



PointVue

USER GUIDE

Version 2.0

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PointVue

Introduction

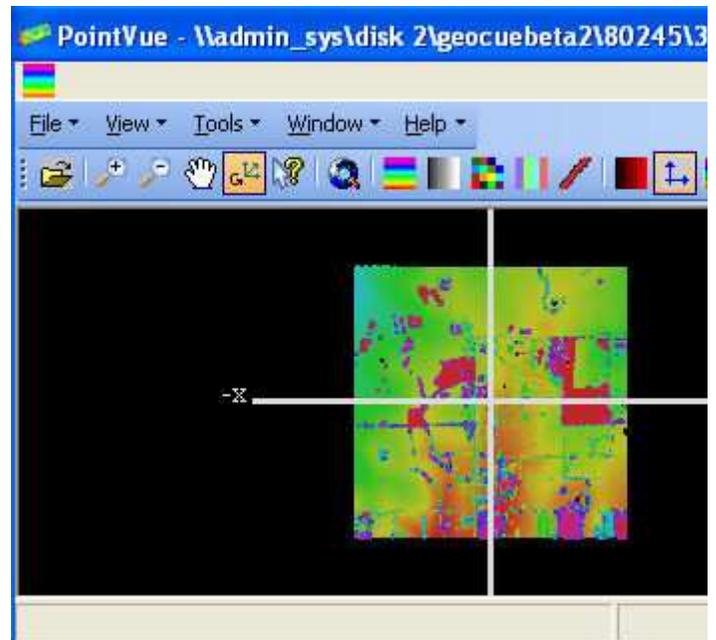
PointVue is a 3-D LIDAR visualization tool which can be used to visualize LIDAR data in ASPRS LAS Version 1.0 format. PointVue is included as part of GeoCue LIDAR 1 CuePac and is also available in a stand-alone version, PointVue LE.

This Help Guide applies to PointVue as well as PointVue LE. However, some functionality of PointVue (as packaged with LIDAR 1 CuePac) is not available in

PointVue LE and will be so noted throughout this Help with the following icon:



PointVue can be accessed through the Checklist in GeoCue LIDAR 1 CuePac, from the Windows Start Menu (Programs->GeoCue->LIDAR1 CuePac->PointVue), or through the Setup menu in GeoCue:



PointVue LE can be accessed from the Windows Start Menu (Programs>PointVue LE>PointVue LE).

The main PointVue window contains the following options:

- **File:** This menu category contains menu items that allow you to Open or Close a LIDAR file, Cleanup the list of most recently used LIDAR files, or Exit the program.

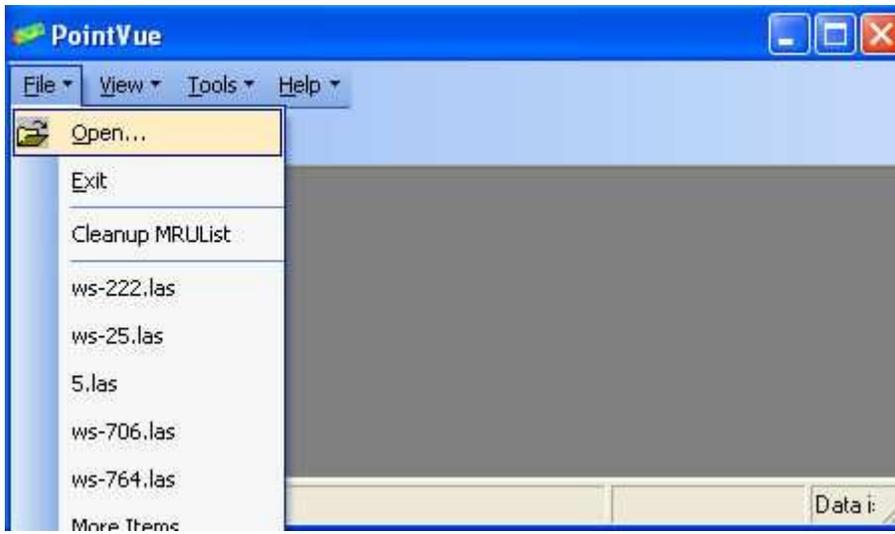
PointVue

- **View:** This menu category contains menu items that provide various viewing options (Settings, Top, Bottom, Left, Right, Front, and Back) and display of the elevation color map.
- **Tools:** This menu category contains menu items that allow you to view File Information and change PointVue settings.
- **Window:** This menu category contains menu items that support window options (tiling, creating new windows, etc.).
- **Toolbar:** The PointVue toolbar contains various tools to manipulate the viewing of the data.

File

Open

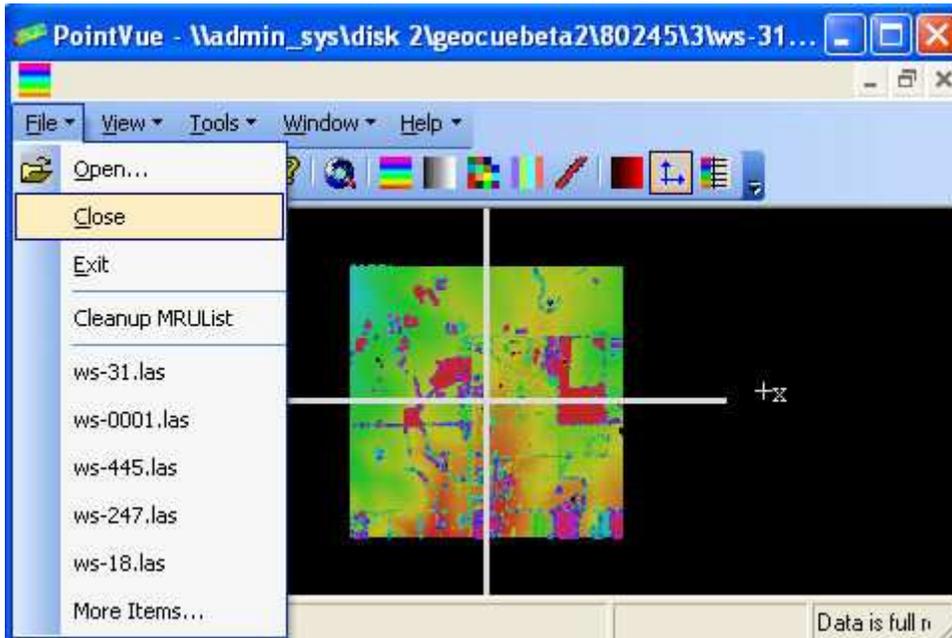
To open a LIDAR file, select Open from the File menu or select a file from the list of most recently opened files.



You can also "drag and drop" a LIDAR file onto PointVue.

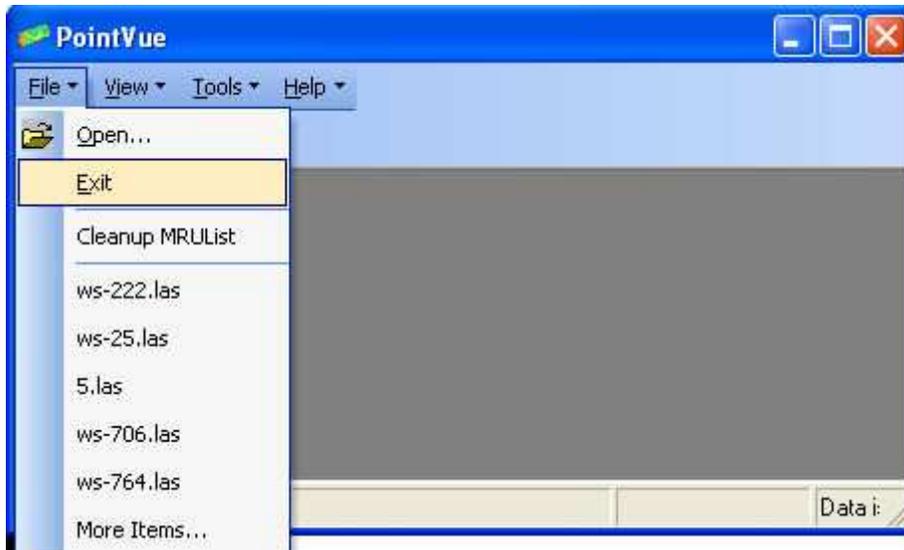
Close

To close the currently open file, select Close from the File menu. Closing the file will also close all view windows.



