



# Your Maps Might Be Lying to You

Gus Lipkin  
2023-10-20

# Mapping the Stage

**(Some) Maps Are Bad**

## The World



Image Credit u/Erewhon1984

- Australia
- Iceland
- Hawaii
- Many others

# The United States of America

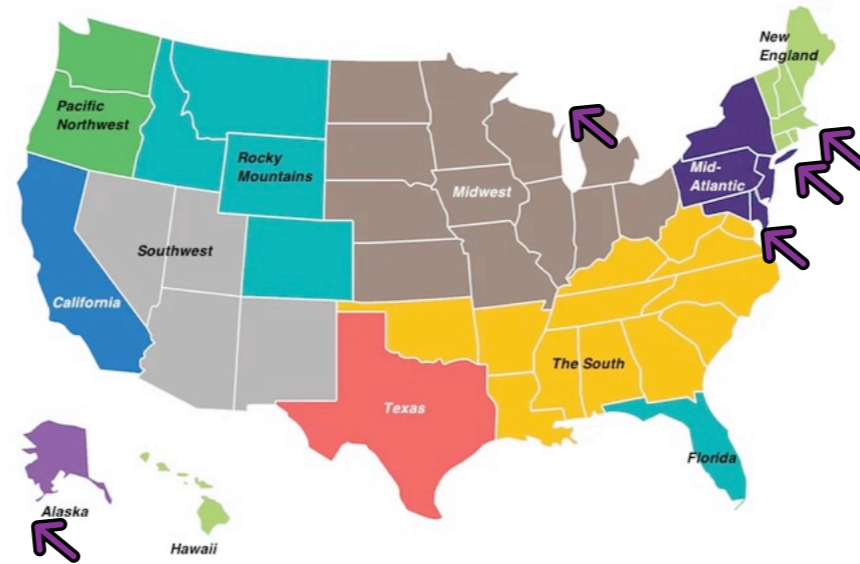


Image Credit u/[deleted]

- Cape Cod
- Long Island
- Michigan UP
- Whatever's going on in the DC region
- Alaska Aleutian Islands

**New Zealand\***

**Page not found**

We're sorry, something's missing...



Image Credit u/damndanman

- New Zealand
  - This one's on purpose

## Borders Are Tricky Too

- Depend on
  - where you are
  - who you ask
  - when you ask

# DataHub



- Miami is outside the US
- Polygon resolution



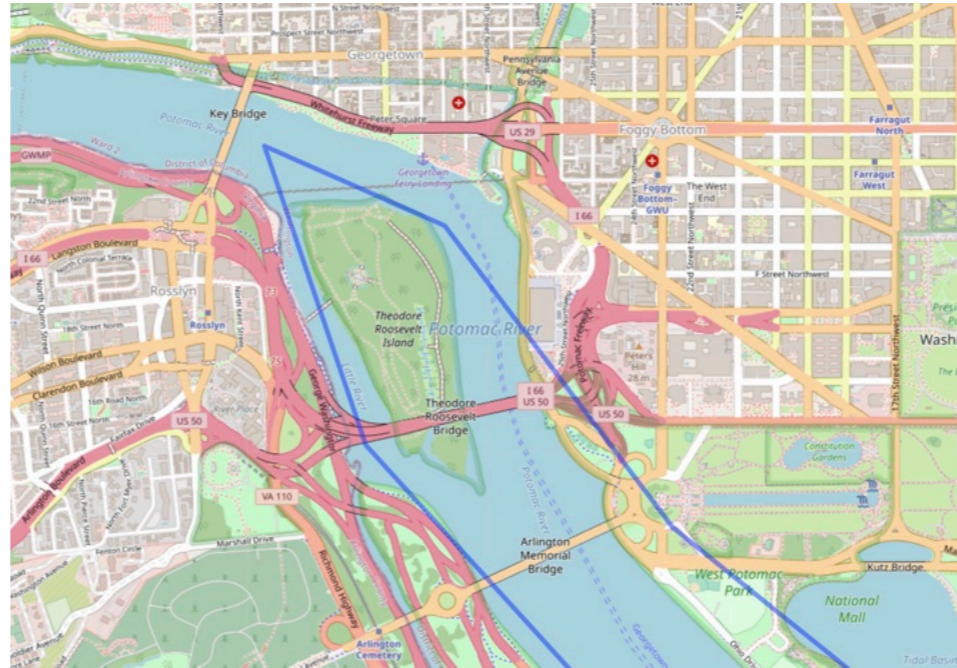
## World Bank



- The gray line is the “true” border and the blue line is the world bank
- Peru and Ecuador
- Resolution and shifted a bit

