

SBMT

Introduction to the Small Body Mapping Tool

This SBMT tutorial:

- Explains the basic architecture of the SBMT
- Summarizes the publicly available data in the SBMT
- Describes the SBMT user interface
- Shows how to save the state of the SBMT and restore a previously saved session

This SBMT tutorial:

- Explains the basic architecture of the SBMT
- Summarizes the publicly available data in the SBMT
- Describes the SBMT user interface
- Shows how to save the state of the SBMT and restore a previously saved session

The SBMT architecture has 2 parts.

- SBMT client
- SBMT server

The SBMT client runs locally.

- Written in Java 8 for cross-platform support
- Uses additional third-party libraries: VTK for 3D visualization, Apache Commons Math for some mathematical procedures, JFreeChart for plotting
- Communicates with the server to download data and perform queries

The SBMT server has 2 components.

- A web server with PHP support
- A MySQL database for storing metadata
- Searched data is cached locally on user's machine and downloaded again only if server data is updated
- Currently over 2 TB of data on server

This SBMT tutorial:

- Explains the basic architecture of the SBMT
- Summarizes the publicly available data in the SBMT
- Describes the SBMT user interface
- Shows how to save the state of the SBMT and restore a previously saved session

The SBMT includes many datasets.

These include shape models, registered images, spectra, and altimetry datasets from spacecraft missions, and geophysical data products.

The SBMT includes comets, near-Earth asteroids, main-belt asteroids, and planetary satellites.

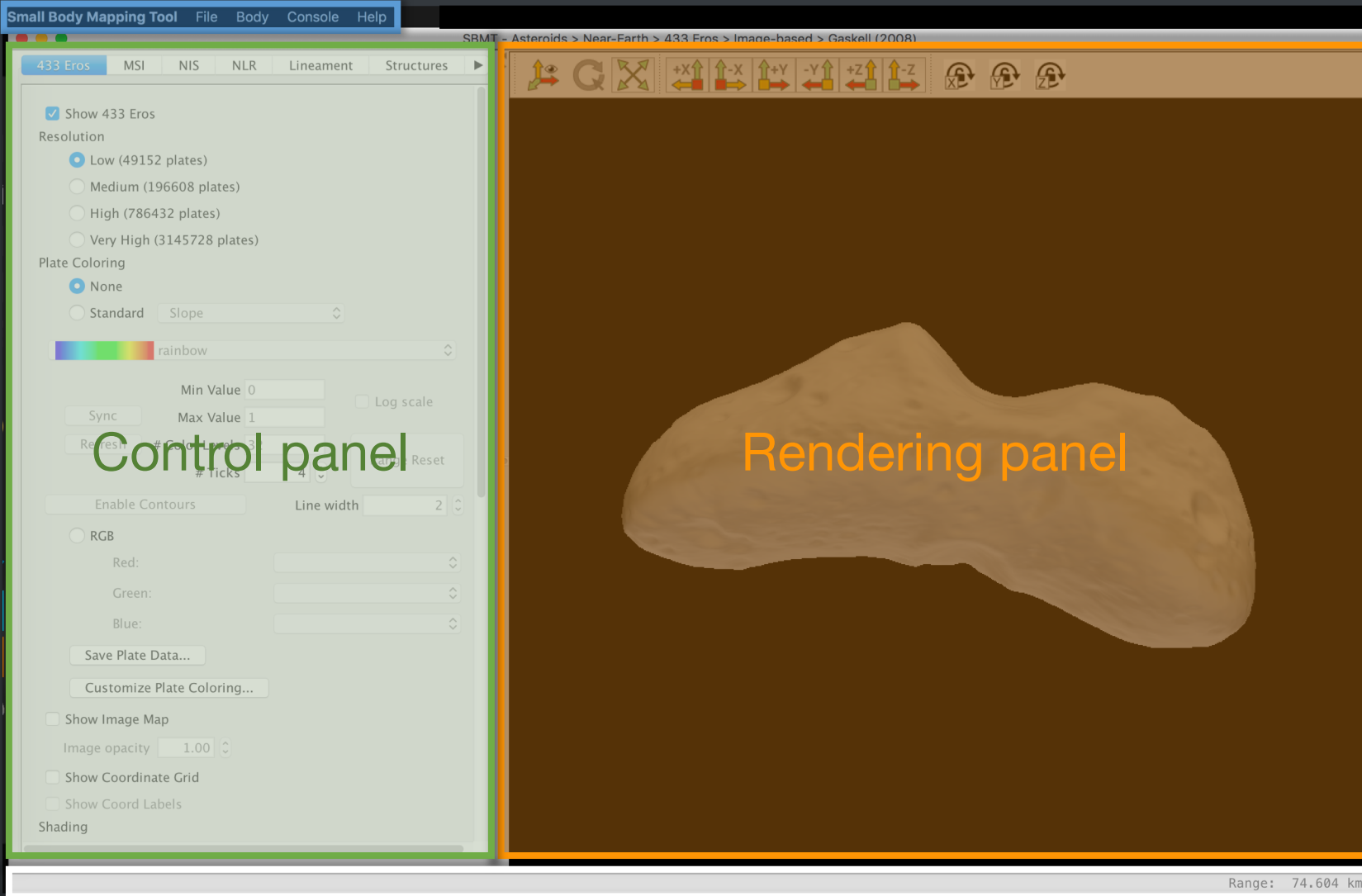
Visit sbmt.jhuapl.edu/Object-Index.php for a complete listing of objects and datasets.