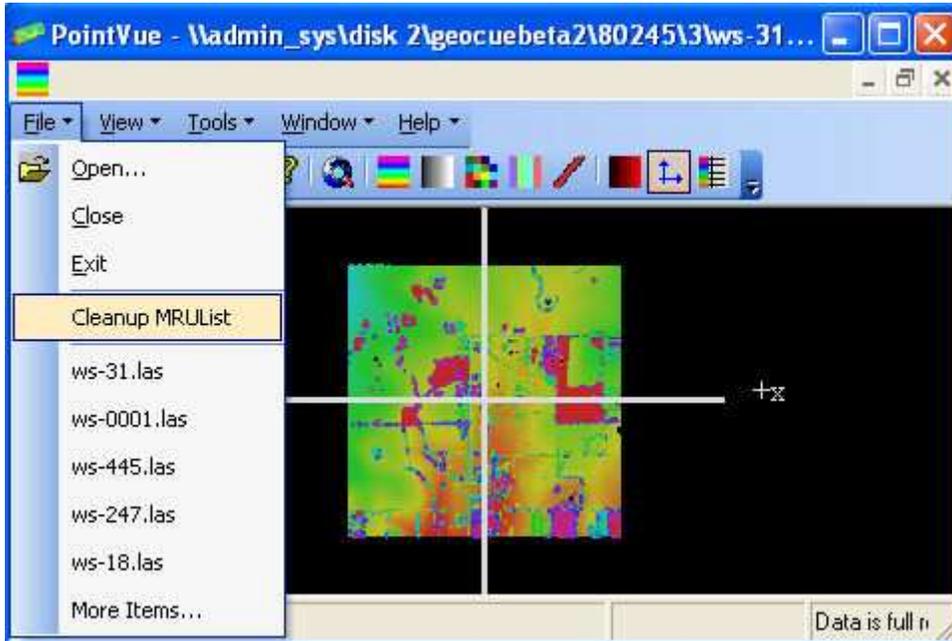
Exit

To Exit PointVue, select Exit from the File menu.



Cleanup MRUList

This command removes any LIDAR filenames from the Most Recently Used list if the files no longer exist.

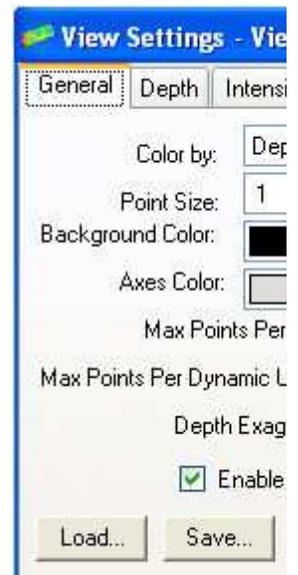
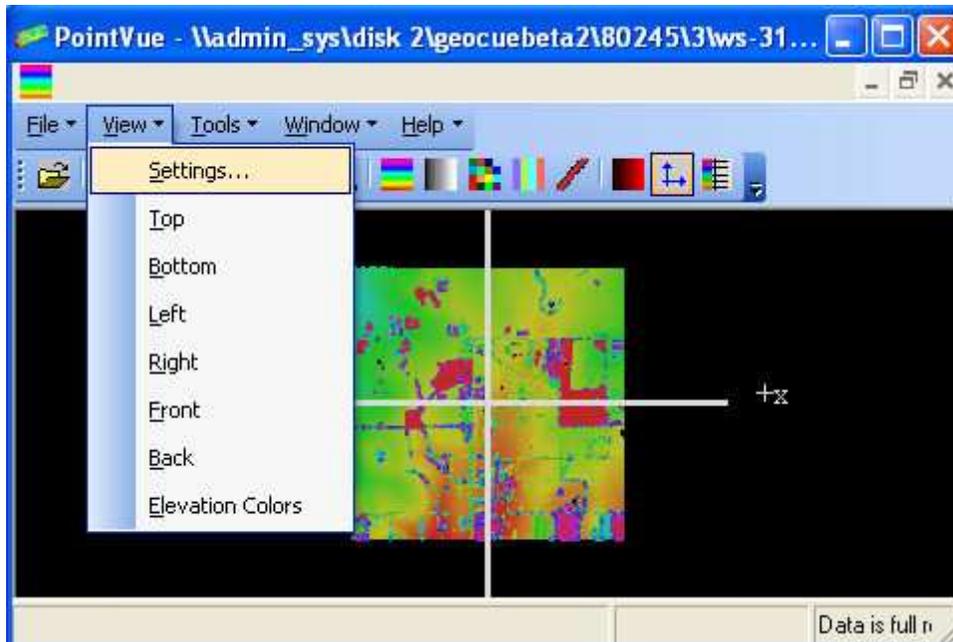


View

Settings

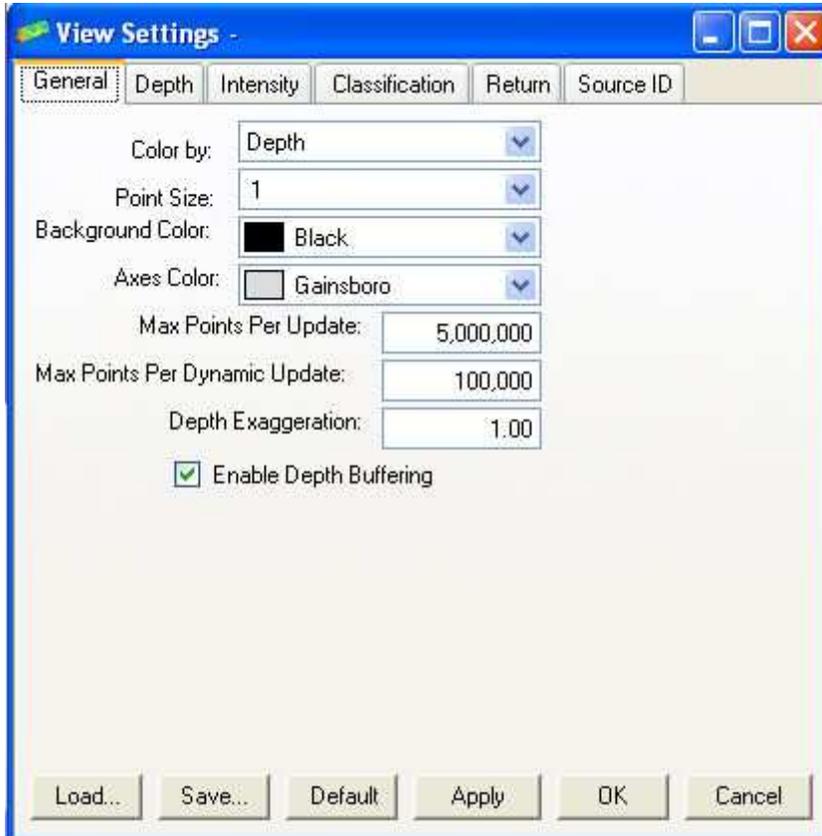
Settings

To see and/or modify viewing options, select Settings... from the View drop down menu. The Settings menu is available even if no file has been opened and no view exists. This is to permit the editing of settings without having to open a LIDAR file. The View Settings dialog displays the view settings for the active view. The view title will be displayed in the title bar of the View Settings dialog.



