SOLSTICE:
An Electronic Journal of Geography and Mathematics

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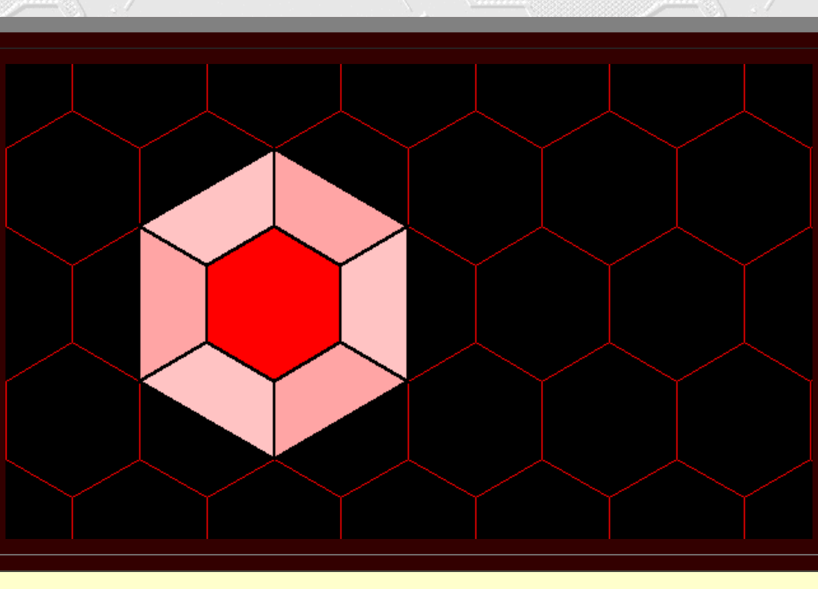
**VOLUME XXIII, NUMBER 1;
June, 2012**

News

1. ***Spatial Mathematics: Theory and Practice Through Mapping***. Sandra L. Arlinghaus and Joseph Kerski, forthcoming (c. 2012), CRC Press. Linked video.
2. The work above is the first volume in a series of books to be published by CRC Press in its series "**Cartography, GIS, and Spatial Science: Theory and Practice**." If you have an idea for a book to include, or wish to participate in some other way, please contact the series Editor, Sandra L. Arlinghaus.
3. Virtual Cemetery with William E. Arlinghaus; an ongoing project that continues in development run in the virtual world in parallel with the trust-funded model of a real-world cemetery.

Articles

Click on the sun/cloud button to see a word cloud of the adjacent article!



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Congratulations to all *Solstice* contributors.

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Allen K. Philbrick | Donald F. Lach | Frank Harary | William D. Drake | H. S. M. Coxeter | Saunders Mac Lane | Chauncy D. Harris | Norton S. Ginsburg | Sylvia L. Thrupp | Arthur L. Loeb | George Kish |

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VOLUME XXIII, NUMBER 1;
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From Tissot to Google Earth: Sampling the Earth's Graticule

Sandra L. Arlinghaus and Joseph Kerski
Associated .kmz download.

Sampling Projection Distortion: Tissot's Indicatrix

Classical Approach: Mercator and Sinusoidal Projections

The Tissot Indicatrix, is the classical way to sample projection distortion. A sequence of circles of constant radius are centered on graticule intersection points. The greater the associated distortion in mapping the globe to the plane, the greater the distortion of the circle, either as an enlarged circle, or as an ellipse with long major axis in relation to its minor axis. Figure 1 shows a typical illustration indicating this idea with simple enlargement on a Mercator projection and Figure 2 shows circular elongation on a sinusoidal projection.

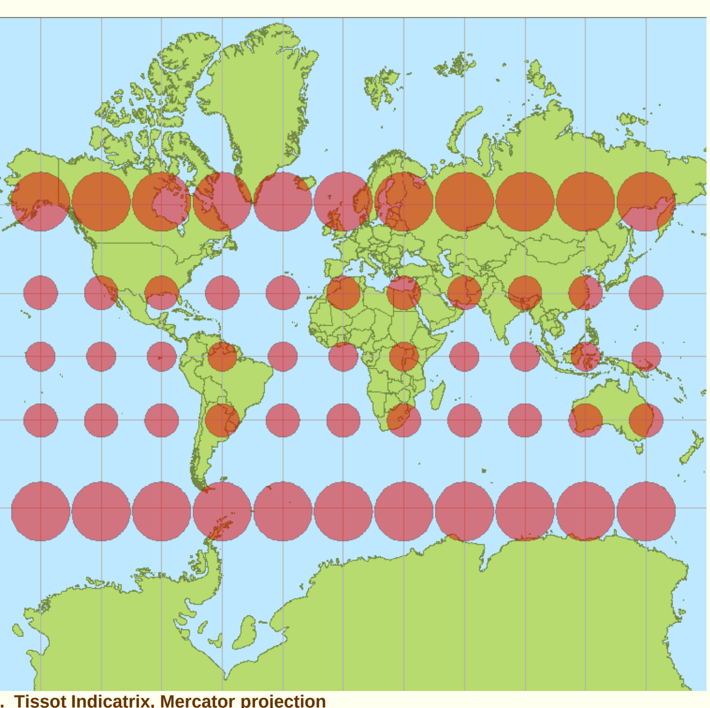

Figure 1. Tissot Indicatrix, Mercator projection
Source: Wikipedia--http://en.wikipedia.org/wiki/File:Tissot_mercator.png

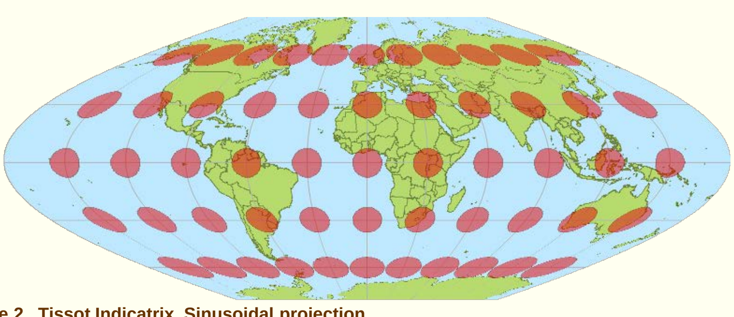

Figure 2. Tissot Indicatrix, Sinusoidal projection.
Source: Wikipedia--http://en.wikipedia.org/wiki/File:Sinusiodal_earth_circles.png

Figure 1 illustrates quite clearly the way in which landmasses become exaggerated in area as one moves toward the poles while Figure 2 illustrates a change in shape, rather than in area, as one moves poleward. While the visual evidence is compelling, it is difficult to see simultaneously in the mind's eye how the graticule distortion might distort a variety of globe features. One reason for this difficulty is that these models are visually static. Indeed, usually, as in Figures 1 and 2, one sees only simple country-level boundary distortion in association with ellipse elongation.

Contemporary Approach: Web Mercator Auxiliary Sphere projection

Software in which one can traverse an image of the globe, such as Google Earth, offers a dynamic way to both see Tissot-style distortion and simultaneously consider an inventory of what is available on the globe through digital imagery. Figure 3 shows an approach to an alternative visual sampling of projection distortion; here, of the Web Mercator Auxiliary Sphere projection.

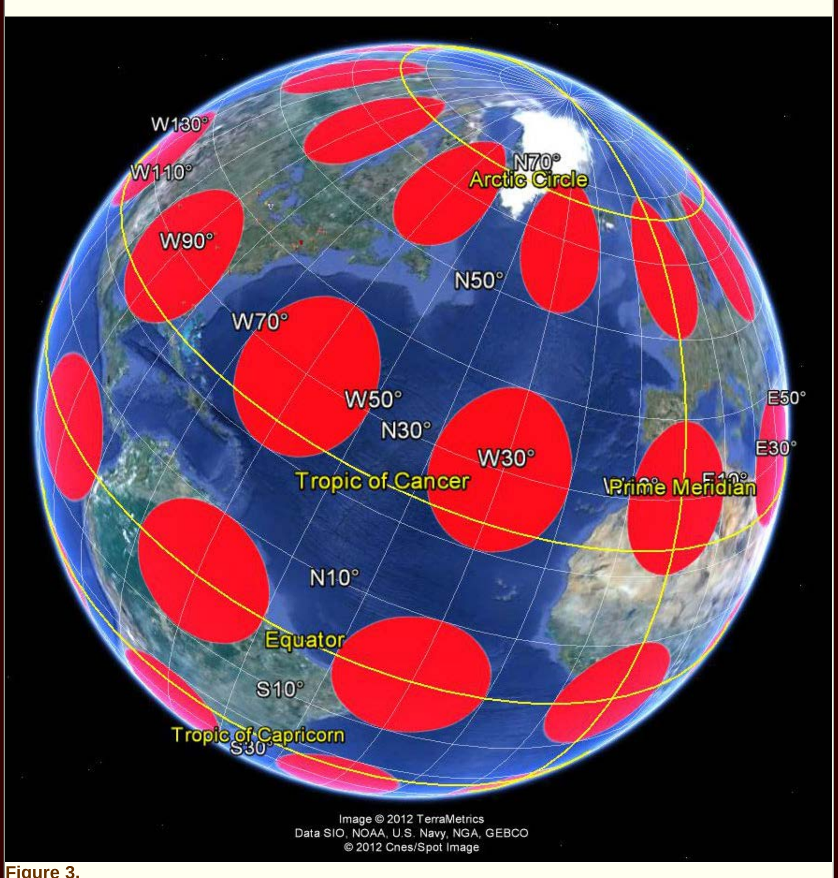

Figure 3.
Tissot Indicatrix of Web Mercator Auxiliary Sphere projection with distortion realized in Google Earth.

Screen captures, and animations of screen captures, show less than half the Google globe. To see it all, download the associated .kmz file and open it in Google Earth.

One advantage, in addition to being able to spin the globe, is to adjust the opacity of the ellipses, the elevation of the ellipses, the scale of visualization, and a host of other factors. The following visual sequence suggests a number of different possibilities. No doubt the interested reader will find others!

The animation in Figure 4 suggests that when looking at a broad region, the elongation of the ellipse might matter when looking at global patterns, such as weather fronts. The radar imagery may be stretched a bit in the north-south direction so care must be taken to interpret the pattern in relation to existing boundaries or benchmarks rather than simply on sheer apparent length of the front. The animation in Figure 5 suggests, however, that local scale studies suffer few effects from the distortion. In fact, the semi-transparent overlay of the ellipse offers no information and simply clouds the wealth of default information available in the mapping software.

Figure 6 returns again to a global view and raises the ellipses above the surface of the globe so that one might walk between the globe and the Tissot layer to view simultaneously the terrain and the superimposed polygons from within the abstract structure. This Tissot umbrella offers unusual vantange points; again, the reader might try this construction, and similar ones, for him or herself using the downloaded .kmz file. This sort of approach, to integrating geometry and geography, is a small sample of what is to come in our forthcoming book on spatial mathematics...stay tuned.

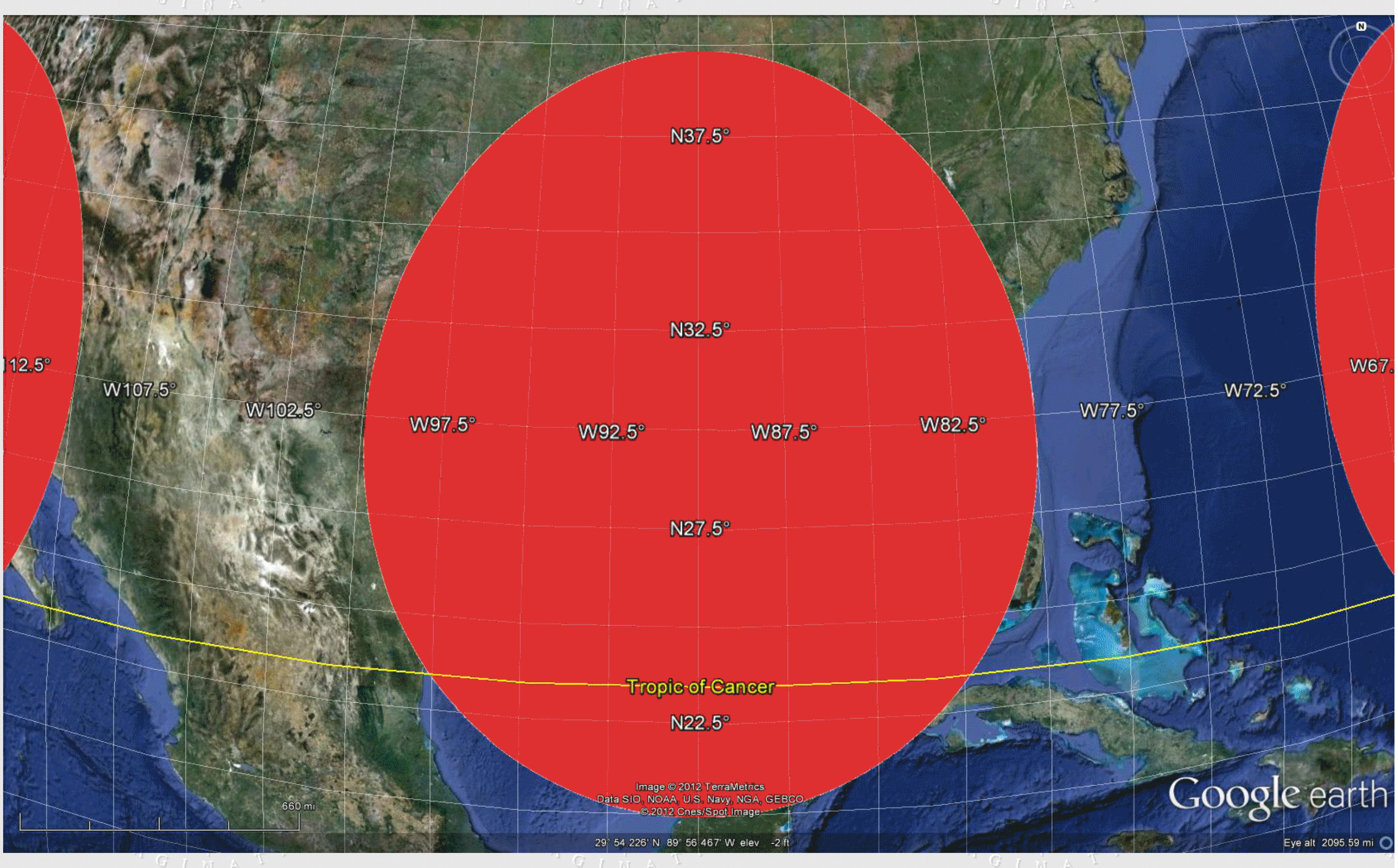

Figure 4.
Google Earth permits simultaneous visualization roads and other features within a Tissot ellipse.
Notice elongation in the weather pattern that comes in east of Florida.

