

# Reference systems

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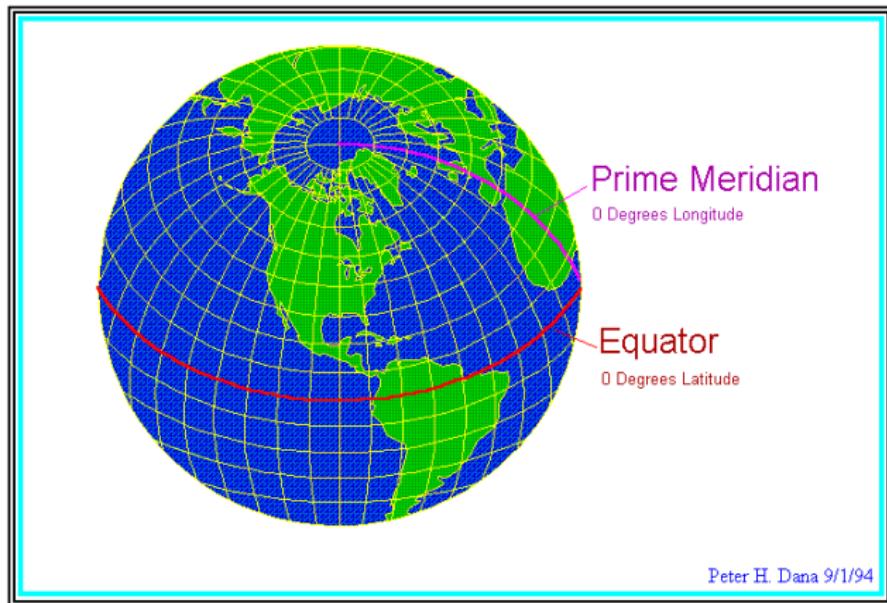
# Outline

