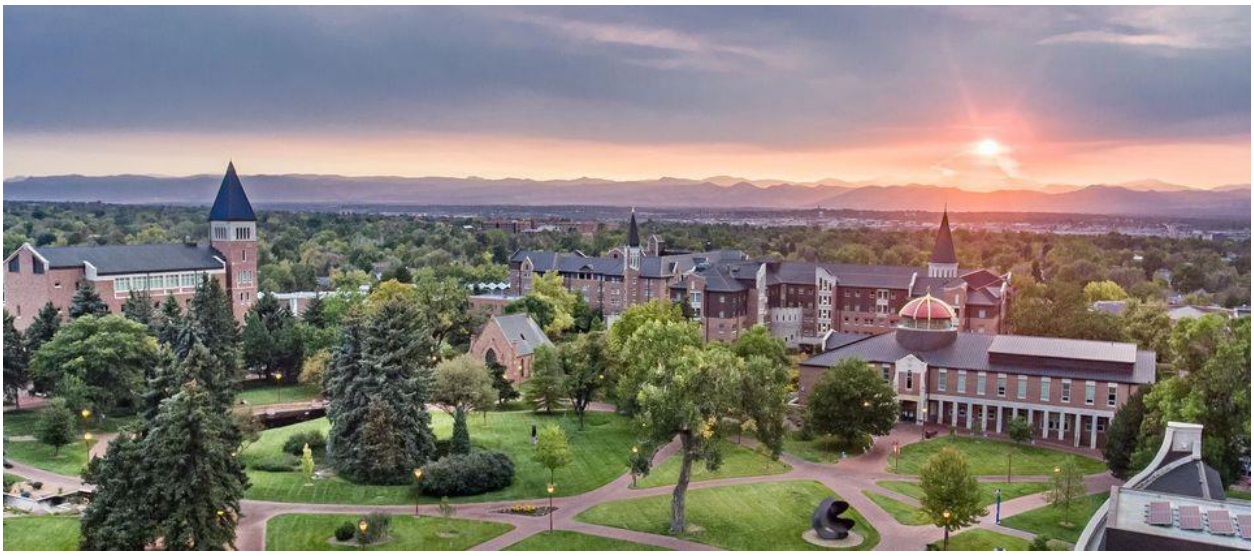
AAG
American Association of Geographers

Great Plains/Rocky Mountains Division

2022 Annual Meeting
October 14-15, 2022

Final Program and Abstracts



Hosted by

Department of Geography & the Environment
University of Denver

Conference Website

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Welcome to DU!

Welcome to the University of Denver, your host for the 2022 Annual Meeting of the American Association of Geographers Great Plains/Rocky Mountains Division. Founded in 1864, DU is the oldest private institution of higher education in the Rocky Mountain region. A doctoral granting university with very high research activity (R1) dedicated to the public good, DU is home to over 13,000 graduate and undergraduate students. With the main campus in suburban Denver, and the newly acquired Kennedy Mountain Campus located two hours north of Denver adjacent to the Roosevelt National Forest, students receive a multi-dimensional educational experience focused on advancing intellectual growth, promoting well-being, exploring character, and pursuing careers and lives of purpose.

Founded in 1945, The Department of Geography and the Environment recently celebrated its 75th anniversary. Home to 17 faculty, the department offers bachelors degrees in geography, geographic information science, and environmental science; masters degrees in geography and geographic information science; and the doctoral degree in geography. In addition, it offers academic minors in geography, geographic information science, geology, environmental science, sustainability, and tourism. Throughout all programs, a tradition of field research and active civic engagement provide students with a rich educational experience.

This year, we thrilled to return to a fully in-person conference! As of this writing, nearly 100 faculty, students, and professionals have registered to attend the meeting. Friday is a day of exploration, with field trips to experience the physical geography of the Colorado Front Range, to learn the history of the development of the iconic Red Rocks Amphitheatre, and a walking tour of the River North (RiNo) Arts District to witness the impacts of the craft beer industry on the neighborhood's economic revitalization. Saturday is a day of research presentations, with paper and poster sessions, the GeoBowl competition, and the banquet and awards presentation. Please join us for a welcome reception on Friday evening at the conference hotel, and we look forward to welcoming you to the DU campus on Saturday!

Acknowledgements

Thank you to the faculty, students and staff of the Department of Geography and the Environment who helped with the planning, logistics and delivery of the conference. Special thanks to Helen Hazen, program chair; Erika Trigoso, GeoBowl coordinator; Hanson Nyantakyi-Frimpong, student competition coordinator; and field trip leaders Steve Hick, Don Sullivan, Paul Sutton, Erika Trigoso, and Kris Kuzera. We appreciate the assistance of several graduate students, especially Emma Haydamack, Namrata Chatterjee, and Jecca Bowen for their help with the student social, the program committee and recruiting student volunteers; and Will Kiniston, department staff, for his help with logistics.

Many thanks to the AAG staff: Emily Fekete, for her guidance on conference best practices; Becky Pendergast, web designer extraordinaire; and Elin Thorlund and Oscar Larson for their invaluable assistance with the online registration and abstract submission systems. Thanks also

to Shannon O'Lear, GPRM Regional Councilor, and Becky Buller and Bob Watrel, GPRM officers.

We appreciate the help of colleagues from across the region who volunteered to serve as judges for the student presentation competitions and for assisting with the GeoBowl.

We are especially grateful to the Department of Geography and the Environment, the DU Office of Graduate Studies and Research, and the College of Natural Sciences and Mathematics for financial support.

Finally, a very special thank you to Patricia Guerra, for wrangling the myriad of logistics required to deliver the conference. Her assistance with negotiations for lodging, catering, room reservations, registration, and her attention to numerous other details was invaluable.

Michel Keables, GPRM Divisional Chair

GPRM Officers 2022-23

Chair	Michael Keables University of Denver
Vice Chair	Robert Watrel South Dakota State University
Secretary	Robert Watrel South Dakota State University
Treasurer	Robert Watrel South Dakota State University
Past Chair	Rebecca Buller University of Nebraska-Lincoln
Regional Councilor	Shannon O'Lear, University of Kansas

Recent GPRM Annual Meetings

2014	University of New Mexico (Joint Mtg with SWAAG)
2015	University of Nebraska at Kearney
2016	University of Colorado, Colorado Springs
2017	University of North Dakota
2018	Kansas State University
2019	University of Kansas
2020	Cancelled due to COVID
2021	University of Nebraska-Lincoln
2022	University of Denver

Conference Venues

Friday, October 14: Holiday Garden Inn Denver Tech Center (DTC), 7675 E. Union Ave, Denver, CO 80237, 303-770-4200. Field trip departures, registration, and welcome reception (complimentary hors d'oeuvres, cash bar). See the conference website for directions to the hotel.

Saturday, October 15: Sturm Hall/Community Commons, University of Denver, 2030 S. Race St., Denver, CO 80210. Registration, paper/poster sessions, GeoBowl competition, keynote address, banquet and awards presentation (see map below).

Getting to the University of Denver

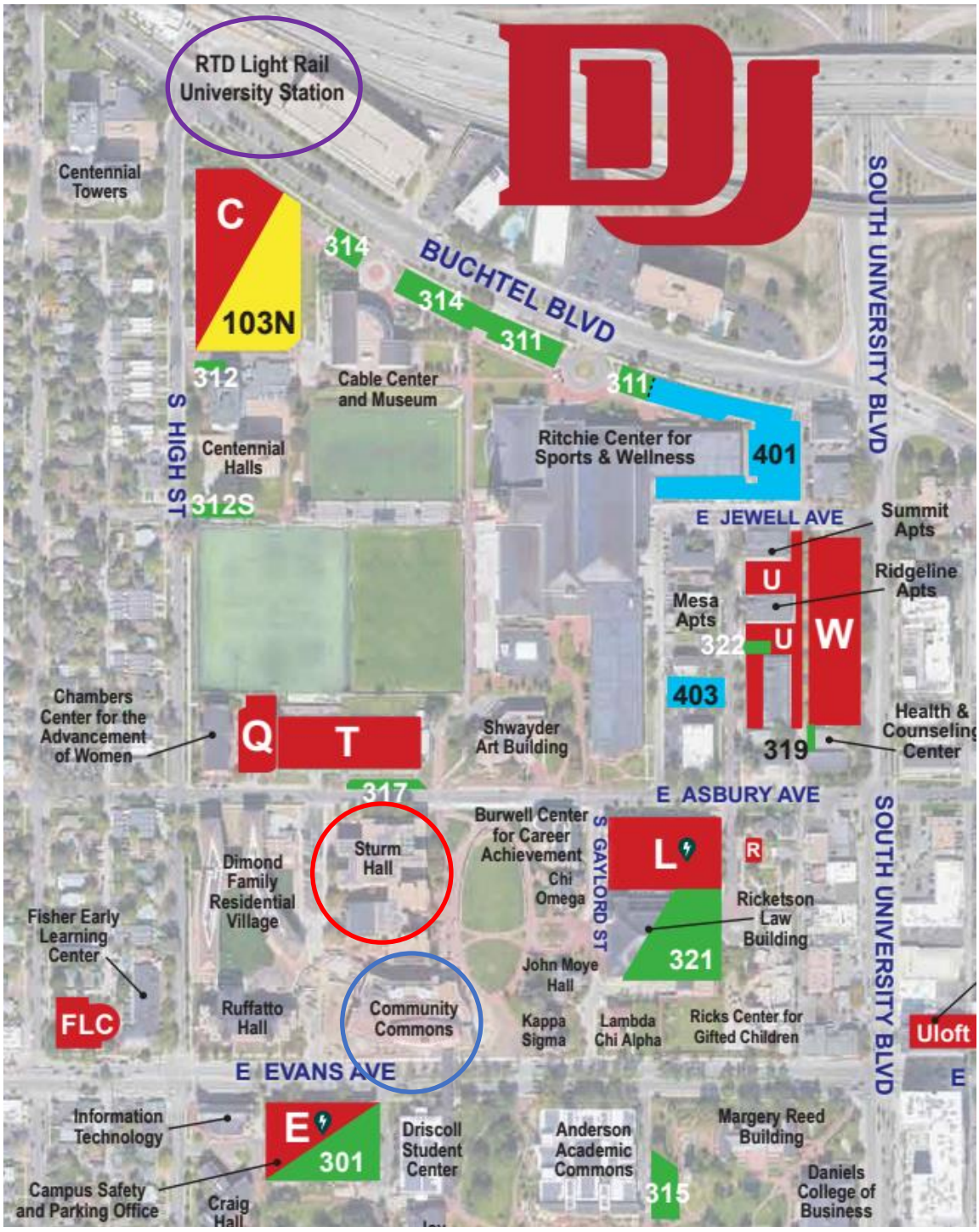
- *RTD Light Rail* - The most sustainable and cost-effective way to get to the DU campus is via the RTD light rail. The E Line and H Line trains both stop at the University of Denver Station. Sturm Hall is a 5 minute walk from the University of Denver Station. See the conference website for directions from the Hilton Garden Inn to DU via light rail.

