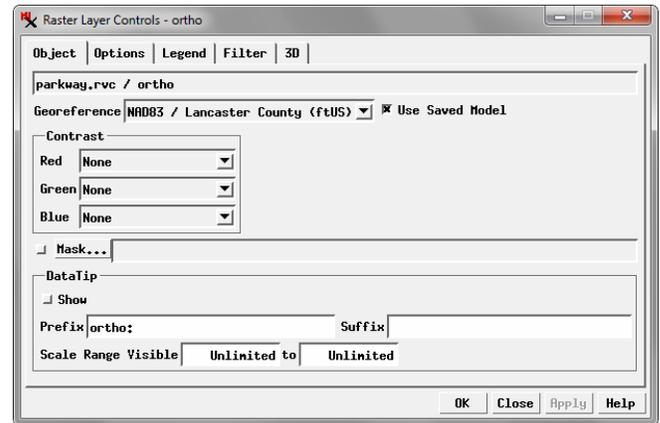


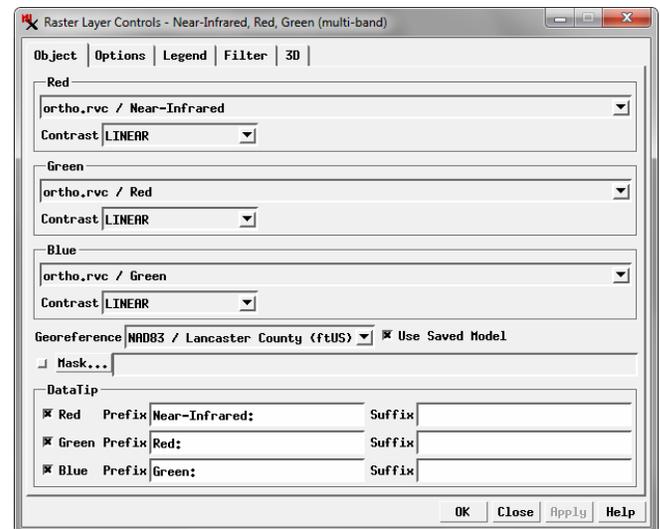
Raster Layer Controls

The Raster Layer Controls window provides controls for varied display settings for all types of raster layers, including grayscale raster objects, color-composites, color separates, and multi-raster layers. The controls are organized in a set of tabbed panels. The Object tabbed panel is shown by default when the window opens. It includes the primary display settings as well as controls for setting up the DataTip for the layer. The Options panel includes layer transparency and scale range controls along with miscellaneous settings. Controls are provided on the Legend panel for choosing and configuring a legend to show in the View sidebar and in layout legends. The Filter panel controls allow you to choose and apply various filters to the display. The Shading panel controls allow you to apply relief shading to a grayscale raster layer, while the settings on the 3D panel apply when the raster layer is used as a drape layer in 3D perspective views.

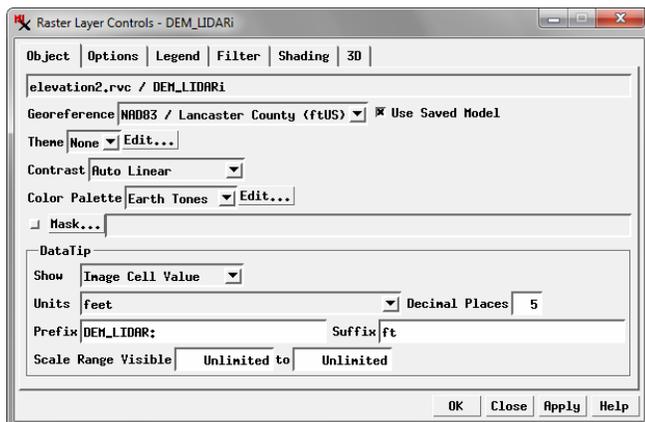
After changing display settings, press the Apply button to apply the changes to the View while the Raster Layer Controls window remains open. Press the OK button to apply the changes and close the window. The Close button closes the window without applying any changes in settings.



Object tabbed panel for a color-composite raster layer.



Object tabbed panel for a multi-band raster display layer.



Raster Layer Controls window Object panel for a grayscale raster.

Object Panel

The controls present and their layout on the Object panel depend upon the type of raster layer. Illustrations of the Object panel are shown on this page for a grayscale raster, a color-composite raster, and a multi-band raster layer. In all cases the upper part of the panel provides controls for primary display settings such as contrast, while the lower part of the panel provides DataTip controls.