General

Selecting the General tab will configure the View Settings dialog as shown below.



The General tab on the View Settings window allows you to adjust the following:

<p>Color by:</p> <ul style="list-style-type: none"> Depth Depth Return Classification Intensity Source ID Classification & Intensity Depth & Intensity Source ID and Intensity Return and Intensity 	<p>Controls the point display coloring scheme:</p> <p>Depth - The point color is controlled by the point elevation. Elevations are mapped according to the chart shown here, where points of lower elevation are colored by the left side of the chart and points of higher elevation are colored by the right side of the chart. The mapping can be tuned via the Depth tab</p>
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on the dialog.



Return - The point color is controlled by the LIDAR point return number. The color assignments can be changed via the Return tab on the dialog.

Classification - The point color is controlled by the LIDAR point classification. The color assignments can be changed via the Classification tab on the dialog.

Intensity - The point color is controlled by the intensity value of the point using a grayscale color, where low intensity points appear dark and high intensity points appear light. The color mapping can be tuned via the Intensity tab on the dialog.

Source ID - The point color is controlled by the LIDAR point source ID. The color assignments can be changed via the Source ID tab on the dialog.

Classification & Intensity - The hue of the point color is determined by the LIDAR point classification, but the intensity of the point color is determined by the intensity value of the point.

The Classification and Intensity tabs on the dialog can be used to tune this color display mode.

Depth & Intensity - The hue of the point color is determined by the LIDAR point depth, but the intensity of the color is

determined by the intensity value of the point. The Depth and Intensity tabs on the dialog can be used to tune this color display mode.

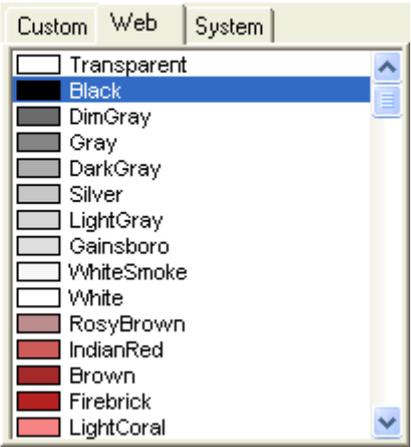
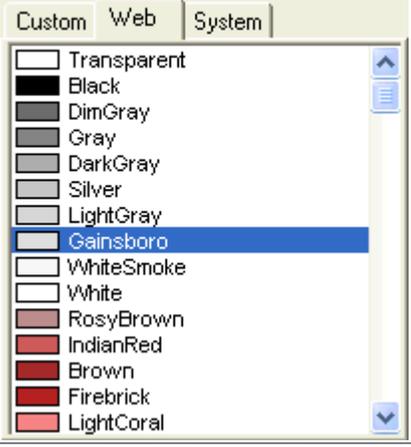
Source ID and Intensity - The hue of the point color is determined by the LIDAR point source ID, but the intensity of the point color is determined by the intensity value of the point. The Source ID and Intensity tabs on the dialog can be used to tune this color display mode.

Return and Intensity - The hue of the point color is determined by the LIDAR point return number, but the intensity of the point color is determined by the intensity value of the point. The Return and Intensity tabs on the dialog can be used to tune this color display mode.

Point Size: 

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The point size (in pixels) used when drawing the points.

<p>Background Color: <input type="text" value="Black"/></p>  <p>The color selection palette shows various color options. 'Black' is selected and highlighted in blue. Other visible options include DimGray, Gray, DarkGray, Silver, LightGray, Gainsboro, WhiteSmoke, White, RosyBrown, IndianRed, Brown, Firebrick, and LightCoral.</p>	View background color.
<p>Axes Color: <input type="text" value="Gainsboro"/></p>  <p>The color selection palette shows various color options. 'Gainsboro' is selected and highlighted in blue. Other visible options include Transparent, Black, DimGray, Gray, DarkGray, Silver, LightGray, WhiteSmoke, White, RosyBrown, IndianRed, Brown, Firebrick, and LightCoral.</p>	Color used when drawing the XYZ axes.
<p>Max Points Per Update: <input type="text" value="5,000,000"/></p>	<p>Maximum number of points to display in the view when NOT in dynamic rotation mode. If this number is less than the total number of points, points appear thinned in the display. For example, if 10 million points were read and Max Points per Update is 2 million, every 5th point will be displayed.</p>
<p>Max Points Per Dynamic Update: <input type="text" value="100,000"/></p>	<p>Maximum number of points to display in the view when performing dynamic rotation. If this number is less than the total number of points, points appear thinned in the display. For example, if 10 million points were read and Max Points per Update is 100,000, every 100th</p>

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<p>Depth Exaggeration: <input type="text" value="1.00"/></p>	<p>point will be displayed.</p> <p>This scale factor exaggerates the z values when displaying points. A value of 1.0 provides no exaggeration. A value of 2.0 doubles the exaggeration. A negative value will invert the z values. The elevations are expanded about the statistical median of the data (after applying the linear percent clip set on the Depth tab of the dialog). Depth exaggeration can also be controlled with the wheel on the mouse while holding down the SHIFT key.</p>
<p><input checked="" type="checkbox"/> Enable Depth Buffering</p>	<p>Depth buffering (on by default) enables hidden surface removal so points closer to your eye are not obscured by points further away. You would only want to disable depth buffering if you are coloring points by classification or source ID and want to honor the priority attribute associated with a particular class or source ID.</p>

Depth

The Depth tab on the View Settings dialog allows you to change the behavior of the view display when coloring by depth.

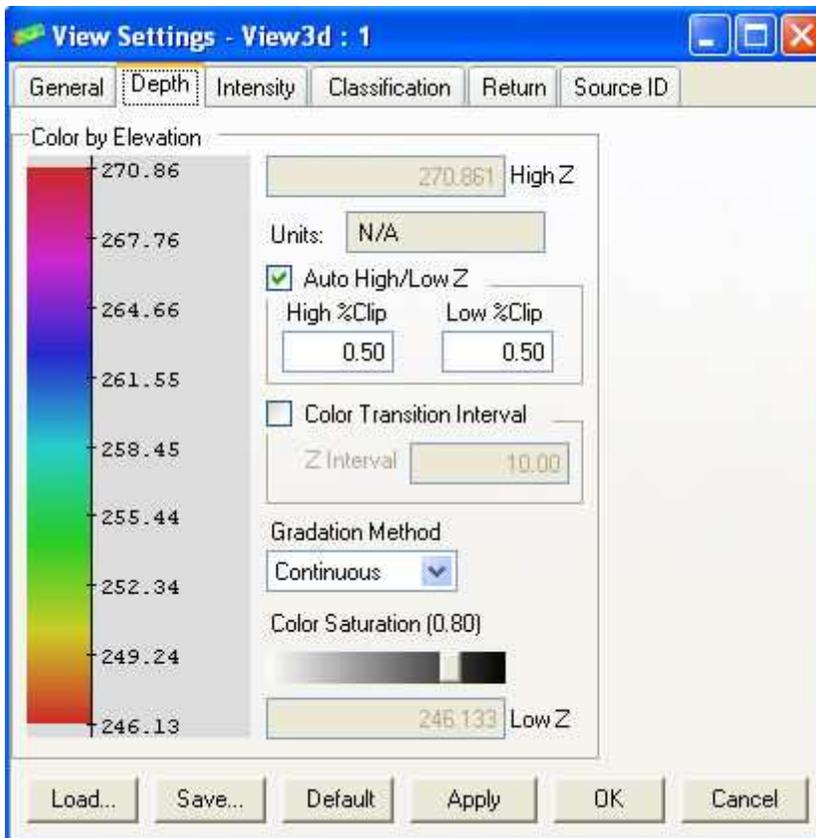
The easiest way to get a good distribution of colors over the range of elevation values is to check the Auto High\Low Z box, which will perform a linear percent clip based on a histogram of the elevation values. When Auto High\Low Z is checked, you can change the percent clip applied at the upper and lower ends of the histogram by typing in the desired percentages in the High and Low %Clip fields.

