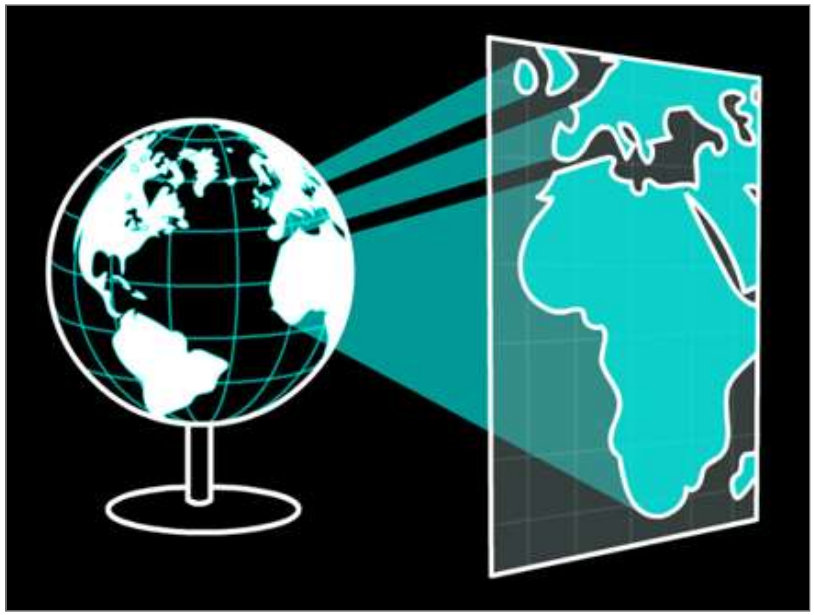
PROJECTED COORDINATE SYSTEMS

A map projection is a flattened GCS. Imagine sending rays of light through the ellipsoid onto a flat surface, the resulting image is a projection.



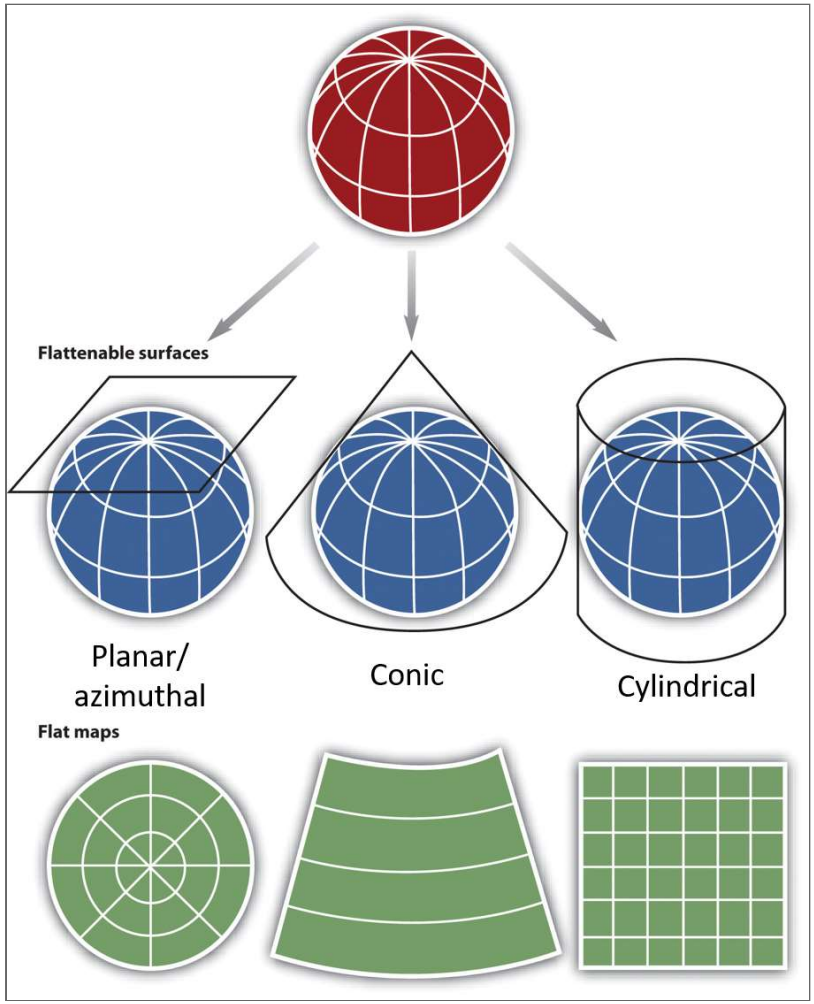
HOW DO WE CONSTRUCT PROJECTIONS?

A GCS is projected onto a surface that can be flattened.

