

week 2: **data**

foundations of geospatial analysis

2026.08.31

group curations!

group curation details

- five presentation groups of 3-4 ppl
- pick a geospatial project, process, or product
- pick your groups & date (sign-ups on Canvas)
- 15 minutes of talking, 5 minutes of questioning

[more details on the course site](#)

**first group will present
wednesday, sep 16**

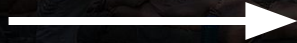
first lab!

data!





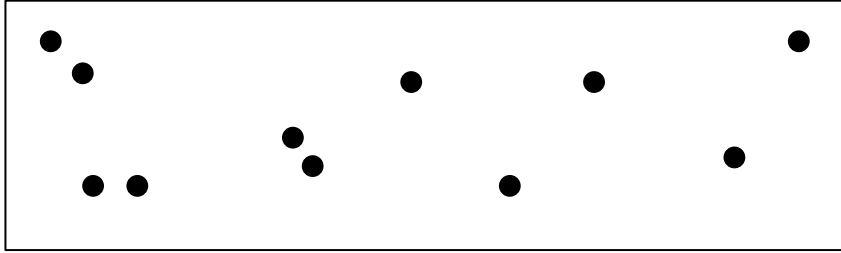
**observations
in the world**



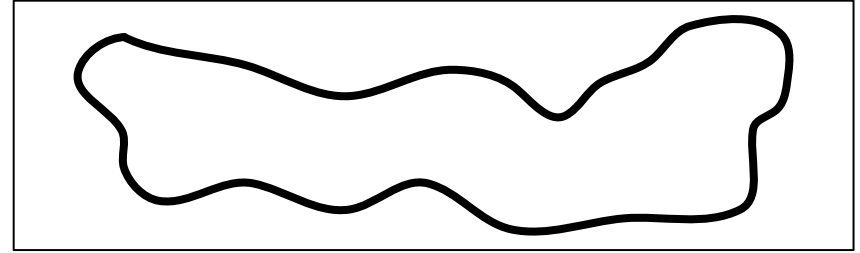
spatial data??

kinds of observations

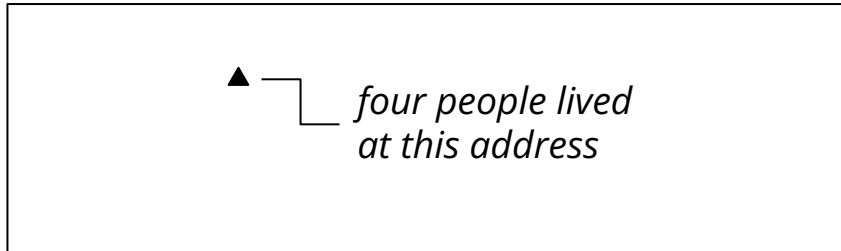
individual (*e.g., archaeological discoveries*)



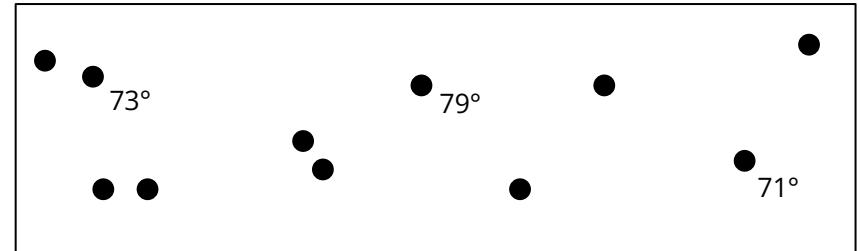
aggregate (*e.g., survey range*)



discrete (*e.g., people*)

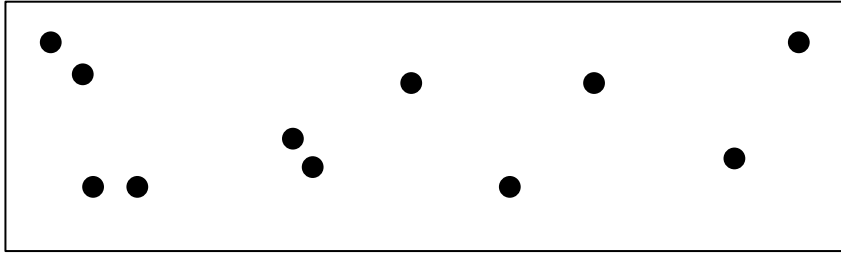


continuous (*e.g., temperature*)

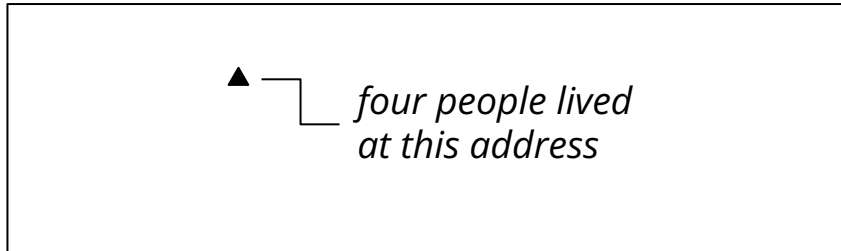


kinds of observations

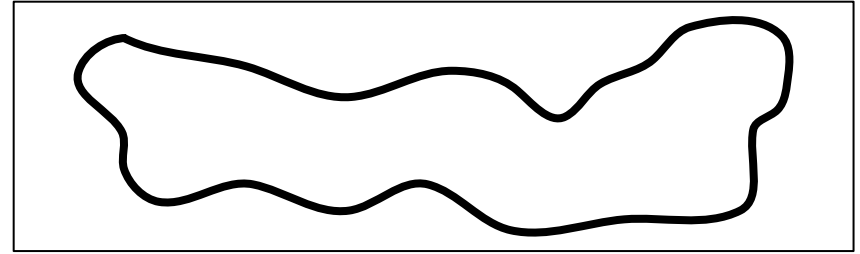
individual (*e.g., archaeological discoveries*)



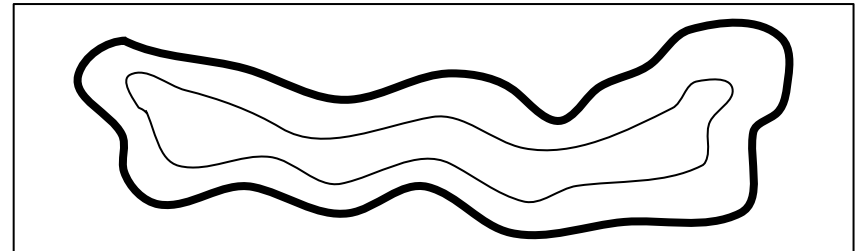
discrete (*e.g., people*)



aggregate (*e.g., survey range*)



continuous (*e.g., temperature*)



where data comes from

primary	secondary	tertiary
<i>manual collection</i> - global positioning systems (GPS) - smart phones - from existing maps - remotely sensed imagery	<i>aggregated primary data</i> - US census - regional governments - private data brokers - NGO/nonprofits	<i>aggregated secondary data</i> - maps/data made from maps/data made from other maps/data

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two genres of
data: *qualitative* **and**
quantitative

qual/quant data characteristics

qualitative	quantitative
differences in kind. shouldn't be mathed. can be nominal or ordinal (electoral victories, streams vs. rivers vs. lakes, railroads versus highways, every VA county's favorite coffee shop)	differences in amount. can be mathed. can be interval or ratio (count of votes cast in election, width of water body, maximum speed in <i>mph</i>, how many Dunkins per county)

qual/quant data characteristics

qualitative	quantitative
typically symbolized with... a range of arbitrarily different color hues (e.g., differences in kind of color) symbols of categorical type	typically symbolized with... differences in color value or intensity, such as lighter red to darker red symbols of graduated size

qualitative data

qualitative

- qualities or categories (y/n)
- here, we have some quant data too (+/-)
- the “changed maps” attributes can’t be mathed

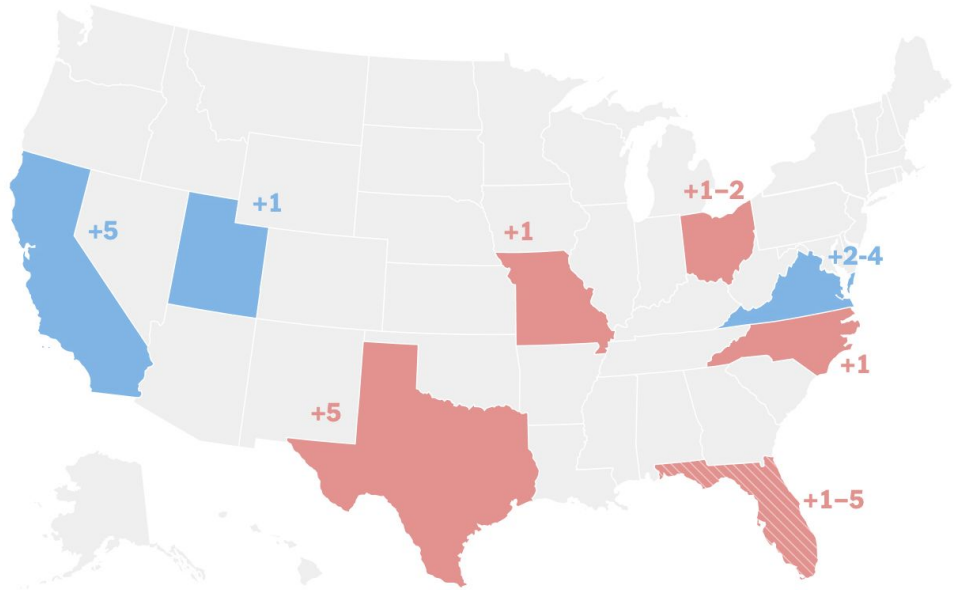


April 21, 2026, 9:42 p.m. ET
[Nick Corasaniti](#)



Here's where the national fight over gerrymandered maps stands.

■ Changed maps ■ Action taken to change maps



qualitative symbols



qualitative symbols



police

FIGURE 11 Maki “police” icon reproduced following “CC0 1.0 Universal” status (Mapbox [n.d. a](#)).



police

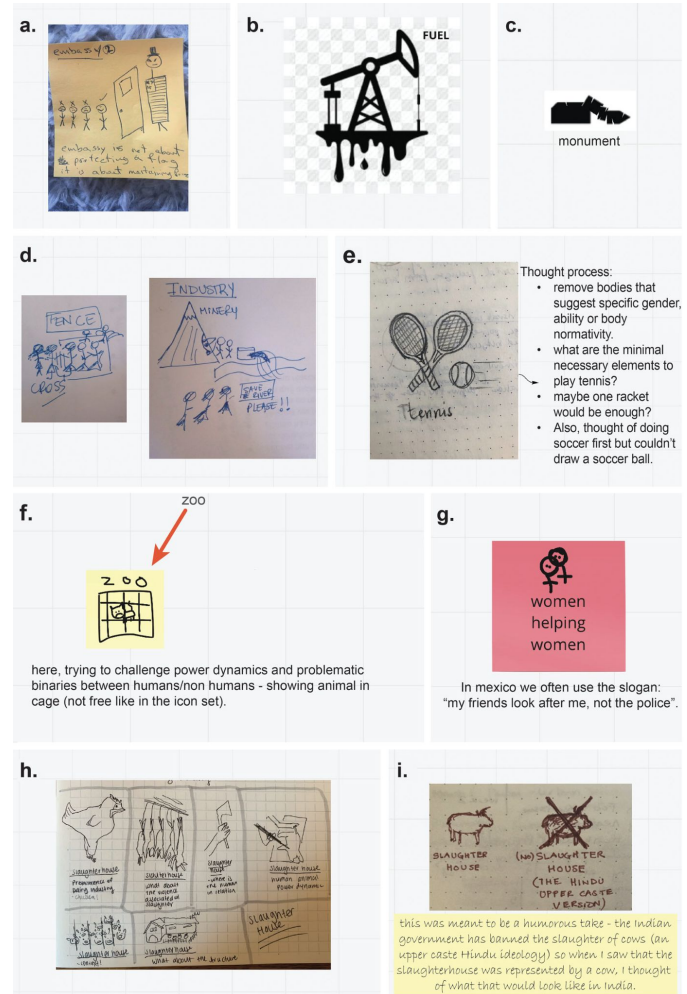


police



police

FIGURE 15 Alternative icon designs for police that draw on and subvert power.



qualitative symbols



FIGURE 11 Maki “police” icon reproduced following “CC0 1.0 Universal” status (Mapbox [n.d.](#) a).



police



police

FIGURE 15 Alternative icon designs for police
vert power.

Mapping Bodies, Designing Feminist Icons

Meghan Kelly
Dartmouth College, USA

Bodies are nuanced, fluid, and political—often combining forms of intersecting and experiential identities. Nevertheless, bodies are frequently missing from maps altogether or, when they are included on maps, they are reduced to points, lines, and polygons. Focusing on iconography, I explore the depiction of bodies in map symbolization through a feminist lens. I apply a feminist semiotic analysis to thirty-eight Maki icons to problematize the ways in which bodies are depicted, abstracted, or erased. I analyze icon symbolization, particularly the presence/absence of bodily forms, the presence/absence of an embodied object, and the icons' iconicity. My feminist analysis reveals the underlying silences, defaults, and power dynamics within the Maki icon set. I call mapmakers to rethink the depictions of bodies in icons—and the role of “universal” icon sets, more broadly—through a feminist lens. I offer design opportunities as a starting point for such an endeavor. **Key Words:** cartography, embodiment, feminist mapping, iconography, semiotics.

Thought process:

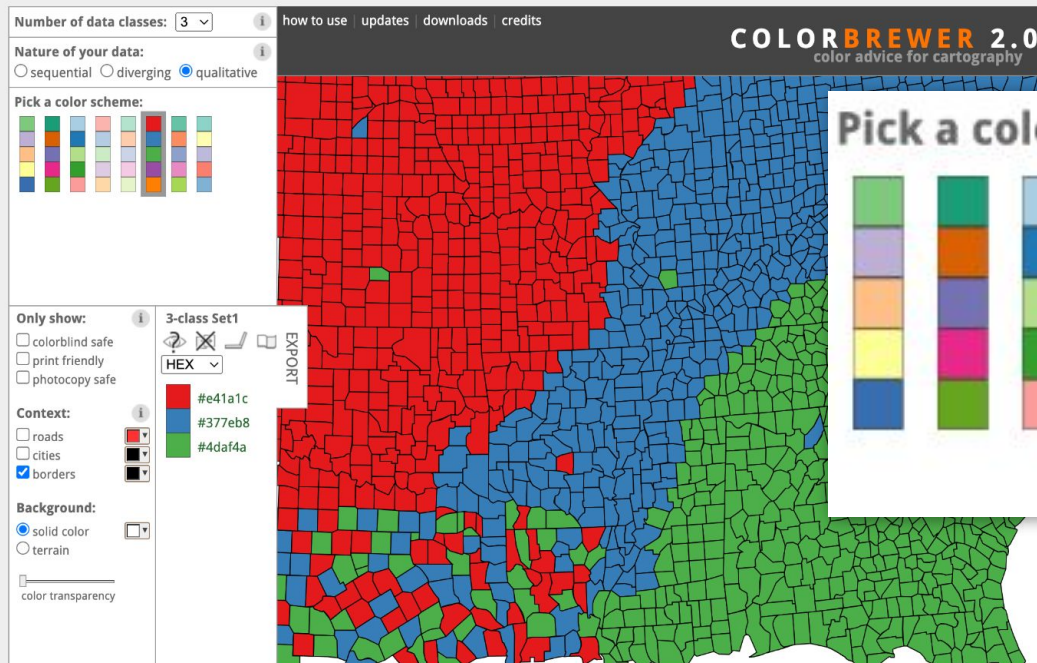
- remove bodies that suggest specific gender, ability or body normativity.
- what are the minimal necessary elements to play tennis?
- maybe one racket would be enough?
- Also, thought of doing soccer first but couldn't

Power is at the core of the icon's design. First, the “police” icon is the only *body-body* icon in the Maki icon set. It is also the most detailed bodily icon. By designing a sign-vehicle that directly personifies its referent, the “police” icon is privileged above the rest. Given the level of detail in its design, the “police” icon is arguably unmistakable in interpretation. On the iconicity continuum in Figure 5 that ranges from abstract to iconic, the “police” icon marches toward iconic and further distinguishes itself as important and powerful. It is one of two icons with noticeable clothing. (The other is the figure in a dress in the “bathroom” icon.) The bodily figure in the “police” icon is wearing a hat and a decorative diagonal sash. The level of detail or lack of generalization in its bodily form gives this icon priority and power. Its iconic and accessorized body creates unquestioned power. What would happen if we removed details like the body's hat and sash through generalization? What if we abstracted the icon altogether into a triangle or circle? A feminist approach examines generalization and detail as power differentials within icon design, prioritizing some (“police”) over others.

The figure's body language appears with an upright and bent arm recognized by many as the “stop” gesture. The icon appears authoritative and dominant. It is almost as if the icon is tapping us on our shoulders. Its body language and posture create emotive responses. My

upper caste Hindu ideology, so when I saw that the slaughterhouse was represented by a cow, I thought of what that would look like in India.