This SBMT tutorial:

- Explains the basic architecture of the SBMT
- Summarizes the publicly available data in the SBMT
- Describes the SBMT user interface
- Shows how to save the state of the SBMT and restore a previously saved session

The SBMT user interface has 4 parts.

Menu bar



Control panel

Rendering panel

Status bar

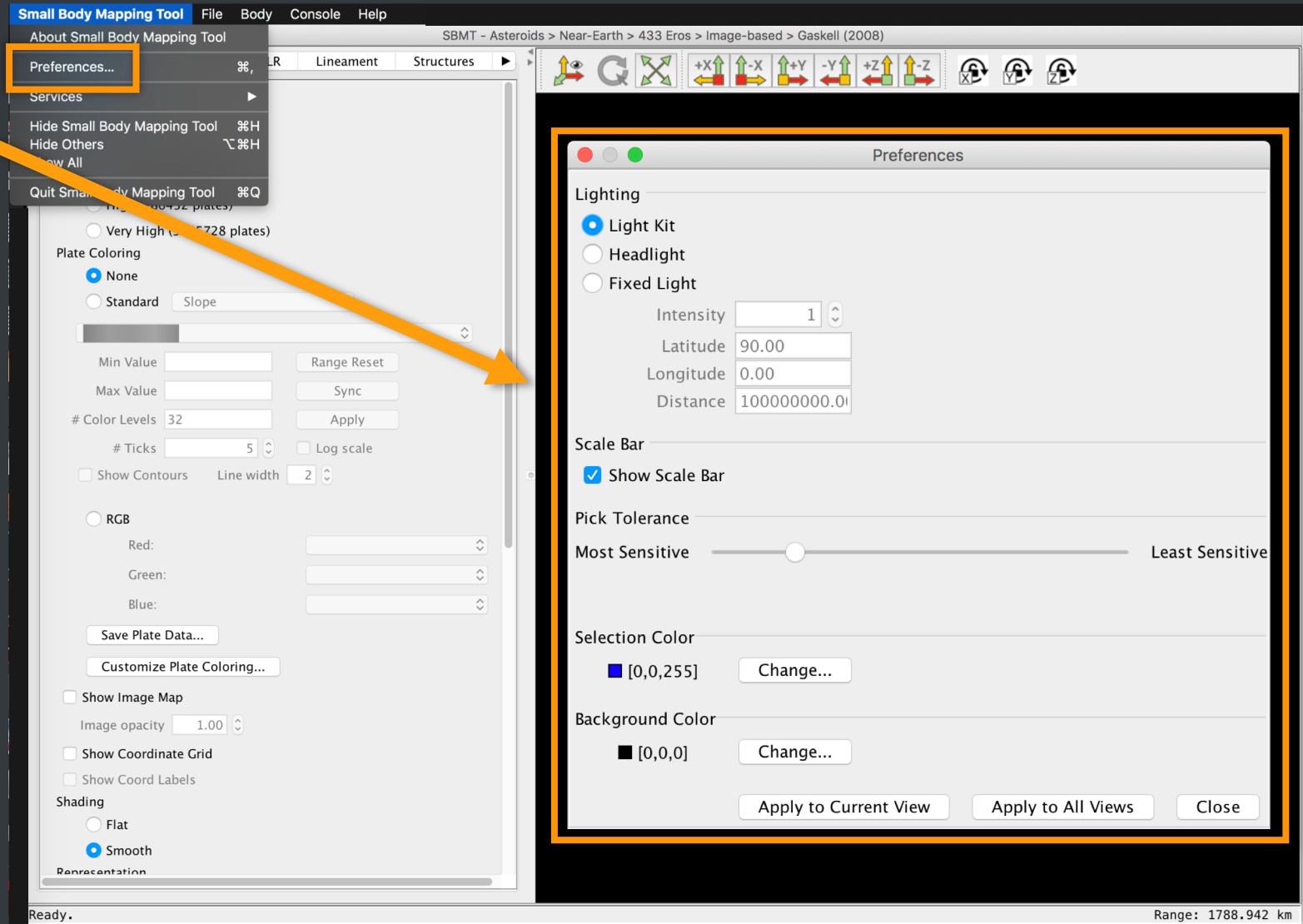
Each part serves a different purpose.

- **Menu bar:** Adjust preferences, select shape models, update password, access help/tutorials, etc.
- **Control panel:** Set shape model parameters, search for and display spacecraft data, map structures, etc.
- **Rendering panel:** View shape models and spacecraft datasets in three dimensions, etc.
- **Status bar:** See range to object, etc.

Preferences affects several things.

