

GeoViz Frontiers

Bo Zhao

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Cartography and Geovisual Analytics



Dead?

A New Phase?

[PDF] Is Cartography Dead? - Department of Geography

www.geography.wisc.edu/.../Roth_20... ▾ University of Wisconsin-Madison ▾
Feb 10, 2006 - Introduction. Wood, Denis. 2003. Cartography is Dead. (Thank God!).
Cartographic Perspectives. 45: p4-7. Primary Impetus. Olson, Judy M.

[PDF] Cartography is Dead (Thank God!) - Making Maps

makingmaps.owu.edu/mm/cartographydead.pdf ▾
by D Wood - Cited by 54 - Related articles
4. Number 45, Spring 2003 cartographic perspectives. Cartography is Dead (Thank God!) Denis Wood. Independent Scholar. Cartography Is Dead (Thank God!).

[PDF] Chapter 5: Counter-Mapping and the Death of Cartography.

www.quiqui.org/wp-content/.../WOOD-2010-Death-of-Cartography.pdf ▾
These examples imply that counter-mapping is played out over long stretches of time —the counter-mapping that led to the creation of Nunavut began in the ...

Cartography is dead, long live the map makers | - edparsons

www.edparsons.com/.../cartography-is-dead-long-live-the-map-makers/ ▾
Sep 1, 2008 - Cartography is dead, long live the map makers. Seems like only last year, ah yes it was last year, that the bored press hits upon it annual "shock ...

The Death of Cartography and the Rise of the Machines ...

www.gogeomatics.ca/.../the-death-of-cartography-and-the-rise-of-the-ma... ▾
Apr 22, 2013 - This article explores how technology has influenced map making, how cartography requirements have changed, and what skill sets one needs ...

Is Cartography Dead? No!... - The British Cartographic Society

<https://www.facebook.com/bcsweb/posts/520973277938615> ▾

Cartography is not dead, but its survival requires thoughtful redefinition. Right now, many of us are not quite sure what cartography involves anymore, and plenty ...



Is there a need for neo-cartography?

[MJ Kraak](#) - Cartography and Geographic Information Science, 2011 - Taylor & Francis
These days more and more maps are being produced and used by more people than ever before. This seems to be a very positive development for those who are in favor of maps. The increase can be witnessed both in a professional environment (eg, geoscientists). Cited by 18 Related articles Cite Save

Crowdsourced cartography: mapping experience and knowledge

[M Dodge, R Kitchin](#) - Environment and Planning A, 2013 - eprints.maynoothuniversity.ie
... We then go on to discuss the changing nature of cartography in the Web 2.0 era with respect to authorship, ontology, representation, and temporality. Keywords: cartography, crowdsourcing, 'prosumers', Web 2.0, authorship, ontology, representation, temporality ... Cited by 48 Related articles All 11 versions Cite Save

[PDF] Cartography 2.0: For people who make interactive maps

[M Harrower, AC Robinson...](#) - Cartographic ..., 2009 - cartographicperspectives.org
Cartography 2.0 (<http://Cartography2.org>) is a free online knowledge base and e-textbook for students and professionals interested in interactive and animated maps. I (Mark) proposed the idea of doing an 'online textbook' to my co-authors because I knew that, as teachers, Cited by 1 Related articles All 11 versions Cite Save More

[CITATION] Perspectives on the new cartography

[MF Goodchild](#) - Environment and Planning A, 2015 - epn.sagepub.com
Whether we recognize it as 'un-cartography', 're-cartography', 'cartography 2.0', 'cybercartography', or whatever we choose to call it, the papers in this collection give a compelling sense of the very exciting changes that are occurring in what has in many ways been a static discipline. Cited by 1 Related articles All 4 versions Cite Save

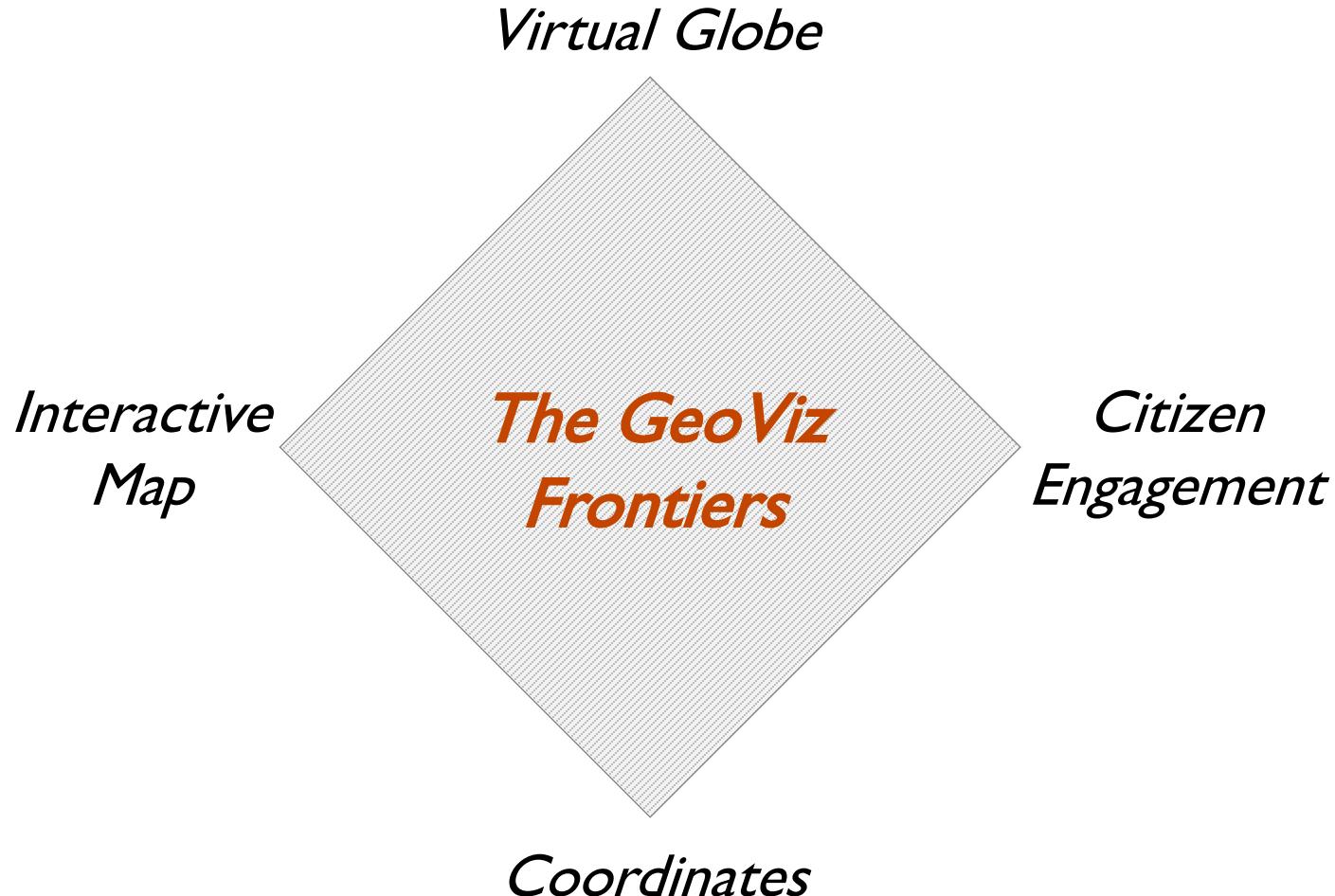
Map?

