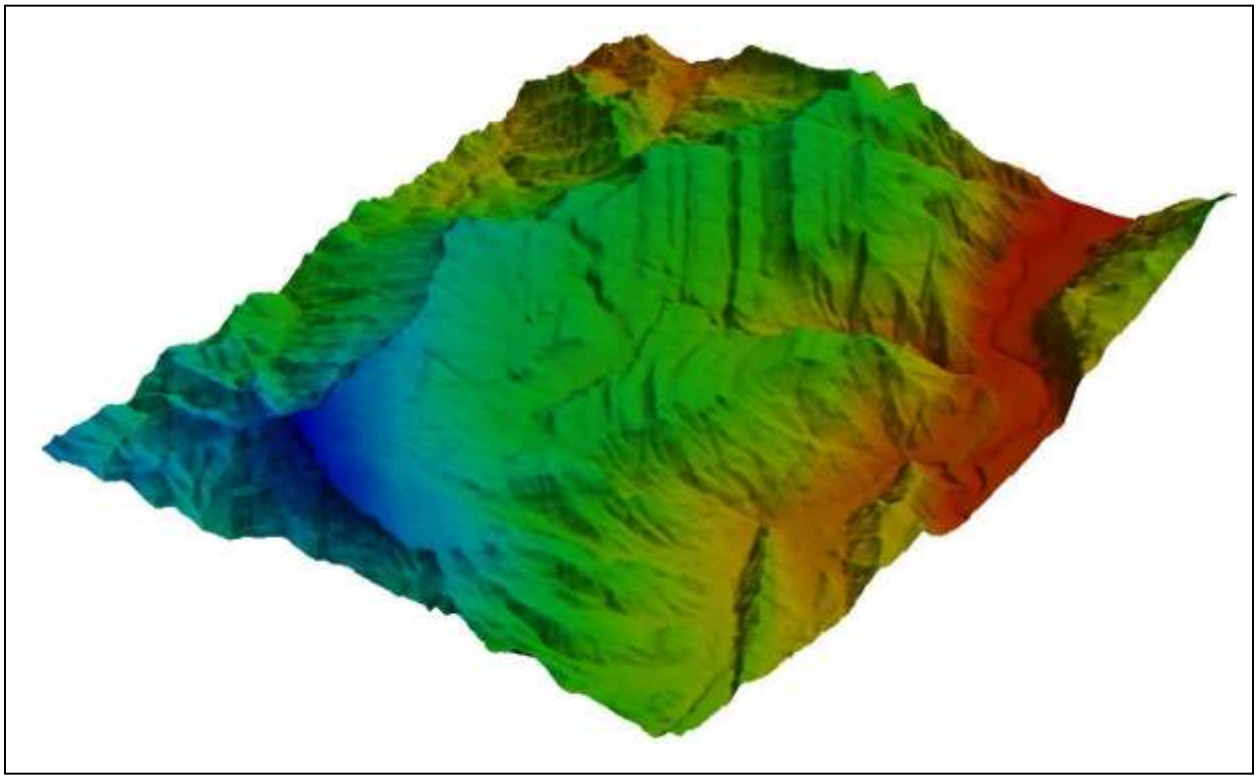
SMS v. 11.2

SMS 11.2 Tutorial

Importing Rasters



Objectives

This tutorial teaches how to import a Raster, view elevations at individual points, change display options for multiple views of the data, show the 2D profile plots, and interpolate data to mesh.

Prerequisites

- Overview Tutorial

Requirements

- Raster Module
- Map Module
- Mesh Module

Time

- 30-45 minutes

AQUAVEO™

1 Introduction

A raster consists of a matrix of pixels or cells stored and displayed in a grid formation (rows and columns). Each cell contains a value representing a type of information such as temperature or elevation. Rasters can be digital aerial photographs, images from satellites, scanned digitized pictures or even scanned maps.

In this case, the raster that will be used is a surface map containing elevation data. However, rasters can also be used as base maps (usually scanned maps and images or satellite imagery) and thematic maps (usually containing information about land use and soil maps).

