

Institute of Mathematical Geography



ISSN: 1059-5325

Solstice: An Electronic Journal of Geography and Mathematics

Volume XXXIII Number 1
June 21, 2022



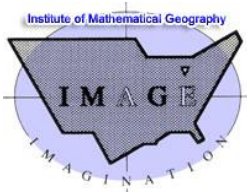
CONGRATULATIONS TO:
THE UNIVERSITY OF MICHIGAN!
RANKED NUMBER 1 PUBLIC UNIVERSITY IN THE COUNTRY IN
TWO CONSECUTIVE YEARS.
WALL STREET JOURNAL AND TIMES HIGHER EDUCATION.

<https://record.umich.edu/articles/u-m-ranked-no-1-public-university-in-the-u-s-by-wsj-the/>



Founded: 1990

Persistent archive: Deep Blue, University of Michigan
Mathematical Geography (Institute of);
Non-persistent user-friendly archive:
Institute of Mathematical Geography



33rd year (1990-2022) of publication of *Solstice*:
An Electronic Journal of Geography and Mathematics
Volume XXXIII, Number 1;
Tuesday, June 21, 2021; 4:14 am, Central Time
Copyright ©2021-- All rights reserved.
Institute of Mathematical Geography (imagenet.org) and the authors.

SOLSTICE:

An Electronic Journal of Geography and Mathematics

33 YEARS OF PUBLICATION!

Persistent URL: <http://deepblue.lib.umich.edu/handle/2027.42/58219>

Cite articles as: Author name(s), Year. Title of article, *Solstice: An Electronic Journal of Geography and Mathematics*, Vol. YY, No. ZZ. Ann Arbor: Institute of Mathematical Geography.

Virtual reality of The University of Michigan “Diag”, below. Note the observatory dome atop Angell Hall, in the foreground.



The IMaGe website, housed in the persistent file storage, Deep Blue, at the University of Michigan, may be accessed directly through this link: <http://www.imagenet.org> . Also, one might find it by searching the Communities and Collections section of Deep Blue.

On that site, in addition to *Solstice*, the full IMaGe *Monograph Series*, IMaGe *eBooks*, and the new (2022) feature, *The Living IMaGe*, are housed. There are files from other sources, including the full set of documents of the *Michigan Community of Mathematical Geographers* (MICMOG). Scroll down, on the IMaGe home page, to find these files and more.

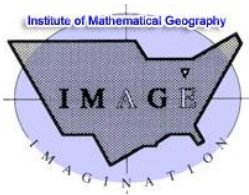
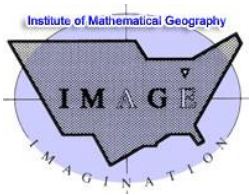


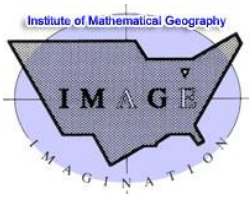
Table of Contents

Frontmatter	5
What's My Number? A Conceptual Viewpoint*	7
Introduction.....	7
Geo-Erdős Numbers? Geographers with Erdős Numbers.....	8
Step Number 1.....	8
Step Number 2.....	9
Step Number 3.....	9
Step Number 4.....	13
Directional Collaboration Interaction: Garrison Numbers.....	15
Step Number 1.....	16
Step Number 2.....	16
Directions for the Near Future	18
References and Related Links, Arranged Chronologically.....	18
The Law of Excluded Middle: To Be or not to Be?*.....	23
Introduction.....	23
The Abstract World.....	23
The Real World.....	24
Mathematical Models.....	24
References	26
Crossroads: Meridian's Preservation Map	27
Introduction.....	27



33rd year (1990-2022) of publication of *Solstice*:
An Electronic Journal of Geography and Mathematics
Volume XXXIII, Number 1;
Tuesday, June 21, 2021; 4:14 am, Central Time
Copyright ©2021-- All rights reserved.
Institute of Mathematical Geography (imagenet.org) and the authors.

Conference Activities	28
The Macon, Georgia Story	29
Our Past is Our Future	30
Evolving Preservation: Best Practices in Historic Preservation.....	31
Icebreaker.....	31
Making Sense of the Dollars: The Economic Impact of Historic Preservation.....	32
Adaptive Reuse Tours	32
Improving Racial Equality through Historic Preservation	33
Trailblazers: Stories of Successful Communities	33
Now We Know What is Possible: How Do We Get Started?.....	34
Post-conference Activities	35
Appendices	37
Correspondence	37
Deep Blue Sample Record	39
Endmatter	49



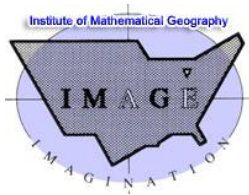
33rd year (1990-2022) of publication of *Solstice*:
An Electronic Journal of Geography and Mathematics
Volume XXXIII, Number 1;
Tuesday, June 21, 2021; 4:14 am, Central Time
Copyright ©2021-- All rights reserved.
Institute of Mathematical Geography (imagenet.org) and the authors.

Frontmatter

Solstice was born digital in 1990, before the advent of the Internet. Early volumes were typeset using the digital typesetting language, TeX. The digital files were sent to subscribers via email and the receiver printed out the TeX code, if desired, to produce a typeset-quality journal, on-demand. Selected monographs in the IMaGe Monograph series contain typeset versions of *Solstice*, printed from the code transmitted as the original version of that issue of *Solstice*. Later, when the Internet became available, *Solstice* switched to the Internet as the platform for transmission, writing documents in html rather than TeX.

Early in *Solstice*'s production history, some authors worried that their electronic files could be maliciously altered by random readers and uploaded to replace their own writings. Of course, that could not have happened (because everything was passworded). However, as reassurance to prospective authors not yet familiar with the mechanics of servers and such, early documents were edited to introduce deliberate errors in spacing, inserted by hand, that a random word-processed document would fail to automatically duplicate. Hence, a bogus copy could be detected simply by overlaying a 'new' printout on the 'old' printout on a light table. The hand-insertion of erroneous spaces motivated the oriental rug motif, photographed from a Bokhara rug from the 1964 New York City World's Fair; that symbol is carried forward (although the practice itself is not) in *Solstice* today, as a subtle reminder of one element of the journal's history.

Over the years, *Solstice* has gained media attention from a variety of sectors: from *Science* (AAAS) and *Science News* early on. A bit later with interaction with a museum, the Exploratorium (San Francisco), and the TV show, *Nova*. For all these notices, as well as for those in more conventional academic arenas, our primary thanks go to our contributors, volunteers, and readers who have been with us for so many years. Best wishes to all!



33rd year (1990-2022) of publication of *Solstice*:
An Electronic Journal of Geography and Mathematics
Volume XXXIII, Number 1;
Tuesday, June 21, 2021; 4:14 am, Central Time
Copyright ©2021-- All rights reserved.
Institute of Mathematical Geography (imagenet.org) and the authors.

Founder and Editor-in-Chief: Sandra Lach Arlinghaus. Contact for article, note, or comment submission information: sarhaus@umich.edu

Advisory Board*: William C. Arlinghaus, William E. Arlinghaus, Robert F. Austin, Neal Brand, Michael F. Goodchild, Daniel A. Griffith, Ming-Hui Hsieh, Joseph J. Kerski, Ann E. Larimore, Jonathan D. Mayer, John D. Nystuen, Kameshwari Pothukuchi, Kenneth H. Rosen, Marc Schlossberg, Richard Wallace.

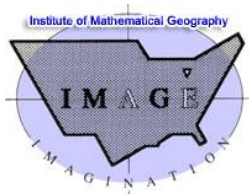
Persistent URL, University of Michigan Deep Blue Archive (housed under 'Communities & Collections', 'Mathematical Geography (Institute of)'): <http://deepblue.lib.umich.edu/handle/2027.42/58219>

Transient URLs that point to the persistent URL: imagenet.org; mathematicalgeography.org; mathematicalgeography.com; instituteofmathematicalgeography.org; instituteofmathematicalgeography.com

*Former (Deceased) Board Members: William D. Drake, Frederick L. Goodman.

AUTHORS OF ORIGINAL MATERIALS APPEARING IN SOLSTICE, 1990-present:

Ainslie, V. | Albert, D. | Ard, K. | Arlinghaus, D. E. | Arlinghaus, S. L. | Arlinghaus, W. C. | Arlinghaus, W. E. | Austin, R. F. | Baird, N. D. | Bandyopadhyay, G. | Barmore, F. E. | Barr, D. | Batty, M. | Beal, F. J. | Beier, K.-P. | Bhatia, S. S. | Blake, B. | Borgers, A. W. J. | Burkhalter, B. R. | Chattopadhyay, S. | Chaudhuri, S. | Childers, P. E. | Chirapiwat, T. | Crane, J. | Crawford, T. C. | De la Sierra, R. | Derudder, B. | Dison, A. C. | Drake, W. D. | Eagle, K. A. | Earl, E. | Emas, T. | Favro, R. | Frank, A. I. | Gober, C. | Glunz, B. | Goodman, F. L. | Gorstein, J. | Griffith, D. A. | Haidar, S. | Hall, B. | Hall, D. | Hamilton, R. C. | Han, S.-H. | Harary, F. | Haug, R. | Haynes, D. | Hoffman, L. L. | Hogh, G. | Iyer, S. D. | Jacobs, D. A. | Johnson, S. S. | Kaur, K. | Kelbaugh, D. S. | Kerski, J. | Kim, E.-Y. | Koenig, R. | Kos, S. | Kwon, T. | Lach, A. | Lane, J. D. | Larimore, A. E. | Laug, A. | Lazzaro, A. A. | Lee, H. | Licate, J. A. | Lindemann, W. | Maeda, J. | Martin, P. | Mayer, J. D. | McCloskey, J. C. | Metzler, D. | Mokray, G. | Moore, K. | Muhilal | Naud, M. | Noguchi, M. | Nystuen, J. A. | Nystuen, J. D. | Onstott, B. | Oppenheim, P. J. | Oswald, K. S. | Pak, S. | Phillips, L. R. | Pogany, T. | Ponce de Leon, J. S. | Pothukuchi, K. | Purvis, E. M. | Ram, B. | Rayle, R. | Robinson, Craig | Rosenblum, A. | Ross, S. | Rushing, D. | Ryznar, R. | Sammataro, D. | Schlossberg, M. | Schumann, L. | Stern, H. L. | Stuckman, P. | Tarwotjo, I. | Tilden, R. | Timmermans, H. J. P. | Tobler, W. R. | Van Acker, V. | Wagner, T. | Wallace, R. | Walton, A. | Ward, M. | Wilson, M. L. | Wilson, S. | Witlox, F. J. A. | Woldenberg, M. J. | Zander, R. H.



33rd year (1990-2022) of publication of *Solstice*:
An Electronic Journal of Geography and Mathematics
Volume XXXIII, Number 1;
Tuesday, June 21, 2021; 4:14 am, Central Time
Copyright ©2021-- All rights reserved.
Institute of Mathematical Geography (imagenet.org) and the authors.

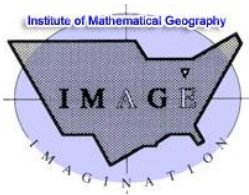
What's My Number? A Conceptual Viewpoint*

Sandra L. Arlinghaus and Jonathan D. Mayer

Introduction

As you read this article, we hope that you will indeed ask yourself, “What’s **MY** Number?”. In particular, “What’s My Erdős Number?” Paul Erdős (Hungarian) was a remarkable mathematician. He had 512 direct collaborators many of whom had multiple collaborators themselves, and so on through numerous ancestral generations of collaborators (Grossman, 1995-2020 and continuing). Within mathematics, a novel way of characterizing research collaboration patterns has centered on him and his own particular interests within mathematics. As geographers, we find this ‘mapping’ of pattern of natural interest. It works, generally, as follows. Erdős, himself is the root of the pattern and therefore has the numeral 0 assigned to him; he collaborated, in essence, with himself. Anyone else who collaborated with him, as a direct co-author of published research, has Erdős Number 1. A person who collaborated with someone with Erdős Number 1, but not with Erdős himself, has Erdős Number 2. Someone who collaborated with someone with Erdős Number 2, but not with anyone with a lower Erdős Number, is assigned an Erdős Number of 3. The numbering scheme continues in a natural manner

*Corresponding author: S. L. Arlinghaus, sarhaus@umich.edu. Sandra L. Arlinghaus, Adjunct Professor, SEAS, University of Michigan, Ann Arbor; Jonathan D. Mayer, Professor Emeritus, Epidemiology, Medicine, and Geography, University of Washington. Identifying collaboration clusters and relations offers extra insight into scholarly process. In the case of this particular article: both authors of this article grew up in Hyde Park (University of Chicago neighborhood) and went to the University of Chicago Laboratory Schools. Both had fathers who were professors in the Division of the Social Sciences at the University of Chicago. Both have Ph.D.s in Geography from the University of Michigan. Each has other pertinent connections and collaborators in other disciplines, as well. Collaboration pattern has been of critical importance to each!



33rd year (1990-2022) of publication of *Solstice*:
An Electronic Journal of Geography and Mathematics
Volume XXXIII, Number 1;
Tuesday, June 21, 2021; 4:14 am, Central Time
Copyright ©2021-- All rights reserved.
Institute of Mathematical Geography (imagenet.org) and the authors.

A whole culture has grown up around Erdős Numbers, and around Erdős himself; an article about Erdős Numbers appears in the mathematics literature as early as 1969 (Goffman). The mathematics and science literature contains many subsequent references: some quite serious, others a bit more frivolous. Imagine, for example, a mathematics cocktail party with colleagues comparing notes on their Erdős Numbers, attempting an odd-sounding one-upmanship game. How must that sound to an outside listener?

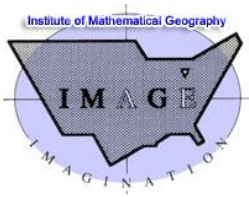
Refinements of the general pattern, so-called Erdős Numbers of the First Kind (the regular ones described above), appear in the literature (Grossman). One such refinement involves Erdős Numbers of the Second Kind. A number is 'of the Second Kind'—and perhaps more valuable for bragging rights—if there are only two co-authors. Arlinghaus has an Erdős Number of 2, but it is not 'of the Second Kind' because the publication that endowed her that ranking had two co-authors with her. Mayer has an Erdős Number of 3, from co-authoring this article with Arlinghaus, but his number is 'of the Second Kind' because it does not represent a shared co-authorship with anyone else (unless one factors in Arlinghaus's co-authorship that gave her the ranking of 2).. There is an abundant culture surrounding many variations of Erdős Numbers. Mathematician Jerrold Grossman has created, through painstaking years of work, an incredibly detailed website associated with the Erdős Number Project at Oakland University. [Take a look](#): it is fascinating reading and it is THE comprehensive primary source on the topic.

