GEOGRAPHIC PERSPECTIVES ON HEALTH

A mini conference organized by the Department of Geography, University at Buffalo

March 6, 2015, 8:30 – 2:30 pm

145H Wilkeson Quad, Department of Geography, University at Buffalo, Buffalo, NY 14221

SCHEDULE

8:30	Peter Rogerson	Opening Remarks
8:45 – 9:30	Michael Emch	Mapping Malaria in the Democratic Republic of Congo using Demographic and Health Surveys: A Spatial and Landscape Genetics Approach
9:30 – 10:15	Timothy Endy	Spatial Restriction of Dengue Virus Transmission in Kamphaeng Phet Province, Thailand
Break until 10:45	106 Wilkeson and Wilkeson Hallway	
10:45 – 11:30	Jason Blackburn	Applications of GIS to Emerging Zoonoses: Examining Spatio-temporal and Ecological Patterns of Anthrax in Wildlife, Livestock, and Humans
Lunch (by invitation only) until 12:30		
12:45 – 1:30	Dan Goldberg	The Promise of Cyber-Enabled HealthGIScience – Researcher Opportunities and Challenges at the Nexus of Interdisciplinary Teams
1:30 – 2:15	Mary Northridge	Recognizing Resilience
2:15	Geoffrey Jacquez	Closing Remarks

University at Buffalo
The State University of New York

Directions

From I90, take 290W to Exit 5B, Millersport Hwy (Route 263 North).
Follow Millersport to North Forest Road, turn left.
Follow North Forest to John James Audubon Parkway, turn left.
Turn right at 1st signal onto Frontier RD.
Take 1st left into Spaulding lot.
Wilkeson is closest to the lake. Look for Dept. of Geography sign.
For Main Office, enter Wilkeson 3.

ABSTRACTS

Michael Emch: Mapping Malaria in the Democratic Republic of Congo using Demographic and Health Surveys: A Spatial and Landscape Genetics Approach

This project uses spatial and landscape genetics methods to understand malaria prevalence, risk, and diffusion in the Democratic Republic of the Congo (DRC). We use population-representative sampling to map prevalence in 2007 and 2014 and survey questions to understand the spatial and temporal dynamics of risk. Malaria diffusion processes are explored using landscape genetics, an approach that employs methods from population genetics, ecology and spatial statistics. We use blood samples and survey data from the national-level, population-based 2007 and 2014 Demographic Health Surveys conducted in the DRC. In order to understand diffusion of malaria we examine the distribution of malaria genetics across survey clusters within the DRC and two nearby countries to understand how the relatedness of malaria parasites varies across space. Malaria genetics in the DRC have a complex and fragmented landscape driven by both anthropogenic and environmental geographic factors.

Timothy Endy: Spatial Restriction of Dengue Virus Transmission in Kamphaeng Phet Province, Thailand

Dengue is an emerging and re-emerging disease of great public health importance in tropical and sub-tropical regions. Studies in Thailand have demonstrated the spatial and temporal clustering of virus transmission in humans and mosquitoes in school-age cohorts in Kamphaeng Phet province, central Thailand. To further characterize transmission dynamics and virus-vector-host interactions in this location, cluster investigation studies were performed to examine the spatial transmission of dengue virus. Our findings demonstrated a significant relationship between proximity to an infected household case of dengue and the likelihood of isolating dengue virus from household members and neighbors and *Aedes* mosquitoes. Our findings emphasize the spatial, geographic restriction of dengue virus transmission largely determined by the flight pattern of its mosquito vector.

Jason Blackburn: Applications of GIS to Emerging Zoonoses: Examining Spatio-temporal and Ecological Patterns of Anthrax in Wildlife, Livestock, and Humans.

Many pathogens can be at least partially maintained in environmental reservoirs. An assessment of how environmental factors modulate the dynamics of environmentally maintained pathogens (EMPs) requires the integration of detailed field and laboratory observations into disease models. For most pathogens with environmental reservoirs, critical knowledge gaps exist that compromise our ability to effectively model and predict disease risk. *Bacillus anthracis,* the causative agent of anthrax, provides an ideal model system for addressing fundamental questions regarding the role of environmental reservoirs in disease transmission. Here we will

examine patterns of anthrax outbreaks across spatial and temporal scales relating patterns to processes. Spatial tools - such as GIS, spatial modeling, wildlife telemetry, remotely sensed imagery, and high resolution phylogenetics - can inform across spatiotemporal scales that can improve our understanding of disease ecology and inform surveillance and control efforts. Anthrax serves as a case study to compartmentalize pathogen persistence, host exposure and transmission across spatiotemporal scales, ranging from the local scale of interactions between a bacterium in an environmental reservoir and hosts moving through that habitat to more extensive landscapes (such as continental scale ecological niche models). This research takes a hierarchical and integrative approach to understanding the transmission and dynamics of *B. anthracis*, which is an essential step forward in the management and control of anthrax worldwide

