

Adding Magnetic Data to a GM-SYS Profile Model

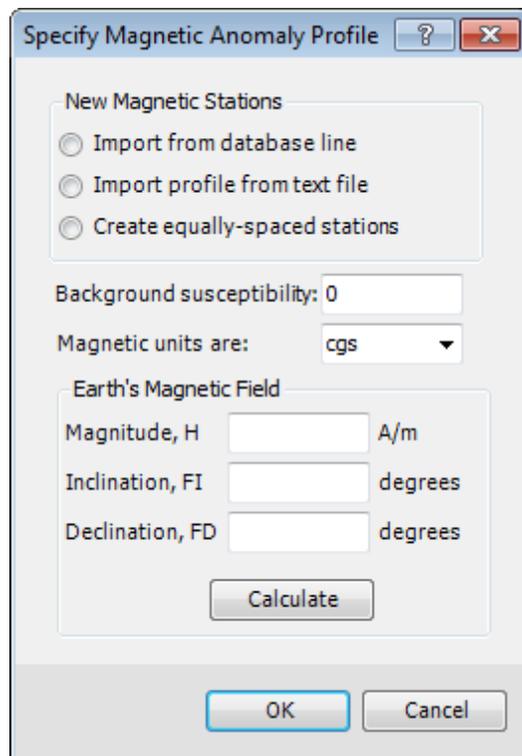
In GM-SYS Profile, a "Station" is a location at which an anomaly component is calculated and, optionally, was measured. In order for GM-SYS Profile to calculate a response at a location, the X, Y, and Z coordinates of the station must be specified. However, observed values are not required.

Magnetic stations may be on land or at some altitude, in the case of an aeromagnetic survey.

-  *Adding or Importing any new gravity or gravity gradient data replaces all existing gravity and gravity gradient data. Likewise, importing any new magnetic or magnetic gradient data replaces all existing magnetic and magnetic gradient data.*
-  *Each time new magnetic stations are created or imported, you must set the appropriate Background Susceptibility and Earth's Field parameters.*

Magnetic Stations

On the *Manage Anomaly Data Spreadsheet*, use the *Specify Magnetic Anomaly Profile* dialog to define the locations of magnetic calculations, the observed values, as well as the Earth's field parameters appropriate to your survey.



The dialog box titled "Specify Magnetic Anomaly Profile" contains the following elements:

- New Magnetic Stations:** Three radio button options: "Import from database line", "Import profile from text file", and "Create equally-spaced stations".
- Background susceptibility:** A text input field containing the value "0".
- Magnetic units are:** A dropdown menu currently set to "cgs".
- Earth's Magnetic Field:** Three text input fields with labels: "Magnitude, H" (with unit "A/m"), "Inclination, FI" (with unit "degrees"), and "Declination, FD" (with unit "degrees").
- Buttons:** A "Calculate" button is located below the Earth's Magnetic Field section. At the bottom of the dialog are "OK" and "Cancel" buttons.

There are three methods to add Magnetic Data to your model: from a database line, from a text file, or by creating equally-spaced calculation stations with dummy observations. Each method is detailed below and in the Application Help.

Importing From a Database Line

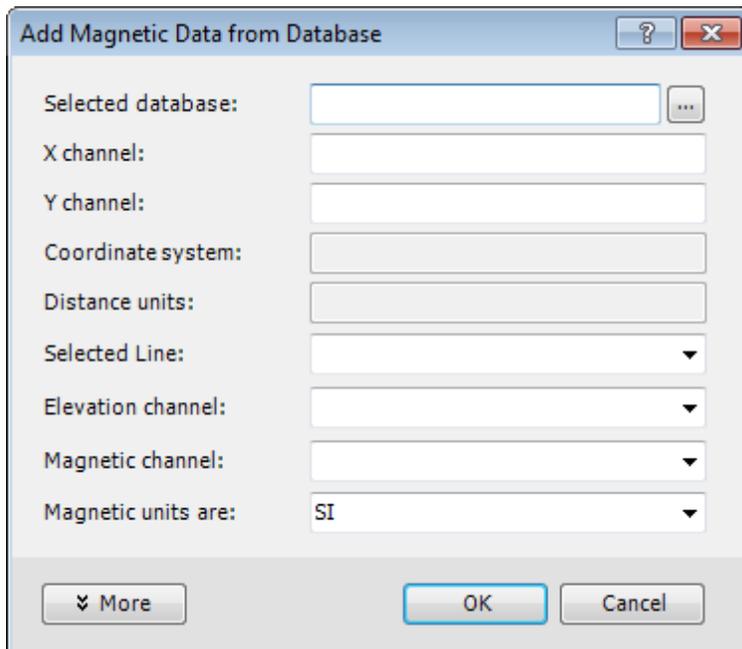
Add a new profile of magnetic observations and/or magnetic gradient observations to your model by extracting from a specified line in a Geosoft Database. Specify the existing database file containing your observed data profile. The current X and Y channels and the coordinate system associated with those channels will be displayed. Magnetic gradient components are calculated at the same station locations as the magnetic calculations.