Geo-Erdős Numbers? Geographers with Erdős Numbers.

How many people with Ph.D.s in Geography (or perhaps some sort of equivalent) have Erdős Numbers; hence, Geo-Erdős Numbers? We begin with the simplest pattern for determining Erdős Numbers, as a surrogate for offering one measure of interdisciplinary research collaboration between Geography and the Mathematics of interest to Paul Erdős.

Step Number 1

To begin to catalog the set of specialized Geo-Erdős numbers, we first consider all the names of 512 folks with Erdős Number 1: <https://oakland.edu/enp/thedata/erdos1/> In this list, each derivative



author (of Erdős Number 2) is also listed. We studied the pattern of that display, to create a similar one for geographers with Erdős numbers.

Step Number 2

The direct liaison (that we know about), from mathematics, with Erdős Number 1, is Frank Harary. It appears there are no geographers with Erdős Number 1 and clearly there will be none since Erdős died in 1996. So, two is the best any geographer can do. In the lists below, entries are arranged in chronological order with earliest collaboration known to us used as the date of collaboration. In many cases, collaboration extends well beyond the initial date. Citations to pertinent references for the dates given appear in the References at the end of this article.

Geographers with Erdős Number 2, acquired through direct co-authorship with Frank Harary and both before and after as co-authors of each other.

- 1993. Erdős 2: Sandra L. Arlinghaus.
- 1994. Erdős 2: John D. Nystuen.

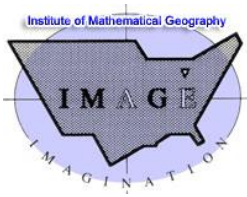
Step Number 3

In Step 3, we supply names of geographers who have written with some geographer with Erdős Number 2, but not with Erdős Number 1. The list is intended as suggestive of style; hence conceptual. We assume it is not comprehensive. These names are organized as descendants of a geographer with Erdős Number 2. They have Erdős Number 3.

Geographers with Erdős Number 3.

Erdős 2: S. L. Arlinghaus. Direct co-authors.

- 1986. Erdős 3: Robert F. Austin
- 1987. Erdős 3: Allen K. Philbrick
- 1992. Erdős 3: Michael J. Woldenberg (also appears through Nystuen collaboration)
- 2000. Erdős 3: Michael Batty (also appears through Nystuen collaboration)



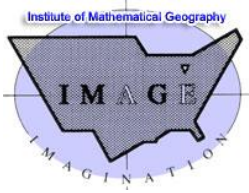
33rd year (1990-2022) of publication of *Solstice*:
An Electronic Journal of Geography and Mathematics
Volume XXXIII, Number 1;
Tuesday, June 21, 2021; 4:14 am, Central Time
Copyright ©2021-- All rights reserved.
Institute of Mathematical Geography (imagenet.org) and the authors.

- 2003. Erdős 3: Ann E. Larimore
- 2010. Erdős 3: Daniel A. Griffith
- 2010. Erdős 3: Joseph J. Kerski
- 2021. Erdős 3: Jonathan D. Mayer

Erdős 2: J. D. Nystuen. Direct co-authors.

- 1959. Erdős 3: William L. Garrison
- 1959. Erdős 3: Brian J. L. Berry
- 1959. Erdős 3: Duane Marble
- 1959. Erdős 3: Richard Morrill
- 1961. Erdős 3: Michael F. Dacey
- 1974. Erdős 3: John F. Kolars
- 1992. Erdős 3: Michael J. Woldenberg (also appears through Arlinghaus collaboration).
- 2000. Erdős 3: Michael Batty (also appears through Arlinghaus collaboration).

Figure 1 shows the pattern of graphical connection of collaboration. The graph was made using NodeXL Basic, App for Microsoft Excel in Windows 10. The App is free to download, <https://nodexlgraphgallery.org/Pages/RegistrationBasic.aspx>, although there is a more refined version that is not free. The free version remains 'free' only for a limited time. However, even the free version has some analytic capability that goes beyond the simple display function exhibited in Figure 1. In Figure 2, for example, the set of Erdos 3 names derived from association with Nystuen is displayed, using analytical tools involving clustering and collapsing capabilities within the software. The variety of analytical tools available may well serve for a deeper analysis of collaboration within patterns more complex than this one, particularly by groups of authors with a primary interest in network analysis and graph theory.



33rd year (1990-2022) of publication of *Solstice: An Electronic Journal of Geography and Mathematics*
 Volume XXXIII, Number 1;
 Tuesday, June 21, 2021; 4:14 am, Central Time
 Copyright ©2021-- All rights reserved.
 Institute of Mathematical Geography (imagenet.org) and the authors.

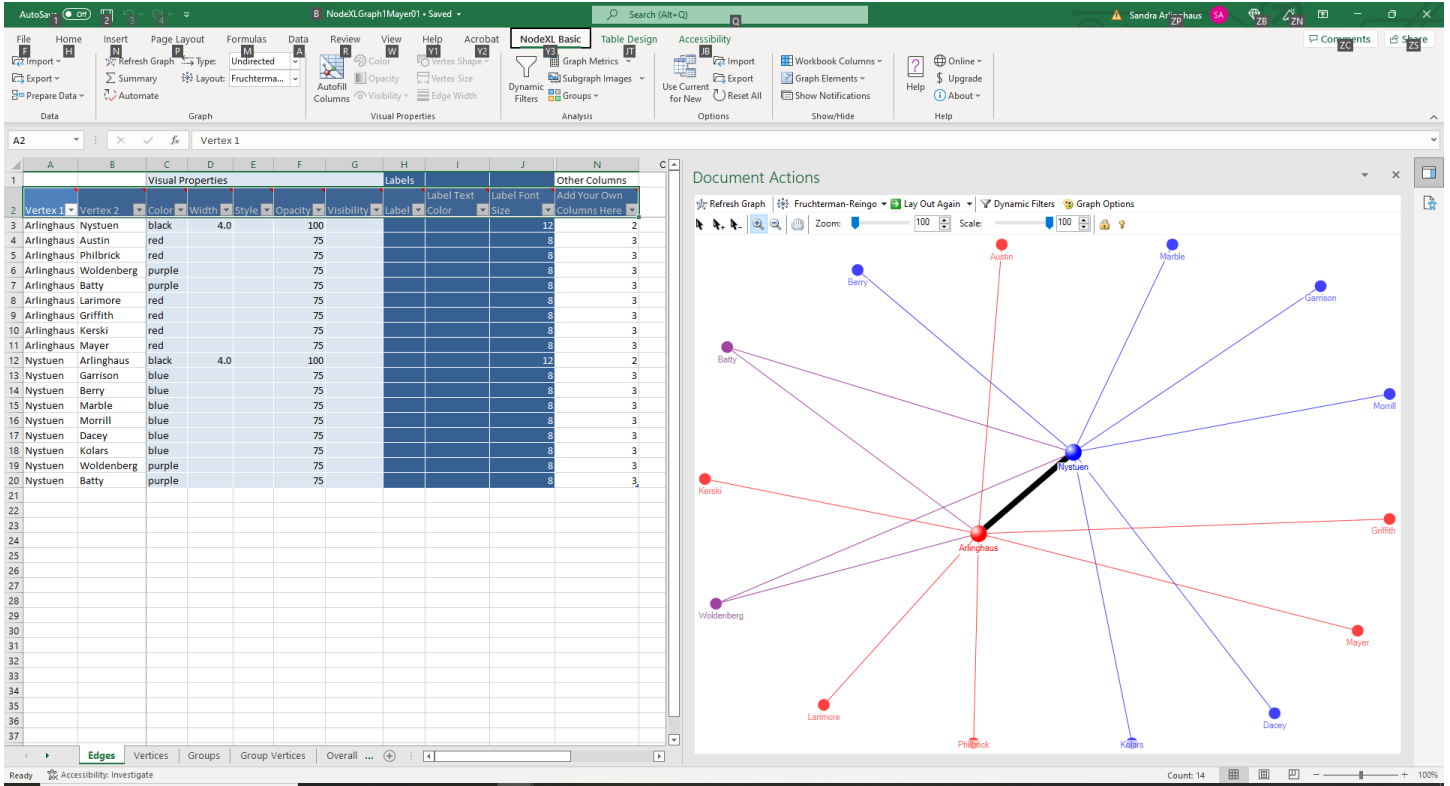


Figure 1. Graph displaying simple collaboration pattern in sets of geographers linked to a geographer with Erdos Number 2 (Arlinghaus or Nystuen). Those linked names have Erdös Number 3.

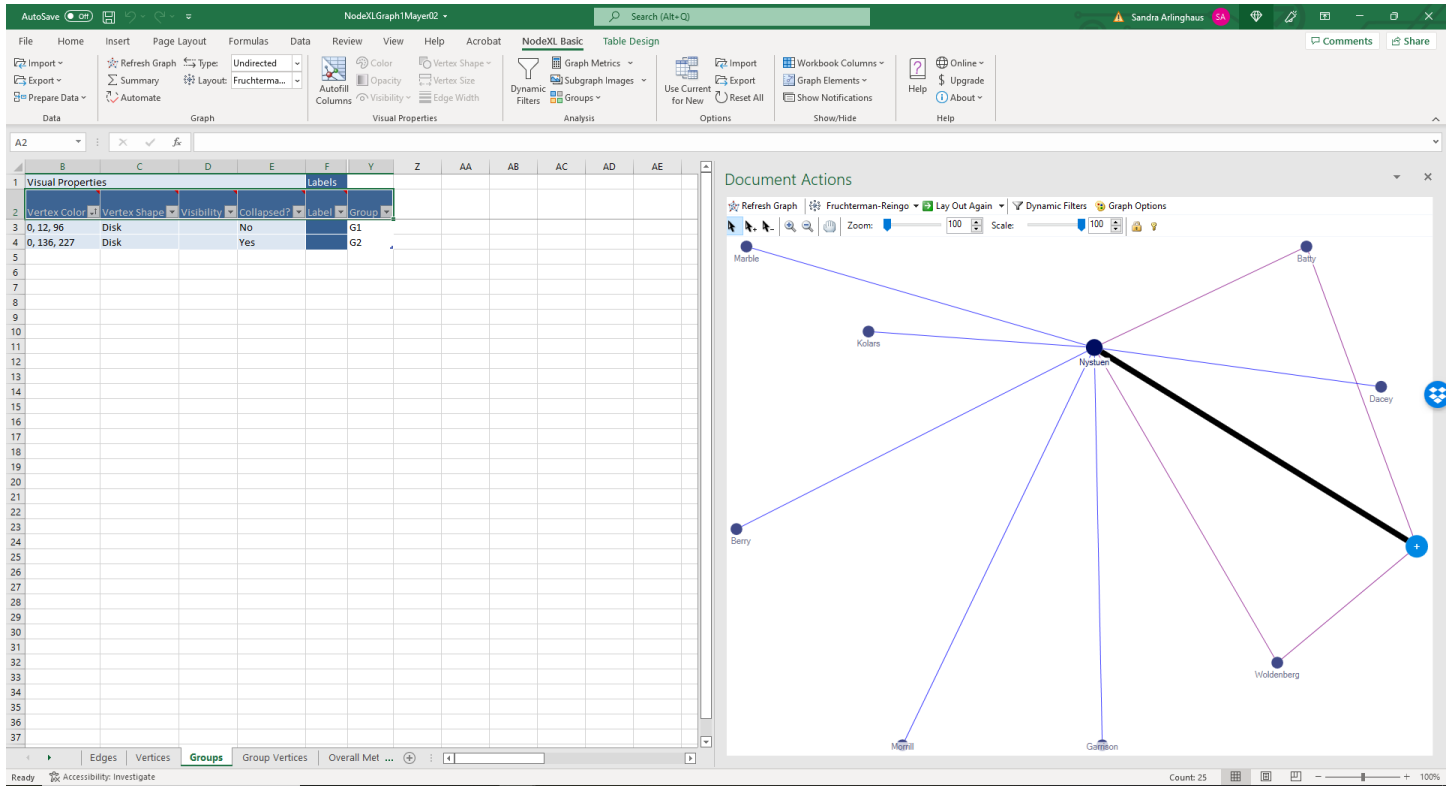


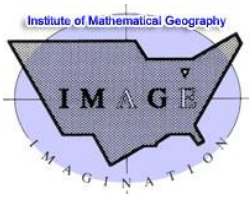
Figure 2. Collapsing part of the graph of Figure 1, and searching for clusters, produces the links to Erdős 3 authors linked to Nystuen.

Geographers with Erdős Number 3*

Beyond direct associations in the simplest pattern for tracking Erdős numbers, one might go any number of different directions. Often, a close collaboration is created between editor and author. Thus, the lists above might be enhanced as follows, with only the directness of the collaboration loosened a bit.

Erdős 2: S. L. Arlinghaus. Indirect relation (not included in a different rank), noted with asterisk.

- 1987. Erdős 3*: Douglas McManis (also appears through Nystuen collaboration)
- 1988. Erdős 3*: Pierre Hanjoul.
- 1988. Erdős 3*: Hubert Beguin.
- 1988. Erdős 3*: Jean-Claude Thill



33rd year (1990-2022) of publication of *Solstice*:
An Electronic Journal of Geography and Mathematics
Volume XXXIII, Number 1;
Tuesday, June 21, 2021; 4:14 am, Central Time
Copyright ©2021-- All rights reserved.
Institute of Mathematical Geography (imagenet.org) and the authors.

- 1988. Erdős 3*: Keith J. Tinkler
- 1989. Erdős 3*: James W. Fonseca.
- 1989. Erdős 3*: Michael F. Goodchild.
- 1993. Erdős 3*: Miklos Pinther.
- 1993. Erdős 3*: Nina Lam
- 1993. Erdős 3*: Lee DeCola
- 2010. Erdős 3*: John Paul Jones, III.
- 2010. Erdős 3*: Basil Gomez.
- 2019. Erdős 3*: John P. Wilson.

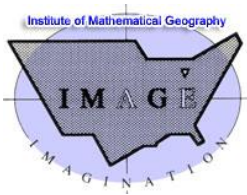
Erdős 2: Nystuen, J. D. Indirect relation (not included in a different rank), noted with an asterisk.