1 Generalities

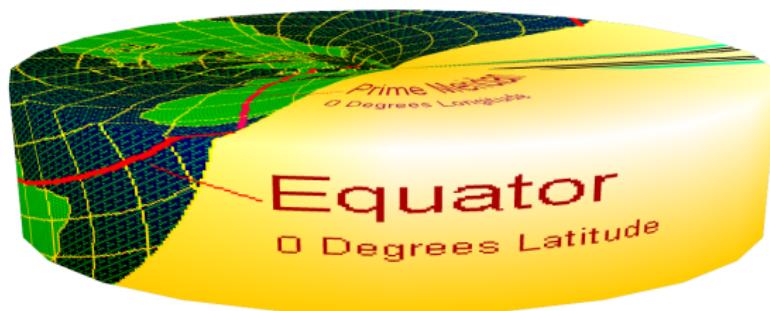
2 Ellipsoids

3 Planar systems

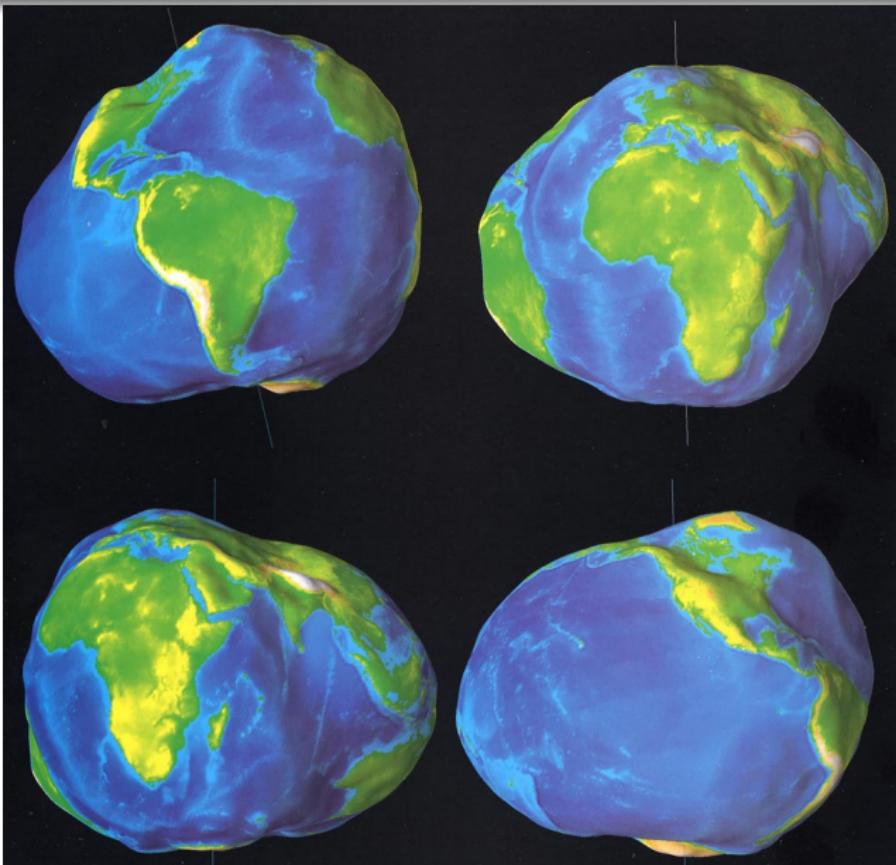
# Earth's grid



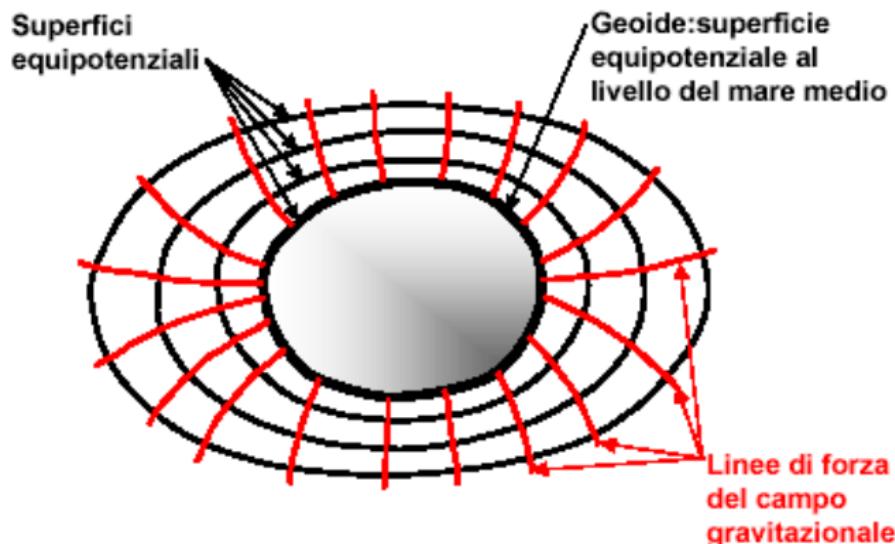
# Reference systems



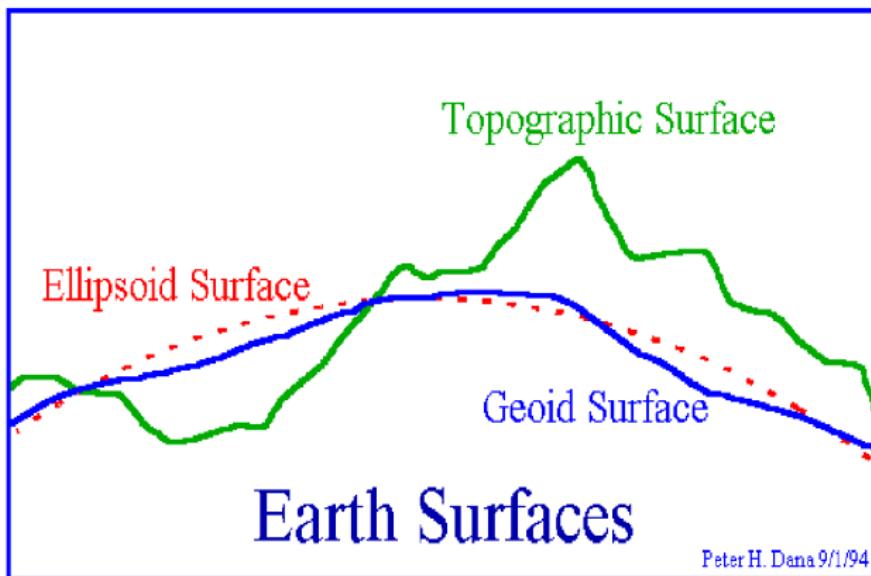
# The real shape of the Earth: the geoid



