

# Projections

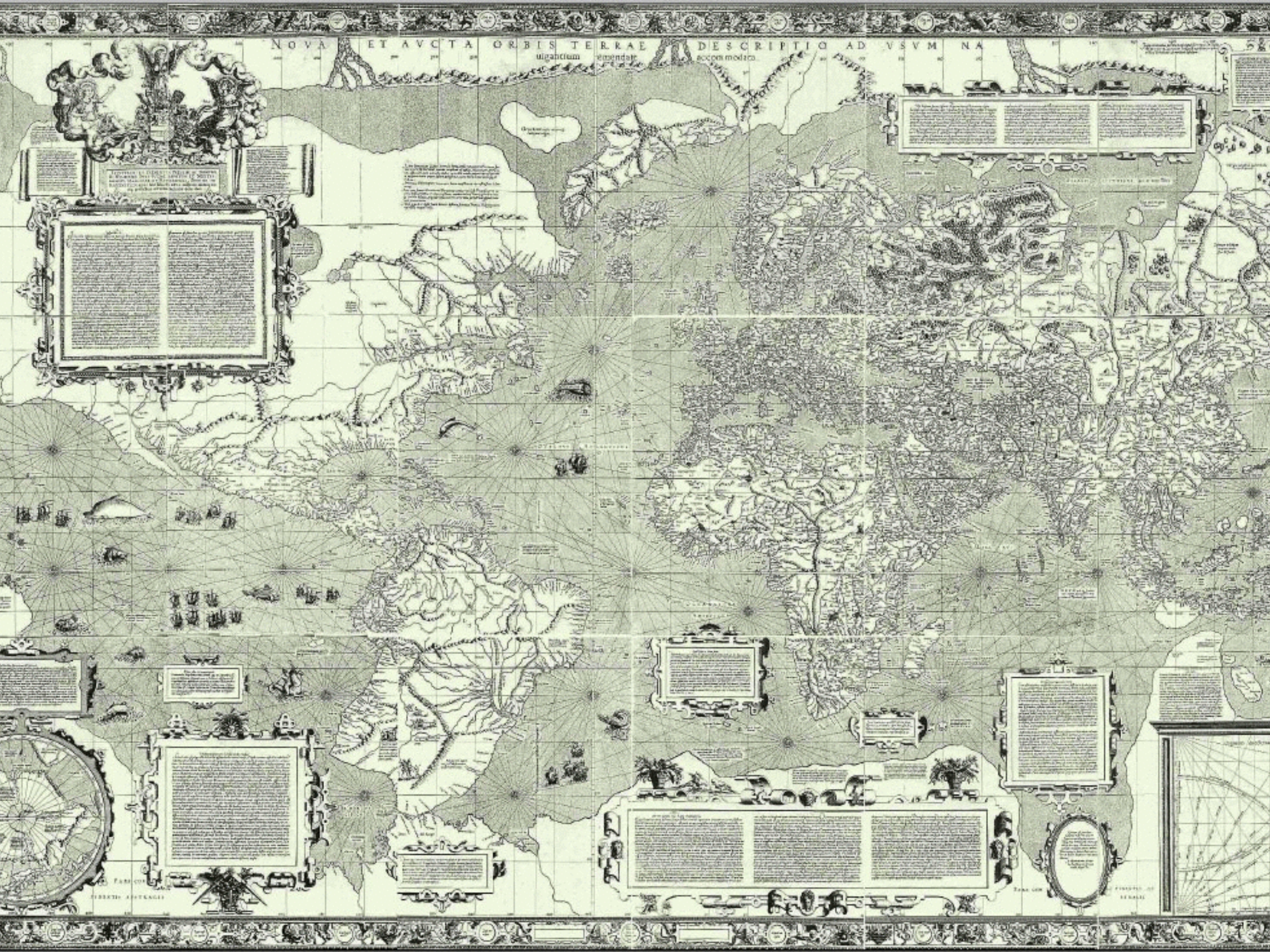
Mapping for Architecture, Urbanism, and the Humanities

October 13, 2017

<https://www.youtube.com/watch?v=vVX-PrBRtTY>







NOVA ET AVCTA ORBIS TERRAE DESCRIPTIO AD VSVM NA...

