INTREPID's supported datums and projections (R09)

Top

INTREPID supports a wide variety of datums and projections. Each supported datum or projection has a parameter file located in the directory ***install_path*/proj** (where ***install_path*** is the location of your INTREPID installation). When you specify a datum or projection, you select it from the list of these files.

The datum and projection parameter files are ASCII (text) files with the standard INTREPID **Begin – End** block syntax (See "INTREPID Auxiliary files" in INTREPID database, file and data structures (R05) for a description of the syntax).

You can use the predefined files as templates to create your own datum / projection variations. Datum parameter files have the extension **.datum**. Projection parameter files have the extension **.proj**.

If you are converting a dataset from one datum to another, the current datum parameter file must contain conversion specifications for the new datum. INTREPID already has the most common specifications, such as conversions to and from WGS84, in the appropriate datum parameter files. This appendix explains how to obtain this information for transformations not detailed in INTREPID.

You can also define local projections (local grids) based on known reference points but allowing for displaced origins and different orientation of coordinate axes.

This appendix assumes that you are familiar with the concept of datums and projections. For an introduction to the topic, we recommend *Geodesy for the Layman*[1], published by the organisation now known as the USA National Imagery and Mapping Agency. You can read it on the World wide Web at the following address:**http://www.nima.mil/geospatial/products/GandG/geolay/toc.htm**

Some confusion exists in the area of datum and projection conversion. Jones (1997)[2] details some of the current potential sources of error due to ignorance or confusion about such matters as feet to metres conversion and rotation of axes. This appendix mentions a specific problem with rotations in the Helmert 7 parameter datum transformation method (See Bursa-Wolf vs Coordinate Frame Rotation methods). If you wish to use parameters not supplied with INTREPID and you follow preliminary testing procedures as advised, the problems are unlikely to affect you. The INTREPID *Cookbook* contains instructions for testing a set of transformation parameters. This method uses a point with known coordinates with respect to each datum.

1. *Geodesy for the Layman*, Defence Mapping Agency Technical Report 80–003, Defence Mapping Agency, Washington DC, 1984.
2. Jones, M. A. B., (1997), Do You Really Know Where You Are?, *GIM International*, **11** 2, 6–9

Note for INTREPID 3.7

Datums, Projections, POSC, SEG standards have changed . This time the unique coordinate system number is to be the key. INTREPID supports this latest version and can map to older *ERMapper*, *Arcview*, *MapInfo* and other formats as required.

The .cs files supplement the current system by providing an alternative way of specifying a coordinate system. There are two ways of specifying a coordinate system:

- **Datum/Projection**. This is the traditional way, inherited from the ERMapper system.

- **Using .cs files**. This is used for systems which suppport a POSC-like coordinate system, eg, geotiff.

Specifying datums and projections

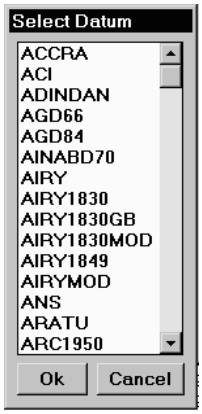
Several INTREPID tools have facilities for you to specify datum and projection.

Notes:

- **Import tool:** When you specify datum and projection (geolocate the dataset) using the Import tool, you are only identifying the existing datum and projection for the data. The Import tool cannot change datum and projection.
- **Projection Conversion tool:** If you wish to transform a dataset from one projection and / or datum to another you must use the Projection Conversion tool.
- **Subsection tool:** You can specify the datum and projection of a rectangle that defines the subsection.

This section describes how to specify datums and projections.

>> To specify a datum



1 Choose the menu option or button for setting the Datum. INTREPID displays the Select Datum dialog box[1].

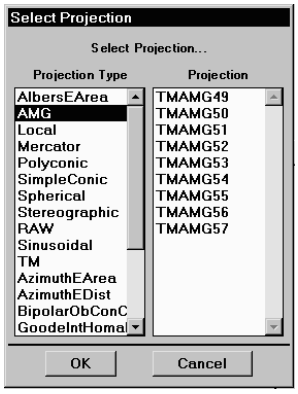
1. Some of the files listed in this dialog box refer to ellipsoids only, not datums. They are included so that you can use them as templates for creating new datum parameter files.

2 Select (click) the datum you require and choose OK. INTREPID will select the datum and display its details in the tool window you are using.

Notes:

- Some projection parameter files have a default datum associated with them. If you specify a datum for a projection which has a default datum, the datum you specify will take precedence over the default datum.
- If you have specified a local projection (local grid), specify the same datum as the reference (fixed) point projection in the local projection definition.

