ArcGIS Introduction and Exercise

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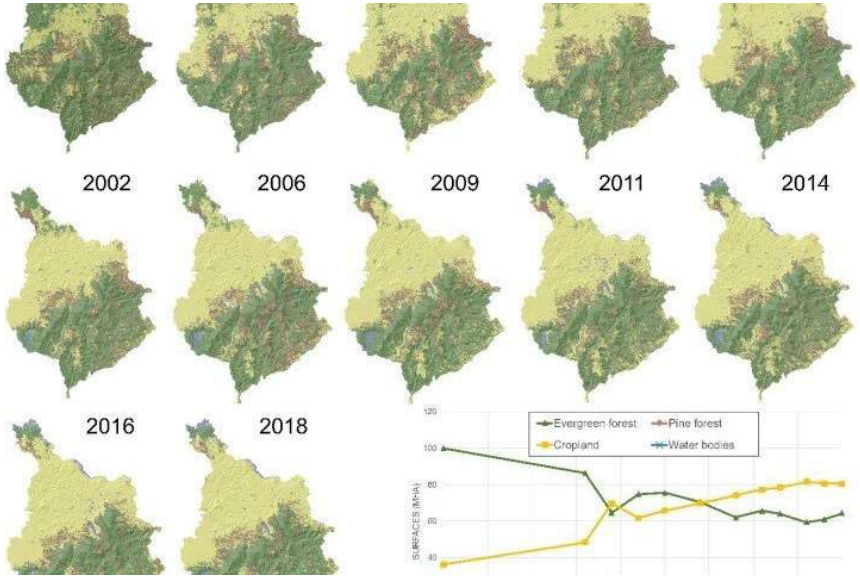
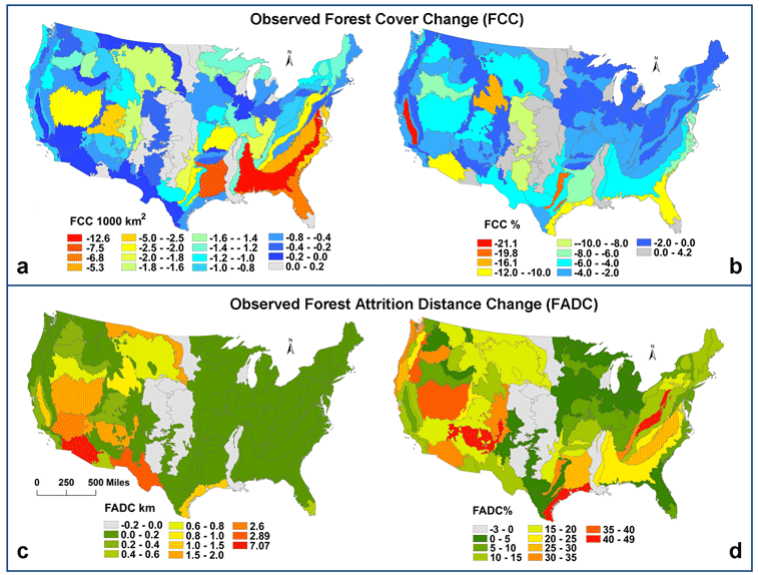
Why make maps?

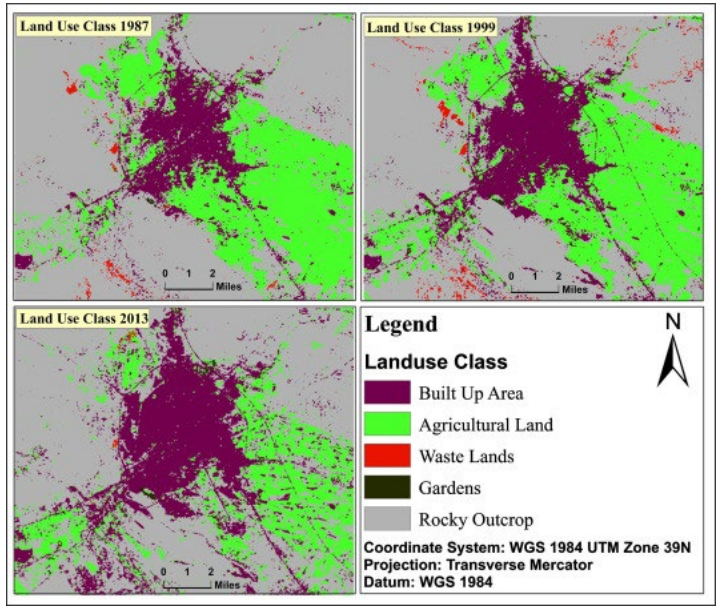
Maps as story tellers and can used as problem solvers.

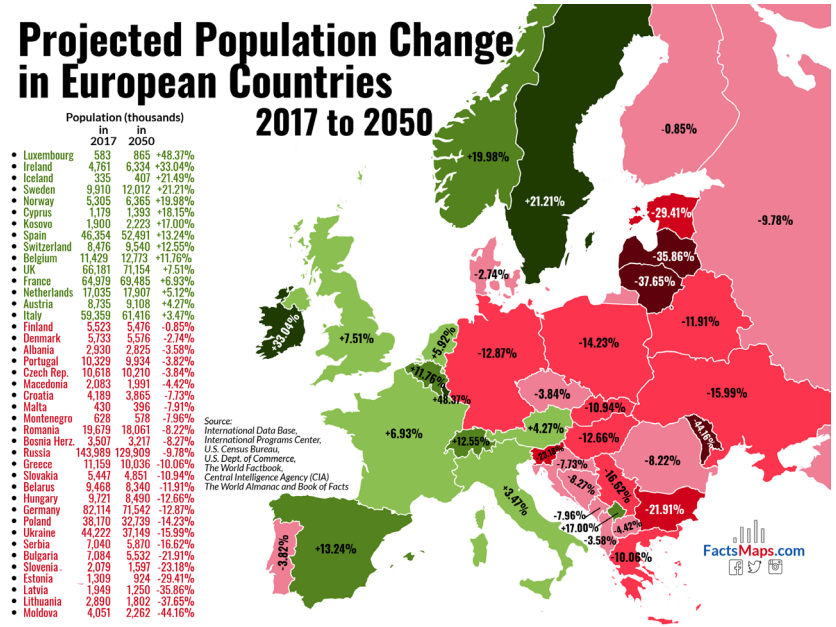
- To represent a larger area than we can see
- To show a phenomenon or process we can’t see with our eyes
- To present information concisely
- To show spatial relationships

