



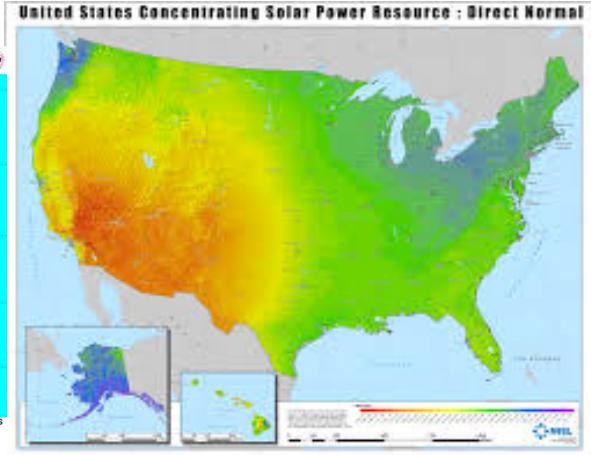
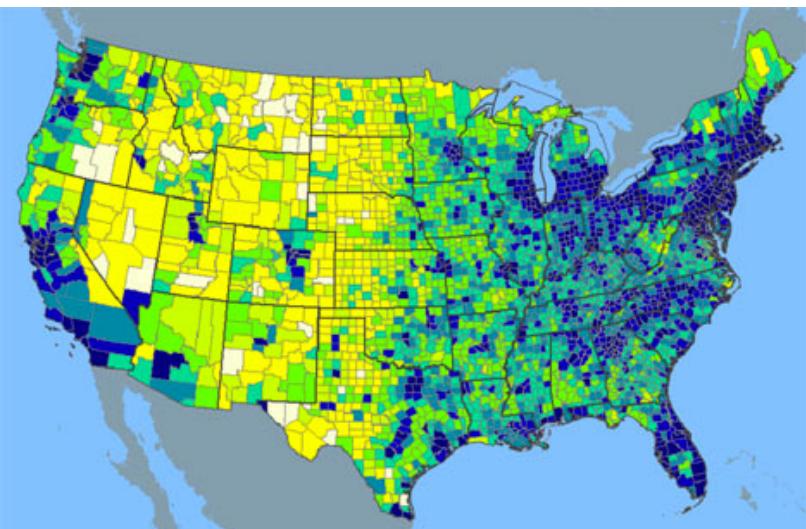
Module #8a: **Maps and Visualization**



Objective

- Discuss Common Geospatial Visualizations techniques
- Learn about the Process of encoding data into maps
- Familiarize with the benefits and tradeoffs of map types

Maps



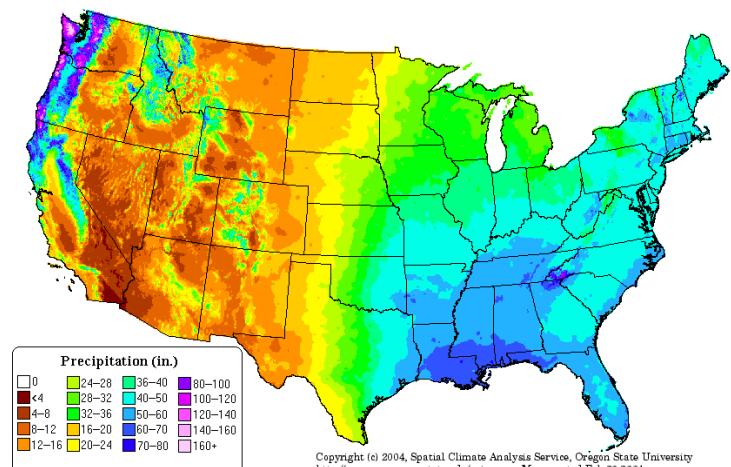
What's a Map

- What a map?

- a representation, usually on a flat surface, of a whole or part of an area.
- describes spatial relationships of specific features that the map aims to represent.
- the most common representation of geographical data
- maps are a universal medium for communication, easily understood and appreciated by most people, regardless of language or culture.