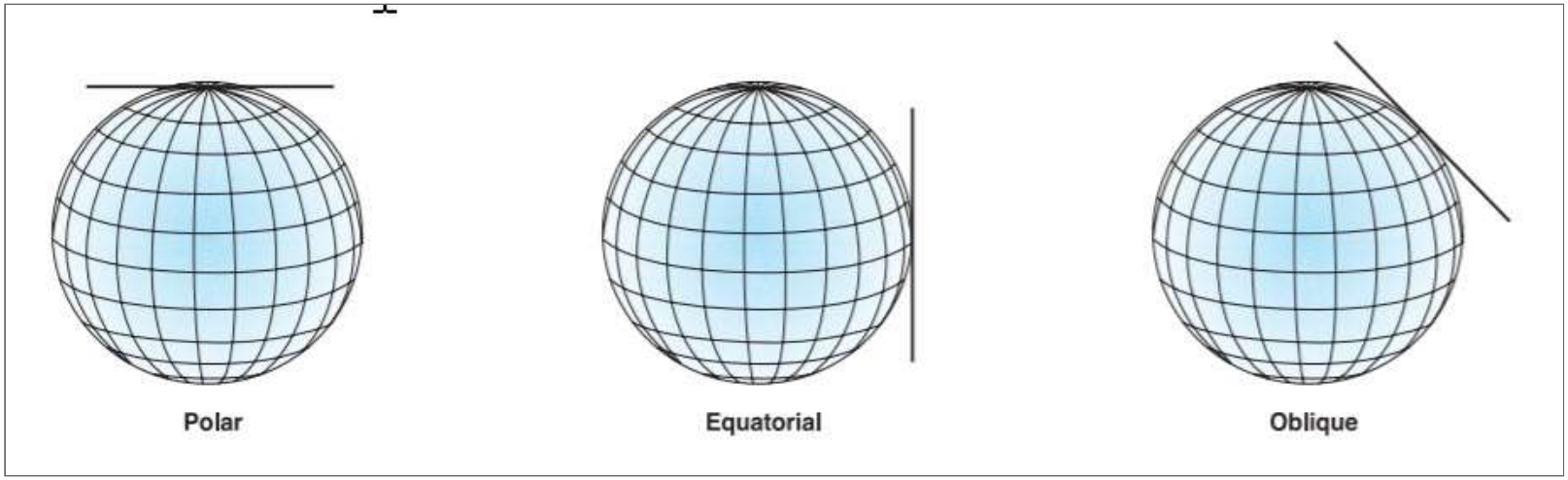
Planar: A 2D flat plane

Conic: A 2D cone

Cylindrical: A 2D cylinder

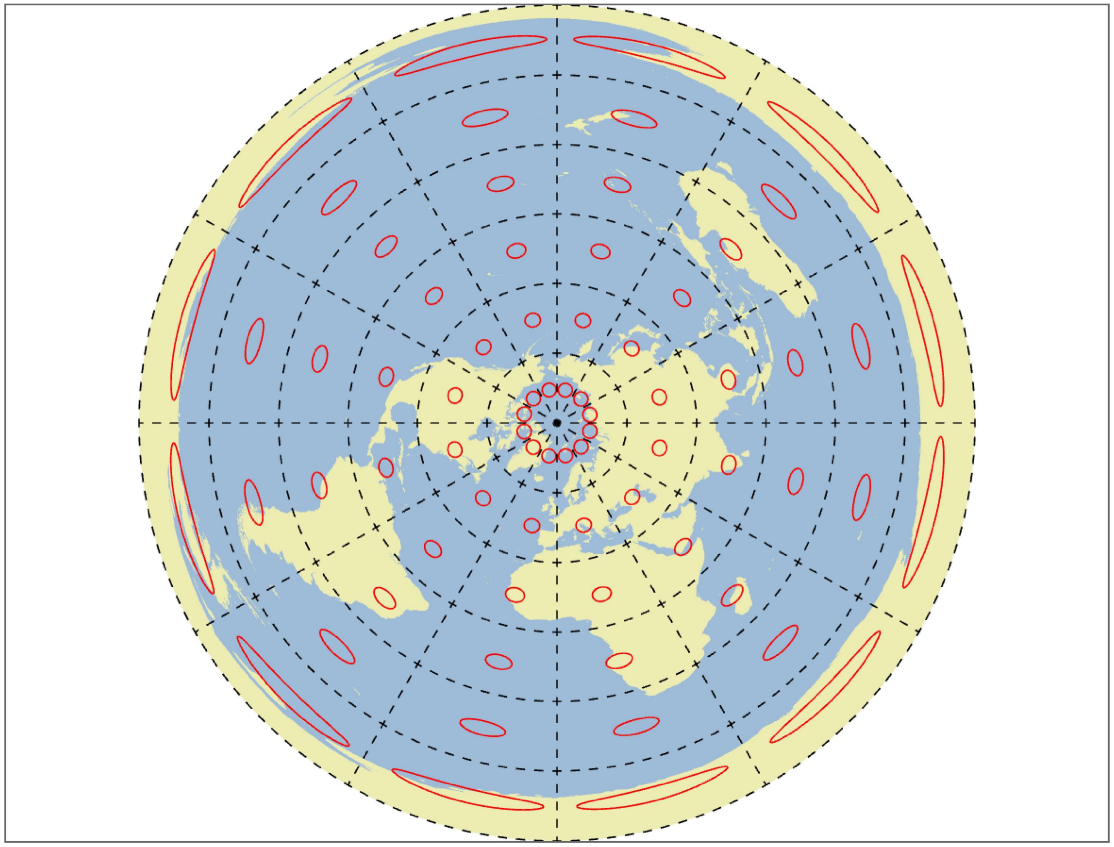


PLANAR/AZIMUTHAL

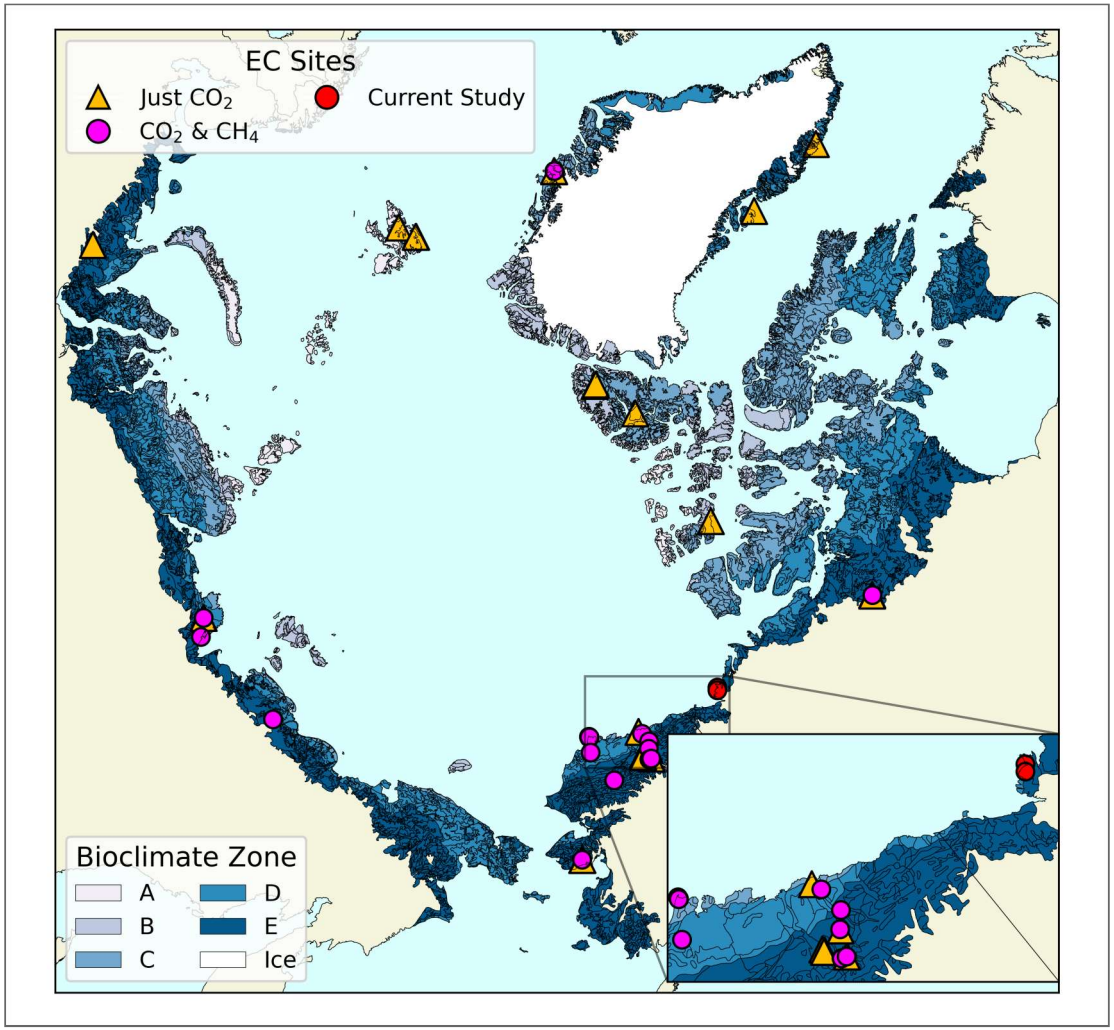


Simplest option but limited applicability/scope. Usually only used for polar regions.