Show what we can’t see

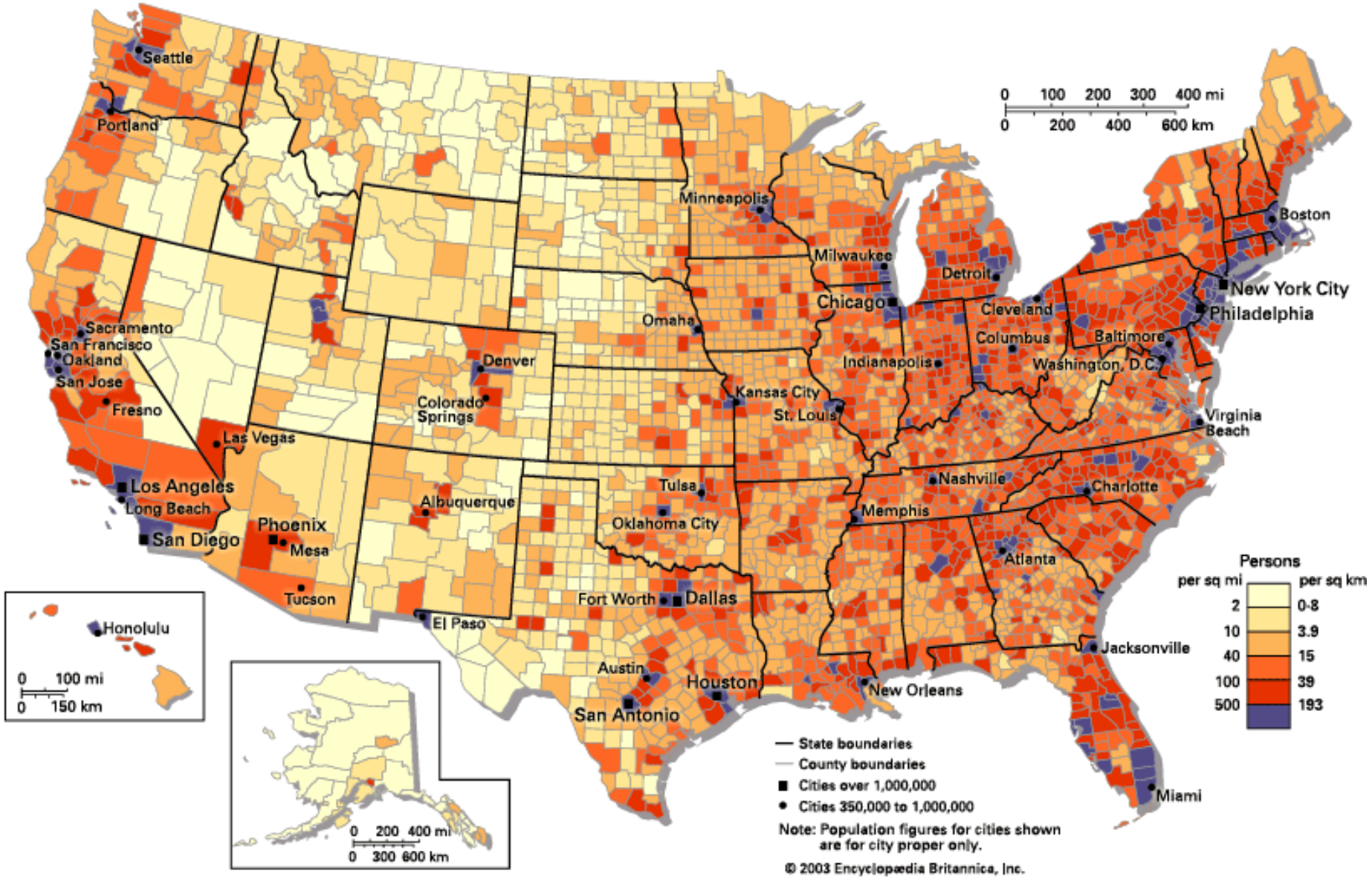




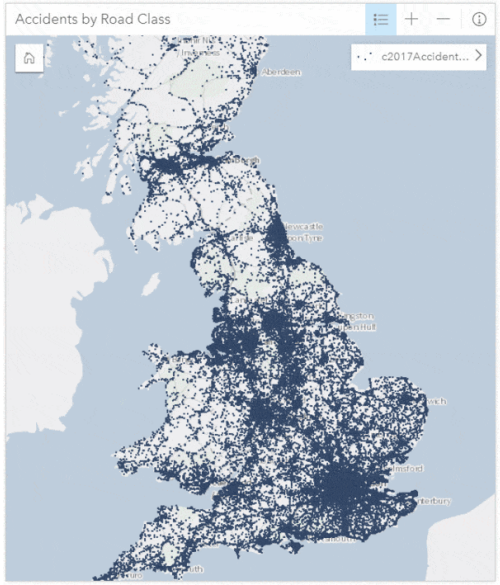


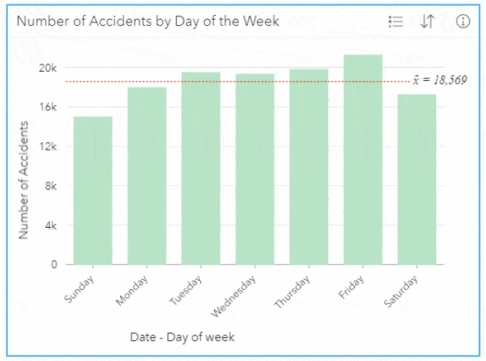


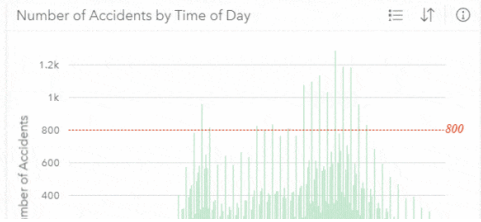
Present info concisely

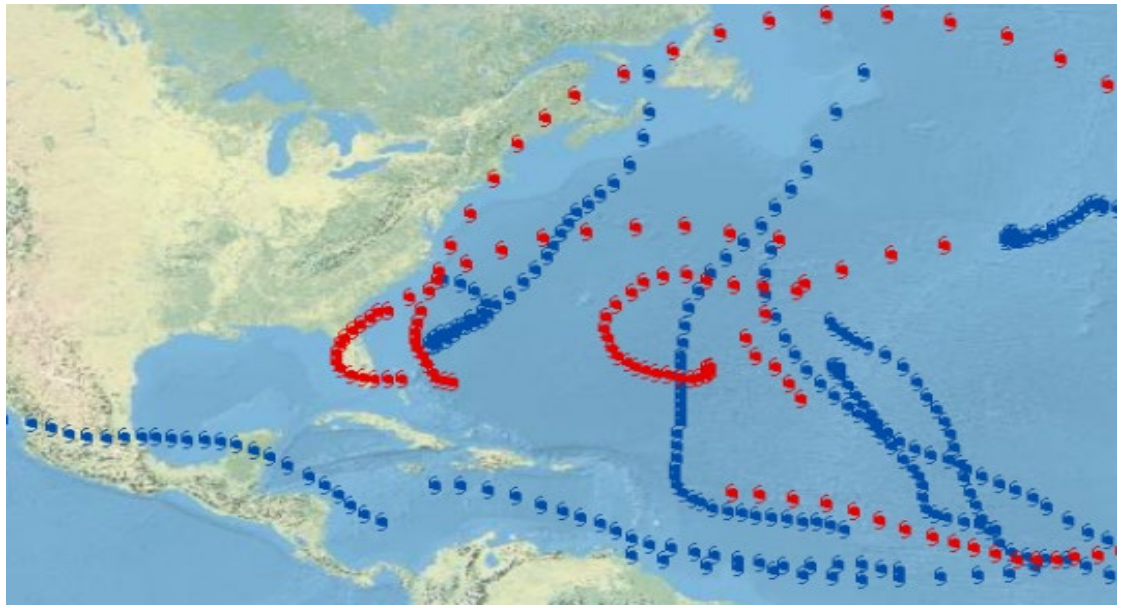


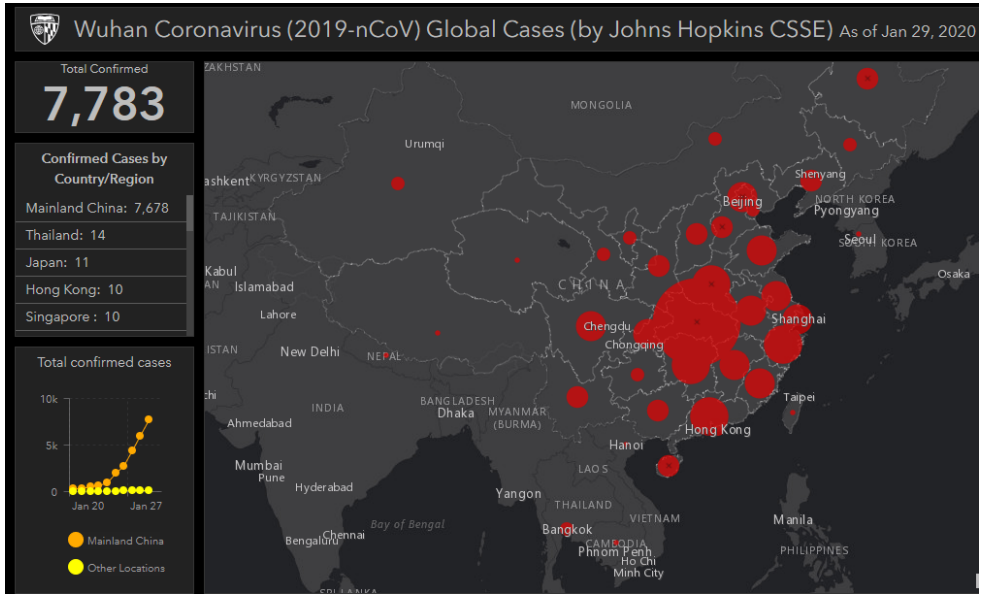
Show spatial-temporal relationships

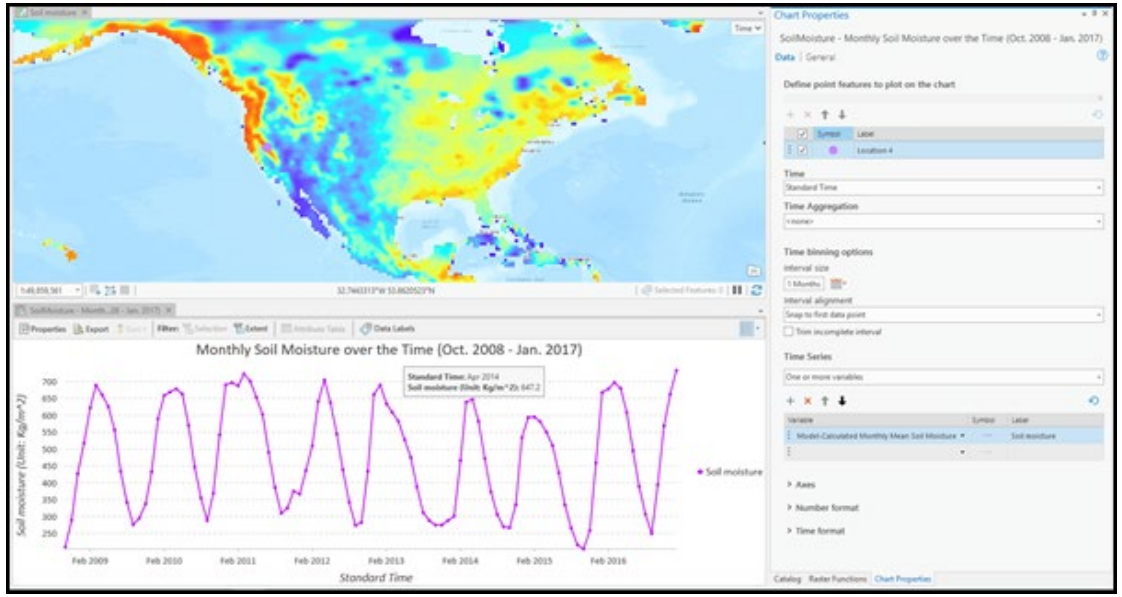








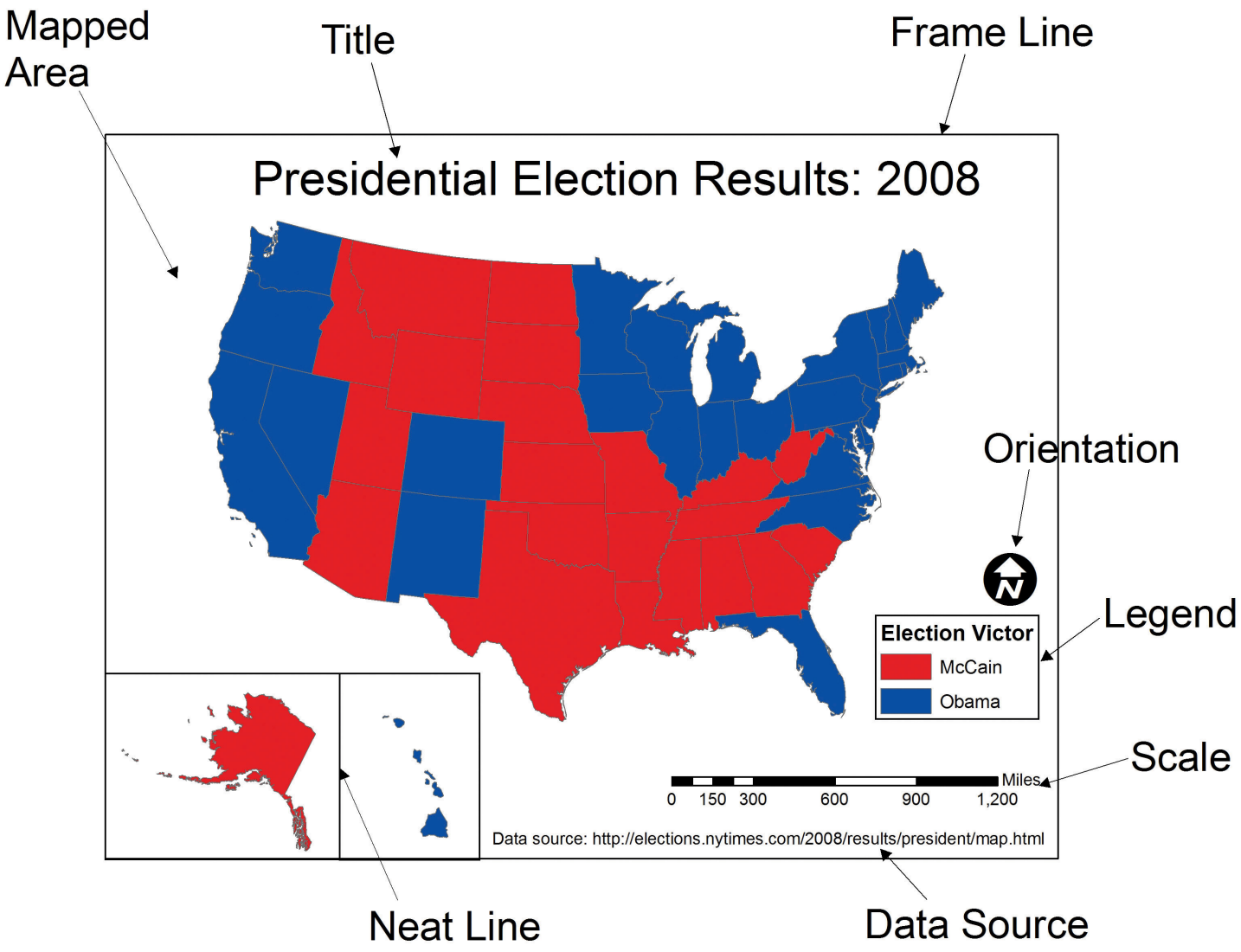




How do we read maps?

