

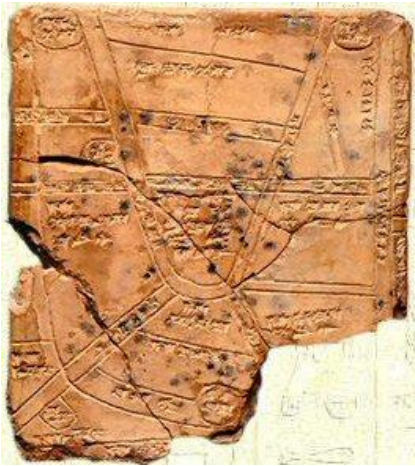


Maps



History of Cartography, the art and science of making maps

~2300 BC



~600 BC



← Early oldest known maps:
Babylonian clay tablets.

Greek and Roman →
Ptolemy's (about AD 85-165) "world map" depicted the Old World from about 60°N to 30°S latitudes.



History of Cartography, the art and science of making maps

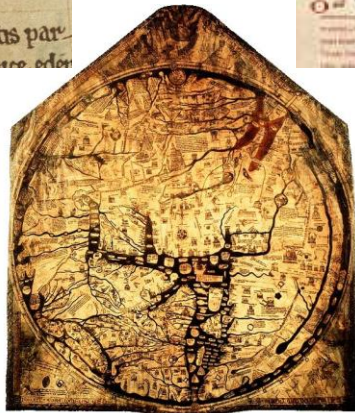
- Before 15th century, maps were hand drawn which made their distribution extremely limited.



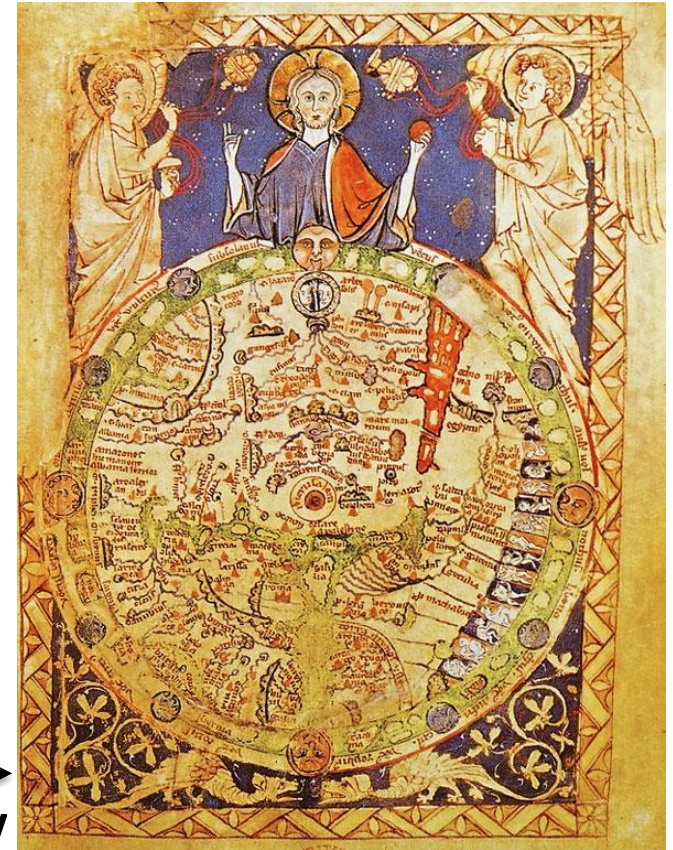
12th century



Isidore ↑
11th century



Hereford
~1280 →



Psalter →
13th century

- Medieval “T-O maps” were dominated by religious views.

History of Cartography

Renaissance maps: beginning in the 15th century, the invention of printing made maps much more widely available. First **whole-world maps** began to appear in the early 16th century following voyages by Columbus and others to the *New World*.



*First map to use the name
"America" to label the New
World, ~1507*

Henricus Hondius, 1633



From Globe to Map

- A map is a graphic representation of geographic information on a flat surface.
- **Transferring** information from the spherical, or ball-shaped, surface of Earth onto a flat piece of paper is called **projection**.



