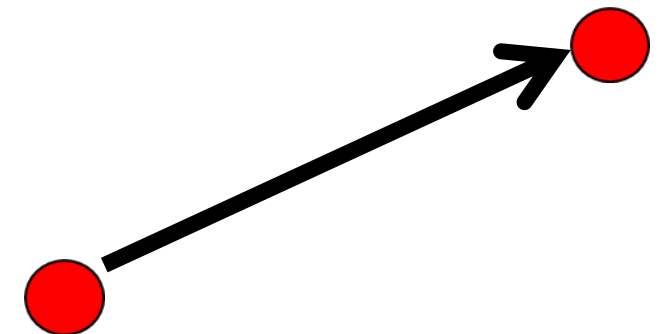
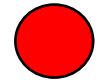


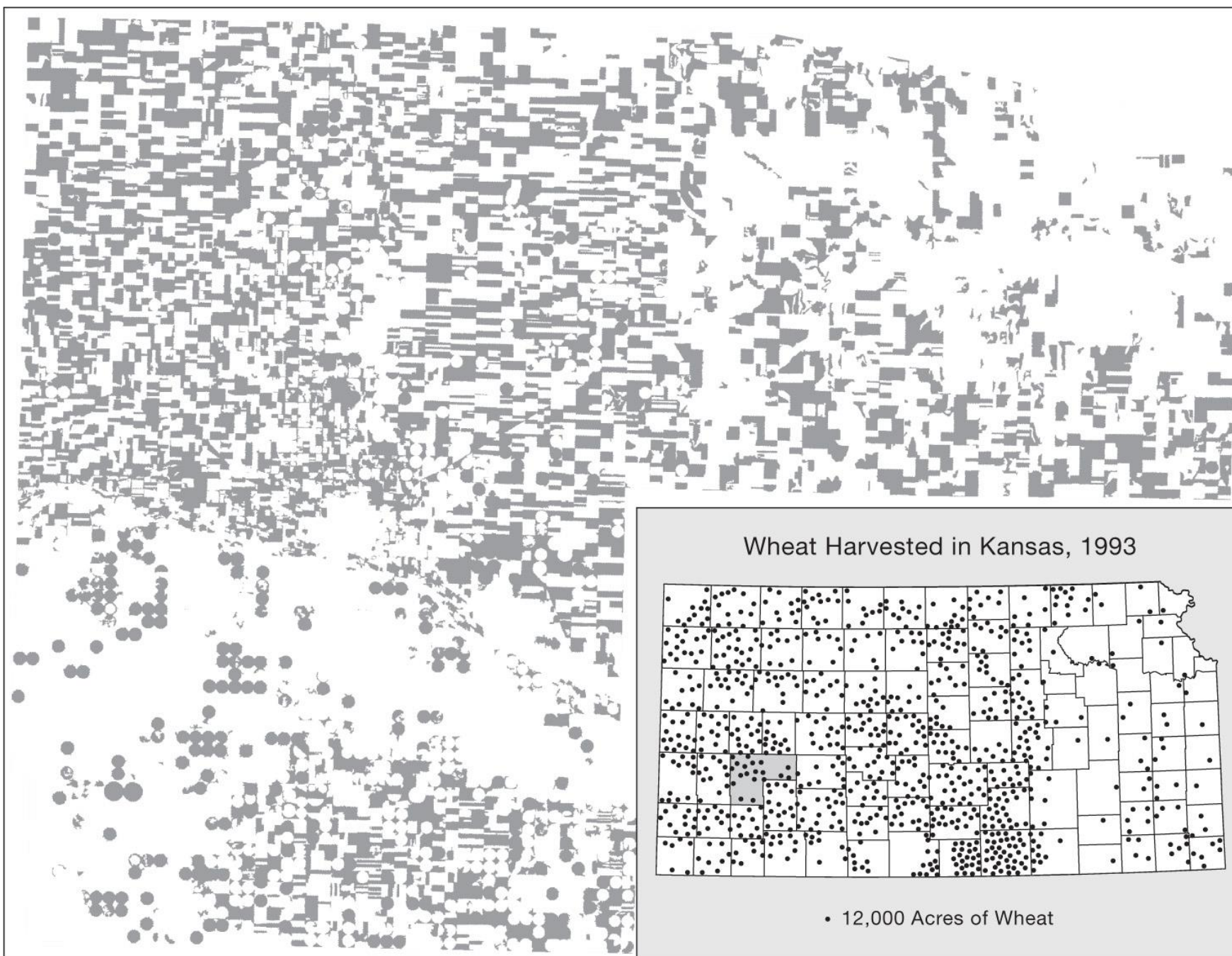
Geog183: Cartographic Design and Geovisualization Spring Quarter 2020

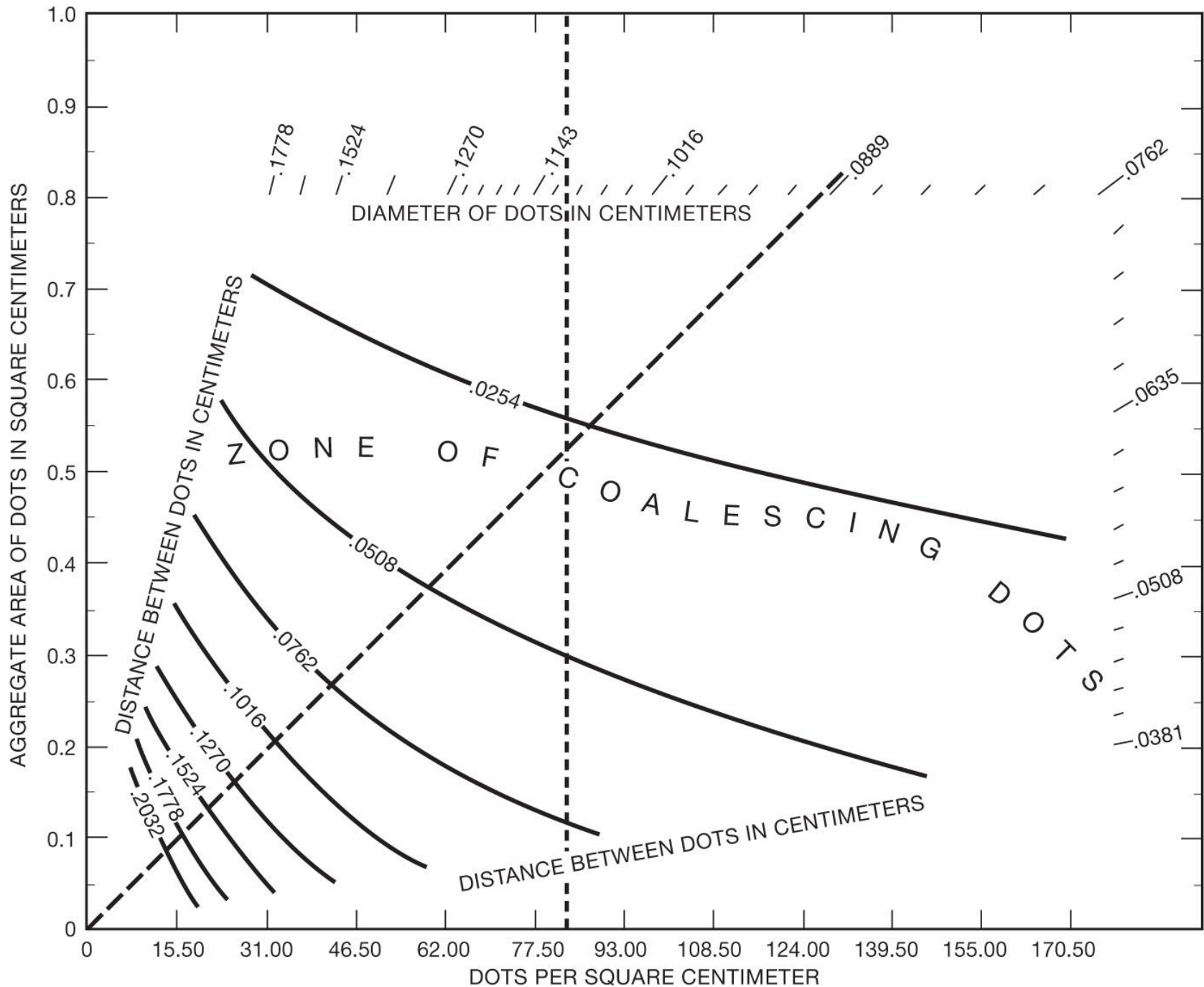
Lecture 12: Point symbol and flow maps

Point data

- Can be mapped using a point symbol
 - Pictorial
 - Glyph
 - Geometric symbol
 - Dot
- When data are point pairs, can use Flow map
 - Arrows
 - Line width
 - Straight line vs curve or great circle



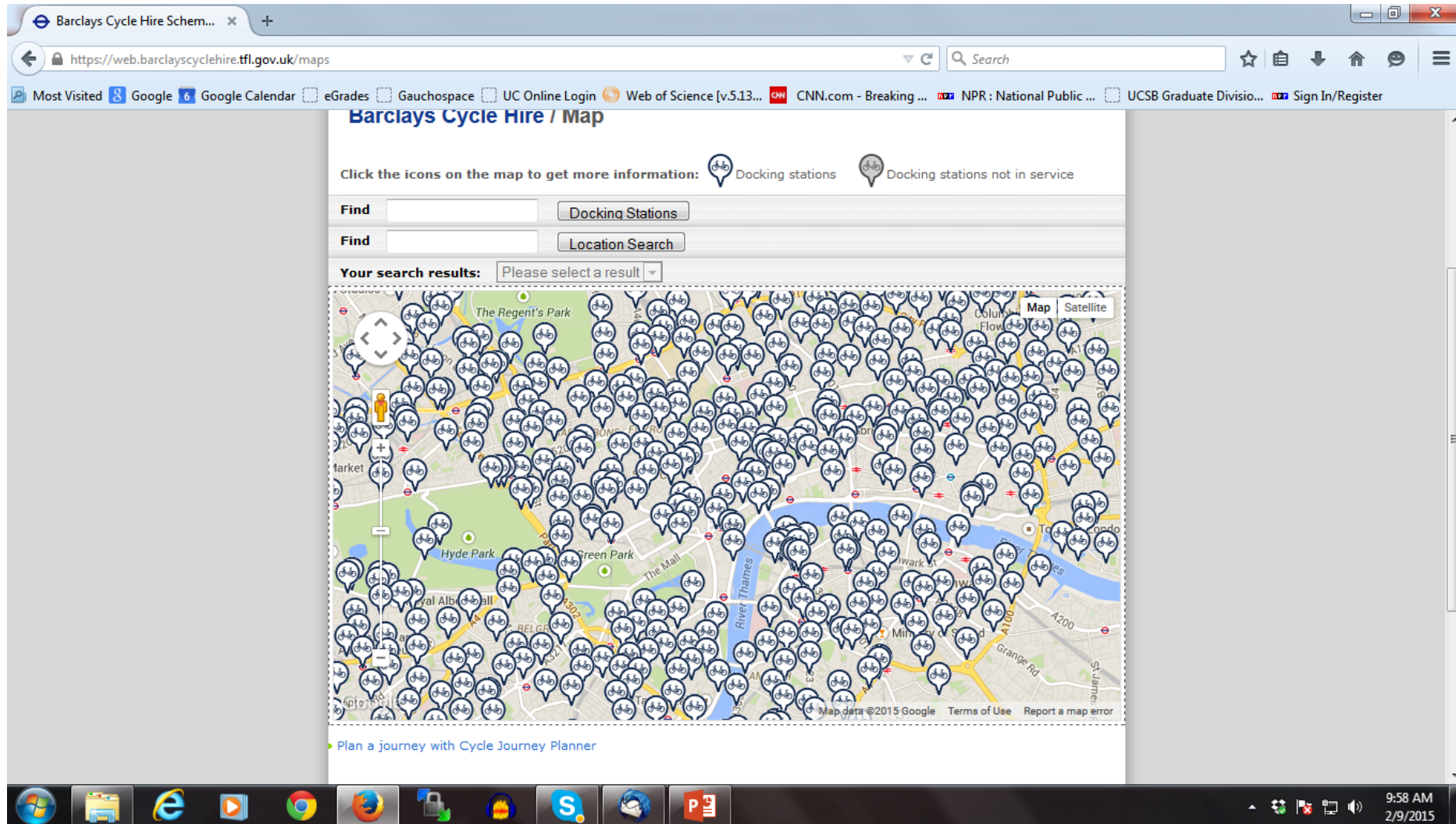




GE Point marker



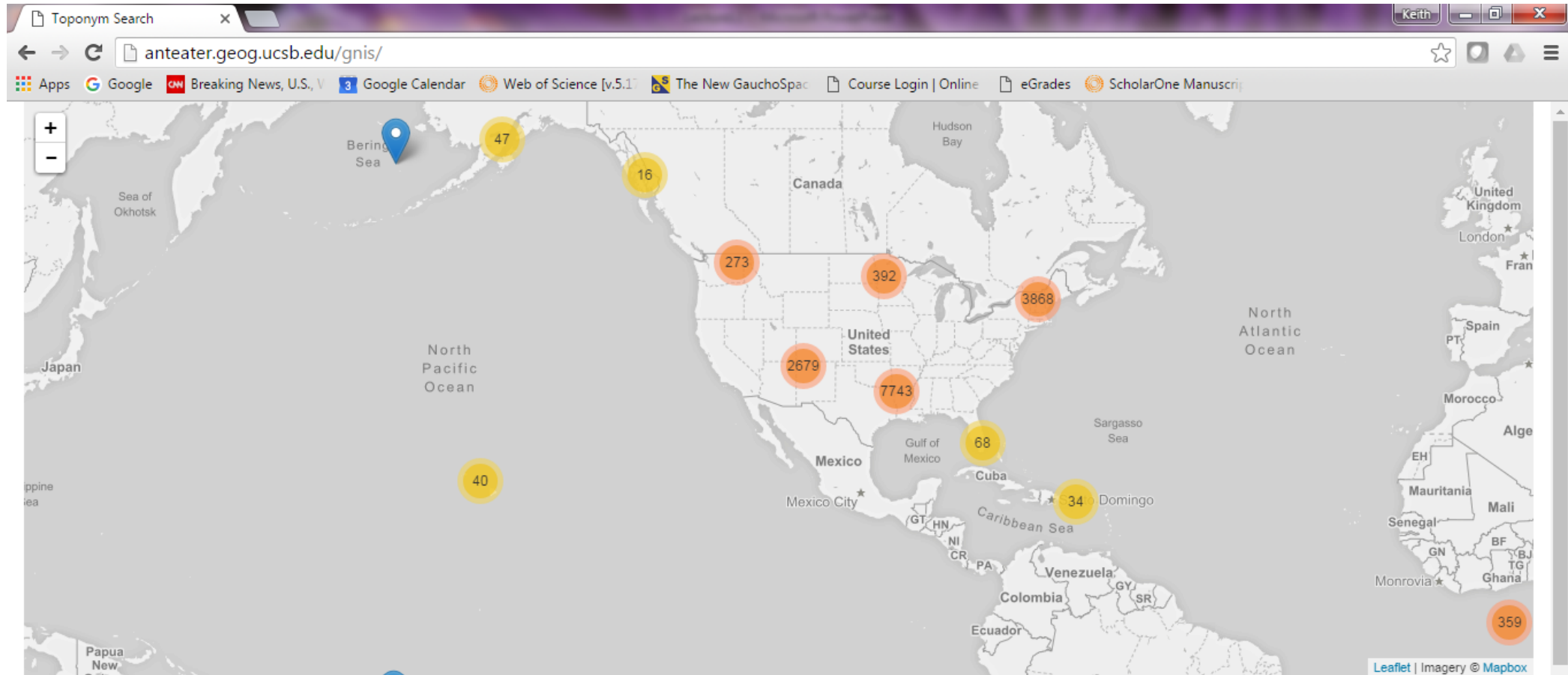
Point symbol overlap



Spider points



Google Maps API Point Counts

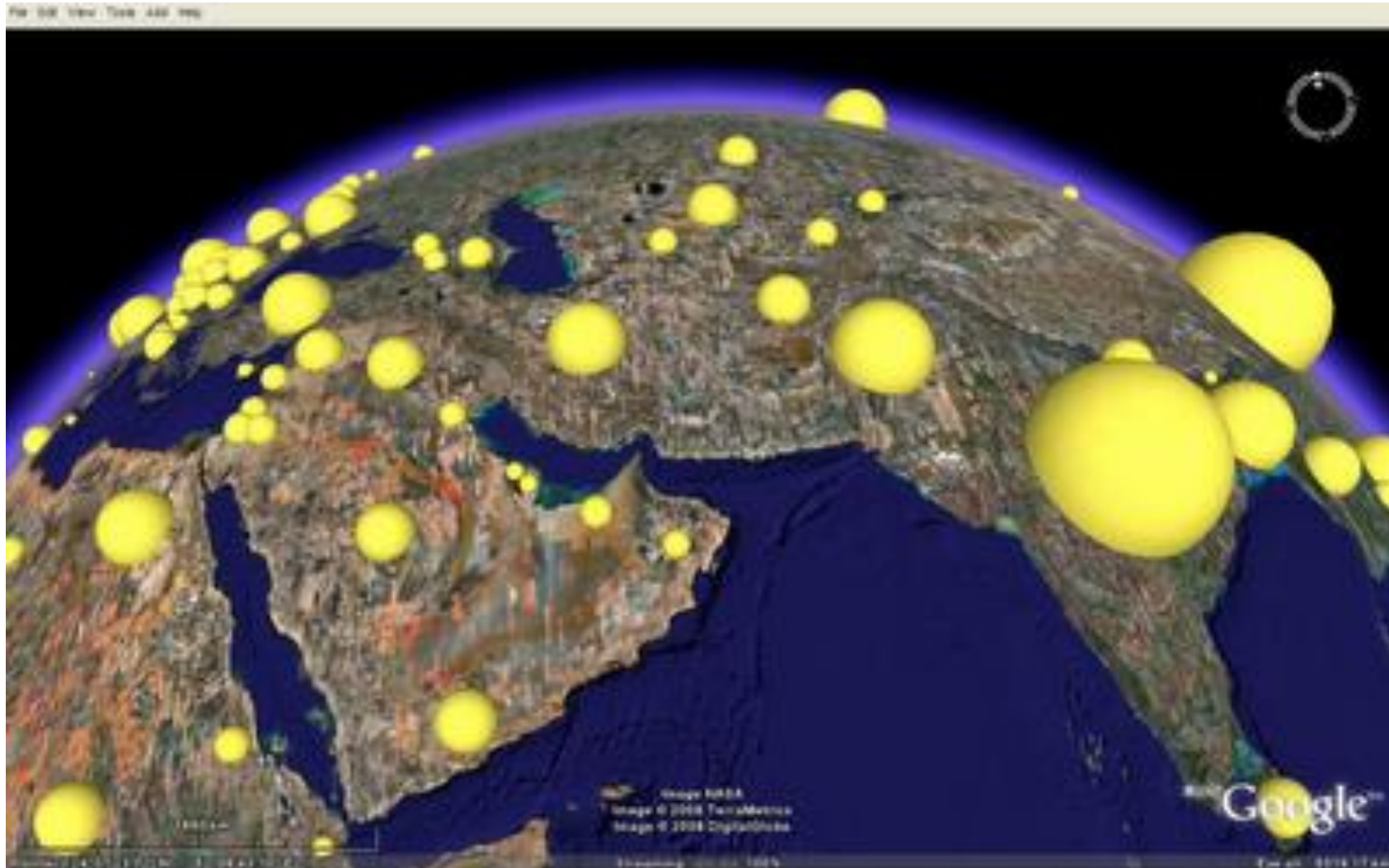


Search toponyms in the [Geographic Names Information System](#)