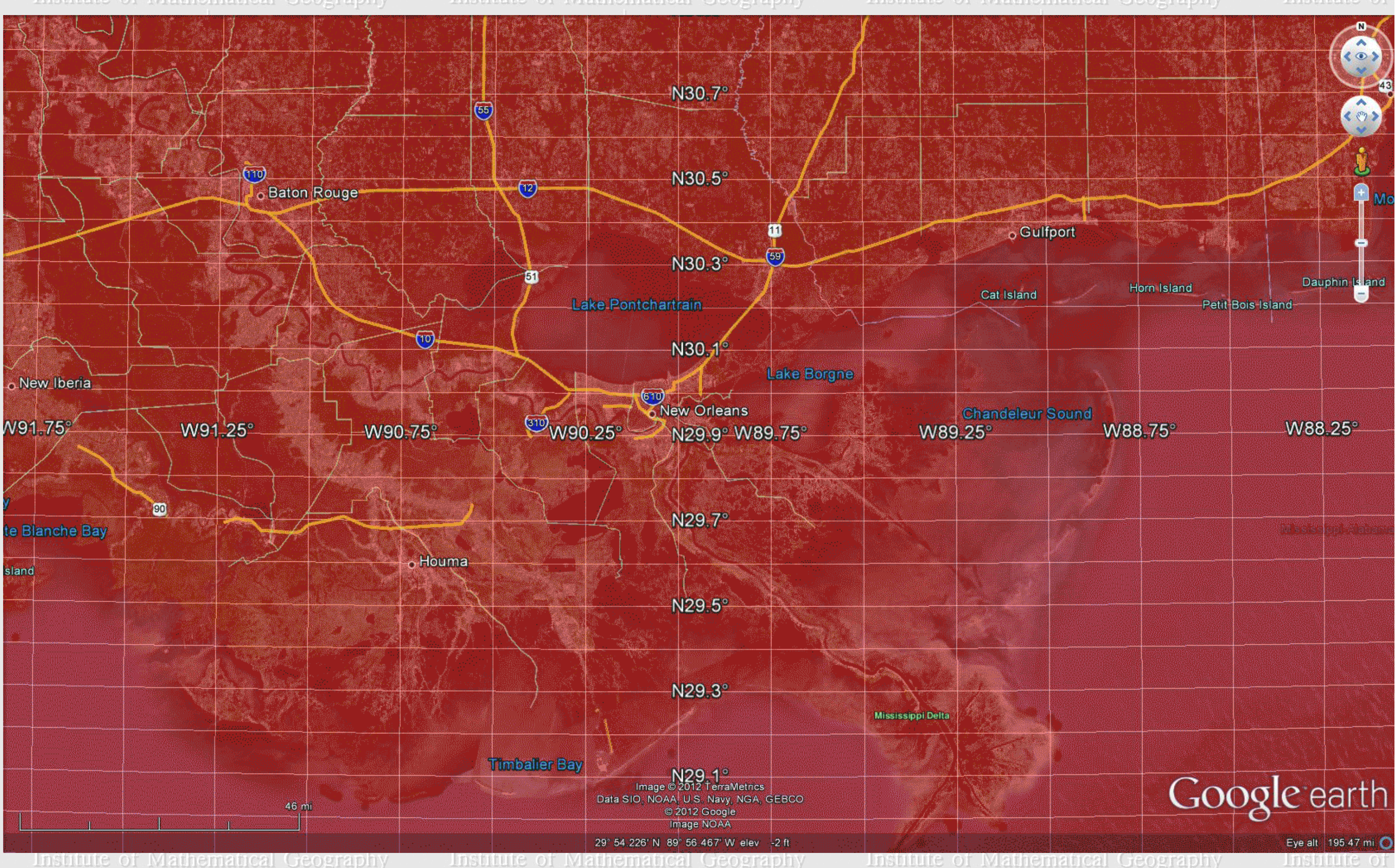

Figure 5. At a scale this local and at this latitude on this projection, distortion makes little difference in general.

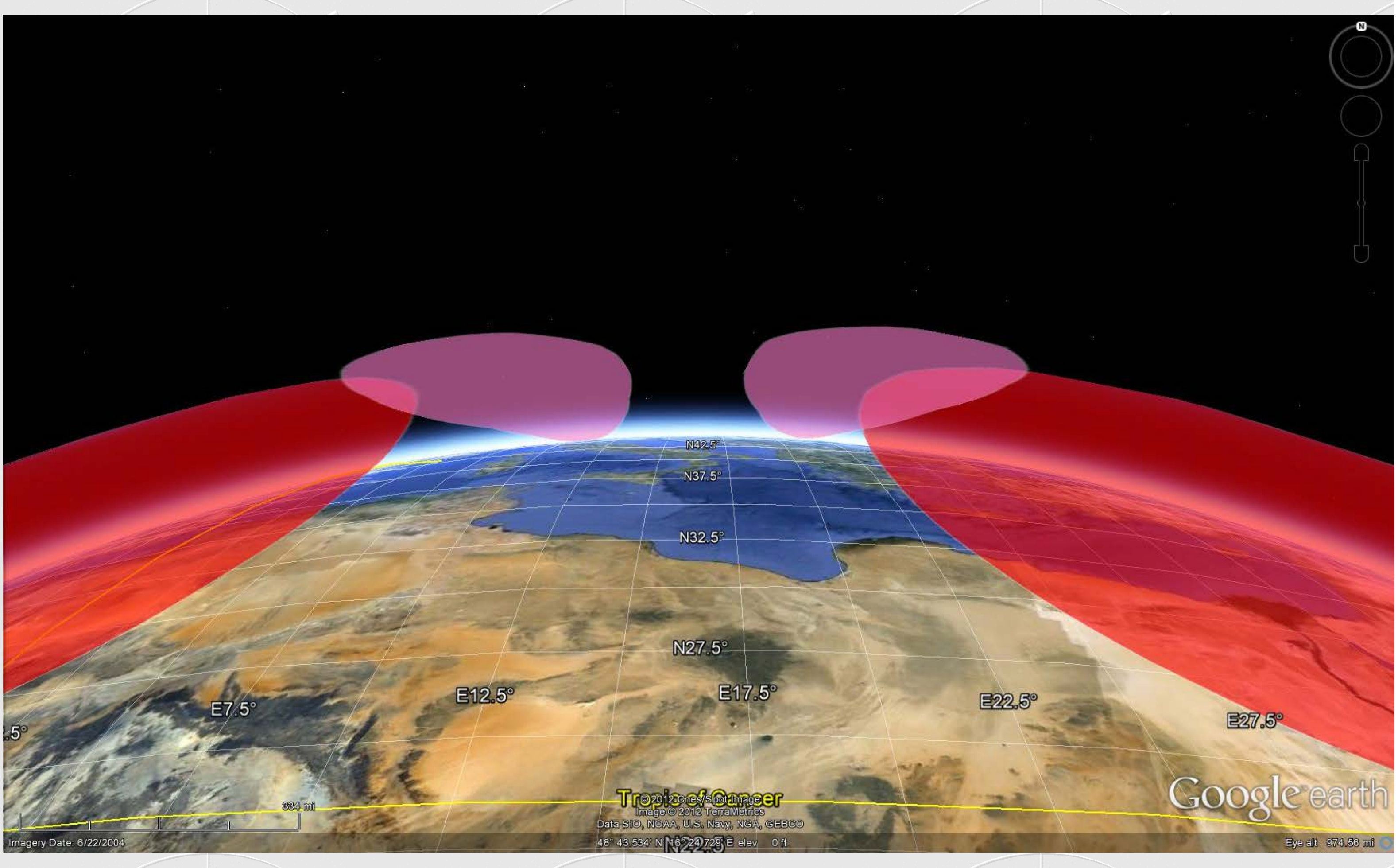

Figure 6. Tissot umbrella. Ellipses are set at successively higher altitudes above the sphere as one moves poleward.

Sampling the Environment: the Degree Confluence Project

The Tissot Indicatrix samples the graticule at the global, or at least, small scale level. A more recent project, called the Degree Confluence Project, photographically samples the Earth's graticule at integer locations of parallels and meridians in order to create an archived inventory at these locations. Try the worldwide confluence navigation tool posted on the DCP website: http://confluence.org/worldwide.php . Consider individual photos and reports of the set of discrete locations (Kerski Confluence visit at 42N, 84W, a sample typical of such visits) . Each one gives an amount of geographic information confined by latitude and longitude within a small capsule, much as postage stamps have done so in the past. Indeed, the collection digital photographs, mounted in an "album" of Google Maps is much like the archives of the journal The CartoPhilatelist that emphasizes maps on stamps and associated stories; here, the compact stories are mounted digitally and are fashioned from virtual images--as perhaps a different contemporary view of cartophilately!

References

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The CartoPhilatelic Society. http://www.mapsonstamps.com/

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Kerski, Joseph. 2012. Confluences.

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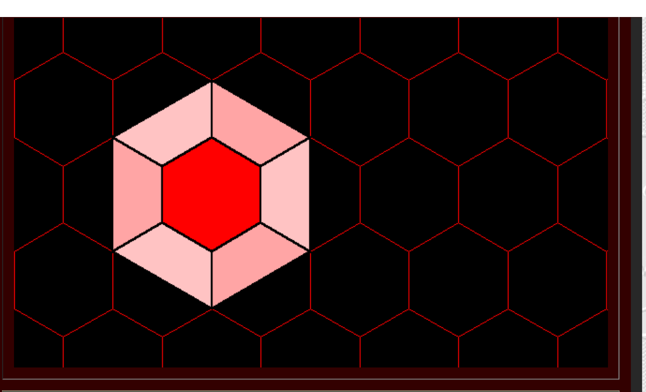
Gregory F. Maxwell. 2006. *Wikipedia*, A sinusiodal reprojection of Image:Tissot_mercator.png by Stefan Kühn. http://en.wikipedia.org/wiki/File:Sinusiodal_earth_circles.png

Tissot's Indicatrix, *Wikipedia*, http://en.wikipedia.org/wiki/Tissot%27s_indicatrix



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Geosocial Networking: A Case from Ann Arbor, Michigan

David E. Arlinghaus and Sandra L. Arlinghaus
Associated .kmz download.

Social networking is an idea that is familiar to many of us: from Facebook, to Twitter, to LinkedIn, to a host of others that come and go. More recent, however, is the idea of "geosocial networking" or "collaborative mapping." According to Wikipedia (2012),

> "Geosocial Networking is a type of social networking in which geographic services and capabilities such as geocoding and geotagging are used to enable additional social dynamics.[1][2] User-submitted location data or geolocation techniques can allow social networks to connect and coordinate users with local people or events that match their interests. Geolocation on web-based social network services can be IP-based or use hotspot trilateration. For mobile social networks, texted location information or mobile phone tracking can enable location-based services to enrich social networking."

Recently, Washtenaw County, Michigan embarked on a major stream bank erosion control project. When that project entered heavily forested residential lands adjacent to a creek, environmentally-sensitive residents quite naturally became concerned for the trees and wildlife that will be destroyed or disturbed. The project is still on-going and the geosocial network described below remains in place.

The County coded its easement with pink flags. It tagged selected large trees or otherwise interesting vegetation with a blue band if they were to be removed; it tagged trees within the easement with a red band if they were to be left alone. All vegetation within the easement, except trees or shrubs carrying red tags, were to be removed. Color was critical—a simple red/blue confusion could cost a tree its life!

One neighborhood used Google Earth, together with a GPS-enabled smartphone, to make an inventory of trees present, along a half-mile stretch of the creek, before the project began. David E. Arlinghaus did all the photography with a smartphone that geotagged the images. He then transmitted the images to Sandra L. Arlinghaus who did the mapping using a combination of GeoSetter and Google Earth (Figure 1).

Figure 1. Pink arrows mark flags showing County drain easements. Red balloons mark trees to be saved within the easement. Blue balloons mark trees to be cut.

The accuracy of the geotagging of the photos was limited by several factors. First, the software in the smartphone has limits. Second, the geotagging of the tree is actually the geotagging of where David stood to take the picture of the tree, rather than of the tree position, itself. He attempted to stand at a consistent distance from trees to ensure precision (but that is difficult in a densely wooded area). The level of precision, however, was quite good—trees were in correct relation to each other and in close to correct relation to dwelling units.

The geotagged camera images were downloaded directly to a computer by plugging the smartphone into a recent Windows 7 desktop computer. All 81 images were stored in a single folder. That folder was then uploaded to the free software called "GeoSetter." From there, the geotagged images were batch-uploaded to Google Earth in a single operation (rather than entering each one individually). The GeoSetter software was able to take the underlying geocoded coordinates from the camera images, as well as the images themselves, and make them correspond to the underlying coordinate geometry in Google Earth. We made color decisions to correspond with the actual colors of tags used on vegetation.

Accuracy, of registration of photo and Google Earth coordinates, using this sort of strategy was guaranteed. Hand placement would not offer that level of accuracy of registration. Overall, the results were sufficiently precise (although not accurate) to offer local residents a clear picture of what was going to happen in wooded areas. When the camera GPS coordinates were obtained, a photo of the tagged item was also taken. Figure 2 shows a photo displayed on the Google Earth surface pointing to the identified red-tagged tree. Figure 3 shows a similar configuration of photo in relation to Google Earth base pointing to the identified blue-tagged tree. These pointing associations are all accurate. Download the linked .kmz file, open it in Google Earth, and you will see associations of this sort for all 81 trees marked by the County before the time of photographing.

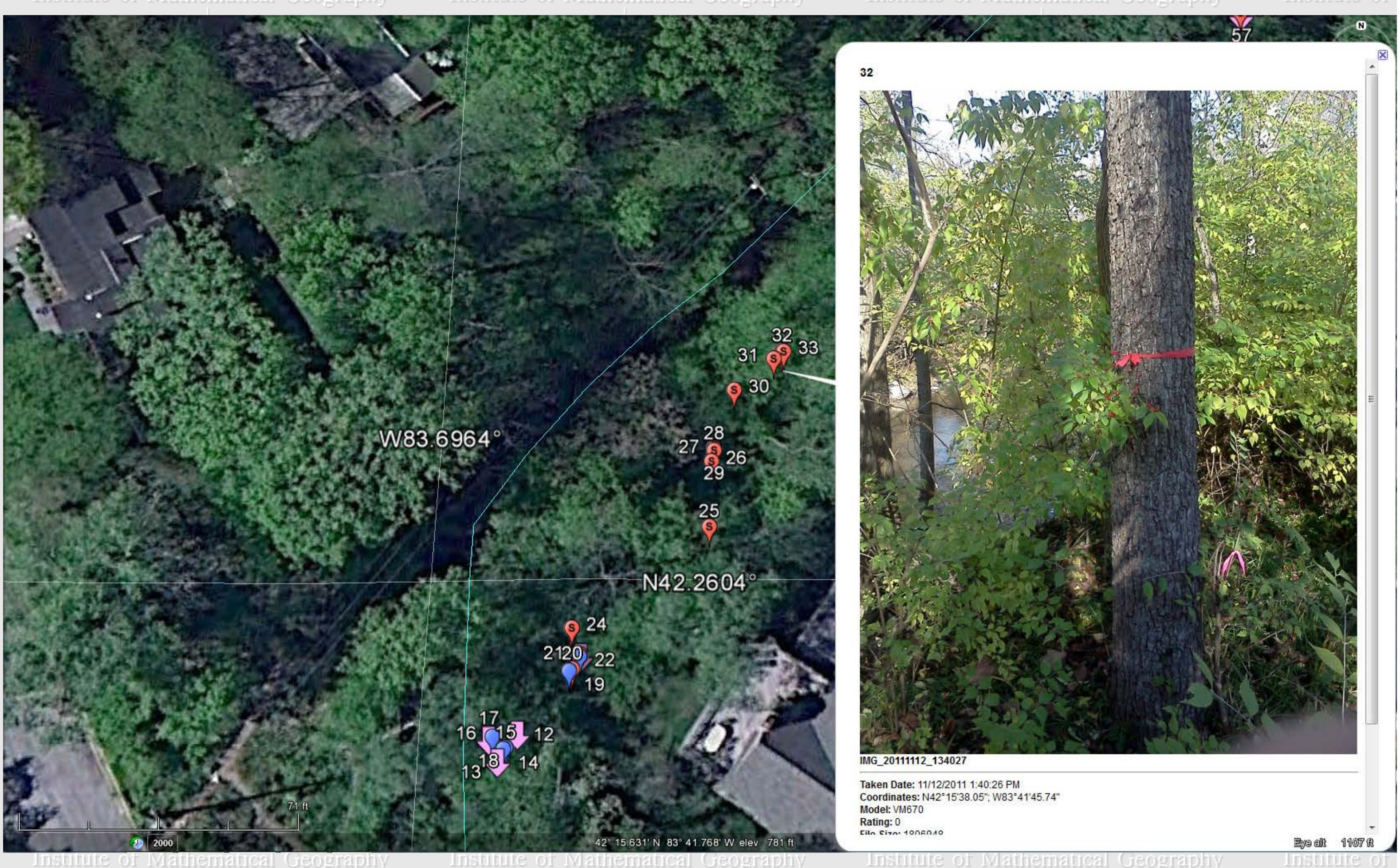


Figure 2. Photo mounted in Google Earth. Note that the photo has a pointer on it that points to the correct balloon location.

