

Institute of Mathematical Geography



ISSN: 1059-5325

Solstice: An Electronic Journal of Geography and Mathematics

Volume XXXIV Number 2

December 21, 2023



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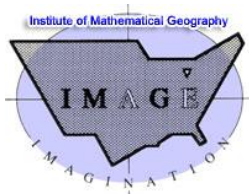
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Volume XXXIV, Number 2;
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34 YEARS OF PUBLICATION!

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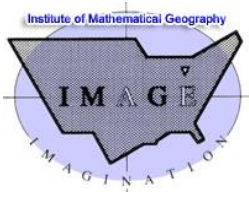
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Virtual reality of The University of Michigan “Diag”, below. Note the observatory dome atop Angell Hall, in the foreground.



The IMaGe website, housed in the persistent file storage, Deep Blue, at the University of Michigan; one might find it by searching the Communities and Collections section of Deep Blue Documents, under Mathematical Geography, Institute of (IMaGe).

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.



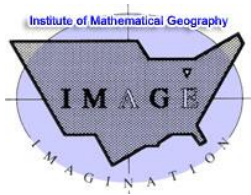
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In Memoriam: Richard Wallace, IMaGe Board of Directors and Book Review co-Editor.

Richard R. Wallace, 59, of Ann Arbor, Michigan, passed away peacefully on Friday, October 6, 2023, with his wife of 26 years, Kami Pothukuchi, by his side. Richard was born May 18, 1964, to Mary (Land) Goldbach and Norman (Cathy) Wallace in Bridgeville, PA. He is survived by his wife, parents, and most of his extended family. Richard was a globally recognized expert in transportation systems, planning, and public policy. His most recent work focused on intelligent transportation systems, connected and automated vehicles, and advanced mobility. As a Vice President of the non-profit Center for Automotive Research, he produced groundbreaking research for top corporations and provided strategic advice to governments at all levels in the U.S. and internationally. His wide-ranging research—such as on the role of transportation in access to health care, use of sensors in monitoring the health of infrastructure, and approaches to monitoring truck activity at international border crossings—was also published in numerous journals including the *Transportation Research Record*. His previous roles included Senior Research Scientist at Michigan Tech Research Institute, Senior Project Manager at Altarum Institute, and Senior Project Manager and Lecturer at the University of Michigan. His colleagues remember him as wickedly smart, creative, insightful, and unfailingly kind.

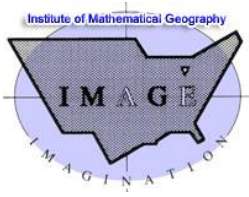
Materials derived from text found in online obituaries:

Legacy.com and [Ann Arbor News](#).
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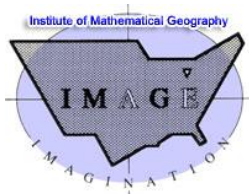
Frontmatter

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!

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



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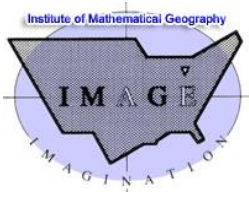
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Maps and Math: Identifying Learning Opportunities

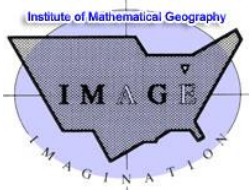
Sandra L. Arlinghaus, Joseph J. Kerski, and William C. Arlinghaus

Because all maps are based on mathematics, it follows that any map presents opportunities to learn about mathematics. The challenge is to identify what those opportunities might be. We illustrate, using example from the real world and from the hypothetical world, how a creative instructor might engage in the requisite identification.

Bike Around Mississippi Story Map

This past July, a first-ever bike adventure presented an opportunity to raise funds on behalf of historic preservation of a Neoclassical Revival mansion in Meridian, Mississippi. During General William Tecumseh Sherman's invasion of Meridian, he sheltered some of his troops at Merrehope. Thus, Merrehope survived Sherman's occupation of Meridian and his Meridian Campaign during the Civil War during which he stated "Meridian no longer stands" following the burning of all but six residences. (Visit Meridian; EMBDC).

Because that home dates to 1858, there are continuing ongoing maintenance issue. Currently, Merrehope needs a new roof. Hence Ed Abdella's contribution to 'raise the roof' at Merrehope by creating a sponsored opportunity for local businesses to donate to his first-ever bicycle ride around the perimeter of Mississippi (Figure 1, a, b, c, d). Abdella is a local high school history teacher, part-time college history teacher, and an endurance cyclist who enjoys the challenges of long bike rides, often dedicated to the memories of colleagues he lost during service as an Army Ranger in Iraq and

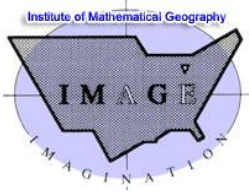


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Afghanistan. He also dedicates rides to other causes he thinks are worthwhile--in this case, to a ride that raised over \$10,000 for a new Merrehope roof!



Figure 1, a, b, c, d. Screenshots of Abdella on Bike Around Mississippi derived from a movie by Donna Huff Owen.