>> To specify a projection



1 Choose the menu option or button for setting the Projection. INTREPID displays the Select Projection dialog box.

2 Open (double click) the Projection Type you require. INTREPID will list the projections available for the selected Projection Type. For latitudes / longitudes, select the Spherical type. NOTE: Intrepid v3.7 does not display the Projection Type list.

3 Select (click) the projection you require and choose OK. INTREPID will select the projection and display its details in the tool window you are using. For latitudes / longitudes, select Geodetic.

Geographical coordinates (latitude and longitude)

For geographical coordinates (latitude and longitude) specify Geodetic from the Spherical type.

The 'geodetic' projection

If your data has geographical coordinates, whenever INTREPID displays it on a screen or prints it, it must project the data from its datum onto the flat surface of the screen or hard copy. This 'geodetic' projection projects latitude and longitude lines onto a plane surface with the vertical longitude lines and horizontal latitude lines. It retains degrees as a distance unit. This projection does not minimise distortion and is intended for processing and on-screen visualisation of datasets only.

Data that is not geolocated (RAW)

If your dataset is not geolocated (has no datum or projection information), specify **RAW** for datum and **RAW** for projection.

Spherical datums

For projections from a spherical datum, whose ellipsoid has major and minor axes of the same length (e.g., **SPHERE.datum**), INTREPID will automatically use a special spherical projection formula. This occurs particularly with the Transverse Mercator projection.

INTREPID Datum specifications

A datum consists of the dimensions and position of an ellipsoid. The position is fixed by an origin point.

All geolocated data imported into INTREPID has a known datum. INTREPID records the name of the datum when the dataset is created, and can display it with other dataset summary information.

INTREPID does not require origin points of datums for any of its operations. It does, however, need to be able to transform datasets between datums. Therefore, INTREPID only defines the positions of ellipsoids relative to other ellipsoids.

INTREPID datum parameter files consist of

- The name of the datum,
- The dimensions of the associated ellipsoid, given as the radii on the semi-major and semi-minor axes in metres[1],
- Sets of parameters for transforming datasets from one datum to another datum. Because of the large number of datums, many of which are specific to certain regions, it is of little value to include parameters for all possible transformations. Therefore we calculate and include only the sets of transformation parameters likely to be used by INTREPID users (e.g., WGS84 to AGD84). See Obtaining datum transformation parameters for advice about sets of parameters not included with INTREPID.

Structure of datum parameter files

INTREPID datum parameter files reside in the ***install_path*/proj** directory (where ***install_path*** is the location of the INTREPID installation) and consist of a **Datum Begin – Datum End** block with lines of text.

The first line contains the INTREPID name of the datum (the same as the file name), in the form

DatumName=*datum_name*

1.This differs from the conventional method of expressing ellipsoid dimensions as the radius on the semi-major axis and the flattening. You can easily derive one from the other.

Where

a = semi-major axis radiusb = semi-minor axis radius1/f = inverse flattening

f = a / (a – b) and

b = a (1 – 1 / f)

The next two lines specify the major and minor axes for the ellipsoid. The lines have the format

Major=constant_value

Minor=*constant_value*

The file may then include a number of datum transformation parameter blocks. These have the format shown in the following example.

```
DatumChange Begin
      ToDatum=AGD84
      DX=         116.000000
      DY=         50.470000
      DZ=         -141.690000
      OMEGA=      0.230000
      PHI=        0.390000
      KAPPA=      0.344000
      SCALEDIFF=  -0.098300
DatumChange End
```

Where

ToDatum is the name of the target datum for the transformation,**DX, DY, DZ** specify differences in origin positions for the ellipsoid(s)

OMEGA, PHI, KAPPA specify rotational differences between the ellipsoid(s) of the datums. These parameters are often called Rx, Ry, Rz respectively.

SCALEDIF specifies a scale difference between the datums.

(See Specifying datum transformation parameters for further details.)

The name of the datum parameter file is the same as the datum name, with a **.datum** extension. For example, the datums in the following examples would have file names **INDIAN60.datum** and **BELG50.datum**.

Examples of datum parameter files

```
Datum Begin
      DatumName=INDIAN60
      Minor=6356075.413
      Major=6377276.345
      DatumChange Begin
            ToDatum=WGS84
            DX=  298.960000
            DY=  750.020000
            DZ=  249.840000
            OMEGA=     0.00000
            PHI=       0.00000
            KAPPA=     0.00000
            SCALEDIFF= 0.00000
      DatumChange End
Datum End
Datum Begin
      DatumName=BELG50
      Minor=6356911.946
      Major=6378388.0
Datum End
```

Creating your own datum specification

If your dataset has a datum that is not included in INTREPID, you can create your own datum specification as follows.