2 Loading the Raster

To start, load a Digital Elevation Model (DEM) file as a raster. This DEM file contains elevation data that can be viewed and processed in SMS.

To open a raster in SMS,

1. Select *File* | **Open.** A dialog should appear.

2. In the *Open* dialog, Browse to the folder named: "data files" of the raster tutorial. This folder will be in the same location as all the other SMS tutorial folders that were downloaded when installing SMS.

3. Select the raster file named "glenwood.asc" and click **Open**.

4. A dialog will ask: "Load it as raster or scatter:" Select **Raster** to open the file. Some users may have to wait a few seconds depending on the computer being used. Once the file is open, the data should like Figure 1.

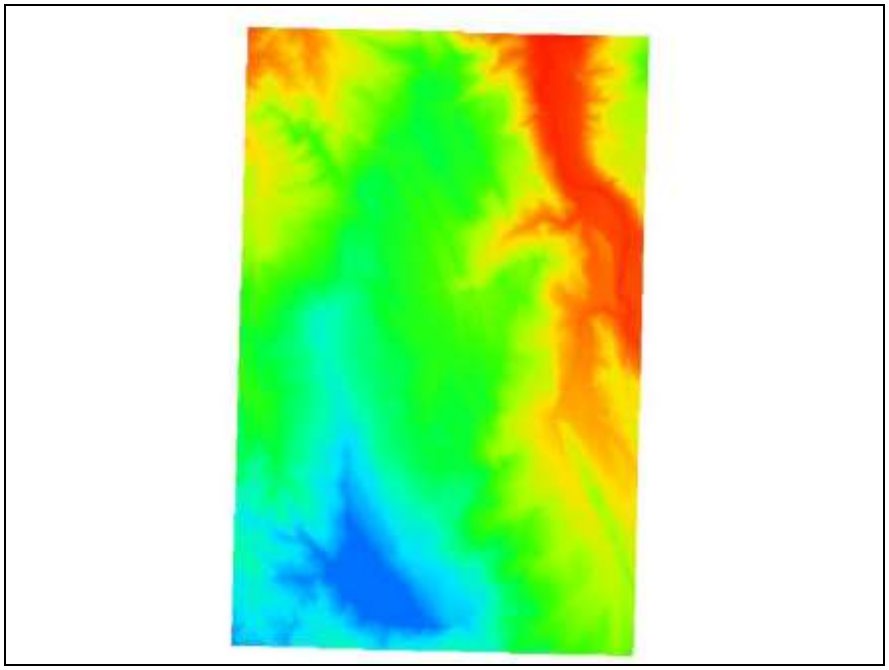


Figure 1 Raster

5. Zoom in on an area of the Raster using the **Zoom** tool on the side bar. While zooming in, notice how the image becomes pixilated. Each pixel will be a cell containing elevation data.

2.1 Elevations

As mentioned previously, a raster is a set of pixels or cells each containing data. In this case, each cell contains an elevation as data.

In order to view individual elevations at selected cells do the following steps.

1. Select the raster "glenwood.asc" in the Project Explorer to make it active.

2. Using the **Select Point** tool, select a random point of the data. Each cell has a location (X and Y) and an elevation (Z). These values are displayed below the menu bar in the *X*, *Y* and *Z* fields.

3. As selecting different points, see how those values changes.

3 Changing the Display

As the data is being displayed in planar view, it is hard to see the different elevations. SMS offers two different ways to view raster data. The data can be displayed as a Raster in block-filled contours (which is shown in Figure 1) and as a surface.

In order to change the display of the data,

1. Select *Display* | **Display Options** or select the **Display Options** icon. This will open the *Display Options* dialog.

2. In the dialog, if it is not already selected, click on *Raster* in the menu bar on the left side of the dialog.

3. Notice how the data is current set as *Displayed as raster*. Select the toggle *Display as surface* to turn it on.

4. Toggle on *Contours* under *Display as surface*.

5. Select the tab *Contours*.

6. Change the *Contour Method* to "Linear".

7. Change the *Line Thickness* to "5".

8. Click on the **Color Ramp...** button to open the *Color Options* dialog.

9. Right now, the contours are being displayed in the *Hue ramp* under *Palette Method*. Select the *Intensity ramp*. This palette method will make it easier to view the elevations. Notice that users can change the color of this palette desired. Currently leave everything as default. Click **OK** in the *Color Options* dialog.