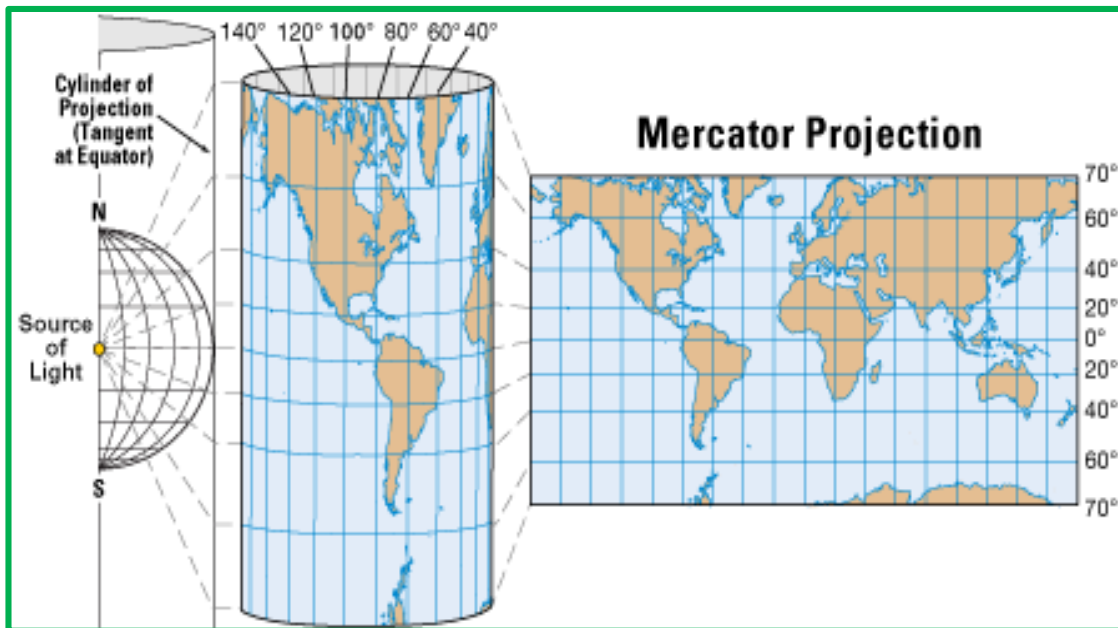
A globe, a spherical model of Earth, **accurately represents** the shapes and locations of the continents.

What about a map?

