

Introduction to GIS and QGIS

YouthMappers

March 5th

Objectives, Schedule, Expectations

Course Objectives: To get a basic understanding of geographic principles allowing you to use GIS software to manipulate, transform and style data to make maps that displays data with integrity and helps answer questions.

Schedule

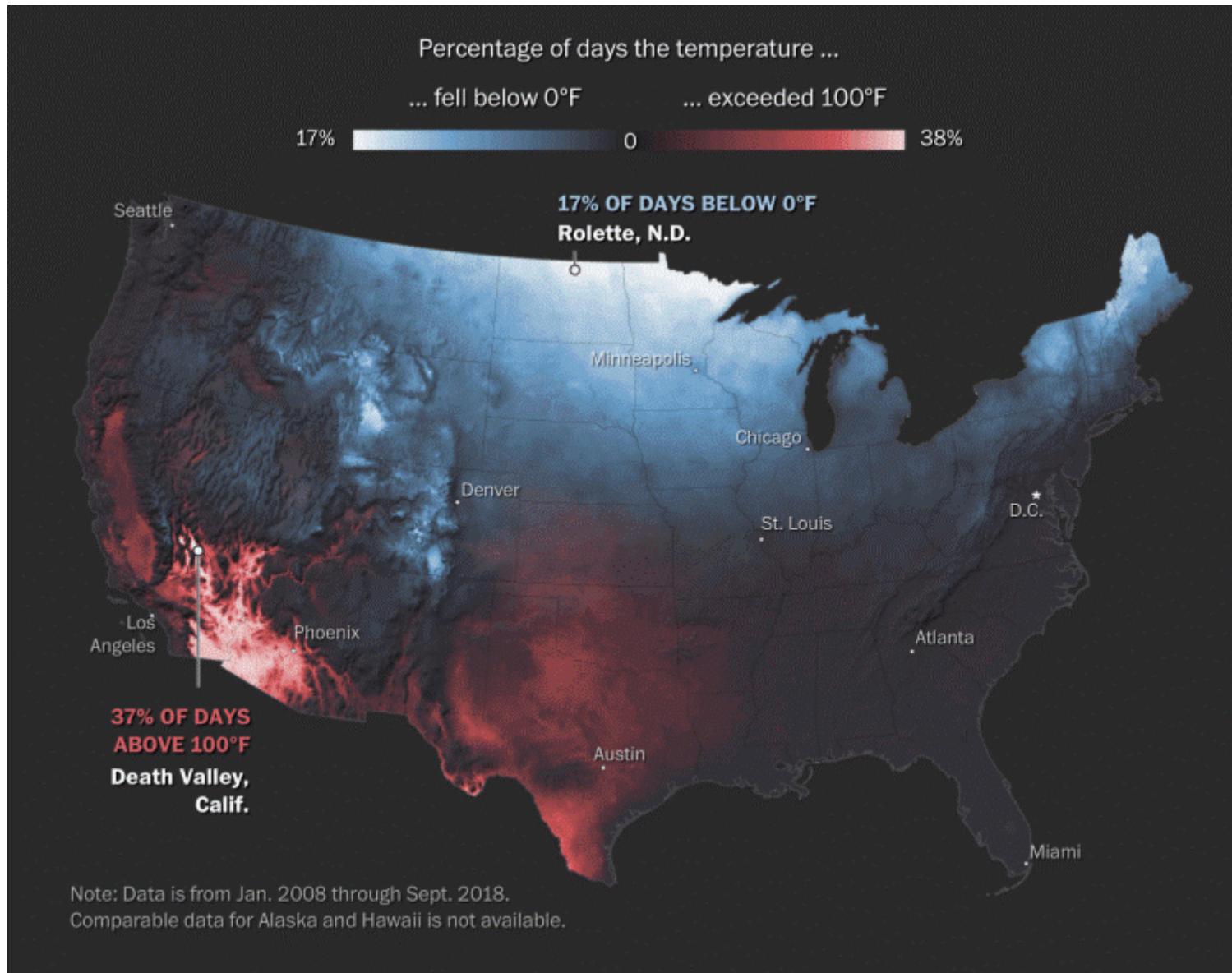
- Geography + GIS Basics
- Exporting OSM Data
- QGIS Basics
- Cartography Basics
- Final Project

