



global mapper

getting started guide



**BLUE MARBLE
GEOGRAPHICS**

bluemarblegeo.com

Welcome to Global Mapper

Thank you for using Global Mapper, the all-in-one GIS application from Blue Marble Geographics. As you will soon discover, this unique software offers an extensive collection of spatial data processing tools in an easy-to-use application that no GIS professional or map enthusiast should be without.

As you begin to explore the wealth of features and functions in Global Mapper, you will quickly learn that this is a truly remarkable software tool. Nowhere else will you find a single application that offers the level of file format support, data visualization options, digitizing capabilities, spatial analysis tools, LiDAR and 3D analysis functionality, and map design tools, right out of the box.

At Blue Marble Geographics, we are committed to ensuring our customers are provided with the information and resources necessary to effectively use the software they have purchased. To that end, we are pleased to offer a collection of instructional materials to help you get up and running in no time.

This Getting Started Guide is designed to assist with the basic operation of Global Mapper and to help you understand some of the commonly used features and functions. For a complete guide to all the software's capabilities, click the Help menu and choose Help... or click the F1 key on your keyboard. If formal instruction or self-training is required, visit bluemarblegeo.com/training to find out about currently available programs and resources.

Contents

Installation and Registration	Page 2
Navigating the Interface	Page 3
Setting Preferences	Page 6
Layer and File Management	Page 7
Importing Data	Page 9
Accessing Data Online	Page 11
Using the Digitizer	Page 12
Working with Attributes	Page 14
Using the 3D Functionality	Page 15
Using the LiDAR Module	Page 19
Exporting and Printing Maps	Page 21
Where to Find Help	Page 23
Useful Keyboard Shortcuts	Page 24
How do I?	Page 25

Installation and Registration

Installing Global Mapper

The current version of Global Mapper can be downloaded from the following web page:
www.bluemarblegeo.com/products/global-mapper-download.php

Depending on your computer's operating system, you can choose either the 32-bit or 64-bit version. The latter will allow you to take full advantage of the extra memory available for 64-bit applications and will improve the performance of the software. Several non-English language versions are also available. To install Global Mapper, simply double-click the executable file. Installation will take no more than a couple of minutes.

Registering Global Mapper

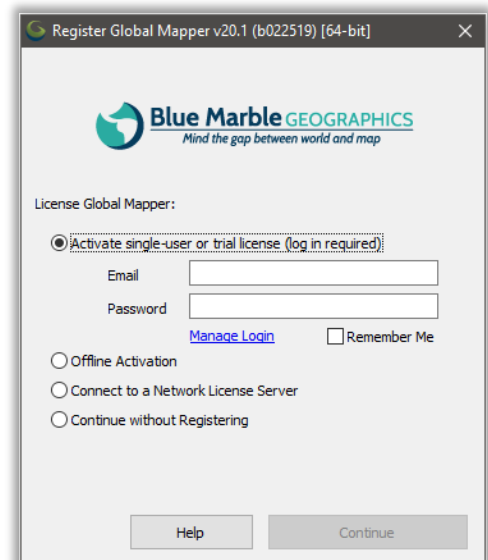
The first time you launch Global Mapper, you will see the **Register Global Mapper** window. The option you select will determine the authorization method and the level of functionality available to you when you run the software.

- **Activate single-user or trial license (log in required)**
Log in with a Blue Marble Geographics account to request a trial license or activate a single-user license from a recent purchase (requires an order number). Use the **Manage Login** link to create a new account or to recover a lost password.

- **Offline Activation**
Activate using a license file provided to you by email. This also displays the computer's information that can be sent to authorize@blumaplegeo.com to request a license for an offline machine.

- **Connect to a Network License Server**
If your company or organization has set up a network licensing system, you can use this option to check out a license while you are using the software. When you no longer need the license, it can be returned and used by someone else in your organization.

- **Continue without Registering**
An unregistered version of Global Mapper offers limited functionality (no support saving or loading workspaces, no export options, no 3D Viewer, etc.) and is not intended for data management or production.



Activating Optional Modules or Extensions

After registering Global Mapper, you will have the option to expand the software's functionality with add-on modules or extensions. Modules require the purchase of the appropriate license and include the LiDAR Module (for more information, see page 19). Extensions are typically developed and registered by third party developers, however a preconfigured extension called the COAST extension is installed with Global Mapper. This powerful tool is used to analyze the financial impact of coastal flooding.

Navigating the Interface

Software Layout

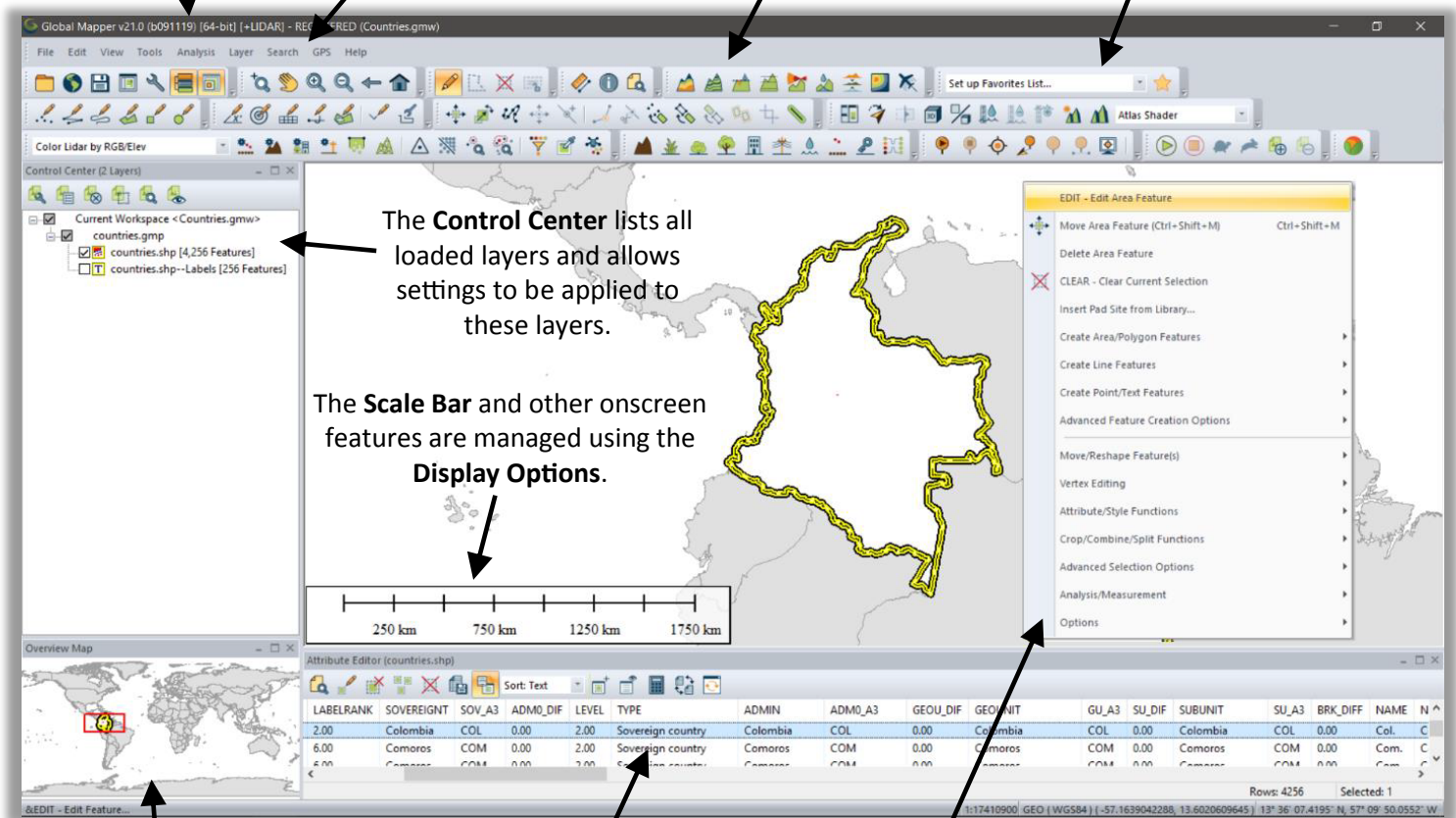
Global Mapper's user interface has been designed to provide easy and intuitive access to all of the software's features and functions. The key elements of the interface are the menus, the toolbar, and, of course, the map window itself. A variety of dialog boxes and floating windows provide access to additional tools or more advanced functionality.

The **Title Bar** displays information about the version of Global Mapper and the name of the current **Workspace**. For more information, see page 8.

Menus provide access to most of Global Mapper's core functionality. For more information, see page 4.

The **Toolbars** offer a convenient way to select a tool, apply a specific function, or change a setting. For more information, see page 5.

The **Favorites List** provides easy access to a customizable list of frequently-used tools. For more information, see page 5.



The **Control Center** lists all loaded layers and allows settings to be applied to these layers.

The **Scale Bar** and other onscreen features are managed using the **Display Options**.

The dockable **Overview Map** displays the full extent of the loaded data and represents the current extent with a box.

The **Attribute Editor** provides a searchable and sortable tabular view of the attribute data for a selected layer.

The **Digitizer Right-Click Menu** offers an extensive collection of tools for creating or editing features on the map. For more information, see page 12.