Map Projections

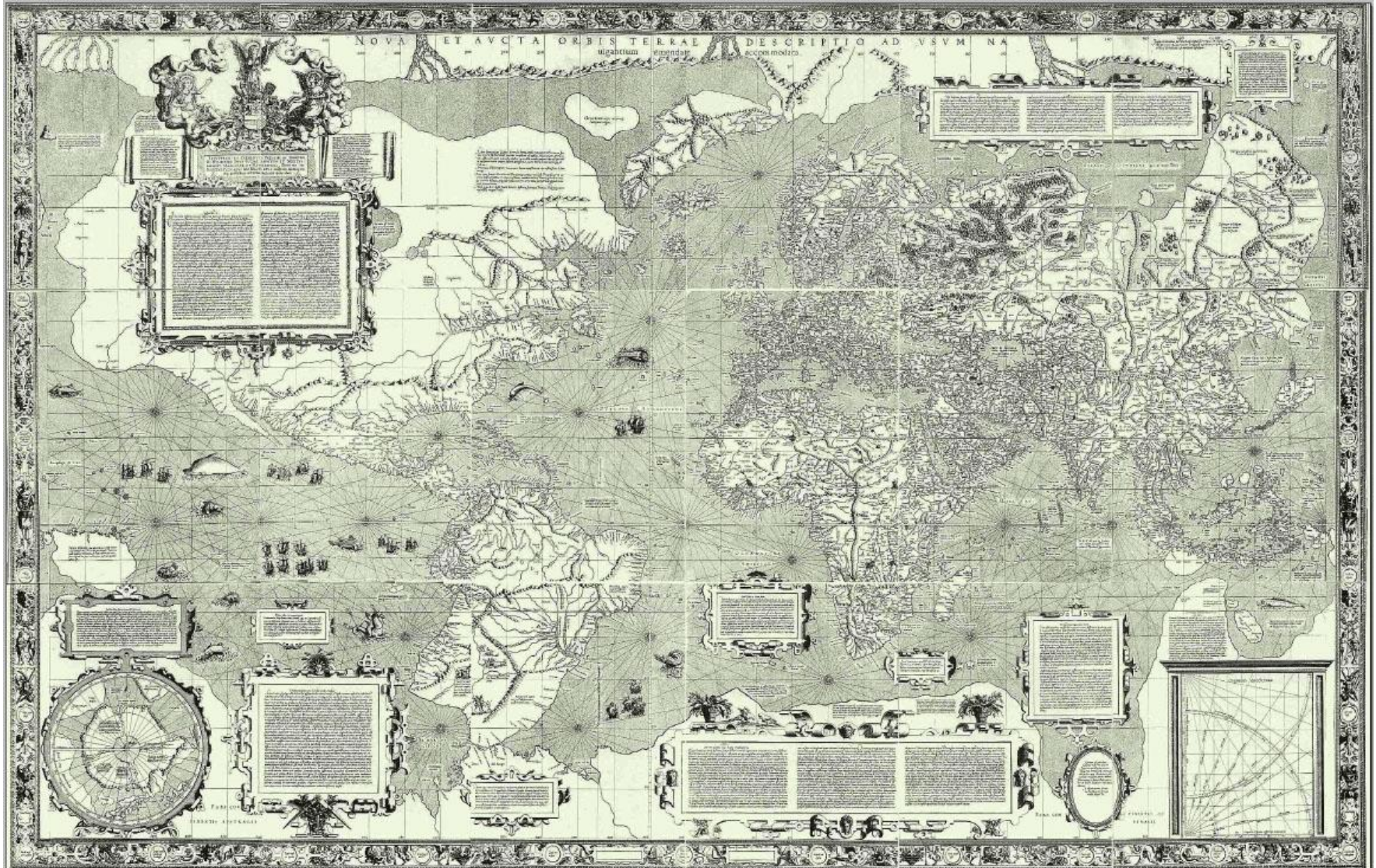


Projection is a **major challenge** for cartographers. Every map has some sort of distortion: it can retain ***either* the correct sizes of landmasses *or* the correct shapes of very small areas, ***but not both***.**



- **Cylindrical** (Mercator): projection onto a tube that is wrapped around the globe and touches it along one line, most often the Equator (the regions **near the Equator** are the **most accurate**, regions **near the poles** are the **most distorted**).

1679 Mercator Map of the World



Direction: Tricky Questions

Where are you going to get to if you go:

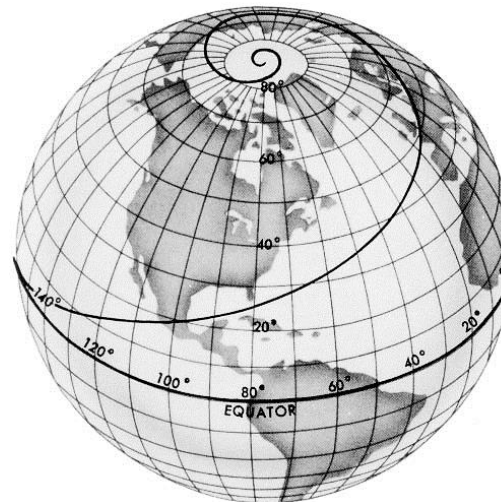


**North?
West?**

**South?
East?**

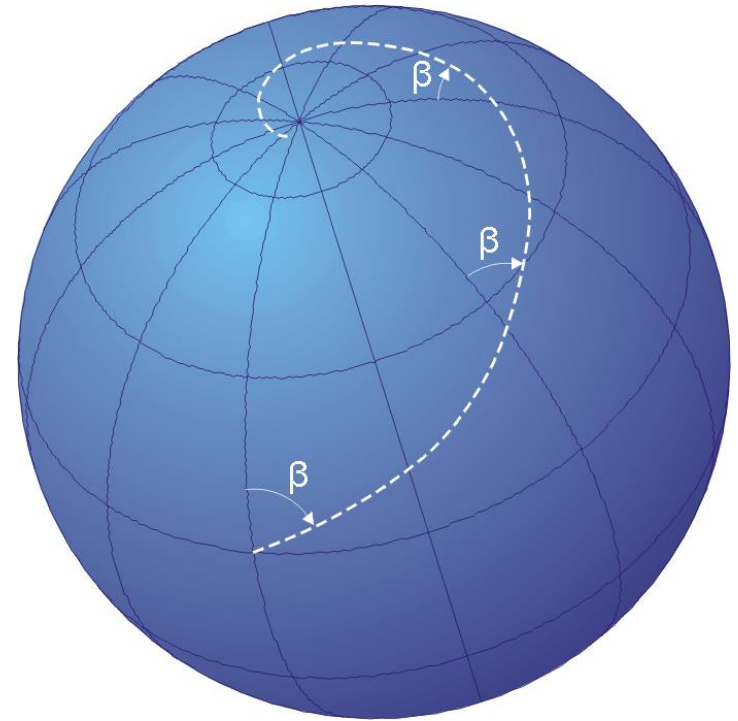
**Northeast?
Southwest?**

**ENE?
WSW?**

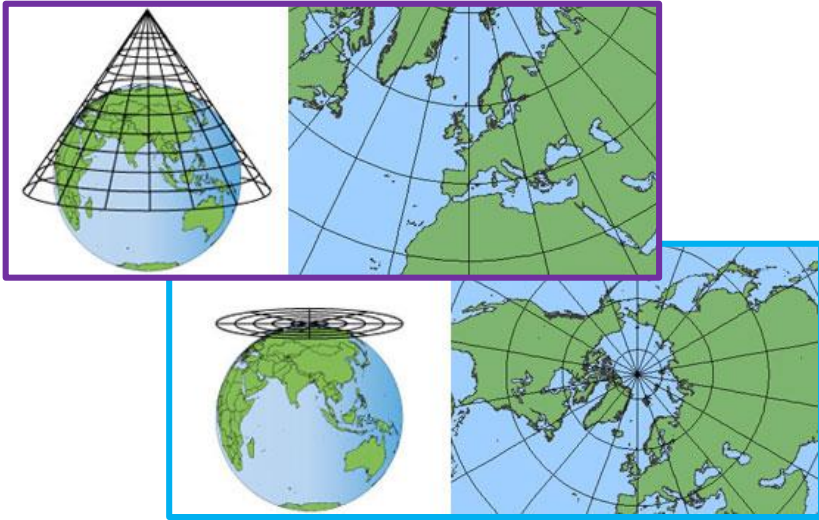


Direction on the Globe

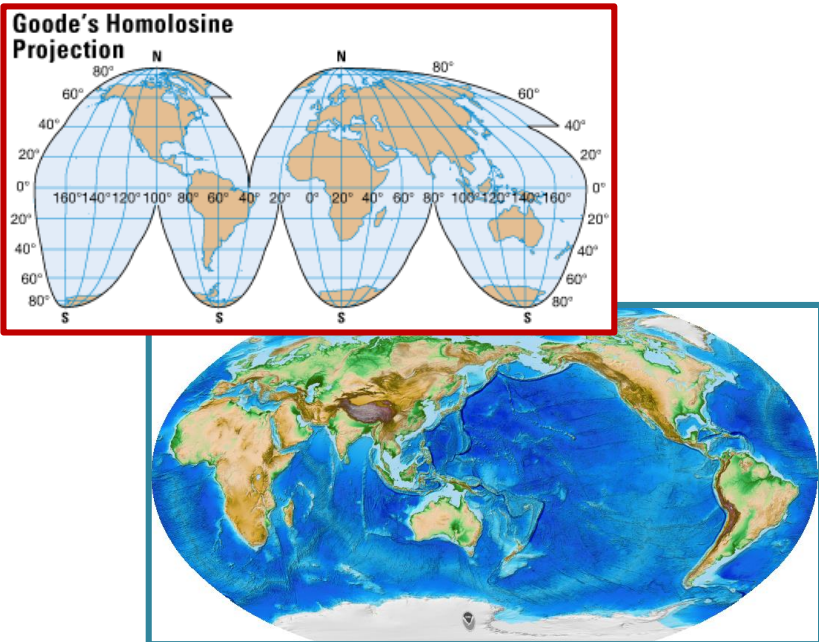
- In navigation, a **rhumb line** (*loxodrome*) is a **path with constant bearing (constant course)** as measured relative to true or magnetic north; it is an arc crossing all meridians of longitude at the same angle.
- Early navigators in the time before the invention of the marine chronometer used rhumb line courses on long ocean passages, because the ship's latitude could be established accurately by sightings of the Sun or stars but there was no accurate way to determine the longitude.
- On a **Mercator projection** map, **a rhumb line is a straight line**, which makes this projection uniquely suited to marine navigation!