If you know the actual high and low Z values over which you want to distribute the full range of colors, you can enter those values manually by unchecking the Auto High/Low %Clip box and typing your Z values directly into the High and Low Z fields. The % clip values are ignored in this case.

When coloring by Depth or by Depth and Intensity, colors are determined by specifying Hue, Saturation, and Intensity. The Hue and Intensity values are computed automatically by PointVue from depth and intensity information on the LIDAR points. The user may control the color Saturation value that is used by changing the Color Saturation slider control. If you are coloring by depth without intensity, you generally get better results with a higher saturation value, but if coloring by depth with intensity, you generally get better results with a somewhat lower saturation value.

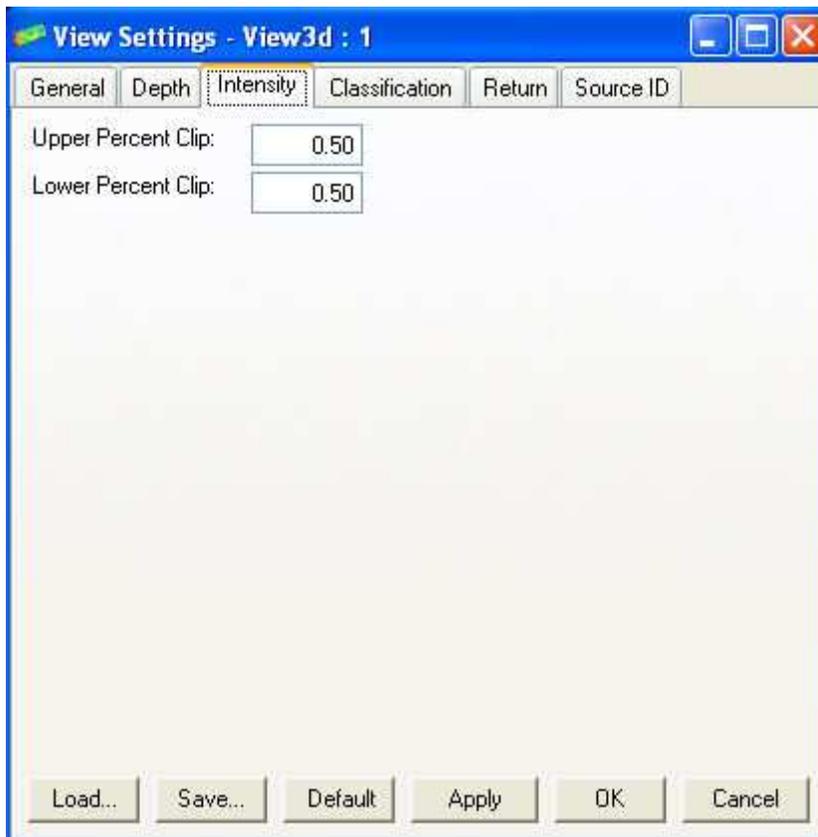
If you want to manually control how fast the colors change as Z changes, check the “Color Transition Interval” box and adjust the Z Interval value. Note that the colors will repeat every 12 x Z Interval units of elevation.

If you want a palette of 12 discrete colors instead of a continuous range of colors, change the Gradation Method to Discrete.



Intensity

The Intensity tab on the View Settings dialog allows you to change the behavior of the view display when coloring by intensity. In order to get a good distribution of grayscale colors over the range of intensity values, PointVue performs a linear percent clip based on a histogram of the intensity values. Here, you can change the percent clip applied at the upper and lower ends of the histogram.



Classification

The Classification tab on the View Settings window allows you to change the color map that is used when coloring by LIDAR point classification. You will be presented with a table containing a row for each possible classification value found in the LIDAR file.

PointVue has a default classification color map, but you can change the color, priority, and name associated with each classification. If depth buffering (accessible on the General tab) is disabled, points of a class with a higher priority number will display on top of coincident points with a lower priority number.

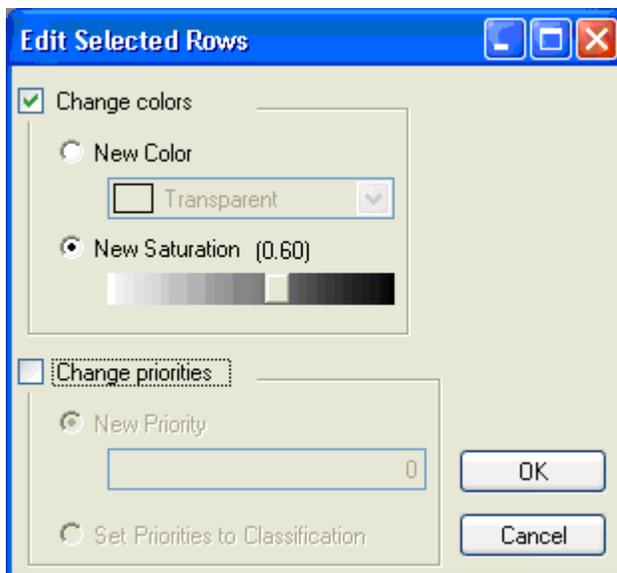
<i>Load System Classmap</i>		Retrieves the system classmap from the GeoCue repository and displays it in the dialog.
<i>Save System Classmap</i>		Saves the system classmap displayed in the dialog to the GeoCue repository. The system classmap is used by Set Image Generation Parameters in LIDAR1 CuePac to compute colors for stereo and ortho images made from LIDAR data.

If PointVue is launched within the context of a GeoCue project, PointVue will automatically load the system classmap from the GeoCue repository (unless the ***Auto load GeoCue repository color maps*** option is unchecked in the PointVue Options form).

If you make changes to your classification color map, you may find it useful to save your view settings (which include the color maps) to a file which you can later load to reinstate your custom classification color map. The Load/Save buttons are discussed elsewhere in this document.



If you select one or more rows of the classification color map (by clicking on the leftmost column), the “Edit Rows...” button becomes active. Selecting “Edit Rows...” displays the “Edit Selected Rows” dialog:



Checking **Change colors** will cause the **New Color** and **New Saturation** radio buttons to become available, which allow you to change the color of the selected rows. Selecting

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New Color enables the color picker where you can pick the new color for the selected rows. Setting a color to transparent effectively turns off that source in the display.

