Dynamic Mapping of Secondary Cities Symposium

Center for Geographic Analysis
Harvard University
June 14-15, 2016

Secondary
CITIES
OFFICE OF THE GEOGRAPHER

Secondary Cities in the developing world are rapidly growing urban areas that are regional hubs for commerce, services, and governance in developing countries that often do not have adequate planning mechanisms for future development and growth. This symposium will focus on the foremost data collection tools and technologies used to map urbanization in such cities. It is part of the Secondary Cities initiative, a global collaboration of universities and organizations supported by the Humanitarian Information Unit of the Office of the Geographer of the State Department.

The aim of the symposium is to bring together organizations and individuals involved in innovative mapping activities and solutions for emergency preparedness, resiliency planning, and urban sustainability. The symposium will open with a half-day session to provide a hands-on venue to explore and assess online, open sources tools for mapping and creating geospatial data for cities. The 2nd day is a full day with sessions including: 1) Secondary Cities overview; 2) case studies of dynamic city data collection; 3) interactive assessment session of tools as linked to emergency preparedness, resiliency planning, and urban sustainability; 4) solutions/lessons learned. The product from this symposium will be a white paper on dynamic tools as well as a position paper on how dynamic mapping is achieved in Secondary Cities.

For more information about the symposium, please go to:
http://gis.harvard.edu/events/conferences/dynamic-mapping-secondary-cities-symposium

Mapping Secondary Cities for Resiliency, Human Security and Emergency Preparedness
Humanitarian Information Unit, The Office of the Geographer and Global Issues

What is a Secondary City (2C)?

2Cs are the fastest growing urban areas in developing countries, experiencing unplanned growth and development. These cities are unique environments that have generally been poorly mapped with limited data and information on infrastructure, land tenure, and planning. A secondary city is not only defined by population, size, function, and economic status, but by the neighboring and/or distant cities and their socio-economic status. The population of a secondary city may range between 10-50% of the country's largest city. 2Cs are urban centers providing critical support functions for governance, transportation and production services. A secondary city may emerge from a cluster of smaller cities in a metropolitan region or may be the capital city of a province, state, or second-tier administrative unit within a country.

Why map 2Cs?

Mapping 2Cs for Resiliency and Emergency Preparedness builds local capacity in using open source geospatial technologies to collect important data needed for urban planning and integrated resource management, strengthens local capacity through international partnerships, and creates new data in secondary cities that are frequently data-poor, under-resourced, and lagging behind in the provision of infrastructure and essential services. Mapping these cities is an essential activity in building resiliency and devising robust emergency management plans.

Core elements of the 2C project are:

1. U.S. Embassy outreach to identify city governments for mapping and imagery analysis partnerships. Working with the twelve regional US Environmental, Science, Technology and Health (ESTH) hubs across the globe, this project facilitates the generation of digital data necessary for planning for urban sustainability;
2. Long term engagement with partners to build capacity for continued geospatial data development in situ;
3. Utilization of high resolution satellite imagery for mapping and analysis;
4. Engagement tools that include ESRI's ArcGIS and other open source geospatial tools for data generation, analysis, and modeling.

Who are the 2C partners?

The 2C project partners come from private and public sectors and are both local and international. The Humanitarian Information Unit (HIU) within the Office of the Geographer of the U.S. Department of State currently partners with the American Association of Geographers (AAG; http://www.aag.org/), Colorado State University (CSU; http://www.colostate.edu/), EcoCity Builders (http://www.ecocitybuilders.org/), and Kathmandu Living Labs (http://www.kathmandulivinglabs.org/). Partners have different levels of responsibility including project implementation and project support, coordination and management. In addition, the Secondary Cities project is continually procuring new partners, as developing cities learn of the initiative and express formal interest and demonstrate local commitment.

The 2C project has established a partnership with Esri (http://www.esri.com/), emphasizing the of strength of public-private partnership. Esri is providing software licenses for University partners across all 2C projects, which are also using ArcGIS Online for data sharing.

Where are Secondary Cities?

Secondary Cities are located in South America, Eastern Europe, Africa, and Asia. Current Secondary Cities include Cuzco, Peru; Medellin, Colombia; Kharkiv, Ukraine; and Pokhara, Nepal. New Secondary Cities include Mekelle, Ethiopia and Denpasar on the island of Bali in Indonesia. Each city faces different needs as well as natural and social challenges that will impact its future planning, growth and sustainable development. The needs and challenges will drive the type of technology implemented as well as the data generation, analysis and visualization process.

Which tools and technologies will be utilized?

The project will use an array of appropriate open source mapping tools and technologies. Open source mapping tools and technologies may be in the form of applications (apps), software programs, and data collection and visualization devices. Open source mapping provides an interface and a platform for interested citizens who have devices that can access the internet to search, collect, manipulate, download and upload, and analyze public geospatial data (geographic coordinates, aerial photography, satellite imagery, surveys, data that come from global positioning system devices, etc.) for a multitude of mapping activities, data generation, data management, data sharing, field data collection, and global positioning systems whether for resource planning and management, to tell a story, or to help in humanitarian efforts, among other purposes. In an open source environment, the results, usually visualizations of maps, are also public and can be shared between individuals and organizations, independent of their location and time zone.