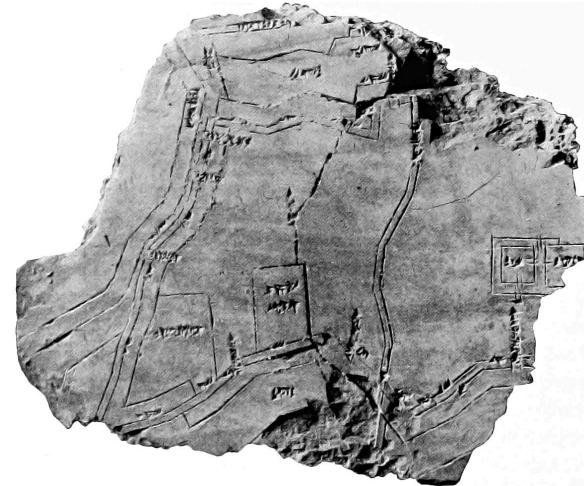


Precipitation: Annual Climatology (1971–2000)

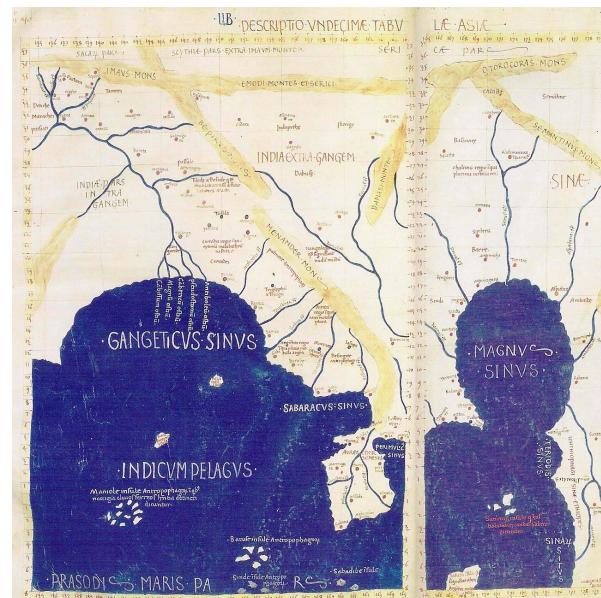


Cartography

- Cartography is the art and science of making maps.
- The oldest known maps are preserved on Babylonian clay tablets from about 2300 B.C.
- Greek and Roman cartography reached a culmination with Claudius Ptolemy



Babylonian's Clay tablet with map (ca. 1400 BC)



Ptolemy's world map
2nd century

History of Maps

- 15th-16th century:
 - The invention of printing made maps much more widely available
 - Maps started to be printed in carved wooden blocks and copper plates
- 17th, 18th and 19th centuries
 - Maps became increasingly accurate with the application of scientific methods.
 - Many countries undertook national mapping programs.
- The invention and improvements of tools like the compass, telescope, sextant, quadrant and printing press all allowed for maps to be made more easily and accurately.



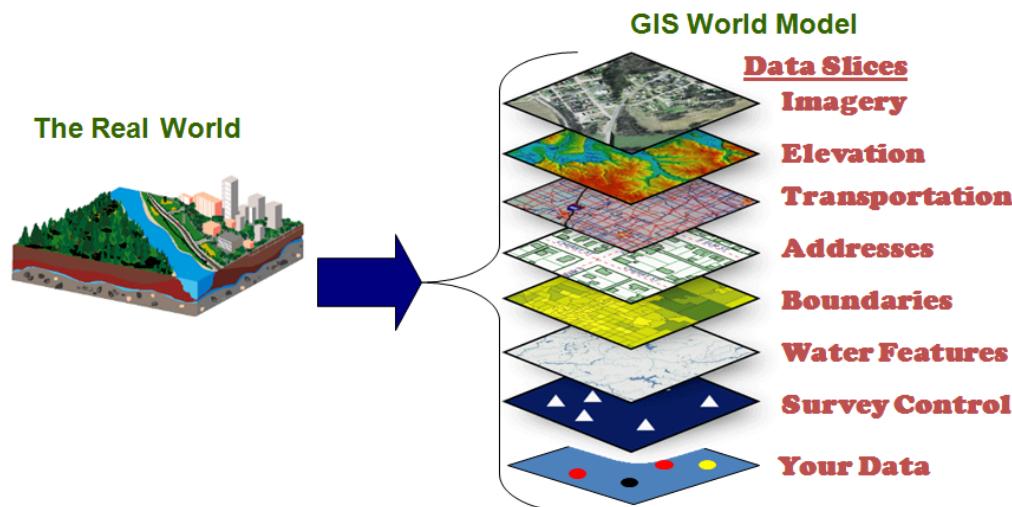
Danish Kingdom, 1629



History of Maps

- 20th century

- the use of planes to take aerial photographs changed the types of data that could be used to create maps.
- satellite imagery added to the list of data and can aid in showing large areas in great detail.
- Geographic Information Systems or GIS -- new technology that is changing cartography today because it allows for many different types of maps using various types of data to be easily created and manipulated with computers.

