Gravity Data Correction
in
QCTool

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1. Importing Data

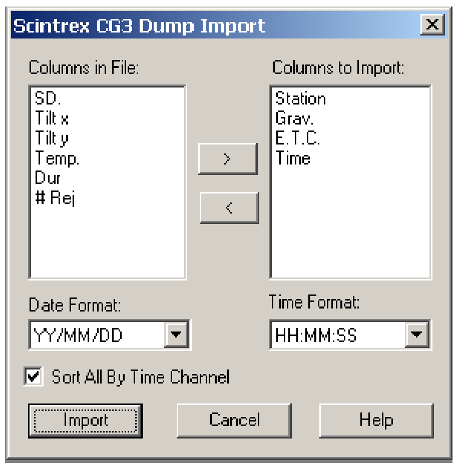
You must import to QCTool measured gravity data from ASCII files. Then you need to import the data from CSV files with base station and location information.

1.1. Importing Gravity Survey Data Files

You can import data from gravity instrument dump files. Accepted file formats are Scintrex's CG3 and CG5 dump files or any ASCII columnar files, and Micro-g LaCoste Air-Sea gravimeter files –.DAT or .ENV formats.

1.1.1. Importing a gravity instrument dump file from a Scintrex CG3 gravimeter

- On the *File* menu select *Import File*, and then select *Scintrex CG3* from a pop up list of Import Formats. Select the desired .dmp or .raw file to import and specify the output qct-file. Then, the *Scintrex CG3 Dump Import* dialog appears:



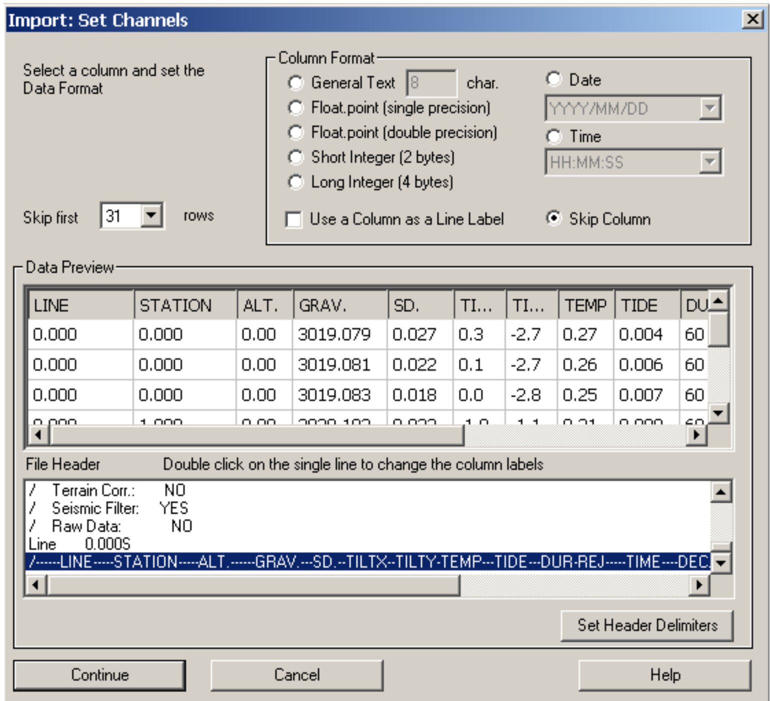
- Specify data columns to be imported. Add or remove columns from the "*Columns to Import*" list with buttons ">", "<".
- Specify '*Date*' and '*Time*' formats in the importing file.
- Leave *Sort All by Time Channel* checked to sort importing records by time automatically.
- Click on *Import* button.

N	A: Station	B: Grav.	C: E.T.C.	D: Time	E: Date
1	90002.	4604.65	0.01	05:18:29	94/06/15
2	5715.	4603.79	0.01	05:41:14	94/06/15
3	1605.	4600.01	0.01	06:09:13	94/06/15
4	1618.	4606.02	-0.03	09:47:23	94/06/15
5	1616.	4604.38	-0.03	09:58:21	94/06/15
6	1621.	4606.96	-0.03	10:10:44	94/06/15
7	1619.	4607.70	-0.03	10:25:23	94/06/15
8	1614.	4603.29	-0.03	10:35:34	94/06/15

1.1.2. Importing a gravity instrument dump file from a Scintrex CG5 gravimeter

- On the *File* menu select *Import File*, and then select *Scintrex CG5* from a pop up list of Import Formats. Select desired ASCII file (.dmp, .dat, .xyz, .txt) to import and specify the name of the output qct-file.

Next, the *'Import: Set Channels'* dialog appears.

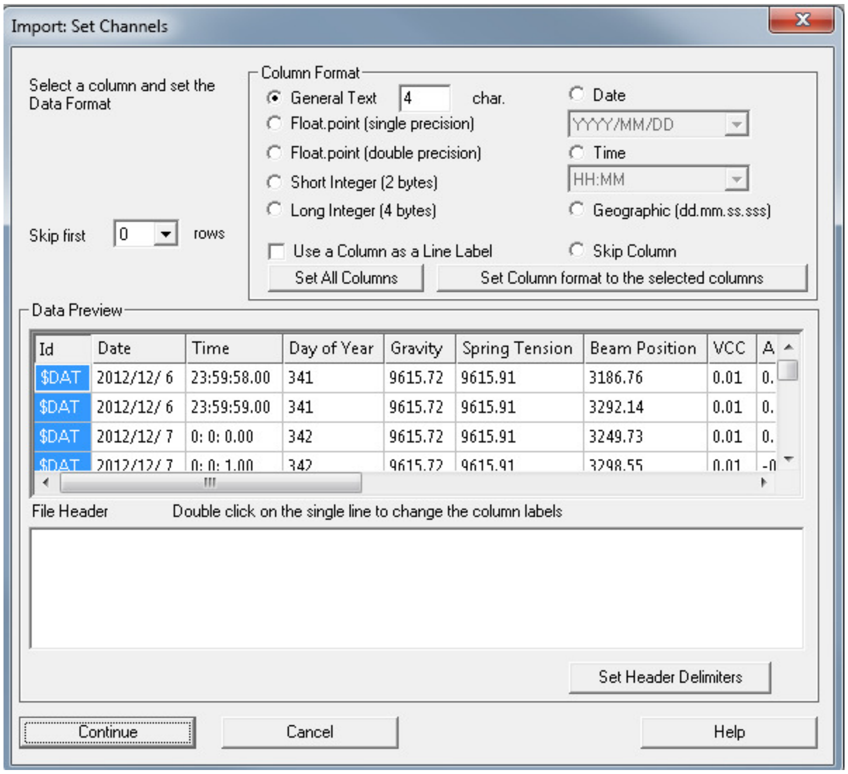


- Specify header line and double-click to change the header selection, if needed.
- Check the format for columns and click on the '*Continue*' button to import the data.