- *By Vehicle*. Take I-25 to Exit 205 (University Blvd). Go south on University Blvd to Asbury St. Turn right on Asbury St. Sturm Hall is located on the south side of Asbury St. opposite the tennis courts. Parking near the DU campus is limited to street parking (difficult to obtain when the university is in session) and in select parking lots for an hourly fee (see map below). Sturm Hall street address: 2030 S. Race St, Denver, 80210. See the conference website for directions from the Hilton Garden Inn to DU.

Land Acknowledgement Statement

We would like to acknowledge that the University of Denver resides on land held in stewardship by the Cheyenne and Arapaho tribes. We recognize the descendant communities of the Northern Cheyenne Tribe of Montana, the Northern Arapaho Tribe of Wyoming, and the Southern Cheyenne and Arapaho Tribes of Oklahoma who were forcibly removed from this land. We also acknowledge the Southern Ute Indian Tribe and the Ute Mountain Ute Tribe, which are the only two federally recognized tribes in Colorado.

Today, Denver is home to many different citizens of Indigenous nations, and we recognize their enduring presence on this land by paying respects to their elders, both past and present. Please take a moment to consider the legacies of violence, displacement, migration, and resettlement that bring us together today and please join us in uncovering such truths at all public events. It is because of the sacrifices and hardships of the traditional Indigenous inhabitants of this land that we are able to be here to learn, collaborate, and share knowledge.



Sturm Hall – Sessions, GeoBowl

Community Commons – Banquet

Parking (hourly fee) – Lots 301, 317, 321

University Station (Light Rail)

Field Trips

Pre-registration required. Participants should meet in the Hilton Garden Inn lobby at the time indicated. Be sure to bring a water bottle, hat, and be prepared for abrupt changes in weather conditions.

- **Friday, October 14, 2022, 8:00 AM – 5:00 PM.** *Grasslands to Tundra: The Physical Geography of the High Plains and Colorado Front Range.* Steve Hick and Don Sullivan, University of Denver.

  Join your hosts on a day-long transect of the Front Range of Colorado from the grasslands of the High Plains to Subalpine forests, and weather permitting, the Alpine. We will travel by van and make several stops as we follow Bear Creek upstream. We will start our tour at iconic Red Rocks Park and work our way west climbing out of the plains and exploring conifer forests and wildflower meadows. We will visit the University of Denver Field Station and High-Altitude Lab and hike around Echo Lake. Above Echo Lake we enter the alpine tundra, with several stops to observe the flora and fauna of the alpine. We will complete the tour with a stop at Summit Lake, an alpine glacial lake above tree line and, weather permitting, continue our drive to the summit of Mt. Evans at 14,264' above sea level. Participants should bring a water bottle and appropriate outerwear as temperatures vary greatly along the transect, especially while on Mt. Evans.

- **Friday, October 14, 2022, 8:30 AM – 12:00 PM.** *Building and Exploring the World-Famous Red Rocks Amphitheater.* Paul Sutton, University of Denver.

  We will take a tour of the one the best-preserved Civilian Conservation Corps (CCC) camps established during the Roosevelt administration. This is where mostly young men lived while working on the building of the Red Rocks Amphitheater during the depression. We will then proceed to the Red Rocks Amphitheater and explore the amazing handiwork of those CCC workers of years gone by and reminisce about the bands and concerts we attended or just missed out on.

- **Friday, October 14, 2020, 2:00-6:00 PM.** *From Warehouses to Brewhouses: Revitalization with Craft Beer in the RiNo Arts District.* Kris Kuzera and Erika Trigoso, University of Denver.

  Over a decade ago, an industrialized sector near downtown Denver began revitalizing into the RiNo Arts District. Newly-transformed spaces became ideal locations for startup craft breweries, to which there are now more than a dozen locally. RiNo has become a destination for beer tourism in a city already known for craft beer. Some of Colorado's most recognizable breweries have also recently found a second home here. This walking tour will visit some of the most influential breweries in RiNo. We will explore varieties of style, scale, and space within this community, all while sampling some of the best craft beer in Colorado. This is a walking tour. Participants are responsible for purchasing a $6.00 RTD Day Pass as well as the cost of beverages at each stop). Note:

Banquet Keynote Address

Saturday, October 15, 6:00 PM – 8:00 PM
Community Commons, Grand Forum

"Geography and Geographers in a Changing World"
Marylin N. Raphael, PhD
President, American Association of Geographers
Director, Institute of the Environment and Sustainability
Professor of Geography
University of California-Los Angeles

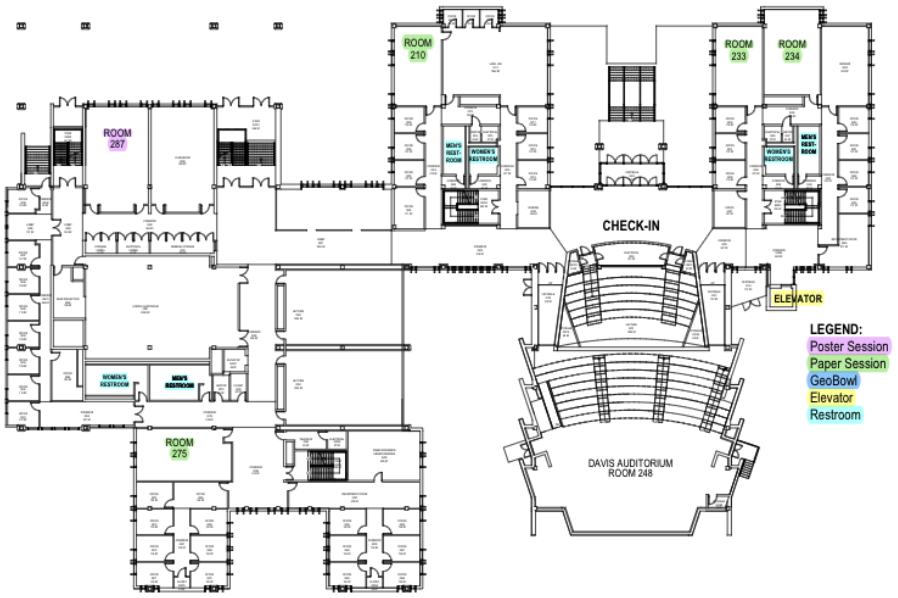
Dr. Marilyn Raphael is Professor of Geography at UCLA and served as Department Chair from 2010-2013. Her primary research focus is Southern Hemisphere (SH) atmospheric dynamics and climate change and her major scientific goals are to characterize the Antarctic sea ice variability and to define and understand the interaction between Antarctic sea ice and the large-scale Southern Hemisphere circulation, focusing on interaction at the seasonal, interannual and decadal time scales. Her work includes global climate modeling with an emphasis on improving the simulation of sea ice and the atmosphere in the Southern Hemisphere.

She is a member of the American Academy of Arts and Sciences, current Chair of the Scientific Committee on Antarctic Research's expert group, Antarctic Sea ice Processes and Climate (ASPeCt) and Co-Chair of the World Climate Research Programme's (WCRP) Polar Climate Predictability Initiative (PCPI). She has served on the National Research Council's Committees on Future Science Opportunities in Antarctica and the Southern Ocean and Stabilization Targets for Atmospheric Greenhouse Gas Concentrations.