File / Object Name: If the layer displays a single raster object, the file name and object name are shown in a field at the top of the panel. For Red-Green-Blue, Hue-Intensity-Saturation, and other color-separate layers, separate name fields are provided to show the file and object name of each color component. For a multi-band raster layer, which shows an RGB display of three of the selected bands, the name field for each

color component includes a menu button that you can use to change the band assigned to that component (see the Technical Guide entitled *Multi-band Image Layers*).

Contrast: A Contrast menu is provided for a grayscale raster layer and for each color component of a color-composite, color-separates, or multi-band raster layer. Each Contrast menu allows you to choose any contrast table that has been saved with the raster object to improve its display contrast, or to choose from a number of automatic contrast methods: Auto Linear, Auto Normalize, Auto Equalize, Auto Logarithmic, Auto Exponential, and Hyperbolic Tangent. The contrast methods and procedure for creating contrast tables are described in the TechGuide entitled *Image Contrast Enhancement*.

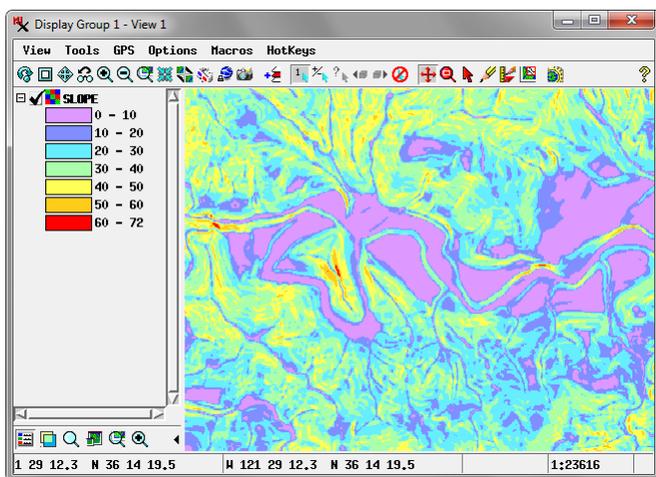
Georeference: The Georeference menu lists the georeference subobjects (if any) of the raster or rasters being displayed, and defaults to the last-used georeference. Most spatial objects should have only one georeference subobject, as there is little need to create more than one, and MicroImages does not rec-

(continued)

ommend doing so. If the raster object is not georeferenced, the Georeference menu reverts to None; you can also select None for a georeferenced object if you wish to display it without georeference. However, use of a georeference subobject is required if you wish to display the layer with proper registration with other georeferenced data layers.

The *Use Saved Model* option, which is toggled on by default, applies the calibration model that was saved with the raster object's georeference. This model sets the type and complexity of the mathematical transformation used to convert object coordinates to map coordinates. If this option is not turned on, a default model is applied. Use of a default model rather than the saved model may introduce subtle changes in the registration of the layer with other georeferenced layers.

Theme: The Theme menu for grayscale raster layers lets you choose to apply any theme map that has been saved for the raster object (if any). A raster theme map displays a grayscale raster as a set of discrete numeric interval classes with a different color assigned to each. To create a raster theme map, press the Edit pushbutton next to the Theme menu to open the Raster Theme Map Controls window (see the TechGuide entitled *Raster Theme Mapping*). When you choose a theme from the menu, the Contrast and Color Palette controls are automatically disabled.



A raster with slope values displayed with a theme map.

Color Palette: The Color Palette menu for grayscale and categorical raster objects allows you to display the raster with a specific color assigned to each raster value. Any color palettes that have been saved with the raster object can be selected from the menu, along with the options None and User Defined. Choosing User Defined opens the Color Palette Editor window to allow you to choose or design a color palette. You can edit a saved palette by selecting it in the menu and pressing the Edit pushbutton. See the TechGuide entitled *Raster Color Palette Editor* for more information.

Mask: You can apply a mask to the raster layer using the Mask controls. Press the Mask pushbutton or turn on the toggle to its left to choose a raster object with the same row and column dimensions as the raster layer. The mask can be a binary raster to set visibility of cells in the layer (mask value 0 = transparent,

mask value 1 = fully visible) or a grayscale object to set varying transparency for the layer. When a mask has been selected, you can choose to apply it or not using the toggle button.

DataTip: Use the controls in the DataTip box to choose whether or not to show a DataTip for the raster layer and to configure it if shown. A Show checkbox is provided for non-integer grayscale rasters and color composites, and for each color component for color separate and multi-band raster layers. For integer grayscale rasters, which can have a raster database, a Show menu is provided from which you can choose Image Cell Value or Select Attribute; the latter choice opens the Select Table/Field window to allow you to choose a database table (if any) and field to provide the value shown in the DataTip.

