Add a Layer to GM-SYS 3D Model

Use the *Add a layer to a GM-SYS 3D Model* option to subdivide the model volume by inserting a new layer surface beneath an existing layer. The new layer automatically inherits all of the properties from the layer above. The property distributions in the model may be refined by assigning different properties to the new layer.

The new layer grid is reprojected, resampled, and clipped to match the model. If there are dummies within the resulting grid, they will be filled automatically if the percentage of dummy values does not exceed 75 percent. Layers are allowed to be coincident, but may never cross. If there are potential crossings, you will be given the option to resolve the conflicts or cancel the operation.

To Add a New Layer to a GM-SYS 3D Model

1. On the *Layer* menu select **Add Layer**. The *Add Layer to Model* dialog appears.

    💡 *You can also right-click on the layer in the Model Explorer and select **Add Layer**.*
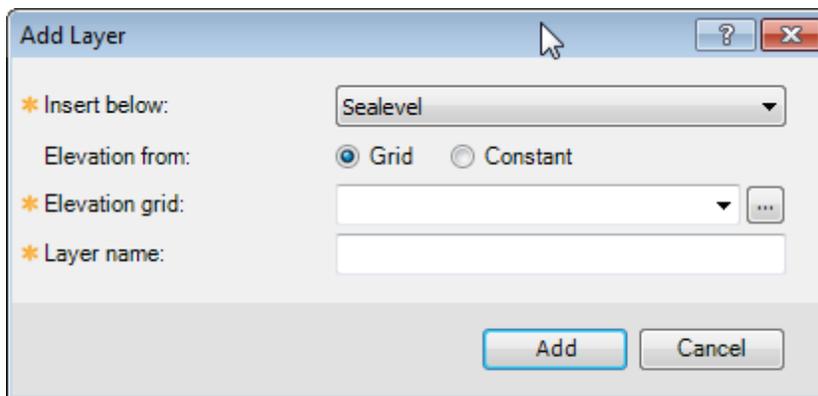
2. From the *Insert below* dropdown list, specify the layer in which to insert this new layer below. Note that the dropdown list includes all existing layers.

3. Select whether to use a *Grid* or a *Constant* for the *Elevation from*. Depending on your selection, either the *Elevation grid* or the *Elevation* parameter will appear below.

4. If *Grid* was selected as the *Elevation from*, use the browse button to select the grid file to use for the layer. If *Constant* was selected as the *Elevation from*, specify the layer elevation.

5. Specify the *Layer name* (label) to use for the new layer. By default, this will be the name of the selected grid.

6. Click **Add**. The input data will be validated.

    ❯ The relief grid will be reprojected, resampled, and clipped to match the model.

    ❯ If the resulting data contain less than 75% dummies within the model area, they will be automatically filled.

    ❯ If the selected grid is completely above the layer above or below the layer below, it will be rejected and you will be given an opportunity to select a different grid or change the position of the new grid within the model.

7. If layer crossings are detected, the *Resolve Layer Crossings* dialog will appear, giving you the options for resolving the conflicts.

Property Distributions in a Model Layer

GM-SYS 3D supports several options of describing the distribution or variation of a property (e.g. density or susceptibility) within a model layer. Some of these methods are limited to density distributions only.

1. Constant: The property does not change within the layer.

2. Laterally-varying: The property of a layer is described by a grid and may be different for every cell in X and Y. The value within the layer does not vary vertically.

3. Vertically-varying: The property of a layer changes with depth, described as an offset relative to a reference horizon, but does not vary laterally at a specified offset.

4. Varying in 3D: The property of a layer can change in any direction. The distribution is described by a voxel.

In all cases, the property distributions must describe a valid property value for every location in the layer. Property distributions imported from files must pass a validation process:

1. The file must have a valid coordinate system.

2. It is reprojected, resampled in X,Y, and clipped to match the horizontal geometry specification of the model.

3. If the resulting grid data contain less than 75% dummy values, the dummies will be automatically filled.

4. If the resulting voxel contains any dummies, they will be automatically filled if there is *any* valid data.

Edit Layer Properties

When a model layer is selected in the *Model Explorer*, all of the properties of that layer are displayed in the *Properties* panel. Any or all of the properties may be edited. Changes to each field are automatically applied as they are made.