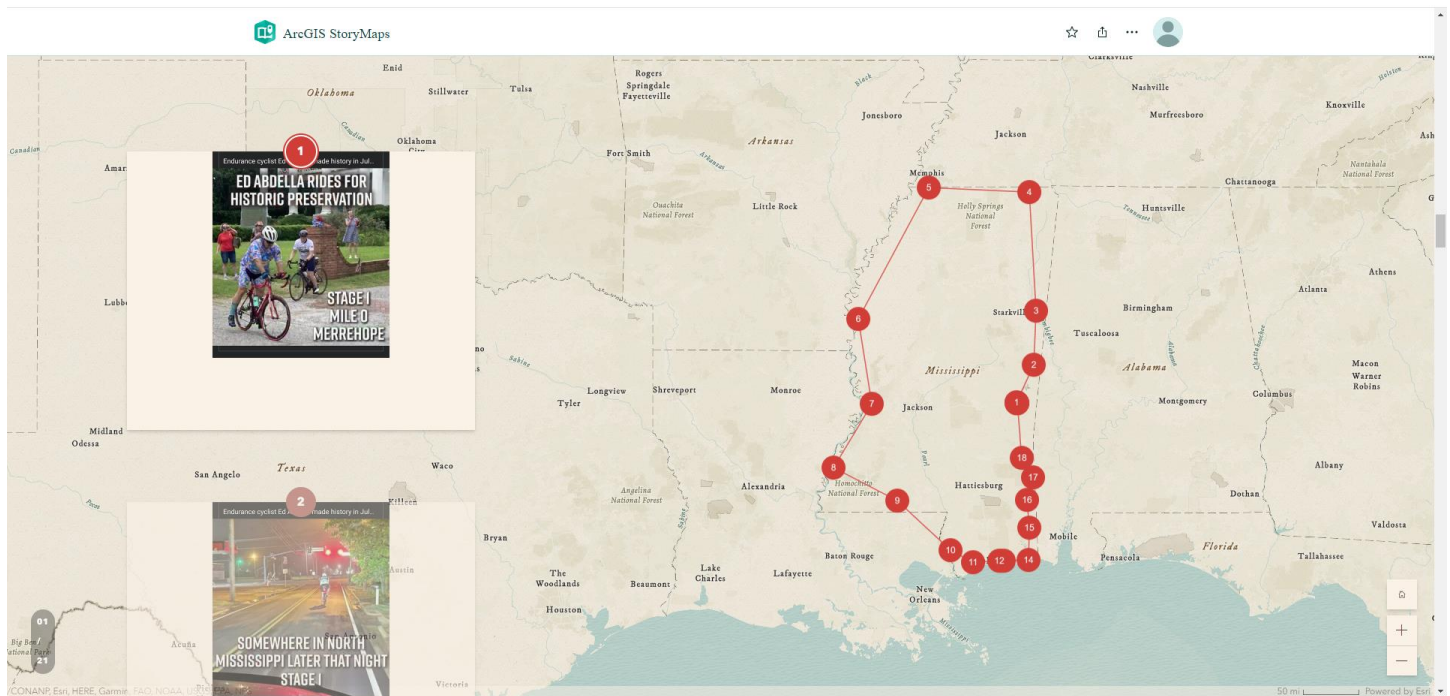


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The link below shows an Esri Story Map describing Abdella's bike ride. A story map is well-suited to such display. It is interactive in two directions. A scroll of trip images/photos and texts links automatically to a map. When the reader scrolls down on the image/text stack, the map adjusts in a corresponding manner to show the location of the image currently in view. The map can be zoomed in or out on. If the reader decides to wonder what happened at a different location other than the one in view, s/he can just click on the dot on the map and the image/text stack will adjust to correspond appropriately. Two way interactivity: from image/text stack to map and from map to image/text stack!

Test it out:

<https://storymaps.arcgis.com/stories/4ac2729970954681b792063e6db5ba8c> Figure 2 a, b shows screenshots from the Story Map.



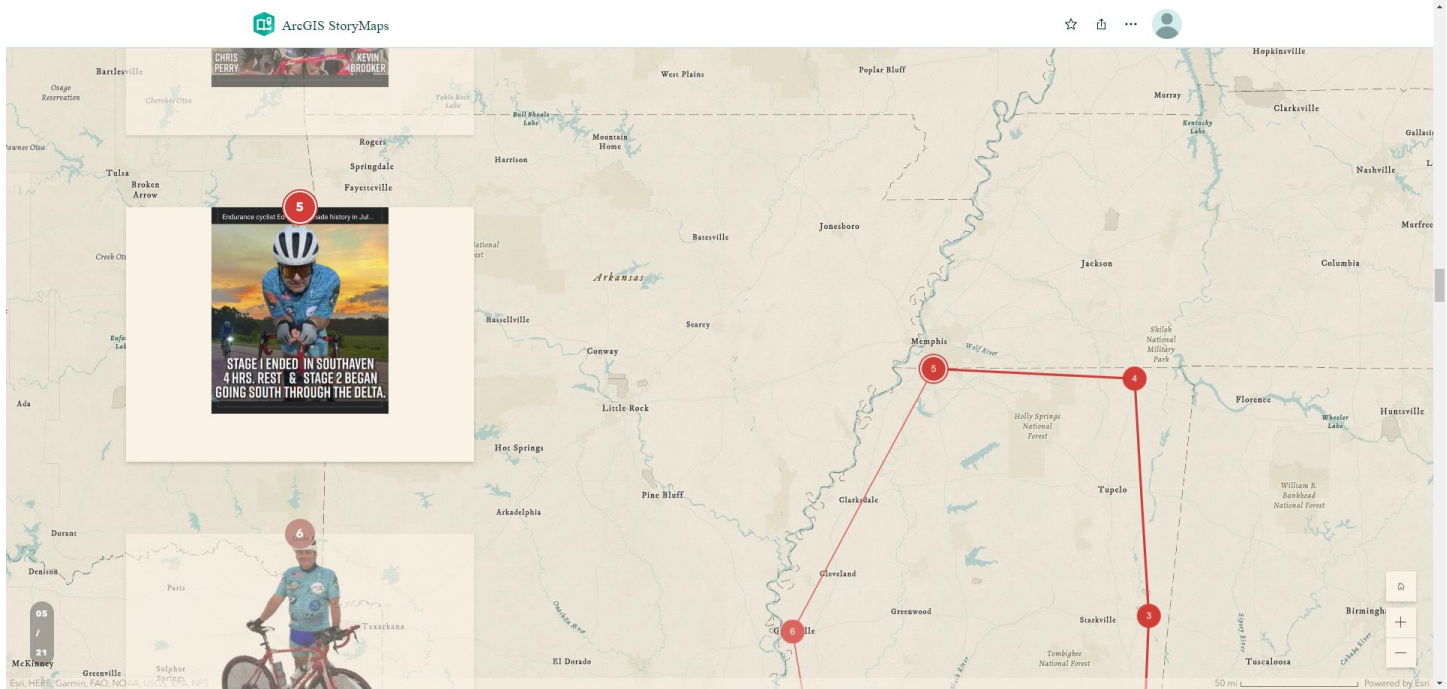


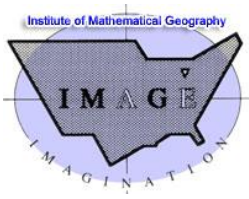
Figure 2 a, b. Screenshots from the Story Map of Bike Around Mississippi.

If one thinks about this map (or any other) more deeply, opportunities will occur for discovering the behind-the-scenes mathematics that drives the mapping and a corresponding teaching opportunity will arise. Notice that the map showing the connection pattern in the route does not contain scale.

Some associated math opportunities that clearly arise with this map:

Observation from the Story Map—no scale is presented on this map

- Why is scale important?
- What are different ways of expressing scale on a map?
- How are fractions related to map scale?

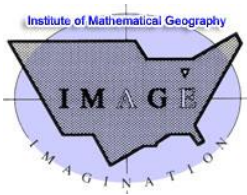


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- Once fractions enter the picture—
 - Demonstrate why it is critical to learn how to multiply fractions before attempting to teach how to add fractions of different denominators
 - Prove how to add fractions of different denominators
 - Decimals
- Beyond whole numbers and fractions, what other types of numbers are there?
 - Infinity
 - One-to-one correspondence
- What are ways of combining numbers?
 - Order of operations?
 - Distributive Law?
- Rearranging arithmetic--unknowns and algebraic expressions.
- What kinds of broad algebraic structures exist...groups, rings, integral domains?

Observation from the Story map--how far did Ed ride to get from point A to point B?

- Distance
 - Use a simple template, as a scaling tool, based only on distance noted within the story map itself. Opportunity to talk about different physical measuring devices (ruler, yardstick, meter stick) and to talk about different systems for measuring distance (English, metric).
 - Find lat/long coordinates of two points and measure distance between them using an online tool. Opportunity to talk about geometry of the Earth-sphere, great circles, parallels and meridians, angular measurement.



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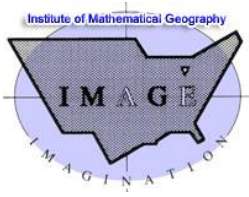
- Coordinate systems
- What lies behind the online measuring tool. Opportunity to discuss trigonometric functions and identities.
- Analytic and synthetic geometries

This one mapping summary of a real-world trip offers mathematical opportunity to teach most of the curriculum on mathematics to be successful in early college-level mathematics!

Honing in on the Math: Rounding and Estimating

To see how a particular interactive mapping activity might be employed in support of the general ideas from above, consider the following example. In practical applications, it is often not convenient to have long decimal expansions as an answer. One way to shorten an answer is to round the numbers up: numbers greater than or equal to 0.5 get rounded up to the next nearest integer. Another way is to simply truncate the string of digits. Independent of the method chosen, the digits that contribute to the degree of accuracy of the value are called 'significant digits'; start counting digits as significant at the first non-zero digit.

