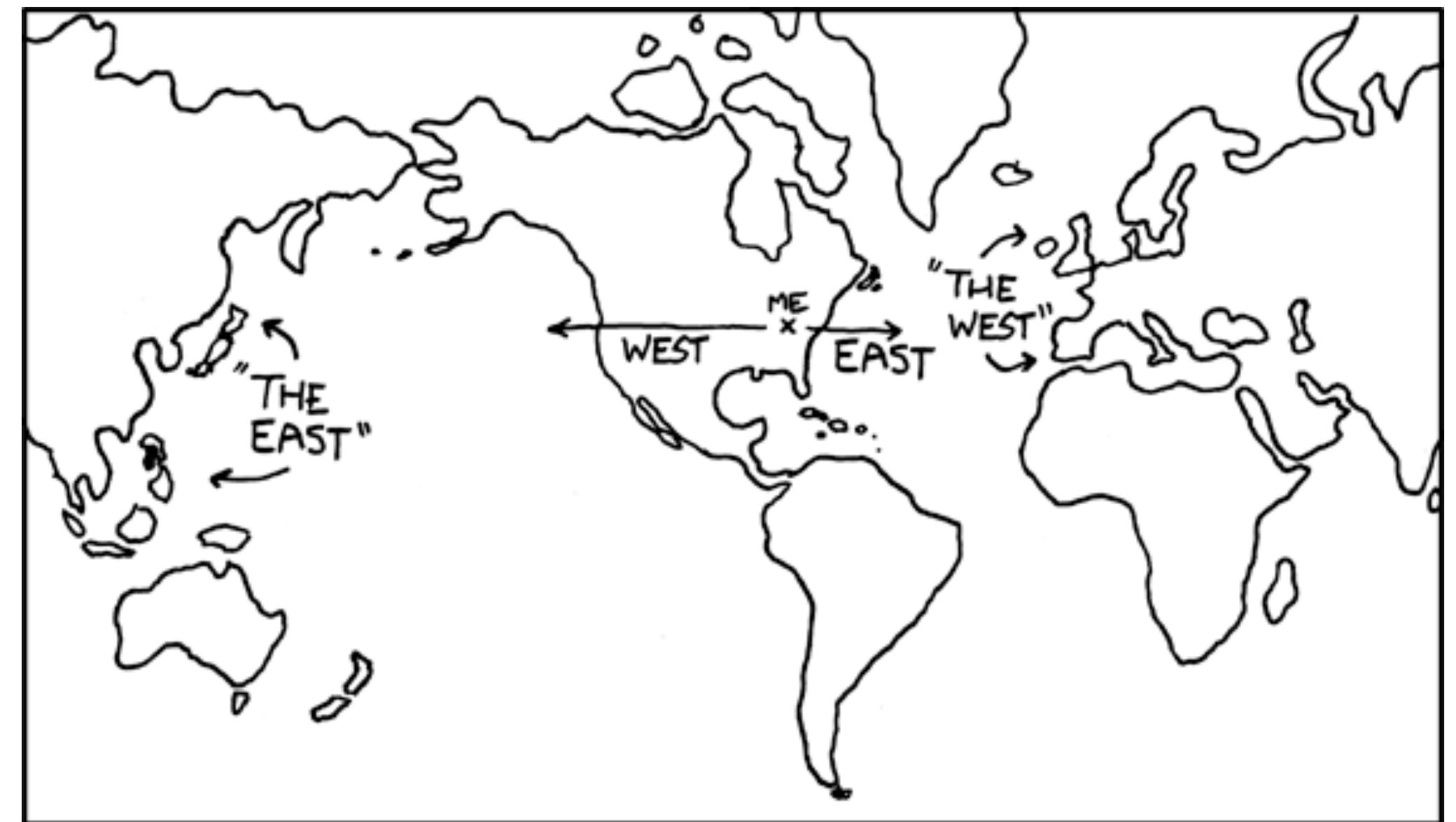


CS-5630 / CS-6630 Visualization

Maps

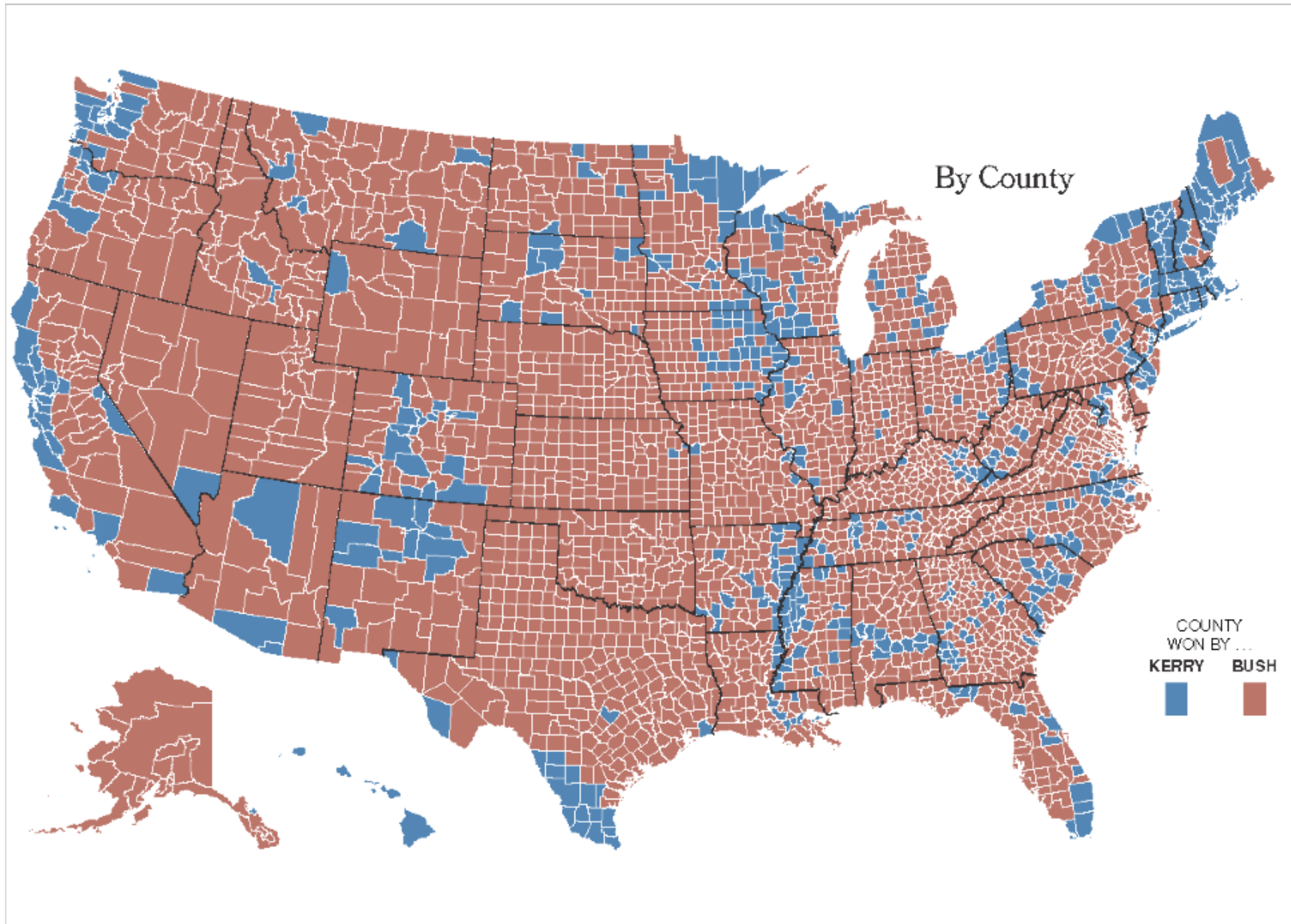
Alexander Lex
alex@sci.utah.edu



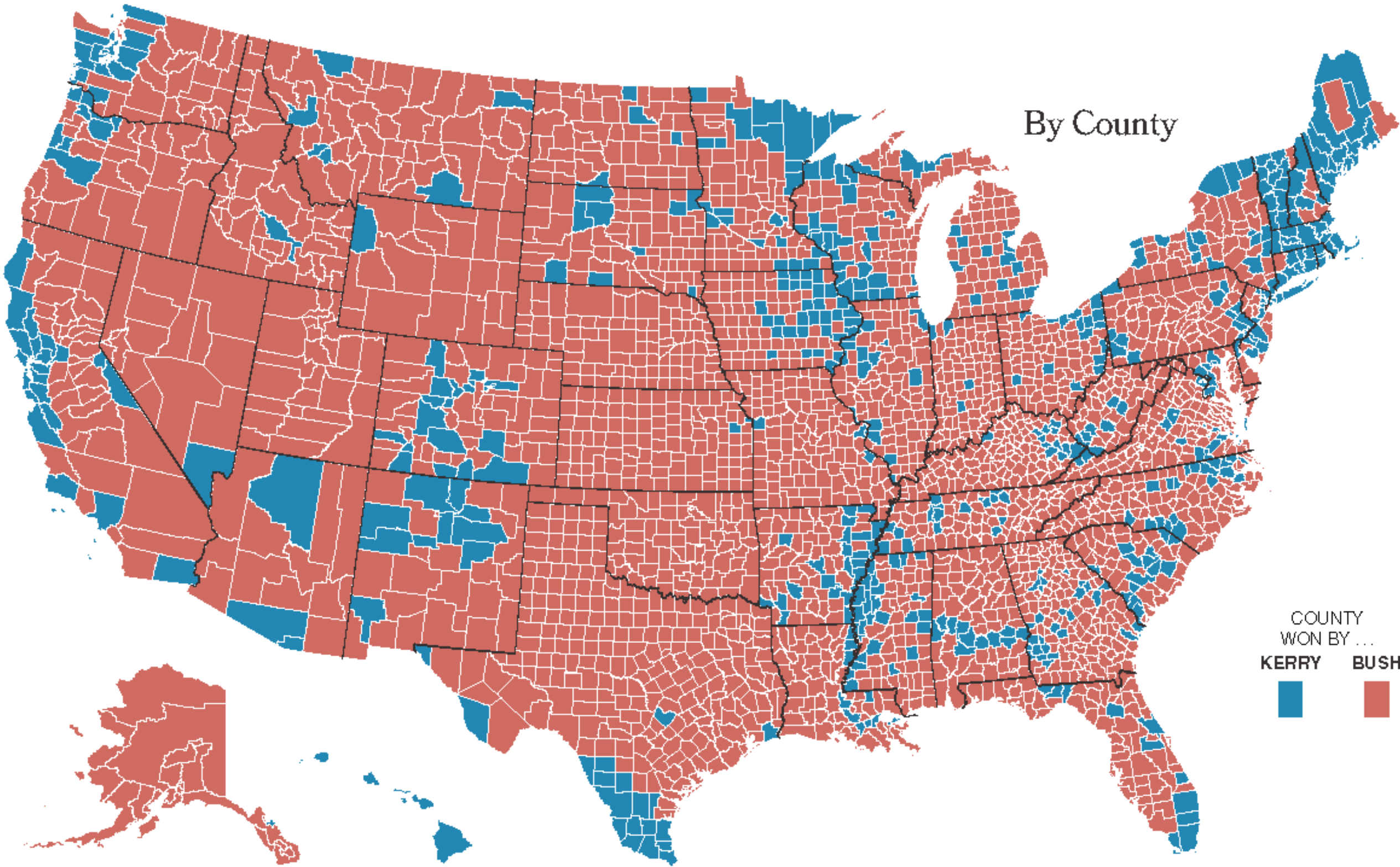
THIS ALWAYS BUGGED ME.

[xkcd]

Two Problematic Maps



Kerry vs. Bush, 2004

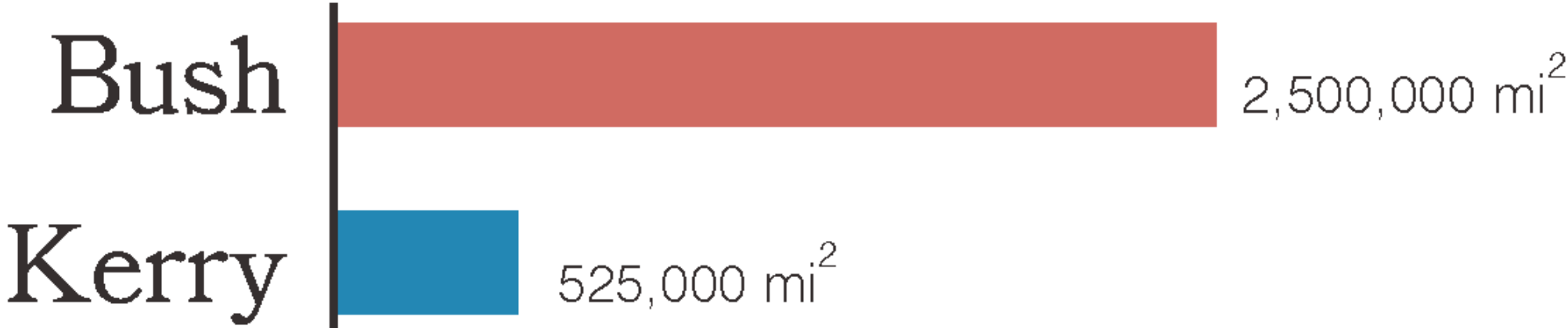


Challenge: Magnitude of Effect vs Perceived Effect

2004 Popular Vote



Amount of red and blue shown on map



Principles

Special type of Spatial Data

Use maps when spatial relationships are paramount

Map Tasks:

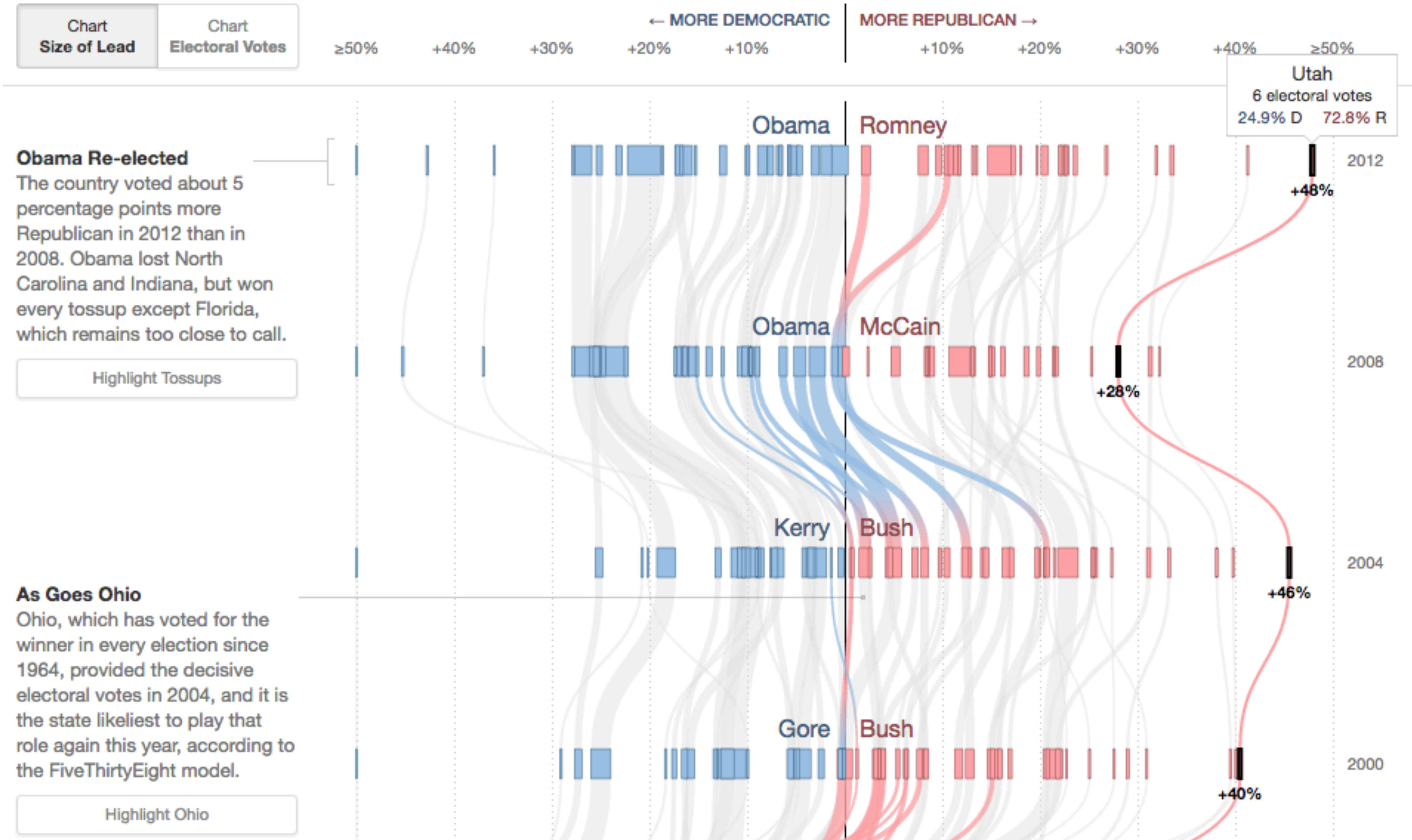
- Find Location / Feature (county, country, city, street)

- Find Route

- Identify attribute associated with location (elevation, land/water, GDP)

- Compare attributes between Locations/Features

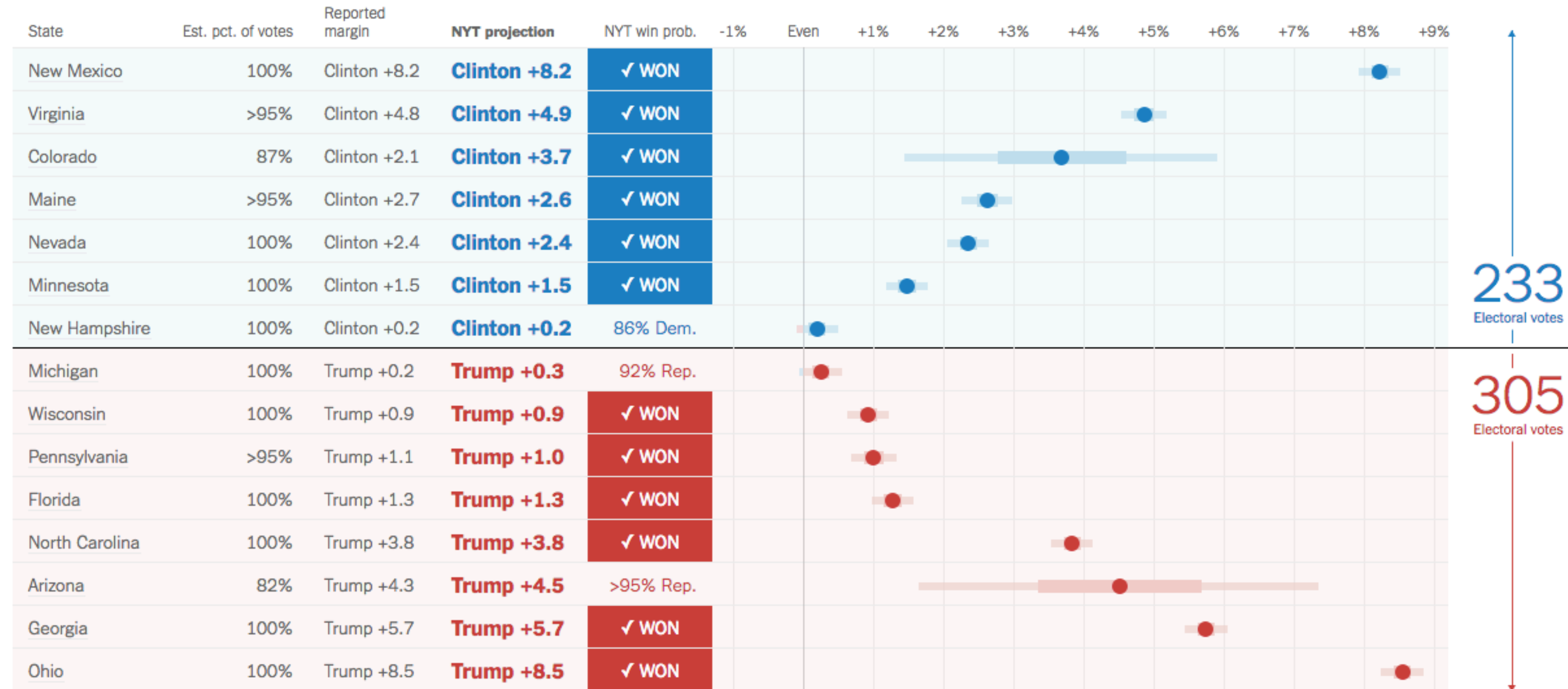
Do we really need a map?



Do we really need a map?

It's hard to do more complex things with maps

Is the spatial context paramount?



Map Projections

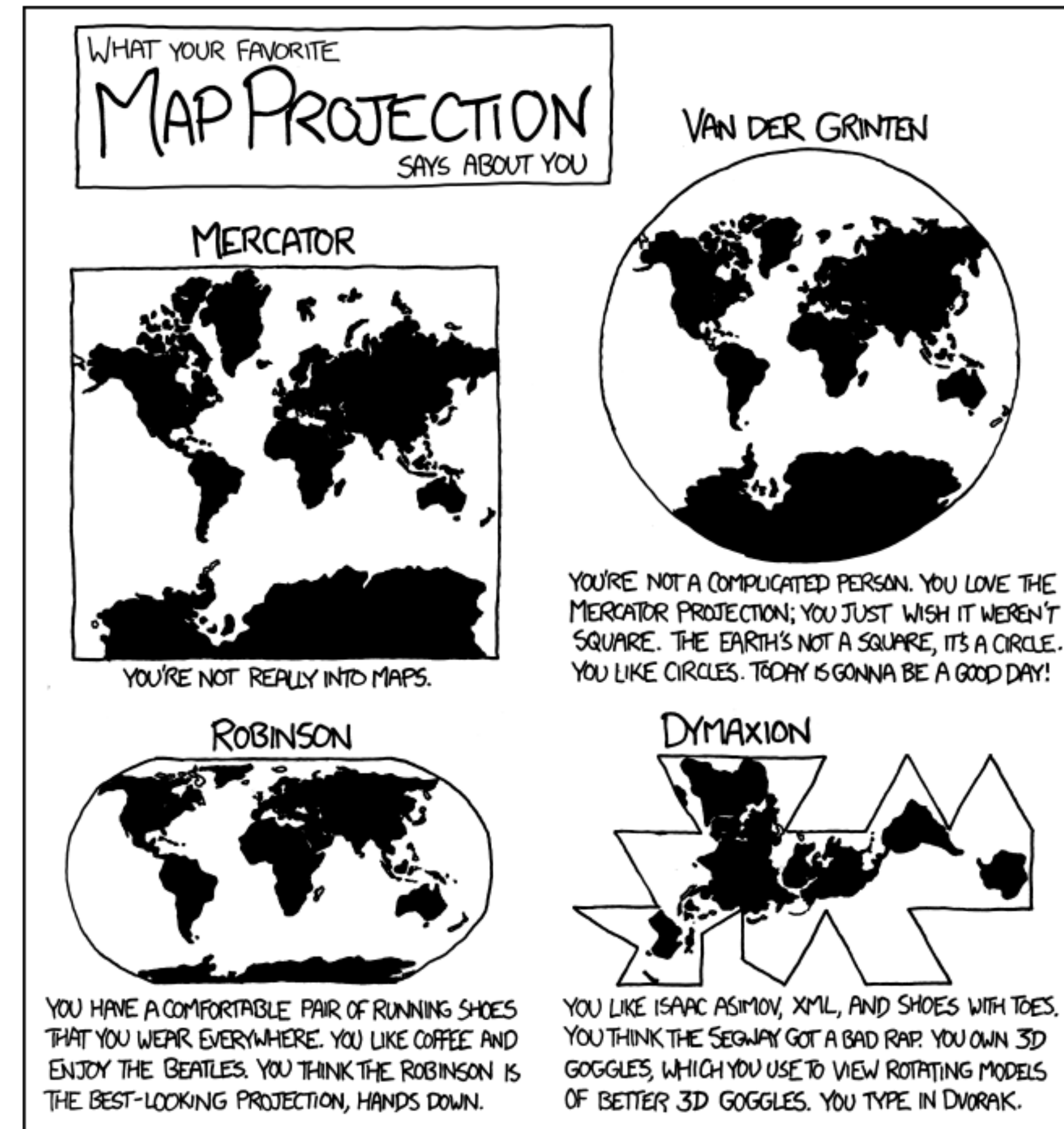
Why projections?

Earth is a (flattened) Sphere

Need to project or “unfold” the hull of the sphere to fit onto paper/ screens

Relevant attributes:

Area, Shape, Direction, Bearing, Distance, Scale



Simple Solution: Use Globe



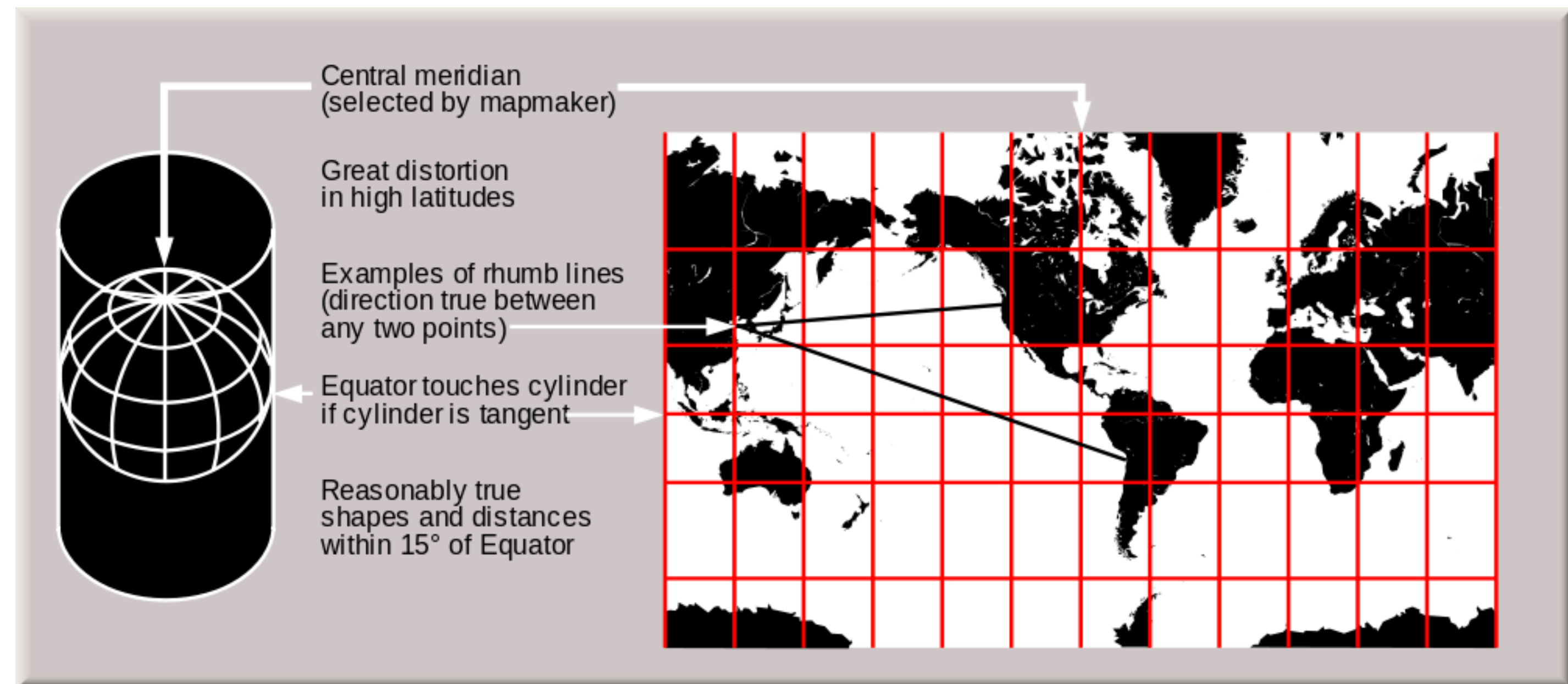
Mercator Projection

Gerardus Mercator, 1569

Projection onto a cylinder wrapped around the globe
conformal map projection; that is, angles are preserved.

Lines of constant bearing
are straight lines.

Constant bearing means
constant compass heading -
developed for sailors

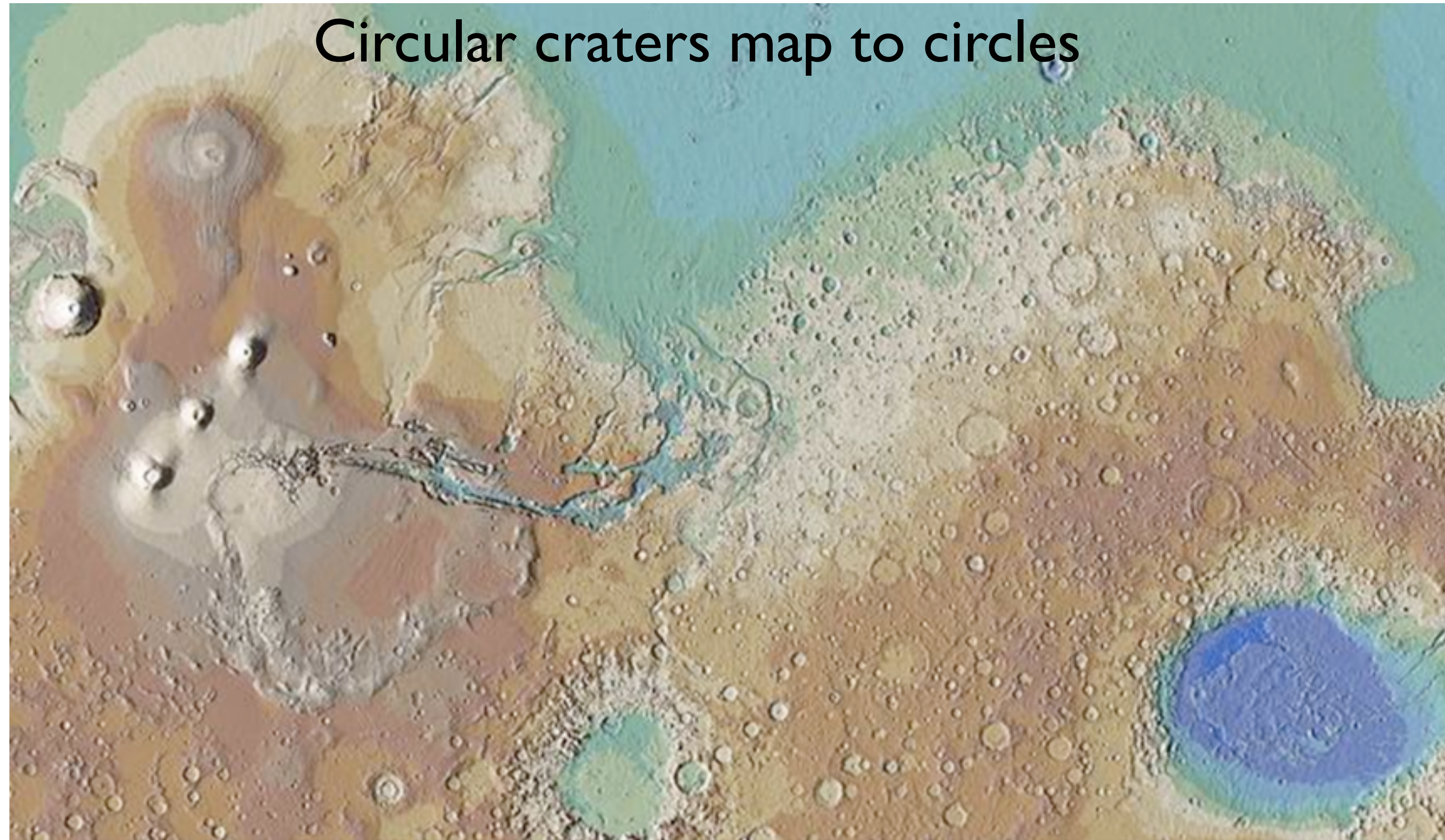


Mercator Projection



D3 / M.
Bostock

Mercator Projection of Mars



Why Mercator is Problematic

Traditional map, used to teach geography

Massive distortion of area distant from equator

“unfair to the Global South, making places that are mostly trees, snow, and better-off white people look huge, and the places where most of the world’s population lives look puny”

Mercator Projection

Mercator works really great if you're, say, Ferdinand Magellan looking for a compass bearing that will take you around Cape Horn, because all of the latitude and longitude lines and angles in between lay out nice and straight on the map like we experience them in real life. It also works well if you're Google and you want a map image that you can neatly slice up into little squares that your server sends to a customer's browser. North is always up, your hometown doesn't look squished or slanted when you zoom in to it, and everybody's happy.

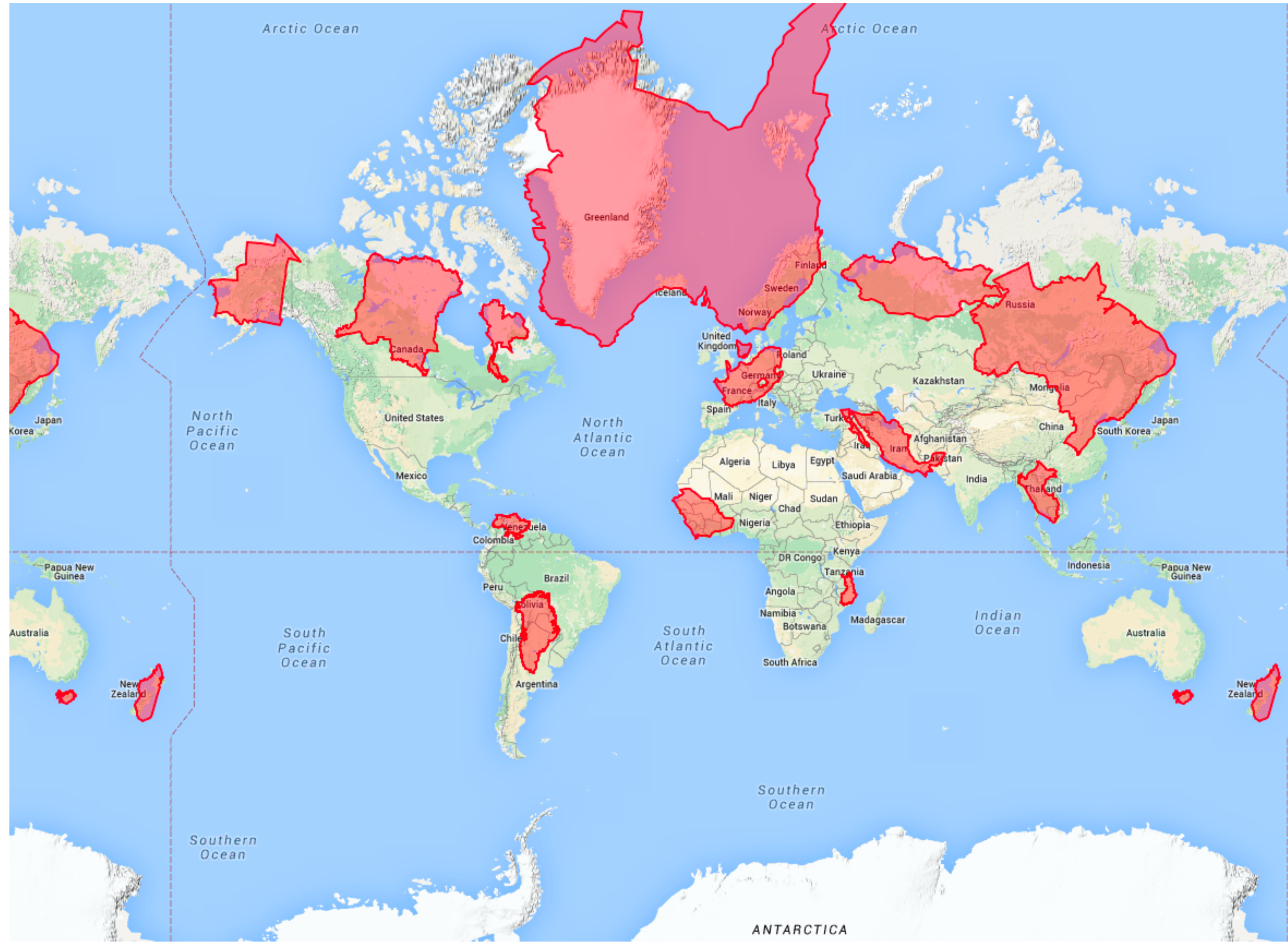


World Mercator projection with true country size added



@neilrkaye

Mercator Puzzle



Caveat

Only a problem for large areas

Continents

World

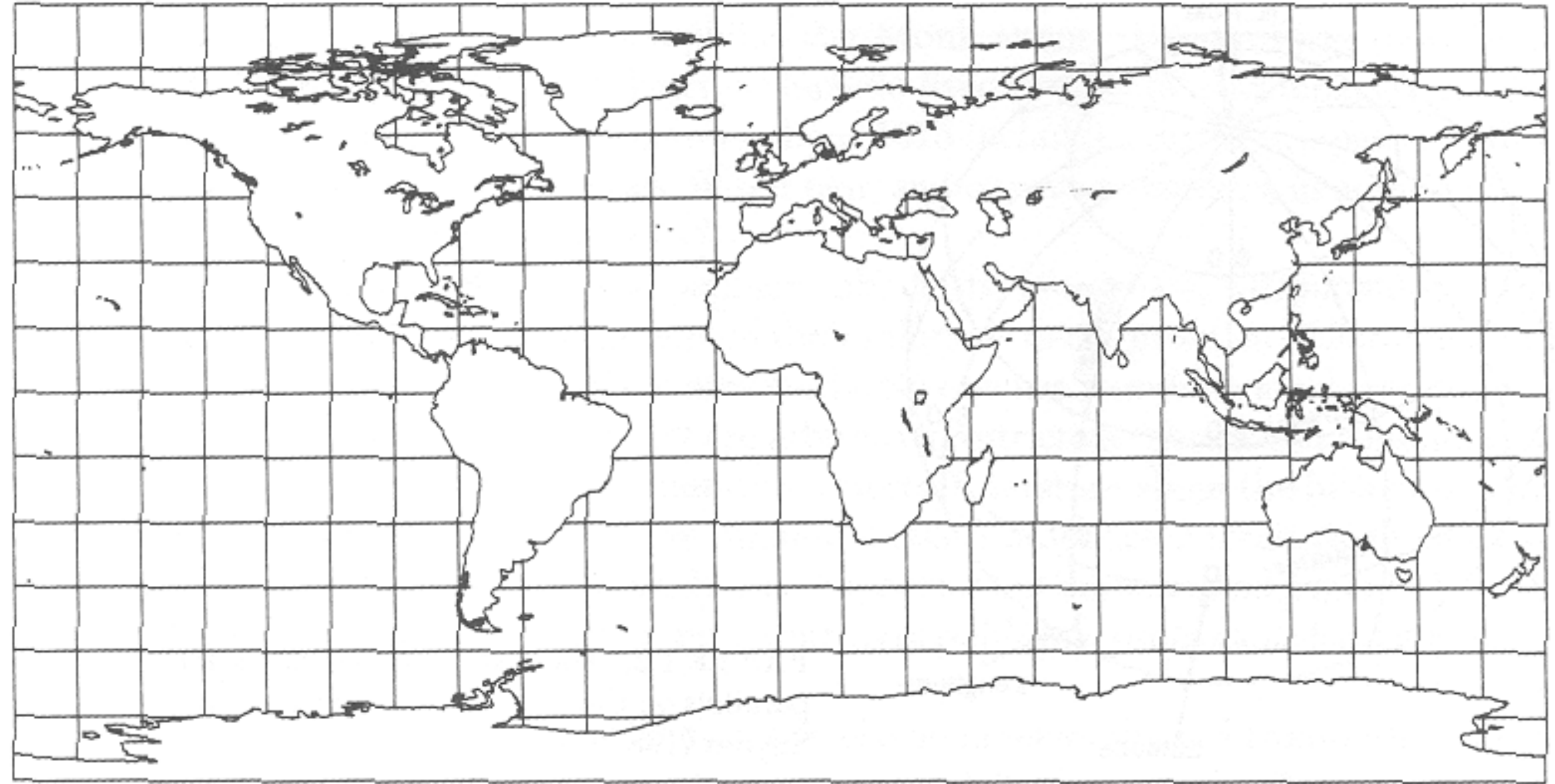
Distortion is not a problem on a state/city level