➤ Selecting a property source type other than "constant" requires an appropriate property source, if one is not already loaded for the layer. If several types have been previously loaded for this layer, the active type may be changed without having to reload them.

➤ Validation of each field or selection occurs when the focus is changed to another field. Changes will not be applied if they are invalid and the focus cannot be switched until errors are corrected. If layers are switched prior to the last change passing validation, changes may be lost.

➤ Magnetic properties for a layer may include constant susceptibility and constant remanent magnetization, or variable susceptibility and no remanent magnetization.

Replace Layer Relief Surface

Replaces the current relief surface of a layer. Before incorporating the new relief surface into the model, it is validated as though it is a new layer.

To Replace a Layer Relief Surface

1. Select the layer on the *Layers* tab in the *Model Explorer*.

2. On the *Properties* pane, under *Surface*, click the **Layer** button. The *Replace Layer Relief Surface* dialog appears.

Replace Layer Relief Surface

Elevation from: ● Grid ○ Constant

✱ Elevation grid: _____ ▼ [...]

[OK] [Cancel]
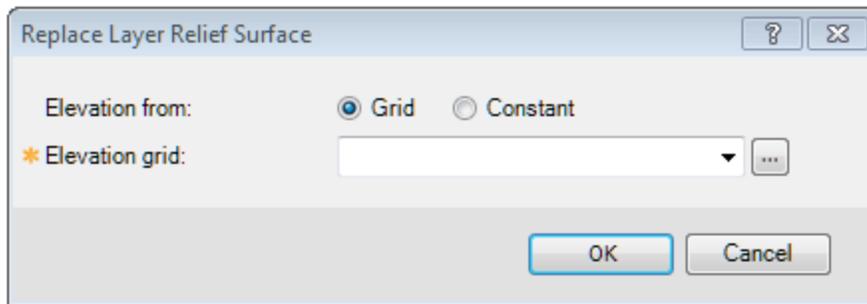
3. Specify whether the relief will be defined using an elevation grid, or a constant elevation.

4. If *Grid*, select the grid to add from the dropdown list. If the grid is not listed, use the *Browse* button to locate it.

5. Click **OK**. The input data will be validated.

   ➤ The grid must have a valid coordinate system.
   ➤ The grid will be reprojected, resampled, and clipped to match the model.
   ➤ If the resulting data contain less than 75% dummies within the model area, they will be automatically filled.

6. If *Constant*, enter the constant elevation and click **OK**.
   The new layer relief will be validated against the existing model structure.

   ➤ If the selected grid or constant elevation is completely above the layer above it, or completely below the layer below it, it will be rejected and you will be given an opportunity to revise your selection or change the position of the new surface within the model.

   ➤ If layer crossings are detected, the Resolve Layer Crossings dialog will appear, giving you the options for resolving the conflicts.

7. If the layer loads successfully, the newly imported relief replaces the previous relief surface. If the import fails, in-line error messages appear.

8. Selecting **Cancel** leaves the relief surface as it was.

Set or Edit Lateral Property Distribution

Specify the *Lateral Property Distribution*, (where *Property* can be *Density* or *Susceptibility*) to be used for the current layer or body, either by importing a distribution from an existing grid, or by setting a constant value.

When "Lateral distribution" is selected as the property source for a layer, the model first checks whether a lateral property grid is already loaded. If so, it becomes the active property source.

If no grid is loaded, the user is prompted to specify the lateral property distribution. This may be done by either selecting an existing grid, or by specifying a constant value. When the 'Constant' value is selected, the field is automatically populated with the current 'Constant' property for the layer.

When importing an existing grid, the input grid must be validated:

➤ It must have a valid coordinate system

➤ It will be reprojected, resampled and clipped to match the model

➤ If the resulting data contain less than 75% dummies within the model area, they will be automatically filled.

