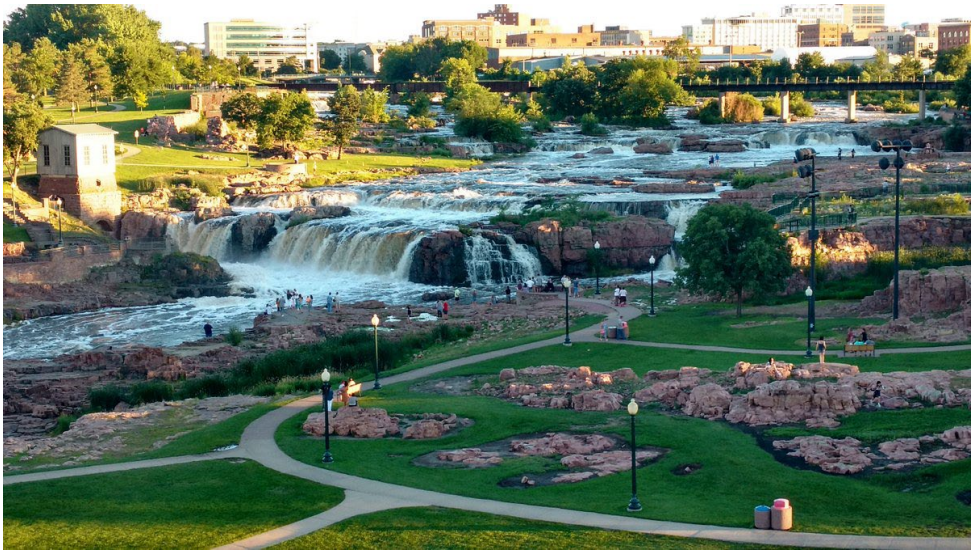
AAG
AMERICAN ASSOCIATION of GEOGRAPHERS

Great Plains/Rocky Mountains Division

2023 Annual Meeting
October 6-7, 2023

Final Program and Abstracts



Hosted by:

SOUTH DAKOTA STATE UNIVERSITY
Department of Geography and Geospatial Sciences

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Welcome

Welcome to Sioux Falls, South Dakota! The host of the 2023 Great Plains Rocky Mountain of Regional Division of the American Association of Geographers (AAG) is South Dakota State University's Department of Geography & Geospatial Sciences.

South Dakota State University (SDSU) is the state's largest, most comprehensive higher education institution. As South Dakota's Morrill Act land-grant university, SDSU had a fall 2023 enrollment of 11,505, with students coming from 47 states and 73 countries. Students can choose from 86 majors, 38 specializations, 102 minors, 39 master's degree programs, 16 Ph.D. programs, and two professional doctorates.

Geography was one of the initial Chairs established when South Dakota State University was founded in 1881. Geography courses were taught periodically over the years, but the groundwork for creating formal geography programs did not occur until the 1966-1967 academic year. In 1967, the South Dakota Board of Regents approved the geography major for the Bachelor of Arts and Bachelor of Science degrees. In 1968, the Department of History, Political Science, and Geography was formed. On July 1, 1973, a separate Department of Geography was established. In July 1974, the Master of Science in Geography started. In 2005, a collaboration between Geography, Engineering, and the EROS (Earth Resources Observation and Science) Center led to the establishment of the Geospatial Sciences Center of Excellence (GSCE). At the same time, the Ph.D. in Geospatial Science and Engineering was created. The GSCE was merged into the Department in 2018, along with the Ph.D. in Geospatial Science and Engineering. Currently, there are nine faculty members and over 120 undergraduate and graduate students in our program.

Acknowledgments

I wish to thank the faculty, staff, and students of the Department of Geography & Geospatial Sciences who were involved in the organization of this conference. Special thanks to Mary Ward, our senior secretary, who was instrumental in day-to-day logistics and planning and helped us stay focused after the fall semester started; Kim Johnson Maier and Mason Maitaitijiang for organizing the GeoBowl; George White and Bruce Millett for organizing the paper and poster sessions; Hankui Zhang for managing the paper/poster competitions; Darrell Napton for organizing the EROS/Pipestone field; and finally to all the student volunteers for help with logistics.

Thanks to our friends who helped us organize and facilitate this conference from the American Association of Geographers. Special thanks to Emily Fekete, our main liaison, for her organizational guidance; Oscar Larson, for setting up and helping with online registration; Elin Thorlund with registration updates, and Becky Pendergast who designed and maintained the conference webpage.

Bob Watrel, GPRM Divisional Chair

GPRM Officers 2023-2024

Chair	Bob Watrel South Dakota State University
Treasurer	Bob Watrel South Dakota State University
Past Chair	Michael Keables University of Denver
Regional Councilor	Rebecca Buller University of Nebraska-Lincoln

GPRM Annual Meetings

2023	South Dakota State University at Sioux Falls
2022	University of Denver
2021	University of Nebraska-Lincoln
2020	Cancelled due to Covid
2019	University of Kansas
2018	Kansas State University
2017	University of North Dakota
2016	University of Colorado, Colorado Springs
2015	University of Nebraska at Kearney
2014	University of New Mexico (joint with SWAAG)
2013	University of Nebraska at Omaha
2012	University of Utah
2011	University of Colorado-Denver
2010	University of Kansas
2009	Utah State University, Logan
2008	University of North Dakota
2007	University of Denver
2006	University of Nebraska-Lincoln(Joint with East Lakes)
2005	University of Wyoming
2004	EROS Data Center, Sioux Falls, SD
2003	Kansas State University
2002	University of Montana
2001	University of Nebraska at Omaha
2000	Brigham Young University
1999	University of Colorado, Colorado Springs
1998	University of Kansas
1997	Montana State University
1996	University of Northern Colorado

1995	University of North Dakota
1994	University of Utah
1993	University of Colorado, Boulder
1992	Kansas State University
1991	University of Wyoming
1990	University of Nebraska at Kearney
1989	Weber State University
1988	US Air Force Academy
1987	University of Regina
1986	University of Nebraska at Omaha
1985	Montana State University
1984	University of Kansas
1983	University of Colorado at Boulder
1982	University of Wyoming
1981	South Dakota State University
1980	University of Utah
1979	University of North Dakota
1978	Metropolitan State University, Denver
1977	University of Calgary
1976	Kansas State University
1975	Utah State University
1974	University of Northern Colorado
1973	University of Nebraska-Lincoln
1972	Weber State University
1971	US Air Force Academy
1970	University of Kansas
1969	University of Utah
1968	Loretto Heights College, Denver
1967	US Air Force Academy

Conference Venues

Friday October 6: Holiday Inn City Centre, 100 W. 8th St. Sioux Falls, SD 57104
Field Trip departures, registration, and welcome reception in the Skyline Room (complimentary hors d'oeuvres and cash bar). See the conference website for directions to the hotel.

Saturday October 7: Holiday Inn City Centre, Registration is outside of the Palisades meeting room. Paper sessions will be held in Skyline, Cascade and Palisades 1 meeting rooms. Poster sessions are in Palisades 2 and 3 meeting rooms. GeoBowl teams meet in the Cascade meeting room and the competitions happen in Cascade, Palisades 1, and Skyline rooms. The keynote address, banquet and awards presentation will be held in Palisades meeting rooms.

Land Acknowledgement Statement

South Dakota State University acknowledges the land it occupies across South Dakota is the ancestral, traditional, and contemporary lands of the Oceti Sakowin (oh-CHEH-tee shaw-KOH-we) meaning Seven Council Fires, which is the proper name for the people referred to as Sioux. We acknowledge that before these sites were named South Dakota State University, they were called home by people of American Indian Nations indigenous to this region.

The tribal alliance made up of individual bands of the Seven Council Fires is based on kinship, location, and dialects: Santee-Dakota, Yankton-Nakota, and Teton- Lakota. We acknowledge the sovereignty of the nine federally recognized Native Nations in South Dakota: Cheyenne River, Crow Creek, Flandreau Santee, Lower Brule, Oglala, Rosebud, Sisseton Wahpeton, Standing Rock, and Yankton Sioux Tribes.

As a land-grant university, it is our mission to provide access to higher education to all. We are committed to building respectful and positive relationships with indigenous communities through academic pursuits, partnerships, historical recognitions, extension programs and enrollment efforts.

Field Trips

Pre-registration is required for both field trips. Participants should meet at the scheduled time in the lobby of the Holiday Inn.

Friday October 6, 2023, 8:00 a.m. to 6:00 p.m. 1.7 Billion Years Ago to the Space Age. Darrell Napton

Join your host for a day long two-part field trip. This field trip will demonstrate the work of geographers at the U.S. Geological Survey Earth Resource Observation and Science Center (EROS) and continue to Pipestone National Monument where pipestone has been quarried by Native Americans for the past 3,000 years.

The visit to EROS will include short talks by geographers about their work and how they use remotely sensed imagery to increase our understanding of land issues such as wildfire, low density urbanization, and climate change. There will be a behind-the-scenes tour of EROS including the archives, which stores all Landsat imagery and declassified military intelligence photographs collected during the Cold War. EROS maintains one of the largest civilian collections of images of the Earth's surface.

After a box lunch, we will go to Pipestone National Monument where a soft layer of pipestone(catlinite) is embedded within 1.7-billion-year-old Sioux Quartzite, one of the hardest rocks on Earth. Native Americans have quarried pipestone here and carved the rock into pipes for use and trade for 3,000 years. Some continue the tradition today by quarrying pipestone from the surrounding quartzite layer using only hand tools. After watching a short video, we will view the museum exhibits, and then look at some of the active quarries and walk the ¾ mile Circle Trail, through the prairie and along Pipestone Creek, which has a population of the endangered Topeka Shiner minnow.

Friday October 6, 2023, 9:00 a.m. to 4:00 p.m. Urban Growth in the Heartland: Sioux Falls Past, Present and Future. Bob Watrel

Join your host for a day long exploration of the Urban Growth of Sioux Falls. This field trip will start with a talk from the Sioux Falls Planning Office about the history of and current development initiatives for the city of Sioux Falls. This will be followed by a tour of the city looking at the active and future development areas. After this tour, there will be a talk about planning for the Sioux Falls Downtown area and then a walking tour through downtown. Lunch will be provided during this field trip.

Banquet Keynote Address
Saturday October 7, 6:00 p.m. – 8:00 p.m.
Palisades Room

"Critical physical geography in practice: Our depth perception improves when we look through biophysical and social lenses."
Rebecca Lave, AAG President

Rebecca Lave is a Professor of Geography at Indiana University, and President of the American Association of Geographers. Her research takes a Critical Physical Geography approach, combining political economy, STS, and fluvial geomorphology to analyze stream restoration, the politics of environmental expertise, and community-based responses to flooding. She is the author of two books: Fields and Streams: Stream Restoration, Neoliberalism, and the Future of Environmental Science and Streams of Revenues: The Restoration Economy and the Ecosystems it Creates (co-written with Martin Doyle).