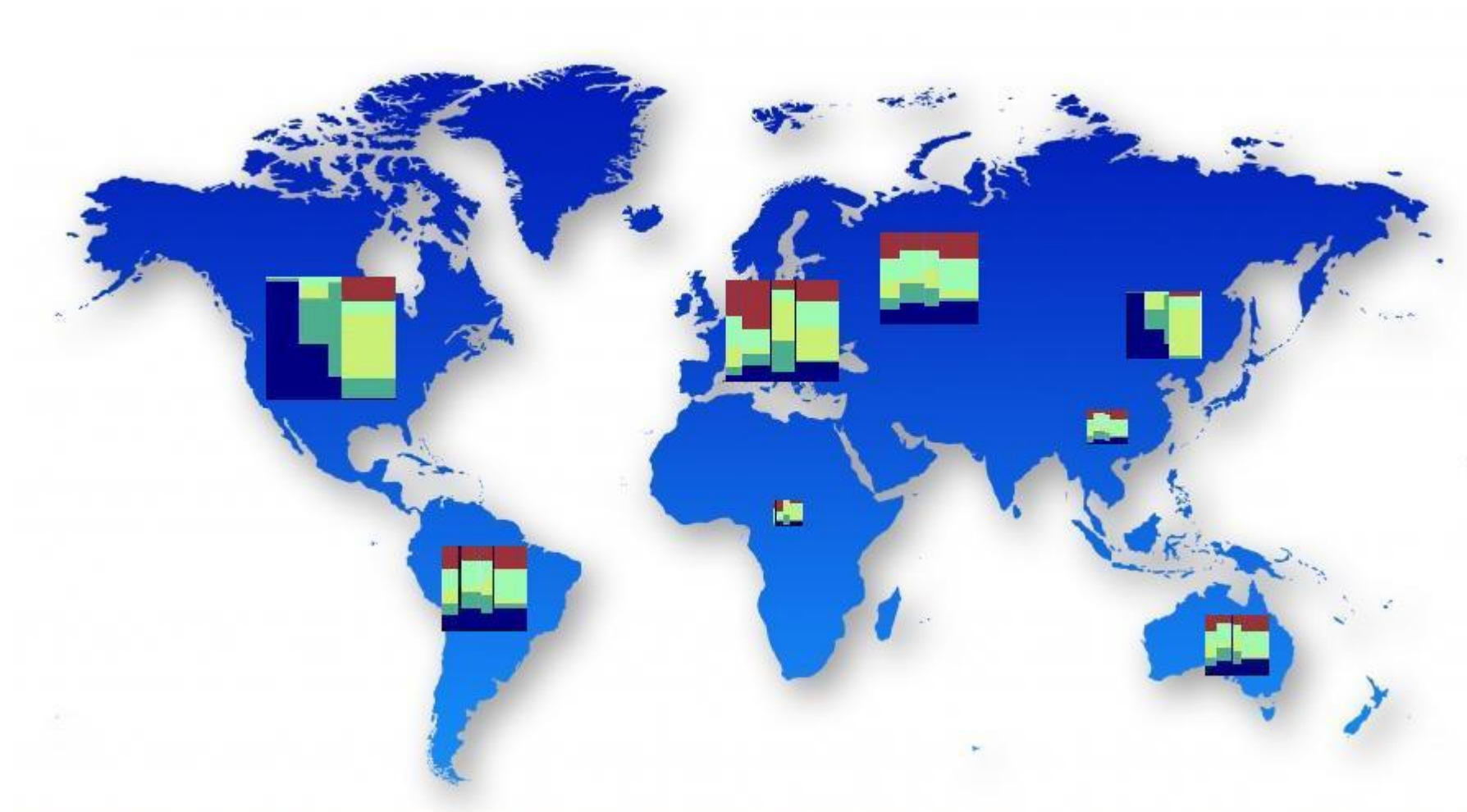
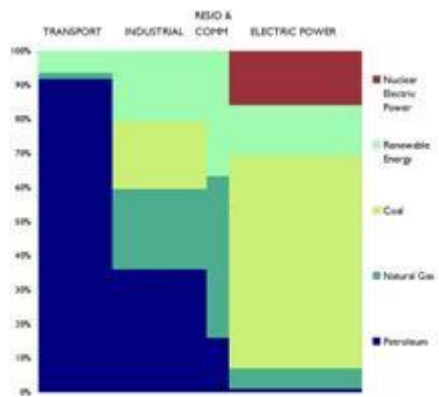
Search term:

Limit search to following [feature classes](#)*:

Bobble symbols in GE



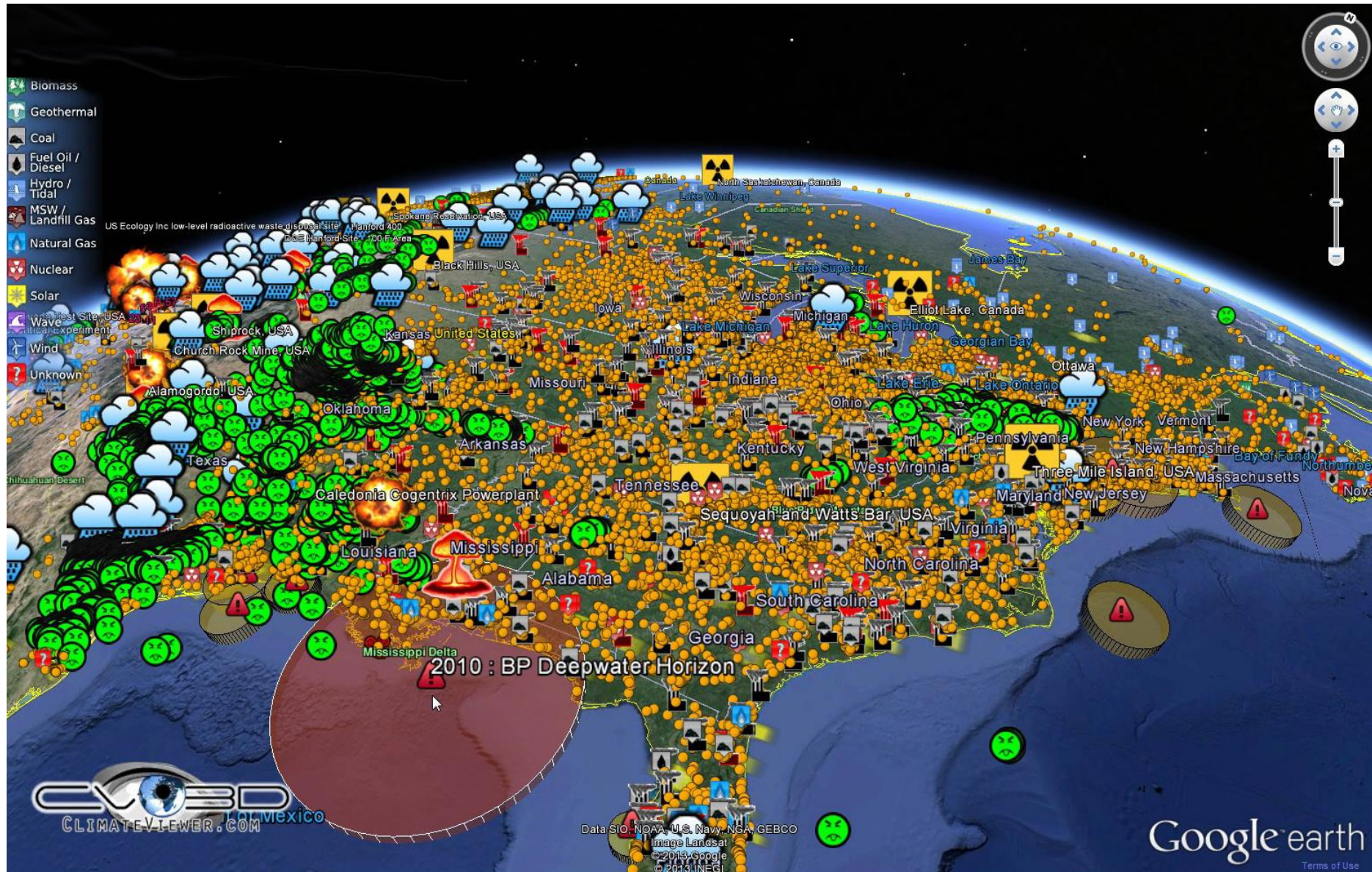
Complex glyphs



GE Glyph

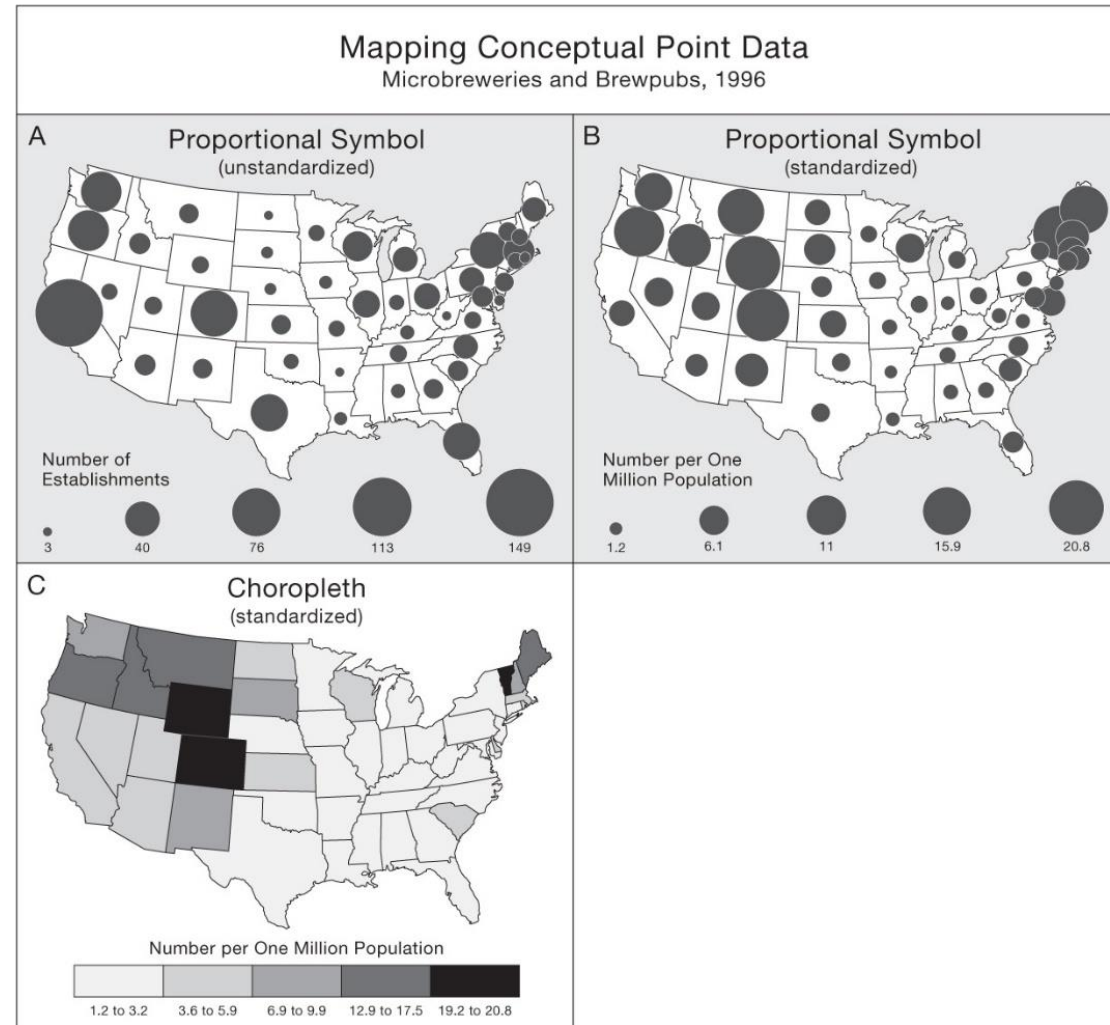


Glyphs and complexity



Basic prop symbols: Classified vs. Continuous

Perceptual: Flannery (1971)



Point symbols in Tableau

Tableau - Tuberculosis

File Data Worksheet Dashboard Story Analysis Map Format Server Window Help

Format legends

Title

Font: Arial, 9pt

Alignment: Left

Body

Font: Arial, 8pt

Shading: None

Border: None

Pages

Columns Longitude (generated)

Rows Measure Names Latitude (generated)

Filters

Measure Names: E Md..

Marks

Automatic

Color Size Label

Detail Tooltip

Country

Measure Values

Show Me

For symbol maps try

- 1 geo dimension
- 0 or more dimensions
- 0 to 2 measures

2 unknown

Edit Sizes [Measure Values]

Sample legend:

- 0
- 20,000
- 40,000
- 60,000
- 85,000

Sizes vary: Automatically

Mark size range:

