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#### How to begin?

- 1. Run an instance of Mod3D application. At the beginning two views of an empty document are opened automatically, map view and profile view. If you closed previously opened document select from menu File \ New.
- 2. Now choose between two possibilities how to create observations.
  - If you want to create planar observation area, select from menu Model \ Define Observations and enter coordinates to Define Observation dialog. See also Mod3D Coordinate system.
  - Second way is to import Digital Elevation Model (DEM) grid. Choose from menu Model \ Import Observation. You will be asked to set the vertical range. Within this range a model can be defined, and it is also used for scaling views to fit the window. You can change vertical range later in menu Model \ Change Vertical Range.
- 3. Open new *Profile View* window. Choose from menu Window \ New Profile Window. Or use shortcut toolbar button .
- 4. Use Model toolbar buttons **HEAP** or keyboard arrows keys to move across the observation area. Move to the profile, where you would like to create a body (i.e. to the middle of the observation area). To create new body *click right mouse button* at the position where you want to insert new body. This will open floating menu. From floating menu choose Insert New Body. In **Body Properties** property page, set the physical properties, drawing parameters of the body and description. The body is

created. Cursor will change to if the vertex is movable. Now the body can be modified after clicking on the vertex, hold *left mouse button down* and move mouse in vertical direction. Body can be extended to the sides

after the cursor changes to the vertical body edge to . Then hold *left mouse button down* and *move mouse* to the side (at the beginning of body creation you **MUST** move to the right).

- 5. The simpliest way how to extend the body to the next profile follows. Click the *right mouse button* inside the body. From the floating menu choose Copy to Next Profile or Copy to Previous profile. The system will copy the body to the next or previous profile respectivelly.
- 6. Move to the next profile using model toolbar buttons ad reshape the body.
- Finally compute the field using command from menu Compute \ Compute.
   Or use shortcut button in from main tooldbar.

## How to Create / Modify the model?

**NOTE:** Most of described operations are performed in the *Profile View*! Only vertex motion can be additionally used in *3D View*.

Conventions in following description:

#### Actions.

- *left mouse button click*-> click with left mouse button
- *left mouse button down* -> left mouse button is down
- *right mouse button click*-> click with right mouse button
- *right mouse button down* -> right mouse button is down
- *mouse double click* -> double click with left mouse button
- *mouse move* -> mouse is moving
- *CTRL* Ctrl button on keyboard is down
- *SHIFT* Shift button on keyboard is down

Use Model toolbar buttons or keyboard arrows to move across the observation area and move to the profile where you would like to create a body .

#### Create new body.

To create a new body use *right mouse button click* at position in *Profile View* where you want to insert a body. You MUST click inside the "model area", what is an area inbetween relief and bottom boundary of the model

#### Creating a new separated part of an existing body.

Use the same steps as described in the **Create new body** section, but choose Insert Existing Body from floating menu. In Insert Existing Body dialog select the body you want to create. The initial body width is by default 1/10 of the

model vertical range. In a case that you may want to change the body properties of the separate part of some body in the future, better create new body.

#### Moving body vertices.

Cursor changes to  $\rightarrow$  if the vertex is movable in vertical direction. Catch the vertext with *left mouse button click*. Use *left mouse button down* + *move mouse* in vertical direction along the grid lines. The limits where the vertex can move are defined by the geometry of the model. Body vertex can not move inside to another body or cross another vertex of the same body. Also cannot move above the relief or below the model range minimum. If you would like to extent the body deeper then change vertical model range minimum. Use from menu Model \ Change Vertical Range command, though. If real-time computation mode in on, the modeled field is gonna be updated.

#### Body extending to the side.

Body can be extended to the sides after the cursor changes to when moving with mouse cursor over the vertical body outer or inner edge. *Click left mouse button* and extend the body to the side using *left mouse button down* + *move mouse*. If you are moving towards outside from the body new parts are created. Moving towards inside the body will remove the last edge. One MUST point with the cursor over next (previous) vertical line in order to create new part of the body. Rules how new part of a body is created is defined in menu Body \ Creation Properties. In the case of moving towards the edge of separate part of the same body, the two parts will be merged. One cannot enter to another body. In that case operation will be stopped. If real-time computation mode in on, the modeled field is gonna be updated.

#### Modifying shape of the body.

Simply *left mouse button click* on the body vertex and use *left mouse button down* + *mouse move* and modify the shape. You can modify vertical vertex position moving along the vertical grid line. To modify next vertex keep the mouse capture and move to the next grid line. This is something like imitation of the boundary drawing. If two bodies have common boundary, it is modified automatically. Upper and lower boundary of a body MUST be modified separately. If real-time computation mode in on, the modeled field is gonna be updated.