Conference at a Glance

Friday October 6, Holiday Inn Sioux Falls City Centre			
Time	**Event**		
8:00 AM – 5:00 PM	Field Trip: USGS and Pipestone		
9:00 AM – 4:00 PM	Field Trip: Sioux Falls Planning and Development		
6:00 PM – 8:00 PM	Registration Welcome Reception (complimentary hors d'oeuvres, cash bar) Holiday Inn (Skyline Room)		
8:00 PM - ?	GPRM Student Social		
Saturday, October 7, Holiday Inn Sioux Falls City Centre			
8:00 AM – 12:00 PM	Registration (Lobby) Breakfast items in Palisades II and III		
9:00 AM – 4:00 PM	Poster Session Creators present 2:00 PM – 3:00 PM		
9:00 AM – 10:40 AM	**Paper Session 1**		
	Skyline	Cascade	Palisades I
	Urban Geographies, Vulnerabilities, and Tactics	*Remote Sensing of the Biophysical World II*	*Cultural-Political Perspectives of the Land*
10:40 AM – 11:00 AM	**Break** snack items in Palisades II and III		
11:00 AM – 12:40 PM	**Paper Session 2**		
	Skyline	Cascade	Palisades I
	Changing Human Geographies	*Remote Sensing of the Biophysical World II*	*Geospatial Analysis*
12:40 PM – 2:00 PM	Lunch (on your own)		
2:00 PM – 3:00 PM	**Poster Session** (presenters in attendance) Palisades II & III		
3:00 PM – 5:30 PM	**GeoBowl** Teams meet in Cascade for instructions Competitions: Cascade, Palisades I, Skyline		
5:00PM – 5:45 PM	**Business Meeting** (Board Room)		
6:00 PM – 8:00 PM	**Banquet, Keynote Address and Awards Presentation** Palisades • Welcome –Dean Charlene Wolf-Hall, College of Natural Sciences • Keynote – Rebecca Lave, President, American Association of Geographers • Awards Presentations – Bob Watrel, Chair, AAG Great Plains/Rocky Mountains Division		

Paper Session One

Session 1 9:00 a.m. – 10:40 a.m.

Urban Geographies, Vulnerabilities and Tactics
Skyline Room
Session Chair: Kwang-il (Jason) Yoo
University of Nebraska-Lincoln

9:00- 9:20 a.m.
Urban Decentralization: "Parking Lots or Garages a Necessity or Business Districts will Fade"
Heather Bloom
University of Nebraska-Lincoln

9:20 – 9:40 a.m.
Battle Maps and Data: A HGIS for the Tactical Cartography of the AEF
Joel Radunzel, Shawn Hutchinson
Kansas State University

9:40 – 10:00 a.m.
Assessment of Social Vulnerability to Floods in Pakistan
Uzma Jabeen
University of Nebraska-Lincoln

10:00 – 10:20 a.m.
Using Geospatial Techniques to Assess the Relationship Between Residential Segregation and Mental Healthcare Accessibility in Urban Omaha, Nebraska.
Solomon Ampofo
University of Nebraska at Omaha

10:20- 10:40 a.m.
Spatial Patterns of Best Management Practices and Local Contextual Factors in the Chesapeake Bay Watershed
Kwang-il (Jason) Yoo, Patrick Bitterman
University of Nebraska-Lincoln

Remote Sensing of the Biophysical World I
Cascade Room
Session Chair: Yongchang Ye
South Dakota State University

9:00 – 9:20 a.m.
A Benchmark Dataset of Land Surface Phenology from a Fusion of Harmonized Landsat 8 and Sentinel – 2 Observations with PhenoCam Time Series
Khuong Tran, Xiaoyang Zhang
South Dakota State University

9:20 – 9:40 a.m.
Mapping Drainage Structures Using Airborne Laser Scanning by Incorporating Road Centerline Information
Nadeem Fareed, South Dakota State University
Chi-Kuei Wang, National Cheng Kung University

9:40 – 10:00 a.m.
Crop Yield and Seed Composition Estimation Using UAV Remote Sensing and Deep Transfer Learning
Mohammad Maruf Billah, Maitiniyazi Maimaitijiang, Bruce Millett, Swas Kaushal, Peter Kovacs, Sunish Sehgal
South Dakota State University

10:00 – 10:20 a.m.
Monitoring Crop Progress at Field Scales in Near-real-time by Fusing Harmonized Landsat and Sentinel-2 Time Series with Geostationary Satellite Observations
Yu Shen, Xiaoyang Zhang, Shuai Gao, Yongchang Ye, Yuxia Liu
South Dakota State University
Zhengwei Yang, US Department of Agriculture
Weile Wang, California State University at Monterey Bay

10:20 -10:40 a.m.
Evaluation of PlanetScope-Detected Phenology Using Infrared-Enabled PhenoCam Observations in Semi-Arid Western United States
Yuxia Liu, Xiaoyang Zhang, Yu Shen, Khuong Tran, Yongchang Ye, Shuai Gao
South Dakota State University

Cultural-Political Perspectives of the Land
Palisades I Room
Session Chair: George White
South Dakota State University

9:00 – 9:20 a.m.
Corn-Based Ethanol Prospects for Southeastern South Dakota Farmers amid Changing Federal EV and Biofuel Mandates
Russell Graves
Dakota State University

9:20 – 9:40 a.m.
Homesickness and Nostalgia among Rural Nebraska Leavers
Andrew Husa
University of Nebraska-Lincoln

9:40 – 10:00 a.m.
The Redlining of Sheelytown
Christina Dando
University of Nebraska at Omaha

10:00 – 10:20 a.m.
A political ecology of Utah Lake
Hilary Hungerford and Abigayle Glenn
Utah Valley University

10:20 – 10:40 a.m.
Exploring the Implications of Cropping System Decision Factors for Diversification of US Agriculture: Insights from Agricultural Experts and Farmers
Jean Ribert Francois
Kansas State University

Paper Session Two

Session 2 11:00 a.m. – 12:40 p.m.

Changing Human Geographies
Skyline Room
Session Chair: George White
South Dakota State University

11:00 – 11:20 a.m.
A Dissertation Pilot Study: Why, Where, How, and What Now?
Alex Mohr
University of Nebraska-Lincoln

11:20 – 11:40 a.m.
The American Cordillera, Temperature, and Precipitation Changes in Our Favorite Places
Anai Capara Bellido, Jeffrey VanLooy
University of North Dakota

11:40 a.m. – 12:00 p.m.
Adaptive Capacity in Kansas: An Uncertainty Analysis
Denise Chavez, Katherine Nelson
Kansas State University

12:00 – 12:20 p.m.
Urban Food Security: Unique Challenges and Opportunities
Michael Djan
University of Nebraska-Lincoln

12:20 – 12:40 p.m.
Forming Sustainable Habits Using the "Paper Error Correction Method."
Valentyna Stopul, George White
South Dakota State University

Remote Sensing of the Biophysical World II
Cascade Room
Session Chair: Yuxia Liu
South Dakota State University

11:00 – 11:20 a.m.
Vegetation Phenology from Surface, Near Surface, and Multiple Resolution Space Observations
Xiaoyang Zhang, Yongchang Ye, Khuong Tran, Yuxia Liu
South Dakota State University

11:20 – 11:40 a.m.
Diverse Primary Drivers of the Greenness Rate of Terrestrial Natural Vegetation Across the Global Ecoregions
Shuai An, Xiaoyang Zhang, Yongchang Ye
South Dakota State University

11:40 a.m. – 12:00 p.m.
Exploration of Long-term Trends of Global Land Surface Phenology from AVHRR, MODIS, and VIIRS
Yongchang Ye, Xiaoyang Zhang, Shuai Gao, Shuai An
South Dakota State University
11:20 – 11:40 a.m.

12:00 – 12:20 p.m.
Generation and Evaluation of the GOES-R ABI Land Surface Phenology in North America
Shuai Gao, Xiaoyang Zhang, Yongchang Ye, Yu Shen, Shuai An, Yuxia Liu, Khuong Tran
South Dakota State University

Geospatial Analysis
Palisades I Room
Session Chair: J.M. Shawn Hutchinson
Kansas State University

11:00 – 11:20 a.m.
Early Forecasting of Crop Production and Quality Using UAV Remote Sensing and Machine Learning
Maitiniyazi Maimaitijiang
South Dakota State University

11:20 – 11:40 a.m.
Using GIScience to Determine Social Service Accessibility for Youth Offenders Reentering Nebraska's Rural and Urban Communities
Paul Burger, Christina Sogar, Julie Campbell
University of Nebraska at Kearney
H. Jason Combs
South Dakota State University

11:40 a.m. – 12:00 p.m.
Developing a GIS Toolbox for Automating Processing and Analysis of Low-Level Aircraft Overflights at U.S. National Parks
J.M. Shawn Hutchinson, Brian Peterson, Bijan Gurung
Kansas State University

12:00 – 12:20 p.m.
Women's Communities in Deadwood, SD in the 1870s-1880s
Jessica Long
University of Nebraska-Lincoln

Paper Abstracts

(Listed alphabetically by last name of presenting author)

Using Geospatial Techniques to Assess the Relationship Between Residential Segregation and
Mental Healthcare Accessibility in Urban Omaha, Nebraska.

Abstract: Equitable access to healthcare is regarded as a major indicator of improved health status of a country's population. Various US governments have implemented series of policies to improve healthcare accessibility. However, historical racial segregation policies have led most of such efforts to be markedly skewed towards only part of the population, creating disparities in healthcare accessibility and health status in many US cities, including Omaha, Nebraska, that persist to the present day. By restricting access to essential social amenities like healthcare, residential segregation plays a key role in exacerbating health conditions such as mental health among racial minorities. Mental health problems, which are significantly high among racial minorities, especially Black/African Americans, serve as stimulants for the intensification of various chronic diseases. Increasing access to mental healthcare in disadvantaged minority neighborhoods is crucial for improving mental and general health conditions among racial minorities. This study, therefore, seeks to employ geospatial techniques to examine the relationship between residential segregation and mental healthcare accessibility in Urban Omaha, Nebraska. The Dissimilarity Index will be used to estimate segregation rates, with segregation and mental health status patterns visualized using maps. The potential spatial accessibility to mental health services in Urban Omaha will be estimated and mapped using the Three-Step Floating Catchment Area method. Ultimately, the study will provide a spatial evidence-based direction for informing healthcare planning to minimize health disparities in the US. This presentation will focus on the rationale and methods for my thesis and give an update on lessons learned so far.