Smallest Largest

Reversed

Start value for range End value for range

0 85,000

Reset OK Cancel Apply

215 marks 1 row by 1 column SUM of Measure Values: 361,810

8:52 AM 5/4/2016

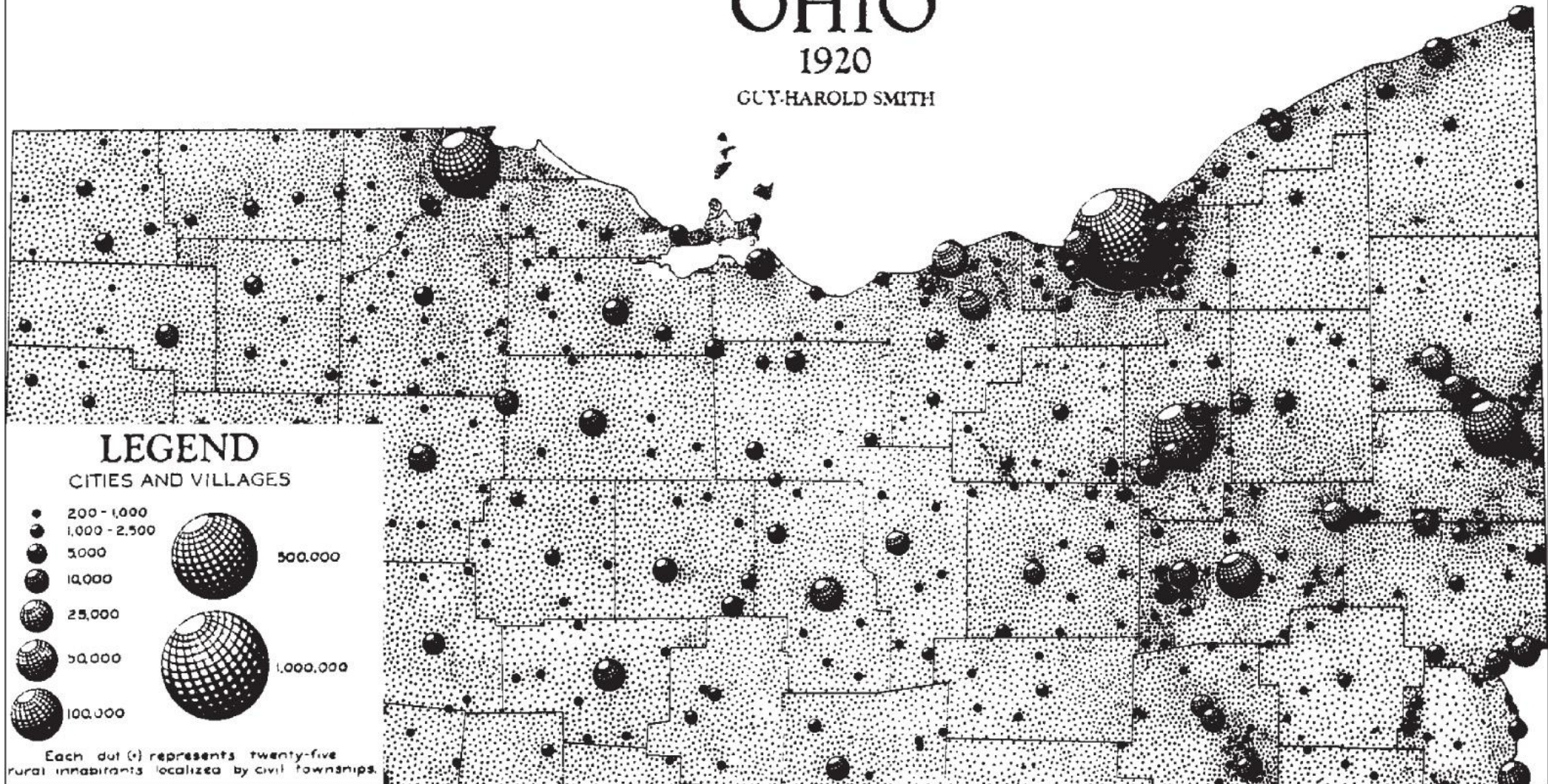
POPULATION MAP

of

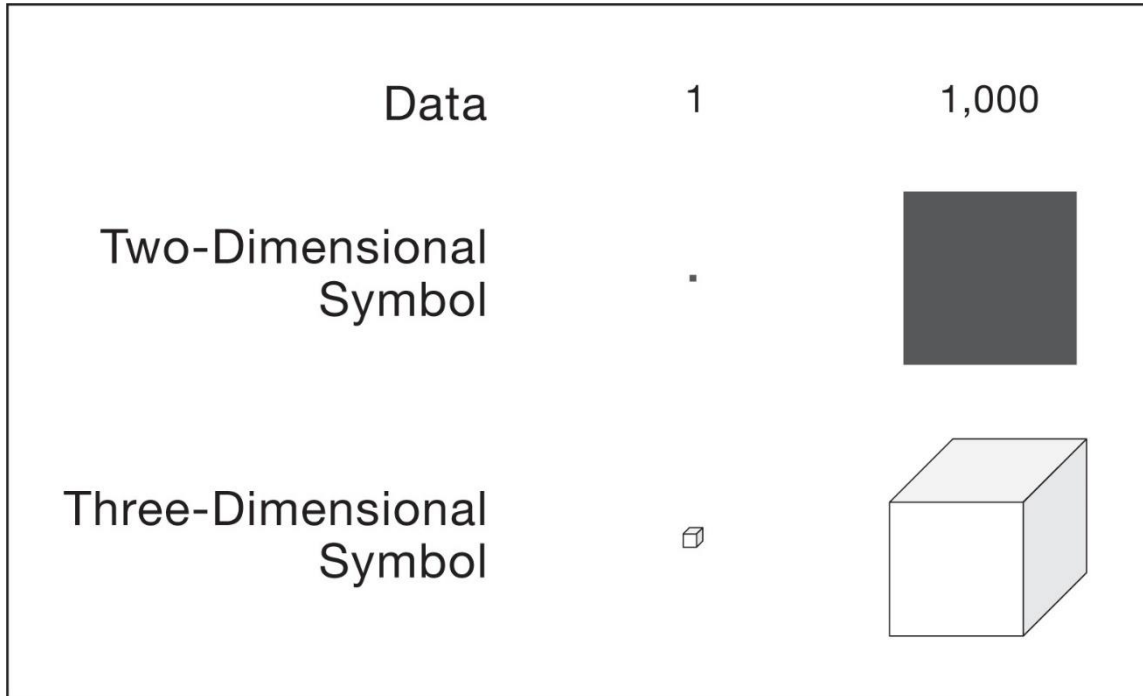
OHIO

1920

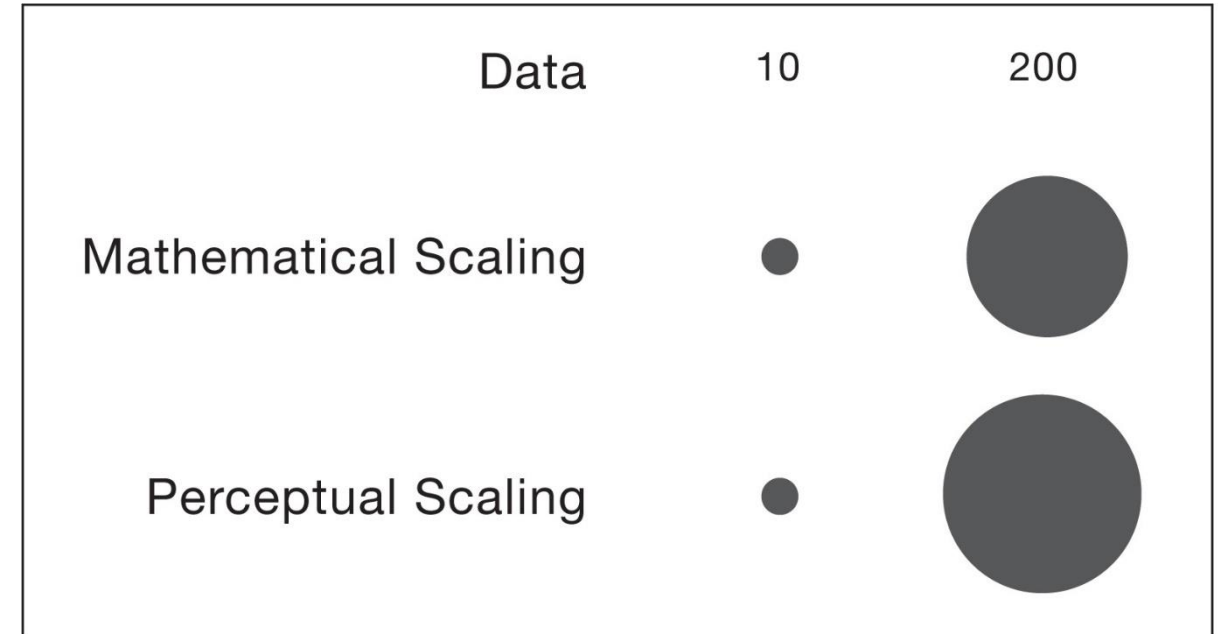
GUY HAROLD SMITH



Scaling/Legend



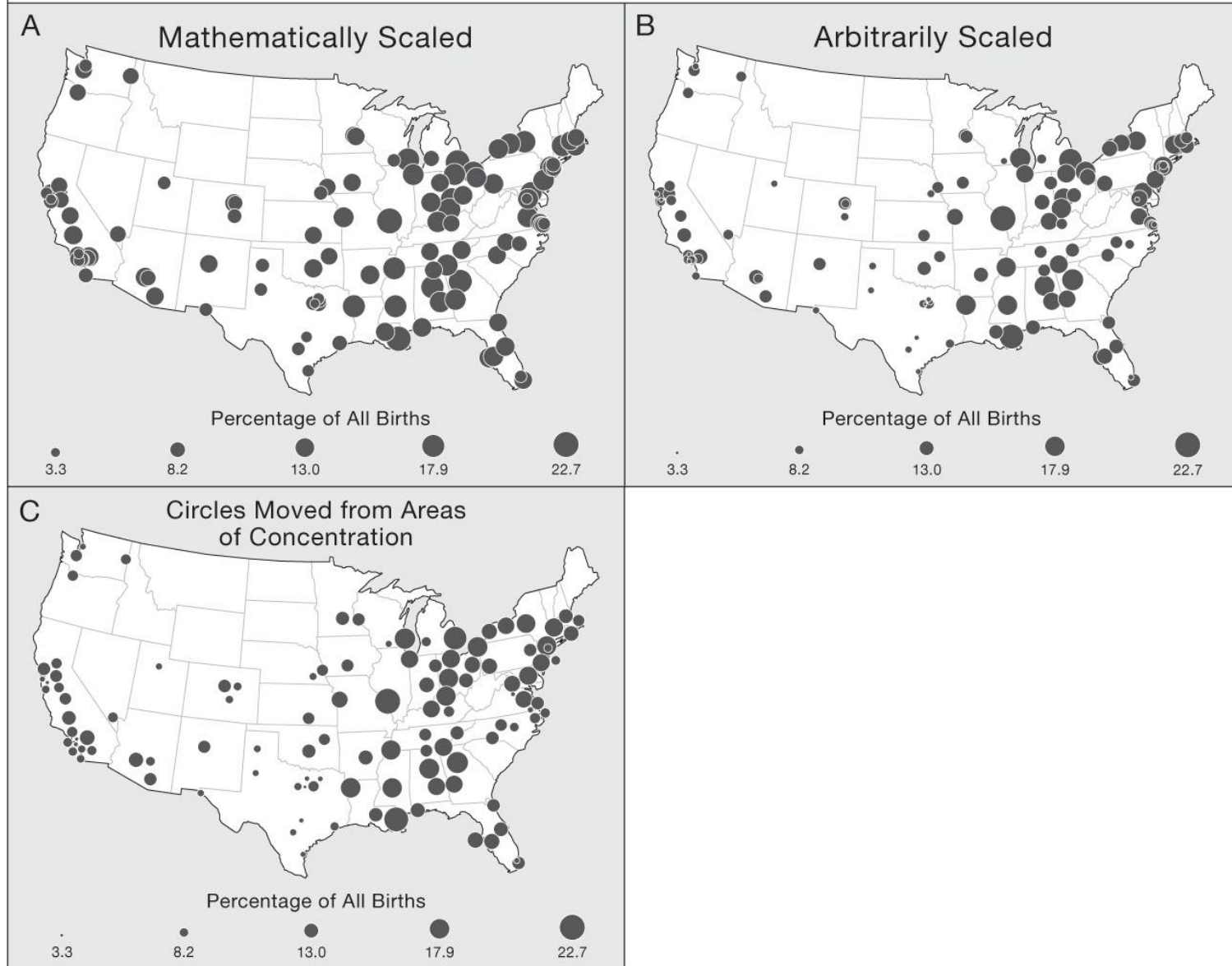
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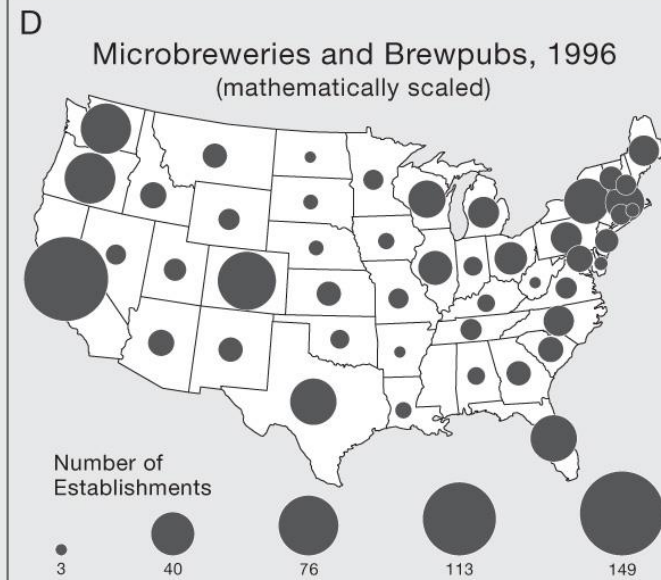
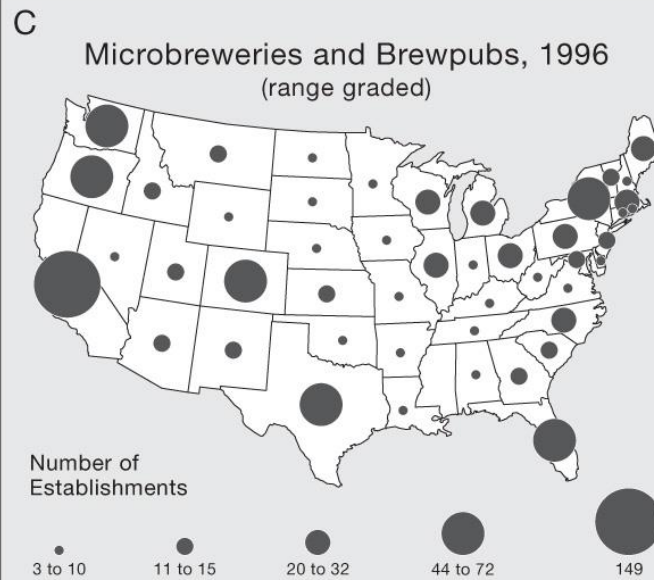
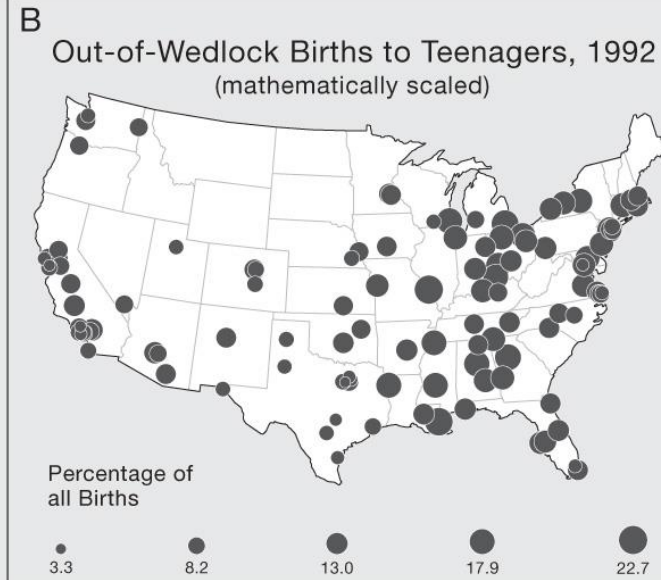
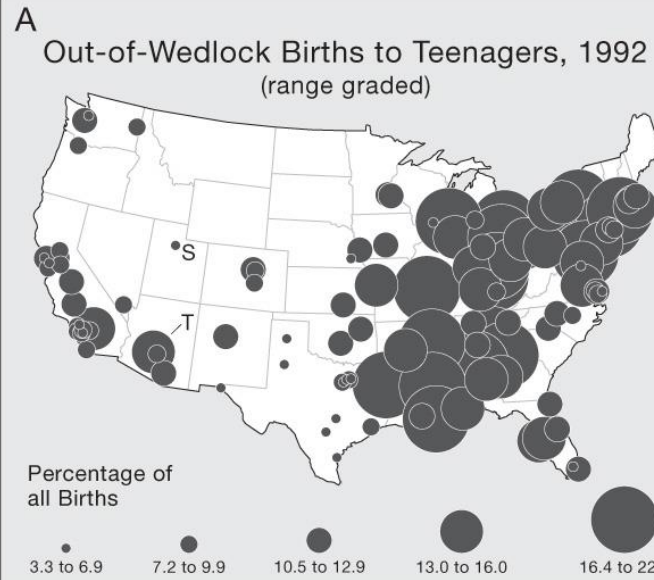
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Effect of Symbol Scaling and Position on Map Pattern