1.1.3. Importing an instrument file from a Micro-g LaCoste Air-Sea gravimeter (.DAT)

- On the *File* menu select *Import File*, and then select *Micro-g LaCoste Air-Sea (DAT) f*rom a pop up list of Import Formats. Select the desired .DAT file to import and specify the output QCT-file.

Then, the '*Import: Set Channels*' window appears:



- Specify the 'channel' format and click on '*Continue*' to import the data.

1.1.4. Importing an instrument file from a Micro-g LaCoste Air-Sea gravimeter (.ENV)

- On the File menu, select *Import File*, and then select *Micro-g LaCoste Air-Sea (ENV)* from a pop-up list of Import Formats. Select the desired .ENV file to import and specify the output QCT-file.

- On the '*Set Channels*' window, specify the format for columns.

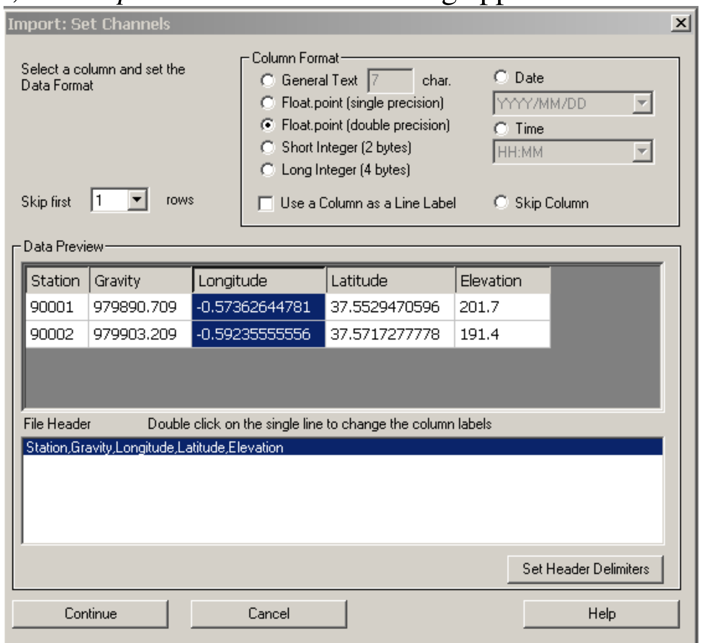
- Click 'Continue' to import the data.

1.2. Importing Base Station Data

You can import data from CSV or any ASCII columnar file. File should contain geographical coordinates, elevation and absolute gravity readings for all base stations.

- On the *File* menu, select *Import File.*

- Then select either '*ASCII CSV' or 'ASCII XYZ'* from a pop up list of Import Formats. Select desired base station data file to import and specify the output qct-file. Then, the '*Import: Set Channels'* dialog appears:



- Specify header line, format of columns and click on the '*Continue*' button.

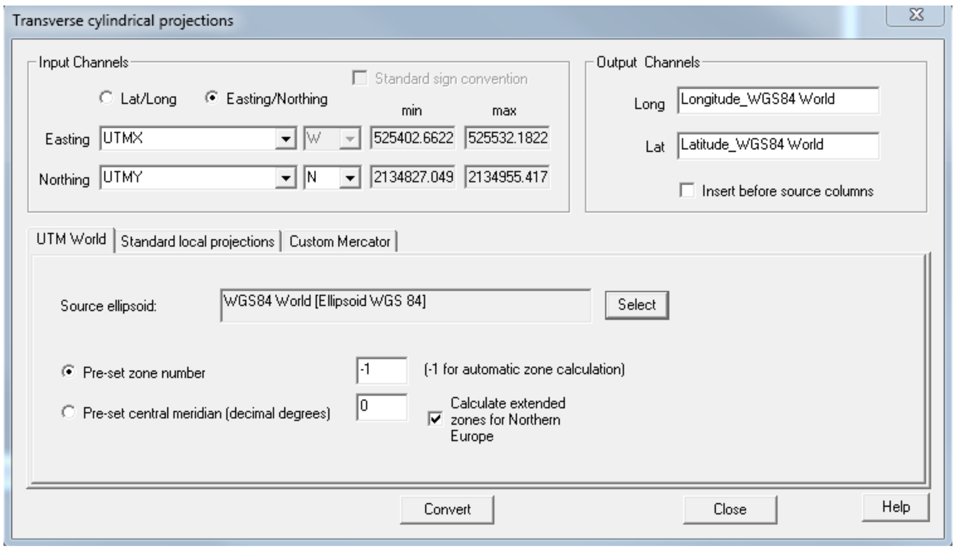
1.3. Importing Location Data

The procedure is similar to the one described above in **Section 1.2**, *Importing Base Station Data*.

2. Merging survey data files with base station and location files

2.1. Creation of Latitude/Longitude coordinates from UTM XY data

Open qct-file with location information. On the *Tools/Coordinates* menu, select *Geographic* ⟺ *Projected Coordinates* and then click '*Transverse Cylindrical Projections*' to see the following dialog:



- *Click the 'Easting/Northing' option under Input channels.*
- Specify channels for *Easting* (UtmX), *Northing* (UtmY).
- Select the axis direction between *W* and *E*, *N* and *S* in accordance with your data. Uncheck '*Standard sign convention'* to indicate that negative values are opposite to the selected direction. e.g. -106W is the same as 106E

- Modify the names of the '*Output Channels*' or leave them unchanged. Check the '*Insert before source columns*' box to have the new columns inserted in that position, otherwise they will be inserted as the last columns.

- Choose between '*UTM World*', '*Standard location projections*' and '*Custom Mercator*' tabs:

Select the ***UTM World*** tab to use the cylindrical projection formula defined in the document DMATM 8358.2 by the US Defense Mapping Agency. Choose the '*Source ellipsoid*' by clicking '*Select*'.

Specify either the '*Pre-set Zone Number*' or the '*Pre-set Central Meridian*'.
Note: This is only required for reverse calculations from UTM to geographic (lat/long) coordinates. Otherwise, leave the '*Pre-set*' values unchanged to -1.

Click '*Convert*' to create the '*Output Channels*'.