Information about a selected feature as well as the coordinates of the cursor are displayed on the **Status Bar**.

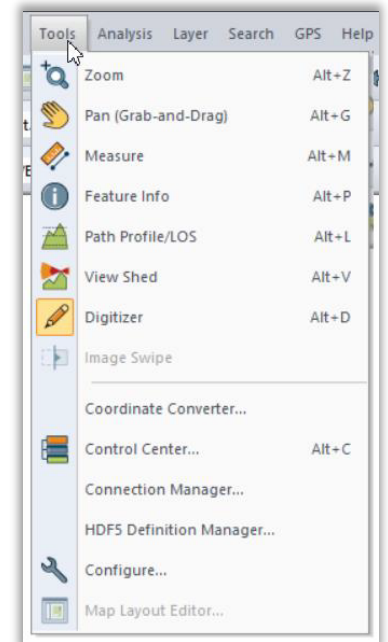
Navigating the Interface (continued)

Menus

The menus in Global Mapper are intuitively organized by function and offer access to all of the features and functions in the application. Note that, as with other software titles, there are often many ways to access a particular tool in Global Mapper. For example, the action of importing a layer can be performed using the Open Data File option in the File menu; the Open Data File button in the toolbar; or by using the Ctrl+O keyboard shortcut. How you chose to perform this and other commonly used functions comes down to your personal preference.

The following summarizes the primary function of each menu:

- **File**
The File menu contains all of the options for importing, exporting and saving data. It also includes a list of recently imported files, providing convenient access to frequently used layers.
- **Edit**
The primary function of the Edit menu is to enable the copying and pasting of features and to control the associated options.
- **View**
The View menu includes an array of settings for configuring the appearance of the interface and of the map itself. There are also options for manually adjusting the zoom level and for saving and restoring a specific map view.
- **Tools**
As its name implies, the Tools menu contains a selection of tools that are used to interact with features on the map. Based on the tool that is selected, the function of the cursor on the map will change. This menu also provides access to certain other dialog boxes such as the Overlay Control Center and the Map Layout options.
- **Analysis**
The Analysis menu consolidates many of the analytical functions into a convenient single list. While most of the analysis tools, such as watershed and contour generation, focus on working with elevation data, this menu also offers access to additional functions including the Raster Calculator and Graph and Chart Manager.
- **Layer**
The Layer menu provides access to a variety of operations that are performed against a layer or layers selected in the Overlay Control Center. These include attribute joining and calculation.
- **Search**
The Search menu offers several options for querying or editing feature attributes. It also includes an address search function that includes geocoding capability.
- **GPS**
When a compatible GPS receiver is connected to your computer, the position can be represented by a symbol on the map. The GPS menu controls the configuration and interaction between Global Mapper and a connected GPS device.
- **Help**
The Help menu provides a single point of access for the various help options and other resources that are available for Global Mapper. For more information, see page 22.



Navigating the Interface (continued)

The Toolbars

The buttons on Global Mapper's toolbars offer the most convenient way to select a tool, to open certain dialog boxes, or to switch between one function and another. If necessary, toolbars can be removed from the interface using the Toolbars option in the View menu, or can be undocked or moved to another position. Within each individual toolbar, buttons can be removed or added as needed.

The following are the buttons in the **File** toolbar:

The **Download Online Data** button offers access to a wealth of online data sources such as WMS and WFS. For more information, see page 11.

The **Configuration** button opens the Configuration window that is used to establish numerous settings in the software. For more information, see page 6.

The **Control Center** button activates the dialog box for managing loaded data layers. For more information, see page 7.

The **Open Data Files** button is used to initiate the import of data in any supported format. For more information, see page 9.

The **Save** button saves the status of all imported data, digitized features and configuration settings to a **Workspace** file.



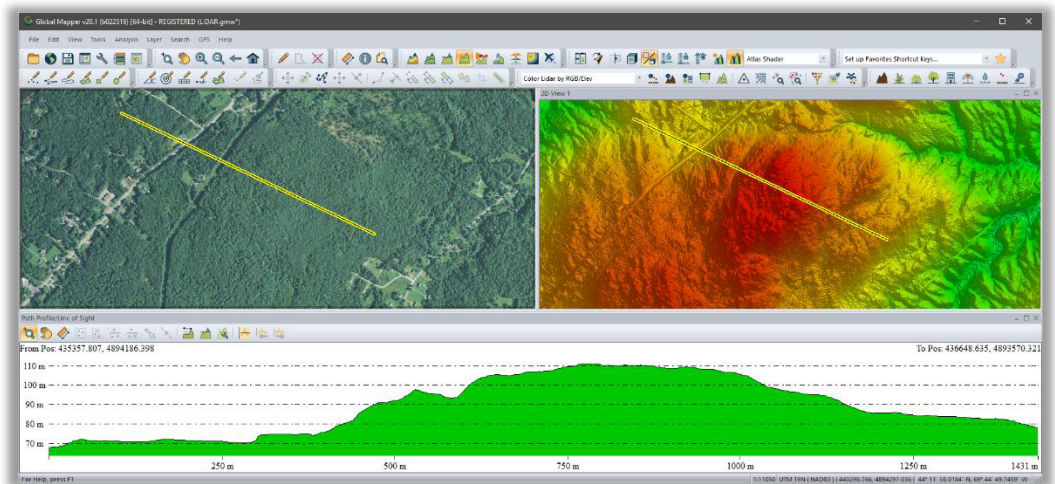
The **Map Layout** button is used to create a cartographic page layout of the current map with elements such as a scale bar and legend.

The **Toolbar Options** dropdown list allows buttons to be added or removed from the selected toolbar.

The **Overview Map** button enables the dockable overview window showing the boundary area of the main map view



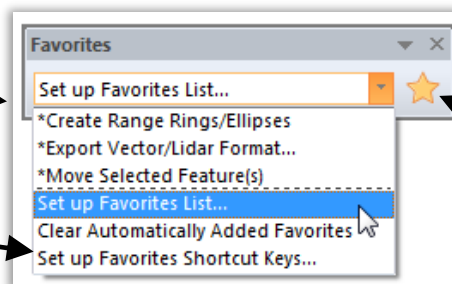
The **Map View Manager** provides the ability to create multiple 2D map displays and to set which layers are displayed in each. This, along with additional windows such as Path Profile and Attribute Editor, can be manually docked by dragging and dropping.



The **Favorites** toolbar provides a convenient way to access commonly used components of Global Mapper:

The customizable **Favorites List** provides easy access to frequently used tools

Custom keyboard shortcuts can be assigned to selected functions.



The **Run Selected Command** button initiates the function selected in the **Favorites List**.

Setting Preferences

The Configuration Dialog Box

The Configuration dialog box can be opened from the Tools menu or by clicking the Configuration button in the toolbar and it offers a single location for establishing personal settings and preferences that control many of the features and functions of the software.



- **General**

The General options include the default units of measurement, background color and coordinate format.

- **Vector Display**

The function of Vector Display is to control the appearance of point, line, and area features on the map. Specific options include filtering data types and adjusting the display order.

- **Display Options**

The Display Options are used to configure the display of map elements including the scale bar and legend.

- **Styles**

These options are used to create and manage feature types that can be assigned to polygons, lines, or points. Applying a feature type to a vector feature will automatically adjust the appearance of the feature and assign a custom list of attributes if required.

- **Projection**

The Projection section is used to alter the coordinate reference information for onscreen display and reproject a layer from one system to another before exporting.

- **3D View Properties**

3D View Properties, which is also accessible directly from the 3D Viewer, includes numerous options for controlling the behavior and display of the 3D map view. These include vertical exaggeration, background color, and 3D vector display. For more information, see page 11.

- **Vertical Options**

Vertical Options offers settings that control the display of elevation or terrain layers. These settings include the selection of a shader pattern and customization of the hill shading.

- **Shader Options**

Shader Options controls the visual display of several preconfigured elevation and slope shader patterns and allows new patterns to be created.

- **Lidar**

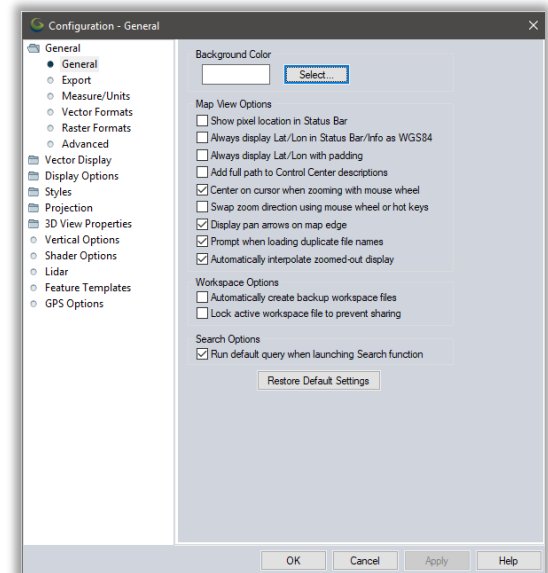
The Lidar settings are used for filtering a point cloud based on classification or return types.

- **Feature Templates**

The function of Feature Templates is to create a set of preconfigured attributes that streamline the process of digitizing or data collection, especially when using Global Mapper Mobile.

- **GPS Options**

GPS Options offers several settings for controlling the tracking process when using a connected GPS receiver.

