Lecture 22
Map Projections

(Slides based on a lecture by Kyle Haddad-Fonda)

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DATASCI / STATS 112

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1. Review
2. Map Projections
3. Making Maps with Geopandas
4. Reminders

1 Review

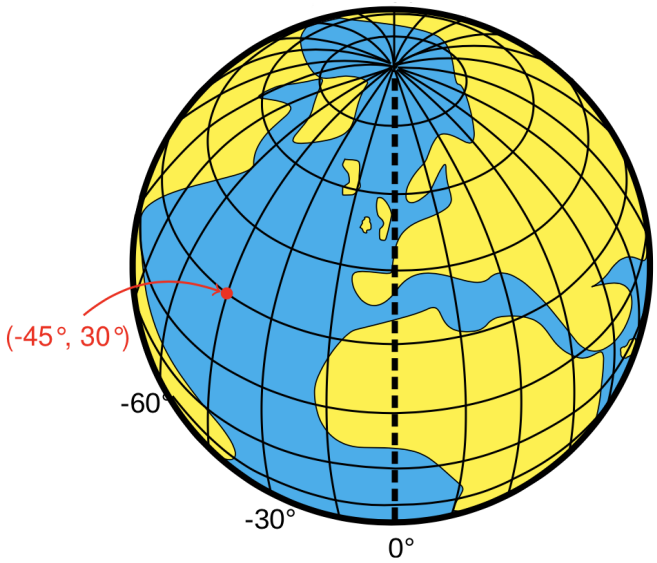
2 Map Projections

3 Making Maps with Geopandas

4 Reminders

Latitude and Longitude

Locations on the Earth are measured using **latitude** and **longitude**.



Distances between two positions should be measured using **Haversine distance** on the latitude and longitude.

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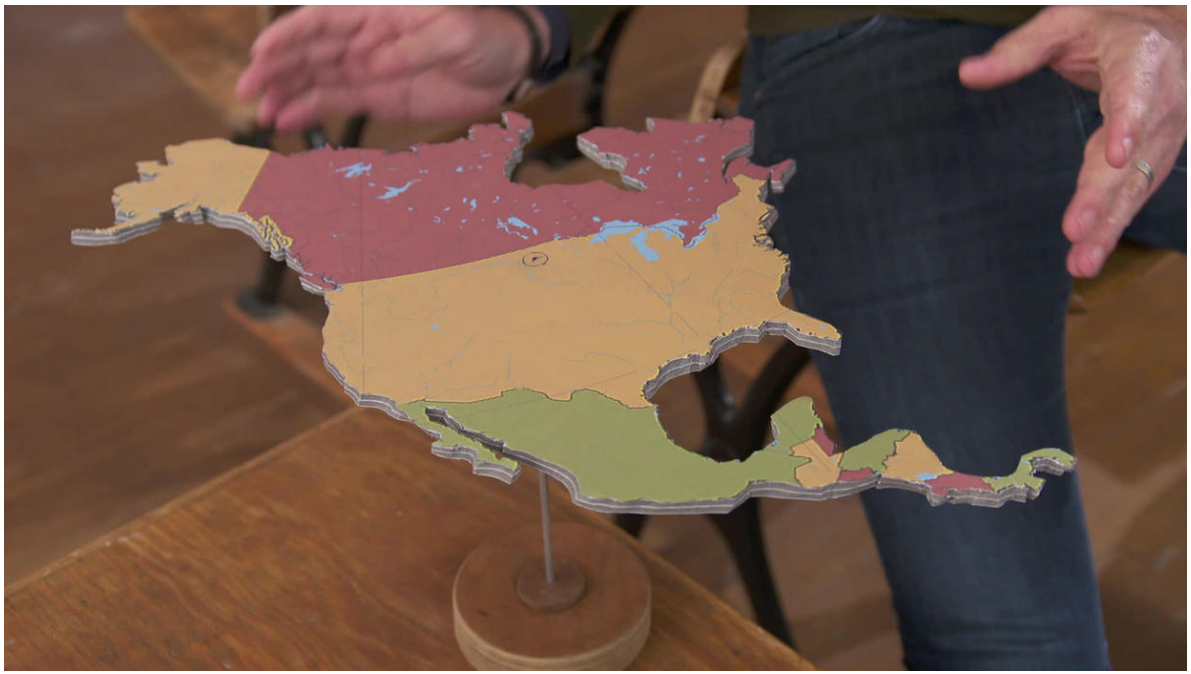
Geographical Center of North America

In 1930, a USGS employee took a cutout of the map of North America and balanced it on the top of a pin.