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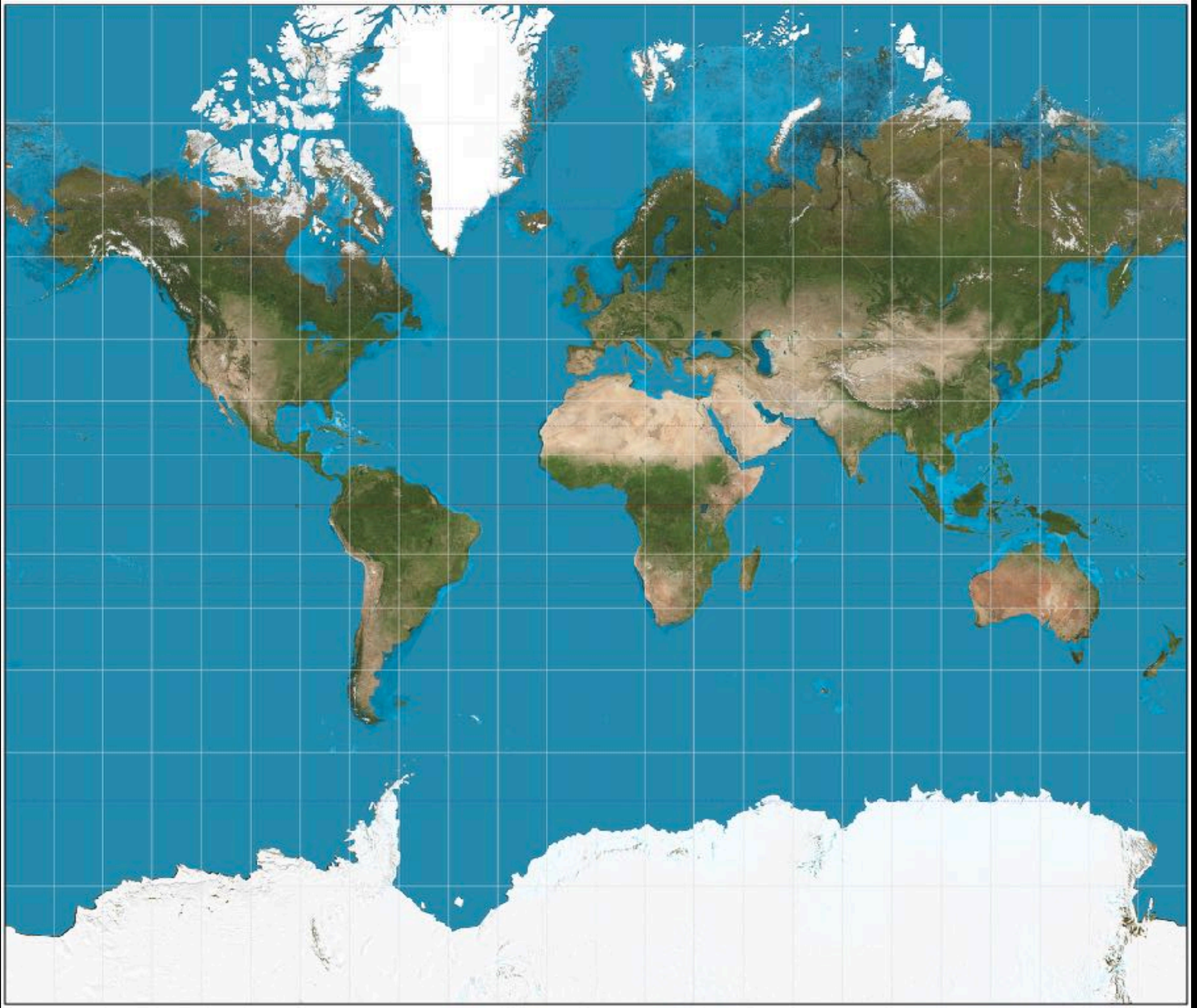
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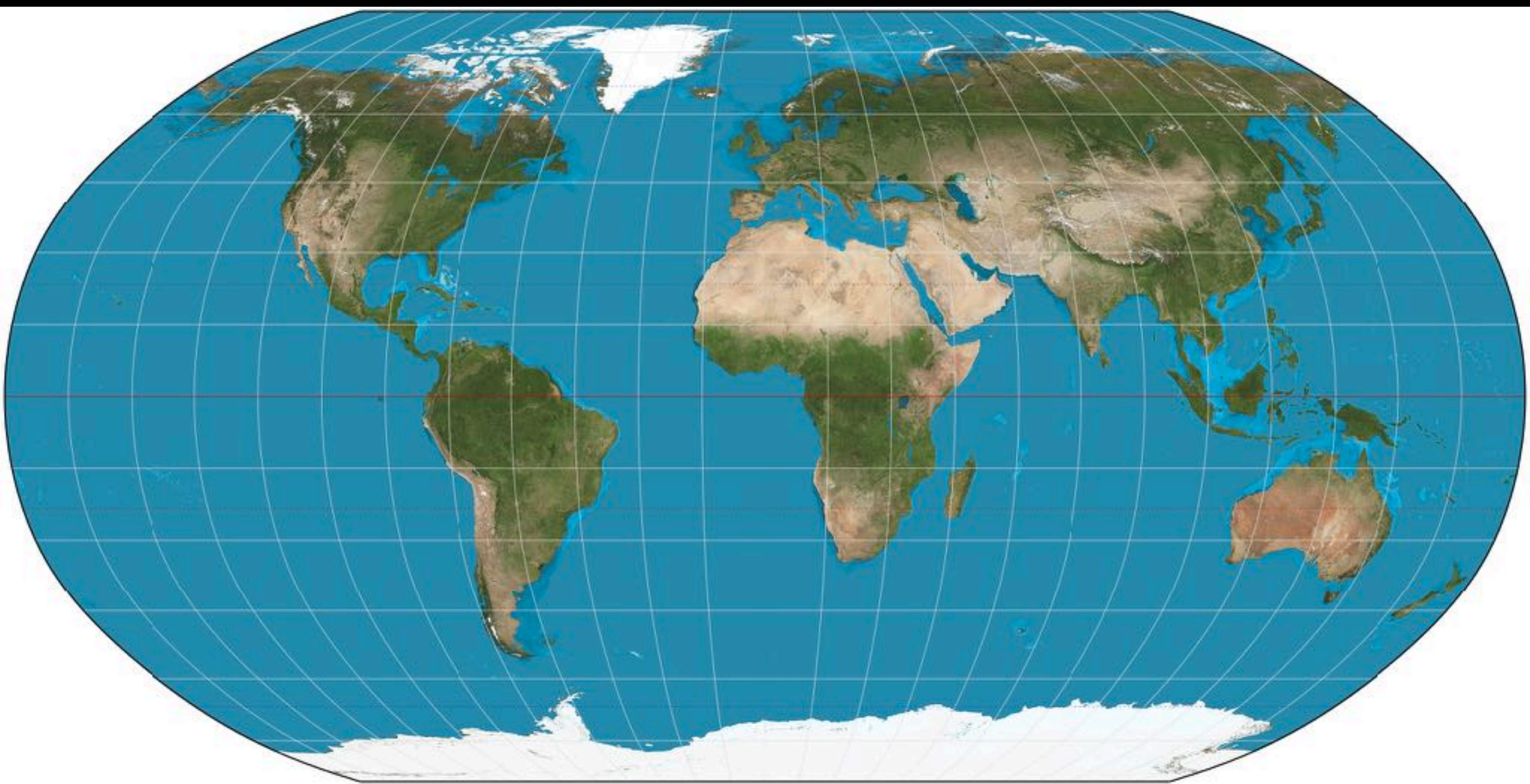
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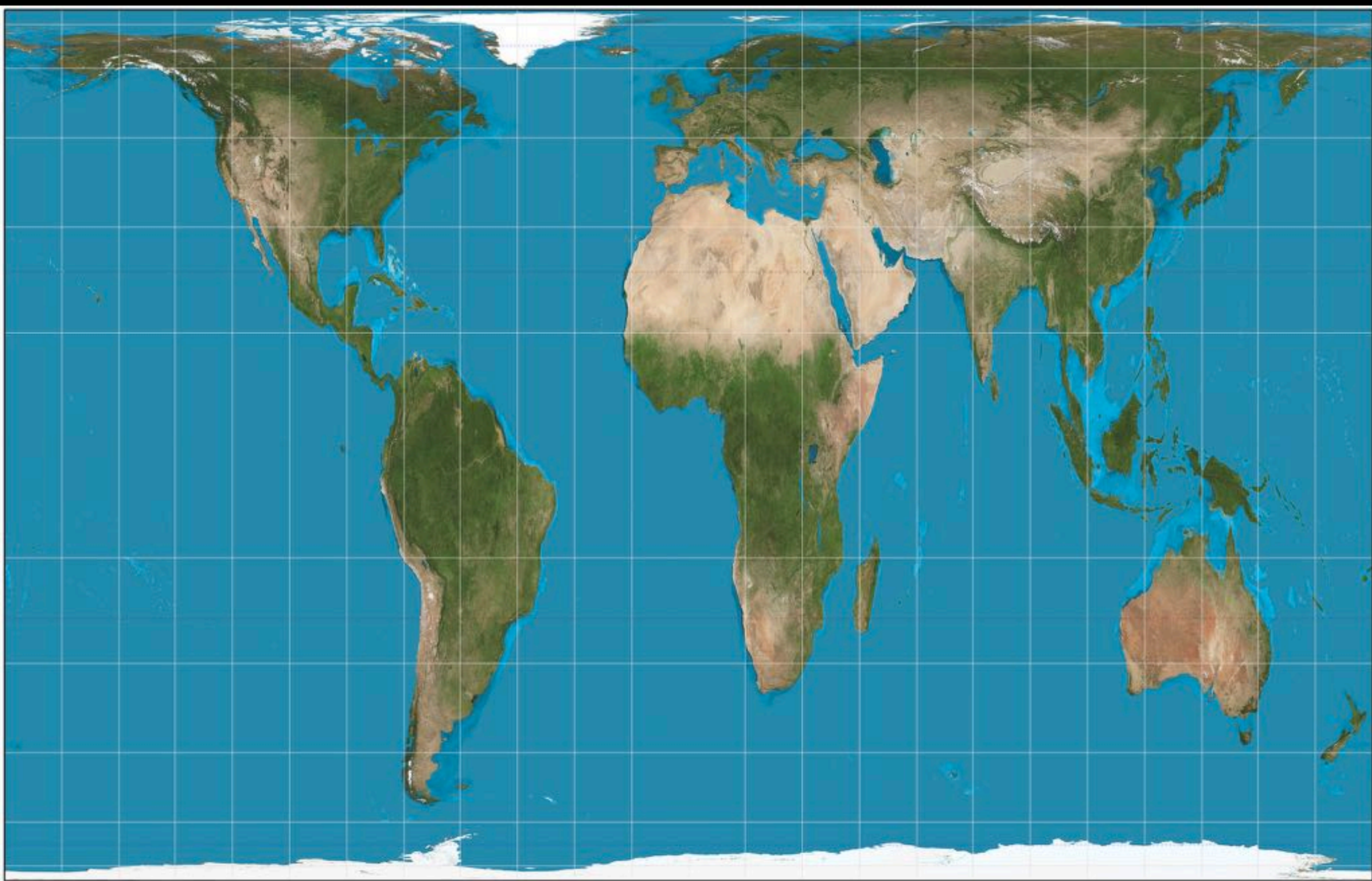