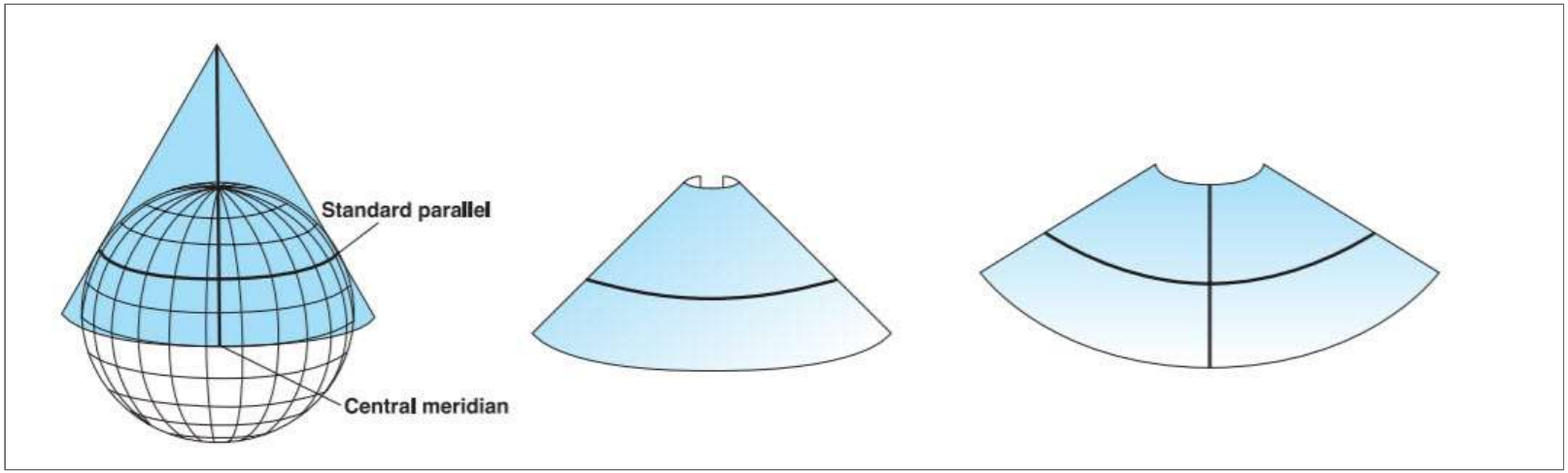
PLANAR/AZIMUTHAL



PLANAR/AZIMUTHAL

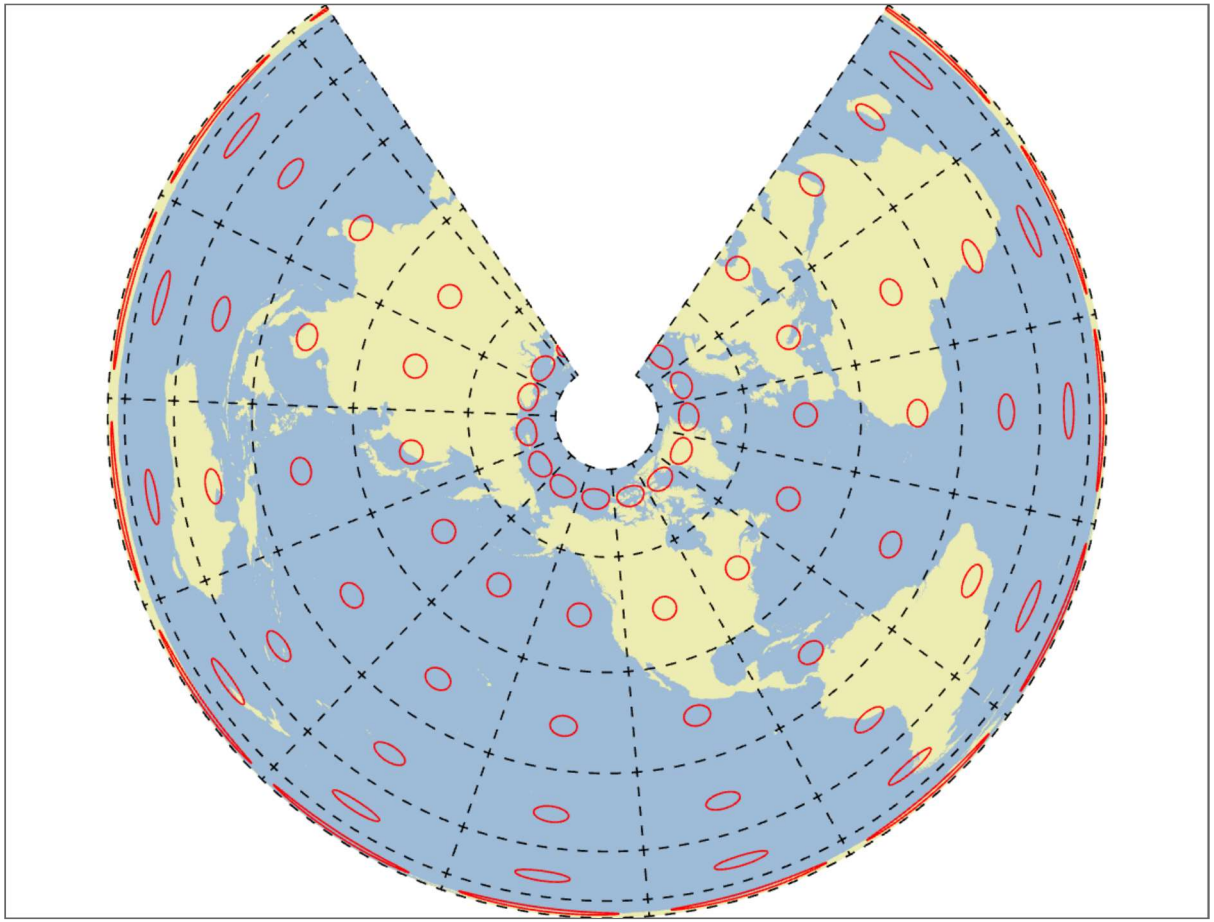


CONIC

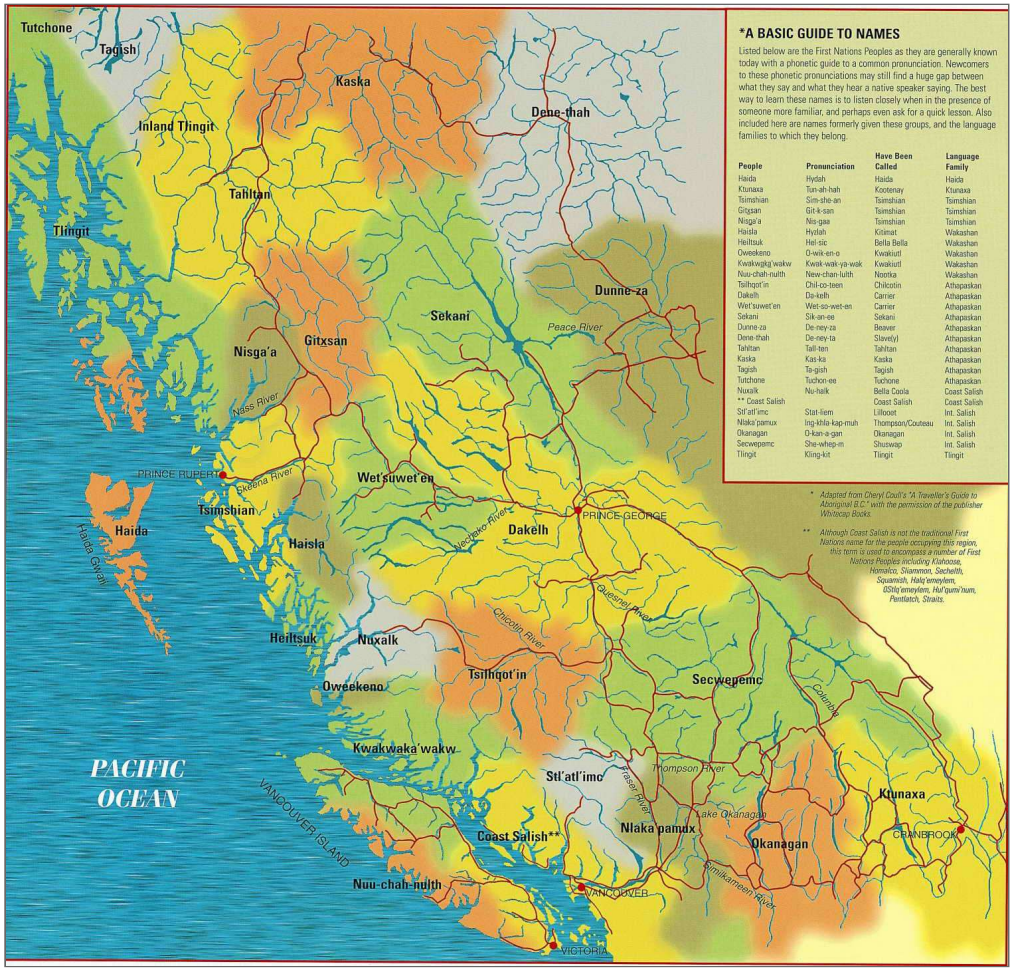


Great for mid-latitudes. Can only cover one hemisphere at a time.

CONIC



CONIC



*A BASIC GUIDE TO NAMES

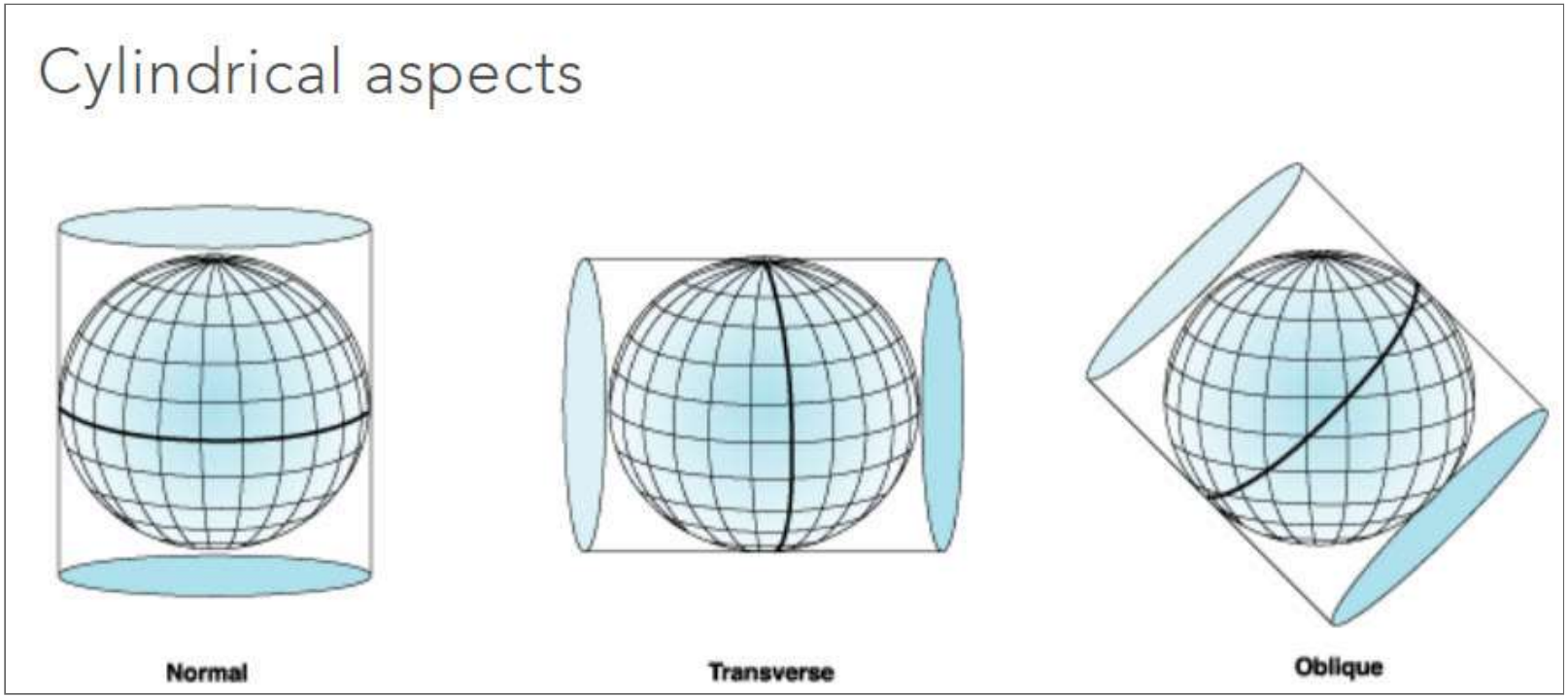
Listed below are the First Nations Peoples as they are generally known today with a phonetic guide to a common pronunciation. Newcomers to these phonetic pronunciations may still find a huge gap between what they say and what they hear a native speaker saying. The best way to learn these names is to listen closely when in the presence of someone more familiar, and perhaps even ask for a quick lesson. Also included here are names formerly given these groups, and the language families to which they belong.