10. Select **OK** in the *Display Options* dialog.

11. The data will now be displayed in hues of green. Using the **Rotate** tool, rotate the data.

12. Users can also change the z magnification in the *Display Options* dialog. Select *Display* | **Display Options** once more and this time select *General* from the side menu.

13. Under *Drawing Options*, toggle off *Auto z-mag*. After turning off the auto z-magnification, the user defined *Z magnification* will be displayed. Change this

number to “2.0” and click **OK** to apply changes and exit dialog.

14. Using the **Rotate** tool, rotate the data to view in 3D. To return to planar view, select the **Plan View** macro.

15. For the remainder of the tutorial, change the contour display to a color fill. Do this be opening the *Display Options* dialog again.

16. In the *Raster* display options, switch back to *Display as raster*.

17. Select **OK** in the *Display Options* dialog.

4 Editing the Projection

In order to create a profile plot as will be done in the next step, we need to set both the display projection and object projection so the object does not have a floating projection. To do this:

1. Click *Display* | **Projection**. The *Display Projections* dialog should appear.

2. Make sure the *Horizontal* projection is set to *No Projection*, then click **OK**.

3. Then right-click on the “Area Property” coverage and select **Projection**.

4. In the *Object Projection* dialog, click **OK** to set the object projection.

5 2D Profile Plot

SMS can show 2D profile plots using the Observation coverage. In this section, we will show how to do so.

1. In the Project Explorer, right-click on the “Area Property” coverage under Map Data. Select **Rename** from the menu and change the name to “Observation.”

2. Right-click on the coverage and select *Type* | *Generic* | **Observation** from the menu.

3. Click on the coverage once more to make sure it is the active coverage.

4. Using the **Create Feature Arc** tool, create two arcs as shown in Figure 2. Create the arcs starting on the left side of the raster and ending on the right side.

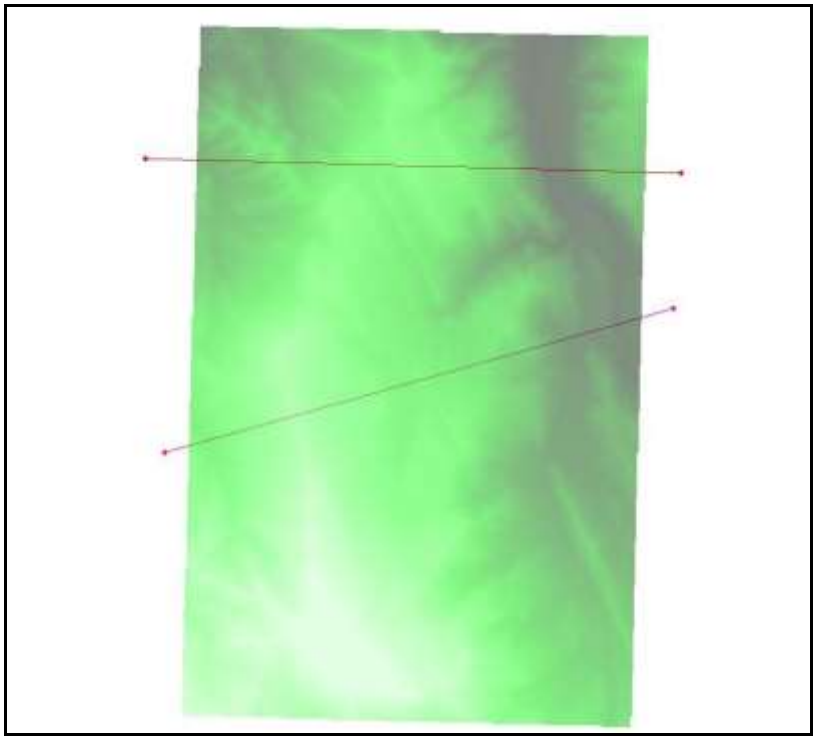


Figure 2 Observation Arc

5. After creating the arcs, select *Display* | **Plot Wizard**. This will open up the *Plot Wizard*.

6. Choose "Observation Profile" as the *Plot Type*. Click on the **Next** button to proceed to step 2 of the wizard.

7. Under the section *Coverage*, select which observation arcs to display in the plot. In this case, leave both arcs turned on.

