Subject: create an UTM grid
Posted by natha on Mon, 28 Nov 2011 14:29:21 GMT
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Hi folks,

I am trying to create an UTM grid. I never did something similar and I got the idea from the last IDL webinar...
What I want is a grid centered in a center point and I would like to have the lat/lon values associated to every pixel. Lets say that I want a grid of 500x500 km centered on -74lon 45lat, is there a way to create that grid ?

What I tried until now is something like :

```
map_utm = MAP_PROJ_INIT('UTM', CENTER_LONGITUDE=-74
CENTER_LATITUDE=45, ELLIPSOID=24)
llrange = MAP_PROJ_INVERSE([-500000.,500000], [-500000.,500000.],
MAP_STRUCTURE=map_utm)
```

Maybe it's not that simple so that's why I call your wisdom to help me with this. Thank you in advance,
nata

Subject: Re: create an UTM grid
Posted by natha on Tue, 29 Nov 2011 01:26:24 GMT
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I think we are doing exactly the same but you are taking in account half pixel. You said that in your grids, the distances are exactly 1000 meters apart. Not in mines. Take a look :

```
  center_lat= 45
  center_lon=-74
  xdim=100
  ydim=100
  resolution=1000.

  map_utm=MAP_PROJ_INIT('UTM', /GCTP, CENTER_LON=center_lon,
CENTER_LAT=center_lat, ELLIPSOID=24)

  xycenter=MAP_PROJ_FORWARD(center_lon, center_lat,
MAP_STRUCTURE=map_utm)

  xstart=xycenter[0] - (xdim/2.-.5)*resolution
  ystart=xycenter[1] - (ydim/2.-.5)*resolution
```

```
  xgrid=FINDGEN(xdim)*resolution + xstart
  ygrid=FINDGEN(ydim)*resolution + ystart

  xgrid=REBIN(xgrid, xdim, ydim)
  ygrid=REBIN(REFORM(ygrid, 1, ydim), xdim, ydim)

  result=MAP_PROJ_INVERSE(xgrid, ygrid, MAP_STRUCTURE=map_utm)

  res_lon=REFORM(result[0,*],xdim,ydim)
  res_lat=REFORM(result[1,*],xdim,ydim)

  sz=SIZE(res_lon,/DIM)

  xres=FLTARR(sz)
  yres=FLTARR(sz)

  FOR i=0, sz[0]-2 DO FOR j=0, sz[1]-1 DO $
    xres[i,j]=MAP_2POINTS(res_lon[i,j],res_lat[i,j],res_lon[i
+1,j],res_lat[i,j],/METERS,RADIUS=6378137.)
  FOR i=0, sz[0]-1 DO FOR j=0, sz[1]-2 DO $

 yres[i,j]=MAP_2POINTS(res_lon[i,j],res_lat[i,j],res_lon[i,j] ,res_lat[i,j
+1],/METERS,RADIUS=6378137.)

  xres[sz[0]-1,*]=xres[sz[0]-2,*]
  yres[*,sz[1]-1]=yres[*,sz[1]-2]

  mmin_x=MIN(xres,MAX=mmax_x)
  mmin_y=MIN(yres,MAX=mmax_y)

  PRINT, mmin_x, mmax_x
  PRINT, mmin_y, mmax_y
```

IDL prints:

```
     998.289      998.727
     1001.60      1002.14
```

Maybe this is because MAP_2POINTS do not use the same semimajor and semiminor axis of the ellipsoid but I tried the same code using the Sphere (6370997.0,6370997.0) and giving the same number to the RADIUS keyword on MAP_2POINTS. The result I get is:

```
      999.991      1000.38
      999.989      1000.38
```

And if my grid is 1000x1000, the results are:

```
      990.751      1000.40
      990.745      1000.40
```

I can consider this results correct even if I was expecting all
distances to be exactly 1000m. Do you think that this is due to the
same error you explained in http://www.idlcoyote.com/map_tips/utmwrong.php
?

Anyway, 1% is not a big error but I am missing some precision here.

nata

Subject: Re: create an UTM grid
Posted by natha on Wed, 30 Nov 2011 22:48:16 GMT
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Well, it seems that nobody knows the answer... I hope that my code is
correct and this is another IDL weird issue.

Subject: Re: create an UTM grid
Posted by David Fanning on Wed, 30 Nov 2011 23:01:09 GMT
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nata writes:

> Well, it seems that nobody knows the answer... I hope that my code is
> correct and this is another IDL weird issue.

Humm. I wrote an answer, but I don't think it has been delivered,
for some reason.

I think the values are essentially correct. Your XY projected
grid is, essentially, a piece of graph paper put down on a flat
map projection. Your great circle distance is the distance
around a sphere. I would *hope* they were different values,
in fact.

That said, plotting a row of your longitude grid shows
a disturbing regularity to the way the data varies. As
if there were a systematic error of some sort. I don't
really know what to make of it, and haven't had time
the past couple of days to investigate further.

Cheers,

David

--
David Fanning, Ph.D.
Fanning Software Consulting, Inc.
Coyote's Guide to IDL Programming: http://www.idlcoyote.com/
Sepore ma de ni thui. ("Perhaps thou speakest truth.")

Subject: Re: create an UTM grid
Posted by natha on Thu, 01 Dec 2011 15:36:14 GMT
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Ok, thank you David. I was thinking that maybe this was something
similar to the problems you explained in "UTM Map Projection Produces
Incorrect Results".
Anyway, I will deal with my results. Thank you again,

nata
