Introduction to GIS

EMPIRICAL REASONING CENTER 2018

WORKSHOP OBJECTIVES

1- Understand the main uses of GIS technologies and software in historical and archaeological studies, what GIS is, how works and the standard GIS work model

2- Become familiar with GIS software

3- Learn about the conventions of map-making, map literacy, and what makes a 'good' map

4- Learn to access, organize, and display data in ArcGIS, as well as some useful sources of data

5- Learn how to create a map in ArcGIS, from importing the data to exporting a final map as an an image or PDF document

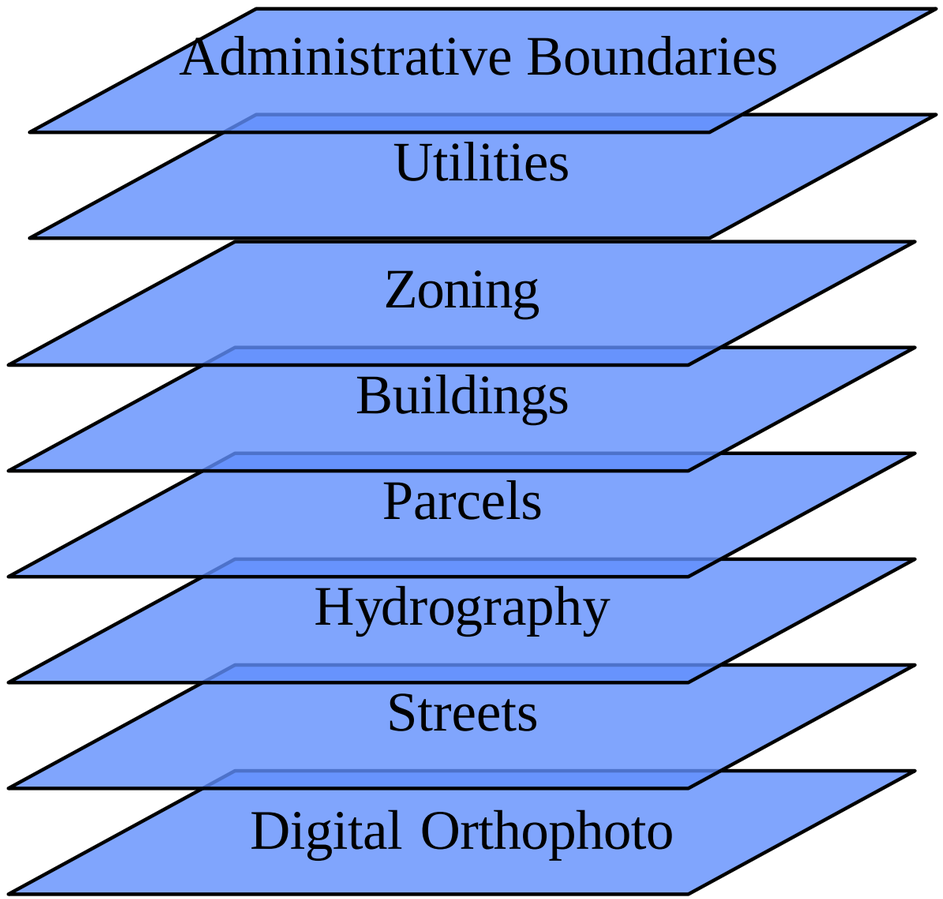
WHAT IS GIS?

Geographic Information Systems (Science)

GIS allows you to process, analyze and visuazlize information about the Earth's surface. GIS is utilized to know "what is where, when" and is used in many different fields like environmental science, economics, history, archaeology, urban studies, biology, sustainable development, geology, etc. It's a flexible tool that allows you to study spatial relationships, PAST AND PRESENT.

"Everything is related to everything else, but near things are more related than distant things."
(First rule of geography)

GIS MODEL



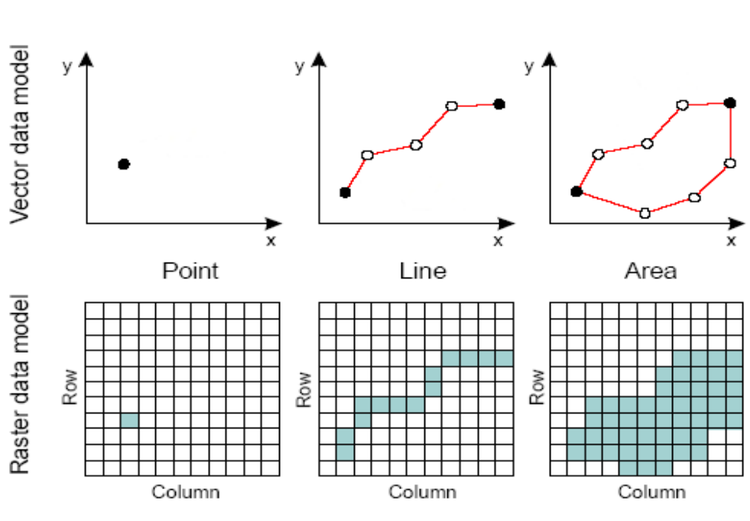
Data is organized in layers, that can be overlayed, compared, and used to represent thematic, quantitative, qualitative, narrative or conceptual information about the world.

These layers can be generated from historical maps, document and satellite images, as well as field notes, surveys, etc.

SPATIAL DATA

specifies where (location) and what kind of feature (shape)

STORED AS GEOGRAPHIC DATA EITHER IN VECTOR OR RASTER FORMAT



ATTRIBUTE DATA

specifies characteristics for that location information, like how much, when, what , etc.