8. Change the *Plot tolerance* to "5.0" m. The plot tolerance allows for points to become clearer in the plot as it puts a tolerance on how many points can be displayed.

9. Click **Finish** to display the profile plots. Notice the two different plots one for each arc. The plots window will be displayed at the top and the graphics window on the bottom. Users may choose to maximize one window and minimize another one to better view either window.

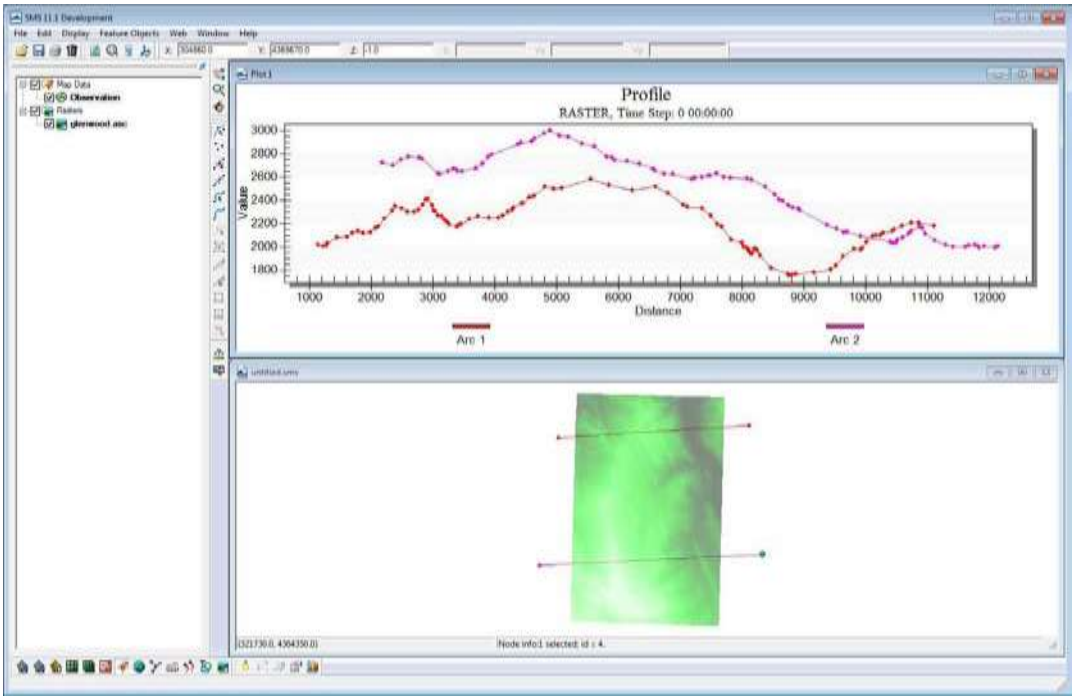


Figure 3 Profile plot for arcs

10. Using the **Select Feature Point** tool, select one of the nodes of either arc.

11. Drag the node around over the raster data. Notice how the plot will change as while moving and releasing the nodes.

12. You may open the *Data Options* (step 2) of the *Plot Wizard* again by right-clicking on the plots and selecting **Plot Data** from the menu.

13. Change the *Plot tolerance* to "1.0" m and Click **OK**. Notice how the points displayed on the plots are now denser because the tolerance was reduced.

14. Close the *Plot 1* window and maximize the graphics window.

15. Click on the **Frame** macro to frame the data.

6 Raster to Mesh Interpolation

The Raster data can also be interpolated to mesh. Meshes are used in SMS for modeling.

6.1 Creating Mesh

The first step to creating the mesh is to create a mesh coverage and providing mesh boundaries.