In the activity below, we illustrate that it makes a difference how one chooses to shorten numbers. When providing general estimates, small differences may, or may not, be important. What is important, though, is to tell the reader how the answer was shortened: by rounding up, or by truncation.



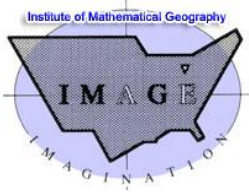
The Eiffel Tower Location: Truncation and Rounding Up of Decimal Coordinates

Open the [linked](#) web map in ArcGIS Online; this activity is one of many that is used, more extensively than it is here, in a recent eBook (Arlinghaus, Kerski, and Arlinghaus). The map contains two layers, each made from a set of seven latitude-longitude coordinates, mapped as points. The longitude value represents the x-coordinate, and the latitude value represents the y-coordinate.

Truncation

Use the map interactively; click on the link above and then proceed with the directions below to make reading the document interactive with using the map. On the left side of the map > Layers > Expand the two layers and make the Decimals and Precision Activity-Eiffel Tower layer the only visible layer. This layer shows mapped seven points. Each point represents the location at that specific longitude and latitude on the Earth's surface. The point labeled "six" includes six significant numbers to the right of the decimal place. This point is exactly the location of the Eiffel Tower in Paris, France. Each successive point is mapped after truncating one digit from the coordinates; thus, "five" contains five significant numbers after the decimal place, point "four" contains four significant numbers, and so on, down to "None" which contains no numbers to the right of the decimal point; thus, the location of point "None" is at 2 degrees east longitude, 48 degrees north latitude. Table 1 displays these values.

Point	Longitude	Latitude
Six	2.294524	48.858260
Five	2.29452	48.85826
Four	2.2945	48.8582
Three	2.294	48.858



Two	2.29	48.85
One	2.2	48.8
None	2	48

Table 1. Geographic coordinates for the location of the Eiffel Tower with decimals TRUNCATED.

Zoom on the cluster of points in the northern part of the map, at and near the Eiffel Tower (Figure 3).

Click on a few points to verify the latitude and longitude values that you are examining.

Observe the direction that the points “drift” as the numbers to the right of the decimal point are removed. What direction are the points moving? Why? How much distance exists between each point? Use the Map Tools > Measurement tool to the right of the map to measure the distance between point six and point five. Then, measure the distance between point five and point four. Do the distances increase or decrease between points as precision of the coordinates becomes less? Why? What is the distance between point six and point none?

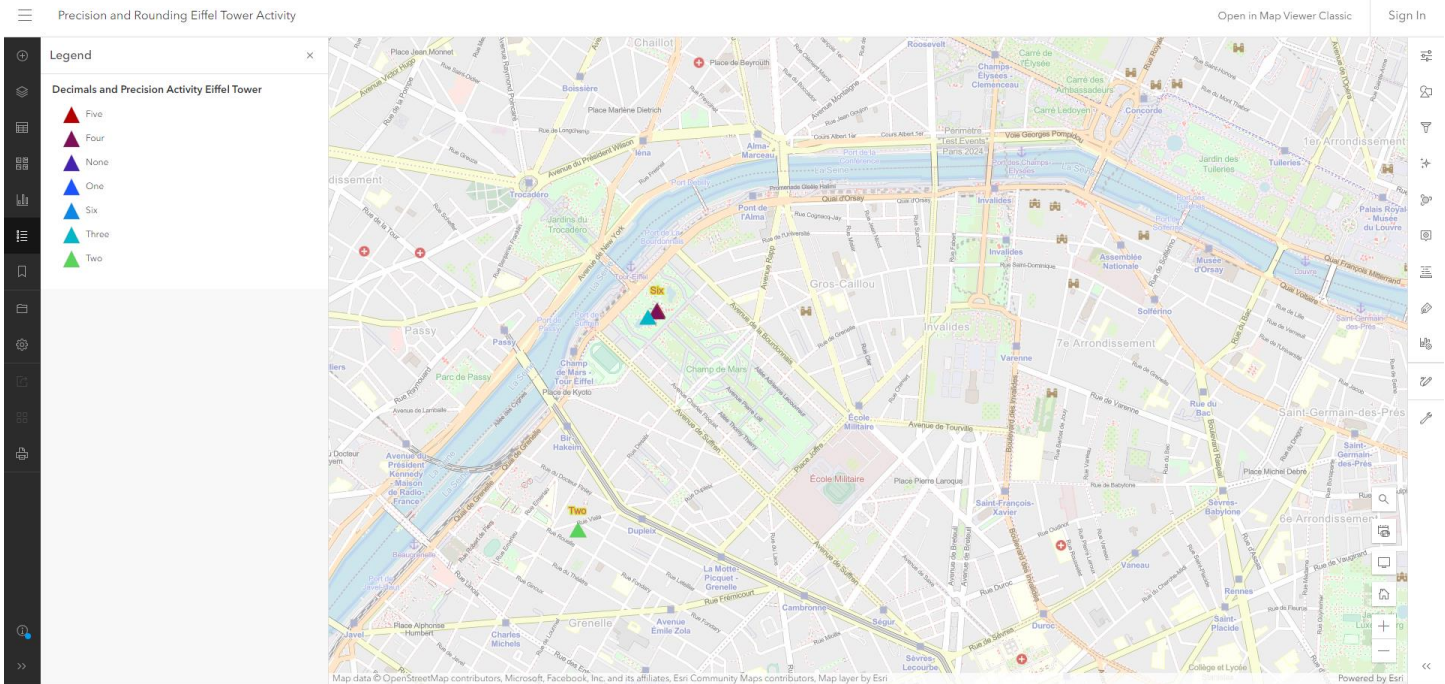
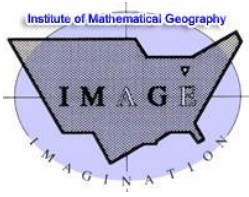


Figure 3. The Eiffel Tower location in Paris, France with a set of points with specific latitude and longitude values. Decimals are TRUNCATED. Interactive mapping activity screenshot. ArcGIS from Esri.

Rounding Up

On the left side of the map > Layers > Expand the two layers and make the Rounding Eiffel Tower layer the only visible layer. This layer shows seven mapped points. As before, each point represents a location at that specific longitude and latitude on the Earth's surface. The point labeled “six” includes six significant numbers to the right of the decimal place and is the same location as Point Six that you examined earlier: the location of the Eiffel Tower. However, in this layer, the decimal values are successively rounded up, rather than truncated. Table 2 displays these values.



Point	Longitude	Latitude
Six	2.294524	48.858260
Five	2.29452	48.85826
Four	2.2945	48.8583
Three	2.295	48.858
Two	2.29	48.86
One	2.3	48.9
None	2	49

Table 2. Geographic coordinates for the location of the Eiffel Tower with decimals ROUNDED UP.

Compare and contrast the values in Tables 1 and 2. For example, from points four to three, 2.2945 was rounded to 2.295 rather than truncated to 2.294. Zoom on the cluster of points at and near the Eiffel Tower (Figure 4). Click on a few points to verify the latitude and longitude values that you are examining. Observe the direction that the points “drift” as the numbers to the right of the decimal point are rounded. What direction are the points moving? Why? How much distance exists between each point? Use Map Tools > Measurement to the right of the map to measure the distance between point six and point five. Then, measure the distance between point five and point four. Do the distances increase or decrease between points as precision of the coordinates becomes less? Why? What is the distance between point six and point none?