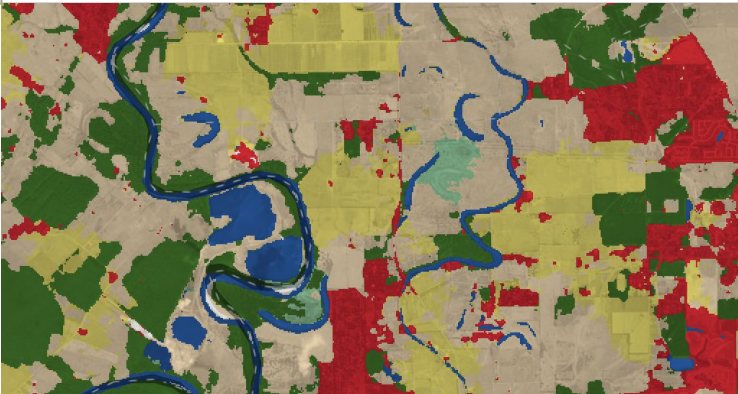
qualitative color ramp



Pick a color scheme:



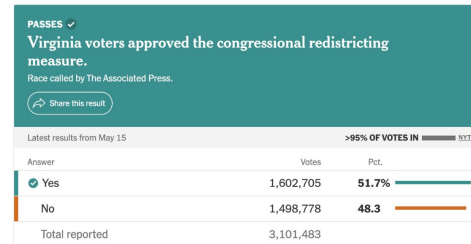
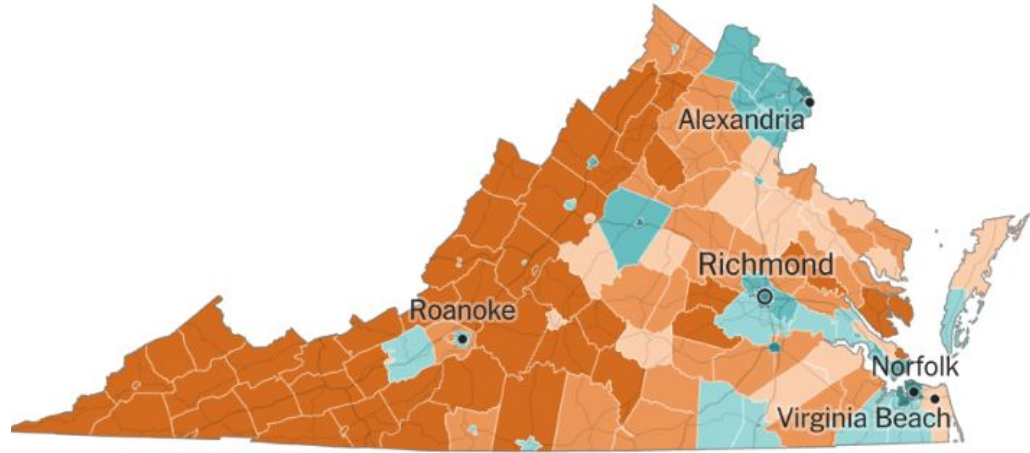
differences in qualitative data types

nominal	ordinal
<i>categories without rank/order</i> - land cover - zoning maps	<i>categories with rank/order</i> - low, med., & high fire risk zones - urban annexations by year
	

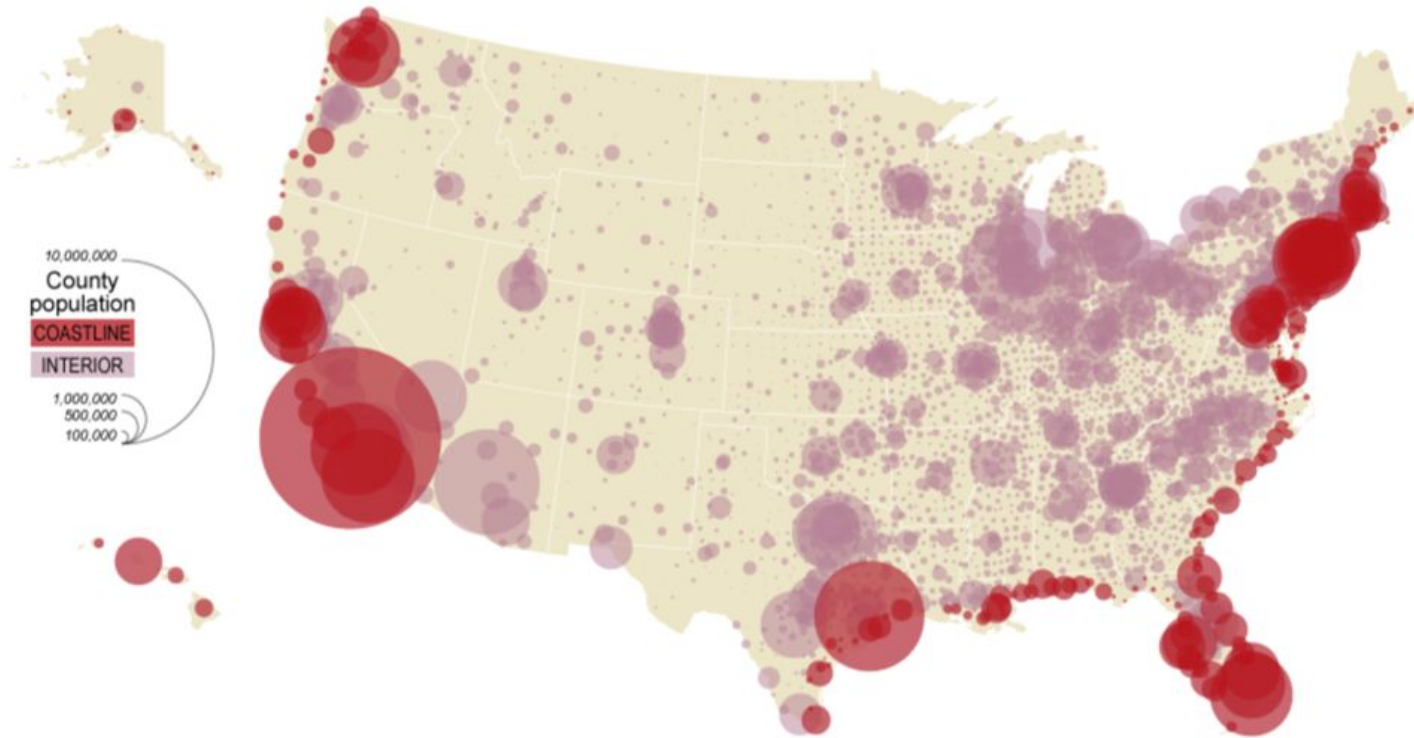
quantitative data

quantitative

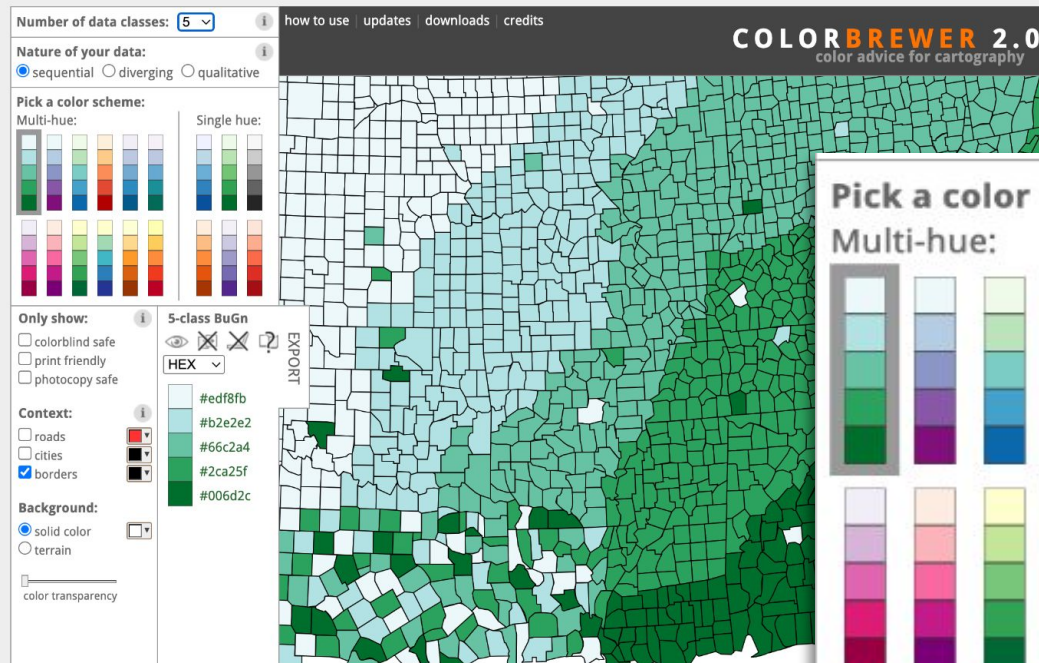
- amounts (%)
- shades represent magnitude
- votes cast can be mathed



quantitative symbols

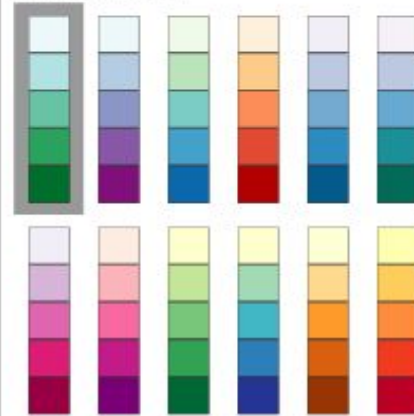


quantitative color ramp



Pick a color scheme:

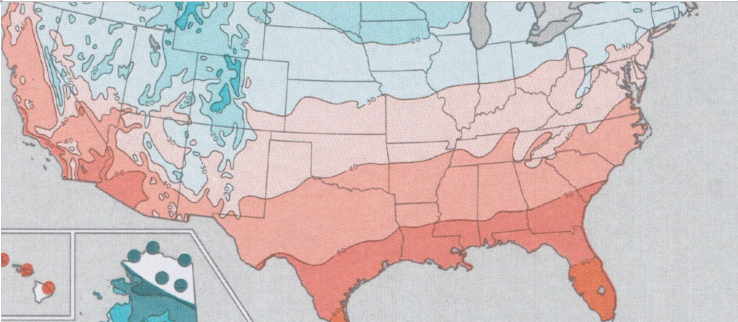
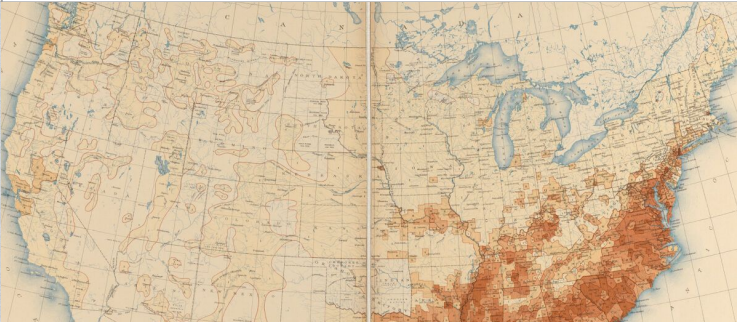
Multi-hue:



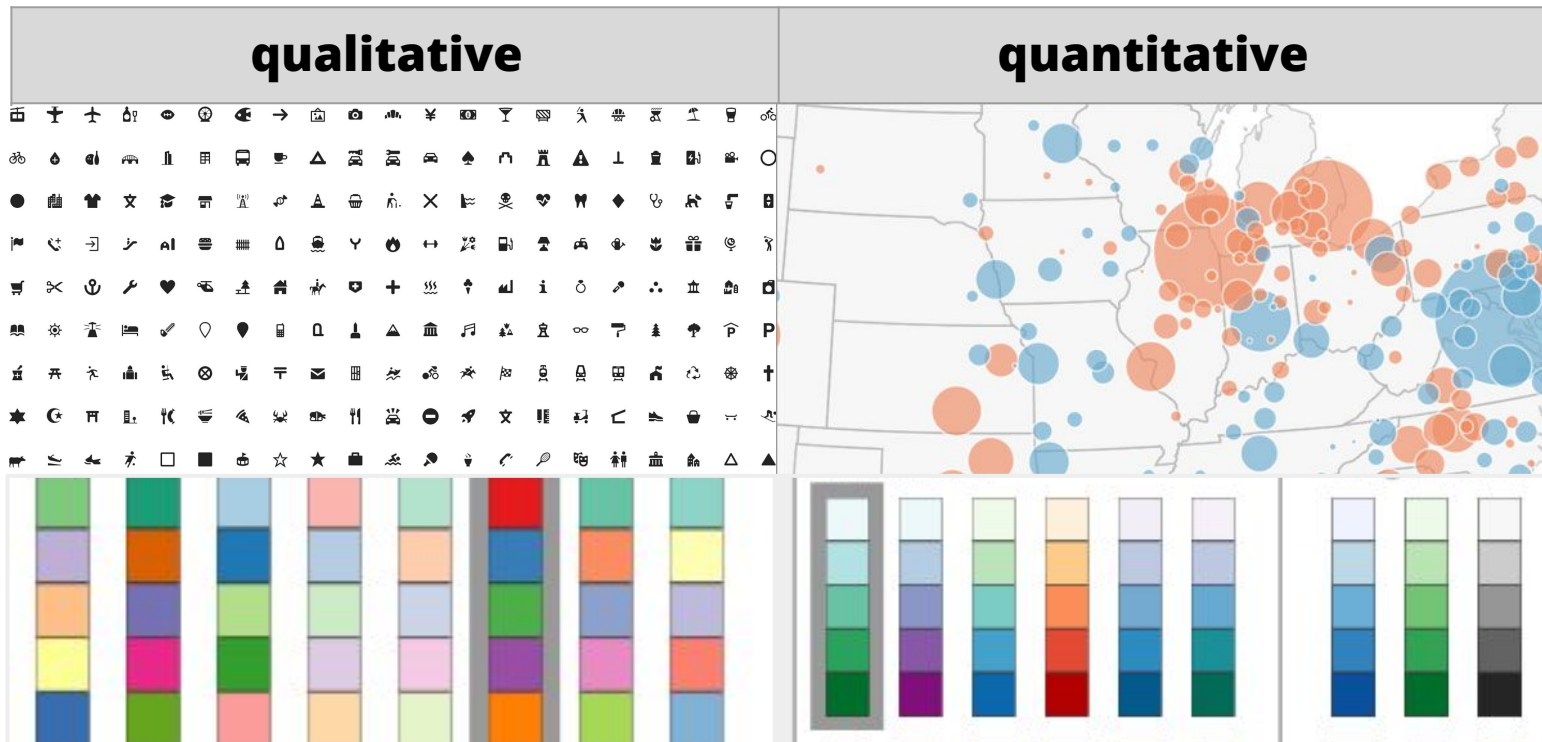
Single hue:



differences in quantitative data types

interval	ratio
<i>order with measurable difference between values, but no absolute zero</i> - temperature - shoe size	<i>order with measurable difference between values, with absolute zero</i> - population - income
	

recap



what kind of map is this?

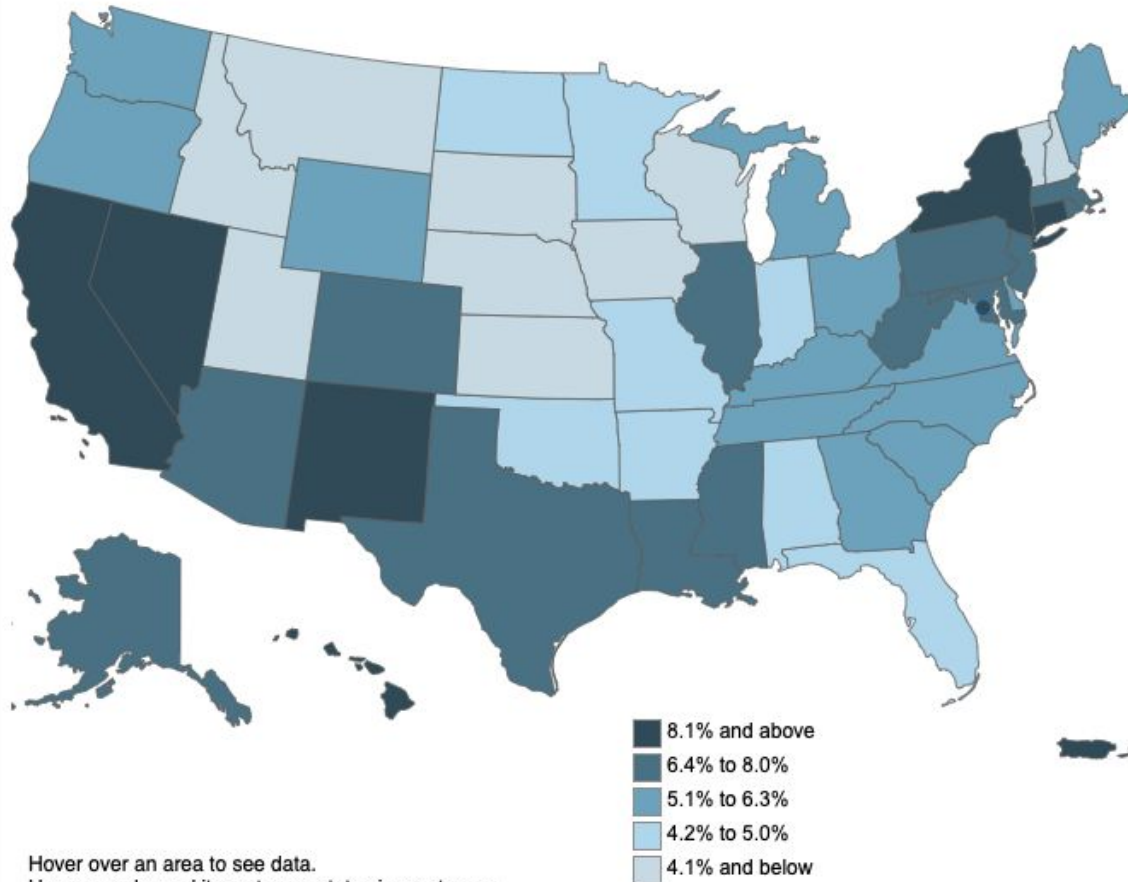
qualitative (categories)

- *nominal (unranked)*
- *ordinal (ranked)*

quantitative (numerical)

- *interval (no zero value)*
- *ratio (has zero value)*

State unemployment rates, January 2021, seasonally adjusted



Hover over an area to see data.
Hover over legend items to see states in a category.
Source: U.S. Bureau of Labor Statistics.