Paradigms	Research Focus	
	Map Construction	Map use
Map as Images (The communicative/cognitive tradition)	Visual symbol design, color use, graphical hierarchy, and figure/ground	Reading, visualizing, communicating, and metaphor
Map as Model (The analytical tradition)	Data structure design, and algorithm development	Analytical modelling, hypothesis testing, and simulation
Maps as Intent/Social Construction (The critical tradition)	Distortion/biases built-in, power relationship, ethical consideration	Power and control, governance, propaganda tool, counter-surveillance

Outline

- An emerging phase of cartography?
- The cartographic frontiers
 - Overview of my research and teaching
 - Discussion and implications
- Conclusion
- Research Structure

Perspectives on the Frontiers

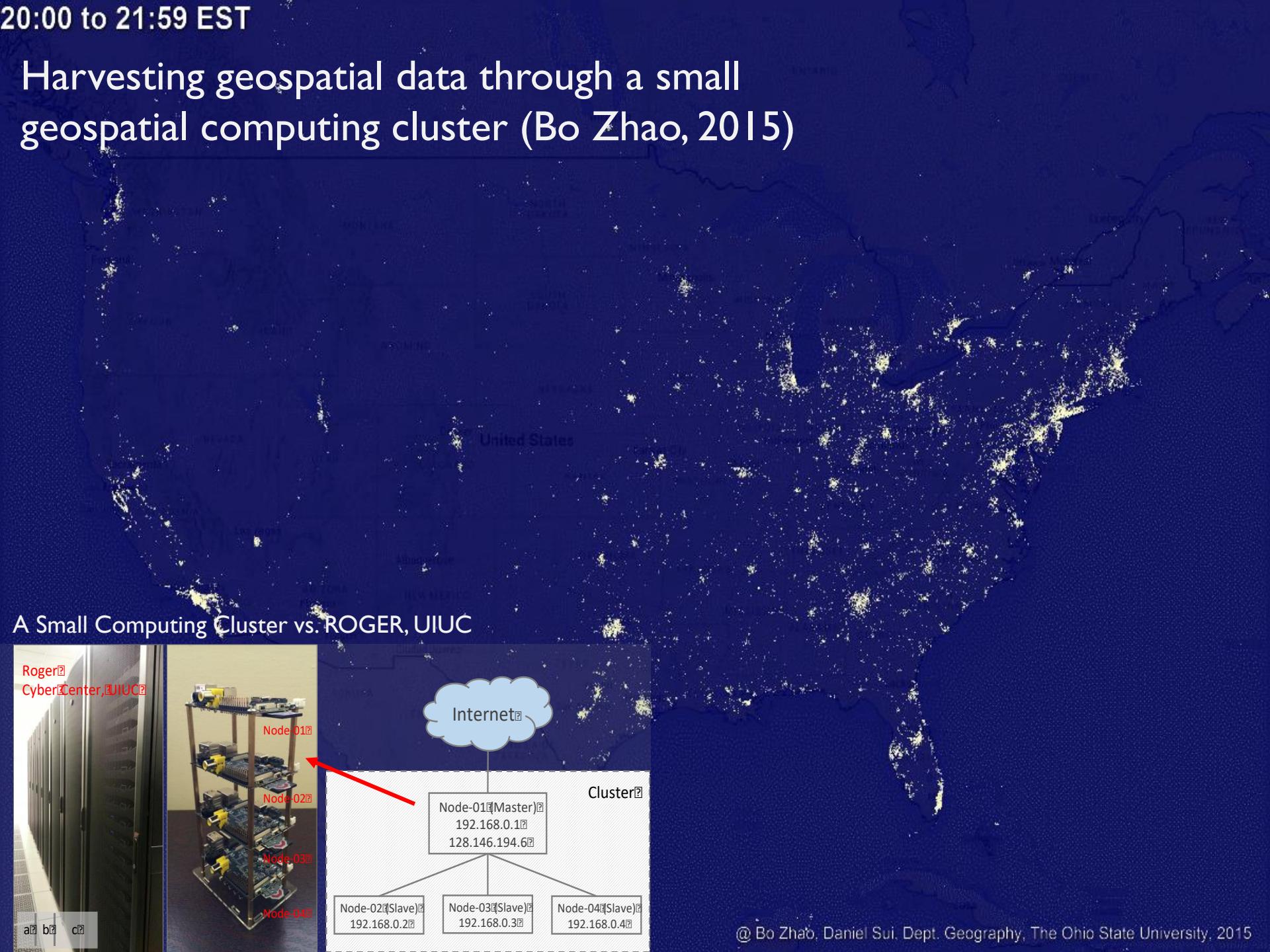


I. Virtual Globe

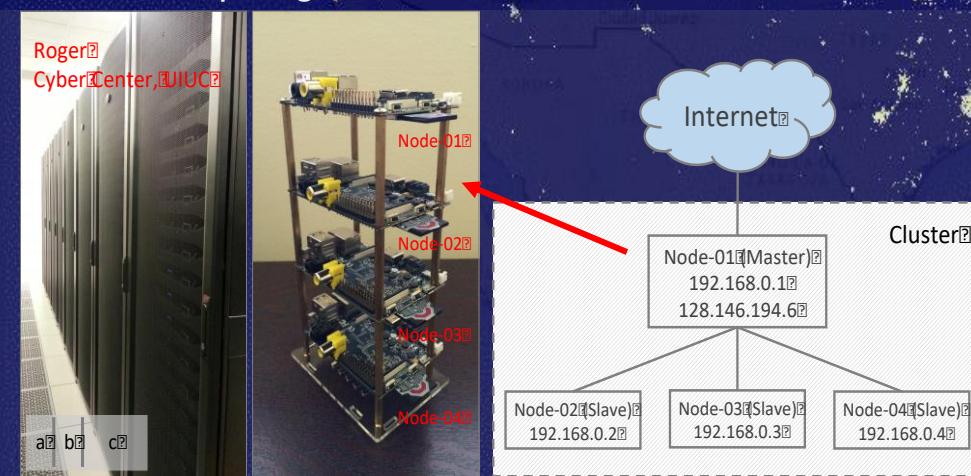
- Digital Earth:
 - Google Earth
 - ArcGlobe by ESRI
- Program for Virtual Globe:
 - United States: EarthCube
 - Europe Union: ENVRI (Environmental Research Infrastructure)
 - China: Tianditu
- Infrastructure:
 - Amazon Web Services
 - ROGER (Resourcing Open Geospatial Education and Research), an NSF funded Cyber GIS infrastructure (Wang, 2015)



Harvesting geospatial data through a small geospatial computing cluster (Bo Zhao, 2015)