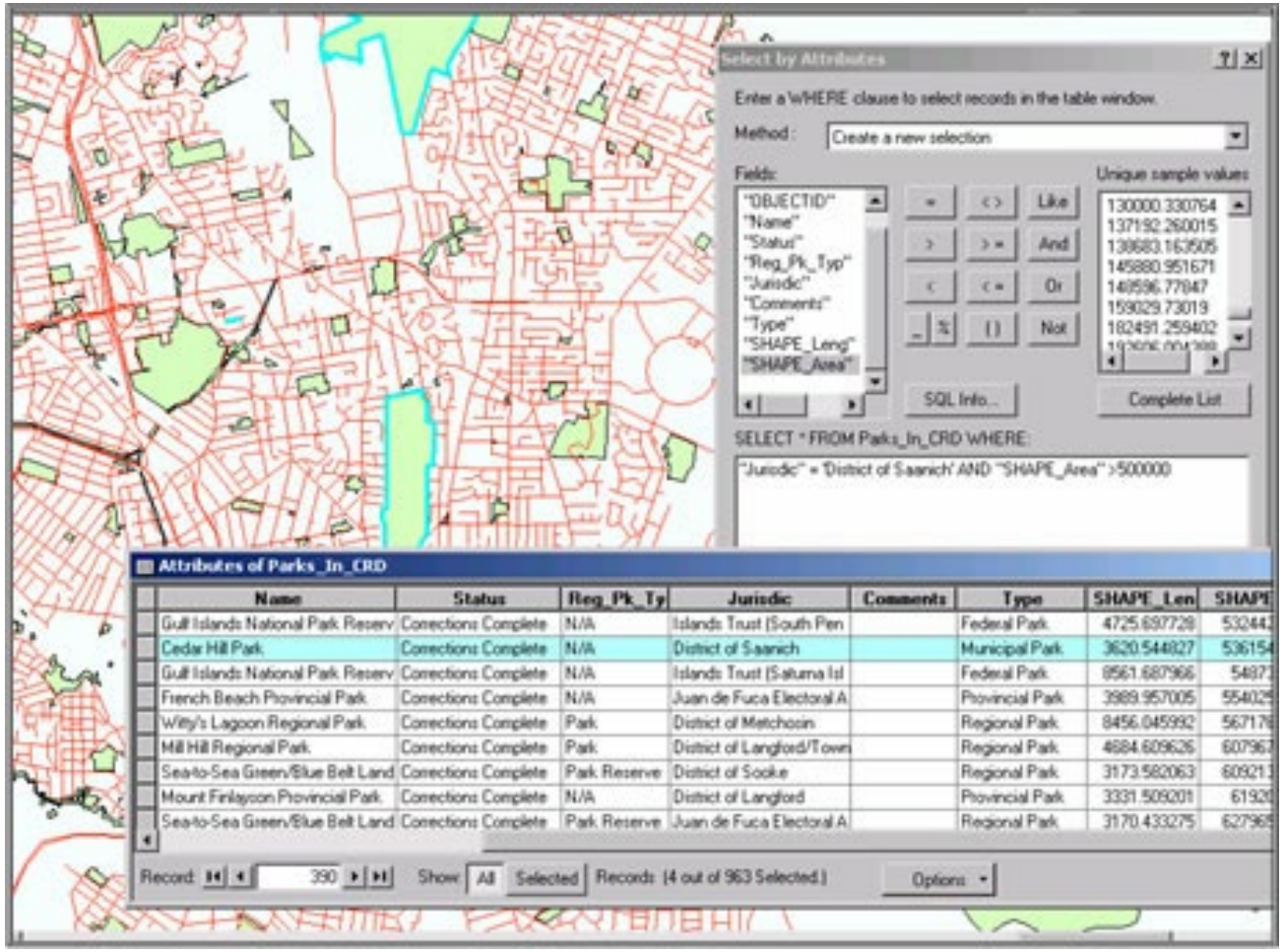
- Maps are selective views of reality
- Size of the map relative to reality (scale)
- What’s on the map (symbolization)
- Shape of the map (projection)
- Checking map orientation (North Arrow)

Common Map Elements



What is a GIS?

A **GIS** is a computer system that allows you to map, model, query, and analyze large quantities of data within a single database according to their location.



Geographic primitive

$$G = f(x, y, z, t, F)$$

x, y = Spatial data
z = Elevation data
t = time data
F = Attribute data

The Feature Model

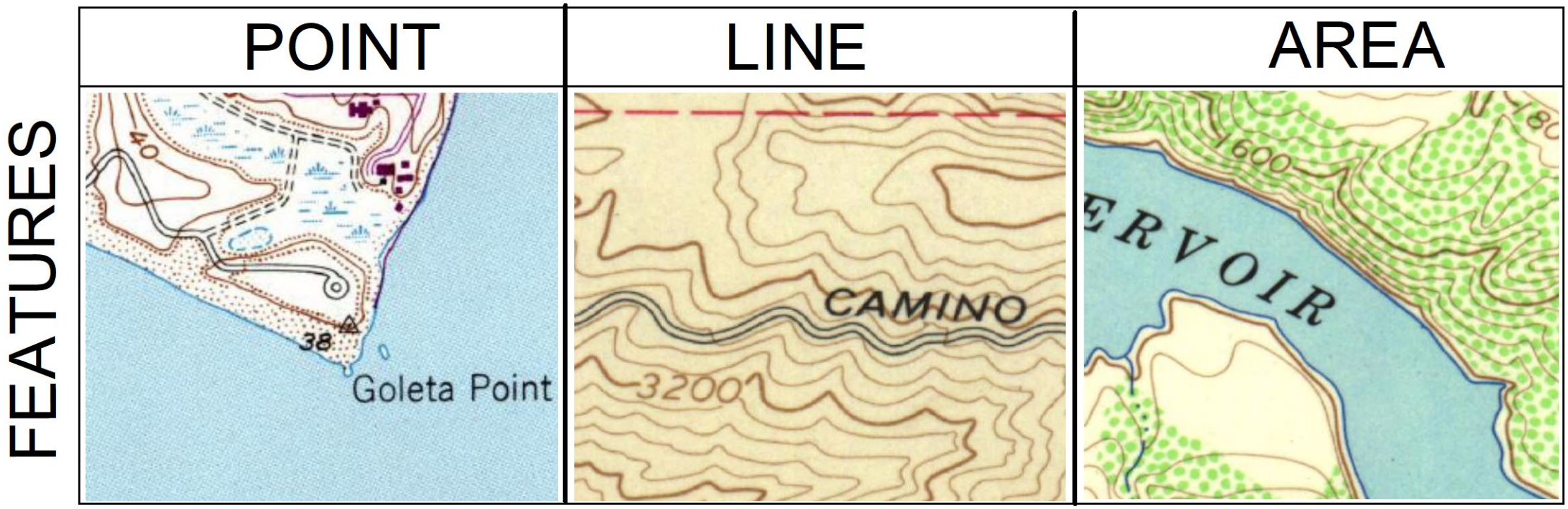
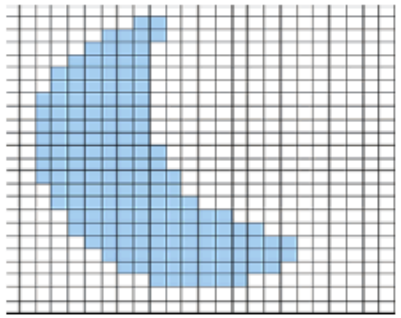
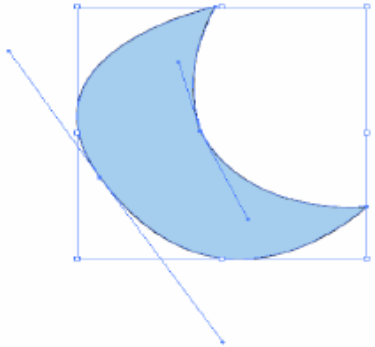


Figure 1.2 The Feature Model: Examples of a point feature (38 foot elevation bench mark), a line fea ture (road, contours) and area features (reservoir, vegetation).

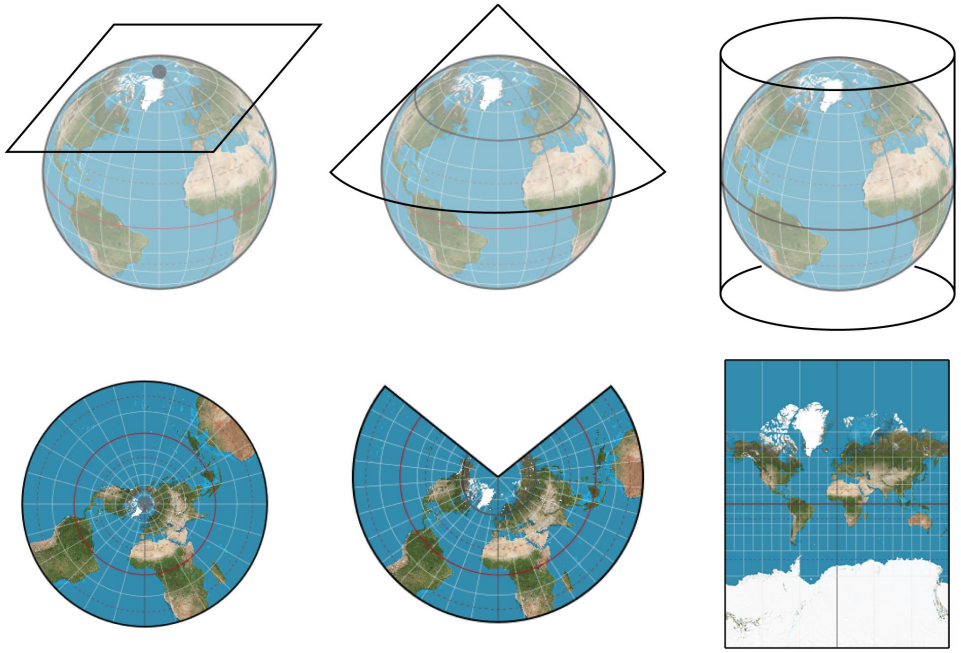
Raster vs Vector

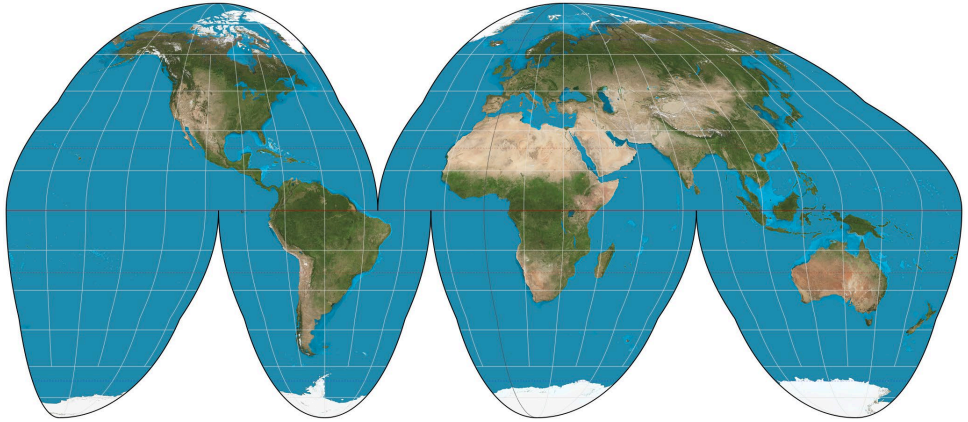
Raster and Vector Graphics

Raster	Vector
	
Made up of a ***grid*** of pixels	Geometric shapes and lines that are defined ***mathematically***
Resolution dependent	Resolution ***independent***
When scaled, visual quality and sharpness is degraded	When scaled, visual quality and sharpness is ***unaffected***
File size is relatively ***large***	File size is relatively ***small***
File Formats: ***GIF, TIF, BMP, PSD***	File Formats: ***EPS, WMF, AI***
Pixel-oriented	***Object*** -oriented