There are five general categories of tools and technologies: 1) GIS platforms (eg. ArcGIS Online, QGIS, etc.); 2) remote sensing analysis (eg. Orfeo ToolBox, etc.); 3) field data collection (eg. Field Papers, Survey123, KoBoToolbox, ikeGPS, etc.); data management and dissemination (eg. GeoNode, WorldMap, ArcGIS Open Data, etc.); and data visualization and communication (eg. CartoDB, Urbinsight, etc.). 2C project and partners support any one or combination of open source and proprietary geospatial tools and technologies.

Why is open source mapping useful?

The importance of open source mapping for this project is to help data-poor, underdeveloped and rapidly growing cities build their capacity by enlisting local efforts and initiatives to locate and generate data in collaboration with their municipalities through scientific rigor (preserve data integrity, enforce data collection and storage standards, long-term data maintenance). The public will be able to access data in order to facilitate community and neighborhood projects that fall within the municipal jurisdiction but outside of the available financial resources. Together with our international and local partners, the Secondary Cities project assesses the appropriate open source tools and technologies to enhance the local technical capacity and fulfill the preferences, needs and challenges of each city.

Program

Address: 1730 Cambridge Street, Cambridge, MA 02138

12:30 PM	*Registration*

Location	*S010 Tsai Auditorium*

1:00 PM
Welcome Address
Jason Ur (Harvard University)

1:05 PM
Dynamic Mapping of Secondary Cities: An Introduction to Tools & Technologies
Melinda Laituri (Colorado State University)

1:15 PM
Keynote Address:
Open Algorithms, Open Data: Toward Continuous Mapping of Sustainable Development
Sandy Pentland (MIT)

Location	*S050 Seminar Room*	*S020 Belfer Case Study Room*
1:45 PM	**ikeGPS Spike Intro & Demo** *James Pardue (IkeGPS)*	**CartoDB Intro & Demo** *Jeff Ferzoco (CartoDB)*
2:30 PM	**GeoNode Intro & Demo** *Cristiano Giovando (World Bank) & Paolo Corti (Harvard University)*	**KoBo ToolBox Intro & Demo** *Patrick Vinck (Harvard University)*

3:15 PM	*Coffee Break*

3:30 PM	**ArcGIS Online, Story Map & Survey 123 Intro & Demo** *Courtney Claessens (Esri)*	**Geographic Futures Intro & Demo** *Mitchell Sipus (White House Presidential Innovation Fellow)*
4:15 PM	**WorldMap Intro & Demo** *Ben Lewis (Harvard University)*	**Field Papers Intro & Demo** *Eric Rodenbeck (Stamen)*

5:00 PM	*Light Reception - CGIS South Concourse*

Address: 1730 Cambridge Street, Cambridge, MA 02138

8:30 AM	*Registration and Breakfast*

Location	*S010 Tsai Auditorium*

9:00 AM
Overview & Orientation
   Melinda Laituri (Colorado State University)

9:10 AM
Keynote Address:
The Challenge of Mapping Human Geography Data in the Urban Milieu
   Lee Schwartz, Geographer of the United States Director, Office of the Geographer

9:40 AM
Panel I: Why Dynamic Mapping in Secondary Cities?
   Mark Montgomery (Stony Brook University), Phil Yang (George Mason University),
   Keith Clarke (University of California-SB)
   Moderator: Jason Ur (Harvard University)

10:50AM	*Coffee Break*

11:00 AM
Panel II: Case Studies on Dynamic Data Collection and Mapping Projects for Urban Developing Communities
   Reinhard Goethart (MIT), Gabriel Moreno (Harvard University), Kellie Stokes (Yale University),
   Kirstin Miller (Ecocity Builders)
   Moderator: Faith Sternlieb (Colorado State University)

12:10 PM	*Lunch*

1:10 PM
Tools & Technologies Applied to Humanitarian Aid
   Nathaniel Raymond (HHI, Harvard University)

1:50 PM
Citizen Participation and GIS Use in Urban India
   Rina Ghose (University of Wisconsin-Milwaukee)

2:30 PM
The Use of Smartphones for Dynamic Mapping and Planning of Transit Systems in Africa
   Zachary Patterson (Concordia University, Canada)

3:10 PM	*Coffee Break*

3:20 PM
Panel III: Solutions, Lessons Learned, and Next Steps for Secondary Cities
   Rina Ghose (University of Wisconsin-Milwaukee), Zachary Patterson (Concordia University,
   Canada), Nathaniel Raymond (HHI, Harvard University)
   Moderator: Melinda Laituri (Colorado State University)

4:30 PM
Closing Remarks
   Sandy Pentland (MIT)

Day 1 — June 14, 2016

1:00PM
Welcome Address
Jason Ur

Jason Ur is Director of the Center for Geographic Analysis and Professor of Archaeology in the Department of Anthropology. He studies the origins and development of cities and empires in the Middle East and their landscape impacts, using satellite remote sensing, mobile GIS-based field survey, and geospatial analysis. He has directed research projects in Syria, Turkey, and Iran. He currently leads the Erbil Plain Archaeological Survey in the Kurdistan Region of Iraq, which is investigating six millennia of settlement and land use history in northern Mesopotamia.