1. Right-click on “Map Dat”a in the Project Explorer and select **New Coverage** from the drop down menu.

2. In the *New Coverage* window, select “Generic 2D Mesh” as coverage type.

3. Under *Coverage Name* enter “Generic 2D Mesh” and click **OK** to create the coverage.

4. Click on the newly created coverage to make it active.

5. Using the **Create Feature Arc** tool click out an arc as shown in Figure 4, making a loop enclosing most of the raster data. Include multiple vertices in each arc.

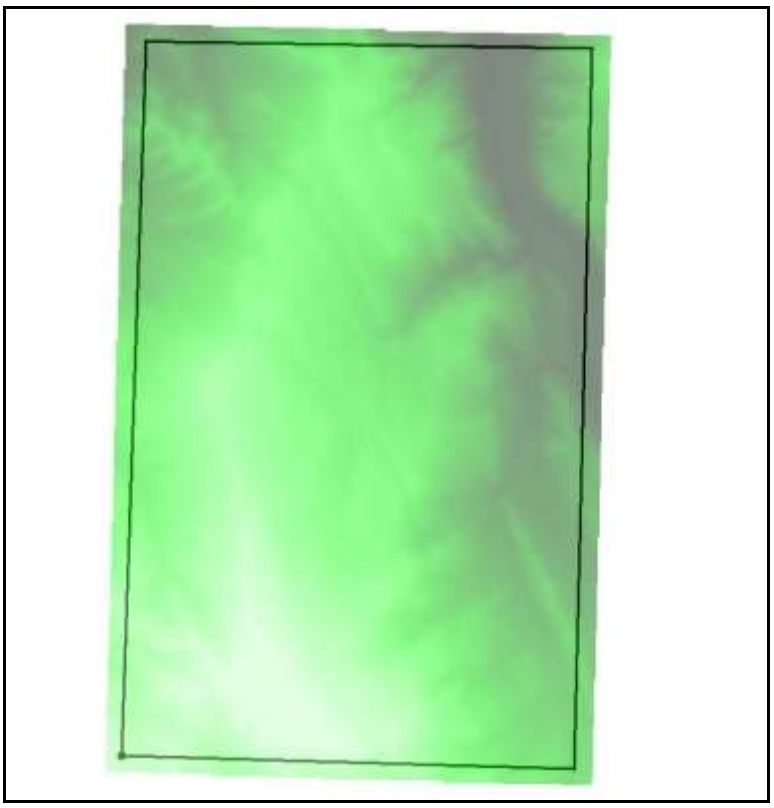


Figure 4 Mesh boundaries

6. Once the arc has been created, select *Feature Objects* | **Build Polygons**. This command will look for any enclosed arc loop and assign the enclosed area as a polygon.

7. Once the polygon has been made, click on the **Select Feature Polygon** tool. This tool will not be highlighted to use if no polygon exists.

8. Double-click in the polygon to open up the *2D Mesh Polygon Properties*. Leave everything as defaulted and click **OK**.

9. Right-click on the coverage "Gen2D Mesh" and *Convert* | **Map → 2D Mesh** from the menu to create mesh.

10. Click **OK** in the *2D Mesh Options* dialog.

11. Notice a simple mesh has been generated.

6.2 Interpolating Raster elevations to Mesh

Now that a mesh exists, the can interpolate elevations to that mesh using the elevations stored as raster data.

1. Right-click on the raster folder in the project explorer titled "glenwood" and select *Interpolate* | **Interpolate to Mesh** from the menu.

2. This will open up the *Raster Interpolation* dialog. At this point a user may change the *New Dataset Name* if desired. In this case leave it as "raster_interp".

3. Toggle on *Map Z* and click **OK** in the dialog.

4. The raster elevations have now been added to the generic mesh. Depending on the number of vertices that were used in creating the arc in step 5 of section 6.1, the user may use the **Rotate** tool to view how the elevations were mapped to the mesh. Users may need to turn on Mesh *Contours* in the *Display Options* dialog to see how the raster elevations were interpolated to the mesh.

7 Conclusion

This concludes the Raster tutorial. Users may wish to experiment some more of the features in SMS or may close SMS at this point.