Datums, Map Projections & Coordinates

Power point developed by Todd Sutherland and Mark Richardson (Rev April 2015)

Why is this important?

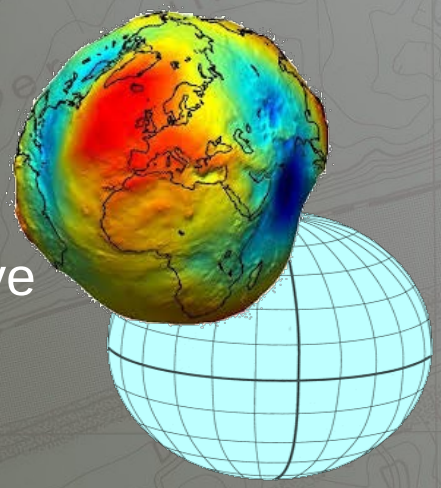
- Creating spatial data
- Overlay themes for analysis (registration)
- Acquiring spatial data
- Display your map products/presentations

Datum:

1. A model of the earth used for Geodetic calculations.

2. Any point, line, or surface used as a reference for a measurement of another quantity.

   Geodetic Datums are established through the relative positioning of the Ellipsoid to the Geoid



Common Horizontal Datums:

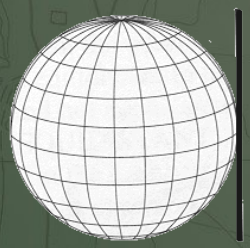
- NAD27 (North American Datum 1927)
- NAD83 (North American Datum 1983)
- WGS84 (World Geodetic System1984)

http://www.ngs.noaa.gov/web/news/NGS_Videos_on_Geodetic_Datums.shtml

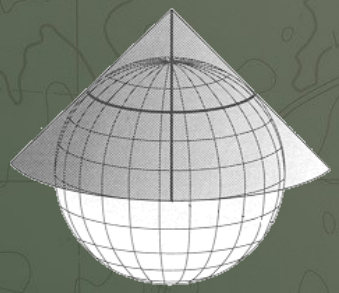
Map Projection:

A method of representing the earth's curved three-dimensional surface as a flat two-dimensional surface.

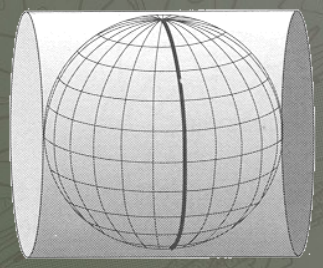
Planar



Conic



Cylindrical



- Transverse Mercator (UTM)
- Albers Conic Equal-Area
- Lambert

Map Projection:

This process of flattening the earth will cause distortions in one or more of the following spatial properties:

- Shape
  - Conformal map projections preserve shape
- Area
  - Equal area map projections preserve area
- Distance/Scale
  - Equidistant map projections preserve distance
- Direction/Angle
  - Azimuthal map projections preserve true direction

Tip: Use ArcMap Help to view the individual map projection characteristics

Sinusoidal Projection

Preserves Area

Mercator Projection

Preserves Shape and Direction

Coordinate Systems:

- Longitude, Latitude (Degrees, Minutes, Seconds)

  -77°45’ 00” Longitude
  39°30’ 00 Latitude

- UTM Grid (Meters)

  258,839 m
  4,374,446 m

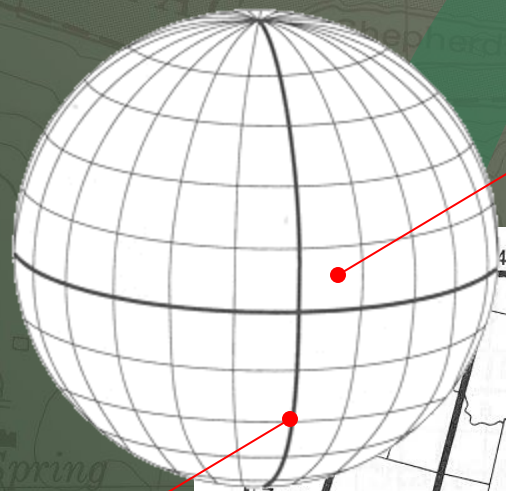
- SPCS (Feet or Meters)

  755,460 ft. E
  111,029 ft. N; West Virginia, N

Universal Transverse Mercator (UTM)

