of the American West should be given priority for remediation. Two commonly used tools for evaluating wildfire damage are the Normalized Burn Ratio (NBR) and the Normalized Difference Vegetation Index (NDVI). Using reflectance data captured by satellites, these tools can be used to assess 1) wildfire boundaries, 2) relative wildfire severity, and 3) whether natural regrowth in a previously burned area is taking place. The goal of this project is to assess the effectiveness of NBR and NDVI values using the 2012 Pine Creek (Montana) Fire as a test case.

Keywords: Landsat, Montana, NBR, NDVI, Pine Creek, reforestation, wildfire

Assessing Deoxygenation in the Gulf of Mexico through Interpolation and 3D Modeling

Lucia Lopez
luciaslopez@arizona.edu

08/02/23, 03:30 - 03:55 PM

Abstract:

Deoxygenation poses a significant global concern, affecting oceans and marine reliant industries. The Gulf of Mexico stands out as an area with persistent hypoxia and yearly eutrophication events, resulting in reduced biodiversity, shifts in species distributions, and diminished fishery resources. Focusing on the central Gulf of Mexico 200 miles south of Louisiana, using World Ocean Database oxygen measurements over the year 2022, this study strives to shed light on methods used for predicting DO at various depths as well as the use of 3D modeling and Bathymetry to create advanced visuals on ocean-based elevation data. By applying Empirical Bayesian Interpolation in 3D, different transformations of the data are explored, and continuous surfaces of predicted DO levels at various depths are yielded. Models are assessed using cross-validation, semivariograms, and statistical performance measures. Among the three models tested, the highest performing model exhibited the lowest average standard error and mean error and with no applied data transformation or vertical trend removals. Exploring local Kriging models at different locations and standard errors, revealed larger standard errors at locations further away from known data points. Arrived at confirmation of no hypoxic conditions in this Gulf location. 3D rendering through exportation of prediction surfaces as multidimensional voxel layers is exercised. Vertical and horizontal angled sections show the predicted DO measurements as intersections of different slopes, as well as isosurfaces visualizing depths showing the same oxygen values. These advanced 3D renderings exhibited that predicted DO concentrations are at their lowest between 66 and 1,000 meters.

Keywords: Deoxygenation, Interpolation, 3D Modeling, Water Quality, Bathymetry