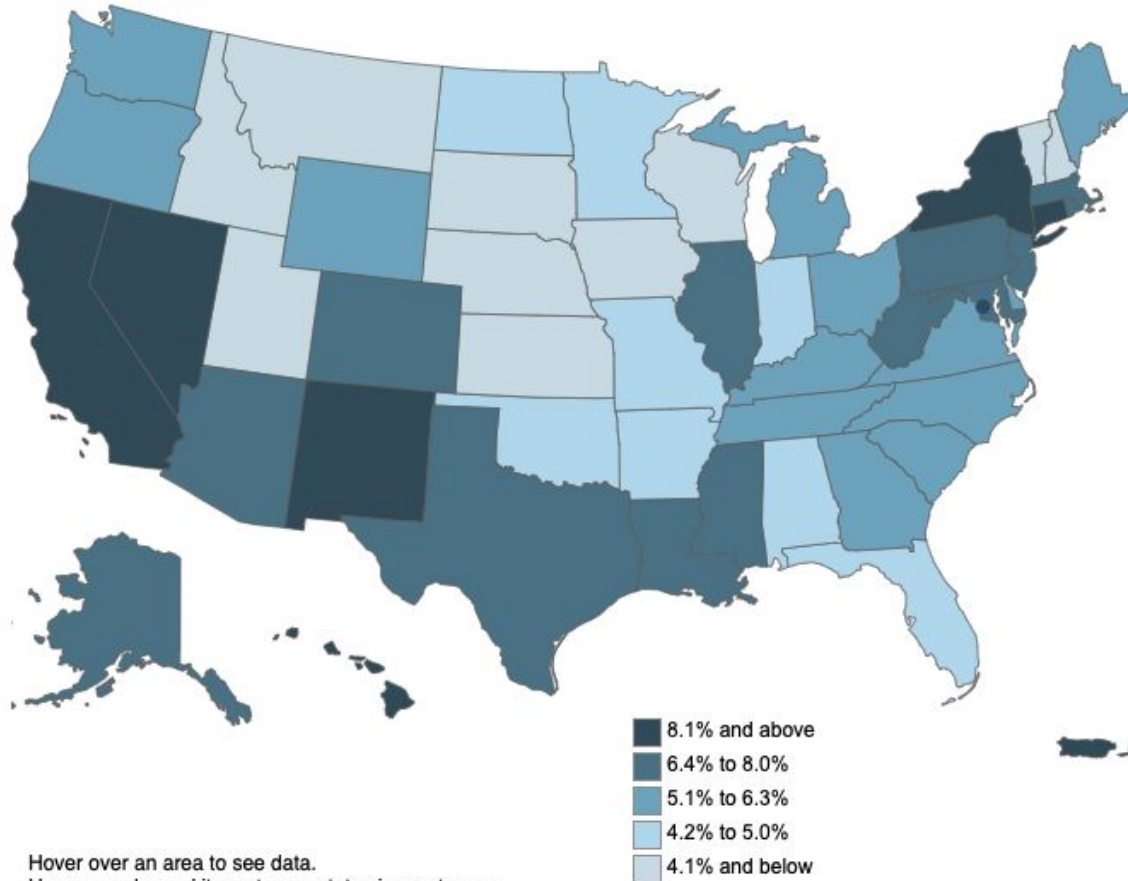
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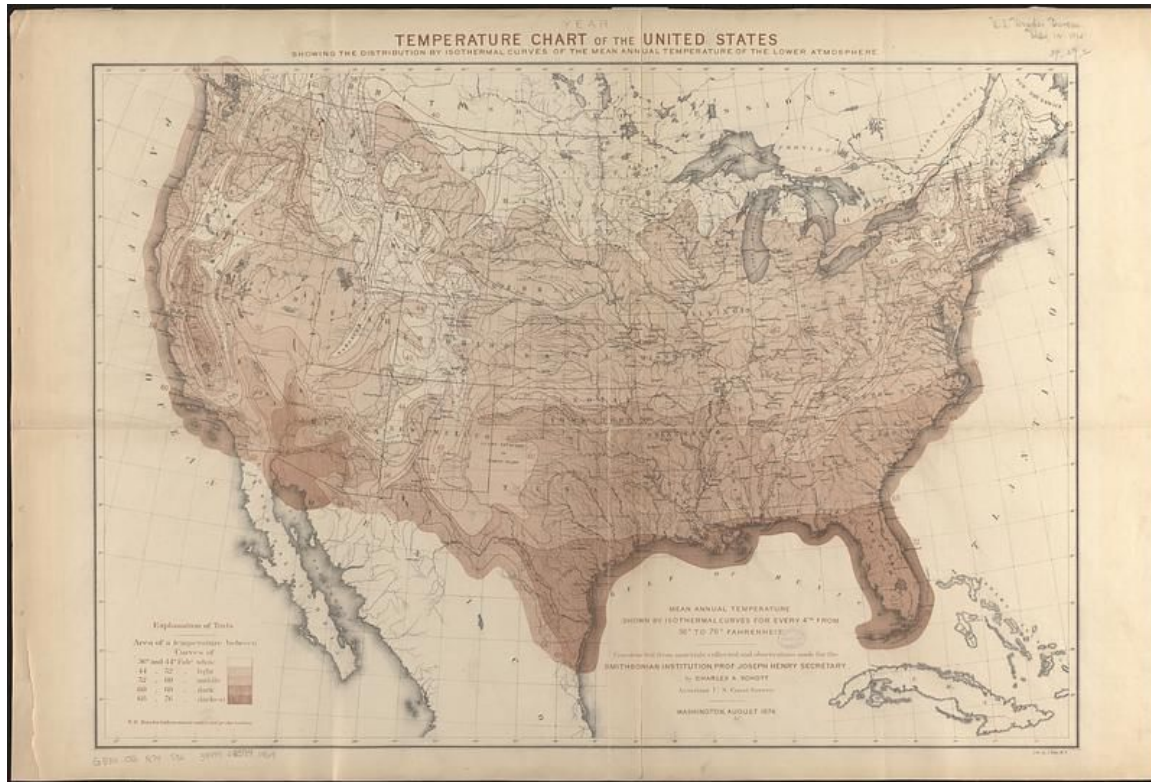
quantitative (numerical)

- *interval (no zero value)*
- *ratio (has zero value)*

**quantitative,
ratio**

—

*because the data can
be measured against
one another and
have an absolute
zero*

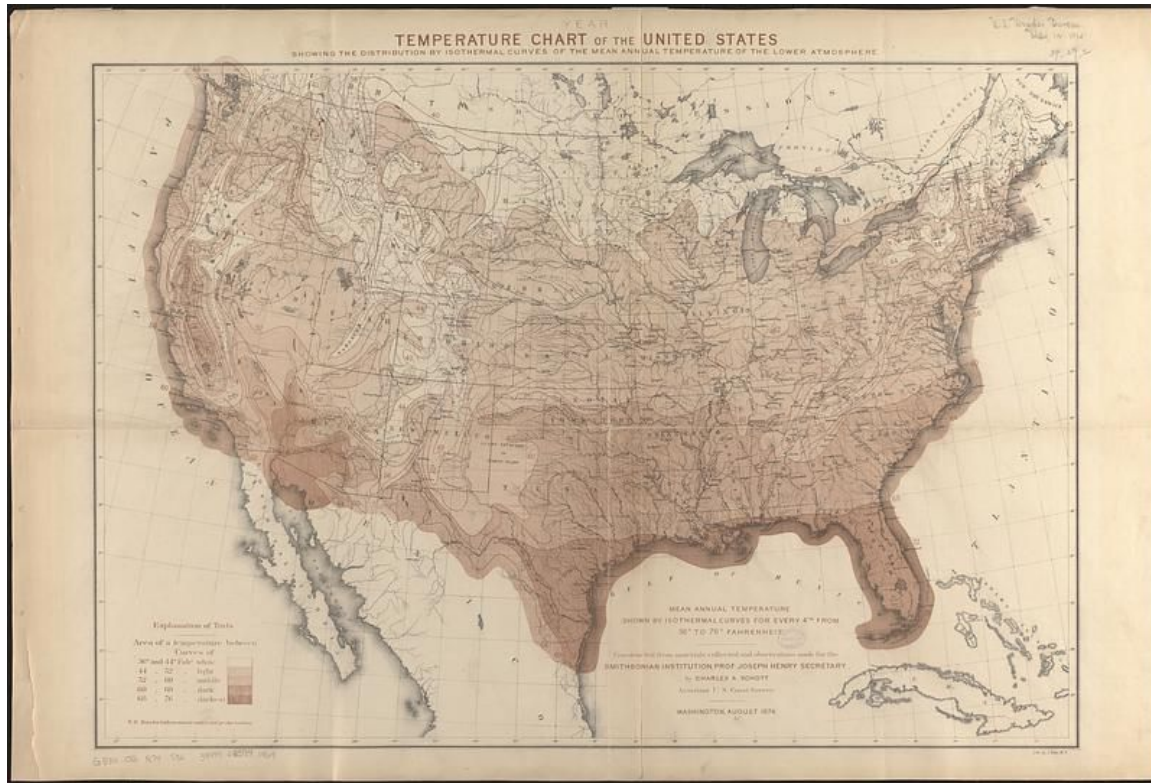


qualitative (categories)

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- *ordinal (ranked)*

quantitative (numerical)

- *interval (no zero value)*
- *ratio (has zero value)*



qualitative (categories)

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- *ordinal (ranked)*

quantitative (numerical)

- *interval (no zero value)*
- *ratio (has zero value)*

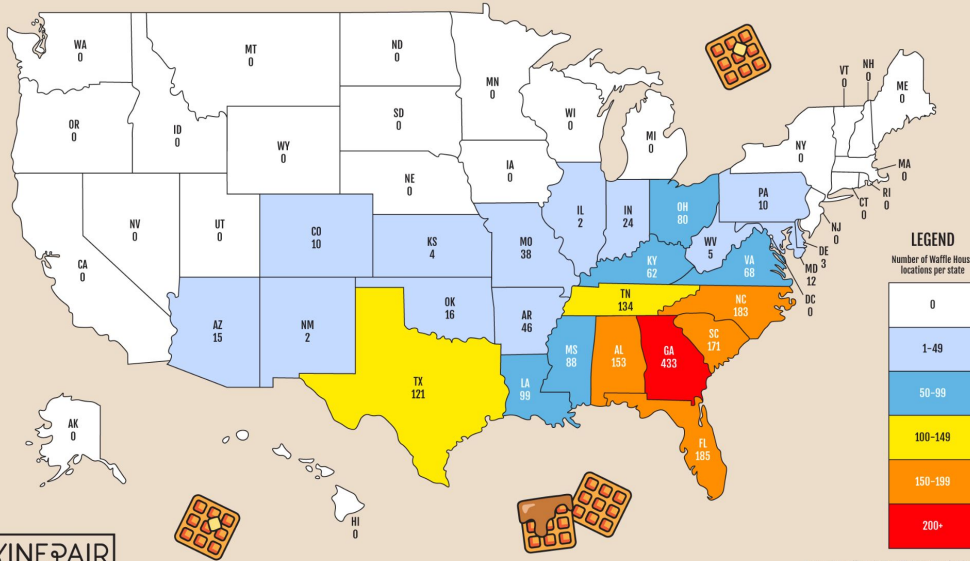
**quantitative,
interval**

—

*relative comparisons can
be made between the
measurements, but there
is no absolute*

WAFFLE HOUSE

LOCATIONS IN EVERY STATE (2022)

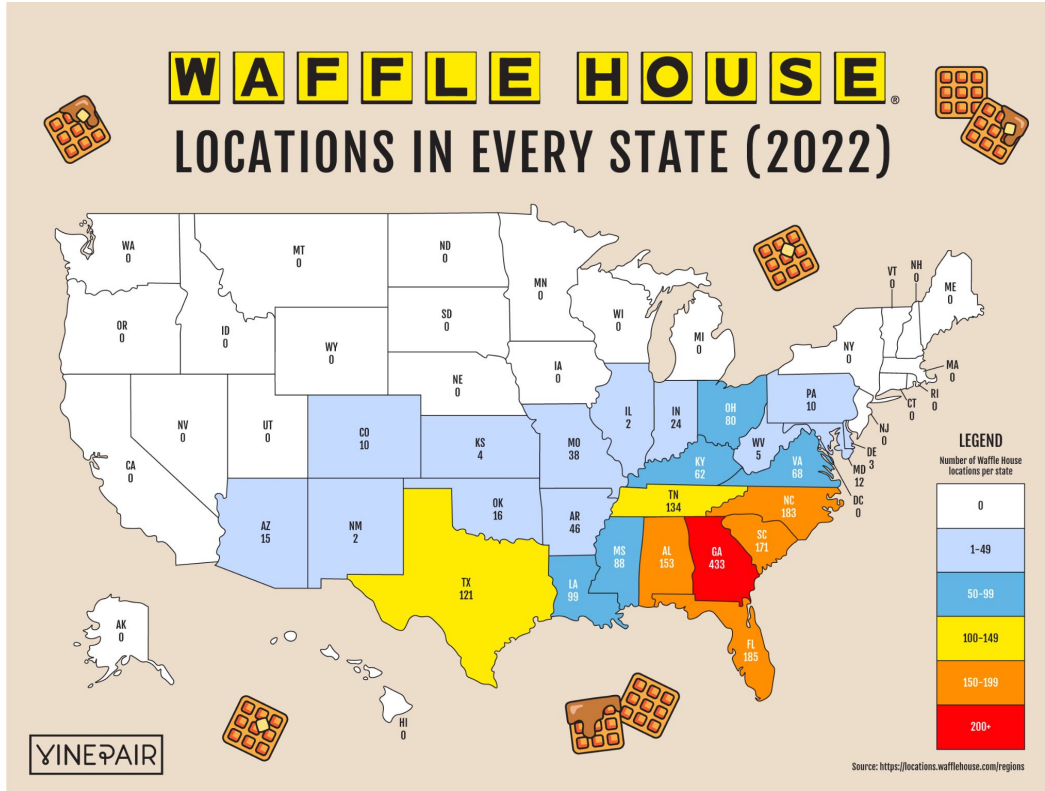


qualitative (categories)

- *nominal (unranked)*
- *ordinal (ranked)*

quantitative (numerical)

- *interval (no zero value)*
- *ratio (has zero value)*



qualitative (categories)

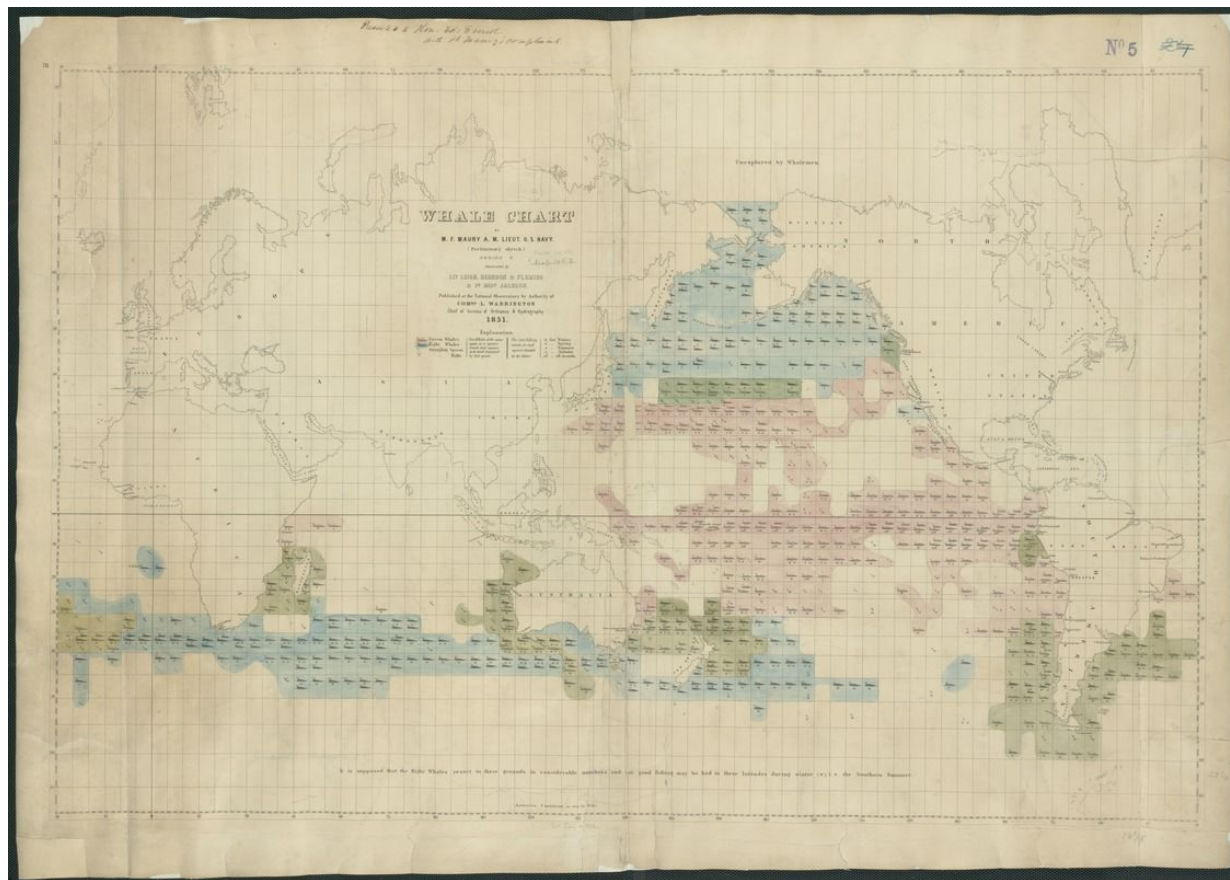
- *nominal (unranked)*
- *ordinal (ranked)*

quantitative (numerical)

- *interval (no zero value)*
- *ratio (has zero value)*

**quantitative,
ratio**

—
*because the data can be
measured against one another
and have an absolute zero*



qualitative (categories)

- *nominal (unranked)*
- *ordinal (ranked)*

quantitative (numerical)

- *interval (no zero value)*
- *ratio (has zero value)*

**qualitative,
nominal/ordinal**

differences in kind are shown, but they can maybe be ranked

MOBY-DICK;

OR,

THE WHALE.