People	Pronunciation	Have Been Called	Language Family
Haida	Hydah	Haida	Haida
Ktunaxa	Ton-ah-hah	Kootenay	Ktunaxa
Tsimshian	Sim-she-an	Tsimshian	Tsimshian
Gitxsan	Git-k-san	Tsimshian	Tsimshian
Nisga'a	Nis-gaa	Tsimshian	Tsimshian
Haisla	Hydah	Kitimat	Wakashan
Heiltsuk	Hel-tsc	Bella Bella	Wakashan
Oweekeno	O-wik-en-o	Kwakiutl	Wakashan
Kwakwgkg'wakw	Kwak-wak-ya-wak	Kwakiutl	Wakashan
Nuu-chah-nulth	New-chan-lulth	Nootka	Wakashan
Tsilhqot'in	Chil-co-teen	Chilcotin	Athapaskan
Dakelh	Da-keh	Carrier	Athapaskan
Wet'suwet'en	Wet-so-wet-en	Carrier	Athapaskan
Sekani	Sik-an-ee	Sekani	Athapaskan
Dunne-za	De-ney-za	Beaver	Athapaskan
Dene-thah	De-ney-ta	Slavely)	Athapaskan
Tahltan	Tall-ten	Tahltan	Athapaskan
Kaska	Kas-ka	Kaska	Athapaskan
Tagish	Ta-gish	Tagish	Athapaskan
Tutchone	Tuchon-ee	Tuchone	Athapaskan
Nuxalk	Nu-halk	Bella Coola	Coast Salish
** Coast Salish		Coast Salish	Coast Salish
Stl'atl'imc	Stat-liem	Lillooet	Int. Salish
Nlaka'pamux	Ing-klia-kap-muh	Thompson/Couteau	Int. Salish
Okanagan	O-kan-a-gan	Okanagan	Int. Salish
Secwepemc	She-whep-m	Shuswap	Int. Salish
Tlingit	Kling-kit	Tlingit	Tlingit

* *Adapted from Cheryl Coull's "A Traveller's Guide to Aboriginal B.C." with the permission of the publisher Whitecap Books.*

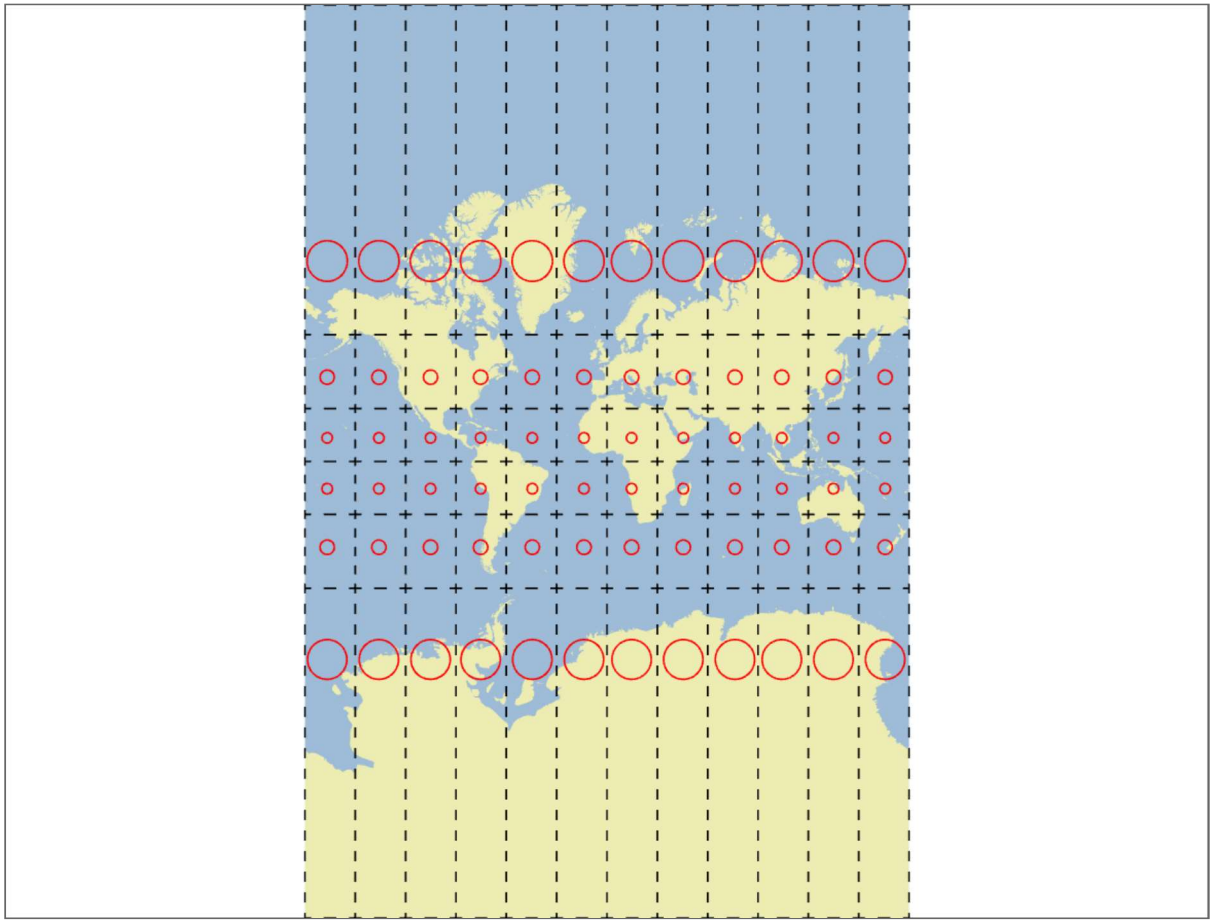
** *Although Coast Salish is not the traditional First Nations name for the people occupying this region, this term is used to encompass a number of First Nations Peoples including Kuhsoose, Homalco, Sliammon, Sechelth, Squamish, Halq'emeylem, SSlilq'emeylem, Hul'qumi'num, Pentlatch, Straits.*

CYLINDRICAL

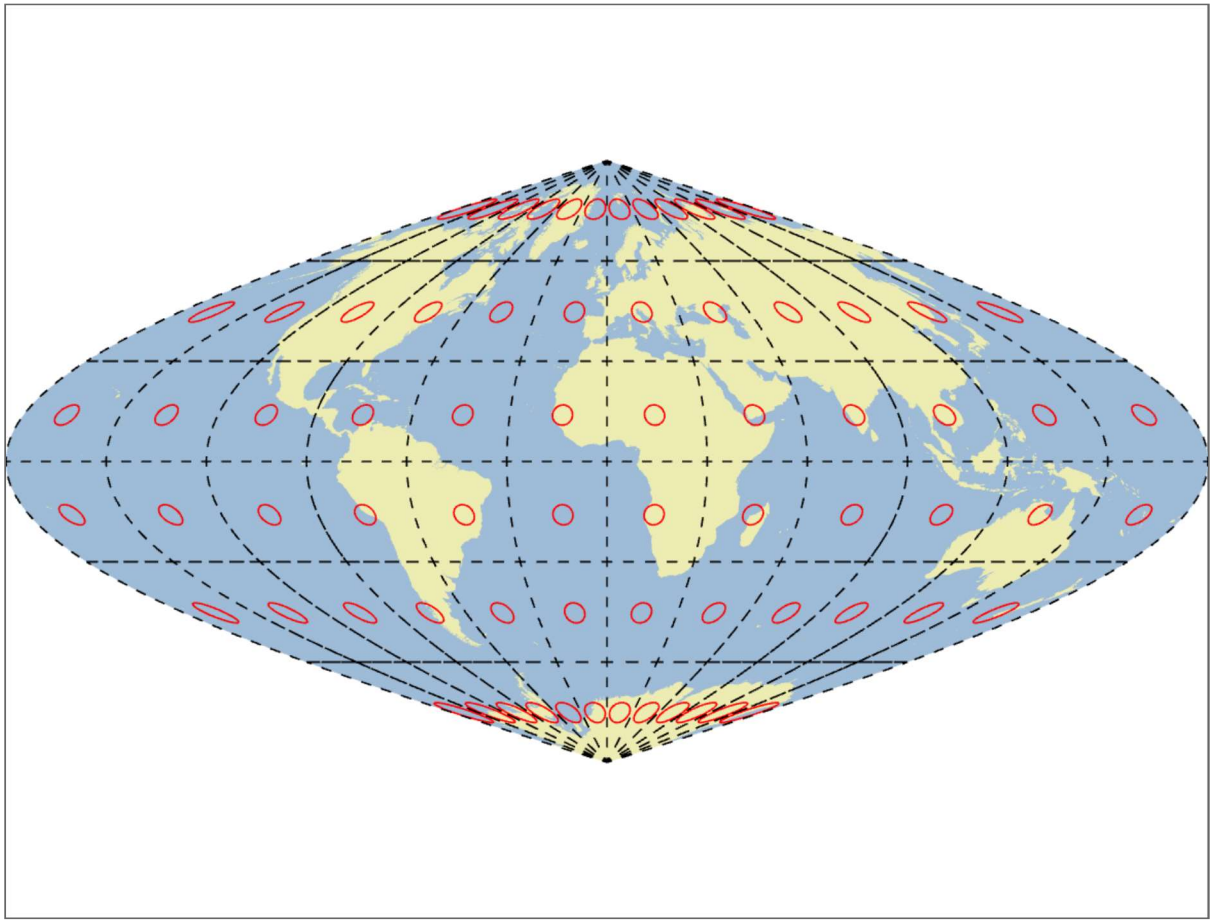


Works for the full Earth (Normal). Or applied to small slices (Transverse)