1:05PM
Dynamic Mapping of Secondary Cities: An Introduction to Tools & Technologies
Melinda Laituri

Abstract: *Mobile tools for data generation provide a method to actively engage in data collection for different stakeholders. Intersecting these tools with web-based maps and geographic information systems are the basis for dynamic mapping – one where the map is interactive and where the data lends itself to analysis for generating new information. Within the current milieu, maps are dynamic on a number of levels: scale (ability to zoom); turning on and off data layers; creating map animations. Maps are also dynamic with respect to what and how data are collected, who participates in the collection process, and who analyzes the data and uses it.*

This symposium is an opportunity to unpack dynamic mapping as it applies to the suite of tools under examination here. The symposium will also lay the groundwork for a network of users to identify intersections and discuss lessons learned on how improvements can be made from data development to stakeholder involvement in the context of secondary cities. Secondary cities are non-primary cities that often serve as regional hubs for commerce, services, and governance, with populations that can range from 100,000 to 5 million. They are generally experiencing rapid urbanization and are often the fastest growing areas in developing countries, experiencing unplanned growth and development with limited geospatial data.

Melinda Laituri is a professor of geography at Colorado State University in Ecosystem Science and Sustainability. Laituri received her PhD from the University of Arizona, Tucson, Arizona in geography. Her dissertation research focused on environmental equity and groundwater resources in the American Southwest and the US-Mexico border. Dr. Laituri accepted a post doc at the University of Auckland, New Zealand and shifted to a lecturer position. She is a Fulbright Scholar and spent 2010 in Botswana. She is a Rachel Carson Fellow at the Environment and Society Unit at the Ludwig Maximillian University, Munich, where she conducted comparative research of major rivers. She is a Jefferson Science Fellow and was assigned to the Humanitarian Information Unit of the Office of the Geographer and Global Issues. She is a Visiting Scientist at Harvard University affiliated with the Center for Geographic Analysis. Laituri is the Director of the Geospatial Centroid @ CSU (gis.colostate.edu) that provides information and support for GIS activities, education, and outreach at her institution and in Colorado. Laituri is a former National Science Foundation program officer in Geography and Spatial Sciences. Lai-

turi's research interests are diverse. She has worked with indigenous peoples throughout the world on issues related to natural resource management, disaster adaptation, and water resource issues using geographic information systems (GIS) that utilize cultural and eco-physical data in research models. A key focus is participatory GIS where indigenous peoples develop spatial information and maps essential for their management of their own resources. Other research work focuses on the role of the Internet and geospatial technologies of disaster management, gender and water issues, and cross-cultural environmental histories of river basin management.

1:15PM
Keynote Address:
Open Algorithms, Open Data: Toward Continuous Mapping of Sustainable Development
Sandy Pentland

Abstract: *The ability to combine data from both private enterprise (telcos, banks, etc) and government allows continuous mapping of variables relevant to good government and sustainable development. The key is a framework that protects individual privacy and private interests.*

Professor Alex "Sandy" Pentland has helped create and direct the MIT Media Lab and the Media Lab Asia in India. He is one of the most-cited computational scientists in the world, and Forbes recently declared him one of the "7 most powerful data scientists in the world" along with Google founders and the Chief Technical Officer of the United States. He has received numerous awards and prizes such as the McKinsey Award from Harvard Business Review, the 40th Anniversary of the Internet from DARPA, and the Brandeis Award for work in privacy.

He is a founding member of advisory boards for Google, AT&T, Nissan, and the UN Secretary General, a member of the U.S. National Academy of Engineering, a leader within the World Economic Forum, and a serial entrepreneur who has co-founded more than a dozen companies. Together Sandy and his students have pioneered computational social science, organizational engineering, wearable computing (Google Glass), image understanding, and modern biometrics. His most recent books are 'Social Physics', published by Penguin Press, and 'Honest Signals', published by MIT Press.

1:45PM
An Introduction to Spike – An Advancement in Mobile Field Data Collection
James Pardue

Abstract: *Most private organizations and government agencies are looking to reduce field data collection costs and improve the effectiveness of their field data collection. As a growing trend mobile devices such as smartphones and tablets are a great way to do that. In order to get the best bang for the buck you need to use a commercial off-the-shelf solution that will adequately replace the multitude of tools that are taken into the field today, reduce time in the field, and collect a wide range of field data. Spike accomplishes that task.*

ikeGPS has developed the world's first laser accurate Smartphone measurement solution called "Spike". The Spike device when paired with the free Spike app and your mobile device all work together to create a new type of field data attribution. This new attribution enables the measurement of objects or features within a geotagged photo taken from a hand held device.

As GIS professionals we are very familiar with the practice of being able to measure and annotate a digital image from satellites and/or aerial pho-

tography. What if you could do the same with a digital photo taken from a hand-held device? This presentation will review the features of the Spike solution and applicable use cases.

James is the Global Vice President of Government Sales at ikeGPS. He is a geospatial industry veteran with 24-years of distinguished service at the world's leading geospatial firms including Space Imaging, TerraGo Technologies, TomTom and now ikeGPS. James has a passion to change the way people explore, experience and collect information about our world. At ikeGPS James is leading that change with the launch of Spike – a new field data collection solution for mobile devices.