Conference at a Glance

<table>
<tr><th colspan="4">Friday October 14, Hilton Garden Inn Hotel Lobby</th></tr>
<tr><td>Time</td><td colspan="3">Event</td></tr>
<tr><td>8:00 AM – 5:00 PM</td><td colspan="3">Field Trip: Grasslands to Tundra: The Physical Geography of the High Plains and Colorado Front Range</td></tr>
<tr><td>8:30 AM – 12:00 PM</td><td colspan="3">Field Trip: Building and Exploring the World-Famous Red Rocks Amphitheatre</td></tr>
<tr><td>2:00 PM – 6:00 PM</td><td colspan="3">Field Trip: From Warehouses to Brew Houses: Revitalization with Craft Beer in the RiNo Arts District</td></tr>
<tr><td>6:00 PM – 8:00 PM</td><td colspan="3">Registration
Welcome Reception (complimentary hors d’oeuvres, cash bar)</td></tr>
<tr><td>8:00 PM - ?</td><td colspan="3">GPRM Student Social</td></tr>
<tr><td colspan="4"></td></tr>
<tr><th colspan="4">Saturday October 15, Sturm Hall, University of Denver</th></tr>
<tr><td>8:00 AM – 12:00 PM</td><td colspan="3">Registration (Lobby)</td></tr>
<tr><td>9:00 AM – 4:00 PM</td><td colspan="3">Poster Session (Sturm 287)
Creators present 2:00 PM – 3:00 PM</td></tr>
<tr><td>9:00 AM – 10:40 AM</td><td colspan="3">Paper Session 1</td></tr>
<tr><td></td><td>Sturm 210</td><td>Sturm 233</td><td>Sturm 234</td></tr>
<tr><td></td><td>Geographies of Health & Environment</td><td>Historical Geography</td><td>GIS, Modeling, and Assessment</td></tr>
<tr><td>11:00 AM – 12:40 PM</td><td colspan="3">Paper Session 2</td></tr>
<tr><td></td><td>Sturm 210</td><td>Sturm 233</td><td>Sturm 234</td></tr>
<tr><td></td><td>Urban and Transportation Geography</td><td>Critical and Feminist Geographies</td><td>Physical Geography</td></tr>
<tr><td>12:40 PM – 2:00 PM</td><td colspan="3">Lunch (on your own)
Food court in the Community Commons
Several restaurants located at Evans Ave and High St
(one block south & one block west of Sturm Hall)</td></tr>
<tr><td>2:00 PM – 3:00 PM</td><td colspan="3">Poster Session (presenters in attendance)
Sturm 287</td></tr>
<tr><td>3:00 PM – 5:30 PM</td><td colspan="3">GeoBowl
Teams meet in Sturm 453 for instructions
Competitions: Sturm 453, 454, 480</td></tr>
<tr><td>5:00PM – 5:45 PM</td><td colspan="3">Business Meeting (Sturm 287)</td></tr>
<tr><td>6:00 PM – 8:00 PM</td><td colspan="3">Banquet, Keynote Address and Awards Prestation
Community Commons, Grand Forum
Welcome – Dr. Andrei Kutateladze, Dean, College of Natural Sciences and Mathematics
Keynote – Dr. Marilyn Raphael, President, American Association of Geographers
Awards Presentations – Dr. Michael Keables, Chair, AAG Great Plains/Rocky Mountains Division</td></tr>
<tr><td>8:00 PM – 8:45 PM</td><td colspan="3">Shuttle to University of Denver Light Rail Station</td></tr>
</table>

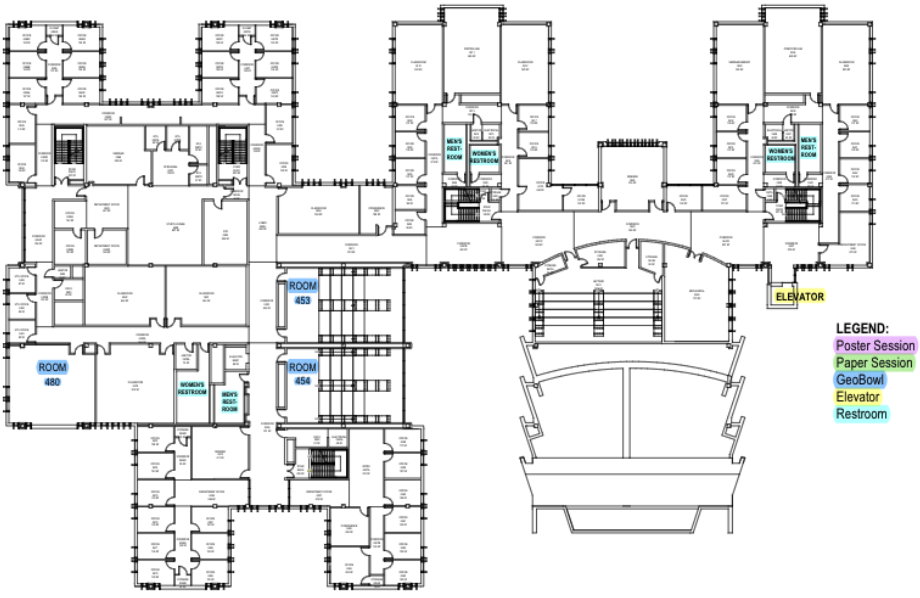
Sturm Hall - 2nd Floor



0425 Sturm Hall

LEVEL 2 FLOOR PLAN

Sturm Hall - 4th Floor



0425 Sturm Hall

LEVEL 4 FLOOR PLAN

Wireless Access: DU_Guest

Paper Sessions

Primary Presenter * Graduate Student # Undergraduate Student

Session 1 9:00 AM – 10:40 AM

Geographies of Health and Environment

Sturm Hall 210

Session chair: Helen Hazen, University of Denver

9:00-9:20 AM

Estimating the Bioavailability of Toxic Heavy Metals in the Soil of Urban Parks in Salt Lake City, Utah

Kirsten Sanders#, Abigail Henrie, Ruth Kerry, Lynden Abernathy, Autumn Lee, Connor Golden, Josh LeMonte

Brigham Young University

9:20-9:40 AM

Using Historic Death Certificate Data from Three Utah Towns to Examine the Potential Impacts of Mining on Human Health

Autumn B. Welling# (1), Sophia Harris (1), Ruth Kerry (1), Ben Ingram (2), Megan Nusink (1), Joe Everett (1)

(1) Brigham Young University, (2) Universidad de Talca

9:40-10:00 AM

The Spanish Flu Pandemic 1918-1920: Examination of the Effects of Age, Residence and Occupation on Mortality

Sophia Harris#, Abigail Henrie, Ruth Kerry, Autumn Welling, Megan Nusink, Joe Everett

Brigham Young University

10:00-10:20 AM

Coronavirus and Conservation: Environmental Repercussions of the COVID-19 Pandemic

Helen Hazen

University of Denver

Historical Geography

Sturm Hall 233

Session chair: Jason Combs, University of Nebraska at Kearney

9:00-9:20 AM

Confronting Consolidation: Examining the Historic Roots of Farm Consolidation in Lancaster County Nebraska

Kevin Pflager*

University of Nebraska-Lincoln

9:20-9:40 AM

Film and the Making of a Modern Nebraska (1895-1920): A Historical Geography

Will Helmer*

University of Nebraska-Lincoln

9:40-10:00 AM

"Water is for Fighting": Aquatic Imaginaries and Congressional Redistricting Battles in Colorado

Gabriella Subia*

University of Colorado Boulder

10:00-10:20 AM

Where Should We Stop Along the Way? Tourist Attractions on Nebraska's Official State Highway Maps

John Bauer

University of Nebraska at Kearney

10:20-10:40 AM

Dust Storms, Jackrabbits, and Grasshoppers . . . Oh My! Frank 'Pop' Conard and His Exaggerated Creations

Jason Combs

University of Nebraska at Kearney

GIS, Modeling, and Assessment

Sturm Hall 234

Session chair: Paul Sutton, University of Denver

9:00-9:20 AM

A Novel Algorithm of Fusing Temporal Satellite Observations with PhenoCam Time Series for Detecting Land Surface Phenology

Khuong Tran*, Xiaoyang Zhang

South Dakota State University

9:20-9:40 AM
Modeling Protective Action Triggers in Wildfire Evacuation: Challenges and Opportunities
Dapeng Li
South Dakota State University

9:40-10:00 AM
Clustering OpenStreetMap Contributors' Temporal Data Contribution Characteristics: A Pilot Study of Methods
Jin Xu*
University of Denver

10:00-10:20 AM
Detecting and Visualizing Observation Hot-spots in Massive Volunteer-contributed Geographic Data across Spatial Scales
Guiming Zhang
University of Denver

10:20-10:40 AM
Apostasy of an Anti-Assessment Curmudgeon: A Geographic Concept Inventory at DU
Paul Sutton
University of Denver

Session 2 11:00 AM – 12:40 PM

Urban and Transportation Geography
Sturm Hall 210
Session chair: Robert Shepard, University of Nebraska-Lincoln

11:00-11:20 AM
Neoliberalism and the Splintering of City Regionalism: The Case of Denver's Regional Transit Agency
Joe Chestnut* (1), Andy Goetz (1), Andy Jonas (2)
(1) University of Denver, (2) University of Hull