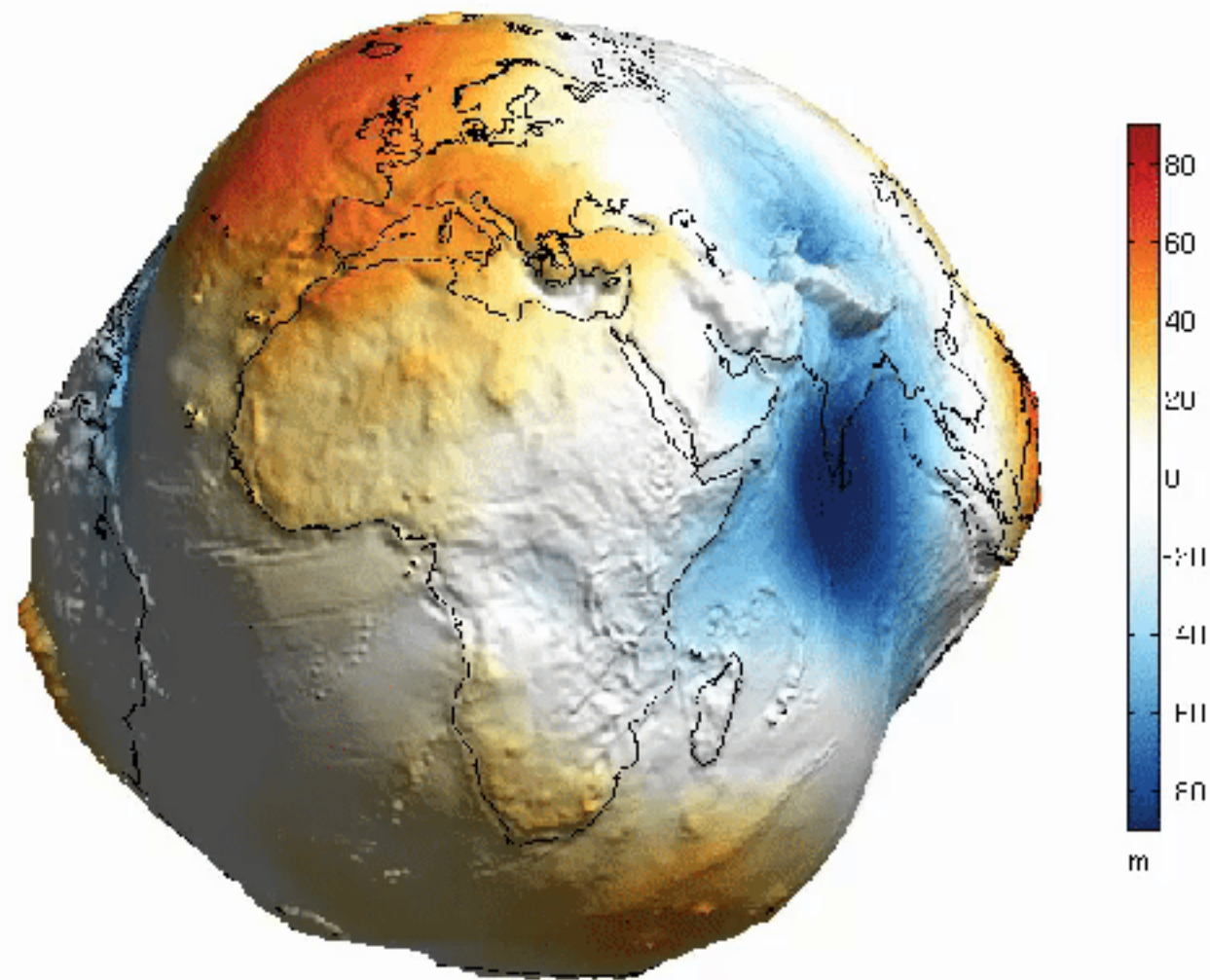


# “Unprojected”

- ‘Plate Carée’ or ‘Equirectangular’
- Latitude & longitude in angular coordinates
- The lat/long are intended to be represented on a sphere, but are often placed on a plane
- Usually used for global thematic maps



# The Earth



Geoid height (EGM2008,  $\sigma_{\text{max}}=500$ )