BY

HERMAN MELVILLE,

AUTHOR OF

"TYPEE," "OMOO," "REDBURN," "MARDI," "WHITE-JACKET."

NEW YORK:

HARPER & BROTHERS, PUBLISHERS.

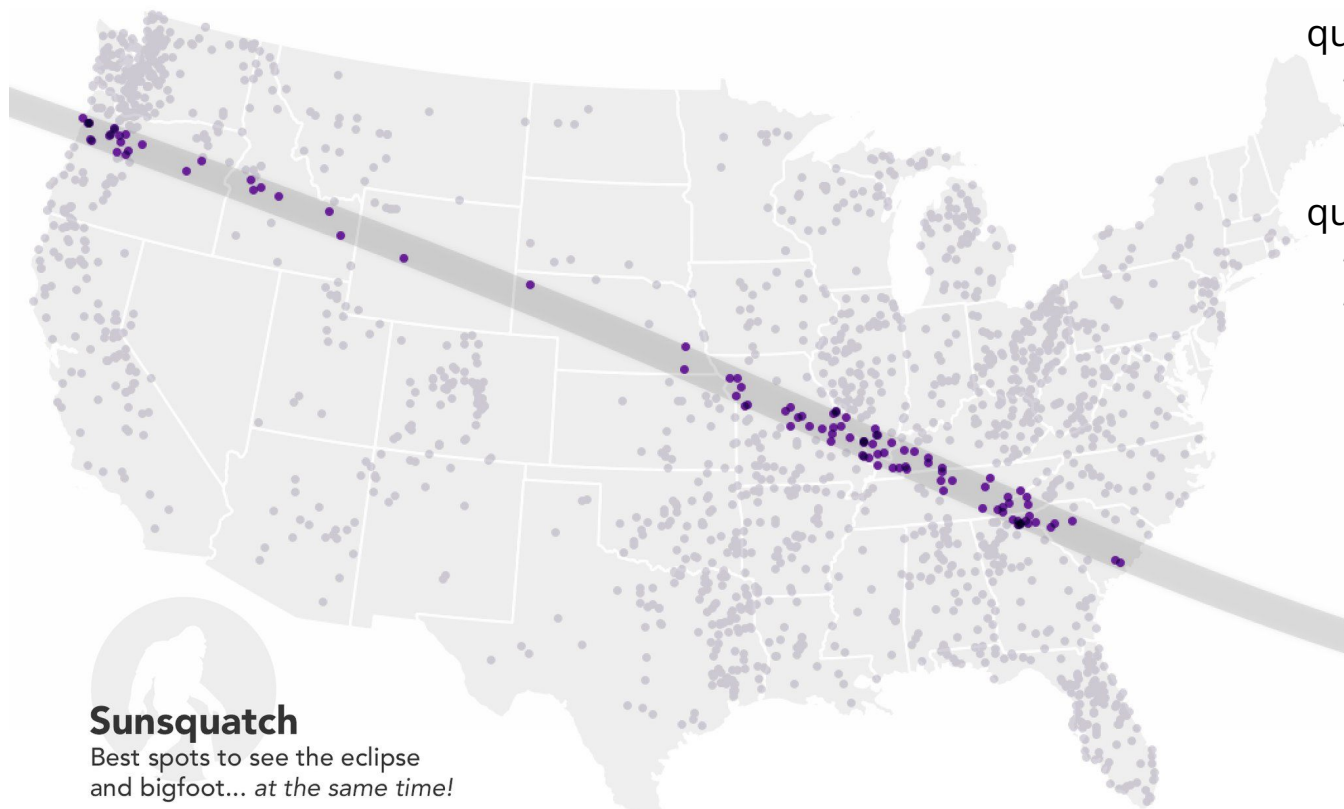
LONDON: RICHARD BENTLEY.

1851.

of the sperm whale's resorting to given waters, that many hunters believe that, could he be closely observed and studied throughout the world; were the logs for one voyage of the entire whale fleet carefully collated, then the migrations of the sperm whale would be found to correspond in invariability to those of the herring-shoals or the flights of swallows. On this hint, attempts have been made to construct elaborate migratory charts of the sperm whale.*

Besides, when making a passage from one feeding-ground to another, the sperm whales, guided by some infallible instinct—say, rather, secret intelligence from the Deity—mostly swim in *veins*, as they are called; continuing their way along a given ocean-line with such undeviating exactitude, that no ship ever sailed her course, by any chart, with one tithe of such marvellous precision. Though, in these cases, the direction taken by any one whale be straight as a surveyor's parallel, and though the line of advance be strictly confined to its own unavoidable, straight wake, yet the arbitrary *vein* in which at these times he is said to swim, generally embraces some few miles in width (more or less, as the vein is presumed to expand or contract); but never exceeds the visual sweep from the whale-ship's mast-heads, when circumspectly gliding along this magic zone. The sum is, that at particular seasons within that breadth and

* Since the above was written, the statement is happily borne out by an official circular, issued by Lieutenant Maury, of the National Observatory, Washington, April 16th, 1851. By that circular, it appears that precisely such a chart is in course of completion; and portions of it are presented in the circular. "This chart divides the ocean into districts of five degrees of latitude by five degrees of longitude; perpendicularly through each of which districts are twelve columns for the twelve months; and horizontally through each of which districts are three lines; one to show the number of days that have been spent in each month in every district, and the two others to show the number of days in which whales, sperm or right, have been seen."



Sunsquatch

Best spots to see the eclipse
and bigfoot... *at the same time!*

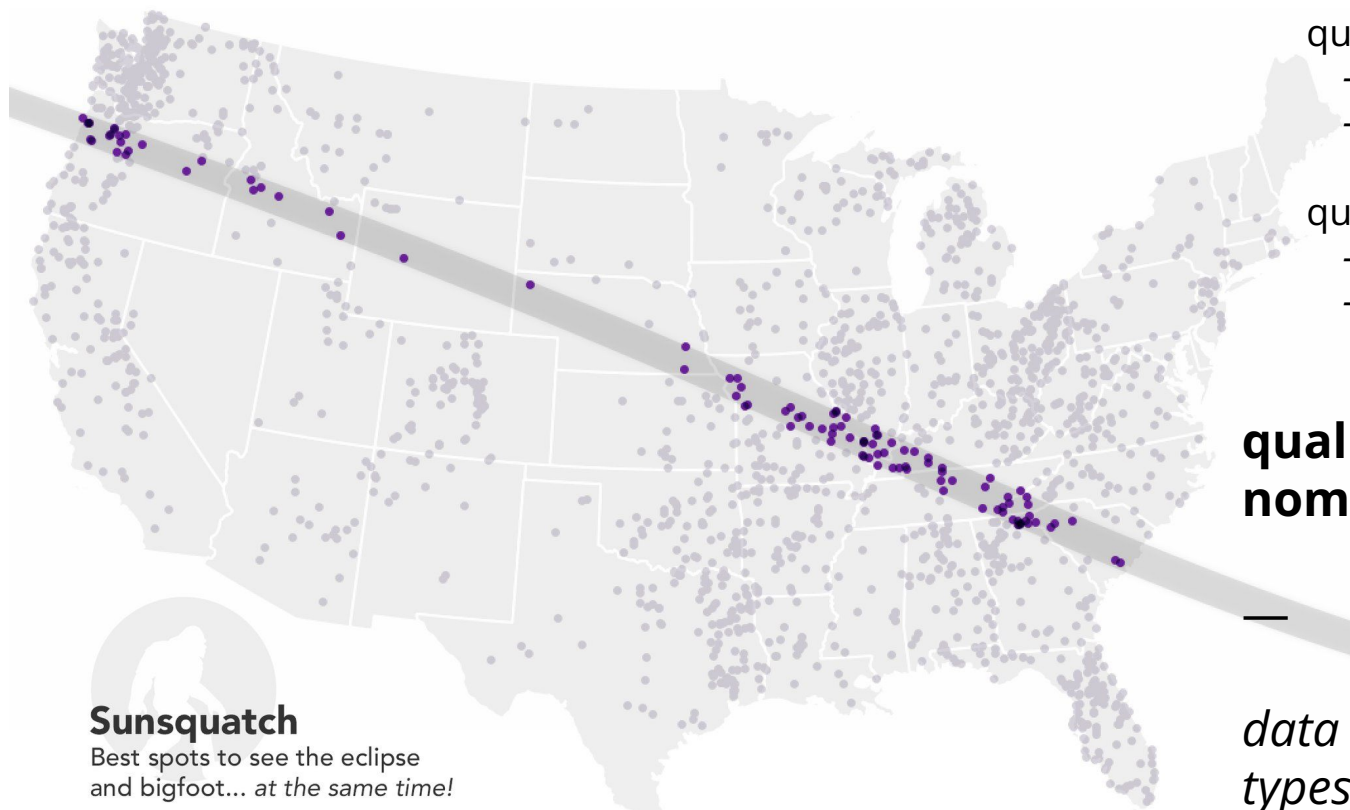
Data: Bigfoot Field Researchers Organization | NASA Scientific Visualization Studio

qualitative (categories)

- *nominal (unranked)*
- *ordinal (ranked)*

quantitative (numerical)

- *interval (no zero value)*
- *ratio (has zero value)*



qualitative (categories)

- *nominal (unranked)*
- *ordinal (ranked)*

quantitative (numerical)

- *interval (no zero value)*
- *ratio (has zero value)*

**qualitative,
nominal/ordinal**



Sunsquatch

Best spots to see the eclipse
and bigfoot... *at the same time!*

Data: Bigfoot Field Researchers Organization | NASA Scientific Visualization Studio

*data is sorted into kinds or
types, arguably ordinal b/c
of the "Best" qualifier*

BOUNDARIES

National	---
State or territorial	---
County or equivalent	---
Civil township or equivalent	---
Incorporated city or equivalent	---
Park, reservation, or monument	---
Small park	---

qualitative (categories)

- *nominal (unranked)*
- *ordinal (ranked)*

quantitative (numerical)

- *interval (no zero value)*
- *ratio (has zero value)*

BOUNDARIES

National	— — —
State or territorial	— — —
County or equivalent	— — —
Civil township or equivalent	— — —
Incorporated-city or equivalent	— — —
Park, reservation, or monument	— — —
Small park	— — —

qualitative (categories)

- *nominal (unranked)*
- *ordinal (ranked)*

quantitative (numerical)

- *interval (no zero value)*
- *ratio (has zero value)*

qualitative, ordinal

—

because the kinds have a hierarchy, but that hierarchy isn't numerical

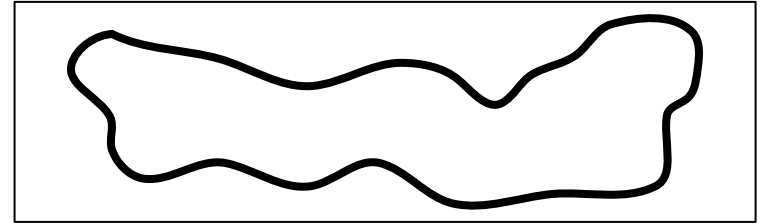
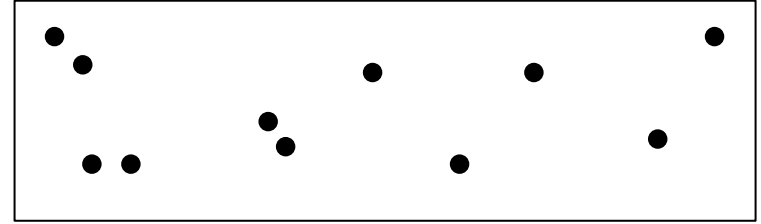
spatial data models

data models are the
*structured **in** structured*
information

**spatial data
models tell a
computer how to
transform this...**



... into *this*



**two kinds of
spatial data
models in most
geospatial analysis**

vector

raster

raster

uses a set of cells in a grid pattern to distinguish features

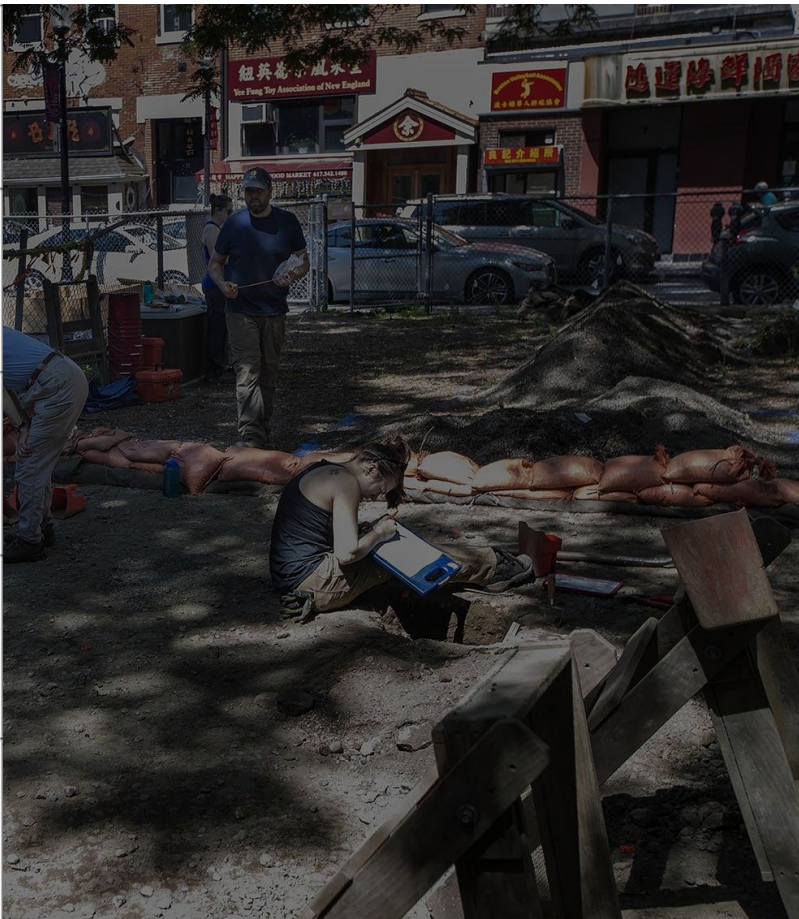
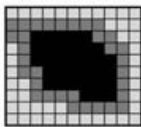
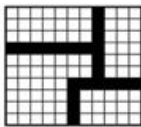
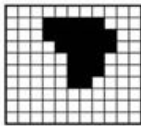
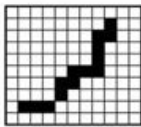
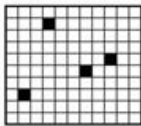
why raster?

good for continuous, homogenous values

more difficult to wrangle attribute table

examples:

- georeferenced maps
- satellite imagery
- temperature data



vector

uses points, lines, and polygons to distinguish features

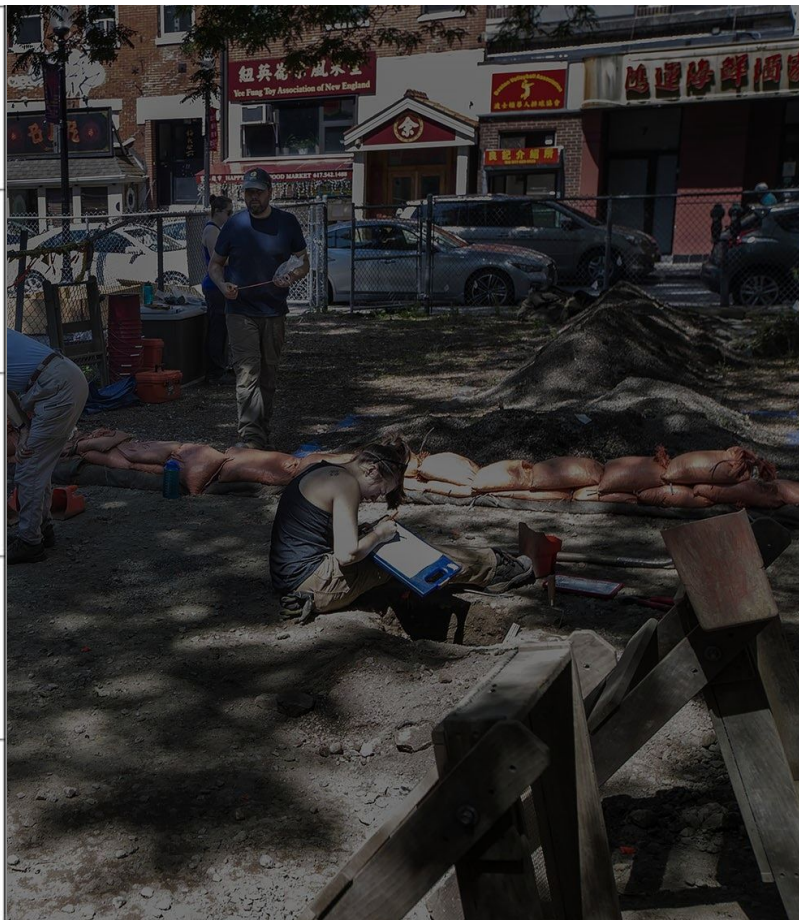
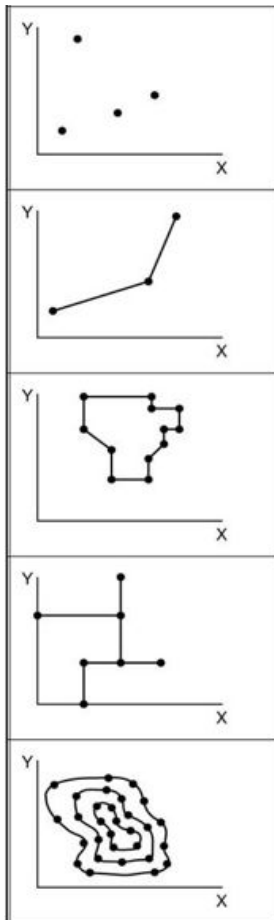
why vector?