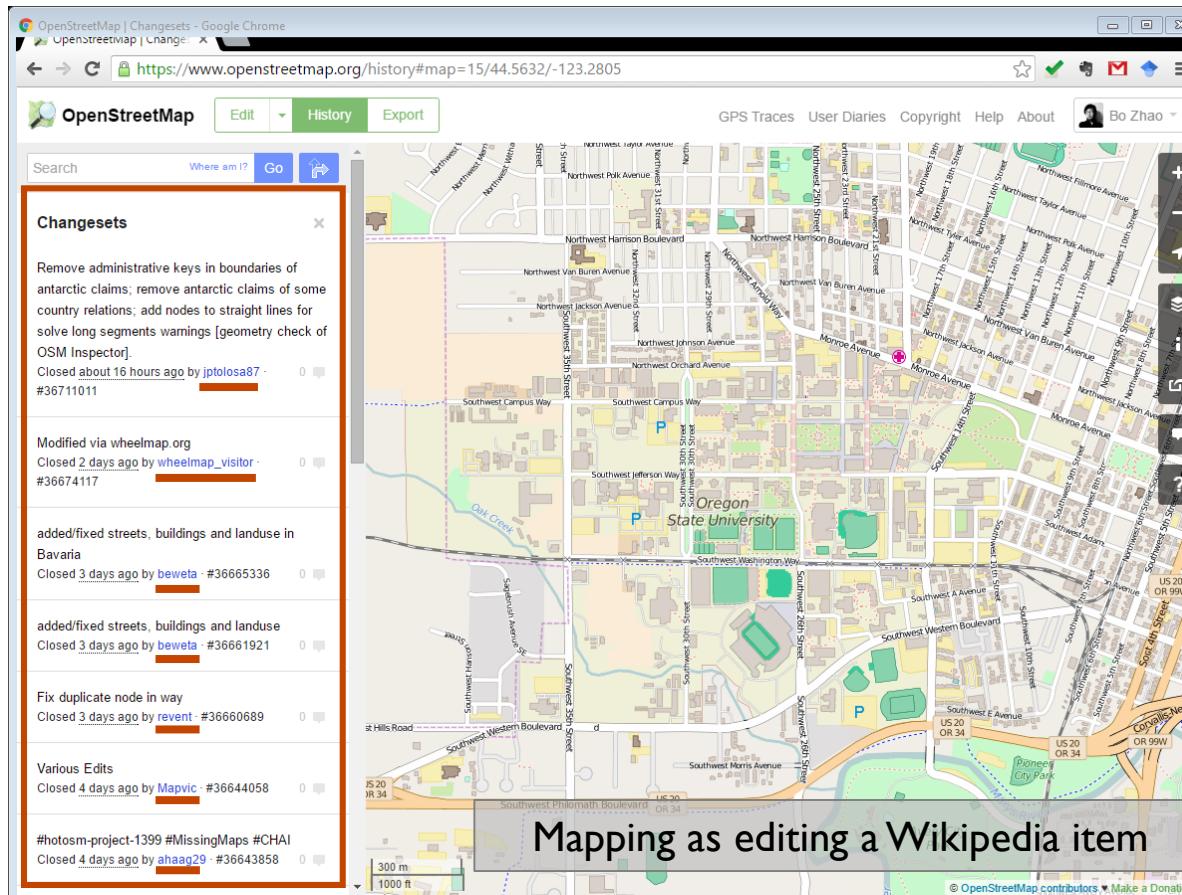


A Small Computing Cluster vs. ROGER, UIUC



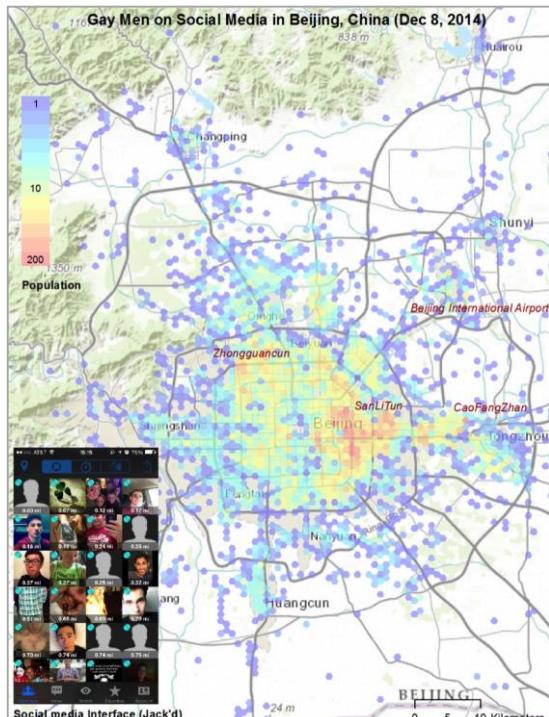
II. Citizen Engagement

- Citizen Science, Crowdsourcing
- VGI: Open street map

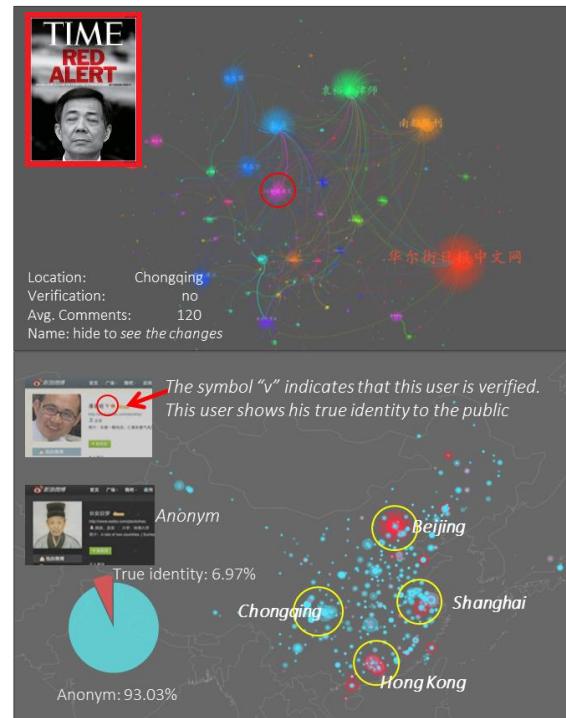


II. Citizen Engagement: Applications

- Forest Fire (Longueville et al, 2009)
- Flood Hazard (Poser et al, 2010)
- Climate Change (Kirilenko, 2014; Williams, 2015)



LGBT Community
(Zhao, 2014)



A Political Scandal
(Zhao, 2012)



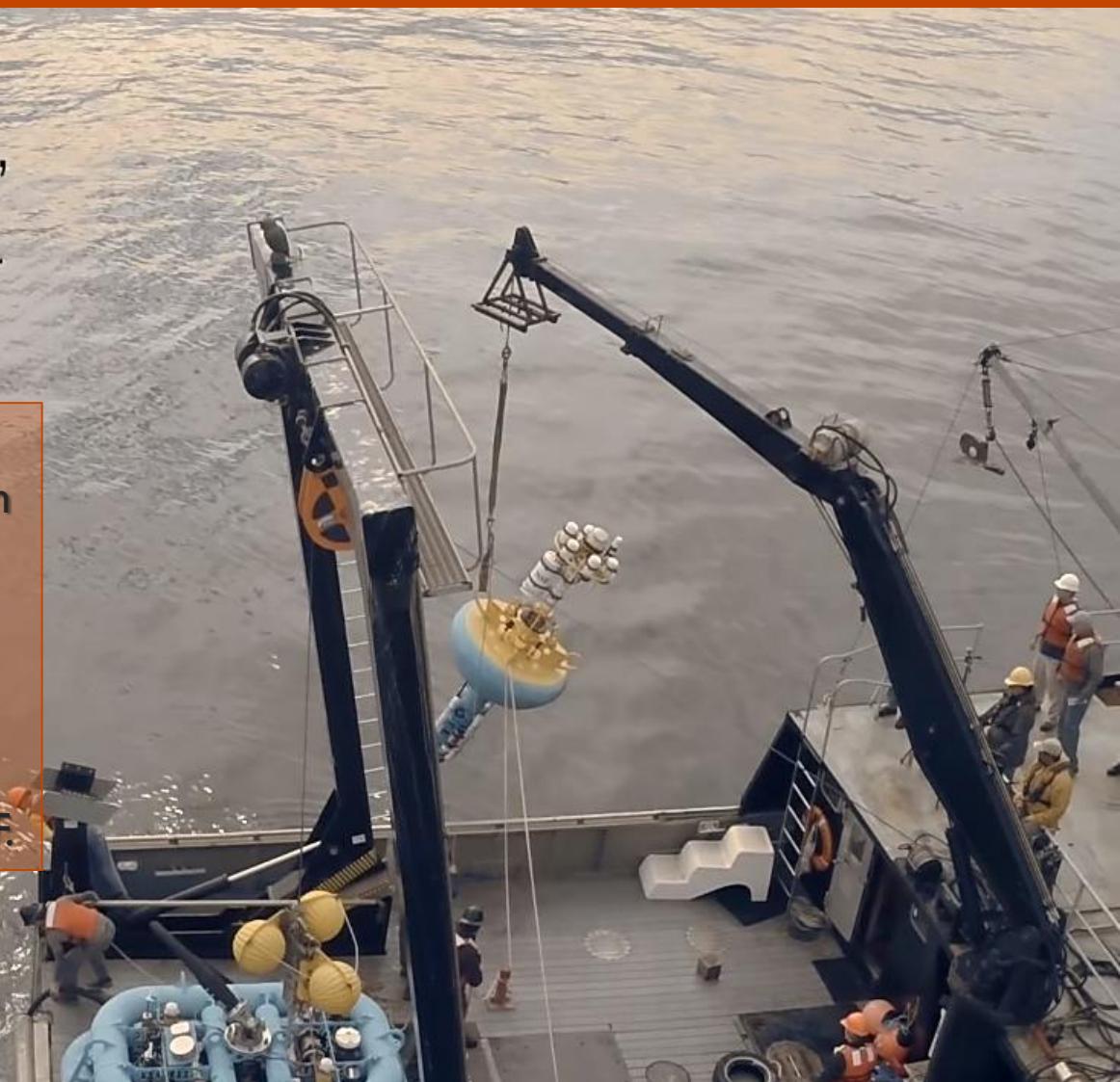
Child Street Beggars
(Zhao, 2011)