1:45PM
Open Data and Interactive Mapping in Secondary Cities
Jeff Ferzoco

Abstract: What is the role of open, accessible data in secondary cities, and how does rapid mapping and insight into location data help those cities achieve their goals? In this talk, we will look specifically at the evolution of open data and how it has evolved to be a tool for cities to communicate, prioritize and make decisions with less overhead and complexity than ever before. As cities make their data more open and transparent, location and demographics can guide leaders through actionable insights and informed decisions. We will look at the array of mapping tools and examples of how it has been successful in helping city leaders achieve goals.

Jeff Ferzoco is CartoDB's New York City Business Development Manager, which means he sees many, many great maps of New York City. His background in design has led him to do mapping in transportation, journalism, and urban planning. Working with the open data and geo communities in New York City, he helps New Yorkers facilitate new ways to leverage the many interesting public and private data sets into deeper location experiences. He has done work with Citibike, Google, NYU Rudin Center America 2050 and New York's Regional Plan Association. He is an alumni of California College of the Arts and enjoys having a spot on the board of his local Business Improvement District in the East Village.

2:30PM
GeoNode Introduction & Demonstration
Cristiano Giovando & Paolo Corti

Abstract: GeoNode is an open source platform that facilitates the creation, sharing, management and collaborative use of geospatial data. It is designed to be fully extensible and it integrates many existing open source software such as Geoserver, PostGIS, and Django. The Global Facility for Disaster Risk Reduction at the World Bank supports the development of GeoNode and its use through the Open Data for Resilience Initiative (OpenDRI). GeoNode is implemented in several OpenDRI projects to enable governments with an efficient and sustainable way of managing and sharing disaster risk data. This presentation provides an overview of the GeoNode software, a live demonstration of its functionalities, and example use cases within OpenDRI.

Cristiano Giovando is a geographer and advocate of open data and open source geospatial software. At the World Bank he works on OpenDRI, promoting the use of

community mapping methods for local preparedness and disaster risk management. He previously held scientific and technical roles at the European Commission and the Humanitarian OpenStreetMap Team.

Paolo Corti is an environmental engineer with over 15 years of experience in the geospatial field. Currently a research fellow at the Center for Geographic Analysis, Harvard University, he previously worked as a software architect and developer for WFP, the European Commission, World Bank and the Italian Government. He is an OSGeo Charter member and a core committer for the GeoNode project.

2:30PM
KoBoToolbox: Humanitarian Data Collection and Beyond
Patrick Vinck

Abstract: *Effective humanitarian action requires an in-depth understanding of risks and needs, context of operations and level of damages among other. Humanitarians must also monitor action and demonstrate impact. Gathering the necessary information, however, is a major challenge in very fluid and data poor settings. In response, humanitarians are increasingly using technology. Despite important progress, these efforts are hindered by a number of challenges, including the lack of common standards, organizational behaviors that do not foster data sharing and integration, and narrow, uncoordinated, focus of data gathering efforts. In response to these challenges, KoBoToolbox has become a platform of choice for humanitarian applications and beyond – enabling the constant gathering, sharing and use of data streams in near-real time. Developed by faculty at the Harvard Humanitarian Initiative, KoBoToolbox is a free, open source platform for data collection, analysis, and visualization. KoBoToolbox is the result of a partnership with leading humanitarian agencies, addressing critical needs and feedback from field experts. The tools are used for data collection in ongoing humanitarian crises, including those in Ukraine, South Sudan, Syria, Iraq, and all countries affected by the Ebola outbreak.*

Patrick Vinck, Ph.D., is the director of the Harvard Humanitarian Initiative's Peace and Human Rights Data Program. He is assistant professor at the Harvard Medical School and holds appointments at the Harvard School of Public Health, Faculty of Arts and Science, and Brigham and Women's Hospital. His current research examines peace, resilience and social cohesion in countries affected by violence and the role of education and transitional justice in peacebuilding. He also examines the role of new technologies and ethics in peace, humanitarian action and human rights. He is the co-founder of KoBoToolbox a leading data collection platform and the Data-Pop Alliance, a Big Data partnership with MIT and ODI. Patrick serves as a regular consultant on peacebuilding and vulnerability analysis to UN, multilateral and non-governmental agencies.

3:30PM
ArcGIS and Secondary Cities: from Collecting Data to Sharing Knowledge
Courtney Claessens

Abstract: *Secondary Cities experience a particular set of challenges which can be met in part by leveraging appropriate technological and mapping solutions. The ArcGIS Platform offers open-source technologies which equip organizations and governments with the ability to not only easily collect data, but to disseminate it back to the community to leverage collective knowledge and*

insights. With this in mind, this session will introduce and demonstrate a suite of tools and will consider two groups of users: data administrators and community actors. We will cover a full flow of survey configuration and data collection using Survey 123, data dissemination using ArcGIS Open Data, and ways to create data narratives and share knowledge using Story Maps.

Courtney Claessens is a Product Engineer on the ArcGIS Open Data team based out of the Esri R&D Center in Washington, DC, where she focuses on creating products to help governments turn open data into open information to strengthen their communities. Prior to joining Esri she worked with a research consortium at McGill University exploring how new geospatial technologies are adopted by local governments and their affects on government-citizen interactions. Outside of Esri she is an organizer of Maptime DC, a meetup group that hosts beginner-focused, hands-on workshops for learning new web mapping tools and geographic concepts. She has a BA in Urban Systems and GIS from McGill University.

