Spatial Structures in the Social Sciences
2020 Winter GIS Institute

Final Presentation Program
January 17, 2020

PSTC 2nd Floor Seminar Room | Mencoff Hall
68 Waterman Street | Providence, RI 02912

9:30 – 10:00 am	**Welcome Breakfast**
10:00 – 10:45 am	**Session I:** GIS Applications in the Social Sciences
10:45 – 11:30 am	**Session II:** GIS and Health I
11:30 am – 12:00 pm	**Session III:** Historical GIS
12:00 – 1:30 pm	**Lunch**
1:30 – 2:15 pm	**Session IV:** GIS and Health II
2:15 – 2:45 pm	**Session V:** GIS: Management, Information & Decision-Making
2:45 – 3:30 pm	Certificate Presentation & Closing Remarks
3:30 pm	Close of Conference

PARTICIPANTS

Cyril Bennouna (Political Science)

Christina Crowley (RI Department of Health)

Lydia Curliss (University Library)

Jonathan B. Fine (German Studies)

Alexander J. Kamper (Computer Science)

Eva Rios (Political Science)

Elizabeth Samuels (Biology & Medicine)

Jong Cheol Shin (School of Public Health)

Joe B. Silva (School of Public Health)

Collette Sosnowy (Biology & Medicine)

Nicolas Taccone (Political Science)

Jun Tao (Biology & Medicine)

Baoli Yang (Comparative Literature)

PROGRAM

SESSION I:

GIS APPLICATIONS IN THE SOCIAL SCIENCES

Cyril Bennouna, *Violence against Refugees: A Geospatial, Time-Series Analysis*

Eva Rios, *Non-State Change in São Paulo: An Exploratory Study*

Nicolas Taccone, *The Spread of Violence inside Peru during the Internal Armed Conflict*

SESSION II:

GIS AND HEALTH I

Jun Tao, *Assessing PrEP uptake and persistence in Rhode Island*

Joe B. Silva, *Geographic Variation in Medicare Advantage Enrollment Expansion: An Exploratory Analysis*

Christina Crowley, *Newly Diagnosed Hepatitis C Cases in Rhode Island: Dispersion and Opportunity for Public Health Intervention*

SESSION III:

HISTORICAL GIS

Jonathan B. Fine, *The Fragments Controversy: Visualizing a Theological Dispute with GIS*

Baoli Yang, *The Poetics of Places: The Imagined Territory and the Han Complex in Chinese Poetry during the Tang Era (618-907)*

LUNCH BREAK, 12:00 – 1:30 PM

SESSION IV:

GIS AND HEALTH II

Jong Cheol Shin, *The Association of Insufficient Sleep and Light Pollution in Urban Residential Areas*

Elizabeth Samuels, *Identifying Overdose Hotspots for Targeted Overdose Prevention and Addiction Treatment*

Collette Sosnowy, *Assessing the Need for Pre-exposure Prophylaxis as HIV Prevention among High-risk Men and Women in the United States*

SESSION V:

GIS: MANAGEMENT, INFORMATION & DECISION-MAKING

Lydia Curliss, *Integrating an Information Literacy Framework to Create Better GIS Instruction in the Library*

Alexander J. Kamper, *A Few Hundred Years of Agricultural Myth Making Or: What Crisis on American Farms?*

PRESENTATION ABSTRACTS

Cyril Bennouna – Violence against Refugees: A Geospatial, Time-Series Analysis
Why are some host countries hostile towards refugees while others welcome them openly? In a global context marked by historic levels of forced migration and increasing anti-refugee sentiment in many countries, political scientists have only recently begun studying the factors contributing to variation in host-country refugee receptiveness. Using a global, geospatial, time-series dataset, I contribute to this literature by studying how ethnic power relations contribute to the incidence of violence against refugees. I hypothesize that countries receiving refugees that are co-ethnic with the dominant group will be the least violent towards refugees, while those receiving refugees that are co-ethnic with a marginalized group will be the most violent. I use ArcGIS to visualize these relationships and discuss steps for further analysis.