More Map Projections



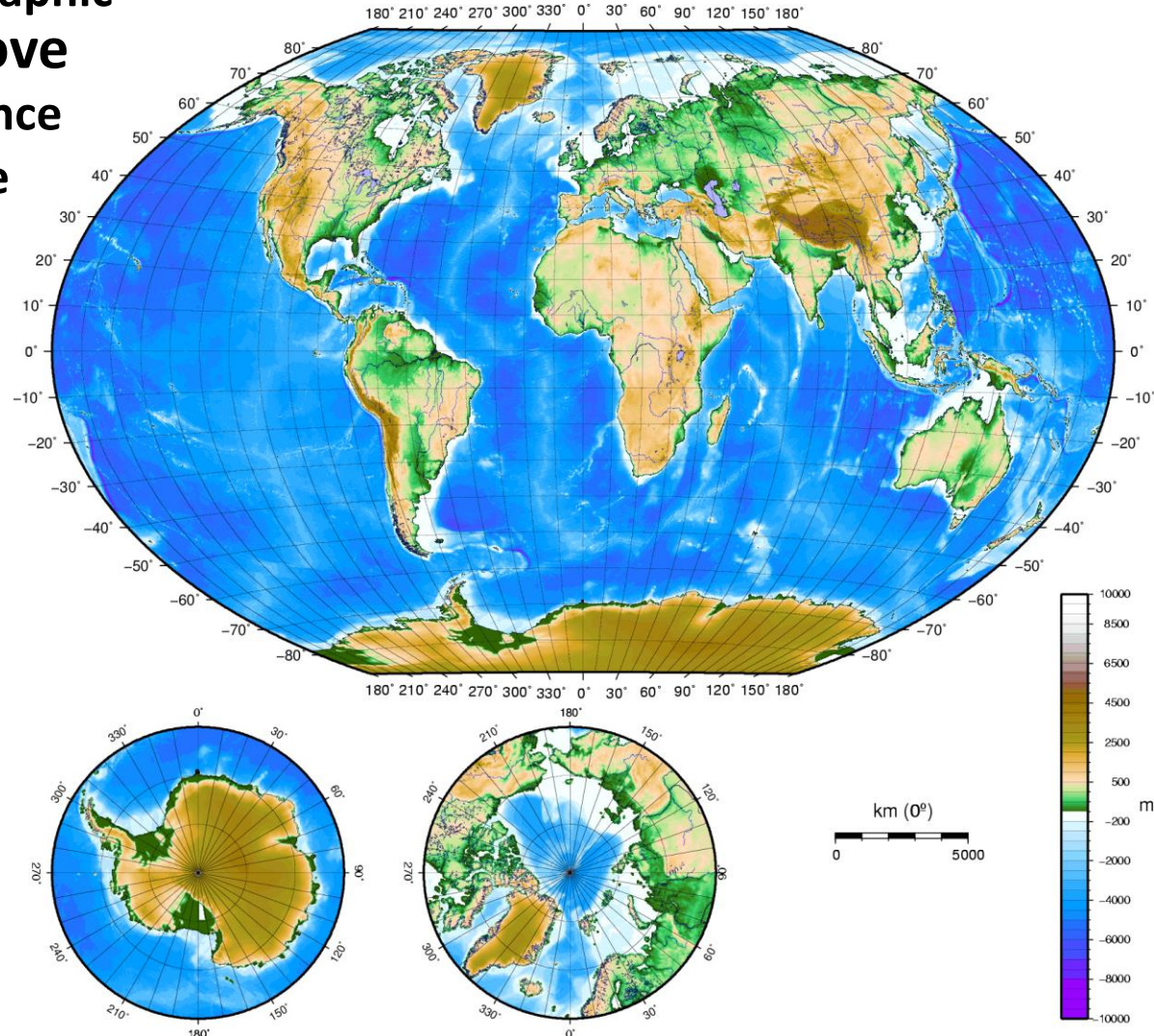
- **Conical**: projection on a flattened cone, with curved lines of latitude and straight meridians (great for mapping mid-latitudes, for example the US Map).
- **Planar**: projection onto a plane with a single point of contact (most accurate at that point; often used for maps of one of the poles).
- **Interrupted**: "orange-peel map" equal-area projection (preserves area measure, generally distorting shapes).
- **Winkel-Tripel**: compromise projection; it minimizes all three kinds of distortion - area, direction and distance.



Mapping Elevation

The elevation of a geographic location is its height above (or below) a fixed reference point, most commonly the Earth's sea level.

- The term “**elevation**” is mainly used when referring to points on the Earth's surface.
- “**Altitude**” is used for points above the surface (an aircraft in flight or a spacecraft in orbit).
- “**Depth**” is used for points below the surface.