#### **Connect vertices**.

In most cases the two neighboring bodies have common boundary. To connect

vertices of two neighbouring bodies in vertical direction together drive the body vertex towards the body which is to be connected using *left mouse button down* + *mouse move*. If the cursor passes over neighbouring body, the vertices are joined together. You can also apply above rules to join body to relief. In cases when two vertices are close to each other (in screen coordinates) they will be connected automatically after clicking on one of the vertices. There is no limitation for how many bodies could be connected ogether. If real-time computation mode in on, the modeled field is gonna be updated.

#### **Disconnect vertices.**

To disconnect common vertex of two or more bodies use *CTRL* + *left mouse button down* + *mouse move*. Continue to move mouse (like Modifying shape of a body) to disconnect another vertices. The vertices of two bodies can be disconnected only in one direction, depending on the internal storage order of the bodies.

#### Connect end of a body into one vertex.

Use *left mouse button down* + *mouse move* and connect the vertices together.

#### Move body in vertical direction.

Use *SHIFT* + *left mouse button down* + *mouse move* to move the body in vertical direction. Cursor MUST be of 'over body' <br/> <br/> type. To controll body motion manually, use fom floating body menu command Move Body.

## Complex model.

In a complex model **common vertical boubaries are NOT supported!** You always **MUST** connect the termination of a body from each side on a given profile into one common vertex!

### File menu commands

The **File** menu offers the following commands:

New	Creates a new document.
<u>Open</u>	Opens an existing document.
<u>Close</u>	Closes an opened document.
<u>Save</u>	Saves an opened document using the same file name.
Save As	Saves an opened document to a specified file name.
<u>Import</u>	Imports aditional files
<u>Print</u>	Prints a document.
Print Preview	Displays the document on the screen as it would appear printed
Print Setup	Selects a printer and printer connection.
<u>Exit</u>	Exits Mod3D.

#### View menu commands

The **View** menu offers the following commands:

ToolbarShows or hides the toolbar.Status BarShows or hides the status bar.

# Compute menu commands

The **Compute** menu offers the following commands:

Compute	Computes model fields.	
Properties	Shows computation properties.	
	Customizes active field for effective computation.	

#### Window menu commands

The Window menu offers the following commands, which enable you to arrange multiple views of multiple documents in the application window:

New Profile Window	Creates a new window that views the profile.
<u>New Map Window</u>	Creates a new window with map view.
<u>New 3D Window</u>	Creates new window with 3D view.
Cascade	Arranges windows in an overlapped fashion.
Tile Horizontally	Arranges windows in non-overlapped horizontal tiles.
Tile Vertically	Arranges windows in non-overlapped vertical tiles.
Arrange Icons	Arranges icons of closed windows.
<u>Window 1, 2,</u>	Goes to specified window.

#### Help menu commands

The **Help** menu offers the following commands, which provide you assistance with this application:

Help TopicsOffers you an index to topics on which you can get help.AboutDisplays the version number of this application.

## Toobars

Toolbars are providings shotcuts to most of the Mod3D commands to make your work more comfortable.

Following toolbars are vailable:

Profile Toolbar

<u>Map Toolbar</u> Ⅲ፲- **Ø2** 承绎

#### Mod3D Toolbar

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The toolbar is displayed across the top of the application window, below the menu bar. The toolbar provides quick mouse access to many tools used in Mod3D document.

To hide or display the toolbar, click **Toolbar** from the **View** menu.

Click	То	
D	Open a new document.	
1	Open an existing document. Mod3D displays the Open dialog box, in which you can locate and open the desired file.	
	Save the active document or template with its current name. If you have not named the document, Mod3D displays the Save As dialog box.	
9	Print the active document.	
Ð	Activate Zoom Out tool.	
Q	Activate Zoom In tool.	
<b>.</b>	Activate Zoom tool.	
	Fit the view to the window size.	
	Open new Map View on the current document.	
	Open new Profile View on the current document.	
Ø	Open new 3D View on the current document.	
Ì=,	Set equal scale for both axes.	
Ħ	Arrange all windows to non overlapping vertical tiles.	
	Arrange all windows to non overlapping	

		horizontal tiles.	
J	∫ <mark>@</mark> =	Initialize computing of model field.	
4	~	Initialize digitize tool.	
6	05	Force redrawing current view.	