Latitude-Longitude

Does not preserve angles

Does not preserve areas

Things are squashed
at the top and bottom



Snyder, "Flattening the Earth"
Based on slide from Hanrahan

Azimuthal Projections

Radical Cartography

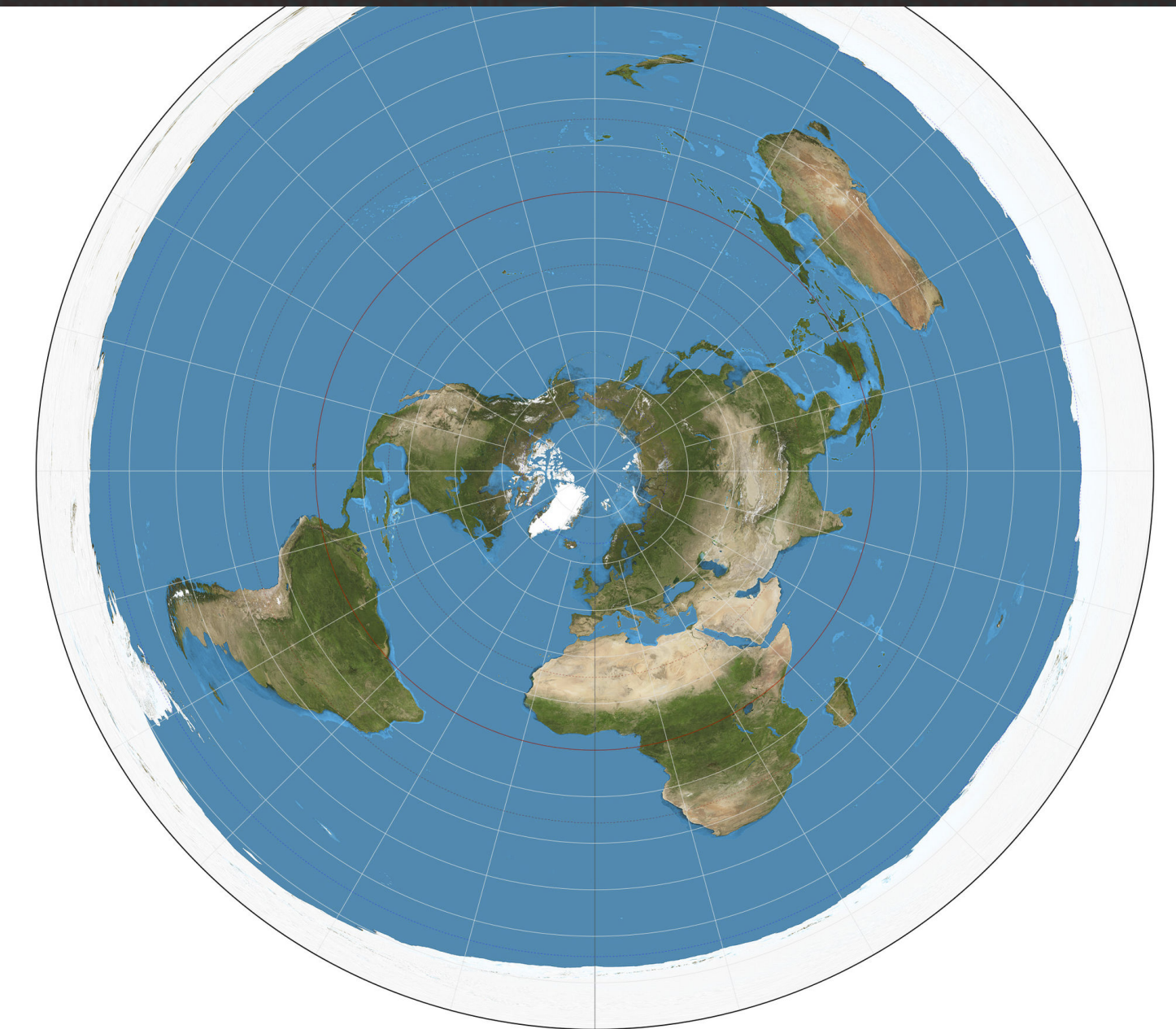
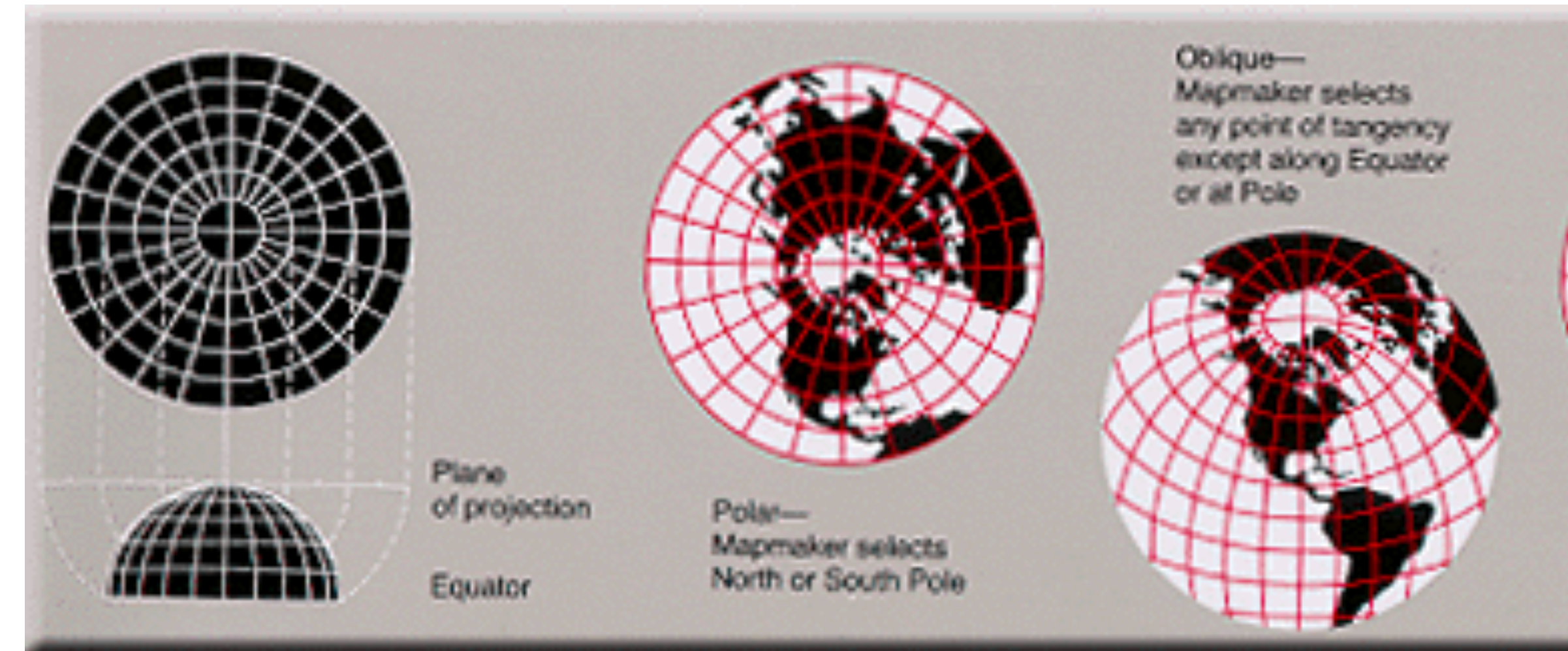
Projection onto a plane tangent to the Earth

angles are correct around the center point

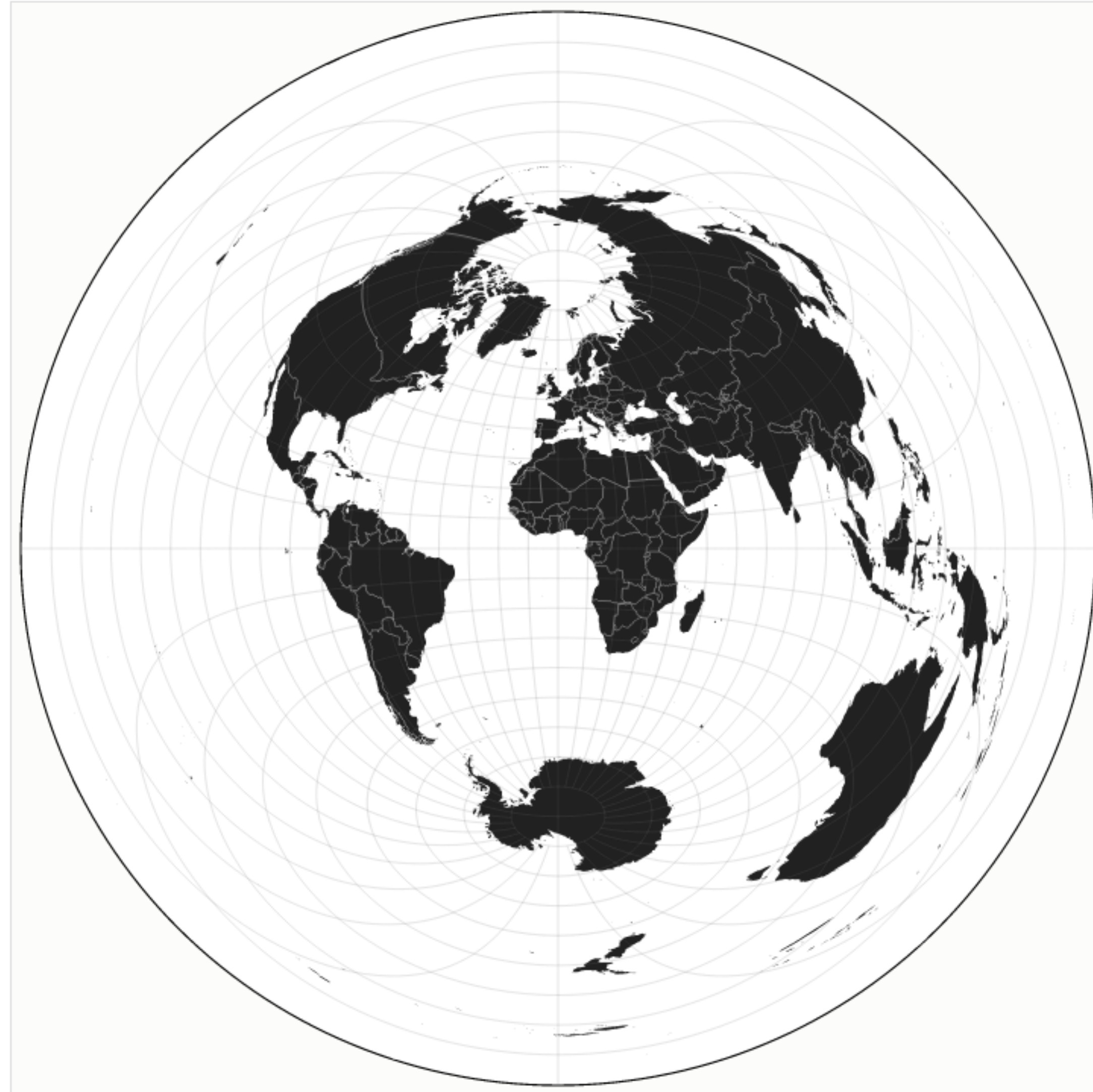
Great circles through the center are straight lines

Radii correspond to true distances

Sometimes see this in airline magazine centered around the hub



Azimuthal Equidistant



D3 / M.
Bostock



ON ASSIGNMENT

In Reykjavik and Rio, New Delhi and Khartoum, Calcutta, Capetown, Sydney and Suva, as you read this—in every troubled news-corner of the globe—are one or more of the 300 special correspondents who work for TIME, LIFE and FORTUNE. In the past twelve months alone, their assignments carried them the 1,505,000 miles you see plotted on this map.

Some of these people are reporters, some photographers, some researchers. Two were on an American cruiser off Hawaii when the Japs blasted Pearl Harbor. Two more were in Manila on December 7, now are interned by the Japanese in ancient Santo Tomas University. Still another managed to make Corregidor from the mainland, filed almost daily dispatches all through January and February, last reported that he had finally reached Australia in safety, joined three other TIME - LIFE - FORTUNE correspondents there. Two of these men had made the trip to Australia in a troop ship with an AEF convoy; the third had arrived on a grimy freighter, he its only passenger, high explosives its only cargo.

But this is not a map of adventure. Rather it is an attempt to visualize a hard-working, world-wide research organization—the News and Picture Bureaus of TIME, LIFE and FORTUNE.

The real significance of the map grows out of the hundreds of fact-finding assignments it represents—the millions of words filed—the stories documented with photos, the weeks and months of observation and analysis it plots.

Eighty thousand of the 1,505,000 miles of travel plotted on the map, for example, were covered by Correspondent Allan Michie. The dispatches he filed from Cairo, Tehran, Simla, Singapore, Batavia and Manila were the basis of news stories in the columns of TIME. Documented with pictures taken by a Picture Bureau photographer in the Middle East, several of his pieces ran in LIFE. Back in New York, he assembled the threads of his experiences and first-hand knowledge on the broad pattern of world strategy into the story of *The Coming Battle for Asia* that appeared in FORTUNE for March.

This same mechanism functions similarly as Walter Graebner, head of the London office, returns to New York to report on the European situation for TIME and LIFE and write the story of *British Politics and the War* for the April FORTUNE—as Sherry Mangan heads back from Buenos Aires via Santiago, Lima and Panama — as correspondents file their dispatches from Ireland, Alaska, India and Bataan . . .

These and three hundred other men like them are a part of the world-wide news and picture organization which is constantly serving your editors, with spot news, with background information, with well-documented research.

TIME—LIFE—FORTUNE

Winkel Tripel Projection

Modified azimuthal map projection

averaged to cylindrical projection

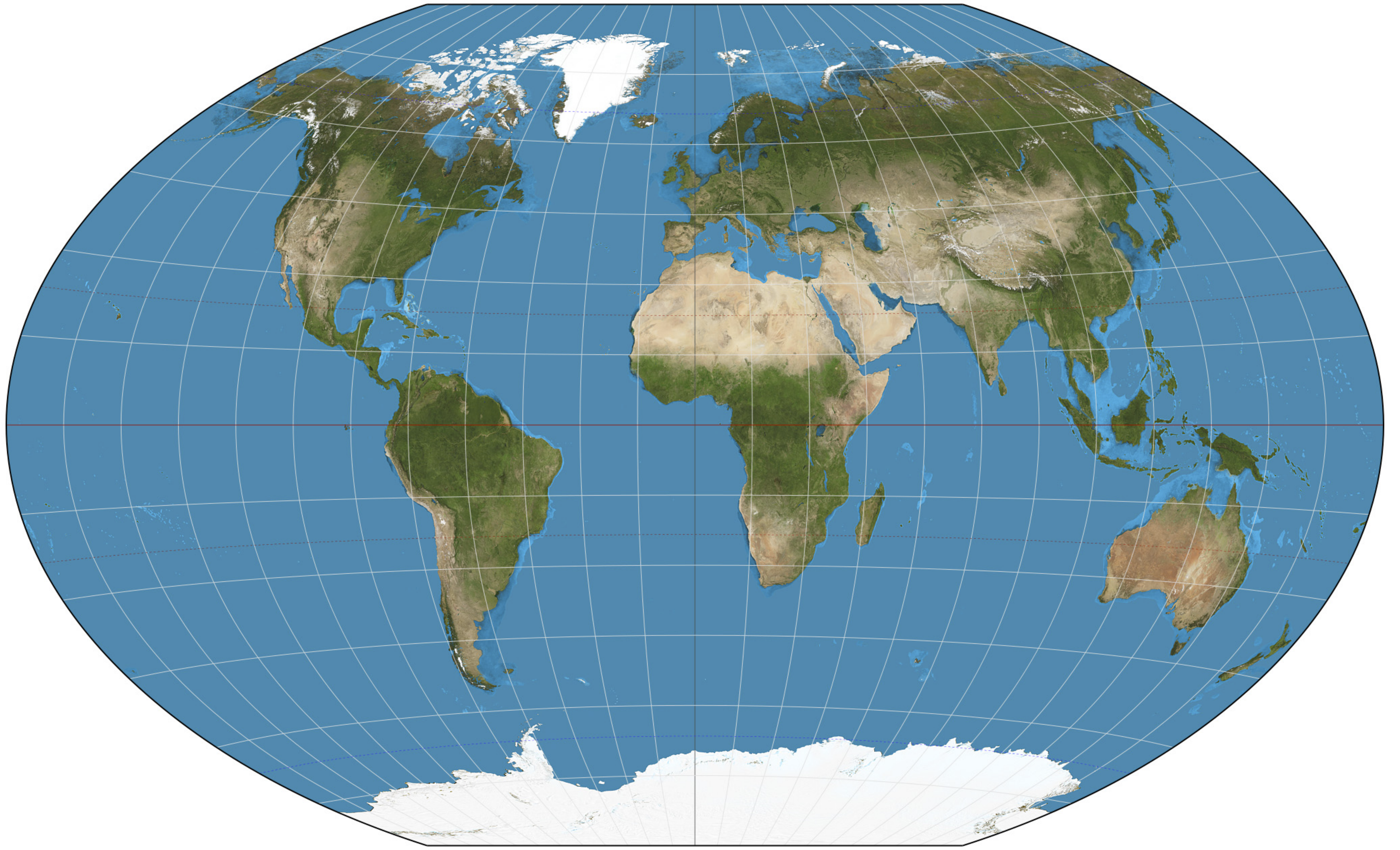
Minimizing three kinds of distortion:

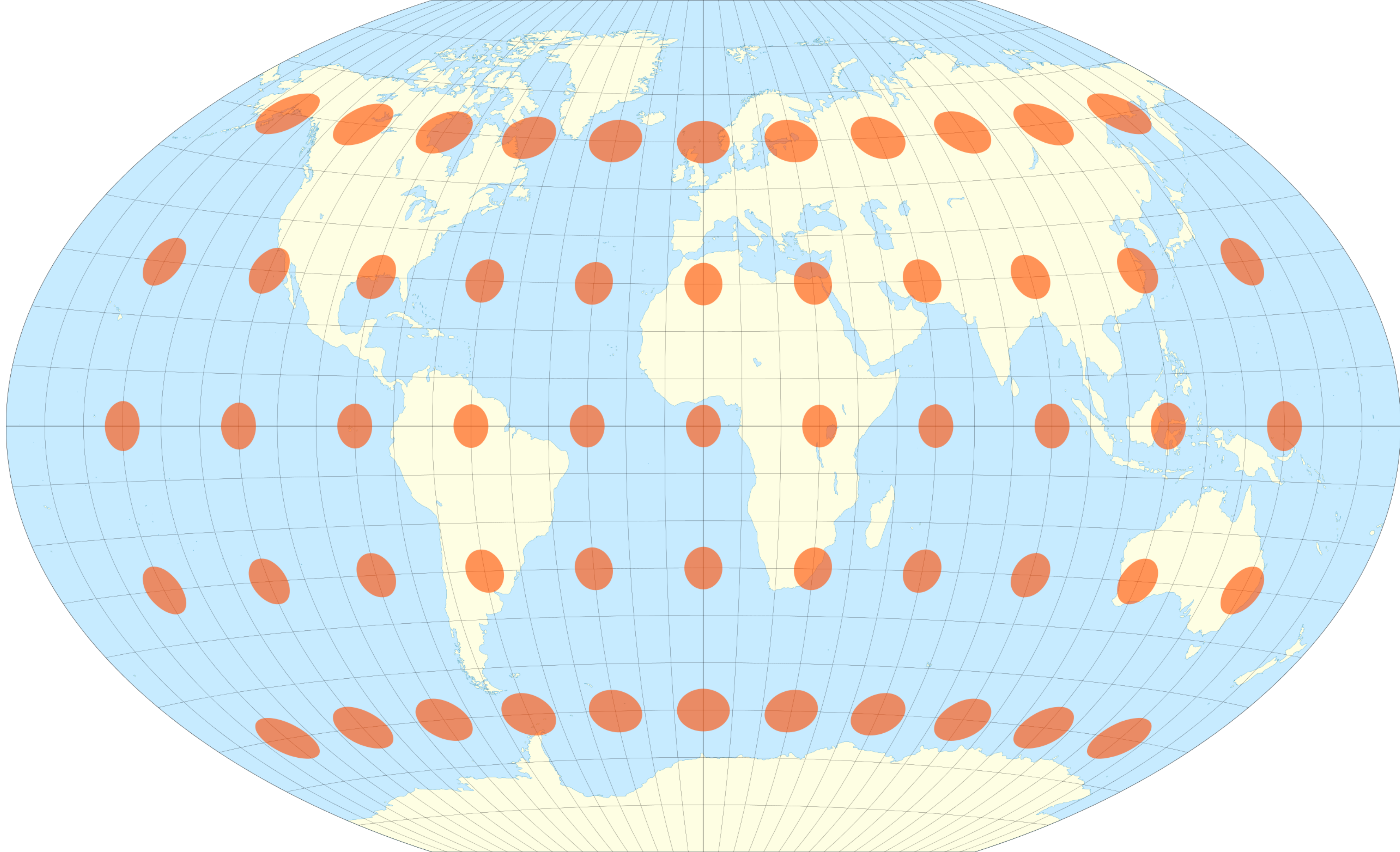
- area

- direction

- distance

Considered good projection for world maps, endorsed by National Geographic Society, used in Textbooks

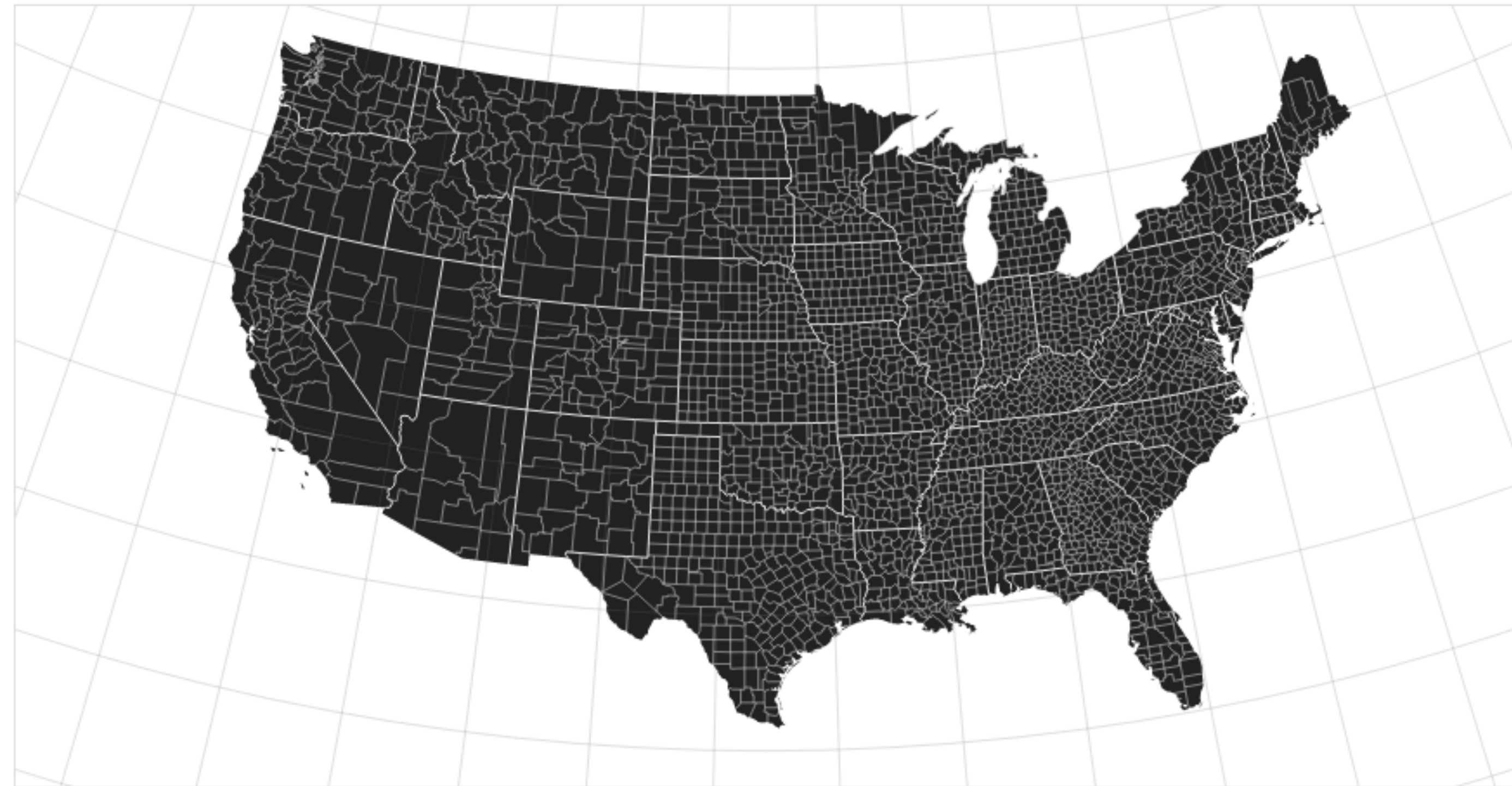




Albers Equal-Area

Shows areas correctly

Distorts distances and shapes

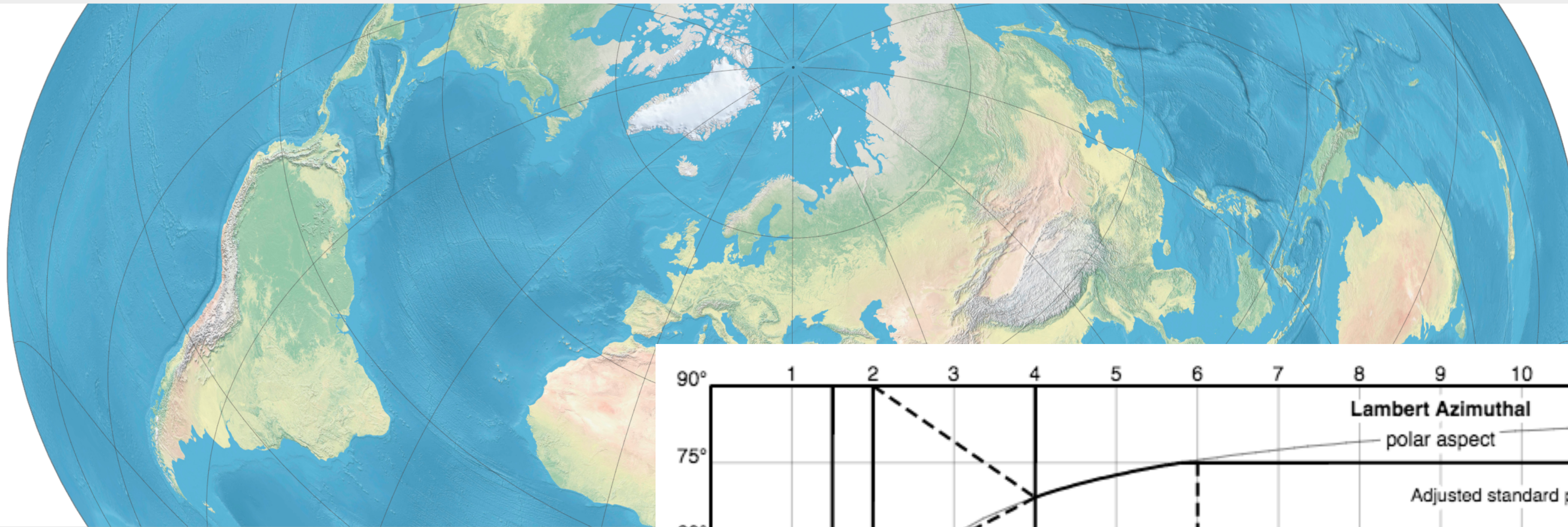


Composite Projections



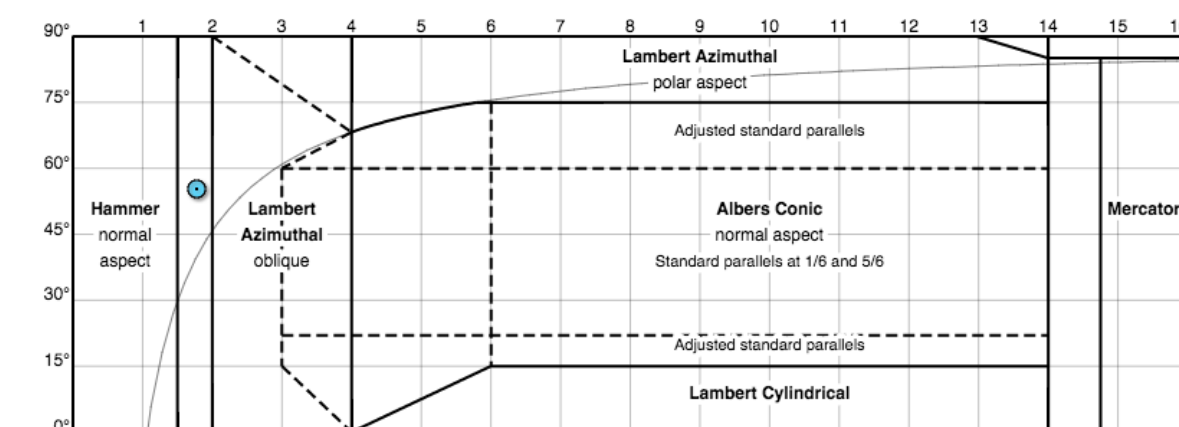
Adaptive Composite Map Projections

A recent version of Firefox or Google Chrome is required to view this interactive map with adaptive composite projections.
More Information | GitHub | Built: January 19, 2015 02:00:24 PM

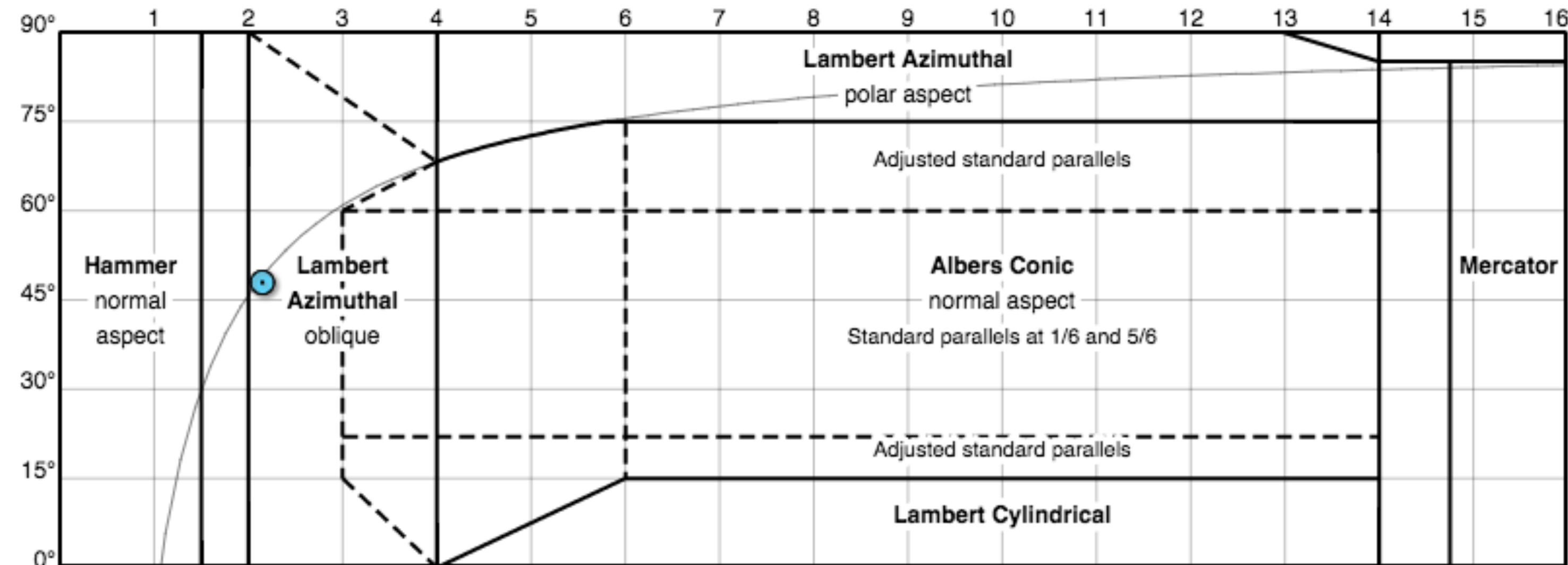


Info Map Projection Diagram Settings Debug About

Horizontal axis: map zoom factor.
Vertical axis: central latitude of map.
Click in the diagram or drag the button to change scale and central latitude.



Bernhard Jenny



<https://www.youtube.com/watch?v=f2vI9tyFC94>

Projections in D3

Many projections included:

<https://github.com/d3/d3-geo/blob/master/README.md#projections>

<https://github.com/d3/d3-geo-projection/>

mbostock / d3 Wat

Geo Projections

Alex Morega edited this page 22 days ago · 120 revisions

[Wiki](#) [API Reference](#) [Geo](#) [Geo Projections](#)

D3 includes several common projections by default, as shown below. Numerous (less-commonly used) projections are available in the [extended geographic projections plugin](#) and the [polyhedral projection plugin](#).

d3.geo.albersUsa 	d3.geo.azimuthalEqualArea 	d3.geo.azimuthalEquidistant
d3.geo.conicEqualArea 	d3.geo.conicConformal 	d3.geo.conicEquidistant
d3.geo.equirectangular 	d3.geo.gnomonic 	d3.geo.mercator
d3.geo.orthographic 	d3.geo.stereographic 	d3.geo.transverseMercator

Extended Geographic Projections

airy 	aitoff 	albers * 	albersUsa *
armadillo 	august 	azimuthalEqualArea * 	azimuthalEquidistant *
baker 	berghaus 	boggs 	bonne
bromley 	chamberlin 	collignon 	conicEqualArea *
conicConformal * 	conicEquidistant * 	craig 	craster
cylindricalEqualArea 	cylindricalStereographic 	eckert1 	eckert2
eckert3 	eckert4 	eckert5 	eckert6
eisenlohr 	equirectangular * 	fahey 	gilbert
gingery 	ginzburg4 	ginzburg5 	ginzburg6

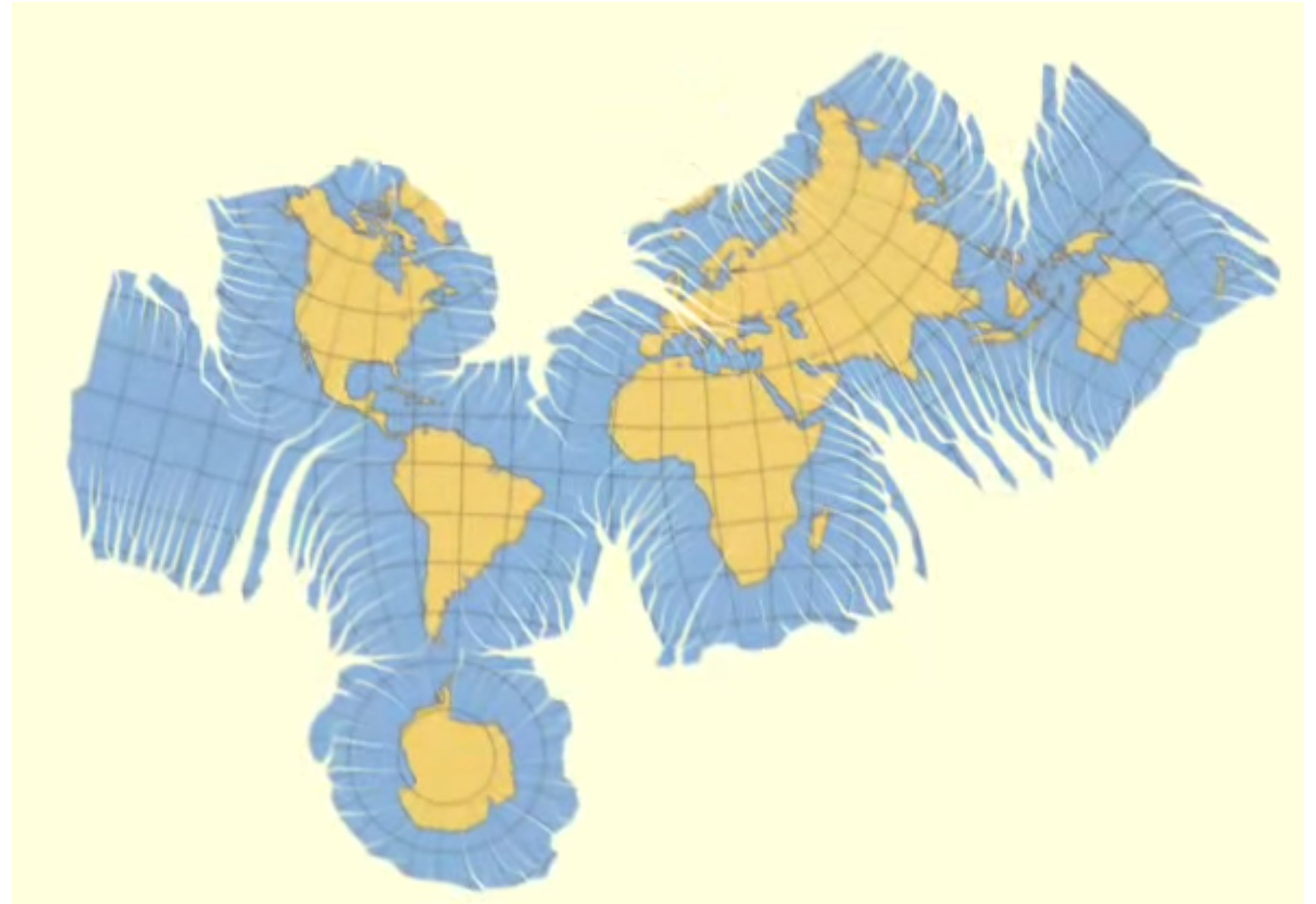
Unfolding The Earth

Idea: use small patches

flatten them out

Jarke van Wijk

<http://www.win.tue.nl/~vanwijk/myriahedral/>

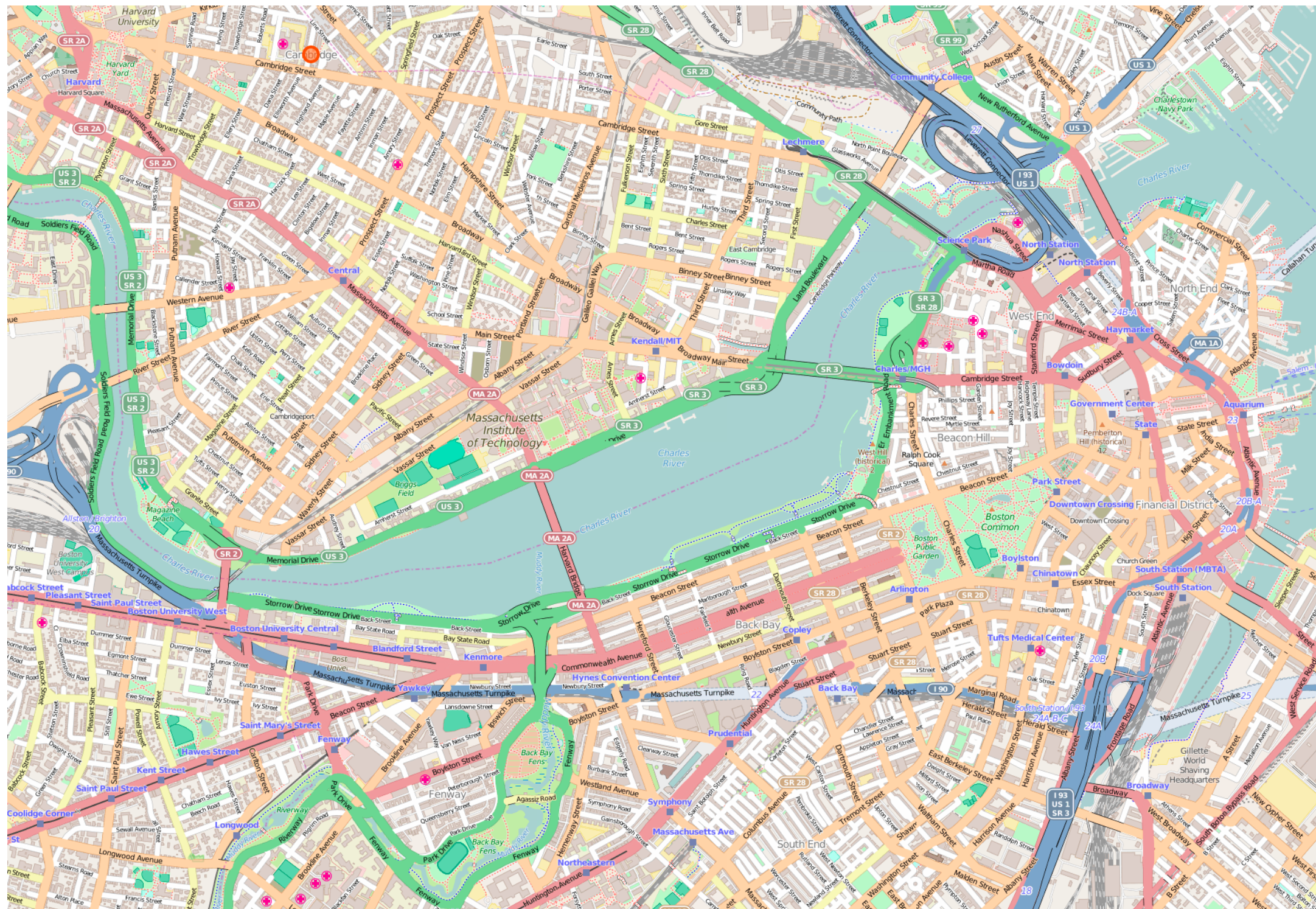


More Info:

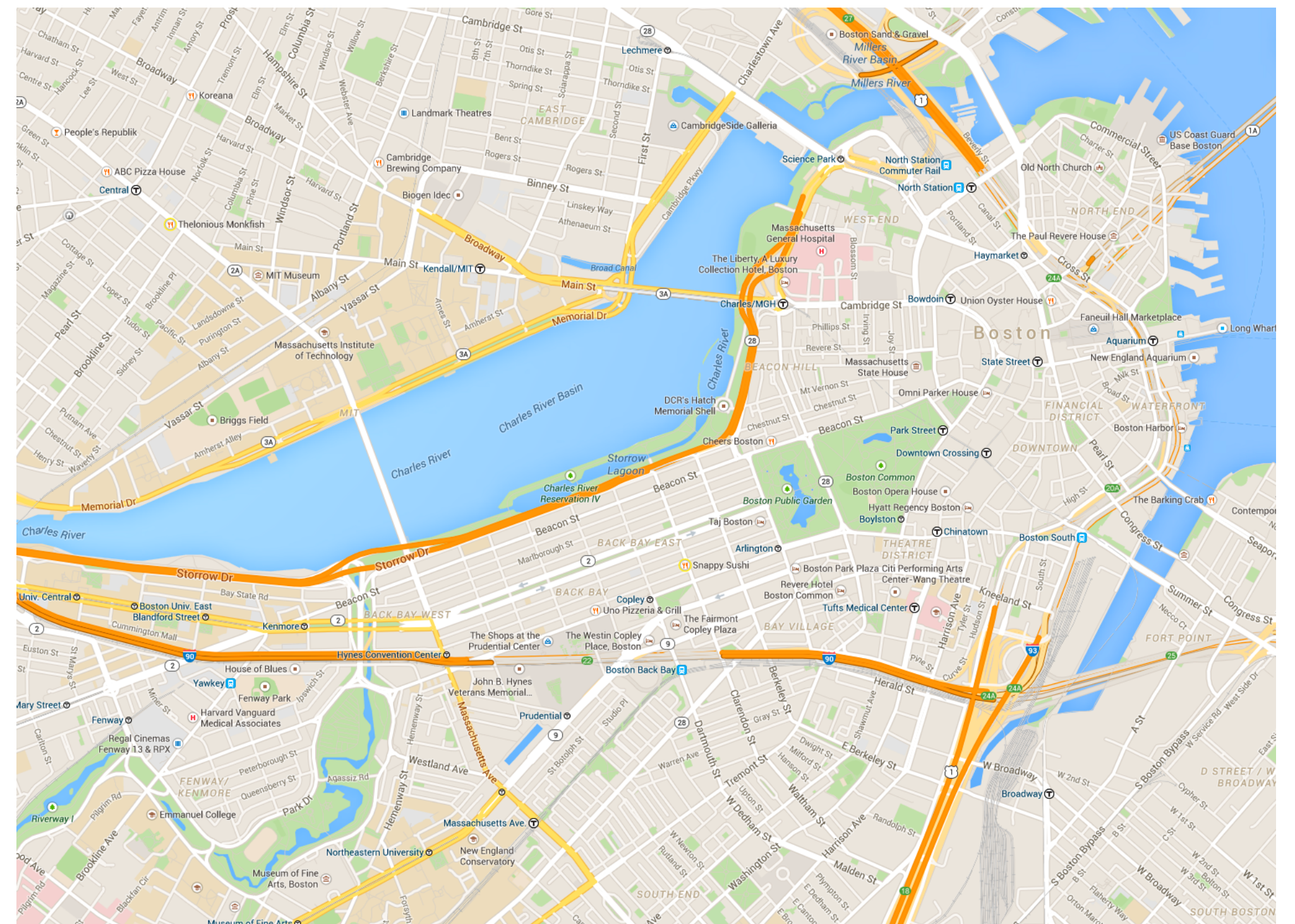
<http://mjfoster83.github.io/projections/>