Approximate to sea level



# Projecting

## Two Step Process

1. Scale it down
2. Make it flat



# Make it Flat

- Geodetic Markers
- Developable surfaces
- Secant or tangent intersections



# Geodetic Benchmarks

## Central Park

N 40° 47.067

W 73° 58.000

Altitude: 106.31

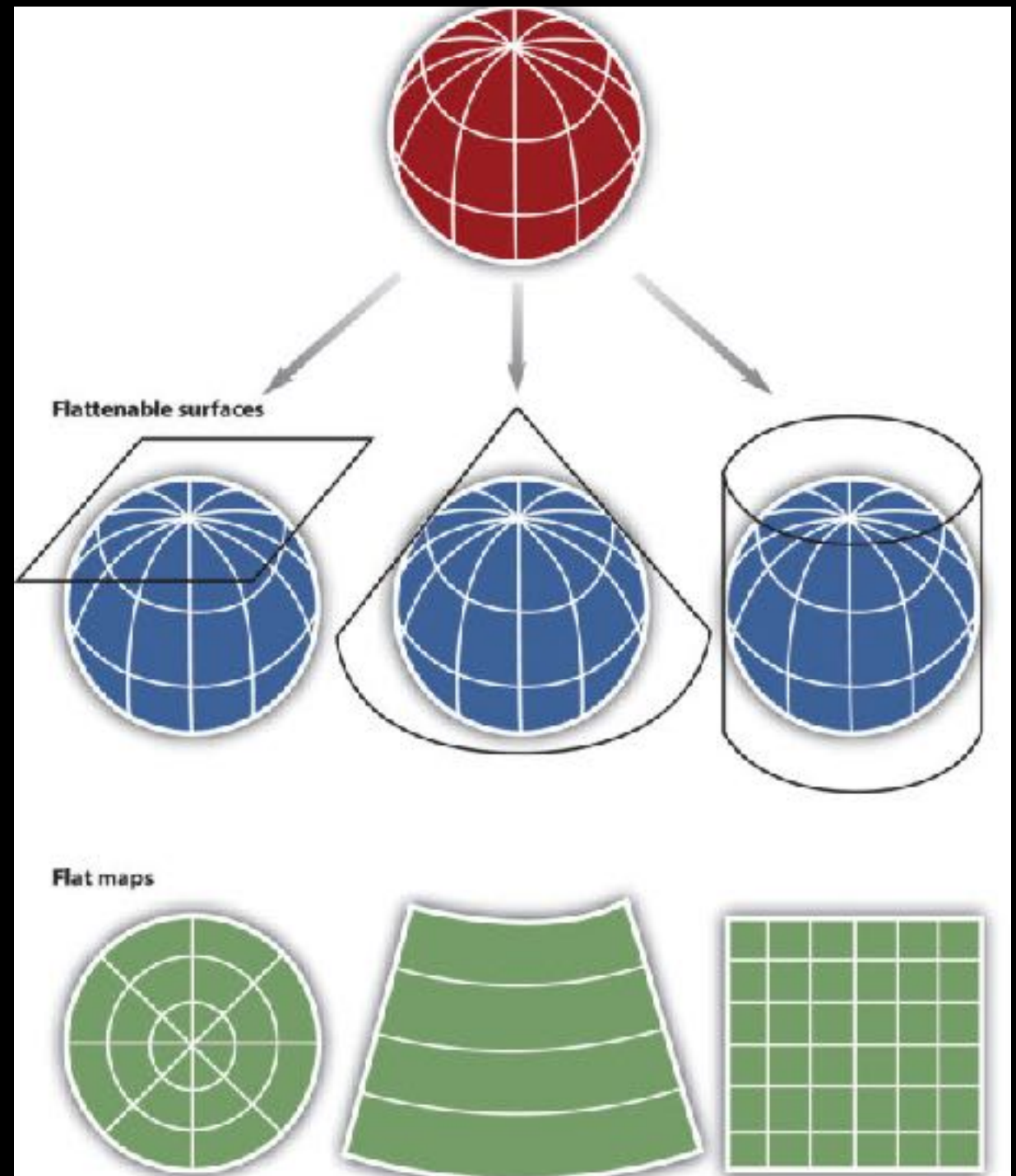




# Projections

## Flattenable Surfaces

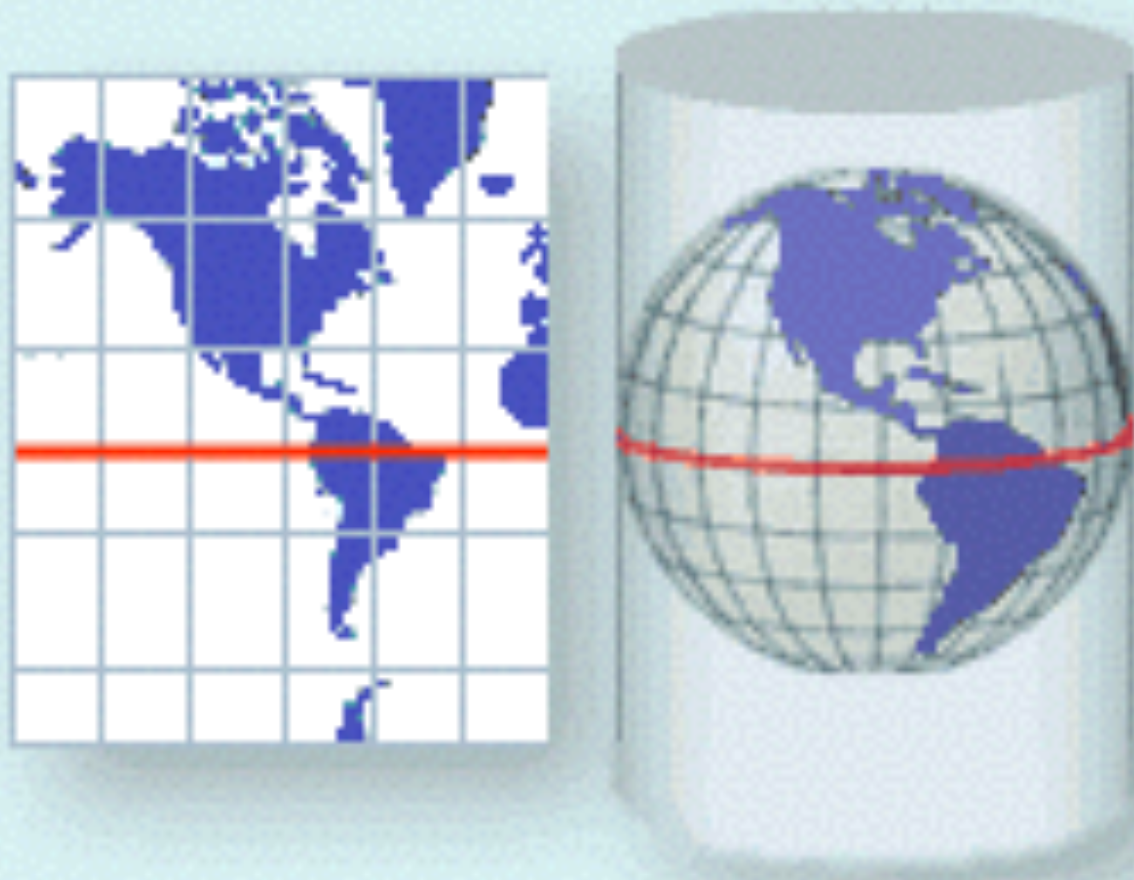