III. Coordinates

It will provide continuous, real-time data on ocean conditions in a way never possible before.

On June 3rd, 2015, a team of scientists from CEOAS at Oregon State University deployed research buoys off of Newport, Oregon.

It is the largest marine sciences initiative in the history of the NSF.



III. Coordinates



CJRSLRB® 16pcs/lots Raspberry pi 2 B+ sensor module Board package 16 kinds of sensor Set kit
by CJRSLRB
★★★☆☆ 5 customer reviews
#1 New Release in Laptop Barebones

Price: \$27.99
In stock on January 13, 2016.
Order it now.
Sold by Vidianna and Fulfilled by Amazon. Gift-wrap available.

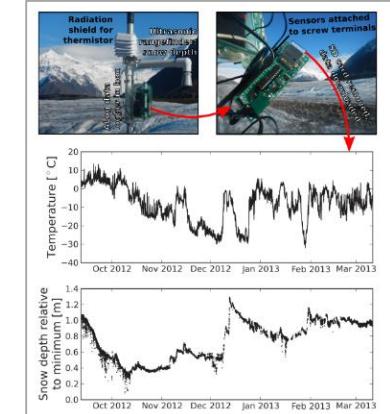
This item has no Manual. If you mind, please order cautiously.

Click to open expanded view
2 new from \$27.99

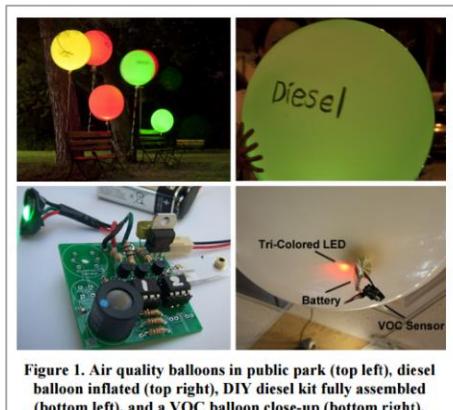
Open Source hardware on Amazon
(Kuznetsov, 2011)



Ocean drifter
(Ganderton, 2014)



Temperature and snow depth sensor
(Wickert, 2014)

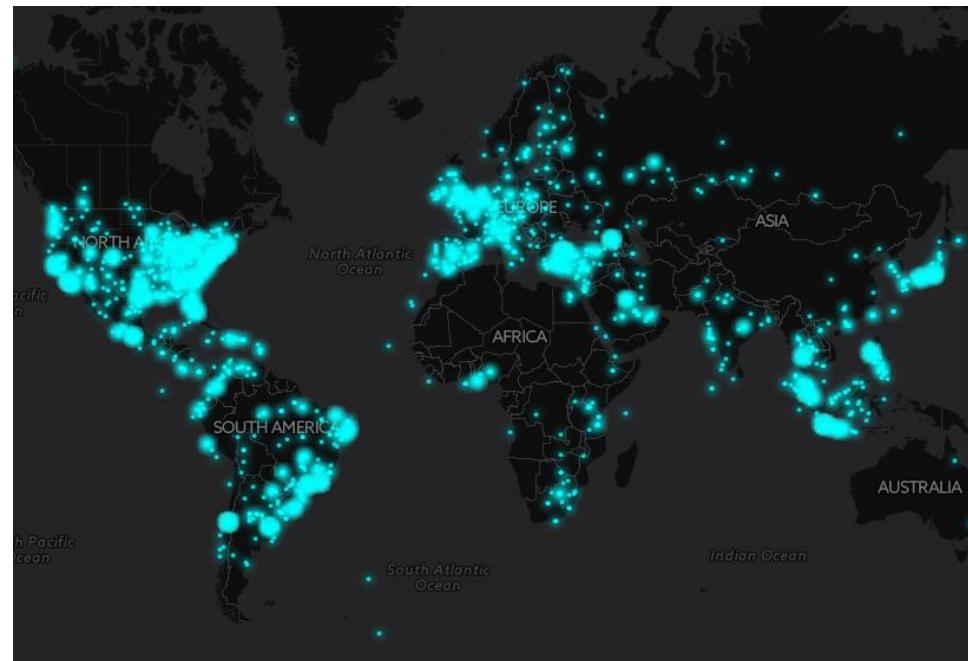
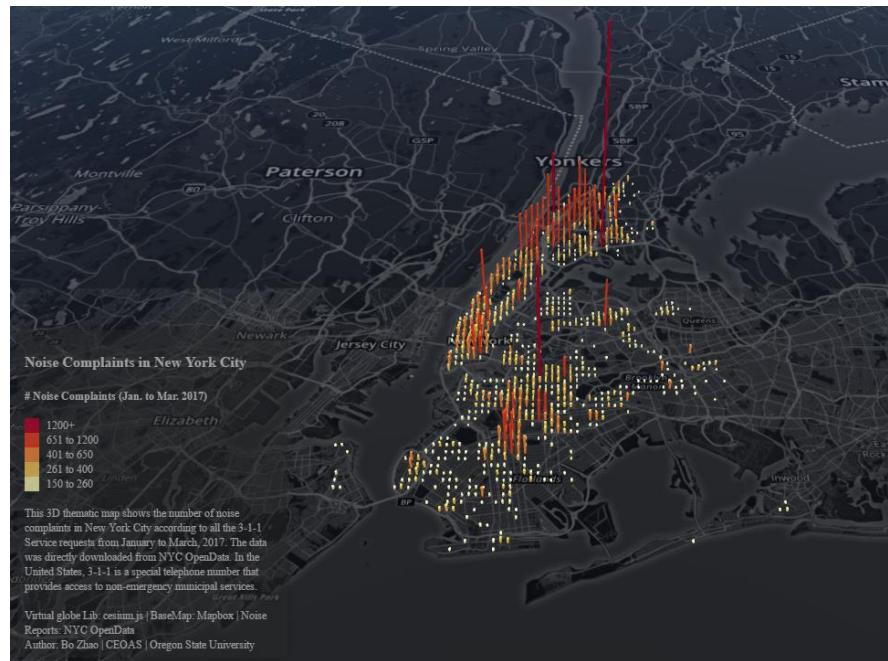


Air quality sensor carried by balloons
(Kuznetsov, 2011)



An infant monitor *unfinished*
(Zhao, 2016)

IV. Interactive Maps



IV. Interactive Maps

Storytelling with Maps



An iPhone App for Historical Sites
(Zhao et al, 2010)