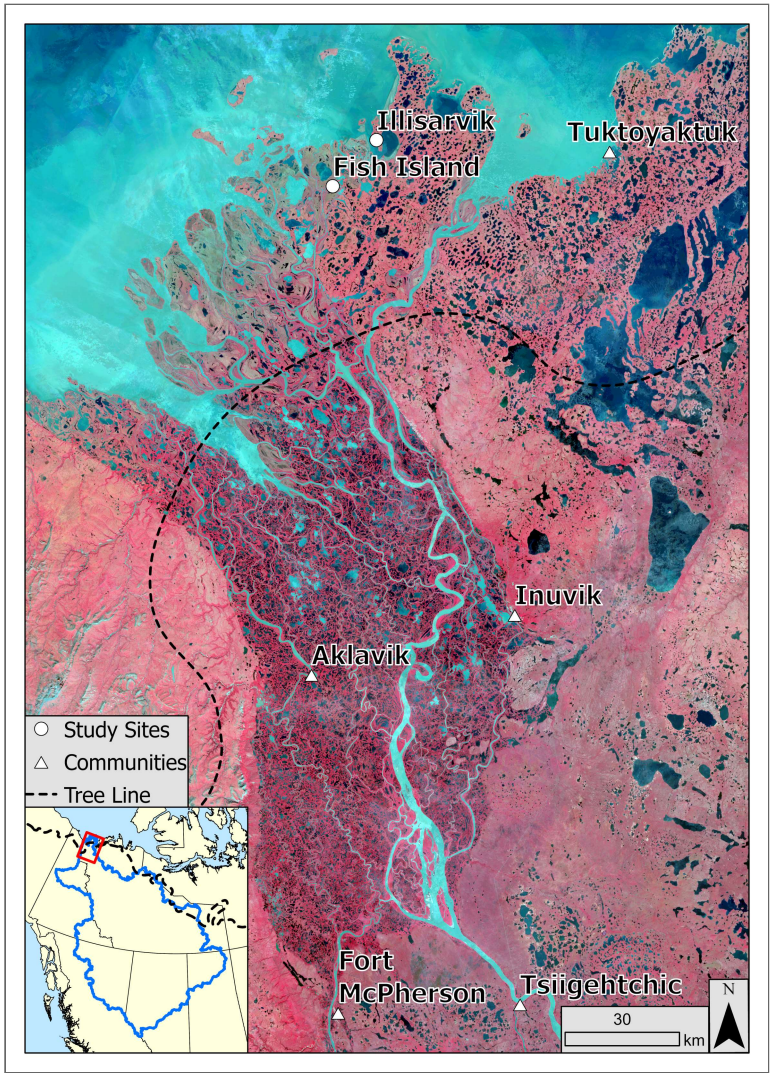
CYLINDRICAL



CYLINDRICAL



CYLINDRICAL



CLASSES OF PROJECTION

Conformal: Shapes are preserved.

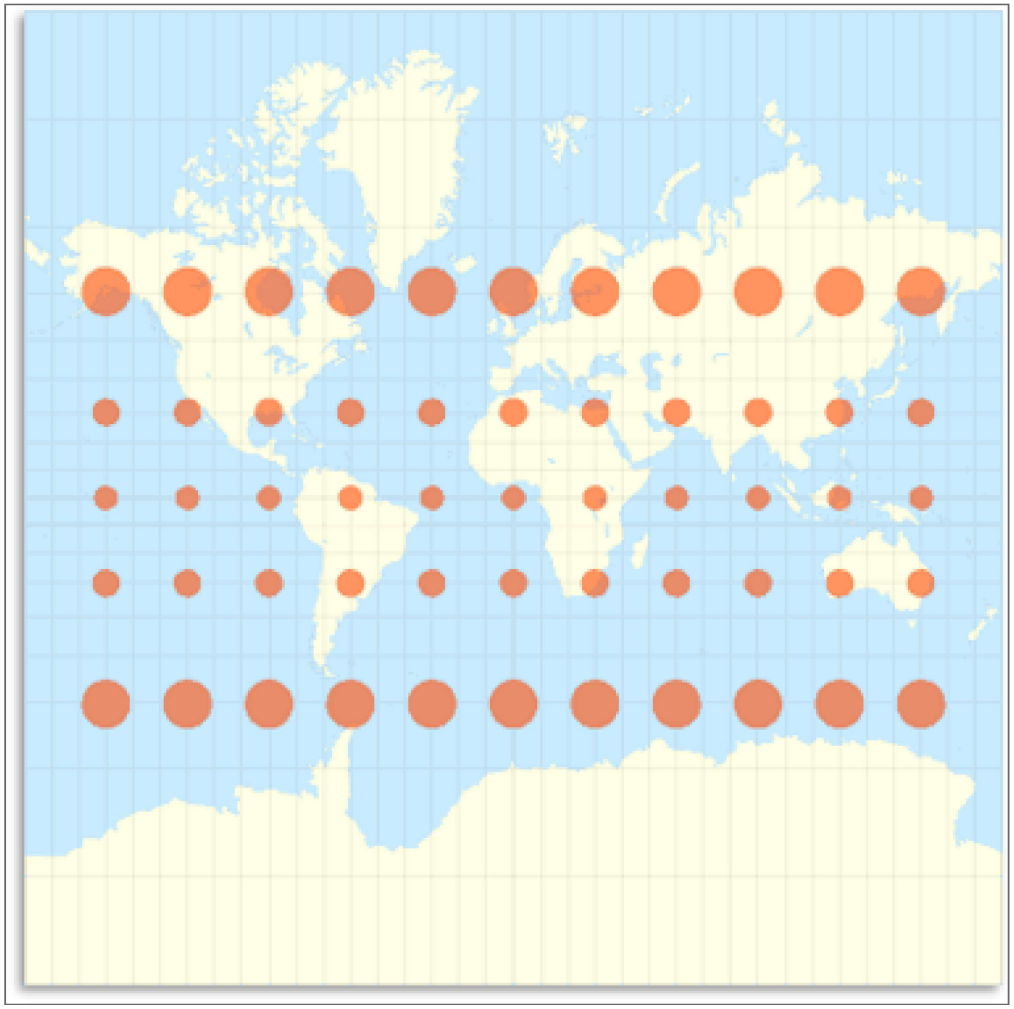
Equal-area: Areas is preserved.

Equidistant: Distance is preserved (*limited)

True-direction: Direction is preserved (*limited)

Compromise: Splits the difference for aesthetics

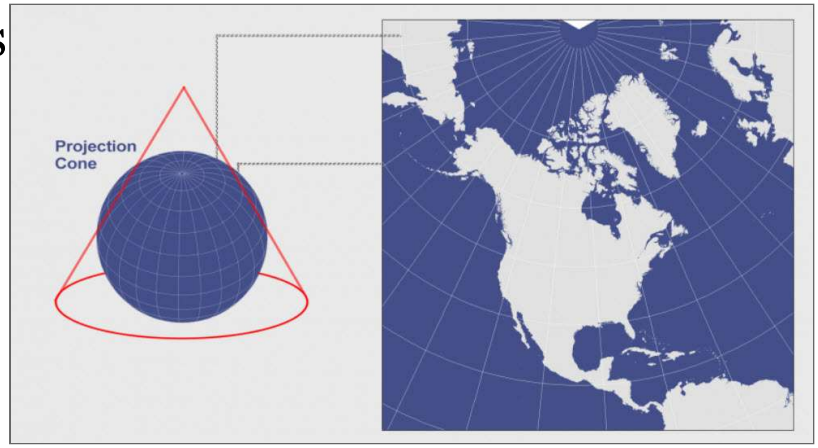
CONFORMAL PROJECTIONS



CONFORMAL PROJECTIONS

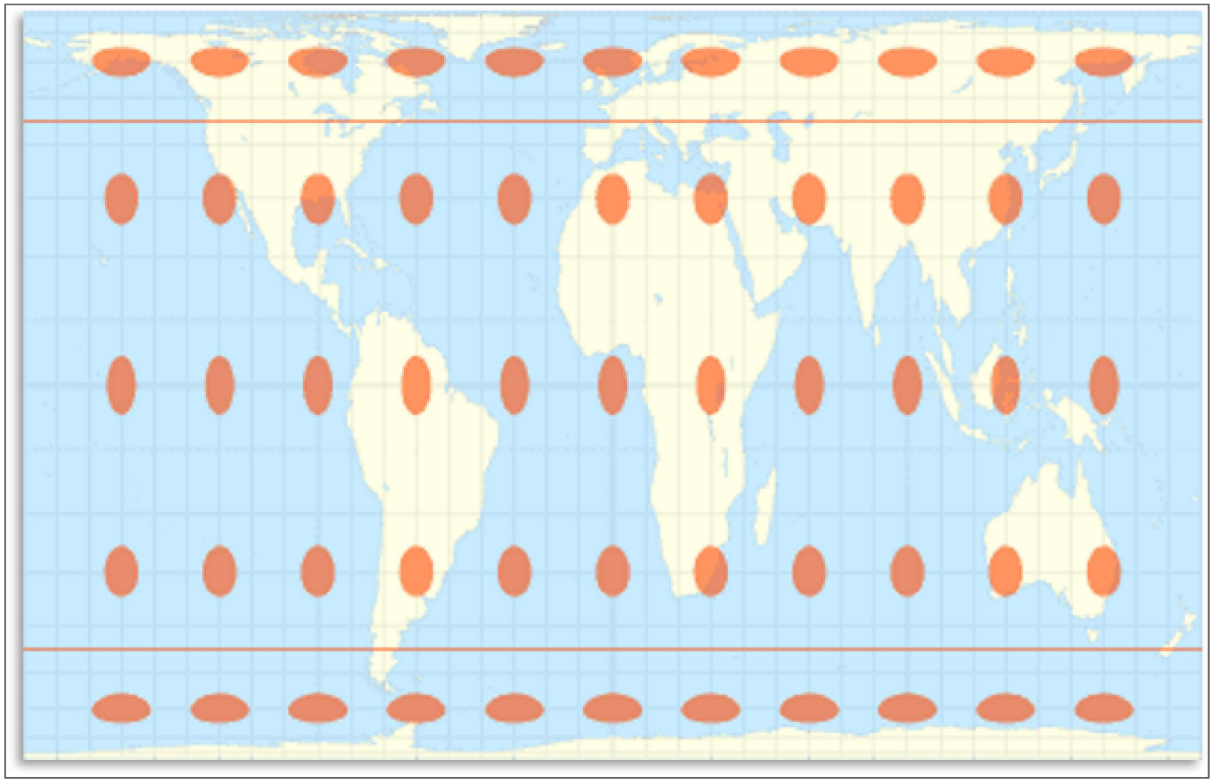
No angular deformation, but area is severely distorted.