Author: Solomon T. Ampofo
University of Nebraska at Omaha

Diverse Primary Drivers of the Greenness Rate of Terrestrial Natural Vegetation Across the Global Ecoregions

Abstract: Vegetation greenness is crucial for the structure and functioning of ecosystems. However, the drivers of the global vegetation greenness process are not clear. Here, we explored the longterm trend of the vegetation greenness rate (1982-2022) and analyzed the primary affecting factors for the global ecoregions using both machine learning and statistical methods. Our results show a distinct spatial difference in the primary affecting factors of the greenness rate. Specifically, excluding central/eastern Asia and southwestern North America, vegetation greenness rate in most ecoregions in the north temperate/cold zones (30 N-70 N) of the earth is primarily affected by phenological indicators (senescence/dormancy onset, the days between the two), and temperature indicators (daily minimum/maximum/mean temperature, growing degree days, and temperature accumulation rate). While for ecoregions in the north cold zone (northern 70 N), central/eastern Asia, southwestern North America, central South America, and southern Australia, the greenness rate is primarily affected by productivity indicators (EVI2 minimum/maximum, and the range between the two) and moisture indicators (accumulated precipitation, mean soil moisture and the accumulation rates). In addition, productivity and temperature indicators primarily affect the greenness rate in ecoregions across Africa

and other areas. The diverse primary drivers of the greenness rate deepen the complexity of the global vegetation greenness process. Due to differences in vegetation types and climate backgrounds over the global terrestrial ecosystems, we suggest that the vegetation greenness processes in the ecoregions must be treated differently in global climate impact assessment.

Authors: Shuai An, Xiaoyang Zhang, Yongchang Ye
South Dakota State University

Crop Yield and Seed Composition Estimation Using UAV Remote Sensing and Deep Transfer Learning

Abstract: Crop yield and seed composition (i.e., protein content) prediction before harvest is crucial for in-season decision-making for production, field management practices as well as field-based high-throughput phenotyping toward enhanced crop yield production and quality. Traditionally, yield or seed composition estimation has relied on ground and laboratory-based data analysis, which can be time-consuming and limited in scope. However, the emergence of unmanned aerial vehicles (UAV) in agricultural remote sensing has provided a promising solution for enhancing assessment accuracies and reducing or eliminating the need for ground-based surveys. UAV is capable of capturing high-resolution images, which can be utilized in advanced deep learning models to improve the accuracy and efficiency of crop yield and seed composition prediction. One significant challenge for prediction in complex deep neural networks is the lack of labeled data and transferability. To address this, deep transfer learning technique was employed to predict crop yield and seed composition across crop types and locations. UAV based multispectral images were collected throughout the 2022 growing season over multiple experimental crop fields (e.g., wheat, soybean) across South Dakota, USA. Deep learning models (e.g., Convolutional Neural Network) were trained on the dataset from the source crop and location to learn the complex relationships between image features (plot-level averaged spectral and texture features) and crop yield and seed composition. By using pre-trained network weights, the performance of the models on the target dataset can be improved. This approach can significantly contribute to precision agriculture and assist farmers in optimizing resource allocation.

Authors: Mohammad Maruf Billah, Maitiniyazi Maimaitijiang, Bruce Millet, Swas Kaushal, Peter Kovacs, Sunish K. Sehgal
South Dakota State University

Urban Decentralization: "Parking Lots or Garages a Necessity or Business Districts Will Fade"

Abstract: In 1940, Homer Hoyt stated that retail decentralization started in the 1920s and the urban periphery would have changed sooner, if not for the stock market crash of 1929, the subsequent depression, and World War II occurring almost concurrently. Hoyt predicted the "fading" of U.S. retail business districts and the emergence of the suburban shopping districts; he embraced the change by developing suburban shopping centers. Hoyt (1943) barely mentioned that post-World War II, automobile parking would need to be provided in downtown areas. Three years later, developer Fred W. Moe wrote in Women's Wear Daily that "automobile users expect parking facilities near designations" and women shoppers consider a "parking places inconvenient if situated more than two blocks from her principal destination." In contrast to many eastern U.S. cities, Omaha's downtown

streets are wide, more than 60 feet from curb to curb and 100 feet from building to building. As a result, nearly one-half of the central business district's land is composed of streets and alleyways, allowing for more room for automobile parking and commuting. Despite this, retail parking was a popular topic in the Omaha World-Herald, starting in 1920. Traffic fatigue had a break during World War II, but rapid post-World War II suburbanization increased automobile ownership and discouraged reliance on streetcars. This study exams Omaha World-Herald articles that discuss retail parking concerns 1945-1955.

Author: Heather Bloom
University of Nebraska-Lincoln

Using GIScience to Determine Social Service Accessibility for Youth Offenders Reentering Nebraska's Rural and Urban Communities

Abstract: Once incarcerated youth often face an uphill battle. The recidivism rate is eighty-five percent within five years following detention and less than twenty percent have completed high school. This study examines the level of accessibility of social services within home communities for Nebraska youth aged fifteen-nineteen years following detention. GIScience is utilized to spatially evaluate the accessibility of youth-related services in the five categories of: housing assistance, job training, mental health, physical health, and transitional living to analyze gaps in the spatial landscape across Nebraska. Results indicate that while over ninety-nine percent of youth have access to health care within a 30-minute drive time, roughly twenty-four percent lack housing assistance or transitional living services. Excluding youth from metropolitan statistical areas (MSAs), over ninety-seven percent still have access to health care, but job training is inaccessible to over fifty percent within a 30-minute drive time and jumps to sixty six percent when a 15-minute drive time is considered. GIScience provides a framework for analyzing and identifying spatial disparities in accessibility and provides policymakers with a tool for finding solutions.

Authors: Paul Burger, Christina Sogar, Julie Campbell
University of Nebraska at Kearney
H. Jason Combs
South Dakota State University

The American Cordillera, Temperature, and Precipitation Changes in Our Favorite Places

Abstract: In recent years, the effort to identify the impacts of climate change on Earth has increased, therefore the number of studies related to the topic has also increased. In mountainous regions, which are highly sensitive to climate change, there is a lack of meteorological stations with continuous data to monitor changes in climate variables. The purpose of this study is to show trends on temperature, precipitation, and snowfall in a temperate (Rocky Mountains - Wyoming) and in a tropical (Andes-Cusco) mountain range during the last 70 years. Both mountain ranges are important for their respective regions because of water availability for consumption and irrigation, and the generation of revenue that comes from tourism. This is possible thanks to the European Centre for Medium-Range Weather Forecasts that provides datasets since 1950 for climate variables. In this study we use ERA5,

which models historical observations to produce global estimates, and the SRTM Digital Elevation Model to determine the ranges in elevation. Google earth engine is used to acquire the datasets, and ArcGIS Pro and Google Collaboratory are used to analyze the data. Even though both mountain ranges have different summer regimes, people living downstream depend on snowpack for water. As previous studies show, warming temperature and rainfall extremes have a dependency on elevation. Furthermore, snowpack based on the snow to precipitation proportion would change on a different rate based on elevation.

Authors: Anai Capara Bellido, Jeffrey VanLooy
University of North Dakota

Adaptive Capacity in Kansas: An Uncertainty Analysis

Abstract: Climate change presents unprecedented challenges for agricultural producers globally. Kansas, a state highly dependent on agriculture is experiencing longer and more frequently. Understanding the drivers of adaptive capacity (AC) across the state is crucial. There is no consensus on the definition, determinants, or methods in characterizing AC. Additionally, the multidimensional and context-sensitive nature of AC makes it a complex and interdisciplinary subject of study. To characterize the uncertainty across community types and methodologies in constructing adaptive capacity indices, this study compares four different construction methods in four different sample (whole state, metropolitan, non-metro metropolitan, farming counties). In addition, this study identifies the variables that drive adaptive capacity in each community type. The study found some consistency in variable selection across community types. Both whole and metro samples featured variables like Households on SNAP, and percent population with graduate degrees, as well as similarities between the non-metro and farming counties. Uncertainty in AC assessment between the non-metro and farming counties. Uncertainty in AC assessment was examined, revealing lower maximum uncertainty in metro, non-metro, and farming counties compared to the whole state. Metro counties had the highest variance in uncertainty with a 37% variance in adaptive capacity values, while the non-metro sample showed only a 1% difference. In summary, this study sheds light on the multifaceted nature of AC assessment, demonstrating variations in variable selection and uncertainty across community types and methodologies.

Authors: Denise Chavez, Katherine Nelson
Kansas State University

The Redlining of Sheelytown

Abstract: On the 1936 Homeowners' Loan Corporation (HOLC) map of Omaha, three areas have been identified as "hazardous" or "redlined," singled out as being "high risk" for extending loans to. The smallest redlined area is Sheelytown, the predominantly Polish neighborhood of Omaha. Conversations about HOLC maps tend to focus on the redling of Black communities but other communities, such as immirants, were also redlined. This paper investigates attitudes and perceptions of this neighborhood in city documents and local media to begin to understand why this immigrant community received this designation.

Author: Christina Dando
University of Nebraska at Omaha

Urban Food Security: Unique Challenges and Opportunities

Abstract: Food security is a significant concern in urban areas (UAs). With the rapid increase in urbanization, addressing this issue has become increasingly important. Despite interventions to tackle food security issues, the world has achieved varying degrees of success in eradicating hunger, and food security in cities is critical. This study examined the unique challenges and opportunities associated with ensuring food security in urban areas. The study reviewed empirical literature and relevant reports in the last five years (2018-2023). This study identified several challenges in ensuring food security in urban regions, across the world, including rising food prices, limited water and land access for farming, and poor infrastructure and food supply systems. There are also opportunities to improve the situation, such as improving access to markets, investing in agricultural production, promoting urban agriculture, expanding and stocking food banks, and government food intervention programs to ensure socioeconomic parity in urban areas. Urban areas' food security opportunities and difficulties are complex and interconnected. However, by addressing the myriad challenges associated with ensuring food security and taking advantage of opportunities, it is possible to create more sustainable, food secured urban cities. This will make it possible to guarantee that everyone in urban areas has access to the food that they need to live healthy and fulfilling lives.

Author: Michael A Djan
University of Nebraska-Lincoln

Mapping Drainage Structures Using Airborne Laser Scanning by Incorporating Road Centerline Information

Abstract: Wide-area drainage structure (DS) mapping is of great concern, as many DSs are reaching the end of their design life and information on their location is usually absent. Recently, airborne laser scanning (ALS) has been proven useful for DS mapping through manual methods using ALS-derived digital elevation models (DEMs). To overcome these limitations, this paper proposes an automated DS mapping algorithm (DSMA) using classified ALS point clouds and road centerline information. The DSMA begins with removing ALS ground points within the buffer of the road centerlines; the size of the buffer varies according to different road classes. An ALS-modified DEM (ALS-mDEM) is then generated from the remaining ground points. A drainage network (DN) is derived from the ALS-mDEM. Candidate DSs are then obtained by intersecting the DN with the road centerlines. Finally, a refinement buffer of 15 m is placed around each candidate DS to prevent duplicate DS from being generated in close proximity. A total area of 50 km , including an urban site and a rural site, in Vermont, USA, was used to assess the DSMA. Based on the road functional classification scheme of the Federal Highway Administration (FHWA), the centerline information regarding FHWA roads was obtained from a public data portal. A benchmark DS dataset was gathered from the transport agency of Vermont and was further augmented using Google Earth Street View images by the authors. The F1-scores were 0.87 and 0.94 for the urban site and rural site, respectively.