Geographic Map

Geographic maps can be classified into categories by:

- Purpose:

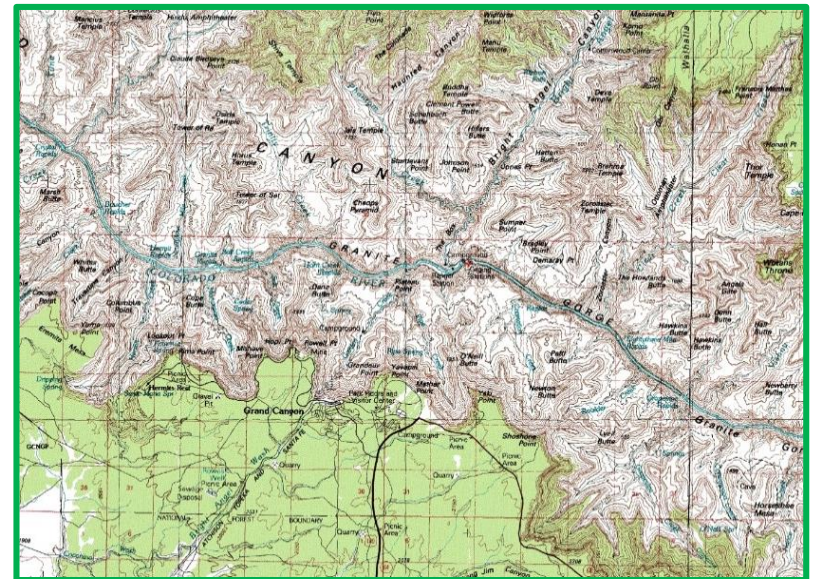
- **General** (variety of features for a general audience)
- **Thematic** (specific geographic themes)



NY City Subway Map

- Detail level:

- **Topographic** (detailed and accurate; large-scale detail and quantitative representation of relief using contour lines)
- **Topological** (simplified so that only vital information remains; lack of true scale, distance and direction)



Types of Maps



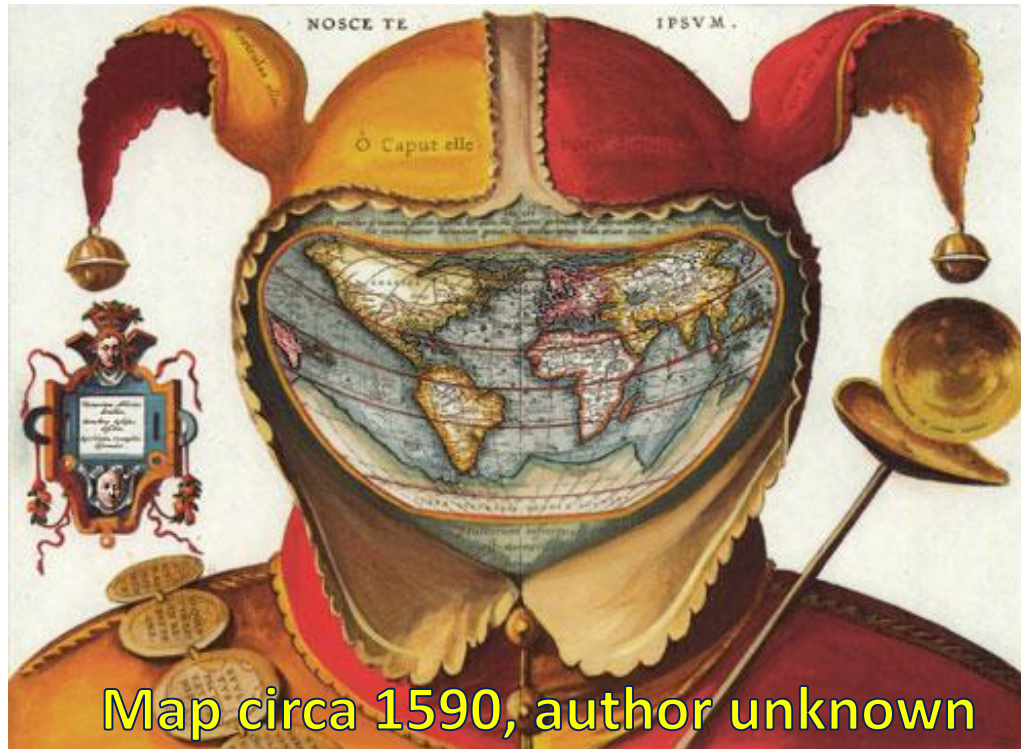
Physical



Political

The Fool's Cap World Map

Are maps realistic representations of the actual world?



Map circa 1590, author unknown

**Not
really!**

A map can display **only** a *few selected features*, usually in *highly symbolic styles*.

All maps are **estimations**, **generalizations**, and **interpretations** of true geographic conditions, made according to certain basic **assumptions** which are not always true or verifiable.