Dan Goldberg: The Promise of Cyber-Enabled HealthGIScience - Researcher Opportunities and Challenges at the Nexus of Interdisciplinary Teams

Geographic Information Science (GIScience) has a profound ability to detect, prevent, and enable individuals to positively affect their health as well as improve the state of public health locally, nationally, and globally when used in health policy and practice decisions. However, truly remarkable discoveries and innovations require the integration of research techniques and research teams from the disparate disciplines of Cyberinfrastructure (CI), Computer Science and Engineering (CSE), Biomedical Engineering (BME), GIScience, Cyber-Enable GIScience (CyberGIS), and the full spectrum of Health Sciences (HS). At the intersection of all of these research areas is the newly emerging field of Cyber-Enabled HealthGIS (Cyber-HealthGIS). This talk will provide an overview of ongoing Cyber-HealthGIS activities in the areas of supercomputing, personal and wearable sensors, and volunteered geographic information (VGI), and will detail a vision and roadmap for future research in light of emerging developments in technologies and data and algorithmic services.

Mary Northridge: Recognizing Resilience

In synthesizing research on the environment and health, nature is cherished not merely as a buffer or a service, but as an integral part of social systems. The potential for resilience not only resides in physical design and form, but within social relationships. As communities strive to provide highly efficient green infrastructure that is designed to be resilient to future storms and rising tides, they would do well to also examine and nurture the social meaning in these shared places. The provision of non-programmed space in communities creates opportunities for emergent forms of behaviors that reflect a sense of the sacred. These places, which invite access and participation, encourage creativity and interactivity, and require restoration and tending, also afford communities the opportunity to express, support, heal, and inspire. These places are critical not only to the daily lives of community members, but also to the collective spirit of human society.

SPEAKERS

Jason K. Blackburn, PhD, Spatial Epidemiology & Ecology Research Laboratory, Department of Geography & the Emerging Pathogens Institute, University of Florida, Gainesville, FL. Jason Blackburn is an Assistant Professor of Geography and a principal investigator in the Emerging Pathogens Institute (www.epi.ufl.edu). He is also the director of the Spatial Epidemiology and Ecology Research Laboratory (SEER Lab), which is jointly housed in Geography and the EPI. His research interests focus on the ecology and spatio-temporal patterns of zoonotic diseases, those that impact animals and humans. Primarily his laboratory is concentrated on bacterial pathogens, such as anthrax, brucellosis, plague, and tularemia. He employs ecological niche modeling, spatio-temporal clustering techniques, and ecological modeling to historical and field-collected empirical data related to disease outbreaks and pathogen distributions. Specifically he works on select agent studies in the former Soviet Republics of Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Ukraine, and Uzbekistan, as well as Botswana, and the American West. He also works with colleagues from the UF Vet School on projects in St. Kitts and Nevis and the island nation of Dominica. The SEER Lab is currently funded by CRDF Global, the Department of Energy, the Defense Threat Reduction Agency, the National Science Foundation, the National Institutes of Health (through MIDAS and NIEHS funding), and the USDA. In addition his lab's work on zoonotic diseases, he also has research interests and continue to publish on shark biology and ecology, marine mammal biology, and large predatory cats (cougars and ocelots) in Texas.

Dr. Michael Emch is Professor and Chair of Geography, Fellow at the Carolina Population Center, and Professor of Epidemiology at the University of North Carolina at Chapel Hill. His expertise is in infectious disease ecology, neighborhood determinants of health, and geographic information science applications of public health. He leads the Spatial Health Research Group which conducts research that explores spatio-temporal patterns of disease, primarily infectious diseases of the developing world. Disease patterns are studied using a holistic approach by investigating the role of natural, social, and built environments in disease occurrence in different places and populations. Diverse statistical and spatial analytical methods are informed by theory from the fields of medical geography, epidemiology, ecology, and others. These theories and methods are used to examine diverse topics such as the role of population-environment drivers in viral evolution, how social connectivity contributes to disease incidence, and using environmental indicators to predict disease outbreaks. For more information see the Spatial Health Research Group website at www.unc.edu/depts/geog/spatialhealthgroup/.