Map Software / Navigation

Mapping Software



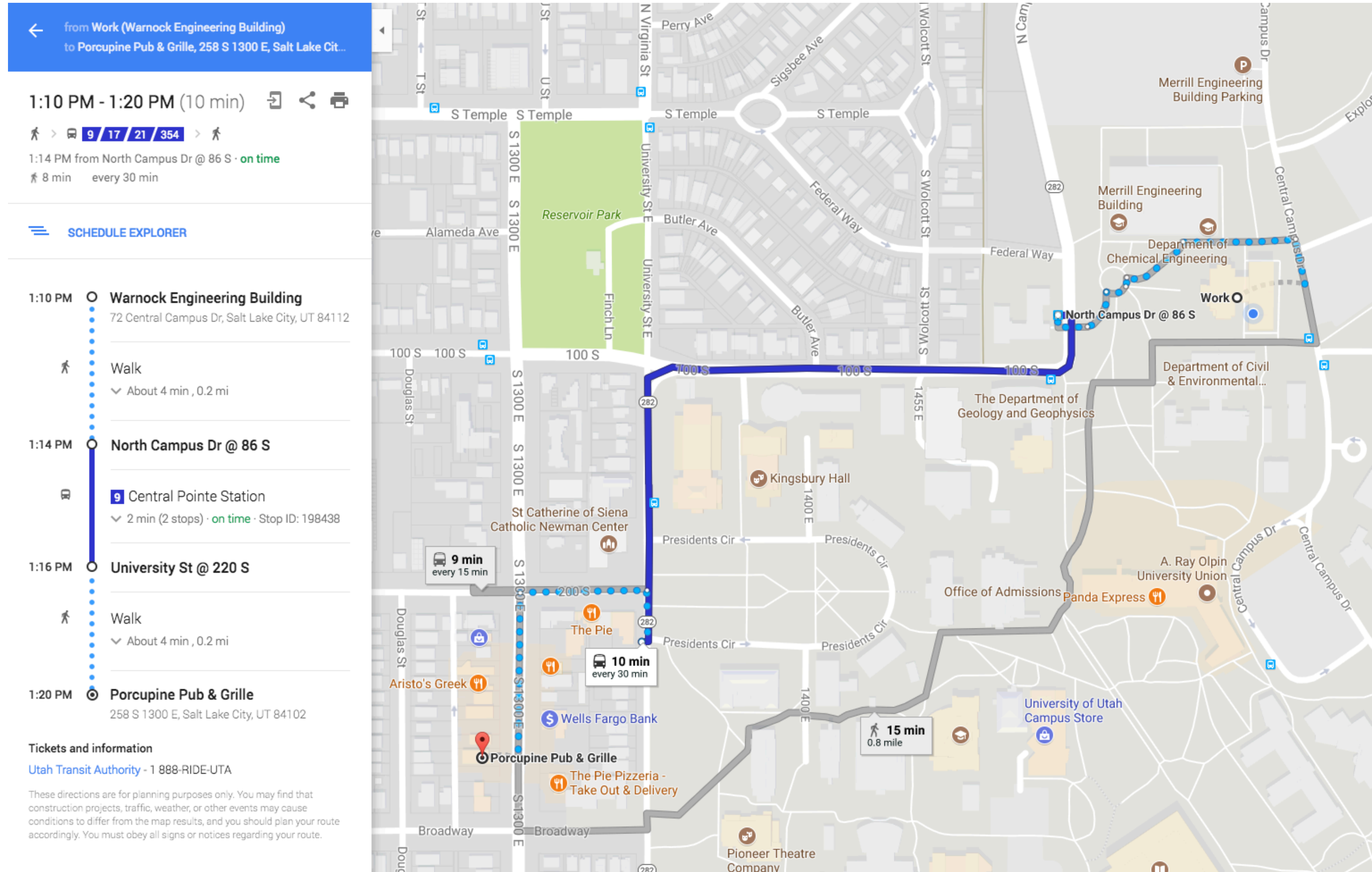
Open StreetMap



Google Maps

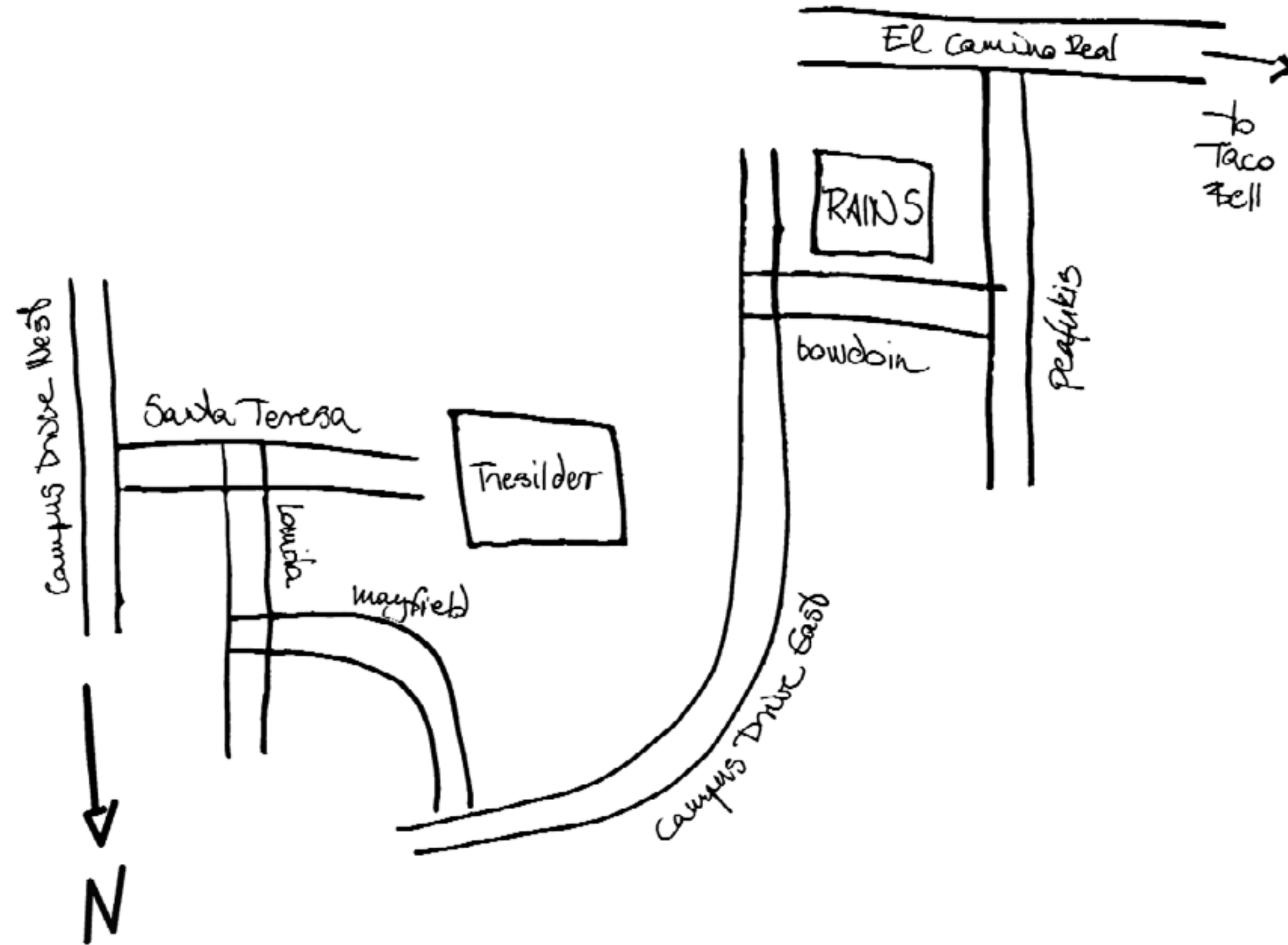
Navigation

Specific



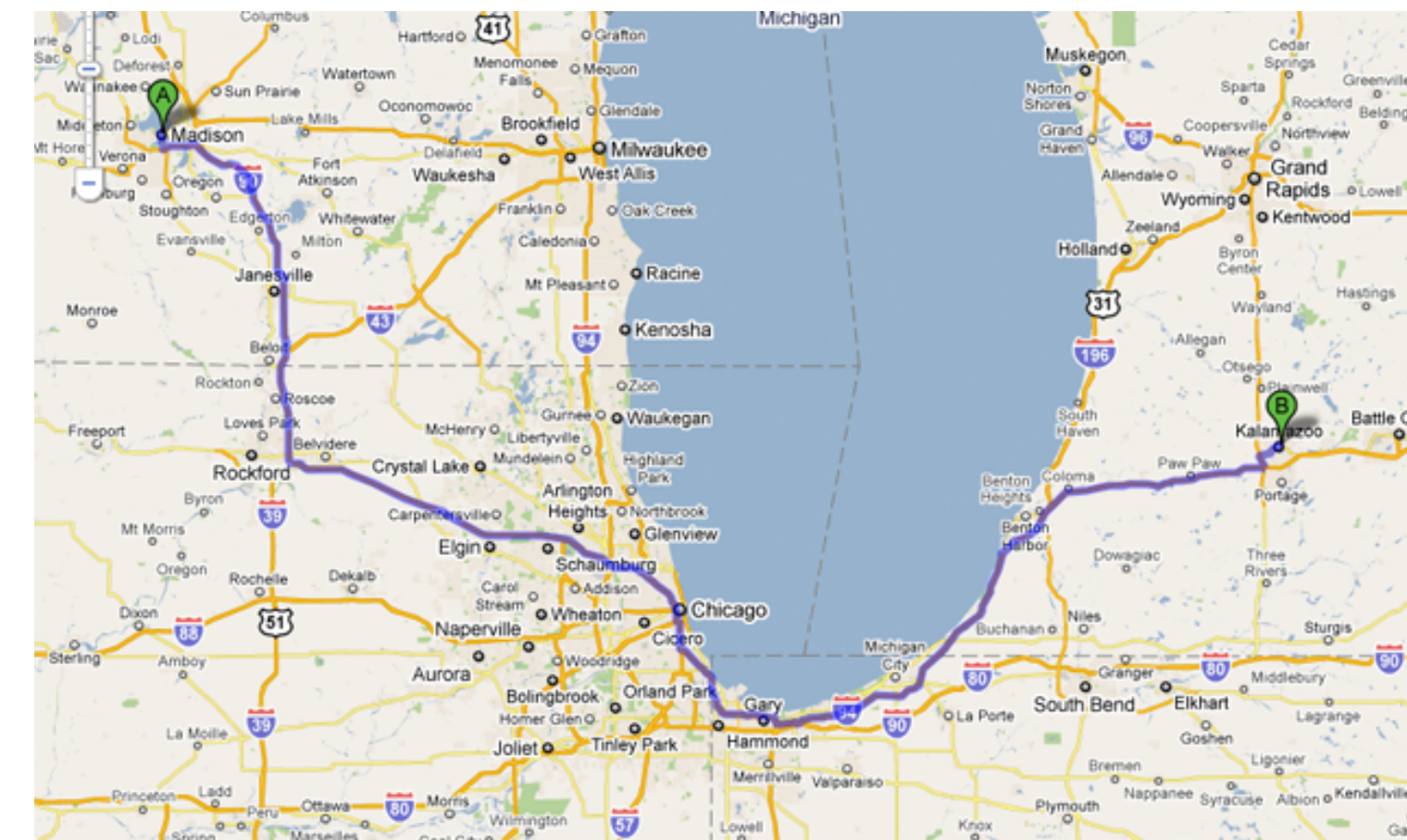
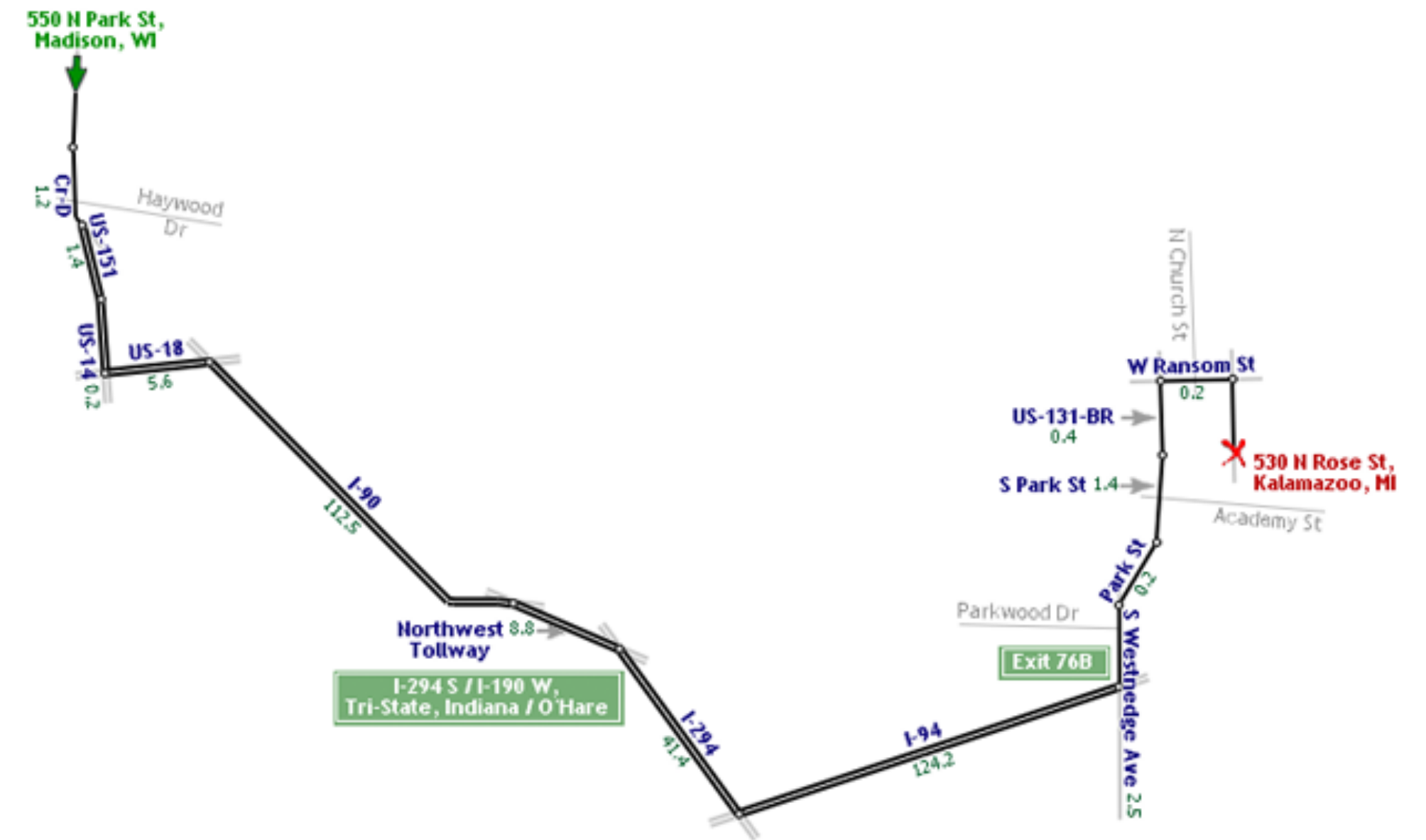
Abstract

Landmarks & Paths



LineDrive, 2001

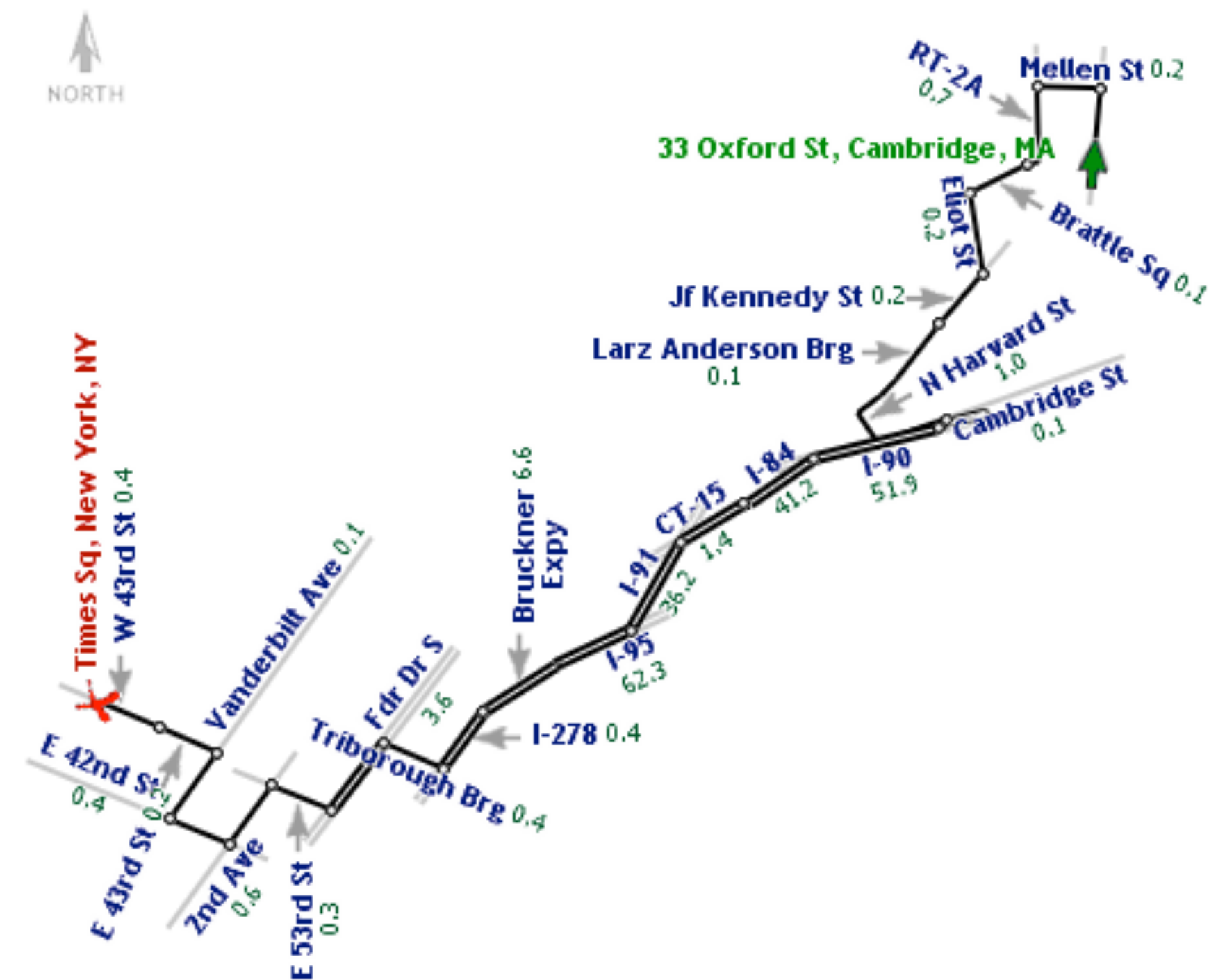
- Straighten wiggly lines
- Turn directions to right angles
- Expand regions with turns
- Contract long straight roads
- Label carefully to avoid clutter
- Maintain overall orientation





Map Size Print E-mail

advertisement



Route

- Turn-by-Turn Directions
- Reverse Directions
- Change Start
- Change End
- Get New Directions

Local Resources

- [Traffic Maps](#)
- [City Guide](#)
- [Yellow Pages](#)
- [Weather](#)

Start: 33 Oxford St, Cambridge, MA 02138
End: Times Sq, New York, NY 10036
Total Distance: 211.2 Miles
Estimated Total Time: 3 hours, 29 minutes

Directions

Miles

Microsoft®

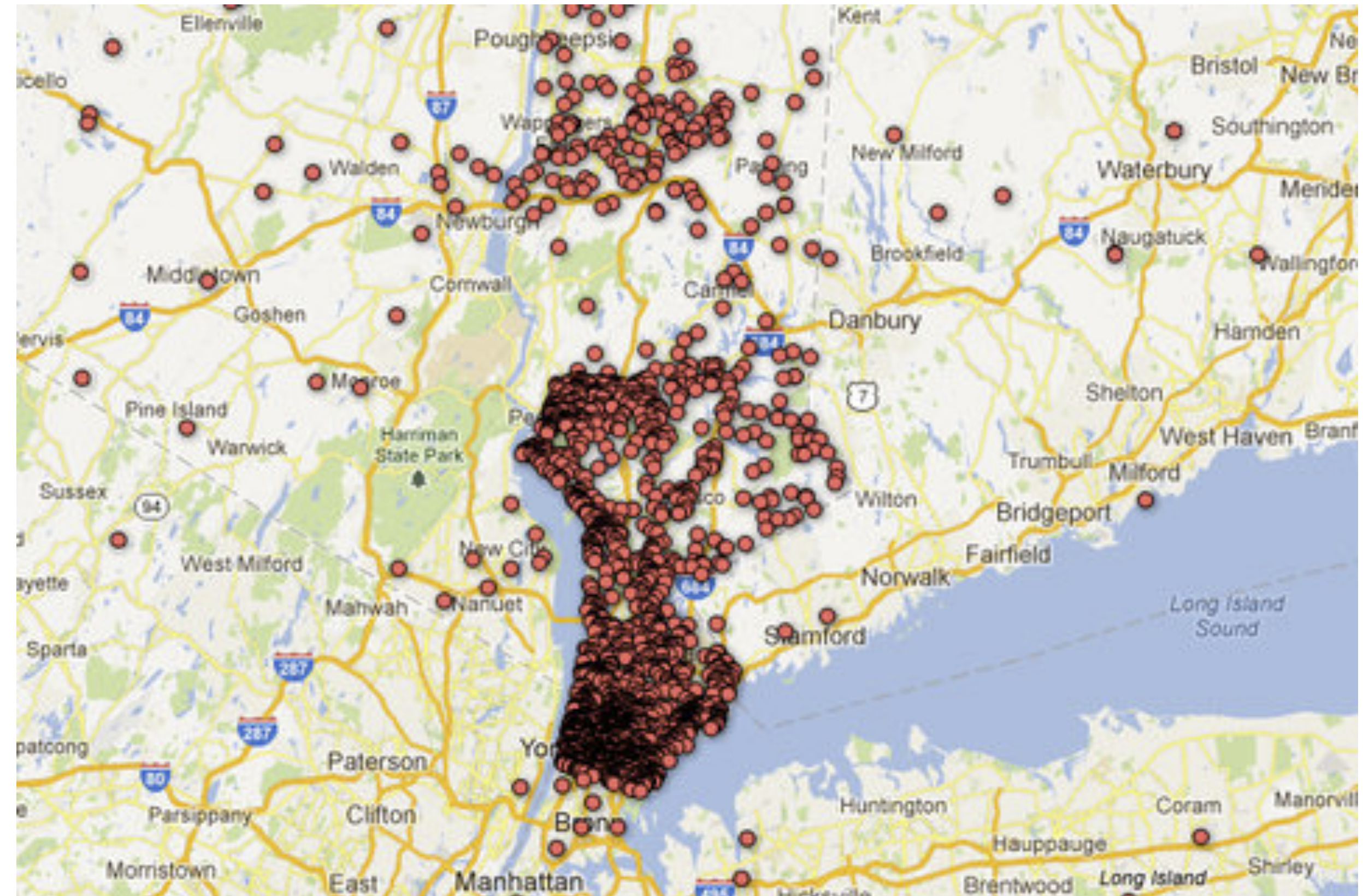
Direct Mapping

One data point one pixel

Mashup: Visualizing Addresses of Gun Owners

Mashup map: augmenting a detailed street map with symbols.

Can resolve individual addresses.

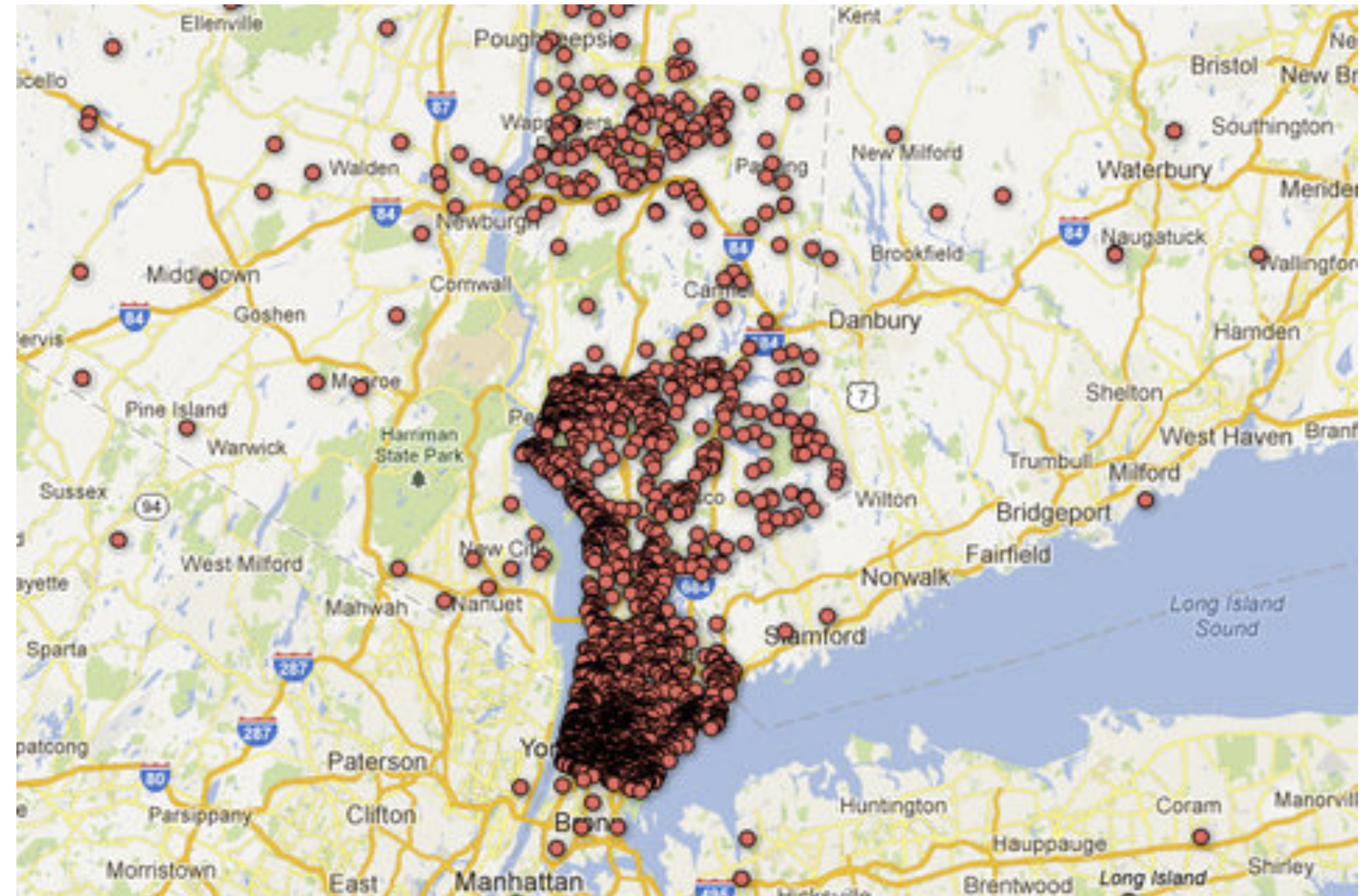


Ethical Questions

Published after Connecticut school killings

What are the ethics of visualization?

Data is public: is making it accessible problematic?



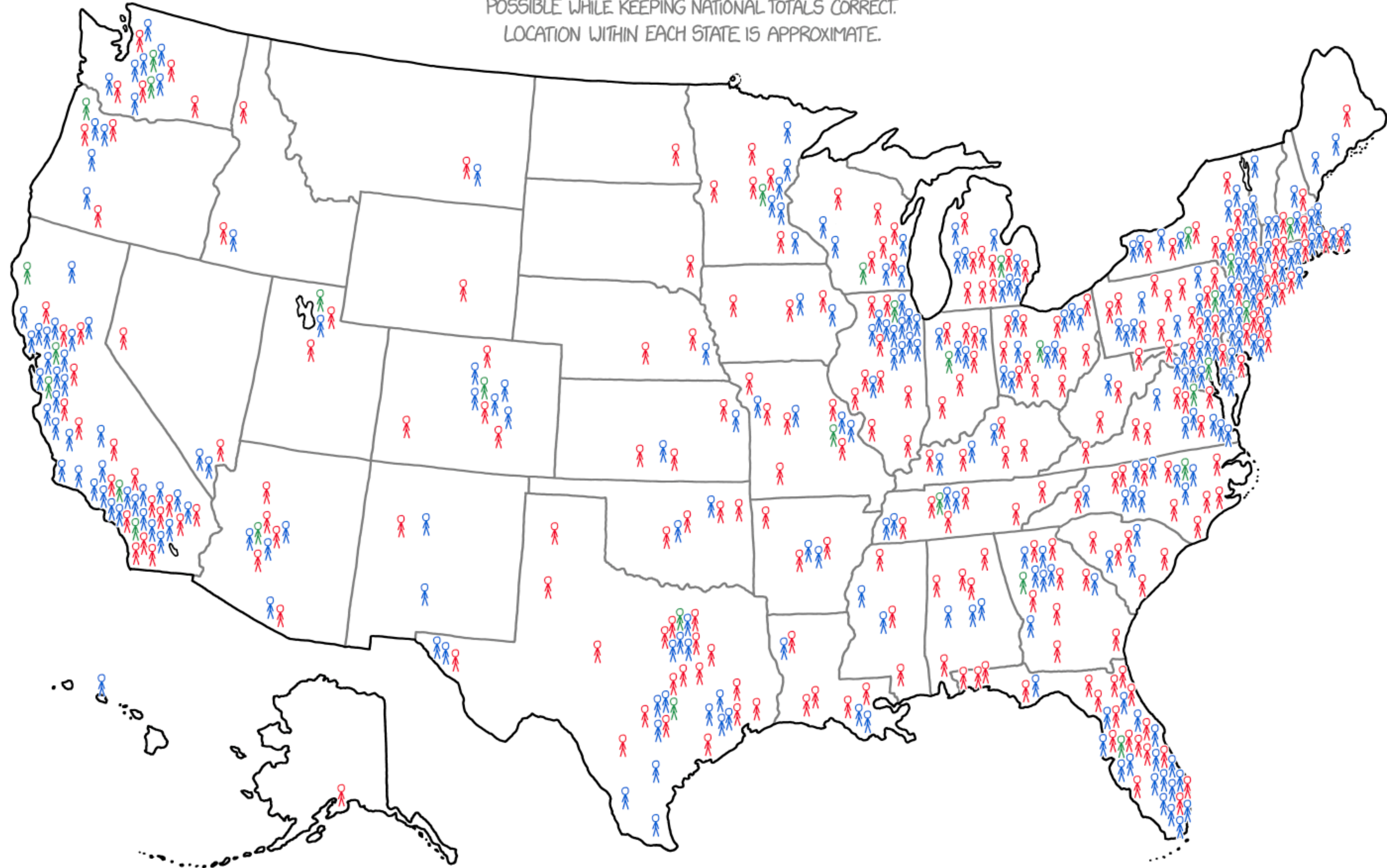
2016 ELECTION MAP

EACH FIGURE REPRESENTS 250,000 VOTES

TRUMP CLINTON OTHER

VOTES ARE DISTRIBUTED BY STATE AS ACCURATELY AS POSSIBLE WHILE KEEPING NATIONAL TOTALS CORRECT.

LOCATION WITHIN EACH STATE IS APPROXIMATE.

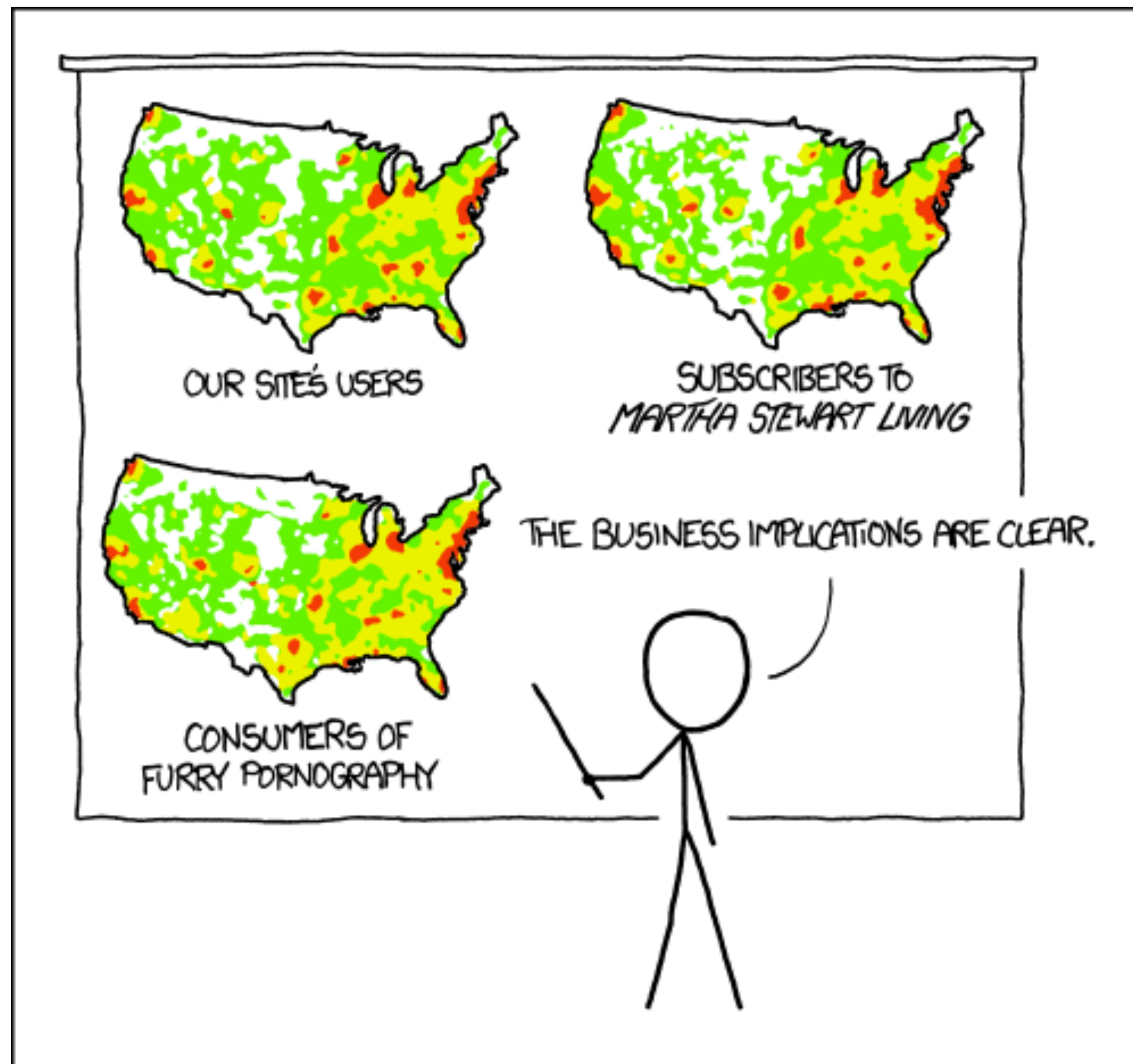


Choropleth Maps

Principle

Areas are shaded or patterned in proportion to measurement

Each spatial unit is filled with a uniform color or pattern



PET PEEVE #208:
GEOGRAPHIC PROFILE MAPS WHICH ARE
BASICALLY JUST POPULATION MAPS

Where We Live...

