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Geodesy Course 2008. Exercise 3.

1. Use the GRAVSOFT software for the evaluation of geoid heights and gravity anomalies over various areas and at various altitudes.

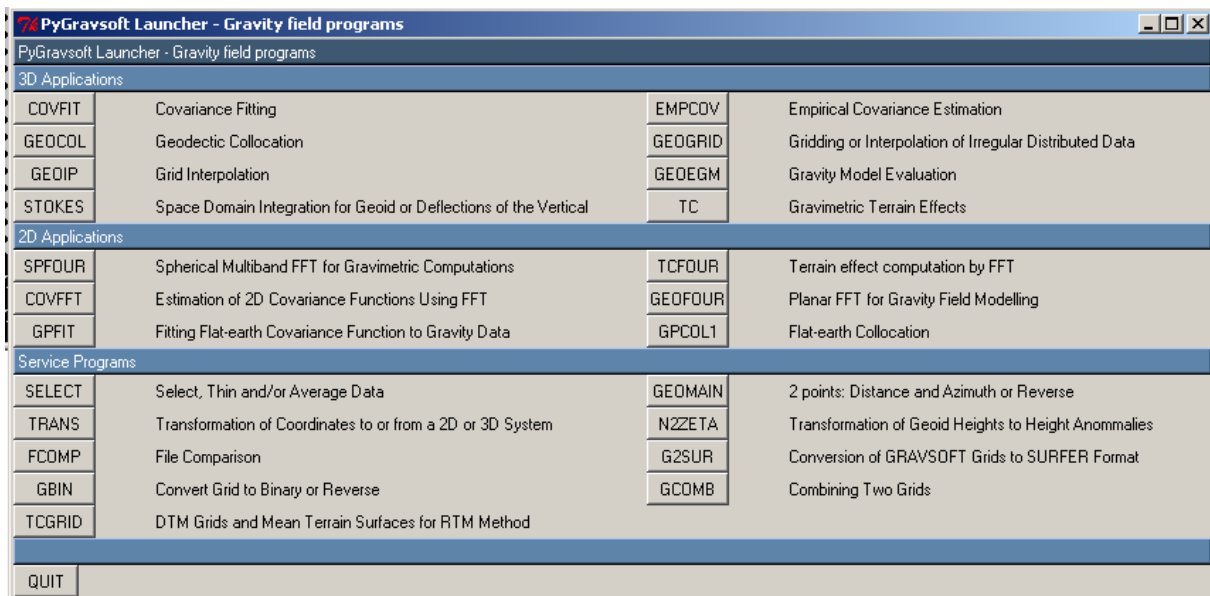
The software should be stored in a directory pyGravsoft, with subdirectories

- (a) bin holding the compiled programs
- (b) src holding the source codes of the programs
- (c) doc holding documentation
- (d) data holding test data to be used in these exercises.

Here we will use only sets of spherical harmonic coefficients, and in the directory you will find the file EGM96. Go to “start” and open a DOS-window with cmd. Then
cd pyGravsoft\data and type
More EGM96.

Then you will see 6 columns. Degree (i), order (j), \bar{C}_{ij} , \bar{S}_{ij} , and error – estimates.

Type cd .. and you will be in the directory pyGravsoft
Here you call the launcher.py by typing its name.



We are going to use one module, GEOEGM.

2. Use GEOEGM with EGM96 coefficients for the calculation of geoid heights and gravity anomalies in grids around Malaysia. Use GRS80 as the reference system.

GEOEGM - Gravity Model Evaluation

Select reference system: **5 - GRS80**
7 - Best current

Input gravity model filepath: data/EGM96 ?

Are the coefficients formatted? **Yes** No

Input format: (214,2D20.12)

Input GM, semi-major axis (M): 3.986004415D14 6378136.3

Input maximal degree: 360

Configure parameters

Input datatype code: 11 ?

Should a grid be used in computations **Yes** No

Input grid specification : 0.0 8.0 98.0 108.0 0.2 0.2 ?

Input grid altitude (m) : 0.0

Input name of datafile (Gravsoft format): coordinates.dat

Should computed values be subtracted from observed **Yes** **No**

Should statistics be output **Yes** **No**

Input histogram bin size: 5.0

Output to file **Yes** No

Name of file to hold result: data/geoid.grd

Running options. Working in /home/gfy-cct/dgravsoft/pyGravsoft

Data send to geocol17

QUIT Write Run Help

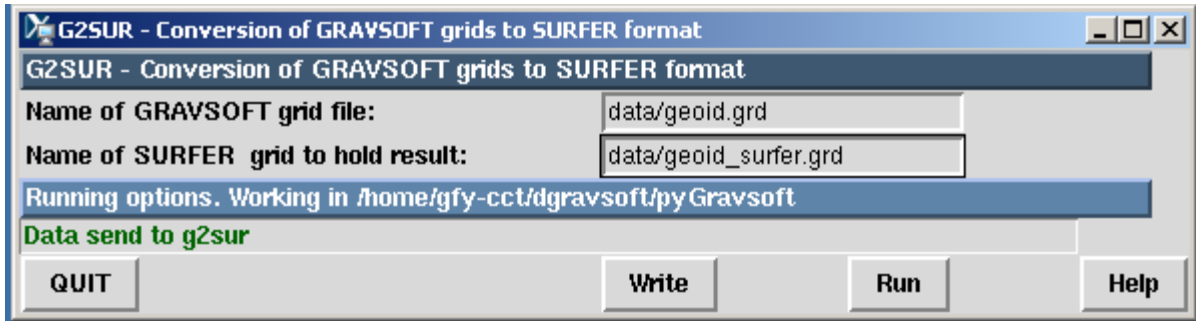
When you type “Write” or “Run” Python will generate a file called geogm.inp, which may be used as input to the program bin/geocol17. The output from the run will be at the screen and also stored in a file geogm.log. The resulting values will be stored on Gravsoft grid format in the file data/geoid.grd.

The first lines of this file look like this:

```
0.000000 8.000000 98.000000 108.000000 0.200000 0.200000
-27.6006 -26.9909 -26.3098 -25.4217 -24.3322 -23.1849 -22.1367 -21.2451
-20.4741 -19.7844 -19.1883 -18.7152 -18.3496 -18.0279 -17.6921 -17.3248
-16.9259 -16.4759 -15.9431 -15.3282 -14.6760 -14.0310 -13.3877 -12.7029
-11.9560 -11.1824 -10.4358 -9.7268 -9.0152 -8.2653 -7.4922 -6.7411
-6.0288 -5.3236 -4.5924 -3.8533 -3.1626 -2.5443 -1.9426 -1.2575
-0.4319 0.4984 1.4370 2.3046 3.0853 3.8090 4.5047 5.1814
5.8506 6.5567 7.3695
```

It starts with a “label” defining the area, and the values from North to South and from East to West. Here is shown the first row of values at latitude 8.0 degrees with spacing 0.2 degrees.

Convert the grids to SURFER format using G2SUR, and make a contour plot of the grids.



Job-output to screen and to a file named g2sur.log. The converted grid file is in data/geoid_surfer.grd.