



→ MEASUREMENTS AND OBSERVATIONS IN THE 21st CENTURY CONFERENCE

GOCE User Toolbox and Tutorial

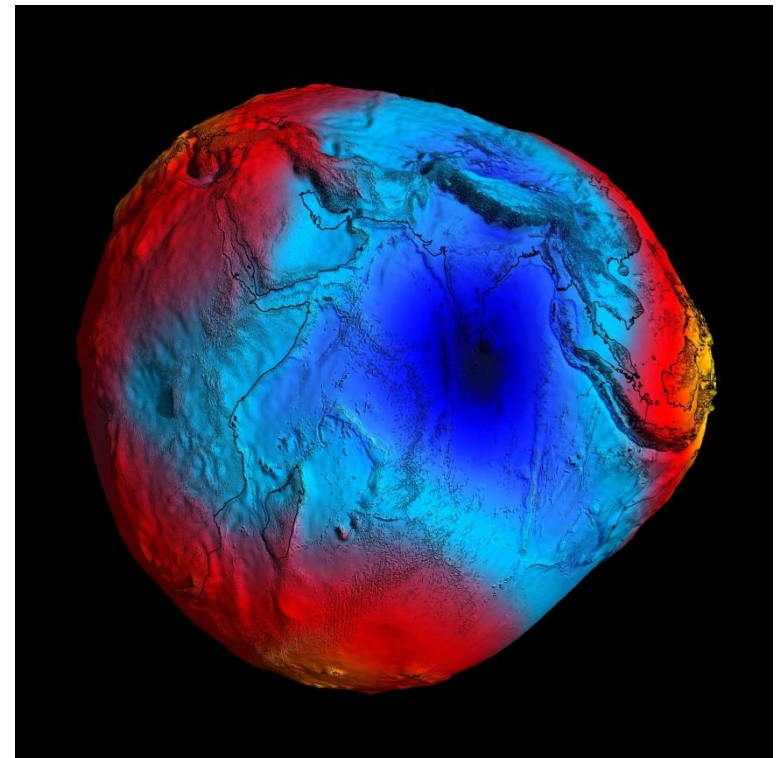
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Background

- Gravity field and steady-state Ocean Circulation Explorer (**GOCE**)
- 12 Earth gravity models (**EGMs**) produced
- **Level 2** products released included the **gravity gradients** and the full **error variance/covariance matrices** for each EGM

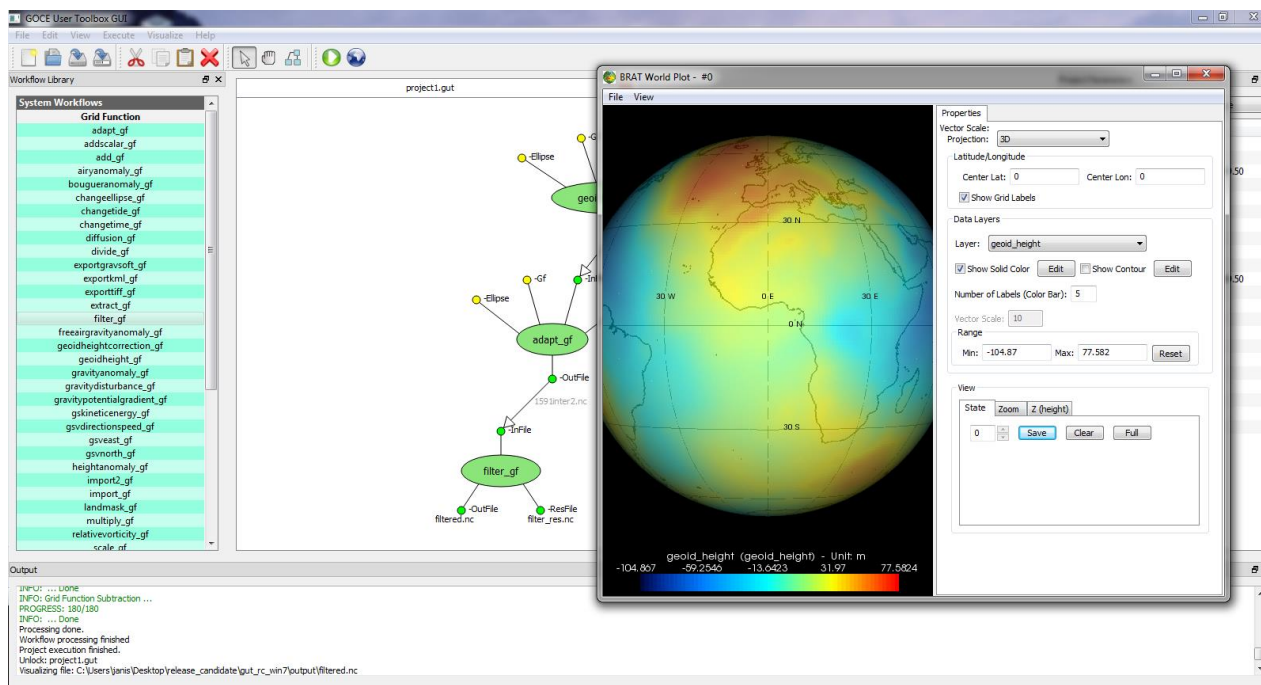


GOCE User Toolbox

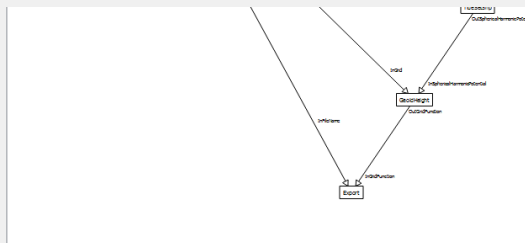


- **GOCE User Toolbox (GUT), version 3.1**
- GUT can:
 - **Read the GOCE level 2** products and ancillary datasets, including apriori surfaces, calibrated gravity gradients and geoid height errors
 - **Read** global and local **gravity models** in ICGEM format
 - **Compute geoid heights** at a chosen maximum degree and order over a grid or transect
 - **Compute gravity and height anomalies, and vertical deflections** on the surface of the terrain for a range of maximum degree and order expansions over a grid or transect
 - **Compute the spherical harmonic synthesis** and calculate the 6 potential gradients
 - **Compute the ocean's mean dynamic topography** and associated geostrophic velocities, kinetic energy and the vertical component of relative vorticity
 - ...