## Map Toolbar.

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The Map toolbar provides quick mouse access to tools used for work with *Map View*. To hide or display the Map Toolbar, choose **Model Toolbar** from the **View menu**. The Map Toolbar acts in *Map View*, if this is currently selected. If the toolbar is not active, activate the *Map View* first by clicking inside the view.

l		
Click	То	
****	Show observation points.	
	Show / hide current profiles.	
0	Show relief contours.	
0	Show relief bitmap.	
*	Show / hide objects.	
9	Show / hide body outer	
	contours.	

## **Profile Toolbar.**

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The Profile Toolbar provides quick mouse access to tools used for work with within *Profile View*. To hide or display the Model Toolbar, choose Model Toolbar from the View menu. The Model Toolbar acts in *Profile View*, if this is currently selected. If the toolbar is not active, select the *Profile View* first by clicking inside the view.

Click	То	
	Set vertical profile type.	
	Set horizontal profile type.	
<b>H</b>	Move to the previous profile.	
	Move to the next profile.	
	Show previous profile bodies.	
	Show next profile bodies.	
	Show vertical grid lines.	

## **Field Toolbar**

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The Field toolbar is default displayed across the right of the application window. To hide or display the toolbar, click **Field Toolbar** from the **View** menu. The Field Toolbar provides quick mouse access to the tools used to show or hide modeled or measured field. The field toolbar acts on both *Map View* and *Profile View*, depending on which view is currently selected. The command shows or hides profile curve in *Profile View*, contours or bitmaps of selected field in map view. If the toolbar is not active, select the view first by clicking inside the view.

Click	То		
0	Activate contours. Available in <i>Map View</i> only.		
<b>?</b>	Activate bitmaps. Available in <i>Map View only</i> .		
<b>*</b>	Activate modeled field.		
<u>~</u>	Activate measured field.		
ß	Activate difference field.		
2	Activate axis. Available in <i>Profile View</i> only. Active field can be selected to the field axis.		
	Gravity field components		
<u>Bx</u>	Show or hide <i>Gx</i> field.		
<u><u>Gy</u></u>	Show or hide <i>Gy</i> field.		
Ģz.	Show or hide <i>Gz</i> field.		
e,	Show or hide <i>G</i> field.		
	Magnetic field componenst		
M×	Show or hide M <i>x</i> field.		
My	Show or hide <i>My</i> field.		
Mz	Show or hide <i>Mz</i> field.		
M	Show or hide <i>M</i> field.		
	Gravity field derivatives tensor		
Txx ~~	Show or hide <i>Txx</i> field.		

Tvv ~~	Show or hide <i>Tyy</i> field.
T <sub>zz</sub>	Show or hide <i>Tzz</i> field.
T <sub>×y</sub>	Show or hide <i>Txy</i> field.
Txz	Show or hide <i>Txz</i> field.
T <sub>vz</sub>	Show or hide <i>Tyz</i> field.

## **Model Properties**

#### Observations

- **Minimum:** Read only. Minimum observation grid coordinates.
- Maximum: Read only. Maximum observation grid coordinates.
- Increment: Read only. Observation grid cell size.
- **Top:** Model vertical range.
- **Bottom:** Model vertical range.

**Creation Properties - Creation** group defines how a new part of a body will be created.

- **Join** group defines how new part of the body will interacts with its neighbors.
  - **None:** means that there will be no interaction with neighboring bodies. Except of the system will not allow body intersections.
  - **Top:** the body will be connected to the closest upper body or relief (if there is no body present).
  - **Bottom:** the body is going to be connected to the closest underlying body, or bottom model boundary.
  - **Const top:** the top boundary has constant depth value if this is not in contradiction with another body. Set the depth value.
  - **Const bottom:** the bottom boundary has constant depth value if this is not in contradiction with another body. Set the depth value.
  - **Body creation** ratio: defines how new part of a body is created. If the value is smaller then 1.0 the body is shrinking. *NewThickness* = *BodyCrationRatio\*OldThickness*. New body edge is centered over the mouse position.
- **Motion** group defines how the body is moving.
  - **Move on current profile:** the body is movable only on current profile.
  - **Move top boundary:** top boundary is movable.
  - **Move bottom boundary:** only bottom boundary is movable.
  - **Fix relief:** the top-most body is fixed to the relief.
  - **Fix bottom:** the bottom-most body is fixed to the bottom.

#### Extension

- **Extend boundaries** to the sides to avoid boundary effects. If not checked extension is not assumed.
- **North:** specify extension length. Must be positive value.
- **South:** specify extension length. Must be positive value.
- **East:** specify extension length. Must be positive value.
- West: specify extension length. Must be positive value.

#### **Model Description**

Enter description of the model. New line - *CTRL* + *ENTER*.