11:20-11:40 AM
Transportation Innovations Affect Retail Location in Omaha, Nebraska, Pre-automobile
Heather Bloom*
University of Nebraska-Lincoln

11:40 AM-12:00 PM
Urban 'Re'-development: Geographies of Caste and the Embodied Infrastructural Realities of Slum Redevelopment in Delhi, India
Naomi Hazarika*
University of Colorado, Boulder

12:00-12:20 PM
A Geospatial Analysis of Community Displacement of the Auraria Neighborhood in Denver
Peter Anthamatten (1), Brian Page (1), Eric Ross (2), Katelyn Puga (3)
(1) University of Colorado-Denver, (2) Five Points Geoplanning LLC, (3) City of Fort Collins

12:20-12:40 PM
Outsiders and Otherness: Residential Segregation Patterns in 1870 Omaha
Robert C. Shepard, Heather Bloom
University of Nebraska-Lincoln

Critical and Feminist Geographies
Sturm Hall 233
Session chair: Rebecca Buller, University of Nebraska-Lincoln

11:00-11:20 AM
Women's Journeys to the Black Hills in the 1870s-1880s
Jessica Long*
University of Nebraska-Lincoln

11:20-11:40 AM
"Changing the World, One Woman at a Time": The American Association of University Women's Maps
Christina Dando
University of Nebraska, Omaha

11:40 AM-12:00 PM
Digital Geographies of Hope?: Virtual Visits through Lebanese Instagram
Sylvia Feghali*
University of Colorado, Boulder

12:00-12:20 PM
A Comparative Study on the Role of Geopolitics on Feminist Movement against Compulsory Hijab in Iran in 2018 and 2022
Neda Shaban*
University of Colorado, Boulder

12:20-12:40 PM
Reading the Text of the US Forest Service's Oldest Nursery: Field Guide to a Hybrid Landscape
Rebecca Buller
University of Nebraska-Lincoln

Physical Geography
Sturm Hall 234
Session chair: Ruth Kerry, Brigham Young University

11:00-11:20 AM
Geographically Weighted Machine Learning to Predict Corn Yield in US Corn Belt
Shahid Nawaz Khan*, Dapeng Li, Maitiniyazi Maimaitijiang
South Dakota State University

11:20-11:40 AM
Cottonwood Forests of the South Platte River in Eastern Colorado – History, Status and Future Trends
Gabrielle Katz (1), Andrew Norton (2), Jessica Salo (3)
(1) Metropolitan State University of Denver, (2) Colorado State University, (3) University of Northern Colorado

11:40 AM-12:00 PM
Historic and Prehistoric Records of Drought and Wildfire in the San Luis Valley, Colorado, USA
Becky Brice (1), Natalie Kehrwald (1), Jennifer Murdock (2)
(1) U.S. Geological Survey, (2) Colorado Open Lands

12:00-12:20 PM
Investigation and Development of Automated Analysis of Snowmelt from Time-series Sentinel 2 Imagery to Determine Variable Rate Irrigation Zones in the American Mountain West
Ruth Kerry (1), Ian Turner (1), Ryan Jensen (1), Elisa Flint (2), Jeff Svedin (3), Neil Hansen (1), Bryan Hopkins (1), Keegan Hammond (1)
(1) Brigham Young University, (2) Utah State University, (3) University of Missouri Columbia

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Poster Session 2:00 PM – 3:00 PM

Primary Presenter * Graduate Student # Undergraduate Student

Sturm Hall 287

Estimating Winter Wheat Yield and Protein Using UAV Multispectral Imagery and Machine Learning
Mohammad Maruf Billah*, Maitiniyazi Maimaitijiang, Shahid Nawaz Khan, Swas Kaushal, Jonathan Kleinjan, Bruce Millett, Sunish K. Sehgal
South Dakota State University

A Geographical Comparison of Death Penalty Politics in Nebraska
Paul R. Burger, H. Jason Combs, Emma Neil
University of Nebraska at Kearney

Characterizing Light Pollution Levels for all Cities of the World
Namrata Chatterjee*, Paul C. Sutton, Uttiyo Raychaudhuri,
University of Denver

The Demise of Irrigated Agriculture in Crowley County Colorado
Douglas R. Clark
Metropolitan State University of Denver

Vegetation and Land Cover Changes in and Around Kilimanjaro National Park Using Google Earth Engine and Open-Source Data
Sierra L. Cutler#, Perry J. Hardin, Ryan R. Jensen
Brigham Young University

From Borrowing to Creating: The Evolution of American Toponyms, 1600-1870
Kyle Davis*
Brigham Young University

Abstracts

(Listed alphabetically by presenting author)

A Geospatial Analysis of Community Displacement of the Auraria Neighborhood in Denver

Abstract: During the postwar era, many low-income and minority communities were displaced by urban renewal program activities in cities across the US. The Auraria campus—upon which CU Denver, Metropolitan State University, and the Community Colleges of Denver are located—was constructed as part of an urban renewal program in the 1970s. Scholars on the Auraria campus have begun investigating. One of the goals of this project is to apply modern digital research tools to a set of long-established research questions concerning urban renewal and social displacement. The study tracks the process of community relocation drawing from public records of displaced households. This work applies geospatial methods to map and analyze this diaspora from the old neighborhood, generating some novel and detailed information about where Aurarians' new homes were located, the characteristics of their new neighborhoods, and the financial costs or benefits associated with the relocation process. The results confirm many of the conclusions of earlier research and suggests a useful set of approaches to studies of spatial history.

Authors: Peter Anthamatten, University of Colorado-Denver
Brian Page, University of Colorado-Denver
Eric Ross, Five Points Geoplanning LLC
Katelyn Puga, City of Fort Collins

Estimating Winter Wheat Yield and Protein Using UAV Multispectral Imagery and Machine Learning

Abstract: Early estimation of grain yield and protein helps farmers obtain optimized output, and scientists make better decisions in breeding for enhanced yield and improved wheat grain quality, ultimately ensuring food demand and security locally and globally. Unmanned Aerial Vehicles (UAV)-based multispectral remote sensing and machine learning can provide promising research outcomes in field-based high-throughput plant phenotyping and precision agriculture. Remote sensing with machine learning is a probed approach as they offer accurate crop grain yield estimation with less time and low cost, where improved spatial, spectral, and temporal resolution remote sensing data are available. In this study, we investigated the potential of UAV-based multitemporal multispectral imageries for early season estimation of wheat grain yield and protein content using machine learning methods. UAV-based multispectral images were collected over an experimental winter wheat field in Brookings in South Dakota, USA, throughout the 2022 growing season. A series of spectral features (i.e., vegetation indices) were extracted from the preprocessed multispectral imagery and used as input variables for the machine learning models. Three commonly used machine learning algorithms: Partial Least Squares (PLS), Support Vector Machine (SVM), and Random Forest (RF) were employed for wheat yield and protein content estimation. This research highlights the potential of machine learning using high resolution and multitemporal UAV imageries to obtain the improved wheat yield and protein estimation, and also the optimal UAV data acquisition day during the growing season. The results from this work deliver valuable insights for high-throughput phenotyping and crop field management with high spatial precision.

Authors: Mohammad Maruf Billah, South Dakota State University
Maitiniyazi Maimaitijiang, South Dakota State University
Shahid Nawaz Khan, South Dakota State University
Swas Kaushal, South Dakota State University

Jonathan Kleinjan, South Dakota State University
Bruce Millett, South Dakota State University
Sunish K. Sehgal, South Dakota State University

Where Should We Stop Along the Way? Tourist Attractions on Nebraska's Official State Highway Maps

Abstract: Throughout the second half of the twentieth century, states within the USA used their tourism and transportation departments to prepare and distribute free official state highway maps to the public. The purpose was to promote the tourism destinations in their state and encourage visitors to spend more time, and money, within their borders. Nebraska used its official state highway maps issued between 1950 and 2000 to promote over 160 attractions and destinations. Earlier research on this topic, presented at the 2021 Great Plains Rocky Mountain AAG meeting, focused on the portrayal of Nebraska as a tourist destination. By examining thirty-nine unique maps spanning the years from 1938 to 2018, I identified seven different eras to Nebraska's road map tourism promotion. In this research paper, I focus on the attractions and destinations themselves and their characteristics. Questions raised include: What types of attractions and destinations appeared on the road map? Did these categories change over time? Where in the state are they located? How are Nebraskans' and their cultures represented through the visual imagery on the map? By reading these highway maps as texts, we can see how they reflect the cultural norms within the wider cultural context of their production.

Author: John T. Bauer, University of Nebraska Kearney

Transportation Innovations Affect Retail Location in Omaha, Nebraska, Pre-automobile

Abstract: There are distinct parallels to Vance's (1970) mercantile model and the development of Omaha, Nebraska as a transportation center. Omaha's early settlers previously made their money in freighting, outfitting, steamboat and land speculation. They came to Omaha to increase their wealth, first with Edward Creighton's telegraph lines, which opened the opportunity for Union Pacific Railroad to headquarter here. The railroad's location spurred the development of South Omaha, its stockyards and meatpacking industry along with a manufacturing and jobbing center in downtown Omaha. During Omaha's first years, residents depended on steamboats to bring goods from the East Coast and Europe. About 10 years later, the railroad was able to bring merchants goods. Pre-streetcar development, retail locations in Omaha were only located in downtown, near the UP shops and the Missouri River. After the streetcar developed in 1868, suburbanization started, and shops started opening at streetcar stops. Jobber's Canyon opened in the early 1880s as a manufacturing and wholesale center; merchants could buy goods to resell locally, with less transportation costs. By 1910, there were three distinct business districts – in downtown, along North 24th Street and South 24thStreet. This study focuses on non-food, retail goods, specifically stores that sold clothing.

