Oasis montaj How-To Guide

Create a GM-SYS® Profile Model

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Create a New GM-SYS Profile Model

Forward modelling involves creating a hypothetical geologic model and calculating the geophysical response to that earth model. GM-SYS$^®$ is a modelling program that allows intuitive, interactive manipulation of the geologic model and real-time calculation of the gravity and magnetic response.

New Depth Model

This tutorial guides you through the creation of a new Depth model with the assumption that your topography data is contained in an ASCII file. For detailed instructions on creating a Time model or to create a model using topography data in a database, or using constant topopgraphy, please refer to the Application Help.

A starting Depth model consists of a single block "Crustal Rock" with a flat bottom and a topographic surface that may vary in the direction of the Profile Azimuth, but is constant along strike. Outside of the area of interest, the model is extended to "infinity" in the +/-X and +/-Y directions to eliminate edge effects.

There are four main selections in creating a new Depth model.

1. Geologic Strike Angle
2. Area of Interest and Topography
3. Profile Origin and Projection
4. Cross-Section Orientation and Limits

Create a New Model

The Create New Model procedure defines the working limits of the earth model.

To Create a New Model

1. Start **GM-SYS$^®$ Profile** .
2. On the *File* menu, select **New Model (Depth)** . The *New Model Creation* dialog appears.

The Initial Parameters of your model are set using the *New Model Creation* dialog. All fields in this dialog must be filled.

💡 *The dialog will capture as much information as possible from the text file that is the source of the topographic profile.*

Setting the Geologic Strike Angle

The Geologic Strike Angle describes the orientation of the 2-D / 2½-D blocks in the model. GM-SYS® Profile needs the strike angle in order to calculate the model response correctly.

The Profile Azimuth is calculated to be perpendicular to the Geologic Strike Angle and in the nominal direction of your imported profile.

If you do not specify the Geologic Strike Angle, the Profile Azimuth is calculated to connect the profile endpoints and the Geologic Strike Angle set perpendicular to it.

To Set the Geologic Strike Angle

1. In the *Geologic Strike Angle* field, specify the required Geologic Strike Angle. The *Azimuth* field updates to be perpendicular to the entry.

Importing Topography from a Text File

The dialog will capture as much information as possible from the source of the topographic profile, which can be either a database line or a text file.
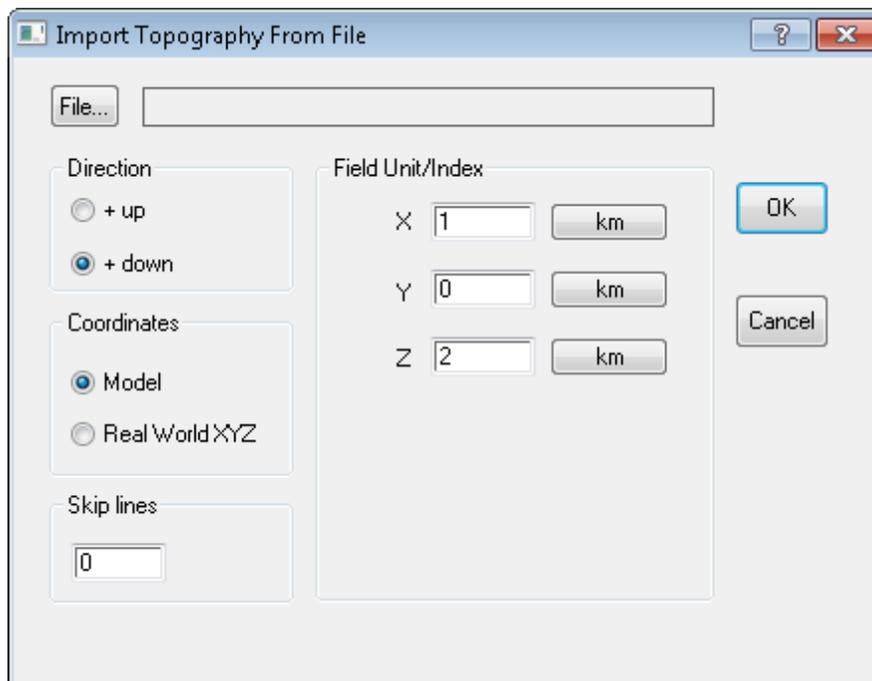
💡 *In this example, we use an ASCII (text) file.*