# Computing properties dialog box.

### Computation

- If **Spherical computing** is checked, the whole computation is done on spherical Earth. It needs additional transformations, which slow down computation speed.
- **Extend edges** to avoid boundary effects. The model continues further in the same manner as it is defined on the edge profile. Give the distance of extension in *m*.
- **Real-time Computation** can be performed in three modes.
  - **None**: real-time computation is not active. The field must be recomputed manually. This mode is efficient in initial stages of model creation. Model creation is not slowed down with re-computing.
  - **Real-time**: field update is performed simultaneously as the mouse is moving. All active grids are updated. All views are updated. Can be slow for large models, or slow computers. Doesn't work for whole body motion! See **Efficient computing** for details, how to achieve the best computation efficiency.
  - After Mouse Click: the fields are updated after mouse button is released. All active grids are updated. All views are updated. See Efficient computing for details, how to achieve the best computation efficiency. Doesn't work for whole body motion!
- Window: set the area, which is recomputed. Only grid points within the computing window are recomputed. Attention! You need to re-compute the whole model after the window change.

### Gravity

- **Units:** Choose units you want to use.
- **Reference density:** If you want to use absolute density for bodies (2700 kg/m3) set the reference density **recommended**. The density is used for computation is then: *DensComputation = DensityBody - ReferenceDensity*. If reference density is 0.0 then is ignored, you can use relative densities. Reference density can be also linearly increasing. Then set the density gradient and origin. If all the components of density gradient vector are 0.0, linearly increasing density is ignored. The reference density is applied to the bodies itself (not to the whole volume).

• **Gradients tensor:** Set either constant flight elevation or height over relief where the field is to be computed.

#### Magnetics

- **Sensor over relief:** set the sensor height over relief for magnetic field computation.
- Set **Inducing Field** for magnetic field computation.

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#### **Body Properties: Gravity**

Set the physical properties used for the gravitational field computation.

**Density:** specify the density of a body -  $ro_{body}$  in  $[kg \cdot m^{-3}]$ . Gravitational field is computed using the reference density  $ro_{ref}$ , if the reference density is nonzero. The density used for computation is:  $ro = ro_{body} - ro_{ref}$ .

**Gradient:** specify the density gradient components of a body in  $kg \cdot m^{-4}$ . Take into account, that right-handed coordinate system with positive *z*-axis pointing upward is used (for increasing density with the depth *z* component of the gradient is negative). The *z* density gradient component can be computed as follows: gz = (roH0-roH)/(h0-h), where *roH0*, *roH* is the density at depth *h0*, *h* respectively.

**Origin:** Specify an origin for the density gradient computation. In the origin the density equals to the density of a body. The density in point **P** is computed as follows:  $ro_P = ro_{body} + r \cdot g$ , where **g** is the density gradient and **r** is the radius vector from point **P** to the gradient origin.

#### **Body Properties: Magnetics**

Set the physical properties for the magnetic field computation.

- Susceptibility: Set the susceptibility of the body in [SI] units dimensionless number equal to (1- m<sub>r</sub>) where m<sub>r</sub> is the magnetic permeabity of the body relative to the vacuum. Magnetic field is computed using the inducing field specified *Model / Inducing field* menu.
- **Remanent Magnetization Intensity:** Set the intensity of the remanent magnetization in [*nT*].
- **Remanent Magnetization Inclination:** Set the inclination of the remanent magnetization in *[degrees]*.
- **Remanent Magnetization Declination:** Set the declination of the remanent magnetization in *[degrees]*.

#### **Body Properties: Drawing**

- Line: Set the line properties of the body. See
- Line Next: Set the line properties for this body contours from next profile.
- Line Prev: Set the line properties for this body contours from previous profile.
- **Fill:** Set the fill properties. Fill color is also used id *3D View* to draw the body, either wireframe or filled.
- **Transparent:** Set the transparency for *3D View*. Floating point alpha value MUST fit the interval <0, 1>. For alpha=0 the body is invisible, for alpha=1 the body is opaque.
- **Filled:** Specify if the body is filled in *Profile View*.
- **Visible in 3D:** Specify, if the body should be displayed in *3D View*.

### **Body Properties: Computation**

- Active: If checked, the body is active in computation, otherwise the body is excluded from computation.
- **Locked:** The body shape cannot be modified.

### **Body Properties - Description**

- **ID** is internal system identification. Read only.
- **Name:** enter body name. This name will be displayed in all dialogs as body identification.
- **Description:** Enter your desription or notes.

## **Computation properties: Computation**

If **Spherical computing** is checked, the whole computation is done on spherical Earth. It needs additional transformations, which slow down computation speed.