good for discrete features
with distinct boundaries

plays well with attribute
table

examples:

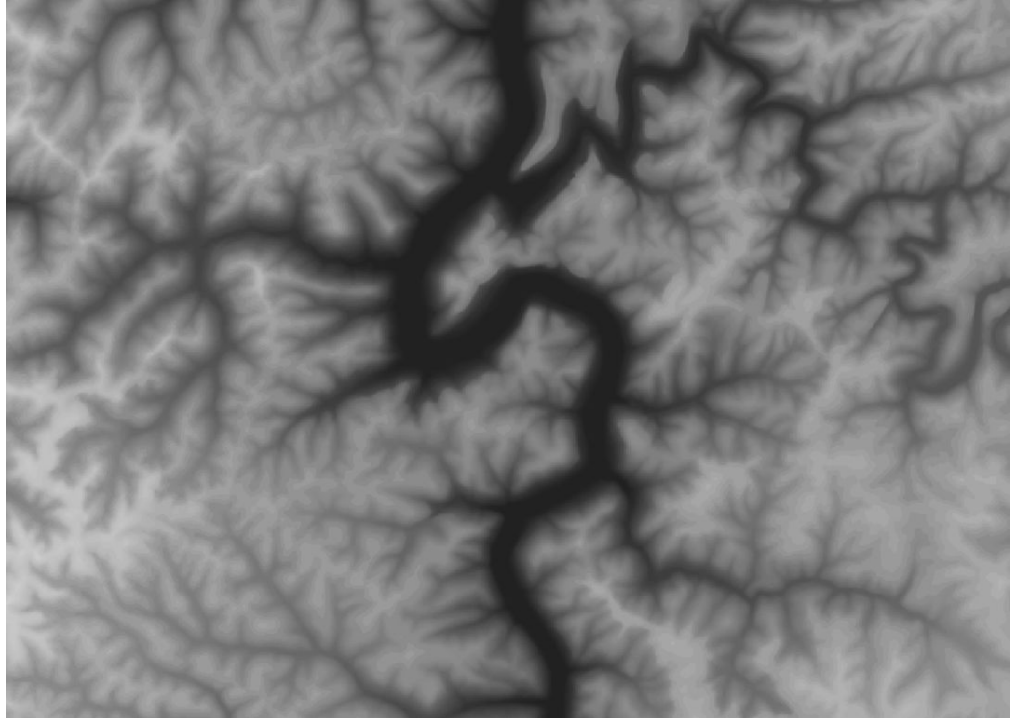
- neighborhoods
- lighthouses
- canals



**when to use
raster vs. vector?**

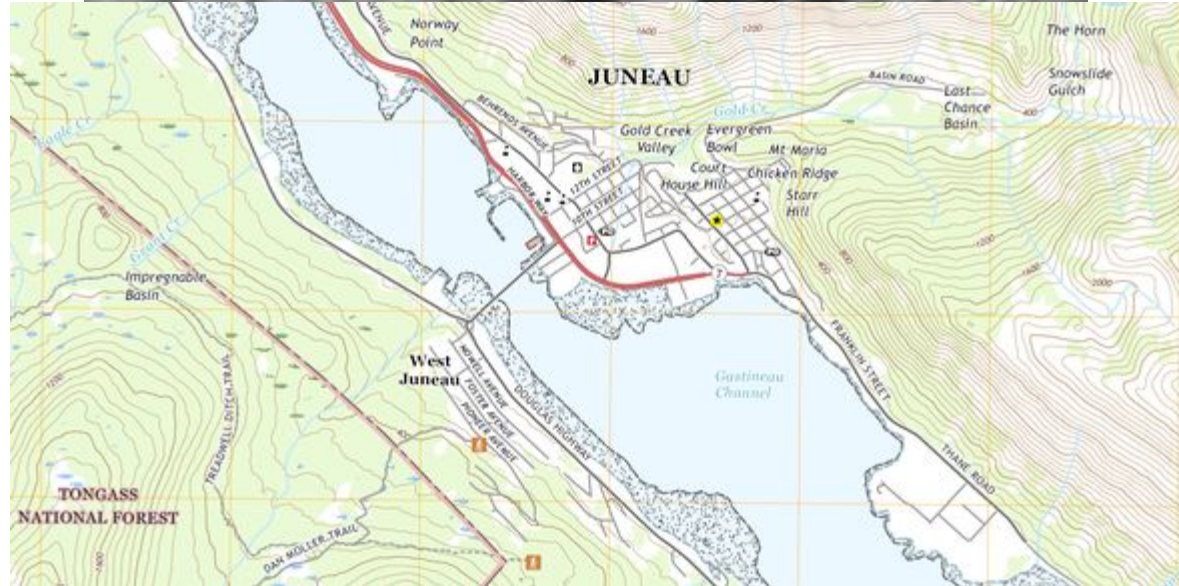
example raster:
digital elevation models

digital elevation n model



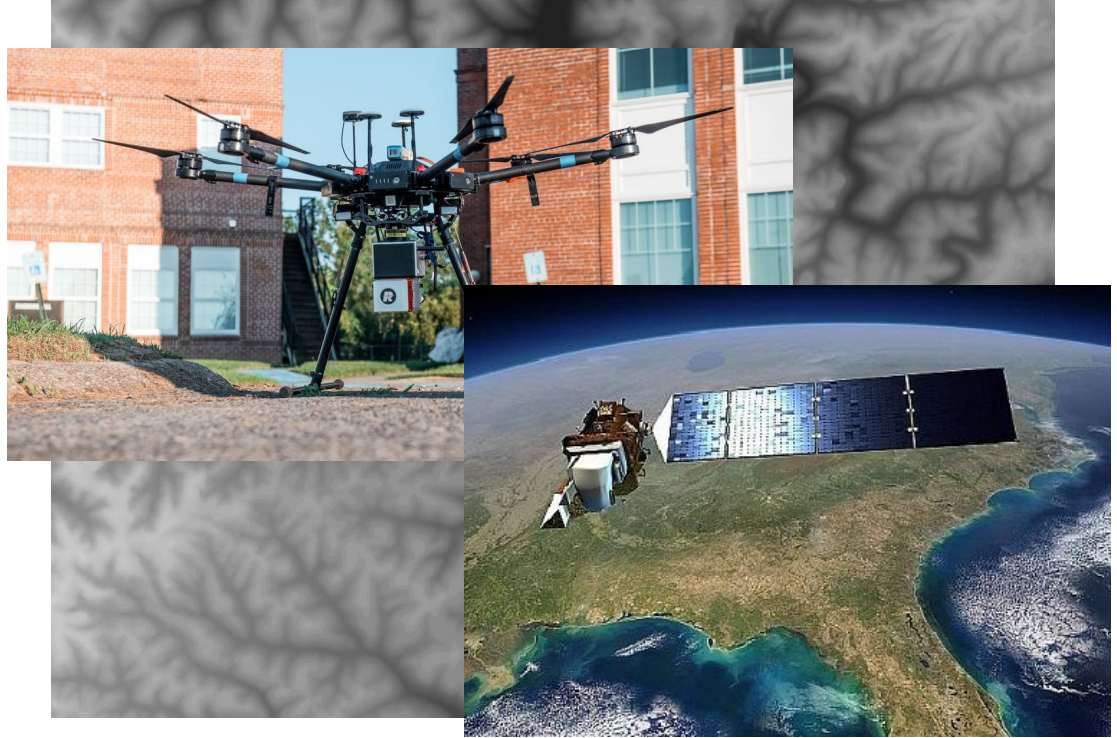
(created from old topo maps!)

digital elevation n model



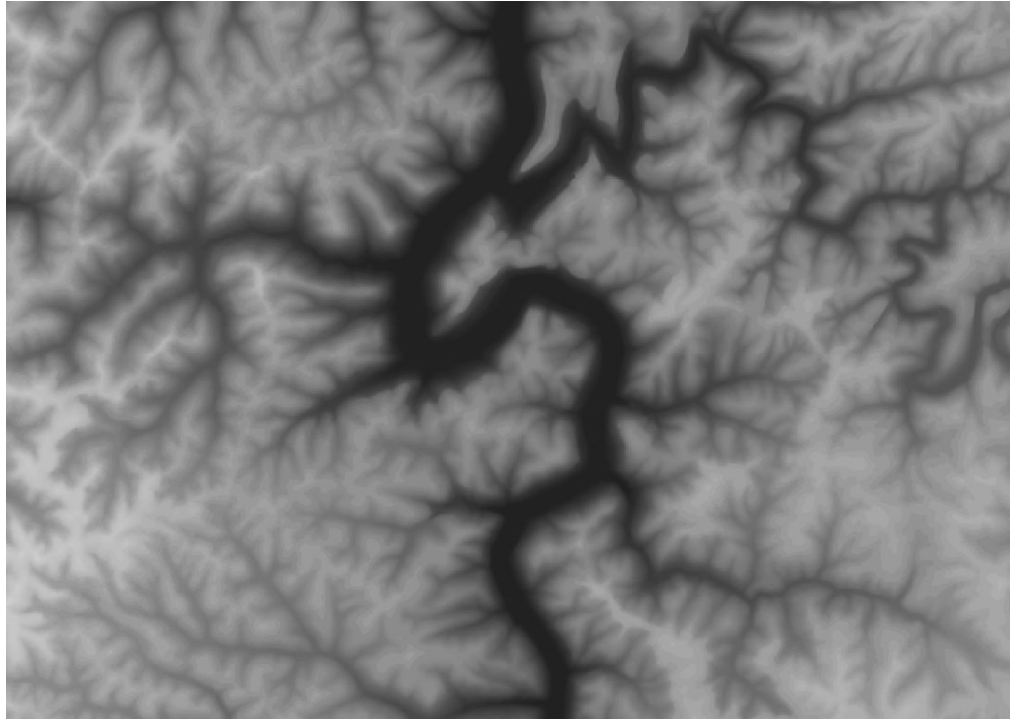
(or remote sensing!)