- Planes
- Cones
- Cylinders



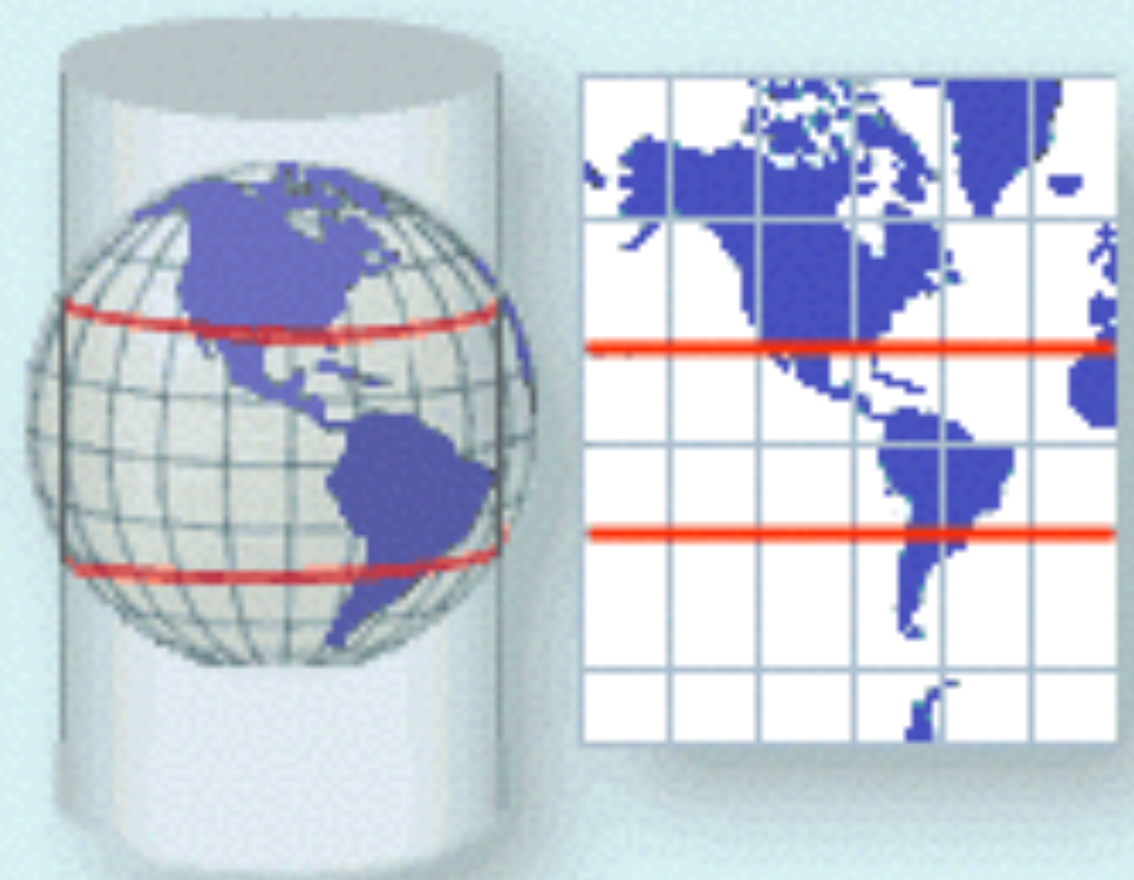


# Projections

**Tangent at a selected line**



**Secant along two lines**



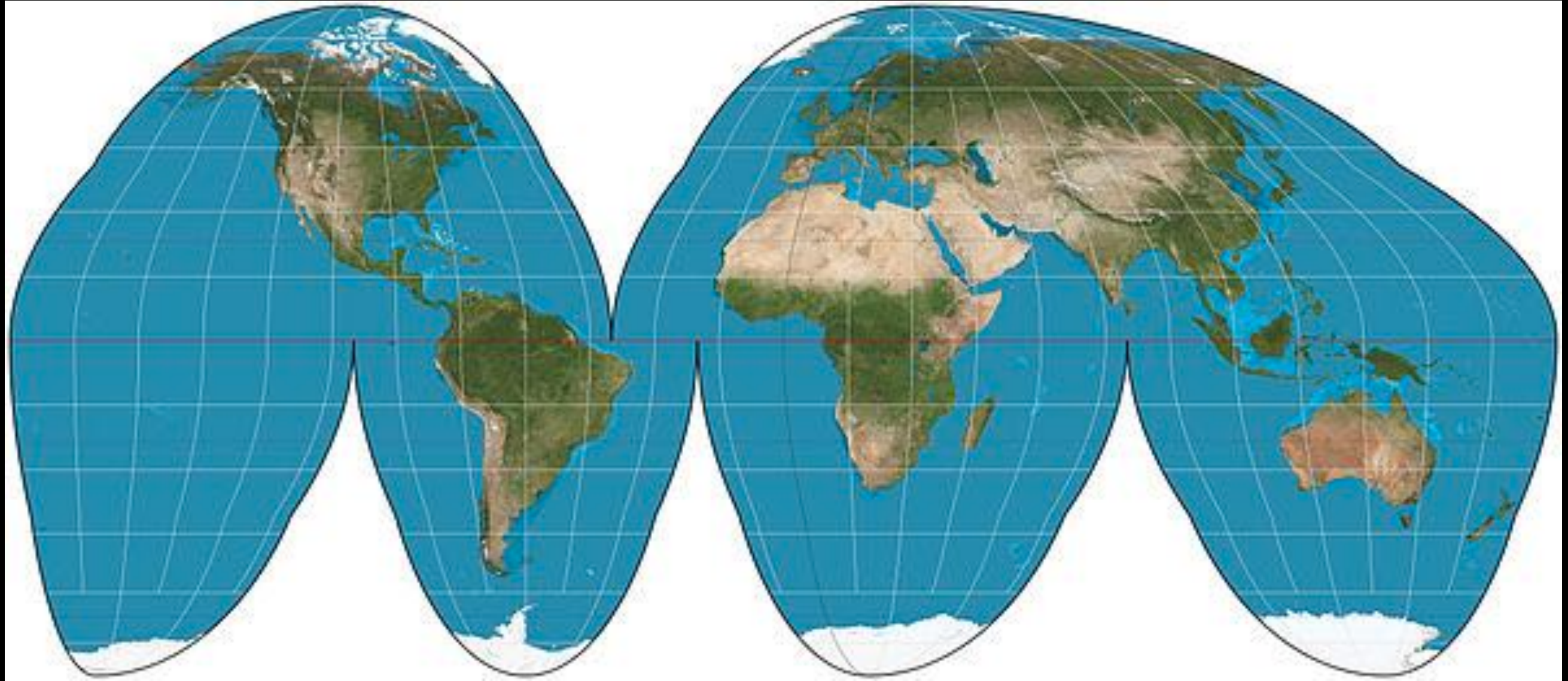
# So What's the Best Projection?

- It depends on your goals and the area you're looking at
- No projection can preserve area and angle