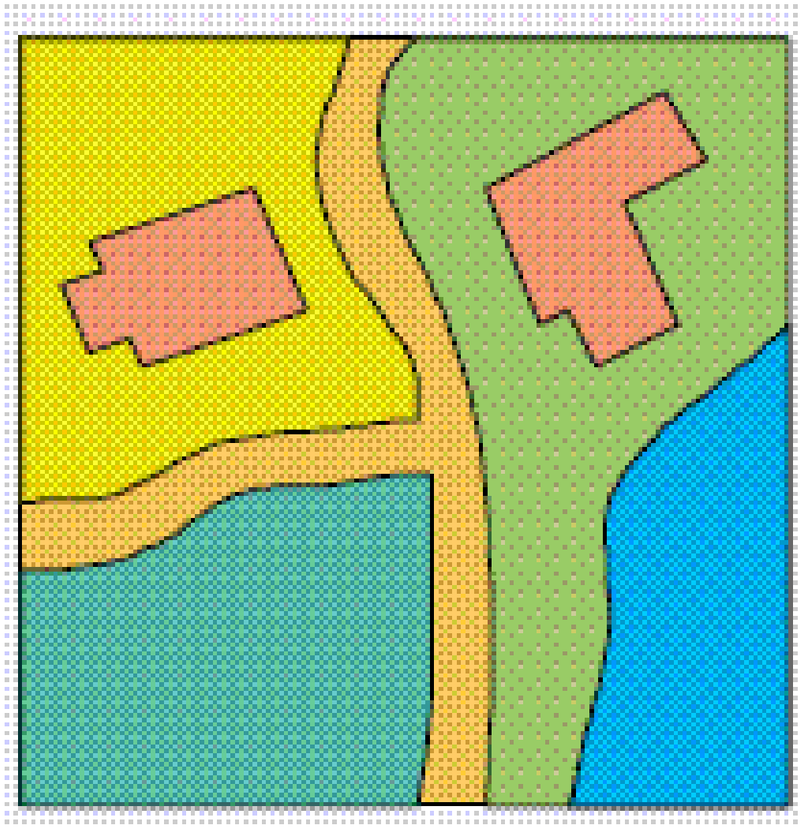
STORED AS TABULAR DATA

Attribute table - Streets :: Features total: 41825, filtered: 41825, selected: 0

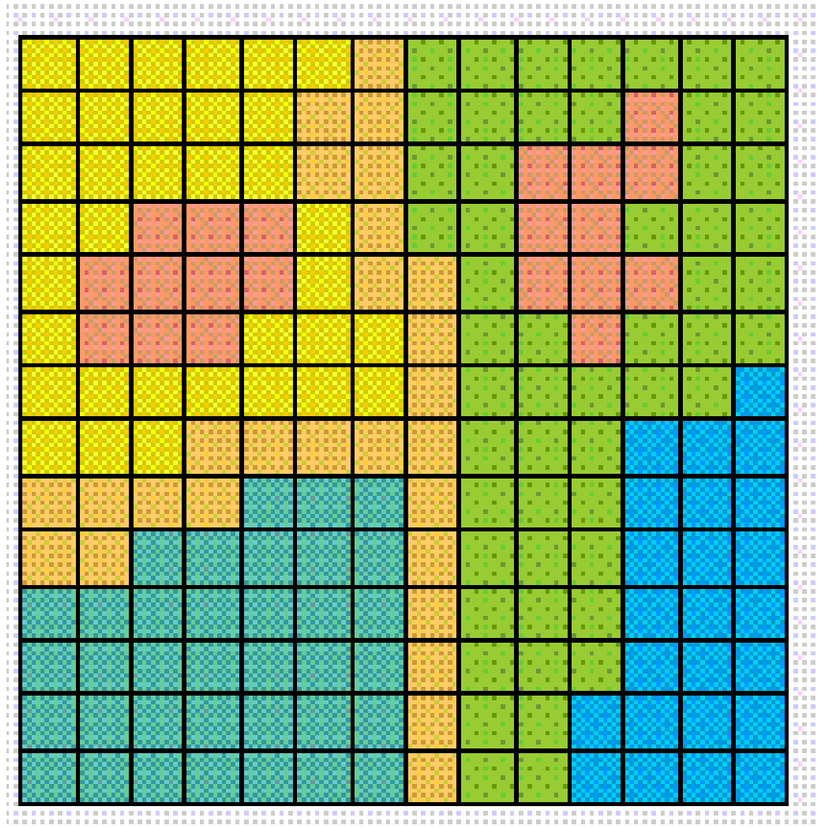
	LEFTLOW	LEFTHIGH	RIGHTLOW	RIGHTHIGH	STREETNAME	STREETDESI
13520	14301.00000000...	14305.00000000...	14300.00000000...	14302.00000000...	COPPER	AV
13581	14301.00000000...	14323.00000000...	14300.00000000...	14324.00000000...	STALGREN	CT
13805	14301.00000000...	14309.00000000...	14300.00000000...	14308.00000000...	MEL SMITH	DR
34181	14301.00000000...	14339.00000000...	14300.00000000...	14340.00000000...	BAUER	RD
34192	14301.00000000...	14321.00000000...	14300.00000000...	14320.00000000...	ENCANTADO	RD
34229	14301.00000000...	14321.00000000...	14300.00000000...	14320.00000000...	PIEDRAS	RD
34241	14301.00000000...	14335.00000000...	14300.00000000...	14334.00000000...	SKYLINE	RD
34255	14301.00000000...	14331.00000000...	14300.00000000...	14330.00000000...	OAKWOOD	PL
34293	14301.00000000...	14317.00000000...	14300.00000000...	14318.00000000...	ARCADIA	RD
34275	14297.00000000...	14331.00000000...	14296.00000000...	14314.00000000...	WINDSOR	PL
13153	14227.00000000...	14233.00000000...	14226.00000000...	14232.00000000...	GRAND	AV