They found that the center was a town called Rugby, ND.

Dispute with Robinson, ND

Meanwhile, Bill Bender of Robinson, ND (100 miles to the south of Rugby) claimed that the center of North America was under his bar, Hanson's Bar.

They trademarked the phrase "Geographical Center of North America".

A Third Contender

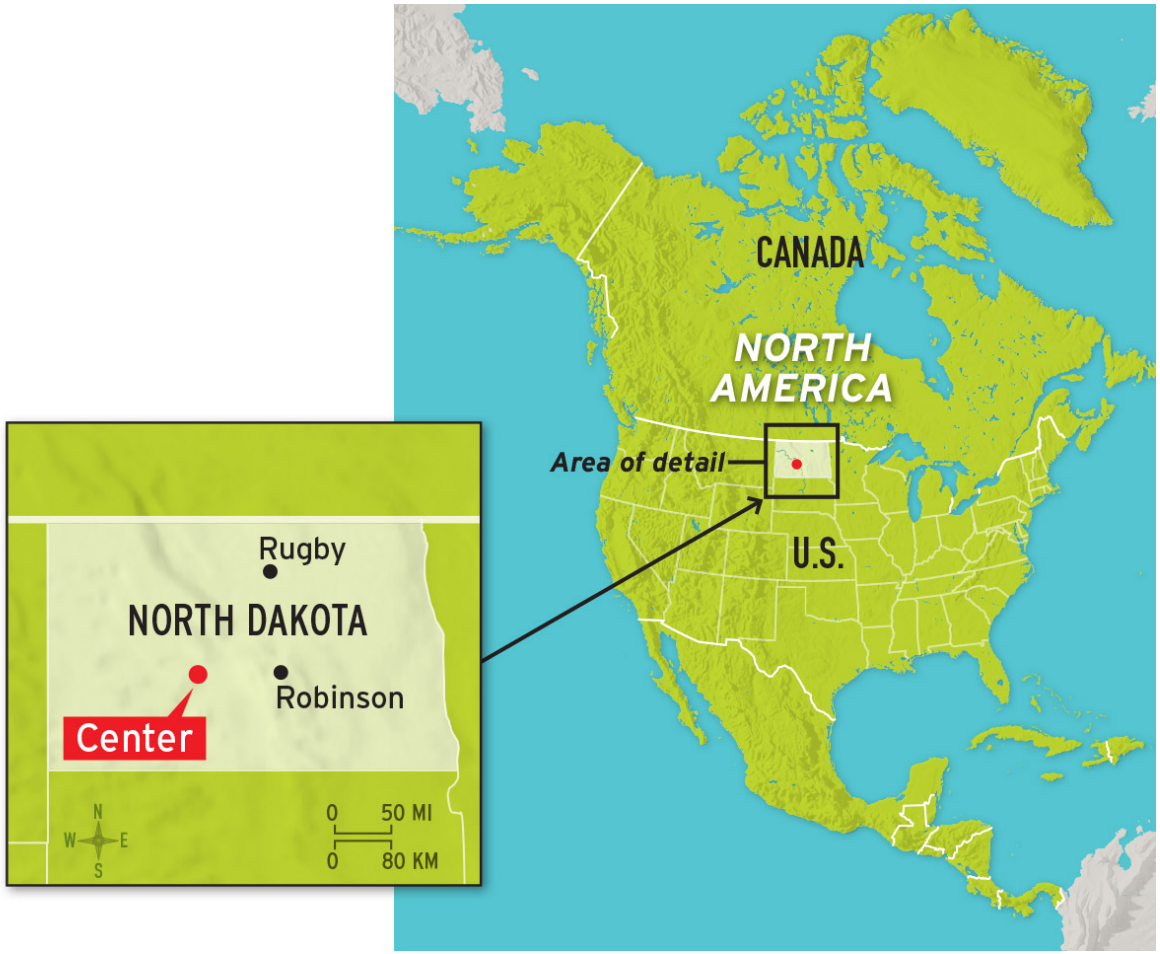
Peter Rogerson, a professor of Geography and Biostatistics, got wind about this debate.

He took latitudes and longitudes from all around North America, and used those coordinates to find the center.

“You have to take into account that the Earth’s surface is curved.”

He found that the geographical center was in a town called… Center, ND (no joke!).