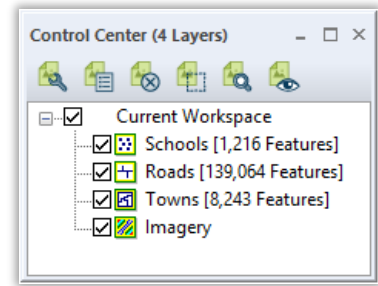


While the Configuration dialog box offers access to most of Global Mapper's preferences and settings options, many other components of the software contain feature-specific settings that are established when performing that function. For example, when exporting a file in a particular format, many of the preferences associated with the exported file are set in the Export Options dialog box.

Layer and File Management

The Control Center

The Control Center is Global Mapper's layer management tool. It can be opened from the Tools menu, by clicking the Open Control Center button in the Toolbar, or by using the keyboard shortcut Alt+C. Unlike most other dialog boxes, the Control Center can remain open while using other tools in the software. The Control Center window can also be docked by dragging the dialog box to one of the edges of the map window.



There are two ways in which a layer can be removed from the map display: the adjacent box in the Control Center can be unchecked or the selected layer can be removed completely by using the keyboard Delete key or highlighting the layer and choosing the Close (Unload Layers) button. Using the uncheck option, the layer is retained and can be simply checked on again when needed. Closing an overlay permanently removes it and any unsaved edits or created features will be lost.



Right-clicking on a selected layer or layers in the Control Center offers a variety of options for managing the layer. For instance, the Description or name of the layer can be changed, or multiple layers can be grouped in a tree view. This right-click menu also offers access to the Layer Options dialog box, which is used to adjust certain settings pertaining to a layer.

The Options Dialog Box

The tabs in the Options dialog box differ depending on the data type contained in the selected layer:

- **Vector Options**

The primary functions of the Vector Options dialog box include managing the display of labels; assigning features to a feature-type category; and adjusting the display characteristics of the features in the layer (fill pattern, symbol style, etc.).

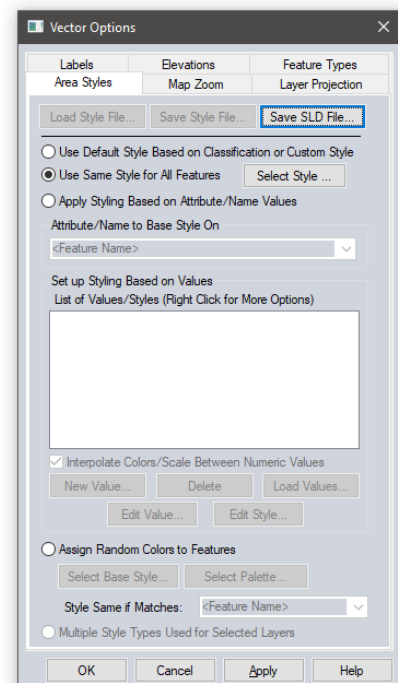
- **Raster Options**

The Raster Options dialog box includes tools for establishing transparency; adjusting color balance, contrast, etc.; and cropping an image to a defined area.

- **Elevation Options**

The available Elevation Options include tools for offsetting elevation values in the layer and for defining the range of visible elevations.

Each of the Options dialog boxes includes Map Zoom, to control the zoom range within which the layer will be displayed, and Layer Projection tab, which is used to reinterpret the coordinate values associated with the selected layer. Adjusting these projection parameters will result in the contents of the layer being physically moved to a new location and should only be performed when you know the original coordinate settings were incorrect. To simply reproject your map, use the Projection section in the Configuration dialog box (for more information, see page 6).

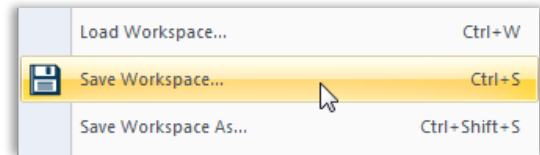


Layer and File Management (continued)

Saving the Workspace

The workspace is the core file management component of Global Mapper. It allows you to store information about the layers that are displayed on the map as well as any settings or configuration that have been applied to these layers. At its most basic level, a workspace is a file (*.gmw) that records a snapshot of your current map view.

To save your workspace, click the Save button in the toolbar or click the File menu and select Save Workspace... If a workspace was not previously saved, you will be prompted to name and choose a location for the file. You can also create a duplicate of an existing workspace by using the File > Save Workspace As... option. This function is useful for establishing a workspace template, possibly containing all layers or covering the full extent of your area of interest. Any workspaces created from this template using the Save Workspace As... command will inherit all of the layers and settings from the original and can then be individually modified to reflect the requirements of a particular project or jobsite.



Working with Imported Layers

An important consideration when working with workspace files is that they do not actually contain the map data from any files that are imported. Instead, the workspace records the path to the original file location as well as any edits or configuration that has been applied to this layer. If the path to the file location is broken, such as when you disconnect from your network or when the file is deleted or moved to a new location, the workspace will not load correctly and an error message will be displayed. For this reason, workspace files should typically not be shared with other Global Mapper users, assuming that the path to the included data is unique to the original computer.

Working with Digitized Features

Points, lines, and area features that are created using Global Mapper's Digitizer tools are stored directly in the workspace file. Modifications or additions made to any imported data are similarly archived internally within the software and are only applied to the original external data using the export function.

Global Mapper Package Files

An efficient way to share data among Global Mapper users is to create a Global Mapper Package file (.gmp). Unlike the aforementioned workspace format, a package file contains all of the map data from any previously imported layers and it retains all of the configuration settings and edits that were applied to these layers. A single Global Mapper package file can contain data in any format (raster, vector, and/or elevation) and as such, it provides an extremely efficient tool for exchanging maps and spatial data among Global Mapper users.

Global Mapper package files also offer a simple way to create backups of important datasets that can easily be reimported in the event of a loss of the original data or hardware failure.

For more information on exporting, see page 20.

Importing Data

Supported Data Formats

One of the defining characteristics of Global Mapper is the volume and variety of file formats that can be imported into the software. In the current version, over 300 file-types are supported, including all common spatial formats, such as ESRI shapefiles, KML files, MrSID imagery, and LiDAR point clouds. If Global Mapper doesn't support your data, contact Blue Marble and the software development team will determine if the format is compatible. A list of the currently supported formats Global Mapper Help system.

Importing Vector, Raster, and Elevation Layers

There are several ways to import data into Global Mapper: the File > Open Data File(s) command, the Open Data File(s) button in the File Toolbar; or the Ctrl+O keyboard shortcut. In each case, you will be prompted to browse to the required file to initiate the import process.

Aside from text files, as noted below, all vector, raster, and elevation formats are imported using the same dialog box and the same procedure. Global Mapper is able to differentiate the various formats and automatically assigns each to the appropriate overlay type. If required, you may be asked to define the coordinate parameters, to verify the data format for files with unconventional suffixes, or to manual rectify the file if there is no inherent geographic reference information. For more information on the rectification process, see page 10.

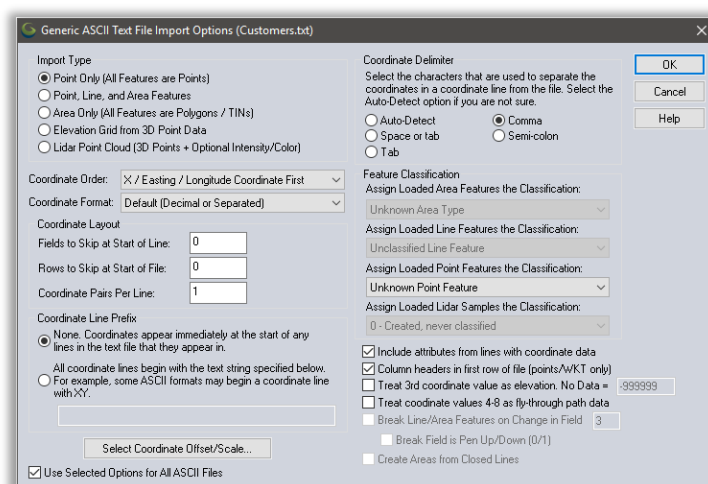
When importing, it is possible to select multiple files by holding down the Ctrl or Shift key while selecting the required files in the Open dialog box. Alternatively, you can open all compatible files in a specified folder or directory tree using the File>Open All Files in a Directory Tree command.

Finally, and perhaps most conveniently, you can simply drag and drop a compatible file onto the Global Mapper window to automatically initiate the import process.

Importing Text Files

Text files containing a list of coordinate values can be imported into Global Mapper and used to create points, lines, or area features. To initiate the text file import process, use the File > Open Generic Text File(s) command.

After selecting the required file, you will be prompted to assign certain parameters for the imported file such as the order and format of the coordinate values, the number of header rows in the file, and whether or not to import accompanying attributes.