**Real-time Computation** can be performed in modes.

- **None**: real-time computation is not active. The field must be recomputed manually. This mode is efficient in initial stages of model creation. Model creation is not slowed down with re-computing.
- **Real-time**: field update is performed simultaneously as the mouse is moving. All active grids are updated. All views are updated. Can be slow for large models, or slow computers. Doesn't work for whole body motion! See **Efficient computing** for details, how to achieve the best computation efficiency.

**Window:** select grid window used in computation. Only grid points within the computation window are recomputed. **Attention!** You need to re-compute the whole model after the window change.

#### **Computing properties:** Gravity

**Sensor over relief [m]:** Specify the sensor height over relief in meters. **MUST NOT be negative.** 

**Units:**Choose units you want to use. If custom units are used, the resulting field is multiplied by the supplied value, which MUST NOT be zero (0.0).

**Reference density:** If you want to use absolute density for bodies (2700 kg/m3) set the reference density - **recommended**. The density used for computation is then: *DensComputation = DensityBody - ReferenceDensity*. If reference density is 0.0 then reference density is ignored, you can use relative densities. Reference density can be also linearly increasing. Then set the density gradient and origin. If all the components of density gradient vector are 0.0, linearly increasing density is ignored.

Note: The reference density is applied to the bodies itself (not to the whole model volume).

**Gradients tensor:** Set either constant flight elevation or height over relief where the field is to be computed. **Multiply resulting field by** supplied value (i.e. displaying purposes, unit conversion...), which MUST NOT be zero (0.0).

### Magnetics

- **Sensor over relief:** set the sensor height over relief for magnetic field computation.
- Set **Inducing Field** for magnetic field computation.

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## **Profile View**

The **Profile View** provides an interface, where the polyhedral bodies are defined in sets of perpendicular cross sections running through the grid nodes. More profiles can be opened simultaneously, to get better overview over the geometry in both south-north and west-east directions respectively. Copying of the bodies or the whole cross section to the next or previous profile followed up by reshaping of the geometry speeds up the process of model creation. Profile View also shows curves of computed and/or measured and/or difference fields. More fields can be drawn transparently. Geo-referenced bitmaps could be imported into Mod3D, and drawn transparently to the Map View or Profile View. An example would be a geological map shown in *Map View*, or a seismic section displayed in a selected *Profile View*. Main geological units could be digitized in *Map View*, which are shown as check marks to achieve better orientation in the Profile View. The model definition system controls internally the consistency of the polyhedra geometries, or their topology in other words. The controlling system prevents overlapping or crossing of the polyhedra, simplifies reshaping of the existing bodies and reduces time needed for model creation.

#### **Model Modification**

See<u>How to Create / Modify the model?</u> for detailed description.

#### **Field Curves**

Field curves on current profile are shown by default in following manner:
Modeled field for gravity and magnetics - solid line.
Modeled field for gravity tensor components - dashed line.
Measured field - cross symbols.
Difference field - dashed line.
See Field Toolbar for details how to show / hide field curves.

#### **RMS & DRV Indicators**

**RMS** indicator shows the Root Mean Square error of the currently selected difference field(s). To show or hide the RMS indicator use command from menu Profile \ Show RMS.

DRV indicator shows the "fake derivative" of the currently selected difference field(s). To show or hide DRV indicator use command from menu Profile \ Show Derivative. Fake derivative is an approximation of the exact derivative and is computed as sum(dFld / dx + dFld / dy) over all points, where dFld=(Fld(i)-

# Fld(i-1)) and Fld(i) is the selected field in the *i*<sup>th</sup> grid point.

#### **Profile View floating menus.**

Depending on where the user clicks the *left mouse button*, one can open following floating menus:

• **Profile View menu.** The default menu displayed, when user click out of any object.

5 5	
Next	N
Previous	Ρ
E-W Profile	H
S-N Profile	۷
Show Previous	
Show Next	
Jump to Extrem	Е
Jump to Min	I
Jump to Max	A

Menu Item	Shortcut	Description
Next	Ν	Moves to the next profile.
Previous	Р	Moves to the previous profile.
E-W Profile	Н	Changes the profile orientation to East-West.
S-N Profile	V	Changes the profile orientation to South-North.
Show Previous		Shows bodies from prom previous profile on the current profile.
Show Next	Shows bodies from next profile on the current profile.	
Jump to Extreme , Min, Max	E	Goes to the profile, where the extreme of the selected extreme field is located. To set the extreme field use command Profile \ Set Extreme Field.