Scale changes across the map, poor for measuring distances or areas.



Lambert Conformal Conic

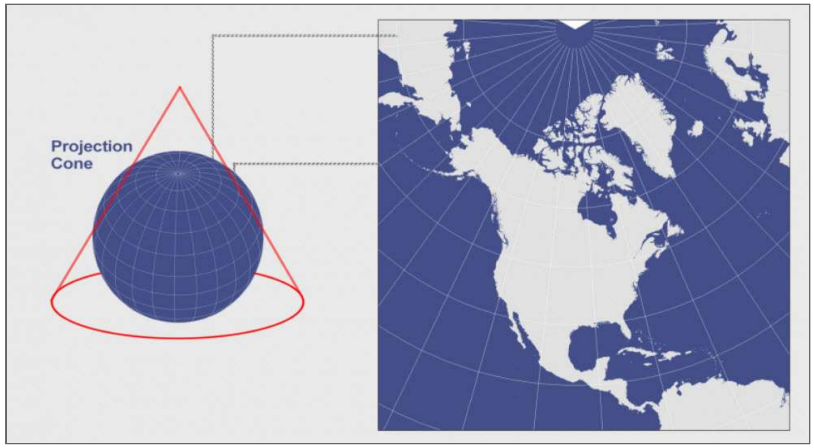
EQUAL AREA



EQUAL AREA

Preserves area but angles/shapes are deformed.

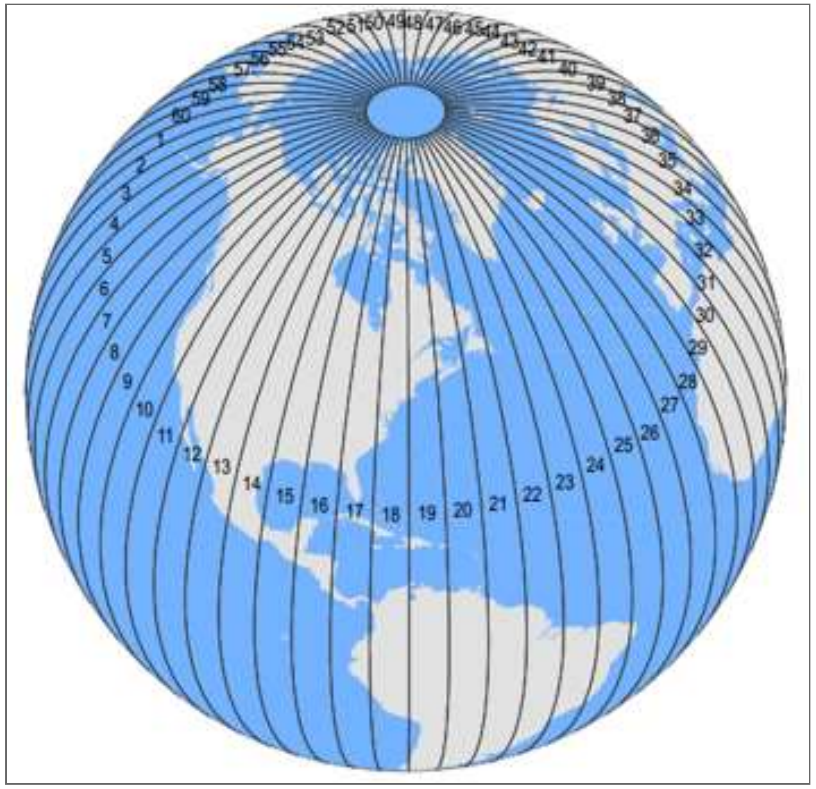
Very useful in GIS where area must be preserved for land analysis.



Albers Equal Area

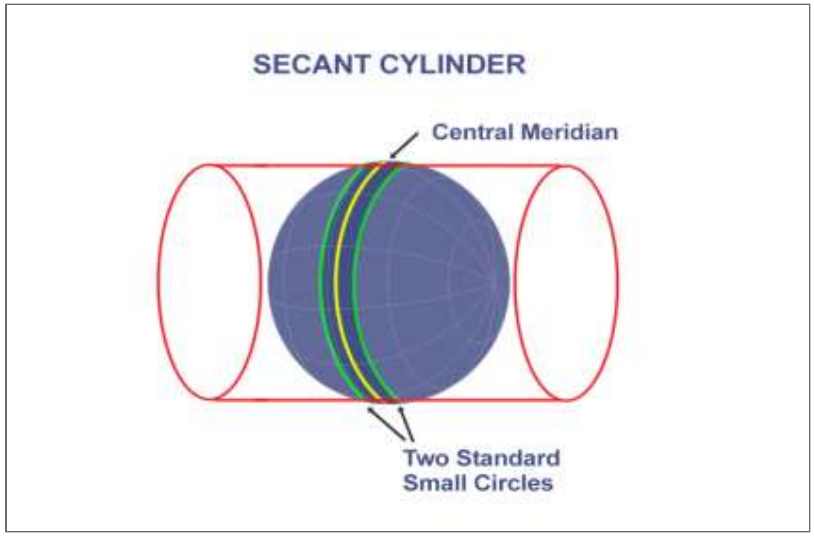
UNIVERSAL TRANSVERSE MERCATOR

Globe is divided into strips 6 degrees wide. Zones span from 80N to 80S.



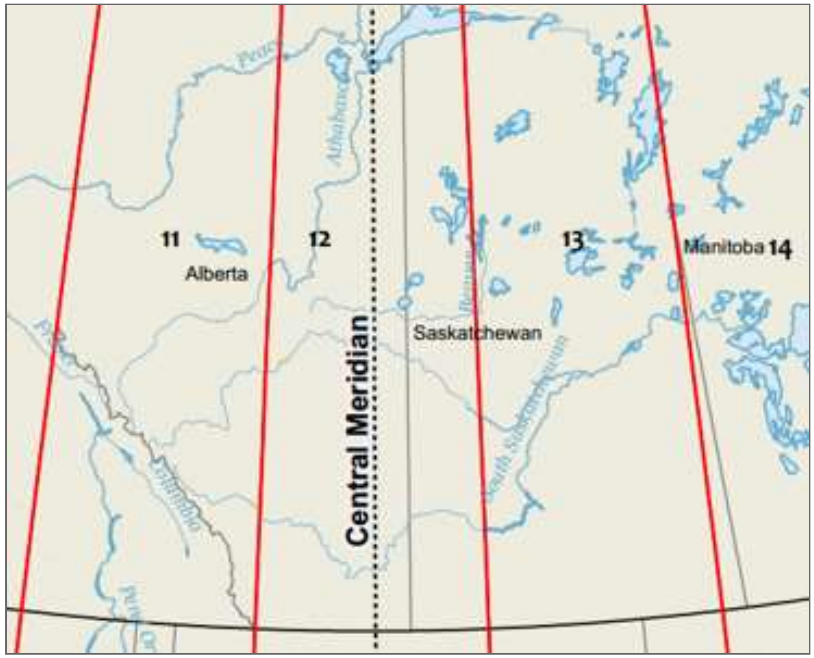
UNIVERSAL TRANSVERSE MERCATOR

Each zone is projected on a transverse cylinder.



UNIVERSAL TRANSVERSE MERCATOR

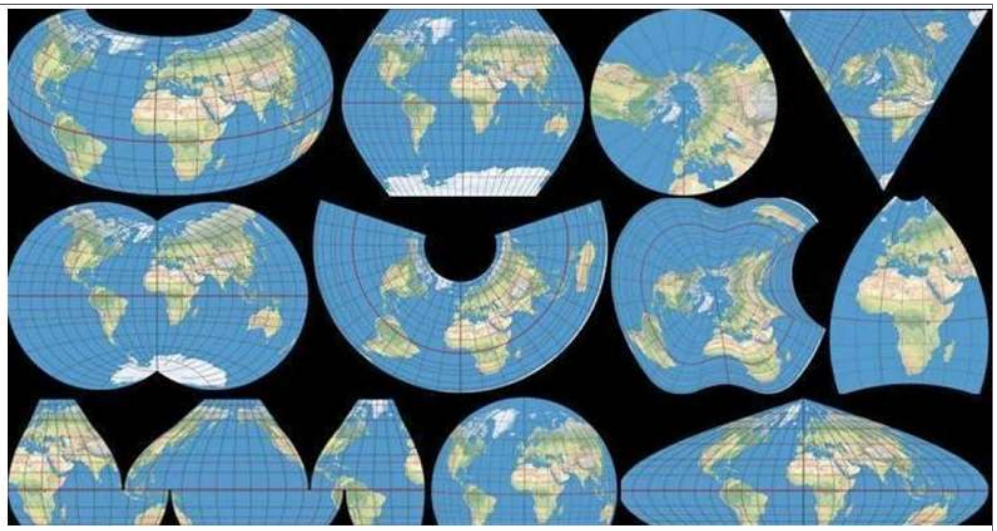
Little distortion within zones – great for mapping small areas.