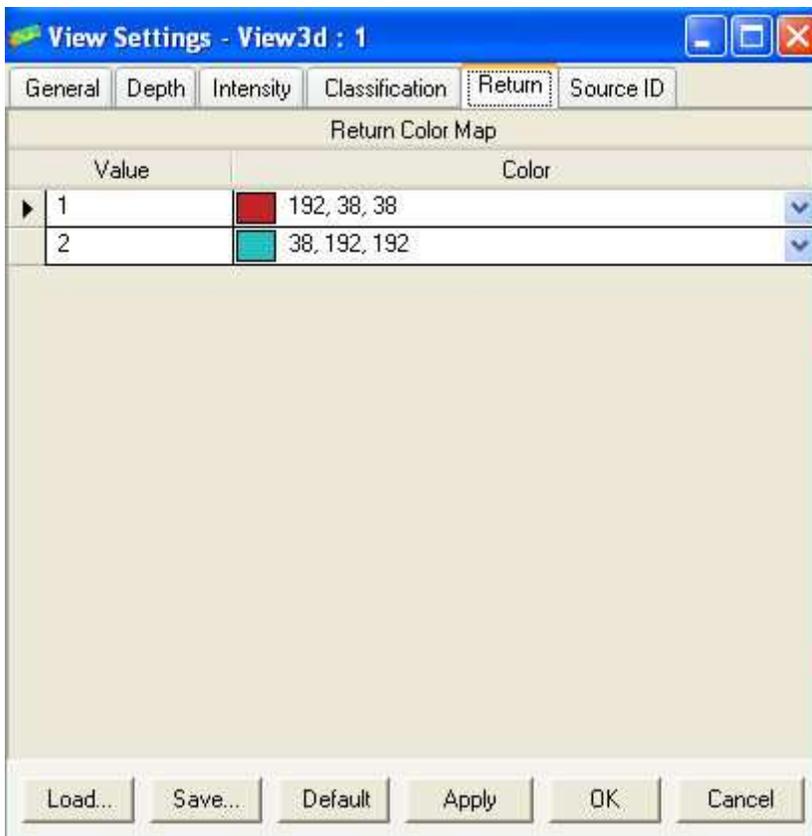
Selecting *New Saturation* enables the saturation slider, where you can choose a new saturation value for the colors in the selected rows.

Checking *Change priorities* will cause the *New Priority* and *Set Priorities to Classification* radio buttons to become available, which allow you to change the priorities of the selected rows. Selecting *New Priority* enables the field where you can key in a new value for the priority of the selected rows (setting all selected rows to the same new priority value). Selecting *Set Priorities to Classification* will set the priority of each row to the classification value of the row.

Clicking OK will apply your changes and dismiss the dialog box. Clicking Cancel will discard your changes and dismiss the dialog box.

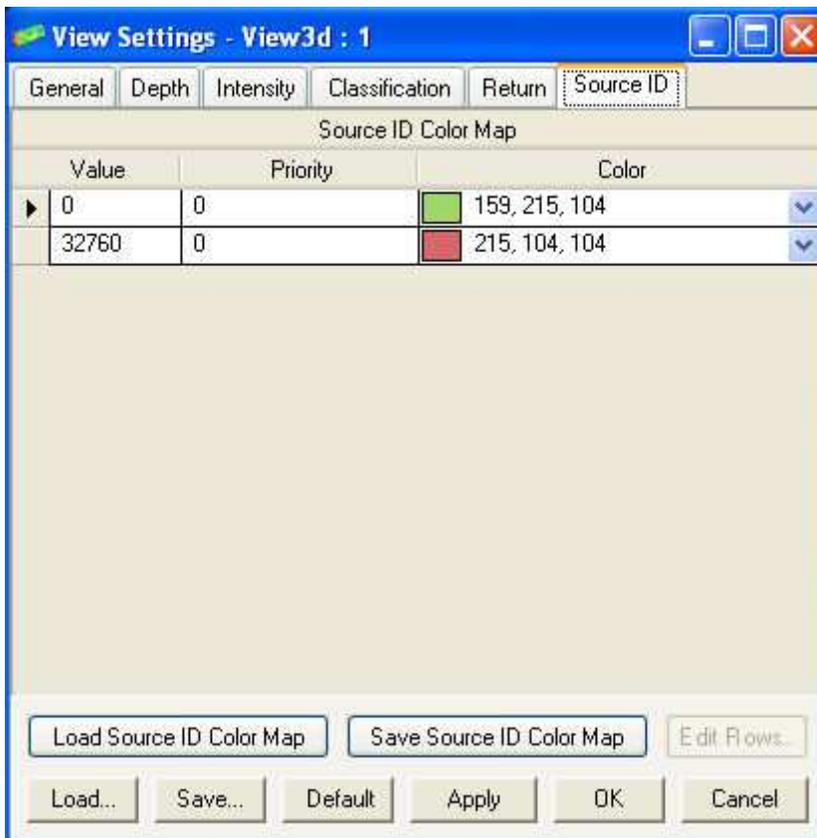
Return

The Return tab on the View Settings window allows you to change the color map that is used when coloring by LIDAR point return number. You will be presented with a table containing a row for each return found in the LIDAR file. PointVue generates a return color map automatically, but you can change the color associated with each return. If you make changes to your return color map, you may find it useful to save your view settings (which include the color maps) to a file which you can later load to reinstate your custom return color map. The Load/Save buttons are discussed elsewhere in this document.



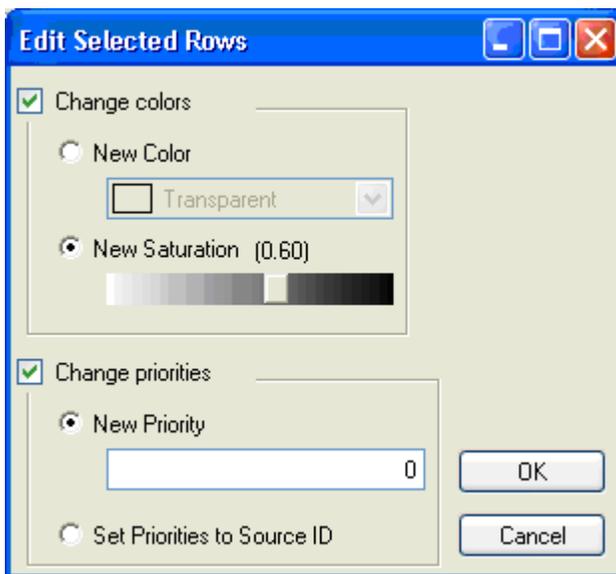
Source ID

The Source ID tab on the View Settings window allows you to change the color map that is used when coloring by LIDAR point source ID. You will be presented with a table containing a row for each source ID. PointVue generates a default source ID color map automatically based on the source IDs in the current file, but you may edit the color and priority values associated with each source ID. If PointVue is launched from GeoCue within the context of a GeoCue project, PointVue will automatically load the source ID color map associated with the project (if it exists AND the *Auto load GeoCue repository color maps* option is unchecked in the PointVue Options form. If depth buffering (accessible on the General tab) is disabled, points of a source ID with a higher priority number will display on top of coincident points with a lower priority number. If you make changes to your source ID color map, you may find it useful to save your view settings (which include the color maps) to a file which you can later load to reinstate your custom source ID color map. The Load/Save buttons are discussed elsewhere in this document.



Load Source ID Color Map		<p>If PointVue is launched from GeoCue within the context of a GeoCue project, the Load and Save Source ID Color Map buttons are enabled.</p> <p>Selecting Load Source ID Color Map reads the map (if it exists) stored in the GeoCue repository that is associated with the current project. PointVue will also add to the map any source ID's from sources that have been added to the project since the source ID color map was saved to the repository. These new rows will have a priority of 0 and a randomly assigned color.</p>
Save Source ID Color Map		<p>Selecting Save Source ID Color Map saves the map to the GeoCue repository for the current project. When saving the color map, PointVue will also add to the map any source ID's from sources that exist in the project but are not included in the current PointVue map.</p>

If you have one or more rows selected, the Edit Rows... button is enabled. Selecting Edit Rows... causes the Edit Selected Rows form to display:



Checking **Change colors** will cause the **New Color** and **New Saturation** radio buttons to become available, which allow you to change the color of the selected rows. Selecting **New Color** enables the color picker where you can pick the new color for the selected rows. Setting a color to transparent effectively turns off that source in the display.

Selecting **New Saturation** enables the saturation slider, where you can choose a new saturation value for the colors in the selected rows.