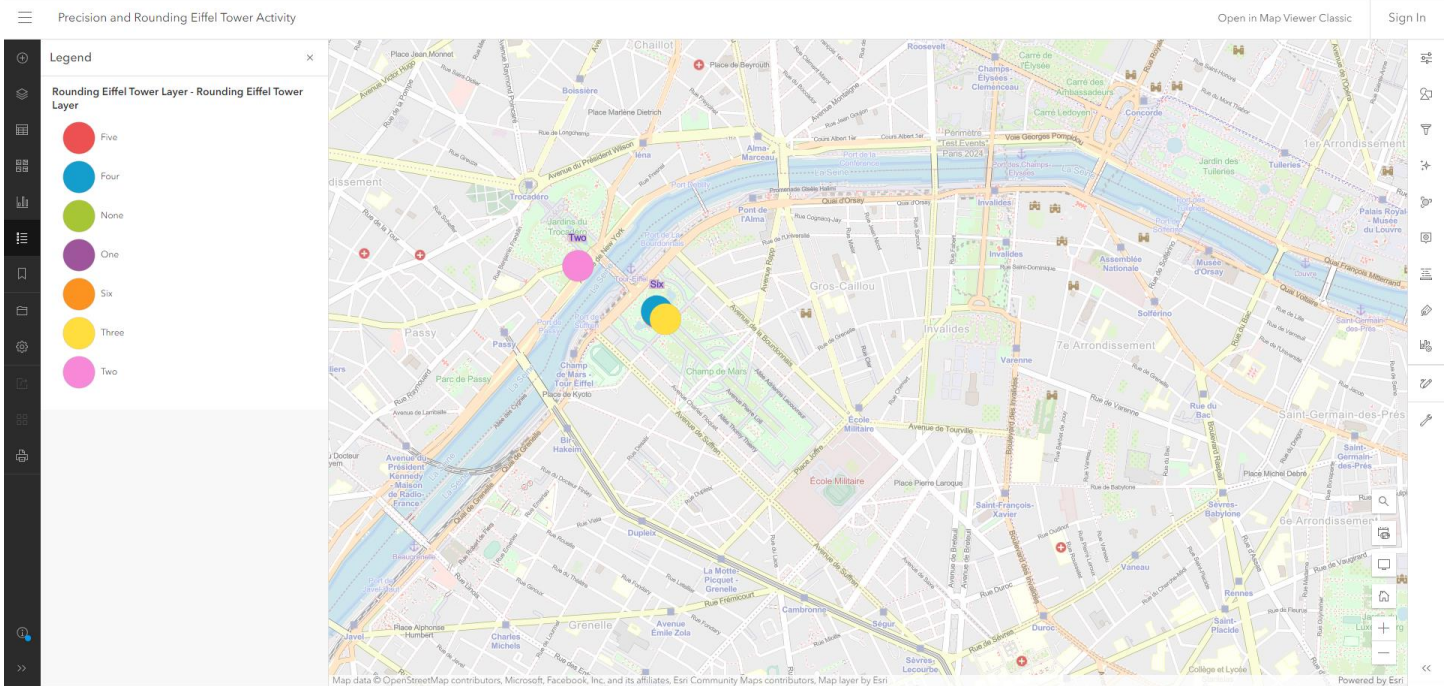
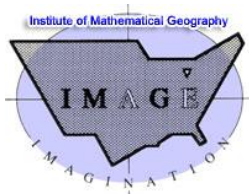


Figure 4. The Eiffel Tower location in Paris, France with a set of points with specific latitude and longitude values. Decimals are **ROUNDED UP**. Interactive mapping activity screenshot. ArcGIS from Esri.

Reflections on this Activity

Turn both layers back on and zoom out until you see all of each layer's points. What cardinal (compass) direction do the rounded set of points move: north, south, east, or west? Why do the direction and the distance differ for the two sets of points: decimal truncation and decimal rounding?

This activity clearly illustrates that the method of shortening decimal numbers can produce correspondingly different real-world results. If you were laying fiber optic cable under the Eiffel Tower, you would need a fair number of significant digits for accurate placement of cable. On the

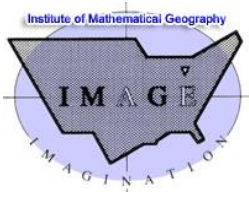


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other hand, if we were studying the weather patterns of the Paris metropolitan area, fewer significant digits would be sufficient. More information is not always better.

Added Opportunity

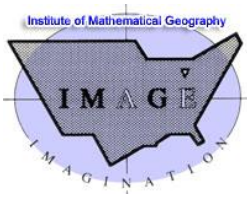
Here we have illustrated that any single mapping activity might give rise to a wide variety of associated opportunities for teaching different branches of mathematics. We followed that general overview with a more detailed single example involving locational coordinates for the Eiffel Tower. The thoughtful reader will have already imagined how many other spin-off mapping activities might be created for various single, or limited, mathematical issues. It is such a process that led this team of three authors to create an entire book demonstrating more of this idea in greater detail; still that, too, only scratches the surface of what might be done. Indeed, some mapping activities may have greater emphasis, for example, on geometry while others have it on analysis. Thus, it is nice for the teacher to consider a selection of activities, tailored to different mathematical approaches. It is also nice for students to have a wide variety of geographical viewpoints as a way to hold their interest. Our new book attempts to do both.



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 - Video describing general nature of this book:
https://youtu.be/Lkcnrohzbm0?si=qRgJyCp_TJ9-qdBC
 - Video describing maps in this book:
<https://youtu.be/GqisuReZoO4?si=orXzkOaW6WXpRZpo>
 - Print: [Routledge](#).
- Bike Around Mississippi: From Merrehope and Back, Meridian MS, July 4-8: A Ride for Historic Preservation. The journey of Ed Abdella:
<https://storymaps.arcgis.com/stories/4ac2729970954681b792063e6db5ba8c>. Story Map created by Sandra L. Arlinghaus, October 18, 2023. Images derived from a movie created by Donna Huff Owen. Materials used with permission of Ed Abdella and Donna Huff Owen.
- EMBDC. Member Spotlight, Meridian Restorations Foundation. <https://www.embdc.org/support-growth/member-spotlight/meridian-restorations-foundation/>
- Visit Meridian. <https://www.visitmeridian.com/explore/historic-trail-markers/civil-war/civil-war-trail-marker-5/>



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Volume XXXIV, Number 2;
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Update: Kudzu Project

Sandra L. Arlinghaus

The previous issue of *Solstice* was a special issue devoted to the ongoing kudzu project, transforming a serious problem from an invasive plant into a constructive edible for a broad segment of human population. Speaking very generally, there are about 7.3 million acres of kudzu growing wild in the southeastern part of the USA. It is human food that is treated as a waste product, at best, when instead it might be used as food. Even worse, it is a net emitter of carbon as it grows at breakneck speed creating large rootballs that fracture the soil open as the plant invades the landscape, often with a foot of growth per day.

One goal of this project is to make humans want to eat kudzu in an effort to balance the large supply with a large demand. We detailed various efforts in this direction, involving kickoff events, suited to the spring and summer weather. With Autumn, came tougher kudzu and eventually no kudzu for harvest. To learn more about how to deal with the tougher kudzu as well as to learn more about how to continue to enjoy it when none was available, we froze mature kudzu leaves and kept them in a freezer for at least three months. Currently, we are in the process of working with frozen kudzu leaves and will have more to report in the next issue of *Solstice*.

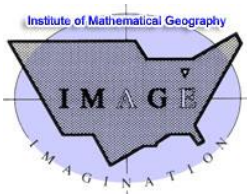
Previous material on the Kudzu Project in *Solstice*, arranged in reversed chronological order is shown below. If no author is specified, then it is the *Solstice* Editor who wrote about the topic.

