

Projections and Coordinate Systems 101

Coordinate System

A coordinate system is a reference system that is used to represent the locations of features on a map. There are geographic and projected coordinate systems. A projected coordinate system is sometimes called a map projection.

Map Projection

A way of showing the surface of the earth on a flat surface. Projections are required to create maps, however, they distort the surface in some way. Different projections cause different types of distortions therefore, each projection serves a slightly different purpose.

In general, projections are designed to minimize the distortion of one or two of the map characteristics. Depending on the projection used, area, shape, direction, or distance are preserved, but not all four. For example, a projection could maintain the area of a feature but distort its shape.

Geographic coordinate system

Uses Latitude and Longitude to reference a location anywhere on earth.

- Longitude indicates how far east or west you are from the Prime Meridian (0°) and have values between +180° to -180°. Positive numbers indicate east and negative, west of the Prime Meridian.
- Latitude indicates how far north or south you are from the Equator (0°) and have values between +90° to -90°. Positive numbers indicate north and negative indicate south of the equator.

Projected coordinate systems

Use linear units of measurement to determine X,Y coordinates on a flat surface, i.e. a map. Examples of projected coordinate systems include Mercator, Robinson and Winkel Tripel (used by National Geographic).

Widely used Projections in British Columbia

Geographic Projection (latitude/longitude)

This projection is best represented using a globe. It allows you to represent any point on the earth's surface accurately. However, when projected onto a map, geographic coordinates may be distorted.

BC Albers

This is an Equal Area projection that accurately depicts the area of displayed features, but distorts shape, angle (direction) and scale (distance).

Universal Transverse Mercator (UTM)

The UTM coordinate system is a grid – it divides the earth into 60 equal zones. In BC, we use Zones 7, 8, 9, 10, and 11. Because the earth is divided into zones, each set of grid coordinates can reference a point in any of the zones so a full grid reference must include the zone number. This coordinate system provides a constant direction relationship anywhere on your map and preserves shapes across small areas but distorts distance and area.