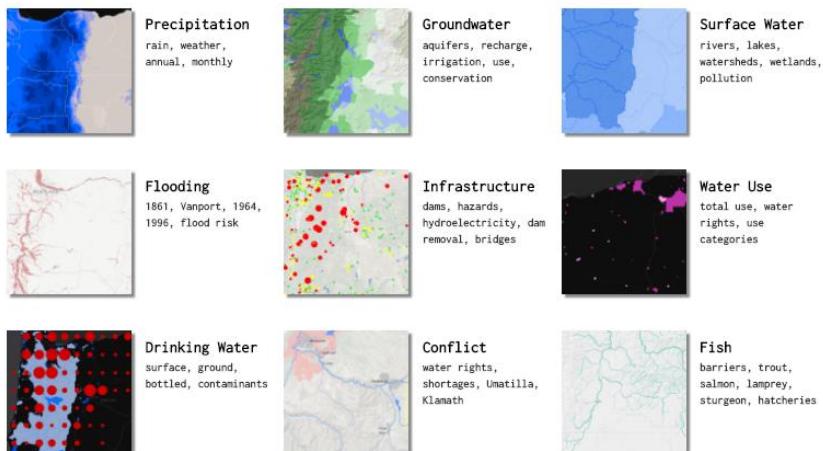
Storymap.js (Zhao, 2016)



Oregon Water Atlas

About

Chapters

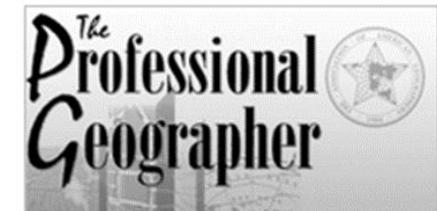


Gareth Baldwin-Franklin, Institute for Water and Watersheds, Oregon State University, 2017



Can Social Media Clear the Air? A Case Study of the Air Pollution Problem in Chinese Cities

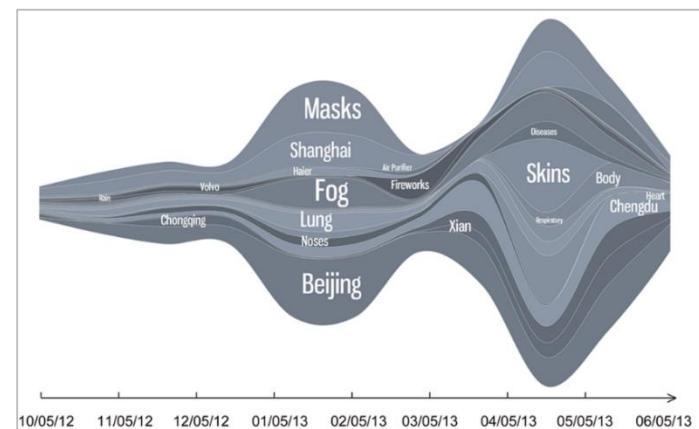
Samuel Kay, Bo Zhao, and Daniel Sui
The Ohio State University



Since the U.S. Embassy in Beijing placed an air quality sensor on its roof and began publishing the results on Twitter in 2008, air quality has gained widespread attention on Chinese microblogs. When the Chinese government introduced new air quality standards in 2012, some hailed this as a victory for Chinese microbloggers, signifying the emergence of social media as a democratizing force leading to greater citizen power. Using a representative sample of microblog posts collected from October 2012 to June 2013 on the topic of air pollution, as well as contextual information from a variety of sources, we examine how the government, companies, nongovernmental organizations, and individuals approach the Chinese social media landscape. We find that although microblogs are capable of empowering citizens to advance an environmental cause, social media have also been increasingly employed by the government as a tool for social monitoring and control and by companies as a platform for profiting from air pollution. **Key Words:** air pollution, Chinese cities, social media, urban political ecology.