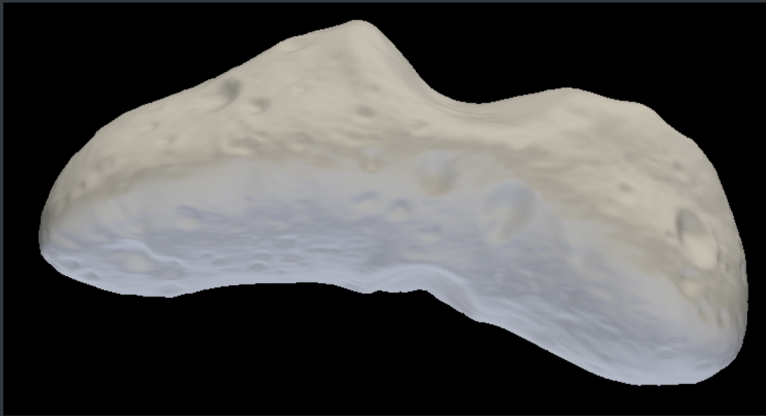
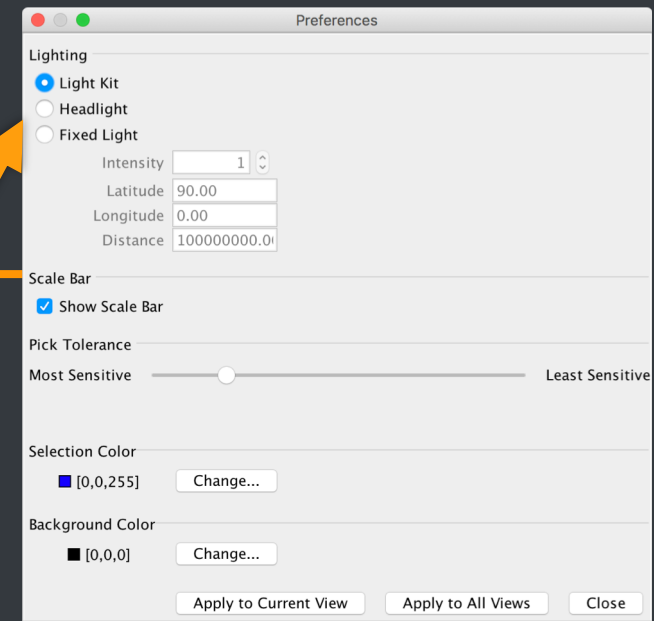
The preferences dialog allows users to change how the shape model is lit, the pick tolerance, selection color, and background color.

Click “Preferences”, then make the desired changes in the dialog that opens.

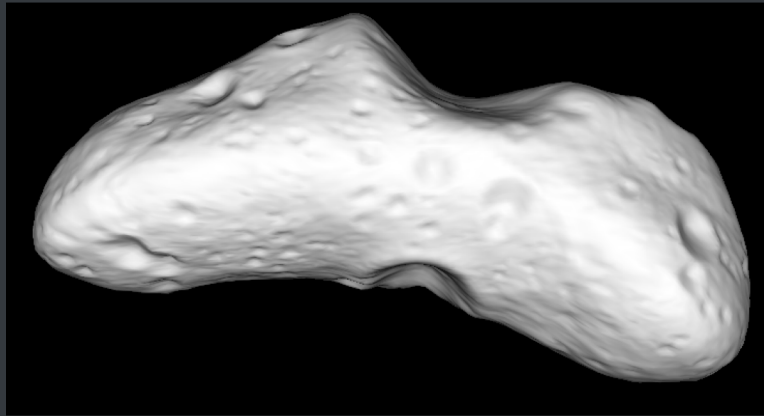


Lighting options

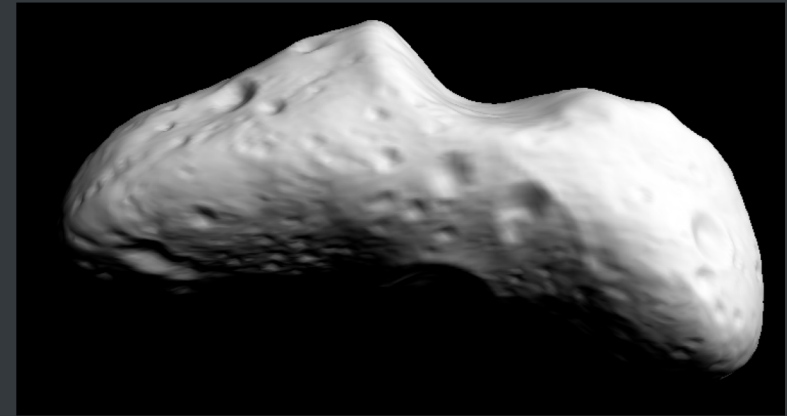
Use the radio buttons to toggle between the options. Click “Apply to Current View” to apply the lighting to the shape.