Out-of-Wedlock Births to Teenagers, 1992

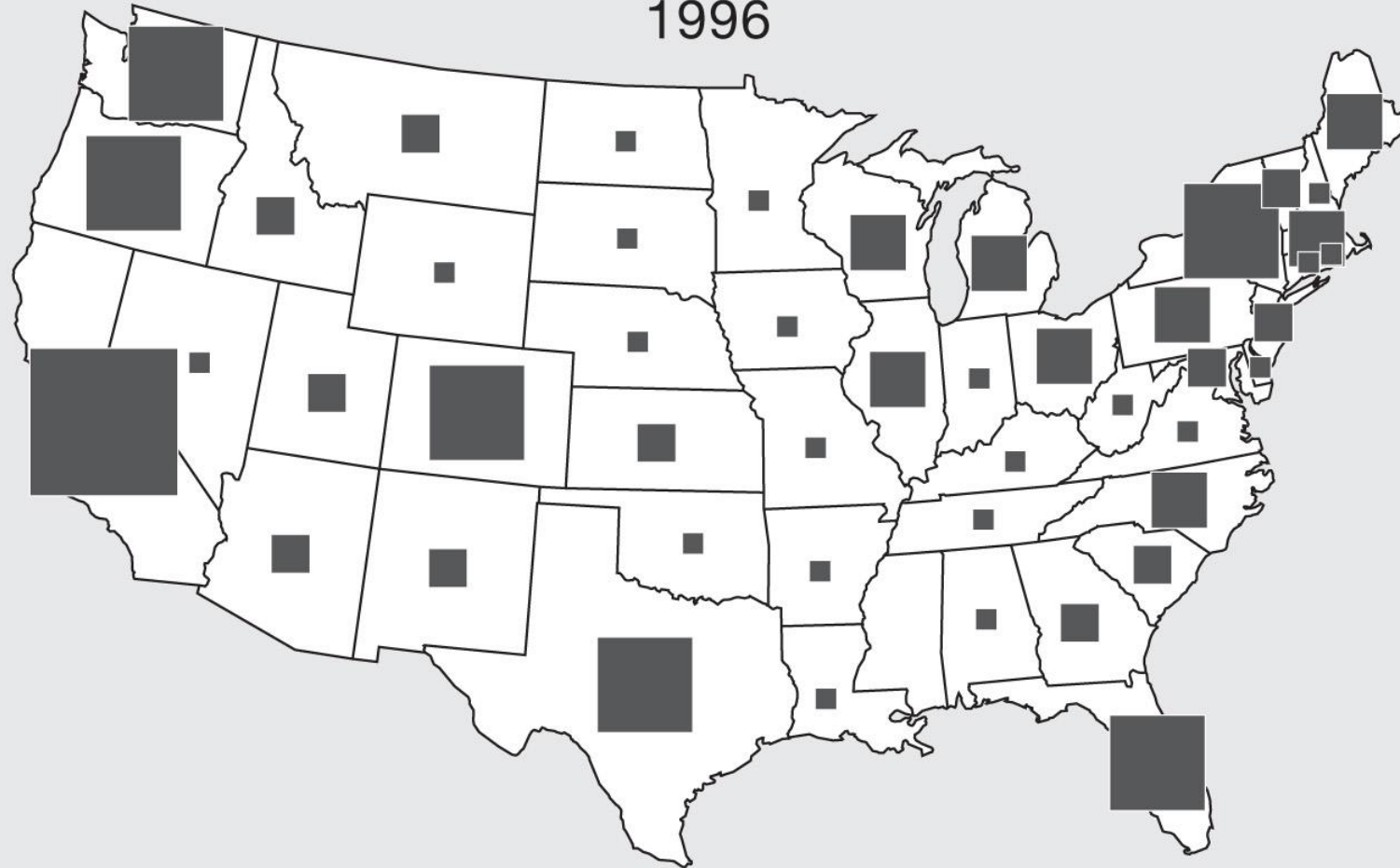


Range Grading Versus Mathematical Scaling



Microbreweries and Brewpubs

1996



Number of Establishments

3 to 10

11 to 15

20 to 32

44 to 72

149

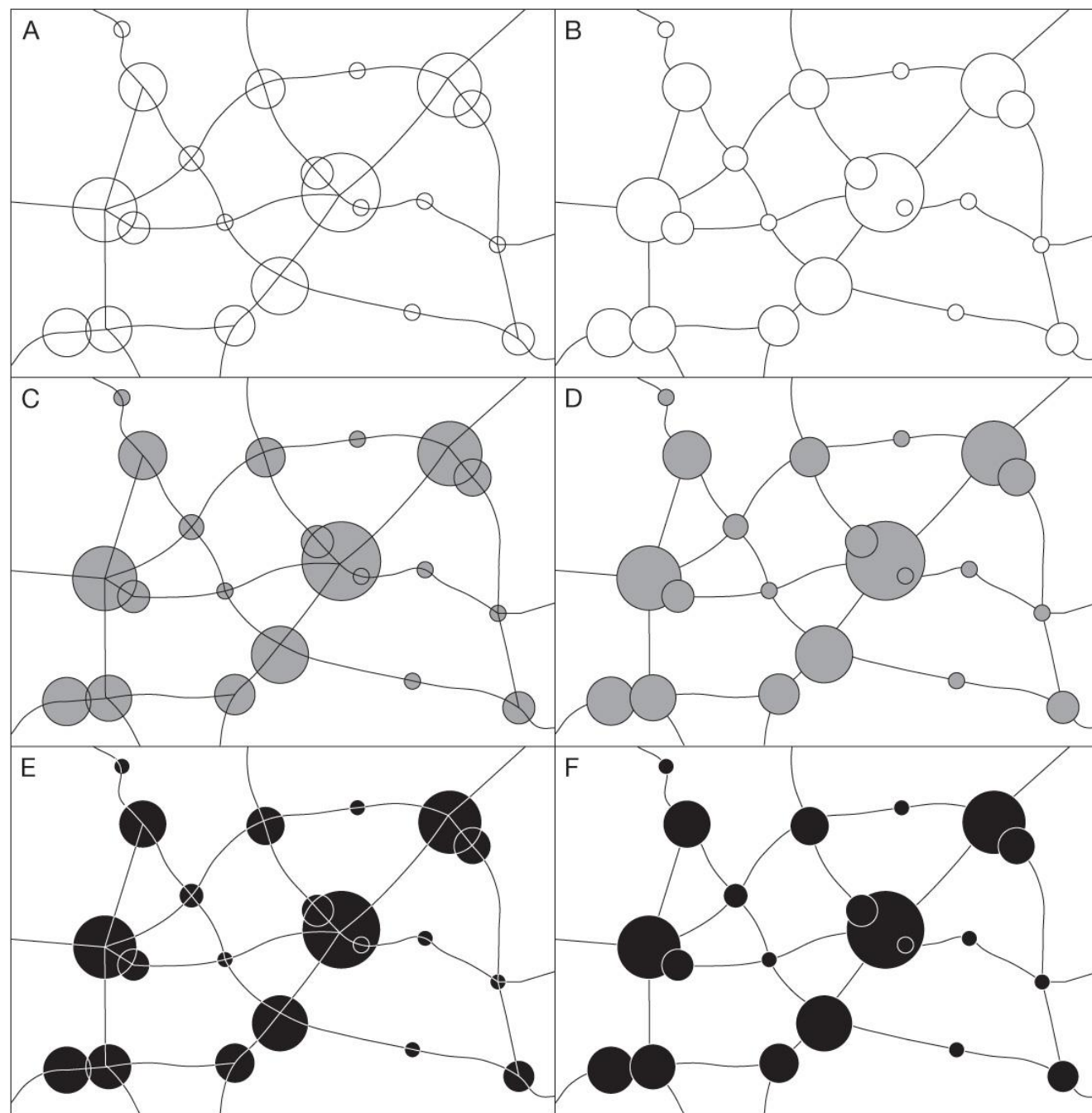
Visual hierarchy

Contrast

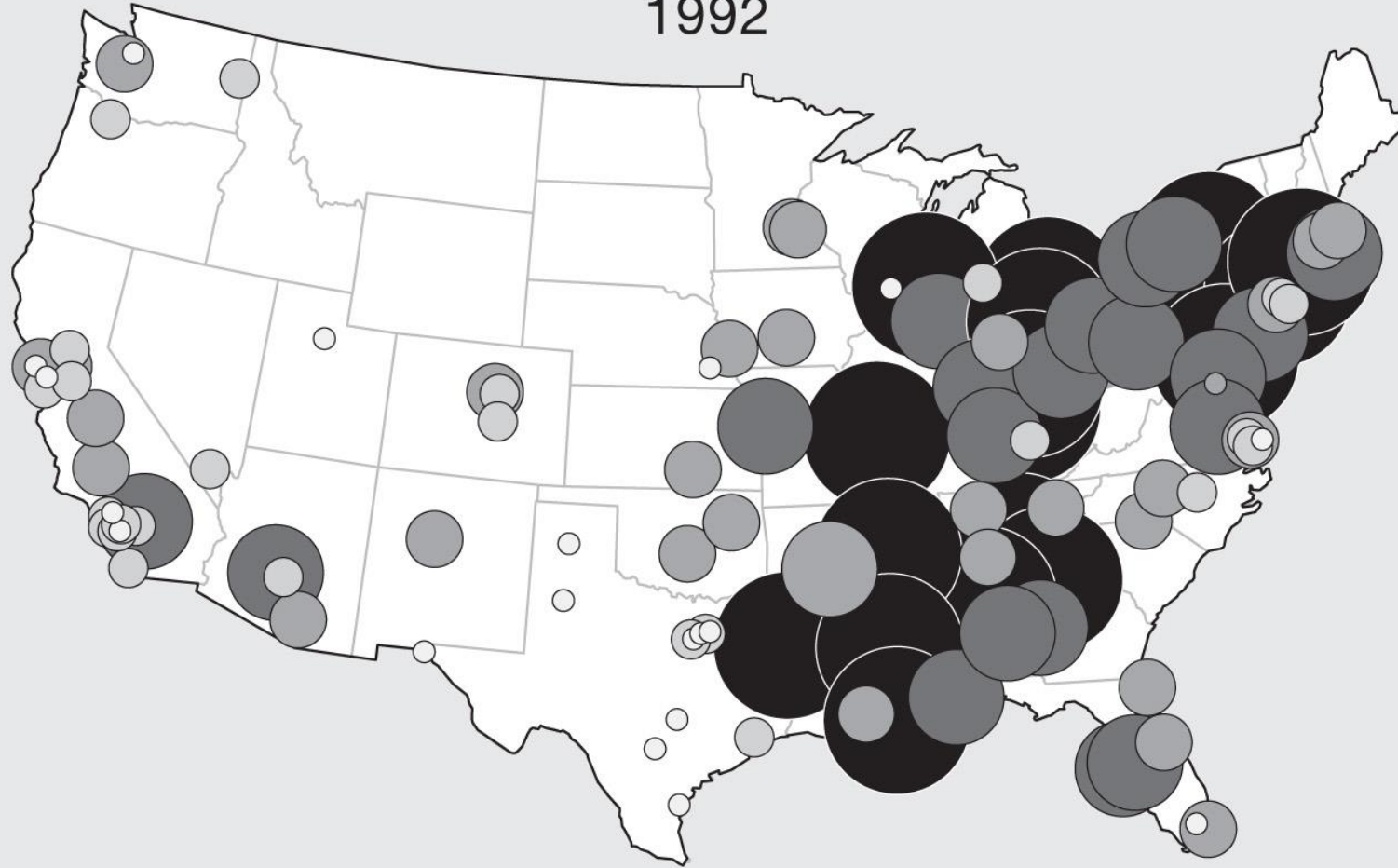
Fill

Overlap

Outline color/style



Out-of-Wedlock Births to Teenagers 1992



Percentage of All Births

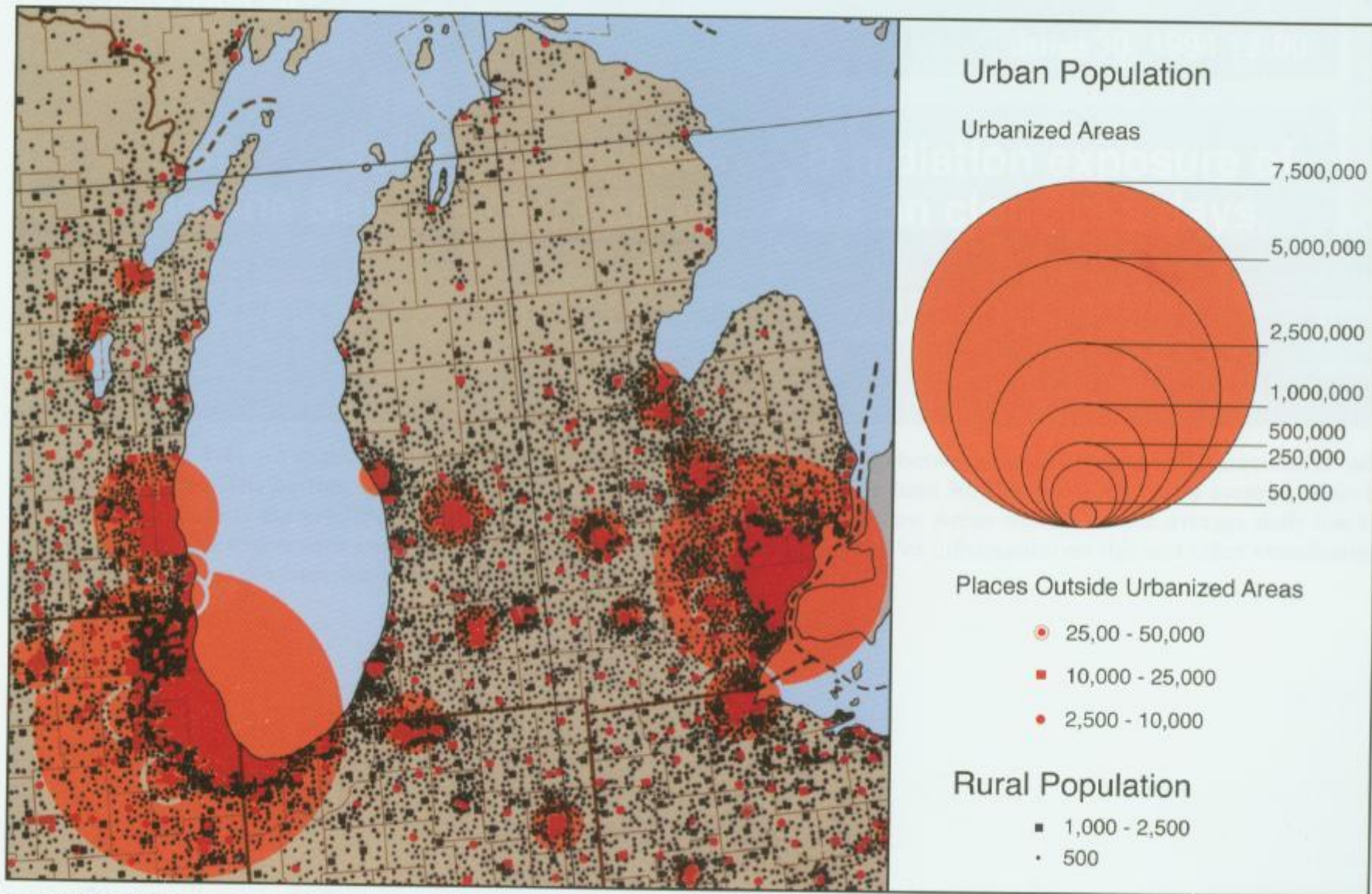
3.3 to 6.9

7.2 to 9.9

10.5 to 12.9

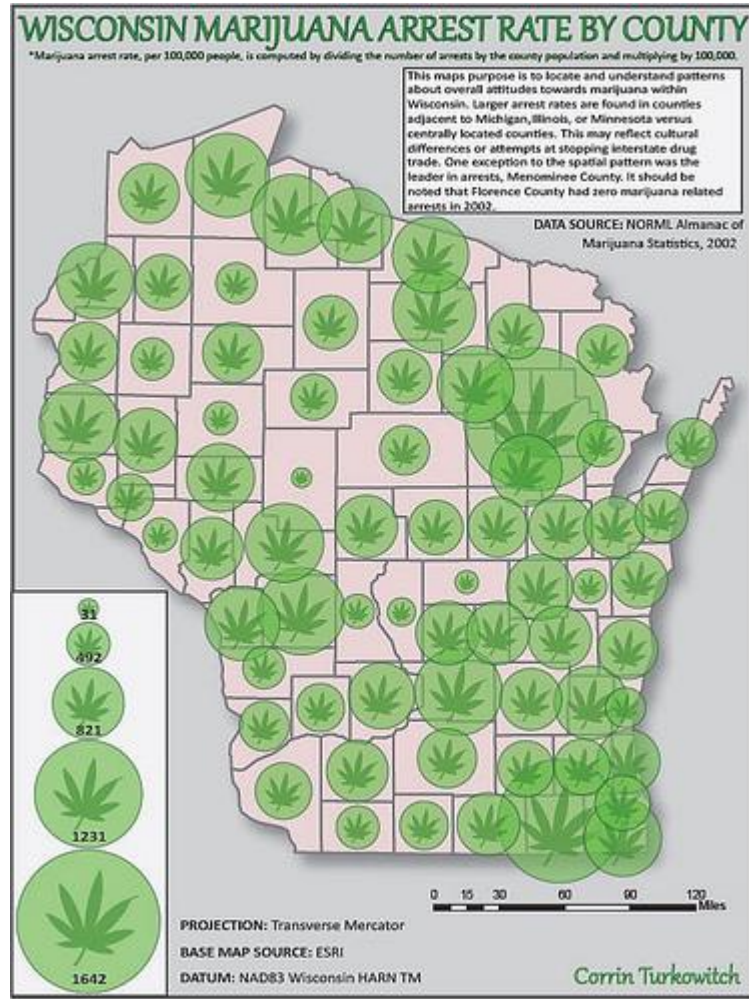
13.0 to 16.0

16.4 to 22.7

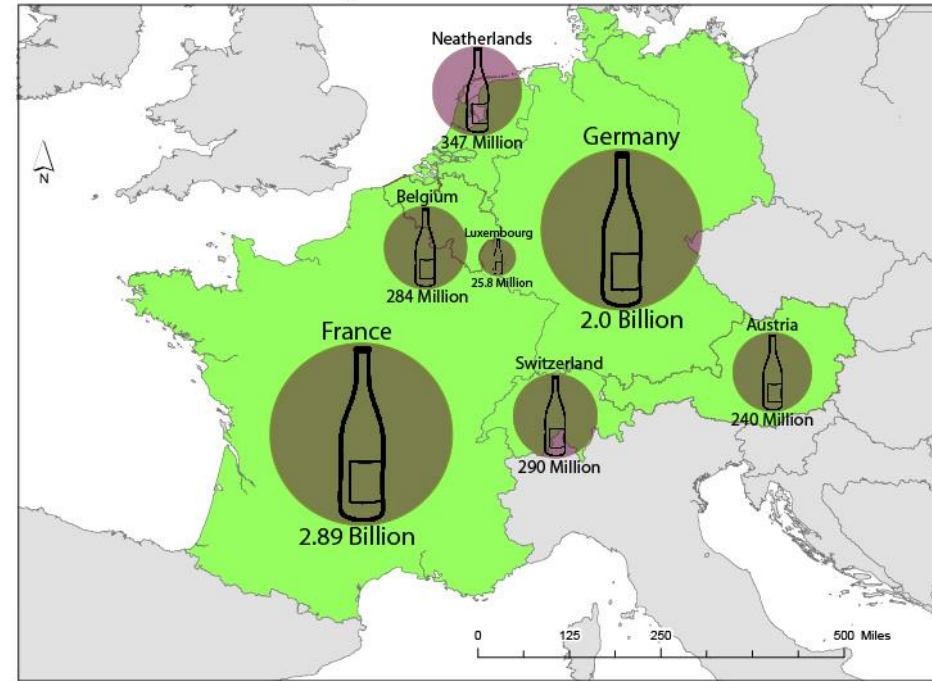


COLOR PLATE 1.2. A combined proportional symbol-dot map that attempts to represent what the population might look like in the "real world." (After U.S. Bureau of the Census 1970.)

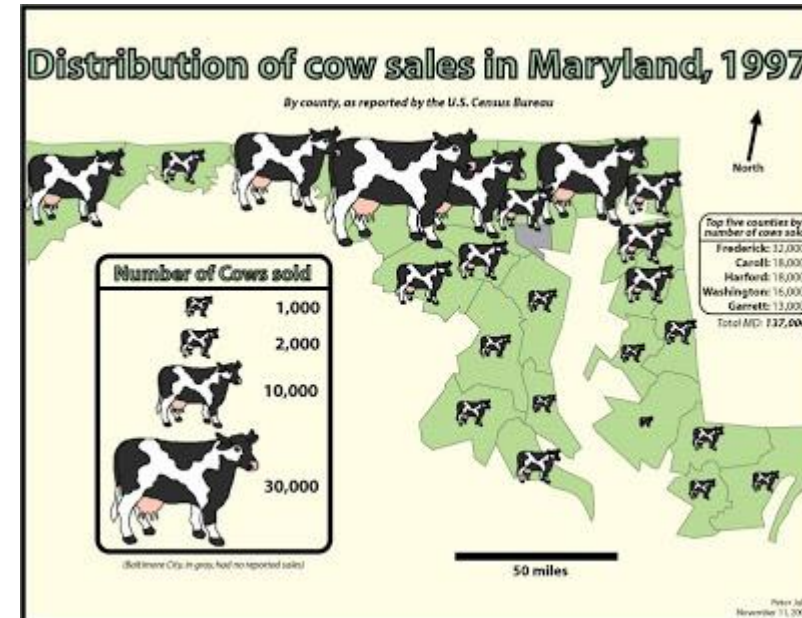
Student maps



Wine Consumption in Eastern Europe 2010



Map By Andrea McCarthy
 Source: The Wine Institute
 Date: March 2, 2012



Multiple variables

Indiemaps

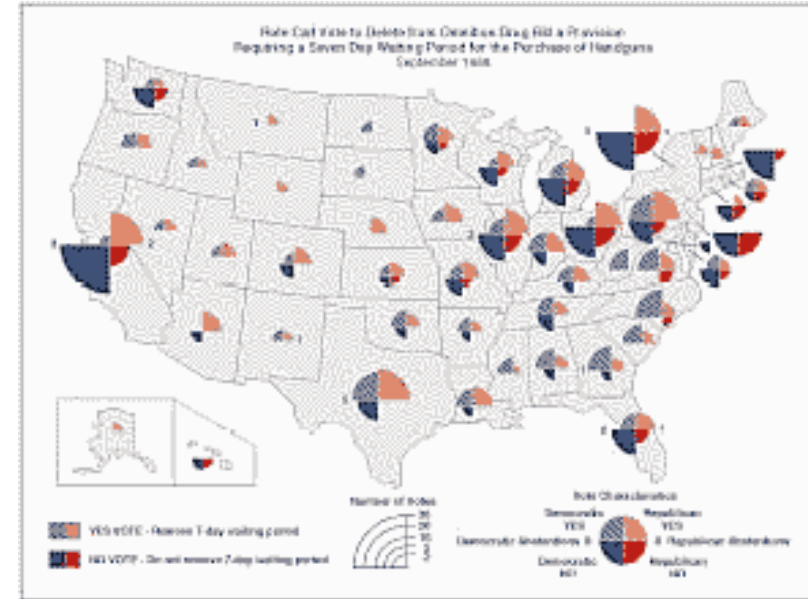
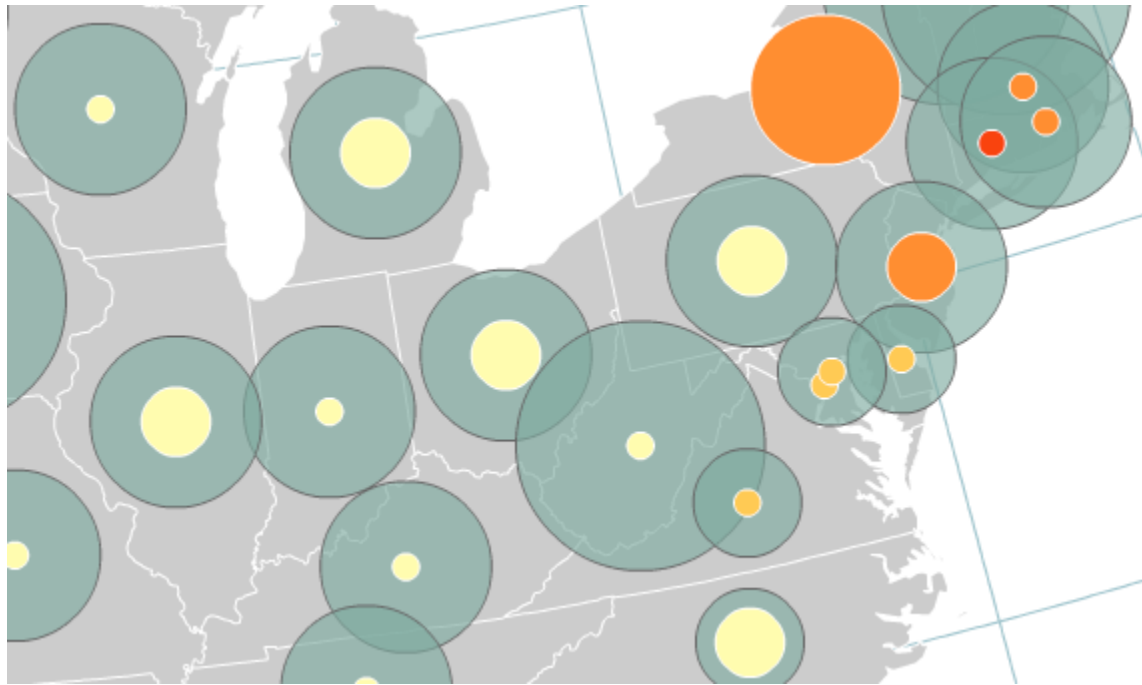
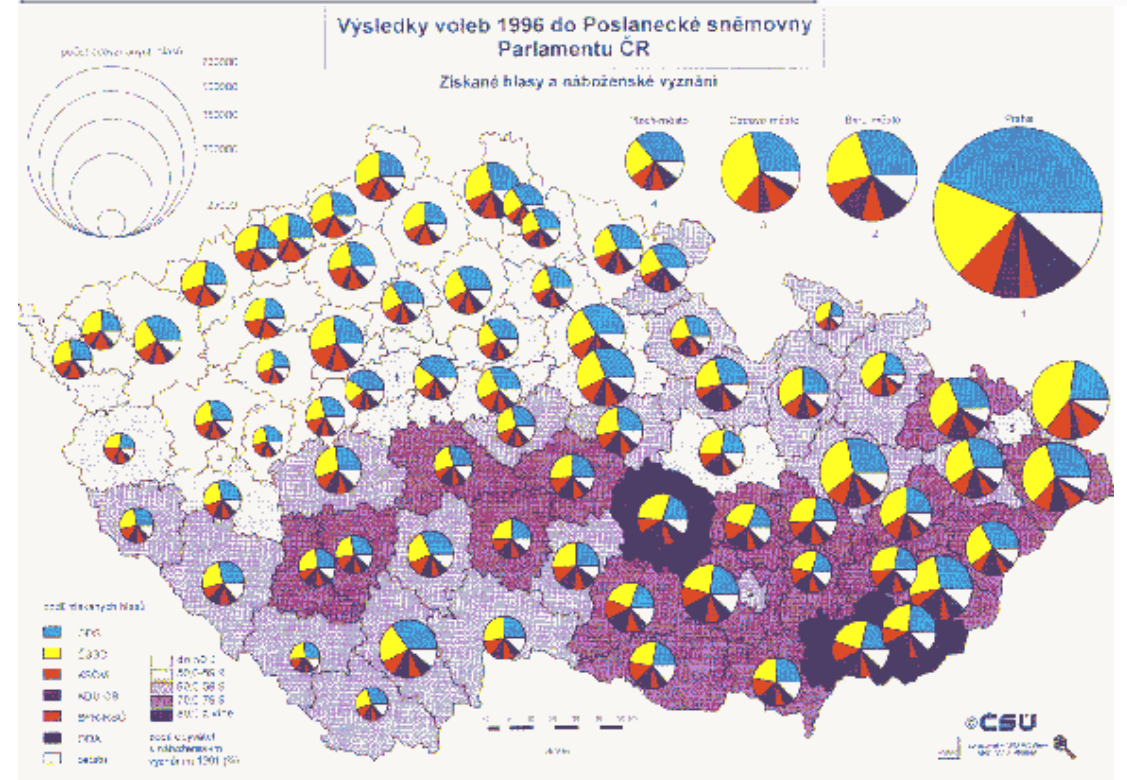


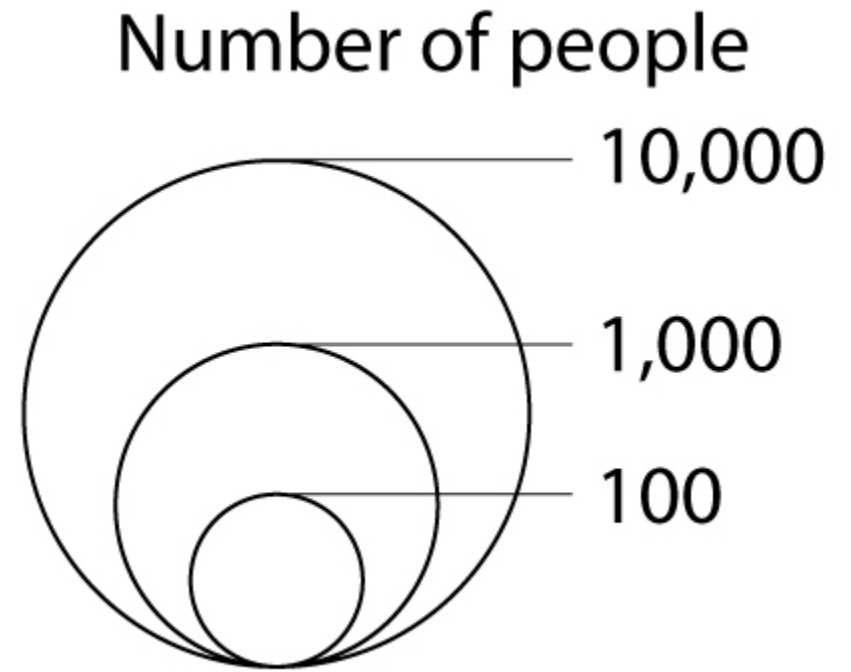
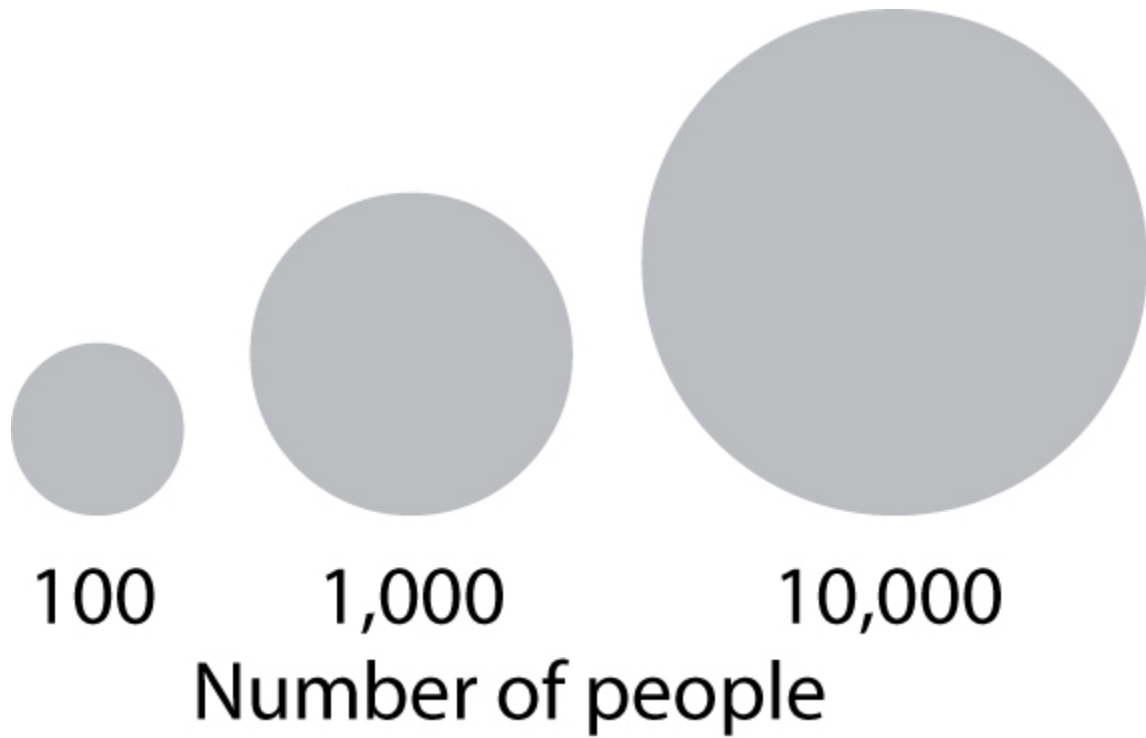
Figure 2.6

A graduated circle map showing a U.S. House of Representatives vote on an omnibus drug bill provision requiring a 7-day waiting period for the purchase of handguns.