## Natural Earth

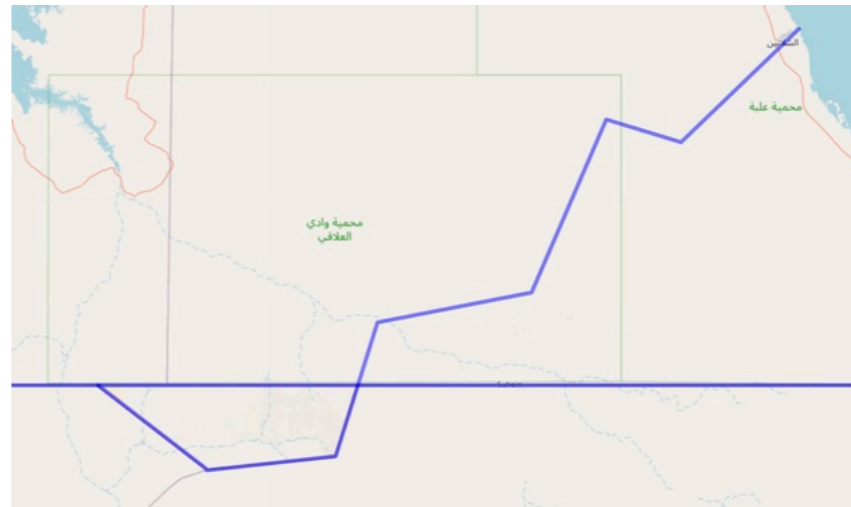
Roosevelt Island is outside the USA



- Roosevelt Island is outside the US
- DataHub has this problem too
- Extra polygons aren't included
- How far up a river do you go?

**Surely the US Department of State Knows  
Where Borders Are?**

## Egypt and Sudan



- To be fair, this is a disputed border

## Sudan and Eritrea



- Extra resolution
- Shifted a bit

## The Vatican



- They have walls!
  - Straight lines
  - Hundreds of years old
    - Built in ~850AD

## The Vatican

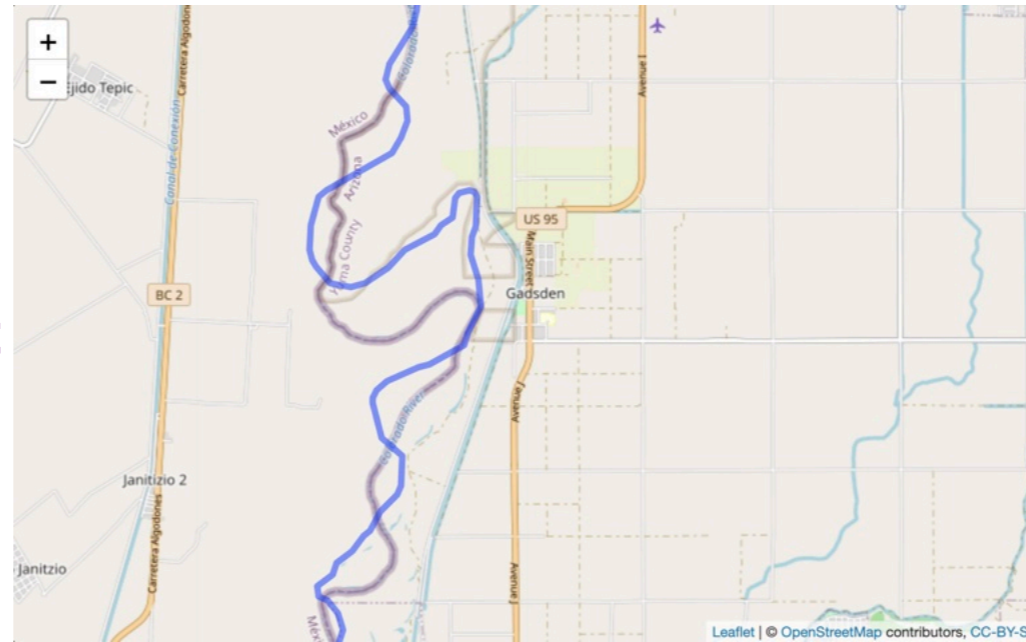


- They have walls!
  - Straight lines
  - Hundreds of years old
- That border line is on the road