Light kit



Headlight

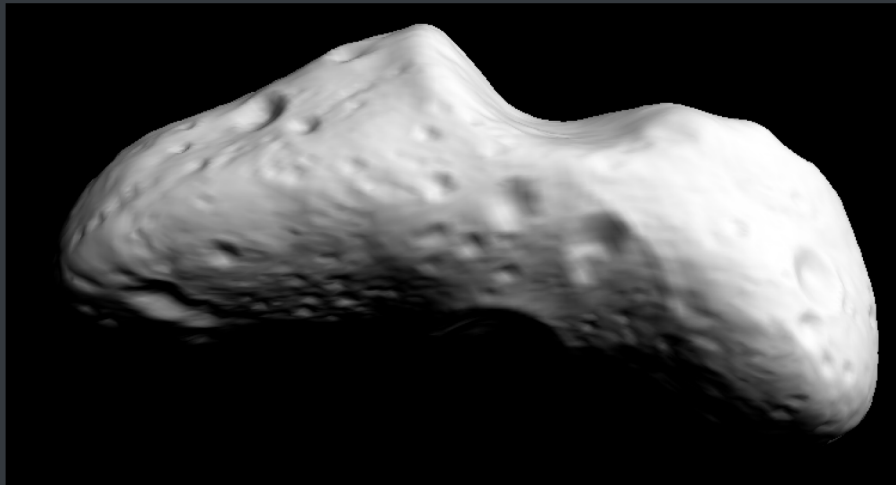
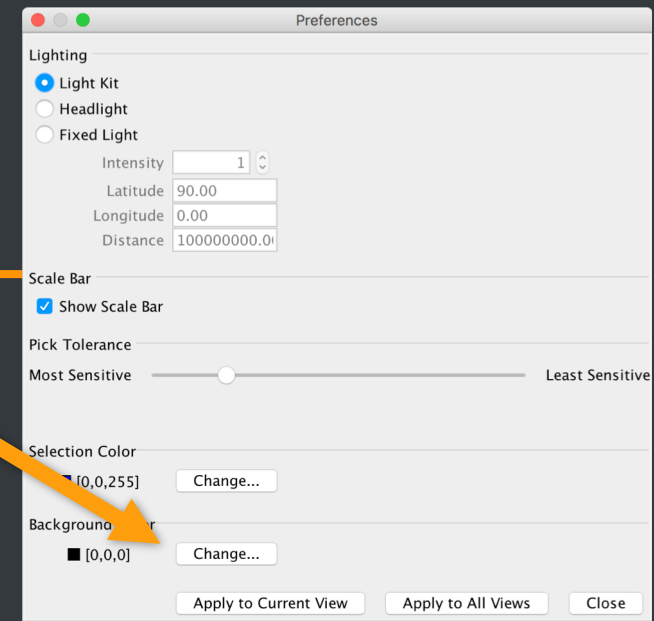


Fixed light

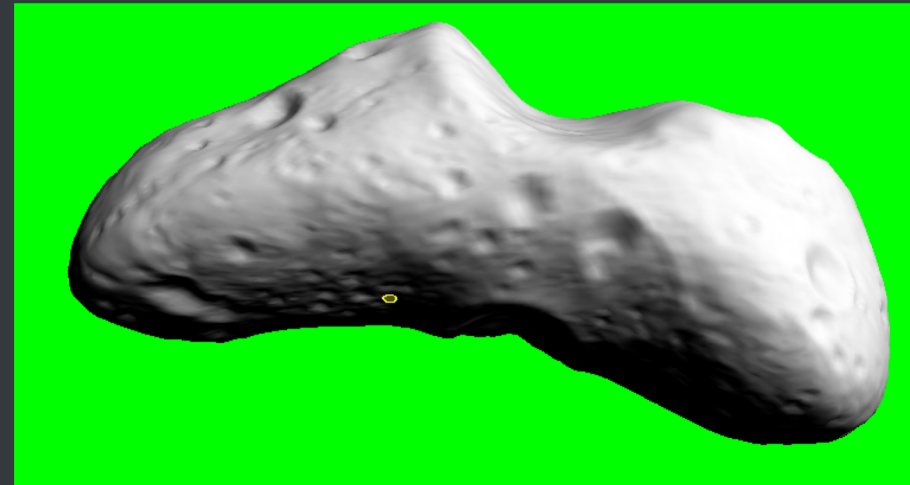
(user can specify intensity, latitude/longitude, and distance to the light source)

Background color

Changing the background color can be helpful for visualizing the limbs of partially-illuminated shape models. Click “Change” and then choose the desired color.



Black background



Green background

This SBMT tutorial:

- Explains the basic architecture of the SBMT
- Summarizes the publicly available data in the SBMT
- Describes the SBMT user interface
- Shows how to save the state of the SBMT and restore a previously saved session

SBMT

The save state capabilities are under active development. The following slides describe how the save state feature works in version 0.6.5 of the SBMT. Additional save state capabilities will be forthcoming in versions 0.7.0 and 0.7.5 of the Tool.

What the SBMT save state does.

- The save state feature allows users to close the Tool and re-open it with the exact same viewing geometry.
- In version 0.6.5, “Save Session As...” does not save the images, structures, regional DTMs, or custom data displayed on the body.
- Users must save these before closing the Tool and then reload the saved files.

Example: Using “Save Session As...”

- A user is working on the Gaskell (2013) shape model of Vesta.
- The user has the shape model oriented just the way she wants it.
- The user has several images mapped, as well as some structures and a regional DTM.

Step 1: Save the list of images.

SBMT - Asteroids > Main Belt > 4 Vesta > Image-based > Gaskell (2013)

4 Vesta Structures Custom Data Regional DTMs

Emission from 0 to 180 deg

Phase from 0 to 180 deg

Select Filter Name

- ☒ Filter 1 (735 nm)
- ☒ Filter 2 (548 nm)
- ☒ Filter 3 (749 nm)
- ☒ Filter 4 (918 nm)
- ☒ Filter 5 (978 nm)