GOCE User Toolbox



gsnorm_gf
heightanomaly_gf
import2_gf
import_gf
landmask_gf
multiply_gf
relativevorticity_gf
scale_gf
simplebouguer_gf
spatialmt_gf
sqrt_gf
stats_gf
subtract_gf
surfacegravitationalpot_gf
surfacegravitation_gf
surfacegravitypot_gf
surfacegravity_gf



Workflow Description - geoidheight_gf.xml

geoidheight_gf.xml

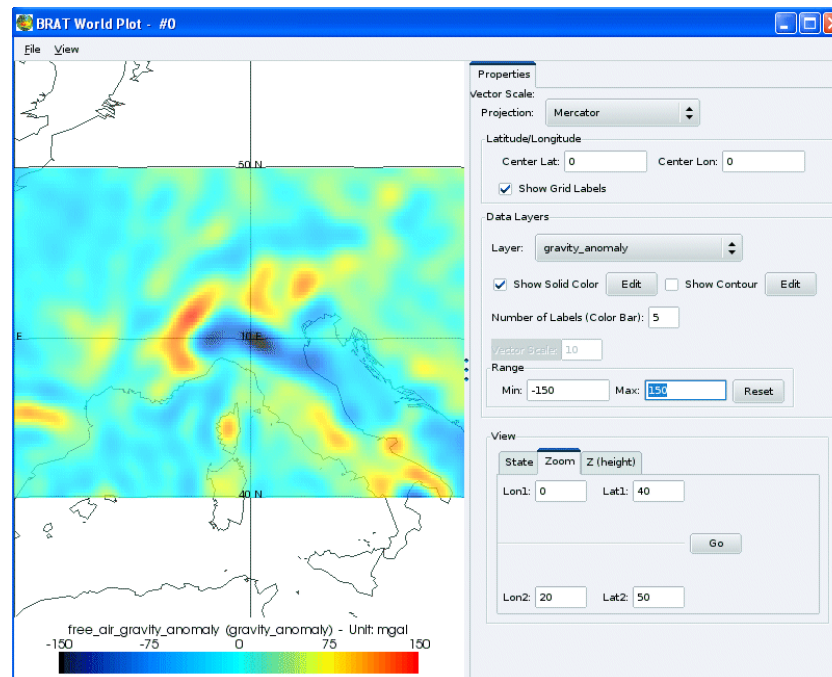
Synopsis : Extract a set of spherical harmonic potential coefficients (and GM, R, tide system) from file and calculate the height of the geoid on a chosen Grid with a specified expansion of the geopotential. The Grid can be specified in one of several ways. The default is a global 1x1 degree grid on the GRS80 ellipsoid with the potential expanded to the degree and order defined by the input file.

Arguments :

- iFile input_file_name
Input file containing the geopotential.
- f input_grid_file (option 1 of 3)
Specifies the file that defines the output Grid. This can be any file from which GUT can extract a grid. Note, this includes the ellipsoid.
- OR
- f input_grid_file (option 2 of 3)
Specifies the file that defines the latitude and longitude axes of the output Grid. This can be any file from which GUT can extract a grid. The -Ellipse flag can be used to specify the ellipsoid, otherwise the GUT default of GRS80 is assumed.
- OR
- R wgs84 (option 3 of 3)
Specifies the latitude and longitude bounds of the equiangular output grid. The longitude limits (wgs) must be in degrees in the range [-360,+360] and the latitude limits (sn) must be in degrees in the range [-90,+90]. This option is normally use in combination with the -f and -Ellipse options.
- d de dn (optional)
Specifies the longitude and latitude grid spacing. de and dn are spacings in degrees. The intervals specified by the -R option must be close to integer multiple of these spacings. The spacings will be recalculated to ensure the region is divided uniformly.
- Ellipse ellipse (optional)
Set a specific Reference Ellipsoid. If not specified, the GUT default of GRS80 is used. The ellipsoid can be specified as one of ...
 - * ellipsoid name
GRS80 TOPEX GRIM WGS84 WGS84rev1
 - * the parameters
formatted as inverse_flattening:GM
 - * filename
extracts the ellipsoid from the meta-data in this file
- O degree_and_order (option 1 of 3)
Specifies the degree and order of the geopotential expansion. degree and order must be a positive integer.

GUT Tutorial

```
gut gravityanomaly_gf -InFile EIGEN-5C.gfc -InDemFile GUT_ACE2_5M.nc -R 0:20,40:50 -  
I 0.1:0.1 -OutFile gravity_anomaly_eigen5c_alps.nc  
BratDisplay gravity_anomaly_eigen5c_alps.nc
```



Conclusions

- **GUT simplifies interacting with GOCE and other gravity missions data**
- **GUT enables a user to build his own tools through the workflows**
- **Always guided by an exhaustive tutorial!**

<https://earth.esa.int/gut>

Any doubts, please contact us at
altimetry.info@esa.int