Christina Crowley – Newly Diagnosed Hepatitis C Cases in Rhode Island: Dispersion and Opportunity for Public Health Intervention
Hepatitis C Virus (HCV) is the most common blood-born infection in the United States. In Rhode Island, morbidity and mortality attributable to HCV have consistently surpassed counts for HIV and other forms of viral hepatitis over the past decade. Increase in HCV diagnoses, in part due to illicit injection drug use, requires thoughtful consideration of HCV testing and access to care in Rhode Island. However, limited resources have curbed HCV surveillance efforts in the state. Using data from the National Electronic Disease Surveillance System, geospatial analysis of newly diagnosed HCV cases with detectable viral loads identified residential hotspots to inform statewide outreach and prevention efforts.

Lydia Curliss – Integrating an Information Literacy Framework to Create Better GIS Instruction in the Library
Developing students' information literacy competencies lies at the center of library instruction. The Association for College and Research Libraries has created a framework which outlines the core concepts integral for information literacy, including ones such as "Information Creation as a Process", "Information Has Value", and "Research as Inquiry". Geographic Information Systems (GIS) among its many functionalities, has several applications for the physical sciences, especially in the geosciences. Among these uses includes investigations in climate, such as rainfall and sea level, determining soil and bedrock types of an area, and mapping events such as tsunamis, earthquakes and volcanoes. Using the framework created by the ACRL, I aim to integrate these core concepts in creating a series of tutorials for basic GIS uses in the geosciences, with the goal to increase competency with geographic information systems, spatial analysis, data collection and information literacy.

Jonathan B. Fine – The Fragments Controversy: Visualizing a Theological Dispute with GIS
In 1777, the renowned German playwright Gotthold Ephraim Lessing published anti-Christian texts that he purported to have found in a library. In reality, the texts were written by a high school teacher in Hamburg who had foreseen the controversy that would attend any publication of his true opinions and opted to remain silent. Once Lessing published the texts, the reaction was swift. He was denounced and subsequently censored by his employer, the Duke of

Braunschweig. His ideas, however, spread rapidly throughout German-speaking Europe as dozens of writer rose up to explain why he was incorrect. This project uses GIS to trace the spread of this response to Lessing's publication. By mapping the publications onto the Holy Roman Empire, I also show how this theological conversation played out primarily in the Empire's Protestant areas.

Alexander J. Kamper – A Few Hundred Years of Agricultural Myth Making Or: What Crisis on American Farms?
The status of agriculture in the United States is a direct result of effective farmer lobbying and pervasive narratives about American farm life as told in farmers' own words. These narratives form part of the American historical conscience and national identity, meaning they wield a great deal of emotional weight with policymakers. Echoes of the back to the land movement, agriculture entering into the crosshairs of environmentalist critique, and recent fascination with food systems in media have brought agricultural narratives out of legislative offices into popular culture, where the word of farmers as a political and economic bloc is often taken at face value, much as it is with policymakers. These narratives typically portray a vision of agricultural precarity, featuring farmers as an oppressed working class laboring to produce a commodity which is as central to American commerce as it is to the country's national independence and culture. In reality, many popular stories about American agriculture are myths spun to advance the interests of farmers who, by a significant majority, represent an affluent owning class. I want to consider four myths that have been effectively challenged by other writers. In particular, I approach the idea that US agriculture would collapse without government subsidies, that small farmers are being impoverished by large corporate farms, that family farms are disappearing, and that there is an epidemic of farmer suicides. This presentation is a cursory look at how GIS and the data which is available for spatial inference might help or hurt critical analysis of American agricultural systems.

Eva Rios – Non-State Change in São Paulo: An Exploratory Study
Since the 1990s, São Paulo has undergone several substantial changes. Besides the more macro changes in political and social attitudes and engagement, an often referenced change is the large drop in homicides. Frequently the role of the state is attributed to these types of changes, however, in the case of São Paulo, the state is not considered a cause. Instead, the origins of these changes are frequently related back to the rise of two non-state groups. First the Primeiro Comando da Capital (PCC), emerged out of the state's prison system and grew across the country, dominating the peripheral neighborhoods of São Paulo. Second, Evangelism, or more specifically Neo-Pentecostalism, underwent a parallel rise throughout both São Paulo and Brazil. By using a combination of census and electoral data over time, this exploratory project seeks to illuminate how, when, and where the entrance and spread of the PCC and the Neo-Pentecostal church in São Paulo has affected how its citizens behave politically.