Projection, Scale, Accuracy and Resolution

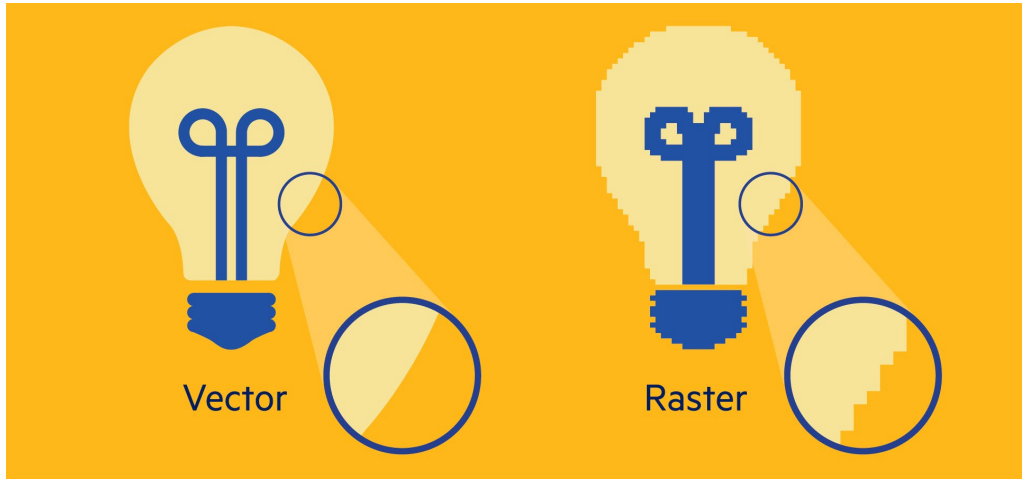
- Projection: the method by which the curved 3-D surface of the earth is represented by X,Y coordinates on a 2-D flat map/screen
- Scale: the ratio of distance on a map to the equivalent distance on the ground
- Accuracy: how well does the database info match the real world
- Resolution: the size of the smallest feature able to be recognized (for raster data, it is the pixel size)

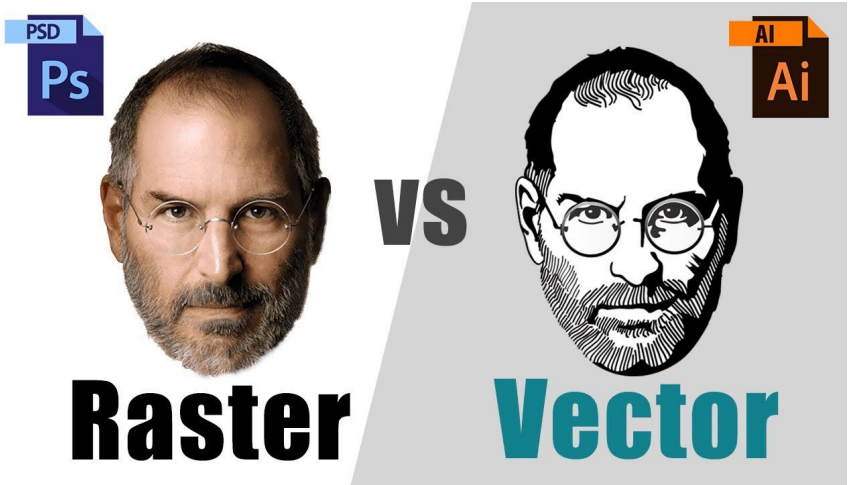




Raster (image)

- A raster image is defined by pixels.
- A pixel is the smallest display element that makes up the images seen on a computer monitor or television.
- In raster images, the more pixels an image contains, the higher its resolution.
- For example, in a raster image a square is drawn as a grid of pixels (dots) and each of those pixels will have a specific color value.
- A line is made up of a row of pixels with each pixel having a color value, and you work with this line by working with the group of pixels that makes up the line, not as a single object as you would in a vector file.
- Programs such as Photoshop, and PaintShop all work with pixels (raster images).

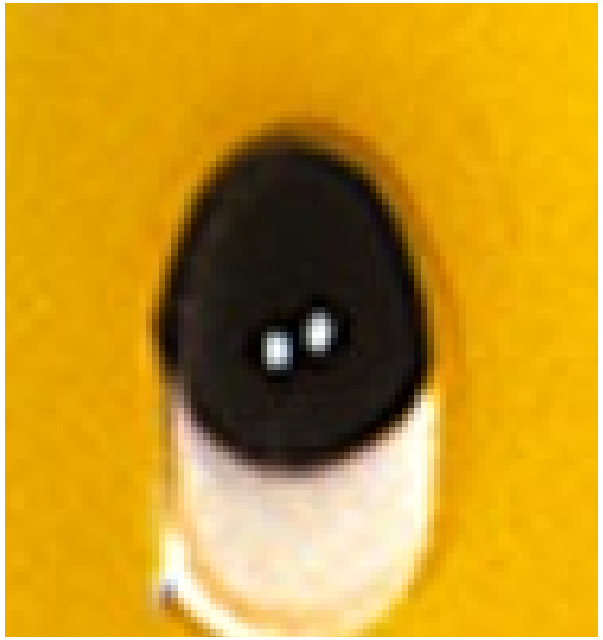




Zoom raster image

100% (900 x 983 dpi)

200%



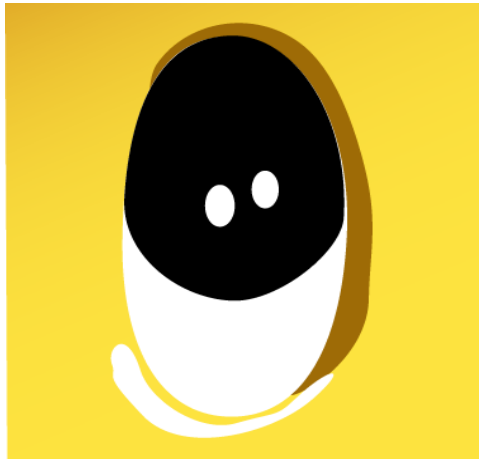
500%

Vector (Lines/Points/Polygons)

- A vector image is defined by objects which are made of lines and curves that are defined mathematically in the computer.
- Vectors can have various attributes such as line thickness, length and color.
- For example, in a vector image, a square is drawn as four lines connected at the corners. Those lines can be set to different thickness and colors. The square can be empty or filled.
- Vector graphics are resolution-independent because the vector objects are drawn mathematically in the computer. They can be made larger or smaller without any loss of quality to the image.

100%

200%



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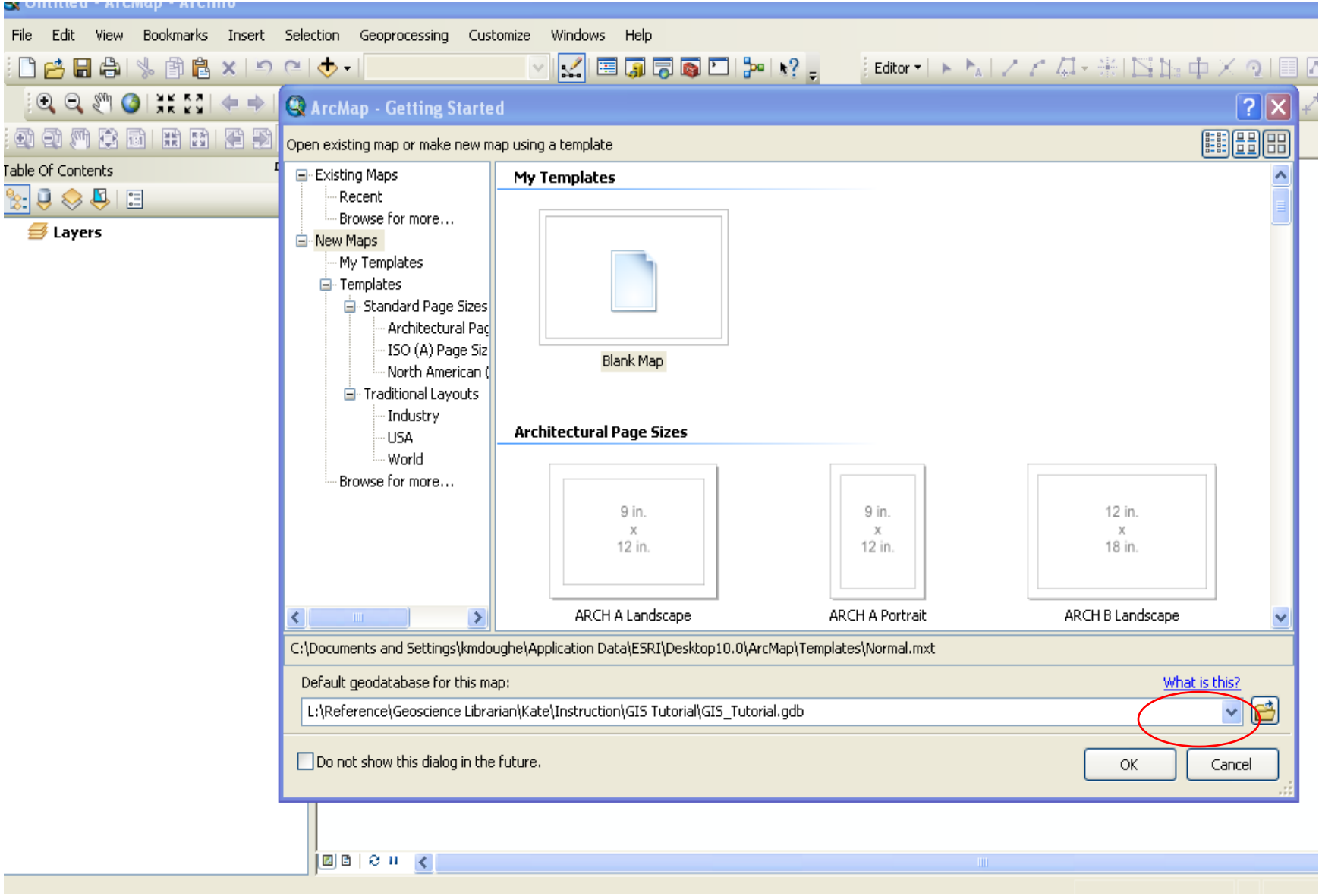
ArcMap