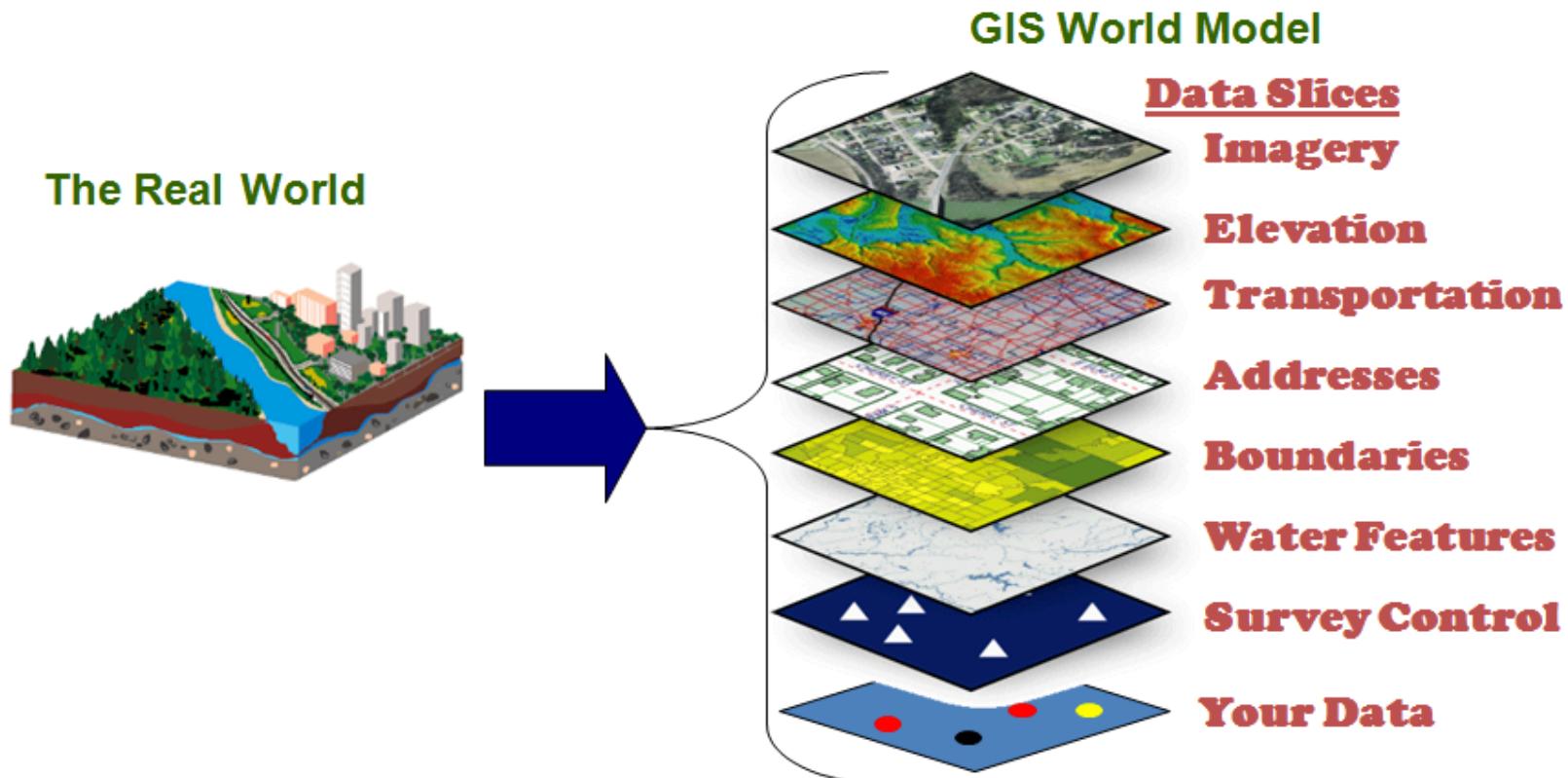


Source: <http://www.in.gov/>



GIS and Visualization

- The success of GIS can be associated with advances in data visualization.