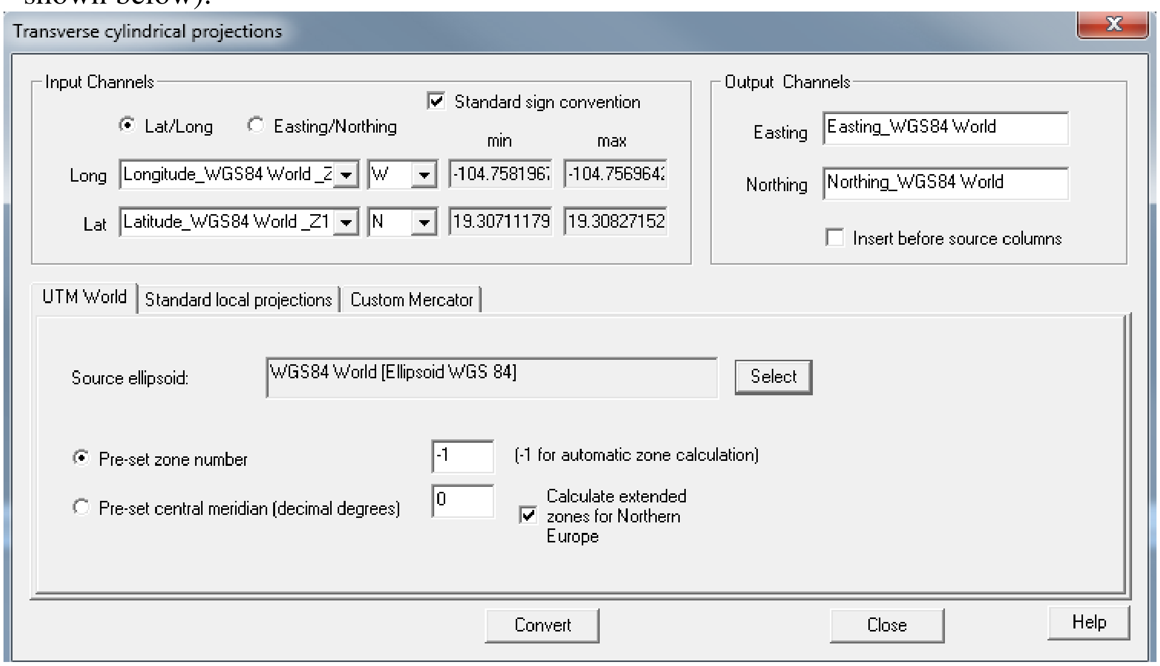
Standard local projections contains projections for specific locations in Europe and Africa and therefore will yield better results. Most European projections on the list are Gauss-Kruger projections. Otherwise, they are *Mercator* projections. Click the *See info* button for more information and map for each entry. You might be required to select the *Zone* for the projection you have selected. Click the '*Convert*' button to create the new channels.

Custom Mercator allows the user to select the location of the *natural origin* and *false origin* as well as the *Scale factor* at the natural origin. Generic Mercator USGS formulas are used to calculate the result. Choose the '*Source Ellipsoid*' by clicking '*Select*'. Specify *natural* and *false origin* values and the *Scale factor* before clicking *'Convert'* to finalize the procedure.

2.2. Creation of UTM XY coordinates from Lat/Long data

Open QCT-file with location information. On the *Tools/Coordinates* menu, select *Geographic* ⟺ *Projected Coordinates* and then click '*Transverse Cylindrical Projections*'.

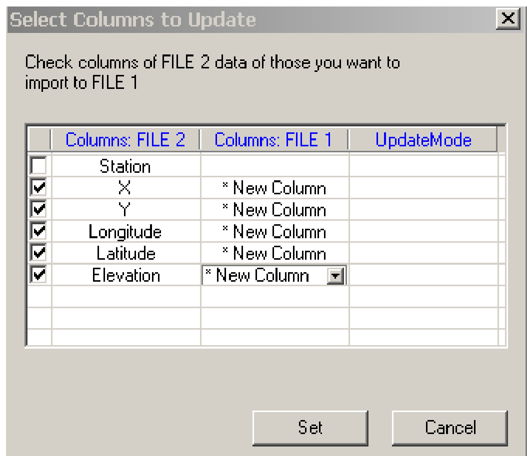
- On the 'Projections' dialog, click the *'Lat/Long'* option under '*Input channels*' (as shown below).



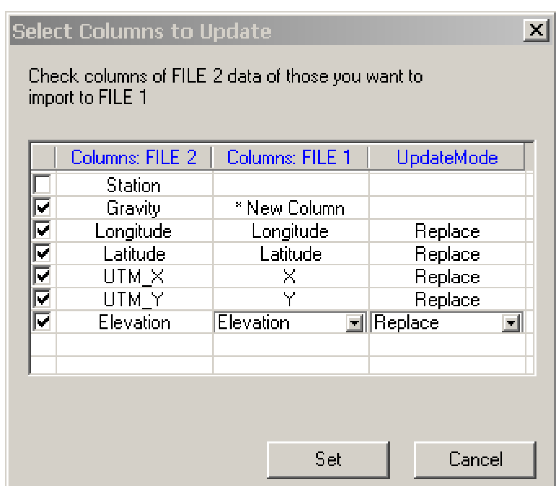
- Follow the rest of the procedure outlined in **Section 2.1** to create UTM XY coordinates channels in QCT-file with base station information.

2.3. Merging survey data files with base station and location files

- Close all qct-files. Select '*Merge Files*' from the '*Tools/Files*' menu.
- On the "*Merging Mode*" window, select *Update File Channels*. Then, the *Merge File* dialog appears.
- Specify the survey data file as File 1. Select Base Channel from Channel list (dropdown menu).
- Specify the location data file as File 2. Select Base Channel from Channel list (dropdown menu).
- Specify the merged file in the box labelled *Save Merged Data in File*
- Click on *Set Channels* button and select those columns from File 2 that would be used to import data into File 1. For example, *X, Y, Longitude, Latitude, and Elevation*. Leave *New Column* selection for updating mode.



- On the 'Merging File' dialog click on 'Merge' button.
- Restart the 'merge file' utility to merge the other files.
- Repeat merging procedure with survey data and base station files. On '*Select Columns to Update*' dialog, specify columns of File 1 that you would like to be updated.



- Click '*Open the result file in Read/Write mode*' to work with the new file.

3. Drift Correction

Now you have a qct-file with measured gravity data and coordinate information—all in one file.

The purpose of '*Drift Correction*' is to eliminate the instrument error. Also you want to correct data for the "tide" effect. This may involve three steps. First, applying the *Meter Calibration Correction*, then, calculating and applying the *Tide Correction*, and finally, applying the *Instrument Drift Correction*.

3.1. Meter Calibration Correction

For many older meters the manufacturers provided a single number for meter calibration. The number was the simple scale factor that converted the meter reading into milliGals by multiplying the reading by the factor. The scale factor was sometimes engraved into the meter nameplate. To apply this correction, simply use the 'QCTool calculator' and apply instrument scale factor to the readings, which already corrected for tide effect.

Modern meters use a more complete description of the relationship between meter reading (counter units) and milliGals. Over the extended range of these meters, the conversion from counter reading to milliGals is not perfectly linear; hence, a table rather than a constant is used. The table for the translation of instrument reading to milliGals is supplied by the manufacturer.