TYPES OF DATA

SPATIAL DATA

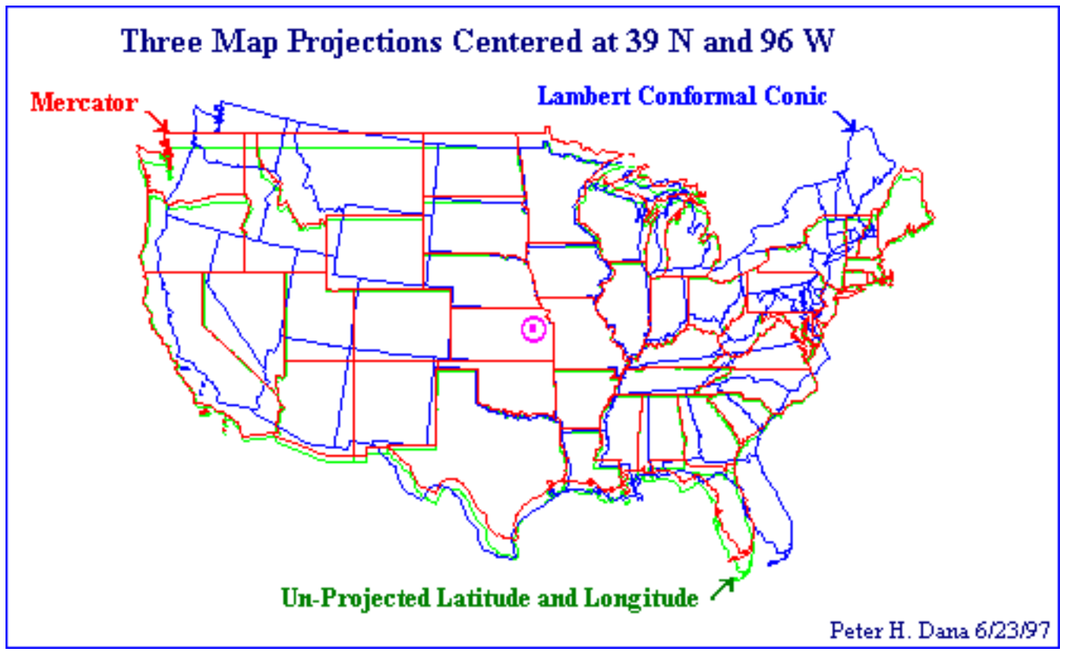


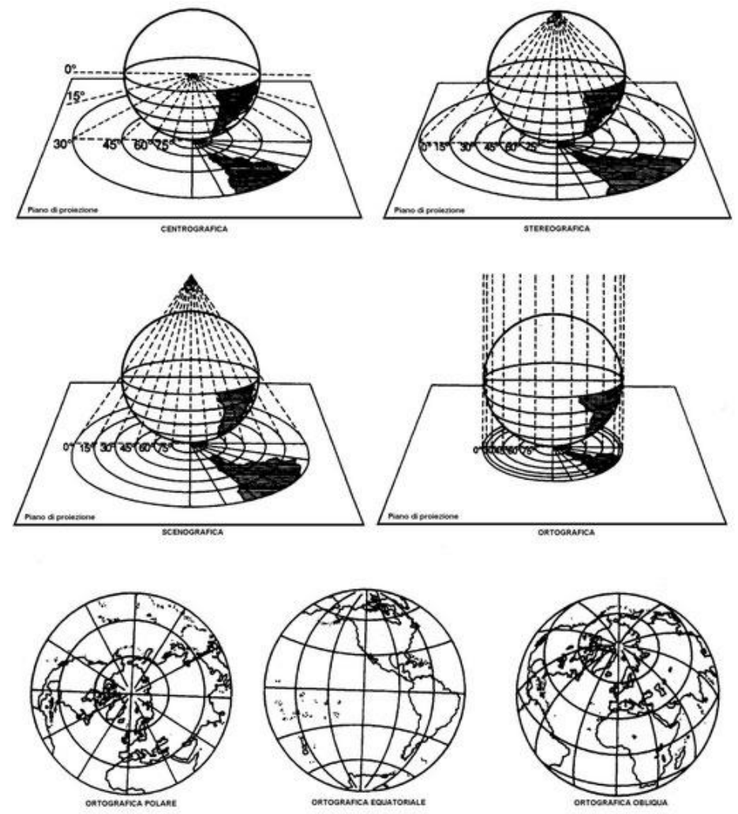
VECTOR



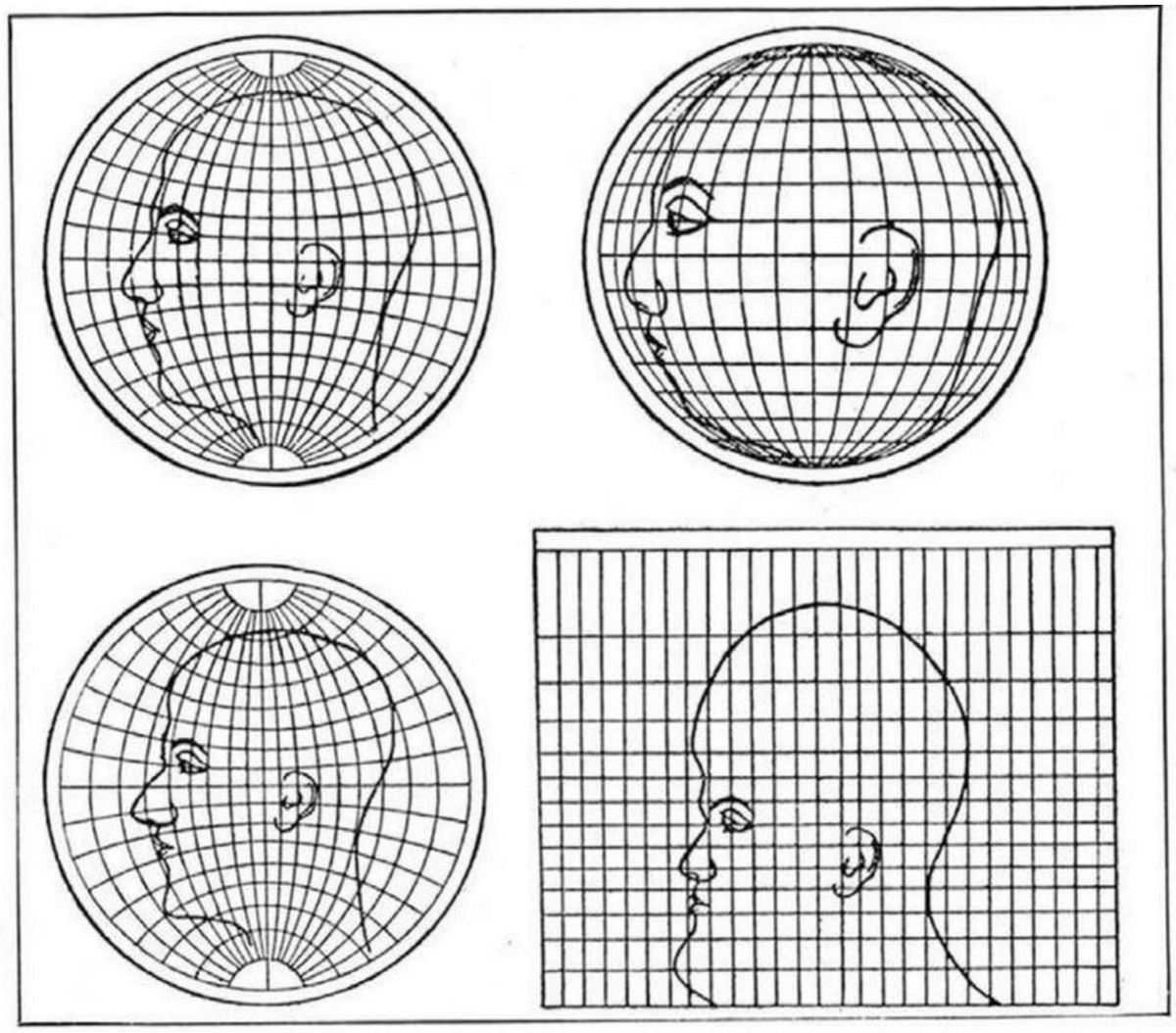
RASTER

PROJECTIONS &