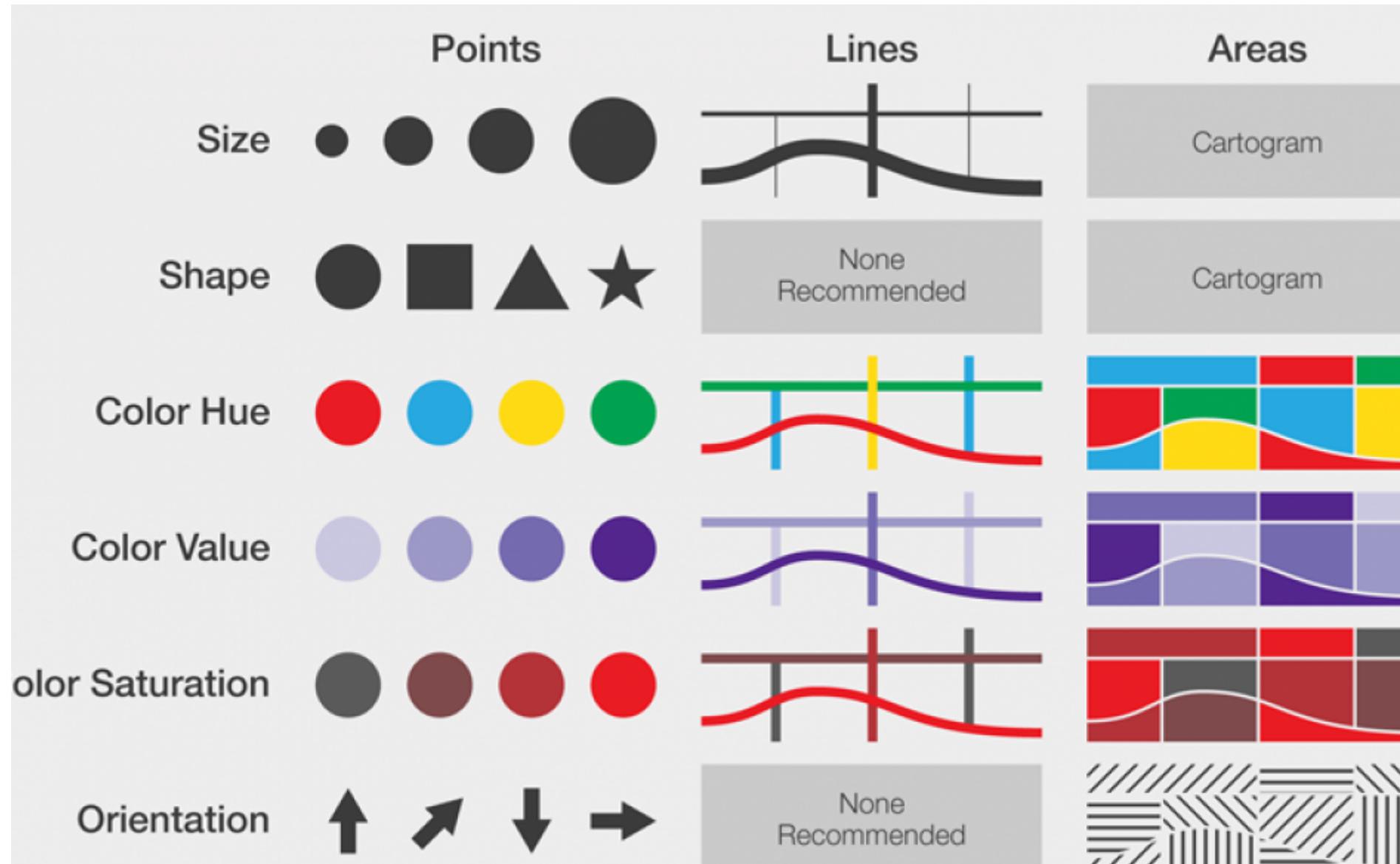
Expectations

- Listen!...if you aren't listening then why are you here?
- Participate...you will learn more that way
- Ask questions when you are stuck
- Be nice! We have a lot of different background and skills at this training

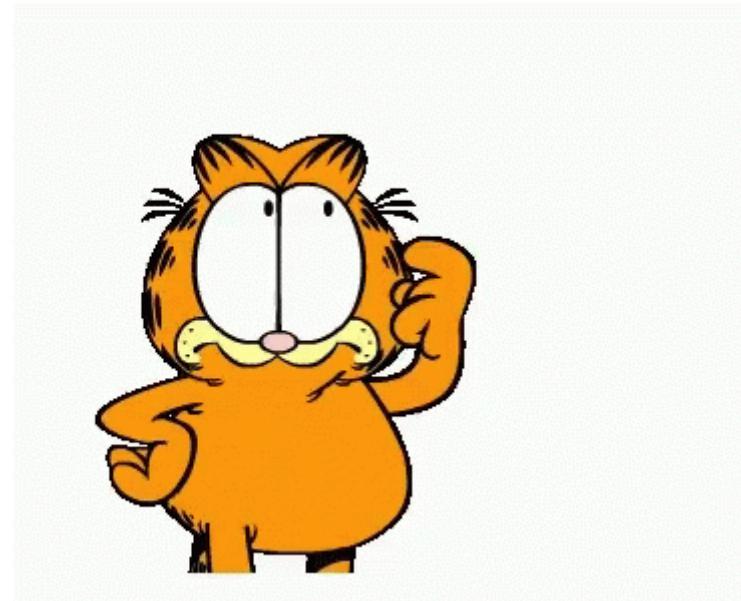
What are Maps?