The Geographical Center

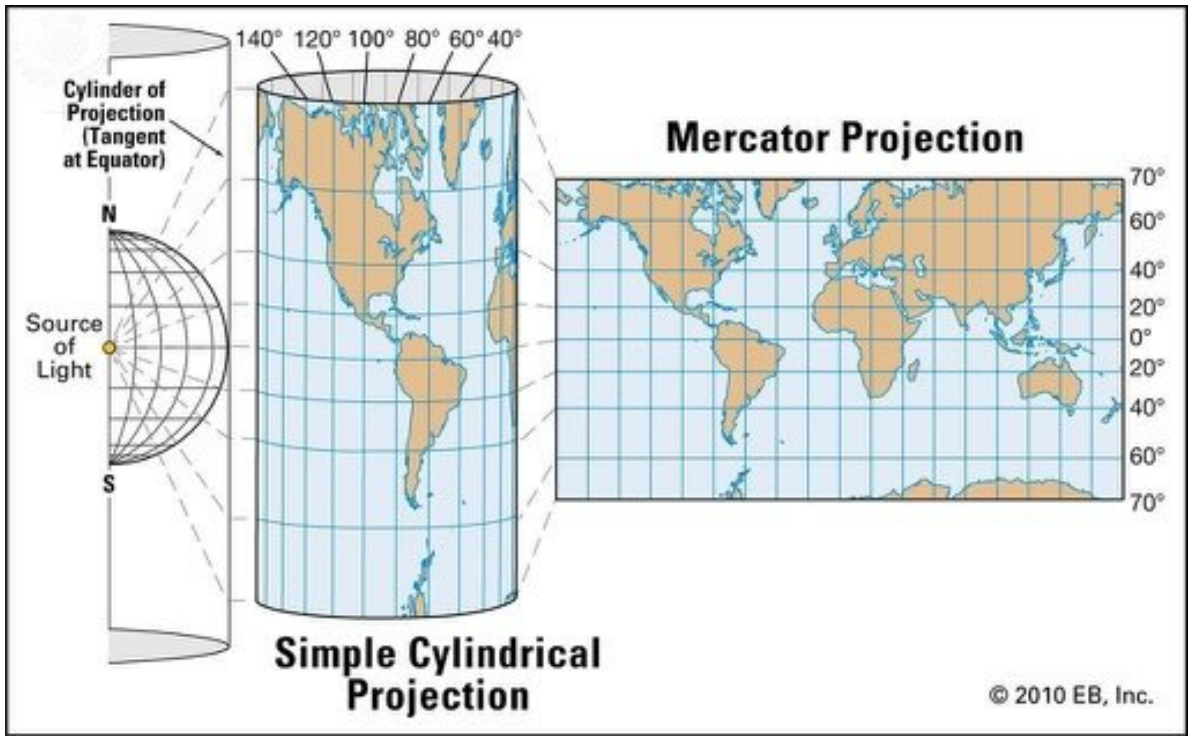


The controversy started because of the way the Earth's surface was flattened. Depending on which way you flatten, you'll get a different center.

Map Projection

Map projection refers to the way the curved surface of the Earth is represented as a flat surface.

One of the earliest projections was proposed by Gerardus Mercator in 1569.

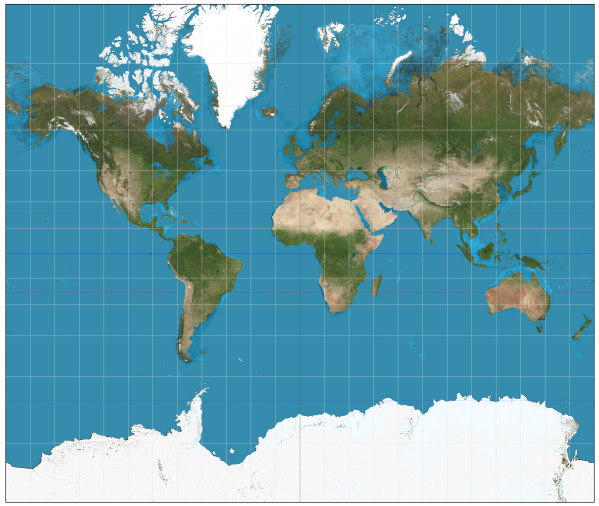


The West Wing on Map Projections

(Click on the image to watch the clip.)