You can use the Prefix and Suffix text fields to enter text to be shown before and after the DataTip value for the layer (and individually for the color components of a color separate or multi-band raster layer). The Prefix field defaults to the object name.

A Units menu is provided and active for grayscale raster layers for which the cell Value type and Unit have been set in the object information for the raster. When you choose a different unit from the menu, cell values are converted to the designated unit for the DataTip; the abbreviation for the selected unit is shown by default as the suffix. The Decimal Places field sets the number of decimal places to be shown in the value for any units used.

The Scale Range Visible fields let you limit the range of map scales over which the DataTip is displayed. For example, you may wish to not show DataTips when the View is zoomed out beyond a certain scale. For more information on Scale Ranges see the TechGuide entitled *Display Layers, Elements, and Groups by Scale*.

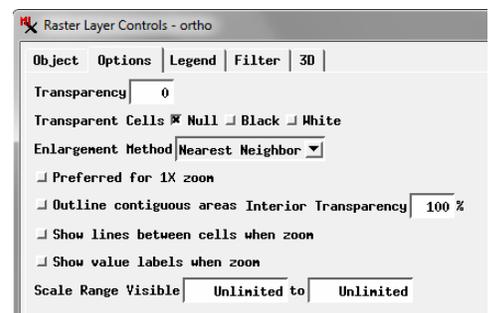
Options Panel

The Options panel provides a Transparency field in which you can enter a value to set layer transparency between 0 and 100%. This transparency value is applied in addition to any transparency resulting from a mask or color palette.

A Null Cells Transparent toggle button is provided on the panel for non-composite raster layers. When it is turned on (the default), null cells in the raster are transparent in the display.

For color-composite raster layers there are multiple toggle buttons provided for setting cells that are Null, Black, and/or White to be transparent (see illustration above).

When the display of a raster layer is zoomed out beyond 1X, stored reduced-resolution pyramid tiers are used to create the



Options panel for a color-composite raster.

(continued)

screen display. The Enlargement Method menu sets the method by which cell values in the current pyramid tier are resampled to the screen. The choices are Nearest Neighbor, Bilinear, Bicubic, Bicubic Sharper, Bicubic Smoother, and Lanczos 4x4. See the TechGuide entitled *Resampling Methods* for descriptions of these methods.

In a display with multiple layers, turning on the *Preferred for 1X zoom* toggle sets the layer as the one used to control the display when the Zoom to Maximum Detail icon button (or numeric key “1”) is pressed. In the 1X display each screen pixel corresponds to a single image cell.

The *Outline contiguous areas* toggle option is useful for categorical rasters displayed with a color palette. When turned on, each area with the same raster value is outlined in the corresponding color while the interior is transparent. The *Interior Transparency* field sets the amount of transparency for the interior areas between 0 and 100%. These settings can be used to compare category areas with features in underlying layers.

Turning on the *Show lines between cells when zoom* and *Show value labels when zoom* toggles allows you to directly view cell boundaries and values (respectively) in the View when you zoom in far enough. The boundary lines appear when both cell dimensions are larger than 16 pixels on the screen. Labels appear when both cell dimensions are larger than 32 pixels on screen and the labels will fit inside the cell. When the layer contains a floating-point raster, a field is also provided to let you set the number of decimal places to show in the cell value labels. See the TechGuide entitled *Inspecting Raster Cells* for more information.

152	128	105	123	149	167	182	192	195	188	179
140	121	105	121	144	157	165	161	157	165	172
126	122	117	121	129	141	154	159	162	164	166
175	180	181	179	177	180	181	170	159	170	181
161	160	157	166	175	175	170	152	138	157	178
156	151	143	149	157	157	158	155	154	162	170
187	196	200	200	196	183	170	167	169	178	184
175	190	201	201	194	178	164	163	167	176	183
177	183	183	180	174	163	152	144	143	159	174
195	202	202	187	166	145	125	99	88	128	171
187	197	200	186	168	157	146	124	111	138	169
176	186	188	171	150	139	130	111	102	132	165

Zoomed-in view of color-composite raster layer with cell borders and value labels shown.

The Scale Range Visible fields let you set a range of map scales over which the layer is visible in the View. The minimum map scale you set controls how far out you can zoom and still see the layer, while the maximum map scale controls how far in you can zoom with the layer visible.