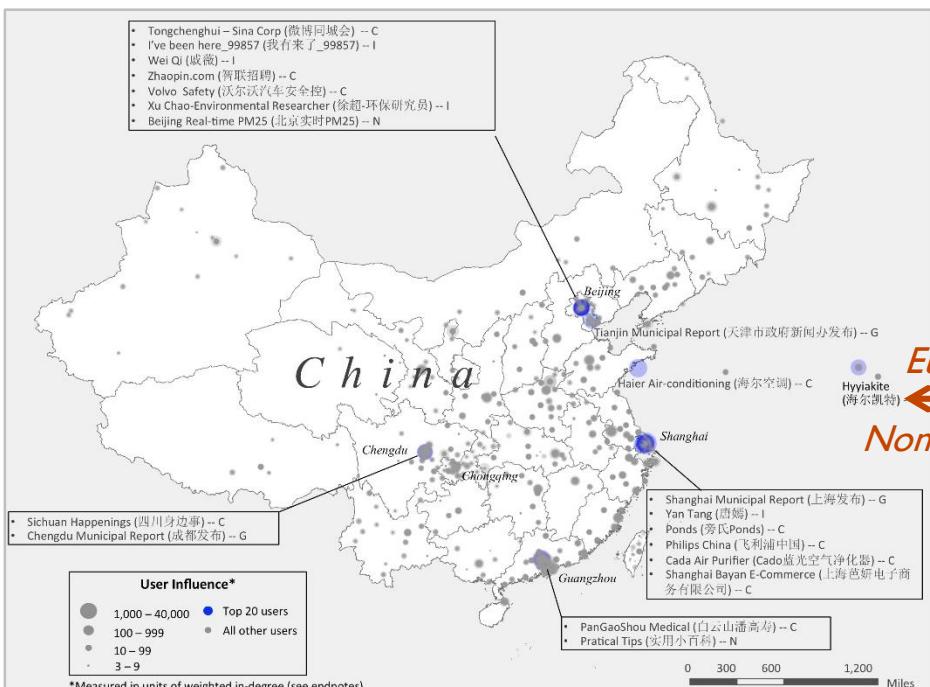


A word cloud of the high-frequency terms in the debate

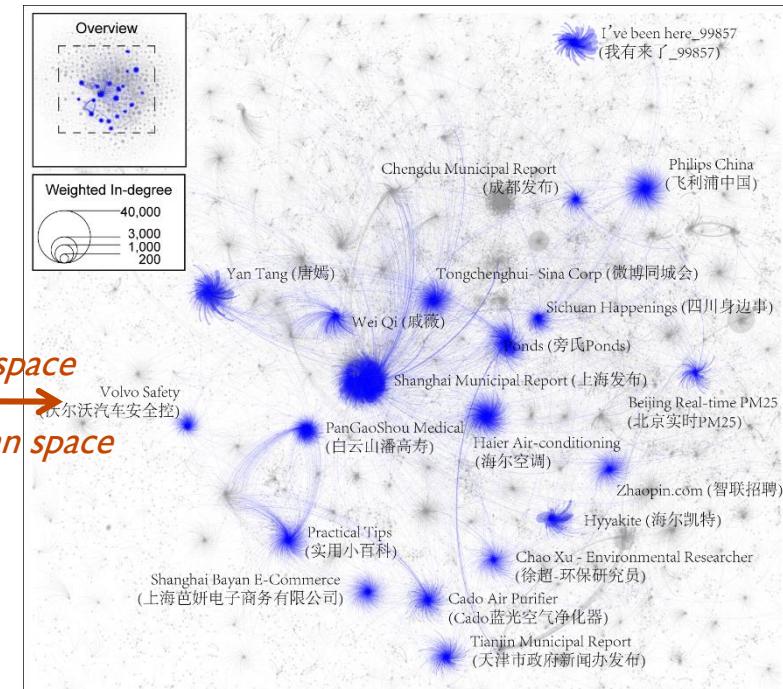


A time stream of the high-frequency terms

Opinion Leaders of the Debate

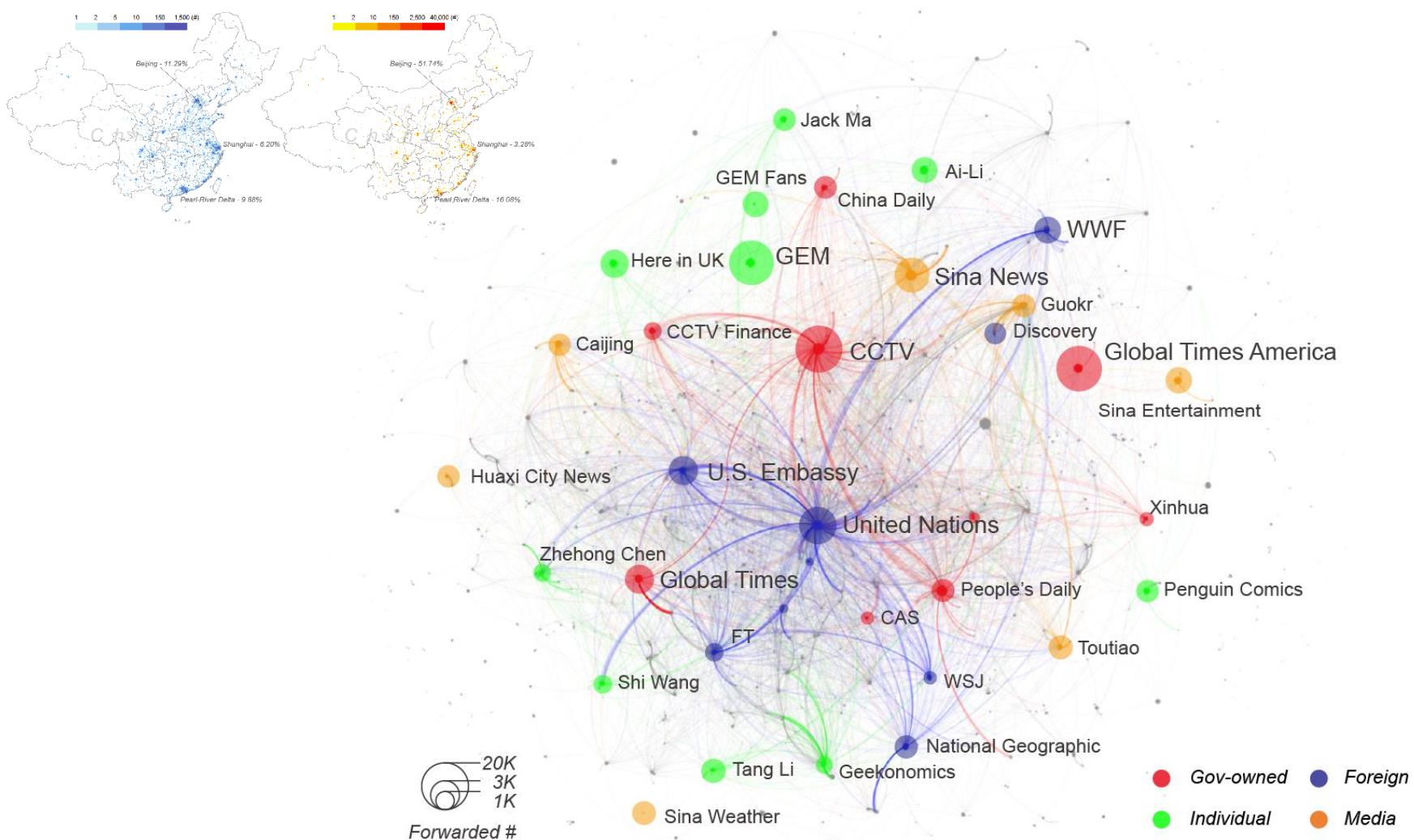


The spatial distribution of the opinion leaders



The social network of the opinion leaders

Who Speaks for Climate Change in China? Evidence from Weibo



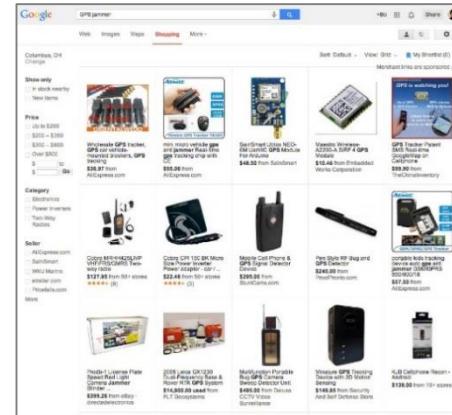
Outline

- An emerging phase of GeoViz?
- The cartographic frontiers
 - Overview of my research
 - Discussion and implications
- Conclusion