digital elevation n model



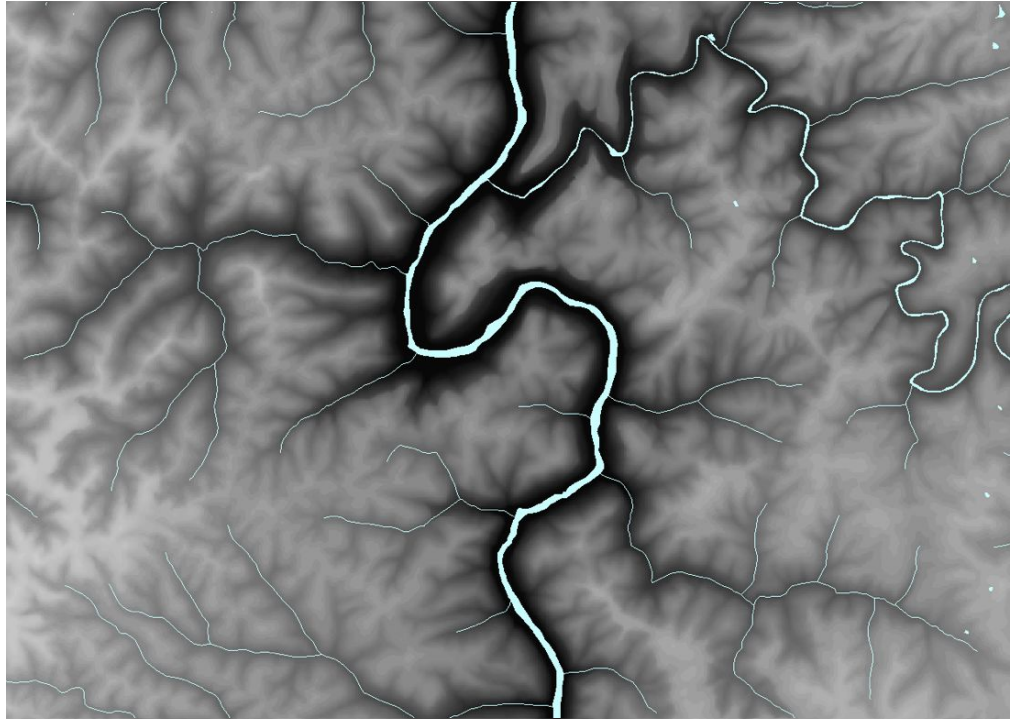
digital elevation n model

size of cell determines resolution



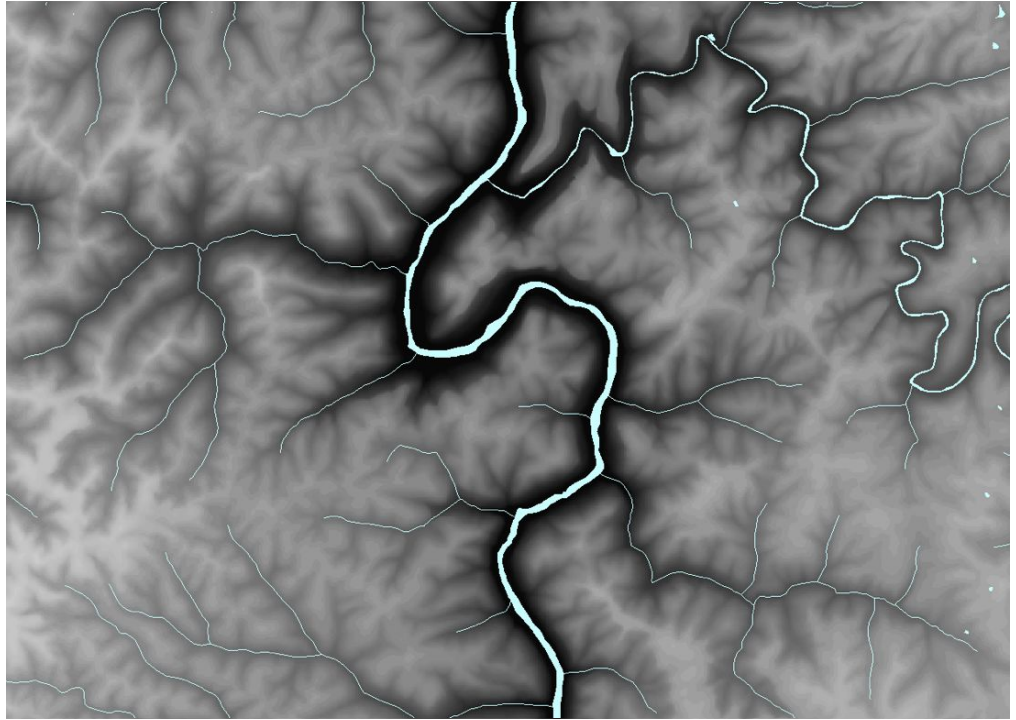
digital elevation n model

could be displayed as vector, too



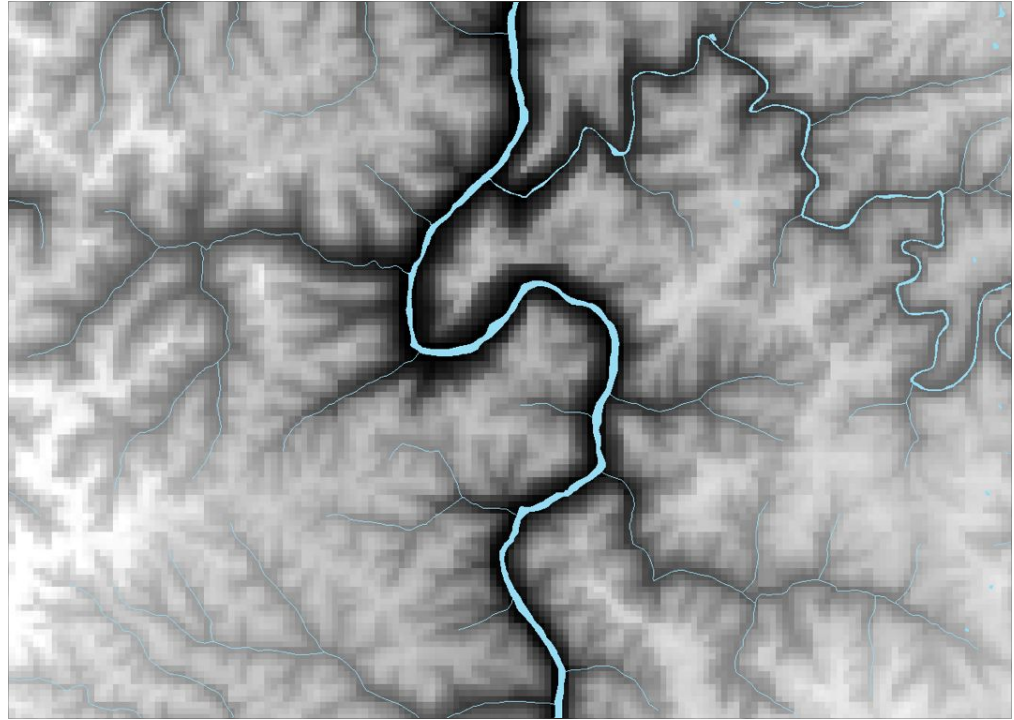
10-meter resolution

digital elevation model



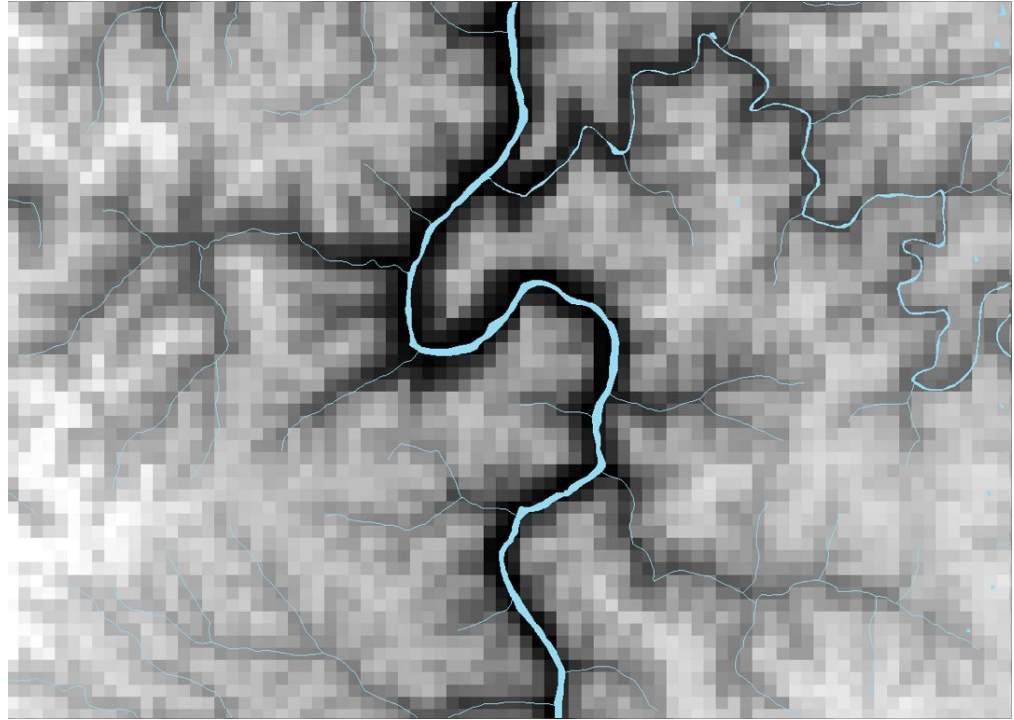
digital elevation model

50-meter resolution



100-meter resolution

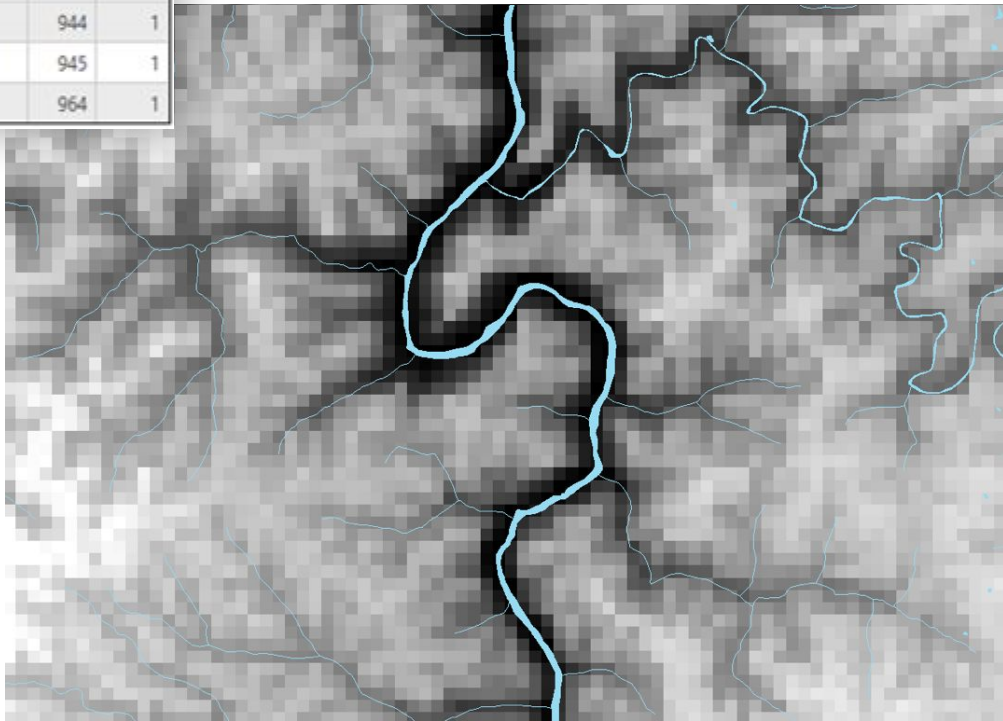
digital elevation model



digital elevation model

	OID	Value	Count
1	0	896	1
2	1	944	1
3	2	945	1
4	3	964	1

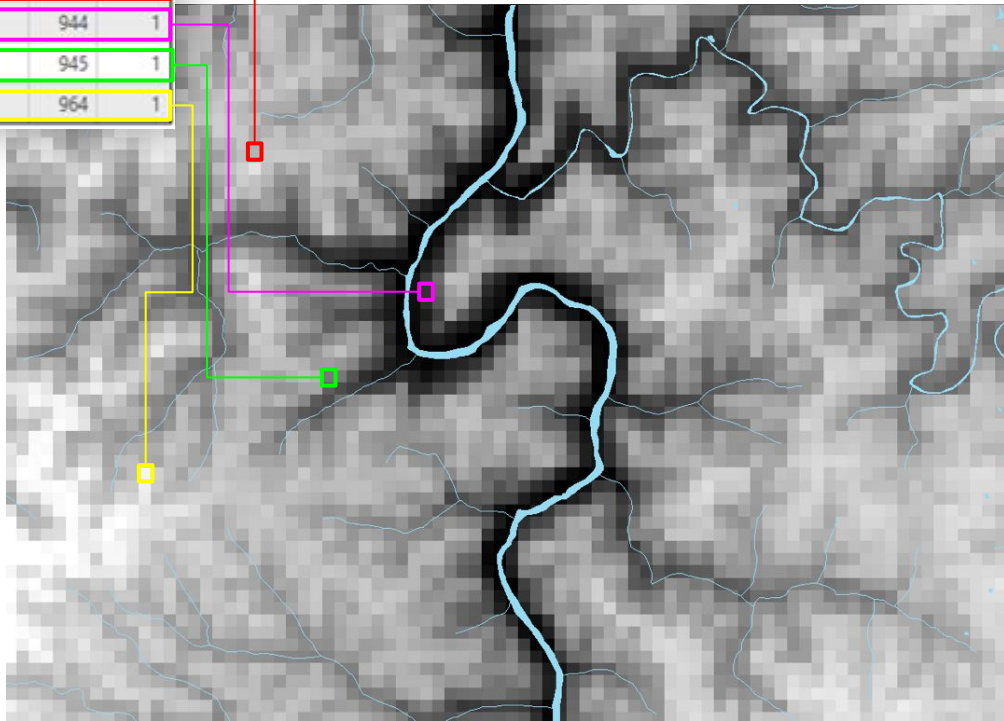
100-meter resolution



digital elevation model

	OID	Value	Count
1	0	896	1
2	1	944	1
3	2	945	1
4	3	964	1

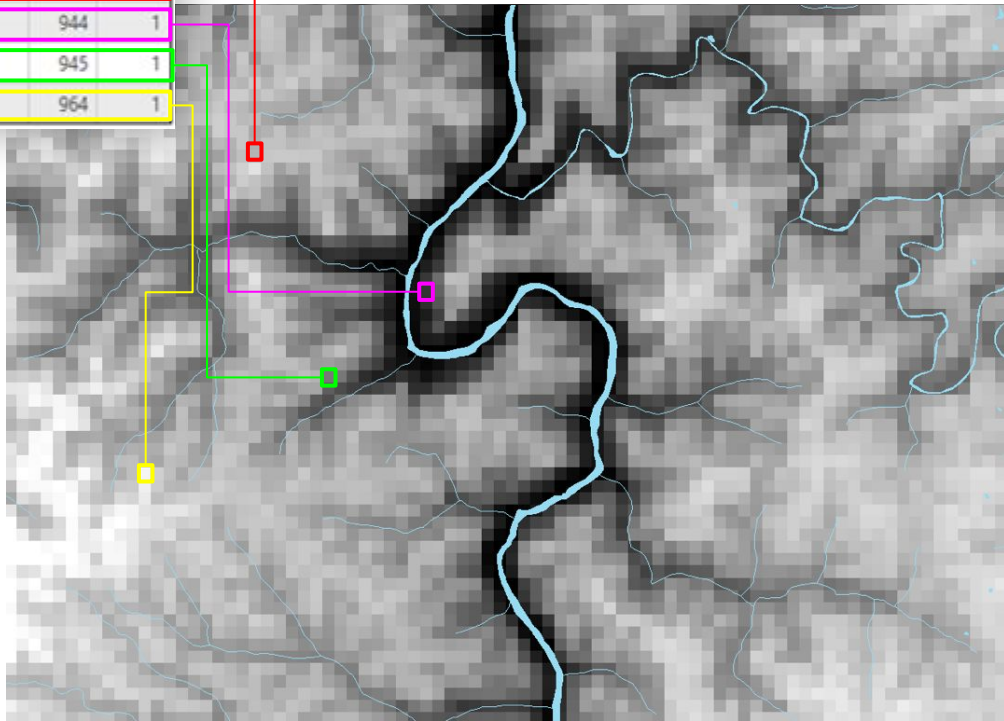
100-meter resolution



digital elevation model

	OID	Value	Count
1	0	896	1
2	1	944	1
3	2	945	1
4	3	964	1

pixel = distance!



**elevation values in a DEM can
be used to compute other
things**



example vector:

university of richmond campus

campus-data

Command Search (Alt+Q)

ian.spangler_urichmond - University of Richmond

15

Project

Map

Insert

Analysis

View

Edit

Imagery

Share

Help

Tile Layer

Linear Referencing

Cut

Copy

Copy Path

Clipboard

Explore

Navigate

Bookmarks

Go To XY

Basemap

Add Data

Add Data From Path

XY Table To Point

Add Graphics Layer

Layer

Selection

Inquiry

Pause

Lock

View Unplaced

More

Labeling

Convert

Offline

Download Map

Feature Cache

Contents

Search

Drawing Order

Map

New Group Layer

World Imagery

Map

1:2,633

-8,631,999.03 4,519,498.93 m

Selected Features: 0

Catalog

Raster Functions

Geoprocessing

Label Class

Symbology

86°F

Sunny

Search

ENG US

11:16 AM

8/31/2026

campus-data

Command Search (Alt+Q)

ian.spangler_urichmond - University of Richmond

15

Project

Map

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Auto Cache

Contents

Search

Drawing Order

Map

New Group Layer

World Imagery

Map

Map



1:6,551

-8,632,116.05 4,519,715.55 m

Selected Features: 0

Catalog

Raster Functions

Geoprocessing

Label Class

Symbology

86°F Sunny

Search

ENG US

11:17 AM 8/31/2026

campus-data

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Pause

Lock

View Unplaced

More

Labeling

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Offline

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Feature Cache

Fill

Auto Cache

Contents

Search

Drawing Order

Map

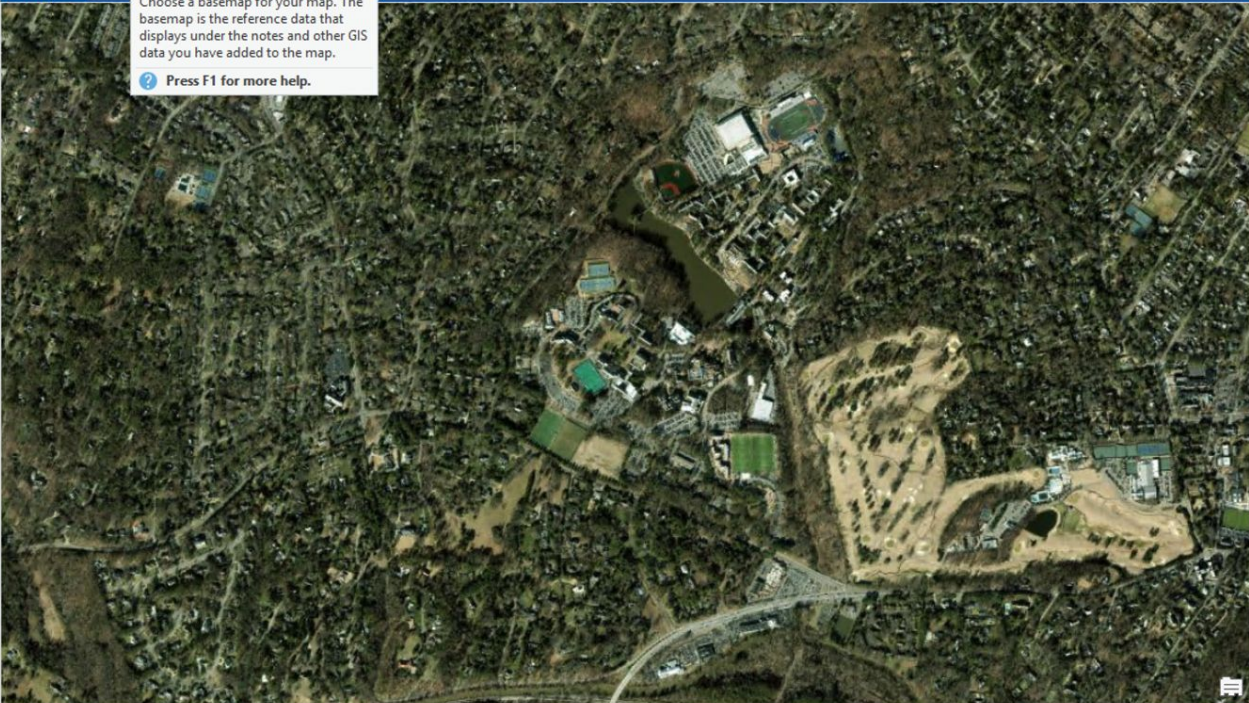
New Group Layer

World Imagery

Basemap

Choose a basemap for your map. The basemap is the reference data that displays under the notes and other GIS data you have added to the map.

Press F1 for more help.



1:16,300

-8,632,748.41 4,519,933.49 m

Selected Features: 0

Catalog

Raster Functions

Geoprocessing

Label Class

Symbology

86°F Sunny

Search

ENG US

11:17 AM 8/31/2026

campus-data

Command Search (Alt+Q)