- No projection can preserve shape everywhere



# Projection Types

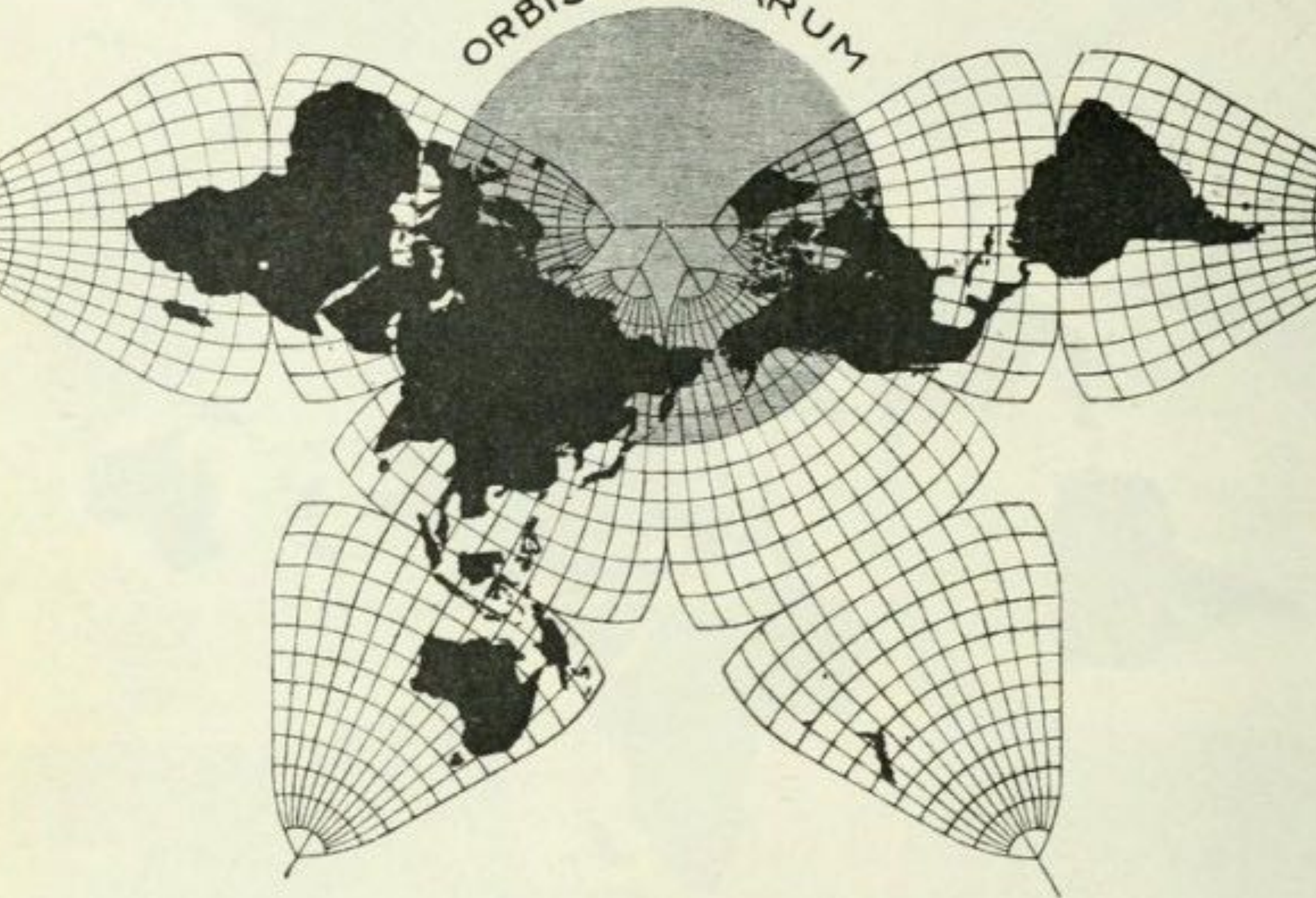
- Conformal preserves scale and shapes of small areas (latitude and longitude lines intersect at right angles)
- Equivalent/Equal Areas preserves areas
- Equidistant preserves distances between locations
- Azimuthal preserves direction
- Hybrid - Tries to minimize distortion all around