1. Use a text editor to create a text file with the format described in Structure of datum parameter files, including the axis radii and the datum name. You can use the files provided with INTREPID as templates for your own specifications. If you will be transforming the dataset to other datums, include appropriate datum transformation parameter blocks. Save the datum parameter file with a unique filename into ***install_path*/proj** (where ***install_path*** is the location of your INTREPID installation). Datum parameter files must have the extension **.datum**.
2. If you will be transforming other datasets to this datum, edit the datum parameter files for the other datasets and insert datum transformation parameter blocks for transforming datasets to your datum.
3. Add the new datum definition to the datums database file, ***install_path*/proj/datum.csv**. (Note: earlier versions of INTREPID stored the datum listings in an ASCII file called **datumDB).**

For example, if your datum is called ABC97, you will create a datum parameter file called **ABC97.datum**. If you will be transforming this data to the WGS84 datum, you will include a datum transformation parameter block as follows.

```
DatumChange Begin
      ToDatum=WGS84
      ...
DatumChange End
```

If you will be transforming data from WGS84 to ABC97, you will edit the **WGS84.datum** file and insert a datum transformation parameter block as follows.

```
DatumChange Begin
      ToDatum=ABC97
      ...
DatumChange End
```

The datums database file

The datums database file, ***install_path*/proj/datum.csv** (where ***install_path*** is the location of your INTREPID installation), is an ASCII file containing one line of text for each datum. In order for INTREPID to recognise a datum, it must be included in the datums database file.

- A projection listing consists of the POSC_CODE, POSC_NAME, ERM_NAME, MAP_INFO. The ERM_NAME is the name of the datum, and must be the same as the datum file name (excluding the **.datum**). It is not necessary to define the POSC fields - if you don't know them you can enter UNKNOWN.

Ellipsoids used by INTREPID datums

At the time of writing INTREPID has over 170 datum parameter files. Most of these datum specifications use one of about 30 internationally recognised ellipsoids. The following table contains a list of the common ellipsoids used by INTREPID, the dimensions of the ellipsoid and either the ellipsoid 'template' file name or an example of an INTREPID datum parameter file which uses the ellipsoid.

Ellipsoid	Semimajor Axis (a)	Inverse Flattening (1/f)	Semiminor Axis (b	Template / Example
Airy 1830 OSGB	6377563.396	299.324964700	6356256.909	**AIRY**
Airy 1830 Mod	6377340.189	299.324964700	6356034.448	**AIRYMOD**
Australian National	6378160.000	298.250000000	6356774.719	**ANS**
Bessel 1841	6377397.155	299.152800000	6356078.962	**BESS1841**
Bessel 1841 Norge	6377492.018	299.152812800	6356173.509	**BESSMOD**
Clarke 1858	6377293.645	294.260000000	6355621.336	**CLA58MTR**
Clarke 1866	6378206.400	294.978698200	6356583.800	**CLA66MTR**
Clarke 1880	6378249.145	293.465000000	6356514.870	**CLA80MOD**
Clarke 1880 IGN	6378249.200	293.466020800	6356515.000	**CLA80IGN**
Clarke 1880 Palestine	6378300.790	293.466307656	6356566.435	**PALEST23**
Clarke 1880 RSA	6378249.145	293.466300000	6356514.966	**CLA80RSA**
Clarke 1880 Mod	6378249.145	293.466300000	6356514.966	**CLA80RSA**
Everest 1830	6377276.345	300.801700000	6356075.413	**EVERST1830**
Everest 1830 Pakistan	6377301.243	300.801700000	6356100.228	**KALIANPR**
Everest 1948 Malaya	6377304.063	300.801700000	6356103.039	**KERTAU**
Everest 1967 Borneo	6377298.556	300.801700000	6356097.550	**EVERST67**
Fischer 1960 Mercury	6378166.000	298.300000000	6356784.284	**FISCHER1960**
Fischer 1960 South Asia	6378155.000	298.300000000	6356773.320	**FISCHER60SA**
Fischer 1968 Mercury	6378150.000	298.300000000	6356768.337	**FISCHER1968**
GRS 67	6378160.000	298.247167427	6356774.516	**GRS67**
GRS 80	6378137.000	298.257222101	6356752.314	**GRS80**
Hayford 1909	6378388.000	296.959262536	6356909.000	**HAYF1910**
Helmert 1906	6378200.000	298.300000000	6356818.170	**HELM1906**
Hough 1960	6378270.000	297.000000000	6356794.343	**HOUGH**
Indonesian National	6378160.000	298.247000000	6356774.504	**IND74**
International 1924	6378388.000	297.000000000	6356911.946	**INT24**
Krassovsky 1940	6378245.000	298.300000000	6356863.019	**KRAS1940**