Importing Data (continued)

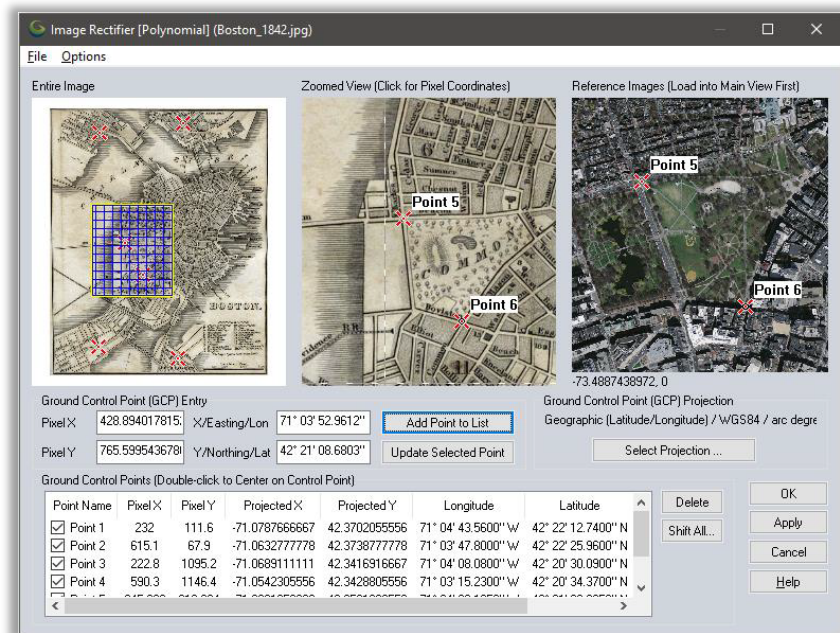
Georectifying Image Files

Global Mapper's Image Rectifier function provides a powerful tool for creating a geographically referenced raster layer from virtually any image file or PDF. The procedure usually involves identifying visible features in the imported image and tagging each of these with their corresponding coordinates.

To import an image, either use the standard File > Open (Ctrl +O) command or File > Rectify (Georeference) Imagery. If you choose the latter, you have the option to directly export the resulting raster file after the required control points have been assigned.

After selecting the file to be imported, the Image Rectifier dialog box is displayed showing an overview of the image; a zoomed view of the image in which the control points can be precisely placed; and a zoomable view of the current map. To begin the process, click an identifiable point on the image, click the corresponding point in the adjacent map, and click the Add Point to List button. Repeat this process for several additional points spaced as far apart as possible. Alternatively, you can manually type the X and Y pixel values from the image and/or type the corresponding coordinate values derived from surveyed ground control points.

After all of the control points have been assigned, click the OK button to create a new raster layer. To correct any errant registration points, select the layer in the Control Center, right-click and choose RECTIFY – Modify Layer Position/Projection.



Working with Spatial Databases

As an alternative to importing files, advanced users can establish a direct connection to an existing spatial database, which allows Global Mapper to both read and write data directly from the database tables. Among the supported database types are ESRI ArcSDE, ESRI File and Personal Geodatabases, MS SQL Spatial, Oracle Spatial, PostGIS, and Spatialite.

To establish a connection to a spatial database, open the Spatial Database Connection Manager (Tools > Connection Manager), click the New button, and enter the required settings. To import data from a connected database, click the File menu and choose Open Spatial Database, select the database name, click the Open button, and select from the available tables.

Accessing Data Online

Using the Download Online Data Function

A great way to get started making maps with Global Mapper is stream data from one of the many free online datasets. Numerous government agencies, organizations, and commercial companies provide direct streaming access to their spatial data archives through Web Map Service (WMS), Web Coverage Service (WCS) and other online protocols. Global Mapper includes preconfigured links to many of these servers.

To initiate the download process, click the Online Sources quick-start button on the introductory screen or click the Download Online Data button from the toolbar. In both cases, the resulting dialog box will list all of the available Data Sources, categorized by type or by geographic area. After expanding a category list, simply select the required data source and set the extent of the data to download using the options at the bottom of the window.



On occasion, you may find that the service that you require is not available and you will see an error message to that effect. This circumstance may be due to routine system maintenance, excessive traffic, or other technical issues. Unfortunately Blue Marble has no control over the availability of these online map sources so it is recommended that you save the data to a local file so you do not have to continually depend on the streamed service. See below for more information.

Premium Data Sources

Blue Marble has partnered with several commercial data providers to offer convenient access to high-quality imagery and elevation datasets. If you select one of the Premium Content options in the Online Data Source dialog box, you will be prompted to enter the appropriate log-in details or data access ID number to download the data. Information on subscribing to these services can be obtained from the data provider's web site.

Adding Custom Data Sources

While Global Mapper includes numerous preloaded maps services, you can also add custom online sources if they are available for your area of interest. Many GIS departments now use the web as an efficient delivery mechanism for their datasets and Global Mapper allows you to set up a direct link to this data. After clicking the Add New Source button in the Online Data dialog box, simply enter the appropriate URL to establish this link.

Saving Data for Use Offline

Because the availability of the streaming data services cannot be guaranteed, it is strongly recommended that you save a local copy of any online map data. Not only will this ensure that you will always have access to the required layers, even when offline, but it will significantly speed up the map draw speed when working with this data.

To save streamed data, click the File menu and select Export > Export Raster/Image Format, choose a file format when prompted, and enter the file settings as needed. A good format choice is JPEG 2000 (.jp2) as it provides a balance between file size and image quality. Before finalizing the export, click the Export Bounds tab in the Export Options dialog box and choose one of the available options to limit the geographic extent of the exported file, otherwise you may inadvertently generate an extremely large file. Note that saving data will take considerably longer than simply displaying it on the map, so be prepared to wait some time for the file to be saved.

Using the Digitizer

The Digitizer Tool

Arguably the most important tool in Global Mapper, the Digitizer allows you to create, delete, edit, move, reconfigure, and copy points, lines, and area features on the map. The most frequently used Digitizer components can be accessed directly from the Digitizer (Create) toolbar, but many more tools are available by right-clicking on the map after the Digitizer has been enabled.

When used by itself, the Digitizer is a selection tool. After clicking the Digitizer button in the toolbar, the position of the cursor is represented by a crosshair with the word EDIT displayed below, and in this mode, points, lines, and area features can be selected in preparation for editing, moving etc. Individual features can be selected by simply clicking the feature on the map or multiple features can be simultaneously selected by clicking and dragging a box that encompasses the extent of the required features or by holding the Ctrl key while selecting multiple individual features.



Drawing Freehand Features

The following buttons are used to manually create vector features on the map:



Point features or text are created by simply clicking at the required location on the map.



Line features are created by clicking at each desired shape point on the map. The line is terminated using the right mouse button.



Trace-mode lines are created by clicking and holding the left mouse button while moving the mouse over the map.



Area features or polygons are created by repeatedly left-clicking on the map. Right-click to add the final point, which is automatically connected to the first point.



Rectangular areas are created by holding down the left mouse button while moving the cursor between the opposite corners. Squares are created by holding the Shift button down while dragging.



Circles are created by holding down the left mouse button while moving the cursor outwards from the center point to define the radius. An ellipse is created by holding the Shift button down while dragging.



Additional Digitizer Tools

The Digitizer (Advanced) toolbar contains several buttons for activating specialized vector creation tools, such as the CoGo tool for creating line or area features by entering specific dimensions and the Range Ring tool for generating concentric circular area features of a specified radius around a point.

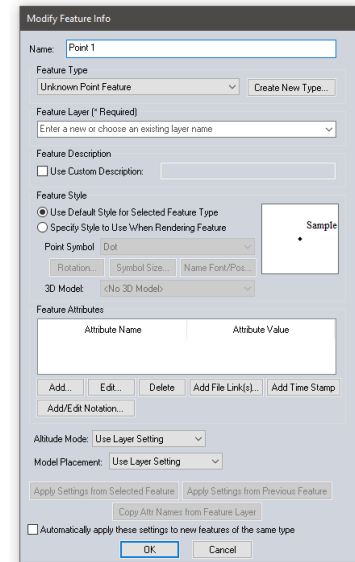
The Digitizer right-click menu offers numerous advanced drawing tools that are organized in submenus by type (areas, lines, and points) as well as an extensive collection of tools for reformatting, editing, and converting vector features.

Using the Digitizer (continued)

The Modify Feature Info Dialog Box

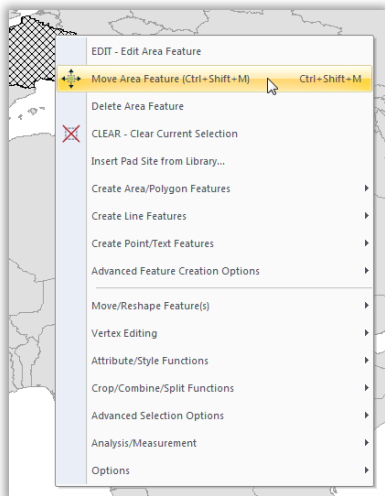
The Modify Feature Info dialog box appears after a new feature is created or when the right-click > EDIT option is chosen after a feature has been selected with the Digitizer tool. This dialog box includes options to establish the target layer for the feature, style settings, and tools for adding or editing attributes.

The Feature Type dropdown list provides the means to assign the selected feature to a preformatted classification, which automatically determines the visual characteristics as well as the attribute fields that are associated with this type. Additional Feature Types can be added to the list by clicking the Create New Type button.



Editing Vector Features

Global Mapper provides tools for editing both the geometry and physical appearance of vector objects as well as the attributes or information that is associated with each feature. Note that modifications made to an imported layer are not automatically applied to the source file. Instead, the layer must be exported in the appropriate format to apply any edits to a original file.



Before initiating any editing function, the feature or features must be selected with the Digitizer tool as previously described. The act of selecting a feature activates several additional buttons in the toolbar that offer such options as moving, rotating, scaling, and converting features. Additional geometric editing options are available by right-clicking on the map.