# The geoid



# Surfaces



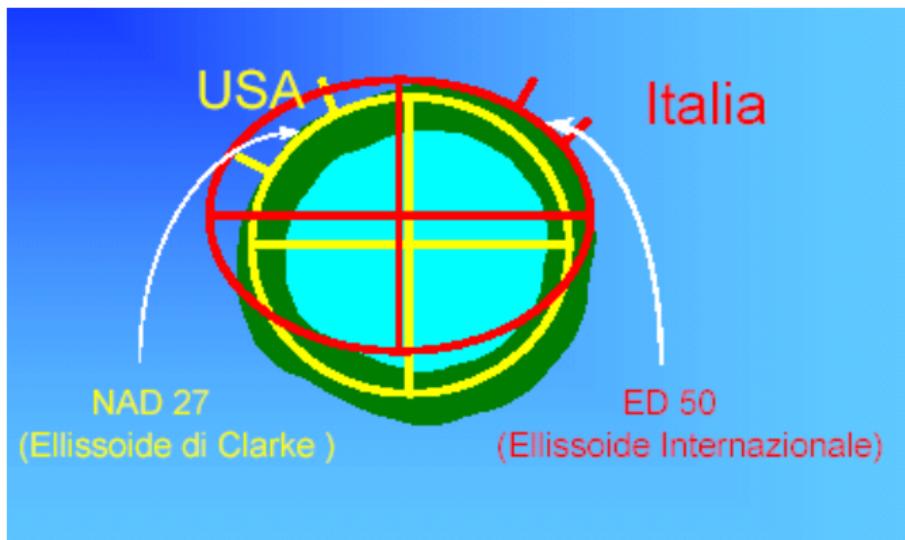
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1 Generalities

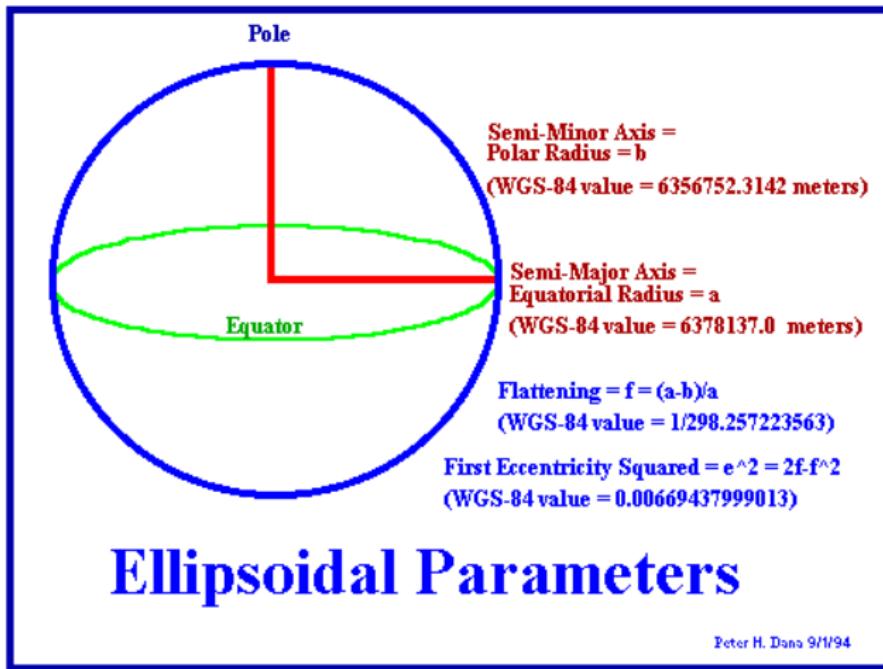
2 Ellipsoids

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# Different ellipsoids for different regions