2023, June. *Solstice: An Electronic Journal of Geography and Mathematics.* Ann Arbor: *Institute of Mathematical Geography*, [Volume 34](#), Number 1. June 21, 2023.

Special Issue: Kudzu Kickoff

- Kudzu Kickoff--Initiation (Sandra L. Arlinghaus)
- Kudzu Kickoff: March 26 and May7 (William E. Arlinghaus)

2021, December. *Solstice: An Electronic Journal of Geography and Mathematics.* Ann Arbor: *Institute of Mathematical Geography*, [Volume 32](#), Number 2. December 21, 2021.

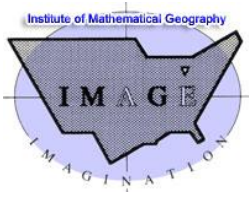


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<p>“Update on Activities (Water supply/aquifer free from PFAs).”</p>
<p>2021, June. <i>Solstice: An Electronic Journal of Geography and Mathematics.</i> Ann Arbor: Institute of Mathematical Geography, Volume 32, Number 1. June 20, 2021.</p> <p style="text-align: center;">“Update on Activities (Kudzu Project).”</p>
<p>2020, December. <i>Solstice: An Electronic Journal of Geography and Mathematics.</i> Ann Arbor: Institute of Mathematical Geography, Volume 31, Number 2. December 21, 2020.</p> <ul style="list-style-type: none"> • “Update on Activities (History Garden).” • “Planning Units: Kudzu Opportunity Zones?” Sandra L. Arlinghaus, William E. Arlinghaus, and Weston Lindemann • “Kudzu, Carbon Footprint, and Bioplastics.” Sandra L. Arlinghaus, William E. Arlinghaus, and Weston Lindemann.
<p>2020, June. Arlinghaus, Sandra L., with William E. Arlinghaus and Weston Lindemann. Green Tables Section. “Eating ‘the Vine that Ate the South’: Turnabout is Fair Play.” Les Dames d’Escoffier International. Quarterly. Spring 2020, p. 28.</p>
<p>2019, December. <i>Solstice: An Electronic Journal of Geography and Mathematics.</i> Ann Arbor: Institute of Mathematical Geography, Volume 30, Number 2. December 2019.</p> <ul style="list-style-type: none"> • “Introduction” to the Special Issue on Bonus Use. • “Kudzu Cascades: Bonus Use Leads to Economic Opportunity?” Sandra L. Arlinghaus, William E. Arlinghaus, and Weston Lindemann.
<p>2018, December. <i>Solstice: An Electronic Journal of Geography and Mathematics.</i> Ann Arbor: Institute of Mathematical Geography, Volume 29, Number 2. December 2018.</p> <p style="text-align: center;">“Cascade: Observation and Challenge.”</p>

Kudzu nutrition links:

- CDC Report: <https://www.cdc.gov/nutritionreport/pdf/Isoflavones.pdf>
- Healthline: <https://www.healthline.com/nutrition/kudzu-root>
- As fodder: <https://www.mdpi.com/2077-0472/9/10/220#:~:text=Corley%20et%20al.,for%20growing%20ruminants%20%5B20%5D.>
- Memorial Sloan Kettering Cancer Center: <https://www.mskcc.org/cancer-care/integrative-medicine/herbs/kudzu#:~:text=Kudzu%20is%20an%20herb%20used,anti%20inflammatory%20and%20neuroprotective%20properties> .



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Kudzu Project: Beyond the Kickoff

Sandra Lach Arlinghaus

Beyond the kickoff, how might we structure the continuation of what looks like a promising beginning at getting the network of human food consumption involved in controlling kudzu? Kudzu is not confined by State, or any other man-made boundaries. Its current extent is roughly the southeastern United States of America and that extent is enlarging all the time.

Kudzu Project Structure

Spatial Distribution

The map in Figure 1 shows the contemporary extent of kudzu as a screen shot from an outstanding interactive map (University of Georgia). The straightforward screen shot shows heavy concentrations of kudzu in the entire southeastern quarter of the USA, east of the Mississippi River and South of the Ohio River, along with Louisiana and Arkansas. One might view this river-bounded region as the 'heartland' of kudzu, with the rest of the States outside that as composing the 'rimland' of kudzu. Go to the [linked](#) interactive map and look around. Dive deeper to see what is there. When you do, you will find that for every county colored in green, there is an associated map showing all reported sightings of kudzu and related information. Figures 2 and 3 illustrate the sort of depth that is available; in them, I moused over Lauderdale County, Mississippi (containing Meridian, MS) and then clicked when asked to click for more, bringing up the record shown only partially in Figure 3--a location map for each reported sighting of kudzu. This tool is an excellent display of the power of interactive mapping and its great utility for monitoring geographical information.

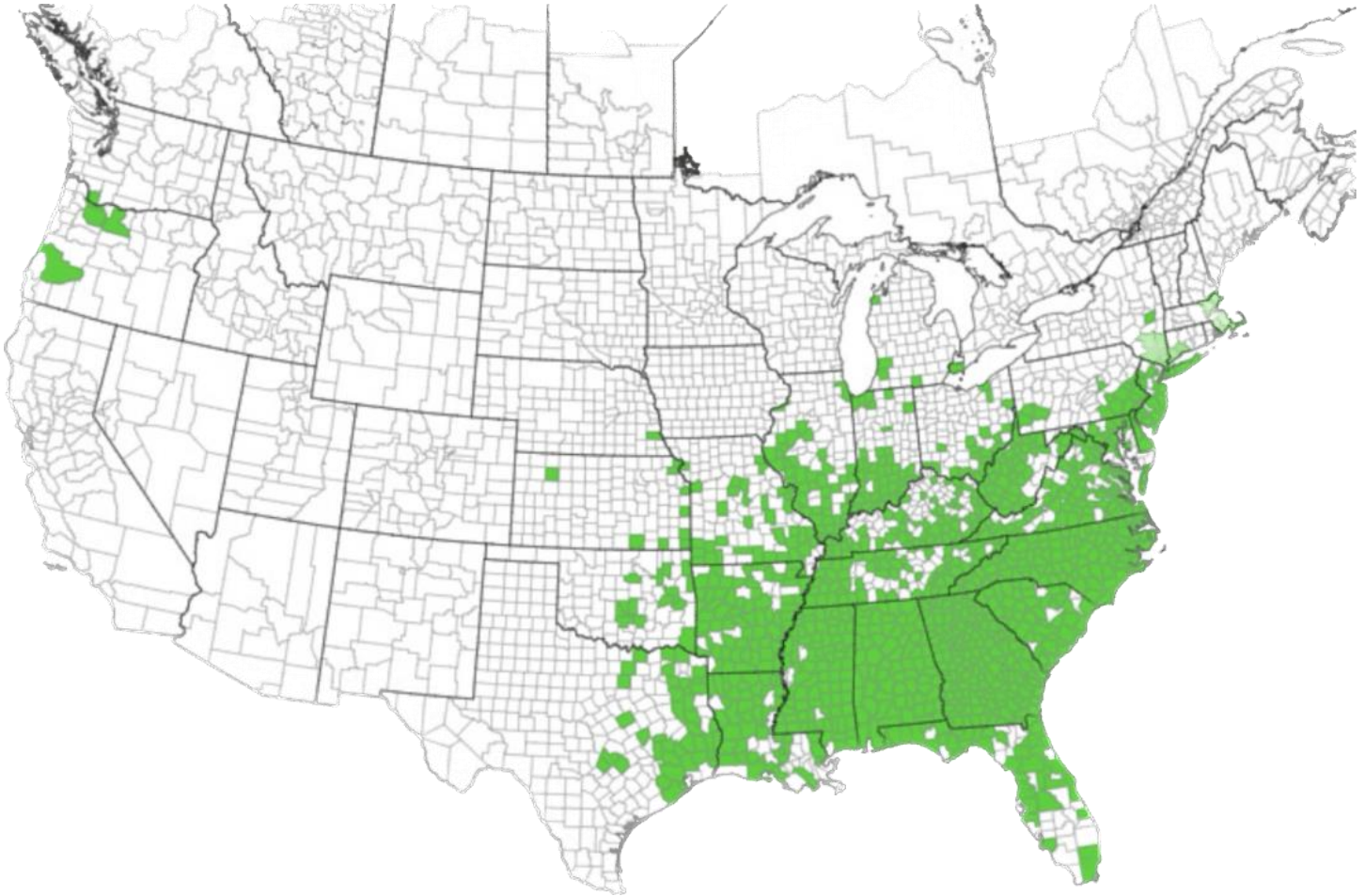
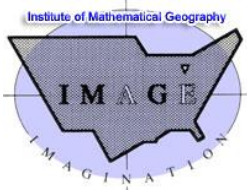