Ellipsoid	Semimajor Axis (a)	Inverse Flattening (1/f)	Semiminor Axis (b	Template / Example
South American 1969	6378160.000	298.250000000	6356774.719	**SAD69**
WGS60	6378165.000	298.300000000	6356783.287	**WGS60**
WGS66	6378145.000	298.250000000	6356759.769	**MWL9D**
WGS72	6378135.000	298.260000000	6356750.520	**WGS72BE**
WGS84	6378137.000	298.257223563	6356752.314	**WGS84**

Specifying datum transformation parameters

INTREPID uses the Helmert 3-Dimensional Similarity Transformation method for transforming between datums[1].

For the purposes of transformations, the X, Y and Z directions are parallel to the axes of the system described here:

For an earth centred reference system,

- The origin is the earth's centre of mass.
- The positive arm of the Z axis passes through the instantaneous axis of rotation of the Earth, towards the Northern hemisphere.
- The positive arm of the X axis passes through Greenwich meridian and is at right angles to the Z axis.
- The positive arm of the Y axis is at right angles to both the Z and X axes so that they form a right handed system.

The Helmert 3-Dimensional Similarity Transformation method uses seven parameters, describing changes in position of the origin, rotations of the axes and the difference in radii of the two ellipsoids.

dX, dY, dZ are the changes of origin along the X, Y and Z axes respectively in metres. These parameters correspond to **DX**, **DY**, and **DZ** in INTREPID datum transformation parameter blocks.

Rx, Ry, Rz are the rotations of the X, Y and Z axes respectively in radians. These parameters correspond respectively to **OMEGA**, **PHI**, and **KAPPA** in INTREPID datum transformation parameter blocks.

Scale Difference is a factor representing the change in scale from the original datum and the new datum. This parameter corresponds to **SCALEDIFF** in INTREPID datum transformation parameter blocks. This is normally defined in parts per million.

1. For a description of transformation methods, see the corresponding web page at the Australian Land Information Group (AUSLIG)'s website. The page address is **http://www.auslig.gov.au/geodesy/transf.htm**

Bursa-Wolf vs Coordinate Frame Rotation methods

There are two different rotation conventions.

- Using the Bursa-Wolf method (said to be normally used in Europe) positions are rotated around the axes.
- Using the Coordinate Frame Rotation method (said to be normally used in Australia and North America), the axes are rotated.

The practical difference between these conventions is opposite signs in the rotation parameters.

Currently there is some confusion in the world about the method to which certain parameter sets belong. We have verified that INTREPID correctly performs transformations with the parameters we have supplied. Different respectable sources we have studied give the same sets of parameters for both Bursa-Wolf and the Coordinate Frame Rotation methods.

Until this confusion is resolved, we strongly recommend the following. If you are creating your own datum transformation parameter block from parameters you have acquired outside INTREPID, test the transformation with a known point. This will ensure that you have the correct sign for the rotations.

The INTREPID *Cookbook* has detailed instructions for performing a datum transformation test.

Are the rotation and scale parameters really necessary?

The dX, dY and dZ parameters are readily available, whereas you may have to take some trouble to obtain the rotation and scale parameters. If maximising positional accuracy is not vital, you can set the rotational and scale parameters to 0. INTREPID will still transform your data with a positional accuracy suitable, say, for a 1:50000 map.

Assuming that you obtain them from a reliable source, using the rotational and scale parameters will produce more accurate transformations.

Example of a datum transformation parameter block

This block belongs to the WGS84 datum parameter file and specifies the transformation to AGD84.

```
DatumChange Begin
      ToDatum=AGD84
      DX=       116.000000
      DY=        50.470000
      DZ=      -141.690000
      OMEGA=       0.230000
      PHI=         0.390000
      KAPPA=       0.344000
      SCALEDIFF= -0.098300
DatumChange End
```

Obtaining datum transformation parameters

The dX, dY and dZ parameter values are readily available for transforming between WGS84 and other datums. The most comprehensive source is *DMA Technical Report 8350.2—World Geodetic System 84*, 2nd Edition, Defence Mapping Agency, Fairfax, Virginia, 1991. At the time of writing, a new edition of this report is about to be released. You can obtain further information from the Agency, now known as the National Imagery and Mapping Agency (NIMA). It has a website at **`http://www.nima.mil`**.