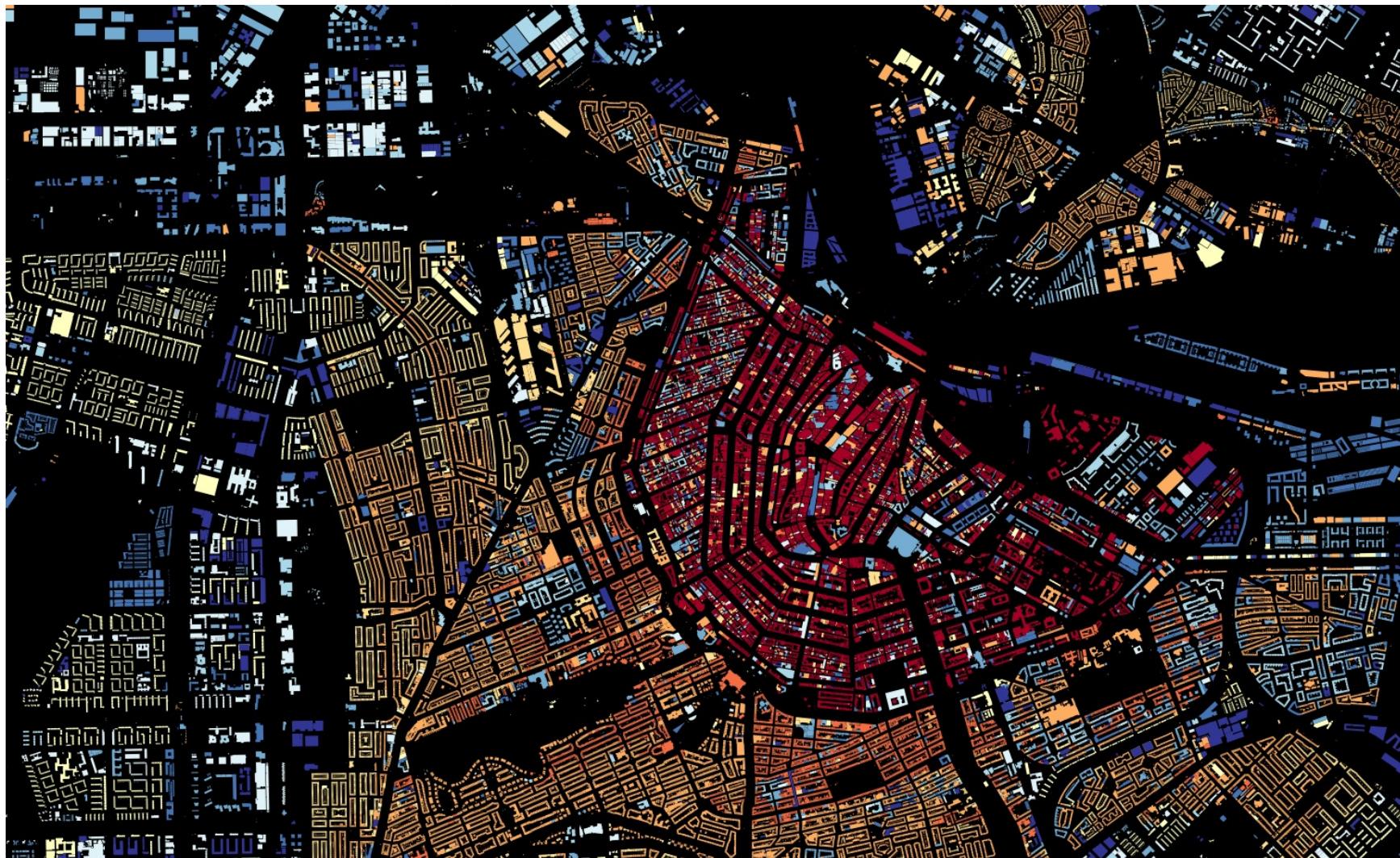


Cartograms, or value-by-area maps, distort geographic areas based on a single variable associated with that area, (e.g., the size of a county is proportional to its population density).



Why Maps?

They look cool!



They are informative

EUROPE ACCORDING TO THE USA 2012

from Yanko Tsvetkov's Atlas of Prejudice
www.alphadesigner.com



OF OCEAN EUROPE

LATIN AMERICA

SMELLY ARMPITS

ROYALTY

NATIONALIZED SEA

WELFARE SEA

SODOM CHOCOLATE

CASH SOUND OF MUSIC

GODFATHERS

MIDDLE EARTH

LAKE

SOCIALIST UNION

DIRTY PORN

BOMB'S

DRACULA

CRISIS

POULTRY

BUFFER ZONE

WTF?