Select User Defined Search Name

- ☒ FC1
- ☒ FC2

Select Region Clear Region Search

397 images matched

Map	Show	Frus	Bndr	Id	Filename	Date
☒	☒	☐	☒	1	FC21B0003559_11218072042F1A.FIT	2011-Aug-0
☒	☒	☐	☒	2	FC21B0003575_11218073612F1A.FIT	2011-Aug-0
☒	☒	☐	☒	3	FC21B0003591_11218075142F1A.FIT	2011-Aug-0
☒	☒	☐	☒	4	FC21B0003607_11218080713F1A.FIT	2011-Aug-0
☒	☒	☐	☒	5	FC21B0003623_11218082242F1A.FIT	2011-Aug-0
☒	☒	☐	☒	6	FC21B0003895_11218124612F1A.FIT	2011-Aug-0
☒	☒	☐	☒	7	FC21B0003957_11223204301F1A.FIT	2011-Aug-1
☐	☐	☐	☐	8	FC21B0003958_11223211258F1A.FIT	2011-Aug-1
☐	☐	☐	☐	9	FC21B0003966_11223214300F1A.FIT	2011-Aug-1
☐	☐	☐	☐	10	FC21B0004003_11224021258F1A.FIT	2011-Aug-1
☐	☐	☐	☐	11	FC21B0004011_11224024300F1A.FIT	2011-Aug-1
☐	☐	☐	☐	12	FC21B0004544_11226180657F1A.FIT	2011-Aug-1
☐	☐	☐	☐	13	FC21B0004552_11226181629F1A.FIT	2011-Aug-1
☐	☐	☐	☐	14	FC21B0004553_11226183727F1A.FIT	2011-Aug-1
☐	☐	☐	☐	15	FC21B0004554_11226184657F1A.FIT	2011-Aug-1
☐	☐	☐	☐	16	FC21B0004562_11226185629F1A.FIT	2011-Aug-1
☐	☐	☐	☐	17	FC21B0004563_11226191727F1A.FIT	2011-Aug-1
☐	☐	☐	☐	18	FC21B0004564_11226192657F1A.FIT	2011-Aug-1

Number Boundaries: 10

Remove All Images Remove All Boundaries

Load List... Save List... **Save Selected List..**

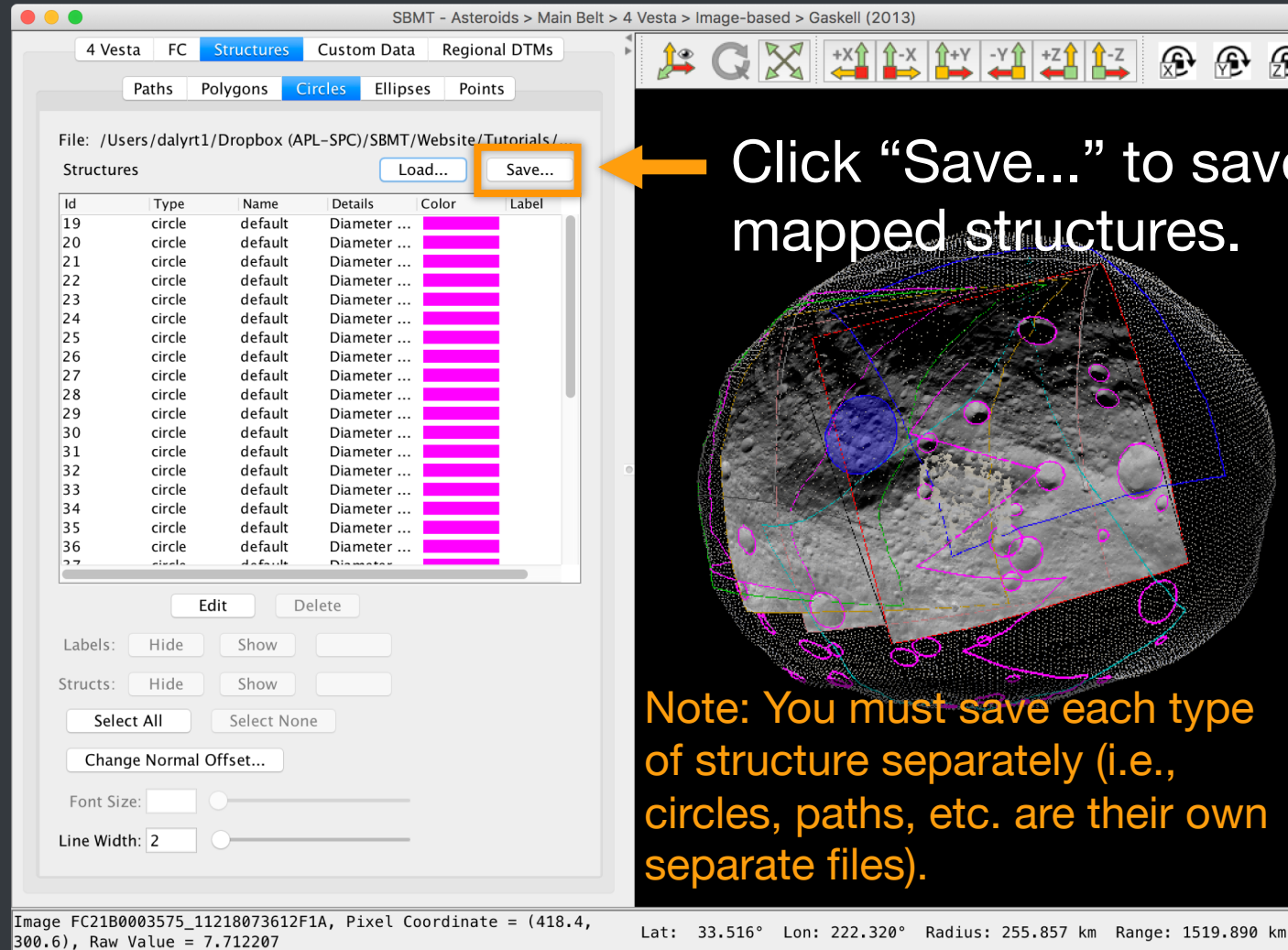
View Search Results as Image Gallery

Image Cube Generation

Image FC21B0003575_11218073612F1A, Pixel Coordinate = (418.4, 300.6), Raw Value = 7.712207 Range: 1519.890 km

Click "save selected list" to save the list of mapped images.