File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Help
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Open existing map or make new map using a template
Existing Maps
Recent
Browse for more...
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ARCH B Landscape
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Default geodatabase for this map:
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Do not show this dialog in the future.
OK
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Terminology

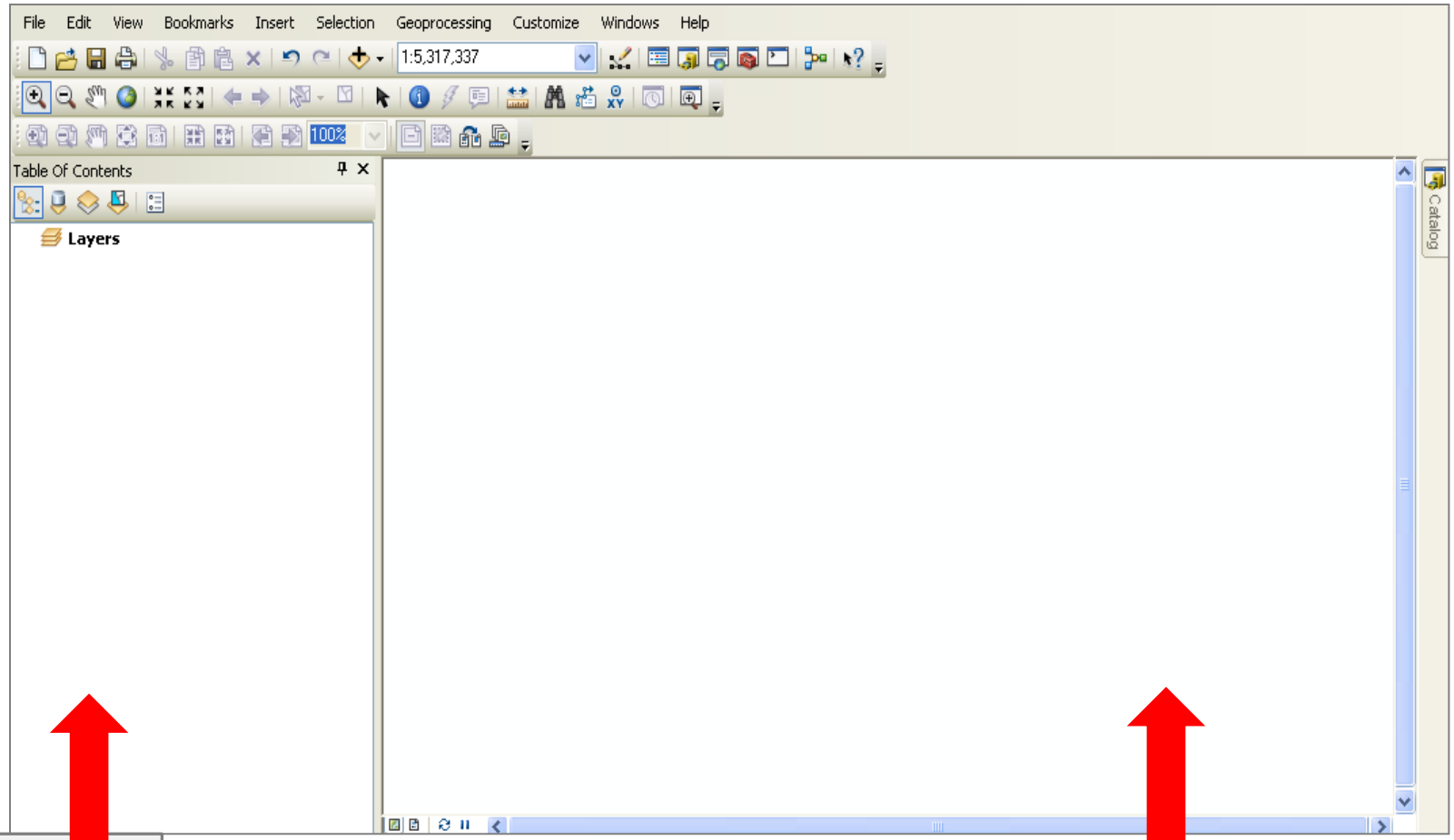
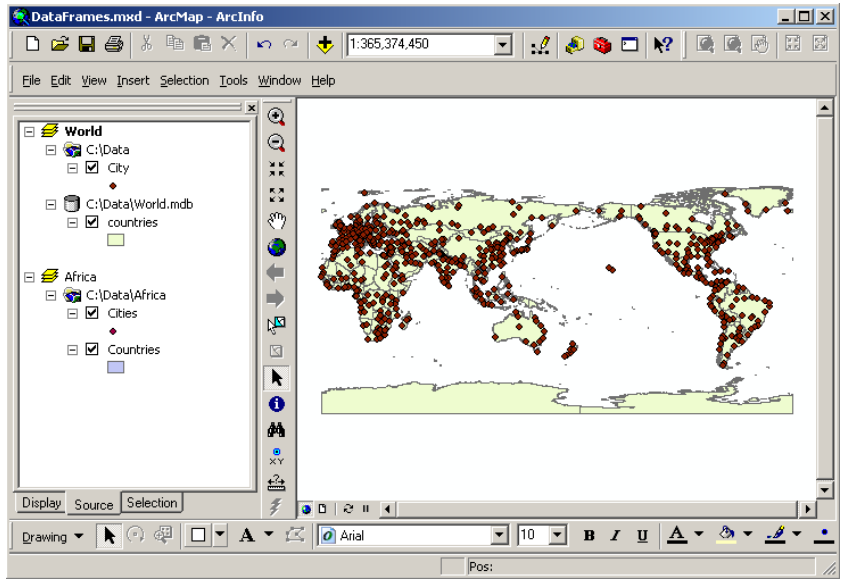


Table of contents that shows the doc's layers.

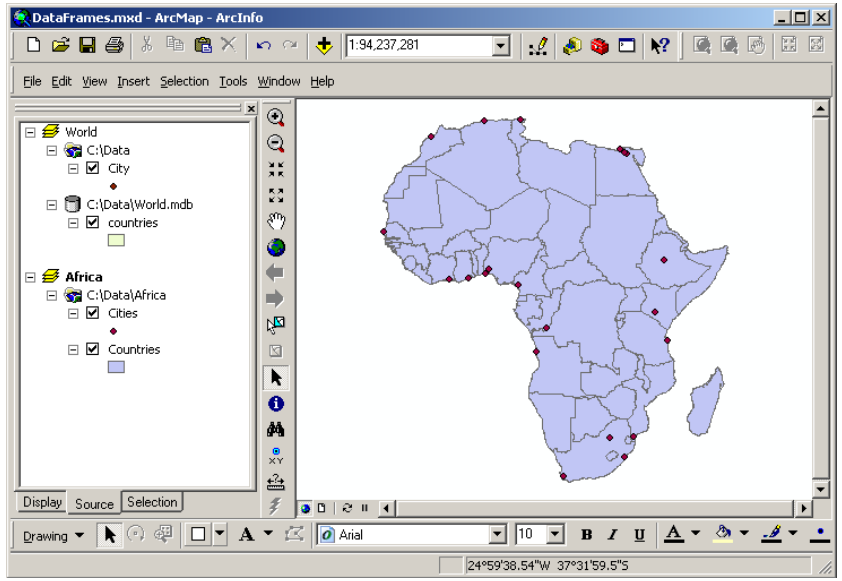
The "data frame" that displays the spatial data.

Terminology

- Data Frame
- Contains layers of map data
- Can have multiple data frames
- Each data frame has properties

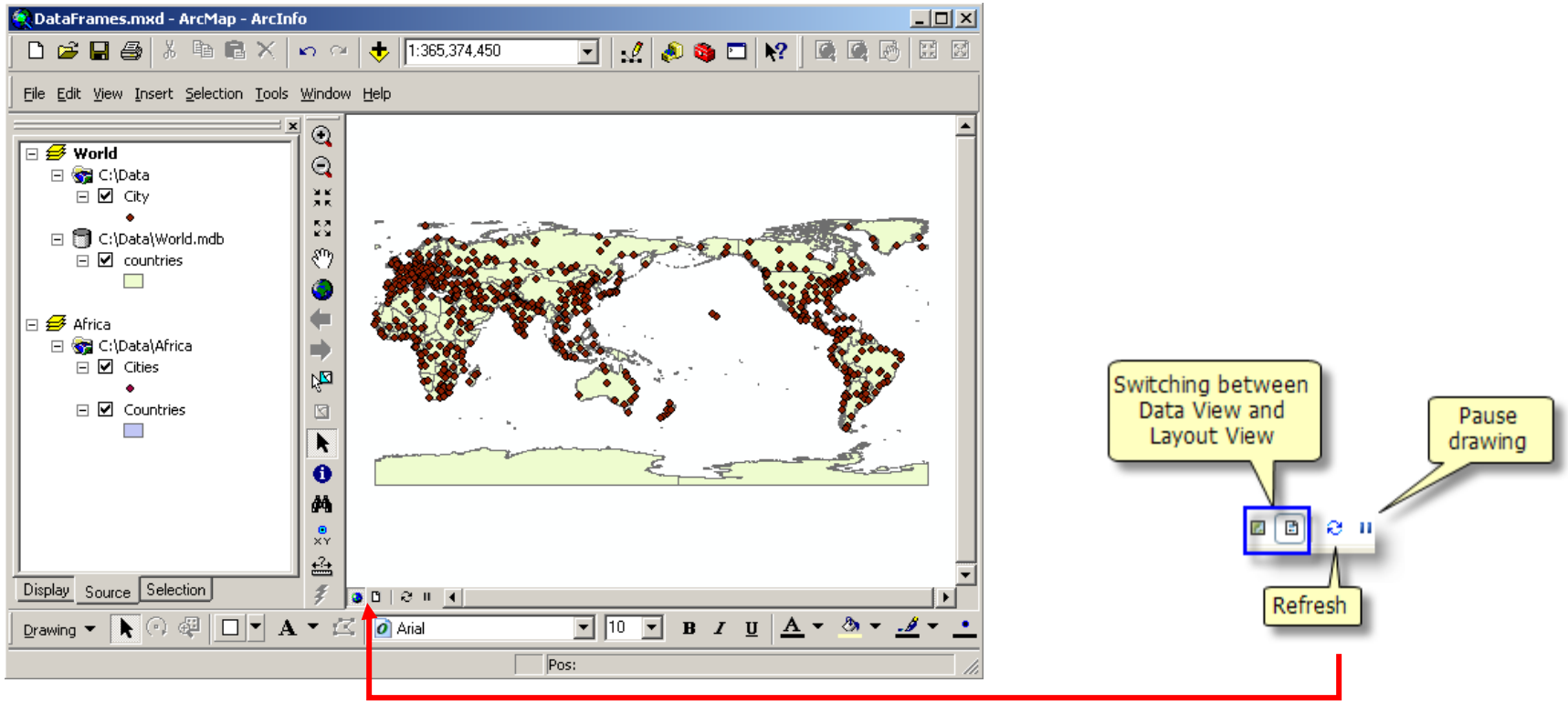


- Data View
- Default view where you do your mapping, analysis, etc.
- Can only see one data frame at a time
- Right-click/Activate or click/Alt