Unlike many developed countries, the U.S. keeps growing. We are also moving south and west. But compared with China or India, the nation is a vast prairie

Our families are getting smaller—with one vital exception. Compared with those of Europe and Japan, the U.S. population is younger and more colorful because of the continued arrival of immigrants and their higher-than-average birthrates. Of the 100 million Americans who will join us in the next 37 years, half will be immigrants or their children. In the next few decades, 97% of the world's population growth will occur in the developing world; the U.S. is the largest developed country in the world that is still growing at a healthy clip. That matters, strategically, economical-

Ala.; Possum Trot, Ky.; or Lonelyville, N.Y. But they are all probably close to someone's idea of paradise. —By Nancy Gibbs

80% of the U.S. population lives in a metropolitan area
Populations of top five shown

The entire state of Wyoming (pop. 509,300) has fewer people than the Harrisburg, Pa., metro area

3. Chicago metro area (pop. 9,443,400)

4. Philadelphia metro area (pop. 5,823,200)

1. New York City metro area (pop. 18,747,300)

2. Los Angeles metro area (pop. 12,923,500)

New Jersey is the most densely populated state, with 1,134 people per square mile

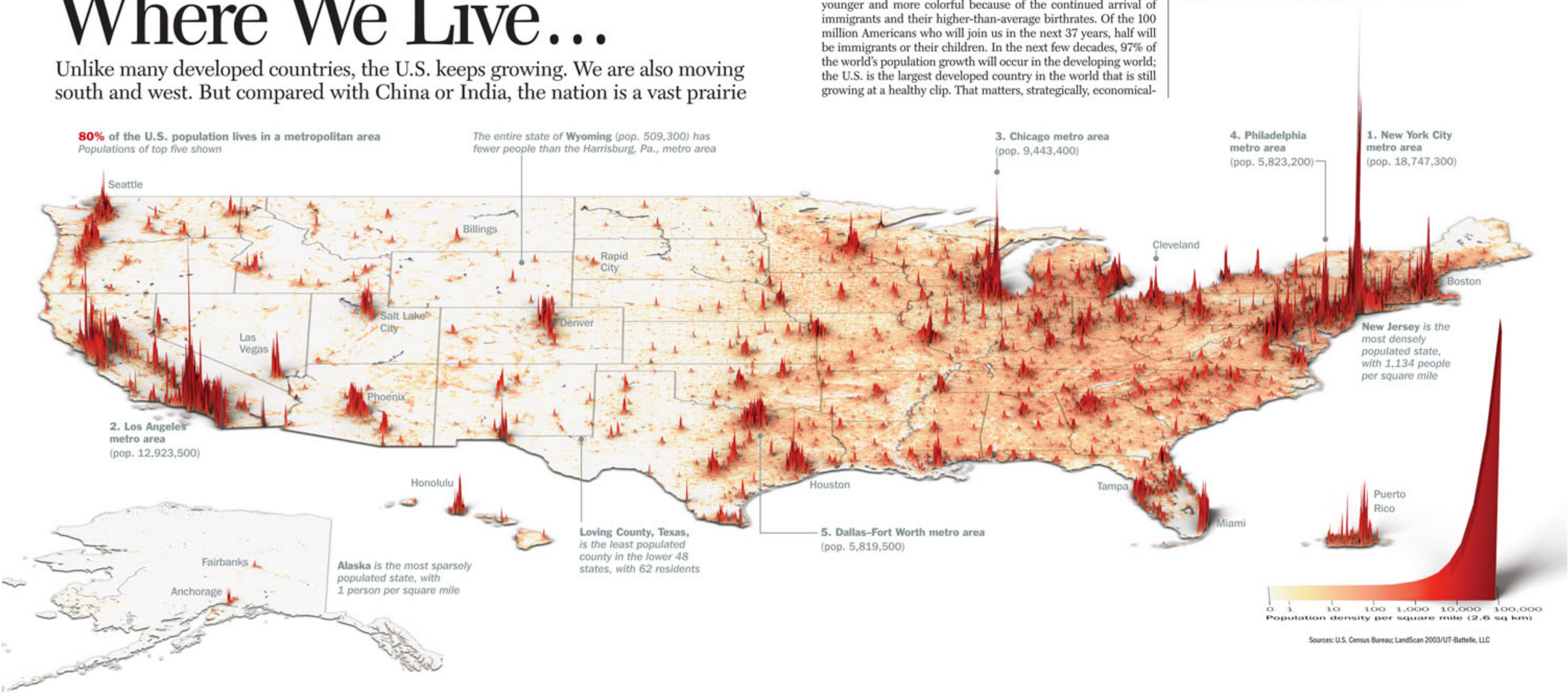
Loving County, Texas, is the least populated county in the lower 48 states, with 62 residents

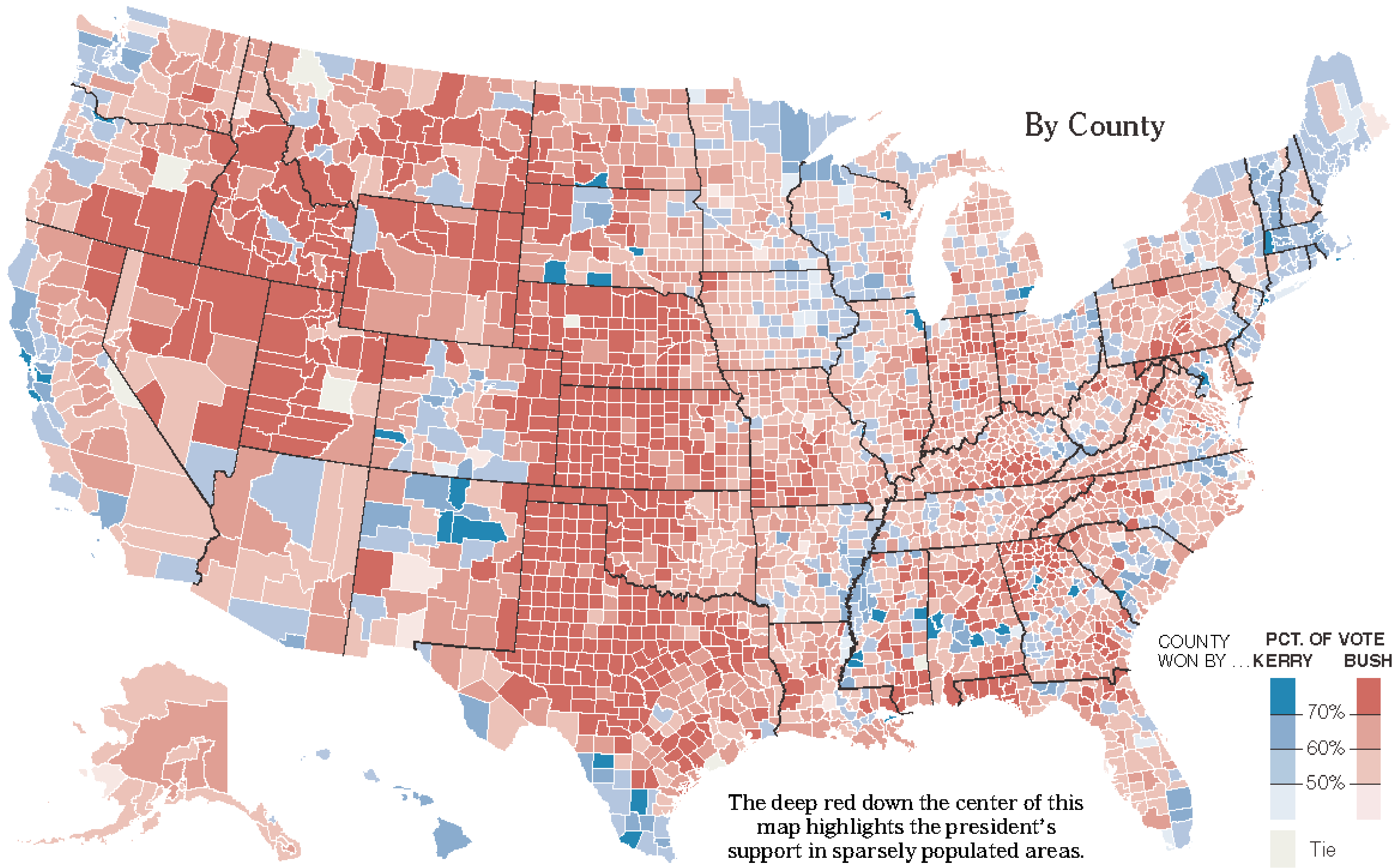
Alaska is the most sparsely populated state, with 1 person per square mile

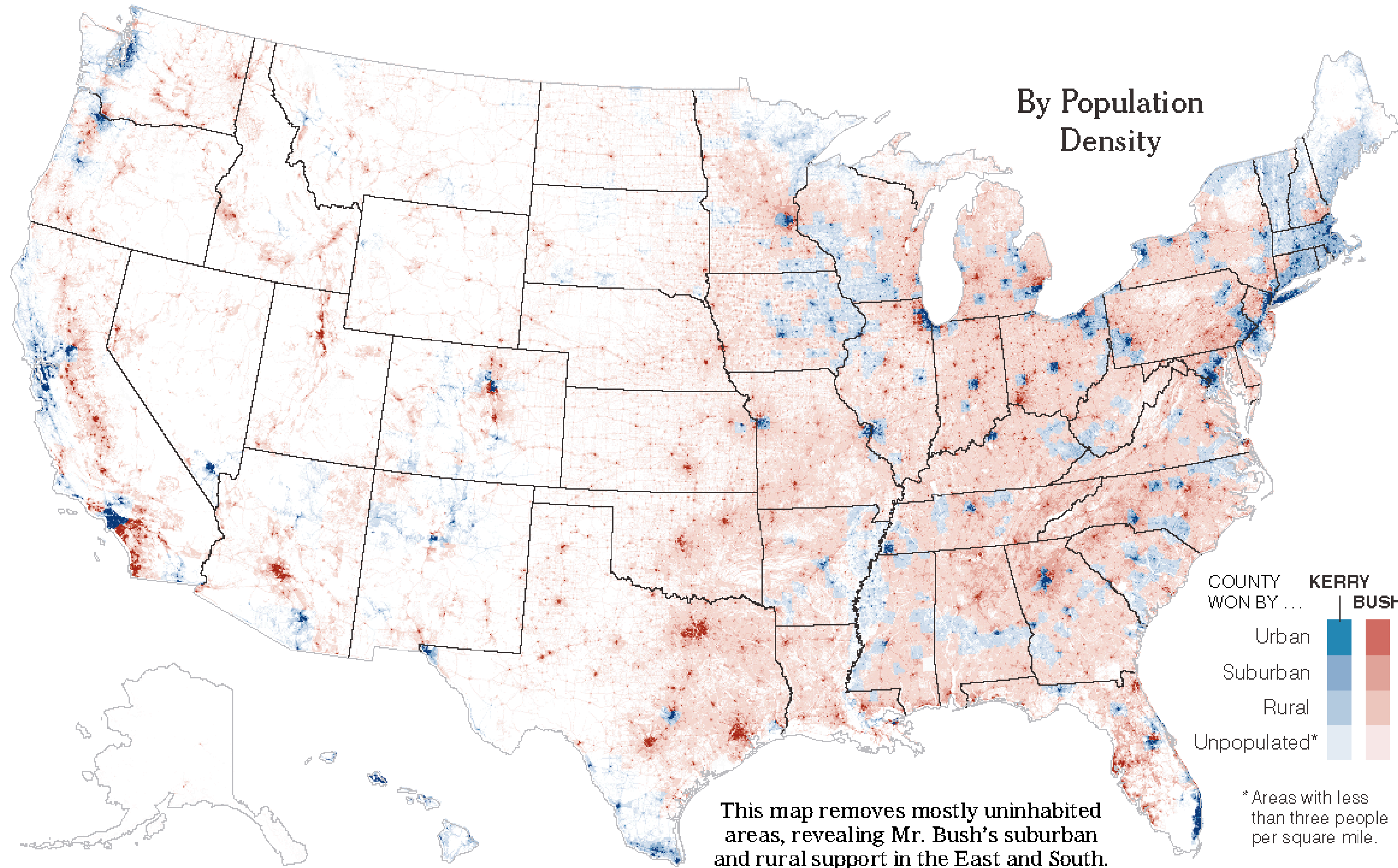
5. Dallas-Fort Worth metro area (pop. 5,819,500)

0 1 10 100 1,000 10,000 100,000
Population density per square mile (2.6 sq km)

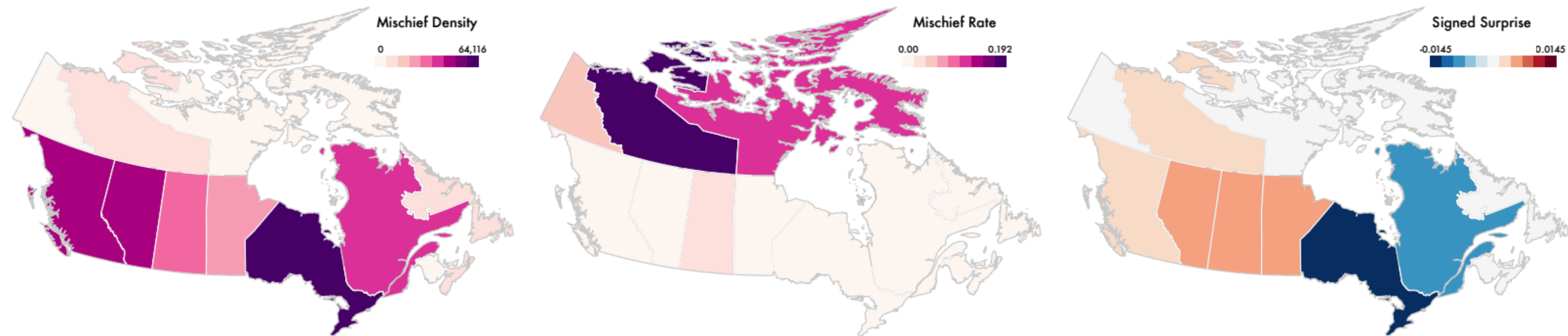
Sources: U.S. Census Bureau; LandScan 2003/UT-Battelle, LLC







Approach: Use a Prior, show difference. Which province is safest?



(a) The **Event Density** of “mischief” in Canada.

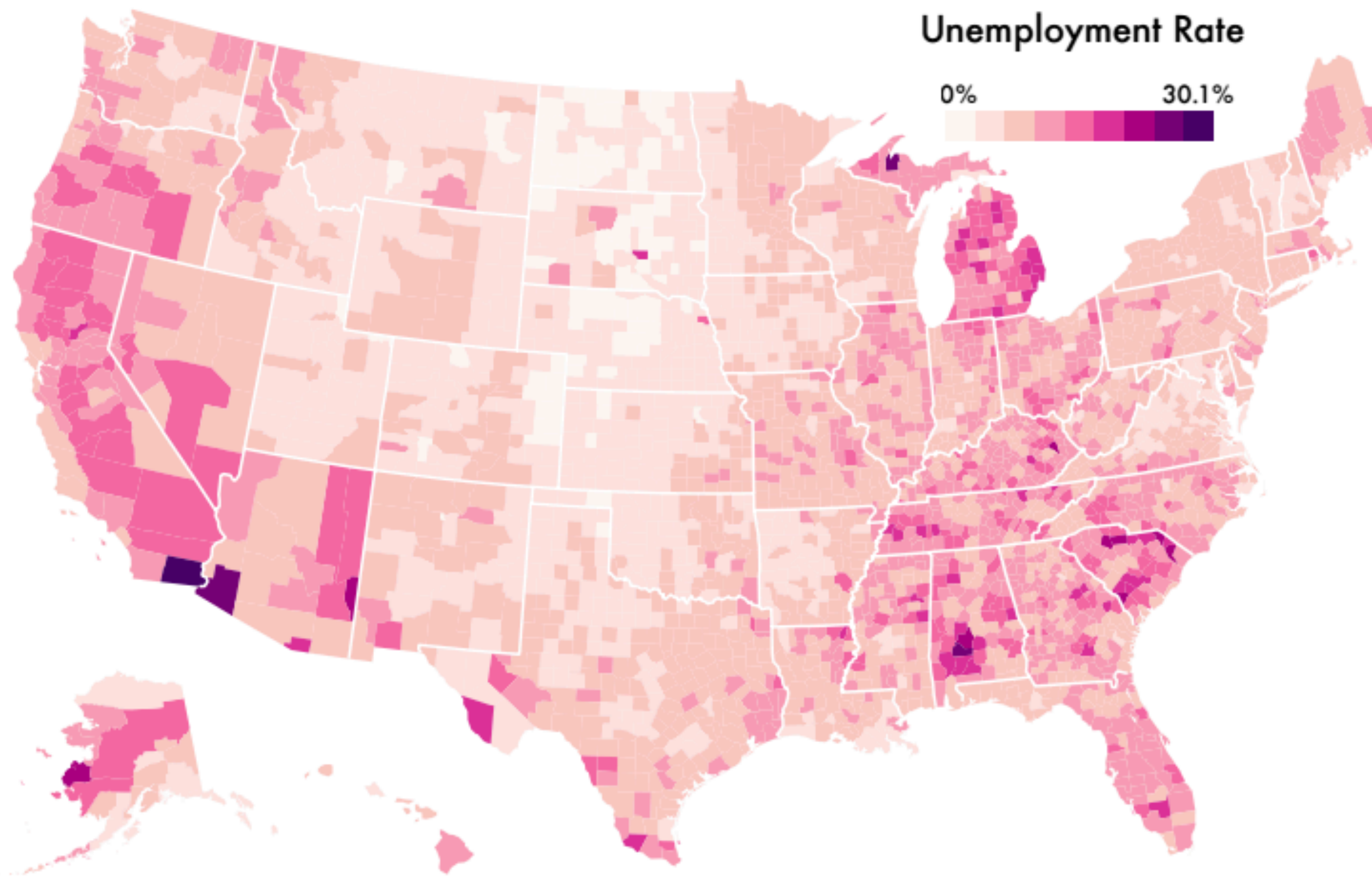
(b) The per-capita **Event Rate** of mischief.

(c) The **Surprise Map** of mischief.

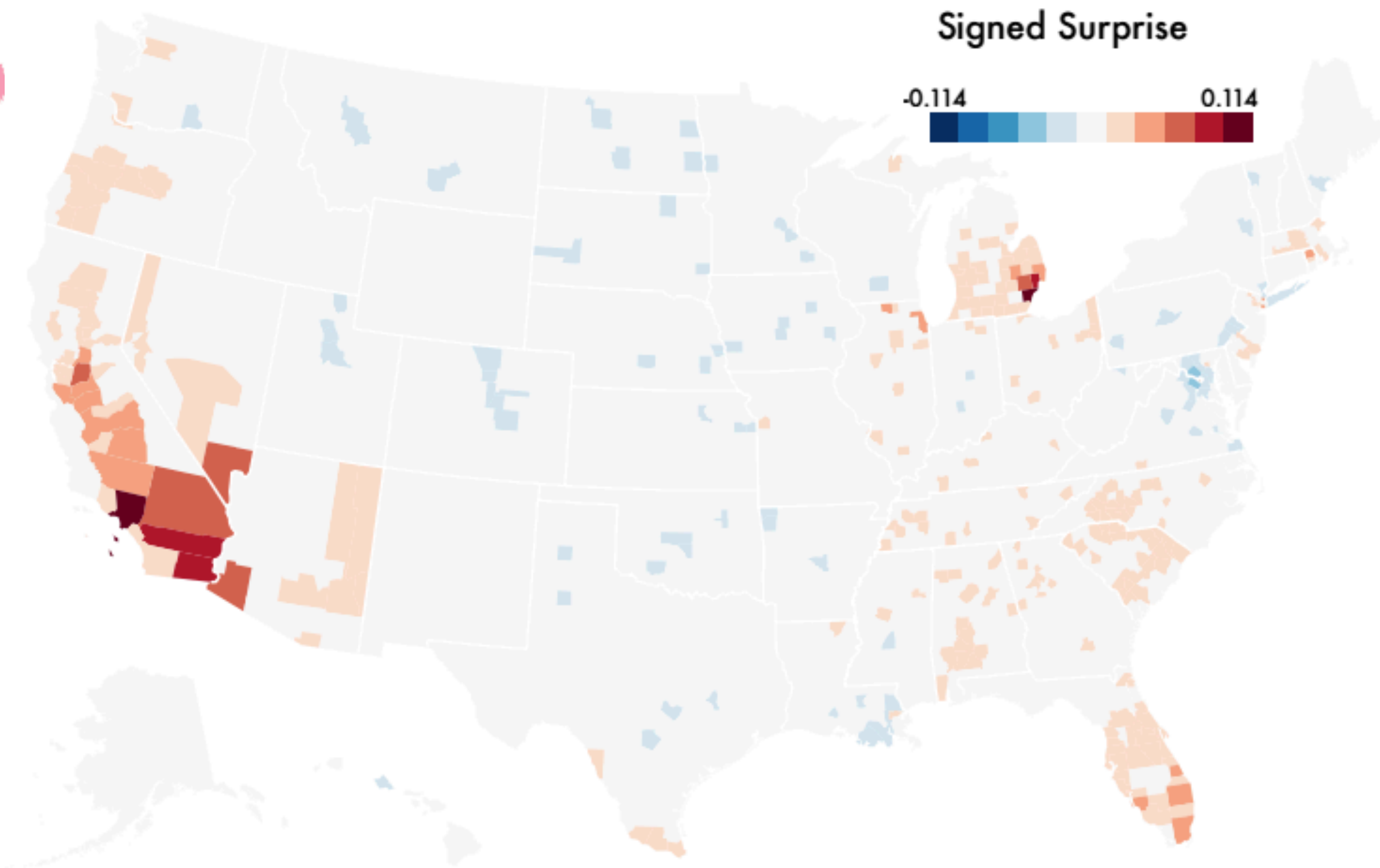
mischief = property damage such as vandalism in Canada

model of population density +
accounting for variability when
analyzing small numbers

Surprise Map: Unemployment



(a) Per capita event rate map.



(b) Signed Surprise Map.

A.A. Mäkijärvi proudly presents:

The Magnificent BEARS of the Glorious Nation of FINLAND

Approximately before & after the year 2010

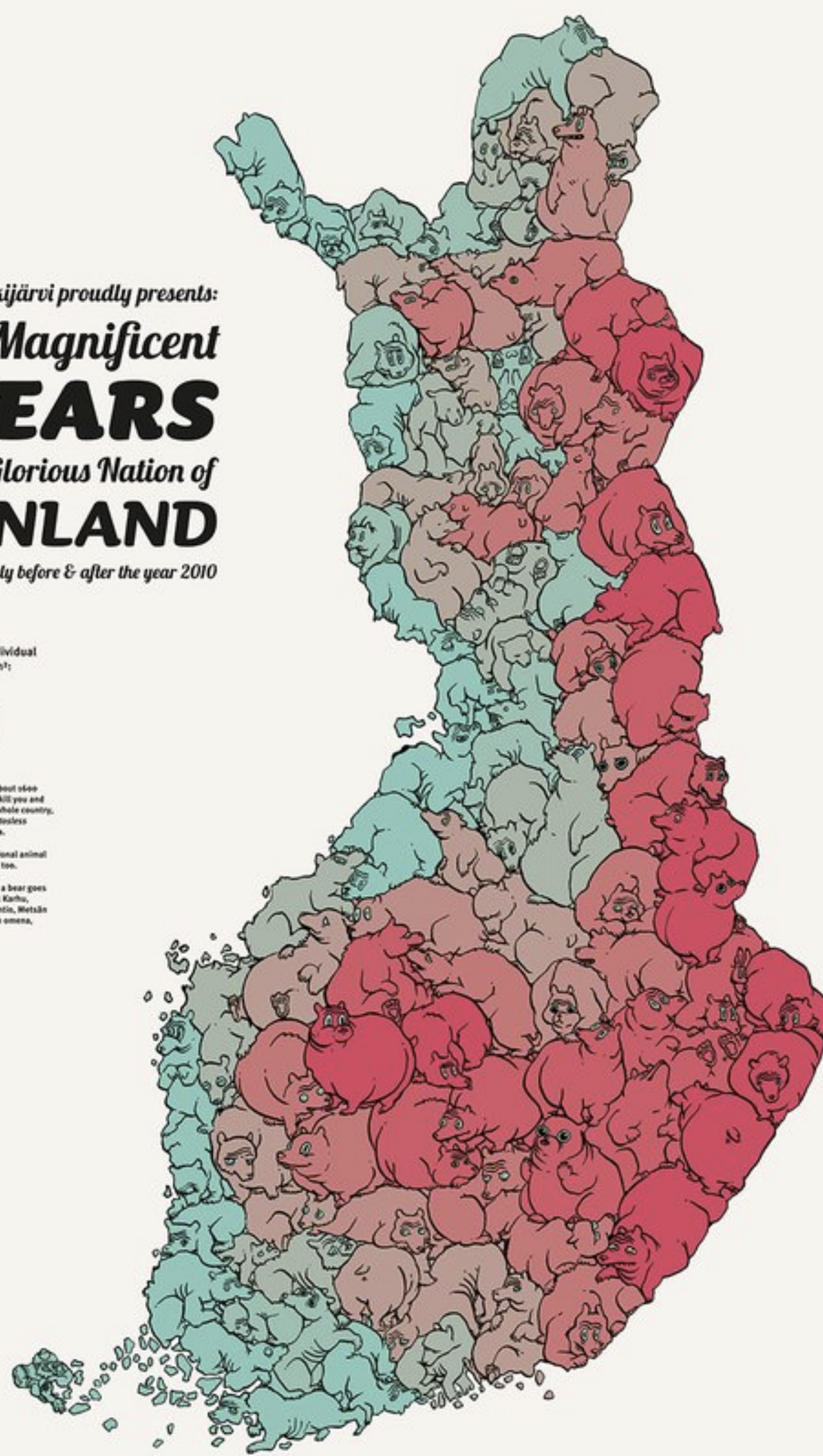
The amount of individual bears per 1000 km²:

- 0 - 2,0
- 2,1 - 4,0
- 4,1 - 6,0
- 6,1 - ∞

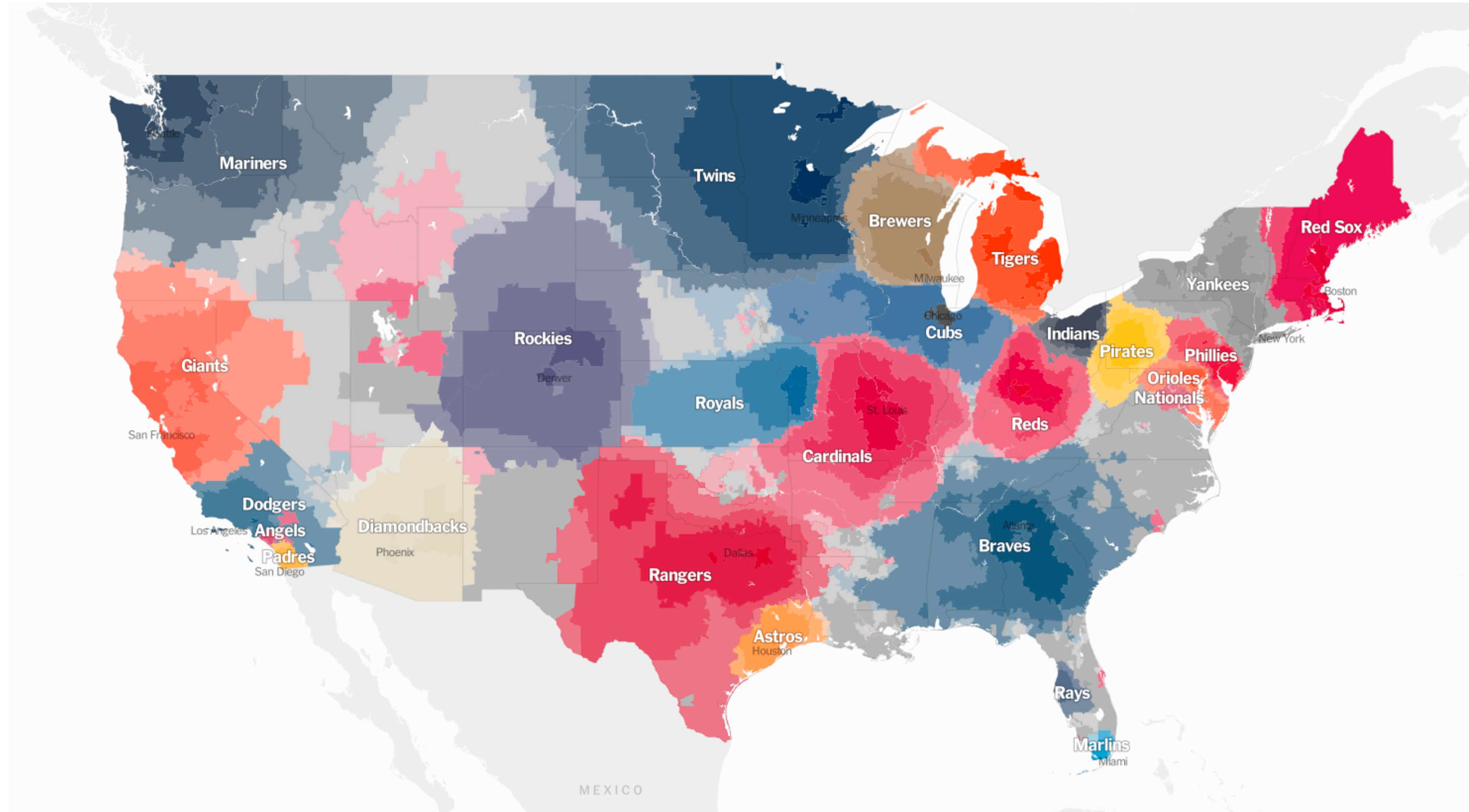
Which means there is about 6000 graceful bears ready to kill you and your loved ones in the whole country, excluding the stress-antiseptic province of Ahvenanmaa.

Fun fact! Bear is the national animal of Finland. And Russia's too.

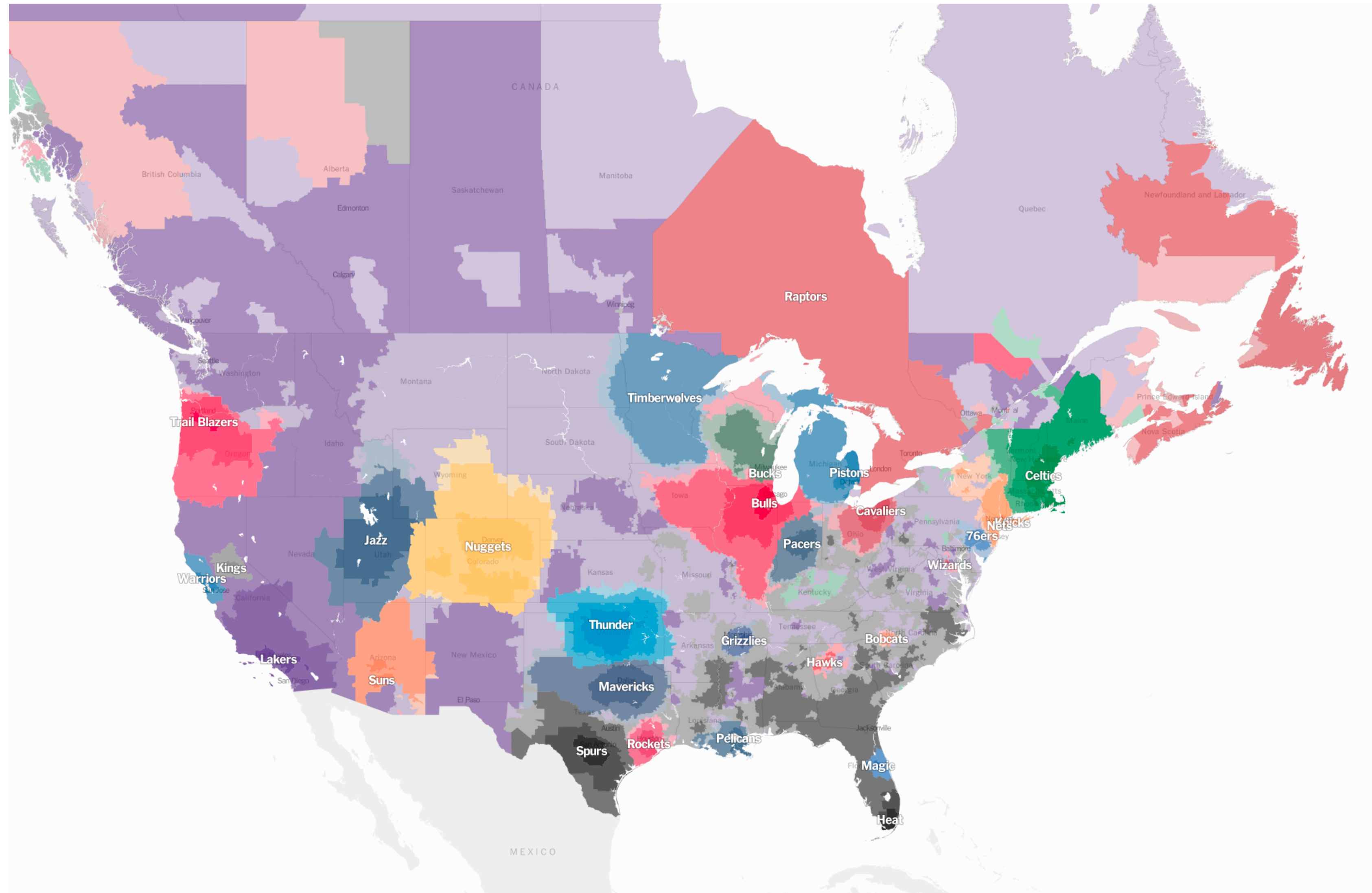
In the Finnish language a bear goes by the following names: Karhu, Mestikäinen, Ötös, Kottio, Metsän kuningas, Kalle, Metsän omens, Ötös and Nallukka.



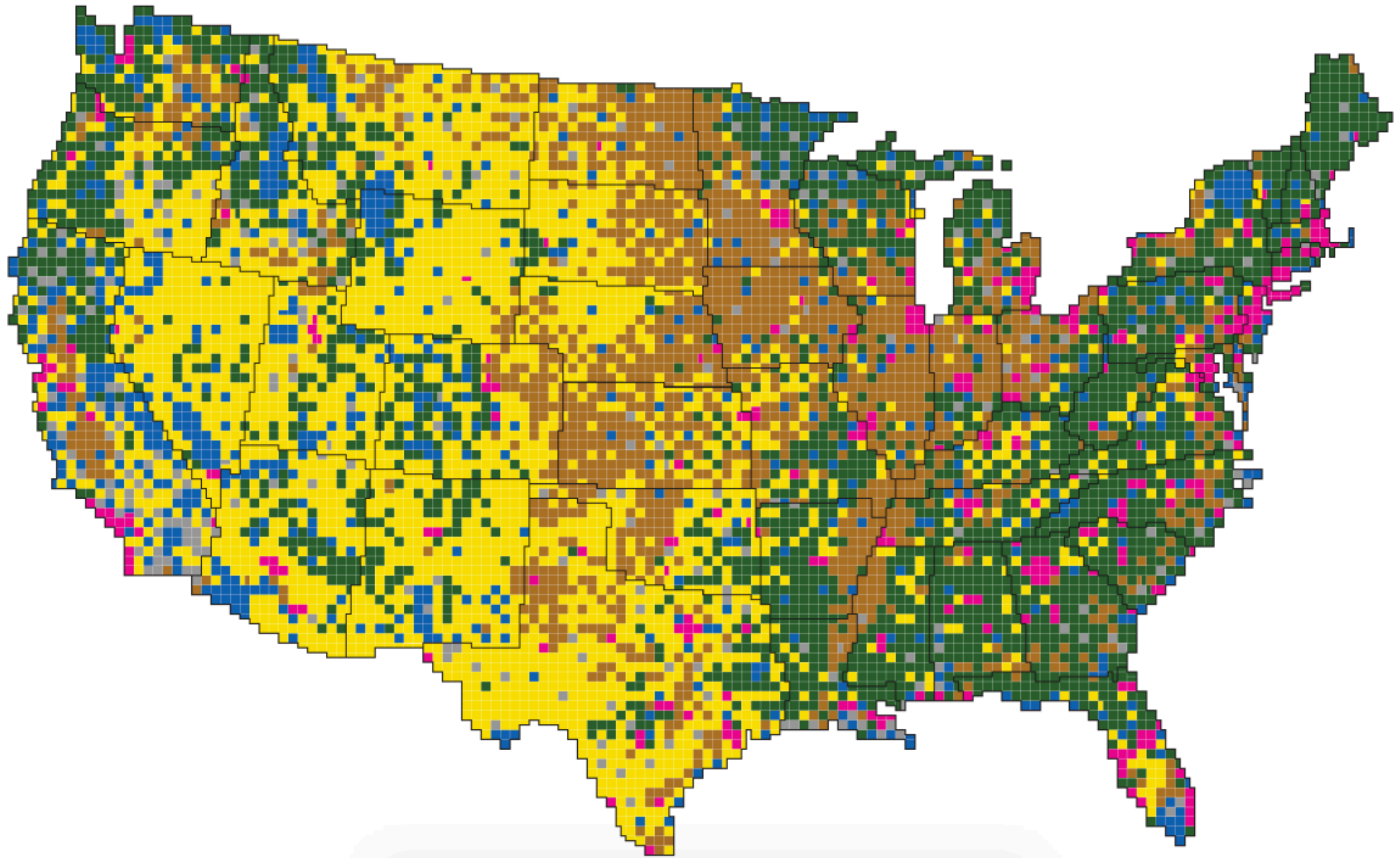
Baseball Territories



Lakers Dominate Basketball (2014)



■ Pasture/range ■ Forest ■ Cropland ■ Special Use ■ Miscellaneous ■ Urban
■ = 1 million acres

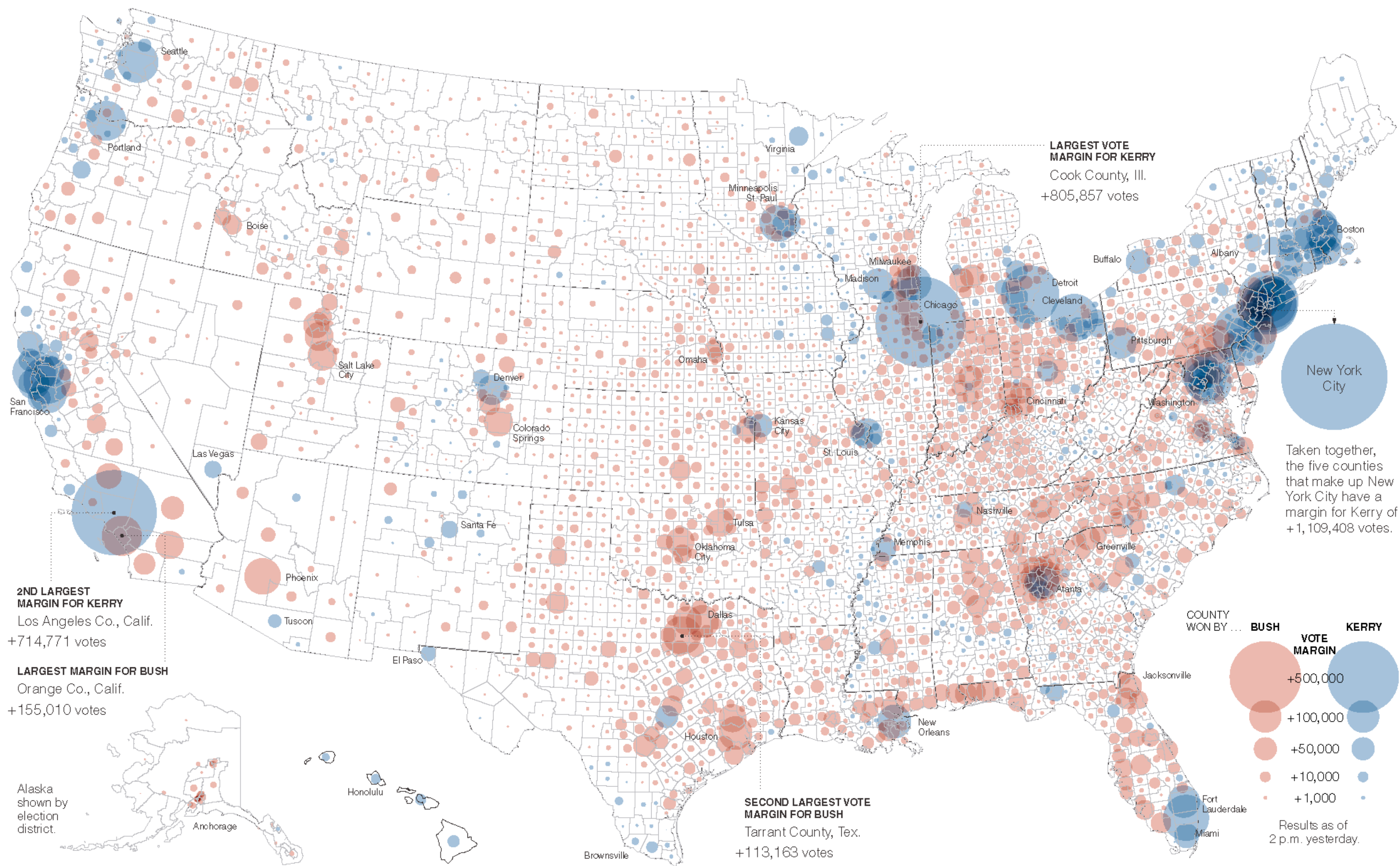


Proportional Symbol Maps

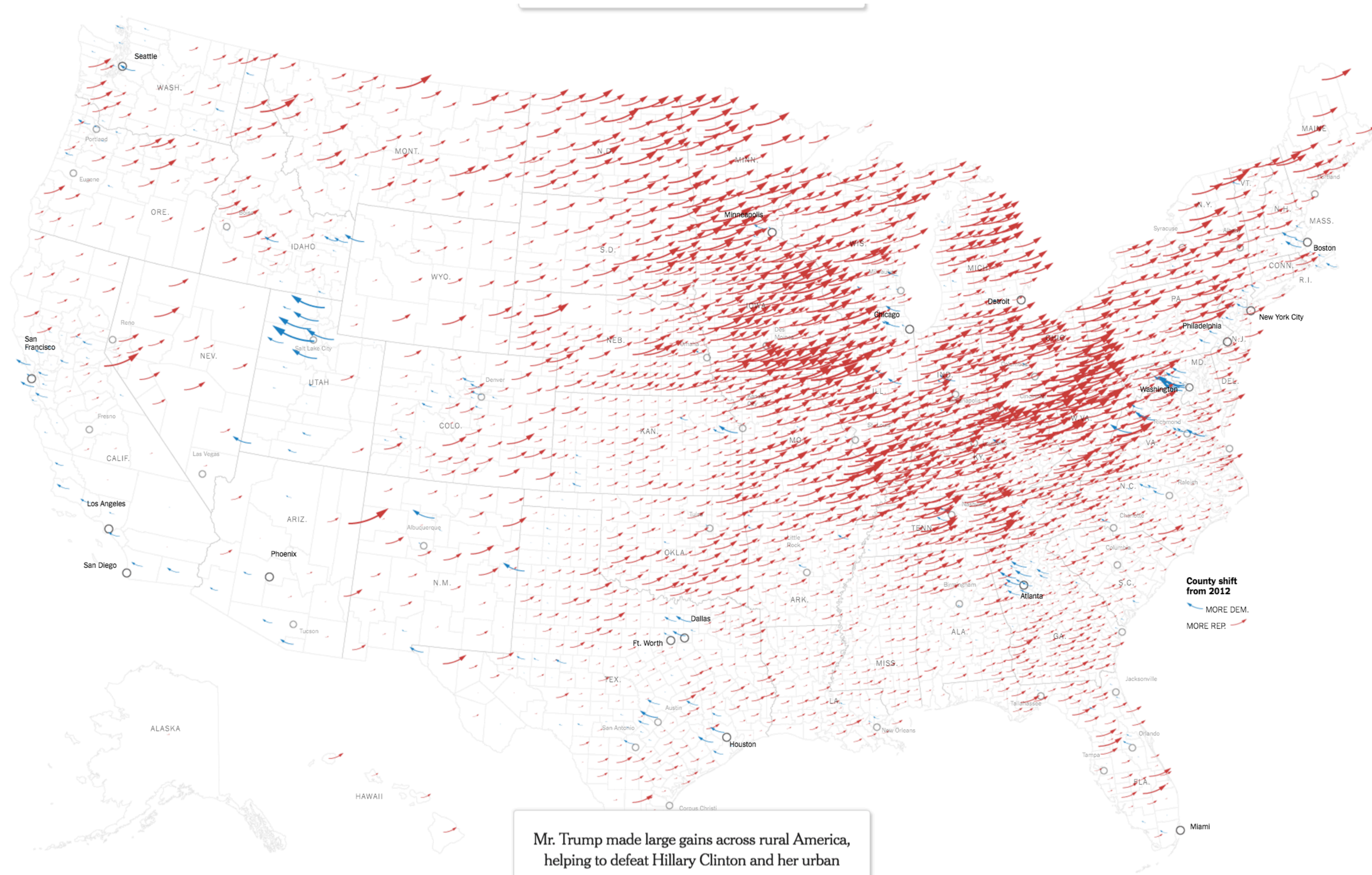
Alternative to Choropleth

Use a Symbol instead of color

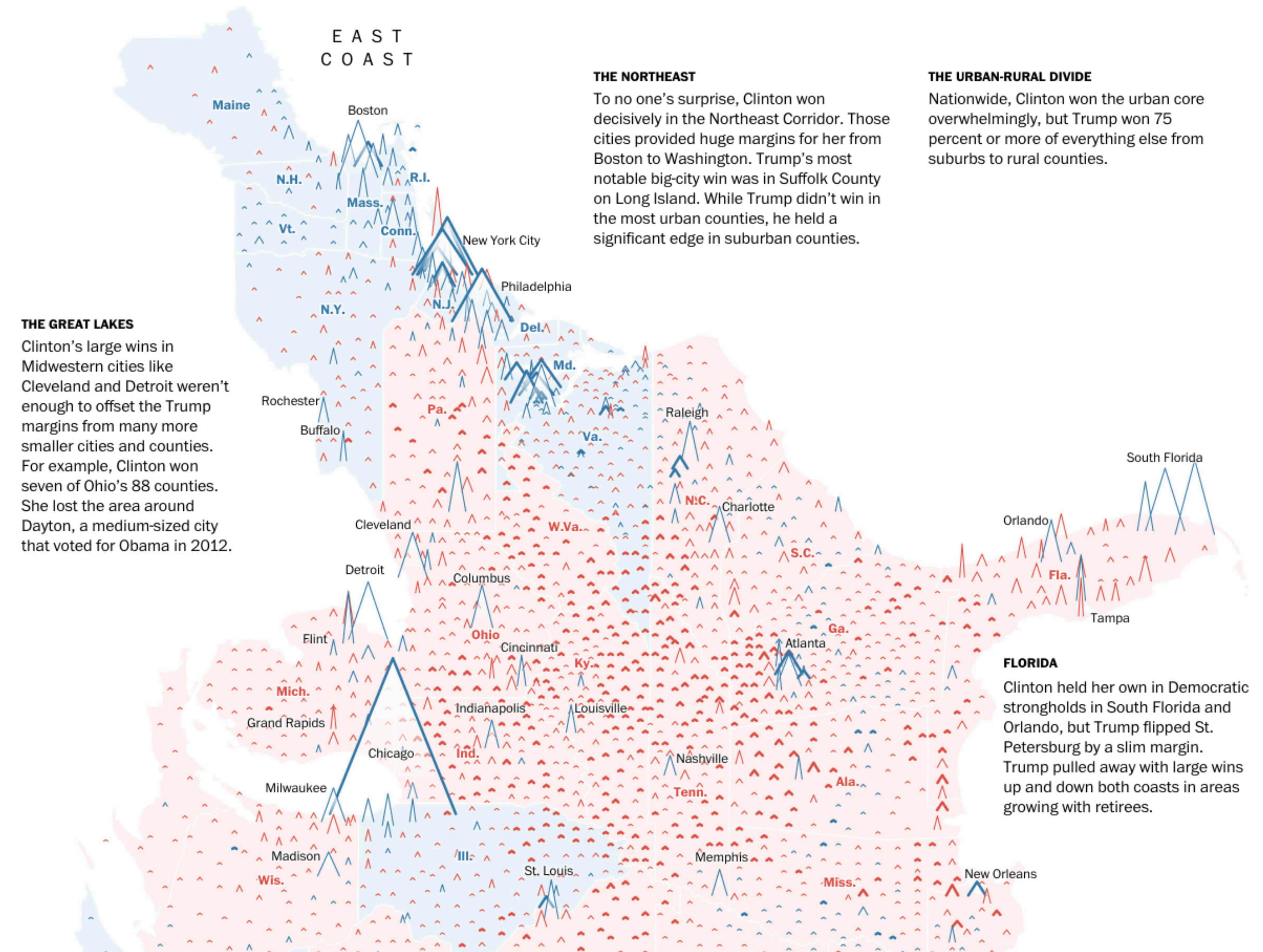
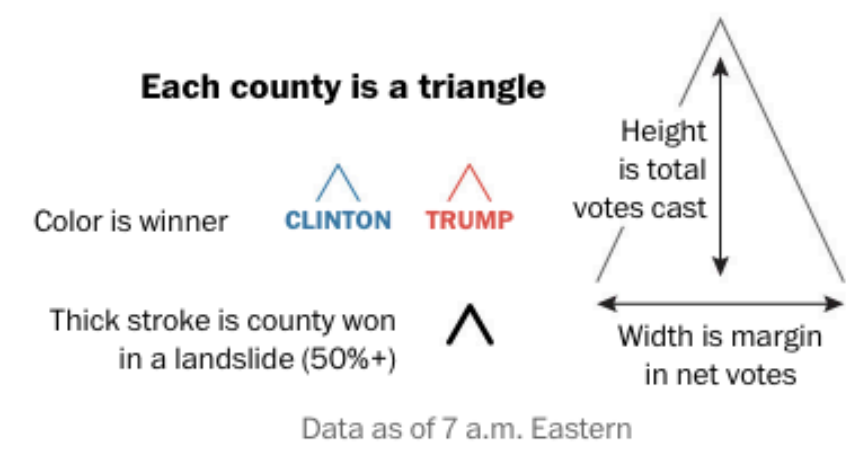
Scale symbol according to data



Matthew Ericson, NY Times



Mr. Trump made large gains across rural America, helping to defeat Hillary Clinton and her urban supporters.