3:30PM
Cognitive Tools and Methods to Unlock New Geographic Futures
Mitchell Sipus

Abstract: Innovation requires more than a good idea. It requires a leap in thinking that veers on the irrational. The first step is to reconsider our general assumptions about the future. When we try to predict the future, we tend to forget that more than one kind of future is possible and that all possible futures exist simultaneously. To consider the state of Geography, mapping and observable urban trends in light of all possible futures - it is clear that the distinction between the possible, the probable, and the most preferred futures have not been thoroughly explored. This is partially because within geography we tend to focus on a structuralist interpretation of "what is" while believing the most probable future is dependent on random chance and market dynamics. Our shared futures are equally subject to the patterns in human cognition, the architecture of information systems, and the design of the daily objects we use to channel thoughts into actions. Equipped with new ways to engage our geographic futures from these domains, we are liberated to ask more of our tools, our methods, our cities and how we live within them. Let's get started.

Mitchell Sipus has created new systems, organizations, technologies and processes for radical urban transformation over the last 15 years. He was an advisor to the Mayor of Kabul, Afghanistan on urban development (2011) and the lead strategist for the Government of Mogadishu Somalia on conflict stabilization and post-war reconstruction from 2011 to 2013. In 2015 he co-founded the data sciences startup Symkala while working as robotics researcher at Carnegie Mellon University to provide breakthroughs in artificial intelligence and advanced computation to subject matter experts. Mitchell is presently a White House Presidential Innovation Fellow.

4:15PM
WorldMap Introduction & Demonstration
Ben Lewis

Abstract: WorldMap is an open source, collaborative mapping platform designed to lower technology barriers for researchers across disciplines who want to discover, share, and use geospatial data. WorldMap is not about creating one large comprehensive dataset as Open Street Maps is, but is rather a collaboration space which allows

users to bring datasets together from multiple sources to explore, collaborate, and create new knowledge. WorldMap currently makes about 28,000 map layers users have contributed available, and is expanding that collection through a new initiative. With initial funding from the National Endowment for the Humanities, the CGA is extending WorldMap to provide access to potentially any web map layer on any server in the world through the development of a service registry and fast visual search capability. This new service orchestration system will soon enable maps across thousands of web servers to be discovered and used within WorldMap as well as in other systems outside WorldMap via an open API.

Ben is system architect and project manager for WorldMap, an open source infrastructure that supports collaborative research centered around geospatial information. Before joining Harvard, Ben was a project manager with Advanced Technology Solutions of Pennsylvania, where he led the company in adopting platform independent approaches to GIS system development. Ben studied Chinese at the University of Wisconsin and has a Masters in Planning from the University of Pennsylvania. After Penn, Ben worked at the U.C Berkeley GIS Lab, started the GIS group for the transportation engineering firm Mc-Cormick Taylor, and coordinated the Land Acquisition Mapping System for the South Florida Water Management District. Ben is especially interested in technologies that lower the barrier to GIS access.

4:15PM
Field Papers Introduction & Demonstration
Eric Rodenbeck

Abstract: Field Papers is a set of web mapping tools, created by Stamen Design, that bridges the digital and physical aspects of modern mapmaking. Field Papers marries digital and analog technology. You start by printing out maps and marking them up in the field. Then they're photographed (or scanned) and auto-georeferenced. The resulting images can be used in any GIS software as a reference layer for tracing, or manual verification. This process embraces mapping's analog past and the role that field enumeration plays when creating new maps. The project is a core component of Portable OpenStreetMap (POSM), a collaboration between the American Red Cross, Stamen Design, and Spatial Development International. POSM gathers best-of-breed OpenStreetMap-related tools and adapts them for use where Internet access is unreliable, like informal settlements and remote areas. It's used to train local volunteers on data collection using OpenDataKit and OpenMapKit on Android phones, Field Papers, and the iD and JOSM OpenStreetMap editors.

Eric Rodenbeck came to San Francisco in 1994, lured by a deep curiosity for the budding internet-based industry in the city. Twenty years later, Eric's passion for cities, design, and technology has made him a both a local and international leader at the intersection of all three. He caught the bug of telling stories with data at early dot-com Quokka Sports, where he turned GPS tracks from round-the-world sailing races into early data-viz entertainment. In 2001, Rodenbeck founded data visualization design studio Stamen, where he is Creative Director and CEO. The company's high bar for elegant, data-driven design has brought many brilliant data artists, designers and technologists through its doors, and has inspired countless more.