Some of the information which can be captured from a text file:

❯ Origin (first point of profile)
❯ Profile Azimuth
❯ Default View Limits

To Import from a Text File

1. In the *Define Area of Interest and Topography* section select **Import from text file**. The *Import Topography From File* dialog appears.

2. Click **File** and browse to the ASCII file containing your topographical profile. A preview of the file appears. Note the distance units used and the order of the X, Y and Z (topography) fields. Also make note of any lines preceding the topographical data.

3. Click **OK**.

4. Set the **Direction** of the Z-coordinate to +up or +down.

5. Set the **Coordinates** to Model or Real World XYZ.

6. If there are header lines before the topographical data begins, specify that number in *Skip lines*.

7. Set the *Field Index* for X, Y, and Z as determined by the column location of the data.

8. Select the **Unit** of distance for each field (m, km, ft, etc).

9. Click **OK**. You are returned to the *New Model Creation* dialog.

Setting Profile Origin and Projection

If not available as part of an imported topographic profile, or if the data were imported as "model" coordinates, you must set the origin, coordinate system and distance units for the external coordinate system. This connects your model coordinates to an external coordinate system and "anchors" the model in the real world.

To Set the Profile Origin and Projection

1. In the *Origin X* field, specify the X-coordinate of the Model Origin, in the coordinate system specified.

2. In the *Origin Y* field, specify the Y-coordinate of the Model Origin, in the coordinate system specified.

3. Click **CoordSys**. The *Coordinate System* dialog appears.

4. Select the **Coordinate System** or click **Copy From** to import a Coordinate System.

5. From the **Length units** drop-down list, specify the unit type (km, m, ft, etc).

6. Depending on the Coordinate System chosen, you may need to include additional information such as Datum details or Projection method. Refer to the Coordinate System help for more detail.

7. Click **OK**. You are returned to the *New Model Creation* dialog.

Setting Cross-Section Orientation and Limits

The Cross-Section limits define the "Startup View" for your model after it is created; i.e. the limits of your area of interest.

If you imported a data profile, the calculated Profile X limits will extend from X=0 (the origin) to the location of the last data point, as projected onto the model section. You may override these values, or enter your own if none have been calculated.

For a Depth model, the default Profile Z limits extend from 0 to 50 km. For a Time model, the Profile T limits extend from 0 to 10 seconds. In each case, this represents the full thickness of the initial "Crustal Rock" block. You may set the view limits differently, if you prefer.

To Manually Set Cross-Section Orientation and Limits

1. In the *Azimuth* field, specify the Profile Azimuth, if it is not already calculated. If you have previously entered a Geologic Strike Angle, the field is already set to be perpendicular.

   ⚠️ *If you change the Profile Azimuth manually, this will cause the Geologic Strike Angle to be recalculated to be perpendicular to it.*

2. Click **Reverse** if the Profile Azimuth should be reversed.

3. In the *Profile X Min* and *Max* fields specify the distance for the X limits.

4. From the **Unit** drop-down list, select the correct unit (km, m, etc).

5. In the *Profile Z Min* and *Max* fields specify the distance for the Z limits.

6. From the **Unit** drop-down list, select the correct unit (km, m, etc).

Create the New Model

1. Confirm your selections for the new Depth Model are correct and click **Create**. Your model opens in the Model Window.

⚠️ *The new model is created in memory only. Use **Save** or **Save as** to save it to a file on disk.*