All fields must be filled in this dialog, in order for GM-SYS Profile to be able to calculate the magnetic response for the model.

 *The X, Y channels must be defined for the database and a valid coordinate system defined.*

To Import Magnetic Data From a Geosoft Database

1. On the *Profile* menu, select **Manage Anomaly Data**. The *Manage Anomaly Data* spreadsheet appears.
2. On the *Magnetic Survey* menu, select **Add New/Replace Existing**. The *Specify Magnetic Anomaly Profile* dialog appears.
3. Select **Import from database line**. The *Add Magnetic Data from Database* dialog appears.



4. On *Selected database*, browse to the file which contains your magnetic data. The X and Y channels are detected and displayed as read-only fields.
5. The *Coordinate system* and distance units, if specified, are displayed as read-only fields.
6. From the **Selected Line** drop-down list, specify which line contains the magnetic data to be imported.
7. From the **Elevation channel** drop-down list, specify the channel containing the station Z-coordinate. Elevations are expected to be positive upward.

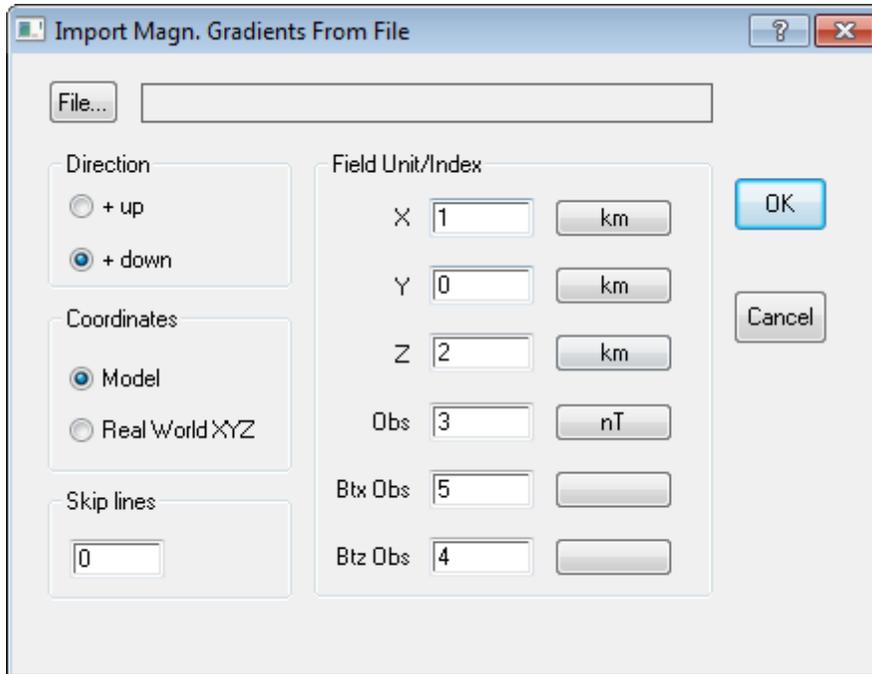
8. From the **Magnetic channel** drop-down list, specify the channel containing the observed magnetic values.
9. From the **Magnetic units are** drop-down list, specify the anomaly units.
10. Click **OK**. You are returned to the *Specify Magnetic Anomaly Profile* dialog.
11. Specify the *Background susceptibility*. In most cases, the correct value is "0.0".
12. Specify the *Earth's Magnetic Field* parameters appropriate to your survey.
 Refer to the **Earth's Magnetic Field** section below for details.
13. Click **OK** to close the *Specify Magnetic Anomaly Profile* dialog. Your new stations will populate the *Magnetic* tab of the spreadsheet.
14. Click **OK** to close the spreadsheet. You should see the magnetic station locations in the Plan View and Depth Panes as blue symbols.
 For additional information about **More** options, refer to the *Add Magnetic Profile from Database* dialog in the *Application Help*.

Importing From a Text File

Use this dialog to import anomaly data from space-delimited ASCII files into GM-SYS Profile. Specify the fields containing each type of data. Leave the field blank or enter zero if the column is not present in the data file.

To Import a Magnetic Profile From a Text File

1. On the *Profile* menu, select **Manage Anomaly Data**. The *Manage Anomaly Data* spreadsheet appears.
2. On the *Magnetic Survey* menu, select **Add New/Replace Existing**. The *Specify Magnetic Anomaly Profile* dialog appears.
3. Select **Import profile from text file**. The *Import Magn. Gradients From File* dialog appears.