Authors: Naeem Fareed
South Dakota State University
Chi-Kuei Wang
National Cheng Kung University

Exploring the Implications of Cropping System Decision Factors for Diversification of US Agriculture: Insights from Agricultural Experts and Farmers

Abstract: In recent years, there has been a growing interest in the sustainability of farming systems, raising specific inquiries with respect to the need to match agricultural productivity with sustainable farming practices. Agricultural diversification has been promoted among management strategies that demonstrated beneficial impacts on agricultural productivity and ecosystem health, thus providing a pathway toward sustainable agricultural systems. This study investigated factors influencing decision-making in cropping system management within this context. We interviewed 48 agricultural stakeholders in 4 counties that represent diverging trends in cropping system diversity. The preliminary results show that both human and environmental factors and their interactions guide cropping system decision-making related to diversification and sustainable agriculture. Markets, networking, labor, policies, technology, climate, and soil type are the fundamental elements that drive decisions on land use and crop selection. This research shows how agricultural producers navigate complexity to decide which species to plant on their farm grounds. The study also highlights the tensions and possibilities created by diversifying farming systems.

Authors: Jean Ribert Francois
Kansas State University

Generation and Evaluation of the GOES-R ABI Land Surface Phenology in North America

Abstract: Land Surface Phenology (LSP) has been widely derived from polar-orbiting satellite observations, but the reliability of LSP detections is often compromised by cloud contamination in the satellite time series, particularly in regions with persistent cloud cover. The Advanced Baseline Imager (ABI) onboard the Geostationary Operational Environmental Satellite-R (GOES-R) series, with its improved temporal (10 minutes) and spatial resolution (500 m), offers the potential to obtain cloud-free observations throughout the vegetation growing season. This study describes the LSP detections derived from ABI data in North America. Combined with the latest directional reflectance products and the new Bidirectional Reflectance Distribution Function (BRDF) correction method, the new detections provide comparable results with VIIRS (Visible Infrared Imaging Radiometer Suite) LSP products in North America, especially for vegetation with homogeneous distribution. Moreover, the high temporal observations of GOES-16/17 ABI could improve LSP detections in the persistent cloud-covered area. The validation indicated that the LSP from GOES-16/17 ABI data are of high quality and are in good agreement with the HLS-PhenoCam LSP product, especially in homogeneous areas. The LSP difference between GOES-16/17 ABI and VIIRS could be accounted for by the difference in spatial resolution, sensor signal noise ratio, view zenith angle, terrain, and heterogeneity of the vegetation itself. The paper demonstrates the unique characteristics of geostationary satellites for land surface phenology detections at large-scale continents and suggests that the geostationary and polar-orbiting satellites have a high level of complementarity for vegetation monitoring.

Authors: Shuai Gao, Xiaoyang Zhang, Yongchang Ye, Yu Shen, Shuai An, Yuxia Liu, Khuong Tran
South Dakota State University

Corn-Based Ethanol Prospects for Southeastern South Dakota Farmers amid Changing Federal EV and Biofuel Mandates

Abstract: This early research prospectus examines the changing levels of traditional corn-based ethanol production and output among landowners in southeastern South Dakota in the face of changing federal regulatory guidelines and policies that have pushed for at least 50% of new vehicle sales in the United States to be electric by 2030. In the short term, the current administration has established a concurrent increase in overall biofuel blending in combustible fuels over the next three years from 21.54 billion gallons in 2023 to 22.33 billion gallons in 2025, all-the-while maintaining a flat cap of 15 billion gallons for corn-based ethanol as a proportion of that overall total through the end of 2025. As a result of this capping of demand for traditional corn-based ethanol, as well as the overall push for electric vehicles, corn producers are facing the prospect of a diminishing market for ethanol soon. As a preliminary part of this research, I seek to develop survey and interview questions and a protocol for asking corn farmers in southeastern South Dakota about their near-future operating plans related to ethanol's likely reduced role in American automobile propulsion.

Author: Russell Graves
Dakota State University

A Political Ecology of Utah Lake

Abstract: As one of the largest freshwater lakes in the western United States, the story of Utah Lake is a curious one. Once the center of vibrant Indigenous communities in Utah Valley, the lake has experienced tremendous environmental pressures over time. From the introduction of invasive and destructive carp to resorts, to steel production and raw sewage, to finally a place of recovery and rejuvenation, the story of Utah Lake is a complex web of environmental policies and politics, resource management strategies, and the diverse interests of the many stakeholders involved. This paper highlights the historical development of these dynamics and their evolution over time, taking into consideration the profound impact of human activities, such as agriculture, urbanization, and industrialization, on the lake's ecological health. In addition, this paper presents a social network analysis of current stakeholders of the lake to examine governance structures, regulatory frameworks, and relationships that influence decision-making related to the lake.

Authors: Hilary Hungerford, Abigayle Glenn
Utah Valley University

Homesickness and Nostalgia among Rural Nebraska Leavers

Abstract: Drawing on results from an online survey of the mobility of people who grew up in Nebraska (2019), this paper discusses feelings of homesickness and nostalgia among those who grew up in, and later left, rural Nebraska. Survey respondents were asked to select all of the factors that influenced them to leave Nebraska from a list of potential factors. In addition to selecting factors from a list of possibilities, the survey asked respondents to explain in their own words why they decided to leave. The survey also asked leaver respondents to identify the kinds of attachments and connections they maintain with Nebraska, along with asking if each leaver if they felt homesick for the state, and,

if so, to describe what they missed about living in rural Nebraska. Just over ninety percent of leavers stated that they return to the state to visit family and friends, while nearly eighty percent of those grew up in and left stated that they miss or feel homesick for rural Nebraska.

Author: Andrew Husa
University of Nebraska-Lincoln

Developing a GIS Toolbox for Automating Processing and Analysis of Low-Level Aircraft Overflights at U.S. National Parks

Abstract: Low-level aircraft overflights are a challenging management issue at many international parks and protected areas and are often the most pervasive noise source at these areas. Understanding their travel patterns is important for managers to establish overflight management strategies and to ensure flight compliance. Overflight travel patterns can be determined by collecting and analyzing Automatic Dependent Surveillance-Broadcast (ADS-B) data. The purpose of this study was to develop and test an automated Geographic Information System (GIS) toolbox that can process large ADS-B datasets and provide useful insights for managing overflights. The toolbox was designed for future use by the United States' National Park Service (NPS) and intended to be intuitively used by NPS employees with only basic GIS training. The toolbox was tested at Great Smoky Mountains, Grand Canyon, and Badlands National Parks and was assessed by seven GIS experts and validated by managers from each park unit. The toolbox is an advancement for NPS units to quickly and efficiently analyze ADS-B data which can be used to assist with the development of air tour and soundscape management plans.

Author: J.M. Shawn Hutchinson, Brian A. Peterson, Bijan Gurung
Kansas State University

Assessment of Social Vulnerability to Floods in Pakistan

Abstract: Pakistan is highly vulnerable to the effects of climate change and is considered one of the countries most affected by natural hazards. Climate change is likely to increase the risk of flooding in the Indus Basin due to more extreme precipitation events associated with climate change. Socially vulnerable populations, particularly those living in flood-prone areas, are at a higher risk of experiencing the negative impacts of floods due to their socio-economic characteristics. This study investigates social vulnerability to flooding at the district level by applying social vulnerability index (SoVI) methods in the Pakistani context based on 20 determinants. The analysis shows a positive spatial autocorrelation across the flood plain of the Indus Basin that reveals spatial identification of vulnerable groups most affected by floods. The highest vulnerability to flood risk is along the Indus River Basin, indicating those more susceptible to risk also live in areas with greater risk of exposure. These findings can help policymakers and emergency managers develop more effective risk reduction strategies and disaster management programs in the context of local conditions.

Author: Uzma Jabeen
University of Nebraska-Lincoln

Evaluation of PlanetScope-Detected Phenology using Infared-Enabled PhenoCam Observations in Semi-Arid Western United States

Abstract: Detecting phenological changes in semi-arid ecosystems using remote sensing data remains a complex task due to the unique spatial variations and irregular temporal patterns of plant growth. PlanetScope imagery, known for its high spatial and temporal resolutions, is revolutionizing the field of Earth observation. In this study, we evaluated the effectiveness of ~3 m PlanetScope data for detecting plant-specific phenology across the semi-arid western United States, by comprehensively comparing phenometrics retrieved from time series of PlanetScope EVI2 (two-band Enhanced Vegetation Index) and NDVI (Normalized Difference Vegetation Index), with a set of PhenoCam observations. PhenoCam time series and phenometrics were extracted from infrared enabled PhenoCam EVI2 and NDVI, besides commonly used PhenoCam GCC (Green Chromatic Coordinate). Our findings indicate the following: 1. Time series of PlanetScope vegetation indices aligned well with PhenoCam GCC and vegetation index time series during the greenup phase**,** however, showing a moderate level of agreement during the senescence phase. 2. Phenological metrics derived from PlanetScope vegetation indices exhibited better agreement with those from PhenoCam GCC and vegetation indices during greenup and maturity onsets compared to the senescence and dormancy onsets. 3. Phenological metrics derived from PlanetScope vegetation indices showed closer agreement with PhenoCam vegetation index retrievals than with PhenoCam GCC retrievals. This was evident in better correlations between phenological metrics, especially during the senescence phase. The findings from this study significantly enhanced our understanding of the accuracy and uncertainty in PlanetScope phenology detections in semi-arid plants and highlighted the value of PlanetScope for investigating plant-specific land surface phenology in semi-arid ecosystems.

Authors: Yuxia Liu, Xiaoyang Zhang, Yu Shen, Khuong H. Tran, Yongchang Ye, Shuai Gao
South Dakota State University

Women's Communities in Deadwood, SD in the 1870s-1880s

Abstract: The Black Hills of South Dakota are a popular focus of historical and cultural geography research for those interested in the gold rush, saloons, and cowboys. However, the almost mythical characteristics of this region have caused the more ordinary and true to life stories to be neglected. These missing accounts are especially true of women who moved to and lived in the Black Hills in the late nineteenth century. In this paper, I introduce women's narratives to the discussion of life and community in the Black Hills. Utilizing a feminist approach and examining accounts of women who lived and worked in the area in the 1870s through the1880s, women stories are presented from their own words. Additionally, using census and Sanborn maps I place women within the city and track their movements. By doing so, the stories and contributions of these women can be seen spatially. For this research, I mine archives to analyze, among other sources, historic newspapers from the Black Hills region, journals, meeting minutes, and historic maps. The majority of these sources are from two archives: Deadwood History, Incorporated's, Deadwood Centennial Archive's, and History Nebraska's. Women's contributions in the 1870s through the 1880s made Deadwood a prominent city of the Black Hills and recognizing their work will allow the real history of Deadwood to come to life.