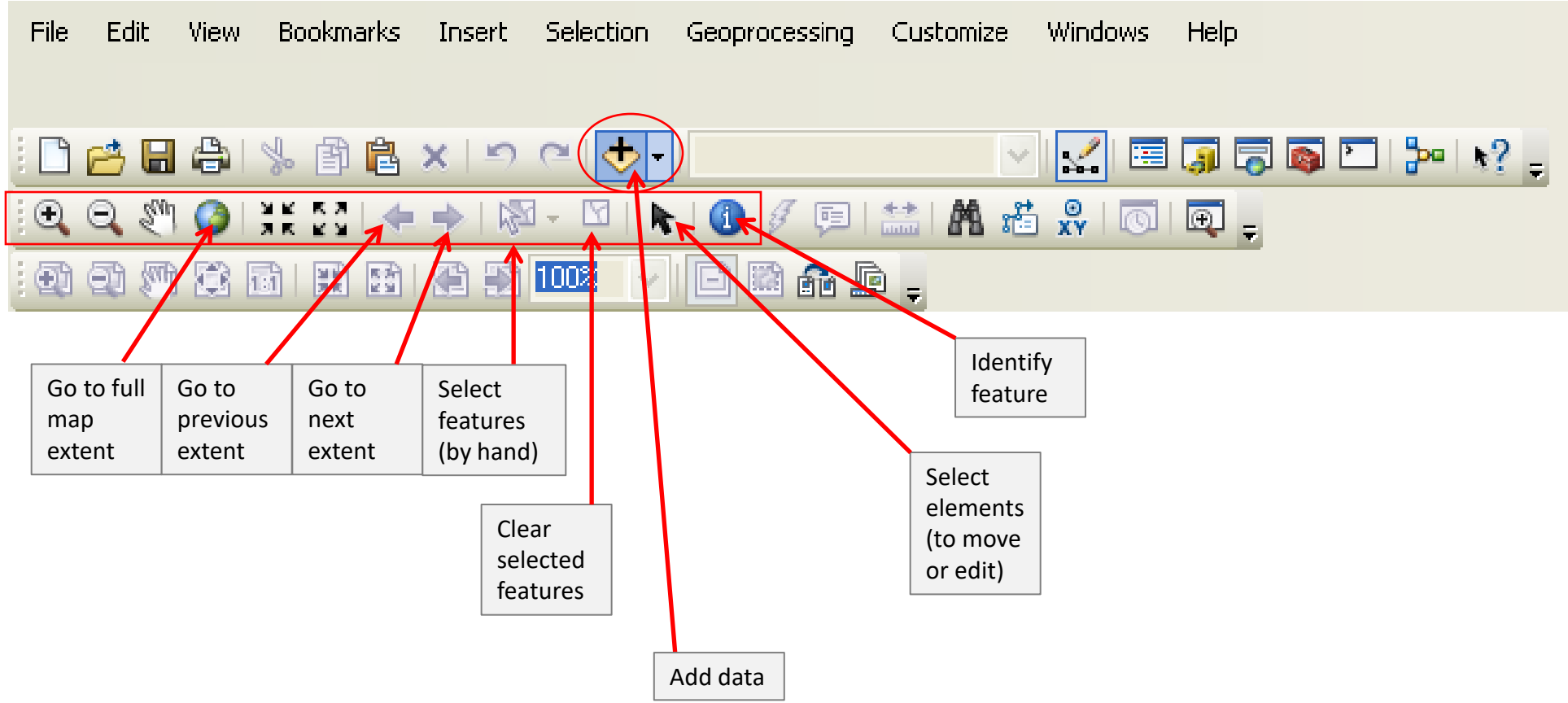


ArcMap

- Is both a data editor as well as map generator
- Provides two different ways to view a map on the fly
  - Data view
  - Layout view



Menu Bar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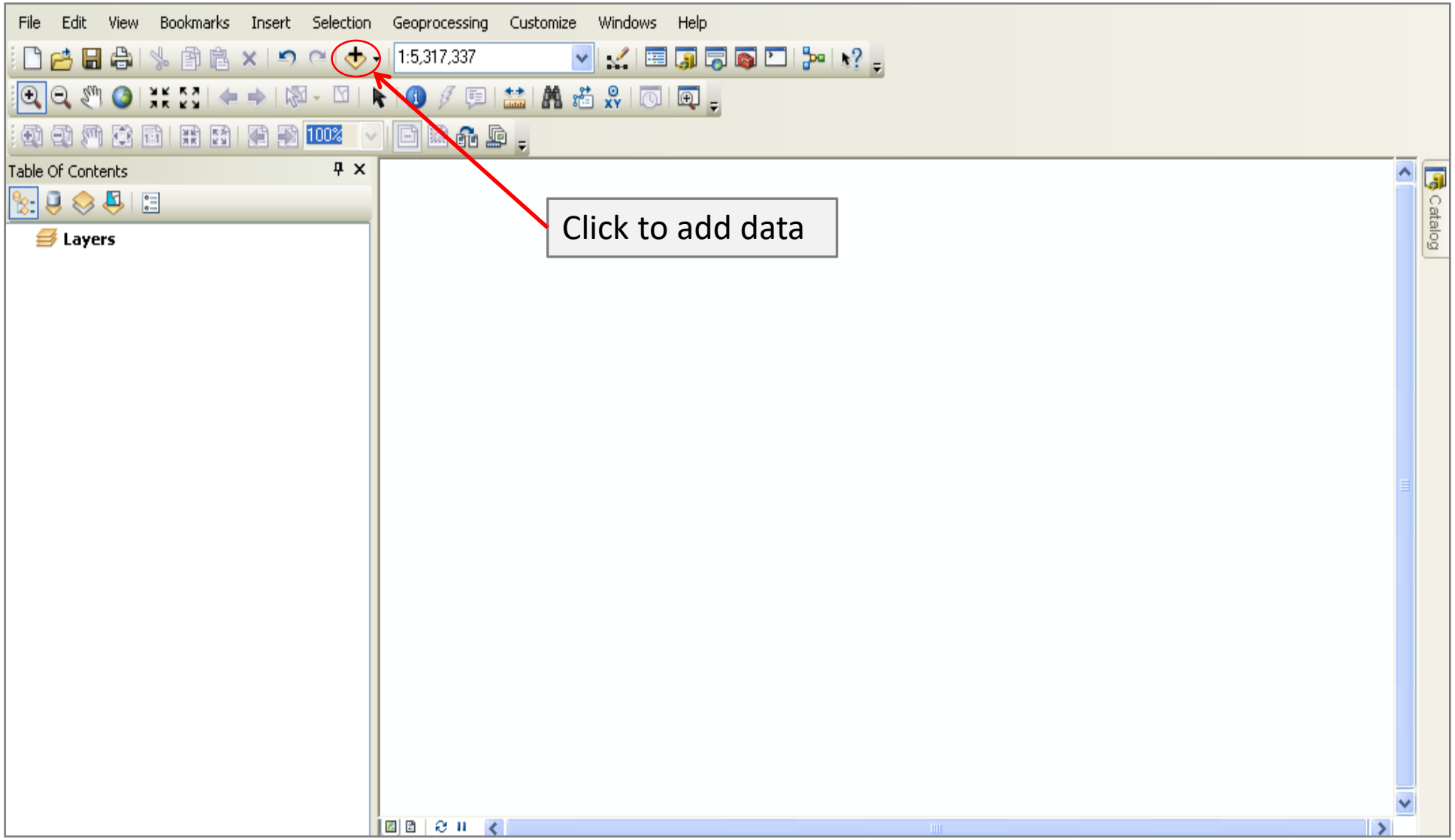
Select elements (to move or edit)
Identify feature