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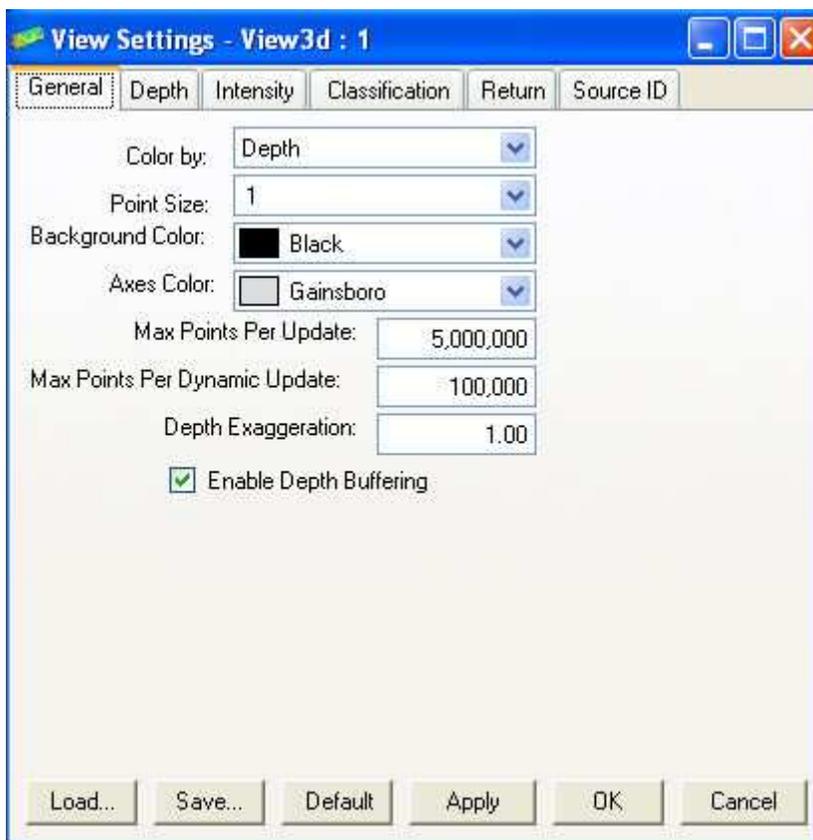
Checking *Change priorities* will cause the *New Priority* and *Set Priorities to Classification* radio buttons to become available, which allow you to change the priorities of the selected rows. Selecting *New Priority* enables the field where you can key in a new value for the priority of the selected rows (setting all selected rows to the same new priority value). Selecting *Set Priorities to Source ID* will set the priority of each row to the source ID value of the row.

Clicking OK will apply your changes and dismiss the dialog box. Clicking Cancel will discard your changes and dismiss the dialog box.

Save Setting Changes

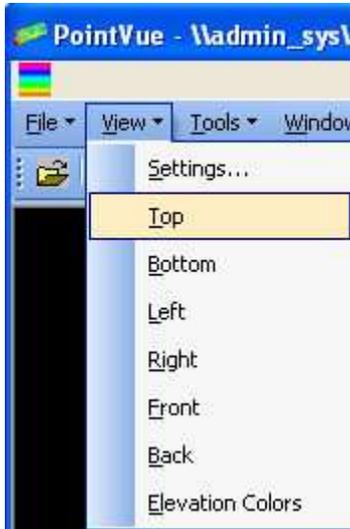
Changes to the View Settings can be Saved and Loaded for future use. Once the desired configuration is set, click the Save...button and assign a file name. This configuration can be accessed at any time by clicking the Load... button. You can return to the Default settings at any time by clicking the Default button.

You can also *Apply* any view settings you have changed and update the active view without leaving the dialog.



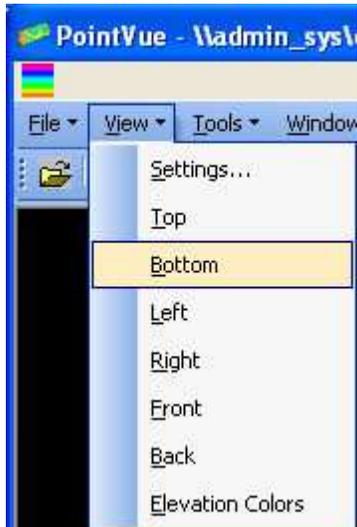
Top

Selecting Top from the View drop down menu gives you a "top" view of your data.



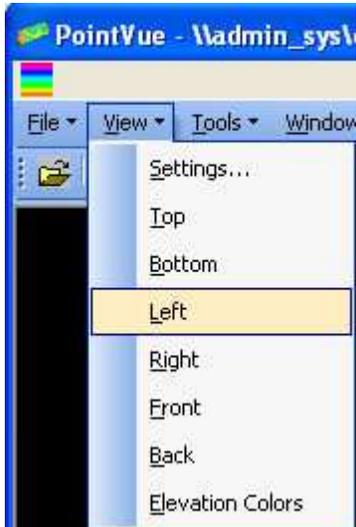
Bottom

Selecting Bottom from the View drop down menu gives you a "bottom" view of your data.



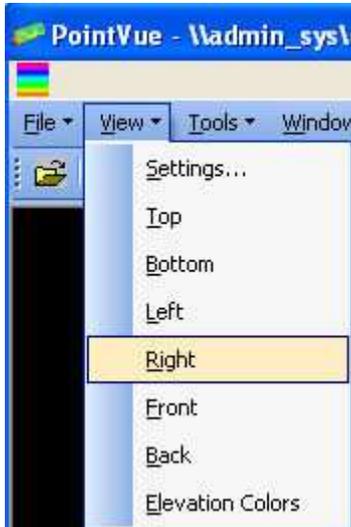
Left

Selecting Left from the View drop down menu gives you a "left" view of your data.



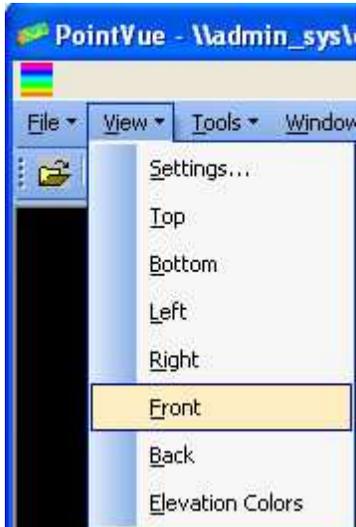
Right

Selecting Right from the View drop down menu gives you a "right" view of your data.



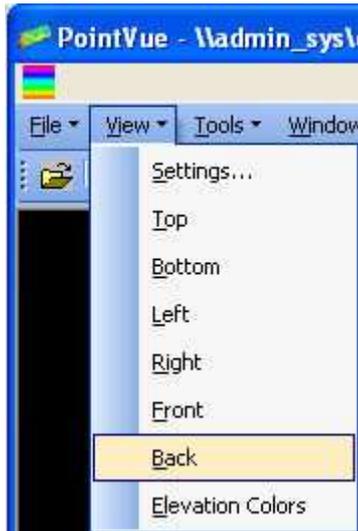
Front

Selecting Front from the View drop down menu gives you a "front" view of your data.