- Import this table to QCTool. Your qct-file should look like this:

F:\Projects\Gravity\GravMaster\D...

N	A: Readings()	B: Calibration()
19	1800.00	1890.00
20	1900.00	1995.00
21	2000.00	2100.00
22	2100.00	2205.00
23	2200.00	2310.00
24	2300.00	2415.00
25	2400.00	2520.00
26	2500.00	2625.00

- To apply the Meter Calibration correction, use the *Merge Files* utility to '*update file channels*'.
- Select your gravity survey file as a File 1. For the Base Station channel, select Instrument Readings Data.
- Select Instrument Calibration file as a File 2. For the Base Station channel, select Instrument Readings Data.
- On the '*Select Columns to Update'* dialog, select channel with translation data in File 2. Leave '*New Column*' mode selected for File 1.
  IMPORTANT: Check the '*Interpolate if Value is not found'* check box. The calibrated reading data will be calculated automatically.

3.2. Tide Correction

Open your gravity survey file and correct data for the 'tide' effect.

- Select *Latitude, Free Air, Tide, Bouguer* from the *Processing/Gravity Data Processing/Corrections* menu. Specify *Latitude*, *Longitude*, *Elevation* channels using the respective dropdown menus. Select '*Tidal'* algorithm in the correction algorithm list box. Specify '*Date*' and '*Time*' channels and GMT time difference. Set the name of '*Output Channel*'. Click on the '*Apply'* button to '*create*' or '*overwrite*' the specified channel.
- The new channel with the 'tide correction' will be created in your QCT file.
- Apply this correction to the channel with instrument readings by using the calculator. (Insert channel, apply formula *new channel = instrument reading + tide correction* (e.g. M = B+L) for all lines, all rows).

Reference for tide correction calculation:

LONGMAN I.M., Formulas for computing the tidal accelerations due to the moon and the sun. Journal of Geophysical Research, 64(12):2351-2355,1959.

3.3. Instrument Drift Correction

Characterizing the Drift

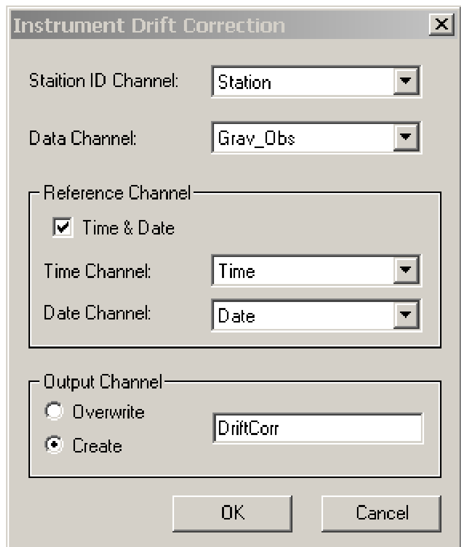
Meter drift is often assumed to be a linear phenomenon. If it were truly linear, the drift rate could be determined from only two readings. You could take a base station reading at the beginning of the survey and another at the same station at the end of the survey. This is called a loop tie. From this, you could solve for the constant drift rate and use this to compute the drift and use it to remove from any observation as a function of time.

Rather than making a single loop tie, you could make several loop ties as the survey progresses. Within each loop tie, you might assume a linear drift but because you have many different drift segments, you can reasonably approximate a more complex drift. Once the drift curve is established, you can compute what drift to remove from any observation as a function of time.

The file needs to be sorted by time. Sorting is done by selecting *Tools/Data Channels/Sort all by Channel.*

Select *Processing/Drift Correction* from the menu. Next, the *Instrument Drift Correction* dialog appears.

- Be sure to select the *Station ID channel* (channel with a station label) as well as *Data channel*, which in our case will be the channel with data already calibrated and corrected for the tide effect. Set the *Reference Channels* (Time and Date). Specify the *Output Channel*.



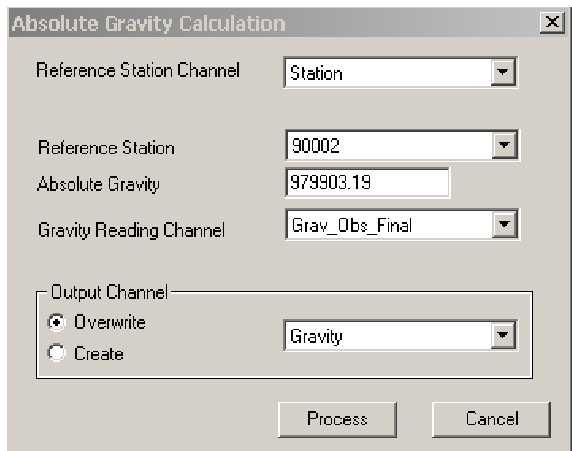
- Now apply the drift correction to the data channel by using the calculator's 'addition' function. You will get the 'corrected' observed gravity values.

N: Grav_Obs	O: DriftCorr	P: Grav_Ob...
4834.865522	0.000000	4834.865522
4833.965497	-0.000352	4833.965145
4830.036361	-0.000785	4830.035576
4836.409874	-0.004162	4836.405712
4834.682339	-0.004332	4834.678007
4837.377858	-0.004524	4837.373334
4838.154712	-0.004751	4838.149961
4833.529221	-0.004908	4833.524313
4835.854897	-0.005167	4835.849730
4832.816510	-0.005298	4832.811212
4834.872262	-0.006740	4834.865522

4. Absolute Gravity Calculation

Now the absolute gravity could be calculated for all stations in the survey file.

Select *Absolute Gravity Calculation* from the '*Processing/Gravity Data Processing/Corrections*' menu. Then, the *Absolute Gravity Calculation* dialog appears.



- Select the *Reference Station Channel* (channel with the station label), *Reference Station* (station for which absolute gravity data is known) and *Gravity Reading Channel* (your 'corrected' channel from **Section 3.3**) from the respective dropdown menus.
- Set the *Absolute Gravity* for the specified reference station.
- Specify the *Output Channel*.
- Click on the *Process* button to obtain the '*Absolute Gravity*' values.

Note: If you have more than one raw file with gravimeter readings, import all of them into QCTool first. Then merge all files into one using the '*Append Files'* utility. Once you have a merged file with all the measured data, repeat **Sections (steps) 2 to 4** described in this manual.

5. Terrain Correction

As of April 2014, this feature has been enhanced to support large gravity surveys. This is done by processing the digital elevation model (DEM) data one station at a time.

You may either build a topography grid from a government DEM file (5.1) or from your own elevation data file (5.2).

5.1. Creating a Regional Topography grid from USGS (GTOPO) or Canadian (CDED) files

This application has been designed to create a regional topography grid from the DEM files in GTOPO and CDED formats. The grid is then used to apply the Terrain Correction.