Author: Jessica Long, University of Nebraska-Lincoln

Early Forecasting of Crop Production and Quality using UAV Remote Sensing and Machine Learning

Abstract: Rapid, accurate, and non-destructive estimation of crop grain yield production and quality (often represented by seed composition such as protein and oil levels) at fine scale during the growing season is crucial in terms of field management practices such as site-specific irrigation and fertilization for improved crop production and profitability. Additionally, in-season estimation of crop production and quality with high accuracy can facilitate field-based high throughput plant phenotyping and enable the identification of high-yielding cultivars efficiently. Remote sensing technology provides timely, non-destructive, instantaneous, and economical crop monitoring and scouting over large areas and has become an essential tool in a variety of agricultural applications. In recent years, rapid advancement in Unmanned Aerial Vehicles (UAV) and sensor technologies have resulted in low-cost and flexible solutions that can provide remote sensing data at high spatial, temporal, and spectral resolutions. In this study, we investigate the potential of UAV-based multisensory remote sensing data (i.e., Multispectral, Hyperspectral and LiDAR) for in season estimation of crop (i.e., soybean, wheat, and corn) grain yield and seed composition (i.e., protein and oil) using machine learning, especially cutting-edge deep learning methods. Our results show that UAV-based multitemporal and multisensory imaging, along with cutting-edge deep learning approaches employed in this research delivers important insights for early estimation of crop final production, as well as grain quality indicated by seed protein and oil compositions, and benefit decision making for in season field management and crop marketing.

Author: Maitiniyazi Maimaitijiang
South Dakota State University

A Dissertation Pilot Study: Why, Where, How, and What Now?

Abstract: Doing qualitative or mixed methods dissertation research (or any research) can be difficult at times and doing that research in a small community that is also a subculture may compound the effort. Figuring out where to start and how to find help or advice can sometimes be daunting. This presentation, geared mainly toward those who may wish to one day perform qualitative research involving smaller groups, seeks to examine the various aspects of one researcher's process in a fun, yet informative way. From finding resources, creating surveys, choosing sampling methods, conducting interviews, data analysis, and ultimately writing the dissertation, the author discusses their (continuing) journey through a pilot study. This presentation aims to aid and educate by illustrating the study plan vs. the reality, what was learned from the experience, and any changes that might be made in the future.

Author: Alex R. Mohr
University of Nebraska-Lincoln

Battle Maps and Data: a HGIS for the Tactical Cartography of the AEF

Abstract: Historical military maps produced since the First World War (FWW), an underexplored class of archival document, present attractive targets for historical geographic information systems (HGIS) methods due to the large amount of data they contain and—because such maps were often produced in series—the opportunity to combine spatial and temporal analysis. HGIS have become a powerful analytical tool for exploring past events and reconstructing historical landscapes. However, a consistent them in criticisms of HGIS methods is the high investment in terms of time and labor that researchers must devote to creating spatial databases. One method of overcoming this challenge is for researchers to employ effective design for the spatial databases into which they deposit the data they extract from map documents. This paper uses an exploration of the American Expeditionary Force's (AEF) maps from the Battle of the Meuse-Argonne in 1918 to showcase an enhanced entity relationship (EER) database structure for organizing the data coded into these battle maps. Moreover, this paper highlights three HGIS methods for analyzing the resultant data that demonstrate the value of the database structure for historical analysis.

Author: Joel Radunzel, Shawn Hutchinson
Kansas State University

Monitoring Crop Progress at Field Scales in Near-Real-Time by Fusing Harmonized Landsat and Sentinel-2 Time Series with Geostationary Satellite Observations

Abstract: Crop phenology has been widely detected from multiple historical satellite observations. Conversely, Near-Real-Time (NRT) monitoring of crop progress from timely available satellite data is barely investigated due to the lack of high-frequency cloud-free satellite observations. To address the challenge, this study proposes a novel algorithm for operational NRT monitoring of crop progress at the field scale. This algorithm first fuses the high spatial resolution (30 m) Harmonized Landsat and Sentinel-2 (HLS) data and the high temporal frequent (10 minutes) Advanced Baseline Imager (ABI) observations to generate cloud-free time series of HLS-ABI EVI2 (two-band Enhanced Vegetation Index) with a Spatiotemporal Shape-Matching Model (SSMM). It then predicts future potential EVI2 values at a given pixel using a reference EVI2 time series obtained from the neighboring pixels in the preceding year. Integrating the currently available HLS-ABI observations and the predicted future EVI2 values to generate annual EVI2 time series, the algorithm finally detects six crop phenometrics including greenup onset, mid-greenup phase, maturity onset, senescence onset, mid-senescence phase, and dormancy onset. The NRT monitoring are continuously updated and improved with new HLS and ABI observations at a weekly basis throughout the growing season. We evaluate the NRT monitoring against standard phenology products, PhenoCam observations, as well as the weekly Crop Progress Reports released from the NASS of the USDA in 2020 across Iowa. Our results prove that the algorithm could be implemented for NRT monitoring of various crop phenometrics from field, state, to national scales.

Authors: Yu Shen, Xiaoyang Zhang, Shuai Gao, Yongchang Ye, Yuxia Liu,
South Dakota State University
Zhengwei Yang, U.S. Department of Agriculture
Weile Wang, California State University Monterey Bay

Forming Sustainable Habits using the "Paper Error Correction Method."

Abstract: The critical ecological situation in which humanity finds itself requires decisive and strategic action. One movement vector concerns the reduction of landfills, which can be achieved by reducing consumption, increasing the diversion rate, and reducing the contamination rate. Recycling has a long history, but it is still not an automatic habit, which, in turn, is evidence of weak sustainable values. "The paper-based through error-correction method" can be implemented to improve recycling outcomes on campus. It is one of the least human and financially costly tools in forming good, permanent habits. This method helps to inform a higher number of people and is time efficient. Paper-based education refers to informing and educating with the help of signage and stickers. In addition to the standard requirements and criteria, signage is edited according to knowledge obtained from previous mistakes found during the waste audit. This method draws attention to recycling criteria and needs and thus starts the development of sustainable habits and a positive attitude of sustainable thinking and values.

Authors: Valentyna Stopul, George White
South Dakota State University

A Benchmark Dataset of Land Surface Phenology from a Fusion of Harmonized Landsat 8 and Sentinel-2 Observations with PhenoCam Time Series

Abstract: Land surface phenology (LSP) products are frequently of large uncertainties because satellite time series always contain gaps caused by noise and persistent cloud/snow cover and the LSP quality has been poorly validated due to the lack of spatially comparable ground observations. Therefore, this study fused the Harmonized Landsat and Sentinel-2 (HLS) time series with near-surface PhenoCam observations to generate a set of 30m standardized phenology datasets for 78 regions of 10 × 10 km across a wide range of ecological and climatic regions in North America during 2019 and 2020. The HLS-PhenoCam LSP datasets are composed of (1) the 3-day synthetic gap-free HLS-PhenoCam EVI2 time series that are physically meaningful to monitor the vegetation development across heterogeneous levels, train models (e.g., machine learning) for land surface mapping, and extract phenometrics from various methods; and (2) the four key phenometrics (accuracy ≤ 5 days) that are spatially continuous and scalable, could be applied to validate satellite-based phenological products (e.g., global MODIS and VIIRS LSP), develop phenological models, and analyze seasonality and climate changes on terrestrial ecosystems.

Author: Khuong Tran, Xiaoyang Zhang
South Dakota State University

Exploration of Long-Term Trends of Global Land Surface Phenology from AVHRR, MODIS, and VIIRS

Abstract: Land surface phenology (LSP) is one of the most important indicators of climate change. Longterm LSP products are commonly derived by integrating observations from different satellite sensors, typically the Advanced Very High-Resolution Radiometer (AVHRR), the Moderate Resolution Imaging Spectroradiometer (MODIS), and the Visible Infrared Imaging Radiometer Suite (VIIRS). However, contradictory LSP trends have been reported, because the data quality of the three

sensors varies greatly, particularly due to the cloud-caused gaps and sun-sensor geometry corrections. Therefore, the aim of the study is to explore the consistency of the long-term LSP trends derived from AVHRR, MODIS, and VIIRS. We developed a Spatiotemporal Shape-Matching Model (SSMM) to reconstruct the high-quality time series of vegetation indices to reduce the cloud impacts on LPS detections. We also analyzed the impacts from Bidirectional Reflectance Distribution Function (BRDF) correction by comparison of LSP metrics derived from both surface reflectance (SF) and Nadir BRDF-Adjusted Reflectance (NBAR) datasets. Specifically, we first generated the climatology 3-day two-band Enhanced Vegetation Index (EVI2) using MODIS NBAR dataset from 2003-2022. We then used the climatology EVI2 to fuse with the EVI2 time series calculated from AVHRR SF (1981-2019), MODIS SF/NBAR (2000- 2023), and VIIRS SF/NBAR (2012-2023), respectively. The fused EVI2 time series were further applied to detect the LPS metrics using hybrid piecewise logistical models. Our results show that SSMM could reduce the phenological inconsistency among sensors, especially pixels with large gaps in EVI2 time series. BRDF correction has a large impact on the LSP metrics, especially in evergreen forests.

Authors: Yongchang Ye, Xiaoyang Zhang, Shuai Gao, Shuai An
South Dakota State University

Spatial Patterns of Best Management Practices and Local Contextual Factors in the Chesapeake Bay Watershed

Abstract: Water quality issues are pervasive and complex, impacting human health and the environment. Addressing these challenges necessitates comprehensive approaches involving stakeholders, research, policy development, and sustainable management practices. As part of a Total Maximum Daily Load for nutrients and sediment, jurisdictions across the Chesapeake Bay Watershed have developed watershed implementation plans (WIPs), which contain suites of best management practices (BMPs). BMPs are designed to reduce the amount of pollutant load to the Bay, thereby protecting wildlife habitats and improving water quality. This research reveals spatial patterns of BMP selection and the degree to which WIP composition varies by the social, environmental, and spatial context in the most recent (Phase III) WIP process. We first develop a typology of BMP selection using model-based clustering methods. Second, we analyze spatial patterns of BMP selection and adoption patterns. Finally, we implement Random Forest algorithms to identify the multi-scale determinants of BMP selection, as well as how those determinants (e.g., land use/land cover [LULC], local water quality) differ at the state scale. Our findings show distinct spatial clustering of similar BMP planning between urban and agricultural areas at the land-river segment scale. We also find that distance to the Bay, LULC, BMP cost-effectiveness, and nutrient load source have the most significant influence on BMP planning, and that the economic factors in predicting BMP planning vary substantially over space. These results may help guide future phases of the WIP planning process and move the system towards more optimal outcomes.