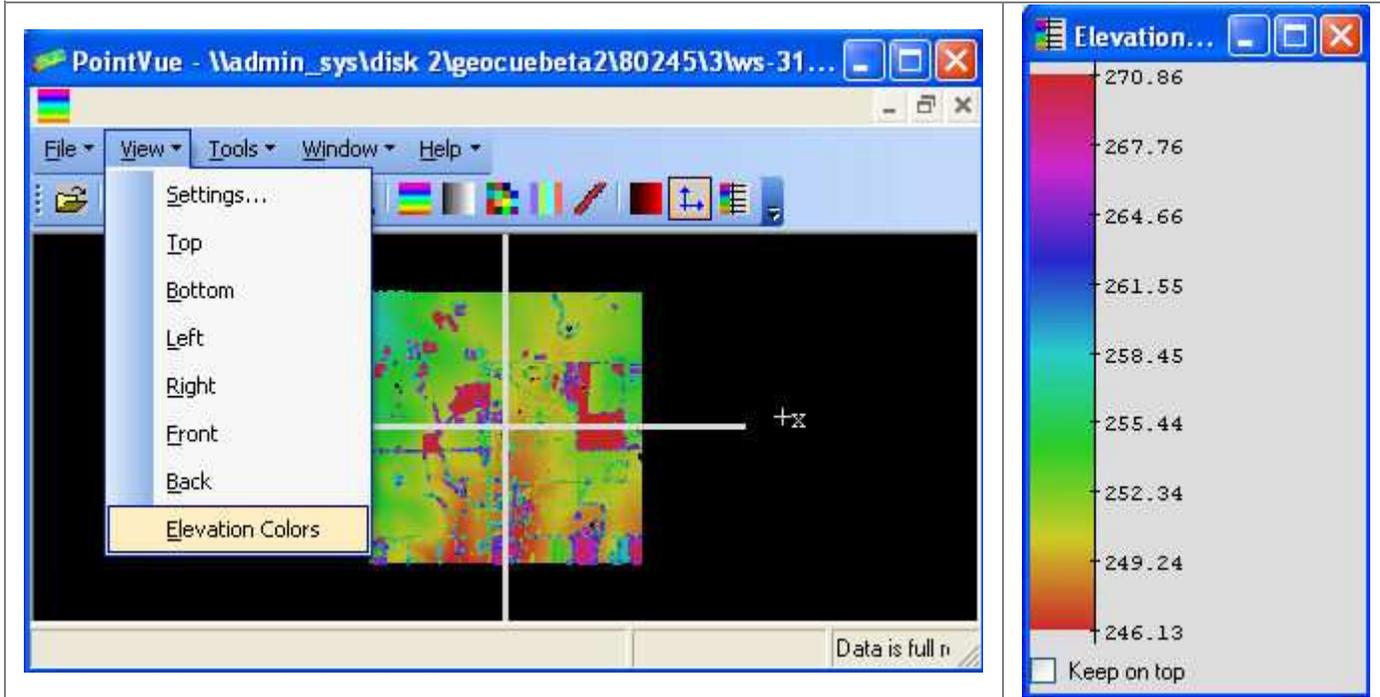
Back

Selecting Back from the View drop down menu gives you a "back" view of your data.

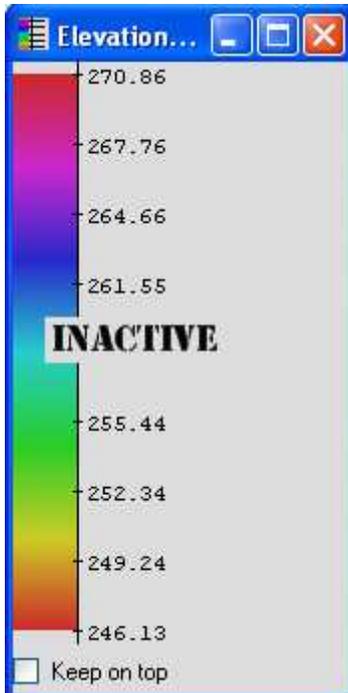


Elevation Colors

Selecting View Elevation Colors from the View drop down menu allows you to see how colors are currently mapped to elevation when a view is coloring by depth (or by depth and intensity):



If the active view is NOT coloring by depth (or depth and intensity), the color map will be displayed as follows:



Checking the “Keep on top” checkbox will cause the elevation color map to stay on top of all other PointVue windows.

The elevation color map can also be turned on/off via  icon on the toolbar.

Mouse Options

You can zoom in and out of the view at any time by rolling the mouse wheel away from you to zoom out and towards you to zoom in. The zoom in/out direction of the wheel can be changed via Options on the Tools menu.

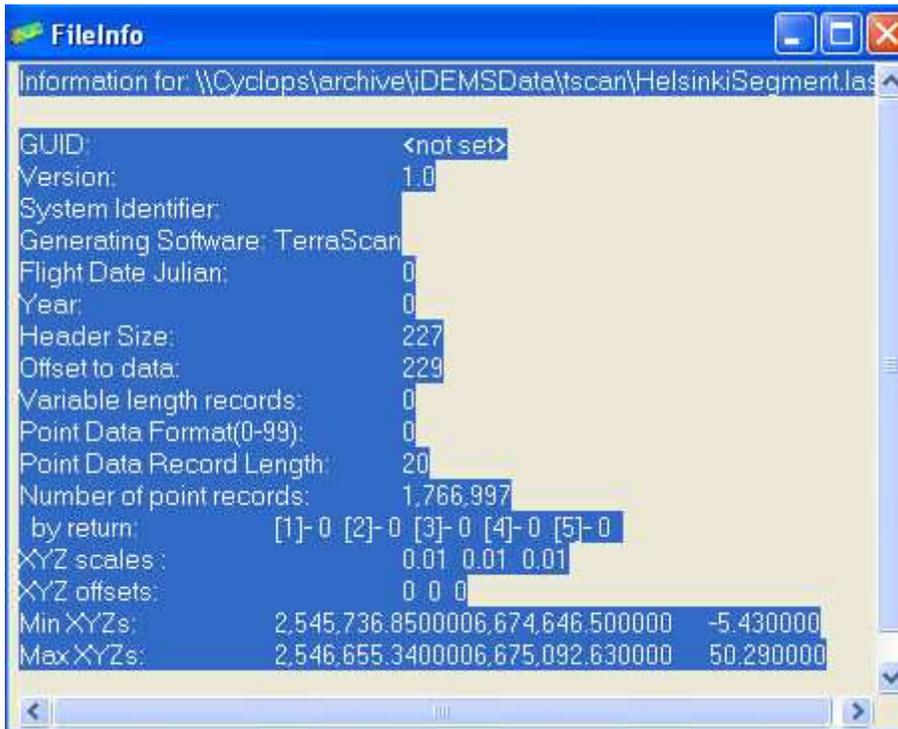
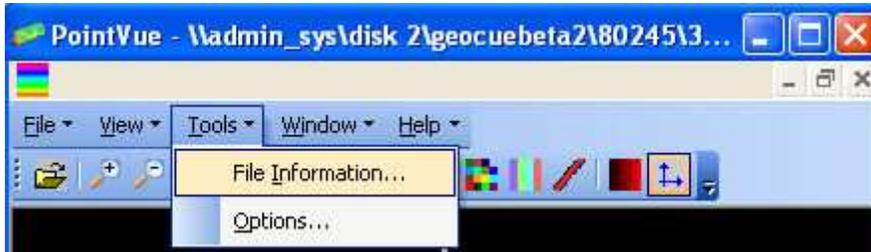
If you hold down the SHIFT key while rolling the mouse wheel, you can change the z exaggeration.

You can pan the view at any time by pushing down the middle mouse button then dragging the mouse.