Global Mapper also provides the ability to edit the shape and size of individual lines or area features by adding, moving, or deleting vertices or shape points. To enable this function, make sure the option to display vertices for selected objects (right-click > Options) is enabled. Vertices can then be selected with the Digitizer tool and, using the right-click > Vertex Editing function, can be modified in several ways.

To restore the original geometric shape or position of a feature, select it with the Digitizer tool and choose Move/Reshape Feature(s) > Restore Original Shape of Selected Features.

Deleting Features

The easiest way to delete a feature in Global Mapper is to select it with the Digitizer tool and use the Delete key on your keyboard. Although the feature will be removed from view, it is not permanently erased and can be easily recovered if necessary. Using the keyboard shortcut Ctrl+Z immediately after deleting the feature will undo the deletion. Alternatively, you can toggle the display of all deleted features using the keyboard shortcut Ctrl+Shift+D and, using the Digitizer tool, right-click and choose the Undelete option.

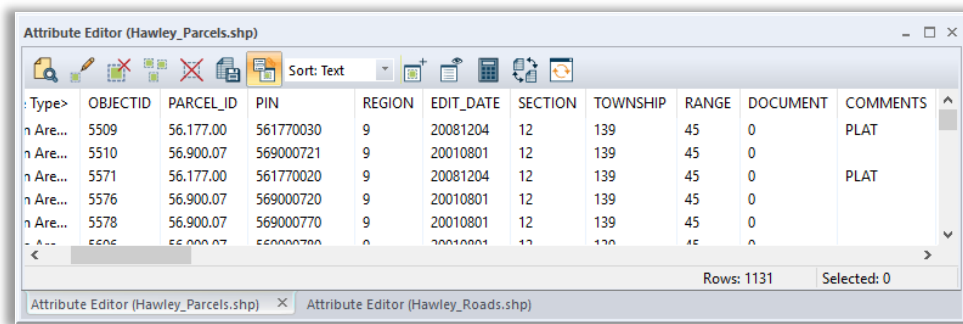
Working with Attributes

Manually Adding or Editing Attributes

The Modify Feature Info dialog box, previously described in the Using the Digitizer section, offers the option to manually add or edit attributes for one or more selected features. New attribute fields can be created and the corresponding values can be manually entered. For large numbers of features, this can be a time-consuming and laborious process, so it is typically recommended that attribute fields are automatically applied by assigning them to an appropriate Feature Type or, if possible, joining attributes from an external source.

The Attribute Editor

Accessed by right-clicking on one or more layers in the Control Center, the Attribute Editor provides a tabular display of all of the attribute data for each layer, separated into individual tabs. Within this dialog box, attributes can be queried, sorted, edited, and exported.



Joining and Calculating Attributes

The join process in Global Mapper allows external data to be assigned to the appropriate features in an existing layer for the purpose of creating additional attribute fields. Before beginning this procedure, it is essential that each feature has an existing attribute that matches a corresponding value in the data being joined. The join can be based on a one-to-one match, where each entry in the imported data matches one feature on the map, or it can be based on a one-to-many approach, where an individual record in the data is assigned to several features on the map.

To initiate the join process, click the Join Attributes button in the Attribute Editor. Supported formats for the external tabular data include .txt, .csv, and dbf.



The Calculate Attributes function, which is also accessed using a button in the Attribute Editor, is used to create a new attribute field by applying a calculation to an existing attribute. Calculation options include standard numeric operations, such as add and multiply; text-based operations, such as append or prepend text; or advanced formulaic operations.



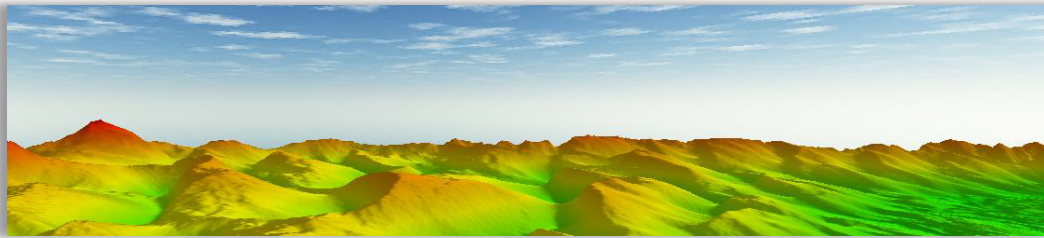
Advanced Attribute Options

Global Mapper provides several options for automatically creating or updating attributes. After selecting a feature or features on the map with the Digitizer tool, the right-click menu offers an Attributes/Style Functions submenu that can be used to automatically assign attributes using a variety of criteria. For instance, with an underlying elevation layer, you can assign elevation and slope values to selected features or you can add an attribute with a count of the number or point features inside a selected area.

Using the 3D Functionality

Working with 3D Data

In order to utilize Global Mapper's 3D functionality, the data with which you are working, must have an inherent elevation or height value. Both vector features and appropriately formatted raster layers can include this "Z" value and can be modeled in a three-dimensional perspective.



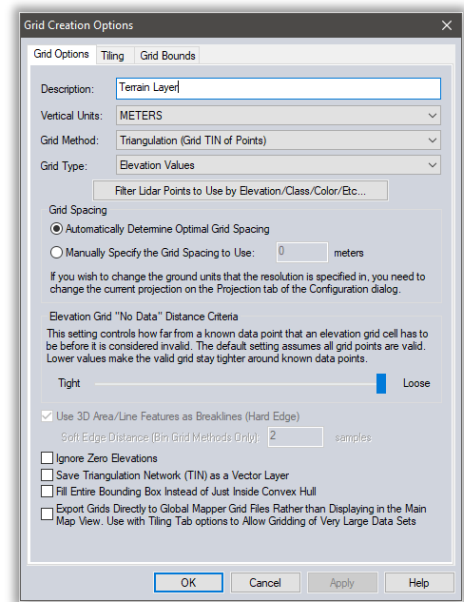
The most common application for 3D data is to generate a terrain surface, which is the basis of many of Global Mapper's analytical functions, such as watershed delineation and flood level modeling. A height value can also be applied to a vector feature or to individual vertices that comprise a vector feature, which allows the feature to be extruded from a terrain surface.

Where to Find 3D Data

As with the standard raster and vector data formats, there are numerous sources of 3D or elevation data. Global Mapper's Download Online Data function provides several preformatted datasets that can be downloaded free of charge, or through a subscription to one of the listed data providers. Global Mapper also supports dozens of preexisting elevation formats, such as DEM and Arc/Info Grid files, which are imported using the normal File > Import process. Simple text files that include elevation values along with coordinates can be imported using the File > Import Generic ASCII Text File(s) command and can be gridded to create an elevation layer. Finally LiDAR (Light Detection and Ranging) data can be imported and processed to create a high-resolution surface model. For more information on working with LiDAR in Global Mapper, see page 19.

Creating a Terrain Map from 3D Vector Features

The process of generating a raster elevation layer from an array of vector features that contain an elevation value involves gridding the data. This procedure typically follows the import of an XYZ text file or LiDAR file, but it can also be performed using other vector files such as contours. To create an elevation grid from a selected layer, right-click on the layer in the Control Center and choose Analysis > GRID or click the Create Elevation Grid button in the Analysis toolbar. In both cases, the Elevation Grid Creation Options dialog box will appear, which offers a number of options for configuring the gridding process.



3D Options and Preferences

By default, an elevation layer will be displayed using the multi-colored Atlas Shader, although there are several additional options in the Shader dropdown list. A simulated hill shade or shadow effect will also be applied to accentuate variations in the terrain. This can be disabled using the Hill Shade button. Additional 3D options can be established in the Configuration dialog box. For more information, see page 6.

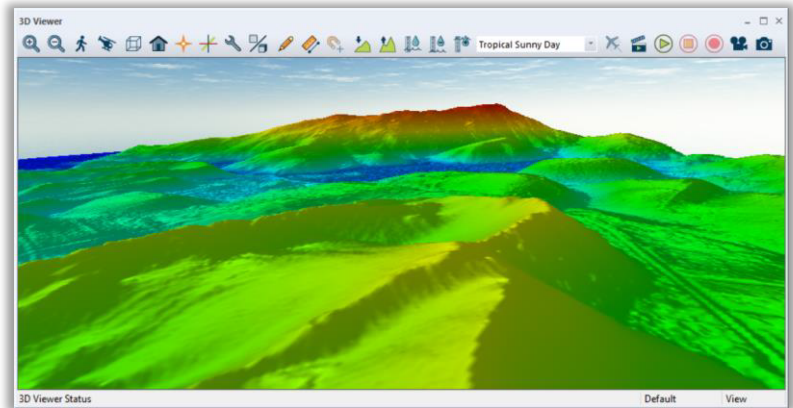
Using the 3D Functionality (continued)

Visualizing the Map as a 3D Model

A supplementary map window in Global Mapper provides the means to view any data with a height or elevation value as a three-dimensional model. This window is opened using the 3D View button in the toolbar. This window can also be docked adjacent to the corresponding 2D map.