Source: <http://www.in.gov/>

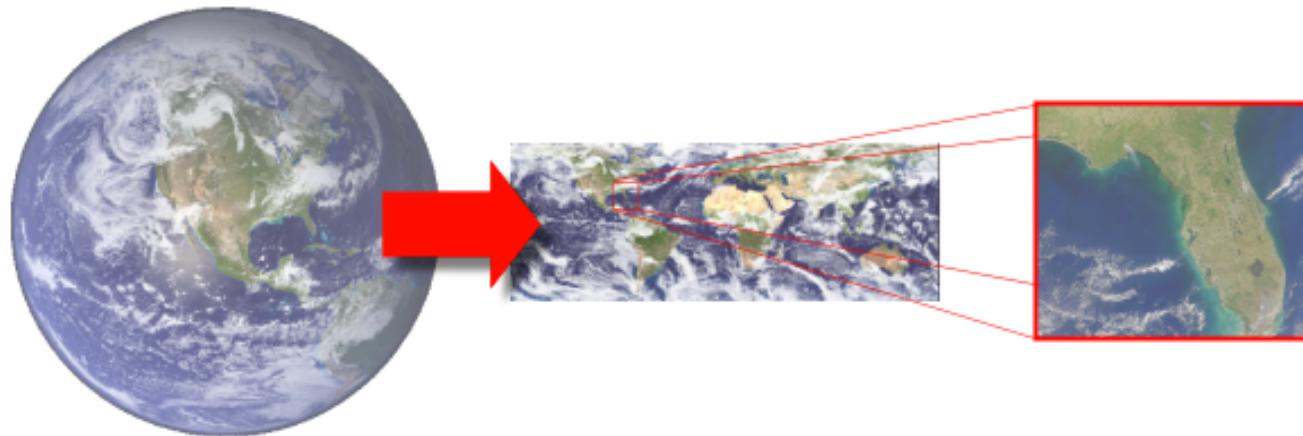


Challenge: 3D to 2D

- Globes are some of the most accurate maps that exist
 - Earth is a three-dimensional object that is close to spherical.
- Maps lose their accuracy because they are actually projections of a part of or the entire Earth



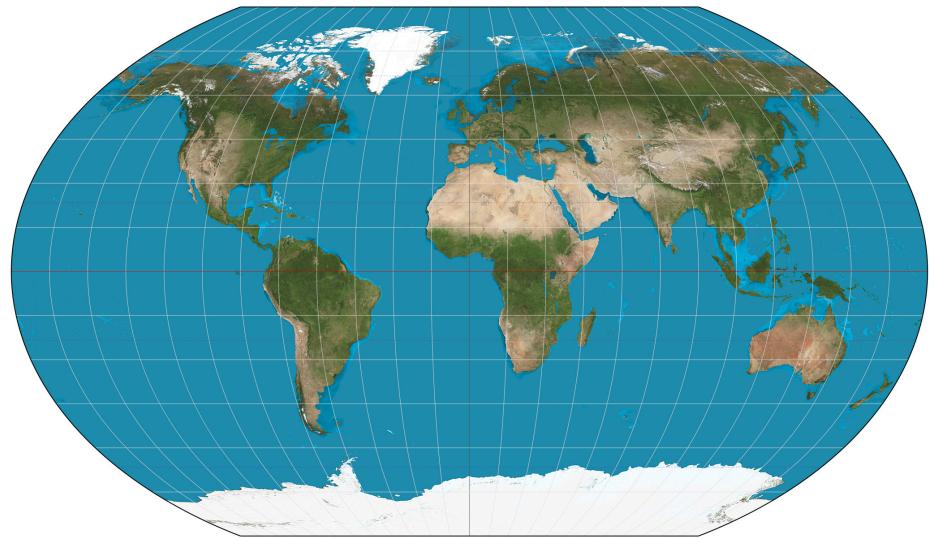
Source: Google Earth





Map Projection

- Map projection:
 - systematic transformation of the latitudes and longitudes of a sphere into locations on a plane.
- There are several types of map projections.
- Each projection is most accurate at its center point and becomes more distorted the further away from the center that it gets.



Source: Wikipedia



Measurements

- Many properties can be measured and visualized on the Earth's surface:
 - Area
 - Shape
 - Direction
 - Bearing
 - Distance
 - Scale
- All map projections involve transformations that result in distortions of one or more of the geometric properties.





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