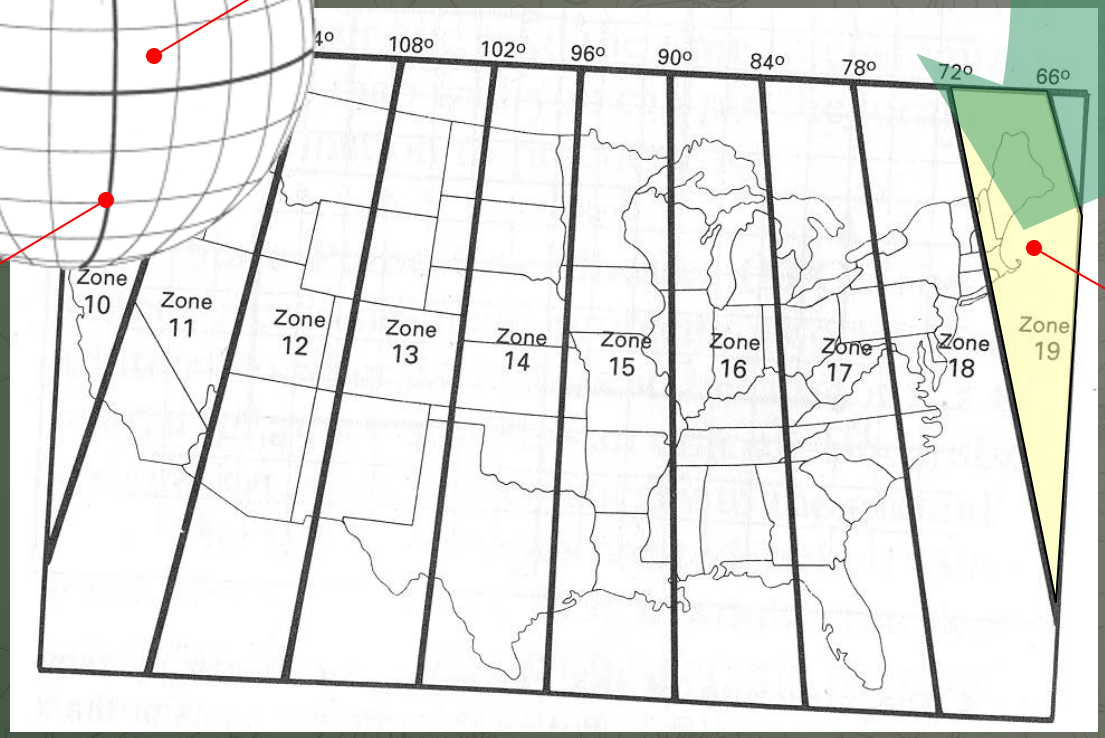
- Developed by military
- Grid system (UTM Grid)
- Earth divided into 60 zones
- Great for small areas
  - minimal map distortion
  - distortion greater at edge of zones
- Most common map projection used by NWRs