Elizabeth Samuels – Identifying Overdose Hotspots for Targeted Overdose Prevention and Addiction Treatment

Opioid overdose is a public health crisis in the US, particularly in Rhode Island. In 2017, 49,068 people in the US died from opioid overdose, more than a 4-fold increase from 2002. In 2017, Rhode Island's rate of opioid overdose death (26.9 per 100,000 people) was more than twice the national rate and one of the highest rates of opioid overdose mortality in the US. Opioid overdoses often occur in hotspots that can be identified by geographic and temporal trends. This study aims to identify and characterize Rhode Island opioid overdose hotspots including identifying 1) associated neighborhood-level social determinants of health and 2) patterns of addiction treatment, medical, and harm reduction service availability within overdose hotspot clusters. Results from this analysis can be used to design local interventions to reduce opioid overdose deaths and improve access to harm reduction, medical, and addiction treatment services.

Jong Cheol Shin – The Association of Insufficient Sleep and Light Pollution in Urban Residential Areas

Light is the one of key factor to disturb sleep, urban residences had more chance to expose the nighttime light pollution. Although limited population studies examine the relationship between light pollution and sleep with remote sensing image, the spatial contexts and geographical uncertainty were not considered regarding actual exposure area of nighttime light. The purpose of this study is to examine the association between light pollution and insufficient sleep with in-depth geo-spatial and behavioral context.

Joe B. Silva – Geographic Variation in Medicare Advantage Enrollment Expansion: An Exploratory Analysis

Medicare Advantage (MA), referred to as Medicare Part C, is a form of private health insurance with expanded benefits in comparison with Medicare Parts A and B. Part C enrollment has been noted to have expanded over time. Increased availability of MA plans at the county level has already been identified as strongly associated with enrollment, however other county-level factors have yet to be explored. This project analyzes previously unexplored associations of various environmental county-level factors with MA enrollment over time. Data was obtained from the Health Resources & Services Administration (HRSA) Area Health Resource Files (AHRF) which includes relevant information on health care professions, facilities, and population characteristics within United States counties, and linked to US Census Bureau Cartographic Boundary Files for visualization of geographic variation in enrollment rates. Spatial regression models were utilized to explore the association between different reported variables and enrollment while adjusting for other county-level population factors.

Collette Sosnowy – Assessing the Need for Pre-exposure Prophylaxis as HIV Prevention among High-risk Men and Women in the United States

Pre-exposure prophylaxis (PrEP) for HIV in the form of daily tenofovir disoproxil fumarate/emtricitabine (TDF/FTC) is highly effective in reducing HIV transmission. It is most important for men and women who engage in high-risk sexual and drug use behaviors, and has the potential to decrease HIV incidence. The number of people taking PrEP in the United States has steadily increased since it was clinically approved in 2012, exceeding 100,000 in 2017. Yet, PrEP is only reaching a small proportion of those who could benefit from it. Among the

estimated 1.1 million people nationwide who are potential candidates for PrEP, only 8% are receiving it, according to the Centers for Disease Control and Prevention. Researchers have described a "PrEP-to-need" ratio (PnR) to identify where PrEP is not reaching those who may benefit the most. Drawing from state-level data related to PrEP use, this project presents the current picture of HIV and PnR among diverse groups.

Nicolas Taccone – The Spread of Violence inside Peru during the Internal Armed Conflict
Peruvian's internal armed conflict was a critical juncture that shaped the country's trajectory forever. The war between the guerrillas—Shining Path and the Tupac Amaru Revolutionary Movement—and the Armed Forces extended for twenty years (1980-2000) and took the lives of almost 70,000 people. Except for some historical and anthropological studies, academic production on the topic has focused on the legacies of violence mostly at the national level. Yet, the impact of the conflict was highly uneven within the territory. This study traces in details the spread of violence within the Peruvian territory during the internal armed conflict. More specifically, it explores how, over the years, multiple types of violence (torture, sexual abuse, forced displacement, etc.) differently affected men and women in different parts of the territory. Future stages of the project will link the patterns of violence with the profile of elected politicians, and associate politicians' characteristics to current levels of subnational socio-economic development.