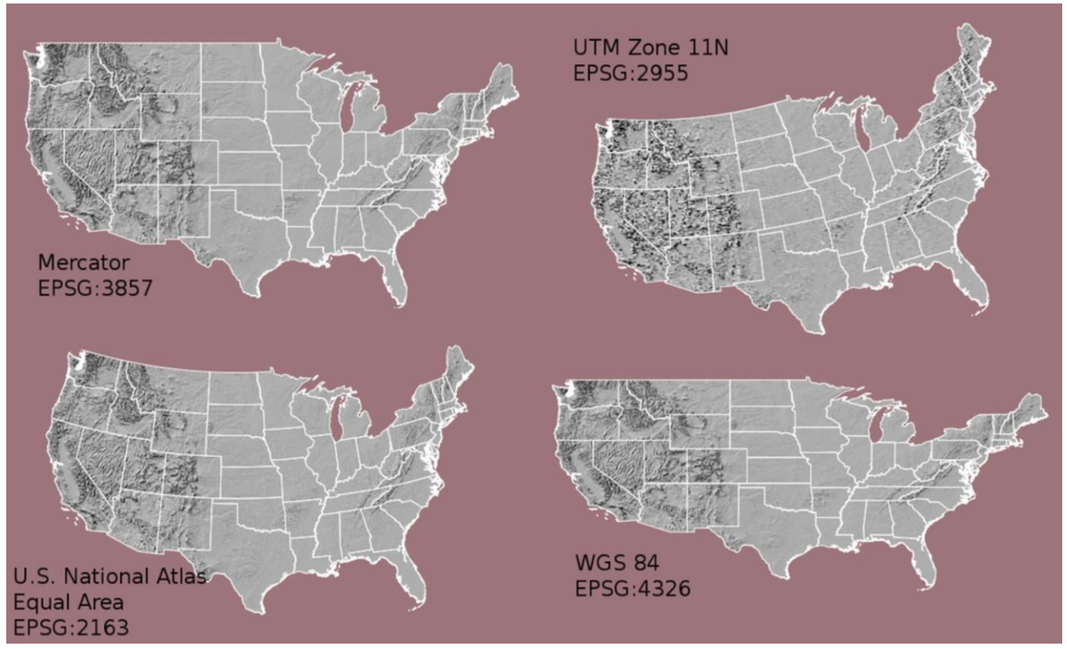




COORDINATES SYSTEMS

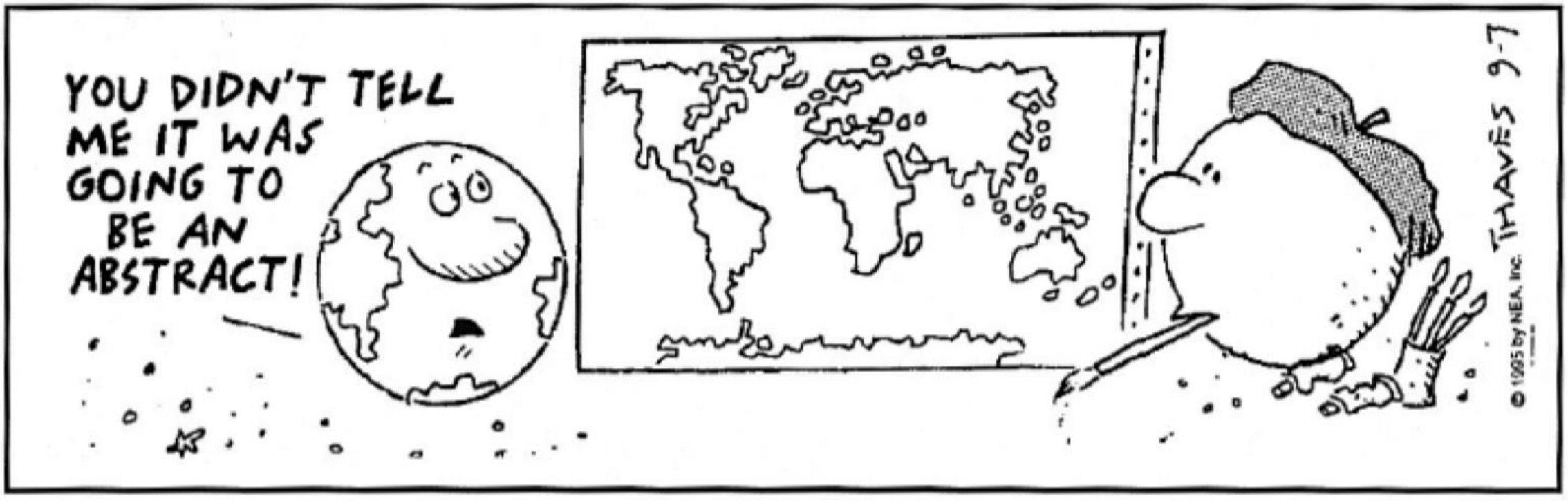


Upper left: Globular. *Upper right:* Orthographic. *Lower left:* Stereographic.
Lower right: Mercator