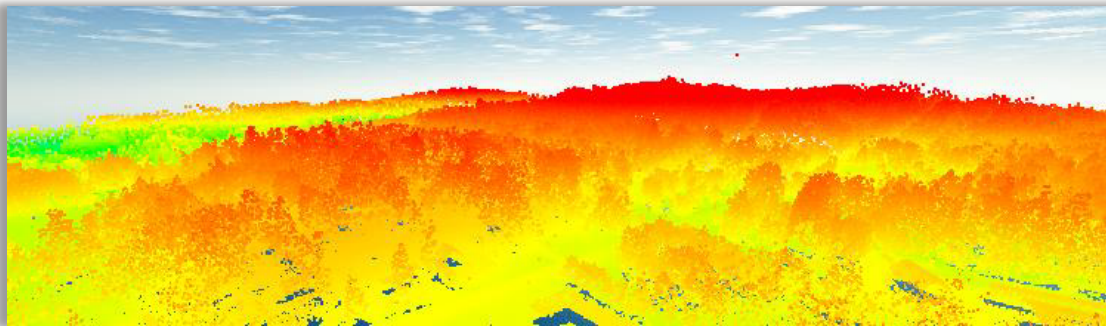


Many of the same zooming and panning functions that are used in the 2D map view are also available in the 3D window. Additional tools allow the vertical exaggeration to be increased, the perspective to be changed to ground level, and water inundation to be simulated. The 3D window also includes a Save function that allows the current 3D view to be saved as an image.



Working with LiDAR Data

A rapidly emerging source of data in the GIS field, LiDAR (Light Detecting and Ranging) data provides the raw material for creating highly accurate terrain surfaces or other 3D layers. In its native format, LiDAR is a series of closely-spaced points, each of which contains precise coordinates, an elevation, a classification that denotes the type of feature that the point represents (ground, vegetation, building, etc.), and several additional attributes. Recent developments in Global Mapper have expanded support for both the standard LiDAR files (.las and .laz) as well as other point cloud formats. An optional LiDAR Module is available that offers advanced LiDAR processing tools. For more information, see page 19.



LiDAR data is imported using the standard import procedure (Ctrl+O) however the subsequent import options dialog box is unique to this format. In this window, the data can be filtered, sampled, and if required, can be directly gridded into an elevation layer.

After importing, the points will inherit the colors of the currently selected shader and will reflect the elevation value if no RGB values have been assigned to each point. Using the layer's Options dialog box, the display of the points can be changed to represent other variables such as classification or intensity. Also unique to this format is the Edit function, which is accessed by right-clicking after selecting one or more of the LiDAR points with the Digitizer. In this dialog box, the point's classification can be edited and other attributes modified.

Using the 3D Functionality (continued)

3D Analysis Functions

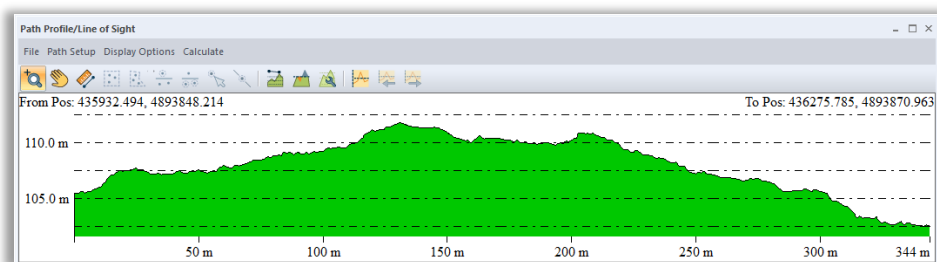
Global Mapper offers several analysis tools that utilize loaded elevation or terrain layers.

- **Watershed Modeling**

This tool is used to delineate the potential for the terrain to support the flow of water using linear features to represent stream channels and area features to outline watersheds or catchment areas.

- **Path Profile/Line-of-Site**

A Path Profile is a cross-sectional view of the terrain as represented by a line feature. The Line-of-Site analysis, which will only work with a single segment line, shows where obstructions impede the view or transmission path from one end of the line to the other.



- **View Shed Analysis**

The View Shed tool outlines which areas are visible or are within the broadcast range of defined location. Options such as azimuth range, distance, and height of the point of origin can be customized in the view shed analysis setup dialog box.

- **Water Level Rise/Flood Simulation**

Based on a selected area or on actual sea level, the Water Level Rise/Flooding tool outlines those areas that will be impacted by a specified increase in water level.

- **Contour Generation**

The creation of contour lines is one of the most common uses for elevation data in Global Mapper. The Contour Generation Options dialog box allows the contour interval to be established, supplementary areas features to be created, and other settings to be applied.



- **Calculating Volume Between Surfaces**

With two overlapping elevation layers loaded, such as a surface layer and a subsurface bedding plane, this straightforward tool calculates the volume of material between the two.

- **Comparing/Combing Terrain Surfaces**

This tool creates a new elevation layer from an operation or calculation applied to the elevation values in two overlapping layers. Operators include subtraction, average and maximum.

- **Cut and Fill Calculation**

Available as a right-click option when either a line or area feature has been selected with the Digitizer, the Cut and Fill calculation tool determines the volume of material that will need to be removed and/or added to create an artificially flattened surface.

For more specific instructions on the use of these analysis tools, refer to the help documentation.

Using the 3D Functionality (continued)

Assigning Height or Depth to Vector Features

Any point, line, or area feature can have an associated z-value, which allows it to be modeled in a 3D environment relative to other vector features or to a loaded terrain surface.

When importing a vector layer, Global Mapper will automatically look for an existing vertical attribute, such height or elevation, and use that as the z-value. To manually assign a z-value, simply add a new attribute to the required feature or features and type the elevation, height, or depth. To make sure Global Mapper recognizes this attribute as a z-value, open the Options dialog box for the layer in the Control Center and choose the appropriate attribute field from the Get 'Elevations' from Attribute Value dropdown list in the Elevations tab.

It is also possible to add a unique z-value to each vertex that comprises a line or area feature. This procedure is initiated by clicking the Vertices button in the Modify Feature Info dialog box for a selected feature.

Working with 3D Models or Meshes

Global Mapper supports several 3D Model formats including OBJ, DAE, and STL files. These are rendered as top-down vector features in the 2D map view but assume their full 3D characteristics when displayed in the 3D View. Using the LiDAR Module, 3D models can be created from selected points in a point cloud layer or as a by-product of the Pixels-to-Points tool. For more information, see page 19.



Creating a 3D Fly-Through Recording

Global Mapper provides a simple tool for creating a video file that records a user-defined path through any 3D environment. The process of creating the path is initiated with the Digitizer tool and can use a drawn line, imported line feature, or GPS track file. The line itself does not have to contain any particular characteristics or attributes but is simply used to define the course of the flight.

After selecting the line, the Create Fly-Through button will be available in the Analysis toolbar. Clicking this button opens the Fly-Through Path Properties dialog box, in which the flight settings are established. These settings include height above ground, flight duration, camera angle, and pitch.

In the 3D Viewer, a series of buttons control the preview, playback, and recording of the video file.



I.	X	Y	Z	Time	Velocity	Heading	Pitch	Bank
0	732270.822	6899491.503	140	0.00	23.37	99.31	0.00	0.00
1	732310.229	6899484.255	140	1.71	23.37	178.89	0.00	0.00
2	732310.229	6899455.266	140	2.95	23.37	158.33	0.00	0.00
3	732325.177	6899415.406	140	4.78	23.37	115.45	0.00	0.00
4	732330.613	6899412.688	140	5.04	23.37	101.03	0.00	0.00
5	732366.396	6899404.988	140	6.60	23.37	36.01	0.00	0.00
6	732379.079	6899421.747	140	7.50	23.37	64.93	0.00	0.00
7	732383.155	6899423.559	140	7.69	23.37	68.33	0.00	0.00
8	732390.403	6899426.277	140	8.02	23.37	142.02	0.00	0.00
9	732395.838	6899419.030	140	8.41	23.37	148.63	0.00	0.00

Auto-Generate Fly-through Data

Camera Mode

☒ Straight Ahead

☐ Fixed Direction

Heading (degrees): 90 Pitch (degrees): 0

☐ Fixed Point

X: 0 Y: 0 Z: 0 Select From Map...

☐ Compute bank angle from bearing changes

☐ Smooth result (Recommended for lines created in trace mode)