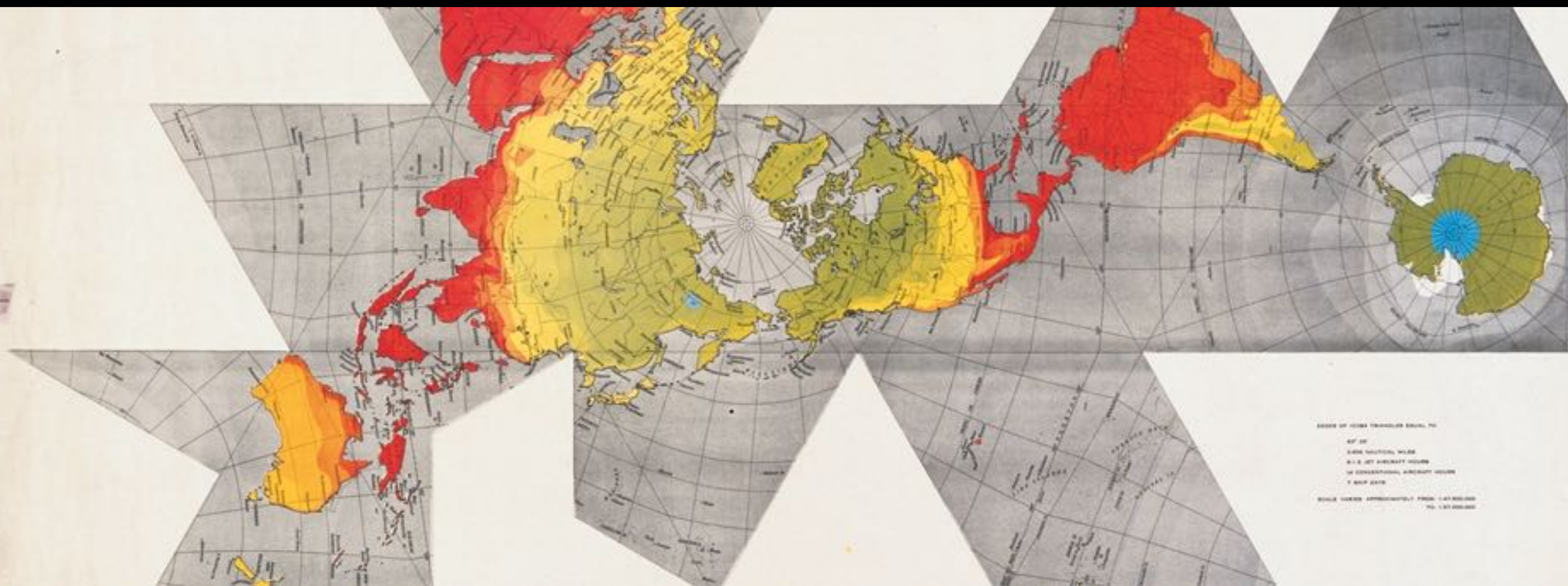
Goode's Map



ORBIS TERRARUM











# Picking a Projection

- Depends on goals
  - Webmaps use pseudo mercator
  - Dot density should use equal area
  - Maps representing a small area should be conformal
  - Pilots should use azimuthal
  - Global unity best illustrated with Dymaxion



# Picking a Projection

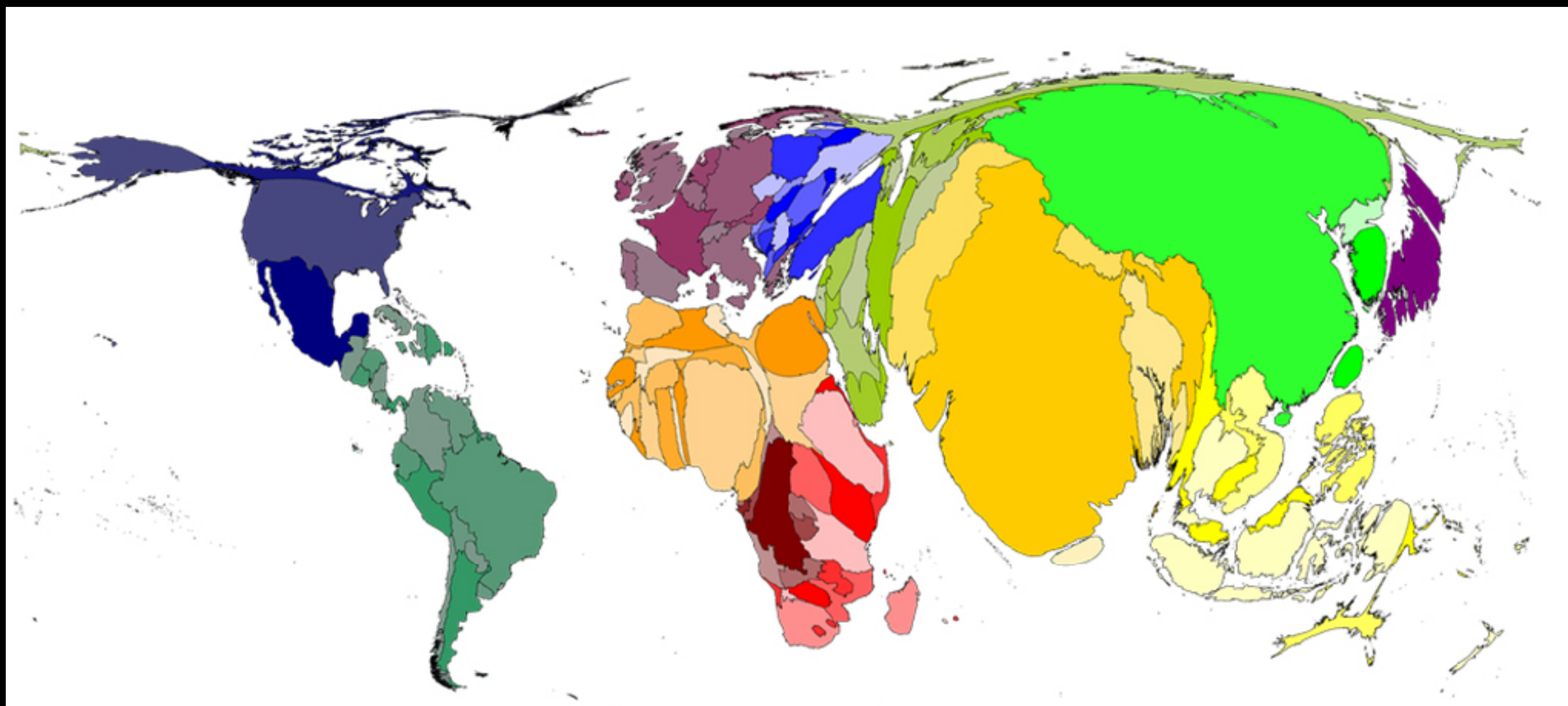
- UTM Zones
  - Conformal projections
  - Uses secant transverse mercator
- <http://tech2mine.maps.arcgis.com/apps/Solutions/s2.html?appid=ef12074d67f648a7825cc7ed160d68fa>
- <http://spatialreference.org/ref/epsg/nad83-utm-zone-18n/>