EAST COAST

THE NORTHEAST

To no one's surprise, Clinton won decisively in the Northeast Corridor. Those cities provided huge margins for her from Boston to Washington. Trump's most notable big-city win was in Suffolk County on Long Island. While Trump didn't win in the most urban counties, he held a significant edge in suburban counties.

THE URBAN-RURAL DIVIDE

Nationwide, Clinton won the urban core overwhelmingly, but Trump won 75 percent or more of everything else from suburbs to rural counties.

THE GREAT LAKES

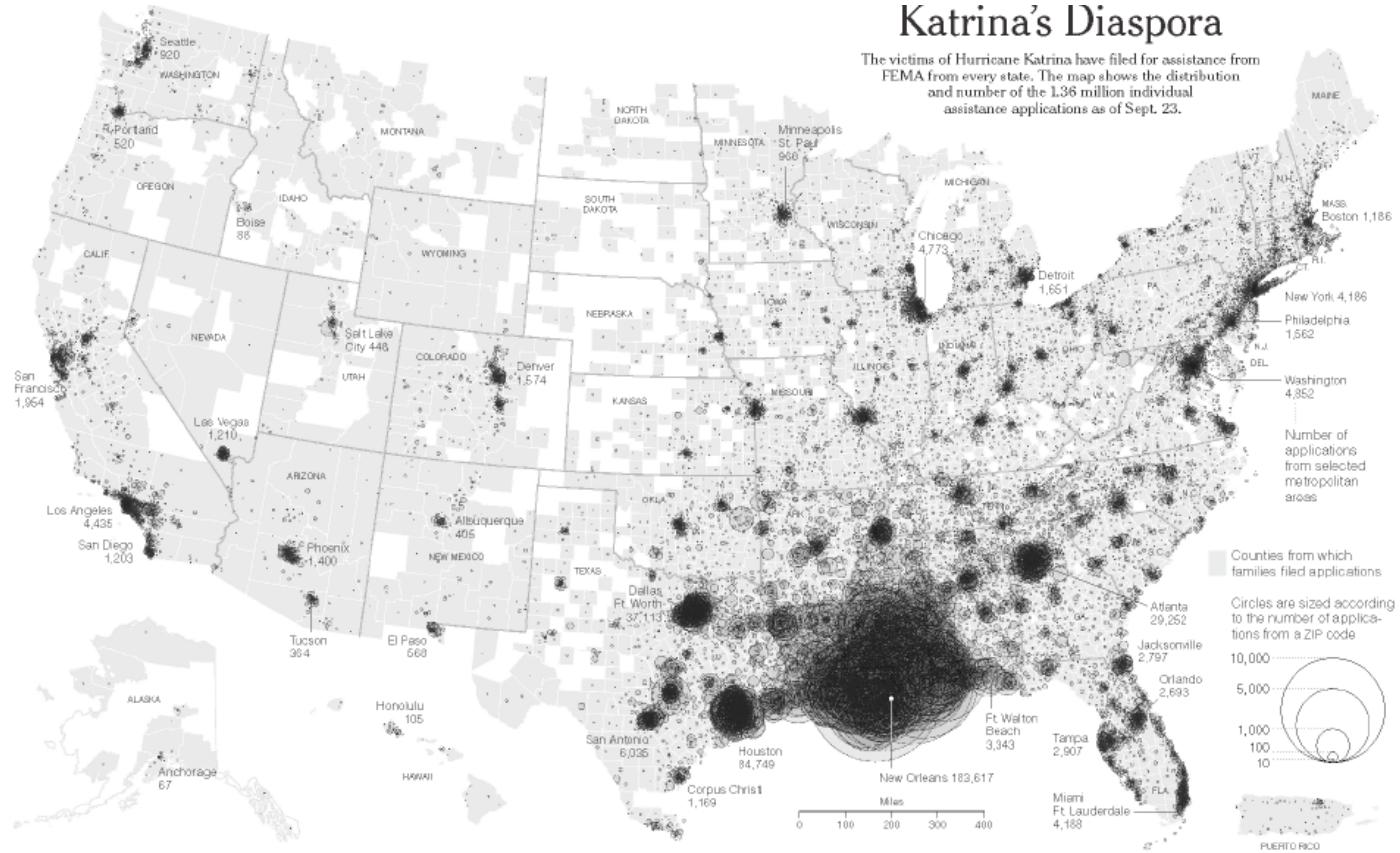
Clinton's large wins in Midwestern cities like Cleveland and Detroit weren't enough to offset the Trump margins from many more smaller cities and counties. For example, Clinton won seven of Ohio's 88 counties. She lost the area around Dayton, a medium-sized city that voted for Obama in 2012.

FLORIDA

Clinton held her own in Democratic strongholds in South Florida and Orlando, but Trump flipped St. Petersburg by a slim margin. Trump pulled away with large wins up and down both coasts in areas growing with retirees.

Katrina's Diaspora

The victims of Hurricane Katrina have filed for assistance from FEMA from every state. The map shows the distribution and number of the 1.36 million individual assistance applications as of Sept. 23.



They are scattered through all 50 states, the District of Columbia and Puerto Rico — 623 in Utah, 1,114 in Kansas, 101 way out in Alaska. They are clustered by the thousands in large Southern cities like Dallas, Atlanta and Memphis, and huddled in handfuls in unlikely hamlets like Shell Knob, Mo. (pop. 1,593) and Fountain Run, Ky. (pop. 236).

Evacuees fled Hurricane Katrina and the floods that followed in caravans of cars and fleets of buses, on helicopters and

emerges of where they landed, based on ZIP codes from which applications for aid were submitted to the Federal Emergency Management Agency as of Sept. 23.

Of 1,356,704 applications, 86 percent came from Louisiana, Mississippi, Texas and Alabama. But 35,539 families were more than 1,000 miles from the Gulf — among the farthest: one in Nome, Alaska, 3,931 miles from the French Quarter and another in Lihue, Hawaii, 4,279 miles away. Residents of New Orleans, a city that

centers. On average, the applicants came from counties where blacks were 28 percent of the population, more than twice the national average.

Baton Rouge, La., appears to be temporary home to 10 percent of evacuees, Houston 6.25 percent. But after the top 18 hubs, applicants are spread like the wind that whipped through their old neighborhoods: none of the other 900-plus metropolitan areas has even 1 percent of the total. Some 4,000 ZIP codes — among them

Applications by state

State	Applications	Pct.
Louisiana	523,149	38.6%
Mississippi	383,840	28.3%
Texas	156,895	11.6%
Alabama	109,469	8.1%
Georgia	35,342	2.6%
Florida	31,005	2.3%
Tennessee	15,529	1.1%
Arkansas	11,027	0.8%
California	10,953	0.8%
Illinois	4,400	0.3%

Applications by distance from New Orleans

MILES	APPLICANTS	PCT.
0-100	626,232	46.2%
100-200	338,080	24.9%
200-400	184,169	13.6%
400-800	143,497	10.6%
800-1,600	45,371	3.3%
1,600-3,200	13,403	1.0%
3,200+	232	0.0%

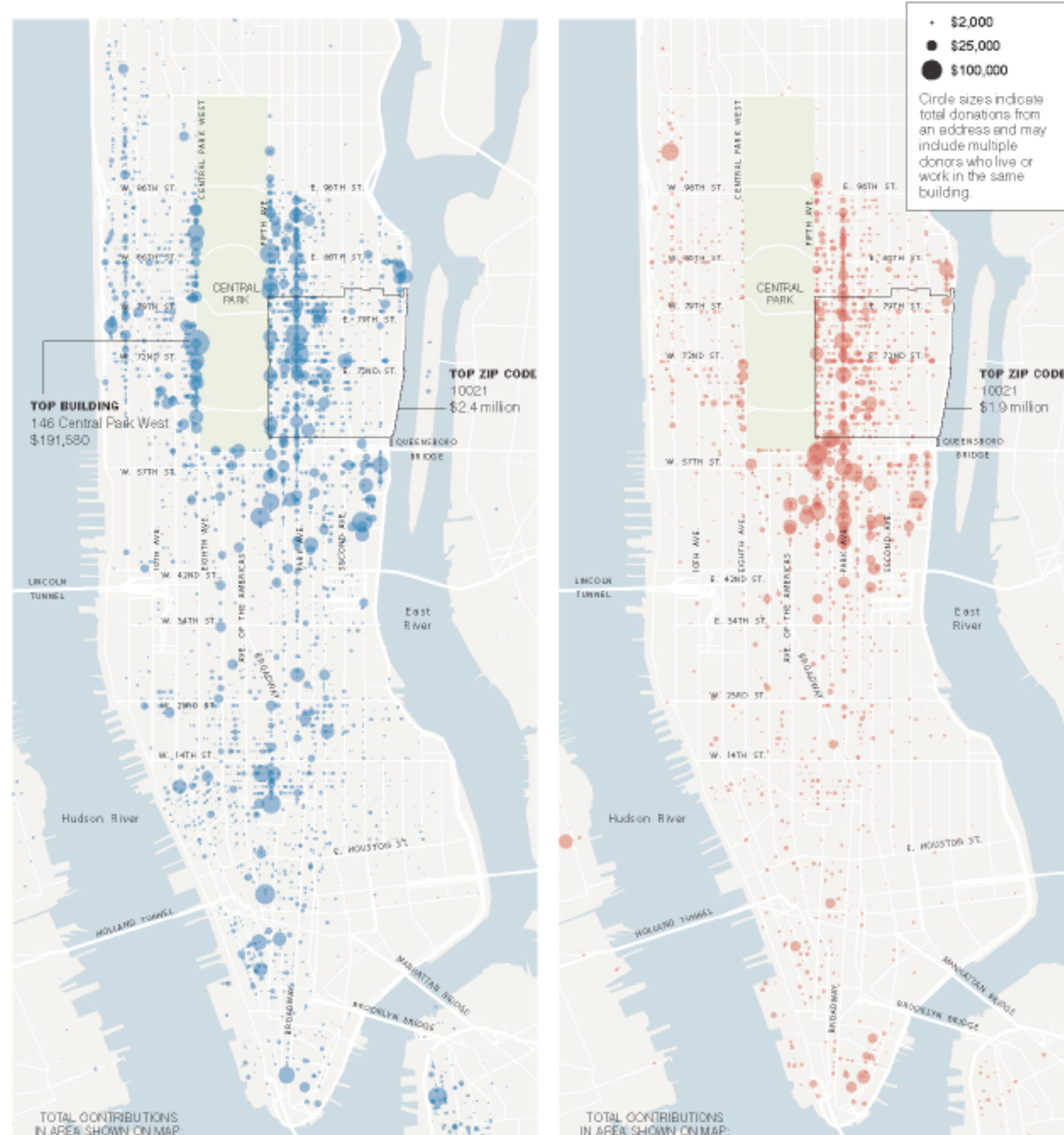
JOHN KERRY
and the Democratic National Committee

Contributions to each
candidate and his party's
national committee

GEORGE W. BUSH
and the Republican National Committee

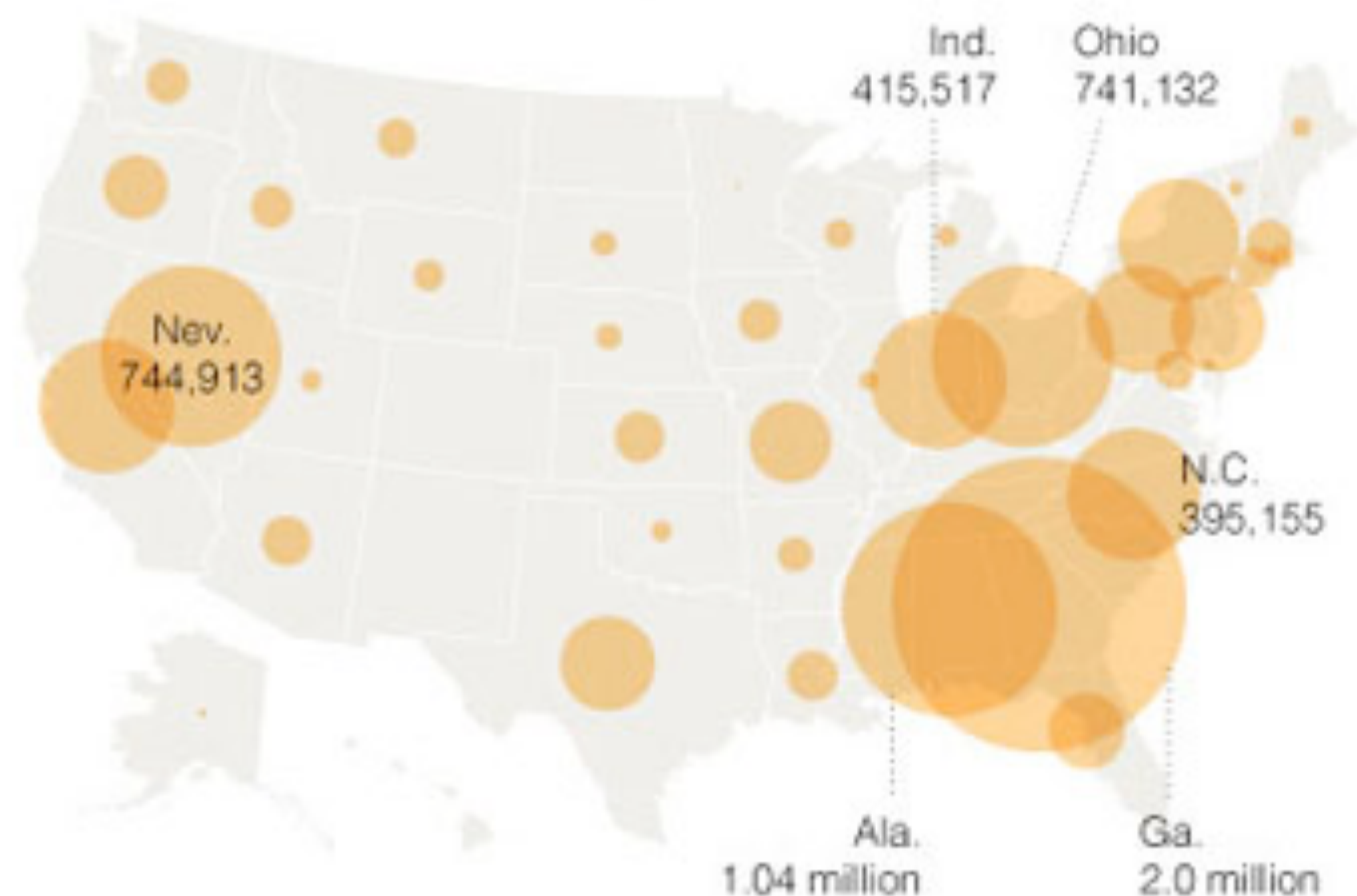
Manhattan

For both sides, the top ZIP code in the nation for contributions was 10021 on the Upper East Side. Mr. Kerry's appeal, however, was greater throughout much of the rest of Manhattan, bringing in more money than Mr. Bush and the R.N.C. in areas like the Upper West Side, Greenwich Village and SoHo.



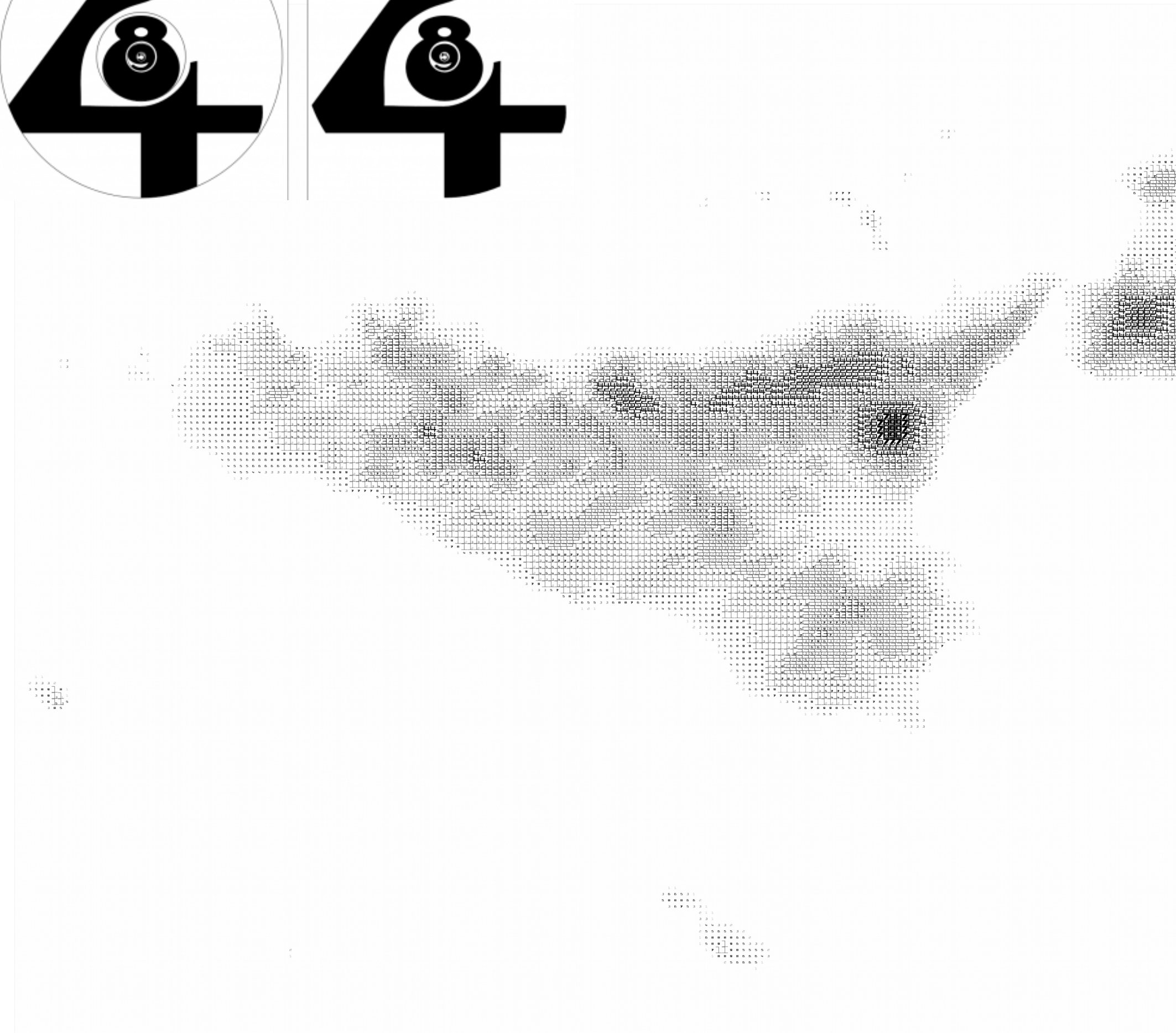
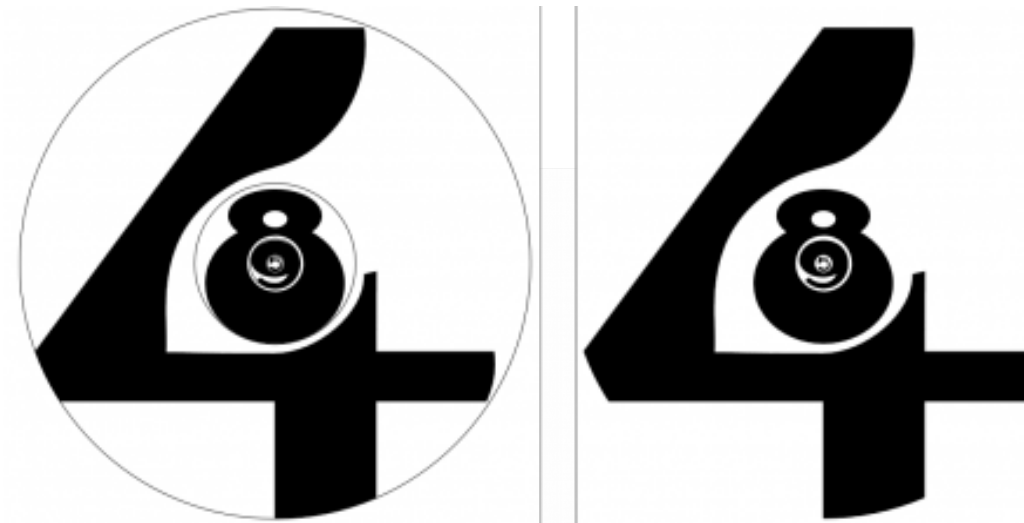
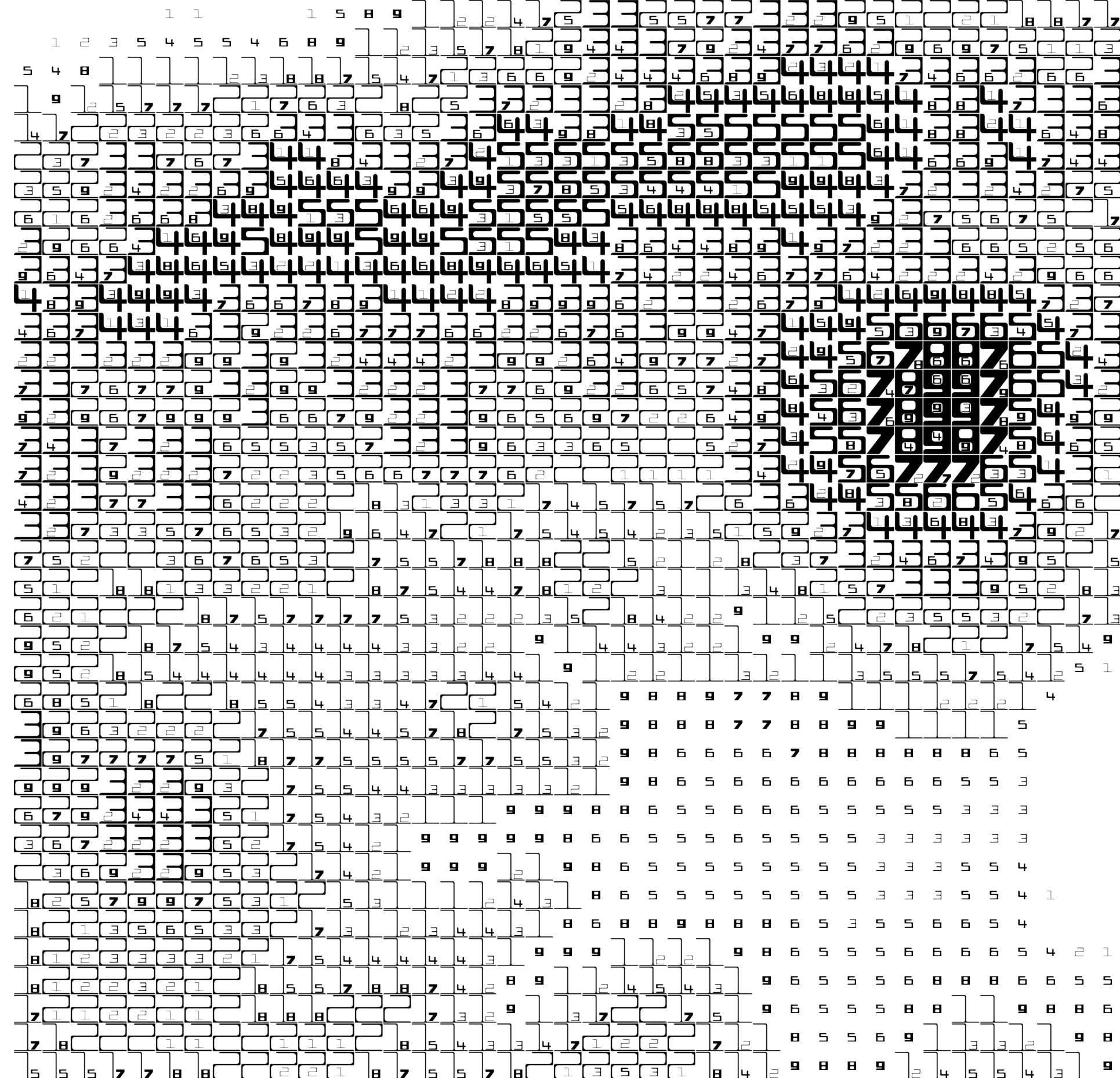
Killer circles threaten America

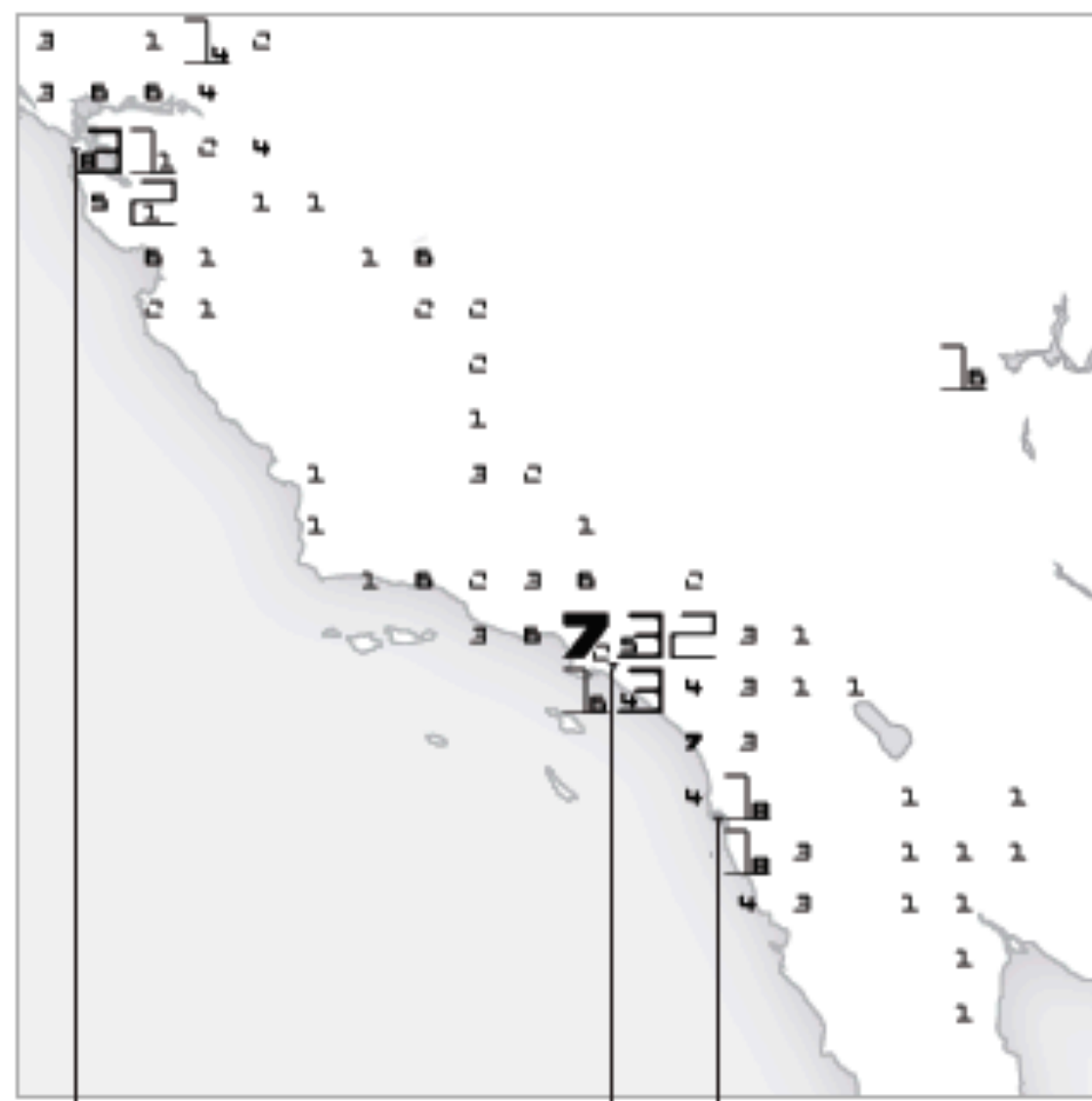
- No sides
- Area equal to πr^2
- Extremely round
- Often fatal
- North Dakota, New Mexico, Colorado remain circle-free