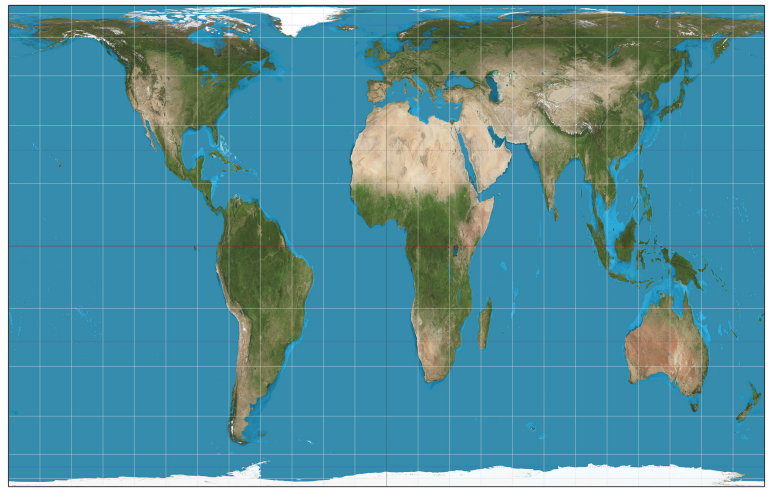
Mercator

(angle-preserving)



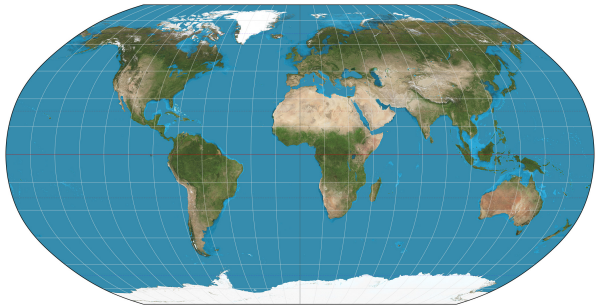
Gall-Peters

(equal-area, but distorted shapes)



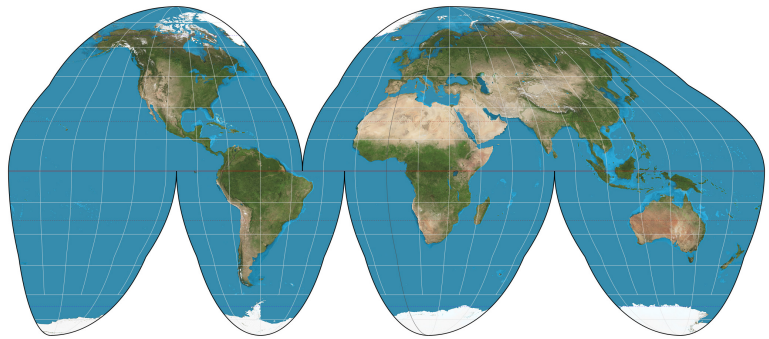
Robinson

(not equal-area or angle-preserving, but a compromise)



Goode homolosine

(equal-area with minimal distortion)



Moral: No projection is perfect. Every projection has tradeoffs.

WHAT YOUR FAVORITE MAP PROJECTION SAYS ABOUT YOU

MERCATOR

YOU'RE NOT REALLY INTO MAPS.

VAN DER GRINTEN

YOU'RE NOT A COMPLICATED PERSON. YOU LOVE THE MERCATOR PROJECTION; YOU JUST WISH IT WEREN'T SQUARE. THE EARTH'S NOT A SQUARE, IT'S A CIRCLE. YOU LIKE CIRCLES. TODAY IS GONNA BE A GOOD DAY!

ROBINSON

YOU HAVE A COMFORTABLE PAIR OF RUNNING SHOES THAT YOU WEAR EVERYWHERE. YOU LIKE COFFEE AND ENJOY THE BEATLES. YOU THINK THE ROBINSON IS THE BEST-LOOKING PROJECTION, HANDS DOWN.

DYMAXION

YOU LIKE ISAAC ASIMOV, XML, AND SHOES WITH TOES. YOU THINK THE SEGWAY GOT A BAD RAP. YOU OWN 3D GOGGLES, WHICH YOU USE TO VIEW ROTATING MODELS OF BETTER 3D GOGGLES. YOU TYPE IN DVORAK.

BAD MAP PROJECTION #358: OOPS, ALL SOUTH AMERICAS!

"This projection does a good job preserving both distance and azimuth, at the cost of exaggerating how many South Americas there are."

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Click on the icon below to be taken to the Colab.

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Exam 2

- Exam 2 will be handed back in section tomorrow.
- Mean score was 17, with fourteen students scoring 20!
- More detailed statistics in a future lecture…
- Reminder: I only decide letter grades at the end of the quarter, when I've calculated the overall grade, so percentages are not important.

Final Project

- Don't forget to sign up for a final project presentation here: [link to form].
- The final project files are due on Canvas on Wednesday 3/22 at 11:59 PM.
- If you haven't started collecting data yet, it is not too late, but you really have to start *now*. If you have the data before the weekend, there should be enough time to do the analyses and put together a nice project.