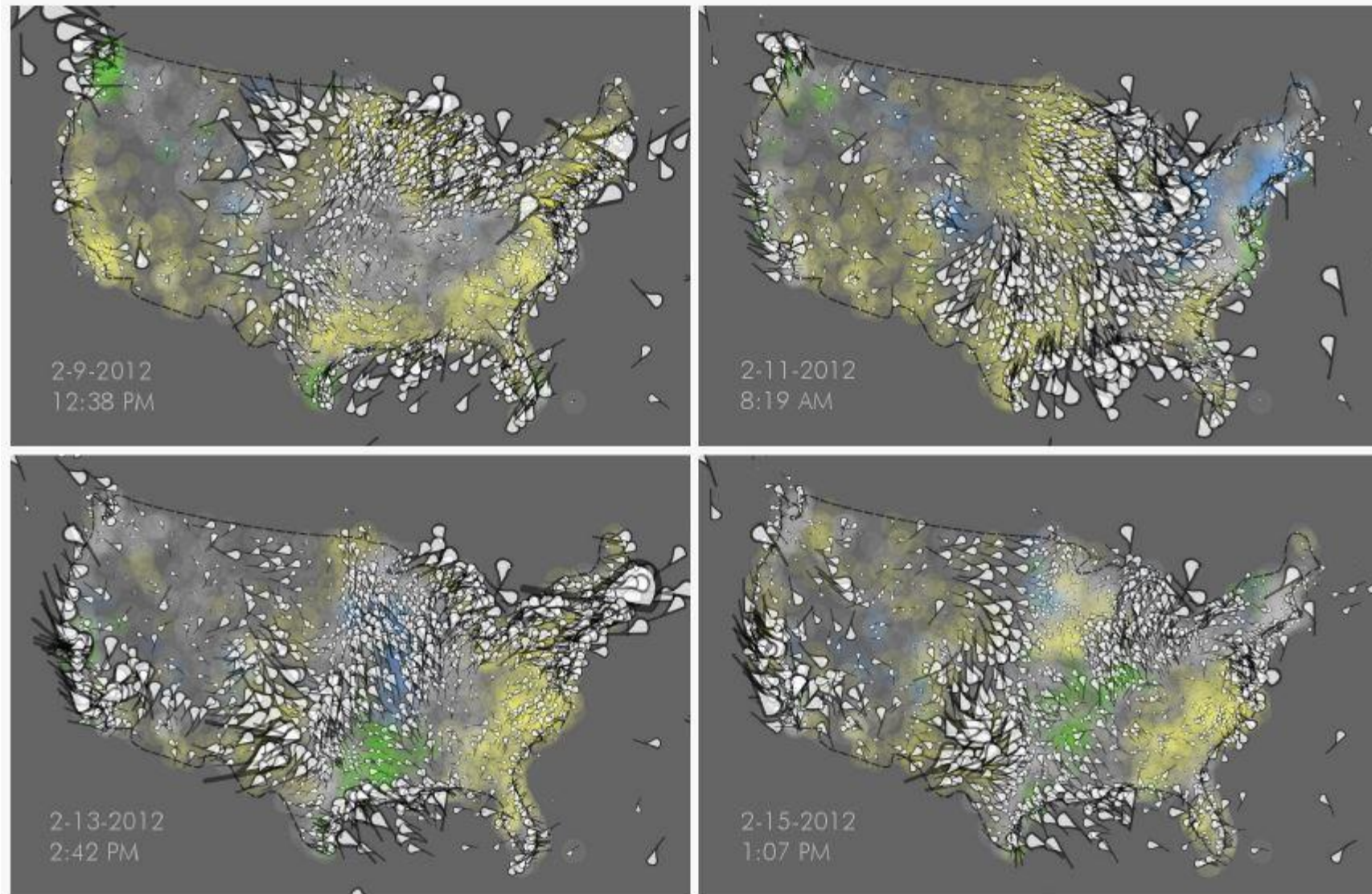
Source: T. Rabenhorst, University of Maryland, Baltimore County, Maryland. Reproduced by permission.



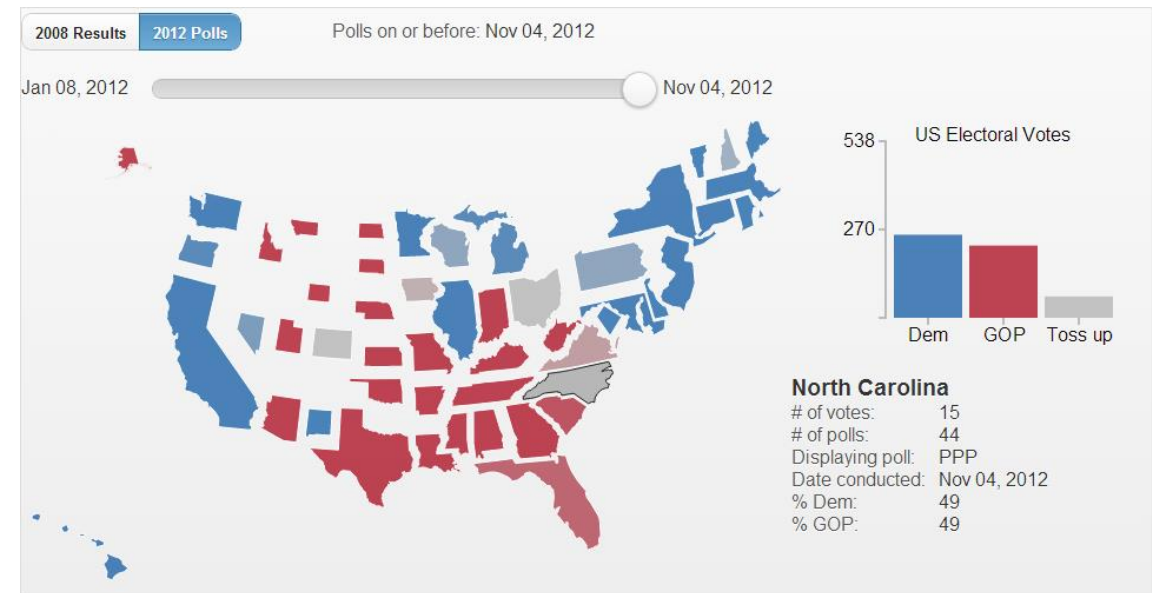
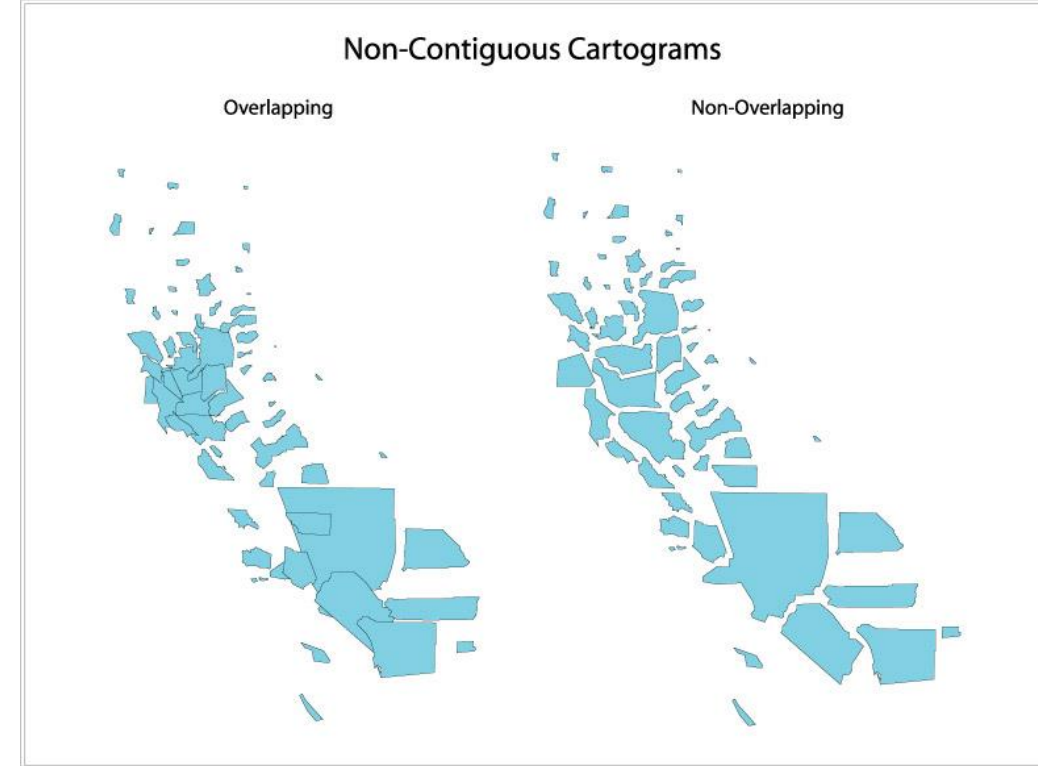
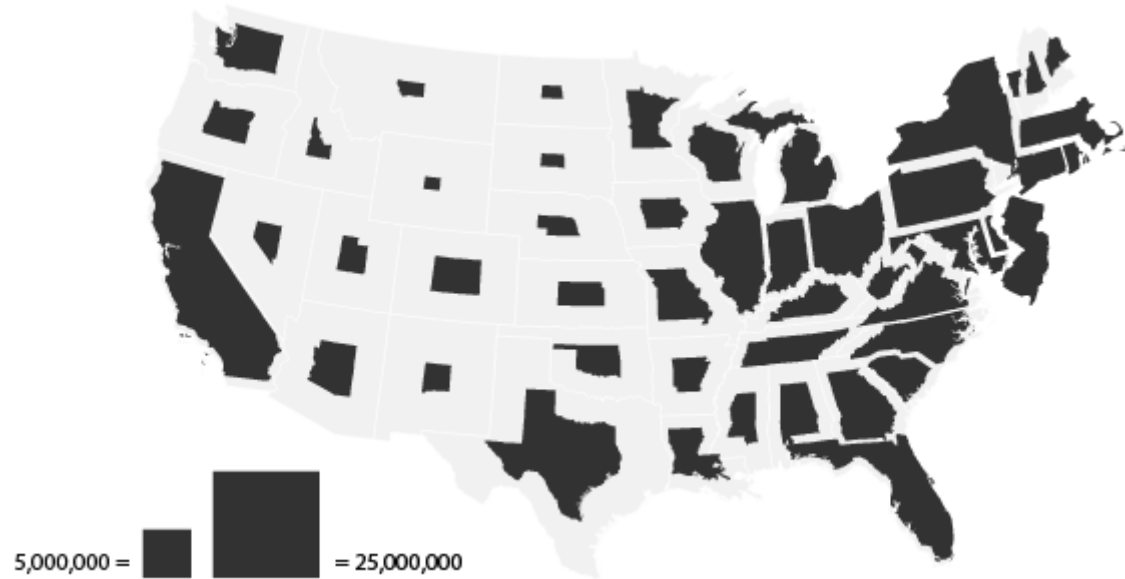
Legend style