Step 2: Save the structures.



The screenshot shows the SBMT software interface. The top menu bar includes 'SBMT - Asteroids > Main Belt > 4 Vesta > Image-based > Gaskell (2013)'. Below this, there are tabs for '4 Vesta', 'FC', 'Structures', 'Custom Data', and 'Regional DTMs'. The 'Structures' tab is active, showing a list of structures in a table. The table has columns for Id, Type, Name, Details, Color, and Label. The 'Save...' button is highlighted with an orange box and an arrow pointing to it. Below the table are buttons for 'Edit', 'Delete', 'Labels: Hide Show', 'Struts: Hide Show', 'Select All', 'Select None', 'Change Normal Offset...', 'Font Size', and 'Line Width: 2'. On the right, a 3D model of asteroid 4 Vesta is shown with various colored circles and lines mapped onto its surface. An orange arrow points from the text 'Click "Save..." to save the mapped structures.' to the 'Save...' button. Below the 3D model, a note in orange text states: 'Note: You must save each type of structure separately (i.e., circles, paths, etc. are their own separate files).' At the bottom, a status bar displays image coordinates and orbital parameters.

File: /Users/dalyrt1/Dropbox (APL-SPC)/SBMT/Website/Tutorials /

Structures

Id	Type	Name	Details	Color	Label
19	circle	default	Diameter ...		
20	circle	default	Diameter ...		
21	circle	default	Diameter ...		
22	circle	default	Diameter ...		
23	circle	default	Diameter ...		
24	circle	default	Diameter ...		
25	circle	default	Diameter ...		
26	circle	default	Diameter ...		
27	circle	default	Diameter ...		
28	circle	default	Diameter ...		
29	circle	default	Diameter ...		
30	circle	default	Diameter ...		
31	circle	default	Diameter ...		
32	circle	default	Diameter ...		
33	circle	default	Diameter ...		
34	circle	default	Diameter ...		
35	circle	default	Diameter ...		
36	circle	default	Diameter ...		
37	circle	default	Diameter ...		

Edit Delete

Labels: Hide Show

Struts: Hide Show

Select All Select None

Change Normal Offset...

Font Size:

Line Width: 2

Image FC21B0003575_11218073612F1A, Pixel Coordinate = (418.4, 300.6), Raw Value = 7.712207

Lat: 33.516° Lon: 222.320° Radius: 255.857 km Range: 1519.890 km

Click "Save..." to save the mapped structures.

Note: You must save each type of structure separately (i.e., circles, paths, etc. are their own separate files).

Step 3: Save the regional DTMs.

SBMT - Asteroids > Main Belt > 4 Vesta > Image-based > Gaskell (2013)

4 Vesta FC Structures Custom Data **Regional DTMs**

Regional DTMs

- TutorialMap
- ✓ Map DEM
- Map DEM Boundary
- Center DEM in Window
- Properties...
- Save FITS File...**
- Change Opacity...
- Hide DEM
- Boundary Color
- Export as Custom Model

Select Region Clear Region

☐ Enter Manual Region:

Latitude (deg)

Longitude (deg)

Pixel Scale (meters)

Half Size (pixels)

Run Mapmaker

Load... Move Up Move Down Rename...

Delete from List Remove All From View

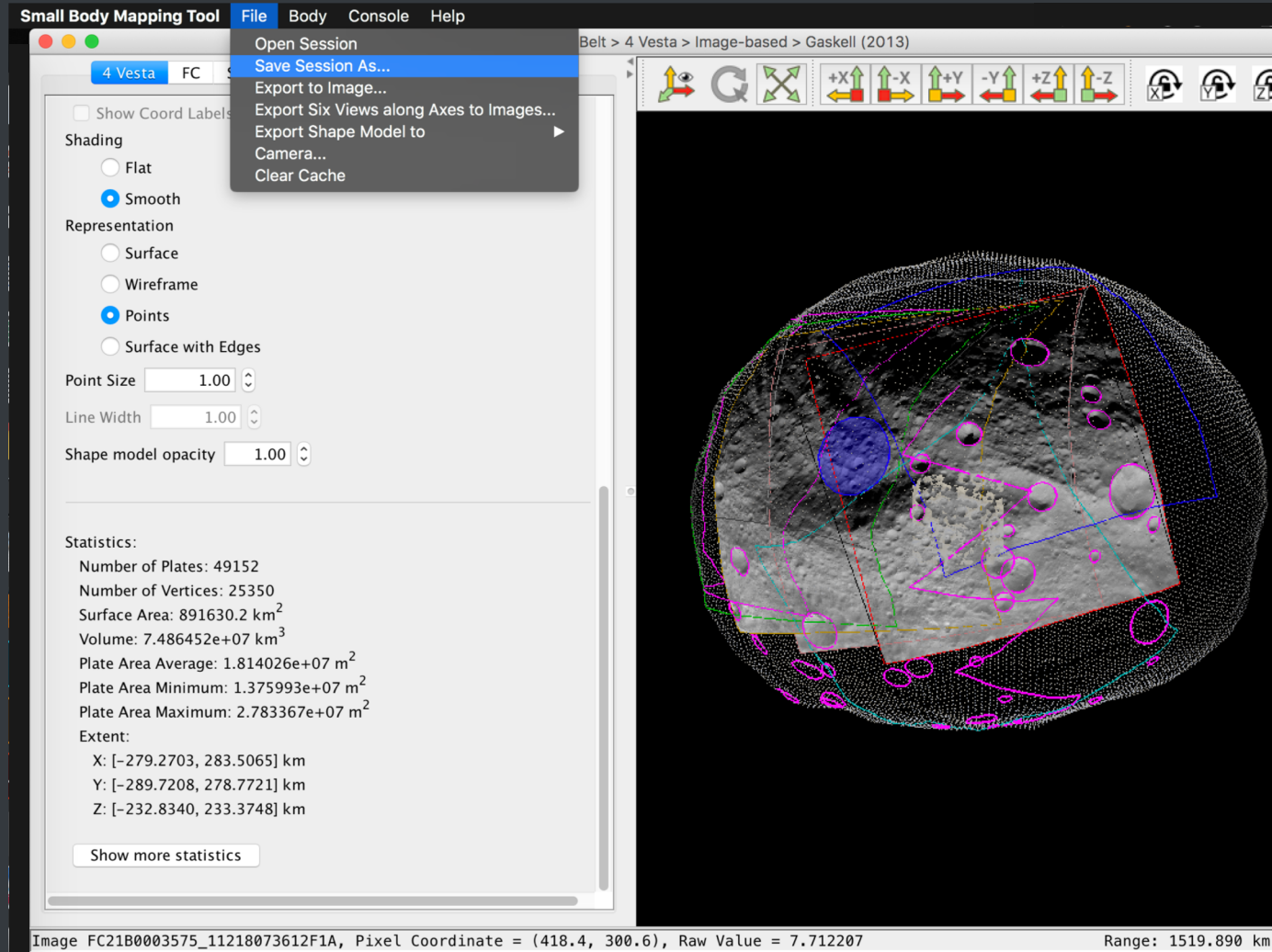
Image FC21B0003575_11218073612F1A, Pixel Coordinate = (418.4, 300.6), Raw Value = 7.712207