NUCLEAR SUBMARINE SEA
COMMIES

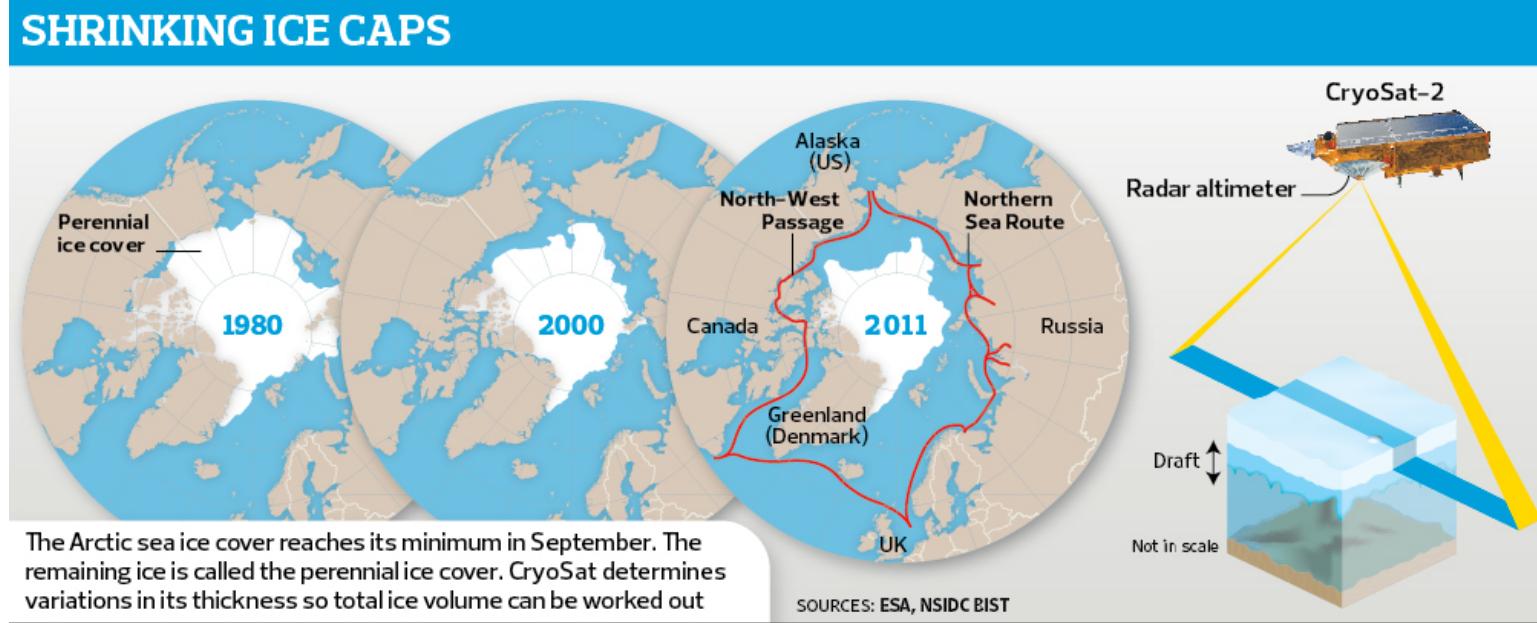
They are useful tools

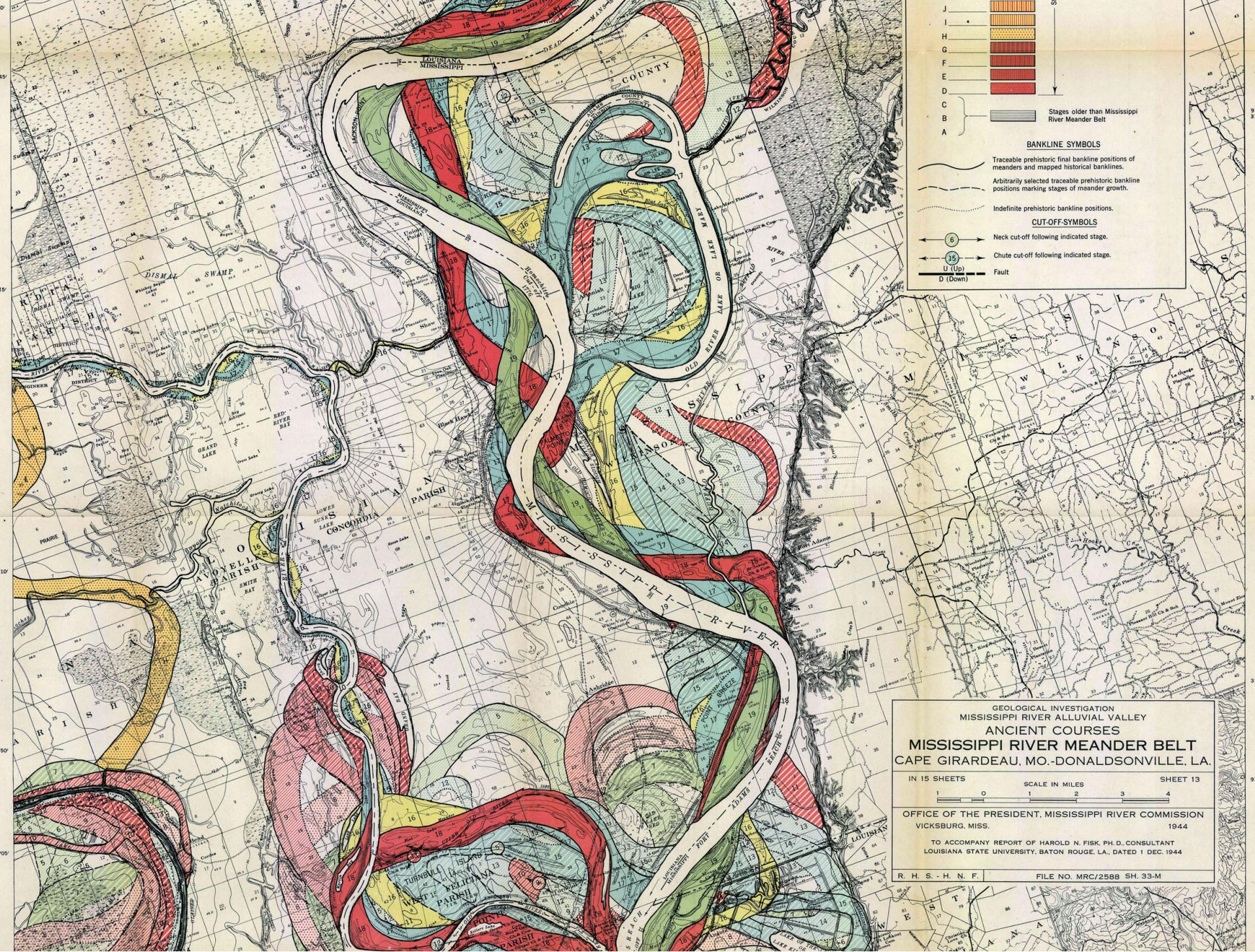


But hasn't the entire world been explored and mapped?