Figure 3. Blue-tagged tree.

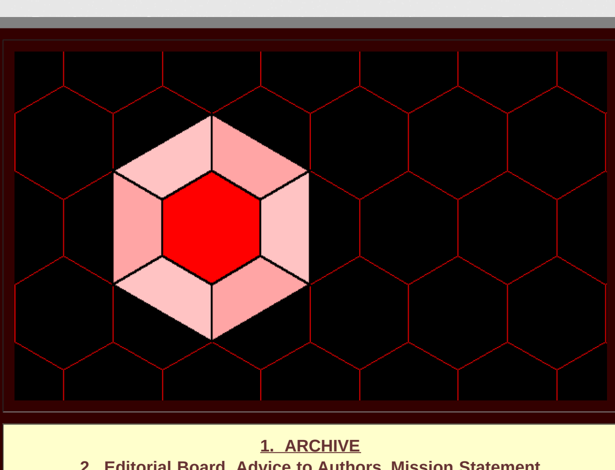
The neighborhood association established a tree monitoring committee. The committee was given a Google Earth file showing tree location and associated tag color. The easement was also geocoded. Prior to using the file, the neighborhood association president and the creator of the Google Earth display met with the lead County official and the lead engineer on the project to ensure a cooperative approach to file usage. Subsequently, the tree monitoring committee used the information in conjunction with field-checking vegetation. Geosocial networking was, and is (through remaining tree restoration scheduled in late fall 2012), critical in developing a constructive relationship among the various parties adjacent to this well-meant and successful evironmental stream-bank restoration project.

References

- Friedemann Schmidt. GeoSetter. Last accessed June 15, 2012: http://www.geosetter.de/en/
- Geosocial Networking, *Wikipedia.* Last accessed June 15, 2012: http://en.wikipedia.org/wiki/Geosocial_networking
- Google Earth. Last accessed June 15, 2012: http://www.google.com/earth/index.html
- Washtenaw County. Mallett's Creek Restoration Project: Final Report. Last accessed June 15, 2012: http://www.ewashtenaw.org/government/drain_commissioner/dc_webWaterQuality/malletts_creek/dc_mc_mcrp.html

Acknowledgements

Numerous people were involved directly and indirectly in this project that brought together County and City officials, Engineers from a local engineering firm, and members of the public from a variety of neighborhoods including differing residential types and zoning. We thank: Harry Sheehan, Greg Marker, Jane Lumm, Roger Rayle, Janice Bobrin, Matt Naud, and all the member neighborhoods of the Huron Valley Neighborhood Alliance and the individuals from those neighborhoods who participated in so many helpful ways.



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Visual Abstracts: Institute of Mathematical Geography

Sandra L. Arlinghaus

Introduction

Word clouds are images that portray word frequency in a document according to the size of the word in the cloud. The words may be arranged in patterns designed to pique interest. They are a sort of abstract, or visual, abstract of a book or article. Word clouds are abstract art representing document content. At a glance, the reader can see what are the important concepts simply by word size in the image. They unify conventional journal "abstracts," "key words," and "word frequency counts."

This new form of abstract is used to create abstracts for the holdings of the Institute of Mathematical Geography from its beginning in 1985 to date. Not all documents can be captured equallly in this manner. Scanned images and other images are excluded. Some files produce denser clouds than do others; as in the real world, there are different kinds of clouds! Formats that are easiest to work with are word-based formats: .html, .pdf, .doc, .dox, and .TeX. PowerPoint displays can be opened in PowerPoint and saved as Rich Text Format and then worked with to form a cloud but these clouds are typically quite sparse in content in relation to the original file. Google Earth files, saved in .kml format, can be opened in WordPad or some such and then converted to cloud form. However, many of the most common words will be computer code words; the same situation holds for TeX files. If these files of code are too large, then a truncated version of them, hopefully representative of broad content, was used. A partial idea of the content seem to come through. Animations, applets, movies, and music are other examples of formats that cannot, or cannot readily, be captured in word cloud format. Perhaps that is not particularly a limitation; they have great visual interest already. In the catalogue below, the original file format is noted if it is not .html. That way, the reader will have an idea of the limitations associated with the word pattern in the resulting cloud.

Catalogue of IMaGe Word Clouds

The software used to create the clouds is available online: http://www.wordle.com/ In using this package to create word clouds, a maximum word count of 150 was selected and random design and color patterns were chosen, largely as a time-saving device. Common words were omitted ("the", "and", etc.). So too were figure captions, section headers (when extensive), article titles, and references and other word elements that give, in themselves, a summary of meaning. The words "Figure" and "Figures" will no doubt appear prominently in most clouds as in-text references to images (Figure 1, for example) were not deleted. The rest of the words in the cloud will carry most of the meaning, although of course when "Figure" or "Figures" are prominent in the cloud they suggest that the article has many images in support of the words. To integrate word clouds within a given year, alll backgrounds from a single year are the same color; for example, all word clouds from 2010 have a white background. Clouds from 1990 to 1996 represent a full journal; after 1996, clouds represent a single article.

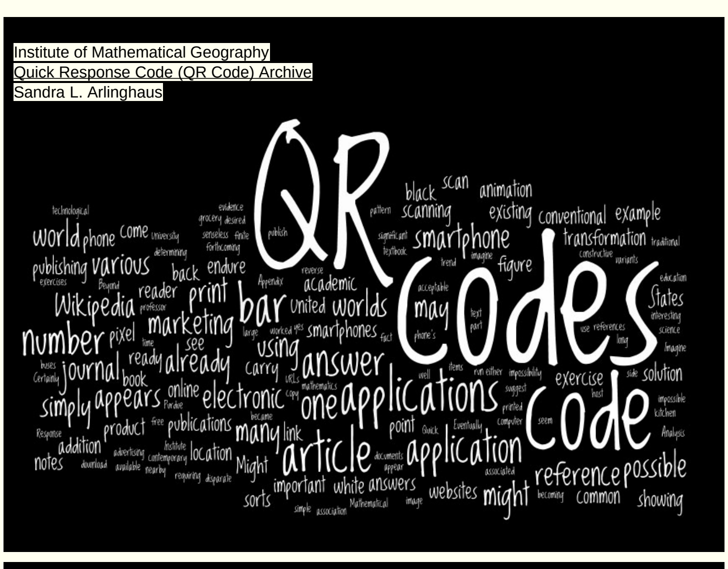
The material below presents a fairly complete catalogue of word clouds for *Solstice*. Look for word clouds to continue to be integrated throughout the entire IMaGe site!

Solstice: An Electronic Journal of Geography and Mathematics

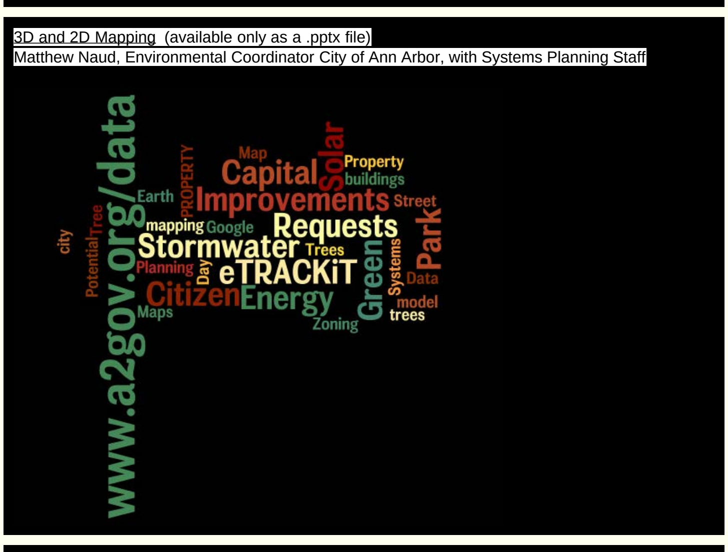
2011

Volume XXII, Number 1.

Institute of Mathematical Geography
Quick Response Code (QR Code) Archive
Sandra L. Arlinghaus

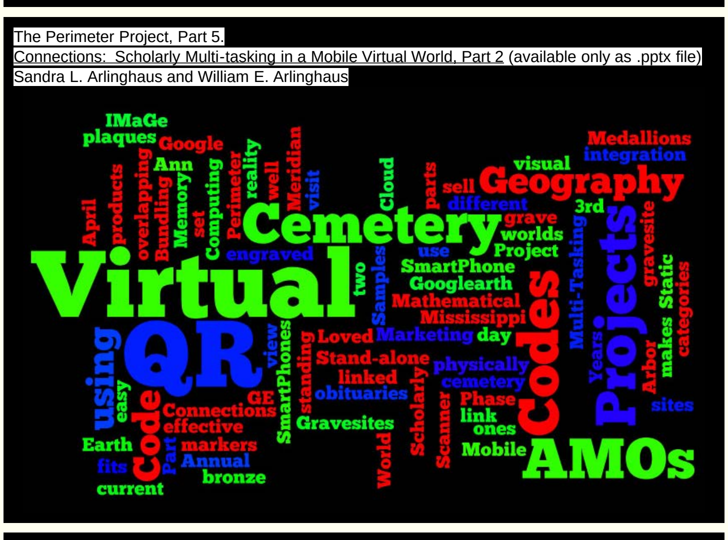


3D and 2D Mapping (available only as a .pptx file)
Matthew Naud, Environmental Coordinator City of Ann Arbor, with Systems Planning Staff

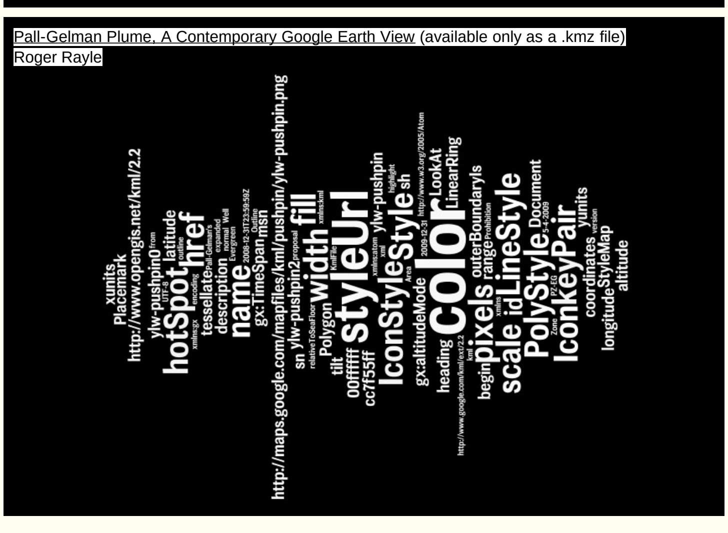


Ann Arbor, Downtown Historical Marker Survey (available only as a .kmz file)
Sandra L. Arlinghaus

The Perimeter Project, Part 5.
Connections: Scholarly Multi-tasking in a Mobile Virtual World, Part 2 (available only as .pptx file)
Sandra L. Arlinghaus and William E. Arlinghaus



Pall-Gelman Plume, A Contemporary Google Earth View (available only as a .kmz file)
Roger Rayle



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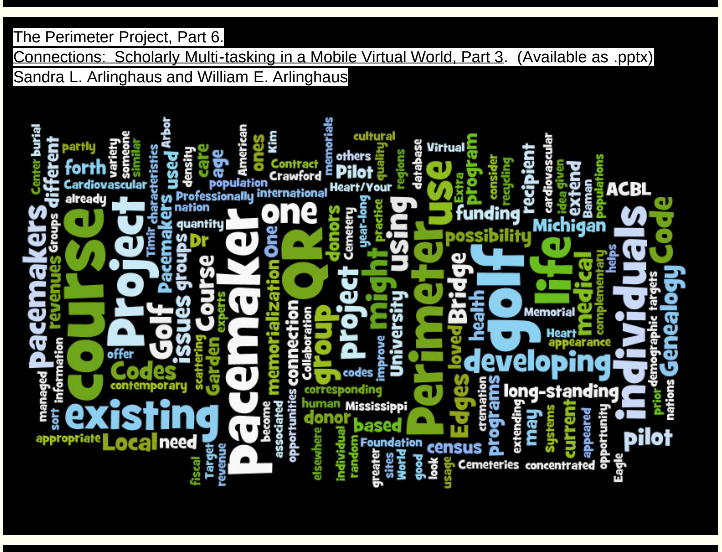
Contemporary Views Along the First Transcontinental Railroad (Available as .pptx)
Richard Koenig

The Perimeter Project, Part 6.
Connections: Scholarly Multi-tasking in a Mobile Virtual World, Part 3. (Available as .pptx)
Sandra L. Arlinghaus and William E. Arlinghaus



2010

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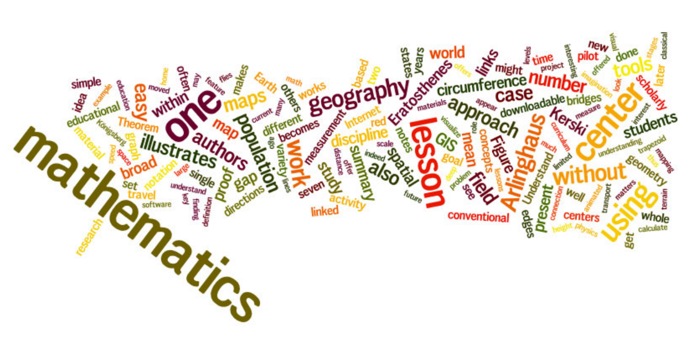
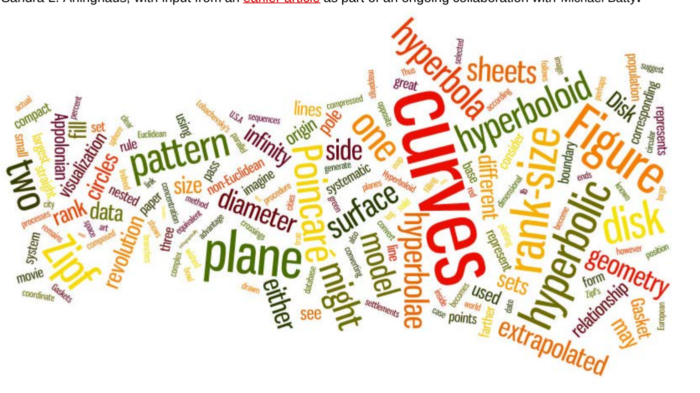
MatheMaPics
Sandra L. Arlinghaus and Joseph J. Kerski



The Perimeter Project, Part 3.
Fragile Lands Protection Using Cemetery Zoning (available as .pptx)
Sandra L. Arlinghaus and William E. Arlinghaus

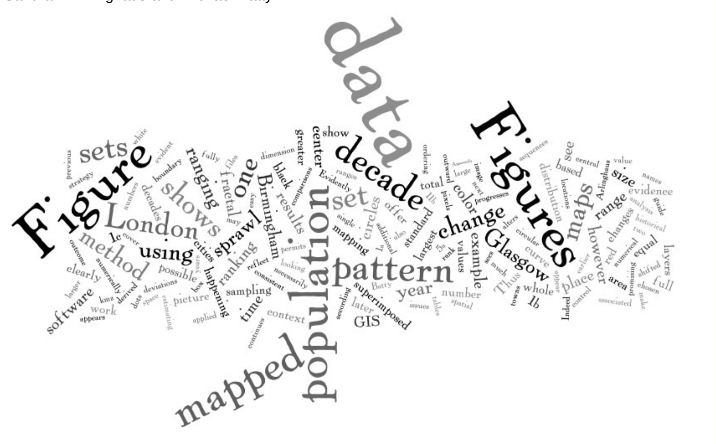
Zipf's Hyperboloid--Revisited: Compression and Navigation--Canonical Form
Sandra L. Arlinghaus, with input from an earlier article as part of an ongoing collaboration with Michael Batty.