Elevation Mode: Absolute Elevation (meters): 140

Duration (seconds): 25 Ave Velocity (m/s): 23.3689

Generate Fly-through Data Clear Fly-through Data Update Vertex Velocity

Export Fly-through Path Layers

OK Cancel Help

Using the LiDAR Module

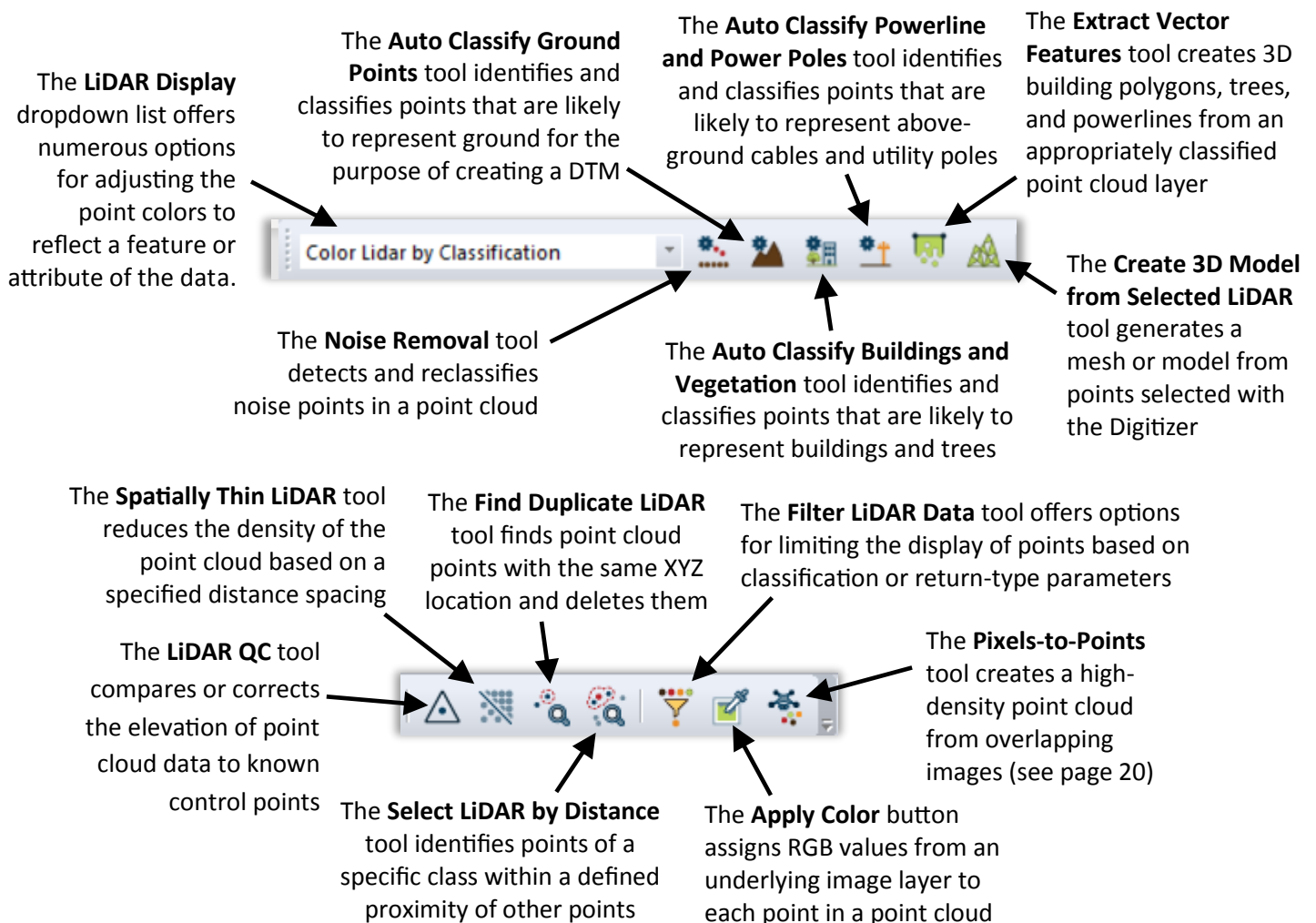
Module Overview

The Global Mapper LiDAR Module is an optional add-on component of the software that significantly enhances the LiDAR processing functionality. The key feature of the module is a toolbar that includes buttons for reclassifying LiDAR points, applying filters, extracting vector features from a point cloud, and for creating a point cloud from overlapping aerial images. Behind the scenes, the Module significantly improves the performance of LiDAR-related processes and offers several visualization options including cross-sectional viewing and editing of a swath of points.

Activating the Module

The LiDAR Module is installed with the standard version of Global Mapper however a valid registration key is required to activate it. This key can be ordered on the Blue Marble website or it can be added to your original purchase. To activate the module, click the Help menu and choose Module/Extension License Manager. Simply checking the box next to the LiDAR module will trigger the registration window. After activating the license, the LiDAR toolbar will automatically appear.

The LiDAR Toolbar

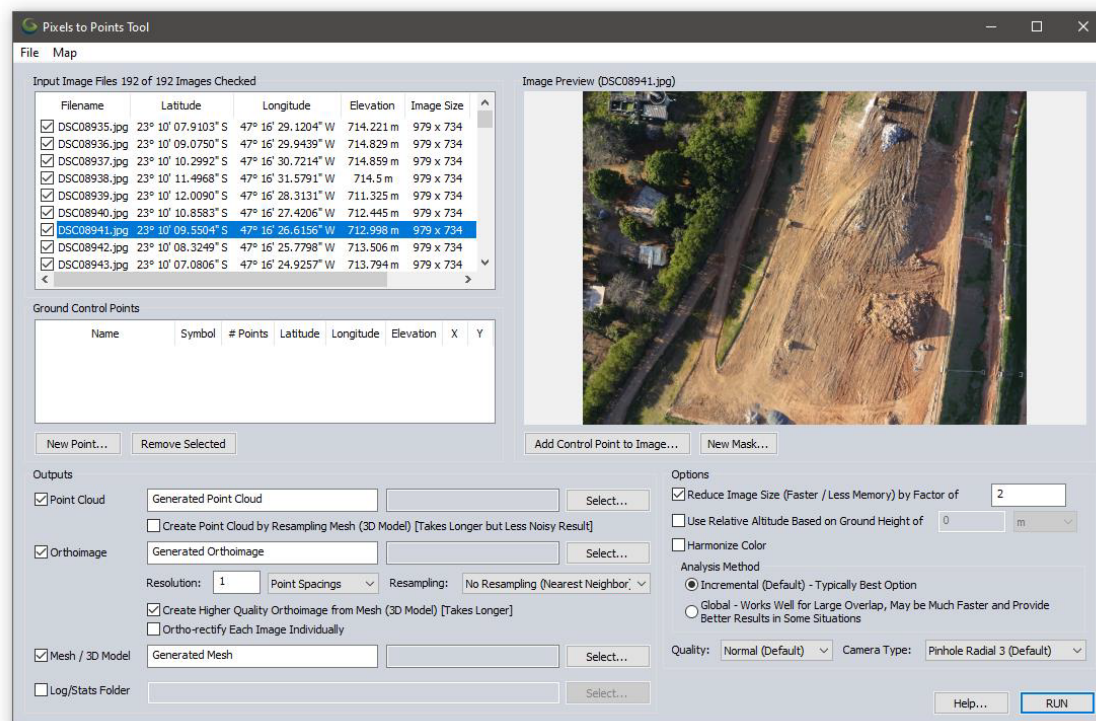


Using the LiDAR Module (continued)

Pixels-to-Points

This powerful component of the LiDAR Module uses the principles of photogrammetry to create a high-density point cloud from overlapping geotagged images. Ideally suited for UAV or drone operators, Pixels-to-Points analyzes the relationship between recognizable objects in adjacent images to determine the three-dimensional coordinates of the corresponding surface. As a by-product of the point cloud generation capability, the Pixels-to-Points tool also offers the option of creating an orthorectified image and/or a 3D mesh.

To create a point cloud, simply click the Pixels-to-Points button and load your images into the resulting dialog box. Apply the necessary settings and add ground control points if available before clicking the Run button.



The

Pixels-to-Points process is memory intensive and may take several hours to process depending on the input data and quality settings.



Exporting and Printing Maps

General Export Considerations

Efficient file exporting and map sharing are essential components of any GIS and play a major role in the functional makeup of Global Mapper. Just as the software can support a vast array of file formats for importing, similarly hundreds of file-types can be exported ensuring Global Mapper's interoperability with many third-party applications.

When exporting data from Global Mapper, there are several issues and factors that need to be taken into account:

- All compatible layers and/or visible features will be exported by default. In other words, Global Mapper will create a single file for all displayed layers by merging multiple layers into one file. In order to export the contents of a specific layer, right click on the required layer in the Overlay Control Center and choose Layer > EXPORT.
- There is no automated process for saving edits or additions to an imported file. In order to save changes to the source file, you need to export the layer in the same format and overwrite the original file.
- The projection and coordinate settings for any exported data are established in the Projection tab of the Configuration dialog box (for more information, see page 6). Regardless of the projection parameters of each imported layer, this global projection will be assigned to all exports.
- Each export format's options dialog box has a set of format-specific settings that are applied to the file being exported. Common to all formats are an Export Bounds option, that can be used to limit the geographic extent of the data being exported, and a Gridding or Tiling option that can be used to break up a single large file into several smaller files.

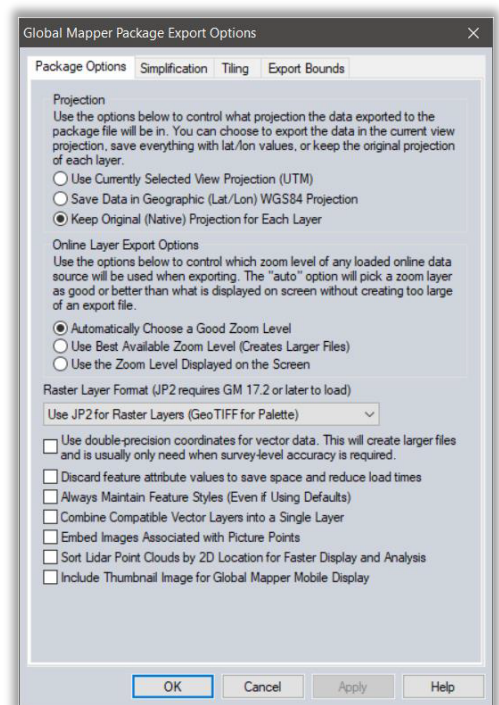
Exporting Global Mapper Package Files

When sharing data with other users of Global Mapper, the Global Mapper Package format is the preferred choice. This proprietary format supports all compatible data-types and allows multiple layers to be simultaneously transferred in a single compressed file. When imported, the Global Mapper package file will recreate the layer structure of the original data.