4. On the *File* field, browse to the location of the text file containing your magnetic data.
5. Select the file. Click **Open**. A preview of the file appears in a new window.
Review the file for the following information:
 - The number of comment lines
 - Fields which contain the X, Y, Z, and data field(s) and the units they represent
 - Do the coordinates represent model coordinates or external coordinates?
 - Do the Z values represent Depth (positive down) or Elevation (positive up)?
6. Click **OK**. You return to the *Import Magn. Gradients From File* dialog.
7. Select the *Direction*. Specify whether the Z values in the file are positive **Up** (elevation) or **Down** (depth).
8. Select the *Coordinates*. Specify whether the X,Y coordinates in the file represent **Model** coordinates (distance along line, offset from line), or **Real World** coordinates. The Real World coordinates in the input file must share the same coordinate system as the model.
9. Enter the *Skip lines* value if the data does not begin on line 1. Header lines not skipped will be imported as zeroes in all fields.
10. Set the *Field Index* for X, Y, and Z as determined by the column location of the data. Specify the units used for each field.
11. In the *Obs* field specify the column containing the observed data and the units used. Depending upon whether you are importing gradient data, additional fields may be present. Specify the field and units for each component you wish to import.
12. Click **OK**. You are returned to the *Specify Magnetic Anomaly Profile* dialog.
13. Specify the *Background susceptibility*. In most cases, the correct value is "0.0".
14. Specify the *Earth's Magnetic Field* parameters appropriate to your survey.



Refer to the **Earth's Magnetic Field** section below for details.

15. Click **OK** to close the *Specify Magnetic Anomaly Profile* dialog. Your new stations will populate the *Magnetic* tab of the spreadsheet.
16. Click **OK** to close the spreadsheet. You should see the magnetic station locations in the Plan View and Depth Panes as blue symbols.

Creating Equally-Spaced Stations

GM-SYS Profile allows you to create any number of stations at a specified interval and constant elevation. If you don't have actual observed data, but wish to calculate the response for a hypothetical profile over your model, you must create "dummy" stations. Magnetic stations are required so that GM-SYS Profile may calculate the response of the model at these locations.

To Create Equally-spaced Magnetic Stations

1. On the *Profile* menu, select **Manage Anomaly Data**. The *Manage Anomaly Data* spreadsheet appears.
2. On the *Magnetic Survey* menu, select **Add New/Replace Existing**. The *Specify Magnetic Anomaly Profile* dialog appears.
3. Select **Create equally-spaced stations**. The *Create Stations with Dummy Observations* dialog appears. All units are those currently used in displaying the model.

The screenshot shows a dialog box titled "Create Stations with Dummy Observations". It contains the following fields and values:

- Starting X coordinate: 0 m
- Spacing: 1000 m
- Number of stations: 5
- Last X coordinate: 4000 m
- Reference elevation: 0 m
- Elevation relative to: sea level (dropdown menu)

Buttons for "OK" and "Cancel" are located at the bottom of the dialog.

4. Specify the *Starting X coordinate* in the current display units.
5. Specify the station *Spacing*.
6. Specify the *Number of Stations* **OR** the *Last X coordinate*.
7. Specify the *Reference elevation*.
8. From the drop-down list select whether the **Elevation is relative to**: *sea level* or *topography*.
9. Click **OK**. You are returned to the *Specify Magnetic Anomaly Profile* dialog.

10. Specify the *Background susceptibility*. In most cases, the correct value is "0.0".
11. Specify the *Earth's Magnetic Field* parameters appropriate to your survey.



*Refer to the **Earth's Magnetic Field** section below for details.*

12. Click **OK** to close the *Specify Magnetic Anomaly Profile* dialog. Your new stations will populate the *Magnetic* tab of the spreadsheet.
13. Click **OK** to close the spreadsheet. You should see the magnetic station locations in the Plan View and Depth Panes as blue symbols.

Background Susceptibility

Specify a background susceptibility if your observed data have been corrected using a background value. In most cases, the correct value is "0.0".

Set Earth's Field Parameters

GM-SYS Profile requires the magnitude and orientation of the Earth's field at the location and time of the survey you are trying to model, in order to calculate the magnetic response of the model correctly. When you import magnetic data, you must enter values for the Earth's field parameters. Models that have the Earth's field magnitude set to zero will be prompted to enter a value each time the model is loaded, unless you opt to turn off the warning.



It is possible to get a calculated model response with a field magnitude of zero and the field orientation defined, if any blocks in the model have non-zero remanent magnetization.



*Use the *Compute Single Point GRF Values* dialog to calculate the magnitude and direction of the Earth's field at the location and time of the survey you are trying to model.*

To Set Earth Parameters

1. Enter the *Magnitude* of the field, in the specified units. Units may be changed in the *Display* menu.
2. Enter the *Inclination* of the Earth's field, in degrees from horizontal.
3. Enter the *Declination* of the Earth's field, in degrees from True North.
4. If you don't know these values, but know the latitude, longitude, and elevation of your model location and the date it was collected, click the **Calculate** button which opens the *Compute Single Point GRF Values* dialog.

Compute Single Point GRF Values

* IGRF/DGRF: IGRF

* Date required (yyyy/mm/dd): 2011/12/13

* IGRF Model Year (ignored for DGRF): auto

* Longitude (-180 to 180): 0

* Latitude (-90 to 90): 0

* Elevation (metres): 0

Field Strength (nT):

Inclination (degrees):

Declination (degrees):

Calculate Close

5. Enter the appropriate values and click **Calculate** to calculate the field parameters. If the observed magnetic data were corrected using an IGRF model, specify the IGRF Model Year.
6. Click **Close** to leave the IGRFPT dialog. These parameters will be captured in the *Earth's Field* dialog for your model.
7. Click **OK** to close the dialog.

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