Universal Transverse Mercator- Grid



Zone 1

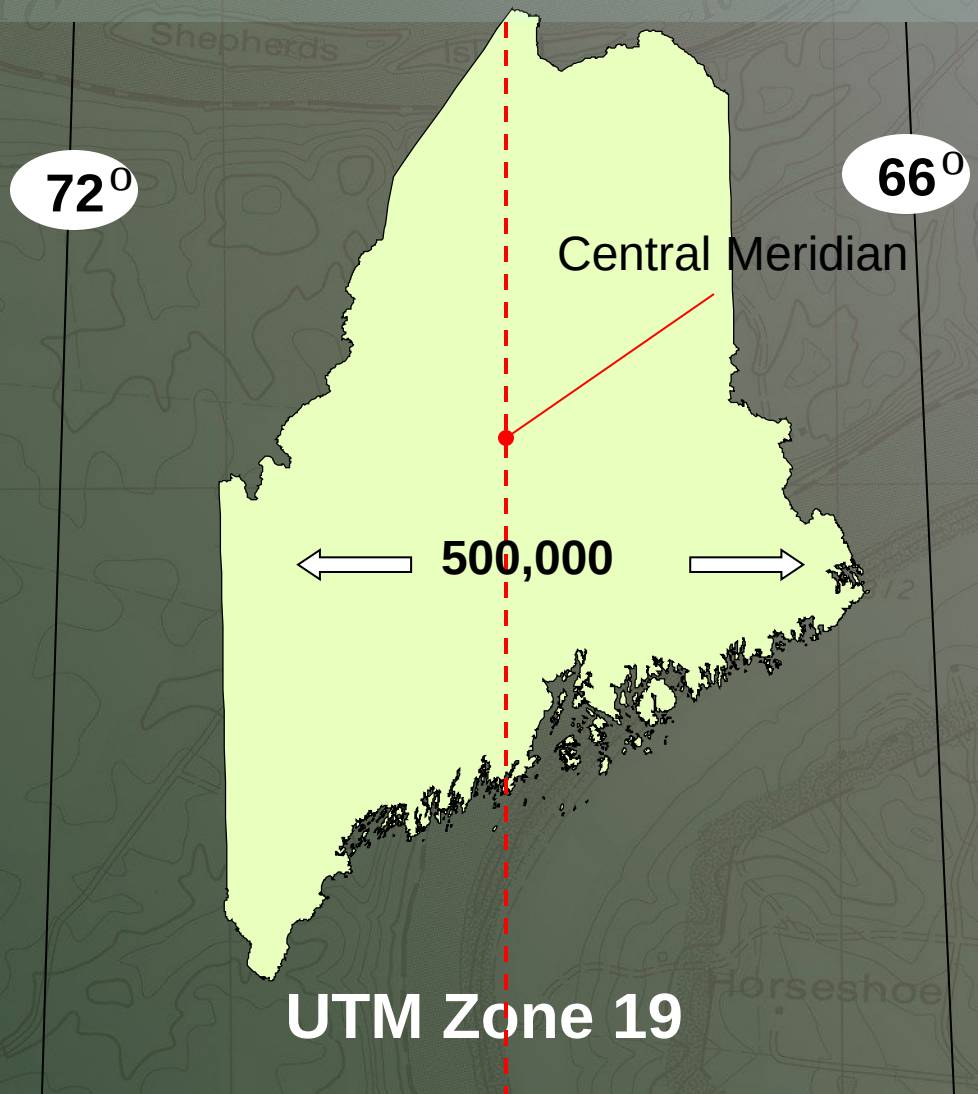
Equator



Zone 19

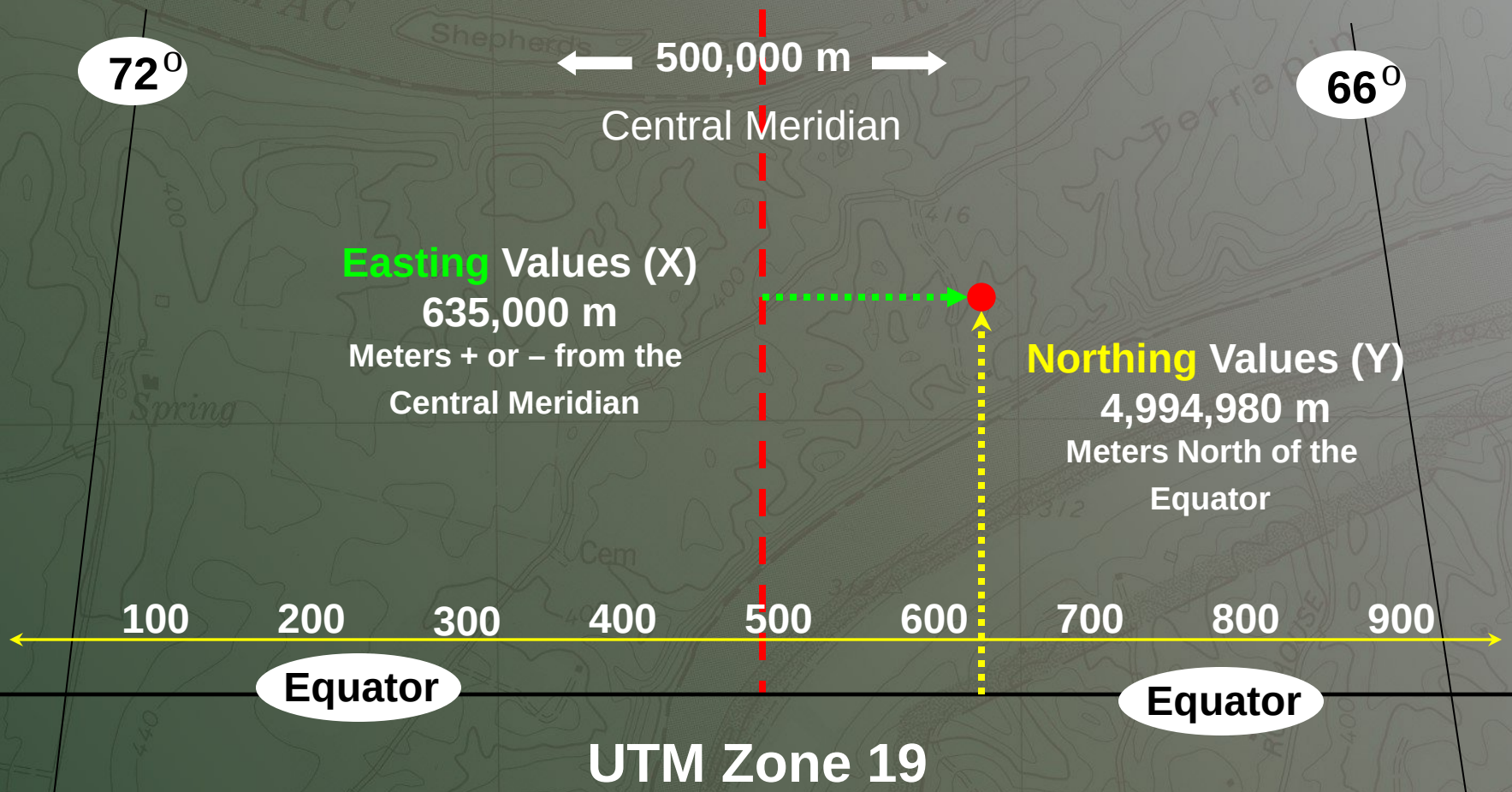
International Date Line - 180°

Universal Transverse Mercator- Grid



UTM Zone 19

Universal Transverse Mercator



UTM Zone 19

Tip: Use Google Earth to visually see how this coordinate system works