# Peters Controversy



**“I am puzzled by Peters’s obsession with land area on maps representing human misery, human needs, and human hopes. Peters’s claim of “fairness to all peoples” seems less accurate than “fairness to all acres”**

*–Monmonier, pg 39*





# WHAT YOUR FAVORITE MAP PROJECTION SAYS ABOUT YOU

## MERCATOR



YOU'RE NOT RELAXING INTO MAPS

## ROBINSON



YOU HAVE A COMPROMISE FOR TRAINING SHOES THAT YOU WORE EVERYWHERE. YOU LIKE COFFEE AND FILTER THE GRUNTLES. YOU THINK THE ROBINSON IS THE BEST-FLOORING FLOOR FOR HAVING YOUR

## WINKEL-TRIPEL



NATIONAL GEOGRAPHIC JOINED THE UNRAVELING OF 1998, BUT SOME BODY A LOT SINCE DOES GETS "WATERS" SHOWED IN YOUR WORKED IT GETTING PLAYS OUT AND ARE THINKING OF SAYING TO THE KAYAKERS. YOU ONLY LIST A PUNCH IN LUGGAGE WHEN A GREAT SHIPLED UP LEAVING JAMES WITH THE YOUR FORTS. MARCH 06-08. IS "1998."

## HUGO-DYER



YOU WANT TO AVOID CULTURAL IMPERIALISM, BUT YOUR HEROES END UP BEING GAY, POSES. YOU'RE CONFIDENT AND SEXY BECAUSE YOU USE A RESEARCH-ORIENTED SET OF CONCEPTS, BUT THE PROBLEM IS THAT YOUR THEORY IS TOO WEIRD. IT'S A PARADOX OF INDIANITY.

A GLOBE!



YES, YOU'RE WITH CLEVELAND

## PEIRCE QUINCUNAL



YOU THINK IT'S WHEN WE LOOK AT IT, AND WE HAVE  
THINKING SHE'S BEING SERVED. AFTER YOU FIRST SAW  
AND THEN YOU SAW HER IN THE THEATER FOR  
SIX HOURS. IT WASN'T UNTIL YOU REALIZED THAT  
EVERYONE IN THE THEATER WAS A GHOST. YOU  
WAS THE ONLY ONE WHO WASN'T.

## VAN DER GRÜNEN



YOU'RE NOT A COMPLICATED PERSON. YOU LOVE THE MARIJUANA PROTECTION. YOU JUST WANT IT WORKING SQUARE. THE EFFORTS NOT A SQUARE, THEY CALL IT. YOU LIKE CIRCLES. TOMMY CHANNABLE. A GOOD TIME.

Других



YOU LIKE ISAAC ASHMOY, JEFF, AND DANNY WITH BBS  
YOU THINK THE "SERVING" GOT A GOOD RIDE YOU OWN 3D  
GOOGLES WHICH YOU USE TO VIEW BETHING THINGS  
OF BETTER 3D GOOGLES YOU ARE IN DUMB.

GOODE, HOMIUSINE



THEY'VE SHIPPED THE ERROR DATA DISK AND IT'S AS GOOD AS  
LIKE RATTENING AN ORANGE PEEL, WHICH MEANS  
SPAY ENOUGH TO KILL YOU LIKE SPAY SOLUTIONS. YOU  
THINK WE WOULDN'T HAVE SOMEONE PROBLEM'S FIXED  
JUST FLEET, ADDRESS "PEOPLE" IN CHARGES, AMOUNT  
OF POLICIES. YOU THINK HISTORY'S SHORTLIST ON  
SOME FROM THE DISSENTERS HERE, THE CRIES AND  
SCREAMS THEY'VE COINED. YOU'VE INVITE YOUR OWNERS ON.  
BUT SURELY WONDER IF YOU WOULD ACCEPT?

PLATE CARREE  
(SQUARE PLATE)



YOU THINK THE ONE IS FINE, YOU SEE HOW I MEY  
HOP TO LITTLE AND VANDERBILT. THE OTHER  
PROPOSITION DISCOMFORTS ME. YOU WANT ME  
TO STAY AROUND NEAR HIPS AND THE OTHER SIDE

## WATERMAN BUTTERFLY



READ? YOU KNOW THE 'WITCHAM' HAVE YOU SEEN THE TOP? JUNE MAY IT'S GOOD— ... YOU HAVE A THERM REPRODUCTION IT HOME? WHOA ... DUTY, READER, THESE QUESTIONS ARE YOU DOING ANYTHING TIGHT?

## GALL-PETERS



I AMIT VU