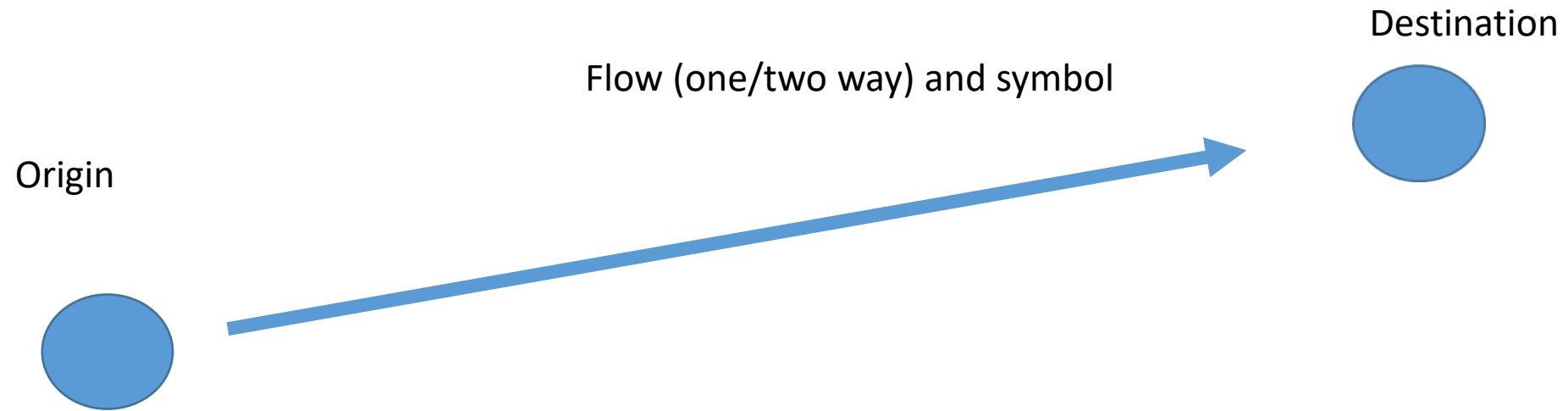
Winds using point symbols



Non-contiguous cartogram



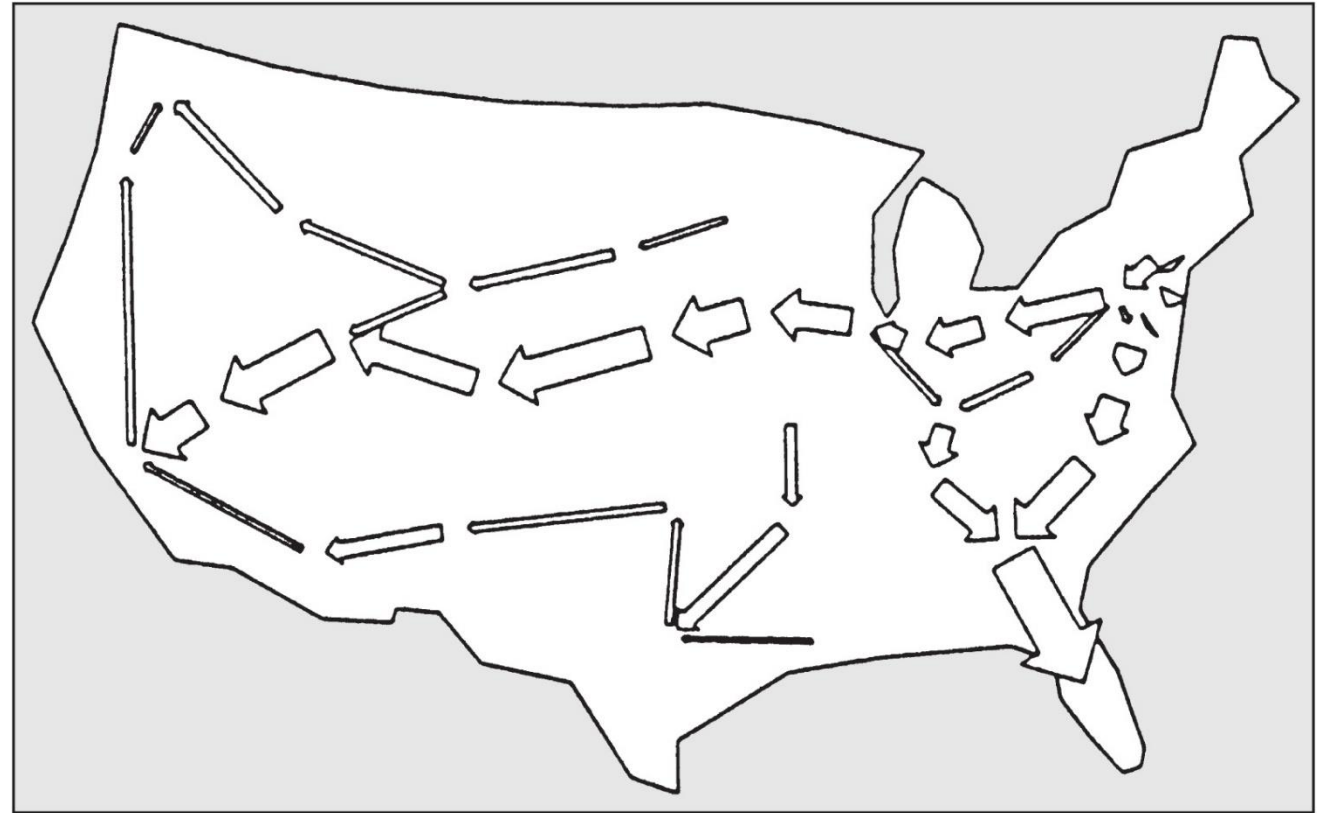
Flow maps: Point pairs



Flow representation

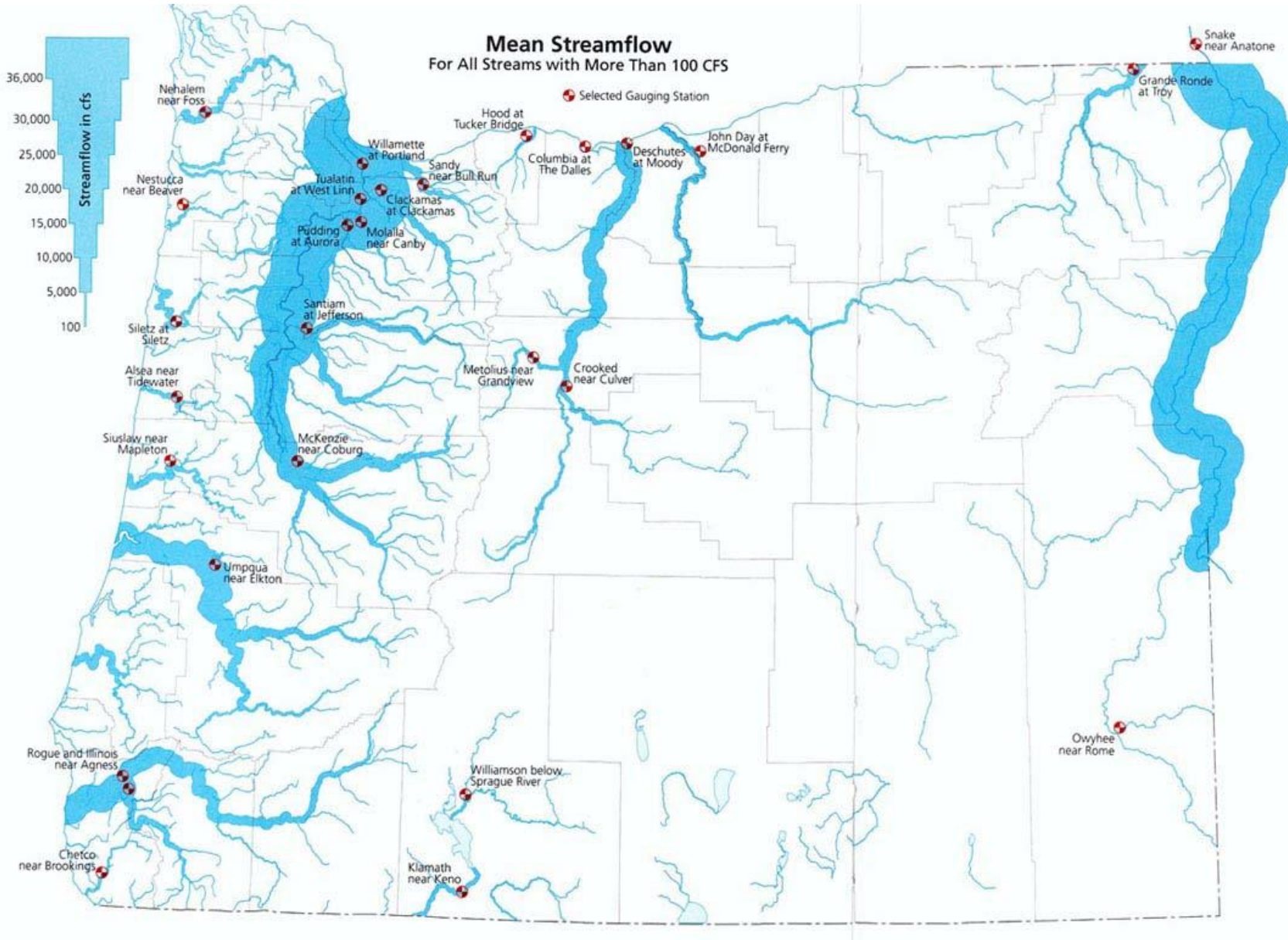


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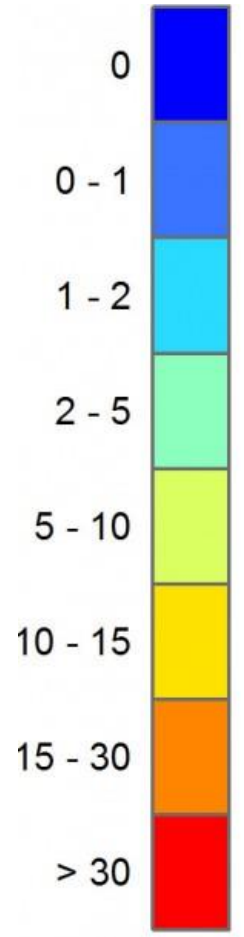
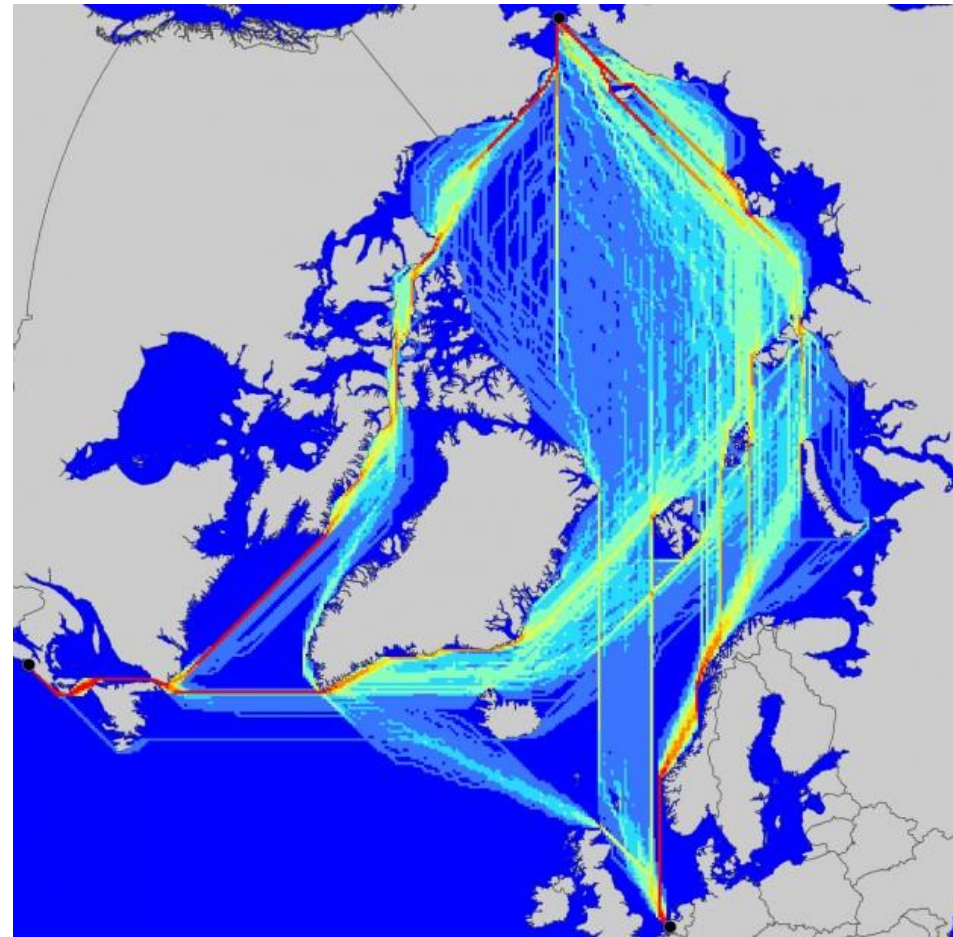
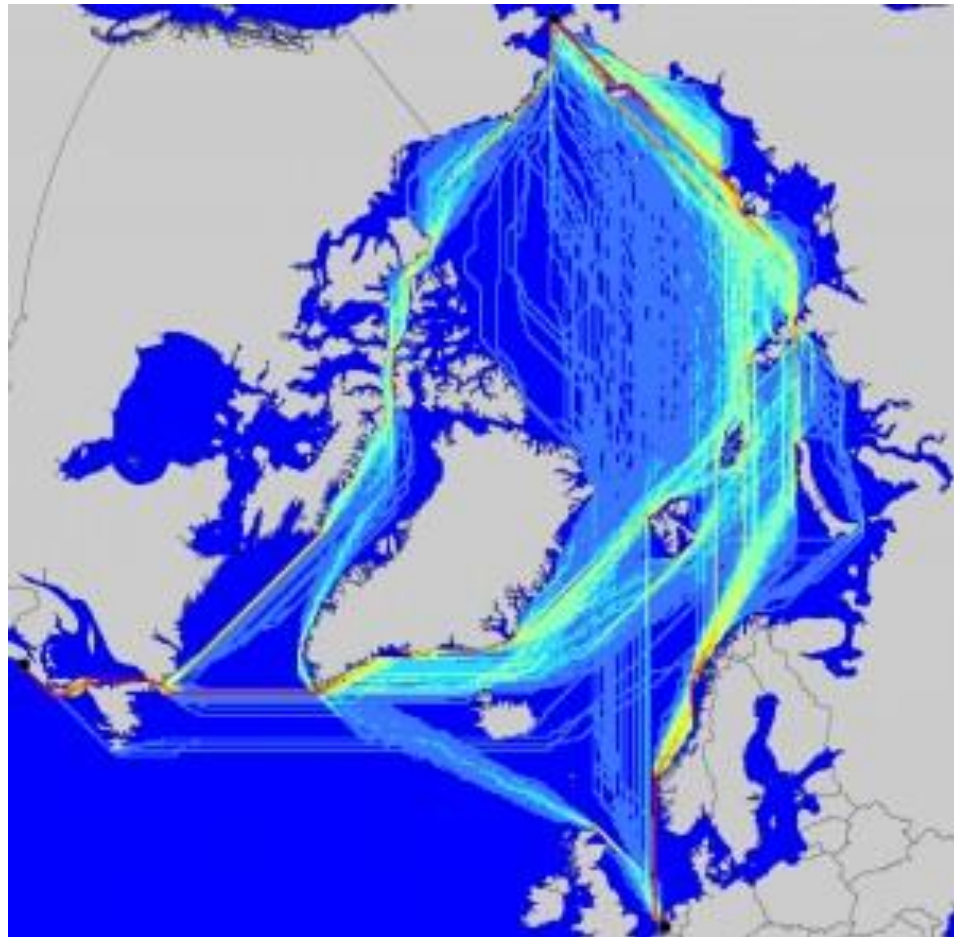
True path flow map



Shipping lanes



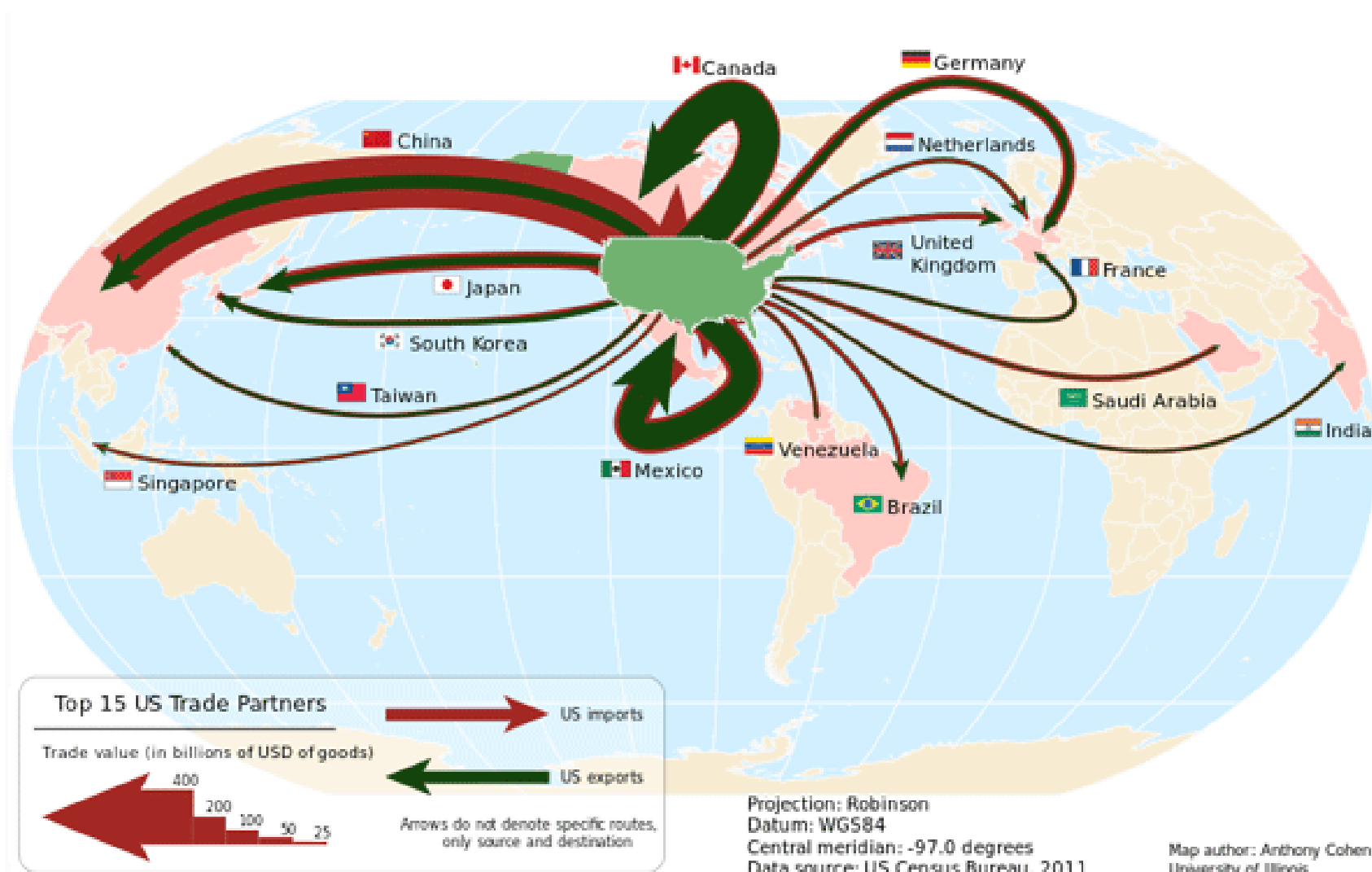
Potential Sea Routes: 2011 and 2035



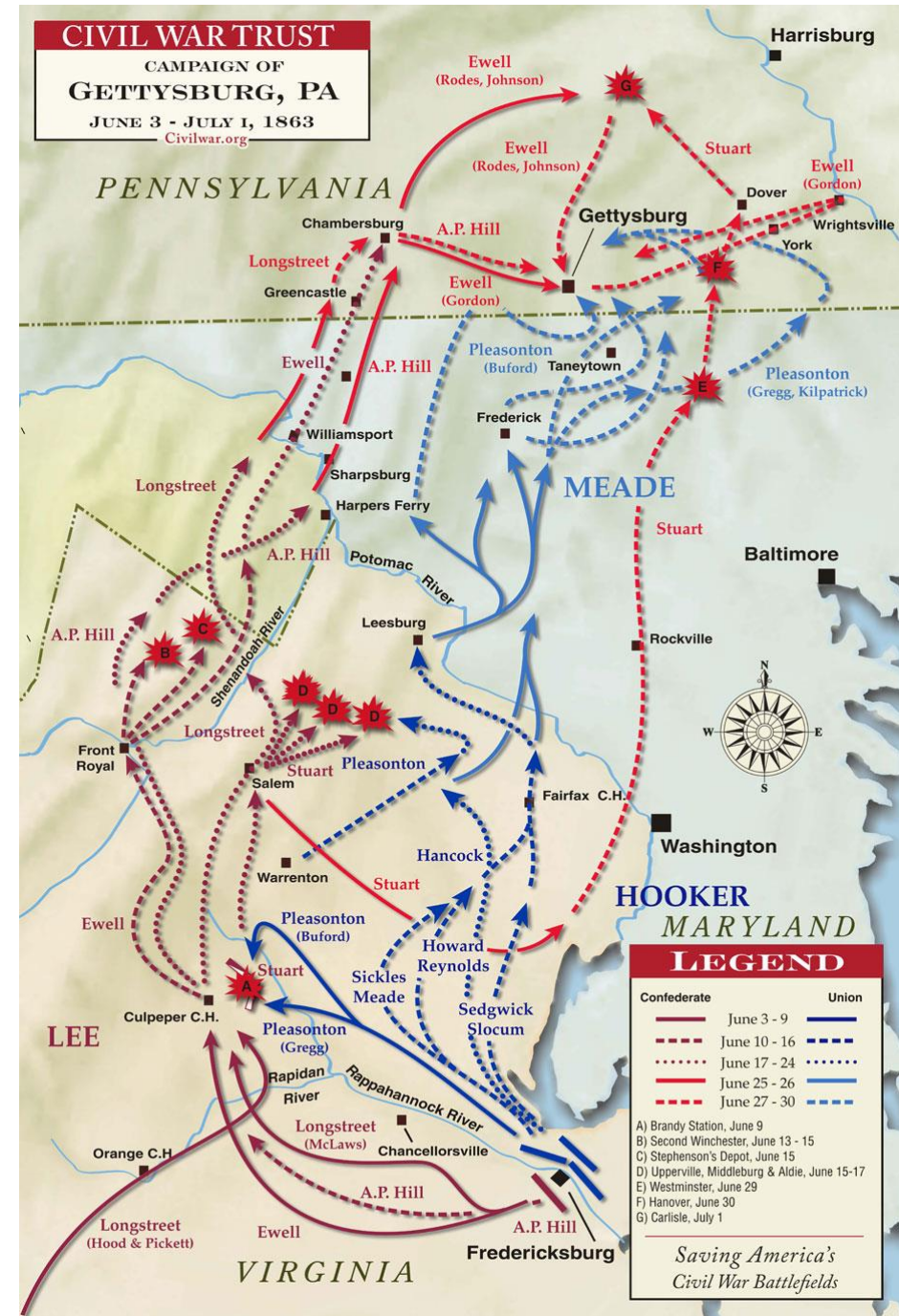
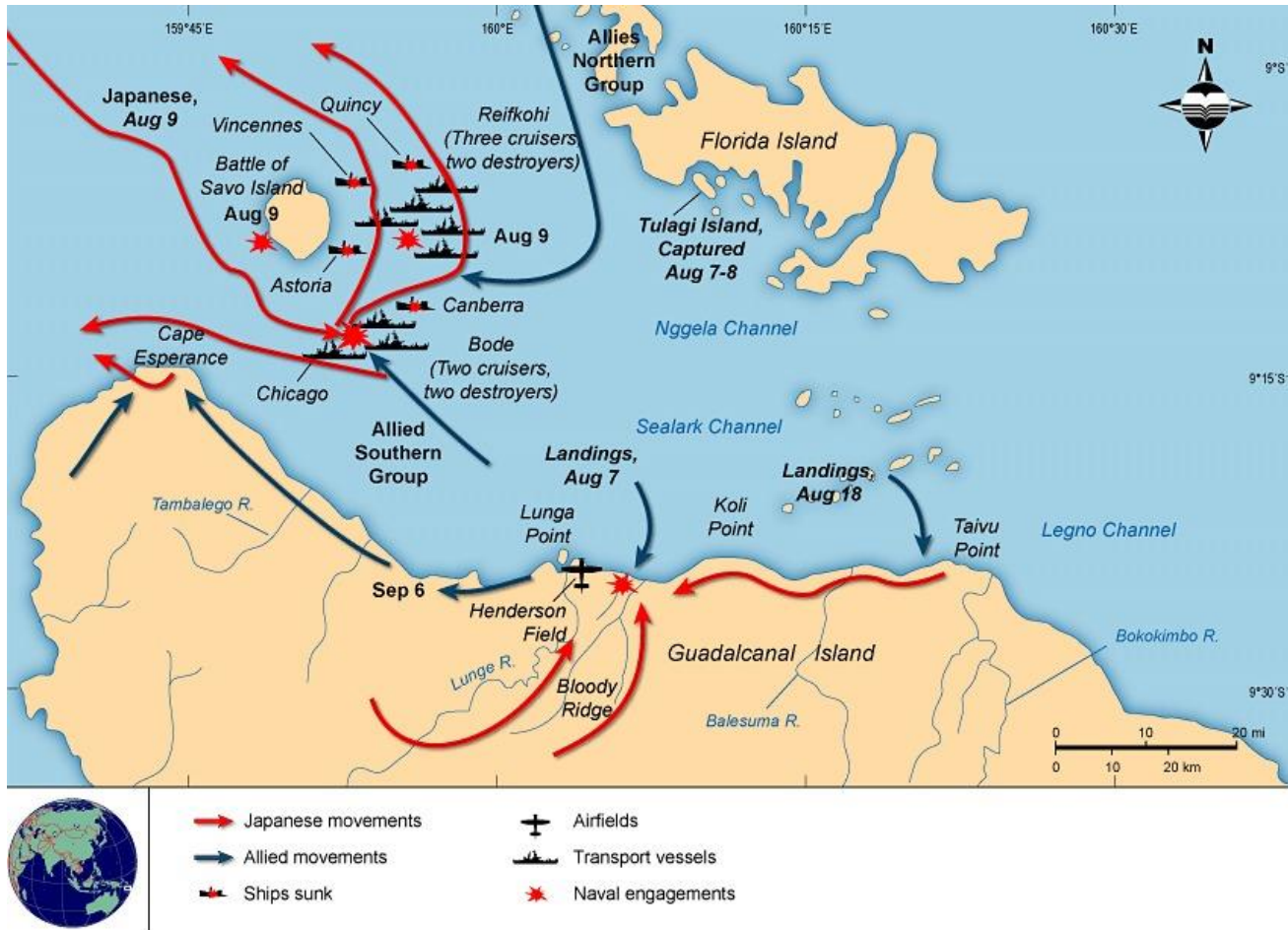
Social media flows



Curved arrows: 2 ways flows

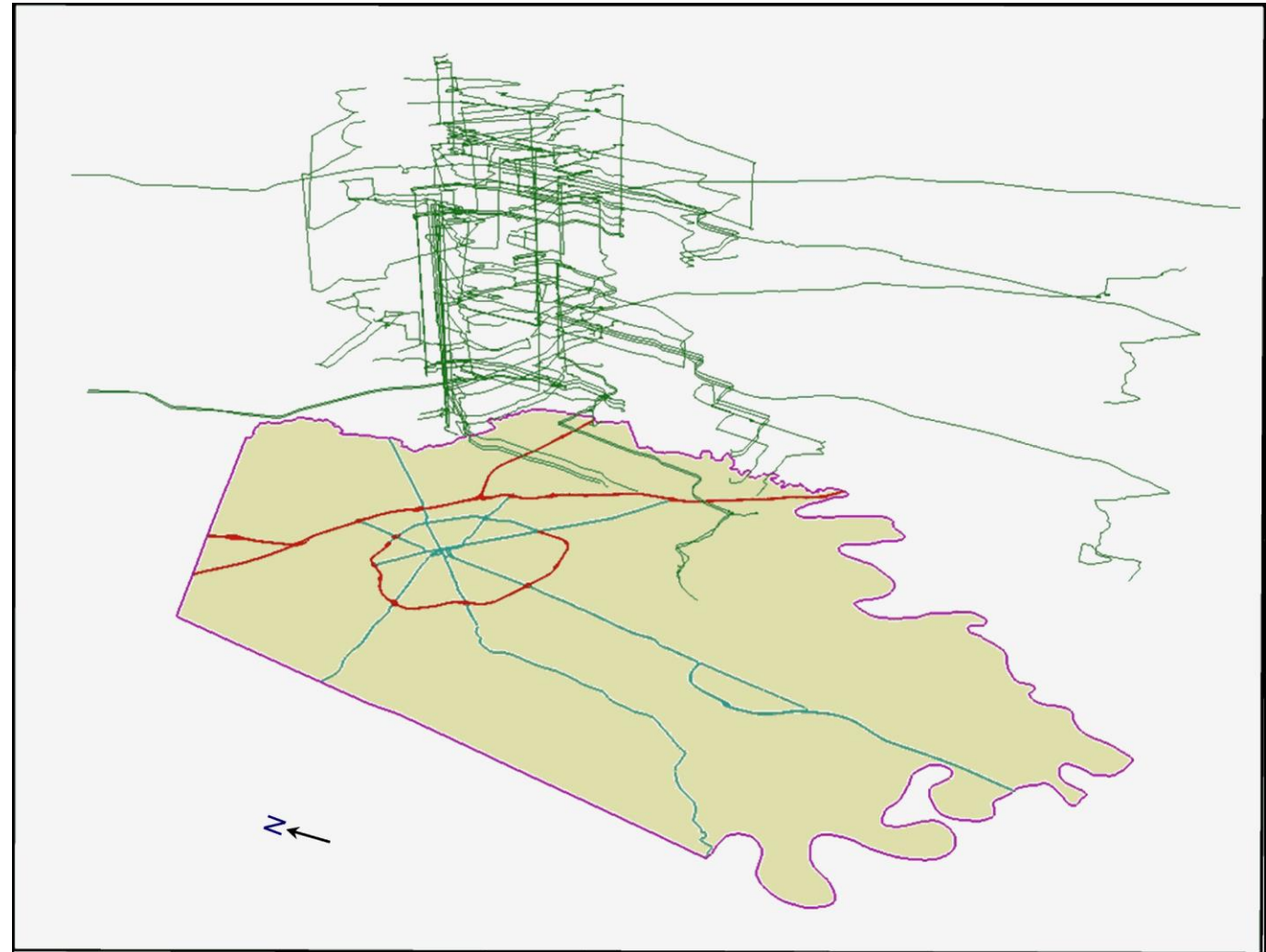
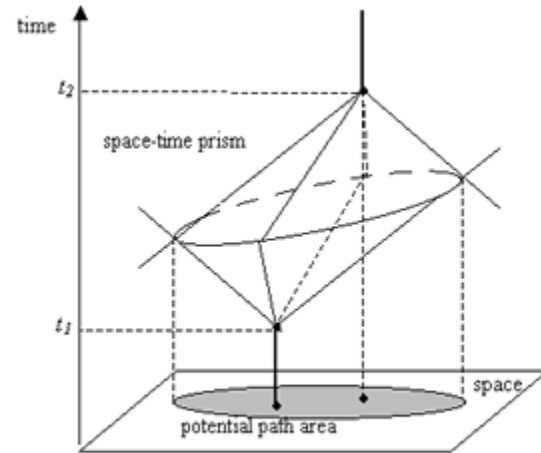
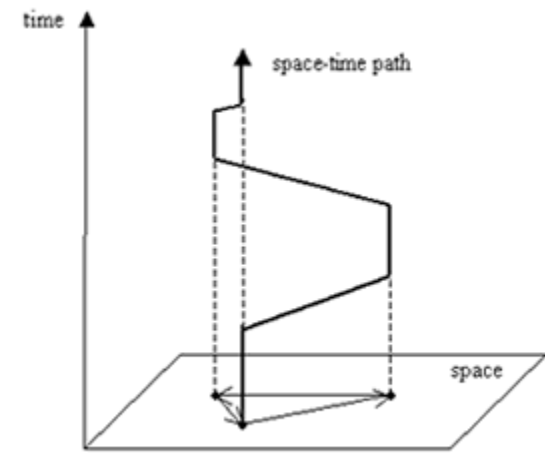