- 1964. Erdős 3*: William Bunge
- 1965. Erdős 3*: William Warntz.
- 1966. Erdős 3*: Waldo Tobler.
- 1966. Erdős 3*: Peter Gould.
- 1968. Erdős 3*: Emilio Casetti.
- 1968. Erdős 3*: R. Keith Semple.
- 1968. Erdős 3*: William Pattison
- 1987. Erdős 3*: Douglas McManis (also appears through Arlinghaus collaboration).

One might wonder if it is, in some sense, 'fair' to bring in an author who died prior to his Erdős ancestors having a number. One might wonder how to treat ancestry that is not one-to-one; for example, Michael Woldenberg enters simultaneously as a direct ancestor of both Arlinghaus and Nystuen. The creation of offshoot directions is time-consuming; the idea is to create pattern that illustrates interdisciplinary collaboration.

Step Number 4

In Step 4, we supply names of a few geographers who have written with someone with Erdős Number 3, but not with Erdős Numbers 2 or 1. The list is intended as highly suggestive of style and concept in



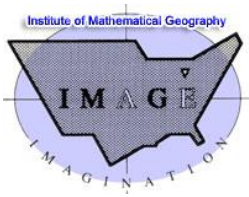
advancing through the hierarchy. Clearly it is not comprehensive; it suggests the speed at which the complexity of process accelerates, even just a few steps away from the root. These geographers have Erdős Number 4 and higher.

Geographers with Erdős Number 4 or Higher.

- Erdős 3: Allen K. Philbrick
 - 1952. Erdős 4: Harold M. Mayer
- Erdős 3: Daniel A. Griffith
 - 1988. Erdős 4: Luc Anselin
 - 2010. Erdős 4: Arthur Getis
 - 1988. Erdős 5: Barry N. Boots
 - 1992. Erdős 5: J. K. Ord
 - 2005. Erdős 5: Judith Getis
 - 2005. Erdős 5: Jon Malinowski
 - 2005: Erdős 5: J. D. Fellmann
 - 1971. Erdős 6: Jack A. Licate
 - 1971. Erdős 6: Chauncy D. Harris
 - 1945. Erdős 7: Edward Ullman

The spinoff from Philbrick to H. M. Mayer (University of Chicago) is straightforward and apparently cannot be shortened. There are two paths already to Berry; there is one to Getis (is there another)? What is the significance, or lack thereof, of uniqueness? Both Berry and Getis are prolific in many ways. Once they enter the equation, pattern is likely to become complex. The path from outside the University of Chicago, to within it becomes more complicated as one moves from Griffith (not University of Chicago) to Harris (University of Chicago). Is there a faster path to Harris?

Philbrick was also a co-author of Norton S. Ginsburg (University of Chicago). Did Ginsburg co-author anything with Harris (we know they knew each other)? H, Mayer knew all of them. The answer is yes. Thus, we now have:

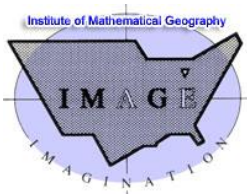


- Erdős 3: Allen K. Philbrick
 - Erdős 4: Harold M. Mayer
 - 1986. Erdős 5: Michael P. Conzen,
 - 1986. Erdős 5: Akin L. Mabogunje
 - 1986. Erdős 5: Jean Gottman
 - 1986. Erdős 5: Chauncy D. Harris
 - 1945. Erdős 6: Edward Ullman
 - 1958. Erdős 4: Norton S. Ginsburg
 - 1986. Erdős 5: Michael P. Conzen
 - 1986. Erdős 5: Akin L. Mabogunje
 - 1986. Erdős 5: Jean Gottman
 - 1986. Erdős 5: Chauncy D. Harris
 - 1945. Erdős 6: Edward Ullman

The path to Harris was improved using a bit of historical knowledge about geographers who knew each other, long ago. Naturally, Ullman's number improves by one value, as well. Multiple paths exist, to different levels and to the same level of the hierarchy. Existence of path certainly does not imply uniqueness of path. To generate an optimal pattern, with all paths as 'best possible' paths is a difficult process drawing from a number of different knowledge banks—not just from quick searches of online databases. It is the 'uniqueness' issue that makes finding optimal paths through the literature of particular difficulty.

Directional Collaboration Interaction: Garrison Numbers

The lists above offer a beginning at understanding the pattern of authors who are part of a collaboration network of geographers who have an Erdős number. The direction of that collaboration is from a mathematics network of mathematicians who have interests related to those of Paul Erdős into the field of Geography. We sought geographers with Erdős Numbers.



One could, however, reverse the process. To do so, we would need first to capture a network of geographers with interests related to a central geographer (or set of such), and then ask what mathematicians would, by their existing set of collaborators, also be entitled to such a number. That process would reverse the flow of collaboration, carrying it from Geography into Mathematics.

Step Number 1.

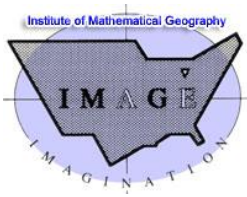
Select a central geographer whose interests and impacts have been deep and far-reaching. One place that seems reasonable to us to look for such a figure is to the so-called 'quantitative revolution' in Geography. Its leader, William L. Garrison, might serve as a stellar central figure on which to base a network of 'Garrison Numbers' representing one approach to geography (there could be as many as there are geographers)..

Step Number 2.

Create a network of Garrison Numbers in parallel with the structure of the Erdős Numbers collaboration network. Thus, from a sketchy standpoint (based for the most part on the reference set related to Geo-Erdős Numbers), we might see a beginning for such a network as below (Garrison has Garrison Number 0).

Geographers with Garrison Numbers.

- Garrison 1: Brian J. L. Berry
 - Garrison 2: Michael P. Conzen
 - Garrison 2: Chauncy D. Harris
 - Garrison 2: Norton S. Ginsburg
 - Garrison 2: Harold M. Mayer
 - Garrison 2: Akin L. Mabogunje
 - Garrison 2: Jean Gottman
 - Garrison 2: Daniel A. Griffith
- Garrison 1: Duane F. Marble
- Garrison 1: John D. Nystuen



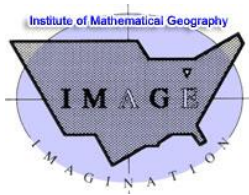
33rd year (1990-2022) of publication of *Solstice*:
An Electronic Journal of Geography and Mathematics
Volume XXXIII, Number 1;
Tuesday, June 21, 2021; 4:14 am, Central Time
Copyright ©2021-- All rights reserved.
Institute of Mathematical Geography (imagenet.org) and the authors.

- Garrison 2: Sandra L. Arlinghaus.
 - Garrison 3: Jonathan D. Mayer
- Garrison 1: Richard L. Morrill

Geographers with Garrison Numbers, that also reach out into ErdősLand.

- Garrison 1: Brian J. L. Berry
 - Garrison 2: Michael P. Conzen
 - Garrison 2: Chauncy D. Harris
 - Garrison 2: Norton S. Ginsburg
 - Garrison 2: Harold M. Mayer
 - Garrison 2: Akin L. Mabogunje
 - Garrison 2: Jean Gottman
 - Garrison 2: Daniel A. Griffith
- Garrison 1: Duane F. Marble
- Garrison 1: John D. Nystuen
 - Garrison 2: Sandra L. Arlinghaus.
 - Garrison 3: Jonathan D. Mayer
 - Garrison 2: William C. Arlinghaus (Ph.D. Mathematics)
 - Garrison 2: Frank Harary (Ph.D. Mathematical Logic)
 - Garrison 3: Paul Erdős
- Garrison 1: Richard L. Morrill

Once Erdős is brought into the Garrison Number network, thousands of mathematicians (the entire Erdős network) enter the picture. A mathematician with Erdős Number 1 has Garrison Number 4 through this path; similarly a mathematician with Erdős Number 2 has Garrison Number 5; and more generally, a mathematician with Erdős Number x has a Garrison Number of no greater than $x+3$. To try to separate out clusters of mathematicians with established interest in mathematical geography, look therefore for those with Erdős Numbers whose Garrison Number is less than three more than their Erdős Number, as a “**Collaboration Cluster Theorem**”!



33rd year (1990-2022) of publication of *Solstice*:
An Electronic Journal of Geography and Mathematics
Volume XXXIII, Number 1;
Tuesday, June 21, 2021; 4:14 am, Central Time
Copyright ©2021-- All rights reserved.
Institute of Mathematical Geography (imagenet.org) and the authors.

Directions for the Near Future

One could create the same process for any number of disciplines (Grossman notes that such activity exists) with any number of refinements to the rules in order to understand various patterns and orientation of interdisciplinary collaboration. What we find, is that as we collect names, questions occur and suggest rule adjustments and decisions regarding such adjustments. What is presented here is part of a conceptual base derived from the inspiration of Grossman and The Erdős Number Project. It may extend in any number of future directions!

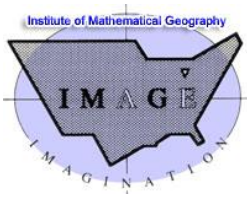
References and Related Links, Arranged Chronologically

General References

- 1963-1968. [Michigan Interuniversity Community of Mathematical Geographers](#) (1963-1968).
- 1969. Goffman, Casper. "And what is your Erdős number?". [American Mathematical Monthly](#). **76** (7): 791.
- 1990- Institute of Mathematical Geography. Direct [link](#) to archived materials in Deep Blue, University of Michigan. Forwarded (easier to remember) [Link](#).
- Initial version: May 25, 1995; latest revision: August 7, 2020. Grossman, Jerrold. The Erdős Number Project. <https://oakland.edu/enp/thedata/erdos1/index> This page was last updated on August 21, 2020. Last accessed October 17, 2021.
- 2021 (earlier and ongoing, as Wikipedia is). List of People by Erdős Number. [Not a complete list.] https://en.wikipedia.org/wiki/List_of_people_by_Erdős_number Last accessed October 17, 2021.

Geo-Erdős Number 2, References

- 1993. Arlinghaus, S. L.; Arlinghaus, W. C.; and, Harary, F. Sum Graphs and Geographic Information. *Solstice: An Electronic Journal of Geography and Mathematics*, Volume IV, Number 1. Ann Arbor: [Institute of Mathematical Geography](#).

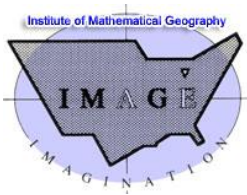


33rd year (1990-2022) of publication of *Solstice*:
An Electronic Journal of Geography and Mathematics
Volume XXXIII, Number 1;
Tuesday, June 21, 2021; 4:14 am, Central Time
Copyright ©2021-- All rights reserved.
Institute of Mathematical Geography (imagenet.org) and the authors.

- [Link](#) to original TeX file in (born) digital journal, as transmitted.
- [Link](#) to article in printed-on-demand Monograph #17, pp. 44-69.
- 1994. Arlinghaus, S. L.; Arlinghaus, W. C.; Harary, F.; and Nystuen, J. D. Los Angeles 1994—A Spatial Scientific Study. *Solstice: An Electronic Journal of Geography and Mathematics*, Volume V, Number 1. Ann Arbor: Institute of Mathematical Geography.
 - [Link](#) to original TeX file in (born) digital journal, as transmitted.
 - [Link](#) to article in printed-on-demand Monograph #19, pp. 42-83.

Geo-Erdős Number 3, References

- 1959. **William L. Garrison, Brian J. L. Berry, Duane F. Marble, John D. Nystuen, Richard L. Morrill.** *Studies of Highway Development and Geographic Change.* Bureau of Public Roads of the Department of Commerce and the Washington State Highway Commission..
- 1961. **Michael F. Dacey.** John D. Nystuen and Michael F. Dacey. A Graph Theory Interpretation of Nodal Regions. *Papers of the Regional Science Association*, Volume 7, pp 29-42.
- 1974. **John F. Kolars.** John F. Kolars and John D. Nystuen. *Geography: The Study of Location, Culture, and Environment.* McGraw-Hill..
- 1986/2010. Robert F. Austin
 - 2010, Arlinghaus, Sandra L. and Austin, Robert F. [Southeast Asia: Historical Place Names Visualized in Google Earth](#). *Solstice: An Electronic Journal of Geography and Mathematics*. Volume XX, Number 2. Derivative of work in next bullet point.
 - 1986. Austin, Robert F. [A Historical Gazetteer of Southeast Asia](#). IMaGe Monograph #4.
- 1987. **Allen K. Philbrick.** [IMaGe Logo revision](#) in conjunction with Sandra L. Arlinghaus.
- 1992. **Michael J. Woldenberg.** Arlinghaus, Sandra L.; Nystuen, John D.; Woldenberg, Michael J. An application of graphical analysis to semidesert soils. *Geographical Review*, July 1992, pp. 244-252. American Geographical Society of New York



33rd year (1990-2022) of publication of *Solstice*:
An Electronic Journal of Geography and Mathematics
Volume XXXIII, Number 1;
Tuesday, June 21, 2021; 4:14 am, Central Time
Copyright ©2021-- All rights reserved.
Institute of Mathematical Geography (imagenet.org) and the authors.

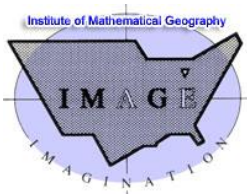
- 2003. **Michael Batty**. Sandra Arlinghaus, Michael Batty, and John Nystuen. [Animated Time Lines: Coordination of Spatial and Temporal Information](#), *Solstice: An Electronic Journal of Geography and Mathematics*. [Volume XIV, Number 1](#).
- 2003. **Ann E. Larimore**, Robert J. Haug, and Sandra L. Arlinghaus. [Lewis and Clark, 200 Years: A Visual Tribute to Exploration. The Gates of the Rocky Mountains](#). *Solstice: An Electronic Journal of Geography and Mathematics*, Volume XIV, Number 2.
- 2010. **Daniel A. Griffith**. Sandra L. Arlinghaus and Daniel A. Griffith. [Mapping It Out? A Contemporary View of Burgess' Concentric Ring Model of Urban Growth](#). *Solstice: An Electronic Journal of Geography and Mathematics*, Volume XXI, Number 2
- 2010. **Joseph J. Kerski**. Sandra L. Arlinghaus and Joseph Kerski. [MatheMaPics](#). *Solstice: An Electronic Journal of Geography and Mathematics*, [Volume XXI, Number 1](#).
- 2021. Jonathan D. Mayer.

Geo-Erdős Number 3*, General Indirect References

[IMaGe](#) stands for Institute of Mathematical Geography. Ann Arbor, MI.

