22. UTM Zone Characteristics

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The illustration in Figure 2.23.1, below, depicts the area covered by a single UTM coordinate system grid zone. Each UTM zone spans 6° of longitude, from 84° North and 80° South. Zones taper from 666,000 meters in "width" at the Equator (where 1° of longitude is about 111 kilometers in length) to only about 70,000 meters at 84° North and about 116,000 meters at 80° South. Polar areas are covered by polar coordinate systems. Each UTM zone is subdivided along the equator into two halves, north and south.

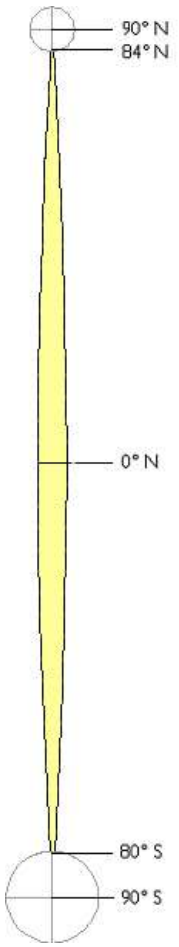

Figure 2.23.1 Extent of one UTM coordinate system grid zone. Note that although latitudes are used to specify the extent precisely in relation to the globe, they are geographic, not UTM, coordinates.

The illustration below in Figure 2.23.2 shows how UTM coordinate grids relate to the area of coverage illustrated above in Figure 2.23.1. The north and south halves are shown side by side for comparison. Each half is assigned its own **origin**. The north south zone origins are positioned to south and west of the zone. North zone origins are positioned on the Equator, 500,000 meters west of the central meridian. Origins are positioned so that every coordinate value within every zone is a positive number. This minimizes the chance of errors in distance and area calculations. By definition, both origins are located 500,000

The Nature of Geographic Information

Search

Chapters

- Chapter 1: Data and Information
- Chapter 2: Scales and Transformations
  - 1. Overview
  - 2. Scale
  - 3. Scale as Scope
  - 4. Map and Photo Scale
  - 5. Graphic Map Scales
  - 6. Map Scale and Accuracy
  - 7. Scale as a Verb
  - 8. Geospatial Measurement Scales
  - 9. Coordinate Systems
  - 10. Geographic Coordinate System
  - 11. Geographic Coordinate Formats
  - 12. Horizontal Datums
  - 13. Geoids
  - 14. Ellipsoids
  - 15. Control Points and Datum Shifts
  - 16. Coordinate Transformations
  - 17. Plane Coordinate Transformations

meters west of the central meridian of the zone (in other words, the easting of the central meridian is always 500,000 meters E). These are considered "false" origins since they are located outside the zones to which they refer. UTM eastings range from 167,000 meters to 833,000 meters at the equator. These ranges narrow toward the poles. Northings range from 0 meters to nearly 9,400,000 in North zones and from just over 1,000,000 meters to 10,000,000 meters in South zones. Note that positions at latitudes higher than 84° North and 80° South are defined in Polar Stereographic coordinate systems that supplement the UTM system.

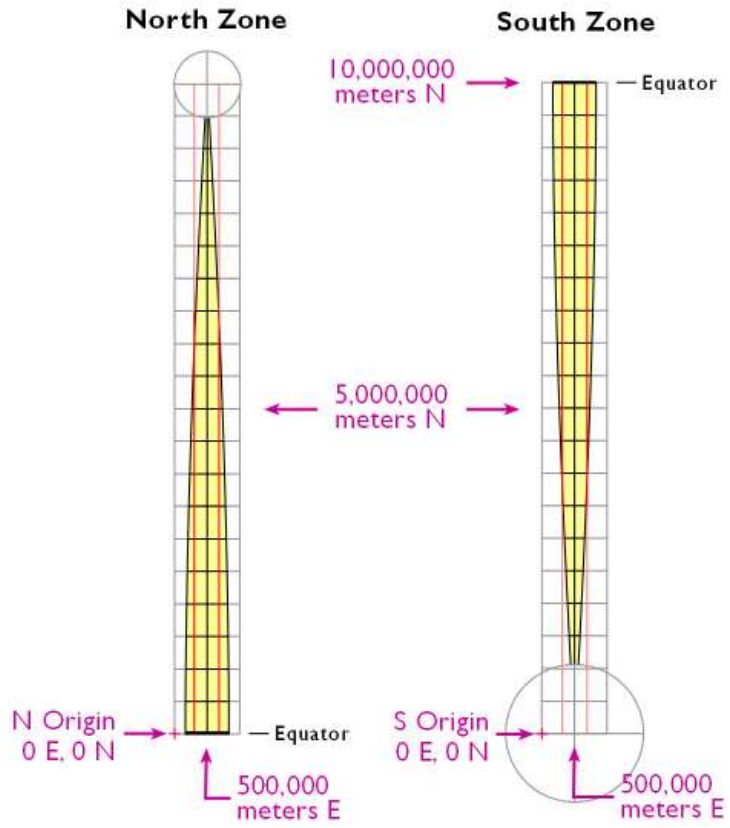

Figure 2.23.2 UTM coordinate system zone characteristics. Yellow represents areas in which UTM coordinates are valid for a given zone. Red lines parallel to the central meridian represent the two standard lines employed in each Transverse Mercator projection. Each square grid cell in the illustration spans 500,000 meters on each side.

See the Bibliography (last page of the chapter) for further readings about the UTM grid system.

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‹ 21. The UTM Grid and Transverse Mercator Projection | up | 23. National Grids ›

Navigation

- login

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