The rotation and scale parameters are more difficult to obtain. We include these for the most common transformations, as listed in the corresponding **`.datum`** files (especially **`wgs84.datum`**). If you wish to obtain these parameters for a less common datum, try requesting them from the mapping authorities in the countries concerned.

INTREPID Projection Specifications

A projection is a method for transposing points from the surface of an ellipsoid to a plane (e.g., a piece of paper or a computer screen).

If geolocated data imported into INTREPID is projected, INTREPID will record the name of the projection when the dataset is created. If the data is not projected, INTREPID records the projection as **`geodetic`**.

INTREPID projection parameter files consist of

- The projection type,
- The names and values of constants required for the projection,
- The names and values of optional constants,
- The name of a default associated datum (optional).

Structure of projection parameter files

INTREPID projection parameter files consist of a **`Projection Begin – Projection End`** block containing a number of lines of text.

The first line contains the INTREPID name of the projection associated with the file, in the form

`ProjectionType=`*`projection type`*

Subsequent lines specify values associated with this specification. The lines have the format

`constant_name=constant_value`

In standard (non-local) projection specifications, you can also specif y an associated datum. The datum line has the format

`Datum=`*`datum_name`*

Local projection (local grid) definitions have a different format from standard projection specifications. See Local projections (local grids) for further information.

Example of standard projection parameter file

```
Projection Begin
      ProjectionType = LambertConicConformal
      CentralMeridian = 135
      StdLat1 = –36
      StdLat2 = –28
      Datum = AGD66
Projection End
```

See Local projections (local grids) below for examples of local projection (local grid) definitions.

Projection types

The projection types appear in the Supported Projections tables at the end of this appendix. These tables also contain the required and optional constants for the projection.

Constant names

The constant names used by INTREPID are as follows

Constant	INTREPID constant name
Australian Mapping Grid Zone	**AMGZone**
Central Meridian	**CentralMeridian**
Standard Latitude	**StdLat**
Standard Latitude 1	**StdLat1**
Standard Latitude 2	**StdLat2**
Middle Latitude	**MiddleLatitude**
Longitude True Scale East	**LongitudeTrueScaleEast**
False Easting	**FalseEasting**
False Northing	**FalseNorthing**
Scale Factor	**ScaleFactor**
Latitude Origin	**LatOrigin**

See the corresponding section below for information about the datum.

Default datums specified in projection parameter files

The datum specified in a projection parameter file is the default datum for the projection. You can specify a different datum for a dataset when you assign the datum and projection using the Projection Conversion or Import tool. A datum you specify in this way will take precedence over the default datum in the projection.

Creating your own projection specifications

You can create your own projection specification as follows:

1. Use a text editor to create a text file with the format described in Structure of projection parameter files. You can use the files provided with INTREPID as templates for your own specifications. Save the projection parameter file with a unique filename into ***install_path*/proj** (where ***install_path*** is the location of your INTREPID installation). Projection parameter files must have the extension **.proj**.
2. Adding the new projection definition to the projections database file, ***install_path*/proj/proj.csv**. (Note: earlier versions of INTREPID stored the projection listings in an ASCII file called **projectionDB).**

The projections database file

The projections database file, ***install_path*/proj/proj.csv** (where ***install_path*** is the location of your INTREPID installation), is an ASCII file containing one line of text for each projection. In order for INTREPID to recognise a projection, it must be included in the projections database file.