Timothy P. Endy MD, MPH, FACP Dr. Endy is currently the Chief, Infectious Disease Division, Professor, Department of Medicine; Adjunct Professor in the Department of Microbiology and Immunology, School of Graduate Studies; and Adjunct Professor, Department of Preventive Medicine at the SUNY Upstate Medical University. He is a Board Certified physician in the subspecialty of Infectious Diseases and Internal Medicine and did his residency and fellowship

training at the Walter Reed Army Medical Center, Washington, DC. Dr. Endy obtained his medical school training at the Uniformed Services University, F. Edward Herbert School of Medicine, Bethesda, MD; received an MPH in Epidemiology from the University of Michigan, School of Public Health, Ann Arbor, MI; and a BS degree from the Pennsylvania State University, University Park, PA. Dr. Endy has a broad area of expertise in the field of Clinical and Translational Research. He has conducted basic science research in the field of virology, developed vaccine field and epidemiological study sites in Southeast and Central Asia, conducted phase I and II clinical vaccine trials and active in the development and management of research programs that are product oriented towards developing vaccines and diagnostics that meet FDA regulatory requirements. Dr. Endy is considered an international expert in the field of dengue and dengue hemorrhagic fever and emerging viral pathogens. Dr. Endy is an active reviewer for five peer reviewed journals, a subject matter expert on dengue and dengue vaccine development for and a NIH funded researcher conducting studies on dengue in Thailand. He has published over 100 manuscripts in peer reviewed journals, published 12 book chapters and has presented to numerous international conferences and symposiums.

Dr. Daniel W. Goldberg is jointly appointed as an Assistant Professor in the Texas A&M (TAMU) Department of Geography and the TAMU Department of Computer Science & Engineering where he also directs the TAMU Esri Development Center and the TAMU GeoInnovation Service Center. He received his PhD in Computer Science from the University of Southern California in 2010 under the supervision of Dr. John Wilson. Dr. Goldberg's research focuses on computational and database aspects of GIS development, including Web-, Mobile-, and Cyber-GIS with a domain focus in HealthGIS. Dr.Goldberg's teaching responsibilities include introductory classes on GIS and advanced classes on GIS databases and programming for desktop, mobile, and web at the graduate and undergraduate levels. Dr. Goldberg is a recipient of a USGIF Scholarship, an ASEE SMART Scholarship, and was a finalist for the AAG Garrison award for Best Dissertation in Computational Geography. Dr. Goldberg's work has been funded by the NIH, DoD, and the CDC. Dr. Goldberg presently serves on the Board of the University Consortium for Geographic Information Science, is the current Chair of the AAG Geographic Information Science & Systems Specialty Group, and is on the Board of the AAG Cyber Infrastructure Specialty Group.

Mary Evelyn Northridge, PhD, MPH is an Associate Professor in the Department of Epidemiology & Health Promotion at the New York University College of Dentistry. She also holds a part-time appointment as a Professor of Clinical Sociomedical Sciences (in Dental Medicine) at the Columbia University Mailman School of Public Health and the College of Dental Medicine, and a Research Assistant Professor appointment at the Department of Geography, University at Buffalo. Professor Northridge has enduring interests in social and environmental determinants of health, including oral health, and a current focus in the utility of systems science to integrate and sustain holistic health and health care. She is currently funded by the National Institute of Dental and Craniofacial Research and the Office of Behavioral and Social Sciences Research of the US National Institutes of Health on a collaborative R01 among researchers and

practitioners at the University at Buffalo, Columbia University, and New York University (Lead PI: Northridge), as well as several local participatory projects related to systems science, dissemination and implementation science, and oral public health. Professor Northridge earned a BA in chemistry with a specialty in biochemistry at the University of Virginia, an MPH in environmental health at the University of Medicine and Dentistry of New Jersey/Rutgers University, and a PhD in epidemiology at Columbia University. Upon the completion of a post-doctoral fellowship in cancer epidemiology at the Environmental and Occupational Health Sciences Institute in Piscataway, NJ, Professor Northridge continued her academic career at the Harlem Health Promotion Center of Columbia University, where her research and practice projects addressed the elimination of social disparities in health through community-based participatory research for more than 2 decades. Professor Northridge is the author of over 175 scientific papers and the co-editor of 2 volumes.