**Body menu.** Is displayed when user clicks over the body.

✓ Fill		
Copy to Previous Profile Copy to Next Profile	e	
Remove Remove from Profile		
Edit Bodies Body Creation Propertie	25	
Invert Density Density Inversion Prope	erties	
Menu Item	Description	
Properties	Shows current body properties.	
Fill	Sets the fill tag.	
Copy to Previous Profile	Use this command to copy the body from current profile to the previous profile. In case of conflict, the problematic vertex is ignored.	
Copy to Next Profile	Use this command to copy the body from current profile to the next profile. In case of conflict, the problematic vertex is ignored.	
Remove	Active only if the cursor is over edge (either boundary edge or inner edge).	
Remove from Profile	Removes the body from the current profile.	
Edit Bodies	Activates Edit Bodies dialog.	
Body Creation Properties:	Use this command to set the body creation properties.	
Invert Density	Use this command to invert the density of the current body. From more details see: Invert Density Properties dialog.	
Density Inversion Properties	Set the settings for density inversion.	

Properties

• **Body Vertex menu.** Is displayed, when user clicks over body vertex.

Fit 1D Fit Properties	
Fit	Start the vertex fitting.
1D Fit Properties	Adjust the settings for 1D vertex fitting.

- **Body Edge.** Is the same as **Body menu.**
- **Insert Body menu.** Is displayed, when the user clicks over vertical line, where the body can be inserted.

Insert New Body Insert Existing Body	
Edit Bodies Body Creation Properties	
Insert New Body	Inserts new body to the specified position.
Insert Existing Body	Inserts existing body to the spefied position.
Edit Bodies	Activates Edit Bodies dialog.
Body Creation Properties	Use this command to set the body creation properties.

### Axes

*Right mouse button click* on the axis activates the axis properties. Use *left button down* + *mouse move* to scale the axis interactively.

#### **Shortcuts**

Use *mouse wheel* or *arrow keys* to move over the model.

## **Map View Properties**

**Image Quality** slide adjusts the image quality. Higher image quality slow down view updating. It is recommended to use lower quality in real-time computation.

#### Show

- **Observation points** Show / hide observation points.
- **Observation bitmap** Show / hide relief bitmap.
- **Observation contours** Show / hide relief bitmap.
- **Imported objects** Show / hide all imported objects.
- **Profiles** Show / hide profiles in *Profile View*.
- Horizontal grid lines Show / hide horizontal grid lines.
- Vertical grid lines Show / hide vertical grid lines.
- **Bodies boundaries** Show / hide outer body boundaries.

#### Equal scale for both axes

If checked AND not zoomed scale for axes is equal. When zoomed this option does not have effect.

## **3D View**

**3D** *View* shows 3D projection of the model, imported objects and fields. It also allows to user modify the geometry of the model. Two main modes are supported.

**Rendering mode** is used to visualize the model. Selection and motion of the vertices is disabled. To rotate, shift or zoom the model use following commands.

Command	Action
right mouse button down	Opens <i>3D View</i> property sheet.
left mouse button down + mouse move	Rotates the model.
SHIFT + left mouse button down + mouse move	Shifts the model.
mouse wheel	Zooms the model.
CTRL + mouse move	Zooming.
key LEFT, RIGHT	Rotates the model about the vertical axis.
key UP, DOWN	Zooms the model.
key Page Up, Page Down	Shift the model along vertical axis.
E	Set the view from E to W.
W	Set the view from W to E.
Ν	Set the view from N to S.
S	Set the view from S to N.
М	Map View.

**Selection mode** is used for interactive modification the model in 3D. The table below describes the commands used in modification, which differs from the **rendering mode** (previous table).

Command	Action
CTRL + left mouse	

button down + mouse move	Zooms the model.
CTRL + SHIFT + left mouse button down + mouse move	Rotates the model.
	Moves the body vertex along vertical. See <u>model modification</u> for details.

For Help, press F1	0%	row 20	col 17	x=6863.3	y=8062.3	z=163.271	Gz=-36.87684

#### **Status Bar**

The status bar is displayed at the bottom of the Mod3D window. To display or hide the status bar, use the **Status Bar** command in the **View** menu.

The left area of the status bar describes actions of menu items as you use the arrow keys to navigate through menus. This area similarly shows messages that describe the actions of toolbar buttons as you press them, before releasing them. If after viewing the description of the toolbar button command you wish not to execute the command, then release the mouse button while the pointer is off the toolbar button.