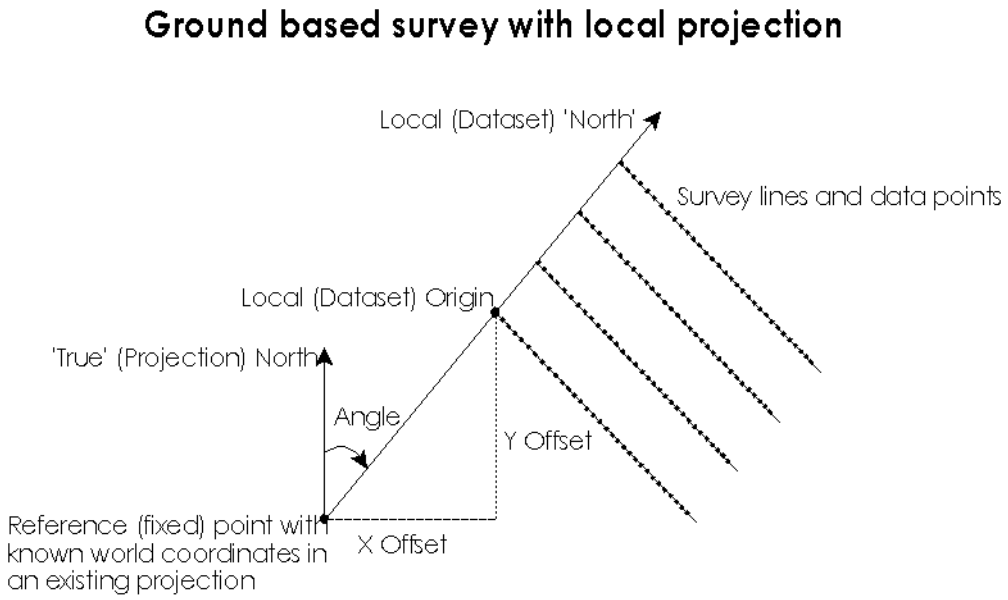
- A projection listing consists of the POSC_CODE, POSC_TYPE, POSC_NAME, ERM_TYPE, ERM_NAME. The ERM_NAME is the name of the projection, and must be the same as the projection file name (excluding the **.proj**). It is not necessary to define the POSC fields - if you don't know them you can enter UNKNOWN.
- Some projection types shown in the projections database are abbreviations of the full projection type names. See the comprehensive table in Supported Projections for details of projection names and database abbreviations.
- You should list all projections of the same type together.
- The projections database file controls the listing of projections in the Select Projection dialog box. See Specifying datums and projections for an illustration.
- Here is an abbreviated listing of the projections database file supplied with INTREPID.

```
Unknown,Unknown,Unknown,AzimuthalEquidistant,AEAFRICA
Unknown,Unknown,Unknown,AzimuthalEquidistant,AERUSS
10101,Transverse Mercator,Alabama CS27 East
zone,TransverseMercator,ALABAMA_CS27_EAST_ZONE
10102,Transverse Mercator,Alabama CS27 West
zone,TransverseMercator,ALABAMA_CS27_WEST_ZONE
10131,Transverse Mercator,Alabama CS83 East
zone,TransverseMercator,ALABAMA_CS83_EAST_ZONE
10132,Transverse Mercator,Alabama CS83 West
zone,TransverseMercator,ALABAMA_CS83_WEST_ZONE
Unknown,Unknown,Unknown,AlbersEqualArea,ALALASK2
Unknown,Unknown,Unknown,AlbersEqualArea,ALALASK3
Unknown,Unknown,Unknown,AlbersEqualArea,ALALASKA
15010,Lambert Conic Conformal (2SP),Alaska CS27 zone
10,LambertConicConformal,ALASKA_CS27_ZONE_10
```

Local projections (local grids)

It may not be convenient for you to convert certain datasets to an existing projection. For example, ground based surveys (e.g, ground magnetics) may be made using a local grid[1] with a local origin and axis perpendicular to the strike of the predominant geology.

You can define a **local projection (local grid)** for such a dataset. Local projections are essentially transformations from existing projections. They use a known reference point in an existing projection, and can incorporate an offset for the local origin from the reference point, a different angle for the dataset's 'North', and different distance units.



Local projection definition files consist of a **`Projection Begin – End`** block. Here is an example of a user-defined Local Projection file:

```
Projection Begin
      ProjectionType = Local
      LocalZone = 1
      Comment = "Derived from Z346"
      FixedPointX = 498029.00
      FixedPointY = 6395731.00
      FPProjection = TMAMG53
      FPXoffset = 934.80
      FPYoffset = 1565.00
      FPAngle = 45:0:4.59289944
      LocalScale = 1
Projection End
```

1. **Note:** Such a survey would first yield an INTREPID line or point dataset with accurate location data, not a grid dataset.

These are the rules for defining a Local Projection file:

- The local projection definition file must begin with the word Local and end with an integer eg: Local1.prj
- The LocalZone statement in the file must be LocalZone=1
- The rotation angle (FPAngle) in Local1.proj should be positive and in degrees minutes seconds ie; ddd:mm:ss.sss. Decimal degrees do not work.
- The file must be copied to the Intrepid /proj directory.
- The following line needs to be added into the proj.csv file in the Intrepid /proj directory: Unknown,Unknown,Unknown,Local,LOCAL1

Keyword	Purpose
LocalZone	Use this keyword to assign a unique identification number to the zone described by the projection.
FixedPointX	World coordinates of the reference (fixed) point using the reference point's projection.
FixedPointY	
FPProjection	Projection of the reference point.
FPXoffset	Offset of dataset origin from reference point. This has the same distance units as the projection of the fixed point (normally metres).
FPYoffset	
FPAngle	Angle in degrees of local North relative to the reference point projection's North. A positive angle corresponds to an anticlockwise rotation.
LocalScale	Scale of distance in the dataset (number of metres in one dataset distance unit).