Fractals Take A Non-Euclidean Central Place
Sandra L. Arlinghaus

Volume XXI, Number 2.

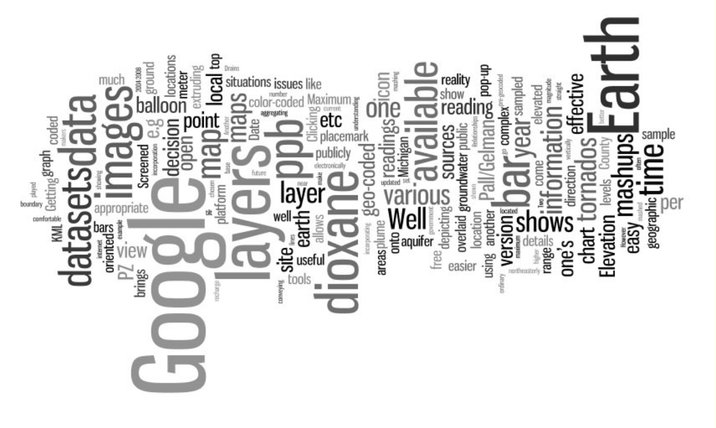
Patterns, Maps, and Fractals: The Case of United Kingdom Historical Data Sets
Sandra L. Arlinghaus and Michael Batty



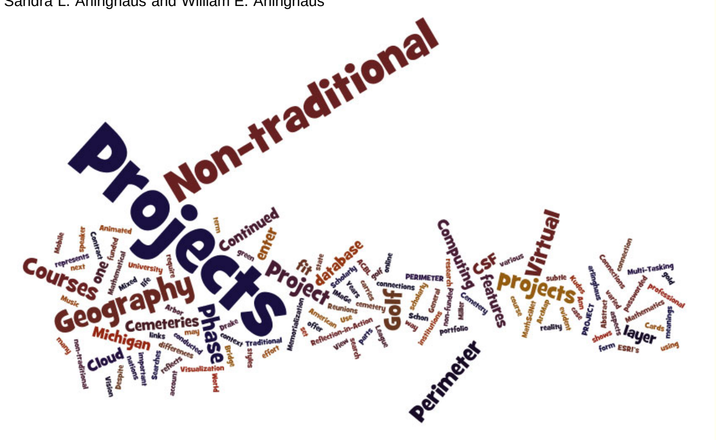
Mapping It Out! A Contemporary View of Burgess's Concentric Ring Model of Urban Growth
Sandra L. Arlinghaus and Daniel A. Griffith

The Quest to Save Honey: Tracking Bee Pests Using Mobile Technology
Diana Sammataro and Sandra L. Arlinghaus

Google Earth: A Platform for Open Data
Roger Rayle



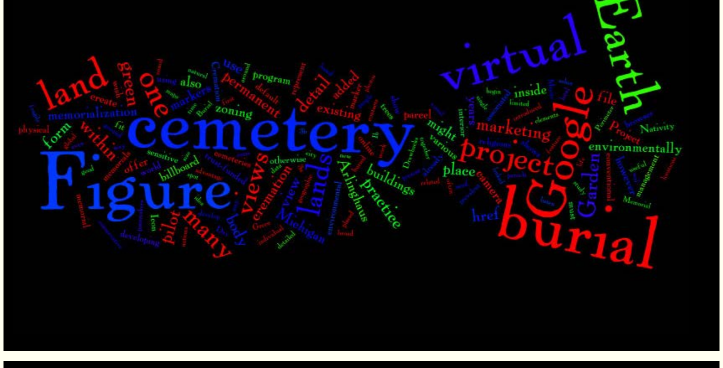
The Perimeter Project, Part 4.
Connections: Scholarly Multi-tasking in a Mobile Virtual World (available in .pptx)
Sandra L. Arlinghaus and William E. Arlinghaus



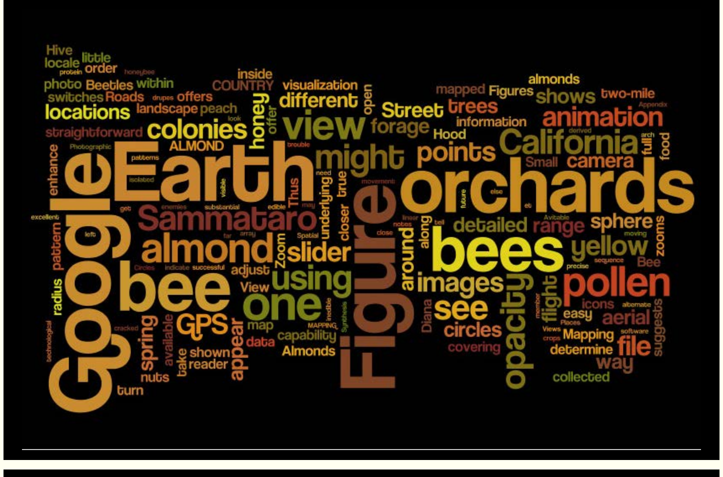
2009

Volume XX, Number 1

The Perimeter Project: Fragile Lands Protection Using Cemetery Zoning
Sandra L. Arlinghaus and William E. Arlinghaus



Bee Ranges and Almond Orchard Locations: Contemporary Visualization
Sandra L. Arlinghaus and Diana Sammataro



Air Pollution Changes in the Detroit Metro Area from 1988-2004
Kerry Ard

Volume XX, Number 2

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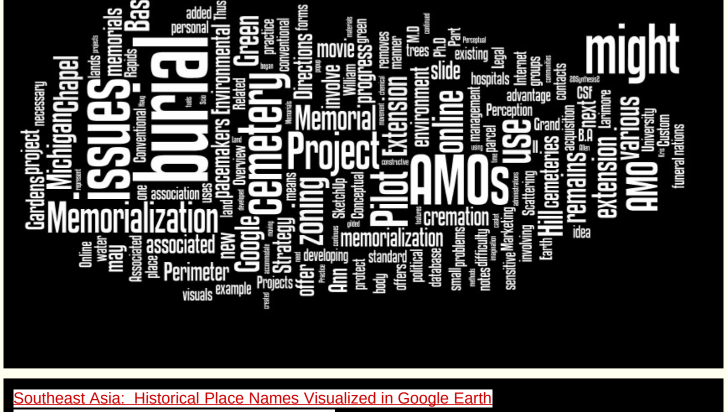
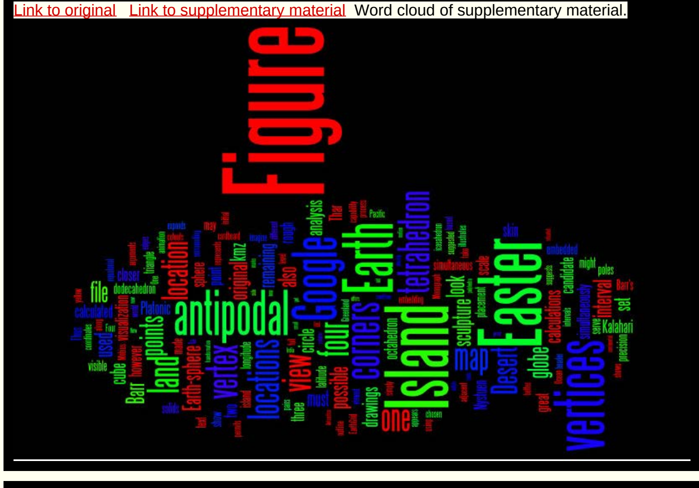
Fragile Lands Protection Using Cemetery Zoning
Sandra L. Arlinghaus and William E. Arlinghaus



Southeast Asia: Historical Place Names Visualized in Google Earth
Sandra Lach Arlinghaus and Robert F. Austin
Revised eBook Supplement, *A Historical Gazetteer of Southeast Asia*, 1986.
Robert F. Austin

Essays on Mathematical Geography: Contemporary Visualizations
Revised eBook Supplement, *Essays on Mathematical Geography*, **1986.**
Sandra L. Arlinghaus

IMaGe Monograph #1:
Sandra L. Arlinghaus and John D. Nystuen, 1986.
Mathematical Geography and Global Art:
the Mathematics of David Barr's `Four Corners Project'.
Link to original   Link to supplementary material   Word cloud of supplementary material.



Emergency Phones: A Google Earth Approach
Sandra L. Arlinghaus

IMaGe Monograph #2:
Sandra L. Arlinghaus, 1986.
Down the Mail Tubes: the Pressured Postal Era, 1853-1984.
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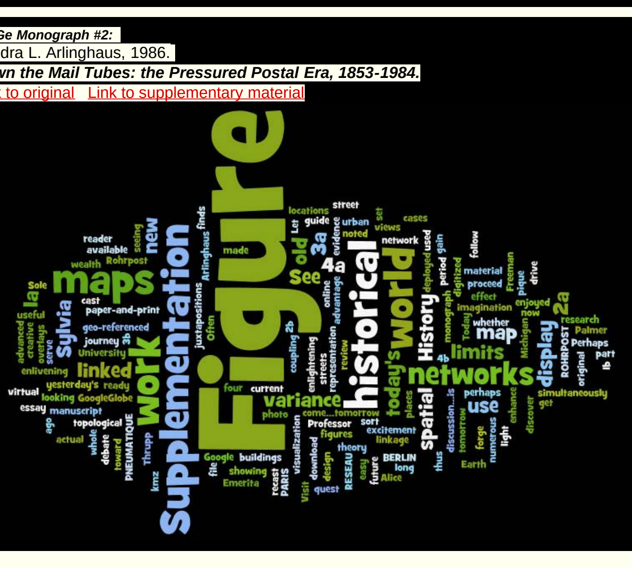

3D Annotated Archive
Sandra L. Arlinghaus

2008

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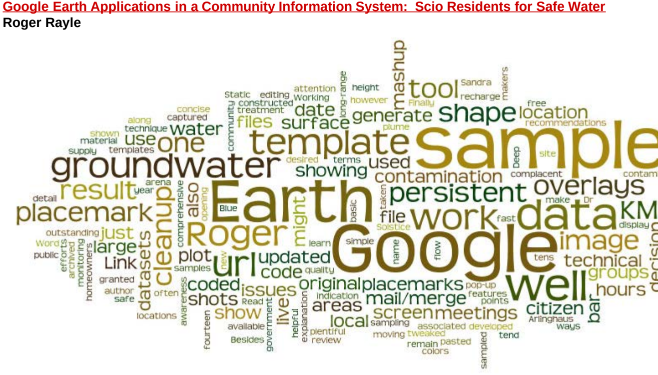
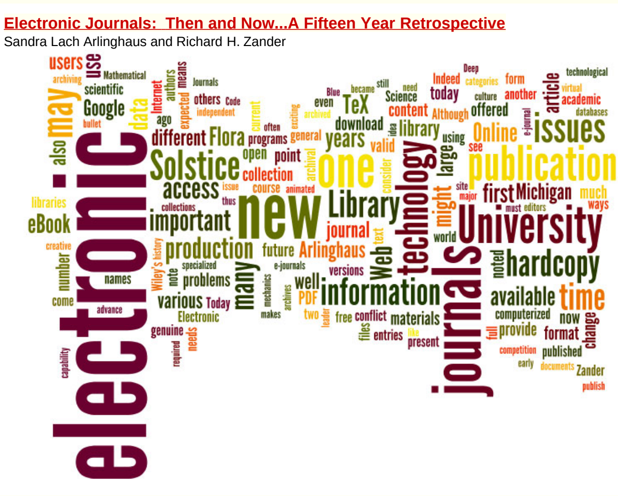
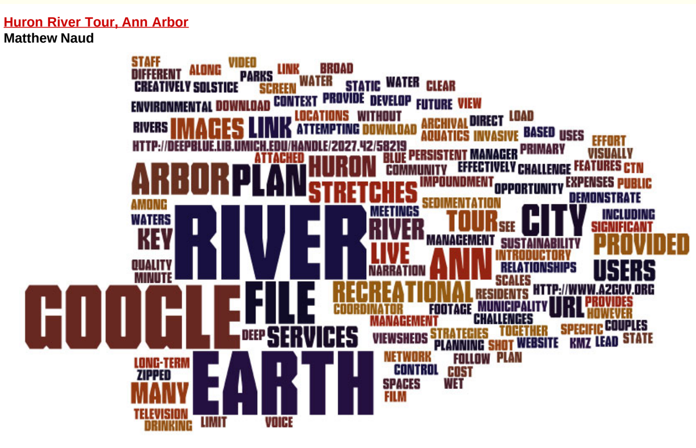
Google Earth Applications in a Community Information System: Scio Residents for Safe Water
Roger Rayle



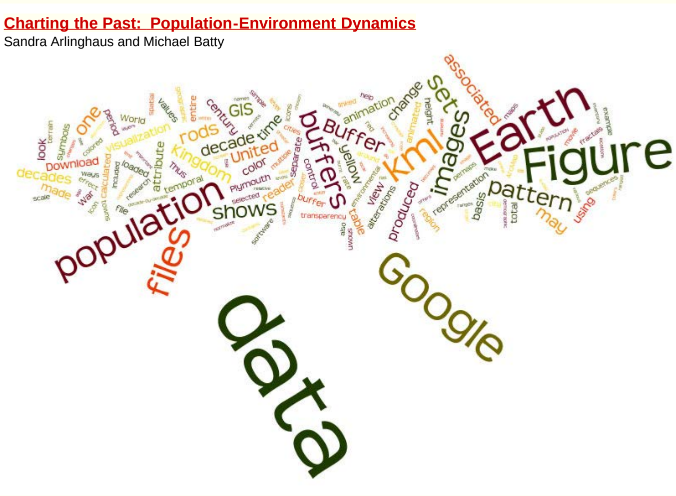
Electronic Journals: Then and Now...A Fifteen Year Retrospective
Sandra Lach Arlinghaus and Richard H. Zander



Huron River Tour, Ann Arbor
Matthew Naud

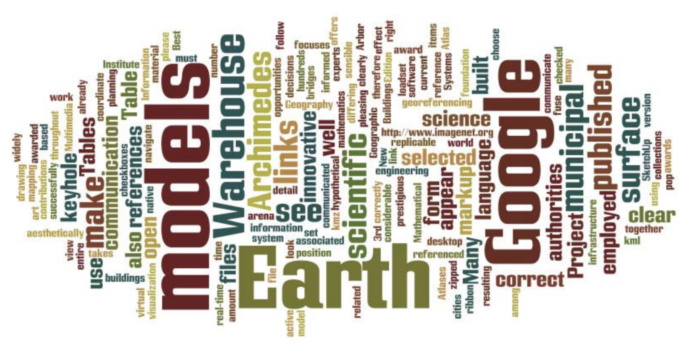


Charting the Past: Population-Environment Dynamics
Sandra Arlinghaus and Michael Batty



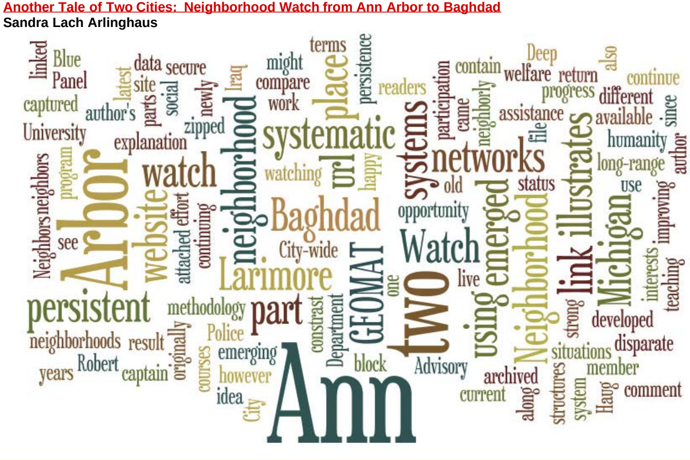
Detroit North American Bridge Championship: the Google Earth Display
Sandra Lach Arlinghaus