FatFonts

1 2 3 4 5 6 7 8 9

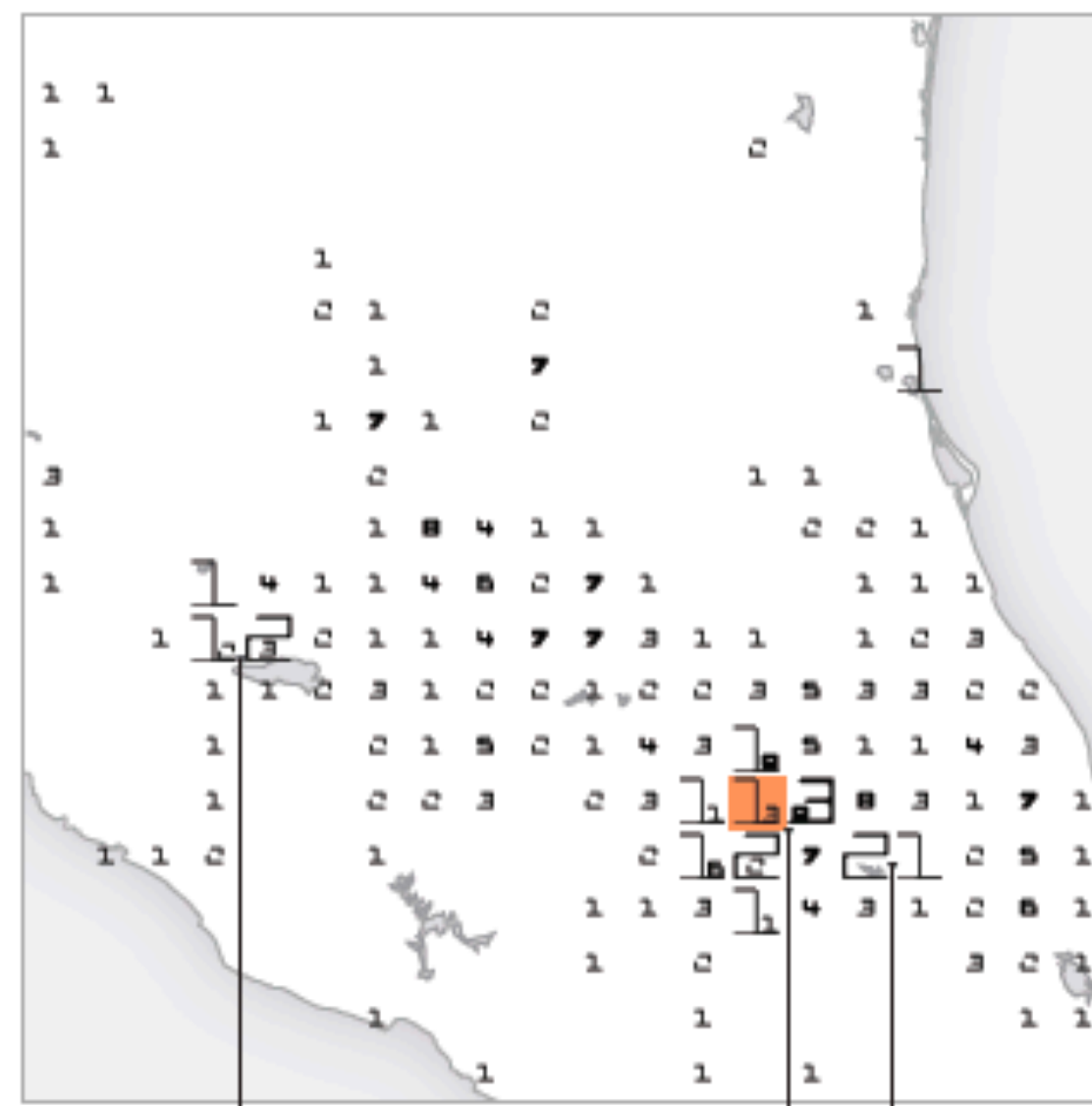




Los Angeles

San Francisco

San Diego



Guadalajara

Mexico City

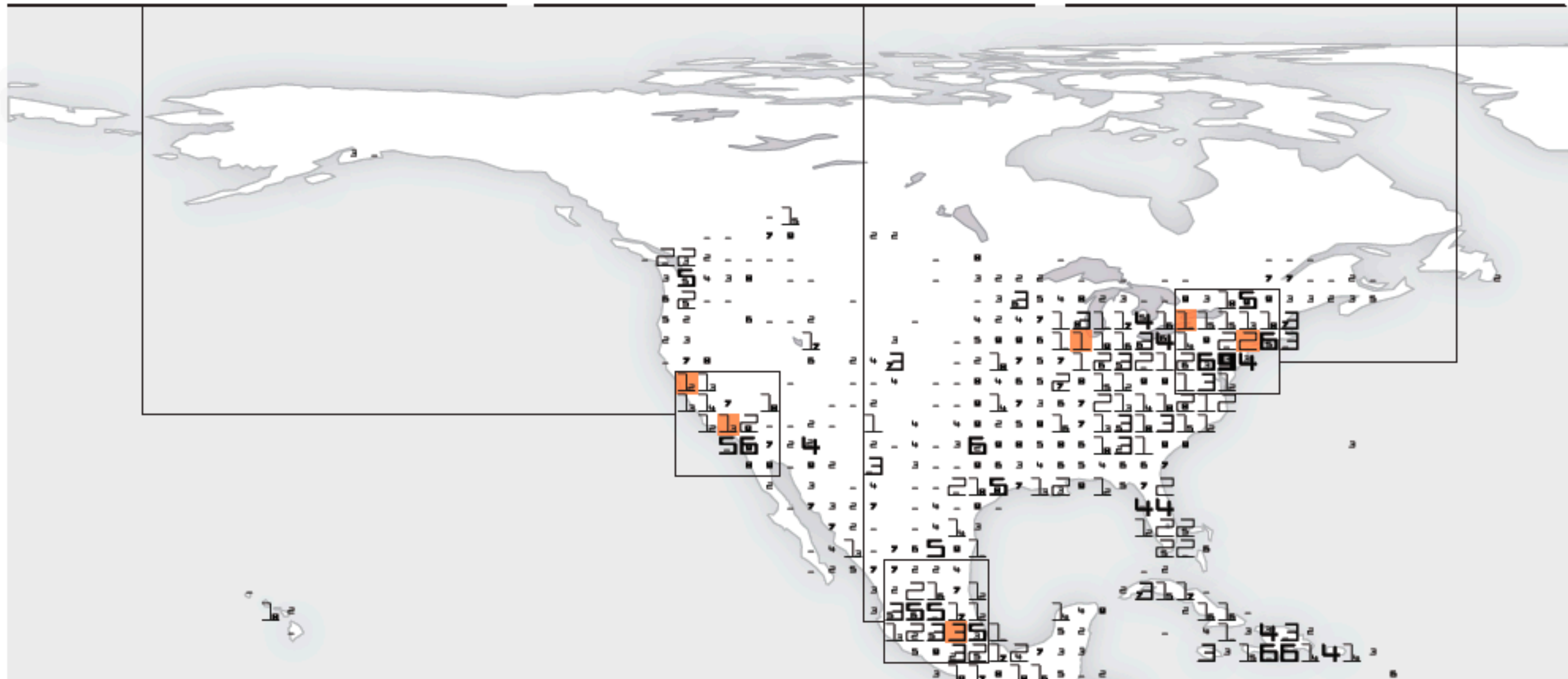
Puebla



Toronto

Washington

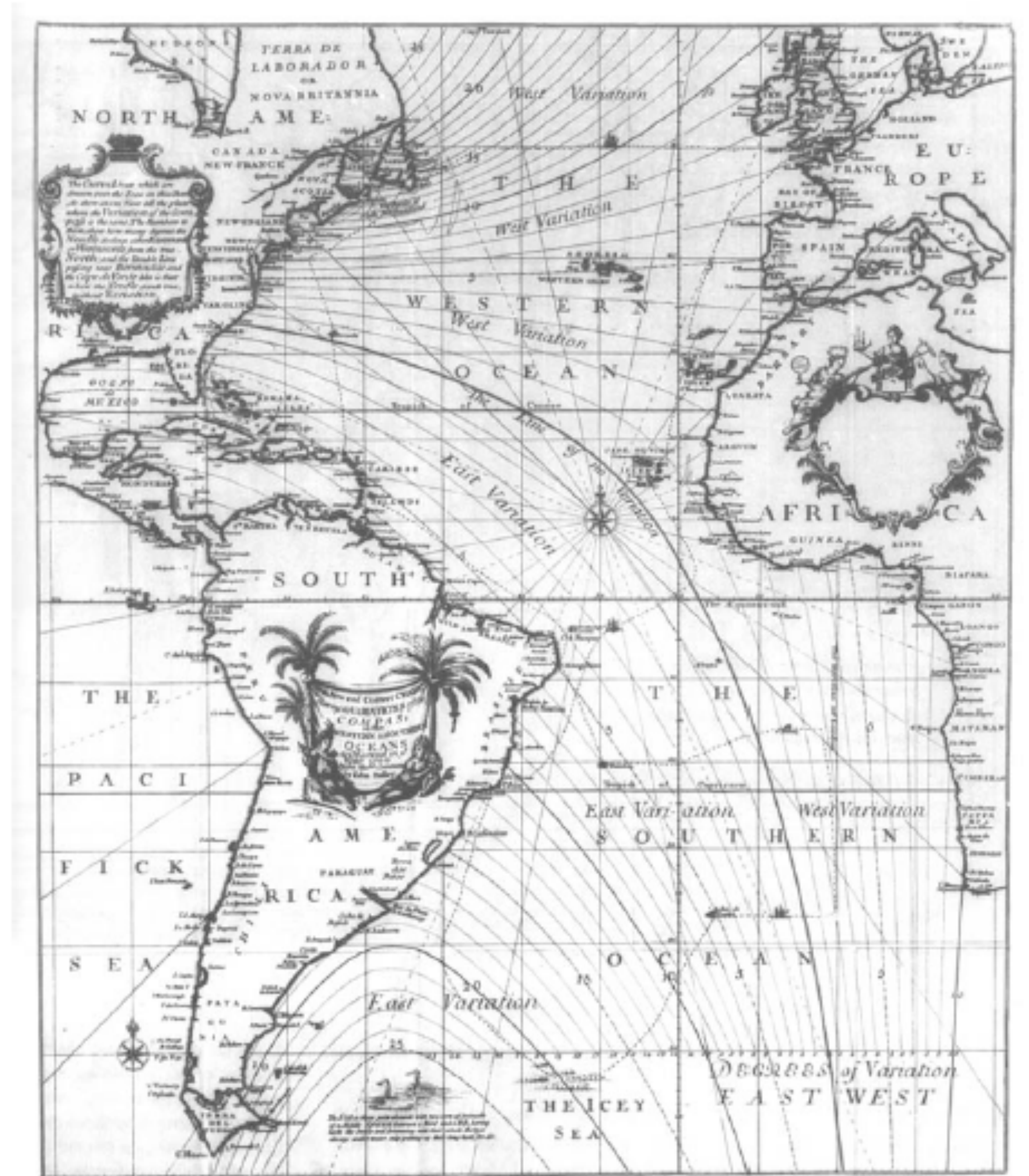
New York City

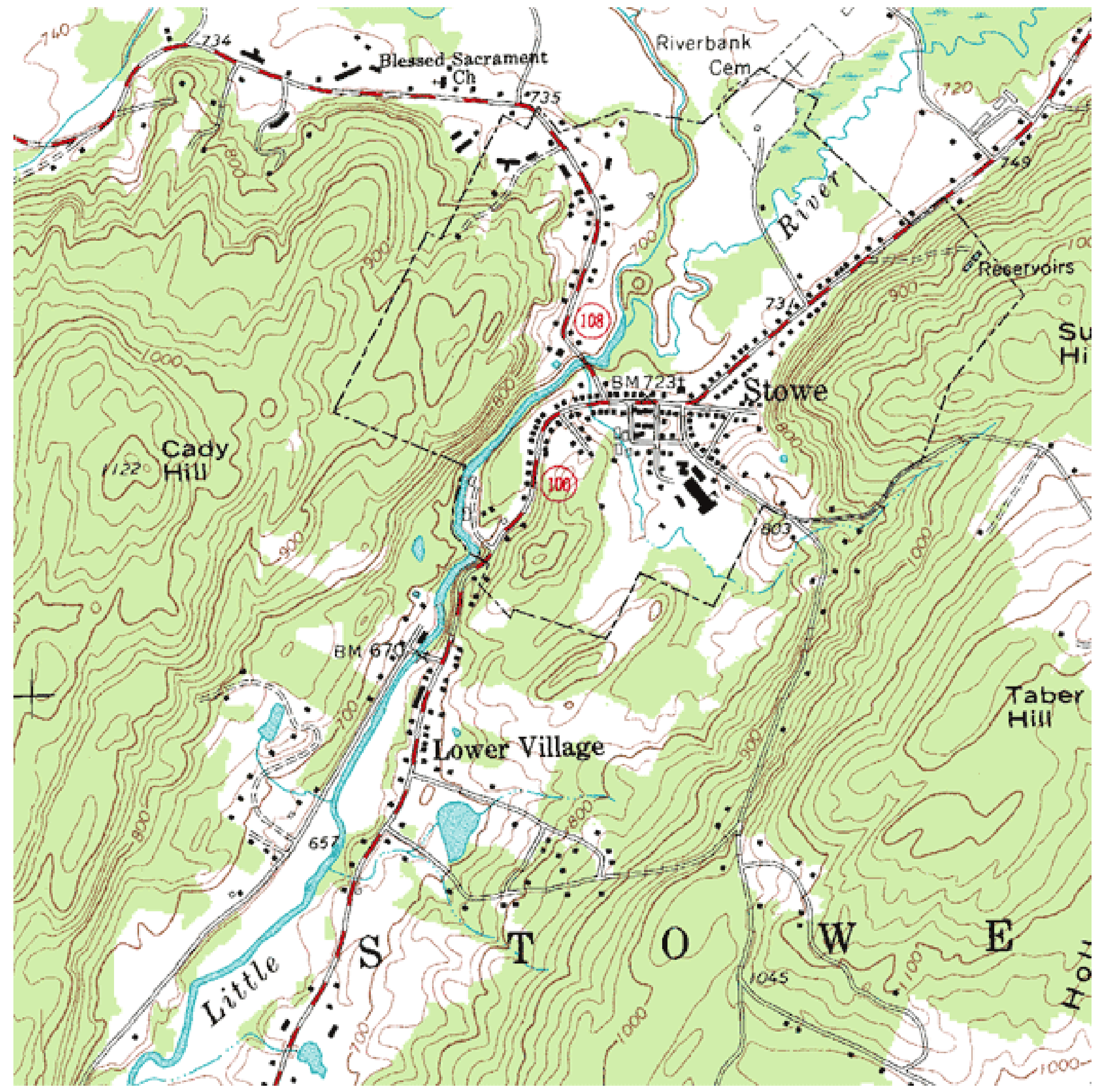


Contour (Isopleth) Maps

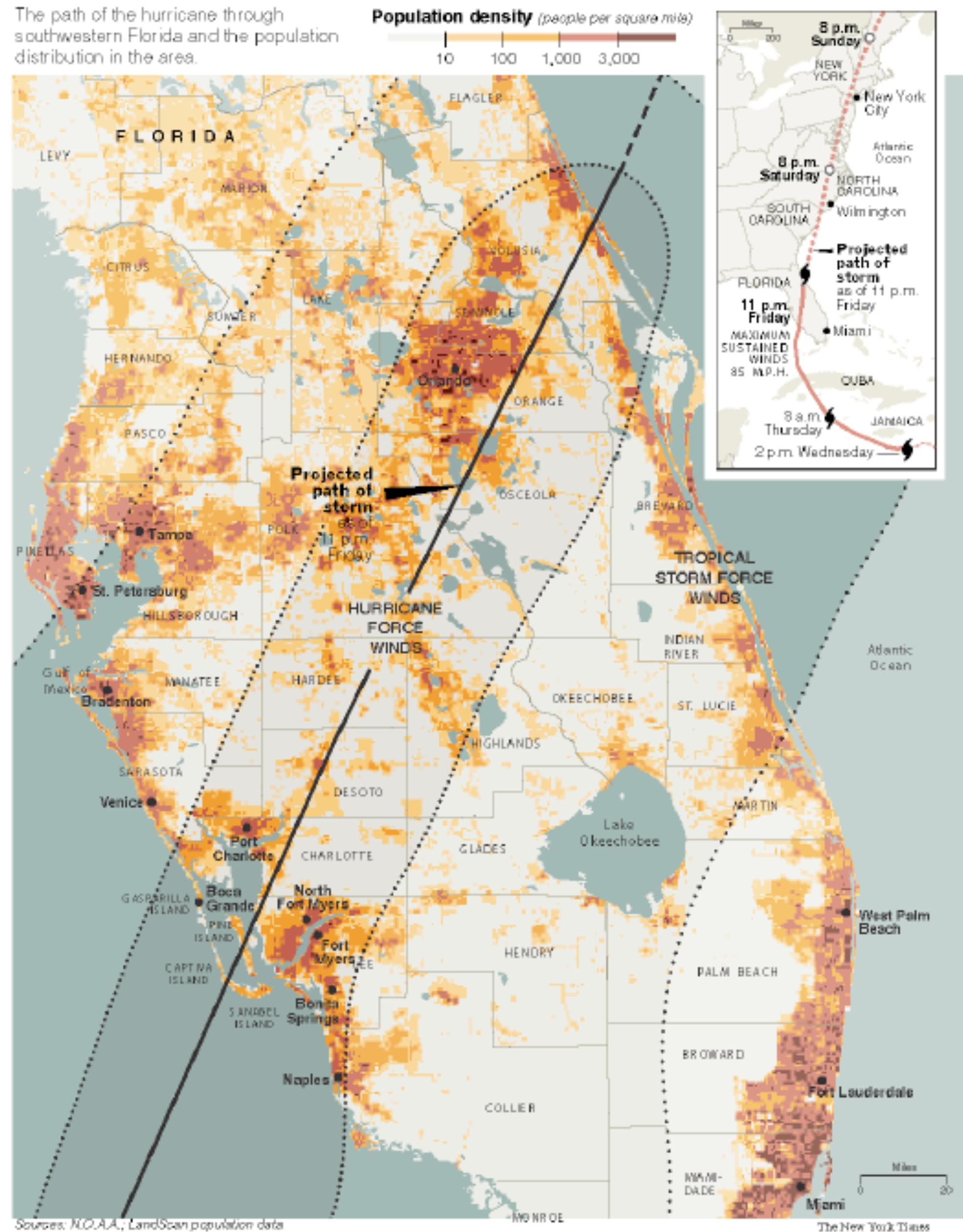
Early Contour Map

Halley's lines of equal magnetic declination, 1701

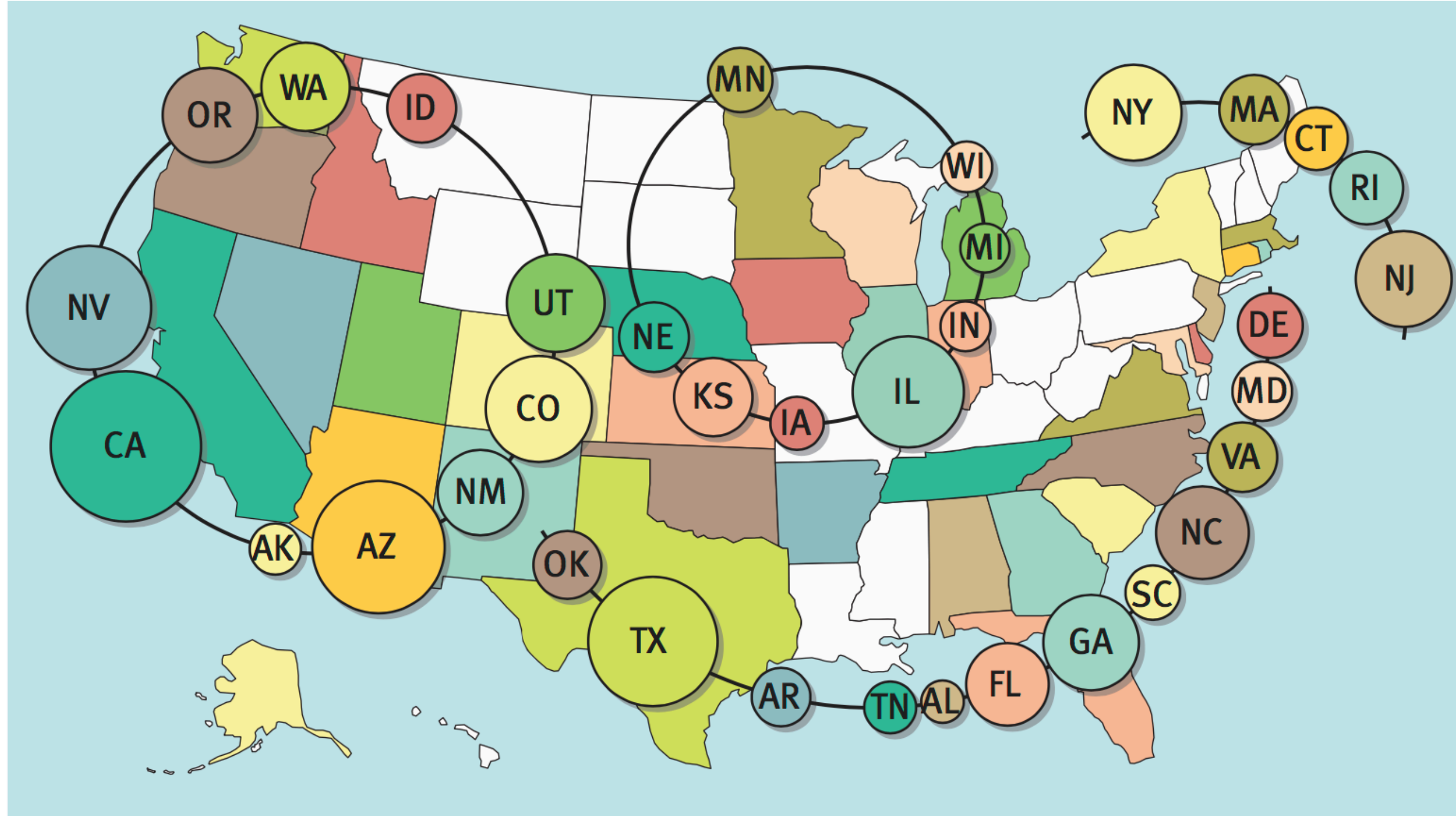




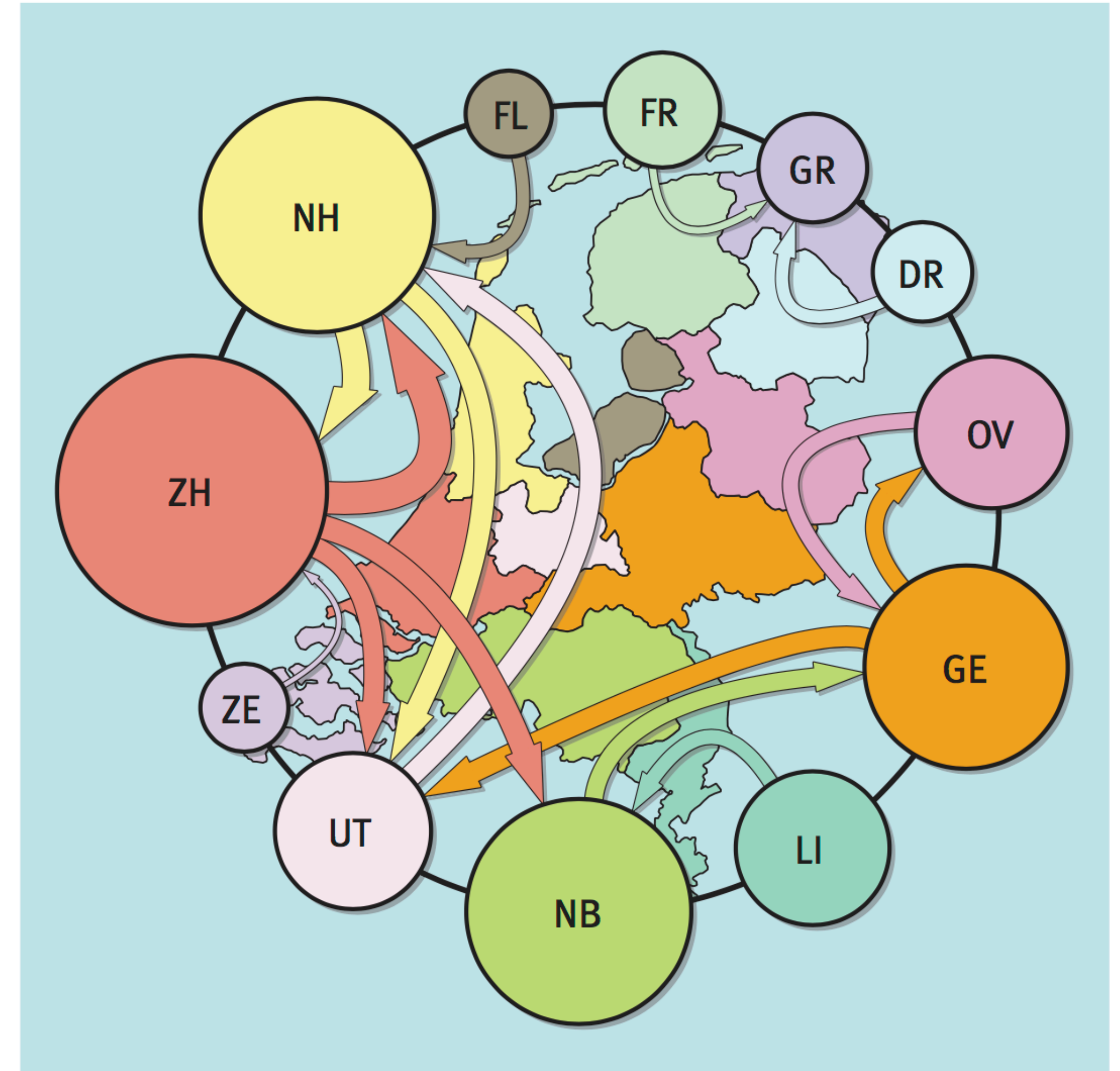
The path of the hurricane through southwestern Florida and the population distribution in the area.



Design Critique: Necklace Maps

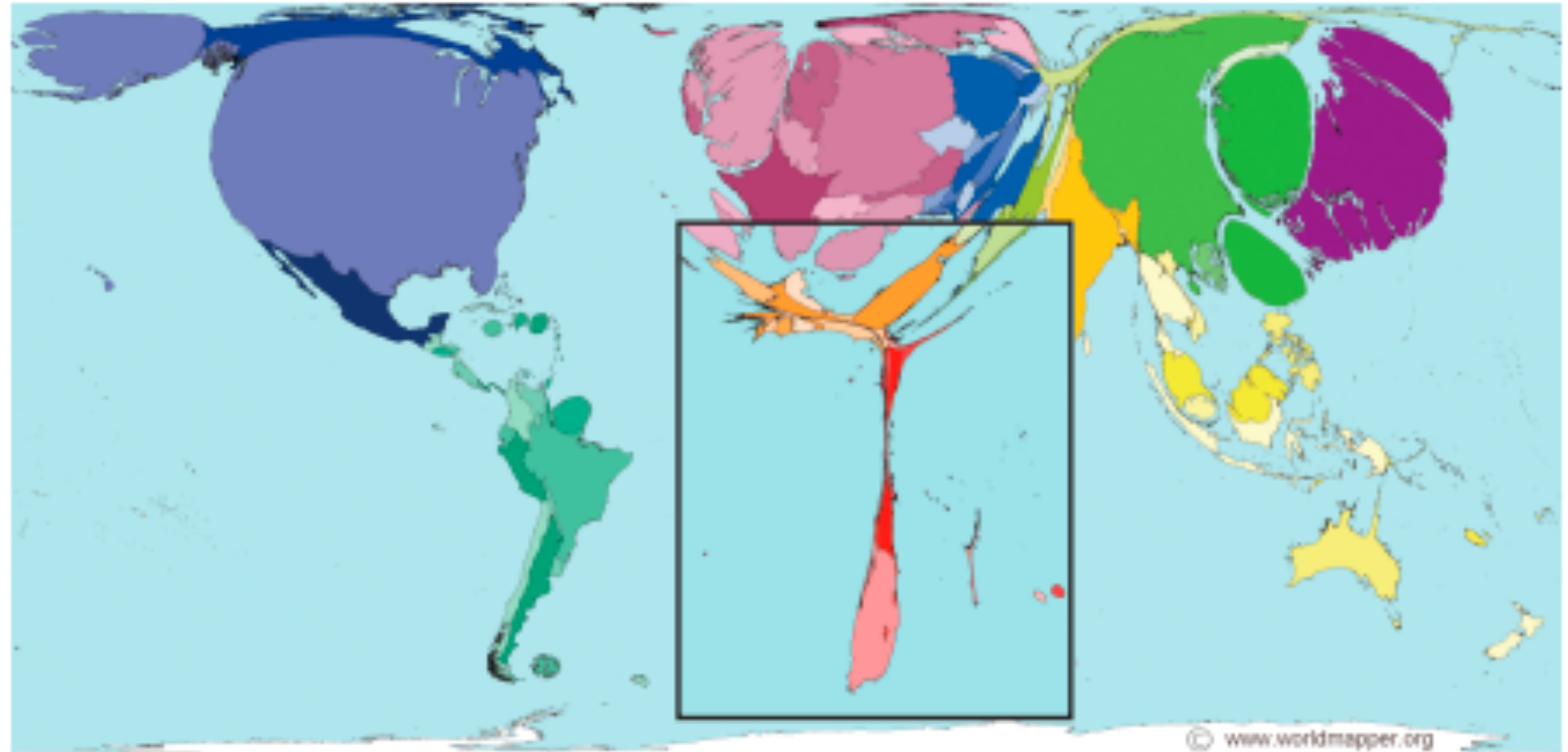
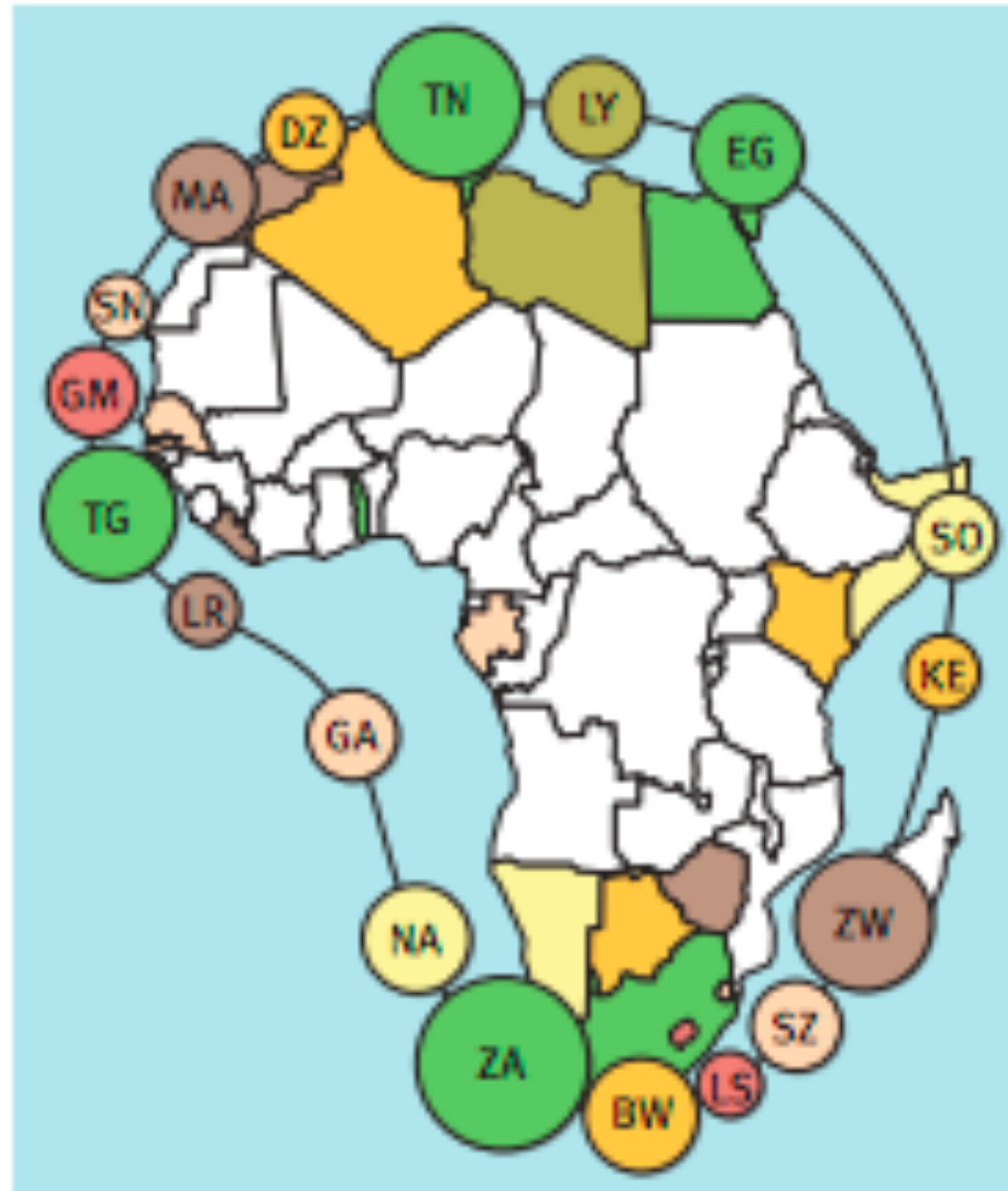


Illegal Immigrants in the US



Migration in the Netherlands

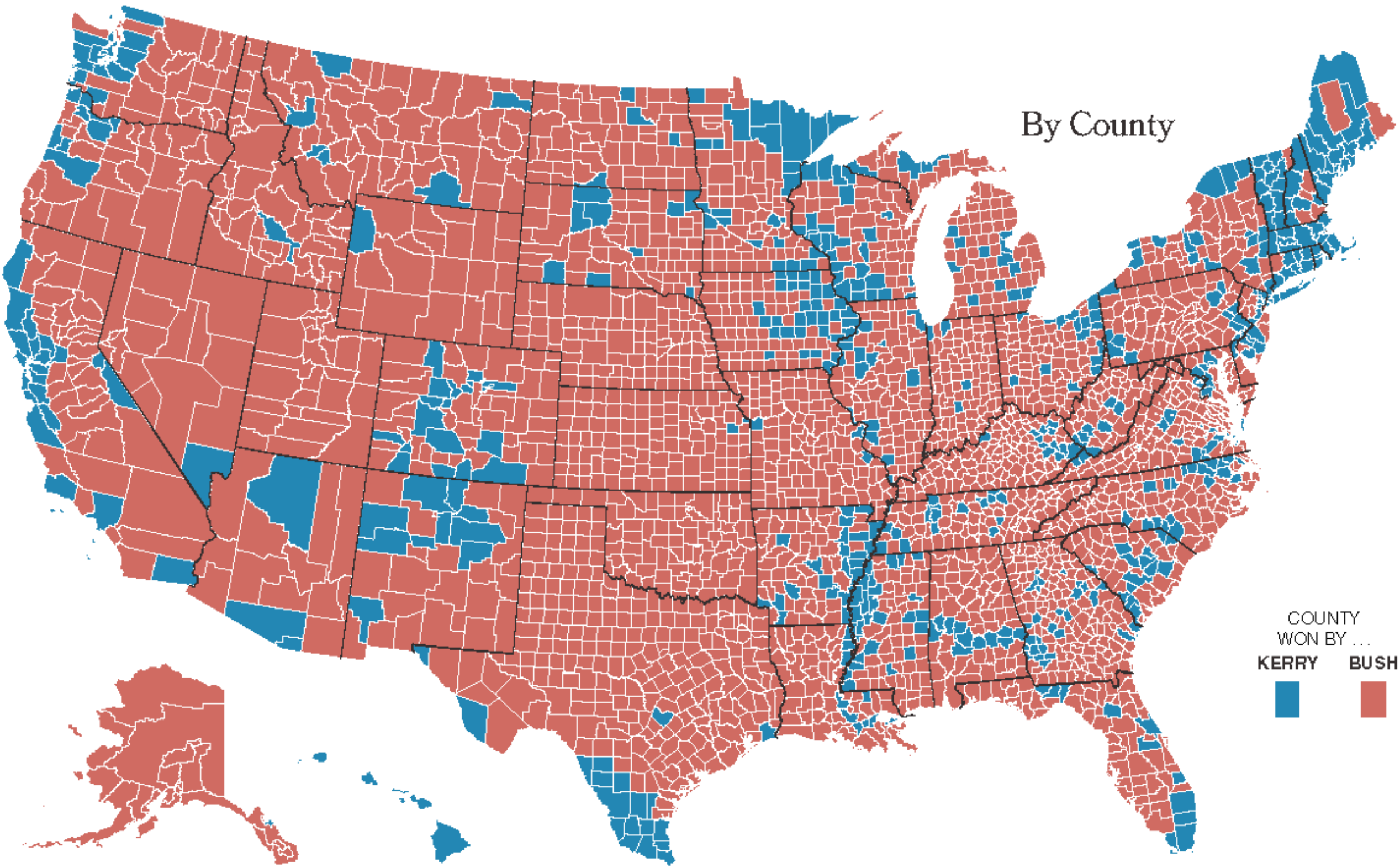
Necklace Maps



Internet Users in Africa

Cartograms

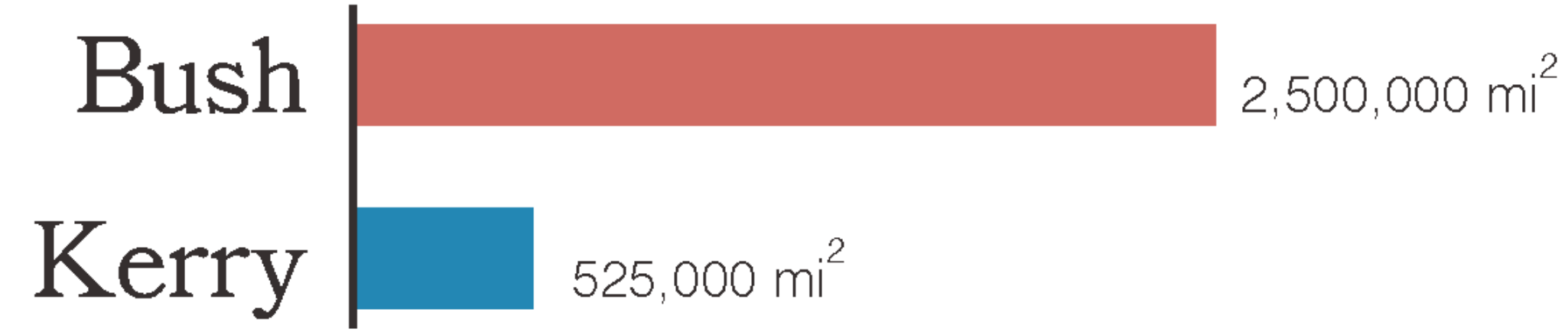
Again: Size vs Data effect



2004 Popular Vote



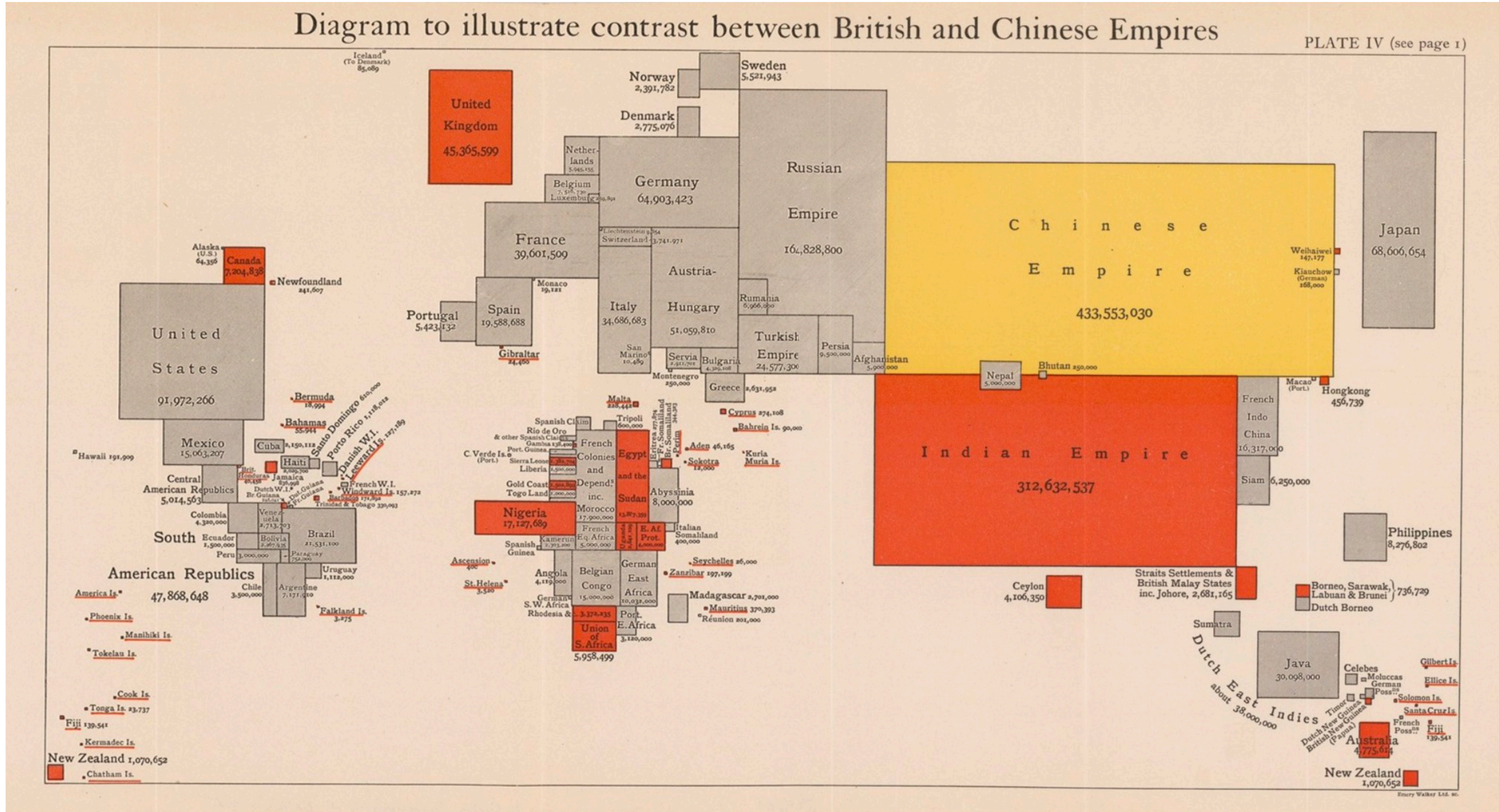
Amount of red and blue shown on map



What if we just change the size on the map?

Compromise between geospatial accuracy and quality of data encoding.

World Population in 1916



<https://twitter.com/lisacrost/status/860507536797163522/photo/1>

<https://digital.library.cornell.edu/catalog/ss:3293861>

World Population in 2018

World Population in 2018

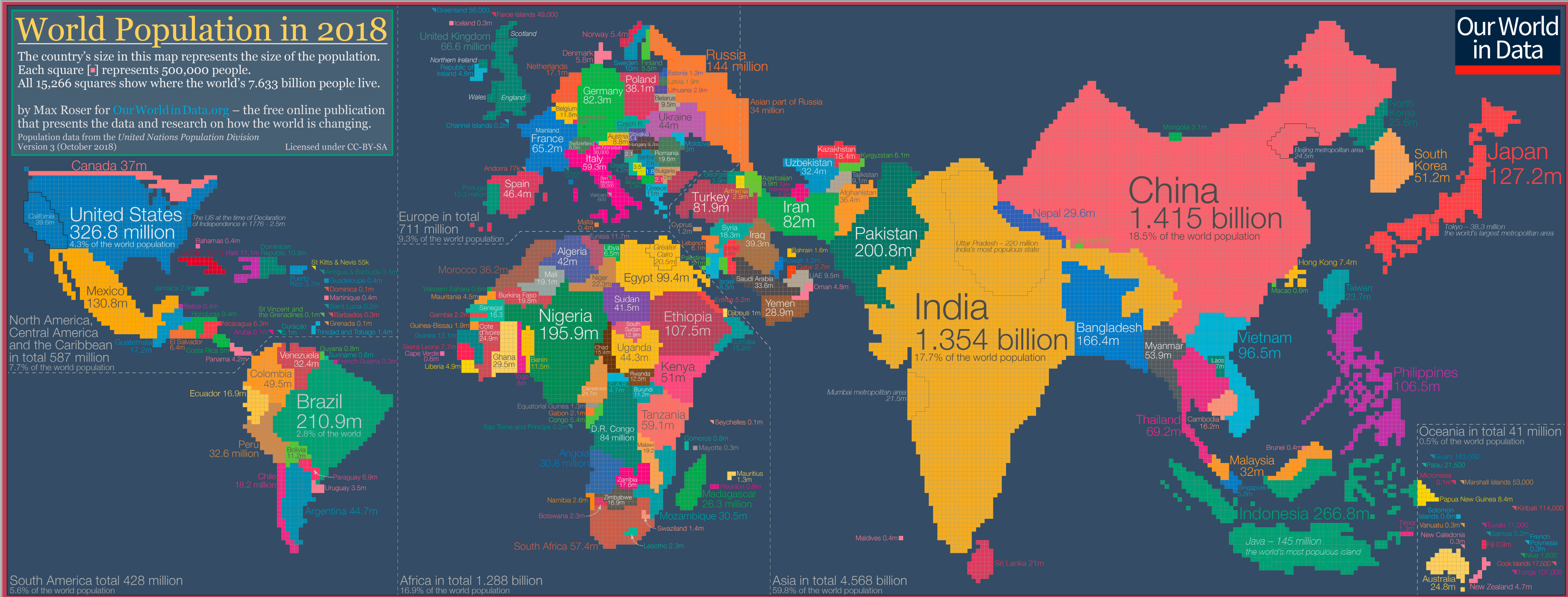
The country's size in this map represents the size of the population. Each square [] represents 500,000 people. All 15,266 squares show where the world's 7.633 billion people live.

by Max Roser for OurWorldinData.org – the free online publication that presents the data and research on how the world is changing.

Population data from the *United Nations Population Division* Version 3 (October 2018)

Licensed under CC-BY-SA

OurWorld
in Data

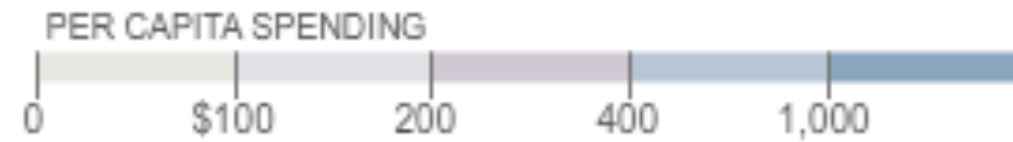


What Your Global Neighbors Are Buying

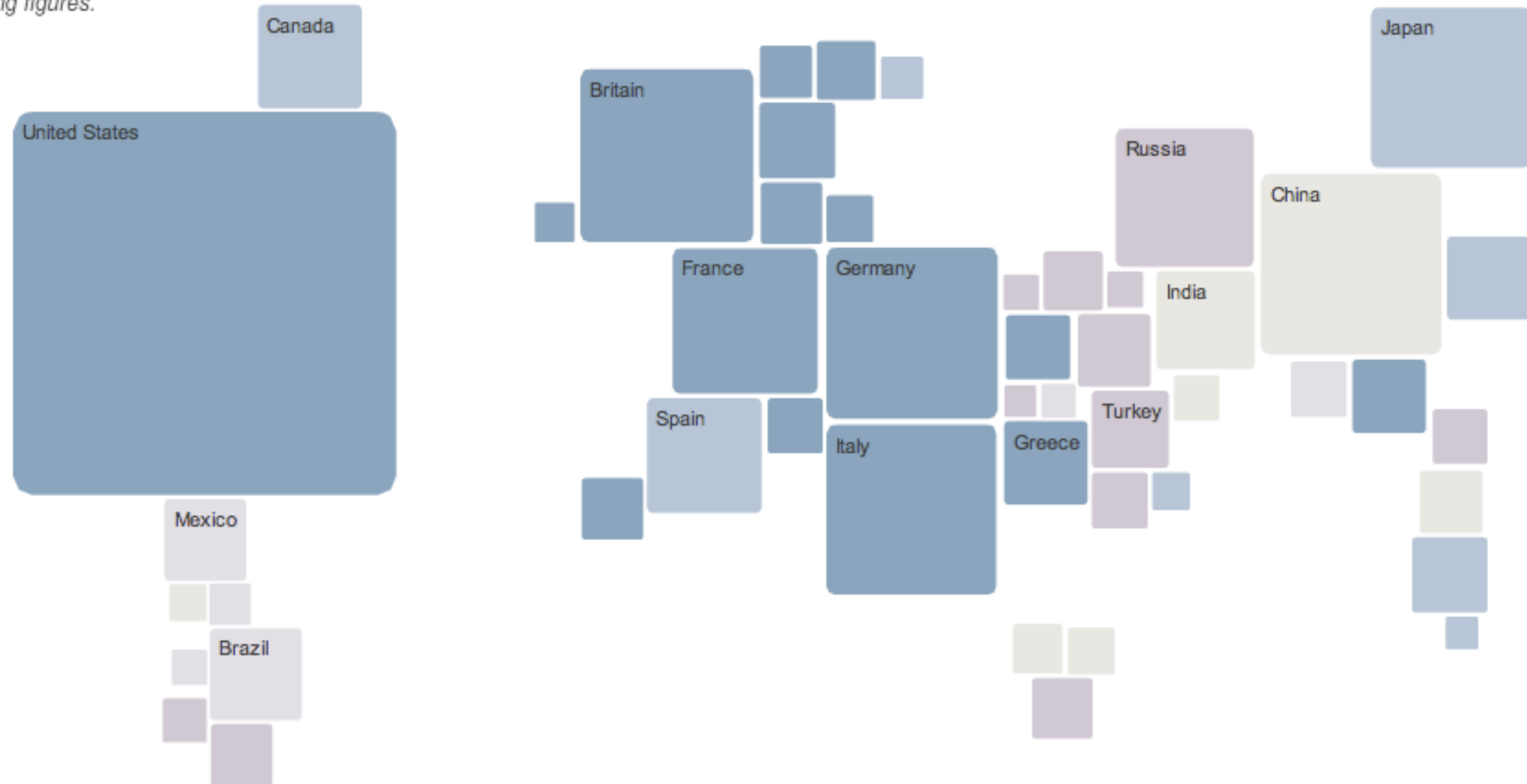
How people spend their discretionary income – the cash that goes to clothing, electronics, recreation, household goods, alcohol – depends a lot on where they live. People in Greece spend almost 13 times more money on clothing as they do on electronics. People living in Japan spend more on recreation than they do on clothing, electronics and household goods combined. Americans spend a lot of money on everything. [Related Article](#)

CLOTHING & FOOTWEAR | ELECTRONICS | ALCOHOL & TOBACCO | HOUSEHOLD GOODS | RECREATION

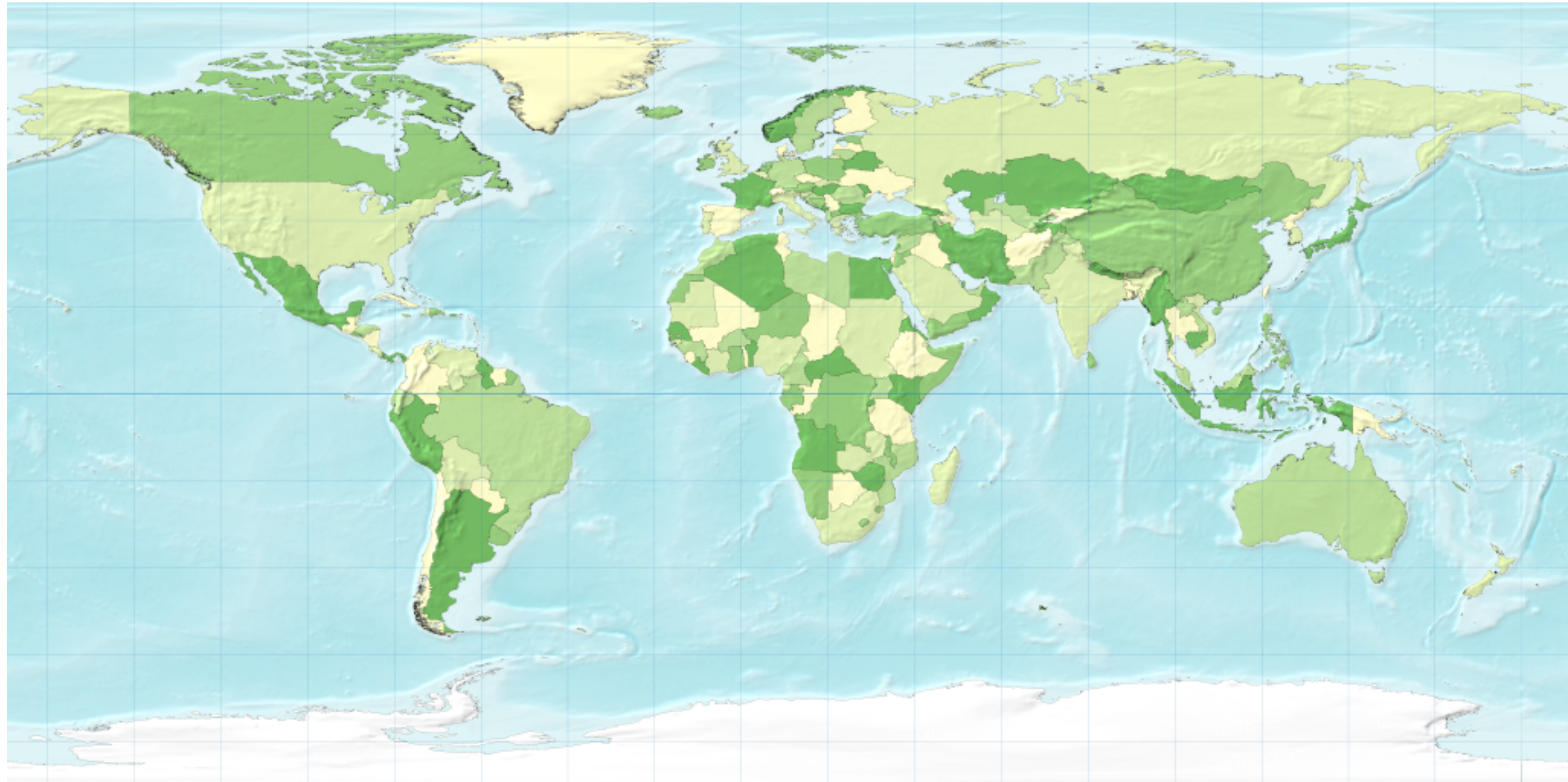
Boxes represent selected countries and are scaled according to total spending in 2007.