Lat: 5.674° Lon: 304.120° Radius: 265.544 km Range: 1519.890 km

Click "Save FITS File..." to save the regional DTM.

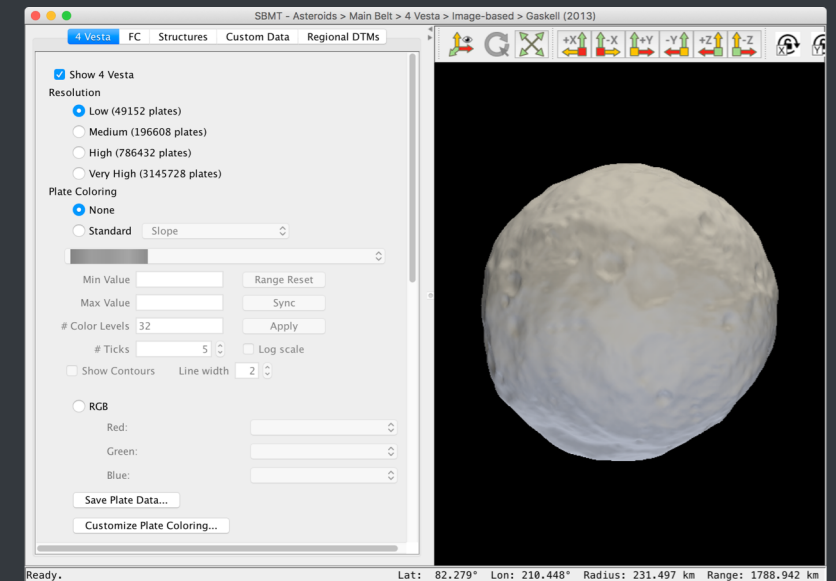
Note: You must save each DTM individually.

Step 4: Save the session.