Author: Heather L. Bloom, University of Nebraska

Historic and Prehistoric Records of Drought and Wildfire in the San Luis Valley, Colorado, USA

Abstract: In the past two decades, nearly 300 square miles have burned in the San Luis Valley (SLV), Colorado. Hotter, drier conditions in the SLV are stressing hydrologic and human systems, disrupting ecosystem services, and increasing resource management concerns about wildfire. While drought preconditioning is believed to have impacted the timing and frequency of past fires, changing seasonal

climate and fuel availability may influence future fire occurrence in uncertain ways. The current prolonged drought has also raised the specter that future fires will be outside the scale and intensity observed in the historical record. But the ability to understand changing climate preconditioning for fire and to place current trends within the full range of natural variability is challenged given limited instrumental records. Pre-instrumental information contained in environmental archives help to refine our understanding of this relationship, benchmark scale and intensity extremes, and explain long-term patterns in the climate-fire record that will better constrain future uncertainty. In this study, we use instrumental data, gridded reanalysis products, historical documents, and satellite imagery to evaluate the SLV hydroclimatic setting and wildfire preconditioning over the past century. We also examine existing paleoenvironmental information from the SLV during the Common Era (2,000 yr BP) in preparation for using updated, newly collected tree ring and lake sediments which will enhance data resolution and lengthen existing records.

Authors: Becky Brice, U.S. Geological Survey
Natalie Kehrwald, U.S. Geological Survey
Jennifer Murdock, Colorado Open Lands

A Geographical Comparison of Death Penalty Politics in Nebraska

Abstract: This particular study not only provides a brief history of the death penalty in the United States, but evaluates in more detail the death penalty in Nebraska. Although fascinating, the goal of the project is to not simply provide an account of Nebraska's death penalty, or to weigh in on the matter either for or against. Information regarding Nebraska's legal position on the issue is provided, but this study goes beyond that to spatially examine recent vote patterns regarding the death penalty. The geographical breakdown demonstrates how Nebraskans vote compared to their elected officials in the legislature's single chamber known as the unicameral, which was implemented in 1937. In 2015, with support from liberal Democrats and moderate Republicans, unicameral members voted for life imprisonment to replace the death penalty, a measure which also withstood the governor's veto in an override vote (LB268). In 2016, Nebraska's citizens by a wide margin (60.6 percent of Nebraskans voted in support of the death penalty) retained the death penalty with Referendum 426. Four unicameral members were also voted out of office in 2016, history demonstrates that outside of term limits sitting senators are rarely replaced. All four had voted against the death penalty but resided in districts that supported the measure, and three of the four were Republicans replaced by Republicans. Ultimately, Nebraska's citizens decided the state's stance on the death penalty which supports long-time Nebraska politician George Norris' contention that abuse of power by elected officials would be offset by the people.

Authors: Paul R Burger, University of Nebraska-Kearney
H. Jason Combs, University of Nebraska-Kearney
Emma Neil, University of Nebraska-Kearney

Reading the Text of the US Forest Service's Oldest Nursery: Field Guide to a Hybrid Landscape

Abstract: Deep within the Western Hemisphere's largest relic erg, what was once a nineteenth century botany professor's experiment to see if pine trees could survive in the Great American Desert endures, with living vestiges of the more than century-old experiment, in the form of the Nebraska National Forest, Bessey Division. A new book addresses the cultural and environmental history of the place. In January 2023—amidst numerous gallery showings, seminars, and panels highlighting the project— the University of Nebraska Press's Bison Books will publish Hixon-Lied Professor of Art Dana Fritz's photography project, *Field Guide to a Hybrid Landscape.* This paper is part of an invited study featured in the book,

aiming to offer a different narrative, a re-envisioning of a visioned landscape, of the Nebraska National Forest, Bessey Division. The study is qualitative, filtered through lenses like Foucauldian Discourse Analysis, visual methodologies, and feminist cultural geography approaches. These approaches, for example, include acknowledgement of the partiality of knowledge, a sensitivity to power relations, faith in everyday knowledges, and an openness to a diversity of approaches and emancipatory goals for research outcomes. Participant observation of the landscape and its activities as well as examination of media like YouTube videos and Facebook accounts provide data sources. This examination of the historical and cultural geographies of the place, providing a new vision, neither singular nor a replacement to the old, offer the contextual frame that there are simultaneously hundreds of narratives/experiences of the place in the past, present, and future.

Author: Rebecca A. Buller, University of Nebraska-Lincoln

Characterizing Light Pollution Levels for all Cities of the World

Abstract: The New World Atlas of Artificial Night Sky Brightness provides a global spatially explicit map of light pollution. This study uses the raw Visible Infrared Imaging Radiometer Suite (VIIRS) data which is used by the Earth Observation Group to make the monthly average radiance grids in which a single data range (DR) threshold is used to distinguish lit grid cells from the background for every 15 arc second grid cell. The Global Human Settlement (GHS) Layer provides a variety of spatially explicit information about the world's cities, towns, and smaller human settlements. This study uses both the VIIRS and GHS datasets to provide an average light pollution number for each urban area of the world with a population greater than 100,000. Light pollution is increasingly recognized as a source of negative human health impacts as well as negative impacts on ecosystem functions. Many astronomers are enjoying the fact that there is a growing coalition of diverse interests advocating for reduced light pollution. This map of urban light pollution will help identify the extent and variability of light pollution in urban areas throughout the world. Future studies incorporating time-series analysis of light pollution can assess the effectiveness of lighting ordinances and other light pollution throughout the world's cities.

Authors: Namrata Chatterjee, University of Denver
Paul C. Sutton, University of Denver
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Neoliberalism and the Splintering of City Regionalism: The Case of Denver's Regional Transit Agency

Abstract: Public transit service provision is fraught with contradictions and tensions, which today tend to converge around the city-regional scale of planning and governance. The promise of public transit is to improve regional accessibility, mobility, economic development, equity, and sustainability. However, these priorities can often be in conflict with each other, resulting in the splintering of the corresponding city-regional planning and governance structures set up to finance and deliver major transit infrastructure projects. Drawing upon a case study of transit-led city-regionalism in Denver, Colorado, USA, this article explores how the tensions and contradictions embedded within regional public transit service planning are exposed and exacerbated during times of financial austerity, such as during the Covid-19 pandemic. The article uses neoliberal critique and entrepreneurial city governance as a lens to better understand the internal conflicts of the city-regional approach to transit planning in Denver. In doing so, the goals and priorities of public transit service provision are understood to be primarily focused on economic development at the expense of regional equity. The article explores how the neoliberal goals of expanding service to Denver's wealthier suburbs clash with the pandemic-induced expediency of targeting transit

service for front-line workers and transit-dependent populations in core urban neighborhoods. The article further demonstrates that the city regional approach to infrastructure development under neoliberalism is at odds with regional objectives to use mass transit to foster equity and transport justice.

Authors: Joe Chestnut, University of Denver
Andy Goetz, University of Denver
Andy Jonas, University of Hull

The Demise of Irrigated Agriculture in Crowley County Colorado

Abstract: The demise of irrigated agriculture in Crowley County Colorado resulted from many factors. These included variability of flow in the Arkansas River, possession of junior water rights, prolonged droughts and other extreme weather events associated with the steppe climate, highs and lows in international sugar markets, an aging and debt-ridden farm population, and the machinations of water speculation. Irrigated crop acreage declined from 50,000 to 5000 acres. Local businesses shuttered, tax revenues tanked, and schools closed. The county's population fell from 6400 in 1920 to 5922 in 2020. Seeding efforts to return the land cover to native vegetation have often failed. Tumbleweeds have multiplied and even became health-and-safety hazards as the county has searched for new economic opportunities.

Author: Douglas R. Clark, MSU-Denver

Dust Storms, Jackrabbits, and Grasshoppers . . . Oh My! Frank 'Pop' Conard and His Exaggerated Creations

Abstract: Not only were postcards in great demand in the United States in the early 1900s, but countries around the world were also in the middle of postcard hysteria. Unlike their predecessors called "trade cards," which were primarily intended for advertising a product, many of the postcards at this time were real printed photos that captured and presented authentic views of city skylines or country landscapes. Other "faux" cards were referred to as exaggeration postcards which often used humor to confront hardships and presented places in a positive light, articulating a sense of regional identity. This was amplified in Kansas, as postcards presented the state and region as a place of abundance and opportunity. This article focuses on photographer and postcard artist Frank "Pop" Conard from Garden City, who began producing postcards in the 1920s and added exaggeration cards--which often included grasshoppers and jackrabbits--to the mix in the 1930s. His intimate, firsthand knowledge of difficult circumstances in western Kansas, joined with his creativity, allowed Conard to capture images that resonated with the public.