No!!! Our planet is dynamic and ever changing.

Humans and natural forces continue to shape & change the earth, and better technology let us map it more accurately.





Geography Basics

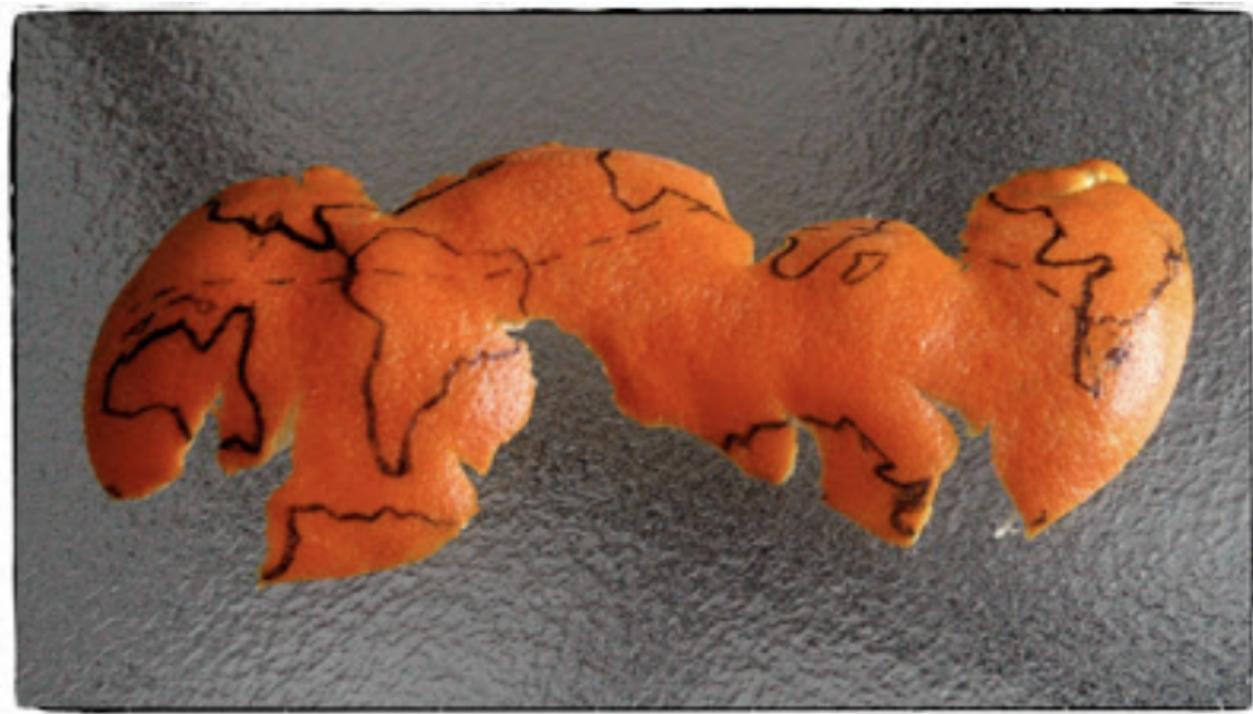
Maps are representations of the real world. This includes things that can be seen as well as representations of things that cannot.

The world is shaped as a(n): _____.

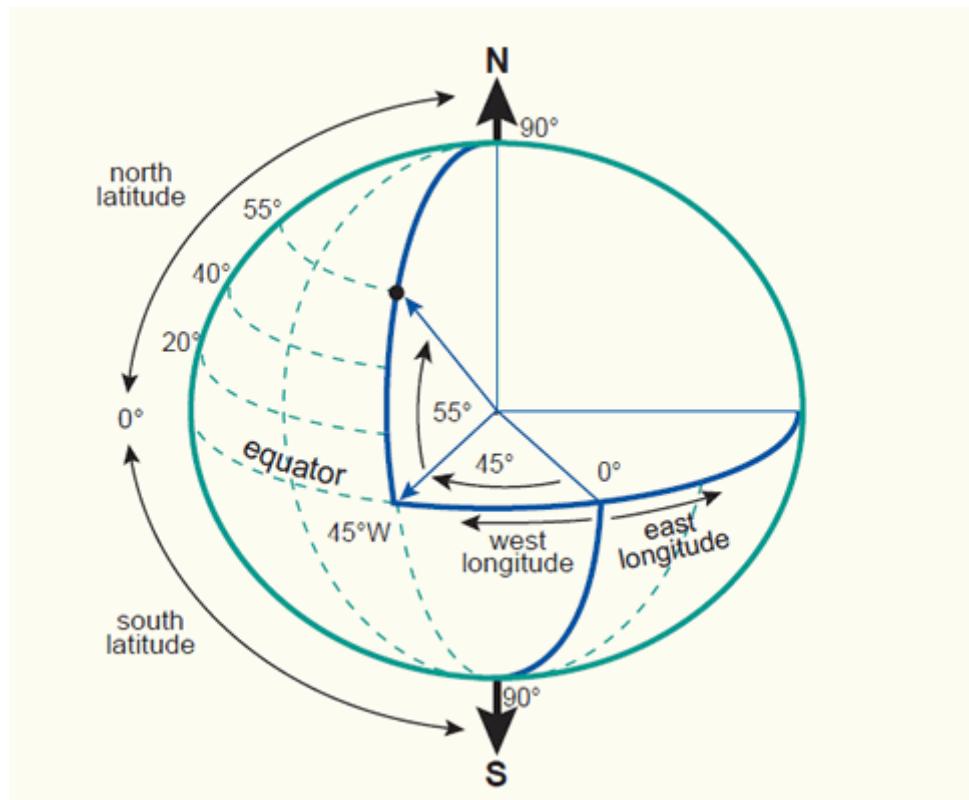
The world is shaped as a(n): ellipsoid.