If you use a local projection, the local origin (i.e., **X** = 0, **Y** = 0) will be the point defined by **FixedPointX**, **FixedPointY** adjusted by **FPXoffset**, **FPYoffset**.

INTREPID will determine the actual location of the dataset origin using the projection defined by **FPProjection** and its corresponding datum.

Supported Projections

The following pages contain tables of projections that INTREPID supports. The columns of the table contain the following information.

Column	Information
1	The normal name of the projection type,The projection type as listed in projection definition files,(The abbreviated projection type as listed in the projections database file—if different from the projection type).
2	A list of the projection definition files of this type supplied with INTREPID (unless they are too numerous to list).
3	A list of the constant values that must be declared in projection definitions for this projection type,The name of any obligatory datum for the projection.
4	Optional parameters for the projection type.
5	Default values for the optional parameters.
6	Distance units for the projection.

The table includes all projection types but does not individually list each projection. For a complete list, examine the list in the Select Projection dialog box and the corresponding projection parameter file (**.proj**) files in the ***install_path*\proj** directory (where ***install_path*** is the location of your INTREPID installation). The INTREPID projections are comprehensive. For example, **TMOMAN.proj** is specifically set up for Oman.

Projection and INTREPID Projection Name (Projections database abbreviation if different)	Projection files provided with INTREPID	Required Constants	Optional Parameters: Name	Def-ault	Un-it
Geographical (unprojected) **Geographic**	**GEODETIC**	none	none		°
Local **Local**	Reference projection assigned in definition				
Albers Equal Area **AlbersEqualArea** **(AlbersEArea)**	**AL*** **GALB**	**CentralMeridian** **StdLat1** **StdLat2**	**FalseEasting** **FalseNorthing** **ScaleFactor** **LatOrigin**	**10**	m

Projection and INTREPID Projection Name (Projections database abbreviation if different)	Projection files provided with INTREPID	Required Constants	Optional Parameters: Name	Def-ault	Un-it
Australia Mapping Grid **AMG**	**TMAMG49** **TMAMG50** **TMAMG51** **TMAMG52** **TMAMG53** **TMAMG54** **TMAMG55** **TMAMG56** **TMAMG57**	**AMGZone** Default Datum **AGD66** Note: You can use **WGS84** or **AGD84** instead.	**FalseEasting** **FalseNorthing** **ScaleFactor** **LatOrigin**	**5e5** **1e7** **.9996** **0**	m
Azimuth Equal Area **AzimuthEqualArea** **(AzimuthEArea)**	**LE***	**CentralMeridian** **StdLat**	**FalseEasting** **FalseNorthing** **ScaleFactor** **LatOrigin**	**10**	m
Azimuth Equidistant **AzimuthEquidistant** **(AzimuthEDist)**	**AEAFRICA** **AERUSS**	**CentralMeridian** **StdLat**	**FalseEasting** **FalseNorthing** **ScaleFactor** **LatOrigin**	**10**	m
Goode International Homalographic **GoodeIntHomalographic** **(GoodeIntHomal)**	**GOOD**	**CentralMeridian**	**FalseEasting** **FalseNorthing** **ScaleFactor** **LatOrigin**	**10**	m
Bipolar Oblique Conic Conformal **BipolarObliqueConicConformal** **(BipolarObConConf)**	**BCNAMER** **BCSAMER** **BCSPHERE** **BOCC**	none	none		m
Lallemand Modified Polyconic **ModifiedPolyconic** **(ModPolyconic)**	**MPCALIF** **MPOL** **MPOLAUS**	**CentralMeridian** **StdLat1** **StdLat2**	**‡FalseEasting** **FalseNorthing** **ScaleFactor** **LatOrigin**	**-77770010**	m