Jun Tao – Assessing PrEP uptake and persistence in Rhode Island
Major PrEP programs are located in urban areas, where most new cases of HIV are diagnosed. Little is known about PrEP implementation in rural areas. We propose to explore whether rural-urban disparities in PrEP care exist in Southern New England. We will conduct a GIS analysis to identify areas with high HIV incidence but low PrEP uptake. This data will aid in the design and development of effective interventions to reduce rural-urban disparities in PrEP uptake. Methods: Exploratory spatial data analysis (ESDA) will be used to describe and visualize spatial PrEP uptake distributions and discover patterns of spatial association, clusters or hot spots. We will use ArcGIS 10.7 to conduct spatial autocorrelation analysis with the consideration of the correlation of a single variable among records in the same ZCTA. The Moran statistic will be used to test the existence of autocorrelation (1: strong autocorrelation; 0 random pattern: -1 over-dispersion and uniformity). Global spatial autocorrelation will be used to explore the distribution of PrEP uptake rate, in which all ZCTAs were seen as a whole. Local Indicators of Spatial Association (LISA) will be applied to identify significant spatial outliers and generate four geographic patterns, including high-high, high-low, low-high and low-low.

Baoli Yang – The Poetics of Places: The Imagined Territory and the Han Complex in Chinese Poetry during the Tang Era (618-907)

Tang poetry was a glorious achievement in the cultural history of the Tang dynasty (618-907AD) in China. Among the broad topics and innovative genres in about fifty thousand Tang poems, frontier poetry, encompassing over one thousand poems depicting the exotic natures and cultures at the Chinese borders and frontiers, foregrounds the consciousness of spatiality and geoeasthetics. For a long time, scholars have relied on those poems to reconstruct the poets' biographies and infer the cultural elites' concerns about the Tang's realpolitik. They assume that the poems pertain to portraits, or at least insinuations, of the diplomatic reality those Tang cultural elites dwelled in. However, if one juxtaposes the location names in those poems and in the Tang historiography, evidently there are discrepancies between the borders and frontiers imagined in those poems and those that existed in the Tang. To what extent did those poems address Tang's everyday politics? Why did poets imagine the borders and frontiers differently from the ones that really existed?

   With geocoding, I hope to visualize two aspects related to those two questions. I initially plan to geocode the place names individual poets mentioned to delineate their poetic constructions of imagined borders and frontiers. In their poems, many poets were inclined to use the place names along the historical frontiers or borders in the previous dynasties, especially the Han dynasty (206 BC–220AD), to mark spatiality. Notably, not all those places belonged to the Tang territory in which the individual Tang poets lived, but critics tended to believe those place names metaphorically implied the political events in the Tang. Meanwhile, those poems did not preclude the usages of their contemporary imageries, including the places in the Tang. By analyzing the poets' preferences of the place names to mark their poetic borders and frontiers, I hope to understand how they engaged with history and reality and whether they intended to build the connections between the two. After individual poets' cartographical constructions of their poetic frontiers, I hope to combine those constructions together to show whether there were any general patterns in the poets' preferences of place names.

   The second visualization means to signify the shifting borders and frontiers in reality over the three hundred years of the Tang history before comparing the real political borders and frontiers with the poetic ones mentioned above. Unlike the states in the modern world, the Tang empire did not control stable borders or frontiers. Instead, its territory constantly and drastically changed, following the Tang's performances in its defenses and military expeditions against its neighboring states. Modern scholars have mapped several versions of the Tang territories in different historical periods by referring to historiographies and other relevant materials. I hope to incorporate those versions and show the patterns of the shifting borderlines of the Tang dynasty. After that, there will be a comparison between the Tang's shifting borders and frontiers and the poets' imagined borders and frontiers over time.