GTOPO30 (USGS)
http://webgis.wr.usgs.gov/globalgis/gtopo30/gtopo30.htm

Band Interleaved by Line format (.BIL)
This is a raster format with geographic information in WGS84 Latitude/Longitude Coordinate system. The DEM data in this format is available from the Mexican government website, INEGI (*National Institute of Statistics, Geography and Computer Science*) and from the WWF.

INEGI :
http://www3.inegi.org.mx/sistemas/productos/default.aspx?c=265&upc=0&s=est&tg=1007&f=2&cl=0&pf=prod&ef=0&ct=209000000&pg=2

WWF :
http://hydrosheds.org/download

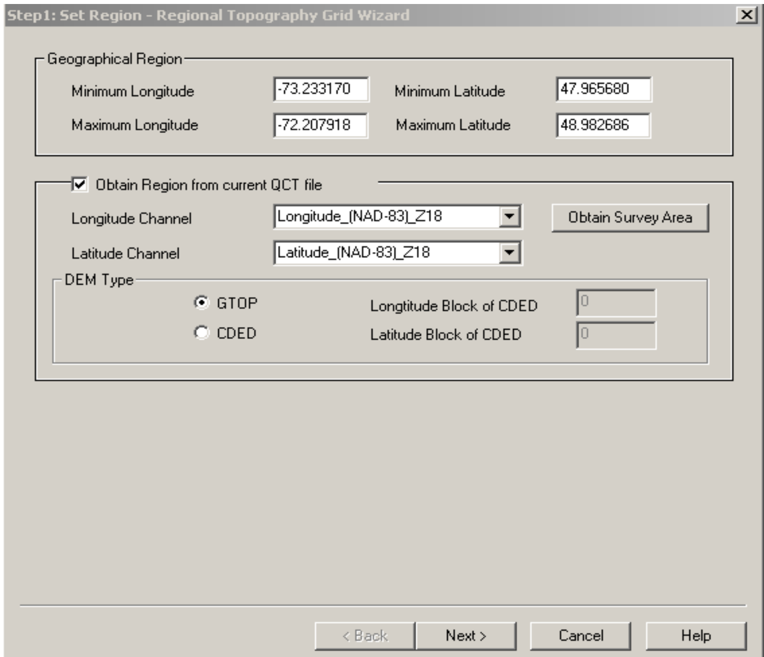
The CDED files may also be used, which are available from Geobase:
http://www.geobase.ca/geobase/en/data/cded/index.html

From the *Terrain Corrections* menu (under *Processing* → *Gravity Data Processing* → *Corrections*), select *Create Grid for DEM Terrain Correction*. The wizard to create such a grid appears.

First Page:

- On the first page of the wizard, specify 'Geographical region' by setting of minimum and maximum values for the latitude and longitude. If you wish to cover the region of your survey data, simply check the *Obtain Region from current QCT file* check box, specify channels for *Latitude* and *Longitude* and click on *Obtain Survey Area* button.

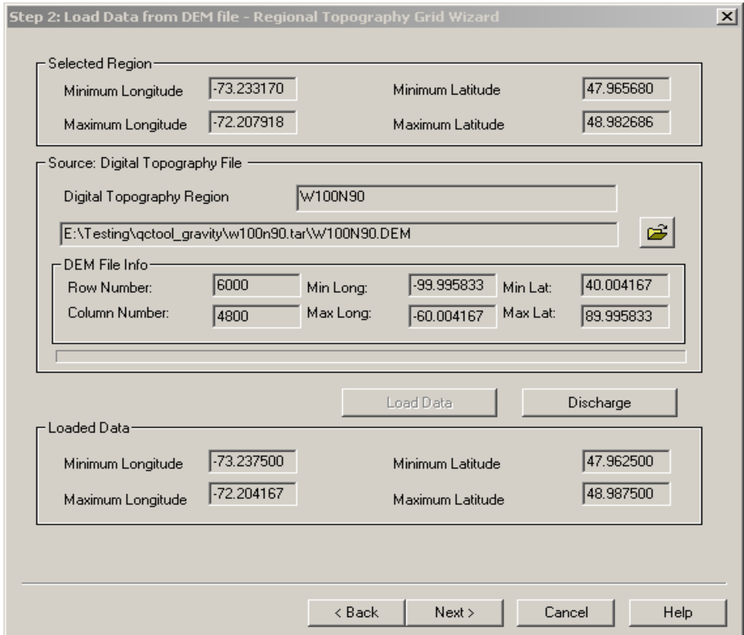
- Select the type of DEM file (GTOPO or CDED) Click *Next*.



Second Page:
For GTOPO Files

- On the second page of the wizard, specify the appropriate digital topography file either in .BIL or .DEM (GTOPO30) formats.
- For .BIL files, click the *File Browser* button to change the file type to .BIL using the dropdown menu. Then, select the file and click *Load Data* to load the elevation data to the QCT file.

- For GTOPO30 files, the directory of the DEM file should also have a header file containing size and coordinate information for the DEM. This file is expected to have the same name as the DEM file and an .hdr extension.



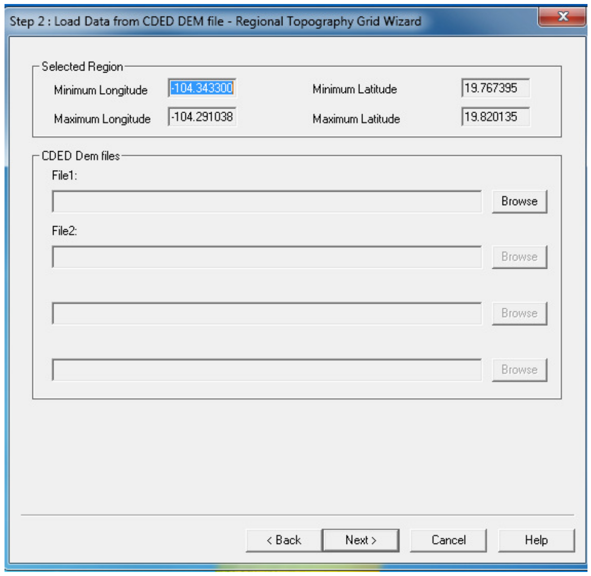
- Click the *Load Data* button to load the elevation data to the qct-file.
- You can append data to the existing topography file if your survey area is covered by more than one DEM-file. Select the second DEM file by clicking the File Browser  button and then clicking the *Load Data* button again. Click *Next* to proceed to the third page.

Note: If selected area covers more than one geographical zone you will get a warning. The suggestion is to split measured area into parts according to the geographical zone bounds.

- You can reset the *Loaded Data* section by clicking the *Discharge* button.