Roll over countries to see spending figures.



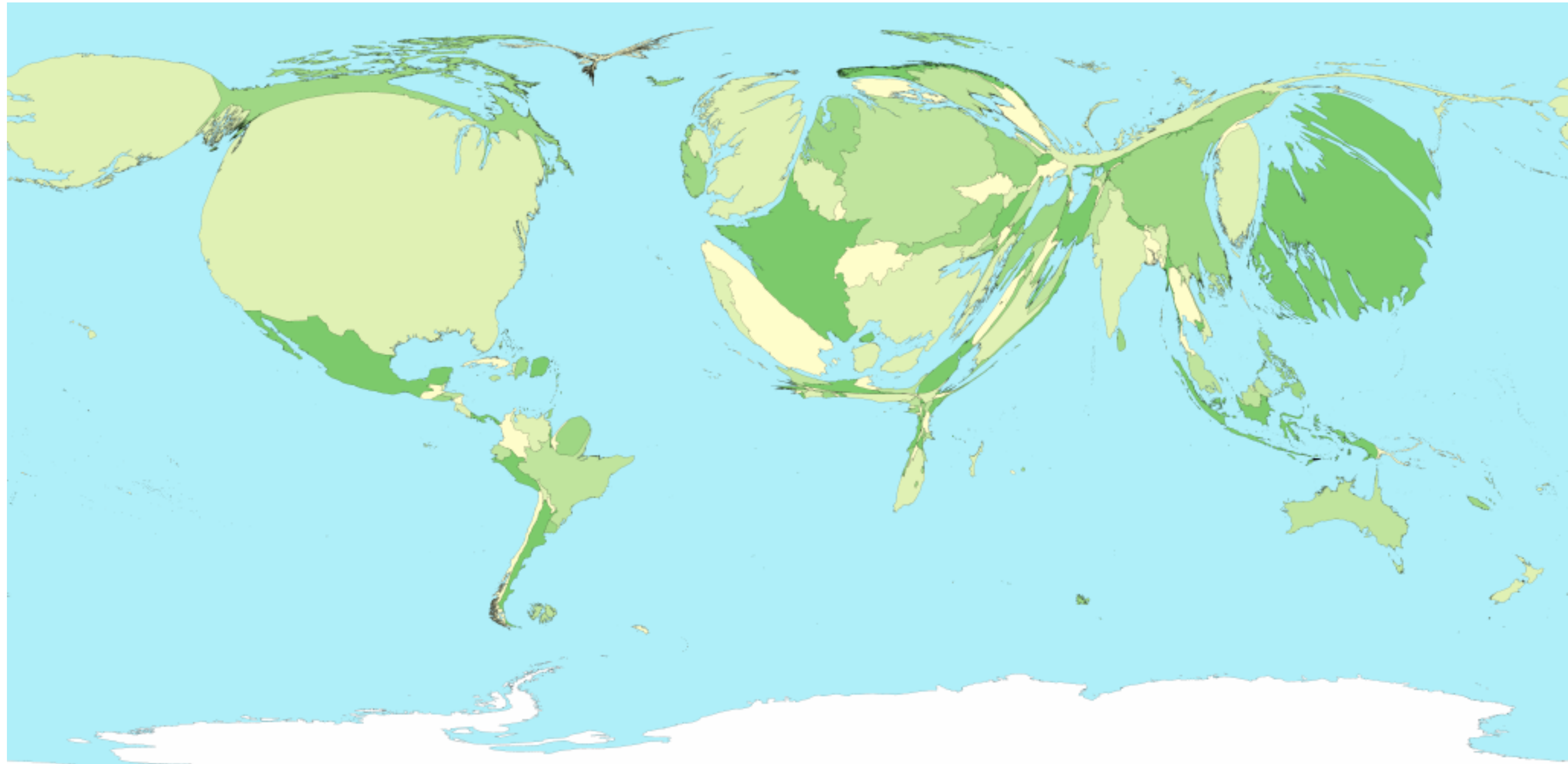
The World



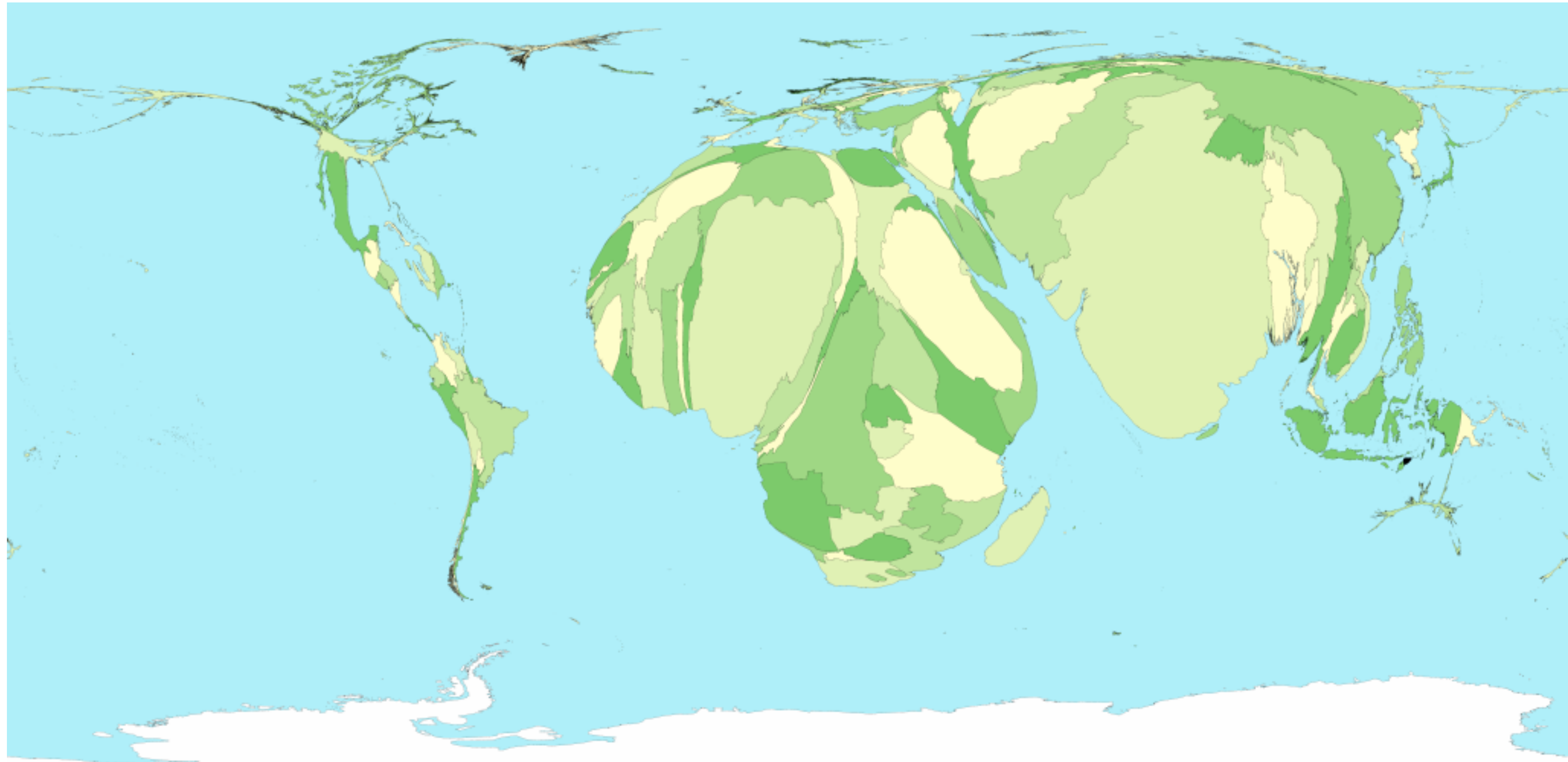
Population



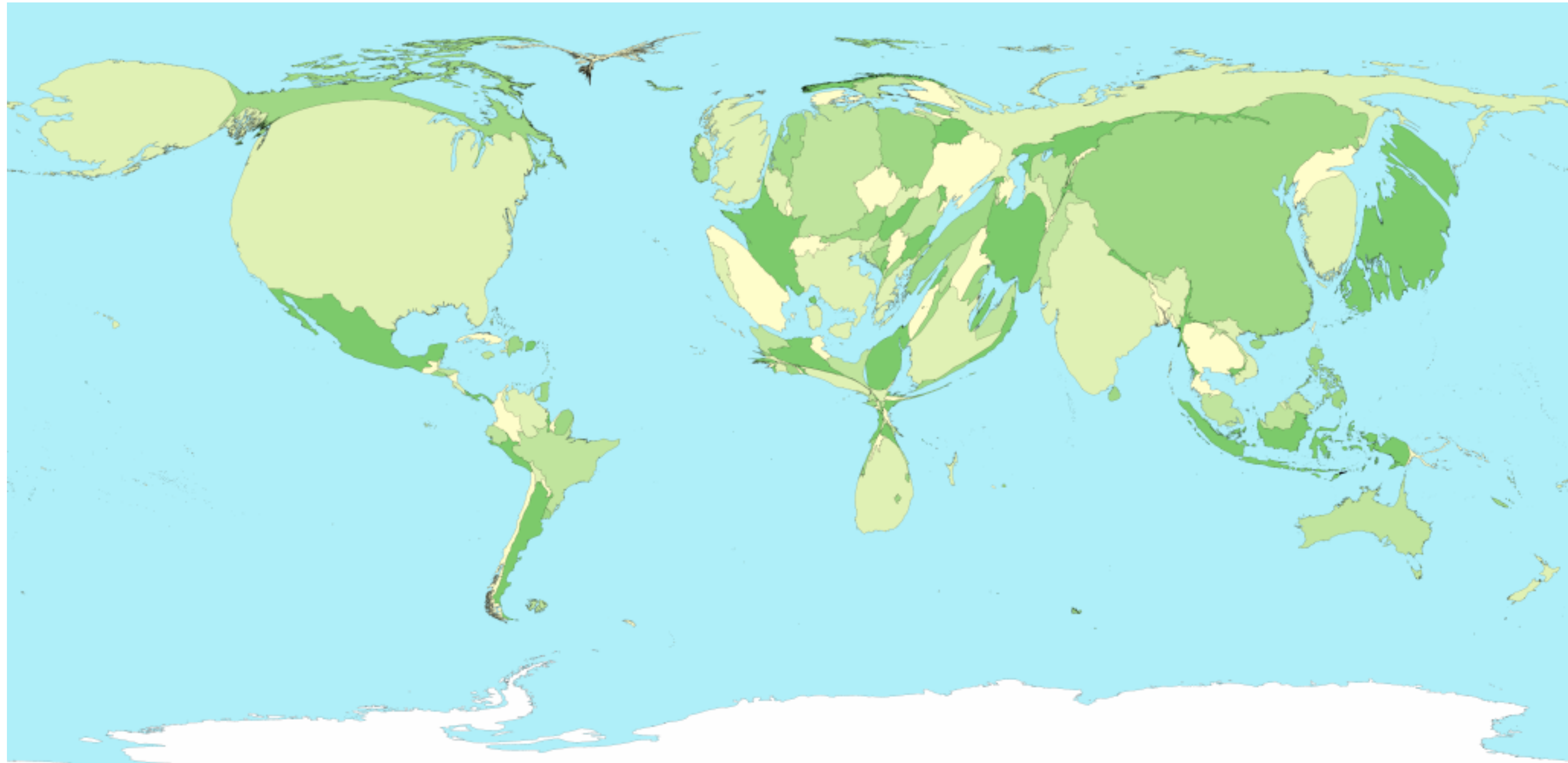
GDP



Child Mortality



Greenhouse Emissions



Kerry vs. Bush 2004



Michael Gastner,
Cosma Shalizi, and
Mark Newman
University of Michigan

House Election Results: Democrats Take Control

230

Democrats

Gained 35 seats
54,505,369 votes (51.8%)

7

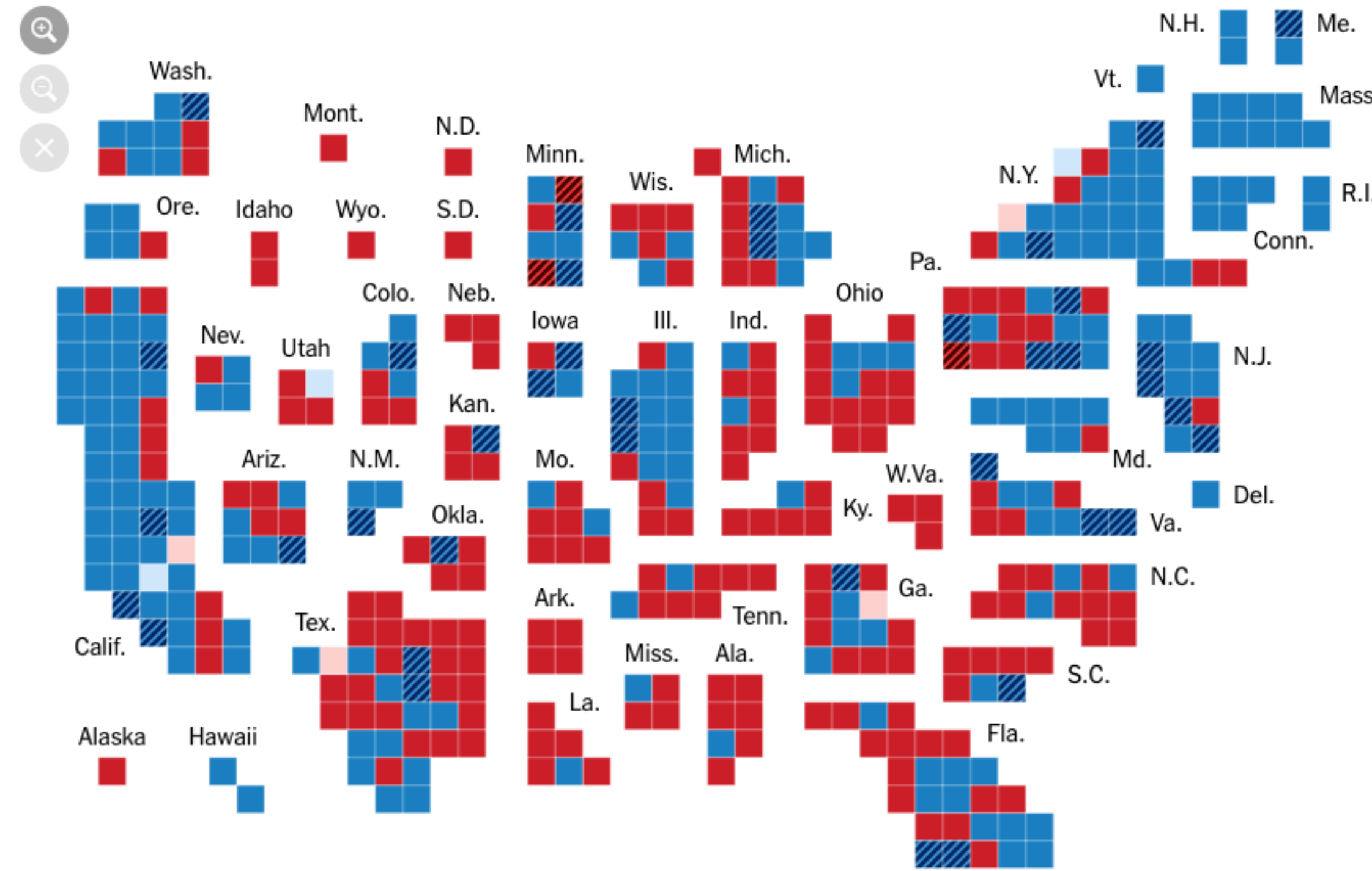
undecided

218
FOR CONTROL

198

Republicans

Lost 35 seats
48,955,236 votes (46.5%)



Map Cartogram

Dem. Lead Win Flip Rep. Lead Win Flip Other Lead Win Flip

One-party rule in Washington is over, at least for the next two years. Democrats won the seats needed to take the House after capturing districts where President Trump is unpopular.

Key States to Watch Florida > New Jersey > New York > Pennsylvania > California >

Key Races 80 Total

Dem. favored		Tossup		Rep. favored	
DISTRICT	MARGIN	DISTRICT	MARGIN	DISTRICT	MARGIN
Ariz. 2	✓	Calif. 10	✓	N.Y. 11	✓
Calif. 49	✓	Calif. 25	✓	S.C. 1	✓
Colo. 6	✓	Calif. 48	✓	Minn. 8	✓
Fla. 27	✓	Fla. 26	✓	Pa. 14	✓
Iowa 1	✓	Ga. 6	✓	Alaska	✓
Ill. 6	✓	Iowa 3	✓	Calif. 50	✓
Kan. 3	✓	Ill. 14	✓	Fla. 6	✓
Mich. 11	✓	Me. 2	✓	Fla. 16	✓
Minn. 2	✓	Mich. 8	✓	Fla. 18	✓
Minn. 3	✓	N.J. 3	✓	Fla. 25	✓
N.J. 2	✓	N.J. 7	✓	Iowa 4	✓
N.J. 11	✓	N.M. 2	✓	Ill. 12	✓
Pa. 6	✓	N.Y. 19	✓	Ill. 13	✓
Pa. 7	✓	Tex. 7	✓	Mich. 6	✓
Pa. 17	✓	Tex. 32	✓	Mo. 2	✓
Va. 10	✓	Va. 2	✓	Mont.	✓
Wash. 8	✓	Va. 7	✓	N.C. 2	✓
Ariz. 1	✓	Calif. 45	D+1.6	Neb. 2	✓
Nev. 3	✓	N.Y. 22	D+0.6	N.Y. 24	✓
Nev. 4	✓	Utah 4	D+0.4	Ohio 1	✓
		Minn. 1	✓	Pa. 16	✓
		Fla. 15	✓	Tex. 22	✓
		Kan. 2	✓	Va. 5	✓
		Ky. 6	✓	Wash. 3	✓
		N.C. 9	✓	Wash. 5	✓
		N.C. 13	✓	Wis. 1	✓
		Ohio 12	✓	W.Va. 3	✓
		Pa. 1	✓	Ga. 7	R+0.4
		Pa. 10	✓	N.Y. 27	R+1.1
		Calif. 39	R+0.0	Tex. 23	R+0.5

Democrats ✓

230 +35

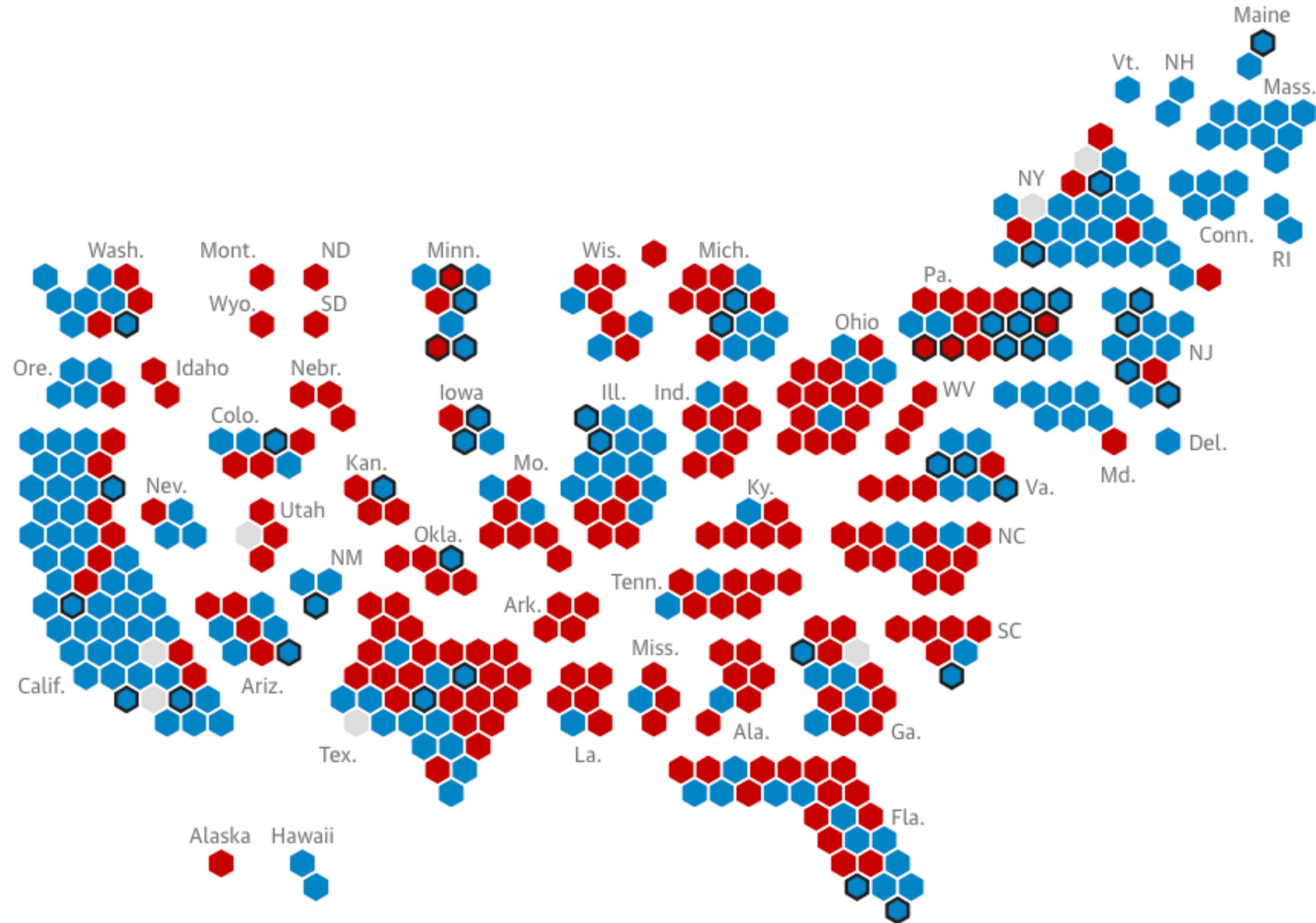
Republicans

-35 198

218

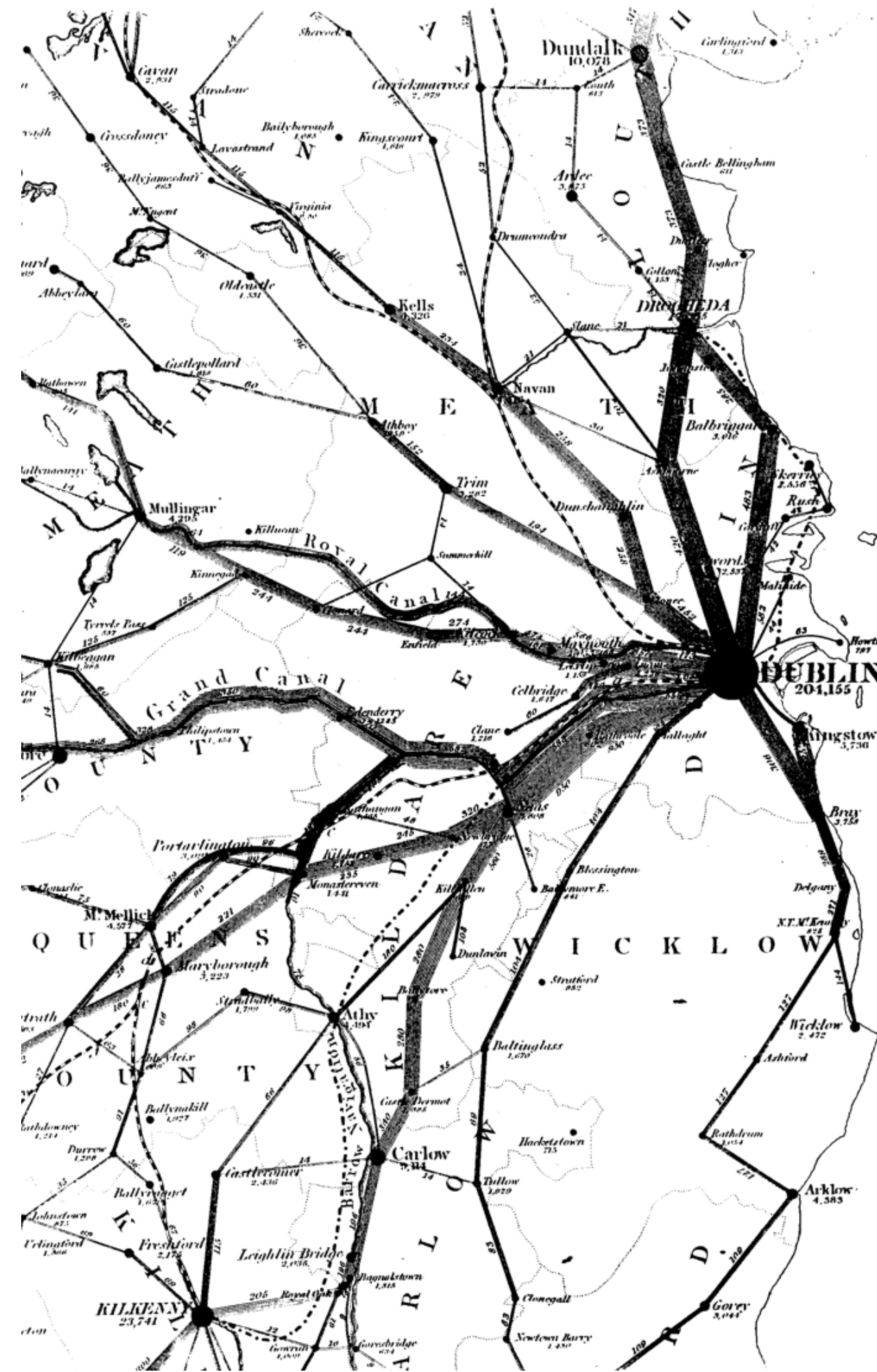


428 of 435 races called



Flow Maps

Early Flow Map



Transportation of Passengers
in Ireland
Henry Drury Harness, 1837

Carte Figurative des pertes successives en hommes de l'Armée Française dans la Campagne de Russie 1812-1813.

Dessinée par M. Minard, Inspecteur Général des Ponts et Chaussées en retraite. Paris, le 20 Novembre 1869

Les nombres d'hommes présents sont représentés par les largeurs des zones colorées à raison d'un millimètre pour dix mille hommes; ils sont de plus écrits en lettres des zones. Le rouge désigne les hommes qui entrent en Russie, le noir ceux qui en sortent. — Les renseignements qui ont servi à dresser la carte ont été puisés dans les ouvrages de M. M. Chiers, de Légar, de Fezoriac, de Chambray et le journal inédit de Jacob, pharmacien de l'Armée depuis le 28 Octobre. Pour mieux faire juger à l'œil la diminution de l'armée; j'ai supposé que les corps de Lince Jérôme et du Maréchal Davout qui avaient été détachés sur Minsk et Mohilew et un régiment de Orcha et Witelsk, avaient toujours marché avec l'armée.

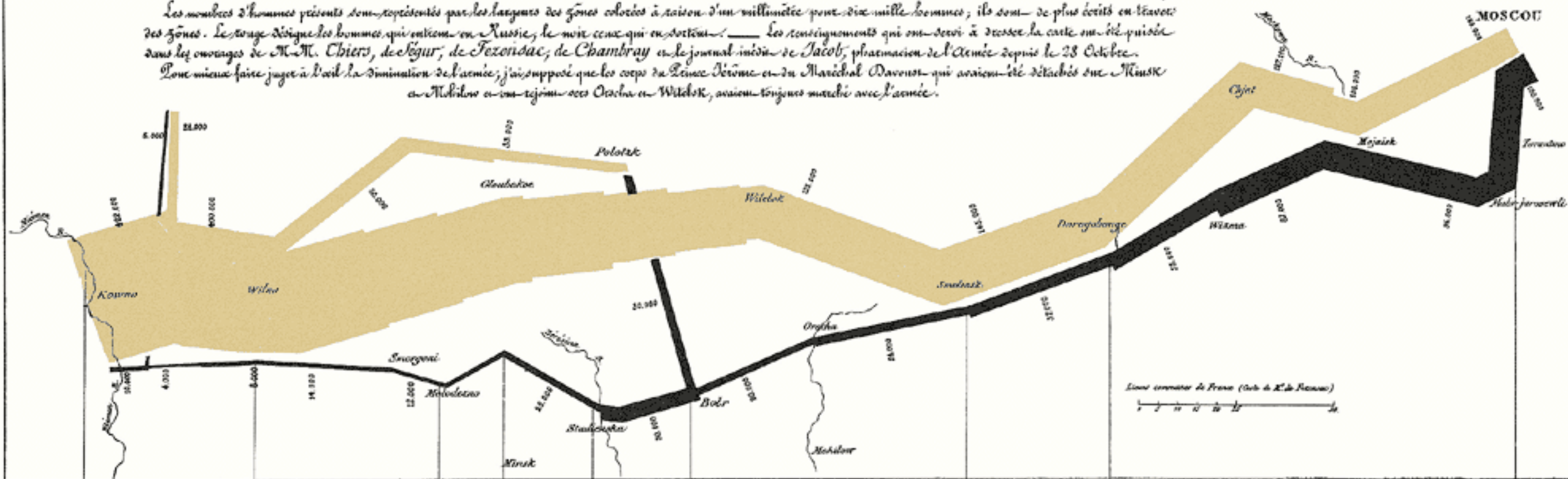
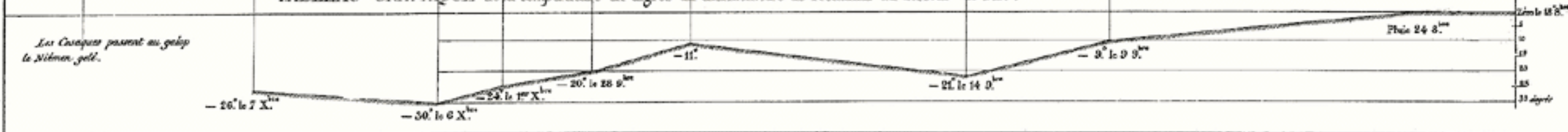


TABLEAU GRAPHIQUE de la température en degrés du thermomètre de Réaumur au dessous de zéro.



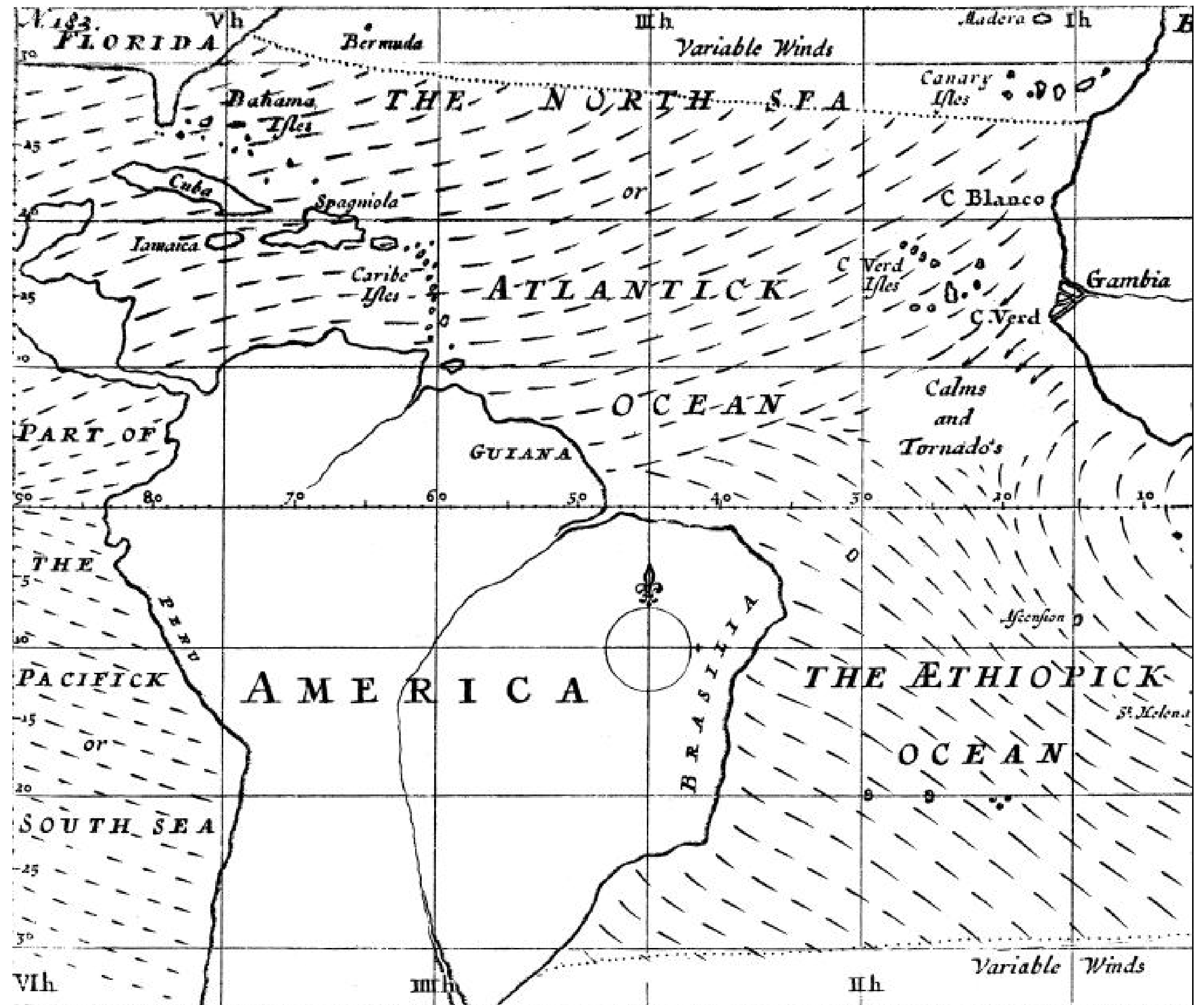
Les Cosaques passent au gélip le Nihmen gell.

Asses par Bagnier, à Paris 31 Mars 1877 à Paris.

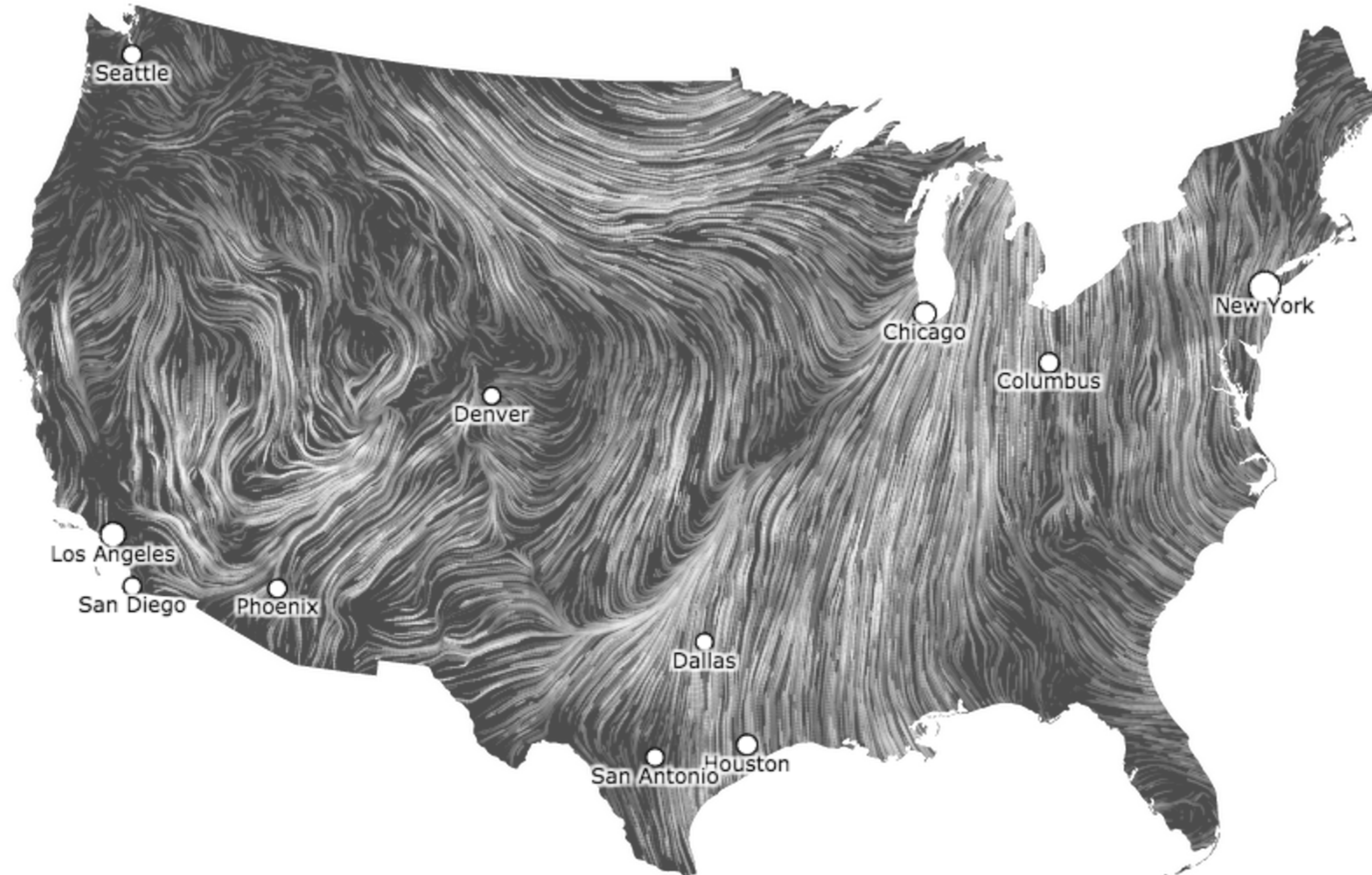
Imp. Lith. Régis et Cie.