Project Archimedes: Google Earth Experiments in Innovative Scientific Communications
Sandra Lach Arlinghaus



Unit 174. American Contract Bridge League Bridge Clubs: Greater Houston
Bert Onstott

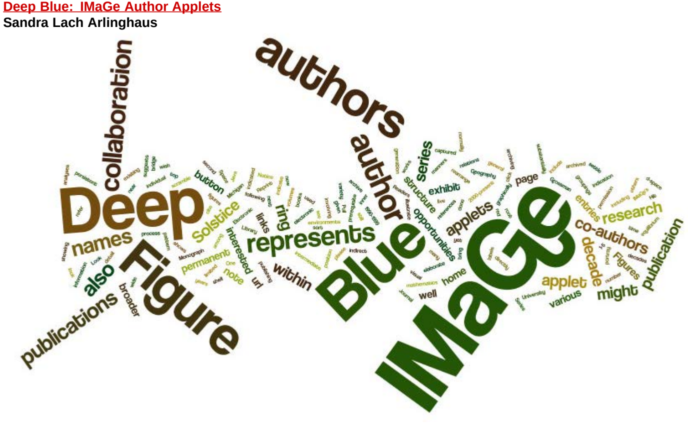
Another Tale of Two Cities: Neighborhood Watch from Ann Arbor to Baghdad
Sandra Lach Arlinghaus



Real-time Animation Scripts for Google Earth
Lars Schumann

Mouth Geography...Or, Sleep Apnea and Linguistics?
William E. Arlinghaus

Deep Blue: IMaGe Author Applets
Sandra Lach Arlinghaus



2007

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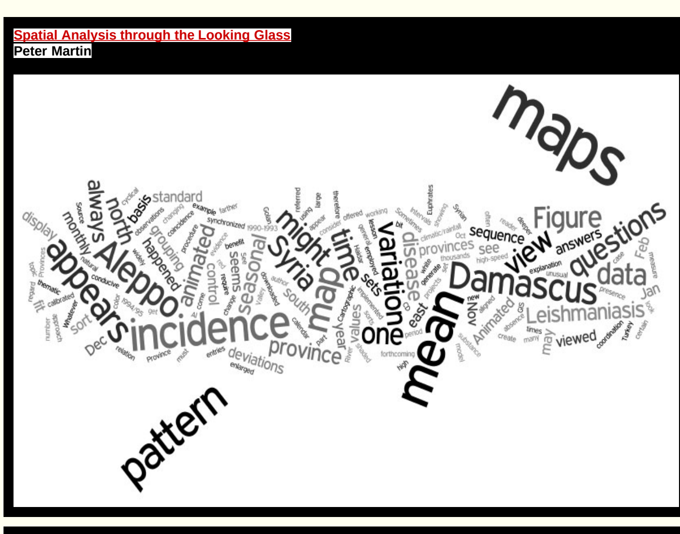
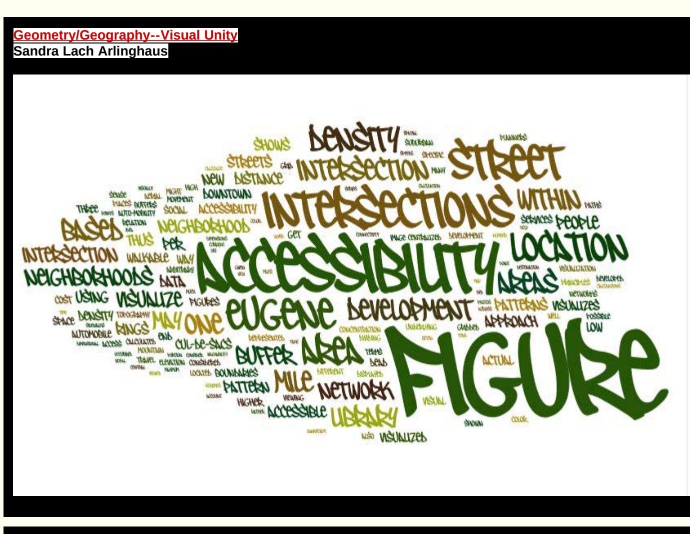
Spatial Analysis through the Looking Glass
Peter Martin

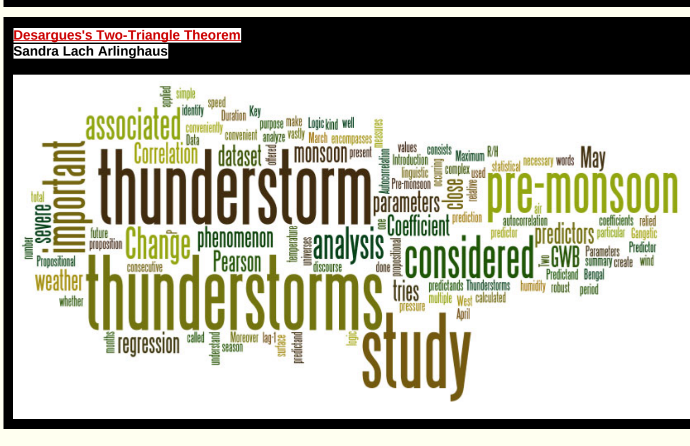


Geometry/Geography--Visual Unity
Sandra Lach Arlinghaus



The Animated Pascal
Sandra Lach Arlinghaus

Desargues's Two-Triangle Theorem
Sandra Lach Arlinghaus



2006

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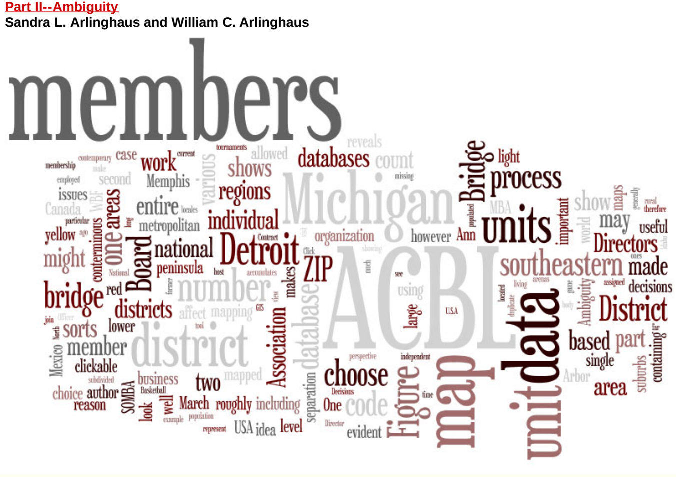
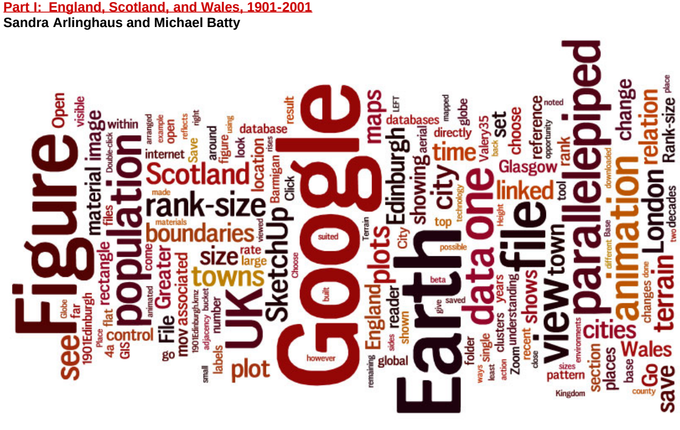
Looking at Some Data from Isard
Waldo Tobler

Introduction to the Special Issue on Internet Geometry and Geography
Sandra Arlinghaus

Maps and Decisions
Part II--Ambiguity
Sandra L. Arlinghaus and William C. Arlinghaus



Visualizing Rank and Size of Cities and Towns
Part I: England, Scotland, and Wales, 1901-2001
Sandra Arlinghaus and Michael Batty



Maps and Decisions
Part III--Redistricting
Sandra L. Arlinghaus and William C. Arlinghaus

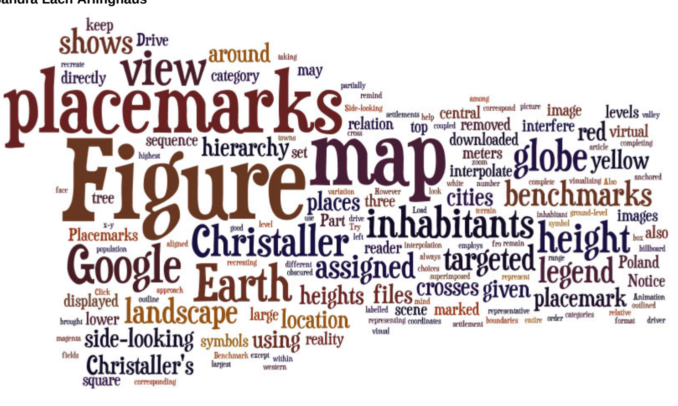
Visualizing Rank and Size of Cities and Towns
Part II: Greater London, 1901-2001
Sandra Arlinghaus and Michael Batty

Maps and Decisions
Part IV--Club Data
Sandra L. Arlinghaus and William C. Arlinghaus

Visualizing a Map of Walter Christaller, Poland 1941
Part I: Benchmarking the Map
Sandra Lach Arlinghaus

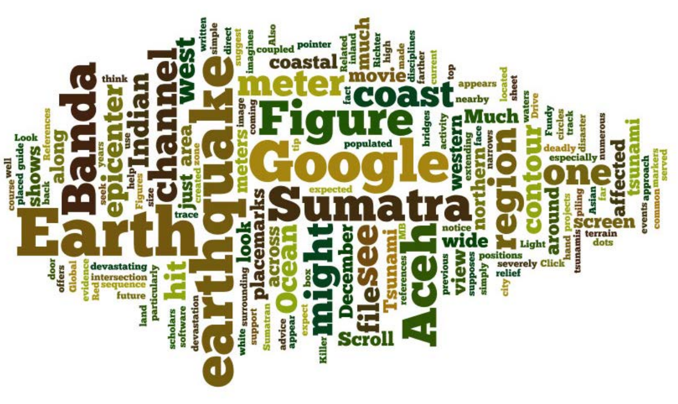
3D Atlas of Ann Arbor: The Google Earth Approach
Part I
Sandra Lach Arlinghaus

Visualizing a Map of Walter Christaller, Poland 1941
Part II: Interpolation of the Benchmarked Map
Sandra Lach Arlinghaus

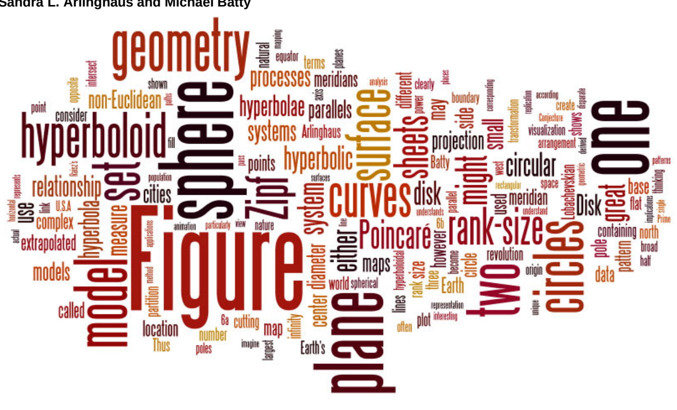


3D Atlas of Ann Arbor: The Google Earth Approach
Part II
Sandra Lach Arlinghaus

Banda Aceh: A View on the Globe
Sandra Lach Arlinghaus



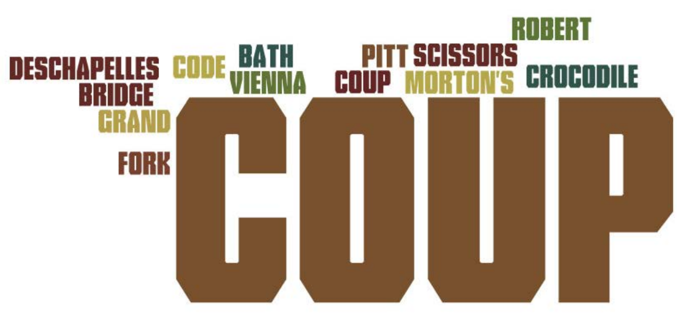
Zipf's Hyperboloid?
Sandra L. Arlinghaus and Michael Batty



Divine Proportions: Rational Trigonometry to Universal Geometry by Norman Wildberger
Book Reviewer, S. Arlinghaus

PseudoCoup: A Psubtle Puzzle
William C. Arlinghaus

PseudoCoup: A Psubtle Puzzle
Solution
William C. Arlinghaus



2005

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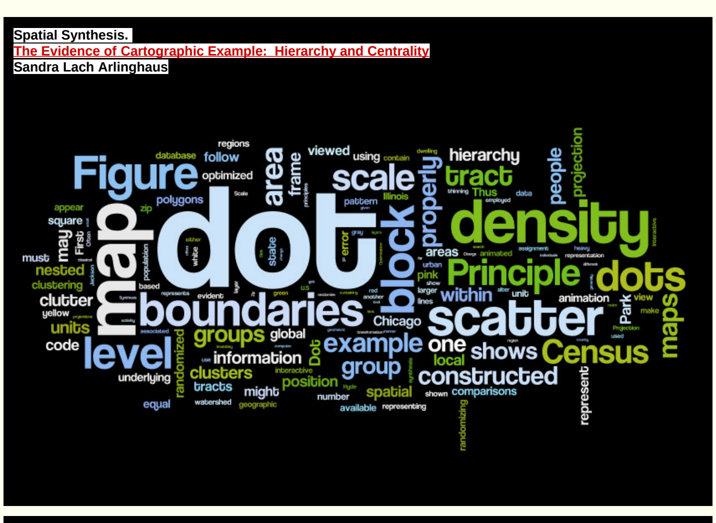
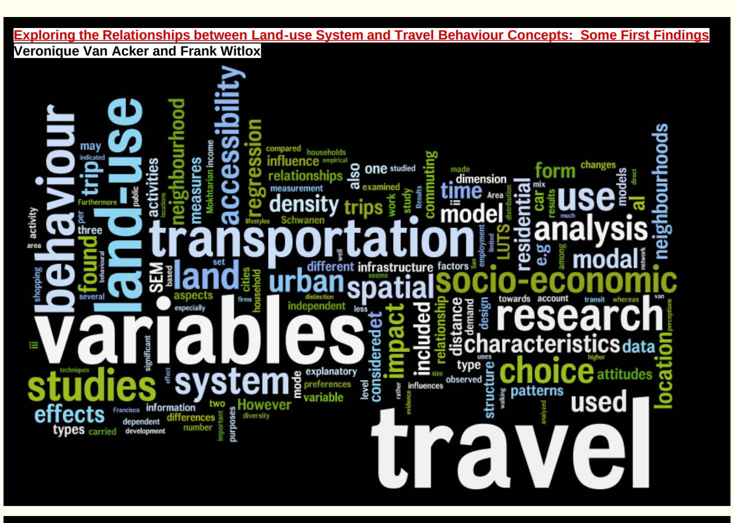
Volume XVI, Number 2

Spatial Synthesis.
The Evidence of Cartographic Example: Hierarchy and Centrality
Sandra Lach Arlinghaus



Exploring the Relationships between Land-use System and Travel Behaviour Concepts: Some First Findings
Veronique Van Acker and Frank Witlox



Kioskland: A Strategy for Linking Hierarchical Levels of Virtual Reality Maps
S. Arlinghaus et al.