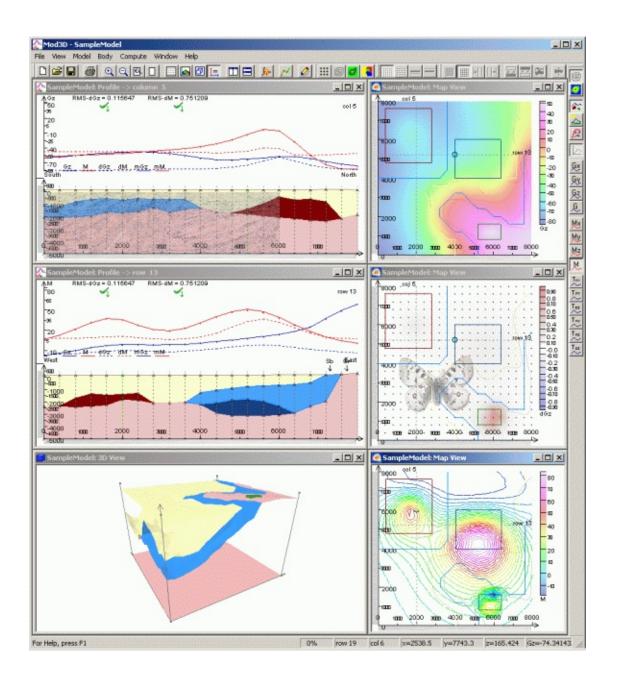
The right areas of the status bar indicate which of the following keys are latched down:

Indicator	Description
%	Shows computing progress
row	Shows current row.
col	Shows current column.
Х	Actual x coordinate.
у	Actual y coordinate.
Z	Actual z coordinate.
field	Actual field value for given row and column.

## What is Mod3D?

# **Mod3D** is an interactive 3D geophysical gravity and magnetic modeling software.

**Mod3D** has been developed to create 3D geophysical models in an user friendly interactive environment. Anomalous gravity and/or magnetic fields are computed using formulae for polyhedral bodies. The *Map View*, *Profile View* and 3D View are provided on modeled half-space. The Map View provides an overview on the model geometry projected to the horizontal plane, and shows bitmaps or contours of modeled field grids and topography. The Profile View provides an interface, where the polyhedral bodies are defined in sets of perpendicular cross sections running through the grid nodes. More profiles can be opened simultaneously, to get better overview over the geometry in both south-north and west-east directions respectively. Copying of the bodies or the whole cross section to the next or previous profile followed up by reshaping of the geometry speeds up the process of model creation. Profile view also shows curves of computed and/or measured and/or difference fields. Geo-referenced bitmaps could be imported into Mod3D, and drawn transparently to the *Map View* or *Profile View*. An example would be a geological map shown in *Map* View, or a seismic section displayed in a selected Profile View. Main geological units could be digitized in *Map View* which are shown as check marks to achieve better orientation in the Profile View. The model definition system controls internally the consistency of the polyhedra geometries, or their topology in other words. The controlling system prevents overlapping or crossing of the polyhedra, simplifies reshaping of the existing bodies and reduces time needed for model creation.



## How To

Begin? Create / Modify the model?

# New command (File menu)

Use this command to create a new document in Mod3D.

You can open an existing document with the <u>Open command</u>.

## **Open command (File menu)**

Use this command to open an existing document in a new window. You can open multiple documents at once. Use the **Window** menu to switch among the multiple open documents. See <u>Window 1, 2, ... command</u>.

You can create new documents with the <u>New command</u>.

## **Close command (File menu)**

Use this command to close all windows containing the active document. Mod3D suggests that you save changes to your document before you close it. If you close a document without saving, you lose all changes made since the last time y ou saved it. Before closing an untitled document, Mod3D displays the <u>Save As</u> <u>dialog box</u> and suggests that you name and save the document.

#### Save command (File menu)

Use this command to save the active document to its current name and directory. When you save a document for the first time, Mod3D displays the <u>Save As</u> <u>dialog box</u> so you can name your document. If you want to change the name and directory of an existing document before you save it, choose the <u>Save As</u> <u>command</u>.

#### Save As command (File menu)

Use this command to save and name the active document. Mod3D displays the <u>Save As dialog box</u> so you can name your document.

To save a document with its existing name and directory, use the <u>Save command</u>.

# Import command (File Menu)

Use this command to import various objects as grids, bitmaps, guiedlines.

Measured Field	Imports new measured field grid
<u>Bitmap</u>	Imports a bitmap image.
<u>Guideline</u>	Imports a gudeline.
Body	Imports body.

#### **Print command (File menu)**

Use this command to print a document. This command presents a <u>Print dialog</u> <u>box</u>, where you may specify the range of pages to be printed, the number of copies, the destination printer, and other printer setup options.

In development! May produce errors!