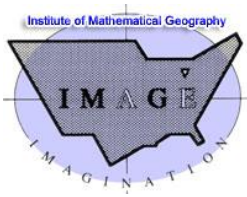
[MICMOG](#) stands for Michigan Interuniversity Community of Mathematical Geographers, Ann Arbor, MI. Document archived in Deep Blue, University of Michigan, IMaGe site.

- 1964. **William W. Bunge**. MICMOG. Patterns of Location.
- 1965. **William Warntz**. MICMOG. A note on surfaces and paths and applications to geographical problems.
- 1966. **Waldo R. Tobler**. MICMOG. Numerical map generalization, and, Notes on the analysis of geographical distributions.
- 1966. **Peter Gould**. MICMOG. On mental maps.
- 1968. **Emilio Casetti** and **R. Keith Semple**. MICMOG. A method for the stepwise separation of spatial trends.
- 1968. W. Bunge, R. Guyot, A. Karlin, R. Martin, **W. Pattison**, W. Tobler, S. Toulmin, and W. Warntz. MICMOG. The philosophy of maps. William Pattison. MICMOG.



33rd year (1990-2022) of publication of *Solstice*:
An Electronic Journal of Geography and Mathematics
Volume XXXIII, Number 1;
Tuesday, June 21, 2021; 4:14 am, Central Time
Copyright ©2021-- All rights reserved.
Institute of Mathematical Geography (imagenet.org) and the authors.

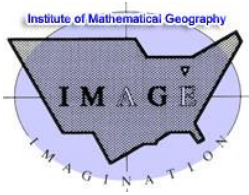
- 1988. **Pierre Hanjoul, Hubert Beguin, and Jean-Claude Thill**, 1988. [Theoretical Market Areas Under Euclidean Distance](#). IMAGe. Monograph Six 162 pp.
- 1988. **Keith J. Tinkler**, Editor, With contributions by Keith J. Tinkler, John D. Nystuen, and **Michael F. Dacey**. [Nystuen--Dacey Nodal Analysis](#). IMAGe Monograph Seven 115 pp.
- 1989, **James W. Fonseca**. [The Urban Rank-size Hierarchy: A Mathematical Interpretation](#). IMAGe. Monograph Eight 85 pp.
- 1989. **Michael F. Goodchild**. Editor, *Geographical Analysis*. Arlinghaus, Sandra L. and Arlinghaus, William C. The fractal theory of central place hierarchies: a Diophantine analysis of fractal generators for arbitrary Lösschian numbers, *Geographical Analysis: an International Journal of Theoretical Geography*. Ohio State University Press. Vol. 21, No. 2, April, 1989, pp. 103-121.
- 2010: **John Paul Jones III**, and **Basil Gomez**, book editors. *Research Methods in Geography: A First Course*. Blackwell. Book chapter by Arlinghaus.
- 1993. **Nina Lam** and **Lee DeCola** book editors. *Fractals in Geography*, a book edited by Nina Lam and Lee DeCola, published May, 1993, Prentice-Hall. Arlinghaus, Sandra L., Chapter 10, Central Place Fractals.
- 1987. **Douglas McManis**. Editor, *Geographical Review*. Arlinghaus, Sandra L. and Nystuen, John D. Geography of city terrain based on bus routes, *The Geographical Review*, Vol. 77, No. 2, April, 1987, pp. 183-195. American Geographical Society of New York.
- 1993. **Miklos Pinther**. Editor, *Carto-Philatelist*. Pneumatic postal maps: The French connections, *The Carto-Philatelist*, affiliated with the American Topical Association and the American Philatelic Society, 1993. Vol. 38, No. 3, 71-75.
- 2019. **John P. Wilson**. Book Editor. *The Geographic Information Science & Technology Body of Knowledge* (2nd Quarter 2019 Edition), Arlinghaus, S. L. Set Theory chapter.. DOI: [10.22224/gistbok/2019.2.1](https://doi.org/10.22224/gistbok/2019.2.1) ([link is external](#)) <https://gistbok.ucgis.org/bok-topics/set-theory>



33rd year (1990-2022) of publication of *Solstice*:
An Electronic Journal of Geography and Mathematics
Volume XXXIII, Number 1;
Tuesday, June 21, 2021; 4:14 am, Central Time
Copyright ©2021-- All rights reserved.
Institute of Mathematical Geography (imagenet.org) and the authors.

Geo-Erdős Number 4 and Higher

- 1945. **Chauncy D. Harris** and **Edward L. Ullman**. The Nature of Cities. *The Annals of the American Academy of Political and Social Science*. Vol. 242, Building the Future City (No. 1945), pp. 7-17. Sage Publications.
- 1952. **Harold M. Mayer** and **Allen K. Philbrick**. *Industrial Cities Excursion Guidebook*. Washington, D.C.: International Geographical Union.
- 1958. **Norton S. Ginsburg**; John E. Brush, Shannon McCune, Allen K. Philbrick, John R. Randall, Herold J. Wiens. *The Pattern of Asia*. Englewood Cliffs: Prentice-Hall.
- 1971. **Chauncy D. Harris**, **Jerome D. Fellmann**, **Jack A. Licate**. *International List of Geographical Serials*, 2nd Edition. University of Chicago.
- 1986. **Michael P. Conzen**, **Chauncy D. Harris**, Norton S. Ginsburg, Harold M. Mayer, **Akin L. Mabogunje**, Brian J. L. Berry, **Jean Gottman**, et al. *World Patterns of Modern Urban Change: Essays in Honor of Chauncy D. Harris*. Research Paper, University of Chicago. Department of Geography, no. 217/218.
- 1988. **Barry N. Boots** and Arthur Getis. *Point Pattern Analysis*. Scientific Geography Series. Sage Publications.
- 1988. **Luc Anselin** and **Daniel A. Griffith**. Do Spatial Effects Really Matter in Regression Analysis? *Papers in Regional Science*, Wiley Blackwell, 65(1), 11-34.
- 1992. **Arthur Getis** and **J. K. Ord**. The Analysis of Spatial Association by Use of Distance Statistics. *Geographical Analysis* 24(3) 189-206.
- 2005. **Jerome D. Fellmann**, Arthur Getis, **Judith Getis**, **Jon Malinowski**. *Human Geography* (8th Edition). McGraw-Hill.
- 2010. **Arthur Getis** and **Daniel A. Griffith**. Comparative Spatial Filtering in Regression Analysis. *Geographical Analysis*, 34(2): 130-140.
- 2013. **Brian J. L. Berry**, **Daniel Griffith**, et al. Geographical Analysis. The First Forty Years. *Geographical Analysis* 45(1): 1-27.



33rd year (1990-2022) of publication of *Solstice*:
An Electronic Journal of Geography and Mathematics
Volume XXXIII, Number 1;
Tuesday, June 21, 2021; 4:14 am, Central Time
Copyright ©2021-- All rights reserved.
Institute of Mathematical Geography (imagenet.org) and the authors.

The Law of Excluded Middle: To Be or not to Be?*

Sandra L. Arlinghaus

Oh, East is East, and West is West, and never the twain shall meet,
Till Earth and Sky stand presently at God's great Judgment Seat;
But there is neither East nor West, Border, nor Breed, nor Birth,
When two strong men stand face to face, though they come from the ends of the earth!

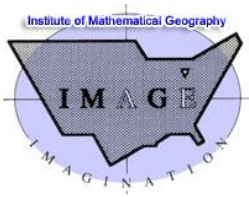
Rudyard Kipling, *The Ballad of East and West*, 1889

Introduction

The Law of Excluded Middle says that a statement is either true or false: not both simultaneously true or false and not partially true. There is no room for debate. Things are black or white; there are no shades of gray. Answers are 'absolute'; they are not 'relative.' Those wishing to delve more deeply into the logical underpinnings of this Law might enjoy reading the reference from a Philosophy course from Stanford University: to see that it is possible to derive the Law of Excluded Middle from the Law of Non-contradiction. Here, however, the focus is on the intuitive view of the Law of Excluded Middle.

The Abstract World

Where does the Law of Excluded Middle hold? One easy answer is 'in the world of mathematics!' Equations are correct or they are not. Many students complain about a lack of 'partial credit' as they say 'but I kind of had the right idea.' Too bad—that's not the way it works. Those interested in less traditional approaches to mathematics, in which partial truth values are admissible, might read materials on 'constructive mathematics' (Bauer, 2017) or on mathematics in which evidence (Passman, 2021), rather than truth value, is used to determine the merits of statements. Here, the traditional viewpoint is adopted: most of mathematics is based on the Law of Excluded Middle: there is no middle ground in evaluating the truth and consequent merit of statements.



Students and teachers alike may become frustrated by traditional process, walk away from the process, and cause learning to cease. In the long run, that is a disaster; we need bridges that stand the test of time; we need skyscrapers that withstand earthquakes. All rely on a firm grounding in traditional mathematics, based on the Law of Excluded Middle.

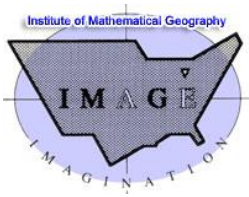
The Real World

Unlike numerous approaches to the abstract world, the Law of Excluded Middle does **not** hold in much of the real world. Politicians may argue from one point of view that their agenda, and only their agenda, is the correct one: that there is no middle ground—only black or white with no shades of gray. Take it or leave it. Again, such an approach can lead to frustration for both the decision-maker and the citizen; furthermore, as with the situation in the abstract world, such frustration can lead to disaster in the implementation and enforcement of decisions and consequent laws.

Where else do we see this sort of approach, where the Law of Excluded Middle is invoked inappropriately? Perhaps almost anywhere that humans interact with each other or with the environment. Think about The Law of Excluded Middle the next time your opinion differs with that of another. Is someone trying to use this Law when it does not apply? Can you create a situation to move the discussion from one extreme, into the Middle, where perhaps it belongs—as a transition from one extreme to another?

Mathematical Models

Given the contrasting situations between the abstract and real worlds in relation to the Law of Excluded Middle, how then does it make sense to attempt to use mathematics, based on that Law, to create models of real-world phenomena, not based on that Law? Thoughtful models typically consider this dilemma. One approach is to make the model fit the real-world situations in or near the Middle and have a procedure for reducing the effect of the outliers: fit the 'gray' and deal with the 'black' or 'white' situations. If creators and users of such models understand these limitations, useful results may be obtained. For example, models simplify complicated situations and thus may offer a clear picture of how structure and function might work interactively to create a smoothly functioning

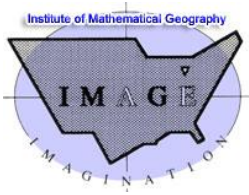


system. A child who builds a model airplane knows that he cannot hop on board and have it fly him to Paris. Model limitations, however, are not always that obvious.

Consider, for example, the following style of reporting of public health data that was prevalent in the past two years during the Covid-19 pandemic. Clearly, one cannot take the number of cases of infection in the greater New York City area and use that number, in terms of raw, absolute number, and apply it directly as a yardstick elsewhere. The fact that there are also so many people living in that region must factor into any such measurement creation. Thus, per capita numbers, or cases per 100,000 residents, may become a useful measure for making comparisons among regions. Is it, however, universally applicable? Some media reporters would have you think so.

Consider the case of a hypothetical (but close to real) county in southwestern Mississippi with a population of 2000 and a Covid-19 case raw number count of 2. Thus, per 100,000, that county has a per capita rate of 100 new cases (multiplying each actual number by a value of 50). Now consider a county in northwestern Mississippi, not far from Memphis TN that has a population of 200,000 and a Covid-19 case count of 200. Thus, per 100,000, that county also has a per capita rate of 100 new cases (dividing each actual number by a value of 2). Is it fair to say that those two counties have comparable problems? Which county would a traveler prefer to stop in to have a restaurant meal? In this situation, given that both counties have about the same area, it is obvious that a traveler would feel far safer in a county with only 2 infected people. Thus, in this case, more useful information might be derived from calculating data that show the number of cases per unit area rather than per 100,000 population. As with the model airplane, the model limitation is obvious. Presumably, the clarity offered in simple cases serves as a guide, perhaps even of a reductionist nature, to analysis within more complicated ones.

When fitting models based on one logical Law to a world that is not based on that logical Law, gaps and wrinkles in the fit will necessarily occur. Map makers are familiar with this problem when trying to model the Earth on a plane; no map is a perfect fit. Forecasts, based on a logical misfit, will always be suspect because there will be no certainty as to where such gaps, creases, or wrinkles will occur. The wise modeler, and model user and interpreter, will still need to engage in clear thought.

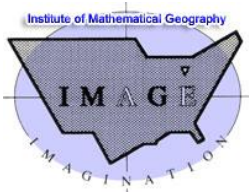


33rd year (1990-2022) of publication of *Solstice*:
An Electronic Journal of Geography and Mathematics
Volume XXXIII, Number 1;
Tuesday, June 21, 2021; 4:14 am, Central Time
Copyright ©2021-- All rights reserved.
Institute of Mathematical Geography (imagenet.org) and the authors.

References

- Bauer, Andrei. 2017. Five Stages of Accepting Constructive Mathematics. *Bulletin (New Series) of the American Mathematical Society*. Volume 54, Number 3, pp 481-498.
<https://www.ams.org/journals/bull/2017-54-03/S0273-0979-2016-01556-4/S0273-0979-2016-01556-4.pdf>
- Passman, Robert. Excluded middle, explained. *Cantor's Paradise*.
<https://www.cantorsparadise.com/excluded-middle-explained-e7f2d1398531>
- Stanford University. An Introduction to Philosophy,
<https://web.stanford.edu/~bobonich/glances%20ahead/IV.excluded.middle.html>

*Note that this article is deliberately placed in the 'Middle', between 'regular' articles.



33rd year (1990-2022) of publication of *Solstice*:
An Electronic Journal of Geography and Mathematics
Volume XXXIII, Number 1;
Tuesday, June 21, 2021; 4:14 am, Central Time
Copyright ©2021-- All rights reserved.
Institute of Mathematical Geography (imagenet.org) and the authors.

Crossroads: Meridian's Preservation Map

Sarah Selzer Johnson, President, Meridian Architectural Trust,

and

Joyce Day Lane, Crossroads Conference Organizer

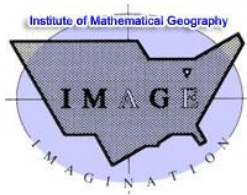
With related input from: Ellen Bourdeaux, Mark Davis, and Elic Purvis.