ian.spangler_urichmond - University of Richmond 15

Project

Map

Insert

Analysis

View

Edit

Imagery

Share

Help

Tile Layer

Linear Referencing

Paste

Cut

Copy

Copy Path

Clipboard

Explore

Navigate

Bookmarks

Go To XY

Basemap

Add Data

Add Data From Path

XY Table To Point

Add Graphics Layer

Layer

Selection

Inquiry

Pause

Lock

View Unplaced

More

Labeling

Convert

Offline

Download Map

Feature Cache

Fill

Auto Cache

Contents

Search

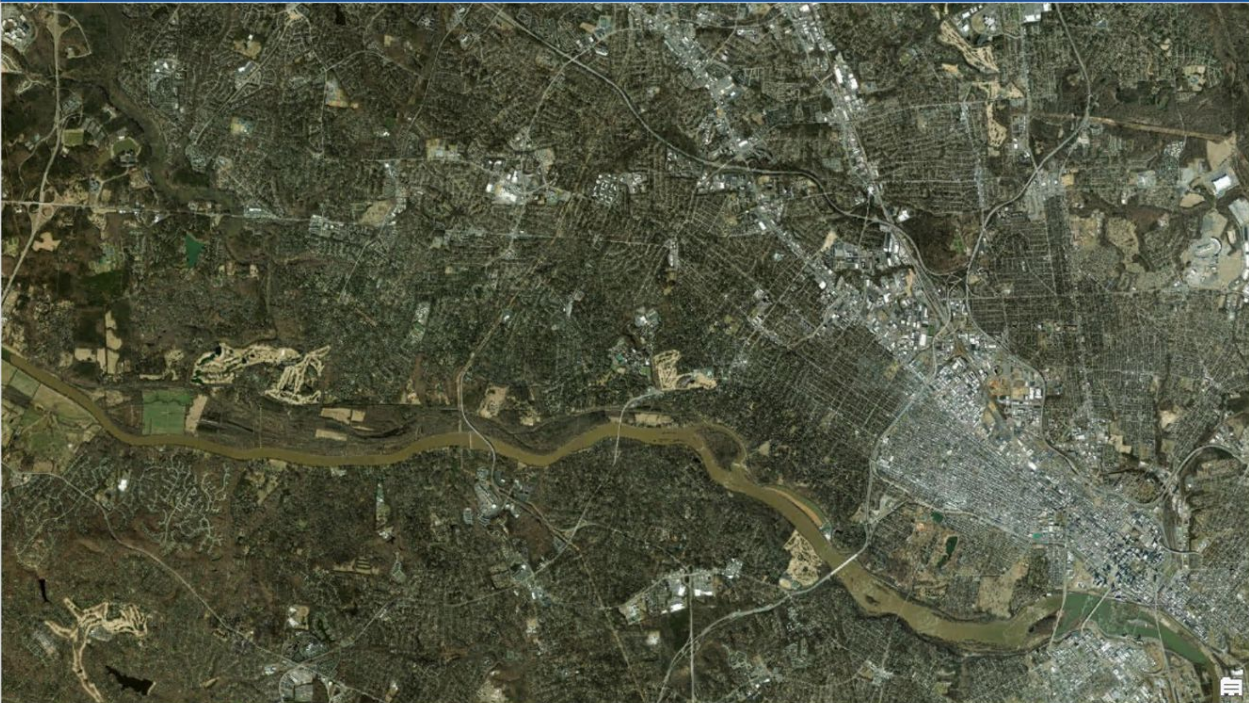
Drawing Order

Map

New Group Layer

World Imagery

Map



1:100,925

-8,632,748.41 4,519,933.49 m

Selected Features: 0

1 86°F Sunny

Search

ENG US

11:17 AM 8/31/2026

Catalog

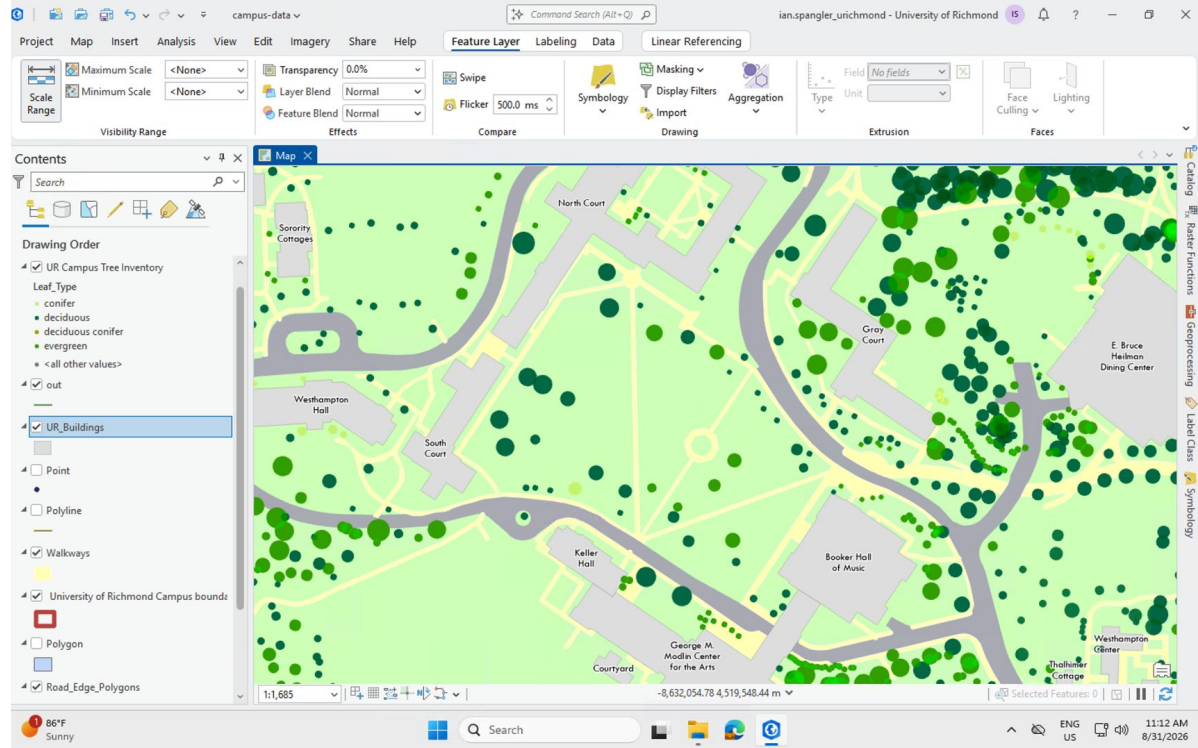
Raster Functions

Geoprocessing

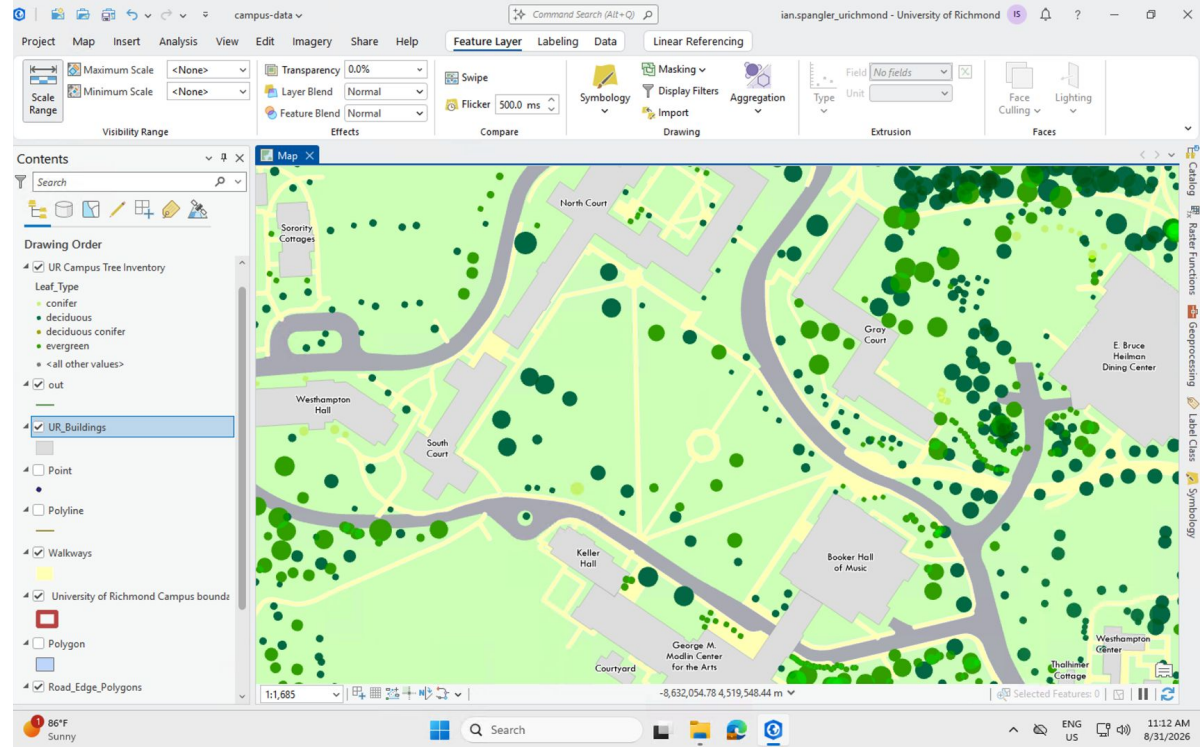
Label Class

Symbology

**why would
you want the
walkways to
be encoded
as polygons?**

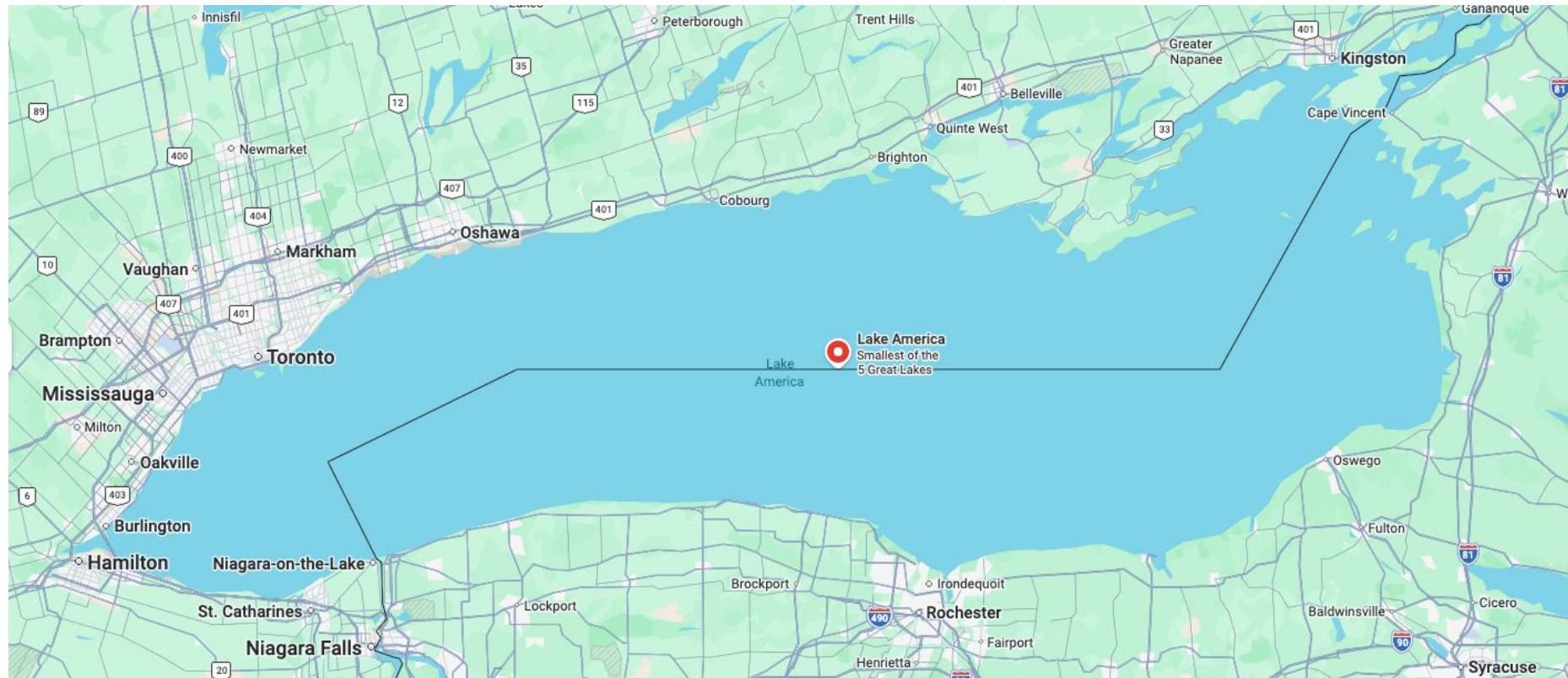


what about lines?



example comparison

lake ontario





▢ PRESIDENTIAL ACTIONS

HONORING THE AMERICAN HISTORY OF THE GREAT LAKES AND RENAMING LAKE ONTARIO AS LAKE AMERICA

Executive Orders | August 27, 2026

Sec. 2. Lake America. (a) The body of water currently known as Lake Ontario is a tremendous asset to the United States and part of our Nation's heritage. With the deepest parts of the Lake's waters lying within United States territory, the United States claims most of the Lake's volume. The Lake has long been an integral asset to American exploration, settlement,

Grid Extract

Use the Grid Extract interactive map to create and download spatial subsets of bathymetry from each of the Great Lakes.

Launch Grid Extract

Lake Erie and Lake St. Clair



Lake Huron



Lake Michigan



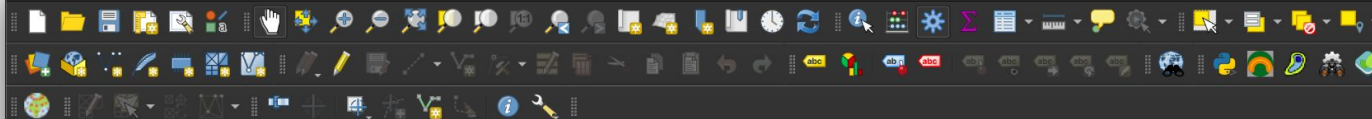
Lake Ontario



Data

- [Bathymetry Contours Shapefile](#)
- Standard Grid: [ARC ASCII](#) | [Binary Float](#) | [GeoTiff](#) | [NetCDF](#) | [GRD98](#) | [XYZ](#)
- [Metadata](#)

Citation: National Geophysical Data Center, 1999. Bathymetry of Lake Ontario. National Geophysical Data Center, NOAA.
[doi:10.7289/V56H4FBH](https://doi.org/10.7289/V56H4FBH) [access date].

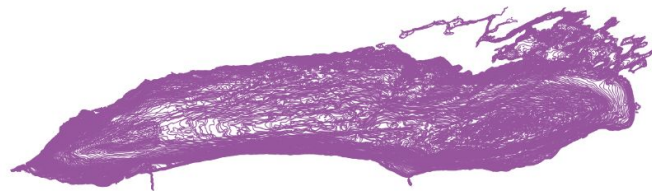


Browser

- 📁 /Volumes
- ★ Favorites
- 📁 Spatial Bookmarks
- 📁 Project Home
- 📁 Home
- 📁 / (Macintosh HD)
- 📁 GeoBookmarks

Layers

- ✓ Lake Ontario Contours
- US_Canada_Land_Bound.
- canada-mask
- us-mask
- us
- cn
- ontario_1ld
- Band 1 (Gray)
- 0
- 239.402389



Processing Toolbox

- 🔍 Search...
- 🕒 Recently used
- 📁 3D Tiles
- 📁 Cartography
- 📁 Database
- 📁 File tools
- 📁 GPS
- 📁 Interpolation
- 📁 Layer tools
- 📁 Mesh
- 📁 Network analysis
- 📁 Plots
- 📁 Raster analysis
- 📁 Raster creation

Results Viewer

🔍 Type to locate (%%K)

Coordinate 43.481°,-80.603°

Scale 1:1044815

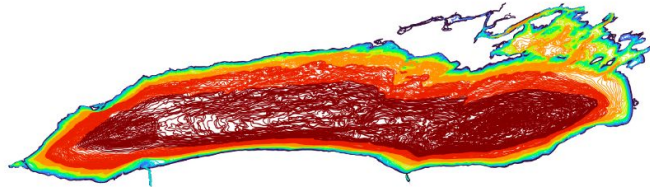
🔍 Magnifier 100%

Rotation 0.0 °

✓ Render

🌐 EPSG:4326

vector contours show depth



Browser

- /Volumes
- Favorites
- Spatial Bookmarks
- Project Home
- Home
- / (Macintosh HD)
- QGIS Bookmarks

Layers

- ✓ Lake_Ontario_Contours
 - ✓ 1 - 4
 - ✓ 4 - 7
 - ✓ 7 - 12
 - ✓ 12 - 18
 - ✓ 18 - 28
 - ✓ 28 - 52
 - ✓ 52 - 100
 - ✓ 100 - 244
- US_Canada_Land_Boundaries
- canada-mask
- us-mask
- us
- cn
- ontario_11d
- Band 1 (Gray)
- 0

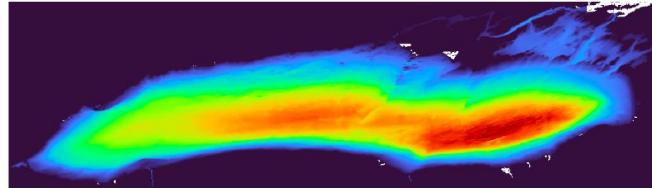
Processing Toolbox

Search...

- Recently used
- 3D Tiles
- Cartography
- Database
- File tools
- GPS
- Interpolation
- Layer tools
- Mesh
- Network analysis
- Plots
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- Raster creation

Results Viewer

they're computed from a source raster



Browser

- /Volumes
- Favorites
- Spatial Bookmarks
- Project Home
- Home
- / (Macintosh HD)
- QGIS Bookmarks

Layers

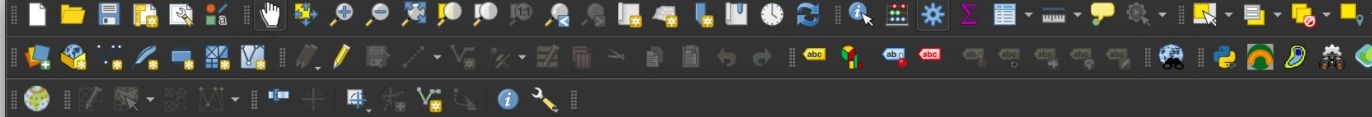
- ✓ Lake Ontario Contour
 - ✓ 1 - 4
 - ✓ 4 - 7
 - ✓ 7 - 12
 - ✓ 12 - 18
 - ✓ 18 - 28
 - ✓ 28 - 52
 - ✓ 52 - 100
 - ✓ 100 - 244
- US_Canada_Land_Bou
- canada-mask
- us-mask
- us
- cn
- ✓ ontario_lld
 - Band 1 (Gray)
 - 0

Processing Toolbox

Search...

- Recently used
- 3D Tiles
- Cartography
- Database
- File tools
- GPS
- Interpolation
- Layer tools
- Mesh
- Network analysis
- Plots
- Raster analysis
- Raster creation

Results Viewer



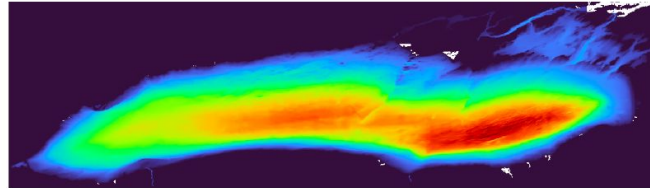
Browser

- /Volumes
- Favorites
- Spatial Bookmarks
- Project Home
- Home
- / (Macintosh HD)
- QGIS Bookmarks

Layers

- ✓ Lake_Ontario_Contour
 - ✓ 1 - 4
 - ✓ 4 - 7
 - ✓ 7 - 12
 - ✓ 12 - 18
 - ✓ 18 - 28
 - ✓ 28 - 52
 - ✓ 52 - 100
 - ✓ 100 - 244
- US_Canada_Land_Bou
- canada-mask
- us-mask
- us
- cn
- ✓ ontario_lld
 - Band 1 (Gray)
 - 0

no country borders here...



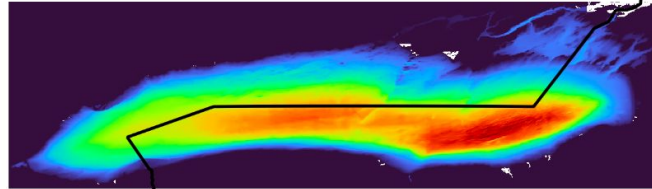
Processing Toolbox

Search...