Hard to put a 3D object (like an ellipsoid) on a 2D plane.

You have to rip, stretch, or perform another distortions



Coordinates are the x,y values given to a particular location on a map. These are called longitude and latitude.



Geocoding is when you take text data like "Sierra Leone" and associate points with it. This is what google maps or OpenStreetMaps does when you search for a location

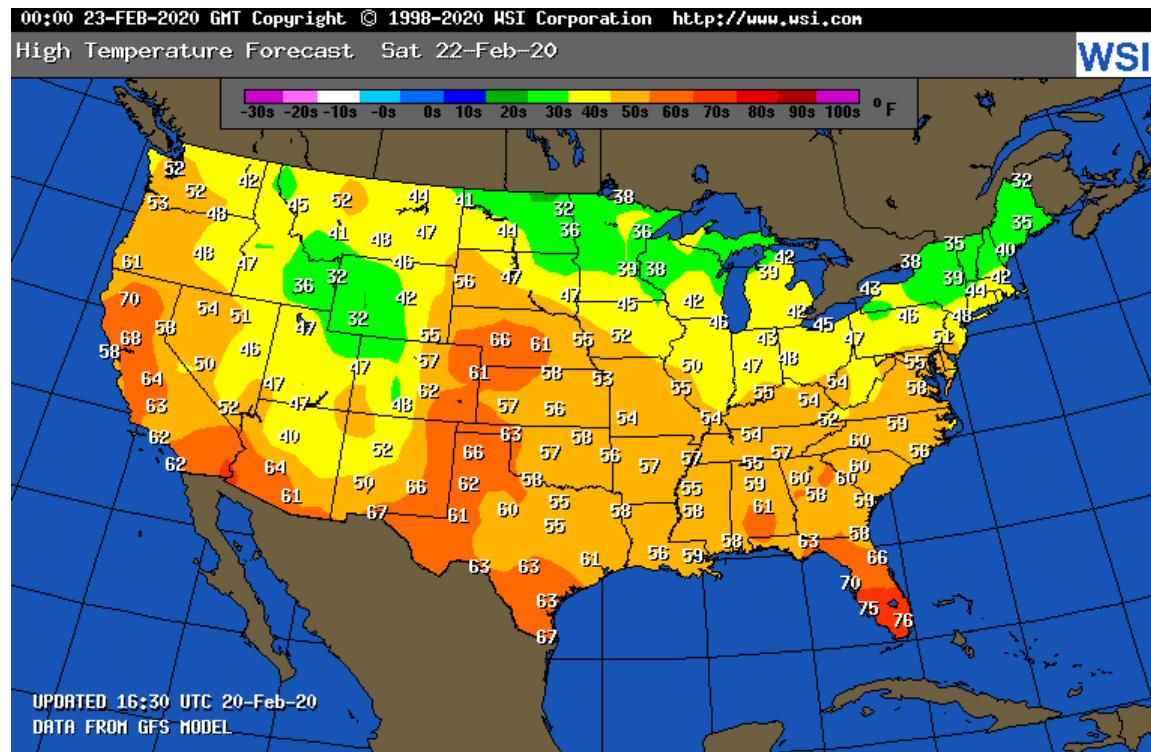
Reverse Geocoding Is when you take a longitude and a latitude and return a text value like "Sierra Leone"

Everything is related to everything else
but near things are more related than
distant things. -*Waldo Tobler*

GIS Basics

Geographic phenomena on our map
can be *discrete* or *continuous*.

Continuous types changes gradually, not abruptly ex: temperature, elevation, salinity.



Discrete types are divided into mutually exclusive parts, with all locations in one part having the same value.

Different types of data can be used to represent our geographic phenomenon.

But you have to make sure that the right data is used to represent the right type of phenomenon!!!

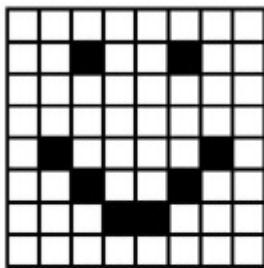
- **Nominal Data** provides an identifier to discriminate between values.
- **Ordinal Data** can be put in some natural sequence.
- **Interval Data** allows for simple forms of computation like + and -.
- **Ratio Data** allows for most, if not all, arithmetic computations.

GIS File Types

Map data is stored as a *Vector* or a
Raster.

A raster is a set of regularly spaced cells with associated values.

The value of the cell is assumed to be valid for all the area within it.