Editorial Note: It was my pleasure to invite my colleagues on the Board of Directors of the Meridian Architectural Trust, 501(c)3, to participate in this issue of Solstice as one way to share their exciting work surrounding the recent kickoff conference of this newly formed non-profit with a mission dedicated to improving Meridian, Mississippi, one house at a time. S. Arlinghaus.

Introduction



Meridian, Mississippi, is loved by many, and its future is a major concern for all. The Meridian Architectural Trust presented the Crossroads Conference, March 31-April 1, 2022, bringing subject matter experts in the field of historic preservation to share best practices. In addition to the authors of this article, Ellen Bourdeaux, Mark Davis, and Elic Purvis were involved in the initial conversations surrounding the beginnings of the Meridian Architectural Trust and of the Crossroads Conference. Together we noted that our community can create a map for securing our past while building our future. Part of that preservation centers on preserving documents as well as on buildings. Thus, we offer selected conference materials as part of that broader archival preservation effort.



33rd year (1990-2022) of publication of *Solstice: An Electronic Journal of Geography and Mathematics*
Volume XXXIII, Number 1;
Tuesday, June 21, 2021; 4:14 am, Central Time
Copyright ©2021-- All rights reserved.
Institute of Mathematical Geography (imagenet.org) and the authors.

Conference Activities



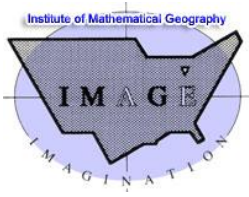
THURSDAY, MARCH 31ST

- 8:00 AM **Registration / Continental Breakfast**
- 10:00 AM **Welcome / Introductions** - Sarah Johnson, President of Meridian Architectural Trust
Master of Ceremonies - Dr. Thomas Huebner, President, Meridian Community College
- 10:15 AM **The Macon, Georgia Story**
- Ethiel Garlington, Executive Director of the Historic Macon Foundation
- 11:00 AM **Our Past is Our Future**
- Jerome Kittrell, Realtor and Developer
- Mark Davis, Davis Purdy Architects
- Craig Hitt, Director of Community Development, Meridian
- 12:00 NOON **Lunch**
- Try one of Meridian's wonderful downtown restaurants
- Visit the Meridian Architectural Trust Photo Exhibit at 2211 5th Street
- 1:30 PM **Icebreaker**
- Create a stronger network with the help of Purdue University's Honors Programs Students
- 2:00 PM **Evolving Preservation: Best Practices in Historic Preservation**
- Lolly Rash, Executive Director, Mississippi Historic Trust
- 3:00 PM **Making Sense of the Dollars: The Economic Impact of Historic Preservation**
- Mary Ruffin Hanbury, Founding Principal of Hanbury Preservation Consulting
- 4:00 - 5:30 PM **Adaptive Reuse Tours**
- Tour three fabulous examples of downtown Meridian buildings that have been rescued, restored, and returned to the community as functional buildings and prized landmarks.
- 5:30 - 7:00 PM **Reception in the Grand Lobby**

FRIDAY, APRIL 1ST

- 8:00 AM **Announcements**
- 8:05 AM **Improving Racial Equality through Historic Preservation**
- Dr. Christopher Hunter, College of Architecture, Art, and Design, Mississippi State University
- 9:00 - 10:30 AM **Trailblazers: Stories of Successful Communities**
- Moderator: Jerome Kittrell, Realtor and Developer
- Panelist: Jim Rasberry, Owner of Rasberry Financial
- Panelist: Mike Grote, Director of Building Programs, Alembic Community Development
- Panelist: David Presiosi, Executive Director, Preservation Dallas
- 10:30 AM - Noon **Now We Know What Is Possible: How Do We Get Started?**
- Moderator: Ellen Bourdeaux, Community Development Specialist
- Panelist: Dr. Beth Miller, Director of College of Art and Design, Mississippi State University
- Panelist: Liz Rice, Historicorps, Director of Workforce Engagement and Communication
- Panelist: Jeff Fulton, College of Art and Design, Mississippi State University
- Noon - 1:30 PM **Luncheon**
- Mayor, The Honorable Jimmie Smith
- Sarah Johnson, President of Meridian Architectural Trust
- Featured Speaker: Dr. Rhonda Phillips, Dean of Honors College, Purdue University





33rd year (1990-2022) of publication of *Solstice*:
An Electronic Journal of Geography and Mathematics
Volume XXXIII, Number 1;
Tuesday, June 21, 2021; 4:14 am, Central Time
Copyright ©2021-- All rights reserved.
Institute of Mathematical Geography (imagenet.org) and the authors.

The image above shows the conference flyer as it appeared in print and online. More detailed information associated with the conference is presented below, based on the conference website (<https://www.meridianarchitecturaltrust.org/crossroadsconference>), as it was used at the time. In addition, that material was enhanced and updated following the conference. The host hotel for the conference was the Threefoot Hotel in Downtown Meridian and the Host Conference Site was the Mississippi State University Riley Center, also in Downtown Meridian. Both were also featured on a conference tour (as noted below).

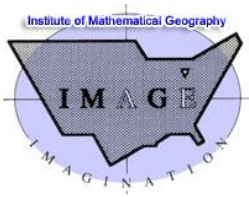
DAY 1

The Macon, Georgia Story

ETHIEL GARLINGTON

Executive Director of Historic Macon Foundation—Macon, Georgia. In his current position at Historic Macon Foundation, Ethiel Garlington has implemented numerous successful strategies in real estate development and neighborhood revitalization as part of the ongoing renaissance of Macon. In 2018, the Foundation under Garlington's leadership was awarded the National Trust for Historic Preservation's Trustees Award for Organizational Excellence. His previous posts include Director of Preservation Field Services at Knox Heritage and Director of the Athens Welcome Center. Garlington is a graduate of Presbyterian College in Clinton, SC, and holds a master's degree from the University of Georgia Historic Preservation program.

Ethiel Garlington shared elements of the [Macon Story](#) that weaves preservation through the ongoing renaissance of Macon, Georgia. Macon's story, much like towns across the country, is not one of easy wins or single solutions. In fact, programs like industrial based economic development, zoning practices, and inequitable lending are systemic across the country. Macon's recent success was built on strategic, incremental improvements focused on people, not buildings. Ethiel will share research and anecdotes from [Macon](#) that are applicable to Meridian.



33rd year (1990-2022) of publication of *Solstice*:
An Electronic Journal of Geography and Mathematics
Volume XXXIII, Number 1;
Tuesday, June 21, 2021; 4:14 am, Central Time
Copyright ©2021-- All rights reserved.
Institute of Mathematical Geography (imagenet.org) and the authors.

Our Past is Our Future

CRAIG HITT

Director of Community Development, City of Meridian. Craig began his new job in 2021. He brings a wealth of suitable background experience to the job and sees a fine future for Meridian. For the nine years prior, he served as the Executive Director of the Economic Development Authority for adjacent Kemper County whose primary goal is to grow existing businesses and attract new ones. Before that, he served as a member of the Lauderdale, MS, Board of Supervisor for 12 years, as one of five elected officials. He has demonstrated experience in governmental multi-tasking as well as earlier direct experience in private timber, logging, and paper businesses. He is a graduate of East Mississippi Community College with an Associate Degree in Forestry and he is a John C. Stennis Institute of Government Graduate.

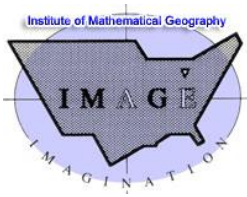
JEROME KITTRELL

Realtor and Developer—Meridian, Mississippi. With a background in law and investment, Jerome Kittrell has been selling and developing commercial and residential real estate for the past 20 years. He is co-founder and the first president of The Community Foundation of East Mississippi; co-founder of downtown's Dumont Plaza; past president of East Mississippi Realtors; and recipient of the East Mississippi Realtor of the Year award and the Mississippi Association of Realtors community service award. Kittrell is a graduate of Mississippi State University and University of Mississippi Law School.

MARK DAVIS

AIA Architect, Davis Purdy Architects; Treasurer, Meridian Architectural Trust—Meridian, Mississippi
After a four-year stint as an architect in Washington, DC, Mark Davis returned to Meridian to work on the Meridian Arts & Entertainment Experience; he then co-founded Davis Purdy Architects, PLLC with John Purdy. He is the owner of Revere Photography, a founding member and the president of the Arts & Community Events Society, a past member of the Meridian Council for the Arts, a past co-chair for Meridian's Threefoot Festival, and currently serves as Treasurer of the Meridian Architectural Trust. Davis is a graduate of Mississippi State College of Architecture, Art and Design.

[Fifty years ago](#), [and more] Meridian was a thriving, vibrant city enjoying the fruits of economic prosperity. What happened? Craig Hitt, Jerome Kittrell and Mark Davis examined some of the growth and subsequent decline of Meridian in an effort to chart a path for the future.



33rd year (1990-2022) of publication of *Solstice*:
An Electronic Journal of Geography and Mathematics
Volume XXXIII, Number 1;
Tuesday, June 21, 2021; 4:14 am, Central Time
Copyright ©2021-- All rights reserved.
Institute of Mathematical Geography (imagenet.org) and the authors.

Evolving Preservation: Best Practices in Historic Preservation

LOLLY RASH

Executive Director of Mississippi Heritage Trust—Jackson, Mississippi. After years of service as a volunteer, board member, and board president, Lolly Rash took the reins of the Mississippi Heritage Trust in 2013 as Executive Director. Rash has over 23 years of experience in historic preservation, which includes: Historical Administrator for the City of Biloxi; Program Manager for the National Trust for Historic Preservation; and Vice President of White House Properties. She has also served as a consultant for the Land Trust for the Mississippi Coastal Plain, the Mississippi Department of Archives and History, and the Mississippi Main Street Association. A recent graduate of the National Development Council/National Trust for Historic Preservation Real Estate Finance program, Rash is a past president of the Mississippi Heritage Trust Board of Trustees and a former fellow with the Knight Program in Community Building. Rash holds a master's degree from the University of Southern Mississippi and a bachelor's from Louisiana State University.

Lolly Rash led us through creating more livable communities by explaining adaptive reuse, cultural heritage, affordable housing, economic development, and the rebirth of genuine neighborhoods.

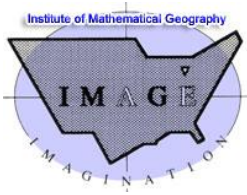
Icebreaker

PURDUE UNIVERSITY HONORS PROGRAM STUDENTS

DR. RHONDA PHILLIPS

Dean of Honors College of Purdue University—West Lafayette, Indiana. Rhonda Phillips joined Purdue in 2013, coming from Arizona State University where she served as an Associate Dean as well as professor and director of the School of Community Resources and Development. She also worked as a Senior Sustainability Scientist at the Global Institute of Sustainability. A three-time Fulbright recipient, her accomplishments include being inducted into the College of Fellows of the American Institute of Certified Planners and being awarded the 2012 International Society for Quality-of-Life Studies' Distinguished Research Fellow. She is author or editor of 24 academic books, including the textbook *Introduction to Community Development*. Phillips' teaching and research experience broadly covers economic development and planning and community sustainability. Phillips holds a PhD in city and regional planning and a master's degree in economics from the Georgia Institute of Technology, as well as a master's in economic development and a bachelor's in geography from the University of Southern Mississippi.

This lively group had an icebreaker ready to help get to know fellow attendees.



33rd year (1990-2022) of publication of *Solstice*:
An Electronic Journal of Geography and Mathematics
Volume XXXIII, Number 1;
Tuesday, June 21, 2021; 4:14 am, Central Time
Copyright ©2021-- All rights reserved.
Institute of Mathematical Geography (imagenet.org) and the authors.

Making Sense of the Dollars: The Economic Impact of Historic Preservation

MARY RUFFIN HANBURY

Historic Preservation Expert, Hanbury Preservation Consulting—Raleigh North Carolina Mary Ruffin Hanbury is the founding principal of Hanbury Preservation Consulting, a firm established to help communities better protect and utilize resources. Prior to founding her own firm, she worked as Preservation Planning and Grants Supervisor for the North Carolina Historic Preservation Office; served as a program officer with the National Trust for Historic Preservation; and worked as an architectural historian for the Tidewater Region of the Virginia Department of Historic Resources. She has served on the Raleigh Historic Districts Commission and on the board of Preservation Action, a national preservation organization. Currently she serves on the board of the North Carolina State Capitol Foundation. Hanbury holds a master's degree in Urban Planning from the School of Architecture, University of Virginia.

How can spending money on old buildings make us stronger financially? Preservation expert Mary Ruffin Hanbury explained how historic preservation creates a stronger economic proposition for investors, city government, and the community.

Adaptive Reuse Tours

MARK DAVIS, see above.

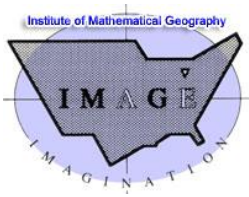
SARAH JOHNSON, President Meridian Architectural Trust.

ELLEN BOURDEAUX

Community Development Specialist—Jackson, Mississippi. As a Project Manager in asset development, Ellen Bourdeaux's current work focuses on community development. She previously worked as an editor at several Jackson-area publications. Bourdeaux holds a master's degree from the University of Baltimore as well as a bachelor's degree from Boston University.

The tour leaders guided us on lively tours of the [Mississippi State University Riley Center](#), The [Threefoot Hotel](#), and the [Threefoot Brewing Company](#). The [Rose Hill Players](#) were on hand to share captivating stories of people and happenings at each site. Tour leaders shared historic preservation details.

Reception in the Grand Lobby



33rd year (1990-2022) of publication of *Solstice*:
An Electronic Journal of Geography and Mathematics
Volume XXXIII, Number 1;
Tuesday, June 21, 2021; 4:14 am, Central Time
Copyright ©2021-- All rights reserved.
Institute of Mathematical Geography (imagenet.org) and the authors.

DAY 2

Improving Racial Equality through Historic Preservation

DR. CHRISTOPHER S. HUNTER

Assistant Professor, School of Architecture, Mississippi State University—Starkville, Mississippi
Dr. Christopher Hunter was previously employed at Populous Architects (College Station, Texas) and HDR Architecture Inc. (Dallas) where he served as architect, manager, and/or designer on numerous municipal projects and educational and medical facility projects. He also worked for the City of Dallas in Housing and Neighborhood Planning. He has submitted and presented numerous peer-reviewed papers and articles on various architectural topics. Hunter's particular area of research focuses on the design, construction, and preservation of early African American churches. Hunter holds both a doctorate and a master's in architecture from Texas A&M, and a bachelor's in architecture from the University of Cincinnati.