- Recently used
- 3D Tiles
- Cartography
- Database
- File tools
- GPS
- Interpolation
- Layer tools
- Mesh
- Network analysis
- Plots
- Raster analysis
- Raster creation

Results Viewer

we can split the raster by a vector line



Browser

- /Volumes
- Favorites
- Spatial Bookmarks
- Project Home
- Home
- / (Macintosh HD)
- QGIS Bookmarks

Layers

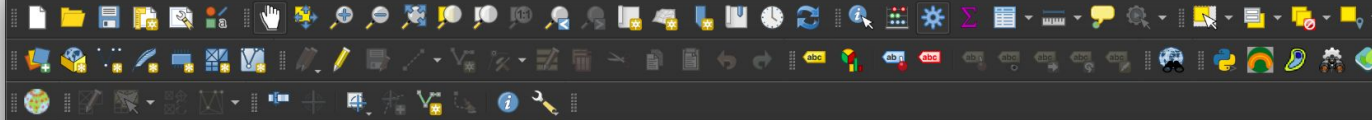
- ✓ Lake_Ontario_Contour
 - ✓ 1 - 4
 - ✓ 4 - 7
 - ✓ 7 - 12
 - ✓ 12 - 18
 - ✓ 18 - 28
 - ✓ 28 - 52
 - ✓ 52 - 100
 - ✓ 100 - 244
- ✓ US_Canada_Land_Bour
 - canada-mask
 - us-mask
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 - cn
- ✓ ontario_lld
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Processing Toolbox

Search...

- Recently used
- 3D Tiles
- Cartography
- Database
- File tools
- GPS
- Interpolation
- Layer tools
- Mesh
- Network analysis
- Plots
- Raster analysis
- Raster creation

Results Viewer



Browser

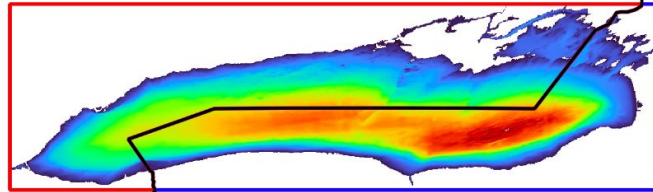
- /Volumes
- Favorites
- Spatial Bookmarks
- Project Home
- Home
- / (Macintosh HD)
- QGIS Bookmarks

Layers

- 18 - 28
- 28 - 52
- 52 - 100
- 100 - 244
- US_Canada_Land_Bour
- canada-mask
- us-mask
- us
- cn
- ontario_ild
- Band 1 (Gray)
- 0

-239.402389

we also get a vector extent and
drop the values > 0

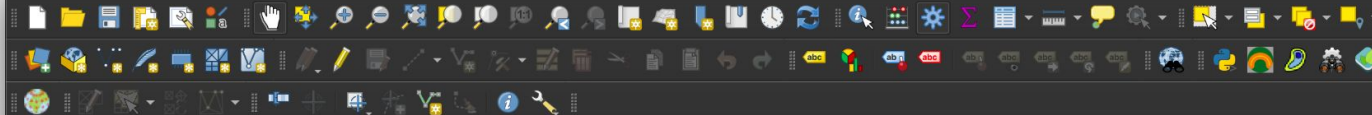


Processing Toolbox

Search...

- Recently used
- 3D Tiles
- Cartography
- Database
- File tools
- GPS
- Interpolation
- Layer tools
- Mesh
- Network analysis
- Plots
- Raster analysis
- Raster creation

Results Viewer



Browser

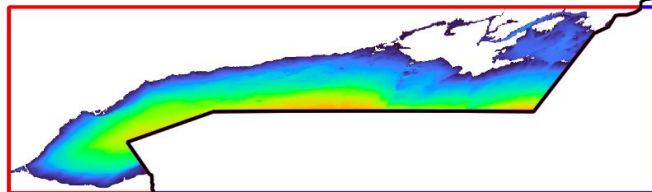
- /Volumes
- Favorites
- Spatial Bookmarks
- Project Home
- Home
- / (Macintosh HD)
- QGIS Bookmarks

Layers

- 18 - 28
- 28 - 52
- 52 - 100
- 100 - 244
- US_Canada_Land_Bour
- canada-mask
- us-mask
- us
- cn
- ontario_ild
- Band 1 (Gray)
- 0

-239.402389

canada

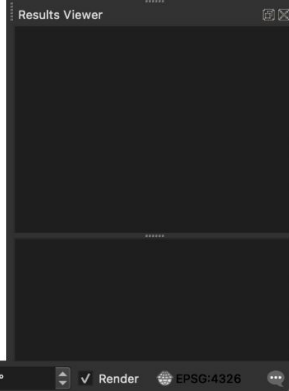
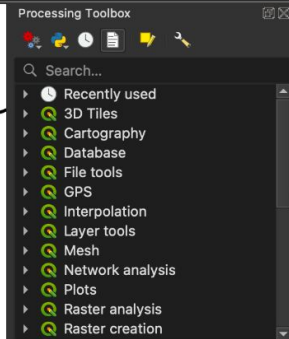
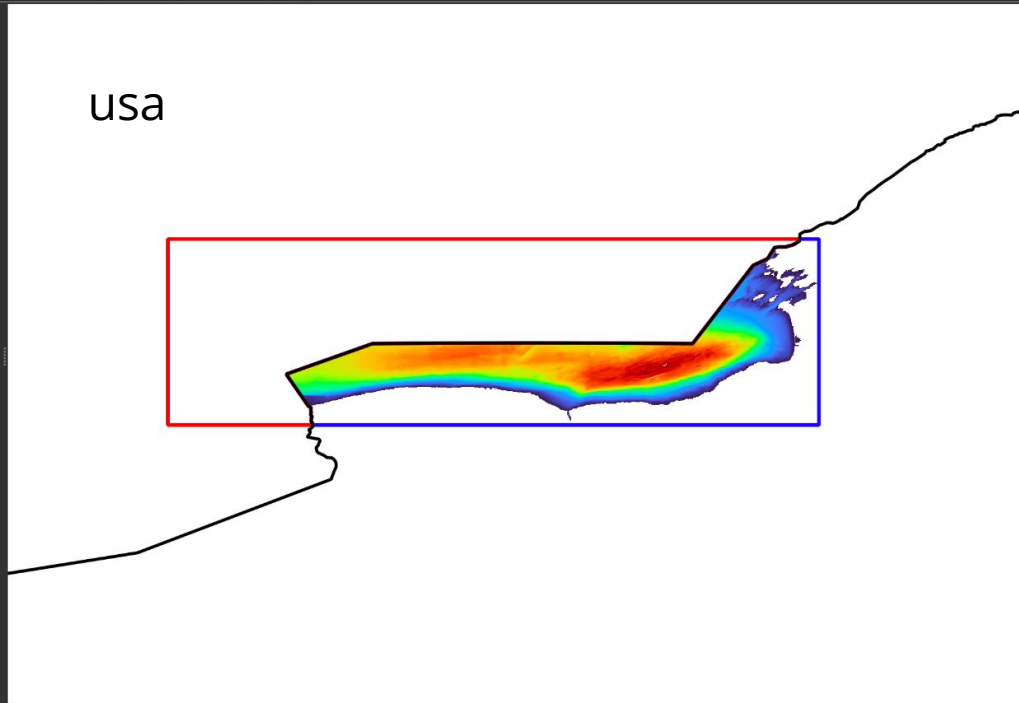
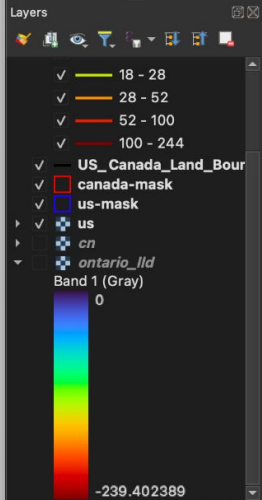
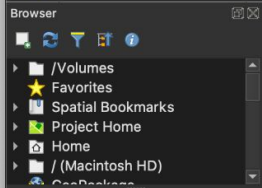
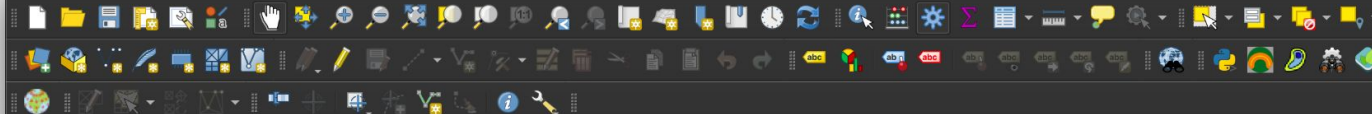


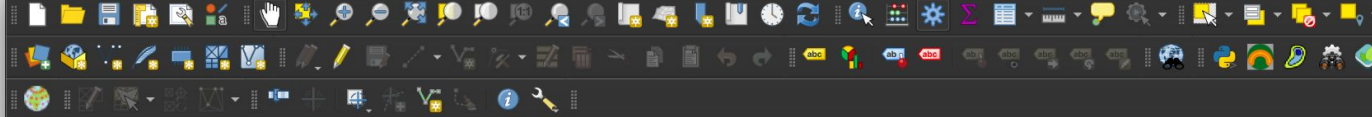
Processing Toolbox

Search...

- Recently used
- 3D Tiles
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- GPS
- Interpolation
- Layer tools
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- Raster analysis
- Raster creation

Results Viewer





Browser

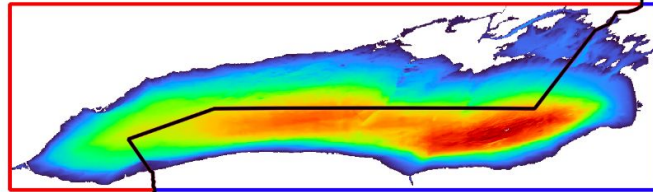
- /Volumes
- Favorites
- Spatial Bookmarks
- Project Home
- Home
- / (Macintosh HD)
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Layers

- ✓ 18 - 28
- ✓ 28 - 52
- ✓ 52 - 100
- ✓ 100 - 244
- ✓ US_Canada_Land_Bour
- ✓ canada-mask
- ✓ us-mask
- ✓ us
- ✓ cn
- ✓ ontario_ild
- Band 1 (Gray)
- 0

-239.402389

next... summarize the cells by depth?



Processing Toolbox

Search...

- Recently used
- 3D Tiles
- Cartography
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Results Viewer

**we can use this
kind of data to
answer practical
questions**

**we can use this
kind of data to
answer practical
questions**

(even if the pretense is
a little impractical...)

**so... when to use
raster vs. vector?**

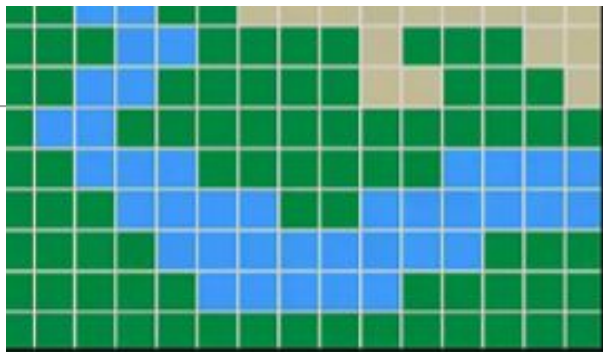
it depends

- what's the *scale* of our map?
- where's our *study area*?
- what kind of *attribute information* are we attaching to the spatial data?
- *why* are we including the data?
- what role will the data serve in our *overall argument*?

summary

raster

- grid of values associated with **cells** and
- becomes pixelated on deep zoom
- example file types include **tiff** and **geotiff**



vector

- relational geometries (**points**, **lines** and **polygons**) with attributes
- never pixelate
- example file types include **shp** and **geojson**



tabular data

feature (row) and
attribute (column) data
in spreadsheet format

*top: pleiades .csv data
in microsoft excel;*

*bottom: pleiades .csv data
in visual studio code.*

both are examples of tabular data.

A1												
	A	B	C	D	E	F	G	H	I	J	K	L
1	created	descriptio	details	provenan	title	uri	id	represent	represent	bounding	location	precision
2	2021-11-1	An ancien	<p>The Ba	Barrington	Gallia	https://pl	993	46.61861	1.14537	POLYGON	rough	
3	2020-01-1	A Roman l	<p>The hc	Pleiades	House of t	https://pl	1E+09	40.75001	14.48951	POLYGON	precise	
4	2015-05-2	The so-called	"House	Pleiades	House of t	https://pl	1E+09	40.75036	14.48929	POLYGON	precise	
5	2020-03-2	A necropol	<p>A necr	Pleiades	Monte Tar	https://pl	1E+09	44.27232	11.37588	POLYGON	precise	
6	2018-05-3	The megalithic defe	Pleiades	Circuit wa	https://pl	1E+09	42.82909	11.16359	POLYGON	precise		
7	2016-12-0	An Ibero-Roman opp	Pleiades	Alto Chac	https://pl	9.99E+08	40.34466	-1.15303	POLYGON	precise		
8	2023-08-1	The Mamluk arched	Pleiades	Yibna Brid	https://pl	99965183	31.86943	34.75226	POLYGON	precise		
9	2012-12-2	A family tomb of the	Pleiades	Sep. Scipi	https://pl	9.99E+08	41.8759	12.50041	POLYGON	precise		
10	2021-06-1	Archaeological site c	Pleiades	Tel Mor	https://pl	9.99E+08	31.8231	34.65646	POLYGON	precise		
11	2009-11-0	An ancien	The Barrin	Barrington	Møllegård	https://pl	99010	55.132	10.70146	POLYGON	precise	
12	2009-11-0	An ancien	None	Barrington	Tubantes	https://pl	99047	52.5	6.5	POLYGON	rough	
13	2009-11-0	An ancien	The Barrin	Barrington	Mannarici	https://pl	99006	51.96624	5.42405	POLYGON	precise	
14	2009-11-0	An ancien	The Barrin	Barrington	Reudigni	https://pl	99026	53.94403	10.25981	POLYGON	precise	
15	2009-11-0	An ancien	The Barrin	Barrington	Rullstorf	https://pl	99030	53.28633	10.52976	POLYGON	precise	
16	2009-11-0	An ancien	The Barrin	Barrington	Wijster	https://pl	99066	52.81523	6.51569	POLYGON	precise	
17	2009-11-0	An ancien	The Barrin	Barrington	Marwede	https://pl	99007	53.14396	11.03879	POLYGON	precise	
18	2009-11-0	An ancien	The Barrin	Barrington	(Ulme)Ru	https://pl	99050	54.18408	12.79749	POLYGON	precise	
19	2009-11-0	Traiectum	<p>The Ba	Barrington	Traiectum	https://pl	99046	52.09093	5.122099	POLYGON	precise	
20	2022-04-1	A Roman	& <p>The Ba	Barrington	Kastell Op	https://pl	99061	52.08717	5.041778	POLYGON	precise	

```
week > O2_distortion > pleiades-gis-data > places.csv
1 created,description,details,provenance,title,uri,id,representative_latitude,representative_longitude,bounding_box_wkt,location_precision
2 2021-11-14T03:44:08Z,"An ancient region covering a large part of southwestern Europe, roughly approximating the territory of modern France. I
3 2020-01-10T20:52:00Z,"A Roman house in Pompeii (I, 6, 15), also known as the House of L. Ceius Secundus. It is also referred to as the House
4 2015-05-28T11:48:45Z,"The so-called ""House of the Lararium of Achilles"" (I ,6 ,4) lies on the Via dell'Abbondanza. Excavated in 1912 and 19
5 2020-03-20T15:26:53Z,"A necropolis with inhumations dating to the fifth and fourth centuries B.C.,<p>A necropolis located close to Monte Bibel
6 2018-05-30T03:08:22Z,"The megalithic defensive circuit of Rusellae dates to the seventh and sixth centuries B.C. and represents an important e
7 2016-12-07T14:42:48Z,"An Ibero-Roman oppidum located just west of modern Teruel in Spain.,Pleiades,"Alto Chacón, Teruel",https://pleiades.sto
8 2023-08-13T15:02:27Z,"The Mamluk arched bridge dating to the 1270s crosses the river Nahal Sorek near modern Yibna, Israel.",,Pleiades,Yibna I
9 2012-12-28T15:18:51Z,"A family tomb of the Cornelli Scipiones near the Porta San Sebastiano in use from the third century B.C. to the first ce
10 2021-06-14T18:27:48Z,"Archaeological site on the northern bank of the Lachish River with signs of habitation dated from the Late Bronze Age to
11 2009-11-02T14:32:20Z,"An ancient place, cited: BATlas 10 G1 Møllegårdsmarken",,"The Barrington Atlas Directory notes: Møllegårdsmarken, DEN",B
12 2009-11-02T14:32:51Z,"An ancient place, cited: BATlas 10 C4 Tubantes",None,Barrington Atlas: BATlas 10 C4 Tubantes,Tubantes,https://pleiades.
13 2009-11-02T14:32:15Z,"An ancient place, cited: BATlas 10 B5 Mannaricium",,"The Barrington Atlas Directory notes: Maurik,Barrington Atlas: BATla
14 2009-11-02T14:32:33Z,"An ancient place, cited: BATlas 10 G3 Reudigni",,"The Barrington Atlas Directory notes: GER,Barrington Atlas: BATlas 10 G
15 2009-11-02T14:32:35Z,"An ancient place, cited: BATlas 10 G3 Rullstorf",,"The Barrington Atlas Directory notes: Rullstorf, GER",Barrington Atlas
16 2009-11-02T14:33:09Z,"An ancient place, cited: BATlas 10 C4 Wijster",,"The Barrington Atlas Directory notes: Wijster,Barrington Atlas: BATlas 1
17 2009-11-02T14:32:16Z,"An ancient place, cited: BATlas 10 H3 Marwede",,"The Barrington Atlas Directory notes: Marwede, GER",Barrington Atlas:
18 2009-11-02T14:32:53Z,"An ancient place, cited: BATlas 10 I2 (Ulme)Rugii",,"The Barrington Atlas Directory notes: GER,Barrington Atlas: BATlas 1
19 2009-11-02T14:32:49Z,"Traiectum (modern Utrecht) was a fortified site along the Roman frontier (limes) of Germania Inferior. It may have been
20 2022-04-15T13:25:42Z,"A Roman auxiliary fort with associated vicus and port at modern Vleuten-De Meern in the Dutch province of Utrecht.,<p>The
```