Author: Jason Combs, University of Nebraska-Kearney

Vegetation and Land Cover Changes in and Around Kilimanjaro National Park Using Google Earth Engine and Open-Source Data

Abstract: Tanzania is well-known for its substantial diversity of plants and animals that exist in a large variety of habitats. This diversity is protected through an extensive network of national parks and other conservation areas throughout the country (Stanley et al., 2007). Conflicts involving humans and the environment may arise when people migrate to an area or otherwise modify the landscape to best fit their needs. Further, as human population continues to increase, even the most marginal lands will probably be

settled and modified by humans (Mwalyosi, 1991). This is especially true in Tanzania which is experiencing rapid changes in its population structure (Wynants, et al., 2018). The resulting loss of forests, grasslands as well as other land cover changes challenge wildlife (Khanna et al., 2001) and may degrade ecosystems throughout a region. This study analyzes vegetation and land cover in and around Mount Kilimanjaro National Park in Tanzania using open-source Landsat and MODIS data acquired over several dates in Google Earth Engine. Results demonstrate substantial vegetation and land cover changes throughout the study area. The methods and data used in this study may be implemented to study vegetation dynamics in protected areas and adjacent counterparts throughout the world. Finally, open source data and image processing tools are particularly important in industrializing countries where access to satellite data and their derivatives and digital image processing programs are not readily available.

Authors: Sierra L. Cutler, Brigham Young University
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"Changing the World, One Woman at a Time": The American Association of University Women's Maps

Abstract: Historically, map creation and use are associated with masculinity, the "science of princes," tied to the survey and control of territory, resources, and space. All peoples map but the gendering of cartography as masculine obscures other mapping practices, such as those by women in their social activism. This paper will consider the gendering of cartography before considering an example of Progressive Era women's mapping. The American Association of University Women (AAUW) created pictorial maps to be sold as part of a late 1920s campaign to raise scholarship funds. Pictorial maps – artistic spatial depictions combining map, images, and texts – appeal to a wide audience with their bold designs and bright colors. While not viewed as "scientific," these maps represent the application of their educations and skills in art, history, and design to create highly appealing maps, while funding women's higher education, supporting educated women, and increasing women in American academics. What might this practice of cartography/mapping be called?

Author:
Christina E. Dando, University of Nebraska Omaha

From Borrowing to Creating: The Evolution of American Toponyms, 1600-1870

Abstract: Starting with European colonization in the early 17th century, the steady westward expansion of the American frontier created a steady stream of new settlements which, in turn, necessitated new names for those settlements. There is now a wide variety of toponyms dotting the American landscape, from those commemorating individuals to ones named for physical geographic features and everything in between. Despite this diversity, it can be argued that the toponymic history of the United States can be divided into three time periods with broad, yet common, themes. From Jamestown to roughly 1750, most settlers named their communities after European influences. Between 1750 and 1870, classical, religious, and Revolutionary War influences dominated. After 1870, more local and pro-Union namesakes became common, although they did not crowd out others to the same extent as the earlier ones did in the first 2 eras. Because the frontier changed over time, the influence of each time period varies by region, with the European ones being most common on the Eastern Seaboard while post-1870 names are more prominent in the West. This study uses the FamilySearch Places Tool to contrast the geographic distribution of three

toponyms: London (representing European influences), Athens (Classical influences), and Roosevelt (Pro-Union influences).

Author: Kyle Davis, Brigham Young University

Digital Geographies of Hope?: Virtual Visits through Lebanese Instagram

Abstract: This in-progress research examines how transnational communities cultivate spaces of connection across virtual and physical space. The project focuses specifically on transnational Lebanese interventions on Instagram, and broadly seeks to map affects of hope generated and transported by the global Lebanese community through Instagram. In doing so I aim to answer broad questions about the character, impact, and limitations of these kinds of mediated spaces. Evolving from my position within a transnational network of Lebanese cultural organizers, this research is driven by my interest in identifying and practicing ways of imagining possibilities outside of foreclosing structures produced and upheld by forces of colonialism and capitalism. I explore creative methods in digital humanities and postcolonial feminist geography, drawing from data collected via webscraping, interviews, and an interactive installation experience, to consider what connections enacted on Instagram offer to projects of imagining hopeful futures. In particular, this presentation reflects on interactions between audience and content, relationships central to both Instagram community development and the work of doing research in Geography. These relationships point toward answers to questions posed by feminist digital geographers such as how technologically mediated space legibly maps into the "everyday", inviting closer attention to the ways people work to foster hope and collective care networks within and in spite of structures of power upholding platforms such as Instagram. Collaboration is a central tenet of this project, and as such, solicitation of feedback and collaborative ideation is invited for ongoing development of the work.

Authors: Sylvia Feghali, University of Colorado, Boulder

The Spanish Flu Pandemic 1918-1920: Examination of the Effects of Age, Residence and Occupation on Mortality

Abstract: The Spanish Flu Pandemic of 1918-1920 caused 17-50 million deaths worldwide. During the Covid 19 pandemic mortality rates have been shown to be greater for older age groups, those with pre-existing conditions and those with lower socio-economic status. Using historic death certificate data, the effects of age, town of residence and the mining occupation on mortality from respiratory diseases during pandemic and non-pandemic years is examined. Three cities in Utah are considered for the study: 1) Bingham, a copper mining settlement developed along a narrow canyon leading to the mine. 2) Price, a coal mining town and 3) Springville a largely agricultural settlement. Death certificate data from each town (1904-1940) were indexed and respiratory deaths were coded. Chi Square tests showed significant differences in the proportions of respiratory and non-respiratory deaths between pandemic and non-pandemic years. The age groups that were most affected by the pandemic with high proportions of death were between 1 and 60. Infants and those >60 were not significantly affected by the pandemic showing no marked increase proportions of respiratory deaths in the pandemic years. Miners and those living in Bingham, and to a lesser extent, Price, saw greater proportions of respiratory deaths in the pandemic years than non-pandemic years. We conclude that occupational and residential exposure to mine dust and heavy metals causes pre-existing respiratory conditions which made miners and those living mining towns more susceptible to mortality from the Spanish Flu.

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Urban 'Re'-development: Geographies of Caste and the embodied infrastructural realities of slum redevelopment in Delhi, India

Abstract: What happens when the houses built as part of 'slum redevelopment' act as infrastructure that exacerbates the urban inequality built into the rapid urbanization process of the global south? In this paper, and as part of my doctoral research, I look at a recent slum redevelopment policy introduced by the Government of India and adopted by the city of New Delhi that allows private developers to build high rises for slum dwellers in order to clear up slum lands in exchange for remunerative components. Building on Lancione's (2020) theory of 'dwelling as difference' but in the context of postcolonial urbanism, I argue that housing struggles in the context of slum redevelopment in cities of the global south need to be understood as instances of everyday lived and embodied contestation of the given habitus for the most vulnerable urban population- the urban poor. These lived experiences of negotiations, contestations and struggles in the backdrop of the desire for and the right to formal housing offer an understanding of how postcolonial urbanization as a process creates and exacerbates existing socio-economic inequalities on the lines of caste and class in cities of the global south. Findings reveal the importance of focusing on the body as a site of politics, to push the concept of infrastructure further into the sphere and scale of the body, desires and aspirations in order to capture the socio-spatial realities of caste in India.

Author: Naomi Hazarika, University of Colorado, Boulder

Coronavirus and Conservation: Environmental Repercussions of the COVID-19 Pandemic

Abstract: The history of pandemic diseases provides a cautionary tale about the vulnerability of human populations to environmental threats. Many have interpreted our current pandemic as evidence of increasing disruption to natural ecosystems and the havoc this can cause as humans are exposed to new pathogens. An initial focus on a Chinese market as the source of the virus turned attention to human interactions with wildlife, and many hope that the pandemic may provide a turning point if the threat of disease stimulates a renewed interest in the conservation of species and wild places. Additionally, declining air pollution and renewed animal activity in human spaces during lockdown emboldened many to push for further environmental measures to be put in place via a green approach to rebuilding economies. On the other hand, shifting global priorities will likely limit funding and willingness to invest in conservation measures, potentially signaling a significant retreat from current environmental efforts. Furthermore, problems with solid waste disposal highlight significant environmental challenges associated with the pandemic. Whether short-term environmental improvements associated with the pandemic can be translated into longer-term environmental gains will prove critical to both environmental and public health futures.

Author: Helen D. Hazen, University of Denver

Film and the Making of a Modern Nebraska (1895-1920): A Historical Geography

Abstract: This paper is a historical geography of the first 25 years of film exhibition in Nebraska, primarily focusing on Southeastern Nebraska. Previous works in Geographies of Media have studied the historical spectatorship of film in various places, but no such analysis has been applied to Nebraska. My research chronicles how the first films were viewed in Nebraska, and the contemporary cultural reaction to film. I complied this information by analyzing historic publications, and records from the History Nebraska archives. This paper examines the first viewings of motion picture devices in Nebraska. I describe how Nebraskans viewed film as bringing modern technology to the frontier, and fascinated those that viewed it. I map the sites of the first film screenings in Nebraska. I also describe how movie theaters were established in Nebraska; first with nickelodeons then improved theaters. I finally use *The Birth of a Nation* (1915) as a case study of the impact of film on Nebraska's culture. I found *The Birth of a Nation* increased racial prejudice in the state by introducing the Lost Cause of the Confederacy to Nebraska. The activism of the Black community in Nebraska against the film was the first action of the NAACP in the state, and organized the Black community to use activism in future social justice campaigns. I map the locations of screenings of *The Birth of a Nation* in Nebraska. Ultimately, this paper demonstrates the impact of film on Nebraska's cultural landscape around the turn of the century.