The Scale Range Visible fields by default are initially set to Unlimited. To set a map scale for either field, you can enter the full scale fraction (e.g., 1:10000) or just the denominator of the scale fraction (e.g., 10000); the resulting map scale fraction is then shown in the field. To reset a map scale to Unlimited, enter 0. See the TechGuide entitled *Display Layers, Elements, and Groups by Scale* for more information.

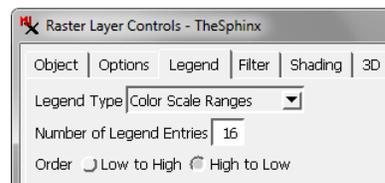
Legend Panel

The Display process provides a number of types of raster layer legends that you can show in the View window sidebar

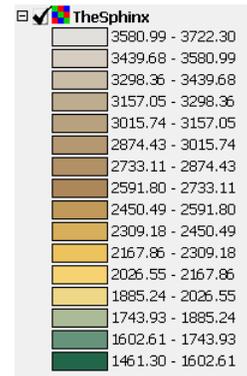
and in multi-object legends in layouts. Use the Legend Type menu on the Legend tabbed panel to choose which legend design to show. The choices None, Thumbnail, and Area Sample are available for any raster layer. The Thumbnail option shows a reduced-resolution thumbnail of the entire raster layer as the legend sample. The Area Sample option creates the legend sample from a 64 by 64-cell subarea of the raster. You can use the Sample Location menu for this option to choose from nine predefined positions from which to create the sample.

Color Sample, Continuous Color Scale, and Color Scale Ranges options are available for single non-composite raster layers with a color palette. The legend using the Color Sample option shows a color sample for each raster value, which is appropriate for classification rasters. The Continuous Color Scale option for grayscale rasters uses a labeled color bar to show how color variations relate to raster values, whereas the Color Scale Ranges option shows discrete color samples for individual ranges of raster values.

The Theme Ranges option is set by default when the raster layer uses the Theme option, and shows a color sample for each of the intervals in the theme. For more information about raster layer legends, see the TechGuide entitled *Legend Types for Raster Layers*.

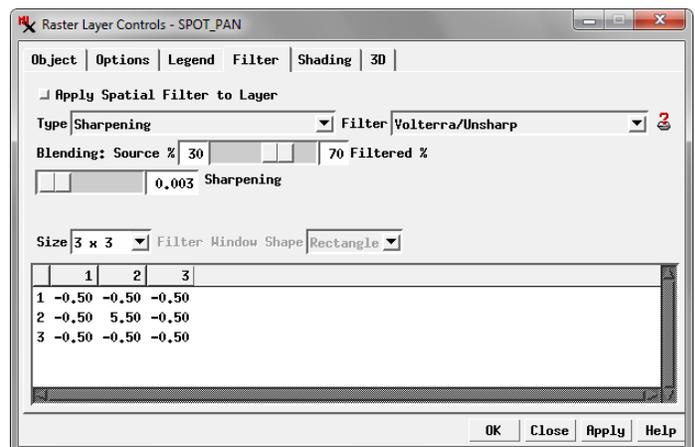


Color scale ranges legend for an elevation raster layer.



Filter Panel

The Filter Panel controls allow you to apply spatial filters to the display of the raster layer. The filter you select or design is applied to the portion of the raster layer currently in view without altering the source object(s). Filters are provided for sharpening, smoothing (noise reduction), and edge detection. There are also filters specifically designed for removing speckle noise in radar images, as well as gray level co-occurrence matrix texture filters. (continued)

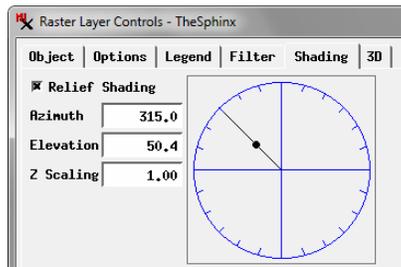


Use the Type menu to choose a filter category and the Filter menu to select a specific filter within that group. Pausing the mouse cursor over the icon button to the right of the Filter menu shows a ToolTip with a description of the selected filter and its parameters. For most filters you can use the Size menu to choose a predefined filter size in the range from 3 x 3 cells to 21 x 21 cells or edit the Size field to set custom filter kernel dimensions. You can also choose either Rectangle or Circle from the Filter Window Shape menu. The Blending numeric field and slider let you blend the filtered image with the original image in varying degrees. You can toggle the filter effect on or off using the Apply Spatial Filter to Layer toggle button. For more information on filters see the TechGuide entitled *Inline Filtering of Images*.