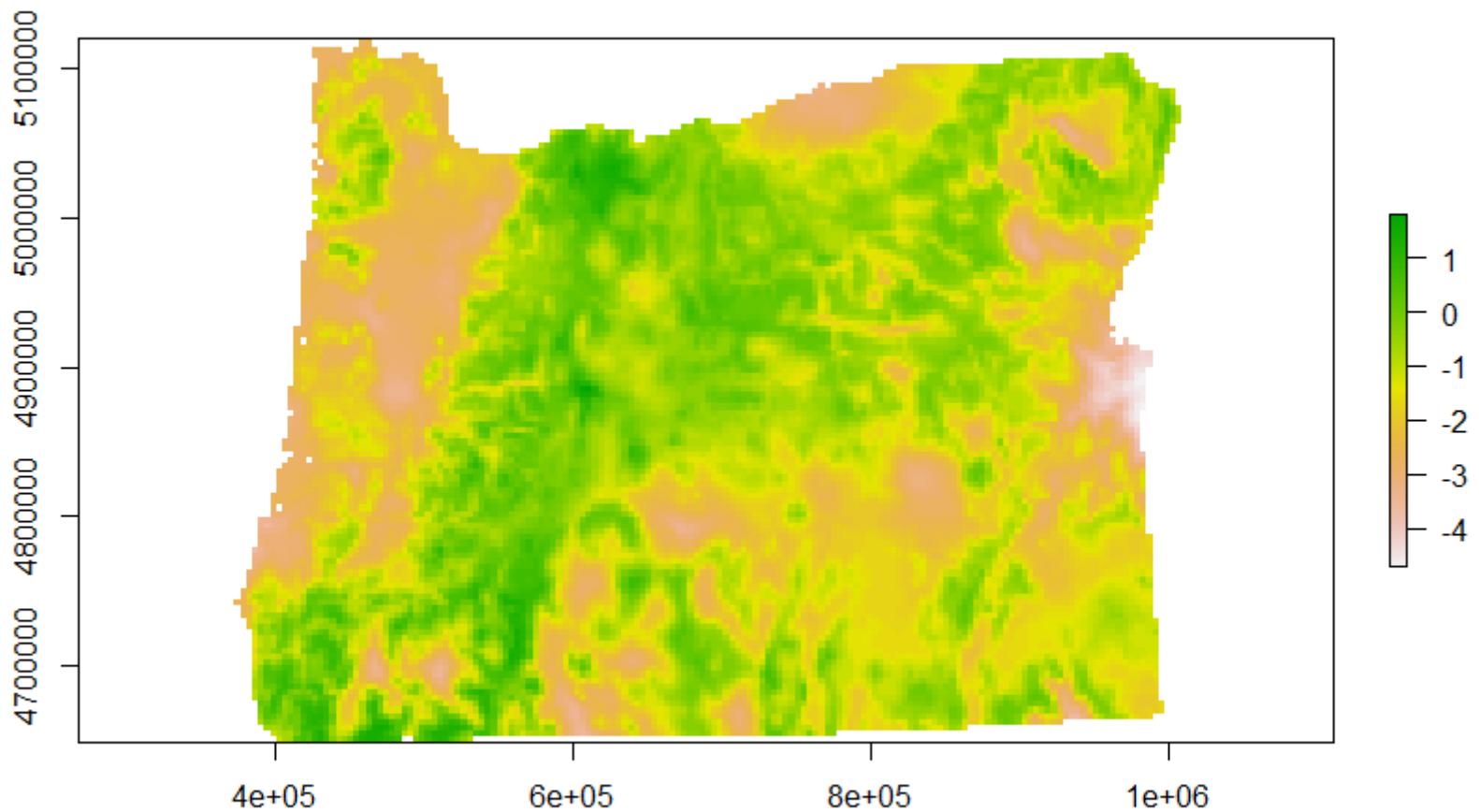


Picture

0	0	0	0	0	0	0	0
0	0	1	0	0	1	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	1	0	0	0	0	1	0
0	0	1	0	0	1	0	0
0	0	0	1	1	0	0	0
0	0	0	0	0	0	0	0