# Ellipsoid parameters



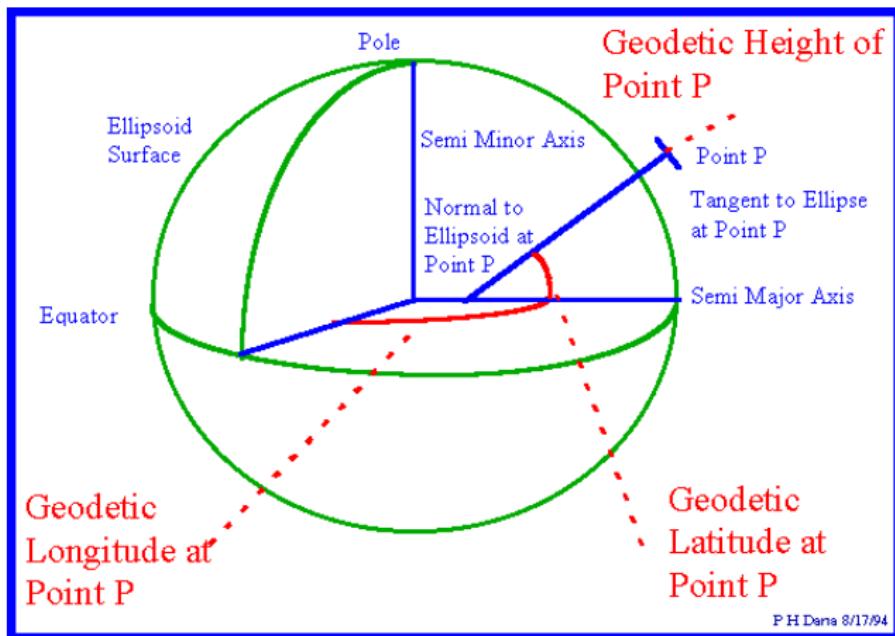
# Ellipsoid parameters

## Selected Reference Ellipsoids

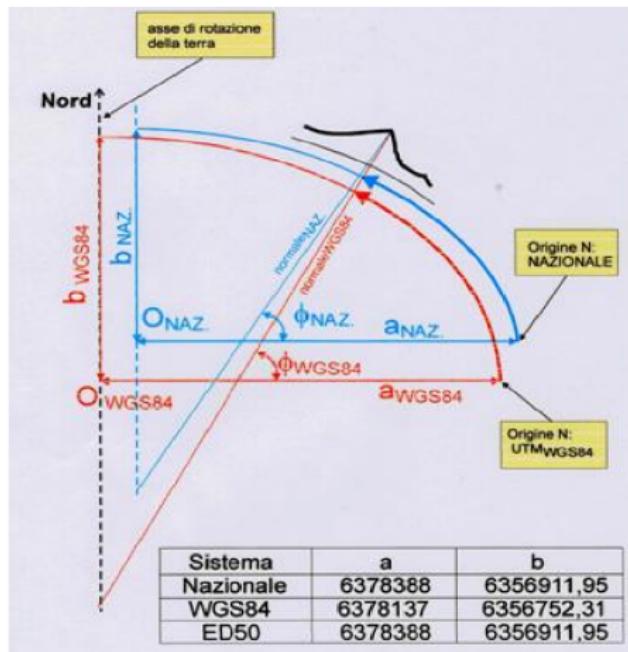
Ellipse	Semi-Major Axis (meters)	1/Flattening
Airy 1830	6377563.396	299.3249646
Bessel 1841	6377397.155	299.1528128
Clarke 1866	6378206.4	294.9786982
Clarke 1880	6378249.145	293.465
Everest 1830	6377276.345	300.8017
Fischer 1960 (Mercury)	6378166.0	298.3
Fischer 1968	6378150.0	298.3
G R S 1967	6378160.0	298.247167427
G R S 1975	6378140.0	298.257
G R S 1980	6378137.0	298.257222101
Hough 1956	6378270.0	297.0
International	6378388.0	297.0
Krassovsky 1940	6378245.0	298.3
South American 1969	6378160.0	298.25
WGS 60	6378165.0	298.3
WGS 66	6378145.0	298.25
WGS 72	6378135.0	298.26
WGS 84	6378137.0	298.257223563