Using Asymmetry to Estimate Potential
Waldo Tobler

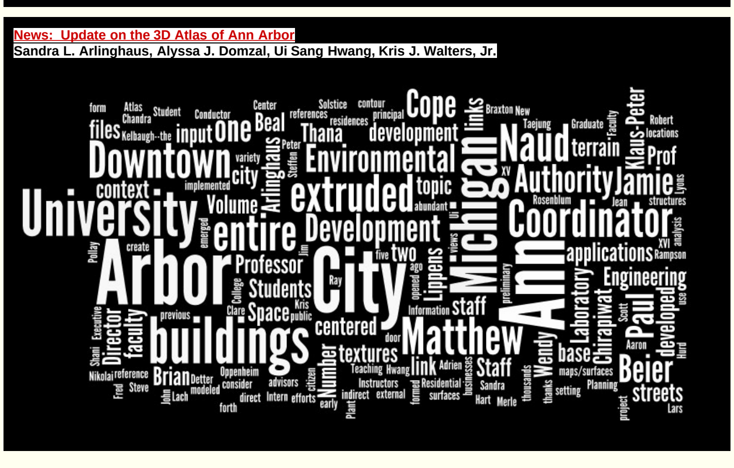
A Methodology for Historical Geography: Internet Implementation
Ann Evans Larimore with Sandra Lach Arlinghaus and Robert Haug

Photo Essay: The Emerald Ash Borer
John D. Nystuen

Spatial Synthesis: Investigations in Progress
Sandra Lach Arlinghaus

Beyond the Shadow
Sandra L. Arlinghaus and William C. Arlinghaus

News: Update on the 3D Atlas of Ann Arbor
Sandra L. Arlinghaus, Alyssa J. Domzal, Ui Sang Hwang, Kris J. Walters, Jr.



2004

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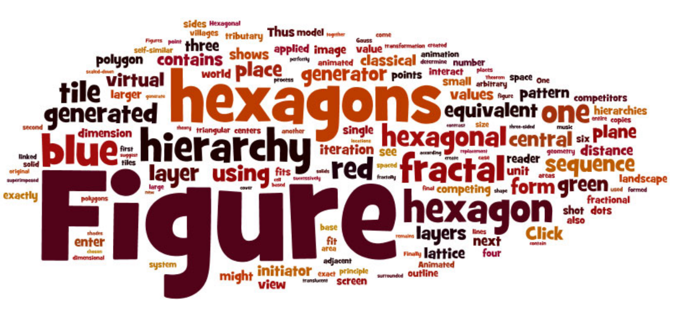
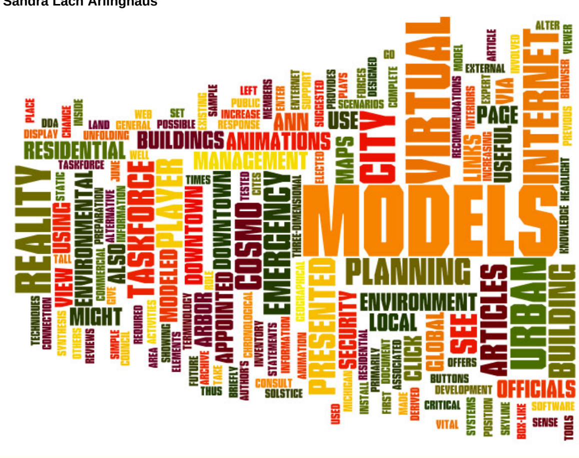
Spatial Synthesis Sampler.
Geometric Visualization of Hexagonal Hierarchies: Animation and Virtual Reality
Sandra Lach Arlinghaus and William Charles Arlinghaus
[A Pirellii INTERNETional Award Semi-Finalist]

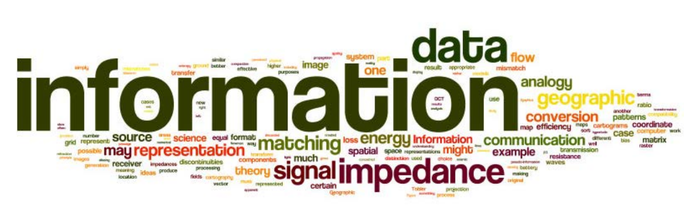


Spatial Synthesis: 3D Atlas of Ann Arbor
Sandra Lach Arlinghaus



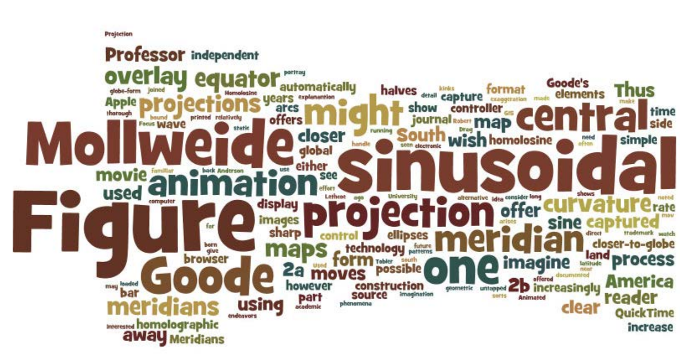
One Optimization of an Earlier Model of Virtual Downtown Ann Arbor
Klaus-Peter Beier

Cross-discipline Analogy: Information Impedance Matching
Peter Martin



Modelling Locational Decision Making of Firms Using Multidimensional Fuzzy Decision Tables: An Illustration
Frank J. A. Witlox, Aloys W. J. Borgers, Harry J. P. Timmermans

Goode's 80th!
Sandra Lach Arlinghaus



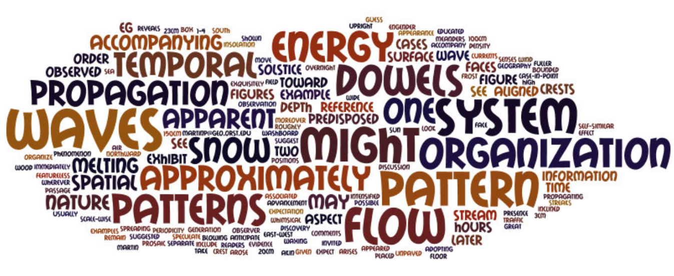
The View from the Top: Visualizing Downtown Ann Arbor in Three Dimensions
Sandra L. Arlinghaus, Fred J. Beal, and Douglas S. Kelbaugh

Continental USA Travel Tracks
Gottfried Hogh

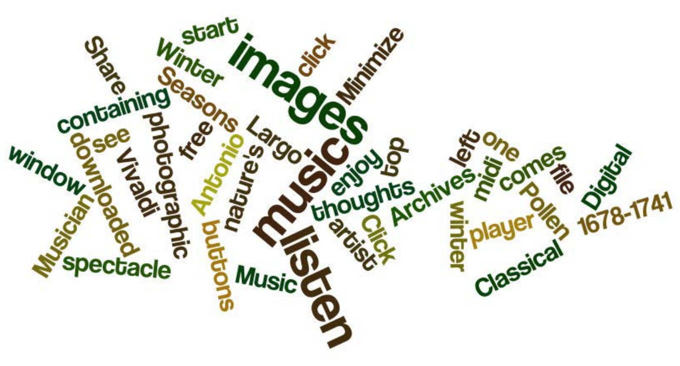
[Visualizing Accessibility II: Access to Food](#)
Marc Schlossberg

[Two Rivers Ridge: Capturing Art](#)
Sandra Arlinghaus and Braxton Blake

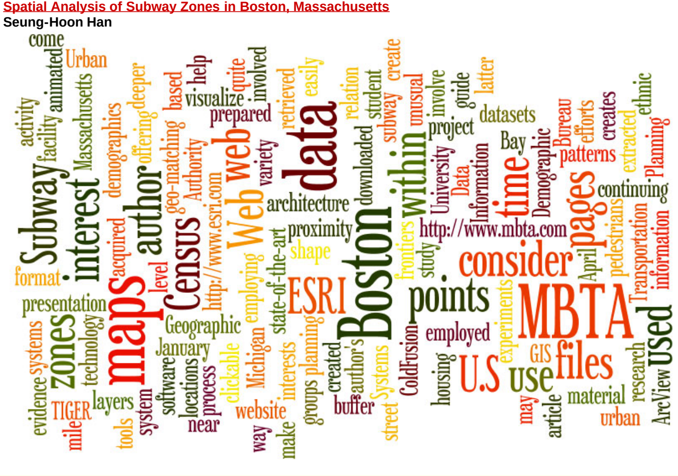
[Energy Flow: Spatial and Temporal Patterns](#)
Peter A. Martin



[Winter Windows: Ice Largo](#)
Alma S. Lach

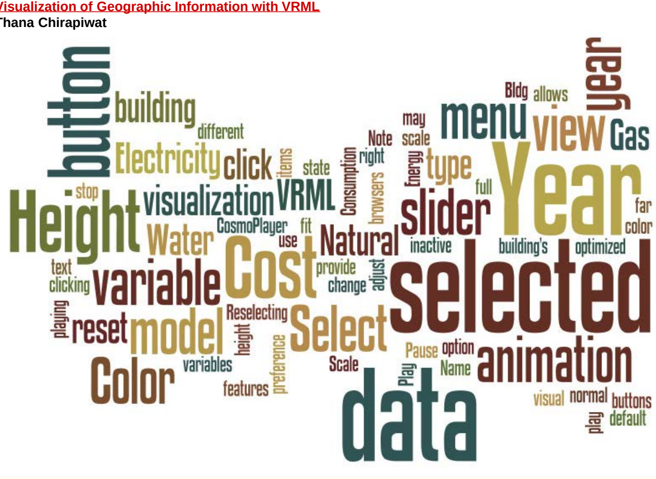


[Spatial Analysis of Subway Zones in Boston, Massachusetts](#)
Seung-Hoon Han



[A Golfer's Resource: Huron Hills Golf Course, Ann Arbor, Michigan](#)
Andrew Walton

[Visualization of Geographic Information with VRML](#)
Thana Chirapiwat



2003

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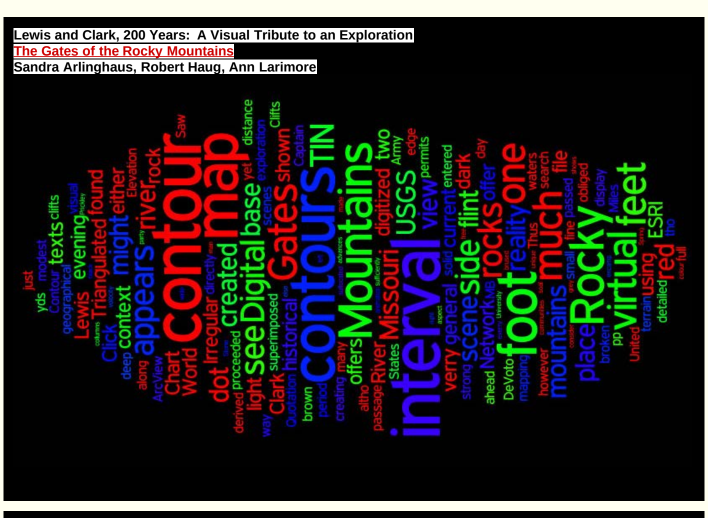
[Animated Time Lines: Coordination of Spatial and Temporal Information](#)
Sandra Arlinghaus, Michael Batty, and John Nystuen

Lewis and Clark, 200 Years: A Visual Tribute to an Exploration
[The Gates of the Rocky Mountains](#)
Sandra Arlinghaus, Robert Haug, Ann Larimore

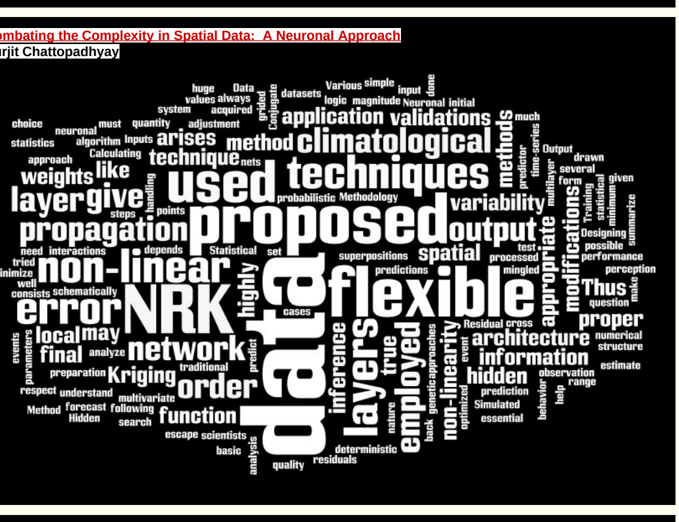


[Viewing the relative importance of some surface parameters associated with pre-monsoon thunderstorms through Ampliative Reasoning](#)
Sutapa Chaudhuri and Surajit Chattopadhyay

[Dependence of Production of Paddy on the Total Annual Rainfall: A Different Approach](#)
Surajit Chattopadhyay

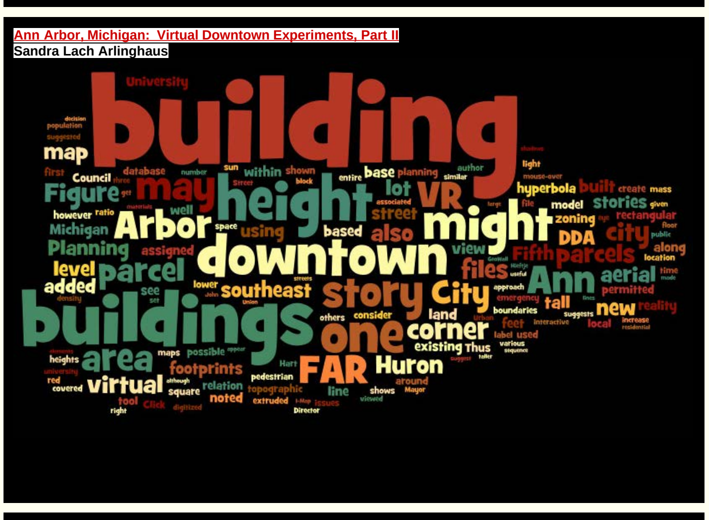
[On L1 Convergence of Modified Sine Sums](#)
Kulwinder Kaur

[Combating the Complexity in Spatial Data: A Neuronal Approach](#)
Surjit Chattopadhyay



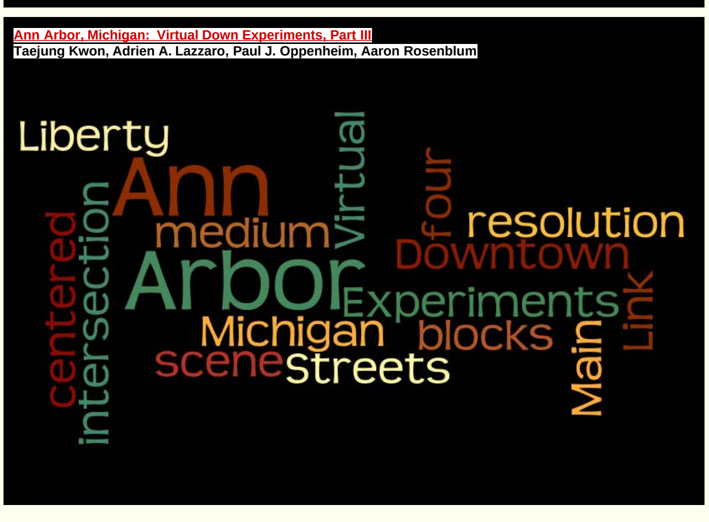
[Ann Arbor, Michigan: Virtual Downtown Experiments](#)
Sandra Lach Arlinghaus

[Ann Arbor, Michigan: Virtual Downtown Experiments, Part II](#)
Sandra Lach Arlinghaus



[Tornado Siren Location: Ann Arbor, Michigan](#)
Sandra Lach Arlinghaus

[Ann Arbor, Michigan: Virtual Down Experiments, Part III](#)
Taejung Kwon, Adrien A. Lazzaro, Paul J. Oppenheim, Aaron Rosenblum