Early Weather Map

Halley's wind map, 1686

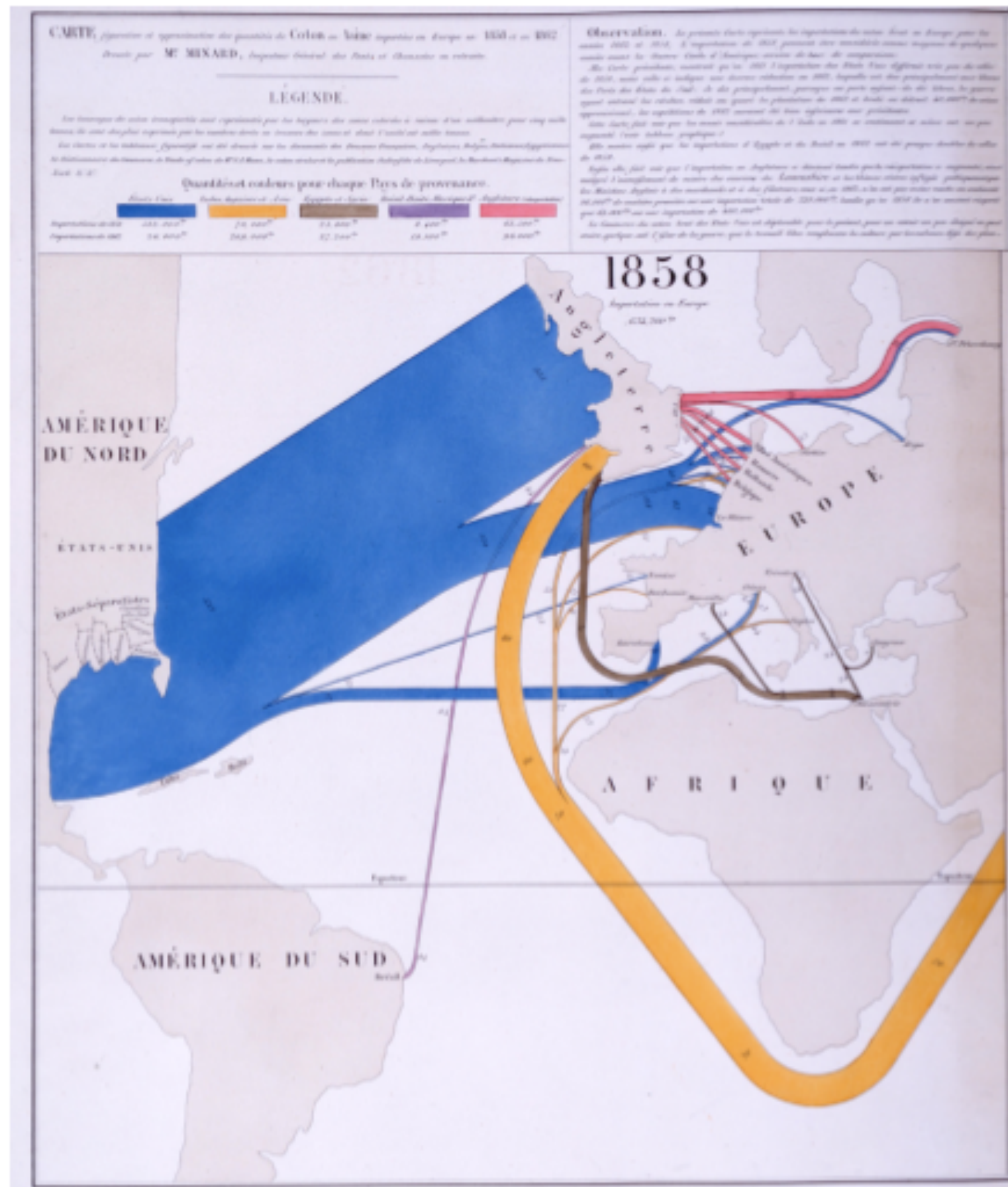


Wind Map

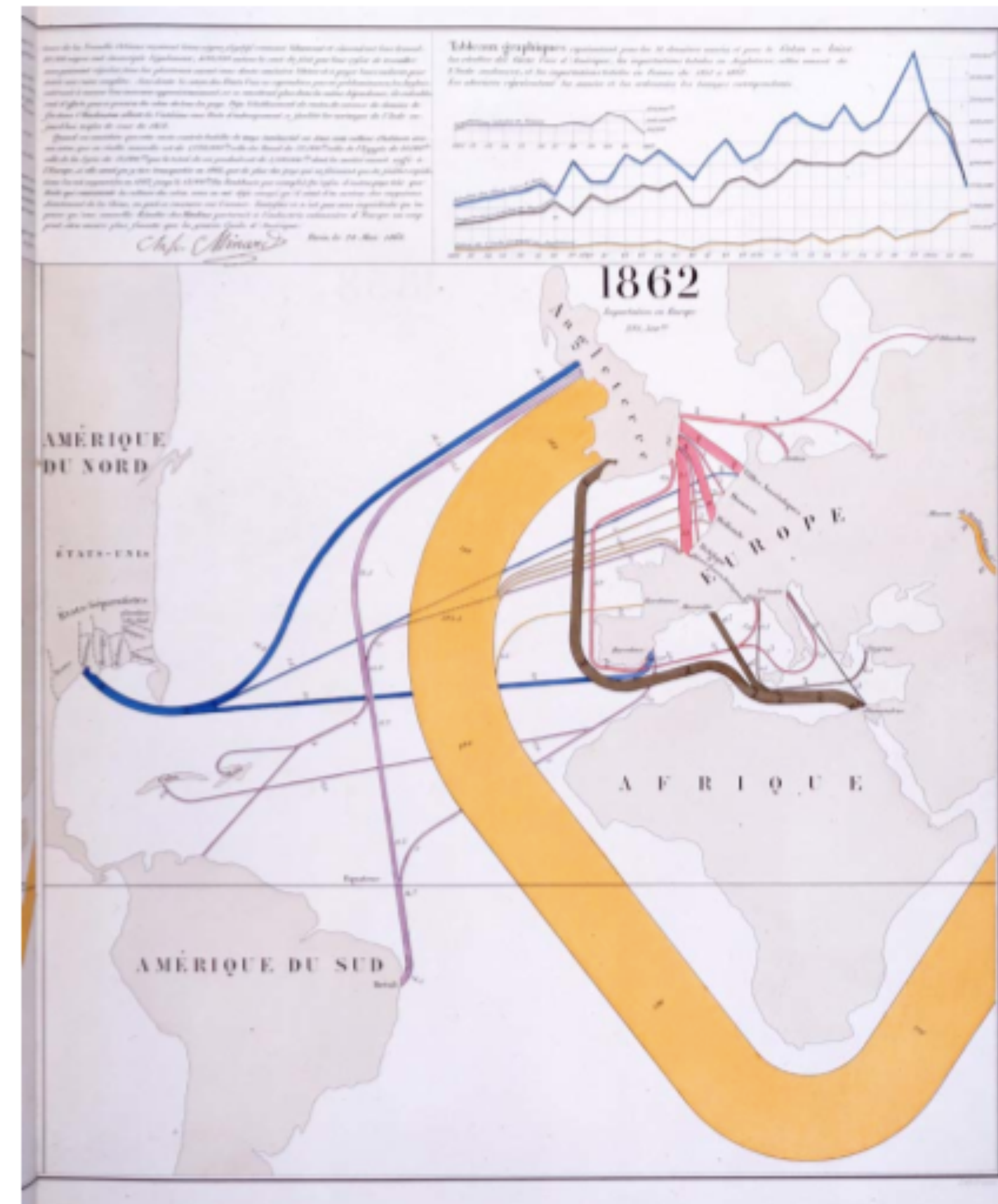


Effect of US Civil War on Cotton Trade

Before



After





11.5k

Share

1.7k

Tweet

440

Share

4.8k

Submit

385

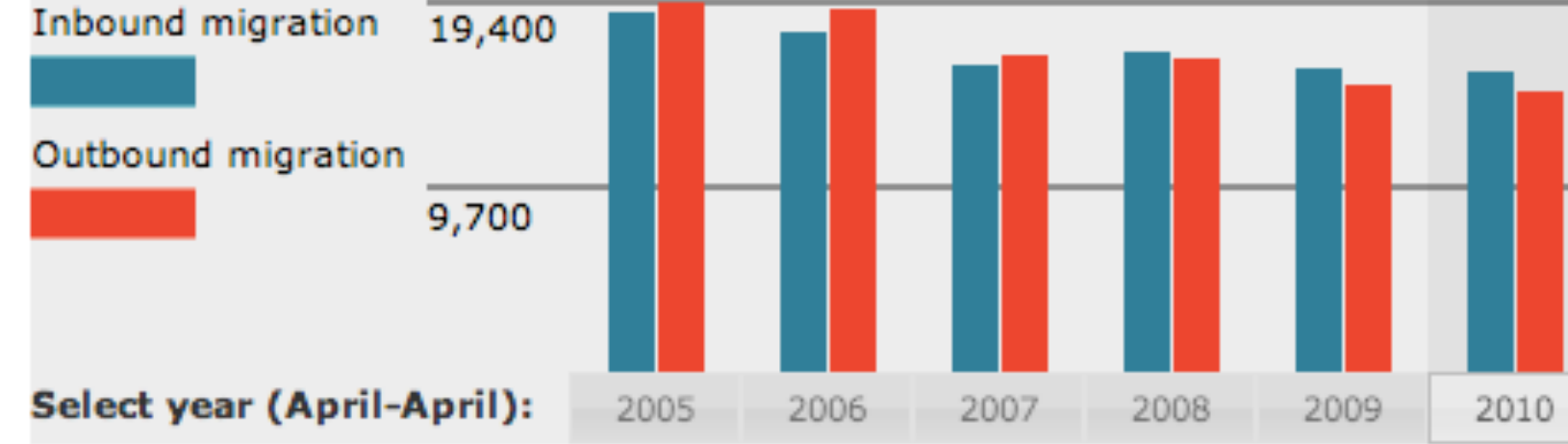
+1

791

reddit

Plymouth County (Brockton), Mass.

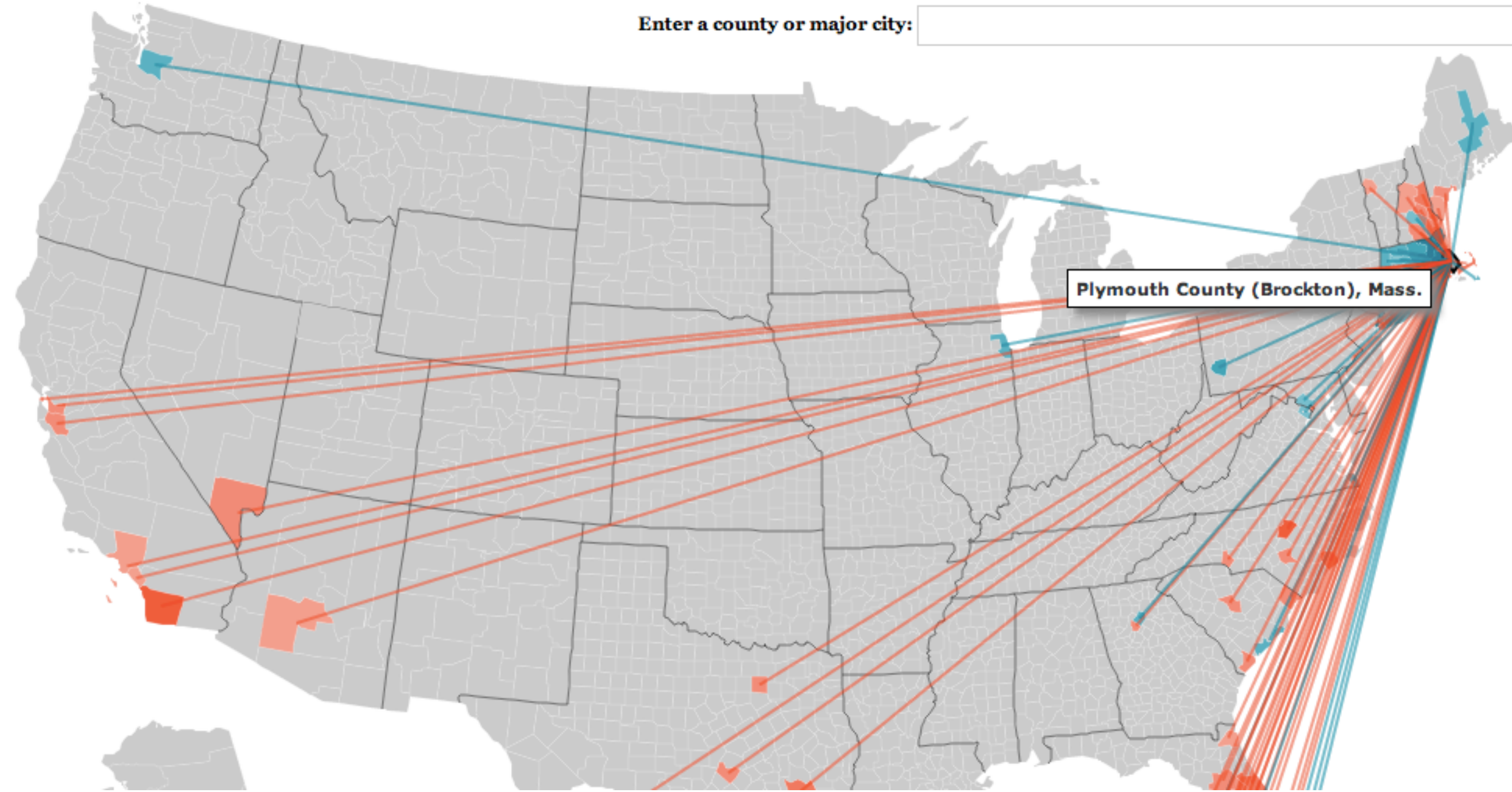
Population (2010): 494,919
Population (2005): 486,292
Inbound income per cap. (2010): \$32,500
Outbound income per cap. (2010): \$29,300
Non-migrant income per cap. (2010): \$33,000



- Hide Lines
- Clear
- Share

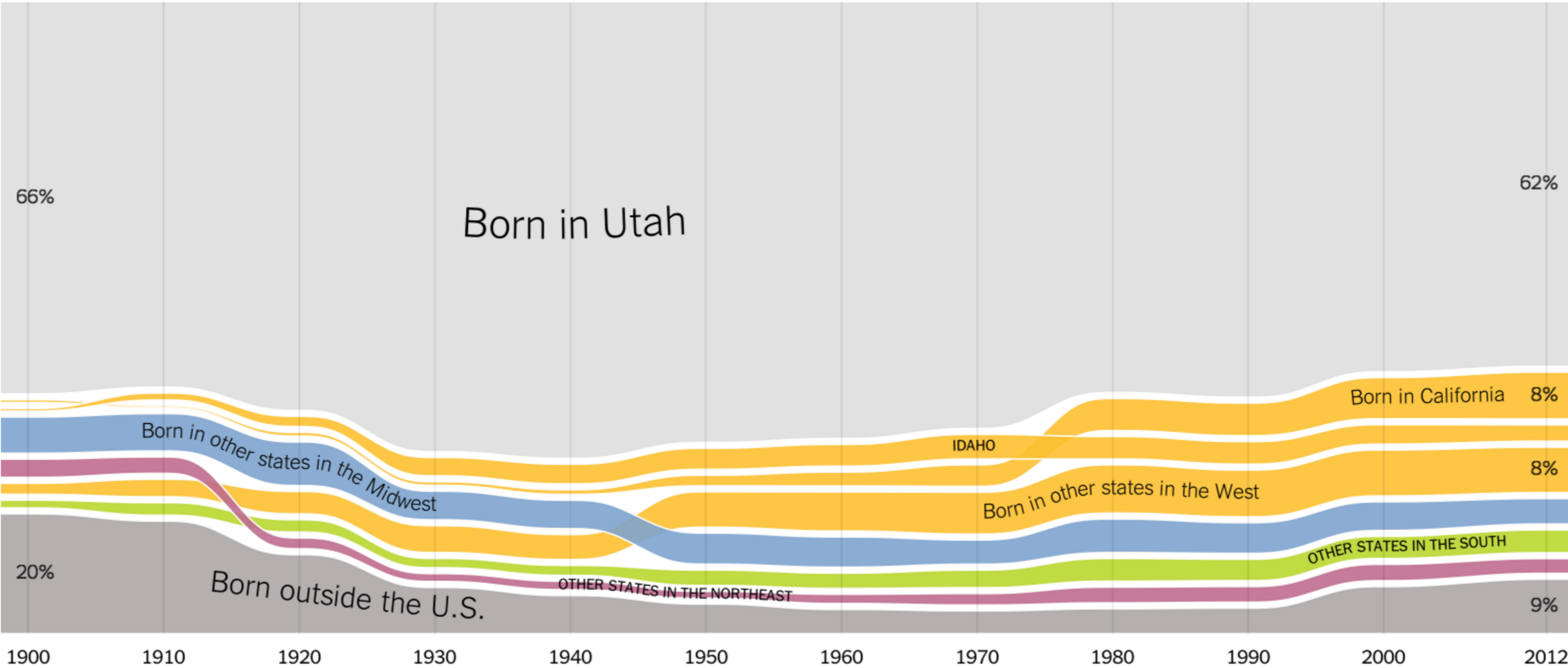
Select year (April-April): 2005 2006 2007 2008 2009 2010

Enter a county or major city:



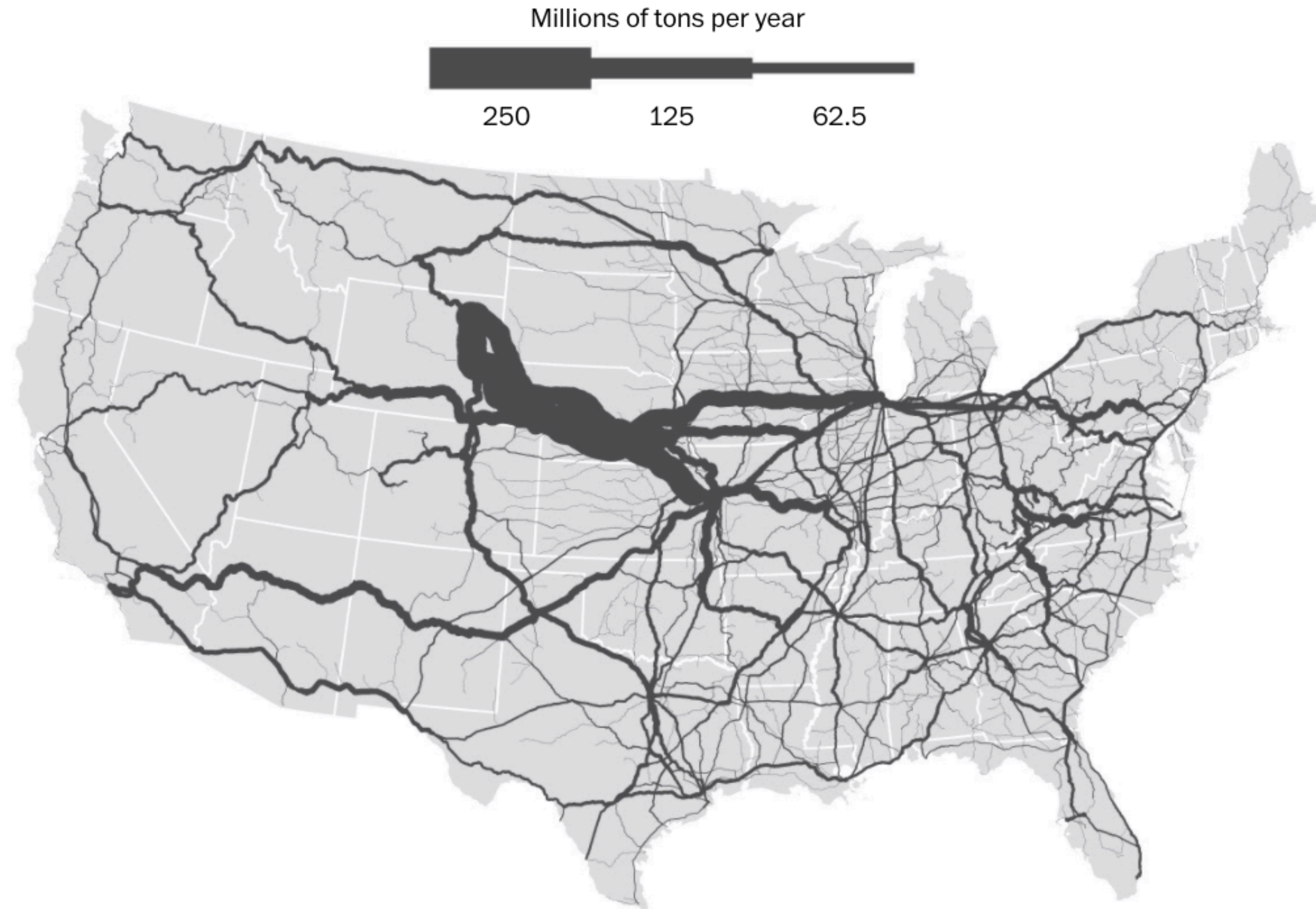
Plymouth County (Brockton), Mass.

Compare to Non-spatial Representation



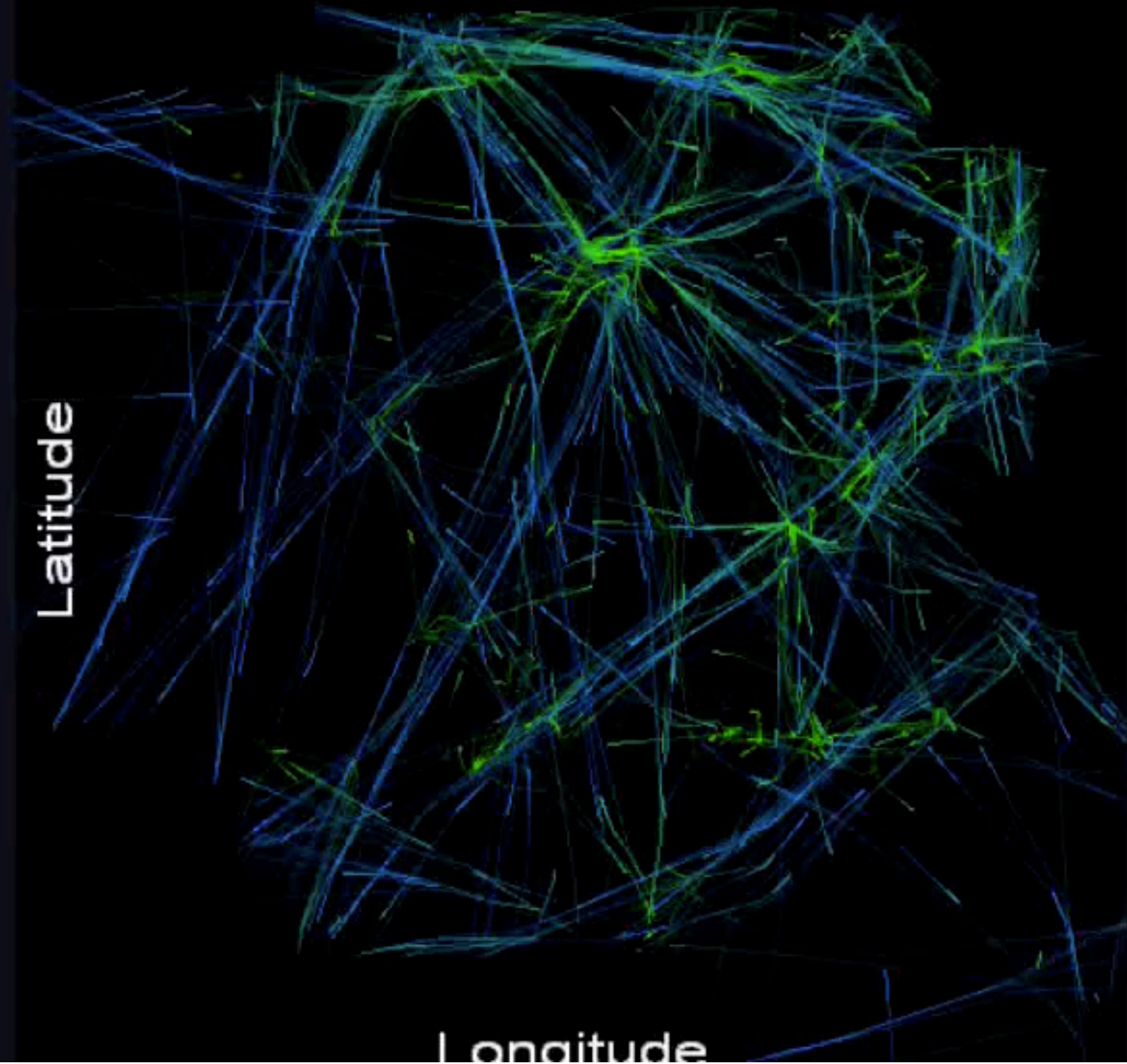
Which is better?

Rail Freight Tonnage



Latitude

Longitude



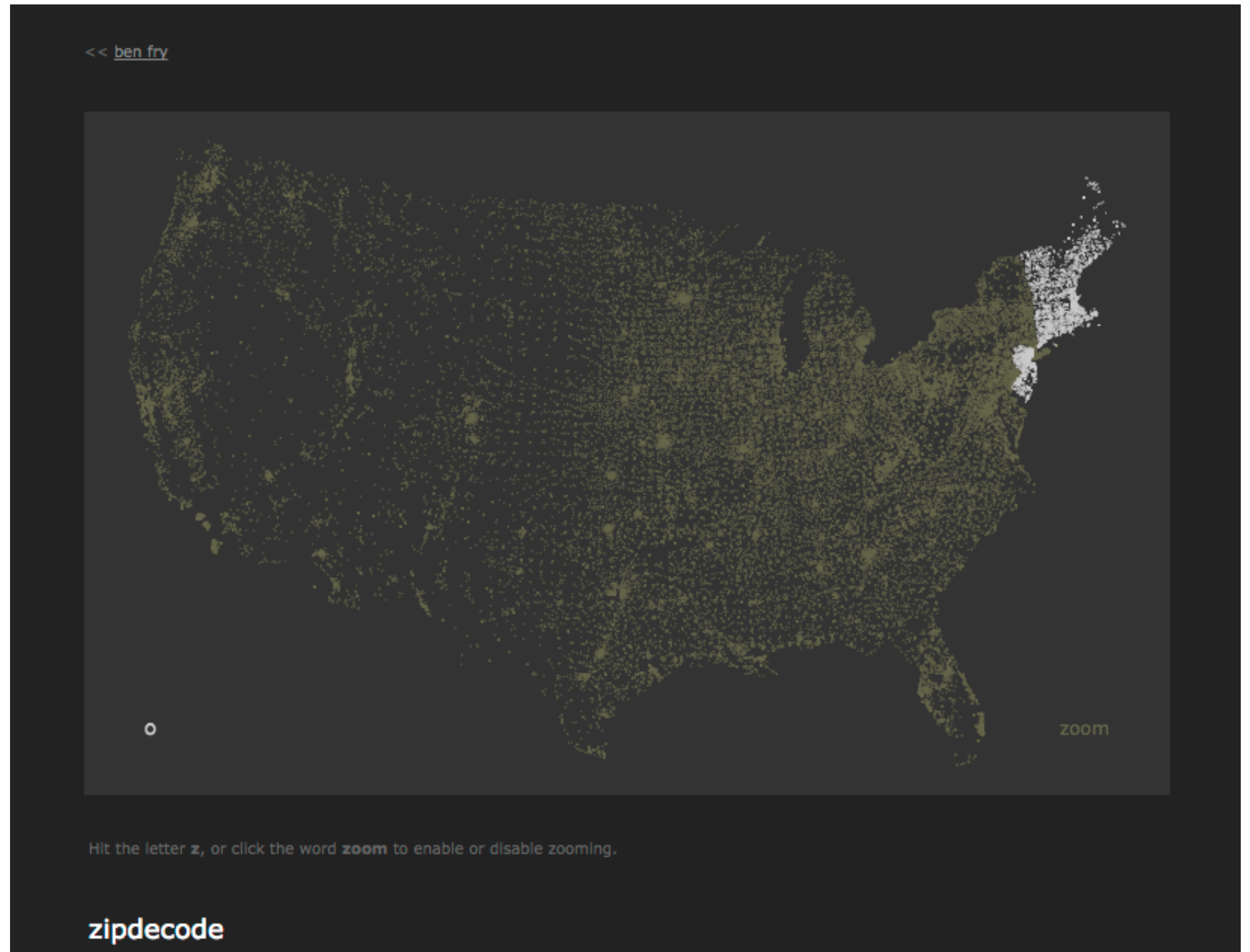
Data Driven Maps

Data Driven Maps

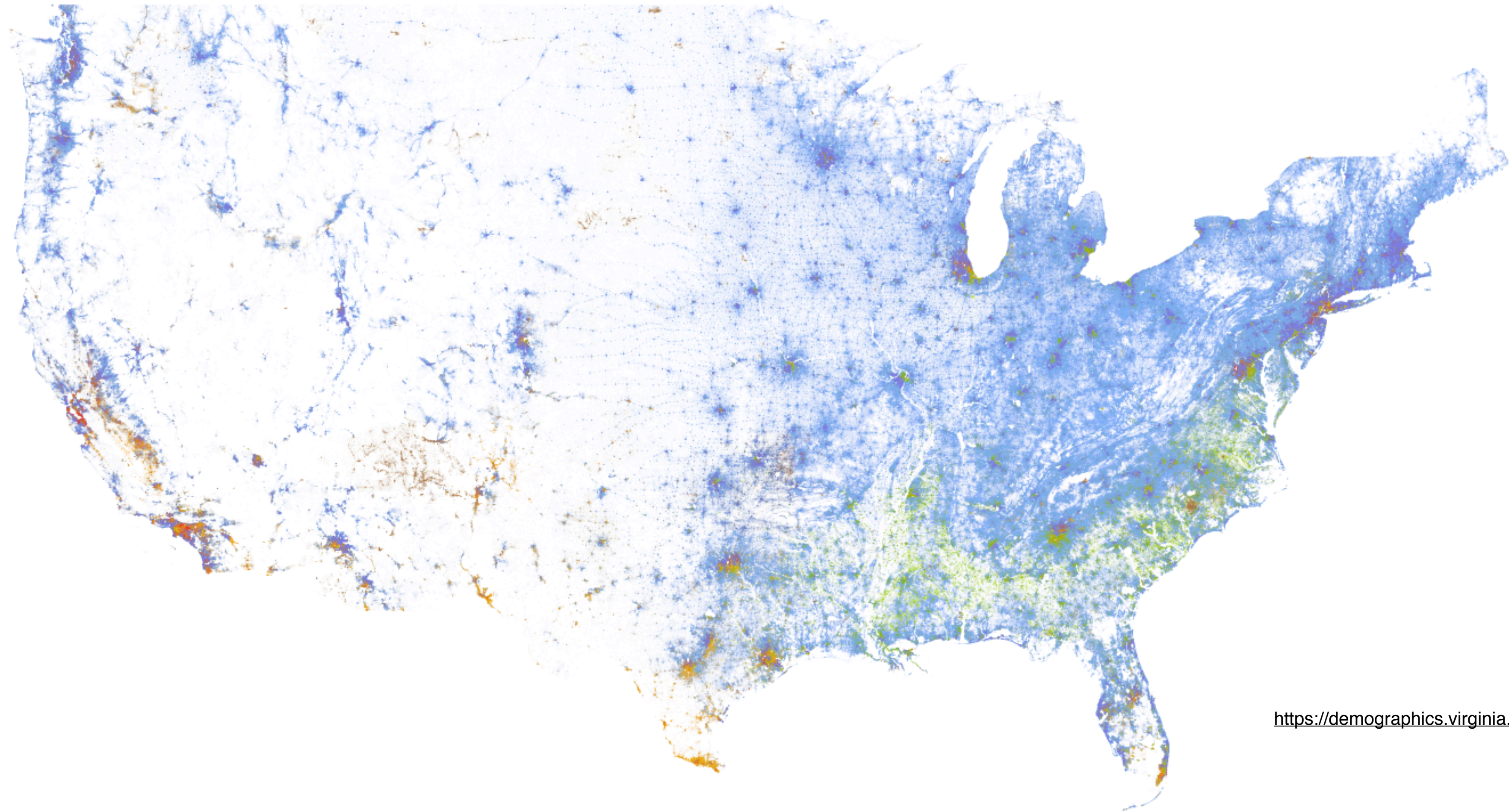
Idea: don't use a map to render on top

Let the data make up the map

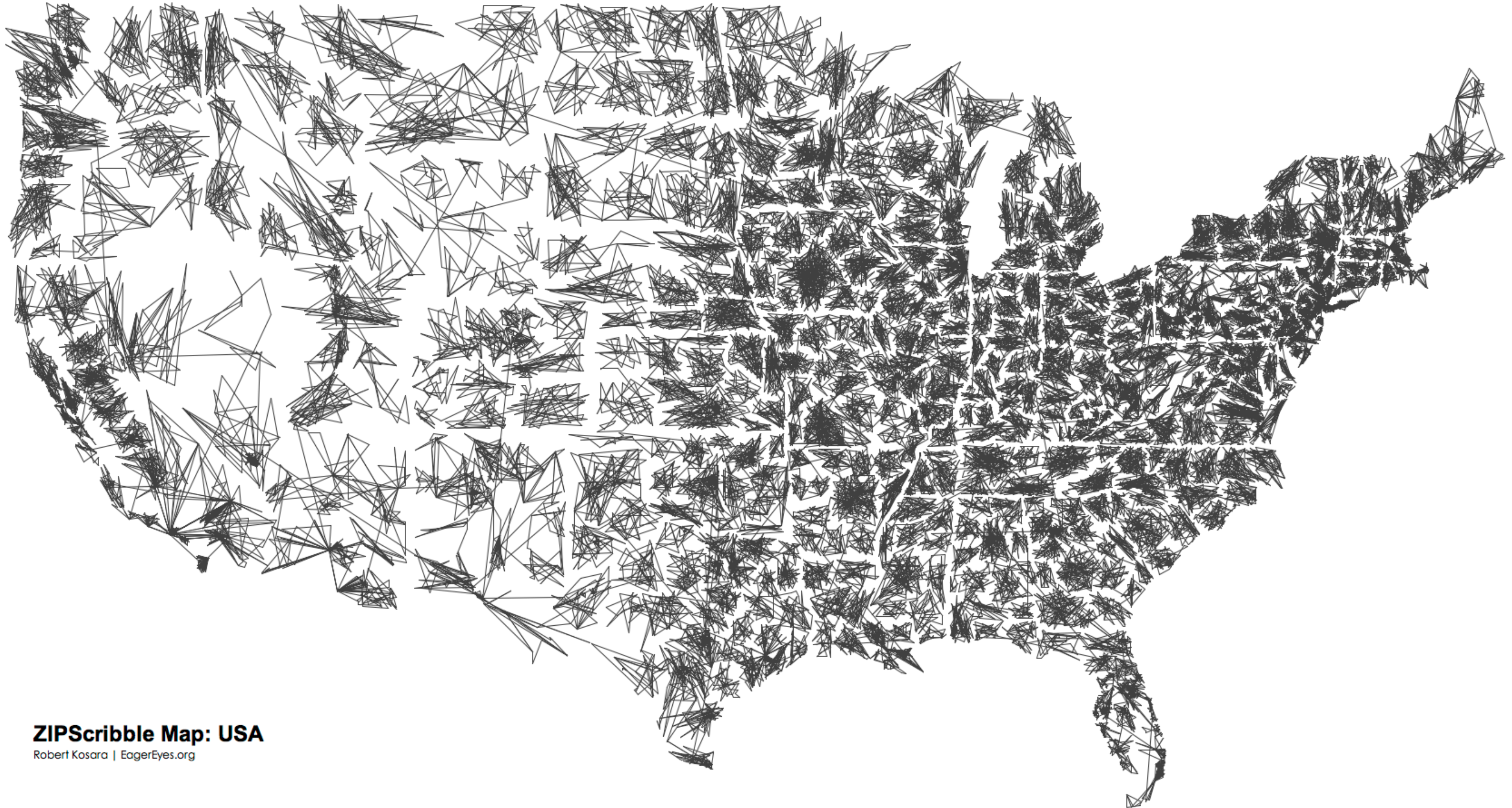
ZipDecode



Racial Dot Map



ZipScribble



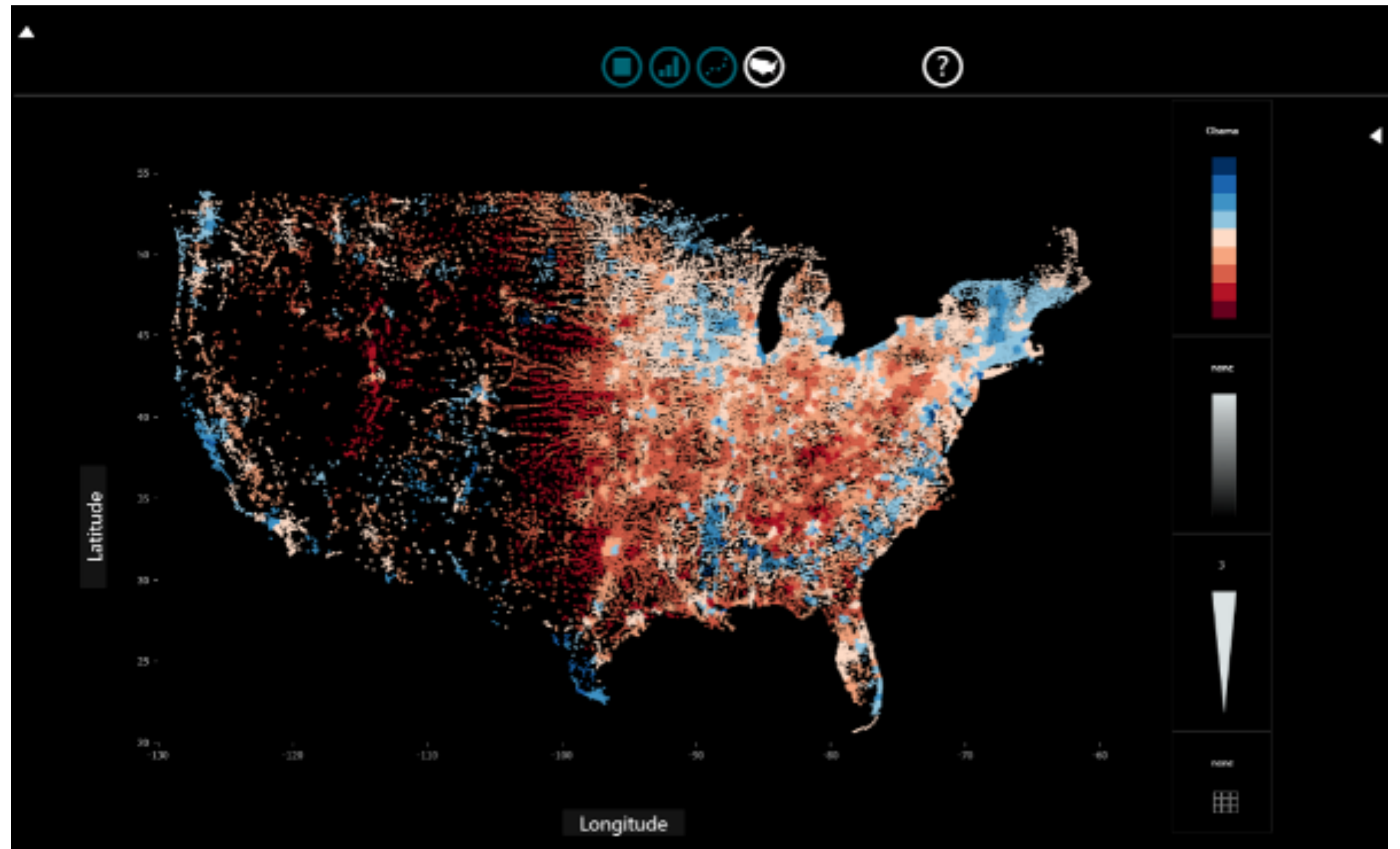
ZIPScribble Map: USA
Robert Kosara | EagerEyes.org

Taxi Drop-Offs

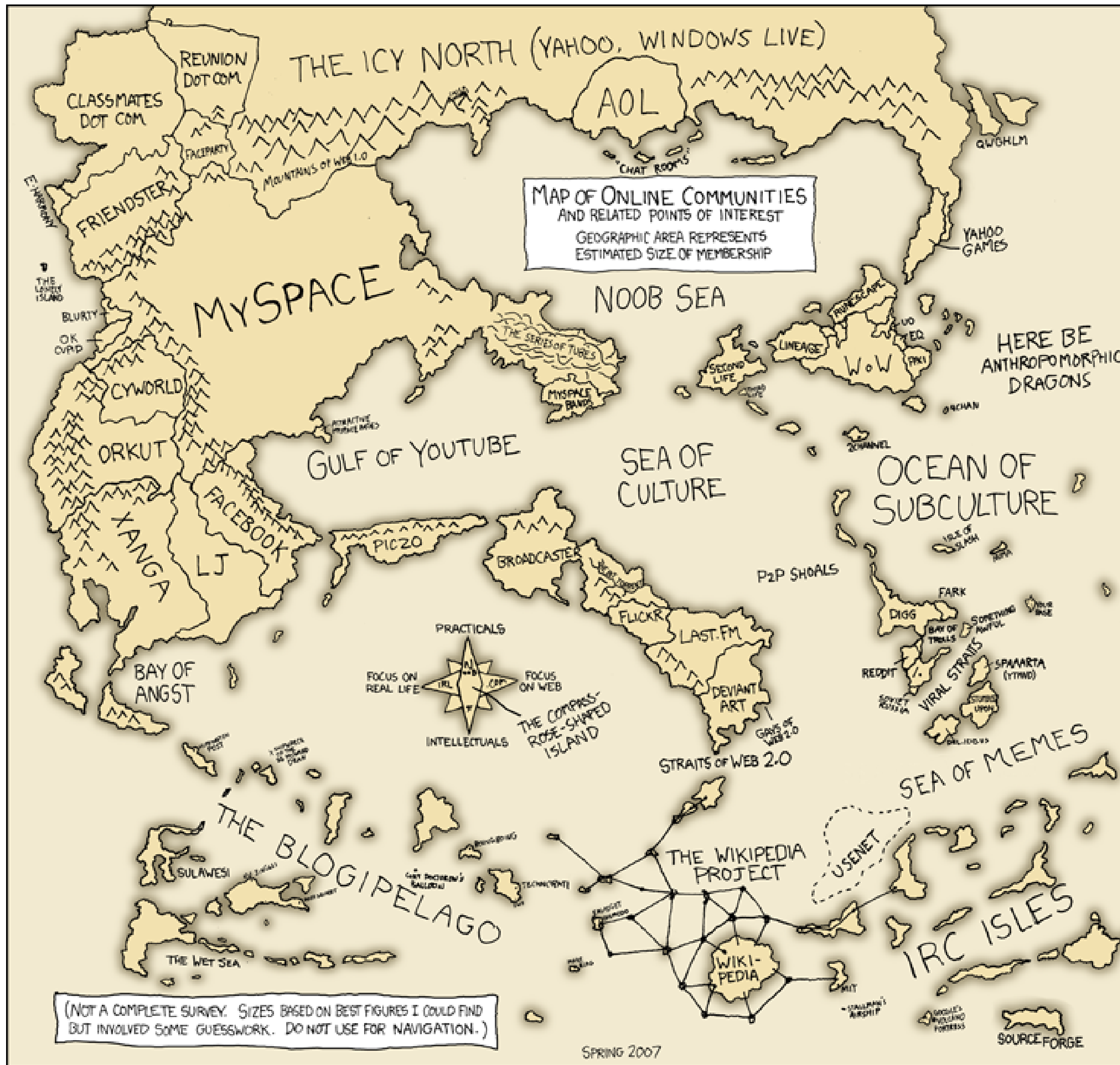


SandDance

Arrange Particles
to create visualizations



Thematic Maps



2007

One hour in front of the TV