**Surely the US Department of State Knows  
Where the US Borders Are?**



They Don't



- Mexico-Arizona border
- They got the 49th parallel with Canada right (it's a relatively straight line)

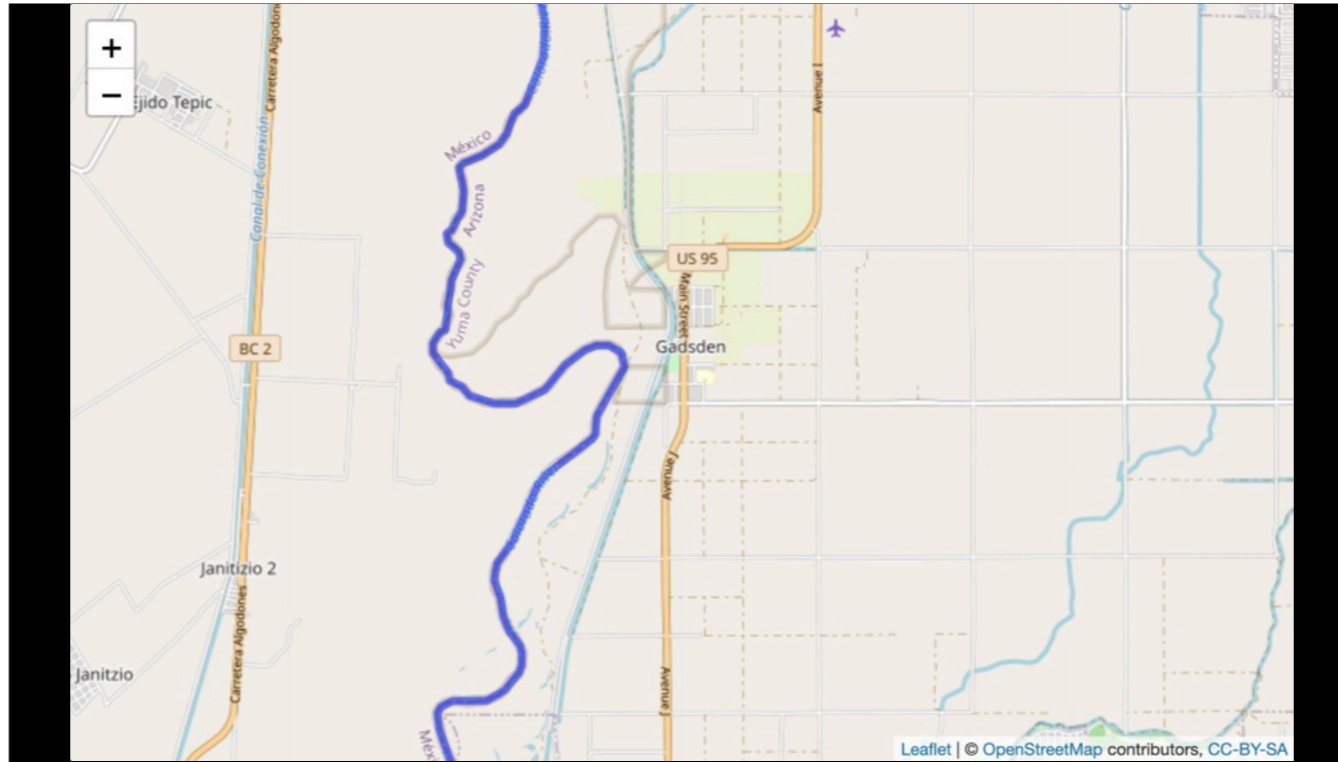
## These Seem Like Relatively Minor Problems

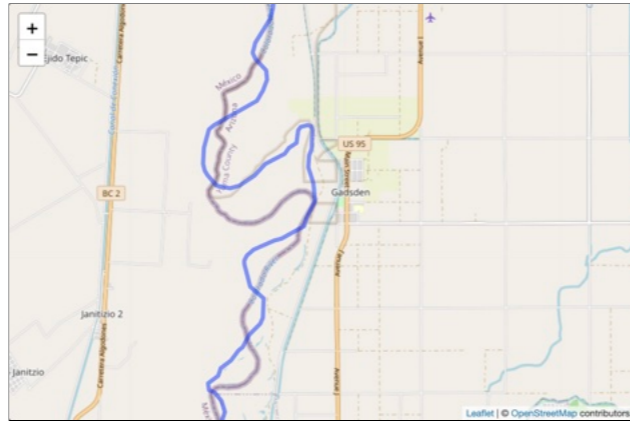
- Property disputes
  - This is why people get surveys!
- Water rights
- Border security (where to patrol) (what map do they use)
- Human trafficking along border roads