Peter H. Dana 9/1/94

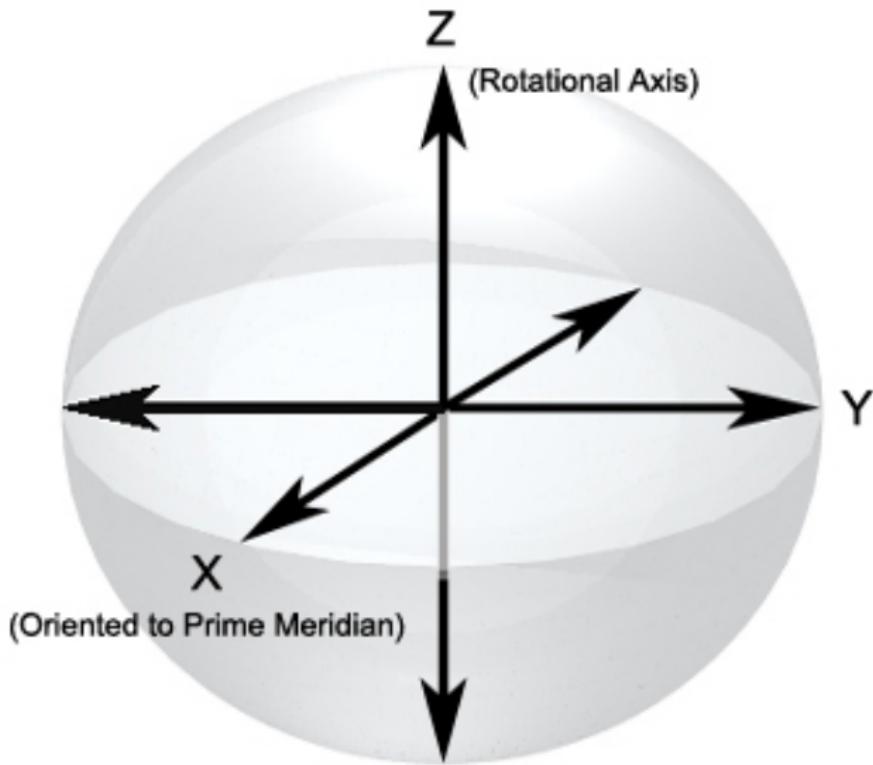
# Latitude and longitude



# Latitude and longitude



## WGS84



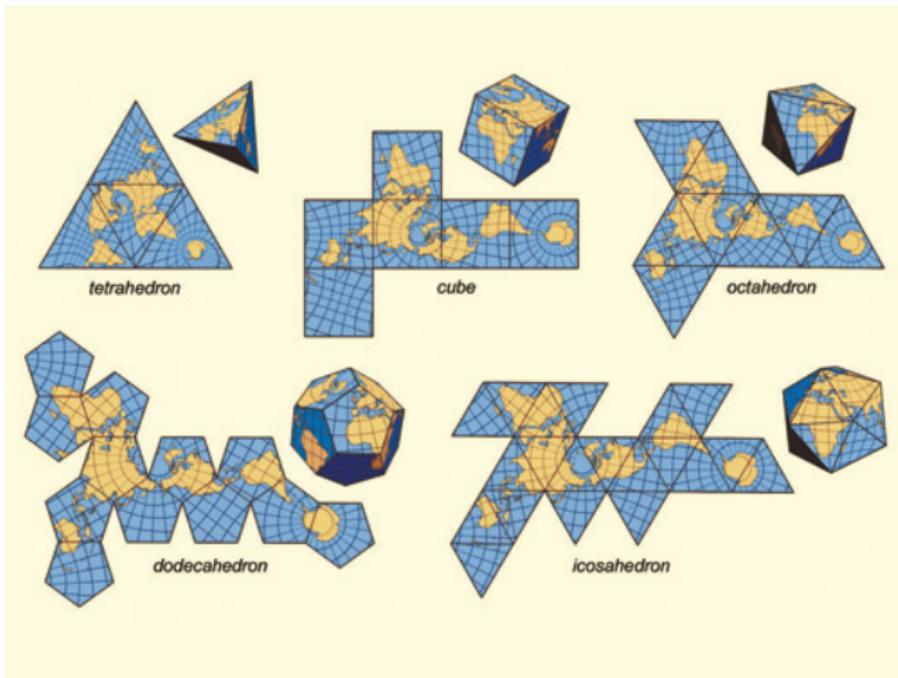
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1 Generalities