Day 2	June 15, 2016

9:00AM

Overview & Orientation

Melinda Laituri

Melinda Laituri - see page 6

9:10AM

Keynote Address:

The Challenge of Mapping Human Geography Data in the Urban Milieu

Lee Schwartz

As Geographer of the United States, Lee Schwartz holds the position of the Director of the Office of The Geographer and Global Issues in the State Department's Bureau of Intelligence and Research. Schwartz is the State Department's 8th Geographer, a position that was established in 1921 and bears the statutory responsibility for providing guidance to all federal agencies on questions of international boundaries and sovereignty claims. He also oversees the Humanitarian Information Unit – a U.S. government interagency organization focused on unclassified data coordination for emergency preparedness, response, and mitigation. Dr. Schwartz earned his Ph.D. in geography from Columbia University, with a focus on political and population geography. Prior to joining the Office of The Geographer, Schwartz was a member of the faculty of The American University's School of International Service. At the Department of State, he has directed research and analysis on global issues primarily related to complex humanitarian emergencies and has coordinated related fieldwork and applied geography projects overseas, in particular in the Balkans, Central Asia, Russia, Afghanistan, Iraq, Sudan, the Horn of Africa, and Haiti. His recent work has focused on ethnic conflict, refugee flows, peacekeeping operations, strategic warning, and conflict mitigation and response – with an emphasis on GIS and Remote Sensing information coordination as well as Participatory Mapping and Volunteered Geographic Information applications. Lee was the State Department's 2005 winner of the Warren Christopher Award for Outstanding Achievement in Global Affairs, the 2012 recipient of the Association of American Geographers' Anderson Medal of Honor in Applied Geography, and was awarded the 2014 James Cullum Medal from the American Geographical Society - in recognition of his distinguished service to the profession of geography.

9:40AM

Panel I: Why Dynamic Mapping in Secondary Cities?

Mark Montgomery, Phil Yang, Keith Clarke

Moderator: Jason Ur

Mark R. Montgomery is a Professor of Economics at Stony Brook University and a Senior Associate in the Poverty, Gender and Youth Program at the Population Council in New York. In Stony Brook's Ph.D. program, he teaches mathematical statistics, applied econometrics, mathematics for economists, and economic demography. From 1999 to 2003, Montgomery served as co-chair of the U.S. National Academy of Sciences Panel on Urban Population Dynamics, and was lead editor of its 2003 report, Cities Transformed: Demographic Change and Its Implications in the Developing World (Washington DC: National Academies Press, 2003), a comprehensive demographic analysis of the economic, social, and political features of urbanization in poor countries. Dr. Montgomery holds a

Ph.D. in Economics from the University of Michigan. Montgomery's current research interests center on empirical modeling of urban poverty and health, and forecasting city growth with attention to climate-related risks.

Chaowei Phil Yang is professor of geographic information science at George Mason University, where he directs the center for intelligent spatial computing and the NSF spatiotemporal innovation center. His research focuses on utilizing spatiotemporal principles to optimize computing infrastructure to support science discoveries and engineering development. He served as PI and Co-I for projects totaling over $25M. He published over 150 papers, edited five books and ten special issues for international journals. He has led several teams who impact GIScience profoundly, e.g., the GeoServNet development led by him at Univ. of Calgary evolves as one of the origins of Virtual Earth/ Bing Maps. He advised over 20 Postdocs and Ph.D. and most of them serve as professors or researchers in the U.S. and China. His current endeavor is to collaborate with colleagues from Harvard and UC-Santa Barbara to develop the NSF Spatiotemporal innovation center for building the national and international spatiotemporal infrastructure to advance a) human intelligence through spatiotemporal thinking, b) computer software and tools through spatiotemporal computing, and c) human capability of responding to deep scientific questions and grand engineering challenges through spatiotemporal applications.

Keith C. Clarke is a research cartographer and professor, with the M.A. and Ph. D from the University of Michigan, specializing in Analytical Cartography. His most recent research has been on environmental simulation modeling, on modeling urban growth using cellular automata, on terrain mapping and analysis, and on real-time visualization. He is the author of three textbooks in eight editions, and over two hundred and fifty book chapters, journal articles, and papers in the fields of cartography, remote sensing, and geographic information systems. Chair of the National Academy of Sciences Mapping Sciences Committee from 2004-2010, Dr. Clarke also chaired National Research Council studies on the National Map and for the National Geospatial Intelligence Agency. In 2005 he received the John Wesley Powell Award, the highest award given by the USGS. He has served on the Board on Research Data and Information for the National Academies, on the National Geospatial Advisory Committee, on the Board of the Cartography and Geographic Information Society, and on the National Geographic Society's Committee on Research and Exploration.

11:00AM

Panel II: Case Studies on Dynamic Data Collection and Mapping Projects for Urban Developing Communities
Reinhard Goethart, Gabriel Moreno, Kellie Stokes, Kirstin Miller
Moderator: Faith Sternlieb

High Tech/Low Tech Partners

Abstract: *Satellite and drone images provide the framework for detailed community surveys in rapidly developing contexts. Examples will be shown from Tsunami rebuilding in Banda Aceh, Egyptian self-built housing projects, recent Louisiana coast line experimentation, and ongoing work in Quito.*

Dr. Goethert is Principal Research Associate in the School of Architecture and Planning at MIT and director of SIGUS, a service oriented program targeting the informal sector in developing countries. His interests in urban planning, settlement design and housing, focus on the incremental housing development process. Dr. Goethert was named recipient of the UN Habitat International Scroll of Honour for "outstanding contributions in the development of innovative methodologies, training and field practice in Community Action Planning."

Gabriel Muñoz Moreno is a licensed Architect with an Advanced Diploma in Digital Fabrication and candidate for a Master in Design Studies from Harvard University. His work has been awarded internationally and has been exhibited including the Expo Milano 2015. Gabriel has worked internationally at Shigeru Ban Architects in Tokyo and Abalos+Sentkiewicz in Boston. His research focuses on achieving a sustainable development between the natural and social environment due to the phenomena of urbanization.