Adding Data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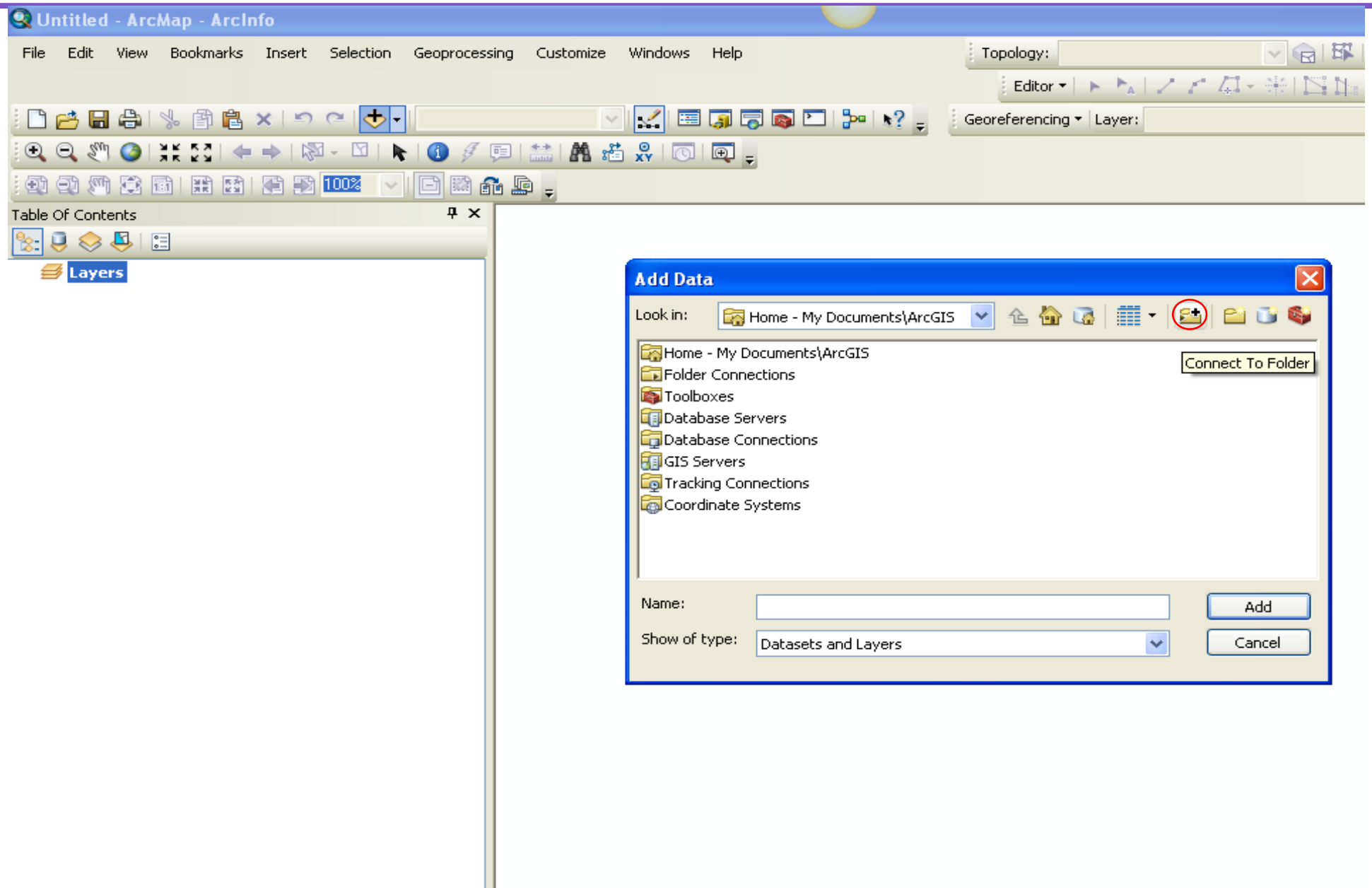
Adding Data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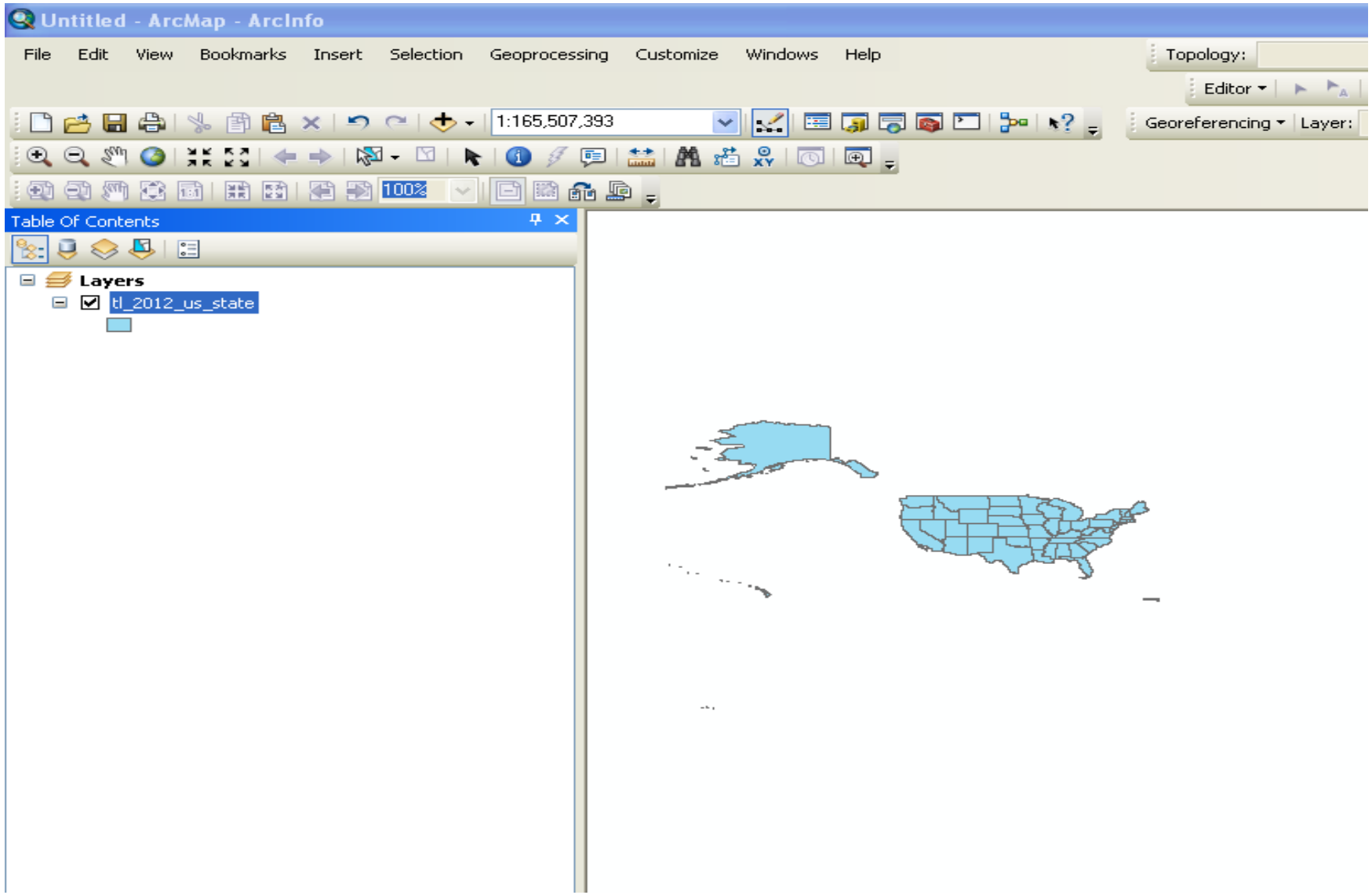
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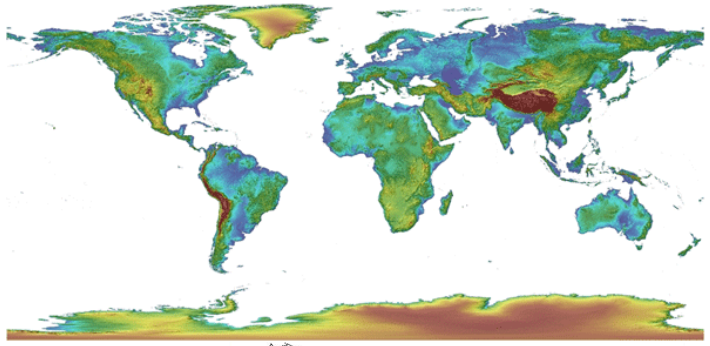
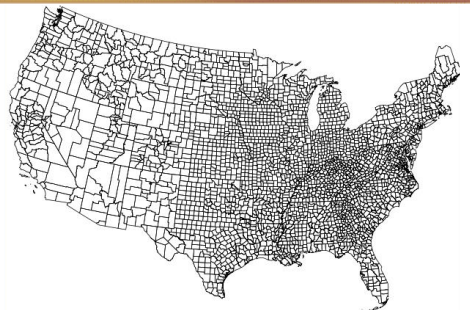
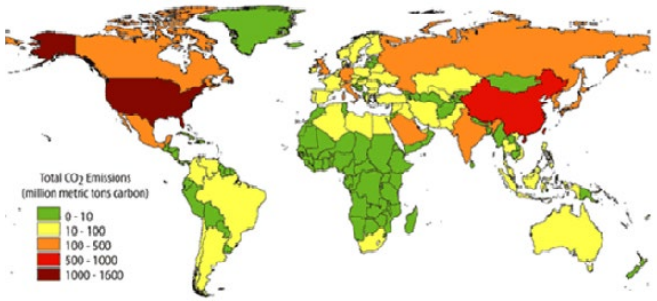
Types of Maps

- General Map
  - Variety of information of equal importance
  - Not targeting a specific audience (e.g. topographic map)
  - Subtle Symbology
- Thematic Map
  - Focussed
  - Importance of information can vary on the map
  - Symbology can dominate
  - Qualitative (no importance in terms of size) vs quantitative (size differences)