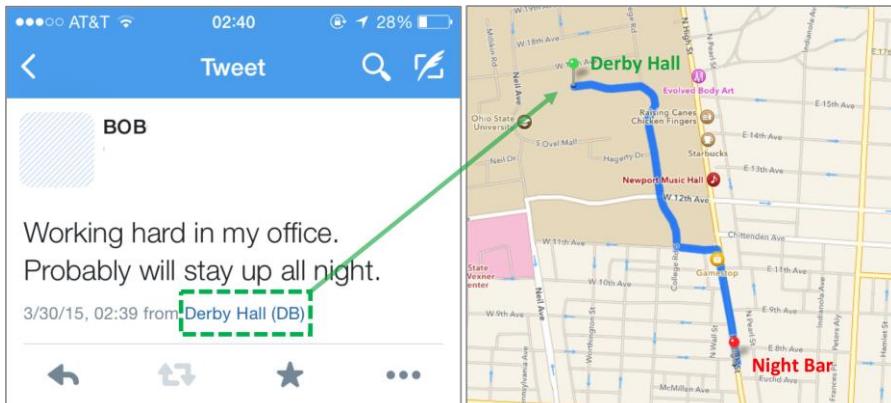
Discussion: Location Spoofing



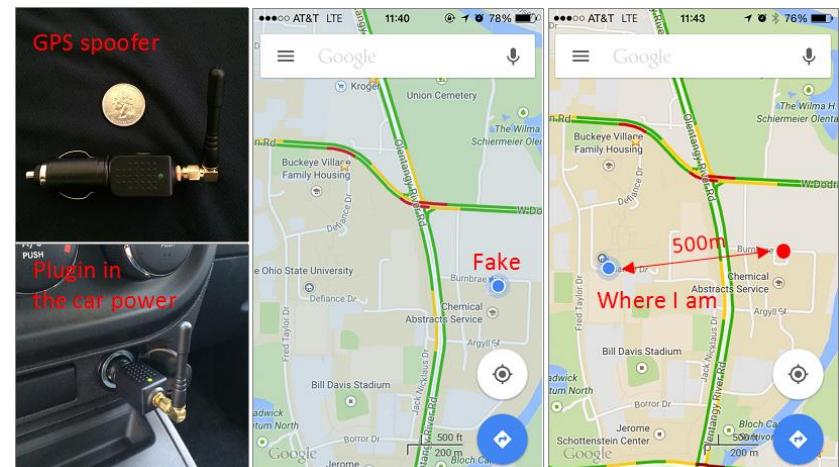
Location Spoofing Apps



GPS spoofers From Google Shopping

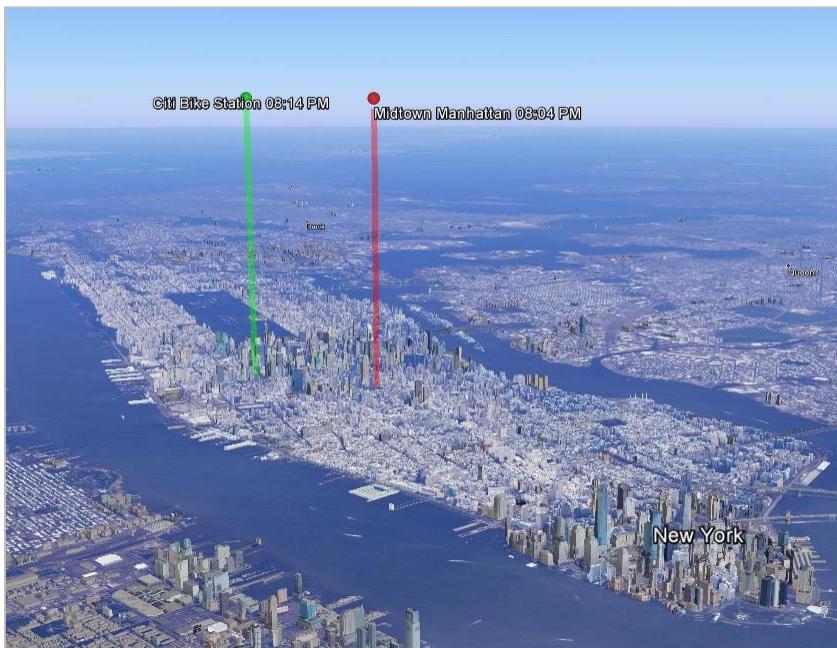


Location spoofing via an app

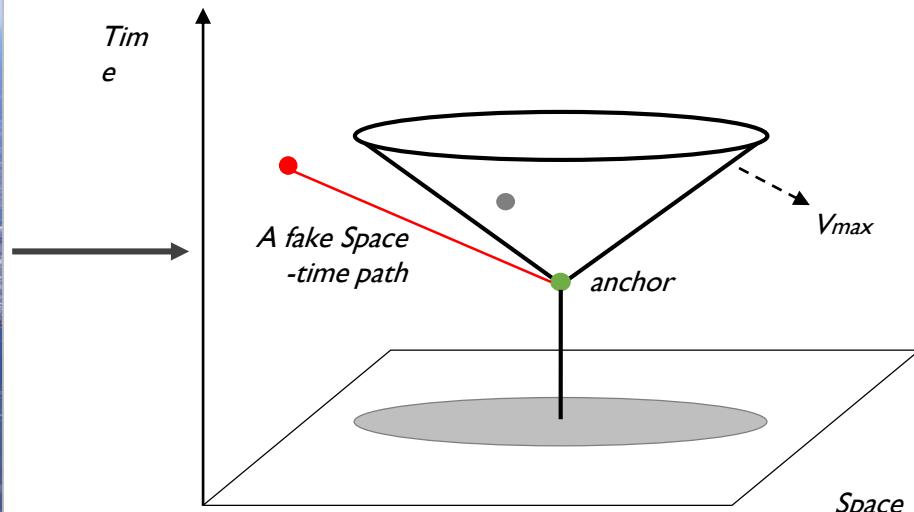


Location spoofing via a mobile GPS spoofer

Detecting location spoofing based on a Bayesian time geographic approach (Zhao, 2015)

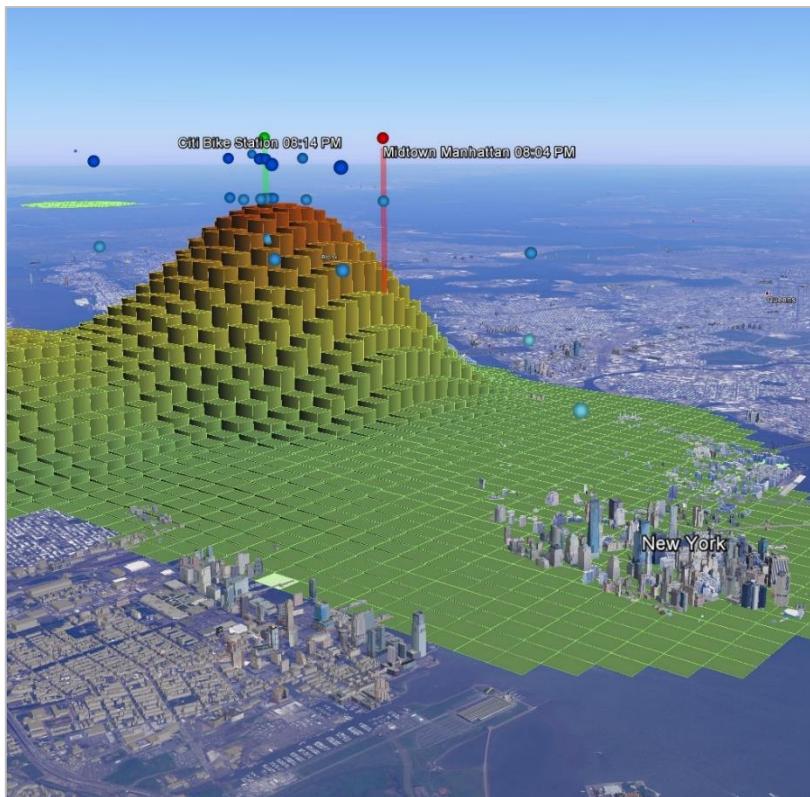


A candidate and its consecutive location



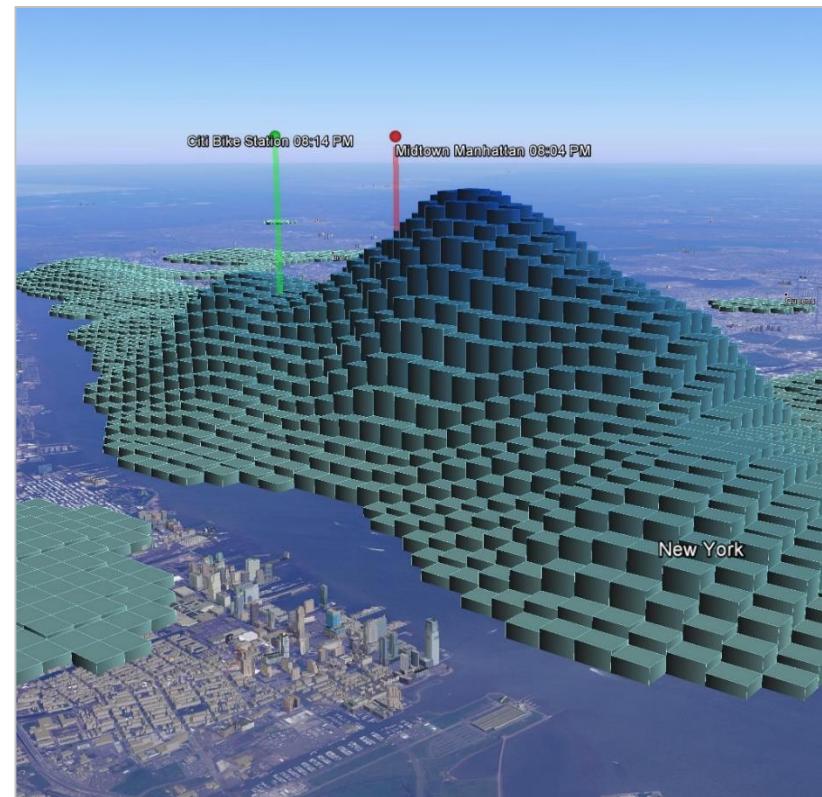
A space-time cone

Detecting location spoofing based on a Bayesian time geographic approach (Zhao, 2015)



Individual Activity Probability $P(A)$

$$P_l(A) = \frac{1}{(N-1)[t(1, N) \cdot v(u)]^2} \sum_{i=1}^{N-1} G \left(\frac{d(i, l) + d(l, i+1)}{t(i, j) \cdot v(u)} \right)$$



Human Appearance Probability $P(H)$

$$P_l(H) = \frac{1}{M[t(1, N) \cdot v(u)]^2} \sum_{j=1}^M G \left(\frac{d(j, l)}{rt(j, l) \cdot v(u)} \right)$$