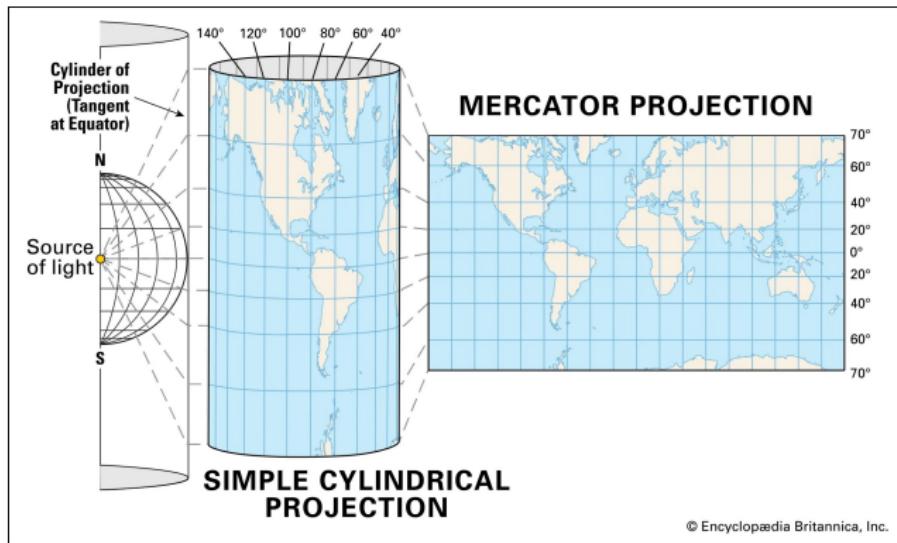
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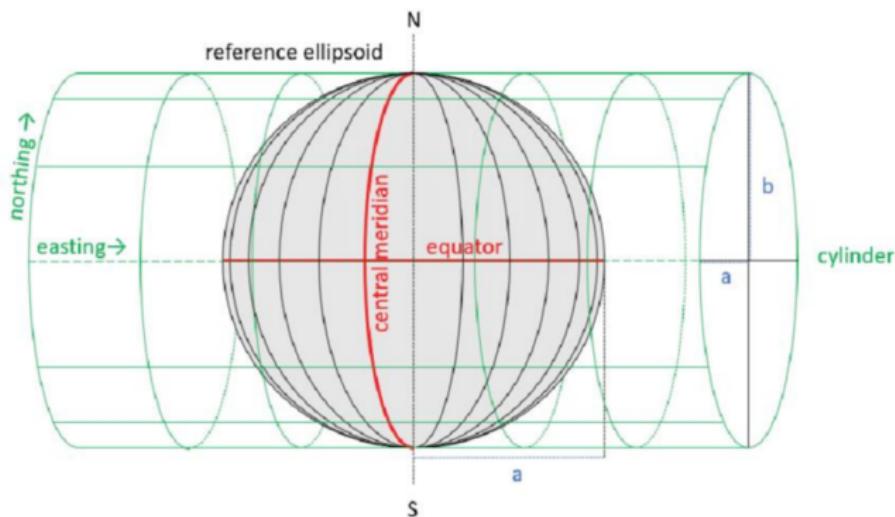
# Planar systems



