

DESCRIPTION

Also known as Transverse Mercator.

This projection is similar to the Mercator except that the cylinder is longitudinal along a meridian instead of the equator. The result is a conformal projection that does not maintain true directions. The central meridian is placed on the region to be highlighted. This centering minimizes distortion of all properties in that region. This projection is best suited for land masses that stretch north–south. The Gauss–Krüger (GK) coordinate system is based on the Gauss–Krüger projection.

PROJECTION METHOD

Cylindrical projection with central meridian placed in a particular region.

LINES OF CONTACT

Any single meridian for the tangent projection. For the secant projection, two parallel lines equidistant from the central meridian.

LINEAR GRATICULES

The equator and the central meridian.

PROPERTIES**Shape**

Conformal. Small shapes are maintained. Shapes of larger regions are increasingly distorted away from the central meridian.

Area

Distortion increases with distance from the central meridian.

Direction

Local angles are accurate everywhere.

Distance

Accurate scale along the central meridian if the scale factor is 1.0. If it is less than 1.0, then there are two straight lines having an accurate scale, equidistant from and on each side of the central meridian.

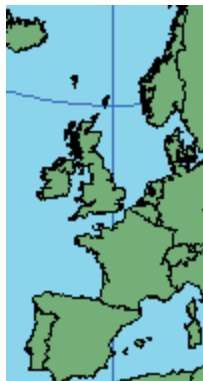
LIMITATIONS

Data on a spheroid or an ellipsoid cannot be projected beyond 90 degrees from the central meridian. In fact, the extent on a spheroid or ellipsoid should be limited to 10 to 12 degrees on both sides of the central meridian. Beyond that range, data projected may not project back to the same position. Data on a sphere does not have these limitations.

USES AND APPLICATIONS

Gauss–Krüger coordinate system. Gauss–Krüger divides the world into zones six degrees wide. Each zone has a scale factor of 1.0 and a false easting of 500,000 meters. The central meridian of zone 1 is at 3° E. Some places also add the zone number times one million to the 500,000 false easting value. GK zone 5 could have a false easting value of 500,000 or 5,500,000 meters.

The UTM system is very similar. The scale factor is 0.9996, and the central meridian of UTM zone 1 is at 177° W. The false easting value is 500,000 meters, and southern hemisphere zones also have a false northing of 10,000,000.



The central meridian and the latitude of origin are 0°. The scale factor is 1.0. Approximately 20 degrees of longitude are shown, which is close to the limit for Transverse Mercator.

DESCRIPTION

Also known as Gauss–Krüger (see that projection).

Similar to the Mercator except that the cylinder is longitudinal along a meridian instead of the equator. The result is a conformal projection that does not maintain true directions. The central meridian is placed in the center of the region of interest. This centering minimizes distortion of all properties in that region. This projection is best suited for north–south areas. The State Plane Coordinate System uses this projection for all zones that are more north–south in extent. The UTM and Gauss–Krüger coordinate systems are based on the Transverse Mercator projection.

PROJECTION METHOD

Cylindrical projection with central meridian placed in a particular region.

LINES OF CONTACT

Any single meridian for the tangent projection. For the secant projection, two almost parallel lines equidistant from the central meridian. For UTM, the lines are about 180 km from the central meridian.

LINEAR GRATICULES

The equator and the central meridian.

PROPERTIES

Shape

Conformal. Small shapes are maintained. Larger shapes are increasingly distorted away from the central meridian.

Area

Distortion increases with distance from the central meridian.

Direction

Local angles are accurate everywhere.

Distance

Accurate scale along the central meridian if the scale factor is 1.0. If it is less than 1.0, there are two straight lines with accurate scale equidistant from and on each side of the central meridian.

LIMITATIONS

Data on a spheroid or an ellipsoid cannot be projected beyond 90 degrees from the central meridian. In fact, the extent on a spheroid or ellipsoid should be limited to 15–20 degrees on both sides of the central meridian. Beyond that range, data projected to the Transverse Mercator projection may not project back to the same position. Data on a sphere does not have these limitations. In the desktop ArcGIS applications, you can use `Transverse_Mercator_complex` to access an implementation that does support data up to 80 degrees from the central meridian. Because of the complex mathematics involved, performance is affected.

USES AND APPLICATIONS

State Plane Coordinate System, used for predominantly north–south state zones.

USGS 7½-minute quad sheets. Most new USGS maps after 1957 use this projection, which replaced the Polyconic projection.

North America (USGS, central meridian scale factor is 0.926).

Topographic Maps of the Ordnance Survey of Great Britain after 1920.

UTM and Gauss–Krüger coordinate systems. The world is divided into 60 north and south zones six degrees wide.

Each zone has a scale factor of 0.9996 and a false easting of 500,000 meters. Zones south of the equator have a false northing of 10,000,000 meters to ensure that all y values are positive. Zone 1 is at 177° W.

The Gauss–Krüger coordinate system is very similar to the UTM coordinate system. Europe is divided into zones six degrees wide with the central meridian of zone 1 equal to 3° E. The parameters are the same as UTM except for the scale factor, which is equal to 1.000 rather than 0.9996. Some places also add the zone number times one million to the 500,000 false easting value. GK zone 5 could have false easting values of 500,000 or 5,500,000 meters.