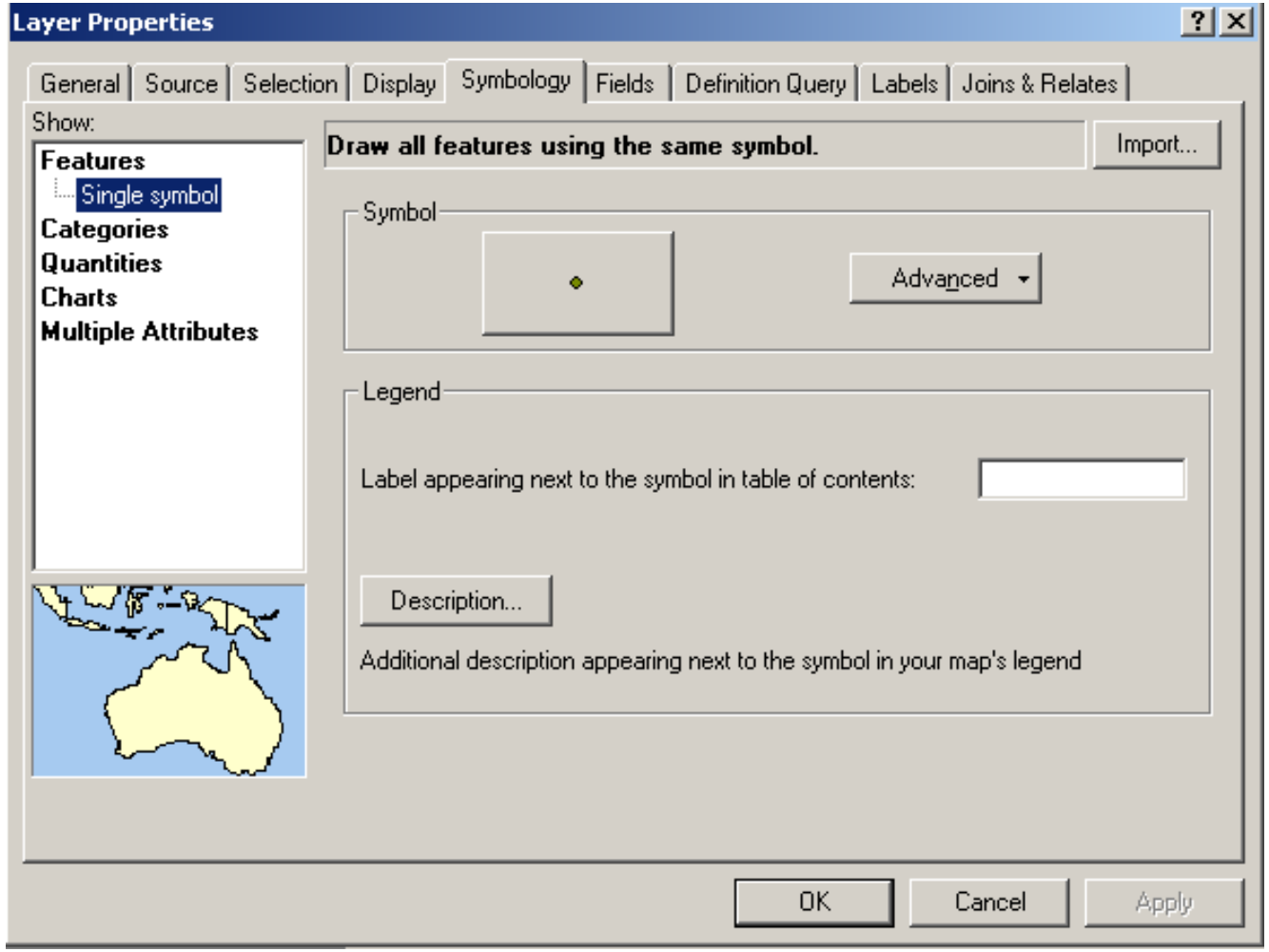




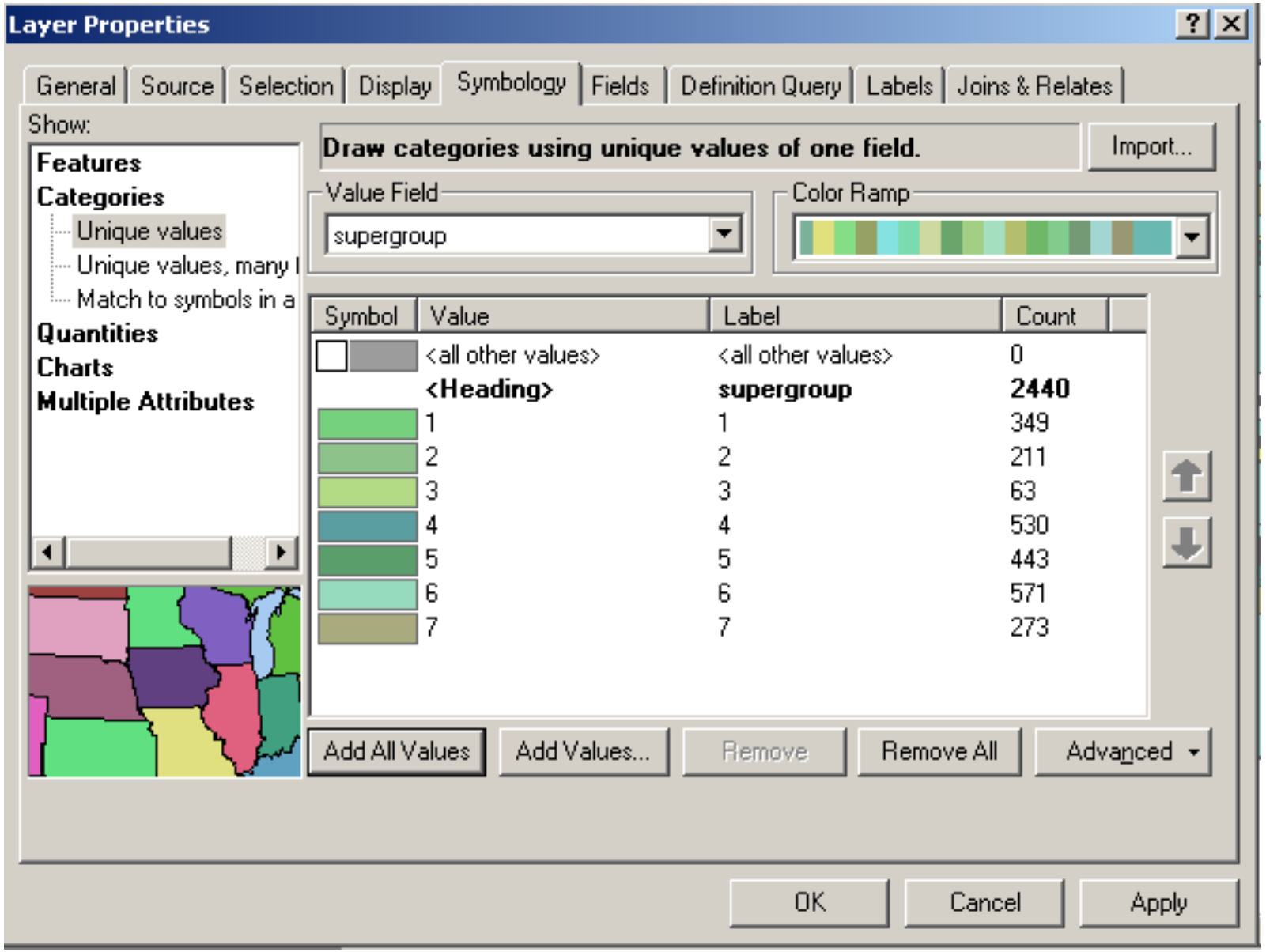


Symbology – Single Symbol

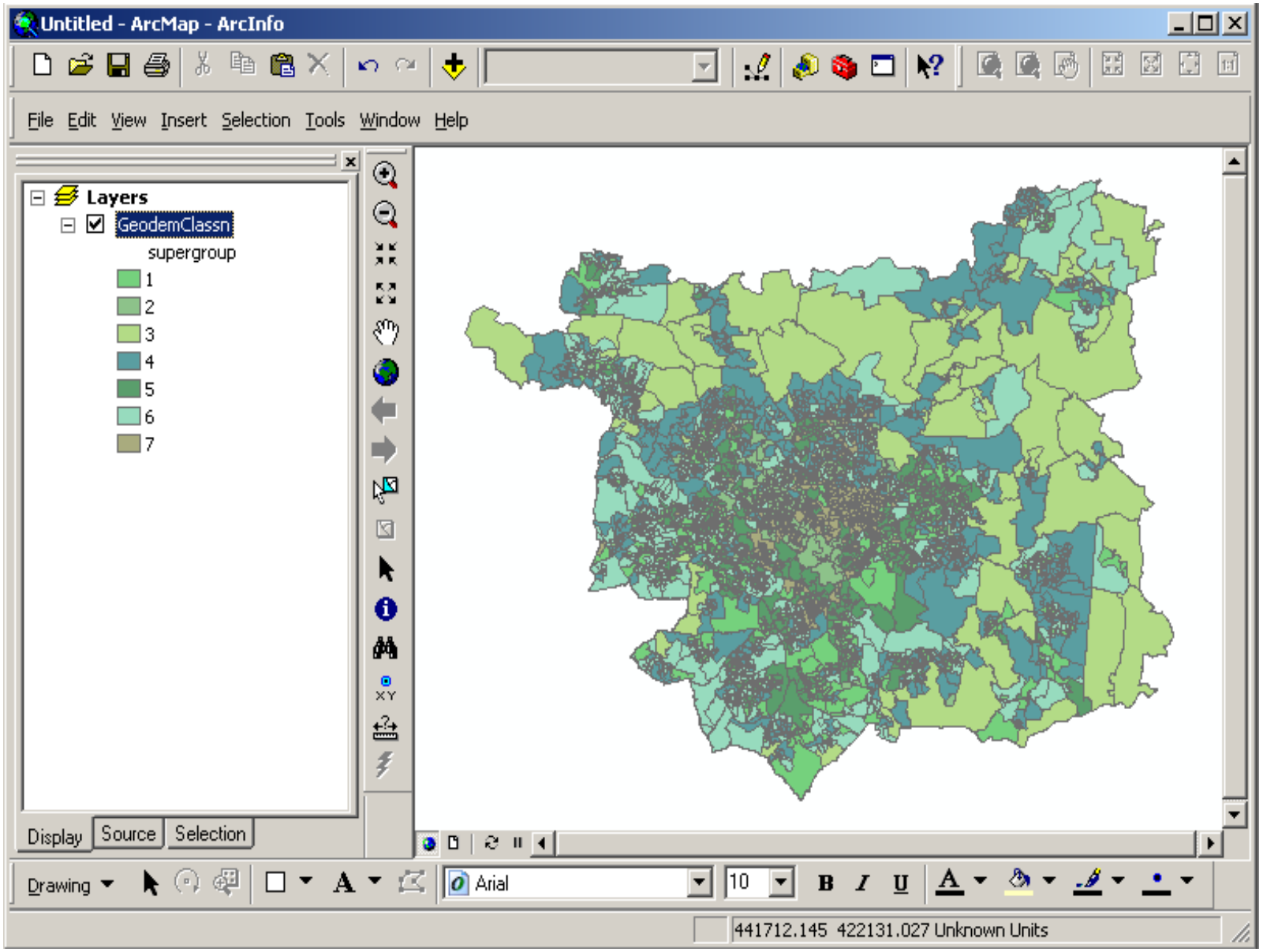
- symbolization regarded as the coding of map features (size, colors, etc.) for better communication.



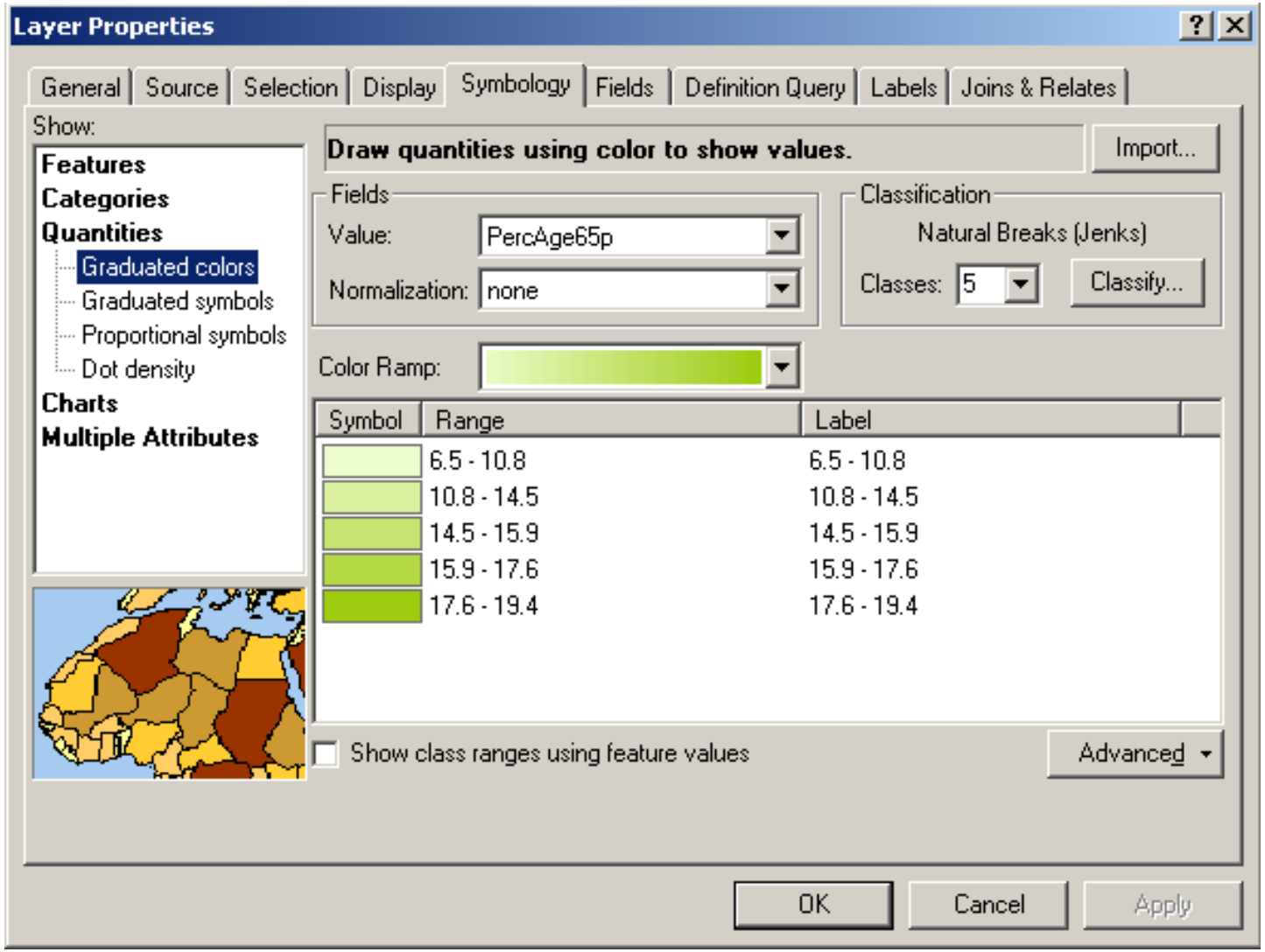
Symbology - Categories



Symbology - Categories



Graduated Colour



Graduated Colours