SOURCES OF DISTORTION

Projections can:

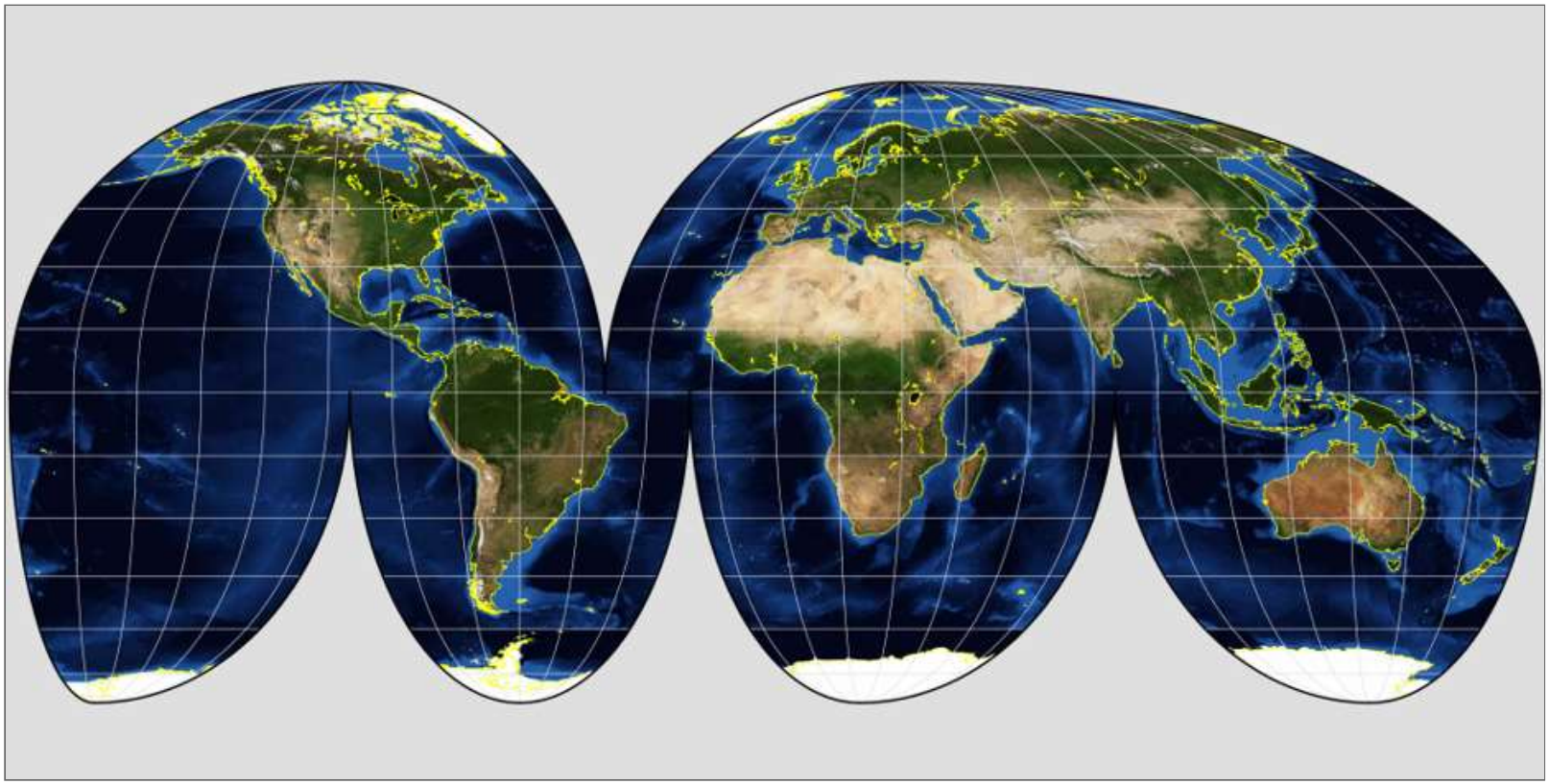
- Preserve shape
- Preserve area
- Preserve distance
- Preserve direction



But they can't do all at once!

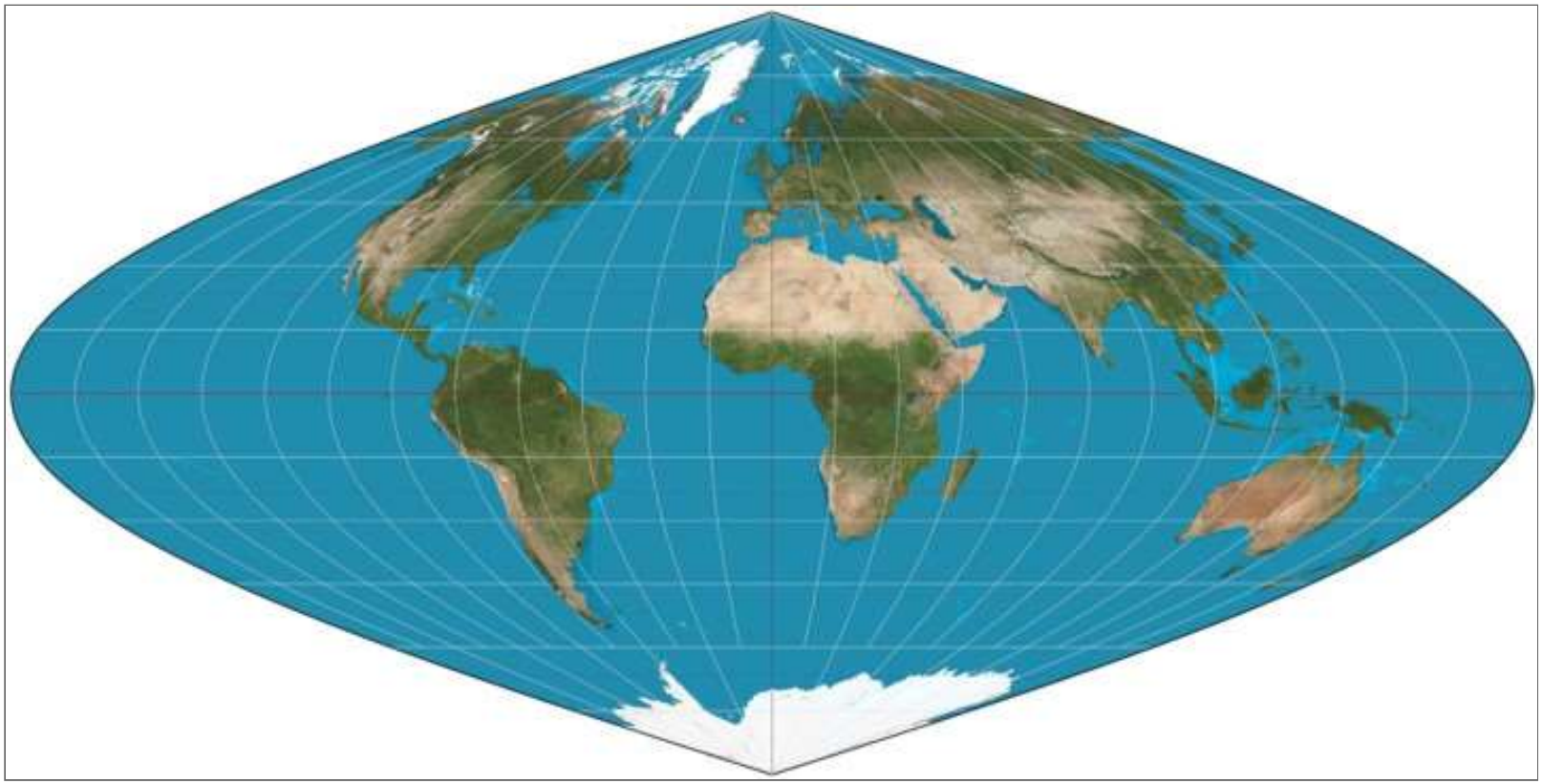
Distortion is inevitable!

TEARING



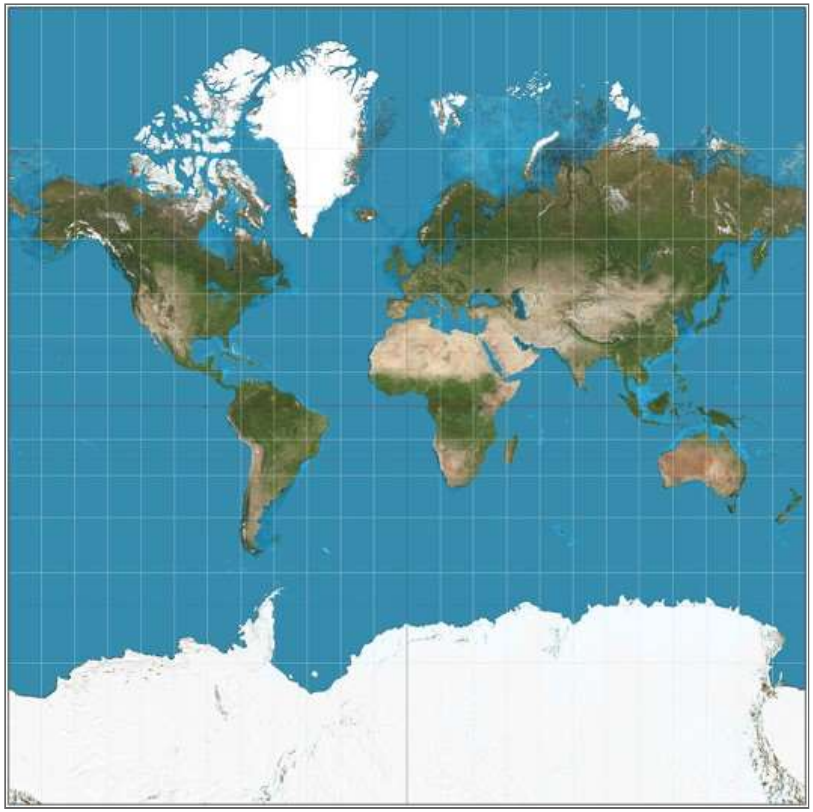
All projections have tearing (edges).

