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In a visual world an image is easily recognizable to viewers when compared to a monochrome point cloud and can be one of the biggest challenges when a new person attempts to interpret LIDAR data sets for the first time. The LAS format (v1.2 and later) supports the storage of point color values directly within the data file which enables the point cloud to become a 3D image. The inclusion of normalized red, blue and green channel color values to be stored with each point record in the dataset have been added with the introduction of Point Data Record Format 2. With the introduction of LAS format 1.4, and point formats 8 and 10, a near infrared channel color value was also added. Visualizing point clouds in this manner will only increase in its appeal as data point densities continue to increase and point clouds take on the role of a 3D image.

Of course, a LIDAR system can only collect the return intensity of the emitted laser pulse so the RGB (and, perhaps NIR) information must be added from a source other than the LIDAR. This source is typically either imagery collected simultaneously with the LIDAR (via a camera on the acquisition platform) or from a separate imaging mission. RGB channel data can be added to different types of LIDAR data, including those collected from airborne, mobile and terrestrial scanners. Figure 2 shows an example of Terrestrial LIDAR displayed in LP360 using the RGB values.

Regardless of the method of how the color values came to exist within the dataset, LP360 has the ability to directly display these values as one of the Legend Types. This legend type option is available within the Main, Profile and 3D Viewer Windows and is known as Display by RGB Values (Figure 1). This legend type is grayed out when the loaded data does not contain RGB values.



Figure 1 - Legend type Display by RGB Values



Figure 2 - Terrestrial LIDAR data displayed by RGB values

If a user does not have the ability to apply the RGB colors directly to the LIDAR points, but they have orthorectified imagery data then LP360 can be used to color the LIDAR points directly for display purposes only within the Profile and 3D Viewer Windows. This is known as GIS Fusion. In order for GIS Fusion to work, the imagery data or shapefile data, must coincide with the LIDAR data with respect to the coordinates and must not be from a web service, such as a WMS server.

To perform GIS Fusion, start by adding the LIDAR and Imagery data sets using LP360. Open one of either the Profile Window or the 3D Window and draw an extent over an area of interest. Select the GIS Fusion legend display type (Figure 3). The user will then need to specify which imagery dataset is going to be used to colorize the points via the LAS Layer Display properties (Figure 4).

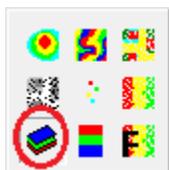


Figure 3 - Legend type Display by GIS Fusion

## Tools, Tips and Workflows

# Colorized Point Clouds take on Role of 3D Image

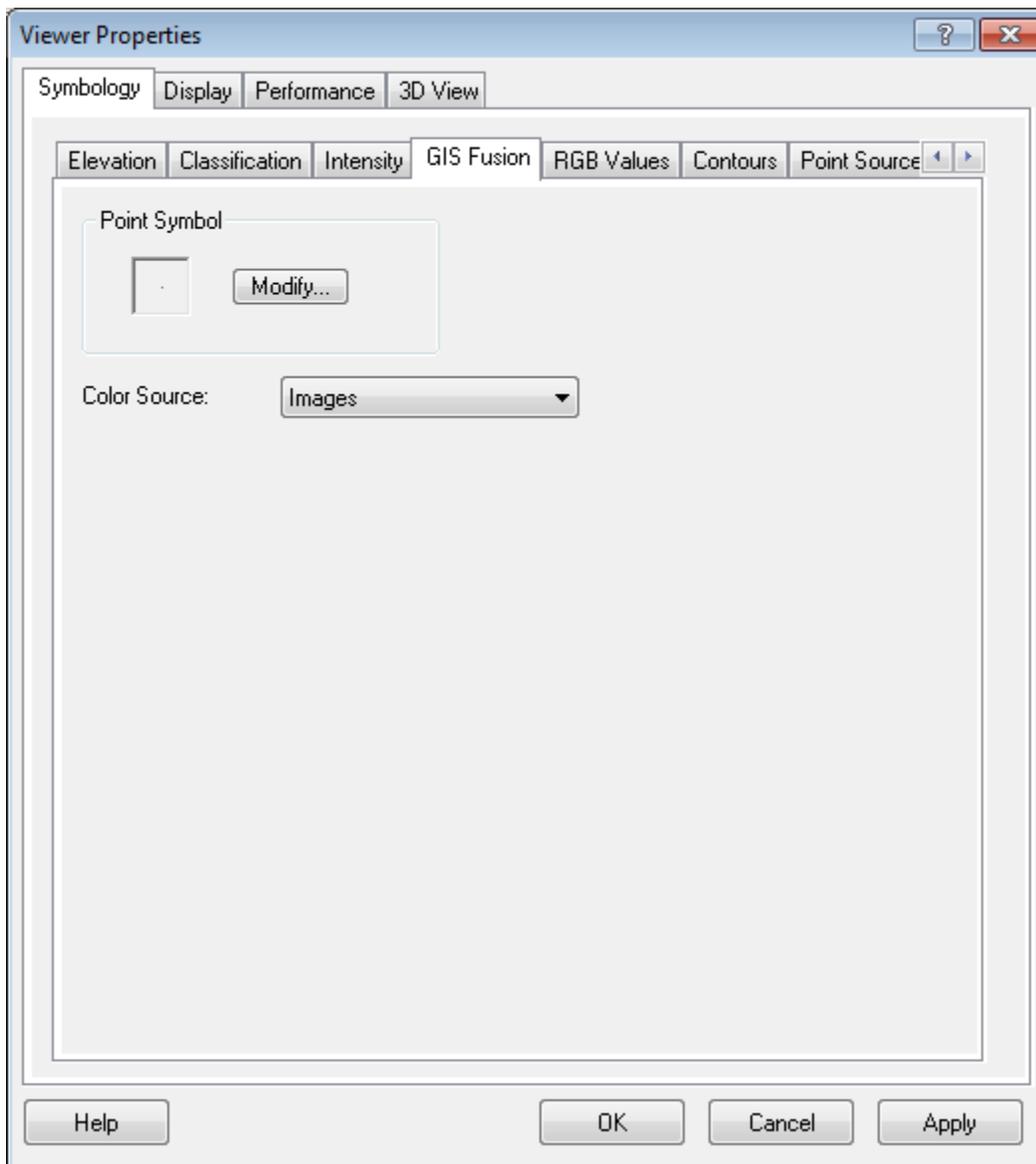


Figure 4 - Viewer Display Properties Symbology GIS Fusion

Only once the properties have been set for GIS Fusion may users visualize the LIDAR point cloud colored by the specified dataset/imagery as seen in Figure 5. The result is a visualization that is suitable for a lot of applications but will not be as robust in point color assignment as specific processes which extract point colors from imagery or assign these values during acquisition, particularly when working with mobile or terrestrial datasets.



*Figure 5 - Airborne data displayed by GIS Fusion*

