

# MOLLWEIDE

10xxxxxx.1

## LEGAL RESTRICTIONS:

This Reusable Software Component (RSC) contains data with Unlimited Government Rights.

## DESCRIPTION:

MOLLWEIDE is a C language code component that provides conversions between Geodetic coordinates (latitude and longitude) and Mollweide projection coordinates (easting and northing).

## CERTIFICATION LEVEL:

This RSC has been certified at level 4. A level 4 component satisfies the criteria for reliability, testing, and documentation for the Army Reuse Center (ARC). The component comes with test materials and a Reuse Manual that aids in integrating the component into a software system.

## LEVEL OF TESTING/ACCEPTANCE:

Unit and integration testing have been performed for the functions contained in this component.

## PURPOSE/INTENDED USE:

The purpose of MOLLWEIDE is to provide a reusable component that supports the following coordinate conversions:

- Geodetic coordinates (latitude and longitude in radians) to Mollweide projection coordinates (easting and northing in meters), and
- Mollweide projection coordinates (easting and northing in meters) to Geodetic coordinates (latitude and longitude in radians).

A particular ellipsoid is specified in terms of the following parameters:

- Semi-Major Axis (a): Radius (in meters) at the equator, and
- Semi-Minor Axis (b): Radius (in meters) at a pole.

A particular variation of the Mollweide projection is specified in terms of the following parameters:

- Central Meridian – Longitude (in radians) at the horizontal center of the projection,
- False Easting – A coordinate value (in meters) assigned to the central meridian of the projection to avoid the inconvenience of using negative coordinates, and
- False Northing – A coordinate value (in meters) assigned to the origin latitude of the projection to avoid the inconvenience of using negative coordinates.

#### HARDWARE/ENVIRONMENT CONSTRAINTS:

There are no hardware or environment constraints. There are no limitations.

#### FUNCTIONS:

`Set_Mollweide_Parameters` – This function sets the ellipsoid parameters and Mollweide projection parameters for the particular variation of the Mollweide projection that is to be used in subsequent coordinate conversion operations.

`Get_Mollweide_Parameters` – This function returns the current values of the ellipsoid parameters and Mollweide projection parameters.

`Convert_Geodetic_To_Mollweide` – This function converts the specified geodetic coordinates (latitude and longitude in radians) to Mollweide projection coordinates (easting and northing in meters) using the current ellipsoid parameters and Mollweide projection parameters.

`Convert_Mollweide_To_Geodetic` – This function converts the specified Mollweide projection coordinates (easting and northing in meters) to geodetic coordinates (latitude and longitude in radians) using the current ellipsoid parameters and Mollweide projection parameters.

#### EXAMPLE APPLICATIONS:

The following example illustrates how MOLLWEIDE can be used to convert Geodetic coordinates to Mollweide projection coordinates and back again:

Function Call:

```
status = Set_Mollweide_Parameters (a, b, Central_Meridian, False_Easting,  
False_Northing)
```

Inputs:

a	6378137.0
b	6356752.3142
Central_Meridian	0.0
False_Easting	0.0
False_Northing	0.0

Outputs:

None

Function Call:

```
status = Convert_Geodetic_To_Mollweide (Latitude, Longitude, Easting, Northing)
```

Inputs:

Latitude:	-35.0
Longitude:	75.0

Outputs:

Easting:	-1857657.35
Northing:	-4218501.64

Function Call:

```
status = Convert_Mollweide_To_Geodetic (Easting, Northing, Latitude, Longitude)
```

Inputs:

Easting:	-1857657.35
Northing:	-4218501.64

Outputs:

Latitude: -35.0

Longitude: 75.0