New Dimensions in Monitoring Patterns of Urban Change

Abstract: *In the last 50 years, global urban populations have increased by 3 billion, and an additional 2.5 billion urban residents are expected by 2050. Critical to predicting the impact of urbanization on environmental and development outcomes, is to understand how urban areas are changing. Land use science has significantly added to our knowledge of urban expansion and its impact on non-urban landscapes, such as agriculture and forests. However, to understand how urbanization will effect emissions and vulnerability, change within urban areas must be monitored.*

In this talk, we discuss the potential of new spatio-temporal remote-sensing data to describe the dynamics of the built environments, energy infrastructure, and activities within urban areas. Applying novel satellite sensors and techniques such as SeaWinds, DMSP-OLS, and Suomi-NPP VIIRS, we present two recent analyses that characterize long-term and short-term patterns of urban change in developing countries. We discuss how these analyses add to our knowledge of the social, political, and cultural activities that shape energy consumption and vulnerability.

Eleanor Stokes is a Ph.D. Candidate at the Yale School of Forestry & Environmental Studies. She is interested in the relationship between the spatial form and structure of the built environment and urban resource use, and the impact of urbanization on greenhouse gas emissions. Before joining the Urbanization and Global Change Group, she received a MS in mechanical engineering at MIT, focusing on building energy use, and a BA from Dartmouth College in math and studio art. She has six years of professional experience in the building technology field, specializing in high performance building design, daylight analysis, renewable energy feasibility studies, and energy efficient mechanical and lighting design. She is currently a NASA Jenkins doctoral fellow, and spends her summers in Washington DC at Goddard Space Flight Center working with the Terrestrial Information Systems Laboratory using the new Suomi-NPP VIIRS Day/Night Visible Band to analyze urbanization dynamics. Her most recent doctoral work focuses on deriving urban sustainability metrics using

remote sensing datasets for the proposed UN UDGs.

Urbinsight – Geospatial Mapping and Education for Community Sustainability and Resilience

Abstract: *This presentation will introduce an interdisciplinary, educational and participatory approach to neighborhood and city-level data collection, management and visualization that supports community-led strategies for urban sustainability and resilience. Highlighted will be processes that integrate environmental, social and economic data for an urban area and its surrounding region, providing a common visual language that facilitates discussion between local stakeholders and government agencies. Current Latin American case studies under the Office of the Geographer's Secondary Cities Program will be showcased, including a low income community of Medellin, Colombia, and an historic neighborhood in Cusco, Peru. Topics covered will include a discussion of mapping technologies selected and piloted and their advantages and disadvantages, the challenges and successes of participatory mapping in the case study locations, and conclusions drawn thus far from the experience.*

Kirstin Miller serves as Executive Director for San Francisco Bay Area based NGO Ecocity Builders, where she leads the organization's program development, global initiatives and activities. She is an international speaker and presenter on ecocity design, technology, development and citizen participation. Ecocity Builders works internationally to establish access to ecocity knowledge, integrating experiences from a diverse range of perspectives. They develop mutual understanding of sustainable city goals and help implement knowledge in new settings, including co-ordinating joint partnerships, projects and work plans. Ecocity Builders is the keeper of the Ecocity World Summit conference series, which has been held in 11 cities around the world since its first convening in 1990 in Berkeley, California.

1:10PM
Tools & Technologies Applied to Humanitarian Aid
Nathaniel Raymond

Abstract: *Remote sensing and mapping technologies are increasingly a critical component of humanitarian assistance operations during both armed conflict and natural disaster contexts. This session discusses common use cases of these platforms and techniques for providing general situational awareness to responders and affected populations, as well as specific applications of them to certain types of aid operations.*

Nathaniel Raymond is the Director of the Signal Program on Human Security and Technology at the Harvard Humanitarian Initiative (HHI) of the Harvard Chan School of Public Health. He has over fifteen years of experience as a humanitarian aid worker and human rights investigator. Raymond was formerly director of operations for the George Clooney-founded Satellite Sentinel Project (SSP) at HHI. He is a lead author of the first UN Office for the Coordination of Humanitarian Affairs documents on data responsibility and data preparedness in humanitarian operations.

Raymond served in multiple roles with Oxfam America and Oxfam International, including in Afghanistan, Sri Lanka, Ethiopia, and elsewhere. He has published multiple popular and peer-reviewed articles on hu-

man rights, humanitarian issues, and mapping technology in publications including the Georgetown Journal of International Affairs, the Lancet, the Annals of Internal Medicine, and many others.

Raymond served in 2015 as a consultant on early warning to the UN Mission in South Sudan. He was a 2013 PopTech Social Innovation Fellow and is a co-editor of the technology issue of Genocide Studies and Prevention. Raymond and his Signal Program colleagues are co-winners of the 2013 USAID/Humanity United Tech Challenge for Mass Atrocity Prevention and the 2012 U.S. Geospatial Intelligence Foundation Industry Intelligence Achievement Award. He is a co-editor for technology with Genocide Studies and Prevention: An International Journal.