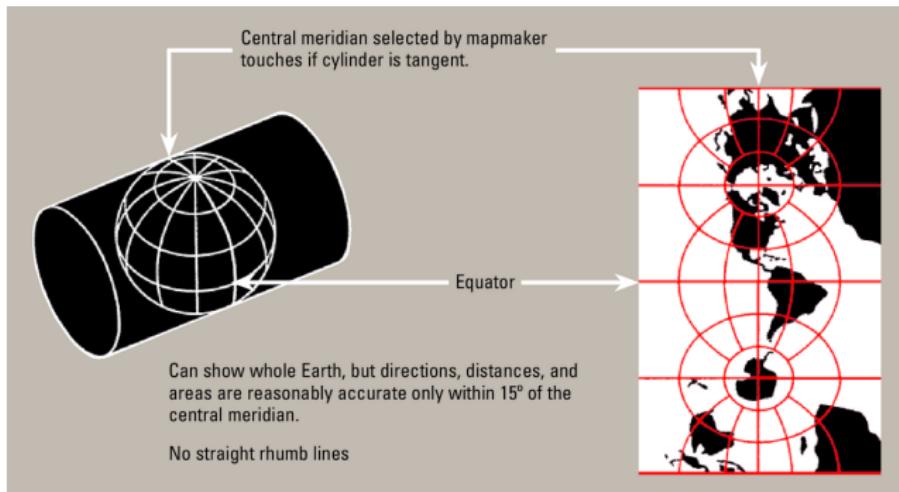
# Mercator projection



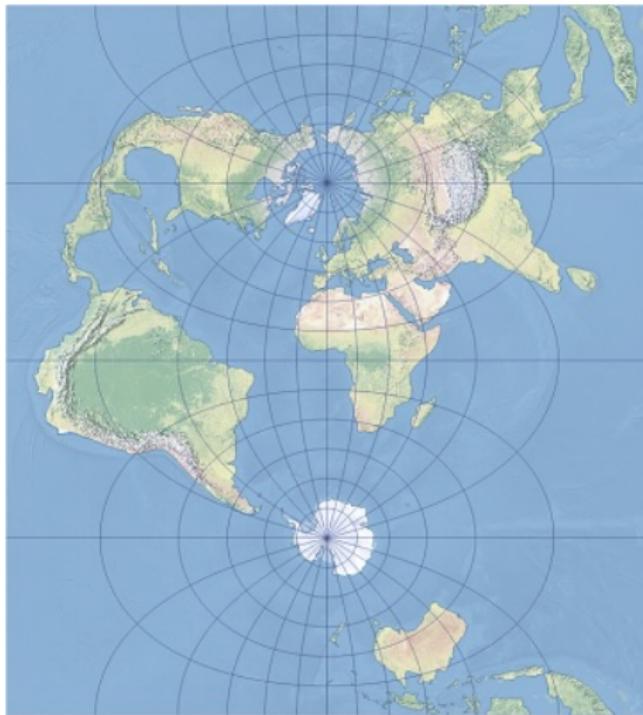
# Gauss projection



# Gauss output



# Distortion in Gauss projection



# Universal Transverse Mercator (UTM)

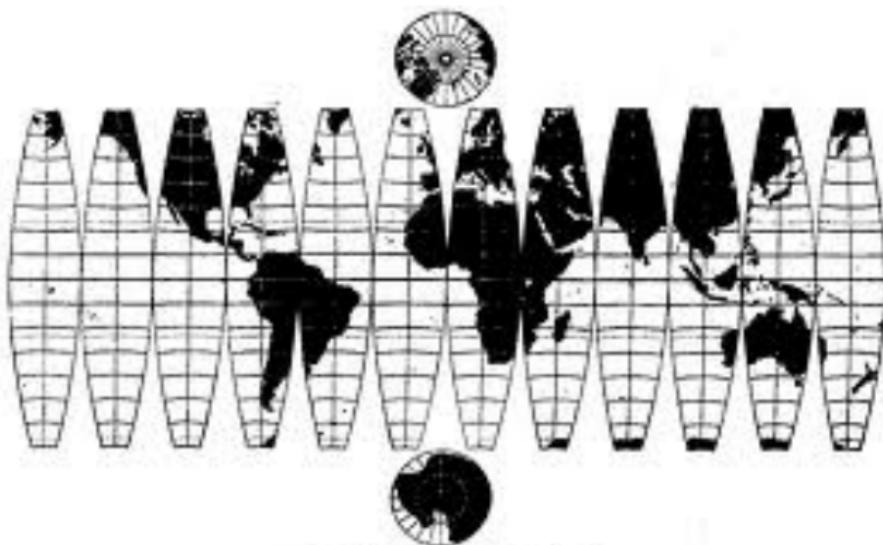
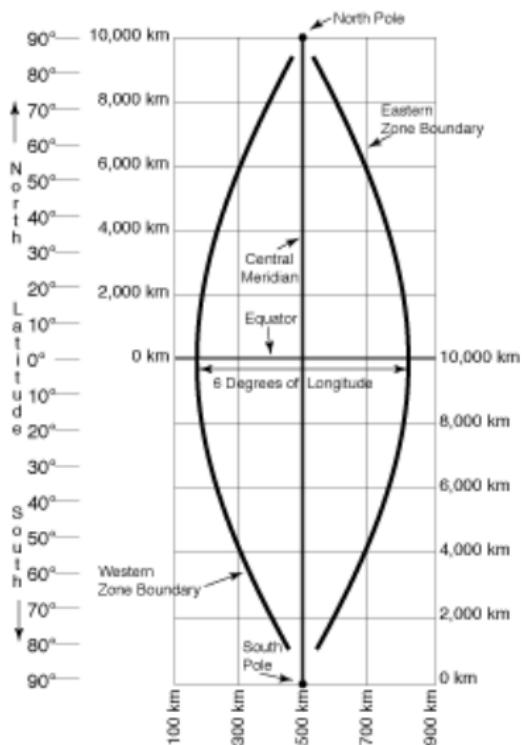
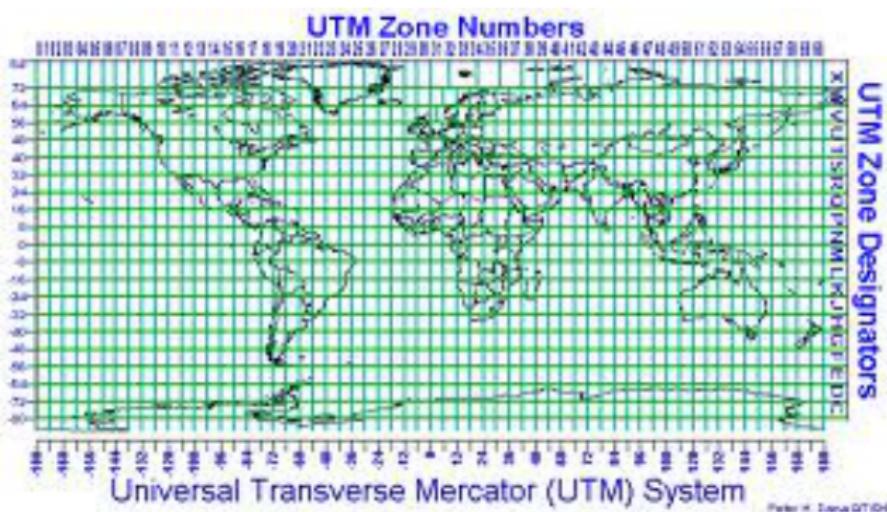