Tools

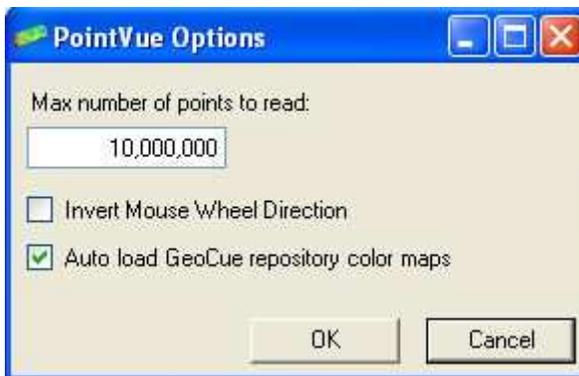
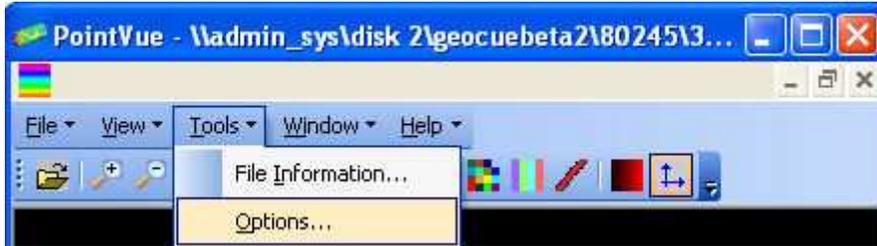
File Information

To view file information, simply select File Information from the Tools drop down menu. File information includes most of the fields in the LIDAR file header.



Options

From the Tools drop down menu, select Options to set the Maximum number of points to read, Invert Mouse Wheel Direction, and Auto load GeoCue Repository color maps.



Max number of points to read: The default value is 10 million points. If you notice that your system performance degrades when opening large LIDAR files, you may want to lower this value. If this number is less than the number of points in a file you are opening, points are skipped at a regular interval as they are read in. For example, if the file contains 20 million points and the maximum number of points is 10 million, then every other point will be read into memory. If you change this setting while a file is already open, PointVue will ask you if you want to reread the file (if your change will actually affect the number of points read in). NOTE: The max number of points to read is persisted between sessions on a per user basis.

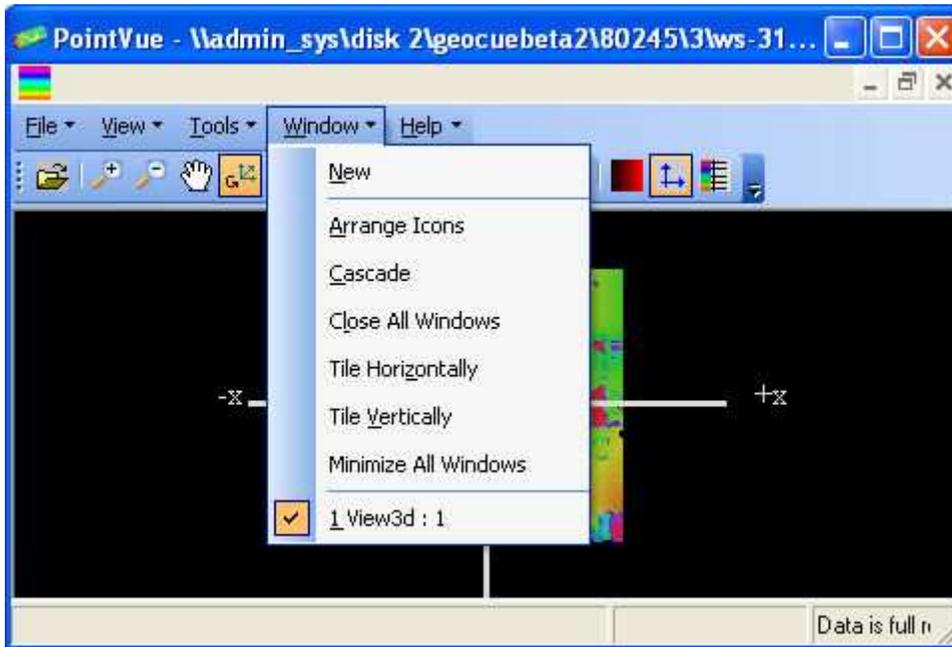
Invert Mouse Wheel Direction: The wheel direction for zooming or changing z exaggeration in the map view can be changed by checking the box next to "Invert Mouse Wheel Direction".

Auto load GeoCue repository color maps: When checked (the default behavior), the classification and source ID color maps (if available) will be automatically loaded from the GeoCue repository when PointVue is invoked.

Window

Standard Window Tools

PointVue has the standard Window options as listed below.



Toolbar

PointVueToolbar

The PointVue Toolbar consists of:



	Open	Allows you to open a file. You can also "drag and drop" a LIDAR file onto PointVue.
	Zoom In	You can "zoom in" for a close-up view of the data. Select this tool and then place the cursor over the point in the map display that you wish to zoom about. The display will zoom in by a factor of two each time you press the left mouse button. You can also use this tool to 'drag' a display rectangle. With the Zoom-In tool selected, place the cursor over one corner of the area you wish to display. Press and hold the left mouse button and drag the cursor to the opposite corner of the rectangle you wish to display. When you release the button, the map view will zoom in and display the contents of the rectangle.
	Zoom Out	You can "zoom out" to see more of the data at a reduced size. Select this tool and then place the cursor over the point in the map display that you wish to zoom about. The display will zoom out by a factor of two each time you press the left mouse button.
	Pan	Allows you to "pan" your data to the desired location. After selecting this button, place the resultant "hand" cursor over the map display. Press and hold the left mouse button to drag the view to a new display location.
	Rotate	Allows you to dynamically rotate the 3D view of the data. When in rotate mode, holding down the left mouse button and dragging inside the view will allow you to dynamically rotate the view.
	Select	Displays XYZ coordinates in the status bar as you move the mouse over point data.
	Fit	Allows you to Fit the all data in the map view.
	Color by Depth	The Depth tool button causes the point color to be controlled by the point depth value.
	Color by Intensity	The Intensity tool button causes the point color to be controlled by the point intensity value.
	Color by	The Classification tool button causes the point color to be

	Classification	controlled by the LIDAR point classification value.
	Color by Return	The Return tool button causes the point color to be controlled by the LIDAR point return number.
	Color by Source ID	The Source ID tool button causes the point color to be controlled by the LIDAR point source ID value.
	Apply Intensity	The Apply Intensity tool button is a toggle that causes the LIDAR point intensity to be applied to the currently active coloring mode. So, for example, if the coloring mode is “Color by Depth” and the “Apply Intensity” toggle is active, then the realized coloring mode is by “Depth and Intensity”.
	Axes Toggle	The Axes Toggle tool button allows you to turn the axes on and off.
	Elevation Colors	The Elevation Colors tool button allows you to see how colors are currently mapped to elevation when a view is coloring by depth (or by depth and intensity).

Status Bar

PointVue Status Bar

The PointVue status bar is shown below:



The status bar consists of 3 panes outlined below:

Status Pane – The left-most pane displays temporary status information relevant to the operation at hand. The types of information displayed include:

- The XYZ coordinate information (when in Select mode).
- Number of points read so far when opening LIDAR files.
- Z Exaggeration value when it is being changed via the mouse wheel.
- User prompts as required.

Progress Pane – When performing time consuming operations (e.g. reading LIDAR data from disk), the middle pane contains a progress bar as shown below:



Point Density Pane – The right-most pane always indicates how much of the LIDAR point data was read from the disk file. The point density pane will contain one of the following strings:

- “Data is full resolution” – All of the point data was read from the file.
- "Data Thinned 1:N” – The number of points in the LIDAR file exceeded the “Max number of points to read” parameter. Therefore, one of every N file points was read.
- “Data truncated to N out of M points” – The user selected “Cancel” during the file read which terminated the file read operation after reading in the first N points.
NOTE: PointVue determines whether to thin the data prior to reading in the data. If the user cancels the read on thinned data, the truncated data is thinned as well.

When reading in a LIDAR file, the status bar also contains a “Cancel” button at the far right. Clicking “Cancel” during a file read will halt the reading of the LIDAR data, but what data has already been read in will still be displayed.

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