Dr. Chris Hunter discussed current barriers in communities and how a successful, well-crafted historic preservation effort can benefit everyone.

Trailblazers: Stories of Successful Communities

MODERATOR: JEROME KITTRELL

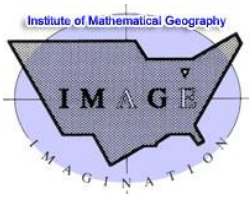
PANELISTS:

JIM RASBERRY

Rasberry Financial Owner – Laurel, Mississippi. Jim followed his passion and founded Rasberry Financial in August of 2002 as a way to help individuals and businesses insure they have the right financial strategy in place. Currently he is helping others with financial planning and investment in stocks, funds, real estate and insurance. He is often featured on HGTV's show "Home Town" where he deals with real estate and funding for the show's projects. Jim attended college at Jones Junior College and University of Southern Mississippi and currently resides in Laurel, Mississippi.

MIKE GROTE

Director of Building Programs, Alembic Community Development—New Orleans, Louisiana. Michael Grote has 21 years of experience in community development. He has been the Director of Building Programs at Alembic since 2008, where he has led the design and construction of numerous projects in both New Orleans and on the Mississippi Gulf Coast—including the implementation of over \$50M in real estate developments for the New Orleans office. He previously worked for Mississippi State University's Gulf Coast Community Design Studio. Grote's experience includes property acquisition and project financing for the development of historic sites and apartment complexes and the repurposing of blighted areas into workspaces, stores, small businesses, and



33rd year (1990-2022) of publication of *Solstice*:
An Electronic Journal of Geography and Mathematics
Volume XXXIII, Number 1;
Tuesday, June 21, 2021; 4:14 am, Central Time
Copyright ©2021-- All rights reserved.
Institute of Mathematical Geography (imagenet.org) and the authors.

performance venues. Grote holds degrees from Auburn University in building design and construction and in community planning. He holds a bachelor's in architecture from the University of Houston.

DAVID PREZIOSI

Executive Director Preservation—Dallas, Texas. At Preservation Dallas, David Preziosi oversees programs dedicated to the preservation of historic places in Dallas—which includes public relations, advocacy, and fundraising. He previously served as Executive Director of Mississippi Heritage Trust with a focus on statewide historic preservation, including the development of historic district design guidelines for communities. Preziosi also worked extensively on recovery efforts for historic structures damaged by hurricane Katrina. Preziosi also worked as City Planner for the City of Natchez where he assisted in the preservation of numerous historic sites. His areas of expertise cover historic preservation and planning, advocacy, grant writing, award writing, and historic district design. Preziosi holds a master's degree in Urban Planning and Historic Preservation Planning, as well as a bachelor's in Environmental Design and Architecture—both from Texas A&M.

Amazing stories of the rebirth of communities in this panel discussion featured top experts from across the South, and pointed to how Meridian might follow a path to success.

Now We Know What is Possible: How Do We Get Started?

MODERATOR: ELLEN BOURDEAUX. See above.

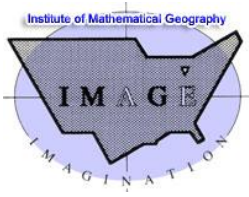
PANELISTS:

DR BETH MILLER

Director of College of Design and Professor at Mississippi State University—Starkville, Mississippi
Dr. Beth Miller is currently the Director of Interior Design at MSU, and previously served as Interim Associate Dean of the College of Architecture, Art and Design. Miller has personally restored five historic structures dating from 1830 to 1930, and worked as a designer on over 100 historic properties throughout Mississippi and Louisiana. Under her direction the Interior Design program at MSU has been the recipient of numerous national and regional awards. Miller holds a PhD from MSU, a master's in education from Mississippi University for Women, and a bachelor's in Interior Design from Louisiana Tech University.

LIZ RICE

HistoriCorps Director of Workforce Engagement and Communication—Denver, Colorado
At HistoriCorps, Liz Rice was instrumental in developing a youth workforce training program with the city of Denver. She also manages a national volunteer/youth program that helps to preserve over 50 historic sites annually. Much of her experience also involves project revenue development. Rice holds a master's degree in Environmental Policy and Management from the University of Denver and a bachelor's from Indiana University in Nonprofit Management.



33rd year (1990-2022) of publication of *Solstice*:
An Electronic Journal of Geography and Mathematics
Volume XXXIII, Number 1;
Tuesday, June 21, 2021; 4:14 am, Central Time
Copyright ©2021-- All rights reserved.
Institute of Mathematical Geography (imagenet.org) and the authors.

JEFF FULTON

Assistant Professor, College of Art and Design, Mississippi State University—Starkville, Mississippi
Jeff Fulton is Assistant Professor of Interior Design and the Master of Fine Arts in Historic Preservation (MFAHP) at Mississippi State University. Fulton co-developed the MFAHP program in 2021 as part of MSU's Interior Design Department. He currently sits on the executive board of the Columbus Preservation Society (Columbus, MS), and was previously the Executive Director of the Ships of the Sea Maritime Museum in Savannah, GA, where he oversaw the restoration of the museum, originally the 1819 William Scarbrough House. Fulton holds a master's degree in Interior Design from Pratt Institute (New York) and a bachelor's in Landscape Architecture from MSU.

A refreshing overview of remarkable ways to engage multiple segments of the Meridian community in charting a course for the future was presented by three very different experts in community engagement.

LUNCHEON

Century Program Introduction

SARAH JOHNSON

Speaker Introduction

JOYCE LANE

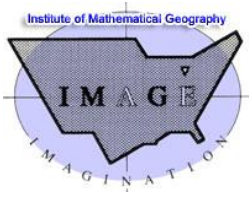
Speaker

DR RHONDA PHILLIPS

The conference ended on a high note with the energy and enthusiasm of noted historic preservation expert Dr. Rhonda Phillips. She is a GPS as we chart our course for Meridian!

Post-conference Activities

Conference follow-up involves, among other things, a series of 'Lunch and Learn' sessions in which residents can continue to learn more about historic preservation and how it might be implemented in Meridian, Mississippi. The first session was held April 26, 2022, at The Church of the Mediator, and it



33rd year (1990-2022) of publication of *Solstice*:
An Electronic Journal of Geography and Mathematics
Volume XXXIII, Number 1;
Tuesday, June 21, 2021; 4:14 am, Central Time
Copyright ©2021-- All rights reserved.
Institute of Mathematical Geography (imagenet.org) and the authors.

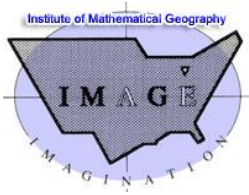
featured Thomas Gregory, the State Coordinator for the Mississippi Main Street Association, where he leads the organization's administrative, advocacy, and development efforts.

A certified community planner, Gregory previously worked for the Small Town Center at Mississippi State University and as the chief administrative officer for the City of Greenwood, Mississippi. Thomas' involvement with MainStreet began as a member of the board of directors for Main Street Greenwood, a position he held for eight years. Gregory received a Master of City and Regional planning from the University of North Carolina at Chapel Hill and both an MBA and a Bachelor of Business Administration from Mississippi State University. He is past president of the Mississippi Chapter of the American Planning Association, and a past participant in Leadership Mississippi, the Public Interest Design Institute, and the Sustainable Cities Design Academy. He currently serves as a board member for the Mississippi Heritage Trust and Keep Mississippi Beautiful and as a member of the Greenwood Planning Commission.

Many of the fine discussion points remain available on the website of Mississippi MainStreet:

- One link chronicles work plan workshops to be conducted throughout the State, including in Meridian: https://www.msmainstreet.com/press-releases/details/work_plan_workshops_to_be_conducted_in_25_mississippi_main_street_community
- Another offers helpful landscape architecture advice for downtowns which one might easily imagine being applicable in emerging historic neighborhoods and elsewhere: <https://www.dropbox.com/s/plc8me9yi10smmj/MMSA%20Landscape%20Guide%20FINAL.pdf?dl=0>

Subsequent Lunch and Learn programs are planned for the remainder of 2022 as our team moves forward to fulfill its mission. Stay tuned for more progress!



33rd year (1990-2022) of publication of *Solstice*:
An Electronic Journal of Geography and Mathematics
Volume XXXIII, Number 1;
Tuesday, June 21, 2021; 4:14 am, Central Time
Copyright ©2021-- All rights reserved.
Institute of Mathematical Geography (imagenet.org) and the authors.

Appendices

Correspondence

Comment from Alice Harper, December 27, 2021:

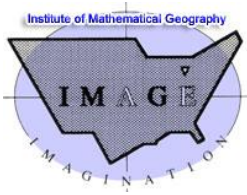
“Thank you so much for sending this out. I was fascinated by all the information about your mother, her kitchen and her book collection.

My husband, Lou Buonanno, who works in the wine auction business, was charmed by old labels that you had collected - at 12!”

Geometry Links, from George Mokray, March 26, 2022:

- A "non-orientable surface" (Klein Bottle) generated by Gerald de Jong
<https://www.facebook.com/gerald.dejong/videos/324558822924822>
Big Bang
<https://www.facebook.com/gerald.dejong/posts/10159535349903948>
- Prithvi Dev, kinetic geometer, experimenting with graphic-screens, jitterbugs, and higher-dimensional moire patterns
<https://www.prithvidev.com>
<https://vimeo.com/user25052413>
<https://www.youtube.com/user/RanaChannaBanana/videos>
- Simon Beck's snow art
<https://www.youtube.com/watch?v=dDMuN6YOWFs>
https://twitter.com/buitengebieden_/status/1487862165239386119
<https://www.facebook.com/snowart8848>
https://www.instagram.com/simonbeck_snowart/

Editorial Comment: from Geometry Links for December 14, 2014:

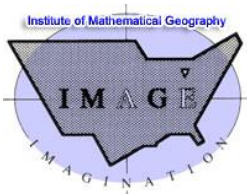


33rd year (1990-2022) of publication of *Solstice*:
An Electronic Journal of Geography and Mathematics
Volume XXXIII, Number 1;
Tuesday, June 21, 2021; 4:14 am, Central Time
Copyright ©2021-- All rights reserved.
Institute of Mathematical Geography (imagenet.org) and the authors.

Simon Beck's snow and sand drawings

<http://www.theguardian.com/science/alex-adventures-in-numberland/gallery/2014/nov/06/simon-becks-snow-art-landscapes-mathematical-designs-drawings-alps>

- Making Designer Crystals?: "Tunable assembly of hybrid colloids induced by regioselective depletion"
<https://www.osti.gov/pages/biblio/1659477-tunable-assembly-hybrid-colloids-induced-regioselective-depletion>
<https://cleantechnica.com/2022/02/06/making-designer-crystals-its-easier-with-a-new-targeted-particle-bonding-strategy/>
- Mathemalchemy Exhibit - many videos, on display at US National Academies in Washington, DC until June 13
<https://mathemalchemy.org/>
hat tip Edmund Harriss
- Victor Acevedo's "VR Domemaster video for Orbic Field dm02"
<https://www.facebook.com/victor.acevedo.92102/videos/330509818997227>
- Angela Johal's "chromesthetic geometric paintings"
<https://johalgeometrics.com>
https://www.instagram.com/johal_geometrics/
hat tip boingboing.net
- Franck Gérard's abstract digital works
<https://opensea.io/collection/harmony-by-franck-gerard>
https://www.instagram.com/abstract_harmony/
- Form for river flow
<https://biomimicry.org/solution/e-colant-net/>
- 9 Women Artists Celebrating the Spirituality and Legacy of Hilma af Klint
<https://www.artsy.net/article/artsy-editorial-9-women-artists-celebrating-spirituality-legacy->



33rd year (1990-2022) of publication of *Solstice*:
An Electronic Journal of Geography and Mathematics
Volume XXXIII, Number 1;
Tuesday, June 21, 2021; 4:14 am, Central Time
Copyright ©2021-- All rights reserved.
Institute of Mathematical Geography (imagenet.org) and the authors.

[hilma-af-klint](#)

hat tip <https://warrenellis.ltd>

- Casey House - Art, Photography, Geometry

<https://www.casey-house.com/>

hat tip Joe Clinton

- Shapeshifting pen

<https://www.crushmetric.com>

<https://www.core77.com/posts/112848/Can-Crushing-Sculptor-Designs-Shapeshifting-Pen>

from <https://geometrylinks.blogspot.com/2018/11/geometry-links-november-13-2018.html>

Noah Deledda's aluminum can sculptures

<https://youtu.be/tilw2vZYPLM>

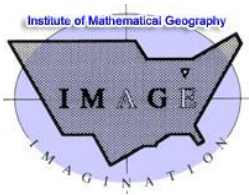
<https://www.instagram.com/noahdeledda/>

Deep Blue Sample Record

Deep Blue. Folks ask, on occasion, what the 'hit/download' pattern is like for *Solstice*. Currently, we have about 300 direct subscribers. Some of our mail, however, comes from indirect subscribers who appear to see the digital transmission through some other means (forwarded from a colleague, or whatever). The listing below shows the download pattern, from online Deep Blue records, of direct access to *Solstice* (and related items linked in some way to the entry for Institute of Mathematical Geography (Mathematical Geography, Institute of)) from Deep Blue (so does not count the hits from the private backup archive). The list is for the month of February, 2022.

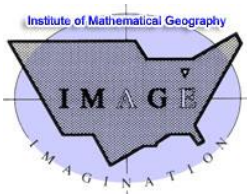
Handle Number of times file(s) downloaded Title Authors

- 2027.42/102019 1 *Solstice: An Electronic Journal of Geography and Mathematics* Arlinghaus, Sandra Lach ; Earl, Edward ; Metzler, David
- 2027.42/108255 119 *Solstice: An Electronic Journal of Geography and Mathematics, Vol. XXV, No. 1* Arlinghaus, Sandra Lach ; Griffith, Daniel A. ; Eagle, Kim A. ; Crawford, Thomas C.



33rd year (1990-2022) of publication of *Solstice*:
An Electronic Journal of Geography and Mathematics
Volume XXXIII, Number 1;
Tuesday, June 21, 2021; 4:14 am, Central Time
Copyright ©2021-- All rights reserved.
Institute of Mathematical Geography (imagenet.org) and the authors.