Author: Will Helmer, University of Nebraska-Lincoln

Cottonwood forests of the South Platte River in Eastern Colorado – History, Status and Future Trends

Abstract: In the semi-arid High Plains of eastern Colorado, the South Platte River (SPR) supports a cottonwood gallery forest that provides ecosystem services but also consumes large quantities of water. The forest owes its existence to anthropogenically altered basin hydrology, including dams, ditches, trans-basin water imports, groundwater pumping and irrigation return flows. Purpose: This presentation summarizes historic SPR channel change, cottonwood forest age structure, and environmental variables impacting tree growth. We also discuss implications for long term forest sustainability. Methods: We digitized the active stream channel for three 30-km river sections in eight sets of aerial images, collected at ~decadal intervals between 1941 and 2016. GIS analysis examined change in channel area, braiding index, and spatial patterns of channel location over time. In 2015 and 2019 we collected field data at eleven study sites to describe forest structure and conduct dendroecological analysis. We examined cottonwood population age structure at seven sites, and related the cottonwood tree-ring chronology (annual basal area increment, BAI) to climate and hydrologic variables. Conclusions: GIS results suggest long-term consistency of the SPR channel, in terms of area, braiding, and number of channel threads. However, channel threads are not active in all years, resulting in spatial variability in channel location and form. Cottonwood age structure indicates ongoing, though episodic, recruitment over the past 130 years. Annual tree growth is influenced by local site factors, river hydrology, and growing-season climate. Overall, the SPR cottonwood forest appears to be regenerating, given recent climate and water management regimes.

Authors: Gabrielle Katz, The Metropolitan State University of Denver
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Investigation and Development of Automated Analysis of Snowmelt from Time-series Sentinel 2 Imagery to Determine Variable Rate Irrigation Zones in the American Mountain West

Abstract: As the American West experiences a "mega-drought", variable rate irrigation (VRI) of crops provides promise for saving water whilst maintaining crop yields in semi-arid regions. Southern Idaho, a key agricultural area in the Mountain West typically has annual precipitation <500 mm with most falling as winter snow or spring rain. Some suggest that snow accumulation and melting patterns influence soil moisture at the beginning of the season. This research investigates whether snow melt patterns measured using time-series Sentinel 2 imagery in Google Earth Engine can be used to define cost-effective VRI management zones. Two field sites in Southern Idaho where intensive soil, plant and topography related data have been collected were used to evaluate the approach. The Normalized Difference Snow Index (NDSI) was computed for each 10 m pixel per field image. The NDSI values were ranked and average ranks calculated for each month and over several years. NDSI based zones were calculated on the mean ranks of March NDSI. They showed consistent and significant differences between zones in terms of most of the soil, plant and topographic variables examined. These differences were more consistent in their order of magnitude than those for VRI zones which were developed based on data that are more labor intensive to collect or NDSI zones that were calculated with just one year of data. The code for automated extraction of appropriate NDSI data from Google Earth Engine makes the approach easily transferable to other locations where snow is the primary source of soil moisture.

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Modeling Protective Action Triggers in Wildfire Evacuation: Challenges and Opportunities

Abstract: Protective action triggers have been used in different types of applications in wildfire evacuation. However, little research has been conducted on developing a computational framework for modeling triggers in wildfire evacuation. Based on a review of relevant research on the use of triggers in wildfire evacuation, we propose a computational framework for modeling triggers. Our proposed computational framework covers the following aspects of trigger modeling: 1) data model and spatial representation; 2) algorithms; 3) model coupling; 4) data; and 5) applications. Lastly, we summarize the challenges and opportunities in trigger modeling based on existing research and recent technological developments. This line of research will help evacuation researchers and practitioners develop a better understanding of how to model triggers and use triggers to improve public safety in wildfire evacuation.

Author: Dapeng Li, South Dakota State University

Women's Journeys to the Black Hills 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 early travel to the Black Hills, utilizing a feminist approach and examining accounts of stagecoach routes to the area in the 1870s through the 1880s. I utilize Annie Gerard's journals and letters as a case study. Gerard's detailed travel journal gives deeper insight into the ways women viewed the journey and the difficulties they faced. I mine archives to analyze, among other sources, historic newspapers from the Black Hills region, journals recorded by those who took the trails leading to the Black Hills, and historic maps. The majority of these sources are from two archives: Deadwood History, Incorporated's and History Nebraska's. This paper, along with future research in women's narratives will create a more realistic view into life in the Black Hills in the 1870s-1880s.

Author: Jessica K. Long, University of Nebraska – Lincoln

Geographically Weighted Machine Learning to Predict Corn Yield in US Corn Belt

Abstract: Crop yield prediction before the harvest is crucial for food security, grain trade, and policy making. Previously, several machine learning methods have been applied to predict crop yield using different types of variables. In this study, we propose using the Geographically Weighted Random Forest Regression (GWRFR) approach to improve crop yield prediction at the county level in the US Corn Belt. We trained the GWRFR and five other popular machine learning algorithms (Multiple Linear Regression (MLR), Partial Least Square Regression (PLSR), Support Vector Regression (SVR), Decision Tree Regression (DTR), and Random Forest Regression (RFR)) with the following different sets of features: (1) full length features; (2) vegetation indices; (3) gross primary production (GPP); (4) climate data; and (5) soil data. We compared the results of the GWRFR with those of the other five models. The results show that the GWRFR with full length features (R^2 = 0.90 and RMSE = 0.764 MT/ha) outperforms other machine learning algorithms. For individual categories of features such as GPP, vegetation indices, climate, and soil features, the GWRFR also outperforms other models. The Moran's I value of the residuals generated by GWRFR is smaller than that of other models, which shows that GWRFR can better address the spatial non-stationarity issue. The proposed method in this article can also be potentially used to improve yield prediction for other types of crops in other regions

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Confronting Consolidation: Examining the Historic Roots of Farm Consolidation in Lancaster County Nebraska

Abstract: Farm consolidation is an issue currently crippling rural America. In order to better understand the genesis and mechanisms of farm consolidation, this project will interrogate the earliest examples of shifting agricultural land ownership and tenure to better understand the forces that have eroded family farms for the past century. This will be accomplished by a website centered around an interactive web map. It will be built using open-source tools like QGIS, Geojson, and java script files. The map will be made by hand digitizing individual plots of land from the county plat books, then transcribing the names and acres from the map to form shapefiles with data to use and share. This will be the tool that helps illuminate the origins of farm consolidation in Lancaster County Nebraska at the start of the 20th century at a granular level. The website will give access to county land records, shapefiles, and show spatial patterns that currently do not exist or at least not in an accessible digital format. The other side to this is connections from individuals to newspaper articles creating deeper human centered narratives to help contextualize the quantitative data. Early conclusions highlight how census data tells an incomplete story,

and that the total number of farms outside of urban areas actually grew. While the humanistic side showed how farmers were nervous about the rise of tenant farming and had already a contentious view of banks by the start of the 20th century.

Author: Kevin Pflager, University of Nebraska

Estimating the Bioavailability of Toxic Heavy Metals in the Soil of Urban Parks in Salt Lake City, Utah

Abstract: Bingham Copper Mine, Salt Lake Valley, Utah releases toxic heavy metals (copper, lead, zinc and arsenic) into the environment that can have adverse health impacts such as respiratory illness, cancer, heart disease, violent behavior and depression. Uptake of metals by plants can indicate their bioavailability. Soil and grass samples were collected throughout the Salt Lake valley from public parks. A 1 km grid was overlaid on a map of the Salt Lake Valley and parks were chosen from every other grid square resulting in 58 parks. Samples were cut from the turfgrass and topsoil samples (0-10 cm) were collected at each park. For large parks two samples were collected at opposite sides of the park. Coordinates were recorded at each sample location. The metal content of the soil samples was determined using a portable X-ray fluorescence analysis and ICP-OES was used to determine the metal content of grass samples. Contamination risk zones are determined through interpolating soil and grass heavy metal contents throughout the Salt Lake valley. Correlations and bi-variate local Moran's I analysis between soil heavy metal and grass heavy metal concentrations were investigated to give an indication of heavy metal bioavailability. Principal components analysis was performed for a larger range of elements for soil samples to try and determine elemental associations which could indicate the forms of the heavy metals that are most bioavailable.

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A Comparative Study on the Role of Geopolitics on Feminist Movement against Compulsory Hijab in Iran in 2018 and 2022

Abstract: In this paper, I explore the role of geopolitics on the current feminist movement in Iran. Built on my interviews with Iranian feminist activists and content analysis of photos and videos posted on social media accounts about the movement, I explore the similarities and differences of the current movement and the anti-compulsory hijab movement going on between 2014 and 2018. I argue that while the US appropriation of women's movement against compulsory hijab under Trump administration in 2018 led to the suppression of the movement by the Iranian regime, the absence of such intervention in the 2022 movement made it hard for the Iranian regime to use "foreign countries' intervention" as a pretext to suppress the movement. As a result, an unprecedented number of groups and marginalized communities joined the movement following the death of Mahsa Amini, a girl who lost her life under arrest of the Morality Police due to not following the hijab rule in Iran. Comparing that to the, I show that the absences of the US and European countries' political intervention in women's protest prevented the Iranian regime to use the allegation of "act against national security" to justify the suppression of the current movement, unlike what it did during women's protest against compulsory hijab in 2018. As a

result, widespread protests were shaped in the streets and other public spaces around women's demand for bodily autonomy with the feminist slogan of "Woman, Life, Freedom".