Fig. 8.—Converting for a terrestrial globe.

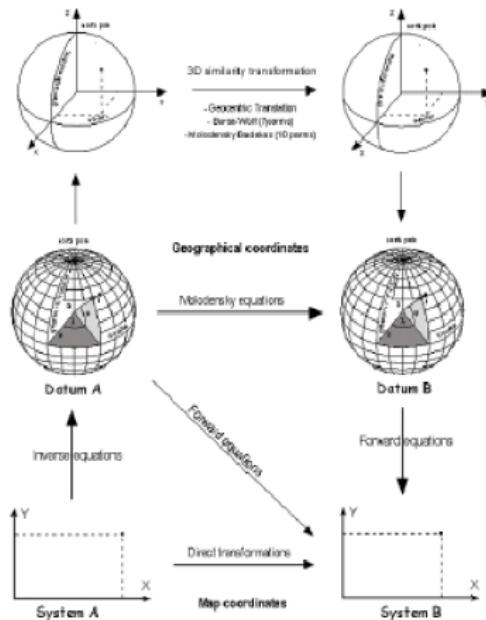
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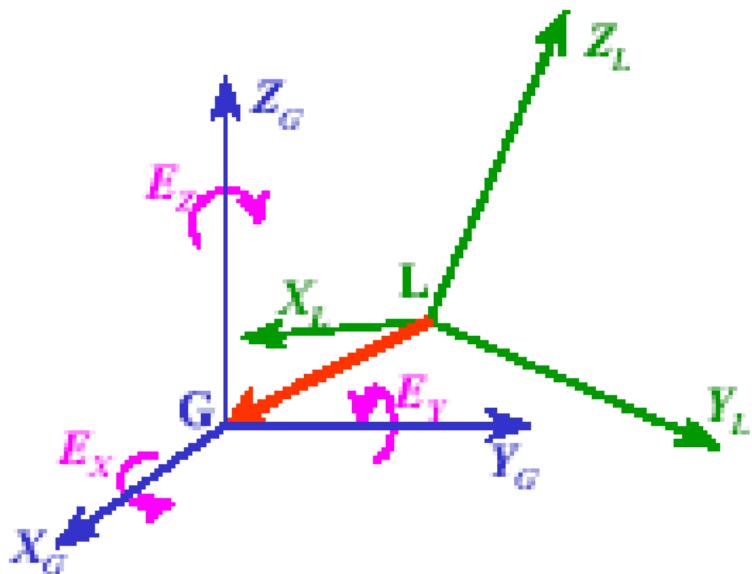
# Universal Transverse Mercator (UTM)



# Changing reference system



# Changing reference system



# Changing reference system