#### **Print Preview command (File menu)**

Use this command to display the active document as it would appear when printed. When you choose this command, the main window will be replaced with a print preview window in which one or two pages will be displayed in their printed format. The print preview toolbar offers you options to view either one or two pages at a time; move back and forth through the document; zoom in and out of pages; and initiate a print job.

## **Print Setup command (File menu)**

Not fully supported!

Use this command to select a printer and a printer connection. This command presents a <u>Print Setup dialog box</u>, where you specify the printer and its connection.

## **Exit command (File menu)**

Use this command to end your Mod3D session. You can also use the **Close** command on the application **Control** menu. Mod3D prompts you to save documents with unsaved changes.

#### **Toolbar command (View menu)**

Use this command to display and hide the toolbar, which includes buttons for some of the most common commands in Mod3D, such as **File Open**. A checkmark appears next to the menu item when the toolbar is displayed.

See <u>Toolbar</u> for help on using the toolbar.

#### Status Bar command (View menu)

Use this command to display and hide the status bar, which describes the action to be executed by the selected menu item or pressed toolbar button, and keyboard latch state. A checkmark appears next to the menu item when the status bar is displayed.

See <u>Status Bar</u> for help on using the status bar.

## 1, 2, ... command (Window menu)

Mod3D displays a list of currently open document windows at the bottom of the **Window** menu. A checkmark appears in front of the document name of the active window. Choose a document from this list to make its window active.

#### Index command (Help menu)

Use this command to display the opening screen of help. From the opening screen, you can jump to step-by-step instructions for using Mod3D and various types of reference information.

Once you open help, you can click the **Contents** button whenever you want to return to the opening screen.

# About command (Help menu)

Use this command to display the copyright notice and version number of your copy of Mod3D.

### File Save As dialog box

The following options allow you to specify the name and location of the file you're about to save:

#### File Name

Specifies a file name to save a document with a different name. Mod3D adds the extension you specify in the **Save File As Type** box.

#### Drives

Specifies the drive in which you want to store the document.

#### Directories

Specifies the directory in which you want to store the document.

#### Network

Click this button to connect to a network location, assigning it a new drive letter.

Import Measured Field command (File \ Import menu)

Import Bitmap command (File \ Import menu)

#### **Import Guideline command**

Use this command to import guideline. Guideline is an object, which sipmlifies the orientation over the observation area. Guideline is shown on both *Map View* and *Profile View*. In *Profile View* is shown the intersection of the current profile with guideline(s). Guideline can be imported from text filewith format described below.

#### **Gudeline file format:**

keywords: *line [name]* describes the begining of guideline; name parameter is optional but recomended and is string shown on *Profile View* as a description of guideline.

After line*line [name]* keyword follows data section. Data section can contain *n* floating point numbers in on line. First coordinate is *x* followed by *y* and *z* coordinates. First two are necassary for valid piont. Third, *z* coordinate can be omited.

```
*** file "guideline.dat" ******
line sampleGL
100 100 10
150.1 200.5 8.6
....
line anotherGL
10 20
25 30
35 40
...
...
*** end of file "gudeline.dat" ****
```

Gudelines can be edited in guideline editor. To edit guideline choose from menu Edit \ Edit Guideline.

Import Body command (File \ Import menu)

## Print dialog box

The following options allow you to specify how the document should be printed:

#### Printer

Displays the active printer and printer connection. Choose the **Setup** option to change the printer and printer connection.

#### Setup

Displays a <u>Print Setup dialog box</u>, so you can select a printer and printer connection.

#### **Print Range**

Specifies the pages you want to print:

All	Prints the entire document.
Selection	Prints the currently selected text.
Pages	Prints the range of pages you specify in the <b>From</b> and <b>To</b> fields.

### Copies

Specifies the number of copies you want to print for the above page range.

### **Collate Copies**

Prints copies in page number order, instead of separated multiple copies of each page.

## **Print Quality**

Specifies the quality of the printing. Generally, lower quality printing takes less time to produce.

## **Print Setup dialog box**

The following options allow you to select the destination printer and its connection.

#### Printer

Specifies the printer you want to use. Choose the default printer, or choose the **Specific Printer option** and select one of the current installed printers shown in the box. You install printers and configure ports using Control Panel.

#### Orientation

Specifies **Portrait** or **Landscape**.

#### **Paper Size**

Specifies the size of paper that the document is to be printed on.

#### **Paper Source**

Specifies the paper source, because some printers offer multiple trays for different paper sources.

#### **Options**

Displays a dialog box where you can make additional choices about printing, specific to the type of printer you have selected.

#### Network

Click this button to connect to a network location, assigning it a new drive letter.