1:50PM
Citizen Participation and GIS Use in Urban India
Rina Ghose

Abstract: *While the global North has a long history of utilizing GIS for spatial decision making, its usage in India has been relatively recent. Further, the concept of citizen participation in planning activities is relatively new in India, and its effectiveness is shaped by multiple contextual factors. Because of the recent emphasis on collaborative governance and transparency, GIS is used to enhance citizen participation through e-governance projects and through Public Participation GIS. This paper aims to examine the complexities of embedded in citizen participation through GIS based knowledge production in urban communities in India. Through empirical findings, it aims to demonstrate how cultural, political and technological factors differentially shape the ways GIS is being used in enhancing citizen participation in urban planning in India.*

Dr. Rina Ghose is Professor of Geography at University of Wisconsin-Milwaukee. She specializes in GIS, urban governance, and social theory. Her research has been widely published in journals such as Cartographica, Transactions in GIS, Urban Geography, Environment and Planning A, Antipode, Geoforum, Progress in Human Geography etc. Her email is rghose@uwm.edu

2:30PM
The Use of Smartphones for Dynamic Mapping and Planning of Transit Systems in Africa
Zachary Patterson

Abstract: *The presentation focuses on the two phases of the AccraMobile Project - a collaboration between the Accra Municipal Assembly (AMA), the Agence francaise de développement and Concordia University's (Montreal, Canada) TRIP Lab. Impetus for the project originated from the AMA who sought to construct a documentary structure (route registry, protocols for data collection and mapping) for planning and passenger use of the Trotro bus network of Accra in Ghana. Phase 1 of the project involved: the adaptation of the TRIP Lab's smartphone travel survey app, DataMobile; development of a data collection protocol; administration of Trotro route data collection; and the dynamic mapping of the routes. Data from Phase 1 has subsequently been trans- formed into Google's General Transit Feed Specification (GTFS) format, and made accessible to the local community through a hackathon and map designed to be easily readable to Trotro users. While Phase 1 sought to gather information on the nature and breadth of the Trotro network for planning purposes, Phase 2 is directed primarily towards Trotro operators. It involves a great deal of engagement with operators with the aim of better understanding Trotro operations and developing business cases to finance a feet renewal program.*

Zachary Patterson is Associate Professor in the Department of Geography, Planning and Environment at Concordia University in Montreal. He is also Tier-II Canada Research Chair in Transportation and Land Use Linkages for Regional Sustainability. Dr. Patterson's research has three main thrusts: the use of emerging technologies in data collection, GIS, and statistical analysis. Recent research concentrates on the processing and inference of information from locational data collected from smartphones.

3:20PM

Panel III: Solutions, Lessons Learned, and Next Steps for Secondary Cities
Nathaniel Raymond, Rina Ghose, Zachary Patterson
Moderator: Melinda Laituri

4:30PM
Closing Remarks
Sandy Pentland

Panel Moderators
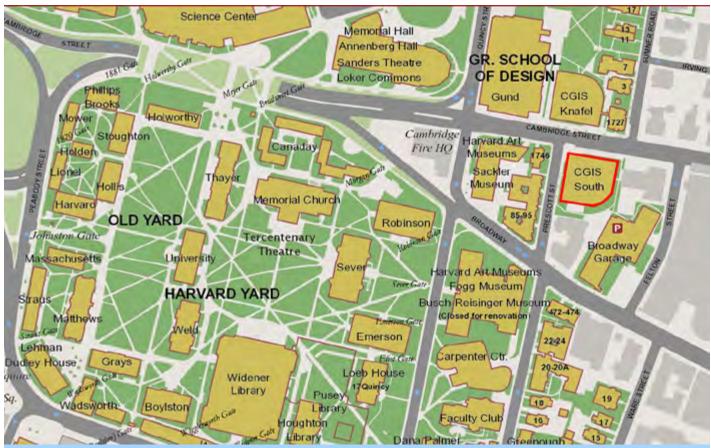Jason Ur, Faith Sternlieb, Melinda Laituri

Dr. Faith Sternlieb has a joint postdoctoral fellowship with the American Association of Geographers and the Department of Ecosystem Science and Sustainability at Colorado State University (CSU) conducting research on Secondary Cities, a flagship project of the Humanitarian Information Unit of the Office of the Geographer, U.S. Department of State. During her first postdoctoral fellowship at the Hebrew University of Jerusalem, she researched the role of desalination in Israeli-Palestinian negotiations. She has a PhD in Earth Sciences with a Watershed Specialty from CSU where she focused on the geospatial implications of agricultural water governance in the Colorado River Basin. Dr. Sternlieb completed a Peace Corps Masters International during which time she worked on community-based natural resource management in Palau, Micronesia. She has been involved in a number of international and national, interdisciplinary projects through the Colorado Water Institute, CSU Earth System Governance Research Center and UNESCO-IHE. She was also one of the founding members of the U.S. University WASH Network, a consortium of universities advocating solutions for the global water, sanitation, and hygiene crisis. Her current research interests include the role and nature of private-public partnerships in local to global environmental governance, social-ecological interactions at the science-policy-practice nexus, and human geography data sharing policies and practices.

Map of the Harvard Campus:

Purchase Parking Pass: https://www2.uos.harvard.edu/cgi-bin/permit/purchase.pl