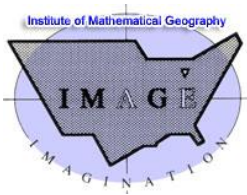
- 2027.42/111740 3 Solstice: An Electronic Journal of Geography and Mathematics, Vol. XXV, No. 2 Arlinghaus, Sandra Lach ; Crawford, Thomas C. ; Eagle, Kim A. ; Favro, Ruth
- 2027.42/111895 9 Solstice: An Electronic Journal of Geography and Mathematics, Vol. XXVI, No. 1 Arlinghaus, Sandra Lach ; Kerski, Joseph ; Arlinghaus, William Edward
- 2027.42/116297 178 Solstice: An Electronic Journal of Geography and Mathematics Arlinghaus, Sandra Lach ; Austin, Robert F. ; Kerski, Joseph ; Arlinghaus, William Charles ; Favro, Ruth
- 2027.42/117251 3 Full CV plus selected citations files for Reviews appearing in Mathematical Reviews, 1991-2015. Arlinghaus, Sandra Lach
- 2027.42/117655 30 Related Works Arlinghaus, Sandra Lach
- 2027.42/134732 46 Cover: Solstice: An Electronic Journal of Geography and Mathematics Arlinghaus, Sandra Lach ; Arlinghaus, William Charles ; Haug, Robert ; Larimore, Ann Evans ; Arlinghaus, William Edward
- 2027.42/134733 85 Cover: Solstice: An Electronic Journal of Geography and Mathematics Arlinghaus, Sandra Lach ; Sammataro, Diana
- 2027.42/137642 13 Solstice: An Electronic Journal of Geography and Mathematics, Vol. XXVIII, No. 1. Arlinghaus, Sandra Lach ; Arlinghaus, William Edward ; Dison, Adrienne Coley ; Hamilton, Richard 'Clay'
- 2027.42/138152 54 Deep Blue Archive Arlinghaus, Sandra Lach
- 2027.42/140387 53 Solstice: An Electronic Journal of Geography and Mathematics: Vol. 28, No. 2 Arlinghaus, Sandra Lach
- 2027.42/142404 176 3D Models, Archive of Selected Links and Citations Arlinghaus, Sandra Lach
- 2027.42/144499 2 Solstice: An Electronic Journal of Geography and Mathematics: Vol. 29, No. 1 Arlinghaus, Sandra Lach ; Arlinghaus, William Edward ; Hall, Billie Jean ; Hall, Douglas ; Maeda, Joshua ; Eagle, Kim A. ; Crawford, Thomas C. ; Purvis, E. Michael ; Ward, Matthew ; Haynes, Derek ; Crane, Jay



33rd year (1990-2022) of publication of *Solstice*:
An Electronic Journal of Geography and Mathematics
Volume XXXIII, Number 1;
Tuesday, June 21, 2021; 4:14 am, Central Time
Copyright ©2021-- All rights reserved.
Institute of Mathematical Geography (imagenet.org) and the authors.

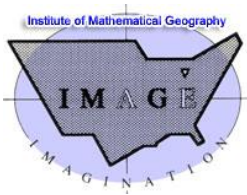
- QR code-related downloads

- 2027.42/144580 9 MHYH 2009 pubs Arlinghaus, Sandra Lach
- 2027.42/144764 8 MHYH 2010 pubs Arlinghaus, Sandra Lach
- 2027.42/144765 4 MHYH 2011 pubs Arlinghaus, Sandra Lach
- 2027.42/144766 6 MHYH 2012 pubs Arlinghaus, Sandra Lach
- 2027.42/144767 5 MHYH 2013 pubs Arlinghaus, Sandra Lach
- 2027.42/144768 5 MHYH 2014 pubs Arlinghaus, Sandra Lach
- 2027.42/144769 2 MHYH 2015 pubs Arlinghaus, Sandra Lach
- 2027.42/144770 2 MHYH 2016 pubs Arlinghaus, Sandra Lach
- 2027.42/144771 4 MHYH 2017 pubs Arlinghaus, Sandra Lach
- 2027.42/144772 7 MHYH 2018 pubs Arlinghaus, Sandra Lach
- 2027.42/145435 461 VRML Flood, Ann Arbor, Allen Creek Arlinghaus, Sandra Lach
- 2027.42/146743 6 Solstice: An Electronic Journal of Geography and Mathematics: Vol. 29, No. 2 Arlinghaus, Sandra Lach ; Rayle, Roger ; Mokray, George
- 2027.42/149577 7 Solstice: An Electronic Journal of Geography and Mathematics: Vol. 30, No. 1 Arlinghaus, Sandra Lach ; Kerski, Joseph ; Arlinghaus, William Edward ; Eagle, Kim A. ; Crawford, Thomas C. ; Purvis, E. Michael ; Ward, Matthew ; Haynes, Derek ; Crane, Jay ; Rayle, Roger
- 2027.42/152345 5 Solstice: An Electronic Journal of Geography and Mathematics: Vol. 30, No. 2 Arlinghaus, Sandra Lach ; Arlinghaus, William Edward ; Lindemann, Weston
- 2027.42/155623 7 Solstice: An Electronic Journal of Geography and Mathematics: Vol. 31, No. 1 Arlinghaus, Sandra Lach ; Arlinghaus, William Edward ; Rushing, Daniel ; Lindemann, Weston ; Arlinghaus, William Charles ; Hall, Billie Jean ; Hall, Douglas ; Ross, Sonya ; Stuckman, Pamela ; Stuckman, Pamela
- 2027.42/163530 4 Calculus 2 Workshops Arlinghaus, William C.
- 2027.42/163531 2 Pre-collegiate Education in Utopia Arlinghaus, Sandra L. ; Arlinghaus, William C. ; Arlinghaus, William E.



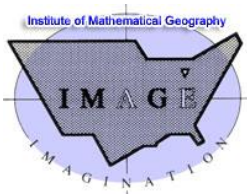
33rd year (1990-2022) of publication of *Solstice*:
An Electronic Journal of Geography and Mathematics
Volume XXXIII, Number 1;
Tuesday, June 21, 2021; 4:14 am, Central Time
Copyright ©2021-- All rights reserved.
Institute of Mathematical Geography (imagenet.org) and the authors.

- 2027.42/163731 6 Solstice: An Electronic Journal of Geography and Mathematics: Vol. 31, No. 2 Arlinghaus, Sandra L. ; Arlinghaus, William E. ; Lindemann, Weston ; Arlinghaus, William C.
- 2027.42/168218 5 Solstice: An Electronic Journal of Geography and Mathematics: Vol. 32, No. 1 Arlinghaus, Sandra
- 2027.42/171078 36 Solstice: An Electronic Journal of Geography and Mathematics: Vol. 32, No. 2 Arlinghaus, Sandra ; Kerski, Joseph ; Emas, Toria ; Glunz, Barbara
- 2027.42/58305 3 Solstice, Volume XI, Number 1, Summary Arlinghaus, Sandra Lach
- 2027.42/58306 2 Solstice, Volume XI, Number 2, Summary Arlinghaus, Sandra Lach
- 2027.42/58314 1 Maps and Decisions: Part II, Ambiguity Arlinghaus, Sandra Lach ; Arlinghaus, William Charles
- 2027.42/58321 2 3D Atlas of Ann Arbor: The Google Earth Approach, Part II. Arlinghaus, Sandra Lach
- 2027.42/58329 2 Spatial Synthesis: Investigations in Progress Arlinghaus, Sandra Lach
- 2027.42/58342 3 Spatial Synthesis: A Research Program Arlinghaus, Sandra Lach ; Arlinghaus, William Charles
- 2027.42/58346 2 Animated Map Timeline, Syria Arlinghaus, Sandra Lach ; Haidar, Salma ; Wilson, Mark L.
- 2027.42/58353 1 A Neighborhood Information System within Ann Arbor, Michigan Arlinghaus, Sandra Lach ; Phillips, Lloyd R.
- 2027.42/58623 11 Graph Theory and Geography: An Interactive View (Ebook) Arlinghaus, Sandra Lach ; Arlinghaus, William Charles ; Harary, Frank
- 2027.42/58700 2 Mouth Geography...Or, Sleep Apnea and Linguistics Arlinghaus, William Edward
- 2027.42/58701 3 Unit 174 American Contract Bridge League Bridge Clubs: Greater Houston Onstott, Bert
- 2027.42/58707 2 Huron River Tour, Ann Arbor Naud, Matthew
- 2027.42/58708 57 Solstice: Volume XIX, Number 1, Summary Arlinghaus, Sandra Lach



33rd year (1990-2022) of publication of *Solstice*:
An Electronic Journal of Geography and Mathematics
Volume XXXIII, Number 1;
Tuesday, June 21, 2021; 4:14 am, Central Time
Copyright ©2021-- All rights reserved.
Institute of Mathematical Geography (imagenet.org) and the authors.

- 2027.42/58709 9 Solstice: An Electronic Journal of Geography and Mathematics, Volume XIX, Number 1 Arlinghaus, Sandra Lach ; Rayle, Roger ; Naud, Matthew ; Onstott, Bert ; Schumann, Lars ; Arlinghaus, William Edward
- 2027.42/58740 1 Fractals Take a Central Place Arlinghaus, Sandra Lach
- 2027.42/58742 1 Geography of City Terrain Based on Bus Routes Arlinghaus, Sandra Lach ; Nystuen, John D.
- 2027.42/58748 1 Structural Models in the Subterranean World Arlinghaus, Sandra Lach
- 2027.42/58749 1 Book Review of Computerized Environmental Modelling by Hardisty, Taylor, and Metcalfe. Arlinghaus, Sandra Lach
- 2027.42/58751 1 Book Review of Environmental Modeling with GIS by Goodchild, Parks, and Steyaert Arlinghaus, Sandra Lach
- 2027.42/58753 1 Book Review of Reactive Data Structures for Geographic Information Systems by Oosterom Arlinghaus, Sandra Lach
- 2027.42/58758 2 Mathematical Reviews: citations for search term "Arlinghaus" Arlinghaus, Sandra Lach
- 2027.42/58759 10 Practical Handbook of Curve Fitting Arlinghaus, Sandra Lach ; Arlinghaus, William Charles ; Drake, William D. ; Nystuen, John D. ; ;
- 2027.42/58763 9 Asia on the Eve of Europe's Expansion Lach, Donald F. ; Flaumenhaft, Carol
- 2027.42/58768 1 Tick Tock, Earth Arlinghaus, Sandra Lach
- 2027.42/59708 3 The fractal theory of central place hierarchies: a Diophantine analysis of fractal generators for arbitrary Loschian numbers Arlinghaus, Sandra Lach ; Arlinghaus, William Charles
- 2027.42/60125 1 Population-Environment Dynamics: Towards Public Policy Strategies Arlinghaus, Sandra Lach ; Drake, William D.
- 2027.42/60126 3 Population-Environment Dynamics: Transitions in Global Change Arlinghaus, Sandra Lach ; Drake, William D.



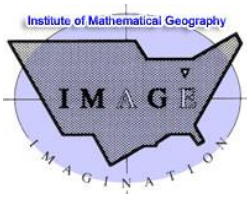
33rd year (1990-2022) of publication of *Solstice*:
An Electronic Journal of Geography and Mathematics
 Volume XXXIII, Number 1;
 Tuesday, June 21, 2021; 4:14 am, Central Time
 Copyright ©2021-- All rights reserved.
 Institute of Mathematical Geography (imagenet.org) and the authors.

- 2027.42/60127 5 Population-Environment Dynamics: Ten Case Studies Arlinghaus, Sandra Lach ; Drake, William D.
- 2027.42/60128 1 Population-Environment Dynamics: Issues and Policy Drake, William D.
- 2027.42/60129 17 Population-Environment Dynamics: Transitions and Sustainability Arlinghaus, Sandra Lach ; Drake, William D.
- 2027.42/60141 3 Human Geography: Spatial Design in World Society Kolars, John F. ; Nystuen, John D.
- 2027.42/60143 1 Analogue Clocks Arlinghaus, Sandra Lach
- 2027.42/60146 1 Satellite configurations and the Petersen graph Arlinghaus, Sandra Lach
- 2027.42/60148 1 *Solstice*: an Electronic Journal of Geography and Mathematics Arlinghaus, Sandra Lach
- 2027.42/60151 2 A cartographic perspective on the security of an urban water supply network Arlinghaus, Sandra Lach ; Nystuen, John D.
- 2027.42/60152 1 Eye-contact graphs Arlinghaus, Sandra Lach
- 2027.42/60165 1 Groups, Graphs, and God Arlinghaus, William Charles
- 2027.42/60173 1 Regular Features Arlinghaus, Sandra Lach
- 2027.42/60174 1 Construction Zone Arlinghaus, Sandra Lach
- 2027.42/60176 1 The Spatial Shadow: Light and Dark--Whole and Part Arlinghaus, Sandra Lach ; Barr, David ; Nystuen, John D.
- 2027.42/60188 1 Features Arlinghaus, Sandra Lach
- 2027.42/60190 1 Computing Areas of Regions with Discretely Defined Boundaries Stern, Harry L.
- 2027.42/60192 1 Where Are We? Comments on the Concept of the "Center of Population" Barmore, Frank E.
- 2027.42/60193 1 What Are Mathematical Models and What Should They Be? Harary, Frank
- 2027.42/60197 1 Microcell Hex-Nets? Arlinghaus, Sandra Lach



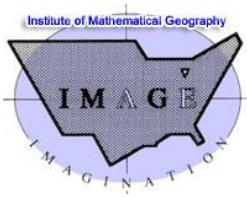
33rd year (1990-2022) of publication of *Solstice*:
An Electronic Journal of Geography and Mathematics
Volume XXXIII, Number 1;
Tuesday, June 21, 2021; 4:14 am, Central Time
Copyright ©2021-- All rights reserved.
Institute of Mathematical Geography (imagenet.org) and the authors.