SHEARING



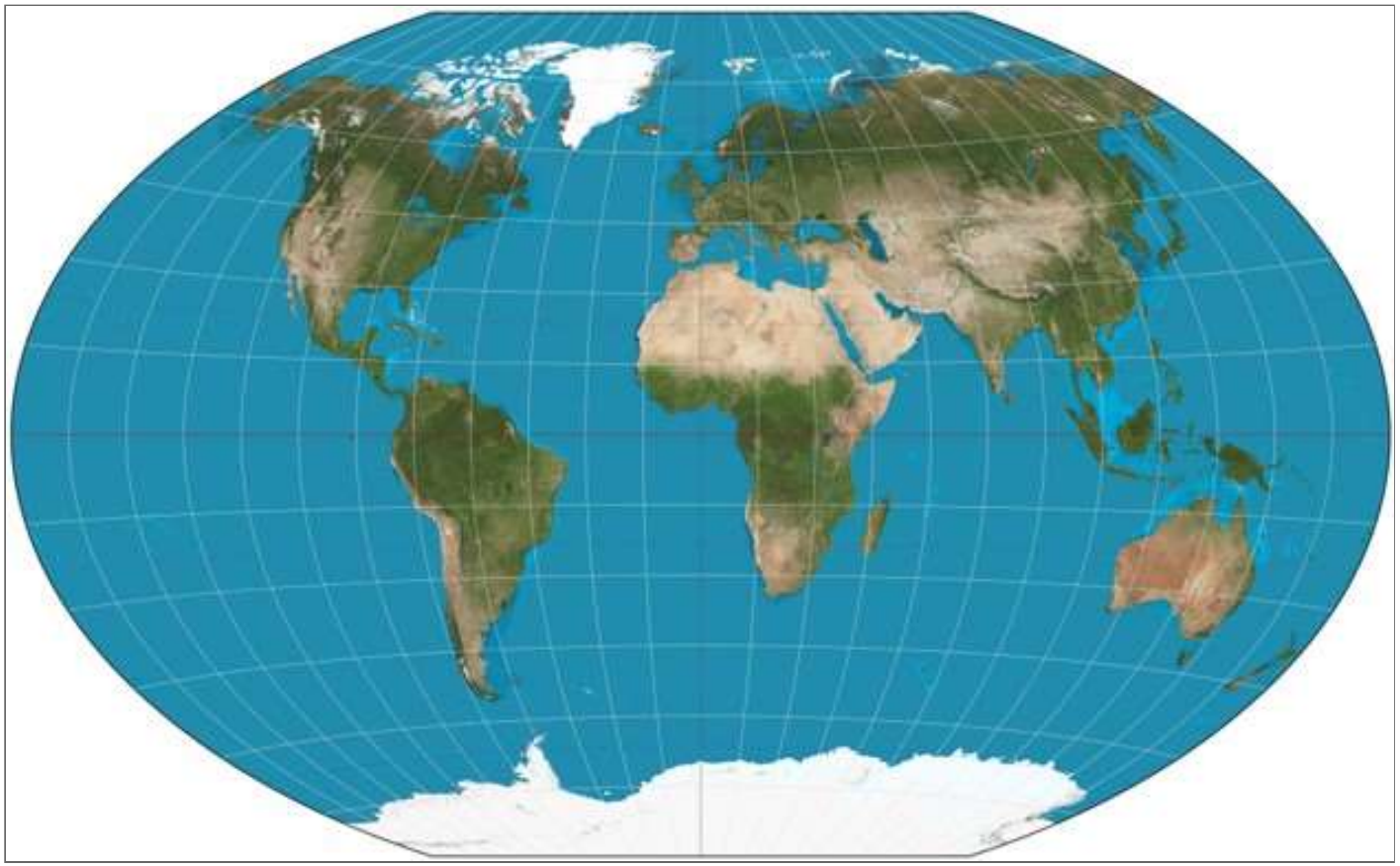
Shapes/angles contorted.

COMPRESSION



Changes to area.

COMPROMISE



Strikes a balance between for aesthetics.

WHAT PROJECTION IS RIGHT FOR MY MAP?

There isn't a "correct" answer here, but there are definitely wrong answers. You can typically get similar results with a handful of different projections, depending on your application.

THINGS TO THINK ABOUT

Where do the data come from?

- Some organizations use a standard projection
- Stats Canada: Lambert Conformal Conic

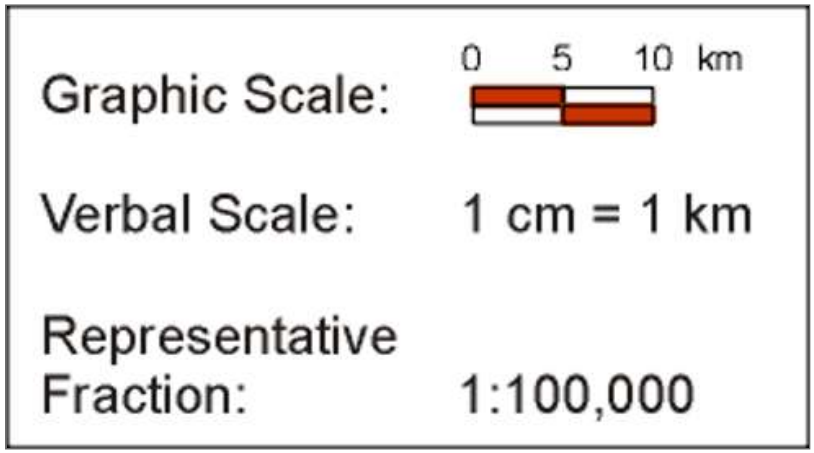
What is the map's purpose?

- Conformal/compromise are aesthetically pleasing.
- Navigational maps, use conformal, equidistant, etc.
- Thematic map (densities) use equal area.

SCALE

The relationship between distance on a map to distance in the real world.

How much smaller than reality is the map?



SMALL SCALE

Zoomed out, large area, more generalization, less detail.

LARGE SCALE

Zoomed in, small area, more detail, less generalization.

SMALL SCALE 1:10,000,000

1/10,000,000 = 0.0000001

LARGE SCALE 1:1,000

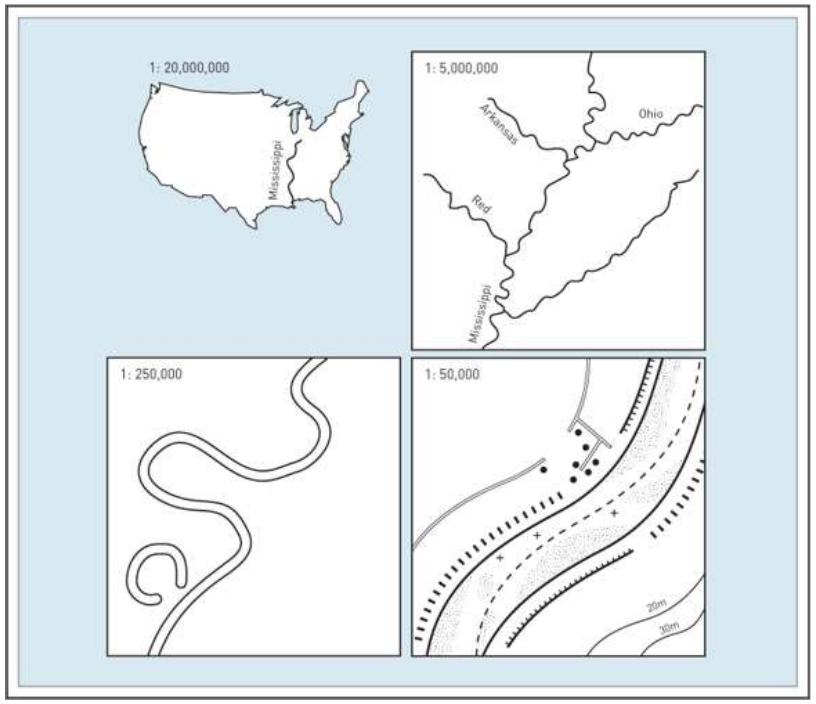
1/1,000 = 0.001

SCALE

All maps require simplification of real world features, amount depends on map scale:

-Smaller scale maps require more generalization.

-Larger scale maps can include more detail.



SCALE & PROJECTION

Map scale will impact our choice of projection.

Projections that work at 1:000 aren't necessarily suited for a 1:10,000,000 map.

SCALE & PROJECTION

With conformal projections like the Mercator, scale changes with position on the map.