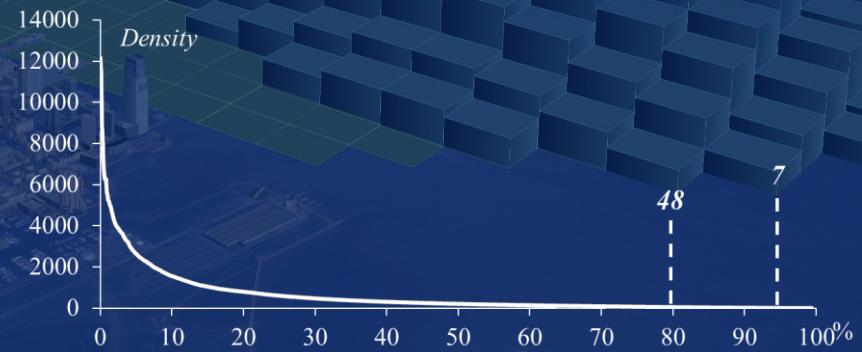
Citi Bike Station 08:14 PM

Midtown Manhattan 08:04 PM

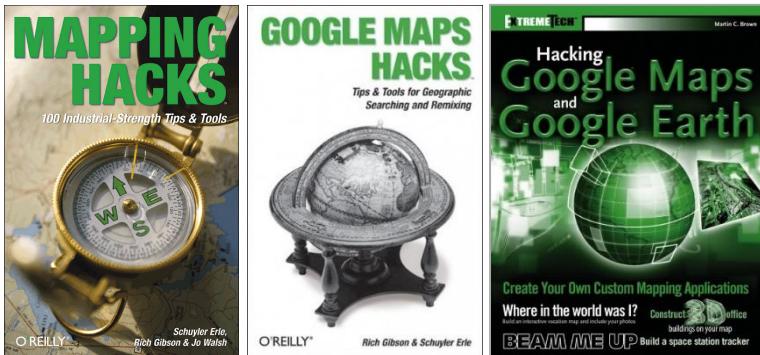
Visiting probability

$$P(V) = P(A|H) = P(A) \cdot \frac{P(H|A)}{P(H)}$$

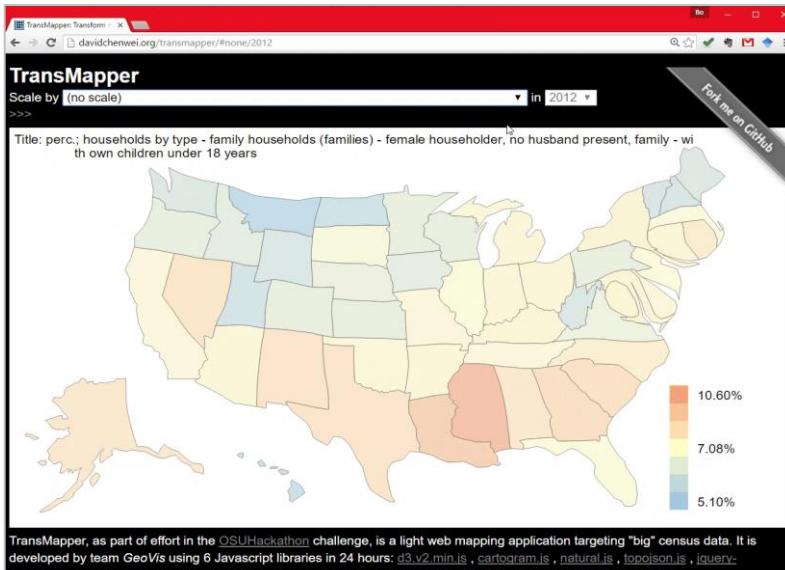
$$P(H|A) = \begin{cases} P(H) & D > p \\ P(A) & 0 < D \leq p \end{cases}$$



New GeoViz Practices



Books on mapping hacks



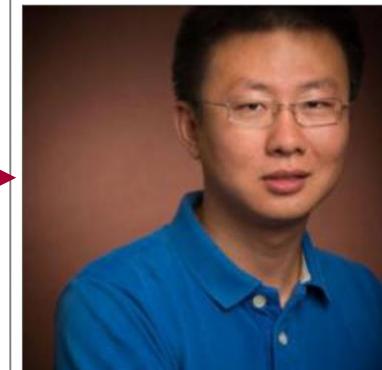
Web based Cartogram (Zhao et al, 2013)

Cartographers as Hackers?

Mapping as Hackathon?

CURA Affiliate Wins Third Place at OSU's Hackathon

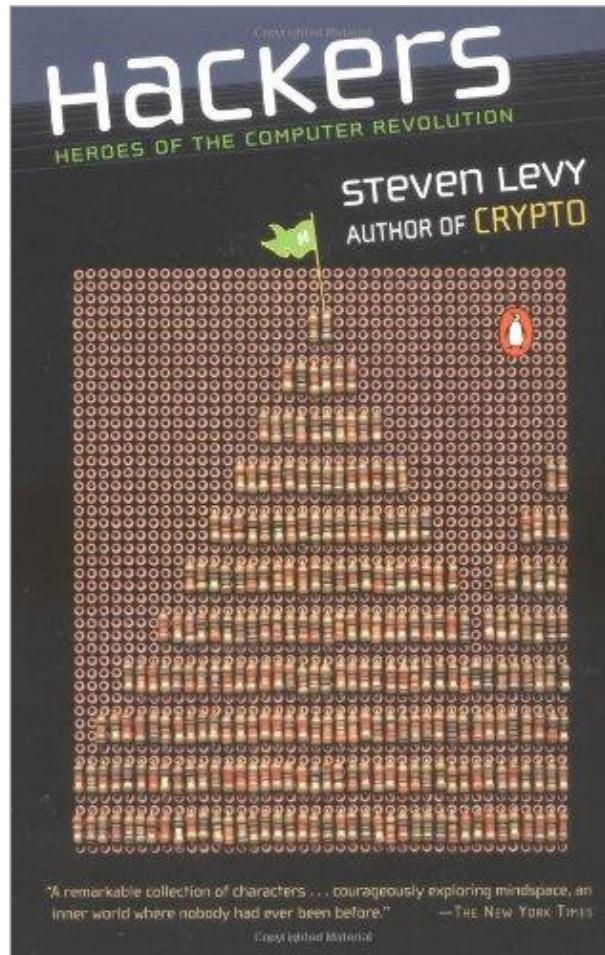
November 12, 2013



CURA Graduate Affiliate [Bo Zhao](#) was part of a three-person team that won third prize at [OSU's Hackathon 2013](#).

To view the team's light web mapping application for big data, the Transmapper, you can click [here](#). And to read stories about the event, you can check out this [Dispatch article](#) or this [Lantern article](#).

New GeoViz Ethics?



1. Access to computers should be unlimited and total.
2. All information should be free.
3. Mistrust authority -- promote decentralization.
4. Hackers should be judged by their hacking, not bogus criteria such as degrees, age, race, or position.
5. You can create art and beauty on a computer.
6. Computers should change our life for the better.

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Conclusion: Shifting GeoViz Paradigms

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	Map Construction	Map use
Map as Images (The communicative/cognitive tradition)	Visual symbol design, color use, graphical hierarchy, and figure/ground	Reading, visualizing, communicating, and metaphor
Map as Model (The analytical tradition)	Data structure design, and algorithm development	Analytical modelling, hypothesis testing, and simulation
Maps as Intent/Social Construction (The critical tradition)	Distortion/biases built-in, power relationship, ethical consideration	Power and control, governance, propaganda tool
<i>Maps as Wiki</i>	<i>Mashing up via heterogeneous media/sensors from both amateurs and experts</i>	<i>Geo-narrative, map story telling</i>