Working with Shape Models
This SBMT tutorial explains how to:

- Select a shape model
- Manipulate shape models
- Work with shape models using the control panel
- Export a shape model
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Selecting a shape model

- Click on “Body” in the menu bar
- Navigate to the object of interest
- Select a model type (e.g., image-based, radar-based)
- Click on the desired shape model
- New shape then appears in the rendering panel

Note: Only image-based shape models have spacecraft data associated with them. You can access spacecraft data in many, but not all, image-based shape models in the SBMT.
Example: Navigating to the “Gaskell et al. (2008)” image-based shape model of Itokawa
Example: The Itokawa shape model appears once the user clicks “Gaskell et al. (2008)”.
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Manipulating a shape model

In the **rendering panel**, you can:

- Rotate the shape model
- Zoom in and out of the shape model
- Pan across the shape model
- Spin the shape model
- Snap to specific views using snap-to-view buttons
Rotate a shape model

- Click and hold down the left mouse button
- Drag the mouse around the rendering panel

Clicking the lock-axis button fixes the rotation to be around the X, Y, or Z axis.
Zoom in and out of a shape model

- Option 1: Use the mouse wheel.
- Option 2: Use two fingers on a laptop touchpad.
- Option 3: Hold down the right mouse button and drag the mouse upward (zoom in) or downward (zoom out).
Pan across a shape model

- Hold down shift
- Left click and drag the shape

Panning moves the shape model sideways or up-and-down without rotating the shape model.
Spin a shape model

- Hold down control
- Left click and drag the shape

By default, the shape model spins about an axis that points into the center of the rendering panel.

To rotate around a different point, place your cursor over the point about which you wish to rotate and press “c”. Press “r” to return to the default center of rotation.
Snap to a view

Click one of the snap-to-view buttons to reset the view to a pre-defined state.
Manipulating a shape model

From **File** in the menu bar, you can

- Change the camera view
Change the camera view

Select File → Camera to open the Camera window.

By default, the vertical field of view is 30° and the distance is chosen so that the entire shape model fits in the rendering panel.

Enter new values, and click “Apply” and then “OK”.
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Working with a shape model

In the **control** panel, you can:

- Change shape model resolution
- Add or remove plate coloring
- Show or hide the coordinate grid
- Change the surface representation
- See shape model statistics
Change shape model resolution

Click the button next to the desired resolution

Note: It’s normal for your computer to take ~30 seconds to 1 minute to load a very high resolution shape model.
Add or remove plate coloring

Plate coloring options appear here

Standard plate colorings: slope, elevation, gravitational acceleration, gravitational potential.

“RGB” lets users display combinations of standard plate colorings.

Plate colorings may take a minute or two to load for very high resolution shape models.
Choose from several palettes

Specify min/max of color scale here (or use default)

Standard plate coloring example: Itokawa shape model colored by elevation.
RGB plate coloring example: Gaskell et al. (2008) Itokawa shape model colored by “RGB” option. R=elevation, G=slope, B=gravitational acceleration.

Use dropdown boxes to assign plate properties (e.g., elevation) to color channels.
Click this button to color plates using a custom data set.

Example: Setting custom plate coloring.
Clicking "Customize Plate Coloring" opens this dialog, which lists all of the available plate data.

Click "New" to add another dataset

Example: Setting custom plate coloring.
Example: Setting custom plate coloring.

Navigate to the data you will use to color the plates. The number of lines in the file must match the number of plates in the shape model.

Name the dataset; add units if desired. Then click “OK” and then “Close”.

Example: Setting custom plate coloring.
The new plate coloring appears in this drop-down menu.
Show or hide coordinate grid

Click the button to toggle the grid on and off.

Right clicking on the grid opens a menu. From it, you can change grid color, spacing, & line width.
Show or hide coordinate grid

Right clicking on the grid opens a menu where you can change grid color, spacing, & line width.
Show or hide coordinate labels

Click to toggle the coordinate labels

The latitude and longitude of the point beneath the cursor can be found here.
Change surface representation

Use buttons to select your preferred representation.
Example: Identical regions of a shape model displayed by the four different representations.
See shape model statistics

Scroll to bottom of control panel

Click here to see more stats
It’s normal for the SBMT to be unresponsive for 30 – 60 seconds after clicking “Show more statistics” for very high resolution shape models.

Example: The view after clicking “Show more statistics”.

Statistics:
- Number of Plates: 3145728
- Number of Vertices: 1579014
- Surface Area: 0.4073634 km²
- Volume: 0.017773195 km³
- Plate Area Average: 1.1294783 m²
- Plate Area Minimum: 0.01257682 m²
- Plate Area Maximum: 0.9874019 m²
- X: [-0.2566000, 0.3059900] km
- Y: [-0.1566000, 0.1502500] km
- Z: [-0.1196310, 0.1243300] km
- Number of Edges: 4718592
- Reference Potential: -0.014684684411415587 [J/kg]
- Plate Area Standard Deviation: 0.05170479 m²
- Edge Length Average: 0.5972739 m
- Edge Length Minimum: 0.1315280 m
- Edge Length Maximum: 2.263674 m
- Edge Length Standard Deviation: 0.1924139 m
- Is Surface Closed?: Yes
- Centroid: [7.041067e-05, -1.385976e-05, -4.549023e-05] km
- Moment of Inertia Tensor Relative to Origin:
  [0.0001325640, 1.296387e-05, -7.127515e-07] [1.296387e-05, 0.0003764662, -2.820284e-07] [-7.127515e-07, -2.820284e-07, 0.0003962564]
- Moment of Inertia Tensor Relative to Centroid:
  [0.0001325640, 1.296385e-05, -7.128083e-07] [1.296385e-05, 0.0003764660, -2.820172e-07] [-7.128083e-07, -2.820172e-07, 0.0003962563]
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Exporting a shape model

- In the menu bar, click “File”, then “Export shape model to”.
- Select the file format of your choice (PLT, OBJ, STL).
- Give the file a name.
- Click “Save”.
Example: Exporting the current shape model (Itokawa, medium-resolution) to an OBJ file.
Example: Give the file a name, click “Save”, and you’re done.
SBMT

For more information, visit sbmt.jhuapl.edu.