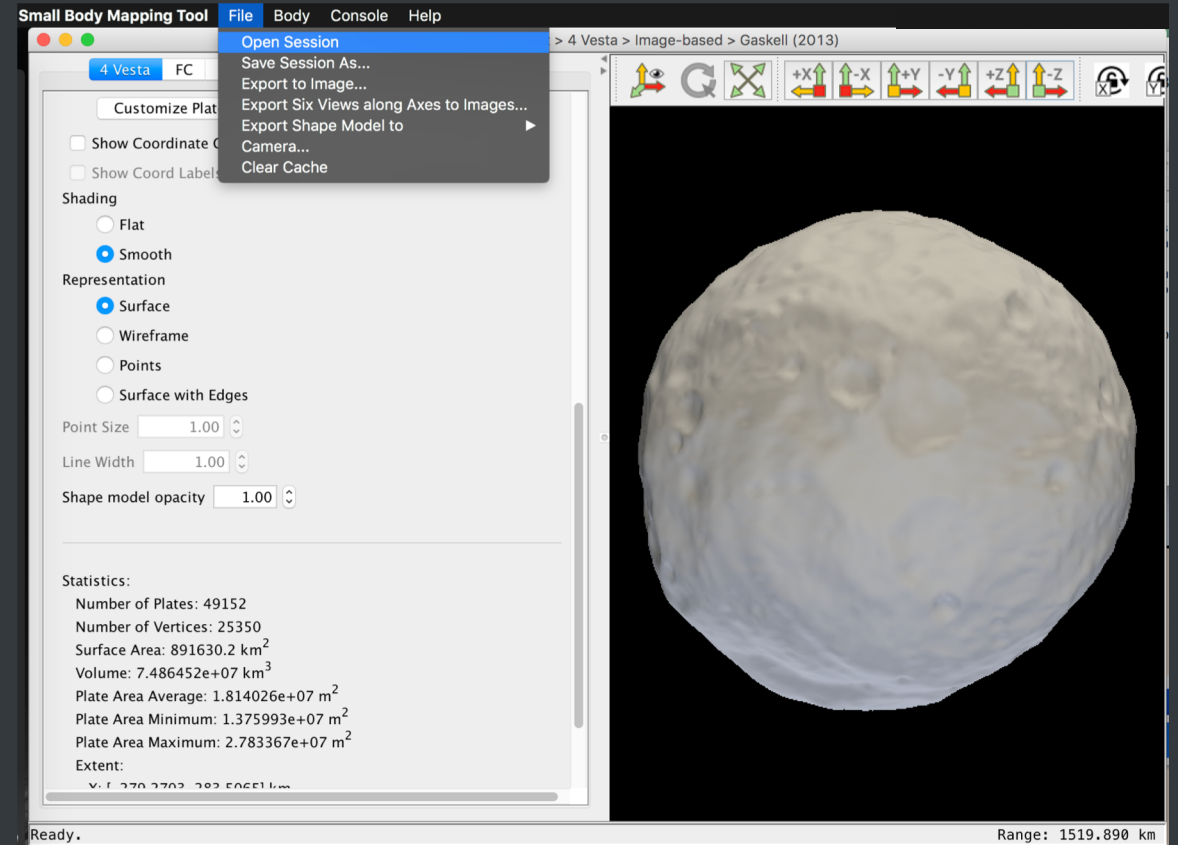
Example: Loading a saved session

- A user previously saved the session using File → “Save Session As...” and then quit the Tool.
- The user reopens the Tool, switches to the body of interest, which is shown in its default state.



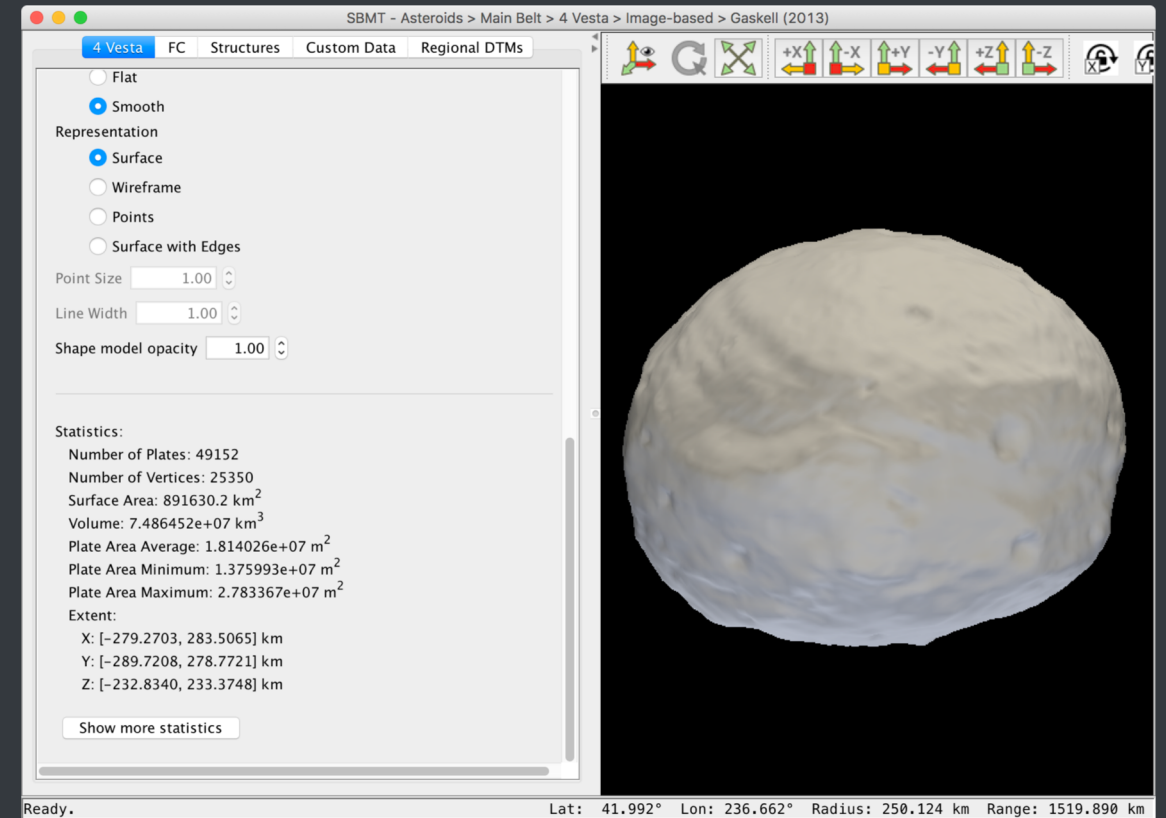
Example: Loading a saved session

- The user goes to File → Open Session and selects the saved .sbmt file.



Example: Loading a saved session

- The Tool then updates to the same view as exited before the Tool closed.
- Finally, the user would load in the saved list of images, the structure files, regional DTMs, and any custom data.



Note: "Open Session" does not yet reproduce the lighting or shape model representation.

SBMT

**For more information, visit
sbmt.jhuapl.edu.**