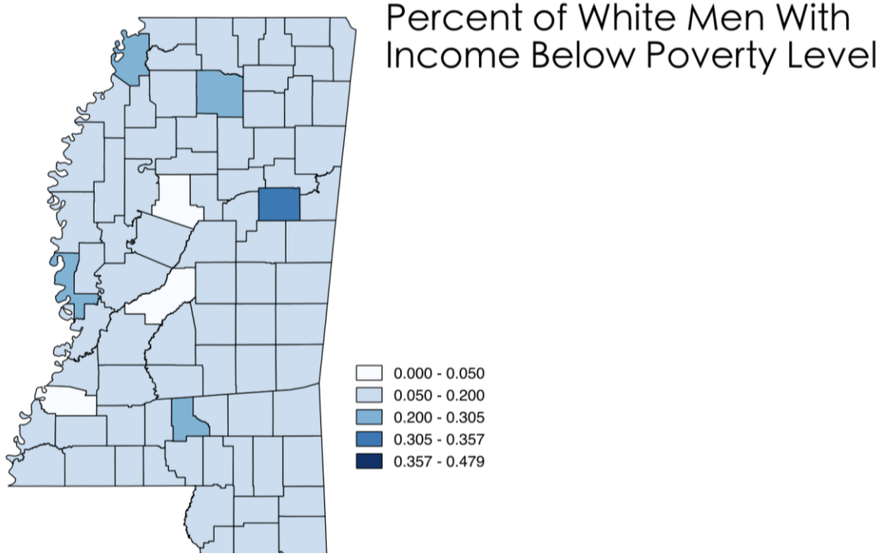


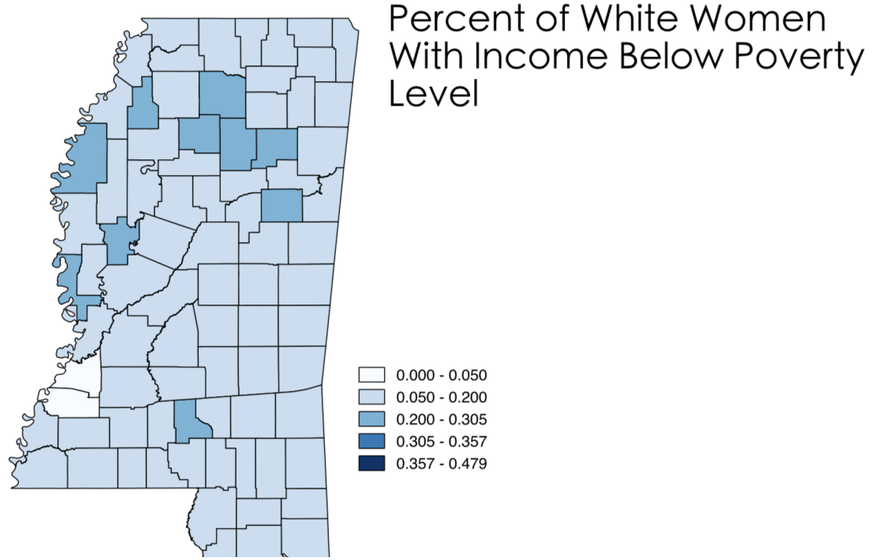
TRUE SIZE

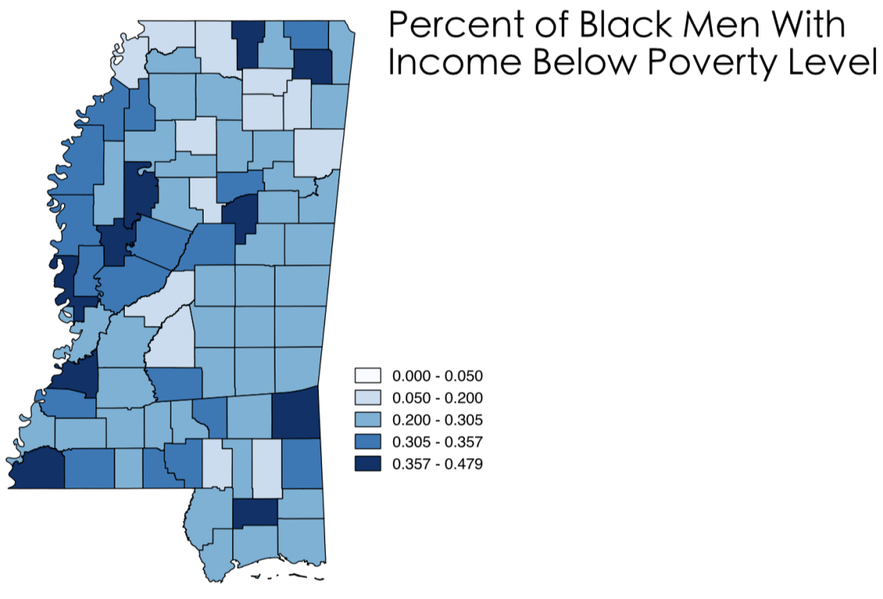
FRANK & ERNEST by Bob Thaves

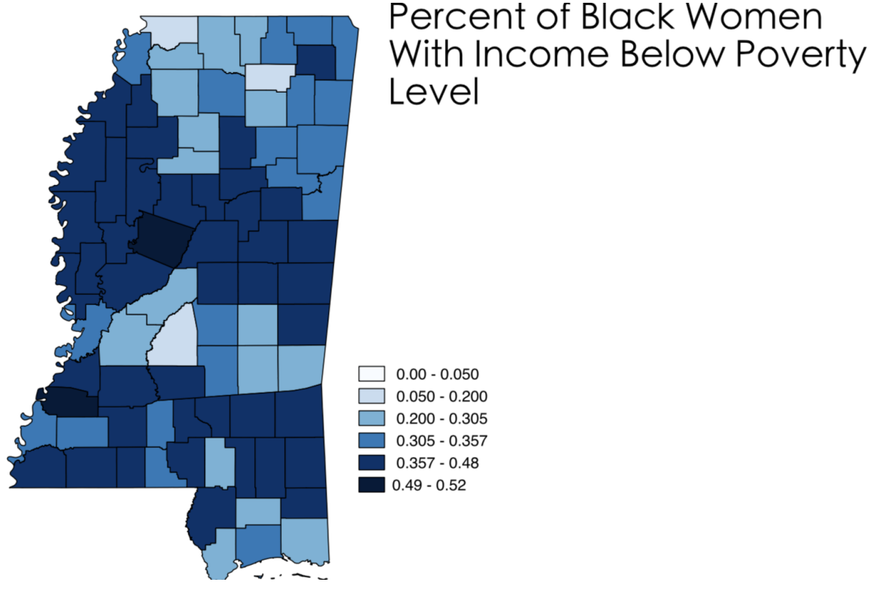


APPLICATIONS

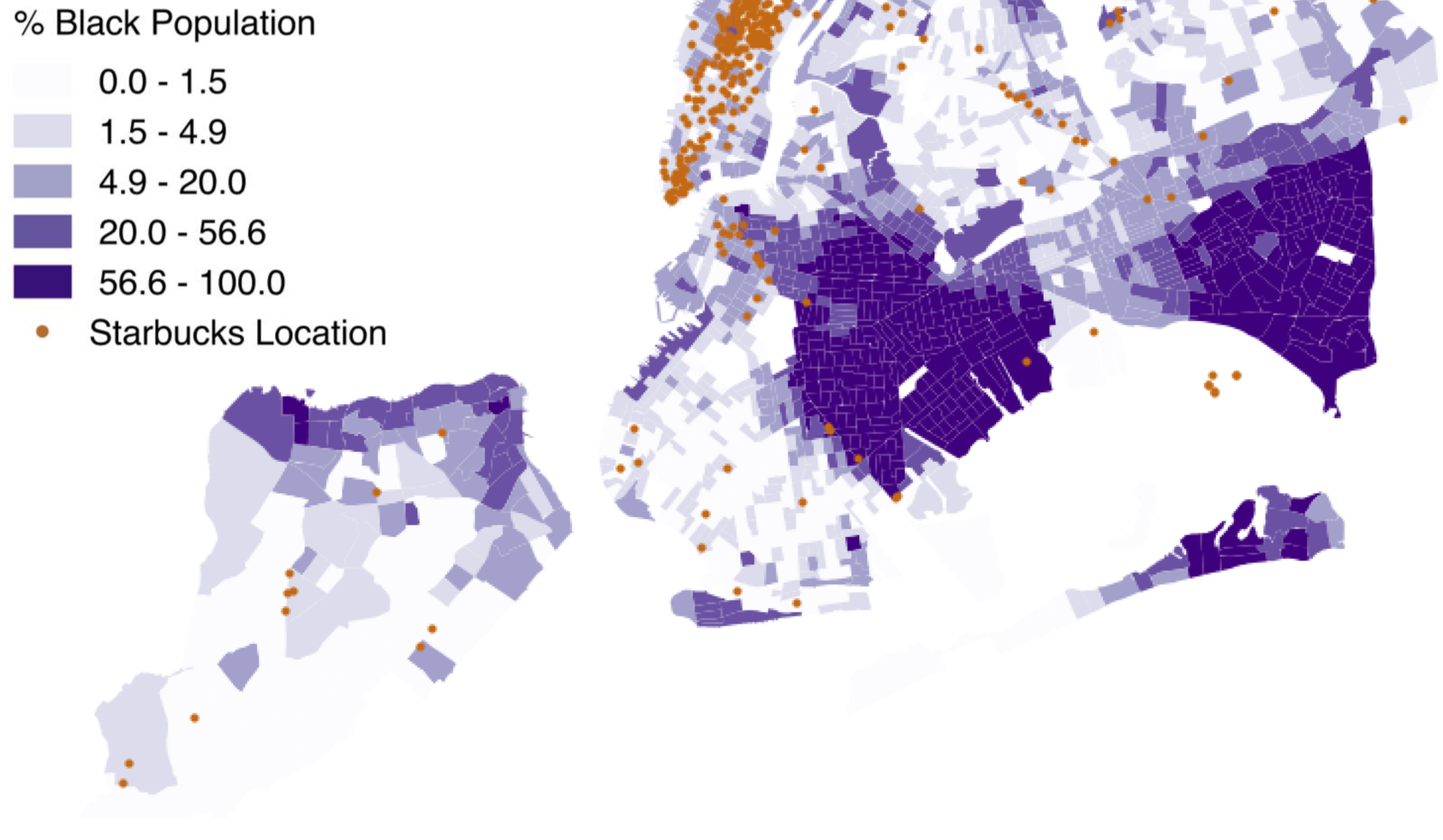




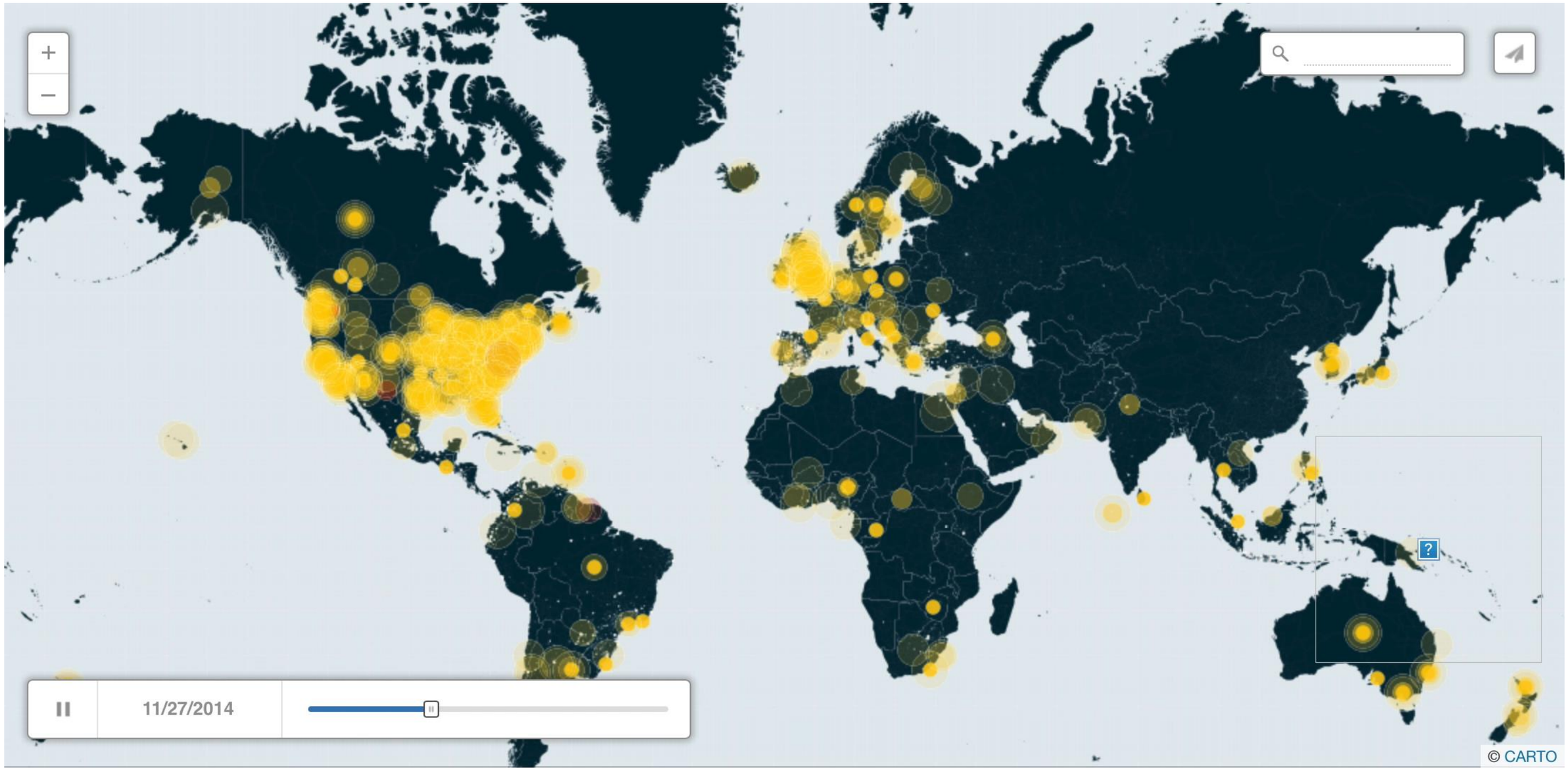




STARBUCKS & RACE



#ICantBreathe,#BlackLivesMatter and #HandsUpDontShoot on Twitter

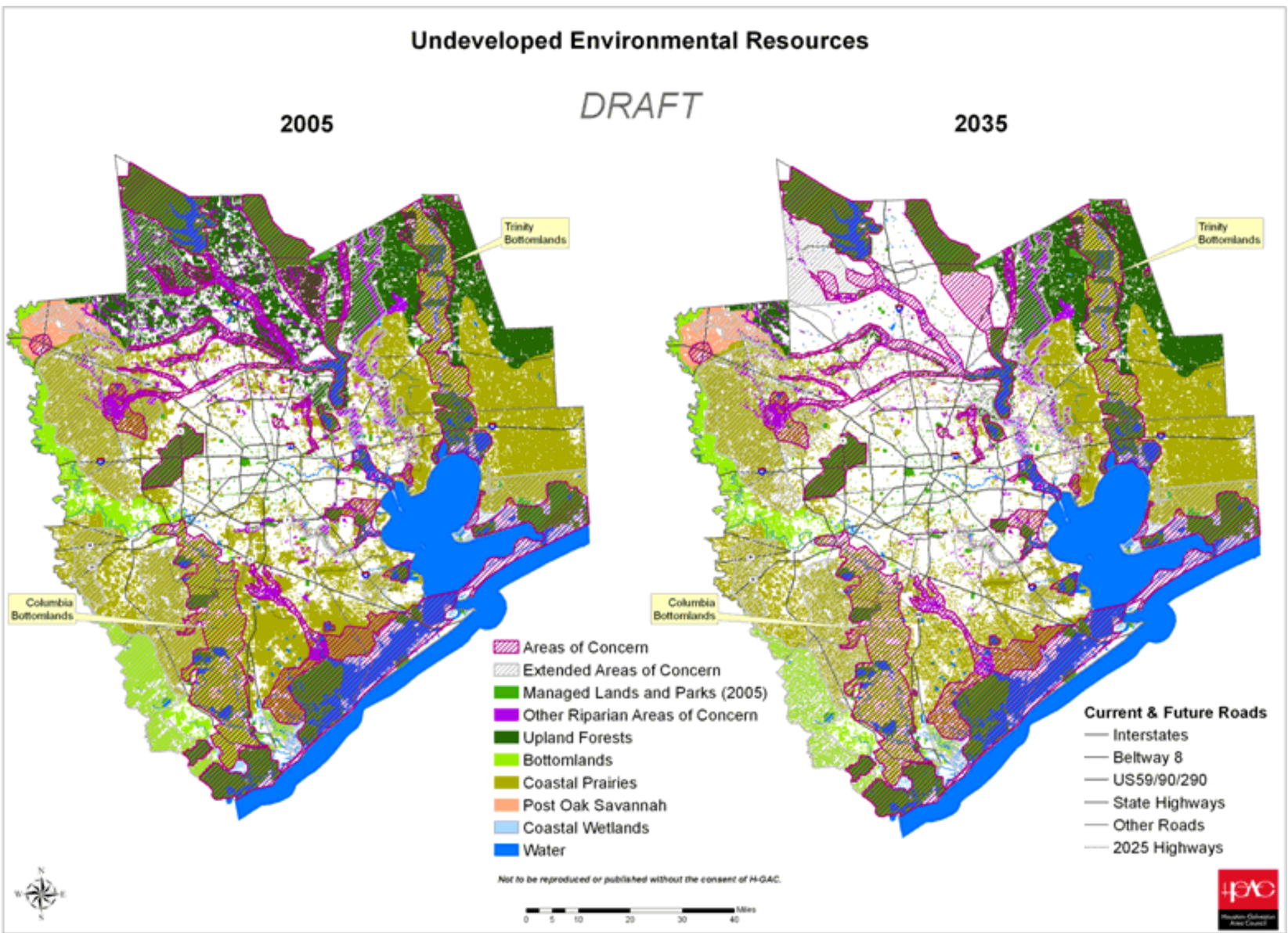


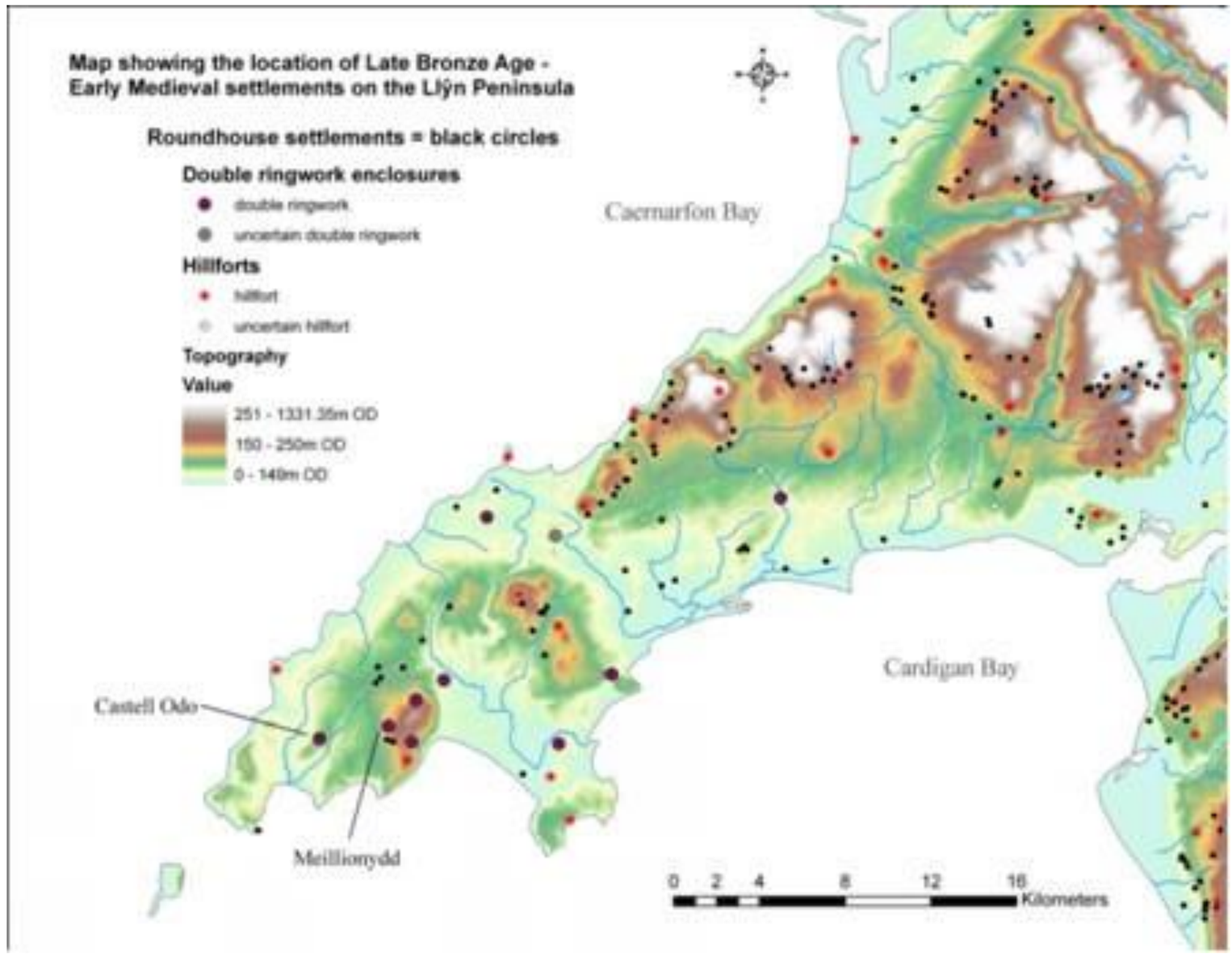
Population Trend

Bad Harmony Map

Undeveloped Environmental Resources

DRAFT




