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Subject: Re: About the Cartesian coordinates of MAP\_PROJ\_FORWARD

Posted by [jameskuyper](#) on Thu, 16 Oct 2008 19:07:02 GMT

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Dave wrote:

> Dear friends:

> I have a simple question. Function "MAP\_PROJ\_FORWARD" transforms map  
> coordinates from longitude and latitude to Cartesian (x, y)  
> coordinates. I am confused about the Cartesian coordinates. What units  
> and origin of the Cartesian coordinates? Is its units meter?

The units of the cartesian coordinates are determined by the units used for either the SPHERE\_RADIUS, or the SEMIMAJOR\_AXIS and the SEMIMINOR\_AXIS, depending upon which map projection you use. If you don't use any of those options, the default values are in meters. If you do use those options, the units you use for those values determine the units of in the map projections. If you give them in miles, the units will be miles. If you specify 1.0, the cartesian coordinates will be in units of the radius of the Earth.

However, keep in mind that these units are measured on the projected surface; the relationship between distances on the surface of the earth and distances on the projection surface is something you can know only by understanding exactly how the particular map projection that you've chosen works.

By default, the origin of the coordinate system is the same as the center of the map projection, which defaults to 0N, 0E. However, if you use the CENTER\_LATITUDE or CENTER\_LONGITUDE options, they override the default center of the map projection. If you use the FALSE\_EASTING or FALSE\_NORTHING options, all projected points are offset by the specified amount, shifting the origin accordingly

```
orthographic = MAP_PROJ_INIT('Orthographic')
```

```
; In this map projection, the cartesian coordinates for 0,90 should be  
0 and the radius of the Earth:
```

```
PRINT, MAP_PROJ_FORWARD(0, 90, MAP_STRUCTURE=orthographic)
```

```
ortho_miles = MAP_PROJ_INIT('Orthographic', SPHERE_RADIUS=3956.539) ;  
Miles
```

```
PRINT, MAP_PROJ_FORWARD(0, 90, MAP_STRUCTURE=ortho_miles)
```

```
ortho_unit = MAP_PROJ_INIT('Orthographic', SPHERE_RADIUS=1.0)
```

```
PRINT, MAP_PROJ_FORWARD(0, 90, MAP_STRUCTURE=ortho_unit)
```

```
ortho_4545 = MAP_PROJ_INIT('Orthographic', CENTER_LATITUDE=45,  
CENTER_LONGITUDE=45)
```

```
PRINT, MAP_PROJ_INVERSE(0,0, MAP_STRUCTURE=ortho_4545)
```

```
ortho_false = MAP_PROJ_INIT('Orthographic', /GCTP, $  
    FALSE_EASTING = 1000000, FALSE_NORTHING=1000000)  
PRINT, MAP_PROJ_FORWARD(0, 0, MAP_STRUCTURE=ortho_false)  
PRINT, MAP_PROJ_INVERSE(0, 0, MAP_STRUCTURE=ortho_false)
```

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