Subject: About the Cartesian coordinates of MAP_PROJ_FORWARD
Posted by Dave[4] on Fri, 10 Oct 2008 07:39:17 GMT
View Forum Message <> Reply to Message

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 coorindates. What units
and origin of the Cartesian coorindates? Is its units meter?

Dave

Subject: Re: About the Cartesian coordinates of MAP_PROJ_FORWARD
Posted by jameskuyper on Thu, 16 Oct 2008 19:07:02 GMT
View Forum Message <> Reply to Message

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 coorindates. What units
> and origin of the Cartesian coorindates? Is its units meter?

The units of the cartesian coordiates 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)
```