Authors: Kwang-il (Jason) Yoo, Patrick Bitterman
University of Nebraska-Lincoln

Vegetation Phenology from Surface, Near surface, and Multiple Resolution Space Observations

Abstract: Vegetation phenology characterizes the seasonal cycles of plant processes and their connections to environmental changes, so that it has a large impact on ecological systems, biogeochemical cycles, and biophysical processes. Currently, vegetation phenology has been observed across various spatial scales. Surface-based (In-situ) phenology observations provide sharply defined life cycle events for individual plant species, such as the appearance of first bloom, first leaf unfolding, and first leaf coloration. Near-surface PhenoCam captures digital images from tower-mounted web cameras, thus it provides consistent and continuous monitoring of vegetation canopy conditions at local area without cloudy and atmospheric contaminations. Space-born satellites observe temporal dynamics of vegetation communities in a pixel that encompasses a mosaic of species and vegetation types, but satellite data are frequently impacted by cloudy contaminations. With the enlargement of pixel size from 3m to500m in multiple satellite sensors, the vegetation heterogeneity increases considerably. This study investigated the similarity and difference of vegetation phenology measurements across scales and further proposed the bridge between near-surface measurements and space observations. It was found that (1) in-situ phenological events are hard to directly compare with satellite observations, but their difference reduces from heterogeneous to relatively homogeneous regions; (2) PhenoCam phenology is overall well matched with satellite-detected phenometrics, but their spatial mismatch significantly affects their direct linkages; (3) satellite-detected phenometrics at 3m, 30m, and 500m pixels cannot be simply averaged from finer to coarser pixels; and (4) fusing PhenoCam time series with satellite observations is able to produce high quality phenology detections.

Author: Xiaoyang Zhang, Yongchang Ye, Khuong Tran, Yuxia Liu
South Dakota State University

Poster Session

2:00 P.M. – 3:00 P.M.

Palisades Room II and III

Remote Sensing Based Identification and Mapping of Winter Cover Crops for Sustainable Agriculture in Minnehaha County

Belinda Apili
South Dakota State University

Tsunami Evacuation Areas of the Big Island of Hawaii

Keith Bremer, Diane Nunez, Joshua Knolla, Josie Hemphill
Fort Hays State University

Geomorphic Changes and Timescales of Incisional and Aggradational Periods in Kings Creek, Northeast Kansas

Moupyali Chakravarty, Abigail L Langston
Kansas State University

Northwestern Kansas Well Water Mineralization

Emma Cohn, Todd W Moore
Fort Hays University

Wheat Fusarium Head Blight (FHB) Disease Detection using UAV Multispectral Imagery and Machine Learning

Ubaid Janjua, Maitiniyazi Maimaitijiang, Bruce Millett, Shahid N. Khan, Mohammad M. Billah, Swas Kaushal, Madalyn Shires, Dalitso Yabwalo, Sunish K Sehgal, Shaukat Ali
South Dakota State University

Murky Water: Investigating Spatial and Temporal Patterns of Turbidity of Strawberry River and Reservoir using Landsat and Drone Imagery

Hannah Johnston, Ruth Kerry
Brigham Young University

Modeling Future Scenarios of Sustainable Agricultural Innovations Adoption: An MCE Analysis of Biodegradable Mulch Suitability

Michael Madin, Kate Nelson
Kansas State University

Evaluating MODIS and VIIRS derived Spring Wheat and Rice Phenology in Comparison with Field-Based Crop Progress Data

Naeem Abbas Malik, Xiaoyang Zhang
South Dakota State University

Exploring Field-Level Spatial and Temporal Soil Moisture Dynamics with the OPTRAM Model

Neda Mohamadzadeh, Andres Patrignani, Marcellus M Caldas
Kansas State University

Derivation of High Spatial Resolution Soil Moisture Map from Sentinel-1 and DEM Images in Support of Agriculture Management

Lina Ndekelu, Hankui Zhang
South Dakota State University
Jean Robert Bwangoy
University de Kinshasa

Wiping Out Kellom Heights: Visualizing the Racial Impact of Urban Renewal in Omaha

Mia Nigro
University of Nebraska at Omaha

Spain's Tourism and Climate Change

Osiris Nunez Espinoza
Fort Hays State University

Whooping Crane Stopover Habitat Model Development and Validation, Quivera National Wildlife Refuge, Kansas.

Ifeoma Okonye, Shawn J. Hutchinson
Kansas State University

Assessing The Accessibility of Public Transit in A Metropolis Using Geospatial Analysis

Akintoye Oyelami
University of Nebraska at Omaha

Developing a Framework for Understanding Climate Variability's Impact on Ranching in the Midwest

Caroline Ruto
Kansas State University

Unlocking Agricultural Potential in Hilly Landscapes: Advancing Digital Soil Mapping by Integration of Empirical and Mechanistical Methods

Mostafa Sadeghnejad, Arnaud Temme
Kansas State University

The Disappearing Lake: Investigating the Shrinking of the Great Salt Lake and Links with PM2.5 and PM10 Air Pollution

Kirsten Sanders
Brigham Young University

Attempting to Determine the Relationship of NDVI During Different Times of Kansas Wildfires

Valerie Scott
Fort Hays State University

Monitoring of Slum Area Dynamics in Dhaka City, Bangladesh Using Remote Sensing

Soubhoon Sadeq Shinjini
South Dakota State University

Understanding Spatial Temporal Clustering and Landslide Path Dependency Using Multi-Temporal Landslide Inventory

Harsimran Singh Sodhi, Arnaud Temme
Kansas State University

A Framework for Identifying Marginal Lands for Solar Photovoltaic Installation

Mobashsira Tasnim, Marcellus M Caldas, James Bergtold
Kansas State University

Hotspot Analysis of Harmonized Landsat and Sentinel-2 Chlorophyll Indexes in Lakes of the Mississippi River Headwaters, Minnesota

Gregory Vandeberg, Jacob Moll, Jeffrey VanLooy, Mbongowo Mbuh
University of North Dakota

Poster Abstracts

(Listed alphabetically by last name of presenting author)

Remote Sensing Based Identification and Mapping of Winter Cover Crops for Sustainable Agriculture in Minnehaha County

Abstract: Winter cover crops also known as cold weather cover crops are crops that are planted in early or late fall for purposes of providing green manure and winter soil protection and offer other vital benefits like soil health, erosion prevention, nitrogen-fixing, and carbon sequestration. These crop practices have been shown to improve agroecosystem resilience to climate change. This study focuses on the identification and mapping of winter cover crops in Minnehaha County, South Dakota, and analyzes the adoption change pattern over a period of 7 years. The study opts to utilize the advanced remote sensing and machine learning - Random Forest classification algorithm to analyze high-resolution multispectral imagery (Sentinel-2). In addition, the study will integrate the image-based, ground truth, and the Cropland Data Layer(CDL) from the US Department of Agriculture to develop a random forest classification model to train and validate the data. To identify, analyze, and visualize the adoption pattern, the study opts to use statistical and time series analysis. A detailed understanding of the spatial and temporal adoption pattern of winter cover crops could aid informed decision-making by policymakers and funding agencies that are trying to encourage and promote the adoption of these cover crops. In addition, the study findings could also be used as a reference by other farmers as a motivation to use these crops. This approach highlights the crucial role of winter cover crops in enhancing soil health and agricultural sustainability.

Author: Belinda Apili
South Dakota State University

Tsunami Evacuation Areas of the Big Island of Hawaii

Abstract: The Big Island of Hawaii position puts the island in a precarious position when it comes to tsunamis. Being in the center of the Pacific Ocean leaves it vulnerable to tsunami strikes from multiple regions of the Pacific Ring of Fire. Due to this the residents of the island must always be prepared to evacuate in case of an emergency. The ability to evacuate quickly and efficiently can be the difference between life and death for a quick striking disaster such as a tsunami. This study aimed to find out whether GIS can be used to locate evacuation areas for the Big Island. Using multiple variables with a focus on land use it was hypothesized that the use of the software would prove to be effective at locating evacuation areas. The study found that evacuation areas could be found through this methodology and that with a more extensive study it would be possible to find the evacuation routes for the people of the island as well. The knowledge and methods gained from this study will allow for future studies to be done on other regions of the world that are at risk of tsunami strikes**.**

Author: Keith Bremer, Diane Nunez, Joshua Knolla, Josie Hemphill
Fort Hays State University

Geomorphic Changes and Timescales of Incisional and Aggradational Periods in Kings Creek, Northeast Kansas

Abstract: Understanding geomorphic changes in river systems is vital for comprehending their dynamic behavior and evolution over time. This study investigates past and present geomorphic variations in Kings Creek, Northeast Kansas, focusing on incisional and aggradational periods. Kings Creek presently undergoes incision but has experienced multiple aggradation phases during the Holocene, evident in fluvial terraces up to 5 meters above the current stream level. Cycles of aggradation and incision on Kings Creek are attributed to natural climate variability or shifts in base level. Our research aims to characterize the time scales of natural processes of incision and aggradation in order to determine to what extent anthropogenic factors play. Abandoned meander cutoffs offer insights into channel mobility and previous channel elevations. Rivers deposit sediment during aggradation and stability, forming meander loops and point bars. However, changes in sediment supply, discharge, or base level can trigger a shift to incision and meander abandonment. Core samples from abandoned meander cutoffs were collected for grain size analysis, range from 1 – 5 meters, enabling the interpretation of depositional environments. The samples were collected from above the bedload gravel layers and represent sediment that was deposited during the period of active meander occupation. By analyzing cross-sectional profiles of meanders, including parameters like width-to-depth ratio and bank slope, we can predict the maturity and developmental stage of meanders which also acts as a proxy for meander age. These results will shed light on the depositional history and environmental changes during the transition from incision to aggradation.

Author: Moupyali Chakravarty, Abigail Langston
Kansas State University

Northwestern Kansas Well Water Mineralization

Abstract: Many Kansas residents rely on well and aquifer water sources that may contain contaminants. Testing wells that are not regulated, therefore, is important for the health and well-being of rural Kansans. In collaboration with the Kansas Department of Health and Environment(KDHE), we sampled and tested water from unregulated domestic, livestock, and irrigation wells within the alluvial plains surrounding Prairie Dog Creek (PDC), Sappa Creek (SC), Beavercreek (BC) in northwestern Kansas. We focused on the following contaminants: arsenic, chloride, conductivity, iron, manganese, nitrate, selenium, sulfate, and uranium. Results were compared against their known maximum contaminant level (MCL) or secondary level (SL), and distributions were statistically and spatially analyzed. We are not confident about the distribution of contaminants in SC and BC because of low sample sizes. In PDC, however, we obtained sufficient evidence to highlight areas where contaminants are found in excess of MCLs or SLs. Additional sampling is needed to better represent the statistical and spatial distribution of contaminants in these alluvial plains. Complementary research is also needed to understand the natural and anthropogenic sources of these contaminants.