2002

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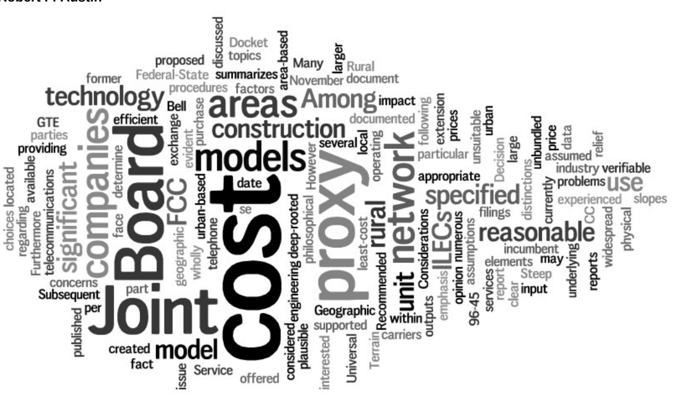
[Animated Map Timeline, Syria](#)
Sandra Arlinghaus, Salma Haidar, and Mark Wilson

[Visual Accessibility with GIS](#)
Marc Schlossberg

[Classification Techniques in Complex Databases: Assessment of Vagueness and Sparsity in a Network of World Cities](#)
B. Derudder and F. Witlox

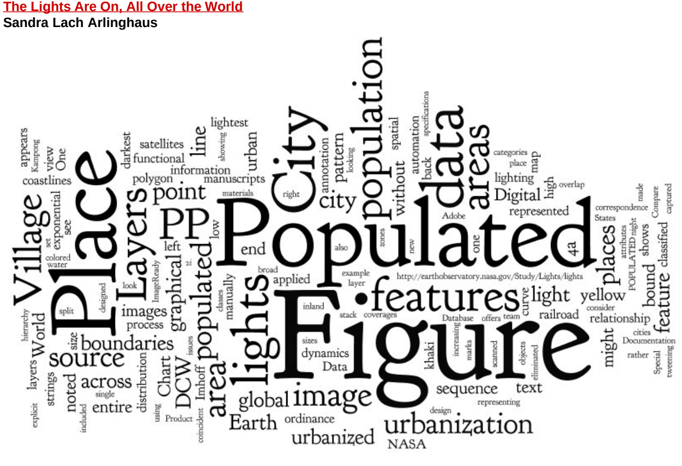
[Cost Proxy Models in Rural Telephone Companies](#)
Robert F. Austin



[The Thunen Society, North American Division](#)
John D. Nystuen

[Predicting Pre-monsoon Thunderstorms--A Statistical View through Propositional Logic](#)
Surajit Chattopadhyay

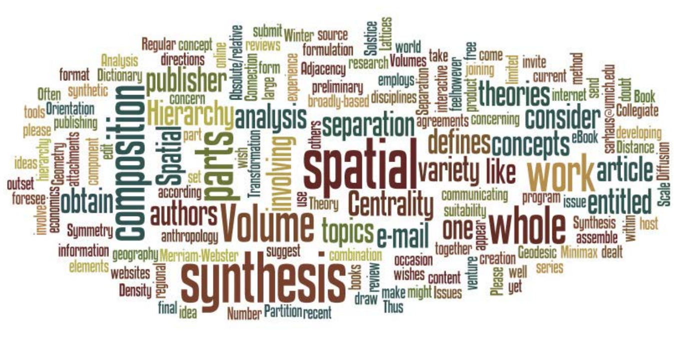
[The Lights Are On, All Over the World](#)
Sandra Lach Arlinghaus



[Disaggregation and Targetingn of Universal Service Support](#)
Robert F. Austin and Porter E. Childers

[L1 Convergence of Cosine Series with Hyper Semi Convex Coefficients](#)
Kulwinder Kaur, Babu Ram, and S. S. Bhatia

[Spatial Synthesis: A Research Program](#)
Sandra L. Arlinghaus and William C. Arlinghaus



2001

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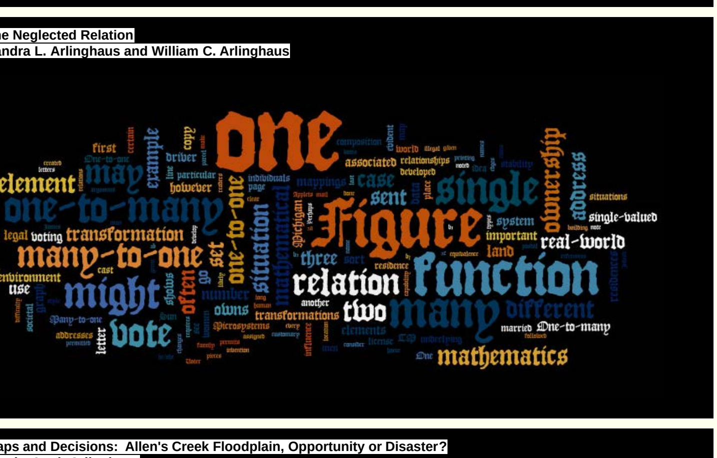
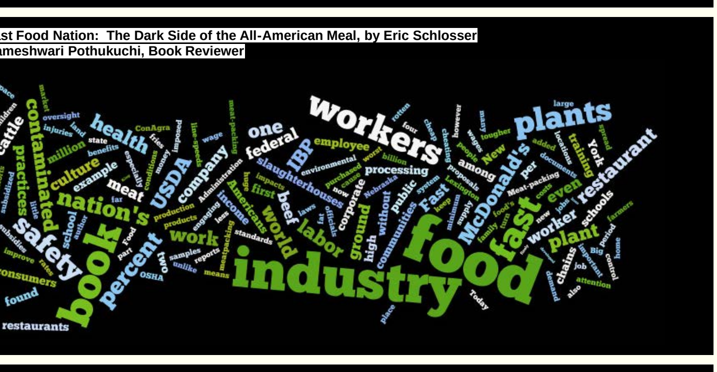
Water Rustlers?
John D. Nystuen

The Neglected Relation
Sandra L. Arlinghaus and William C. Arlinghaus

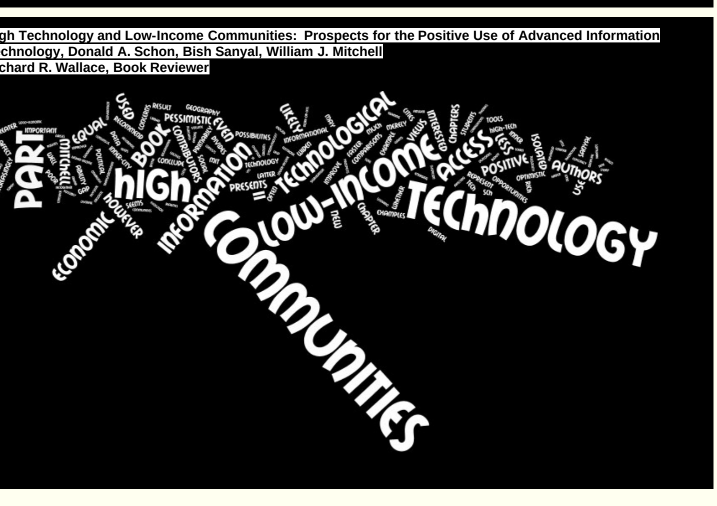


Maps and Decisions: Allen's Creek Floodplain, Opportunity or Disaster?
Sandra Lach Arlinghaus

Fast Food Nation: The Dark Side of the All-American Meal, by Eric Schlosser
Kameshwari Pothukuchi, Book Reviewer



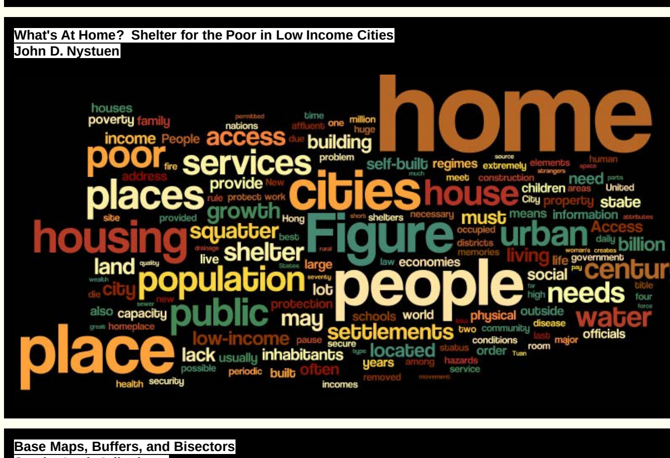
High Technology and Low-Income Communities: Prospects for the Positive Use of Advanced Information Technology, Donald A. Schon, Bish Sanyal, William J. Mitchell
Richard R. Wallace, Book Reviewer



Volume XII, Number 2

Spherical Measures without Spherical Trigonometry
Waldo Tobler

What's At Home? Shelter for the Poor in Low Income Cities
John D. Nystuen



Base Maps, Buffers, and Bisectors
Sandra Lach Arlinghaus

2000

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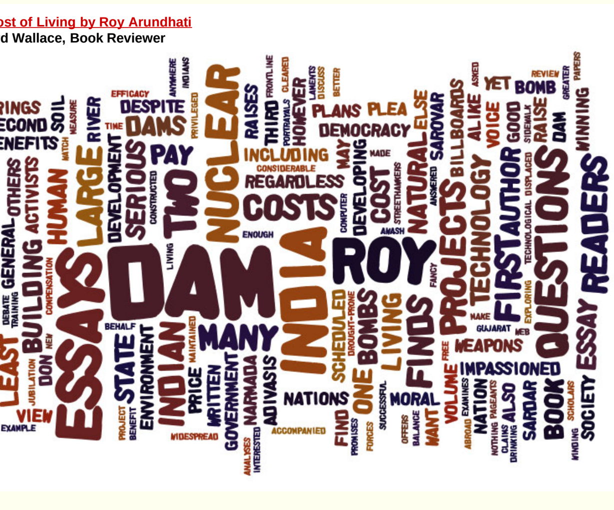
Set in Stone: An Analemma in Northern Italy
John D. Nystuen

Personal Reflections on Solar Power
Richard Wallace

Animaps, IV: Of Time and Place
Sandra Lach Arlinghaus

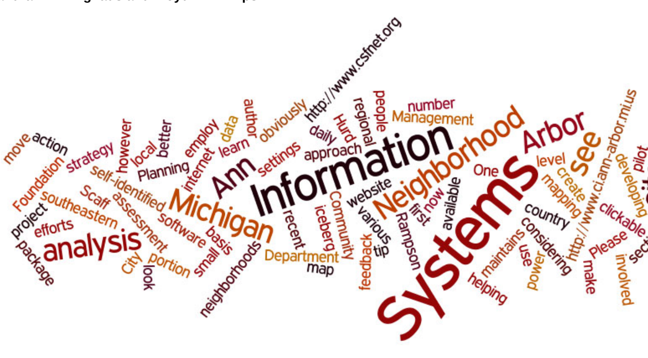
The Cost of Living by Roy Arundhati
Richard Wallace, Book Reviewer



Volume XI, Number 2

Fifty Years of Spatial Analysis: A Symposium in Honor of William L. Garrison, 1950-2000. Photo Essay.
John D. Nystuen

A Neighborhood Information System within Ann Arbor, Michigan
Sandra L. Arlinghaus and Lloyd R. Phillips



Animaps, Again
Courtney Gober

Animap Sequences
Nakia D. Baird

1999

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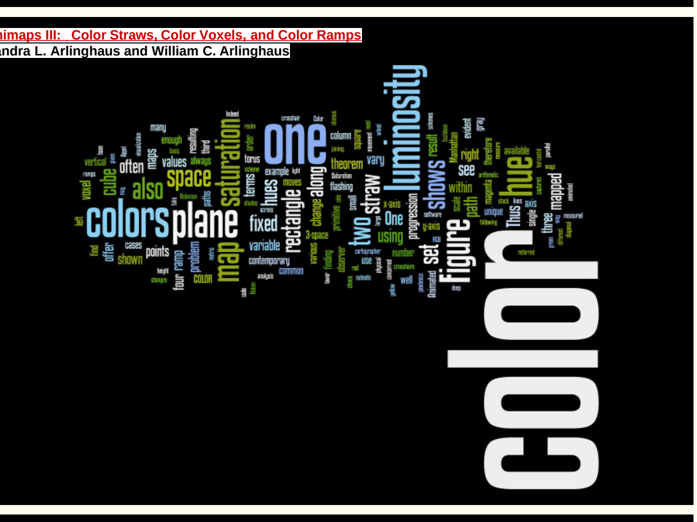
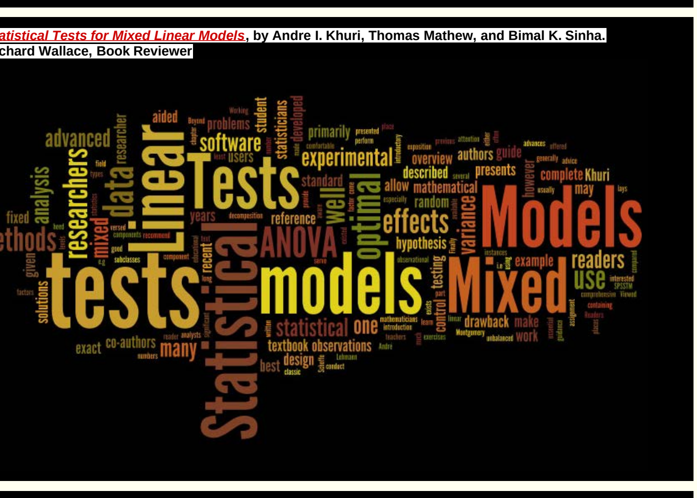
Metropolitan Mining: Institutional and Scale Effects on the Salt Mines of Detroit
John D. Nystuen

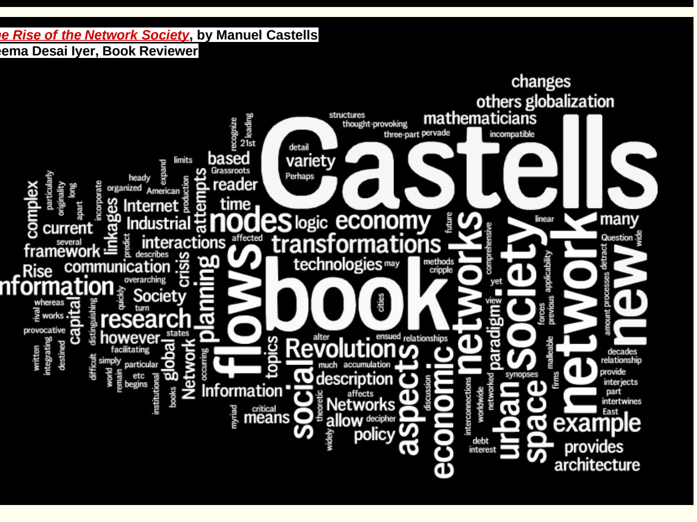
Animaps III: Color Straws, Color Voxels, and Color Ramps
Sandra L. Arlinghaus and William C. Arlinghaus



Statistical Tests for Mixed Linear Models, by Andre I. Khuri, Thomas Mathew, and Bimal K. Sinha.
Richard Wallace, Book Reviewer



The Rise of the Network Society, by Manuel Castells
Seema Desai Iyer, Book Reviewer



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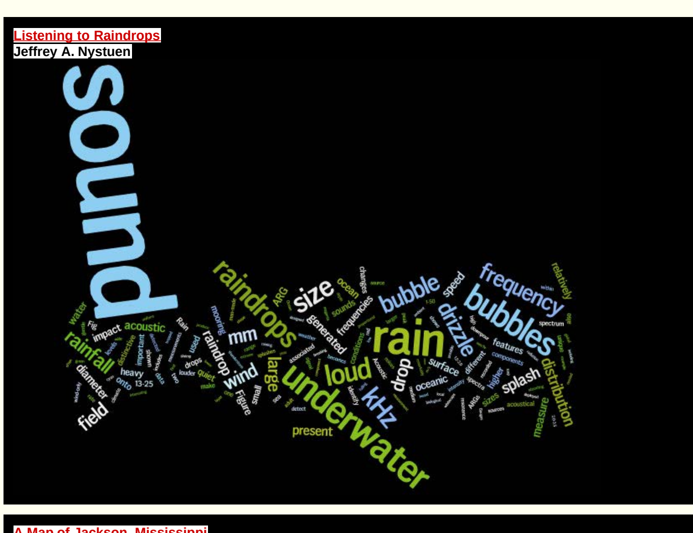
Listening to Raindrops
Jeffrey A. Nystuen

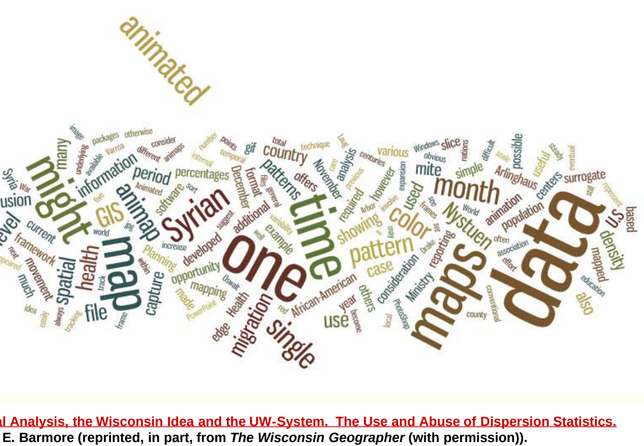


A Map of Jackson, Mississippi
Sandra L. Arlinghaus

1998

Volume IX, Number 1

Animaps
Sandra L. Arlinghaus, William D. Drake, and John D. Nystuen with data and other input from Audra Laug, Kris S. Oswalt, and Diana Sammataro



Spatial Analysis, the Wisconsin Idea and the UW-System. The Use and Abuse of Dispersion Statistics.
Frank E. Barmore (reprinted, in part, from *The Wisconsin Geographer* (with permission)).