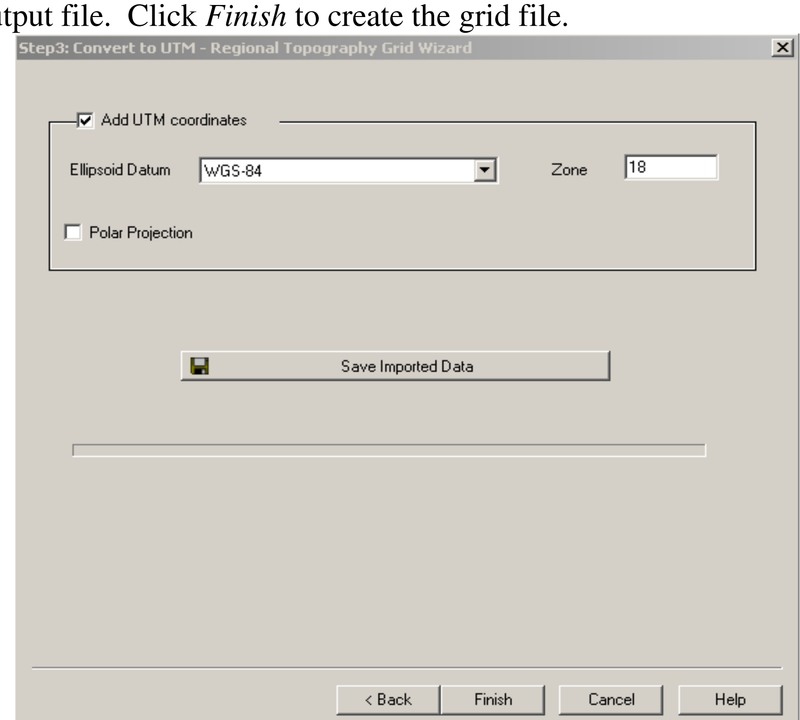
For CDED files:

- Depending on the size of the area you selected in Step 1, you may need to load up to four files. Select the relevant files before clicking *Next*.



Third Page:

- On the third page, you will create a grid using the topography data file in the QCTool grid format (.qdem). This will be done in two steps.
- First, the latitude/longitude coordinates are converted to UTM X and Y. Select the desired *Ellipsoid Datum* to do this. Check the *Polar Projection* box if the survey area is within the polar region. Please note that *Add UTM coordinates* box must be checked in order to use the grid with the *Terrain Correction from DEM* tool.
- Second, the regional grid is created. Click *Save Imported Data* to specify a name for the output file. Click *Finish* to create the grid file.



5.2. Building a Grid from User Elevation Data

If you have your own elevation data, you may use it to build a grid and use this grid to perform the correction.

- Import your data into QCTool. To do this, you must have UTM X and Y channels in addition to elevation data.
- Grid the elevation channel in QCGrid . When you click QCGrid, a *Set Channels* dialog appears. Ensure that the correct channels are selected for X, Y, and data.
- Interpolate the data using . You can set an appropriate cell size.
  Note: The rotation angle must be zero to use the grid for a terrain correction.
- Click the *Grid Mesh* button , and then click to save the grid as an .EGR file.

5.3. Regional Terrain Correction.

Select *Terrain Correction from DEM* from the *Terrain Correction* menu (under *Processing* → *Gravity Data Processing* → *Corrections*)

- Once the dialog appears, specify the Regional DEM Grid file either the .qdem file (you built using the Regional Topography grid wizard) or the .EGR file (created using the *Save Grid* button on the *Grid Mesh* tab of the *Tools* window).
- Select the correct channels for UTM X and UTM Y in the respective dropdown menus.
- Specify *Output Channel.*
- Set *Parameters*: Density, Inner Radius and Outer Radius.
  The suggested value for *Inner Radius* is the resolution of the grid. e.g. Enter 1000 for grid with cells measuring 1km. *Outer Radius* should be less than the distance between the outer edge of the DEM and the outer edge of the survey area.
- Click the '*Calculate Correction*' button to perform the correction and add the resultant channel (with regional terrain correction values) to the file.

Note: You may create a .qdem file without using the wizard; create a .qct file with UTM_X, UTM_Y and ELEVATION channels and then simply change the file extension from .qct to .qdem.

NEW FEATURES – *The algorithm has been modified to utilize all the grid points of the DEM except at the specified boundaries for inner and outer radii, where the elevation is computed using interpolation.*
The interface can now utilize non-regular DEM grids as well as grids created entirely from QCTool (.EGR).

Local Terrain Correction

Select *Local Terrain Correction* from *Processing >Gravity Data Processing > Corrections* menu. Once the' *Local Terrain Correction'* dialog appears:

- Specify channels for *Station ID*, *UTM X*, *UTM Y*, and *Elevation* using the respective dropdown menus.
- Select qct-file with correction points. This file should already have *Station ID*, *UTM X*, *UTM Y*, and *Elevation* channels. There should be at least 3 correction station points around each corrected station of the original file. The file should look like the one below:

N	A: StationID	B: X	C: Y	D: Z
1	A	380669.88	4439796.51	2000.50
2	A	380667.58	4439794.51	2001.00
3	A	380666.88	4439790.00	2000.00
4	A	380670.00	4439795.00	2000.40
5	A	380669.00	4439795.51	2000.30
6	B	374649.08	4436562.84	1900.50
7	B	374648.08	4436560.84	1900.00
8	B	374647.58	4436561.34	1901.00
9	B	374647.28	4436561.24	1900.80
10	B	[illegible]	[illegible]	[illegible]

- Select channels for *Station ID*, *UTM X*, *UTM Y*, and *Elevation* using the appropriate menus for the file with correction points.
- Specify *the Output Channel* and the average *Density* (of crustal rocks).
- Click the '*Calculate Correction*' button to apply the Local Terrain correction.

6. Latitude, Free Air, Bouguer corrections

- Select *Latitude, Free Air, Tide, Bouguer (*from *Processing >Gravity Data Processing > Corrections)*
- Specify *Latitude*, *Longitude* and *Elevation* channels from the respective dropdown menus
- Select *Theoretical, Free Air, Bouguer or Spherical Cap Bouguer* algorithm from the *Correction Algorithm* list.
- Set the additional parameters for the selected algorithm:
  Theoretical Gravity correction *System* for Latitude correction
  Density value for the Bouguer corrections
- Verify 'Output Channel' for the selected algorithm.
- Click the *Apply* button. The new channel with correction data will be created.
- Repeat the above steps for each desired correction
- Use formula *Corrected_Gravity = Gravity_Observation_Final – Gravity_Theoretical - Free Air correction - Bouguer correction* to calculate the reduced gravity value with simple Bouguer correction.
- Use formula *Corrected_Gravity = Gravity_Observation_Final – Gravity_Theoretical - Free Air correction - Bouguer correction – Spherical Cap Bouguer correction+*

Terrain Correction+ Local Terrain Correction to calculate the reduced gravity value with complete Bouguer correction.