Figure 1. Map of the extent of kudzu. Captured as a screenshot from an interactive map. Source: EDDMapS. 2023. Early Detection & Distribution Mapping System. The University of Georgia - Center for Invasive Species and Ecosystem Health. Available online at <http://www.eddmaps.org/>; last accessed May 24, 2023.



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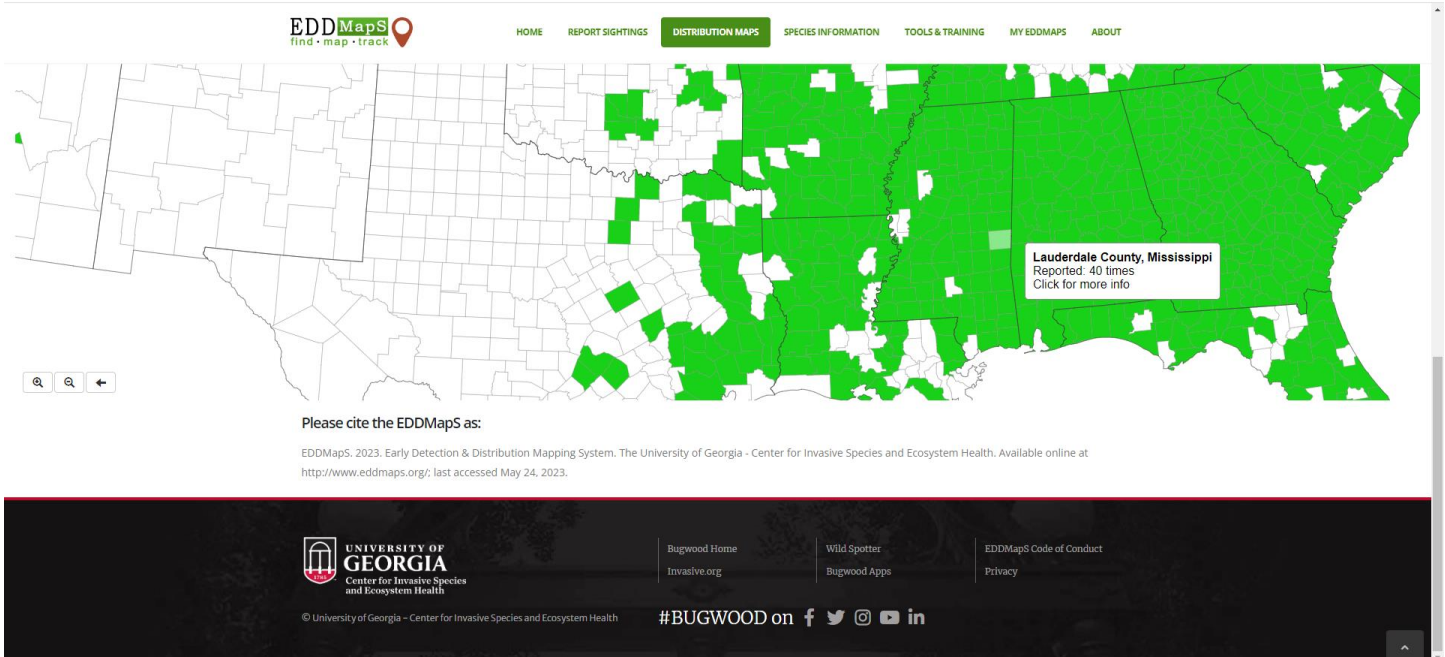
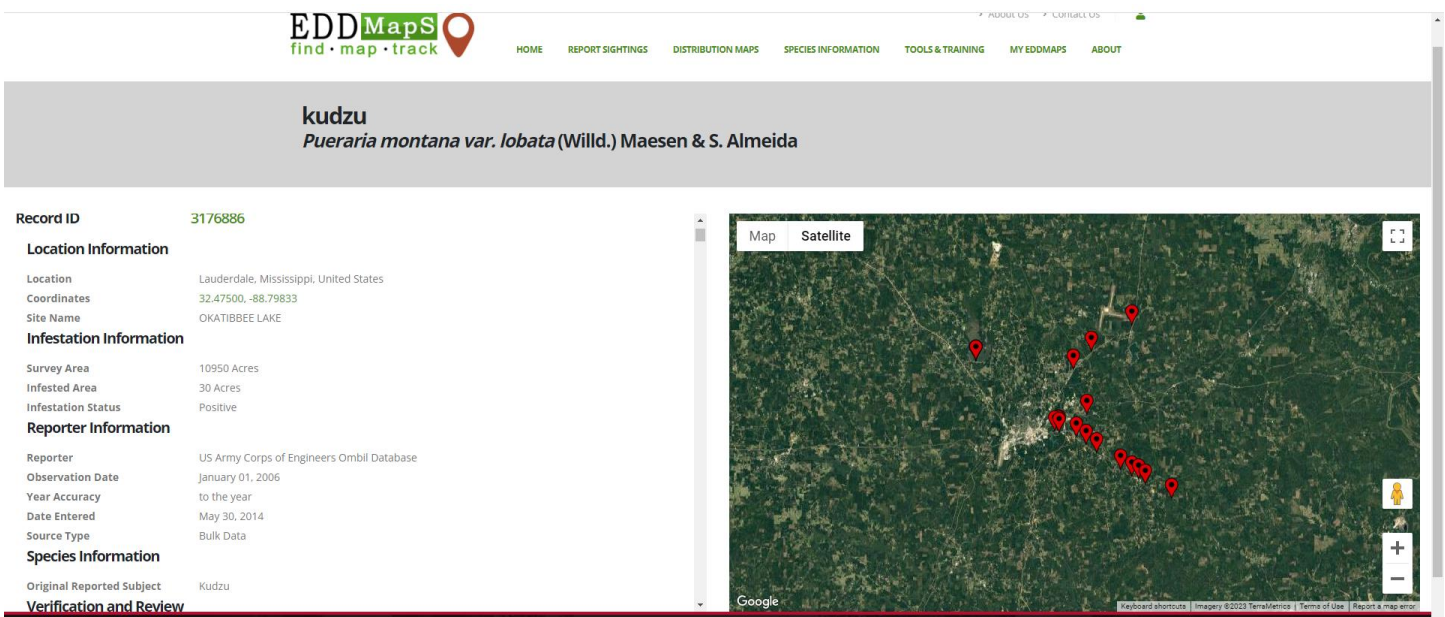
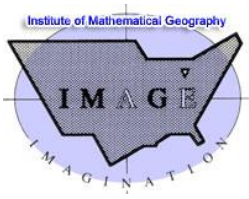


Figure 2. Sample of the interactivity capability the map in Figure 1. Mouse-over a county and information pops up. Here, Lauderdale County, MS, was moused-over. Source: EDDMapS. 2023. Early Detection & Distribution Mapping System. The University of Georgia - Center for Invasive Species and Ecosystem Health. Available online at <http://www.eddmaps.org/>; last accessed May 24, 2023.