**What's going wrong?**

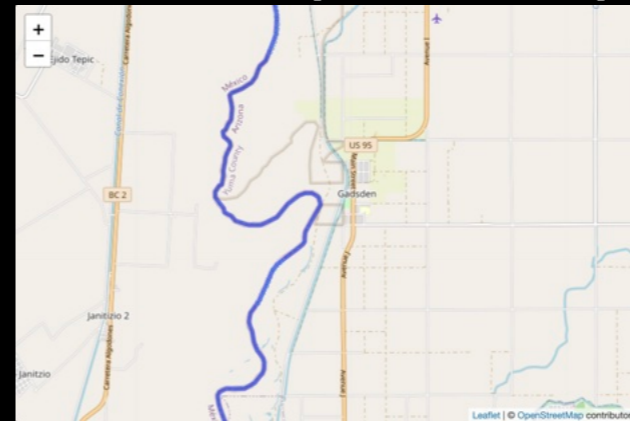
## I Haven't Been Entirely Truthful

- I'm comparing everything to OSM base maps
  - What made them the "true" map
- I didn't check my projections
  - I did check my CRS





**US Department of State**



## Other Common Problems

## Projections and Coordinate Reference Systems (CRS)

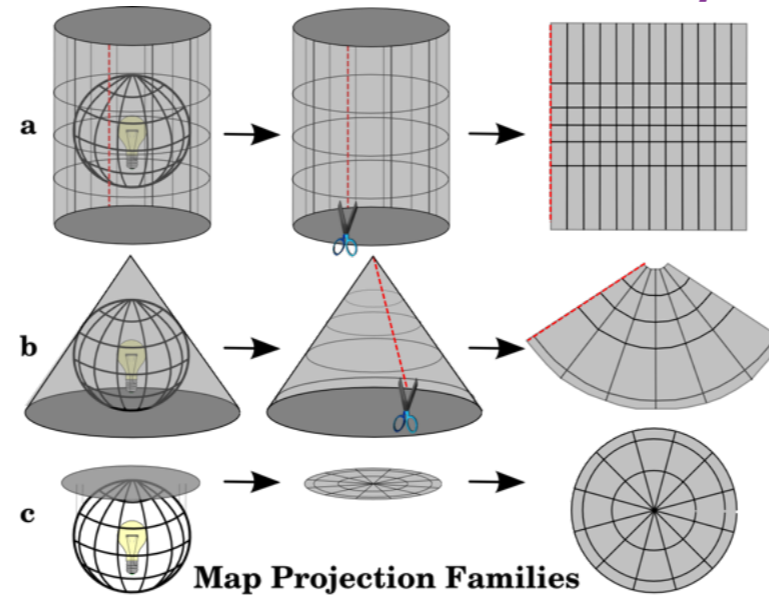


Image Credit QGIS

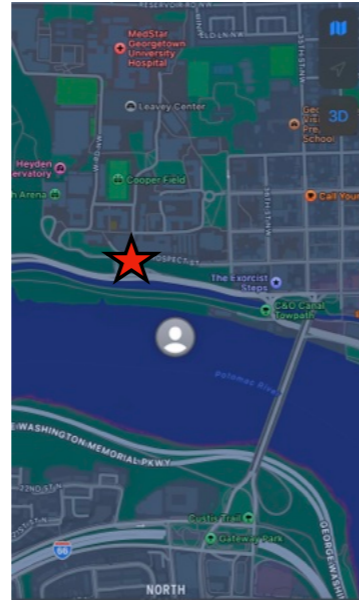
- Represent 3D planet on 2D maps
- Distance changes between points



## Data Problems

- Incomplete data
- Extra data:
  - Features
  - All versions of a disputed border
- Incorrect or out of date data
- File type or data type mismatches
- Data resolution
- Fake data so people don't steal your maps

## Where in the World is Travis Knoche?



**Now what?**

## Finding Your Source of Truth

## Base Maps

- Function
  - Street, Satellite, Hybrid, Topographic
- Style
  - Full color, grayscale, dark, labels/no labels
- Data sources
  - OpenStreetMap, Government, MapBox, Overture Maps, many more!
- Coordinate reference system
  - WGS 84, everything else