If you wish to invert for a Lateral *Property* distribution that better fits the data, you must first define the layer *property* using a lateral *property* distribution; by default the property is defined by a constant value.

To Set the Lateral Property Distribution

1. Select the layer (or body) on the *Layers* tab in the *Model Explorer*.

2. On the *Properties* pane, under your selected *Property* (*Density* or *Susceptibility*), select **Lateral Distribution** from the dropdown list. The *Select Lateral *Property* Grid* dialog appears.

3. Using the **Property* from* radio buttons, select **Grid** or **Constant**.

4. If you have selected *Grid* above, select an existing *Property grid* from your workspace. If you have selected Constant above, specify the constant **Property** value to be used for the lateral distribution.

5. Click **OK**. If the **Property** grid is imported successfully, the layer properties panel and the statistics of the imported data will be displayed. If the import fails, in-line error messages appear.

    > 💡 *Cancel leaves the density distribution as it was. If no lateral distribution was loaded prior to this operation, the density source will revert to its previous setting.*

Edit Layer 3D Density

Replaces a 3D density distribution layer by importing a voxel. Before incorporating the new density distribution into the model, the input voxel is validated:

❯ It must have a valid coordinate system.

❯ If the resulting data contain dummies within the model area, they will be automatically filled.

To Select a Density Voxel

1. Select the layer on the *Layers* tab in the *Model Explorer*.

2. On the *Properties* pane, under *Density*, select **Voxel Distribution** from the dropdown list, if it is not already selected. The *Select Density Voxel* dialog appears.

    If *Voxel Distribution* is already selected, press the **Layer** button to open the dialog.

3. *Browse* to select the *Voxel* to import.

4. Click **OK**. If the voxel is imported successfully, the layer properties panel and the statistics of the 3D density distribution will be displayed. If the import fails, in-line error messages appear.

    > 💡 *Cancel leaves the 3D density distribution as it was. If no 3D density distribution was loaded prior to this operation, the density source will revert to its previous setting.*
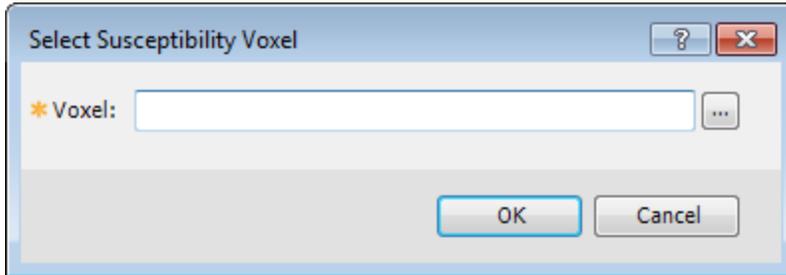
Edit Layer 3D Susceptibility

Replaces a 3D susceptibility distribution layer by importing a voxel. Before incorporating the new susceptibility distribution into the model, the input voxel is validated:

❯ It must have a valid coordinate system.
❯ If the resulting data contain dummies within the model area, they will be automatically filled.

To Select a Susceptibility Voxel

1. Select the layer on the *Layers* tab in the *Model Explorer*.
2. On the *Properties* pane, under *Susceptibility*, select **Voxel Distribution** from the *Type* dropdown list, if it is not already selected. The *Select Susceptibility Voxel* dialog appears.

2. *Browse* to select the *Voxel* to import.
3. Click **OK**. If the voxel is imported successfully, the layer properties panel and the statistics of the 3D susceptibility distribution will be displayed. If the import fails, in-line error messages appear.

> 💡 *Cancel* leaves the 3D susceptibility distribution as it was. If no 3D susceptibility distribution was loaded prior to this operation, the susceptibility source will revert to its previous setting.

Delete Layer

To Delete a Layer

1. Click on the layer to delete on the *Layers* tab of the *Model Explorer*.
2. Select either **Delete Layer** from the *Layer* menu or *right-click* on the layer name and select **Delete**. A confirmation dialog appears.
3. When the layer is deleted, the properties of the layer above will be extended through the volume vacated by this layer.

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