Note: More information about the spherical cap Bouguer algorithm can be found in **An exact solution for the gravity curvature (Bullard B) correction**. T.R. LaFehr. Geophysics. Vol. 56. No.8(August 1991);p1179-1184.

7. Isostatic Correction - NEW

In addition to the aforementioned corrections, the Isostatic correction is used to compensate for density variations in the crust for large surveys.

Select *Create a Regional Grid for Isostatic Gravity Correction (*from *Processing >Gravity Data Processing > Corrections > Isostatic Corrections)*

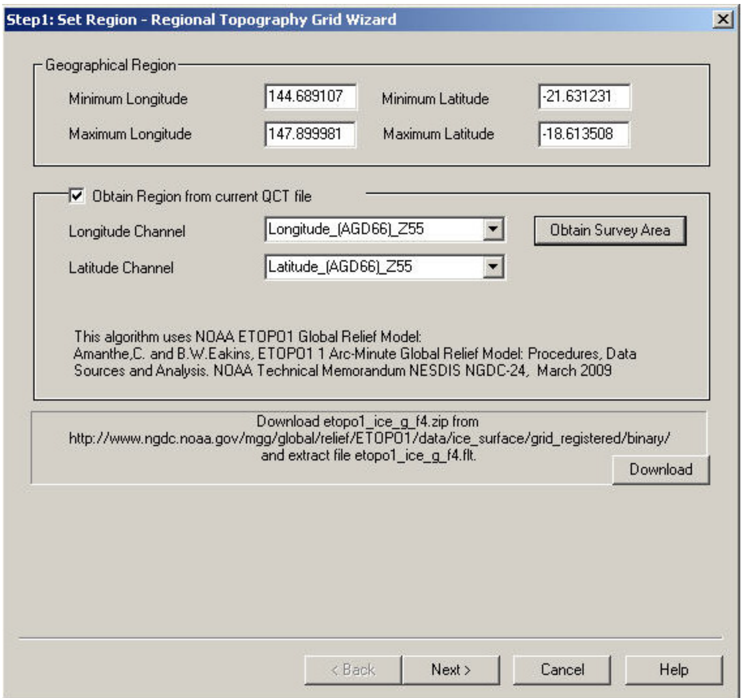
7.1. Creating a Regional Grid from NOAA's Global Relief Model (ETOPO1)

This application is designed to create a Regional Grid in order to apply the Isostatic Correction. The wizard obtains a Global Relief Model (in ETOPO1 format) of the current survey area (as specified by the .qct file) with an overlap of 166.7km on each side and then saves it as a smaller grid.

First Page

- Specify the geographical region by setting the *Minimum* and *Maximum* values for the Latitude and Longitude.
- Otherwise, if you wish to cover the survey area, check the '*Obtain Region from current QCT file'* box and select the latitude and longitude channels. Then, click *Obtain Survey Area* to update the minimum and maximum channel values.
- Click the '*Download*' button to save the required file from NOAA's website: etopo1_ice_g_f4. Zip. Choose a location to 'Save' the file to your computer.

Note: To create the grid, the algorithm uses the grid-registered, binary ice surface version of the NOAA ETOPO1 Global Relief Model. This grid is not included with QCTool SETUP due to the significantly large size of the file.



Second Page

- Specify the location of the *Digital Topography file* by clicking the  button

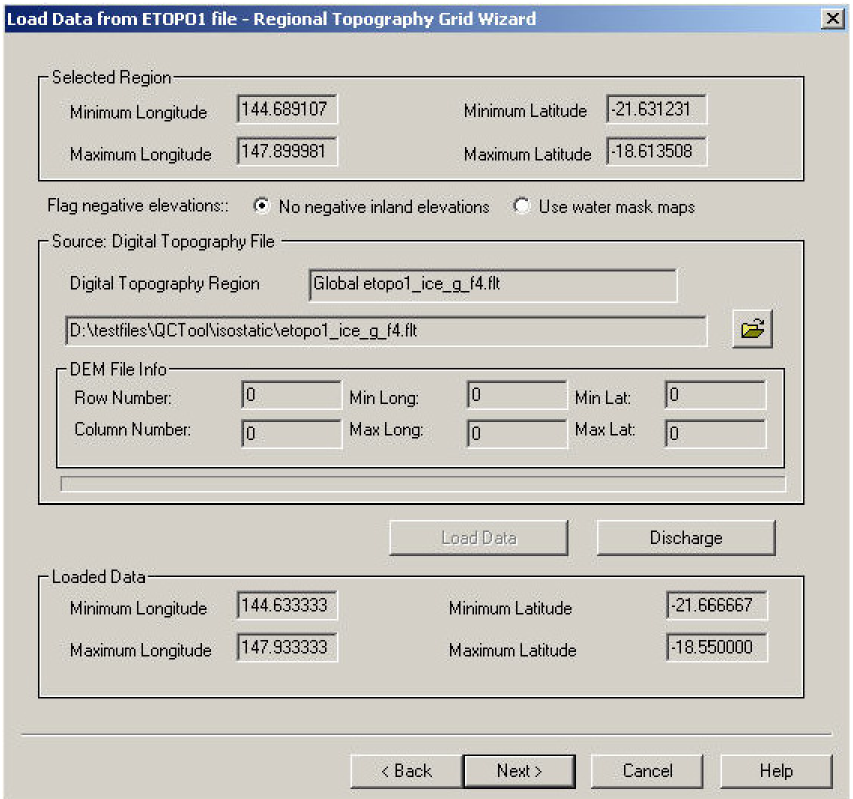
Note: Since the ETOPO1 grid does not distinguish between negative elevations on land and sea, MODIS water mask maps are used for this purpose. If a point is located in the ocean, 50 km must be subtracted from its value for correct Isostatic calculations.
Click MODIS and water mask maps for more information.

- Choose *Use water mask maps* to differentiate between negative elevations on land and water. Otherwise, select *No negative inland elevations*.

When using the '*water mask maps*' option, each point is checked against MODIS maps to determine if the location is under water. If that's the case, then a value of -50 km is used for that location only. Conversely, if '*no negative inland elevations'* is selected, the -50km value is used for ALL negative elevations, by default.

- Load the elevation data by clicking the *Load Data* button. Alternatively, to reset the 'loaded data', click the *Discharge* button.

Note: The *DEM File Info* section is not applicable for the Isostatic Correction.