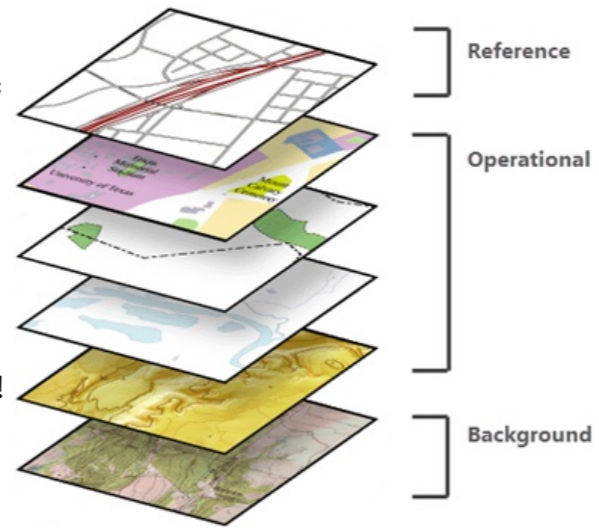


Image Credit [arcgis.com](https://www.arcgis.com)

## Choosing a Base Map

- Function
  - What am I trying to show?
- Style
  - Does a certain style help communicate
  - How can I display my data to make the impact I want?
- Data Sources
  - Where does my data come from? Do they have a base map?
- Coordinate Reference System
  - What CRS is my data?

**Adding Data**

## Data Layers

- Your data!
- Other data you might want
  - Borders
  - Roads
  - Weather patterns
  - Migratory patterns of Canada Geese
  - Locations of working McDonald's Ice Cream Machines

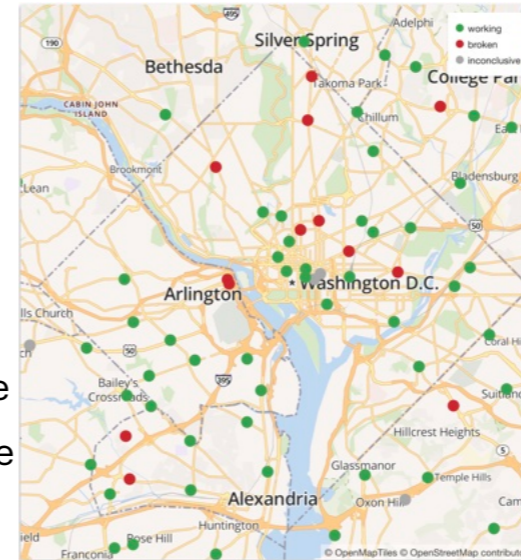


Image Credit [mcbroken.com](http://mcbroken.com)



## Kinds of Data Layers

- Raster layers
  - Tiles
- Vector layers
  - Lines, polygons, images
- UI layers
  - Markers, popups, tooltips
- And more!

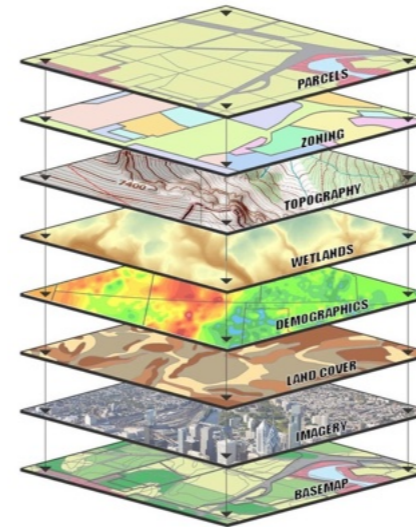


Image Credit [USGS.gov](https://www.usgs.gov/)

- Raster (satellite images, weather radar)
  - These have a specific resolution
  - Why maps have to reload when you zoom
- Vector (borders, paths)
- UI (extra info, about whatever)

**This Is Complicated and I Don't Care**

## Fair Enough

- You don't need super accurate locations
  - You don't need to know where in the McDonald's the ice cream machine is located
  - Population centers in cities
- You're using maps as visualizations, and the data itself is what matters
  - Choropleth (colorful polygons) voting maps
  - Visualizations of a region's watersheds

-

- conveying other data via the map

**Just Be Consistent**

- Projection
- Coordinate reference system
- Data sources
- Base map sources

## All Maps Are Lying to You

- Do you know how?
- What are you sacrificing to communicate your message?



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