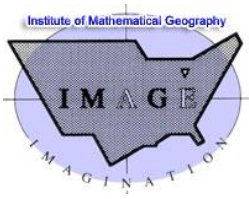
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Figure 3. Reported kudzu sightings, mapped on the right, with data on the left, are exhibited in this screen shot of a partial display of evidence. Source: EDDMapS. 2023. Early Detection & Distribution Mapping System. The University of Georgia - Center for Invasive Species and Ecosystem Health. Available online at <http://www.eddmaps.org/>; last accessed May 24, 2023.

Heartland

One might expect that great rivers would serve to contain the spread of kudzu: that when it reached the Mississippi and the Ohio Rivers that it would not spread across them. Evidently, from looking at the maps in Figures 1, 2, and 3, that is not the case. Kudzu makes its way across apparent natural barriers: perhaps via transport vehicles, perhaps through it being carried by small animals or by humans, or perhaps along the barriers which then become carriers. Nonetheless, these river boundaries coupled with the Atlantic Ocean and Gulf of Mexico coastlines do outline a heart of heavy kudzu concentration--as a 'Heartland.'

The concept of 'Heartland' is not a new one; placing it in the context of 'kudzu' is. In 1904, Halford J. Mackinder presented the 'heartland' concept as the basis for, and subsequent foundational element of, classical global 'Geopolitics' in his 'Geographical Pivot of History' speech to the Royal Geographical Society (Mackinder, 1904). He later (Mackinder, 1919, p. 150) summarized his ideas as the somewhat catchy, perhaps deterministic in nature, version: "Who rules East Europe commands the Heartland; who rules the Heartland commands the World-Island; who rules the World-Island commands the world." What might be sought with kudzu is to control its spread within the Heartland to terminate its devastating environmental impact, both on existing vegetation and on the carbon footprint it leaves behind, on the world.



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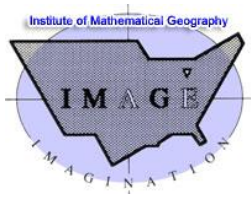
Kudzu: The New Kale?

Plants are sessile (even kudzu); human beings are not and therefore what might be viewed as geographical determinism for human populations might be suitable for invasive plant populations. Context is critical! A good idea, placed in an inappropriate context, may generate bad results: the context where the idea is implemented, rather than the idea itself, may be what is 'bad.'

To assist with Heartland control, we are furthering the connection with the Les Dames d'Escoffier, to entice residents to eat kudzu. Create new ideas for using it as food; promote it as a trendy haute cuisine regional Heartland delicacy. Encourage folks to try eating it. In Meridian, we found that many folks were eager to try it, but that a number also found the idea of eating this horrible scourge to be disgusting...they apparently saw it as only a negative blight and saw none of its potential as a beautiful, edible, leafy green. The challenges of making substantial inroads in the Heartland, in getting the indigenous population to embrace viewing kudzu as a desirable addition to their dinner tables on a regular basis, may be many. Drawing together the skills of great chefs and entrepreneurs, restaurateurs, environmental scientists, and more seems critical to marketing wild kudzu in the Heartland leading kudzu to a role as the new kale!

Rimland

Spykman later revisited Mackinder's ideas and proposed a focus on the coastline as a rim of containment of land activity and an interface with sea activity: what happened in the 'Rimland' was what was important in geopolitics. Paraphrasing Mackinder, Spykman notes: "Who controls the Rimland rules Eurasia; Who rules Eurasia controls the destinies of the world."



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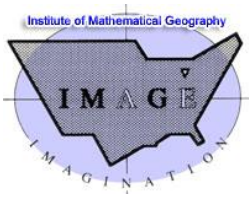
Viewed in the context of kudzu control, what appears critical in the Rimland is to remove the plant more quickly than it can grow. Literally, eat back its edges so it cannot progress. In the Rimland, interaction with Les Dames d'Escoffier will take on a form different from that in the Heartland.

Louisiana and Arkansas already have substantial concentrations of kudzu with more coming in all the states just outside the Heartland and even one interesting patch in western Oregon (causing one to wonder if the leapfrog effect is real or if there is an unreported pathway of kudzu concentrations from the Heartland to the west coast). In the Rimland, one might expect that there is no existing prejudice against eating kudzu. So, having a network of sentinels, take stock of the presence of kudzu in their region, report sightings to the University of Georgia network, and then use recipes or suggestions from chefs and restaurants in the Heartland to educate Rimland population could reduce the spread of the plant pest. Eat back the edges and literally, nip kudzu's spread in the bud.

Administration of the Kudzu Project

There is considerable administrative effort associated with the idea of implementing a project that involves far-flung populations across the entire continent and their food preferences associated with kudzu. At the outset at least, it seems to make sense to have two administrative centers, one in the Heartland and one in the Rimland, associated with previous work involving kudzu by existing practitioners in multiple disciplines in numerous locations—but with a focus on the human consumption of kudzu.

Heartland Administrative Center



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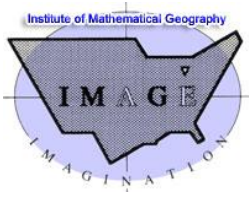
The Heartland Administrative Center has been functioning in Meridian, MS at a combination of locales: the home of the author and a local restaurant (owned by the author's son). That combination has worked well, at least in the infancy of project development. In the long run, however, other capabilities will no doubt become important. In the meantime, the focus in Meridian is to continue current activities throughout the kudzu season and to offer reasons why this particular location is well-suited as an administrative center.

Home of Premium Kudzu

One factor that is important, when considering cooking with kudzu, is to ask about the quality of the plant, as one might ask about the quality of tomatoes or peaches in a grocery store. Yes, it is critical that the plants were not treated with chemicals or exposed to large amounts of vehicle exhaust. It is just as important to know what the plants drink and breathe. Meridian is a fine choice to consider as a location for harvesting high quality, indeed premium, kudzu. The aquifer underlying that part of Mississippi has no PFAs (toxic 'forever' chemicals), at least at a sampling point near Meridian, according to an article in USA Today. In fact, it was the only one of 50 tested sites that had 0 PFAs.

"Only one city, Meridian, Mississippi, which uses well water 700 feet below the surface, found no PFAS, while Tuscaloosa, Alabama and Seattle had levels lower than the 1 part per trillion limit advised by the EWG" (Bote, 2020).