Trajectories

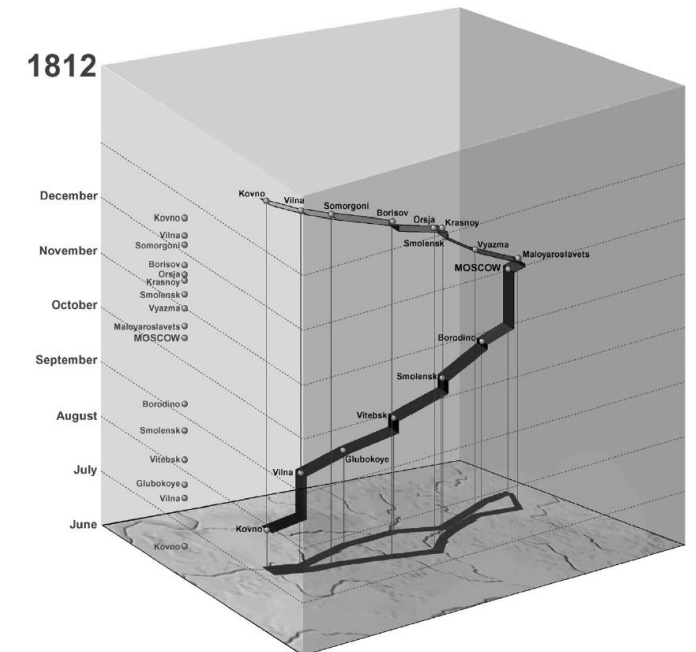
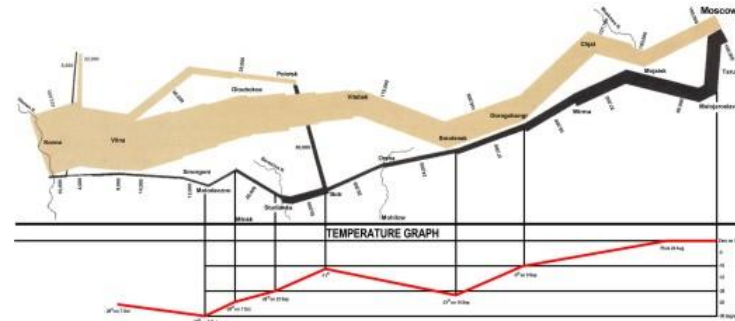
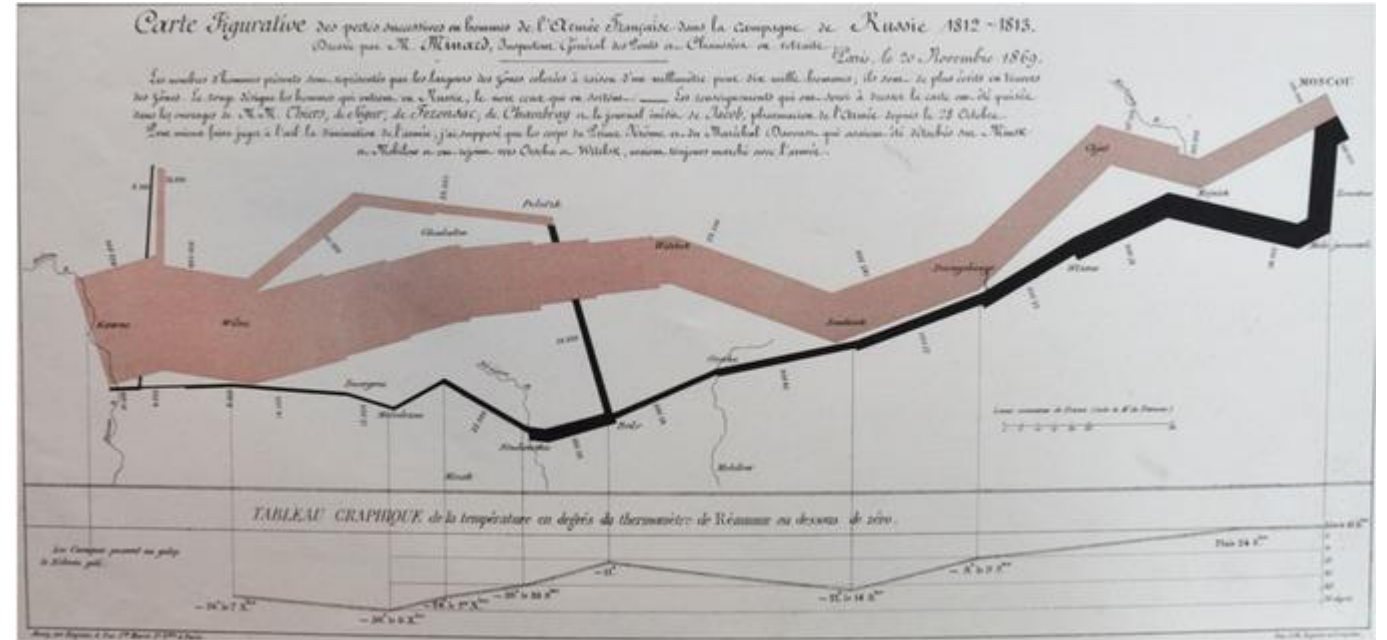
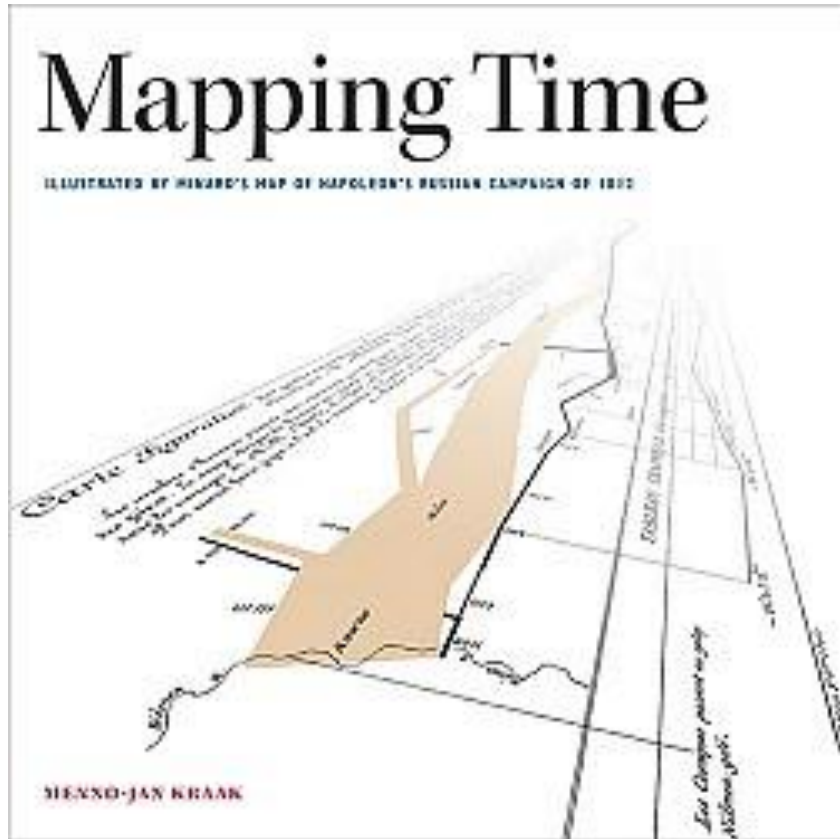


Saving America's Civil War Battlefields

Hagerstrand's time-space prism

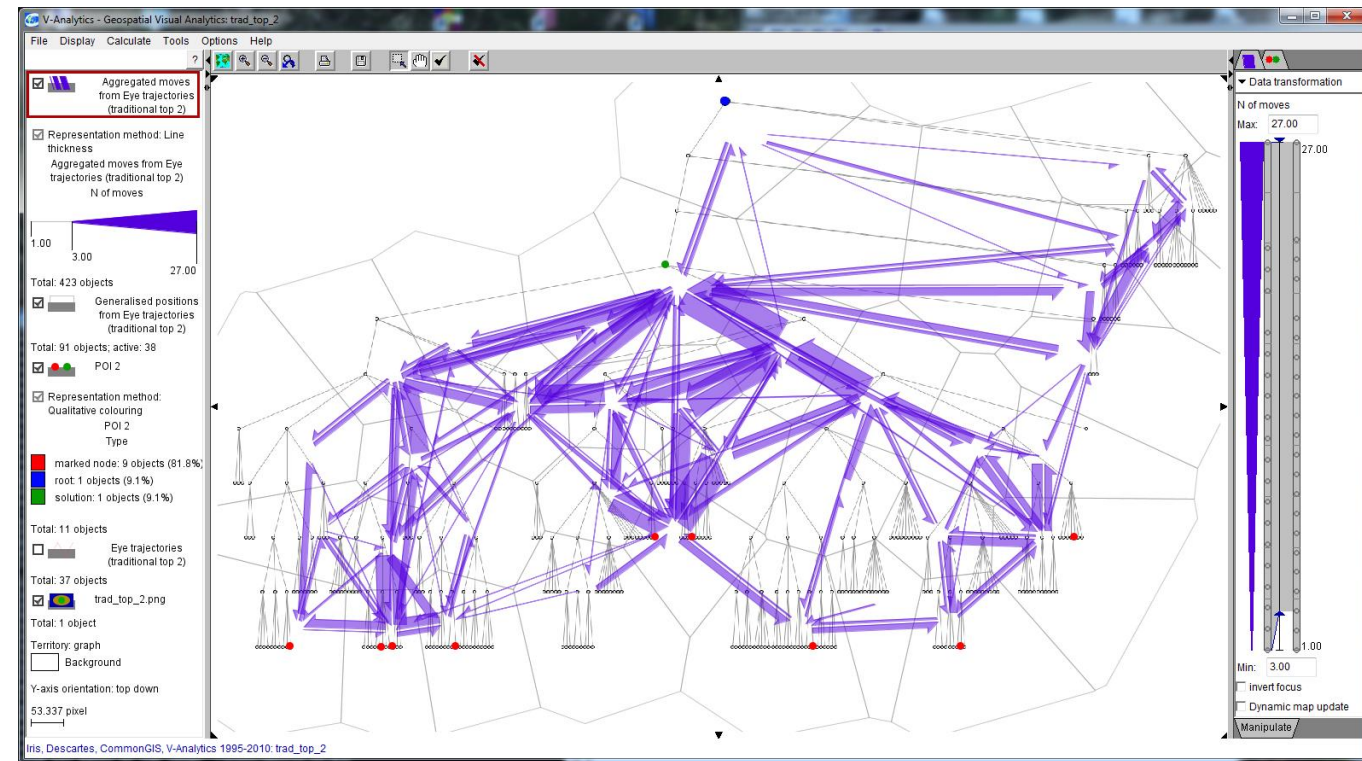
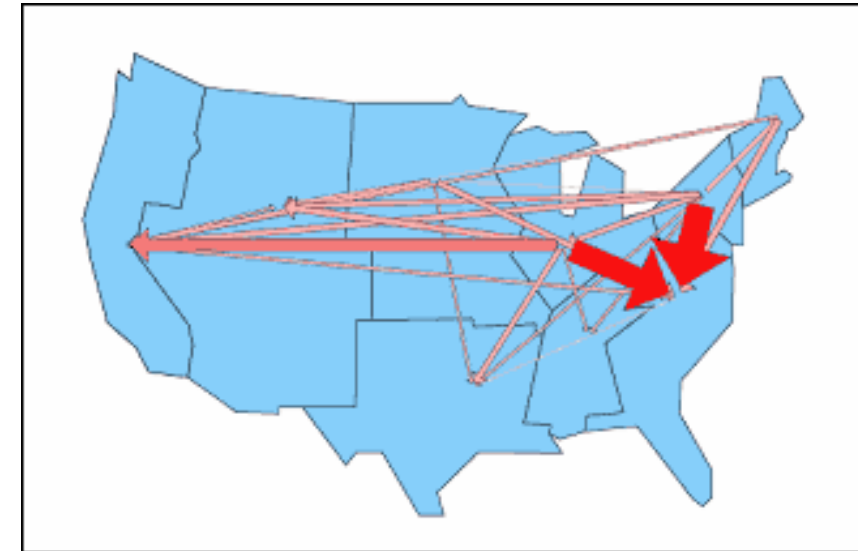
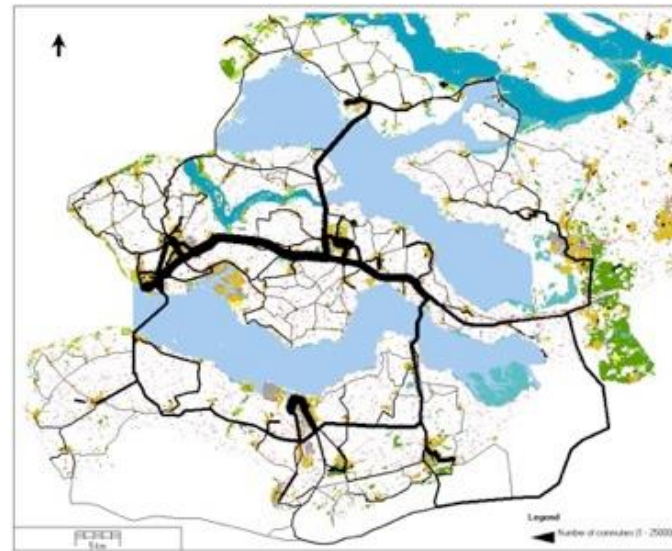


Minard's Map

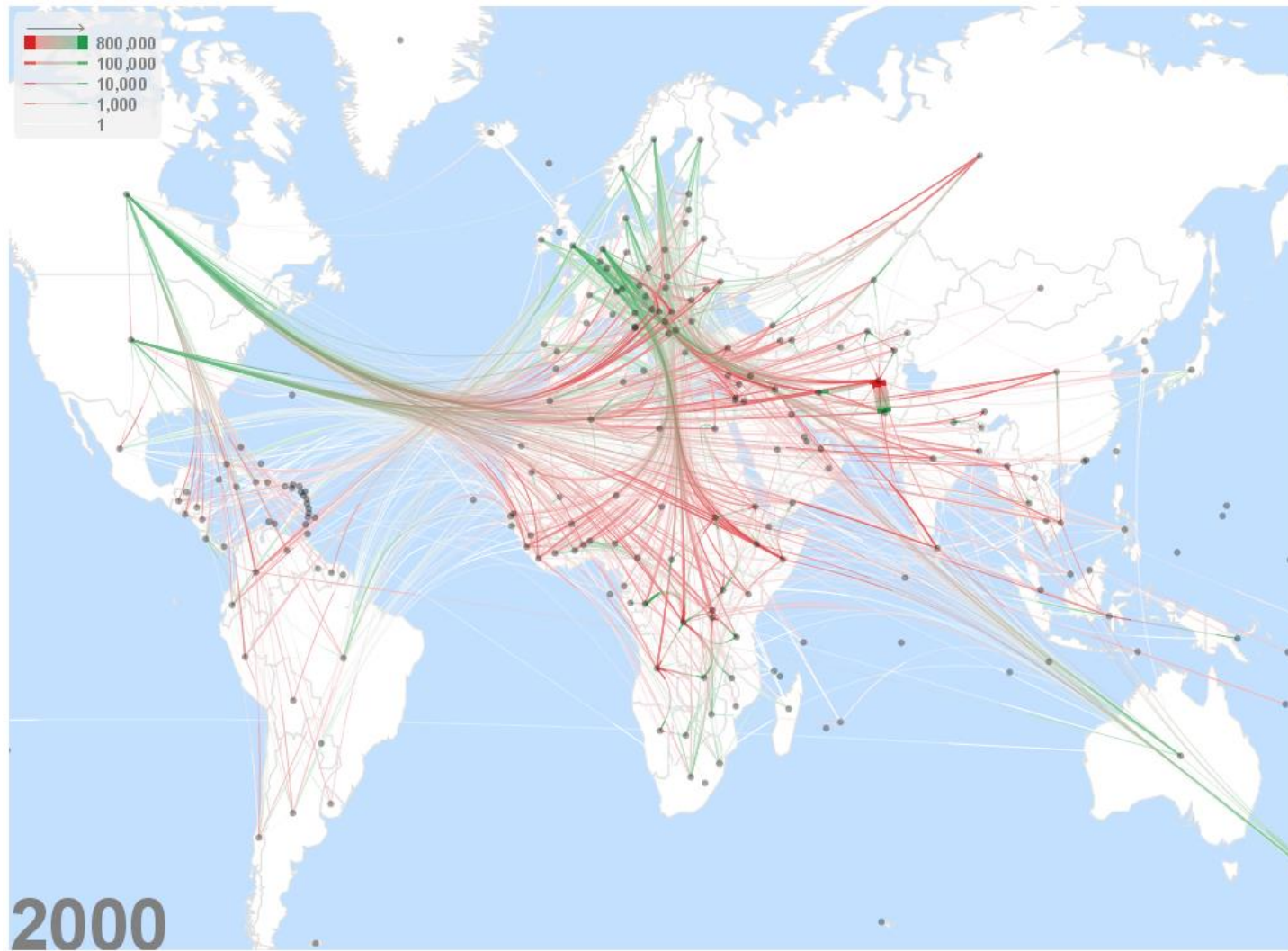


Software

- V-analytics
- Flowmap
- QGIS (Flowmap python plugin)
- ArcGIS—Network Analyst
- Flow Mapper
- Java scripts
- Jflowmap