Map showing the location of Late Bronze Age -
Early Medieval settlements on the Llŷn Peninsula
Roundhouse settlements = black circles
Double ringwork enclosures
double ringwork
uncertain double ringwork
Hillforts
hillfort
uncertain hillfort
Topography
Value
251 - 1331.35m OD
150 - 250m OD
0 - 149m OD
Caernarfon Bay
Cardigan Bay
Castell Odo
Meilliorydd
0 2 4 8 12 16
Kilometers

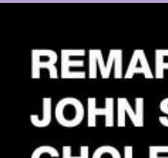
REMAPPING JOHN SNOW'S CHOLERA MAP

Soho, London: 1854

FROM THE AIR:
Surrounding the Broad Street Pump

57% locations of cholera deaths were nearer to the Broad Street Pump by straight-line distance than any other pump. These locations account for 62% of the recorded cholera deaths.

The Broad Street Pump is the only water pump within the first standard distribution of cholera deaths and is 25 meters (across the street) from their mean center.



Buildings with Cholera Deaths
maximum: 9 deaths
minimum: 1 death

Water Pump Locations
straight-line distance to nearest pump from buildings with cholera deaths (Broad Street Pump)
straight-line distance to nearest pump from buildings with cholera deaths (all other pumps)

Distribution of Cholera Deaths
mean center
1 standard distribution
2 standard distributions

0 meters 100

data source: georectified version of Snow's map and digitized point locations with cholera death counts by Rhonda Houser at the University of Kansas Libraries, Lawrence, KS, 2013.
map by Leah Meisterlin, 2013/2015

MAP ELEMENTS

TITLE - DESCRIPTIVE
DATA SOURCE
CLEAR LEGEND - WITH EXPLANATION
SCALE BAR - IN UNITS THAT MAKE SENSE
NORTH ARROW - AT AN APPROPRIATE SIZE
PROPERLY PROJECTED MAP
ANY NECESSARY LABELS

NOW, LET'S MAKE A MAP!