Global Mapper package files can also be employed as a means for backing up critical datasets. This ensures that the data can be effectively restored in the event of a loss of the original data or hardware failure. To create a package file, click the File menu and select Export > Export Global Mapper Package File...

Exporting Vector, Raster, and Elevation Layers

Unlike Global Mapper's import process in which a single Open command is used to access all compatible data, exporting requires the selection of a data type (vector, raster, or elevation) and subsequently a specific file format. The Export submenu under the File menu offers these three options. The selection of a format for the exported data will depend on the intended use of the resulting file and its compatibility with the third party software into which it will be imported.



Exporting and Printing Maps (continued)

Exporting to a Spatial Database

In the same way that Global Mapper provides a streamlined way to import data from a spatial database, any loaded data, regardless of its origin, can be written out to any of the supported database formats. As when exporting data in file format, the Export submenu provides three database export options: raster, vector, and elevation. For more information on establishing a connection to a spatial database, see page 10.

Uploading Maps to an Online MangoMap

MangoMap is an online mapping service that provides a simple and efficient way to share geospatial data with anyone, on any device. Beginning in version 21, Global Mapper users can set up a MangoMap subscription and publish map directly from the software. To initiate the process, click the MangoMap button the toolbar.

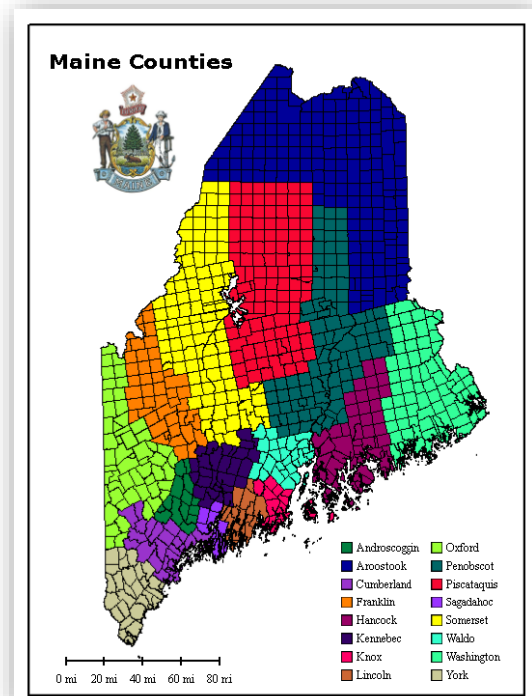


Printing the Map

Before sending a map to a connected printer, Global Mapper offers a powerful page layout tool that can be used to add cartographic elements such as a title, legend, and scale bar to the map. Using a *what-you-see-is-what-you-get* approach, the Map Layout Editor simplifies the production individual maps or map books.

Creating a Geospatial PDF

Capturing a map view as a Portable Document Format (PDF) allows the map to be shared with virtually anyone, regardless of their computer's operating system. Global Mapper's PDF export function also retains the inherent layering structure and geographic referencing information so that the map viewer can turn on and off layers as needed, can see the coordinates when their cursor is moved over the map, and can perform simple cartographic functions such as measuring distances.



Exporting a PDF is similar to sending a map to a printer and includes many of the same setup options. To create a PDF, click File > Export > Export PDF File... Additionally, a geospatial PDF can be created in the Map Layout Editor window.

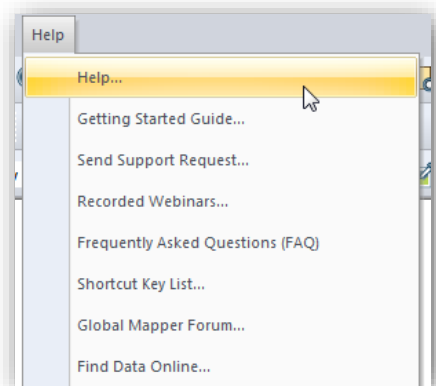
Capturing a Screenshot

Perhaps the simplest way to share a map, the Capture Screen Contents to Image command is an available option in the File menu or by using the Shift+C keyboard shortcut. The resulting dialog box offers the choice of four common image formats and includes an option to save a projection and/or world file that will allow the image to be imported into a third party GIS application.

Where to Find Help

Global Mapper Help Documents

Global Mapper's searchable help system is automatically installed with the software and is accessed from the Help menu or by clicking the F1 key. You can either browse through the contents section or search for a keyword to find information on the function in question. Embedded hyperlinks help you navigate between sections and provide supplementary information about the selected topic.



Online Resources

- An online version of the complete User's Manual is available here:
www.bluemarblegeo.com/knowledgebase/global-mapper
- Recordings of the Global Mapper webinar series, which cover a variety of topics in the software can be viewed here:
www.bluemarblegeo.com/products/webinars.php

The Global Mapper Forum

The Global Mapper Forum is an active online community of users and experts from a wide variety of industries and fields. Forum participants have the opportunity to ask questions, offer tips, and participate in discussions about the use of the software and its future development. Many new users find browsing through the posted topics to be an invaluable part of their learning experience.

A link to the Global Mapper Forum is available in the software's Help menu or you can navigate directly to the following site:
www.globalmapperforum.com

Training Opportunities

Both public and company-specific training opportunities are available to help you get the most out of the software. The availability of scheduled public classes and information about registering is posted here:
www.bluemarblegeo.com/training

Customized onsite or online classes can also be arranged for individual companies or organizations. For information, email:
training@bluemarblegeo.com

Global Mapper Support

After all other self-help options have been tried, on-demand support is available to resolve any issues with the installation, registration, or performance of the software. Support requests are initiated using the preconfigured form on the following web page:
www.bluemarblegeo.com/support/support.php

Useful Keyboard Shortcuts

General Application

Open the User Guide	F1
Display 3D Window	Ctrl+3
Print	Ctrl+P
Alt+X	Exit Global Mapper

File Management

Open data file (import)	Ctrl+O
Save the current workspace	Ctrl+S
Load a workspace	Ctrl+W
Unload (remove) all layers	Ctrl+U
Copy selected features to the clipboard	Ctrl+C
Delete and copy selected features to the clipboard	Ctrl+X
Paste features from the clipboard to a selected layer	Ctrl+V
Open the Overlay Control Center.....	Alt+C

Tools Selection

Digitizer Tool.....	Alt+D
Feature Info Tool	Alt+P
Measure Tool.....	Alt+M
Zoom Tool.....	Alt+Z

Zooming and Panning

Zoom in.....	Page Down
Zoom out	Page Up
Zoom to full extent of all loaded data	Home
Pan the Map (¼ screen increments).....	Arrow Keys
Pan the Map (Entire screen).....	Ctrl+ Arrow Keys

Digitizer Functions

Edit the feature under the cursor.....	Left Double-Click
Select a feature and automatically enter move mode	Alt+Left Click
Undo last operation.....	Ctrl+Z
Cancel the current operation	Esc
Delete the selected feature.....	Delete
Undelete the selected feature	Shift+Delete
Temporarily disable snapping when drawing a feature	Alt+Left Click

Custom Keyboard Shortcuts

Additional keyboard shortcuts can be manually assigned using the Favorites dropdown list in the toolbar. For more information, see page 5.

How do I...?

How do I register Global Mapper?

After installing Global Mapper, launch the software and you will see the Register Global Mapper window. If you purchased a license, enter your account information as prompted to unlock the full functionality. For more information, see page 2.

How do I reproject a layer?

Open the Configuration dialog box (Tools > Configure), select the Projection section and update the projection and coordinate parameters as needed. These settings will be applied to all loaded data and will be applied to exported layers.

How do I change the background color of the map window?

Click the View menu and choose Background Color... The selected color will be saved in the current workspace.

How do I recover a deleted feature?

Use the Ctrl+Shift+D keyboard shortcut to toggle the display of deleted features. Select the required feature with the Digitizer tool, right-click on the map, and choose Undelete to restore the feature to its original state. Alternatively, use the Ctrl+Z keyboard shortcut right after deleting the feature.

How do I add text to the map without an accompanying symbol?

Select the New Point tool from the Digitizer (Create) toolbar and click at the location of the map where you would like to place the text. In the resulting Modify Feature Info dialog box, type the text you would like to add in the Name field and choose Text from the Feature Type dropdown list.

How do I save map layers from an online data source for offline use?

After the required online data is displayed on in the map window, click the File menu and choose Export > Export Raster/Image Format. In the Export Options dialog box, make sure the Export Bounds settings match the geographic coverage requirements. Leaving the default All Loaded Data may result in an extremely large file and increase processing time. After the export process is complete, close the connection to the online data in the Overlay Control Center and import the previously exported file.

How do I automate data processing tasks in Global Mapper?

There are several tools that can be employed to streamline certain data processing tasks. In the File menu, the Batch Convert/Reproject command can be used to collectively translate multiple files of a specific type into another format and/or to reproject the data to another coordinate system. Scripting can also be used to automate multiple tasks in a workflow. A script is a simple text file that contains a series of commands and associated parameters for importing, processing and exporting data. For more information on scripting go to the following web page:
www.bluemarblegeo.com/knowledgebase/global-mapper/ScriptReference.html