Author: Emma Cohn, Todd Moore
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Wheat Fusarium Head Blight (FHB) Disease Detection using UAV Multispectral Imagery and Machine Learning

Abstract: Wheat is an important primary crop that feeds billions of people worldwide. Wheat diseases, particularly Fusarium head blight (FHB) disease often has severe effect on wheat yield quantity and quality, and potentially threatens the health of humans and livestock. Traditional field surveying-based methods for monitoring and assessment of wheat diseases are time-consuming and inefficient. Remote sensing approach, particularly aerial imaging from Unmanned Aerial Vehicles (UAV) has become an important tool for fine-scale and rapid field scouting and crop growth and health monitoring in recent years. The work is to investigate the potential of combination of high-resolution UAV multispectral imagery with machine learning methods in detection of FHB disease severity. Two experimental wheat fields are setup in Volga, South Dakota USA in 2022. The severity of FHB disease was assessed and rated periodically in the field, and synchronous UAV flights were conducted to collect multispectral imagery. UAV multispectral imagery-based canopy spectral and texture features were derived and used as input variables for machine learning models to predict FHB disease severity levels. Machine learning methods such as Random Forest Regression, Multilinear Regression, Support Vector Regression, and Partial Least Squares Regression were employed. The results show that both canopy spectral and texture features are important indicators for wheat FHB disease severity and can contribute to predict FHB severity. Additionally, UAV remote sensing and multispectral imaging, coupled with machine learning-based modeling is viable approach to rapidly and accurately detect wheat FHB disease severity.

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Murky Water: Investigating Spatial and Temporal Patterns of Turbidity of Strawberry River and Reservoir using Landsat and Drone Imagery

Abstract: Turbidity is a measure of light that is scattered or absorbed by suspended particles in a body of water. Higher turbidity means murkier water, and lower turbidity means clearer water. The Strawberry River and Reservoir areas are breeding grounds for Salmon, and they need clearwater to thrive. This poster investigates seasonal changes in turbidity of the Strawberry River and Reservoir in relation to seasonal weather. The turbidity is investigated through the Normalized Difference Turbidity Index (NDTI) of samples points for the reservoir calculated from LANDSAT 7 imagery from different seasons. The turbidity of the river was calculated at sample points based on Drone imagery from different seasons. Kriging was used to map spatial variations in turbidity within the lake and the river then Bivariate Local Moran's I tests were used to see if clusters of high and low turbidity were consistent between seasons.

Author: Hannah Johnston, Ruth Kerry
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Modeling Future Scenarios of Sustainable Agricultural Innovations Adoption: An MCE Analysis of Biodegradable Mulch Suitability

Abstract: The agriculture sector is facing the challenge of feeding a growing population in the midst of global environmental change— twin potentially major stressors to the food production systems. For instance, the U.S. in recent decades has experienced climate events such as droughts and precipitation variabilities, which are projected to intensify to levels where all counties could permanently exceed the baseline variability of occurrence by 2050. These impacts on agricultural production systems and environmental degradation demand a transition towards more sustainable innovative practices. Adoption and utilization of sustainable agricultural practices have been proposed as one part of the viable solutions; however, research on future scenarios of adoptions remains limited. As such, this proposed study seeks to model future scenarios of the prospects of farmers adopting biodegradable mulches (BDM)— environmentally sustainable mulching material aimed to protect crops from climate variabilities. Specifically, a Multi-Criteria Evaluation model in GIS will be used to assess the suitability of BDM applicability under different future scenarios presented in the Shared Socioeconomic Pathways (SSPs)model. An understanding of whether and how the future scenarios of BDM suitability will shift would be useful to policymakers in efforts to promoting its adoption as a sustainable agriculture practice. BDM adoption among farmers would also help replace plastic mulch materials— which take a longer period to degrade and are associated with ecologically and agronomically detrimental outcomes.

Author: Michael Madin, Kate Nelson
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Evaluating MODIS and VIIRS Derived Spring Wheat and Rice Phenology in Comparison with Field-Based Crop Progress Data

Abstract: The aim of study was to evaluate spring wheat and rice phenological transition dates derived from MODIS and VIIRS in comparison with ground truth crop progress data for the major crop growing states. MODIS and VIIRS land surface phenology products MCD12Q2 and VNP22Q2from 2008 to 2021 and 2013 to 2021 respectively were downloaded. Crop data layer (CDL) was used to identify pure crop pixels within MODIS and VIIRS phenology layers. The average mean absolute difference (MAD) between MODIS and VIIRS derived greenup onset and emergence of spring wheat reported by NASS was around 10 and 5 days respectively for majority of states. Similarly, the MAD between MODIS and VIIRS derived greenup onset dates and rice emerged was less than 17 and 15 days respectively for most of the states. The MAD for MODIS derived peak dates and field-based headed stages for spring wheat was less than 5 days for Idaho and Montana states, around 10 days for Minnesota and North Dakota and 21 days for South Dakota. The MAD for VIIRS derived greenness maximum dates and field-based headed stages for spring wheat was less than 10 days for Minnesota and North Dakota, 18 and 14 days for Idaho and Montana states respectively. Moreover, MAD for MODIS and VIIRS derived peak and greenness maximum and field-based headed stage for rice was less than 10 and around 20days respectively. The results indicated that phenometerics derived from MODIS and VIIRS were comparable to NASS reported stages for spring wheat and rice.

Author: Naeem Abbas Malik, Xiaoyang Zhang
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Exploring Field-level Spatial and Temporal Soil Moisture Dynamics with the OPTRAM Model

Abstract: Microwave remote sensing such as NASA's Soil Moisture Active-Passive (SMAP) satellite has
great potential for global- and continental-scale soil moisture mapping. However, its coarse spatial resolution (36 km) often hinders field-scale applications in agriculture. The Optical TRApezoid Model (OPTRAM) is an emerging method that fills this gap by harnessing high spatial resolution satellite images to estimate surface soil moisture. This study evaluated the spatial and temporal accuracy of OPTRAM-derived soil moisture against a dataset of in situ soil moisture measurements. The spatial analysis consisted of using harmonized Sentinel-2 MSI reflectance data obtained from Google Earth Engine (GEE) to generate 20-m spatial resolution soil moisture maps at the KONA site of the National Ecological Observatory Network (NEON) near Manhattan, Kansas. OPTRAM-based soil moisture maps were compared with spatially intensive ($n > 200$) soil moisture surveys using a hand-held sensor obtained in July 2019. The temporal analysis consisted of comparing OPTRAM-derived soil moisture timeseries in 2019 and 2020 with daily volumetric water content at 5 cm depth collected using five calibrated capacitance sensors available at the NEON site. Our findings indicate that OPTRAM effectively captures temporal variations in soil moisture at the field-scale with a root mean square error (RMSE) of 0.089 m m. but does not accurately capture intra-field spatial variability with a root mean square error (RMSE) of 0.111 m m .

Authors: Neda Mohamadzadeh, Andres Patrignani, Marcellus M Caldas
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Derivation of High Spatial Resolution Soil Moisture Map from Sentinel-1 and DEM Images in Support of Agriculture Management

Abstract: Soil moisture is an essential variable for understanding Earth's water cycle, improving climate models, enhancing weather forecasting, and supporting crop management practices. Current soil moisture maps have spatial resolutions spanning from 1 km to 36 km, these are too coarse for practical uses at local scale. High spatial soil moisture data is urgently needed for applications such as croplands management and monitoring, and regional hydrology modeling. The availability of high spatiotemporal satellite imagery and standardized ground true soil moisture datasets coupled with advances in remote sensing and deep learning techniques raise the potential to generate finer spatial and temporal soil moisture maps. The goal of our study is to develop a deep learning model that derives high spatial soil moisture from Sentinel-1 and digital elevation model (DEM) images. The developed model is trained using in-situ soil moisture measurement data from the International Soil Moisture Network (ISMN). The results show better model performance than existing high spatial resolution soil moisture products such as the NASA SMAP Sentinel-1 soil moisture datasets.

Authors: Lina Ndekelu, Hankui Zhang
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Wiping Out Kellom Heights: Visualizing the Racial Impact of Urban Renewal in Omaha

Abstract: How did the City Planning Proposals of the early 1960s impact the historically black neighborhood of Kellom Heights? The historic neighborhood of Kellom Heights in Omaha, NE was bound by Charles, 24th,Cuming, and 30th streets. A 1966 "Neighborhood Plan" map of Kellom Heights from the Omaha City Planning Department showed that the original residential layout of the neighborhood was set to be almost completely demolished and redeveloped. The interstate was planned on top of 27th Street and 27th Avenue, which would completely remove those streets and permanently clear that area of all residential properties. The rest of the neighborhood was also set to be redeveloped, and very few of the original buildings would be maintained. The "Neighborhood Plan" map showed that most of the residential properties would be sold to private developers who would demolish and replace the present homes with higher-value suburbs. This project is mapping a sample size of 42 addresses and studying the progressing demographics of the residents at those properties from 1920, 1940, and 1953 to understand the primary groups that were impacted by the implementation of the Urban Renewal Program in this area of Omaha. All 42 addresses were originally located in the historic neighborhood of Kellom Heights.

Author: Mia Nigro
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Spain's Tourism and Climate Change

Abstract: Spain's Mediterranean climate has been a major attraction for tourists all around the world. However, with Spain experiencing increasing temperatures due to climate change, there is a concern that this could have detrimental effects on their environment, tourism and potentially impact the country's economy. The aim of this study is to investigate the relationship between climate change and the Spanish tourism sector. Additionally, a policy analysis was conducted to understand what measures have been taken and are currently in progress to improve Spain's environmental sustainability. These data utilized for this study was obtained from INE.se, Spain's Statistics National Institute. To gain a better understanding, maps, frequency analysis, reports from the Intergovernmental Panel on Climate Change (IPCC), and relevant literature were used.

Authors: Osiris Nunez Espinoza
Fort Hays State University

Whooping Crane Stopover Habitat Model Development and Validation, Quivera National Wildlife Refuge, Kansas.

Abstract: The whooping crane (Grus americana) is an endangered bird species facing critical challenges during its long migratory journey, emphasizing the need to identify suitable stopover habitats for survival and recovery. In line with previous research efforts within the Aransas-Wood Buffalo Population migratory corridor, this study focuses on modeling habitat suitability for whooping cranes in Kansas, a state with significant wind energy generation capacity and proposed developments like the Grain Belt Express transmission line. Our research centers on The Watershed Institute's (TWI) Habitat Suitability Index (HSI) model, with two primary objectives. First, we reconstructed the TWI HSI model, originally based on a priori hypotheses and GIS data, using ArcGIS Pro 3.x software.

Subsequently, we verified and validated the model's results against independently collected telemetered whooping crane locations, quantifying TWI HSI habitat assessment scores against real crane use patterns. Based on the verification and validation outcomes, our research aimed to refine the TWI model's habitat criteria. Future research will explore alternative modeling techniques, including logistic regression and machine learning, successfully employed in neighboring states, incorporating diverse predictor variables and rigorous statistical methodologies. The results of these efforts will serve as a critical foundation for conservation efforts within the Kansas portion of the Aransas-Wood Buffalo Population migratory corridor. This research informs strategies for development avoidance, habitat improvements, and protective measures, supporting the conservation of the endangered whooping crane. Moreover, it contributes valuable insights into habitat suitability modeling for broader wildlife conservation practices.