Now that is for water directly from the aquifer (USGS 2021); there is no saying what that means once the water gets into a distribution network of pipes. But the good news is that for the aquifer to have remained clean, the rain and runoff that are feeding the aquifer are in good shape. Thus, harvesting WILD local kudzu fed with natural rainwater and runoff, rates to generate a product superior to harvesting domesticated kudzu watered with sprinklers and such, as well to product grown



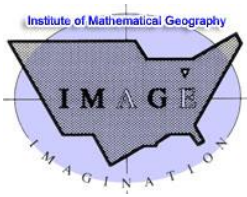
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elsewhere—motivation for people to get out and harvest a free product that can then be sold as premium. Further, there seems to be no existing heavy industry nearby that produces large amounts of air- or water-borne contaminants. All of this adds up to the suitability of harvesting wild kudzu based on spatial patterns of roads, aquifer quality, industrial location, lawn care practice and chemical usage, and more. Any region wishing to claim premium wild kudzu would seem to need to meet these and perhaps more standards. Wild kudzu from Meridian may be able to set those standards.

Kudzu as Cottage Industry

The rural folks in the Heartland, however, may not have such access. And, where is most of the kudzu grown? In the rural areas of counties. Thus, our willingness to include them as interested parties in Green Tables may give them a leg up if they wish to create a Cottage Food Sales capability from their own homes. The State of Mississippi encourages such practice; there are no expensive licensing fees, rigorous tests, or inspections (Mississippi State University, 2023). There are only simple rules to comply with and then a Cottage Food Industry can open. Usually, the Cottage Food locations are rural and usually they are created by women. Indeed, one sees parallels all over the world in rural/urban transitions in a variety of countries as rural women begin to enter the workforce in ways that do not require start-up funds or extra training and still permit them to stay at home and raise children. How suitable for a Les Dames Green Table project! And, a Meridian administrative center is well-suited to managing this sort of network as it is the county seat of Lauderdale County, situated in otherwise rural East Central Mississippi, adjacent to rural West Central Alabama.

Rimland Administrative Center



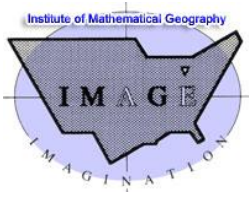
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Within the structure of the LDEI framework, there is room for any chapter wishing to do so to claim projects as “Green Table” projects (LDEI 2023). The Ann Arbor Chapter (LDEAA) adopted the Kudzu Project as a Green Table project, in June of 2023. Thus, Green Table LDEI advice becomes available to the Rimland networks of participants as well as the Heartland participants if they wish it. LDEAA serves as the Rimland Administrative Center, from which it can disseminate Green Table and other project information, advice, and collaboration.

Indeed, as *Solstice* was going to press, a popular call to study kudzu in Michigan came about (Jaworowski, 2023)! While this particular item is noteworthy as a timely entry from the press, it is not the only expression of concern regarding kudzu in Michigan. Earlier comment appeared elsewhere, as for example in:

- Freedman, Eric. April 2023. “Watch Out! Creepy Kudzu is Coming.” <https://www.manisteenews.com/news/article/invasive-kudzu-found-lake-michigan-shoreline-17891158.php>
- Michigan Invasive Species Program. “Invasive Species: Kudzu.” <https://www.michigan.gov/invasives/id-report/plants/vines/kudzu>
- The Nature Conservancy. August 2019. Stories in Indiana. Kudzu: the Invasive Vine that Ate the South. <https://www.nature.org/en-us/about-us/where-we-work/united-states/indiana/stories-in-indiana/kudzu-invasive-species/>
- Michigan United Conservation Clubs. August 2016. “Invasive Species Watchlist: Kudzu.” <https://mucc.org/invasive-species-watchlist-kudzu/>
- Michigan State University. February 2016. National Invasive Species Awareness Week: Michigan Species and What You Should Know, Day Three (Featured Michigan Terrestrial Is Kudzu). https://www.canr.msu.edu/news/national_invasive_species_awareness_week_michigan_species_and_what_you_shou

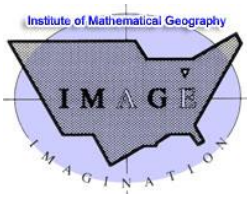
Clearly, a Michigan administrative center is suitable!



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Thus, LDEAA is creating a network of participants positioned in key Rimland locations throughout the country to both monitor and educate surrounding population in the consumption of kudzu. From suggestions on Apps to identify kudzu and harvest it (keep leaves on the vine so not all leaves need testing with the App), to how to report sightings to the University of Georgia database, to how to think about using kudzu as a garnish or as a food to cook with, to the education of others, to related public health or legal issues: the network of Rimland volunteers plans to communicate on a regular basis using Zoom. There is a strong axis, from Meridian to Ann Arbor, around which to build nationwide networking involving haute cuisine using kudzu.

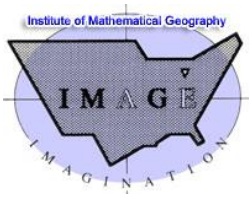
We seek more volunteers in the Rimland, and, to continue to fuel suggestions from the Heartland, we need volunteers from Heartland locales as well. Currently, we have about 10 participants in the Rimland and about 40 participants in the Heartland. Please email me, sarhaus@umich.edu, if you wish to participate.



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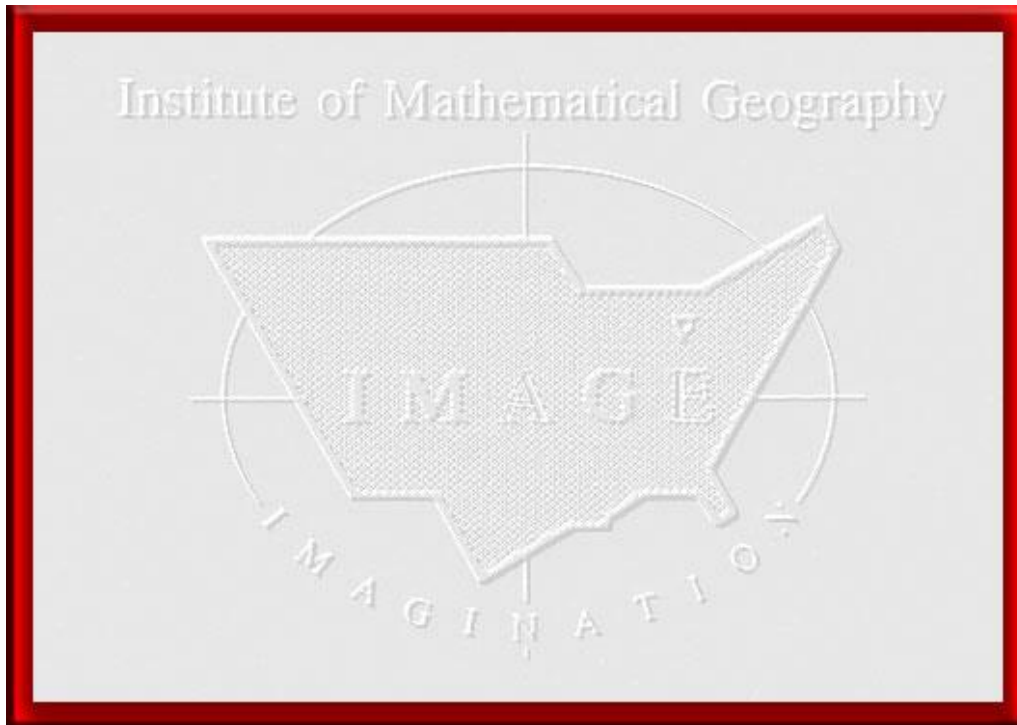
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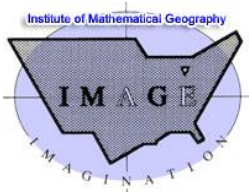
Endmatter



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*.



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

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- 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.