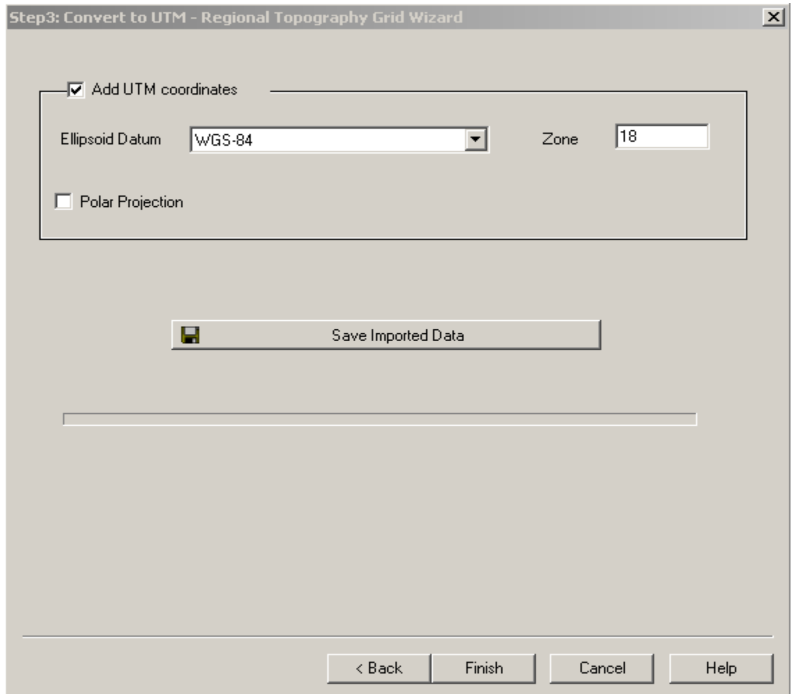


- Click *Next* to proceed to the third page.

Third Page

This page allows for the creation of a grid in the QCTool format (.isgr) using the extracted elevation data. This grid is then used to apply the Isostatic Correction.

- Select the desired *Ellipsoid Datum* and specify the *'Zone'* to convert latitude and longitude to UTM X and Y coordinates. Check the *Polar Projection* box if the survey area is within the polar region. Please note that *Add UTM coordinates* box must be checked in order to use the grid with the *Isostatic Gravity Correction* tool.
- Click *Save Imported Data* to specify a name for the output file. Click *Finish* to create the grid file.



7.2. Applying the Isostatic Correction

- Select '*Isostatic Correction'* from the *Processing* > *Gravity Data Processing* > *Corrections* > *Isostatic Corrections* menu.
- On the window that appears, load the *Isostatic correction grid file* (.isgr) created in the previous step by clicking the  button.

Note: The ISGR file MUST have been created using QCTool's *Isostatic Regional Grid Wizard*.

- Select *UTM X* and *UTM Y* channels from the dropdown menus.
- Specify the *Output Channel*.
- Set Parameters: *Densities*, *Inner Radius* and *Outer Radius*. The suggested value for the *Inner Radius* is the resolution of the grid. i.e. 1000 for a grid with cells measuring 1 km. *Outer Radius* should be less than the distance between the outer edge of the grid and the outer edge of the survey area.
- The chosen '*Compensation depth*' value will be the assumed thickness of the crust.
- Choose between two models: *Airy-Heiskanen Model* and *Pratt-Hayford Model*
- For the *Airy-Heiskanen Model,* specify the *Crust, Mantle* and *Water densities* as well as the *Inner* and *Outer Radii* and the *Compensation depth.*

- For the *Pratt-Hayford Model,* specify ONLY the *Crust* and *Water densities* in addition to the *Inner* and *Outer Radii* and the *Compensation depth.*

Note: The *Airy-Heiskanen Model* assumes a constant density of the crust and accommodates for changes in topography by changes in crustal thickness, whereas the *Pratt-Hayford Model* uses lateral changes in rock density to accommodate for changes in topography. For more information, click here.

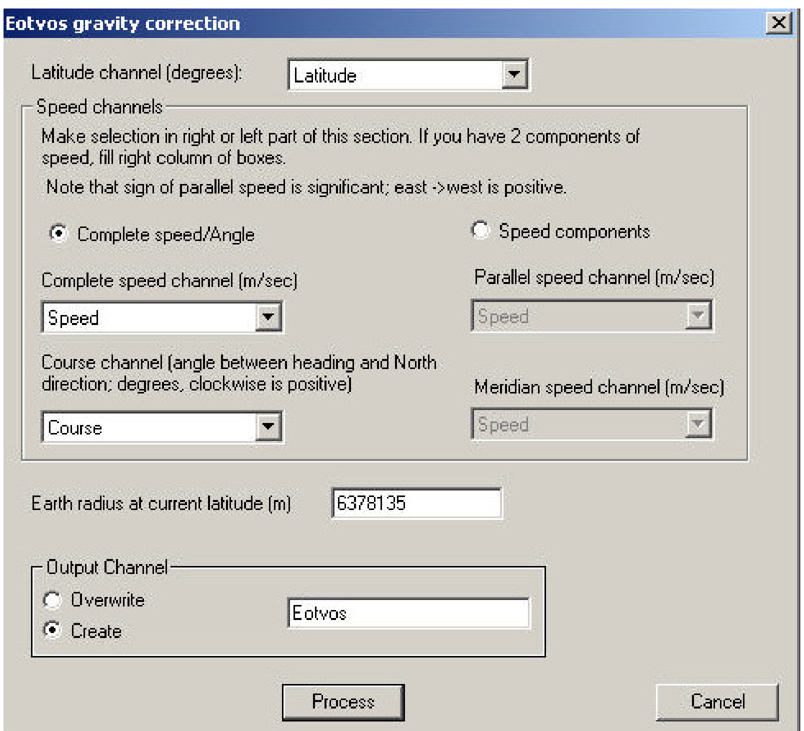
- Click on the '*Calculate Correction*' button to create a channel with local Isostatic correction values. These values must be subtracted from your instrument readings to apply the correction.

NEW FEATURES – *This procedure can now utilize topography and bathymetry data from all over the world using the ETOPO1 format. Furthermore, using the MODIS water mask tiles, the accuracy of the procedure is further enhanced by determining whether a given point is on land or under water. The algorithm has been modified to utilize non-regular grids and ALL the grid points of the Isostatic Grid except at the specified boundaries for inner and outer radii, where the elevation is computed using interpolation.*

8. Eötvös Correction (for Marine and Airborne surveys) - NEW

This correction is applied when the gravimeter is on a moving platform either as part of a marine or an airborne survey.

- Select *Eotvos Correction* from the '*Processing > Gravity Data Processing > Corrections*' menu.



- Select the *Latitude* channel from the dropdown menu.
- Specify the '*Speed*' channels. Speed can be defined by 'amplitude' and 'direction' on the left side of the window or by '*Parallel*' and '*Meridian*' channels as two components on the right side of the window.
- Enter *the Earth radius at current latitude* in meters.
- Specify the *Output Channel* either by overwriting an existing channel or by creating a new one.

- Click *Process* to calculate the 'Eötvös effect' correction and create the specified *Output Channel*.

Note: For additional background information on the Eötvös correction, click here.