Author: Neda Shaban, University of Colorado, Boulder

Outsiders and Otherness: Residential Segregation Patterns in 1870 Omaha

Abstract: This research explores ethnic segregation patterns in the City of Omaha in 1870 by matching location information from city directory records with census records, which did not include address information at that time. The block-level index of dissimilarity between the German population and the native-born population of Omaha in 1870 was 71.4, while the dissimilarity index between the Irish and native-born population was 62. Both figures exceed the estimated degree of ethnic residential segregation for this period in American history. 1880 enumeration district boundaries are also used to compare 1870 data directly with the subsequent census data, finding that ethnic segregation was higher in 1870. The use of multiscale boundaries also demonstrates how the 1870 dissimilarity index calculations would have been substantially lower at the enumeration district level – just 41.2 between Irish and native-born population and 34.7 between German and native-born population, highlighting the importance of scale in studying segregation patterns. This paper also contextualizes these patterns with respect to the local historical and political realities of the American West in the late nineteenth century.

Authors: **Robert C. Shepard**, University of Nebraska-Lincoln
Heather Bloom, University of Nebraska-Lincoln

"Water is for Fighting": Aquatic Imaginaries and Congressional Redistricting Battles in Colorado

Abstract: "Whisky is for drinking, water is for fighting." The quote, ubiquitously attributed to Mark Twain to describe the significance of water conflicts across the American West and around the world, has been at the forefront of Coloradoans' minds when describing their needs and interests for political representation. Today, as the West continues to be mired in drought, there is no question that water (and its dearth) is at the heart of environmental justice and political battles *and* that water is an essential part of our community relationships and identities as Coloradoans. During Colorado's 2021 redistricting process, Colorado residents were asked to provide public feedback and define themselves as "communities of interest" to be kept intact through the drawing of the state's new congressional districts. Given the importance of water for survival and growth, it is perhaps not surprising that many participants alluded to their concerns over water allocation as they defined their communities. This paper looks at how a history of water politics in the West impacts contemporary understandings of water rights and access, defining community boundaries and entrenching unequal political representation across
the state. I argue that any chance of "fair" representation requires a deeper consideration and wider awareness of this history and how it has shaped the drawing and placement of district lines since the state's founding.

Author: Gabriella Subia, University of Colorado Boulder

Apostasy of an Anti-Assessment Curmudgeon: A Geographic Concept Inventory at DU

Abstract: This presentation is a summary of a paper published in the Annals with a similar title. Apostasy is defined as the abandonment or renunciation of a religious or political belief. The author had an apostasy regarding the utility of learning outcomes assessments. This apostasy motivated the

development of assessment instruments that could provide evidence that graduating geography and environmental science majors possessed more skills and knowledge and confidence in their skills and knowledge than they did as incoming first-year students. The instruments developed for learning outcomes assessment are described and presented. Qualitative and statistical analyses of several years of data demonstrate statistically significant improvements in the objective quizzes and self-assessments of the graduating students. The results provided a satisfying body of evidence suggesting that the teaching and learning taking place in our department are effective while also identifying some issues we need to address. These data provide a mechanism for the faculty to reflect on our curriculum and teaching practices to identify ways to improve them. These instruments are used on an ongoing basis to inform departmental program reviews, to field inquiries from accreditation teams, and to promote the department within the university.

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A Novel Algorithm of Fusing Temporal Satellite Observations with PhenoCam Time Series for Detecting Land Surface Phenology

Abstract: Vegetation phenology is one of the most sensitive indicators of environmental and climate changes. Fine spatial resolution satellite data (≤ 30 m), such as Landsat, Sentinel-2, have been increasingly applied to detect Land Surface Phenology (LSP) in relatively homogenous vegetation types. However, a critical challenge in LSP detection is the low quality of temporal observations caused by noise and persistent cloud cover. Thus, this study presented a novel algorithm to fuse the harmonized Landsat and Sentinel-2 (HLS) data with near-surface PhenoCam observations for improving LSP detection at field scale (30 m). Specifically, we first developed a framework to create a large collection of vegetation growth characterized by the Green Chromatic Coordinate (GCC) time series from all PhenoCam sites. For a given HLS pixel, the EVI2 time series was matched and fused with the most comparable temporal GCC shape using the Spatiotemporal Shape-Matching Model (SSMM) to generate a synthetic gap-free HLS-PhenoCam EVI2 time series. The Hybrid Piecewise Logistic Model based Land Surface Phenology Detection (HPLM-LSPD) algorithm was then applied to identify phenometrics from the synthetic HLS-PhenoCam time series. The derived phenometrics were evaluated using manually selected and spatially matched PhenoCam observations. The result indicates that the phenometrics derived from the HLS-PhenoCam time series are very close to the observations from the PhenoCam network with R = 0.82~0.97, RMSE = 3.5~4.0 days, MAE = 2.8~3.5 days, and Bias = 0.1~2.2 days. The proposed algorithm can successfully bridge temporal satellite observations with near-surface PhenoCam time series to improve LSP quality at various scales.

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Using Historic Death Certificate Data from Three Utah Towns to Examine the Potential Impacts of Mining on Human Health

Abstract: This study examines the impact of mining on human health using data from three Utah towns. Historic death certificate data from Bingham, Price, and Springville, Utah, (1904-1960) were indexed and coded according to cause of death. Crude death rates from several causes were compared between towns. Bingham Canyon, disbanded in 1971, is now the deepest open pit mine in the world. In the early 1900s the population lived very close to the mine and were probably exposed to elevated levels of Copper, Lead, Arsenic, and Zinc associated with it. Price, Utah grew as a coal mining town. Mining of the coal deposits in Carbon County continues today. Springville, an agricultural town in northern Utah of similar size to

Bingham and Price acted as the control in this study. Previous research has suggested that coal and metal miners often experience chronic lung conditions and are prone to depression which can lead to suicide and alcoholism. Also, heavy metals exposure can lead to aggressive behavior and still birth or premature birth. The rates of accidental, respiratory, cardiac, cancer, infant, kidney/appendix, homicide, suicide and alcoholism related causes of death were compared between the three towns. Comparison tests showed significantly higher rates of death from all causes and significantly lower average age at death in mining towns and particularly in Bingham compared to Springville. Relationship tests showed an increase in average adult age at death and decrease in infant mortality and accidental death rate over time for all three towns.

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Clustering OpenStreetMap Contributors' Temporal Data Contribution Characteristics: A Pilot Study of Methods

Abstract: Volunteered Geographic Information (VGI) is obtained from the voluntarily contribution from the general public and it is a social practice where knowledge is embedded. As one of the most famous VGI data source for geographic services, OpenStreetMap (OSM) data, presents this knowledge through contributors' mapping activities. In this study, OSM contributors' temporal data contribution patterns were clustered using two different methods: Dynamic Time Wrapping (DTW) and K-shape, with original or standardized OSM contributor's monthly updates data during 2018-2021. Clustering results are examined to answer: i) Is it possible to classify OSM contributors using data contribution time series? And ii) if yes, which method-data pair is better and what are the characteristics of the cluster groups? The result suggests that it is possible to classify the OSM contributors through their temporal contribution patterns. More reasonable clusters are generated with DTW and original data. Contributors are classified into 4 groups: cluster 1 shows a peak at last half, cluster 2 has large number of updates at last half, cluster 3 has large number of updates at first half, and cluster 4 has large number of updates at very end, suggesting distinctive temporal characteristics of OSM contributor's mapping behavior. This pilot study explored methods for clustering temporal characteristics of VGI contributors and contributes to future studies of examining the impacts of major events (e.g., COVID-19) on VGI contributors' mapping behavior.

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Detecting and Visualizing Observation Hot-spots in Massive Volunteer-contributed Geographic Data across Spatial Scales

Abstract: Volunteer-contributed geographic data (VGI) is an important source of geospatial big data that support a variety of research and applications. A major concern on VGI data quality is that the underlying observation processes are inherently biased. Detecting observation hot-spots helps better understand the bias. Enabled by the parallel kernel density estimation (KDE) computational tool that can run on multiple GPUs (graphics processing units), this study conducted point pattern analyses on tens of millions of iNaturalist observations to detect and visualize volunteers' observation hot-spots across spatial scales. It was achieved by setting varying KDE bandwidths in accordance with the spatial scales at which hot-spots are to be detected. The succession of estimated density surfaces were then rendered at a sequence of map

scales for visual detection of hot-spots. This study offers an effective geovisualization scheme for hierarchically detecting hot-spots in massive VGI datasets, which is useful for understanding the pattern-shaping drivers that operate at multiple spatial scales. This research exemplifies a geocomputation tool that contributes to expanding the toolbox for geospatial big data analytics.

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