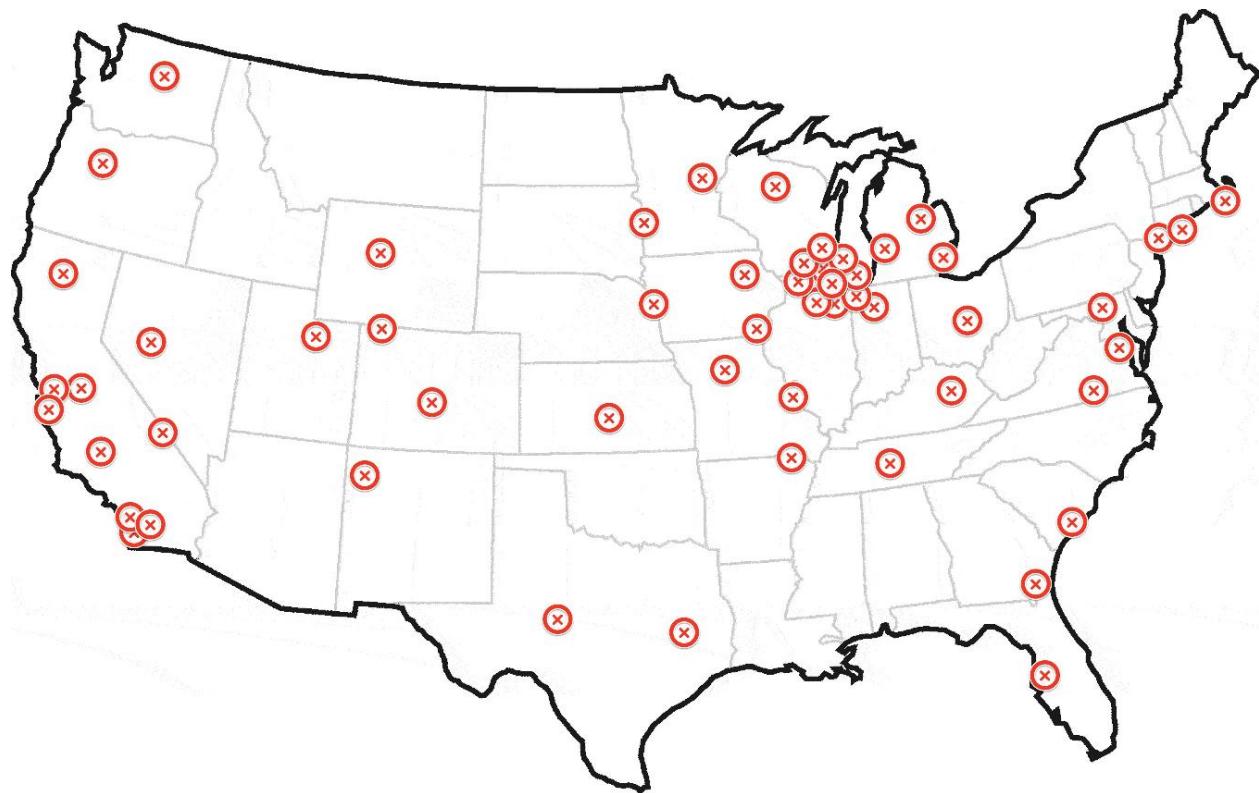
Bitmap

□ = 0
■ = 1

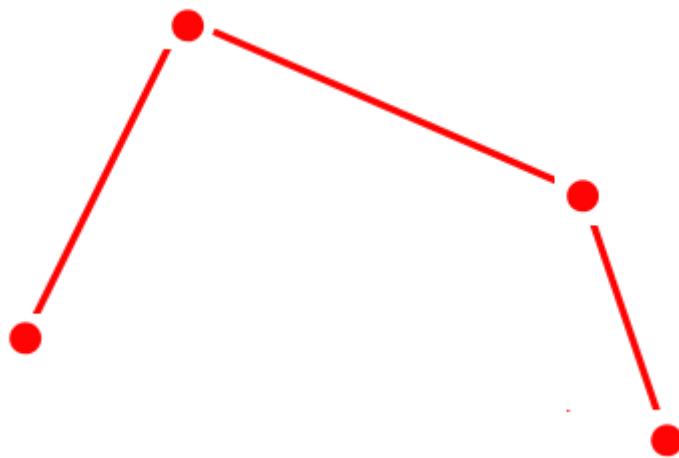


Vectors, unlike rasters, attempt to explicitly georeference the geographic phenomena.

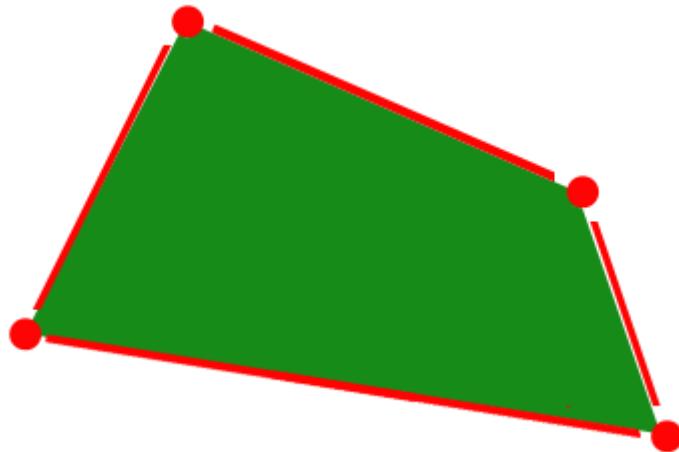
They can be a single point (x, y) or (x, y, z).



They can be a line. Which requires two or more nodes and a line drawn between them.



Another type of vectors are polygons.
They are a collection of nodes and
arcs.



Each section of vector data can have thematic data associated with it.

Now we have some basic GIS
principles down...lets get mapping!!!
Over to you Christine!

Exporting Data from OSM

Over the years there has been a lot of different tools and websites developed for extracting data from OSM. Today I will show you three of my favorite.

- HOT OSM Export Tool
- Overpass Turbo
- Geofabrik

HOT Export Tool

- Pros
 - Easy to use
 - Exports data in a variety of formats
 - OSM data is categorized into easy to understand categories
- Cons
 - Can be slow when the OSM servers are busy or a lot of exports have been requested

Overpass Turbo

- Pros
 - Requires knowledge of OSM data structure
 - You can view it before you download it!
 - Can be incorporated into programming scripts
 - Works very quickly for small datasets
 - Has a wizard to assist with Queries
- Cons
 - Requires learning a programming language
 - Requires knowledge of OSM data structure

GeoFabrik

- Pros
 - Provides standard ready to use GIS Files (.shps!)
- Cons
 - "Fremium" model meaning data may be incomplete
 - The data can be a little outdated