Projected Coordinate System: Cylindrical (Mercator) Projection

Interact with the Earth project on a cylinder

Watch the animation of the Earth project on a cylinder and its unwrapping

The World Map created with cylindrical projection

Mathematics behind Mercator projection

For the spherical earth

\[ x = R(\lambda - \lambda_0) \]
\[ y = R \ln \tan \left( \frac{\pi}{4} + \frac{\phi}{2} \right) \]

Where “\(x\)” and “\(y\)” are the rectangular coordinates, “\(R\)” is the radius of sphere depending on map scale, “\(\phi\)” and “\(\lambda\)” are in radian for latitude and longitude.

For the ellipsoidal earth

\[ x = a(\lambda - \lambda_0) \]
\[ y = a \ln \left[ \tan \left( \frac{\pi}{4} + \frac{\phi}{2} \right) \left( \frac{1 - e \sin \phi}{1 + e \sin \phi} \right)^{e/2} \right] \]

Where “\(x\)” and “\(y\)” are the rectangular coordinates, “\(a\)” is the equatorial radius of the ellipsoid depending on map scale, and “\(e\)” is its eccentricity, “\(\phi\)” and “\(\lambda\)” are in radian for latitude and longitude.

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