Revitalizing Maps or Images?
Sandra L. Arlinghaus and Ruben De la Sierra

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Animated Four Color Theorem: Sample Map
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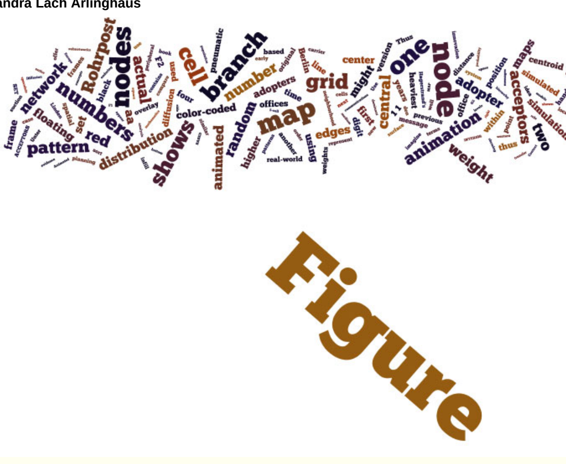

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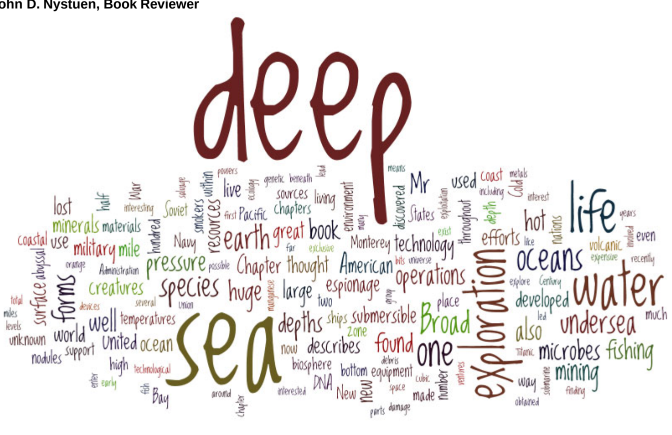

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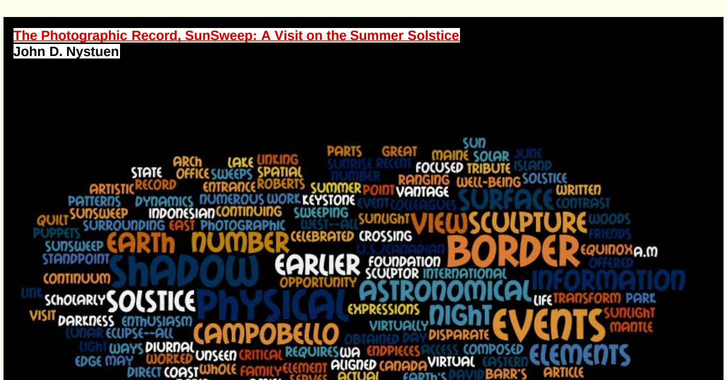

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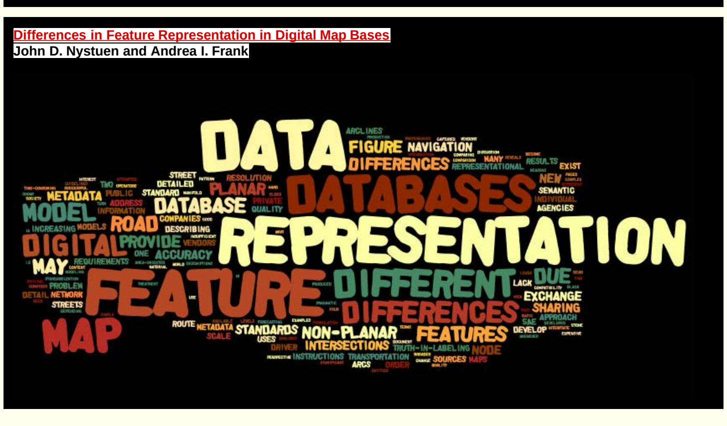

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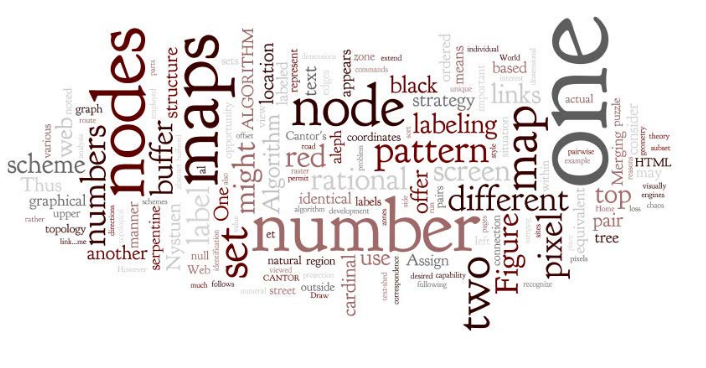

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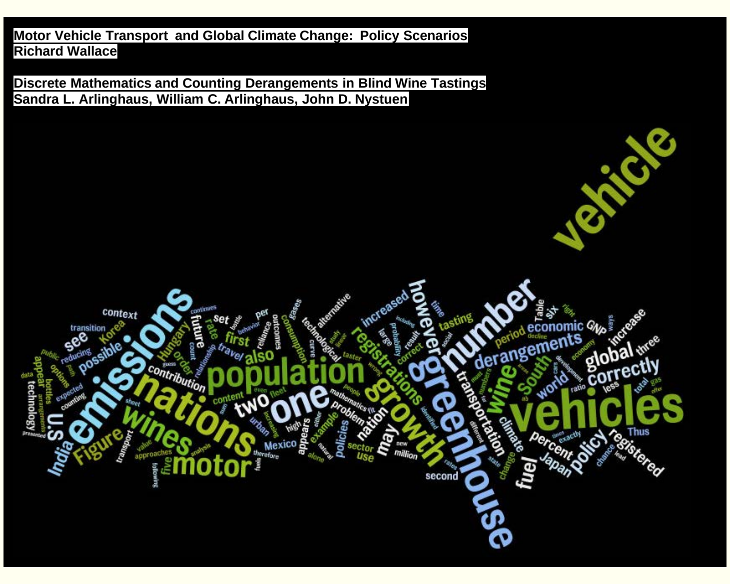

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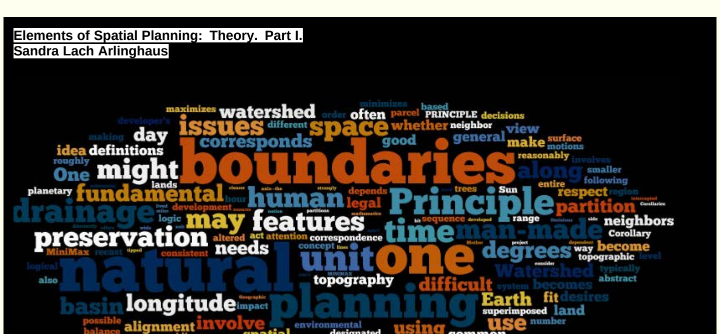

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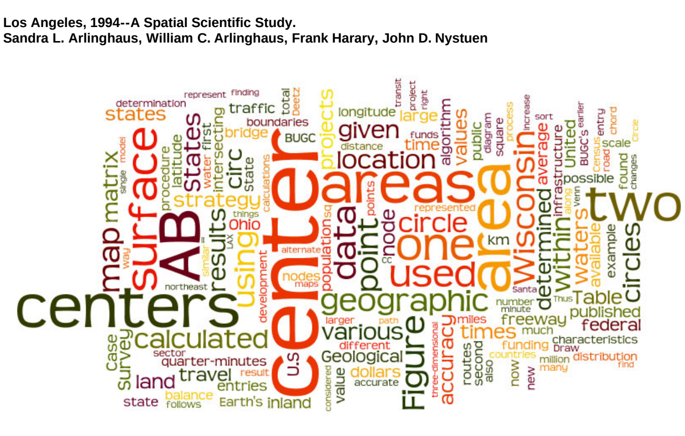

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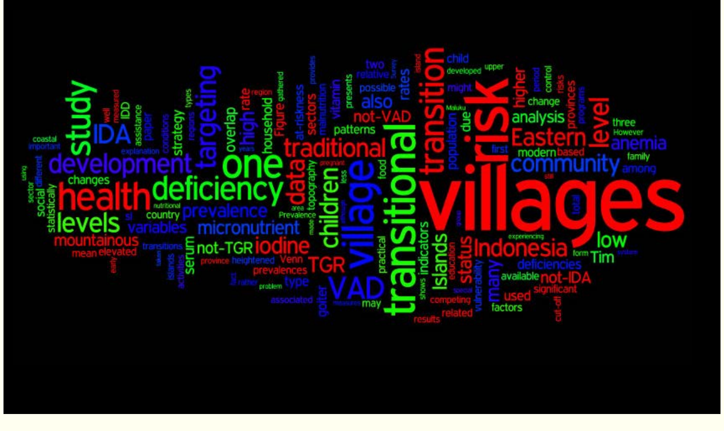

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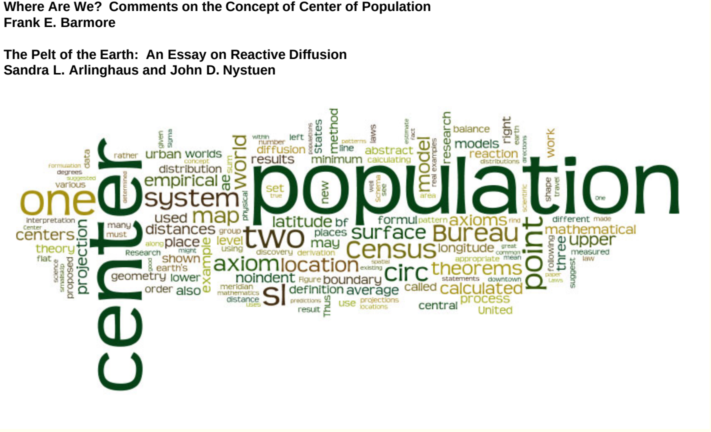

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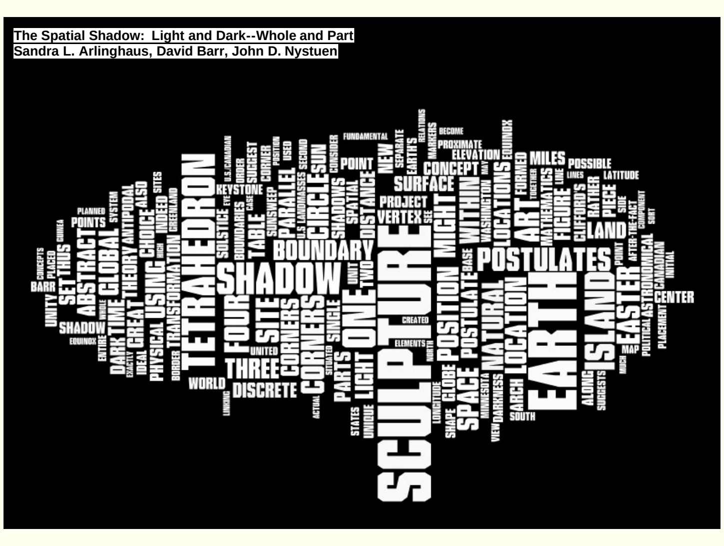

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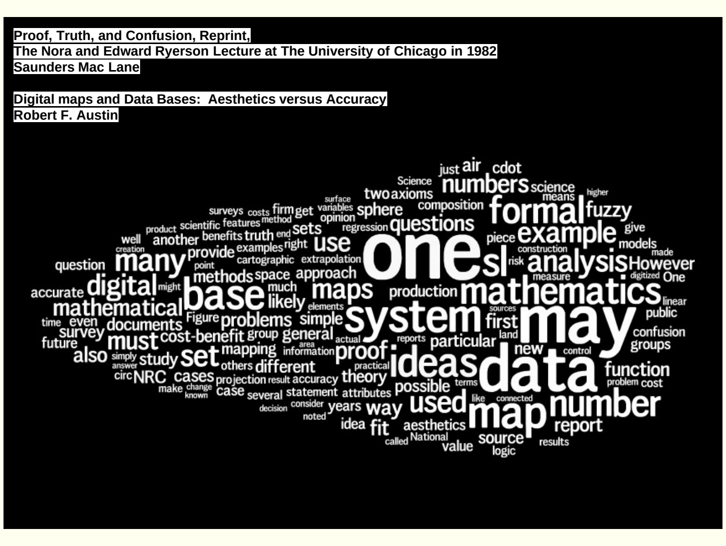

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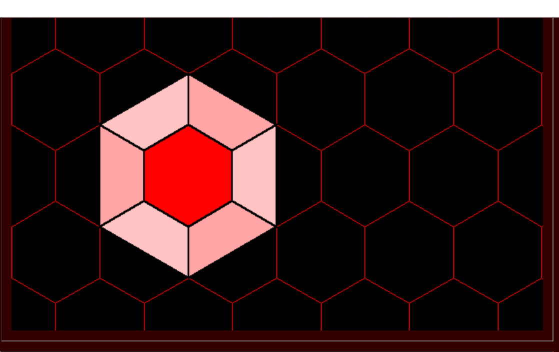

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Congratulations to all *Solstice* contributors.

Remembering those who are gone now but who contributed in various ways to *Solstice* or to IMaGe projects, directly or indirectly, during the first 25 years of IMaGe:

Allen K. Philbrick | Donald F. Lach | Frank Harary | William D. Drake | H. S. M. Coxeter | Saunders Mac Lane | Chauncy D. Harris | Norton S. Ginsburg | Sylvia L. Thrupp | Arthur L. Loeb | George Kish |

1964 Boulder Drive,
Ann Arbor, MI 48104
734.975.0246
http://deepblue.lib.umich.edu/handle/2027.42/58219
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