Choosing the Right Map Projection

Michael Corey's guide to stretching the earth for fun and profit

By Michael Corey

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The USA Not Alike

Nearly all maps are an attempt to represent our environment (generally flat) on a curved surface (generally a ball). Cartographers have spent years (or decades) adjusting and tweaking, and it is a key concept of cartography, the art and science of making maps.

If you're already familiar with projections and how they work (and don't work), jump down to see my process for choosing and using them in some interactions.

In one sense, making a projection is always a fickle affair. Why? Because the Earth is not flat it's a spheroid, but a projection requires a surface. Reality flatness is spherical.

First since the first new cartographer cracked the first mammoth driving directions to the local watering hole on to the wall of a cave, that impossibility has been a problem for cartographers. Some have tried to make a flat world map as best as pigs can, and so worst one that dramatically misrepresent your data and/or context. Not since you know a lot of the rules, map projections are a tool, and like any tool, they can be misused and underutilized. Or misused and underutilized.

Will the Real U.S. Please Stand Up? (Mercator and its Distortions)

Let's start with a real world example from my work. Which of the four maps above is the real United States?

Well, none of them is accurate, of course. But which looks right to you?

Chances are, you probably are most comfortable with the map at the top left, the one that looks like a piece of paper. Maybe you've seen it in a map of the United States you get in Google Maps. In many of the more sophisticated GIS, it's a perfectly good canvas for overlaying points on a map.

But it's not always the best choice, in the Center for Investigative Reporting, we wanted to show the value of homeland security grants awarded to state and local governments in California, Nevada and Arizona. The challenge was how to get Grand and Alaska on the same map, if we wanted to use one of the standard "Albers map" APIs: Google, Bing, Leaflet, OpenLayers, Flash, Silverlight, etc. Well, we could, but it would look like crap. We would have to make the Alaska inset the lower 48 states, and we'd have to show Alaska and Hawaii unless someone chose to drag the map down. The second option is to show all 50 states at one time, which means even more Alaska. Alaska would be too small for a user to click on or even easily see.

The United States with Alaska and Hawaii in Mercator – a bad map

Alaska is several projections

Which is the real Hawaii?

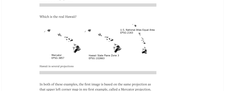
Hawaii is several projections

In both of these examples, the first image is based on the same projection as that upper left corner map in my first example, called a Mercator projection. Mercator is the projection most people know, but it's not a different story. As any Alaskan will tell you, Mercator makes a mess of it.

Yet that terrible Alaska map is probably the version you've most familiar with.

But why is Mercator likely to be the projection you're most familiar with? It was invented by a Flemish cartographer, Gerardus Mercator, who in 1569 (who asked a troubled Mercator projection to the first year of Google Maps is 2005) or you can blame Uncle 16th Century Flemish Cartographer Gerardus Mercator.

Mercator's projection is by far the best known by laymen, and it's the most commonly used projection. It's also the most misused and abused. Why? Because, for a few hours, it's not that bad. Mercator is a perfect example of how a given map projection can be hugely helpful or quite misleading depending on the situation.



Mercator world map

The big land against Mercator is that it makes Greenlanders feel too good about their country, it makes Africa look small and it makes Europe look huge and America. For example, look much larger than Africa in relation to area nearer to the equator. This is because Mercator's balancing act at flattening the globe involved in effect, stretching the surface to meet the surface of a cylinder the world sat like silly putty until he had a flat, rectangular map. In the image above, Africa is about 14 times bigger than Greenland in area, but Greenland looks about 6 while current Greenland has an area of about 836 per square miles, compared to South America's 6 million square miles. Why did such a crappy map become ubiquitous?

Because the crushed ice of that distortion in areas where most people don't live, Greenland and Antarctica, for example, Mercator is a very good projection for navigation—the rumb course appears as a straight line, which is very useful.

Think about the impact to the land of the 19 flight magazine on an airplane—the cases with all the carry-less business destinations. This is a good illustration of a phenomenon common to many global projections a straight line course appears curved on the map. Mercator's projection is based on a cylinder, so it's perfect for navigation distances and angles between nearby points. This is the brilliance of Mercator's projection—on a Mercator map, straight courses over the ocean can be accomplished by straight lines, halves could pass easily and accurately calculate the bearings they needed by simply measuring the angle between their straight line course and Mercator's straight meridian.

Most of us are not currently navigating on the high seas, however, so shouldn't we pick this that dreaded Mercator?

Mercy cartographers will tell you we should, but when it comes to building interactions for the web, I've found it very useful. Why? Because it's familiar.

You might throw off your users by presenting them with an unfamiliar map of a familiar place, and you can easily distort their mental maps.

Mercator's projection is well suited for web mapping because it's familiar. It's the most commonly used projection, and it's well suited to web mapping because it's familiar. It's the most familiar projection, and it's well suited to web mapping because it's familiar. Mercator's projection is

as you start practicing the best ways to slice and dice the planet.

Map data sources: Natural Earth, U.S. National Atlas, U.S. Census Bureau, National Geospatial-Intelligence Agency

CREDITS

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