jflowmap

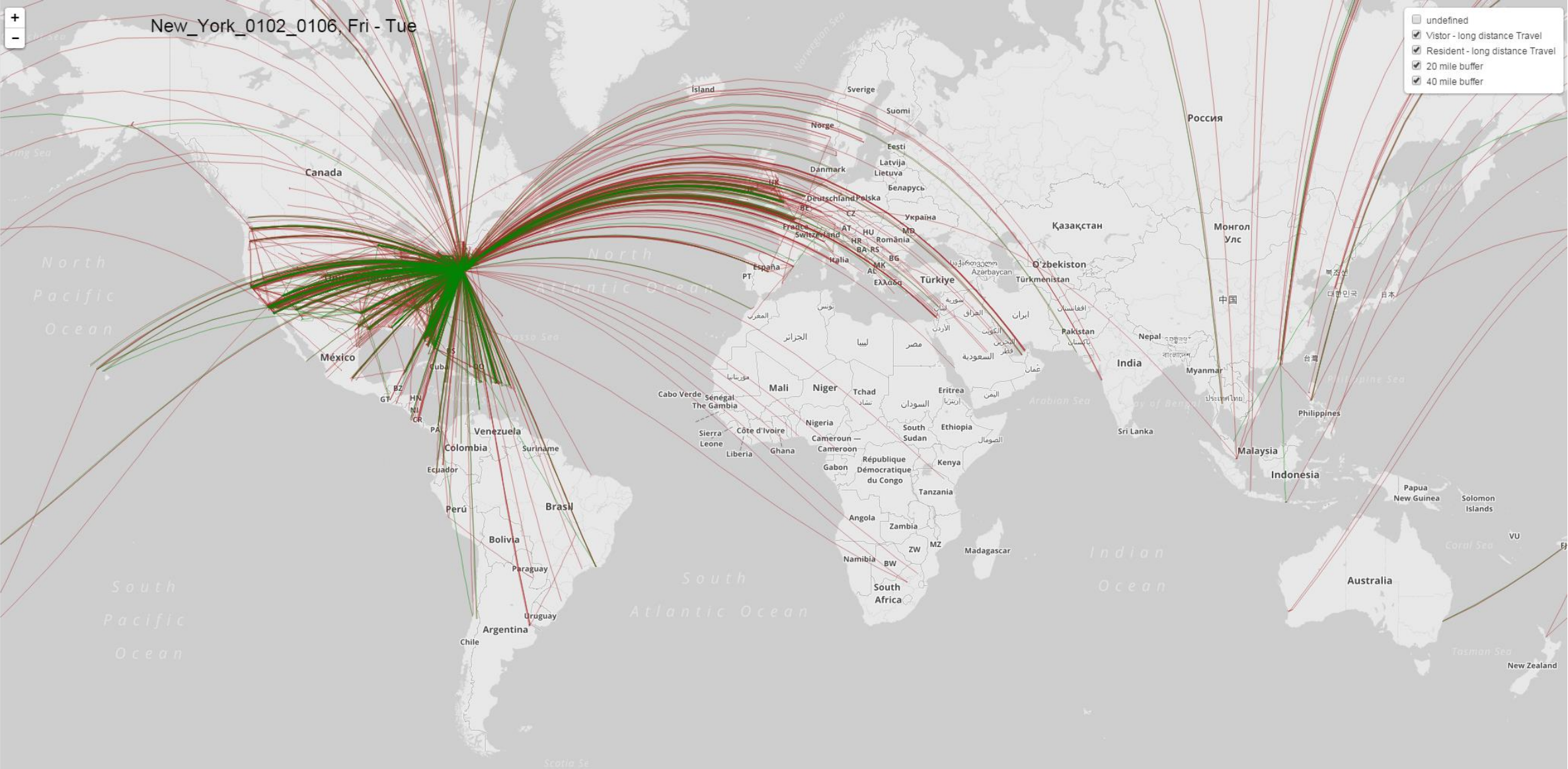


Great circle flow lines

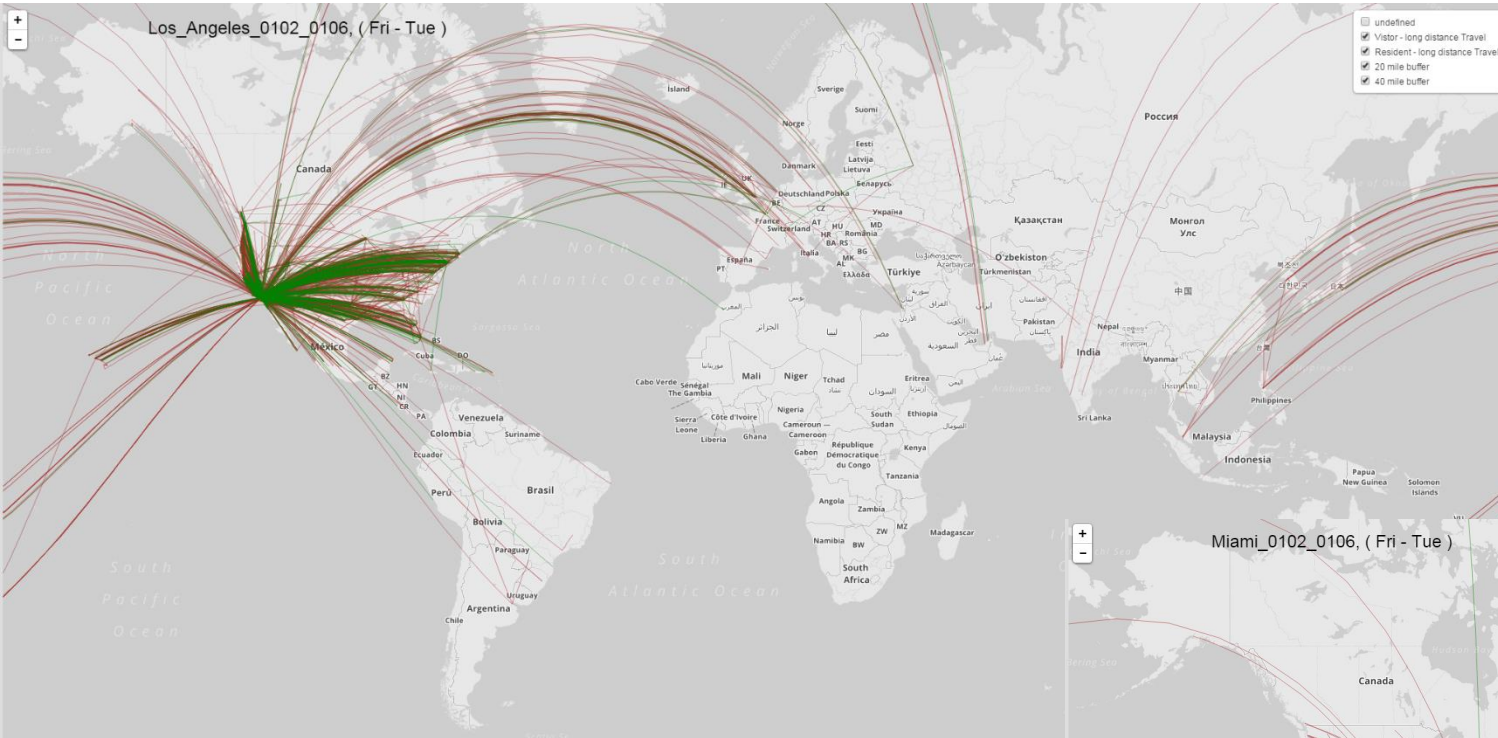


Great circle routes in twitter: Leaflet

(Han, S.Y., Tsou, M-H and Clarke K.C. (2015) Do Global Cities Enable Global Views? Using Twitter to Quantify the Level of Geographical Awareness of U. S. Cities. *PLoS ONE* 10(7): e0132464. doi:10.1371/journal.pone.0132464)



Tweets in LA vs. Miami



Animation of flows

<http://vision.sdsu.edu/su42/Figure3d>



Spiral tree method

2536

IEEE TRANSACTIONS ON VISUALIZATION AND COMPUTER GRAPHICS, VOL. 17, NO. 12, DECEMBER 2011

Flow Map Layout via Spiral Trees

Kevin Verbeek, Kevin Buchin, and Bettina Speckmann

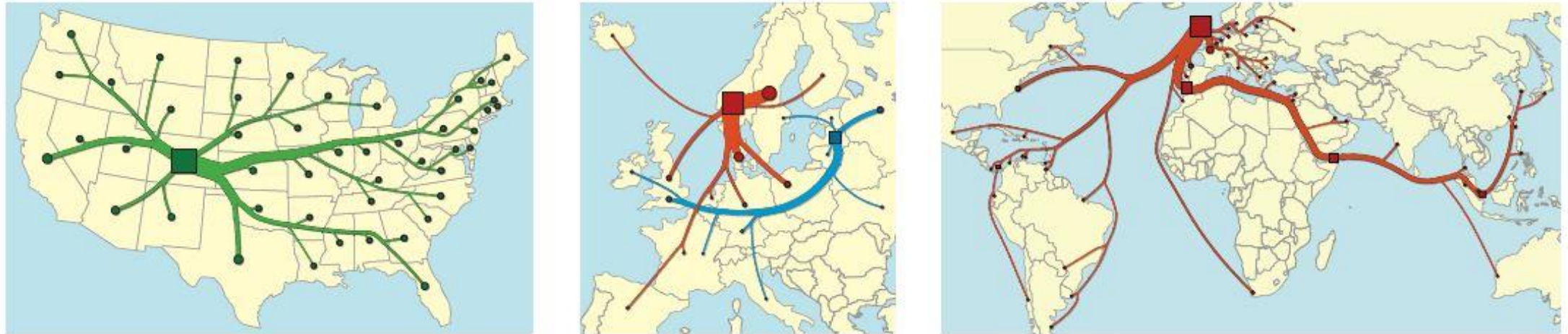


Fig. 1. Flow maps: Migration from Colorado, migration from Norway and Latvia, whisky exports from Scotland.

More spiral trees

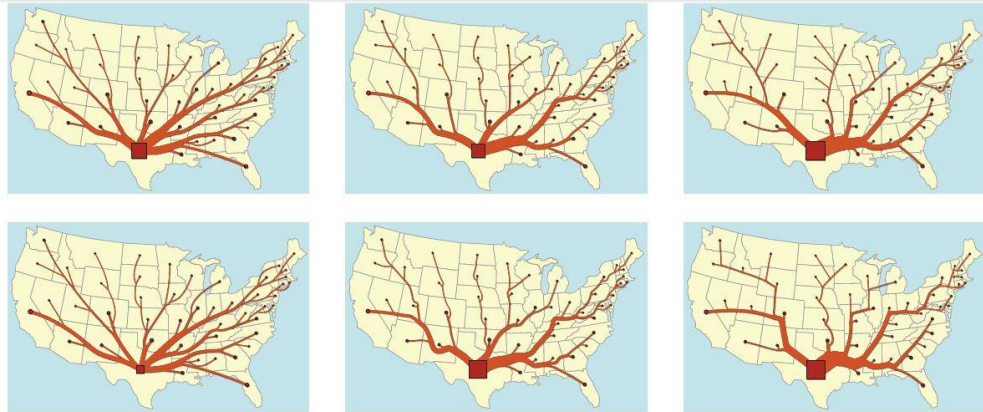


Fig. 11. Various results of our algorithm. We use $\alpha = 15^\circ$ (left), $\alpha = 25^\circ$ (middle), and $\alpha = 35^\circ$ (right). The top figures use standard parameters. For the bottom figures, we increased buffer size B by a factor of 1.5 (left), set $c_S = 0$ (middle), and set $c_{str} = 0$ (right).

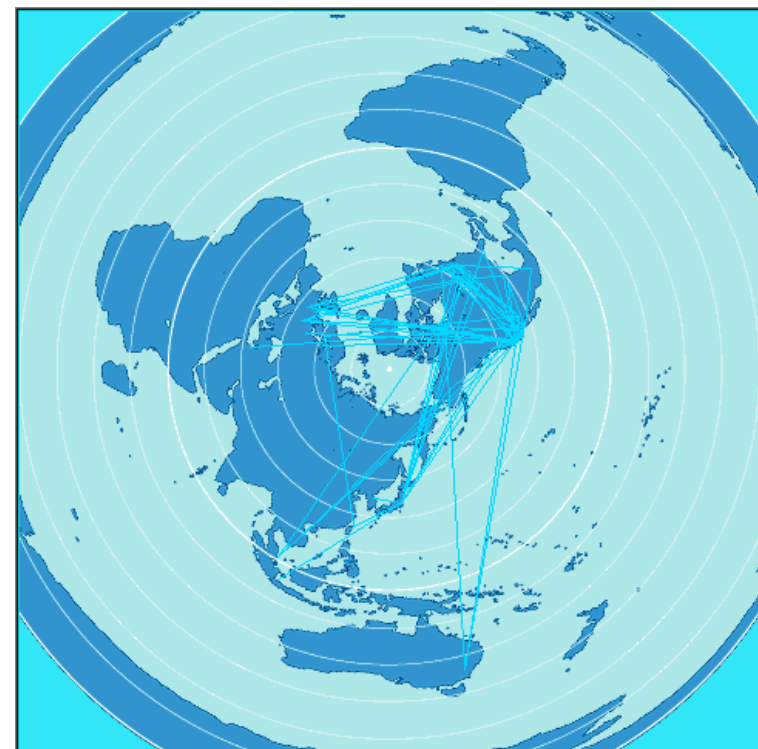
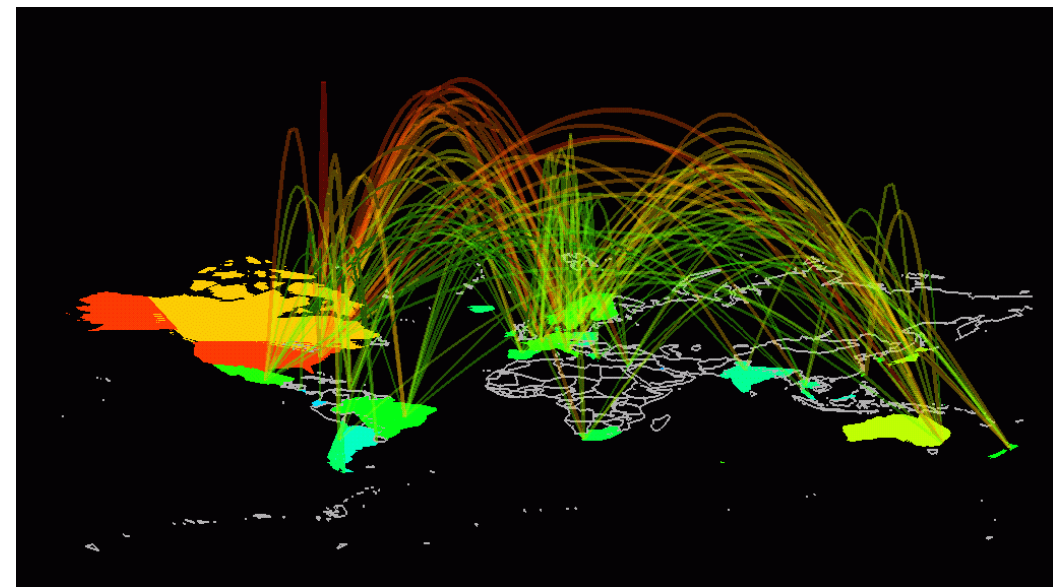


Fig. 2. Maps illustrating migration from California 1995–2000. Top: flow maps, Tolber [1, 22] (arrows of varying width), Phan *et al.* [16] (edge-bundling with crossings), and our output. Bottom: subgraphs of the bundled complete migration graph, Cui *et al.* [5] and Holten & van Wijk [11].



Fig. 9. Flow map illustrating migration from Texas 1995–2000 after computing the spiral tree (left), subdividing and thickening the edges (middle), and finally minimizing the cost function (right).

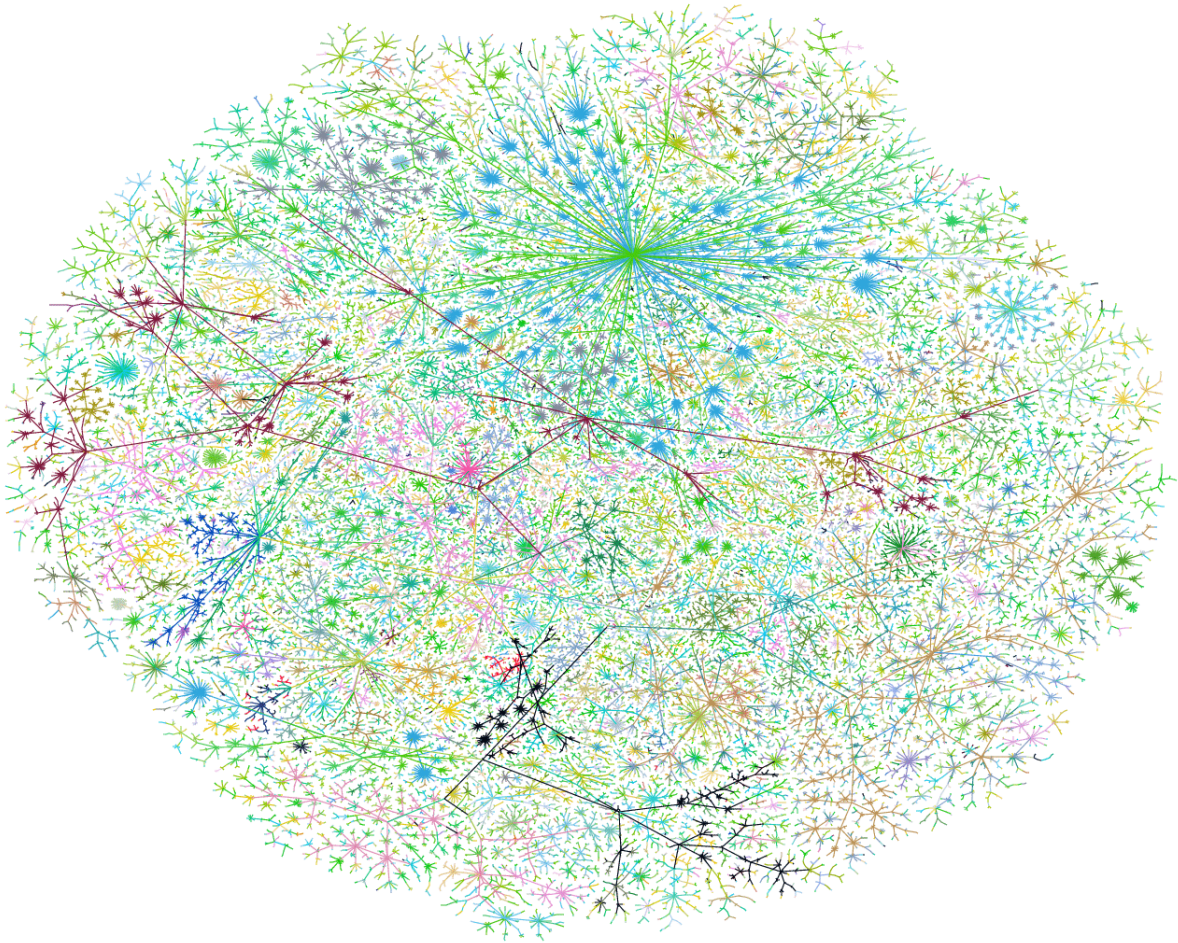
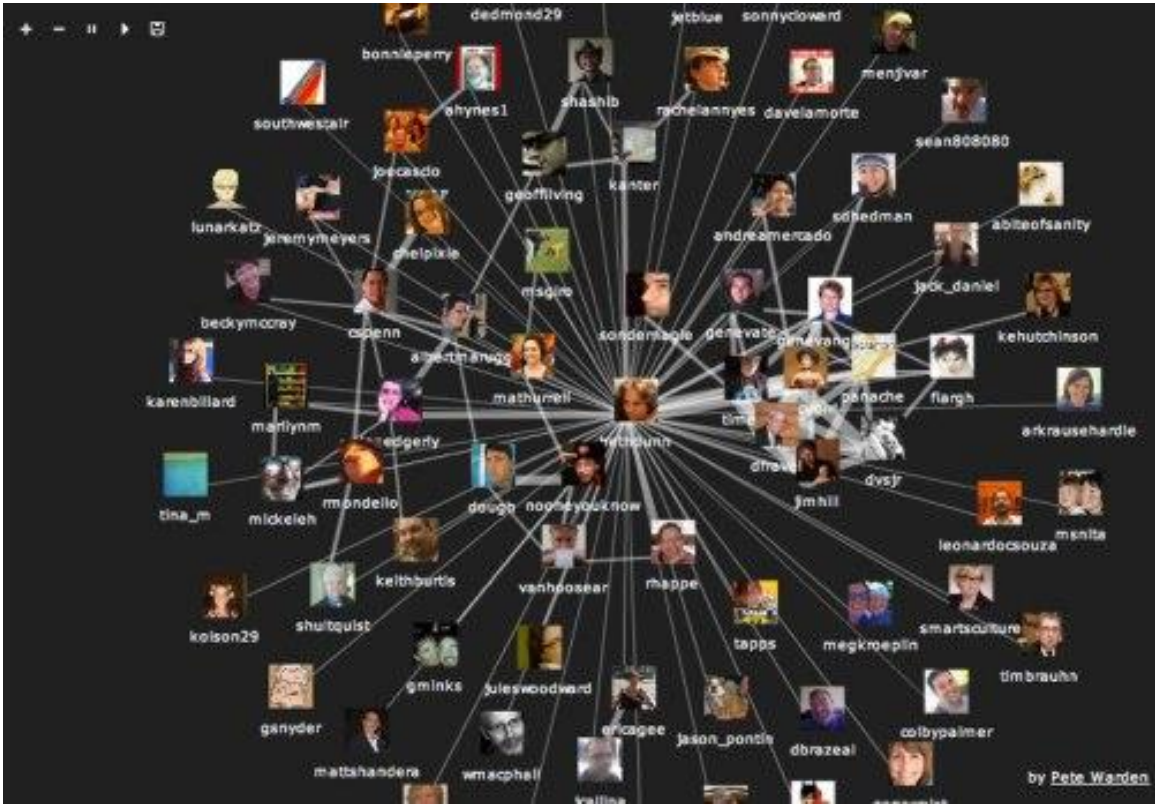
More great circles



Great circle mapper <http://www.gcmap.com>



Abstract networks



Summary

- Point data: dots, pictures/glyphs, point symbols, proportional symbols
- Point pairs: link mapping, flow mapping, trajectories
- Classic symbolism: lines, arrows
- Possible to convey complex linkage information
- Also possible to make a mess—simplicity
- Some software, some open source
- Various new web-based flow mapping methods now possible
- Abstract links also mappable--networks