Projection and INTREPID Projection Name (Projections database abbreviation if different)	Projection files provided with INTREPID	Required Constants	Optional Parameters: Name	Def-ault	Un-it
Lambert Conformal Conic † **LambertConicConformal** **(LambertConConf)**	**LAM*** **LM*** **LCCTEST**	**CentralMeridian** **StdLat1** **StdLat2**	**False Easting** **False Northing** **Scale Factor** **LatOrigin**	**10**	m
Regular Polyconic **Polyconic**	**RPMON** **RPNAM** **RPSIB** **RPUSSR** **POLAUS** **POLTEST**	**CentralMeridian**	**False Easting** **False Northing** **Scale Factor** **LatOrigin**	**10**	m
Simple Conic **SimpleConic**	**CE*** **GEOSIM** **RUSSIA** **SIM***	**CentralMeridian** **StdLat1** **StdLat2**	**False Easting** **False Northing** **Scale Factor** **LatOrigin**	**10**	m
Interrupted Sinusoidal **InterruptedSinusoidal** **(InterruptedSinus)**	**SIN**	none	none		°
Sinusoidal **Sinusoidal**	**SNSPHERE** **LAVINIA** **VENRAD***	none	none		°
Spherical **Spherical**	**GEODETIC** **STDGEO**	none	none		°
Polar Stereographic **PolarStereographic** **(PolarStereo)**	**STEREO_EQUATORIAL** **STEREO_OBLIQUE** **STEREO_POLAR** **POLAR_STEREO**	**CentralLatitude** **CentralMeridian** **StdLat**	**False Easting** **False Northing** **Scale Factor** **LatOrigin**	**10**	m

Projection and INTREPID Projection Name (Projections database abbreviation if different)	Projection files provided with INTREPID	Required Constants	Optional Parameters: Name	Def-ault	Un-it
Stereographic **Stereographic**	**OS*** **PS***	**CentralLatitude** **CentralMeridian** **StdLat**	**Scale Factor** **LatOrigin** **Convergence**	**1e-07**	m
Mercator† **Mercator**	**MER*** **MR***	**CentralMeridian**	**False Easting** **False Northing** **Scale Factor** **LatOrigin**	**10**	m
Transverse Mercator† **TransverseMercator** **(TM)**	**STM*** **TM*** (except **TMAMG*** **TMS**)	**CentralMeridian**	**False Easting** **False Northing** **Scale Factor** **LatOrigin**	**10**	m
Spherical Transverse Mercator **TransverseMercatorSphere** **(TMSphere)**	**TMS**	**CentralMeridian**	**False Easting** **False Northing** **Scale Factor** **LatOrigin**	**10**	m
Universal Transverse Mercator † **UniversalTransverseMercator** **(UTM)**	**NUTM*** **SUTM*** **UTM***	**CentralMeridian** Datum	**False Easting** **False Northing** (Nth Hemisph) (Sth Hemisph) **Scale Factor** **LatOrigin**	**5e5** **0** **1e7** **.9996** **0**	m
Van der Grinten **VanDerGrinten** **(VDGrinten)**	**VANDG_AUS** **VANDG_RUSSIA** **VG***	**CentralMeridian**	**False Easting** **False Northing** **Scale Factor** **LatOrigin**	**10**	°

'*****' Wild card indicating numerous projection parameter files. For example **VG*** refers to **VG120E**, **VG120W**, ... For a full list, refer to the projections database ***install_path*/proj/projectionDB** (where ***install_path*** is the location of your INTREPID installation).

‡ **LongitudeTrueScaleEast**, Default value is -**7777**

† Uses the formula for the sphere if major axis = minor axis

Projection Conventions for Antarctica

These conventions appear in full in the revised standing resolutions of the SCAR Working Group on Geodesy and Cartography submitted to XVI SCAR October 1980.

Use the World Geodetic System 1972 (WGS72) as the datum.

At scales smaller than 1:1 000 000 use the polar stereographic projection with the standard parallel (**StdLat**) at 71°

At scales of 1:1 000 000 use the ICAO specifications for projections at that scale and the common ICAO–IMW sheet lines along parallels, with optional meridian limits.

At scales greater than 1:1 000 000 use a conformal projection and sheet lines which subdivide ICAO–IMW 1:1 000 000 sheet lines.

Frequently asked questions

Q : How do I create a new projection or alter an existing projection in INTREPID?

INTREPID's projection attributes can be changed simply by editing the existing files or creating new files in the ***install_path*/proj** subdirectory. If new projections or datums are created then remember to add them to the **proj.csv** or **datum.csv** spreadsheets so that Intrepid knows about them. If you don't know the POSC code for the projection or datum, you can enter **Unknown** as a keyword. Note that for a datum to datum change, INTREPID requires the transformation parameters to be present in the ***.datum** file.

If the projection suite is modified then make a copy of the ***install_path*/proj** directory because a re-installation or upgrade would overwrite the changes. If you supply us with new projections or modifications to existing ones, we can include them in our distribution.