Authors: Ifeoma Okonye, Shawn Hutchinson
Kansas State University

Assessing The Accessibility of Public Transit in A Metropolis Using Geospatial Analysis

Abstract: Leveraging GIS technology streamlines the process of updating and interpreting geographical data, facilitating the planning, analysis, control, and management of transportation systems. This, in turn, offers valuable tools for transport modeling. To ensure the efficient and equitable provision of public transport services, several critical factors, including geographic coverage, frequency, passenger comfort, and accessibility for individuals, need thorough examination. In this study, I assessed the accessibility of public transportation, by examining the spatial distribution of bus stops and population across various census tracts within the Oregon metropolitan area. I aimed to understand the relationship between population density and transit accessibility in terms of catchment area in the metropolis. Are there correlations between high population density in census tracts and the presence of more bus stops? The study revealed an inverse relationship between population density and the concentration of bus routes. Specifically, the old town or city center displayed a relatively lower population density, while the density progressively increased as one moved away from the center. In contrast, the city outskirts exhibited a higher population density in comparison to the number of available bus stops. Additionally, the study identified "blank spots" within the metropolitan area, which became more prominent with greater distance from the city center. This suggests that bus stops had a more effective catchment area within the city center in comparison to the city outskirts. "Blank spots" refer to residential areas that do not meet the threshold for walkable access to public transport.

Authors: Akintoye Oyelami
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Developing a Framework for Understanding Climate Variability's Impact on Ranching in the Midwest

Abstract: Ranching is a significant production system in the United States, particularly in the Midwest. However, climate variability and extreme weather events can significantly impact decision making, ranch productivity and profitability. Ranchers must, therefore, navigate the uncertainty and risks associated with climate variability, such as droughts, floods, and wildfires, to ensure the

sustainability of the ranches. Thus, it is essential to understand the association between climate variability and rancher decision-making. This poster will present a framework that explores the key dimensions of rancher decision-making in response to climate variability, including barriers to adaptation, economic trade-offs, and the role of social learning within rancher communities. By analyzing these critical aspects, the framework offers a comprehensive understanding of the dynamic landscape in which ranchers operate. Given the significant footprint of the U.S. livestock sector and its dual role as a contributor to and victim of climate change, a detailed understanding of this sector is imperative for sustainable development, especially sustainable livestock production. Through this poster, we present a framework and a commitment to fostering resilience and sustainable practices within the Midwest livestock and ranching community.

Author: Caroline Ruto
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Unlocking Agricultural Potential in Hilly Landscapes: Advancing Digital Soil Mapping by Integration of Empirical and Mechanistical Methods

Abstract: Facing a rising world population, we are running up against the limits of our resources. Clearly, humans are highly dependent on crops that grow on soil. Thus, providing accurate soil maps is crucial for farmers, urban planners, and decision-makers to make the most out of the soil's productive capacity, and to protect it against degradation. Many have worked on preparing soil maps using modern digital empirical approaches and great progress has been achieved. However, in hilly areas, digital soil maps remain inadequate due to complex hillslope processes. To improve soil maps there, we must incorporate terrain variables and hillslope derivatives. Instead of variables that describe the current topography, we believe that variables that are mechanistically calculated may be more valuable. Such mechanistic-empirical mixed methods remain underexplored. By using this method, we aim to provide accurate digital soil maps for hilly regions. Specifically, I aim to mechanistically simulate the interaction between the processes of land sliding and hillslope diffusion on the one hand, and soil development on the other hand, in the model LORICA. Outputs of this model include timing and locations of all simulated landslides, the critical rainfall amount per location over time, and the soil depth. Instead of directly evaluating the quality of these outputs themselves as predictions for landslide risk or soil properties, I aim to use the outputs as covariates in digital soil mapping. This will test the hypothesis that mechanistic model outputs hold value in an otherwise empirical process.

Authors: Mostafa Sadeghnejad, Arnaud Temme
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The Disappearing Lake: Investigating the Shrinking of the Great Salt Lake and Links with PM2.5 and PM10 Air Pollution

Abstract: The Great Salt Lake (GSL) found in the Salt Lake Valley is a remnant of Lake Bonneville. In the 1980's the GSL reached record high levels. But by 2022, the lake has reached record lows. As Owens Lake in California has dried out it has become the main source of dust pollution in the U.S. with a price tag of $3.6 billion in damages (Wurtsbaugh & Sima, 2022). This research investigates potential links between the desiccation of the GSL and dust/particulate pollution. Two sizes of particulate pollution are usually examined, PM2.5 and PM10. The former is usually associated with

very small particles that result from incomplete combustion of vehicle fuel etc. However, PM10 pollution is usually most associated with dust from industry or dried soils. Dust particulates can be enriched in poisonous heavy metals such as arsenic, copper, lead and zinc which increases the hazard to humans from the dust pollution. This study maps spatial patterns particulate air pollution as captured by the Purple Air network for a seven-year period. This data is used in conjunction with imagery of the shrinking GSL and long-term weather patterns. to give a broader understanding of how the lake's desiccation could be impacting air quality in the surrounding urban areas.

Author: Kirsten Sanders
Brigham Young University

Attempting to Determine the Relationship of NDVI During Different Times of Kansas Wildfires

Abstract: Wildfires are prevalent events in many areas throughout the world, and this study specifically focuses on wildfires in Western Kansas. The aim of this study is to determine relationships between the landscape, normalized difference vegetation index (NDVI) , and five wildfires. This study will look at NDVI before, during, and after wildfire events in Kansas, as well as areas inside and outside during these times. Then this study aims to statistically determine if there is significant change in NDVI between these parameters (time and location). Other parameters that will be implemented and analyzed include aspect, slope, and landcover. These three variables can have impacts on the fuel available for the fire and will be used to understand how these influence Kansas wildfires. Understanding NDVI changes in relation to wildfires, in addition to parameters like aspect, slope, and landcover will further contribute to the understanding of wildfire relationships.

Authors: Valerie Scott
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Monitoring of Slum Area Dynamics in Dhaka City, Bangladesh Using Remote Sensing

Abstract: Dhaka, a rapidly growing megacity, is constantly facing numerous urbanization challenges. Of these, 'slums' or informal settlements have become a matter of serious concern for the relevant authorities and policymakers, as they are facing continuous challenges to improve the life standard of the slum dwellers. The need for proper and up-to-date data on the slum areas has become a vital task for researchers. The goal of this research is to showcase the prospect of remote sensing for slum detection and monitoring and to answer questions about detecting slum areas without physical surveys and tracking slum area changes in a high-density developing area. The study aims to address this issue by combining remote sensing and deep learning techniques. The research particularly seeks to detect and monitor slum areas in Dhaka city using the U-net segmentation deep learning method applied to PlanetScope satellite images. Preliminary results indicate a significant level of accuracy that shows the possibility of using this model. Furthermore, the study implies that deep learning methods combined with remote sensing in slum areas could pave the way to address the challenges faced by conventional research methods, especially in a developing city's context.

Authors: Soubhoon Sadeq Shinjini
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Understanding Spatial Temporal Clustering and Landslide Path Dependency using Multi-Temporal Landslide Inventory

Abstract: Landslides, one of the major natural disasters worldwide, cause significant damage to life, property and social and economic development. Therefore, it is crucial to identify hillslopes susceptible to landsliding. One way to achieve this is landslide susceptibility mapping, where statistical methods are used to correlate the landslide inventory to geological or topological factors. These maps until recently were purely spatial. Recently, studies have revealed that landslide susceptibility is influenced by time as well, i.e. that earlier landslides do affect the near-future landslide susceptibility. This effect was named landslide path dependency. Landslide path dependency has been quantified by using Ripley's K function in space-time, using one temporal and one spatial dimension, with the latter being estimated by calculating Pythagorean distance between consecutive landslides on an X-Y plane. However, the drawback of using the X-Y plane for analyzing spatial relationship between consecutive landslides is that it ignores the actual hillslope context. Here, we hypothesize that landslide path dependency is better captured using two spatial parameters in addition to time. One of these is the downslope distance between landslides along the slope in the downslope direction, and the other is the lateral distance: the distance along the same hill in the direction parallel to the slope. In our study we will accordingly modify Ripley's K to understand landslide path dependency and to predict landslide clustering pattern in three relevant dimensions.

Authors: Harsimran Singh Sodhi, Arnaud Temme
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A Framework for Identifying Marginal Lands for Solar Photovoltaic Installation

Abstract: Rising energy demand in the United States, projected to increase by 15% between 2020 and 2050, has spurred a growing emphasis on adopting energy-efficient technologies and expanding renewable energy infrastructure. However, this heightened investment in renewable energy infrastructure potentially exacerbates the current competition for accessible land resources between agricultural-based food production and energy generation in rural areas. For instance, while technically and economically promising, utility-scale solar PV facilities face a substantial challenge due to their notable land demand of around 2.5 to 3.5 hectares per MWac of installed capacity. Prior research emphasized identifying suitable SPV installation sites, leaving a research gap in exploring the prospects of marginal land for micro-grid SPV facilities. In their report, the National Renewable Energy Laboratory asserts that Kansas and the Great Plains have great potential for rural SPV power generation, with Kansas ranking 3rd within the CONUS. Thus, this research concentrates on developing a framework to identify marginal lands that would be suitable for SPV deployment in Kansas. We defined marginal land based on two broad criteria: (a) biophysical and environmental properties, such as slope, soil erosion, soil moisture content, soil temperature, drought intensity, and environmentally restrictive areas, and (b) specific land uses, including Conservation Reserve Program (CRP) lands, abandoned mine lands, and unproductive rangelands and pasture lands. We leveraged the GIS and remote sensing techniques to process the soil biophysical properties and land cover data. Our findings propose an avenue to harness marginal lands for sustainable energy production while safeguarding crucial agricultural resources within Kansas.

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Hotspot Analysis of Harmonized Landsat and Sentinel-2 Chlorophyll Indexes in Lakes of the Mississippi River Headwaters, Minnesota

Abstract: Algae blooms have become increasingly common in many bodies of water and are occurring in more and more new locations. These algae blooms can be harmful to aquatic species through eutrophication or produce toxins that can harm or kill organisms including humans. Past study methods have relied on in-situ sampling to determine algae and chlorophyll concentrations and can be time and cost intensive. Satellite-based algae bloom studies have mostly focused on oceans and large lakes in providing timely assessment of the concentration and extent of these blooms. Few studies have focused on medium and small-sized lakes. This study investigated the use of harmonized Landsat and Sentinel-2 imagery and chlorophyll indexes to determine the spatial and temporal pattern of algae in six lakes in the Mississippi River headwaters in Itasca State Park, Minnesota. Itasca State Park contains more than 100 lakes and lies within the Northern Forest Ecoregion of Minnesota. The lakes studied ranged in size from 0.022 km to 4.28 km . The harmonized imagery provided from NASA as surface reflectance includes atmospheric correction, cloud and cloud-shadow masking, geographic co-registration, reflectance normalization and bandpass adjustment. Water samples were collected from July through October 2022 and analyzed for Chlorophyll-a and other parameters. The results were compared to multiple spectral indexes determined from the harmonized imagery and a greenred-blue band index had the highest correlation with chlorophyll-a measured concentrations. Getis-Ord Gi* Hot Spot analysis of the lake chlorophyll indexes showed distinct distributions and patterns for the lakes investigated.

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