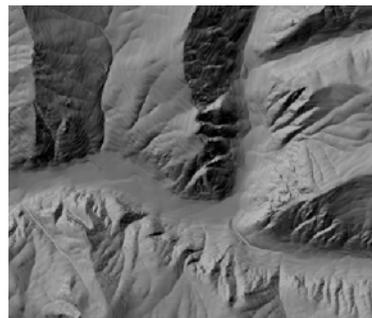
Shading Panel

The Raster Layer Controls window for single-raster non-composite layers includes a Shading tabbed panel that can be used to display the layer with relief shading. This option renders the layer as a 3D surface illuminated by light from a specific direction. The relief shading effect can be turned on and off using the Relief Shading toggle button.

The direction to the virtual illumination source for the shading effect is specified by the values in the Azimuth and Elevation fields. Azimuth is a compass direction from 0 to 360 degrees measured clockwise from north. The Elevation value is the vertical angle of the illumination source above the horizontal, with a range of 0 to 90 degrees. You can vary the illumination azimuth to accentuate features with different orientations in the layer. Decreasing the elevation angle increases the shading affect on slopes facing away from the illumination source and thus increases the contrast.



Relief shading settings and result for an elevation raster layer.



The graphic control in the Shading panel can also be used to change these values. Drag the radius line around the circle graphic to set the azimuth value. Move the black dot in or out along the radius line to change the elevation angle. Changes in the shading graphic immediately update the values shown in the Azimuth and Elevation fields.

The Z Scaling field value (default 1.0) is a multiplier applied to the raster cell values when the shading is computed. Increasing the Z Scaling value exaggerates the terrain relief and thus increases the contrast.

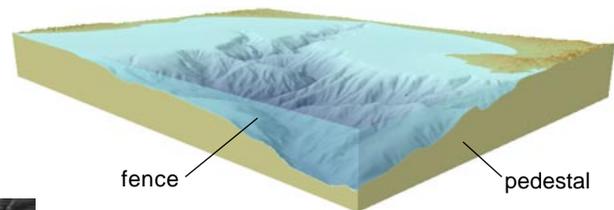
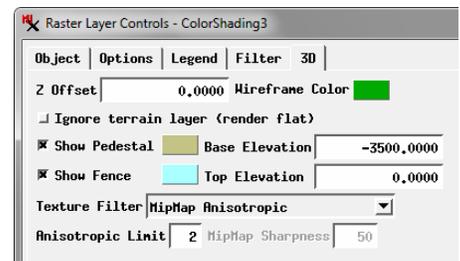
The shading option is most commonly used for elevation raster objects or those with other types of value that can be represented as a continuous surface. Note that these raster objects

can also be used as terrain layers, which provide options to display the layer with continuous color gradations, relief shading, or a combination (see the TechGuide entitled *Visualizing Terrain Layers* for details).

3D Panel

The controls on the 3D panel set display options when the raster layer is used as a drape layer in 3D perspective views. The value in the Z Offset field moves the perspective display of the layer upward (positive value) or downward (negative value) with respect to the terrain surface being used to define its 3D shape. If there are several raster drape layers, you can set different Z Offset values for the different layers to “float” each layer rendering at a different height above the terrain for comparison. Turning on the *Ignore terrain layer (render flat)* toggle button creates a flat perspective display of the layer; this option can be used effectively with different raster drape layers with different Z Offsets for specialized displays.

Press the Wireframe color button to select a color to use for rendering the layer’s mesh when the perspective view window is in Wireframe mode.



Turn on the Show Pedestal and/or Show Fence toggle buttons to add special graphic elements to enhance the perspective display. These vertical, curtain-like elements are drawn along the boundaries of the raster layer (excluding transparent cells). A pedestal is drawn vertically downward from the terrain surface to the elevation set in the Base Elevation field. A fence is drawn vertically upward from the terrain surface to the specified Top Elevation. A color button is provided

for each element to select its color and optional partial transparency. See the TechGuide entitled *Pedestal and Fence in 3D Views* for more information.

In perspective view of a raster layer the foreground cells are magnified while those in the background are reduced in size so that a number of raster cells project to each screen pixel. Raster layers are rendered in perspective views using a texture filter to provide smooth rendering in the foreground while efficiently handling the background cells. The Texture Filter menu provides several options: the default MipMap Anisotropic, Nearest Neighbor, Bilinear, Upper MipMap Nearest Neighbor, Lower MipMap Bilinear, and MipMap Trilinear. These perspective texture filters are described in the TechGuide entitled *Texture Filters for 3D Rendering*.