- 2027.42/60199 1 Wilderness as Place Nystuen, John D.
- 2027.42/60201 3 Villages in Transition: Elevated Risk of Micronutrient Deficiency Drake, William D. ; Pak, S. ; Tarwotjo, I. ; Muhilal ; Gorstein, J. ; Tilden, R.
- 2027.42/60202 1 Center Here; Center There; Center, Center Everywhere! Barmore, Frank E.
- 2027.42/60209 1 Interruption! Arlinghaus, Sandra Lach
- 2027.42/60238 2 Discrete Mathematics and Counting Derangements in Blind Wine Tastings Nystuen, John D. ; Arlinghaus, Sandra Lach ; Arlinghaus, William Charles
- 2027.42/60239 7 Motor Vehicle Transport and Global Climate Change: Policy Scenarios Wallace, Richard
- 2027.42/60240 5 Elements of Spatial Planning: Theory. Part I. Arlinghaus, Sandra Lach
- 2027.42/60242 1 Algebraic Aspects of Ratios Arlinghaus, Sandra Lach
- 2027.42/60244 2 The Greening of Detroit, 1975-1992: Physical Effects of Decline Nystuen, John D. ; Ryznar, Rhonda ; Wagner, Thomas
- 2027.42/60245 1 Part II. Elements of Spatial Planning: Theory. Merging Maps: Node Labeling Strategies Arlinghaus, Sandra Lach
- 2027.42/60252 2 Buffers and Duality Arlinghaus, Sandra Lach ; Goodman, Frederick L. ; Jacobs, Daniel
- 2027.42/60255 1 Animated Four Color Theorem: Sample Map Arlinghaus, Sandra Lach
- 2027.42/60257 17 Book Review of Rising Tide Albert, Daniel
- 2027.42/60258 1 Animaps Arlinghaus, Sandra Lach ; Drake, William D. ; Nystuen, John D. ; Laug, Audra ; Oswalt, Kris S. ; Sammataro, Diana
- 2027.42/60263 35 Book Review: The Rise of the Network Society Iyer, Seema Desai
- 2027.42/60267 6 Listening to Raindrops Nystuen, Jeffrey A.
- 2027.42/60269 14 Set in Stone: An Analemma in Northern Italy Nystuen, John D.
- 2027.42/60276 1 Spherical Measures without Spherical Trigonometry Tobler, Waldo Rudolph



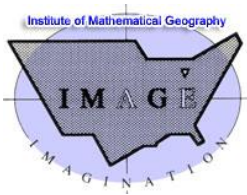
33rd year (1990-2022) of publication of *Solstice*:
An Electronic Journal of Geography and Mathematics
Volume XXXIII, Number 1;
Tuesday, June 21, 2021; 4:14 am, Central Time
Copyright ©2021-- All rights reserved.
Institute of Mathematical Geography (imagenet.org) and the authors.

- 2027.42/60277 1 Book Review: High Technology and Low-Income Communities Wallace, Richard
- 2027.42/60278 4 Book Review: Fast Food Nation Pothukuchi, Kameshwari
- 2027.42/60279 1 Cost Proxy Models in Rural Telephone Companies Austin, Robert F.
- 2027.42/60287 2 Beach Closures in Oakland County, Michigan: Using GIS as an investigative Tool McCloskey, Jeanine Chura
- 2027.42/60288 1 The Possibility of Extending the Streetcar Line in Kagoshima City, Japan Noguchi, Makoto
- 2027.42/60294 1 Surface flow and steep slopes resource page. Arlinghaus, Sandra Lach
- 2027.42/60295 1 Parks and Schools Directory: Southern Ann Arbor City -- Pittsfield Charter Township Acuff, Peter Zebulon
- 2027.42/60297 1 A History of Landscape Change in a Neighborhood of Ann Arbor Podsiadlo, Katya
- 2027.42/60298 1 Ann Arbor, Michigan: Virtual Downtown Experiments, Part III Kwon, Taejung ; Lazzaro, Adrien A. ; Oppenheim, Paul J. ; Rosenblum, Aaron
- 2027.42/60304 2 Selected Writings of Donald F. Lach and Alma S. Lach Lach, Alma ; Lach, Donald F.
- 2027.42/60311 1 Using Asymmetry to Estimate Potential Tobler, Waldo Rudolph
- 2027.42/60314 5 Book Review: Divine Proportions Arlinghaus, Sandra Lach
- 2027.42/60349 1 Review: Mathematical Reviews Arlinghaus, Sandra Lach
- 2027.42/60354 2 Review: Mathematical Reviews Arlinghaus, Sandra Lach
- 2027.42/60355 1 Review: Mathematical Reviews Arlinghaus, Sandra Lach
- 2027.42/60359 2 Review: Mathematical Reviews Arlinghaus, Sandra Lach
- 2027.42/60361 1 Reviews: Mathematical Reviews Arlinghaus, Sandra Lach
- 2027.42/60362 1 Review: Mathematical Reviews Arlinghaus, Sandra Lach
- 2027.42/60363 1 Reviews: Mathematical Reviews Arlinghaus, Sandra Lach
- 2027.42/60371 1 Review: Mathematical Reviews Arlinghaus, Sandra Lach



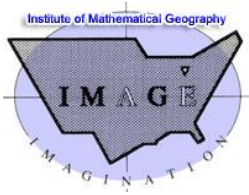
33rd year (1990-2022) of publication of *Solstice*:
An Electronic Journal of Geography and Mathematics
Volume XXXIII, Number 1;
Tuesday, June 21, 2021; 4:14 am, Central Time
Copyright ©2021-- All rights reserved.
Institute of Mathematical Geography (imagenet.org) and the authors.

- 2027.42/60372 1 Review: Mathematical Reviews Arlinghaus, Sandra Lach
- 2027.42/60373 1 Review: Mathematical Reviews Arlinghaus, Sandra Lach
- 2027.42/60377 1 Review: Mathematical Reviews Arlinghaus, Sandra Lach
- 2027.42/60393 1 Ann Arbor, MI: Untextured Buildings Outside the DDA and UM Arlinghaus, Sandra Lach
- 2027.42/60394 1 Archimedes: All Models Arlinghaus, Sandra Lach
- 2027.42/60401 3 University of Michigan Arlinghaus, Sandra Lach
- 2027.42/60427 2 Awards Plus Arlinghaus, Sandra Lach
- 2027.42/60637 19 Community Systems Foundation, Archived Website and Documents Arlinghaus, Sandra Lach ; Oswalt, Kris S.
- 2027.42/60959 1 Spatial Synthesis: Scientific, Planning, Humanitarian, and Teaching Applications, From DevInfo to Google Earth Arlinghaus, Sandra Lach
- 2027.42/61202 11 Spatial Synthesis, Volume II, Book 2. Making It Clear: The Importance of Transparency Arlinghaus, Sandra Lach
- 2027.42/61342 1 Spatial Synthesis: Volume II, Book 2: Making It Clear: The Importance of Transparency, GoogleBook version Arlinghaus, Sandra Lach
- 2027.42/61416 1 Solstice: Volume XIX, Number 2, Summary Arlinghaus, Sandra Lach
- 2027.42/61417 4 Solstice: An Electronic Journal of Geography and Mathematics, Volume XIX, Number 2 Arlinghaus, Sandra Lach ; Batty, Michael ; Zander, Richard H.
- 2027.42/61418 1 Electronic Journals: Then and Now...A Fifteen Year Retrospective Arlinghaus, Sandra Lach ; Zander, Richard H.
- 2027.42/61419 1 Charting the Past: Population-Environment Dynamics Arlinghaus, Sandra Lach ; Batty, Michael
- 2027.42/63016 5 Solstice: Volume XX, Number 1, Summary Arlinghaus, Sandra Lach
- 2027.42/63017 6 Solstice: An Electronic Journal of Geography and Mathematics, Volume XX, Number 1 Ard, Kerry ; Arlinghaus, Sandra Lach ; Arlinghaus, William Edward ; Sammataro, Diana



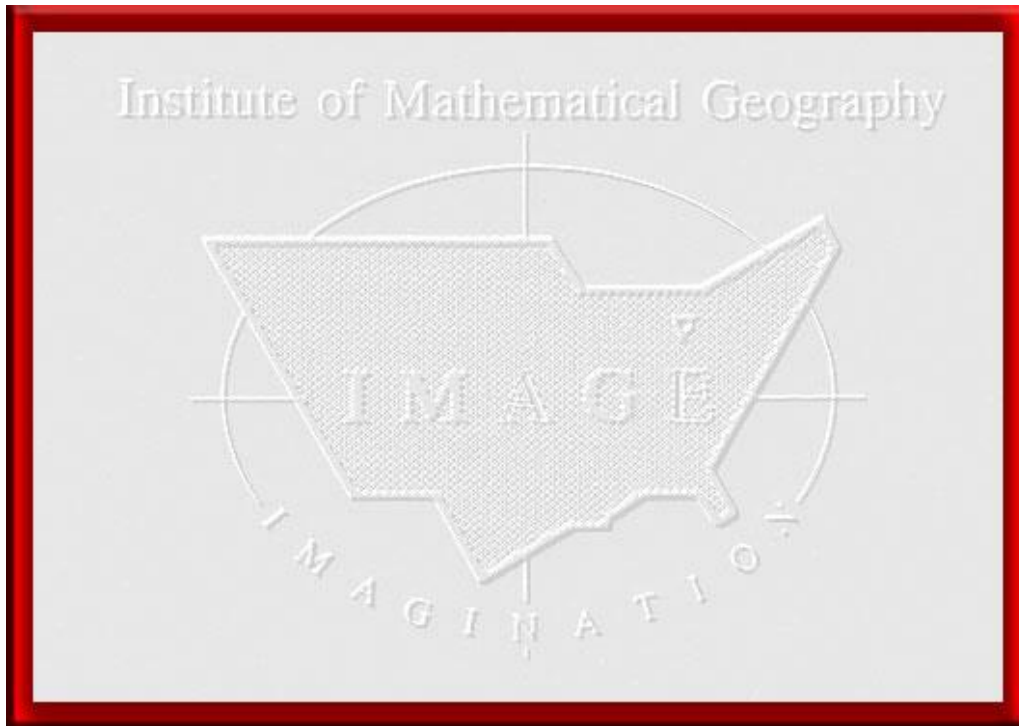
33rd year (1990-2022) of publication of *Solstice*:
An Electronic Journal of Geography and Mathematics
Volume XXXIII, Number 1;
Tuesday, June 21, 2021; 4:14 am, Central Time
Copyright ©2021-- All rights reserved.
Institute of Mathematical Geography (imagenet.org) and the authors.

- 2027.42/64497 7 Solstice: An Electronic Journal of Geography and Mathematics, Volume XX, Number 2 Arlinghaus, Sandra Lach ; Arlinghaus, William Edward ; Austin, Robert F.
 - 2027.42/77404 1 Solstice: An Electronic Journal of Geography and Mathematics, Volume XXI, Number 1. Arlinghaus, Sandra Lach ; Arlinghaus, William Edward ; Batty, Michael ; Kerski, Joseph
 - 2027.42/78440 5 Solstice: An Electronic Journal of Geography and Mathematics, Volume XXI, Number 2. Arlinghaus, Sandra Lach ; Batty, Michael ; Griffith, Daniel A. ; Sammataro, Diana ; Rayle, Roger ; Arlinghaus, William Edward
 - 2027.42/83160 1 Reprint Archive Arlinghaus, Sandra Lach
 - 2027.42/85141 10 Solstice: An Electronic Journal of Geography and Mathematics, Volume XXII, Number 1. Arlinghaus, Sandra Lach ; Arlinghaus, William Edward ; Naud, Matthew ; Rayle, Roger
 - 2027.42/88213 2 Solstice: An Electronic Journal of Geography and Mathematics, Volume XXII, Number 2. Arlinghaus, Sandra Lach ; Arlinghaus, William Edward ; Koenig, Richard ; Robinson, Craig ; Sammataro, Diana ; Austin, Robert F. ; Tobler, Waldo Rudolph
 - 2027.42/89424 2 Archive, Solstice and IMAge, 1985-2015 Arlinghaus, Sandra Lach
 - 2027.42/91626 1 Geosocial Networking: A Case from Ann Arbor, Michigan Arlinghaus, David E. V. ; Arlinghaus, Sandra Lach
 - 2027.42/91627 2 Visual Abstracts: Institute of Mathematical Geography Arlinghaus, Sandra Lach
 - 2027.42/91628 13 Solstice: An Electronic Journal of Geography and Mathematics, Volume XXIII, Number 1. Kerski, Joseph ; Arlinghaus, David E. V. ; Arlinghaus, Sandra Lach
 - 2027.42/94573 7 Solstice: An Electronic Journal of Geography and Mathematics, Volume XXIII, Number 2 Kos, Serdjo ; Pogany, Tibor K. ; Arlinghaus, David E. V. ; Arlinghaus, Sandra Lach ; Tobler, Waldo ; Sammataro, Diana
- /nStats are also in the attached file.



33rd year (1990-2022) of publication of *Solstice*:
An Electronic Journal of Geography and Mathematics
Volume XXXIII, Number 1;
Tuesday, June 21, 2021; 4:14 am, Central Time
Copyright ©2021-- All rights reserved.
Institute of Mathematical Geography (imagenet.org) and the authors.

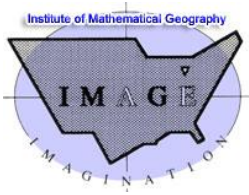
Endmatter



Original logo designed by Sandra L. Arlinghaus and stylized and redrafted by Allen K. Philbrick.

AWARDS AND SELECTED COMMENTS

- *Solstice* page translated into Belorussian, April, 2016; many thanks to Valerie Bastiaan.
- *Solstice* cover materials translated into Ukranian, August 25, 2011; many thanks to Galina Miklosic.
- *Solstice* was a Pirelli INTERNETional Award Semi-Finalist, 2001 (top 80 out of over 1000 entries worldwide)
- One article in *Solstice* was a Pirelli INTERNETional Award Semi-Finalist, 2003 (Spatial Synthesis Sampler).
- *American Mathematical Monthly*, September 1992, in Telegraphic Reviews section notes *Solstice* as "one of the world's first electronic journals using TeX." L. A. Steen.
- [*Science News*, 25 January, 1992. Article about *Solstice*.](#)



33rd year (1990-2022) of publication of *Solstice*:
An Electronic Journal of Geography and Mathematics
Volume XXXIII, Number 1;
Tuesday, June 21, 2021; 4:14 am, Central Time
Copyright ©2021-- All rights reserved.
Institute of Mathematical Geography (imagenet.org) and the authors.

- [Science](#), AAAS, 29 November, 1991. Article about *Solstice*.

🌐 LISTINGS IN DIRECTORIES AND DATABASES

- IMAge is listed as a "Collection" in the persistent online archive, [DeepBlue](#), of The University of Michigan library. It is listed under "Mathematical Geography" on the Collections link.
- *Solstice* has been listed in the Directory of Open Access Journals (for its first 28 years) maintained by the University of Lund.
- *Solstice* is listed on the journals section of the website of the American Mathematical Society, <http://www.ams.org/>
- *Solstice* has been listed in the EBSCO database.
- IMAge has been listed on the website of the Numerical Cartography Lab of The Ohio State University, with thanks to Harold Moellering.
- *Solstice* was listed in Geoscience e-Journals, with thanks to Bruno Granier.



Sandra L. Arlinghaus, celebrated over 30 full years of archived *Solstice* publication in 2020.