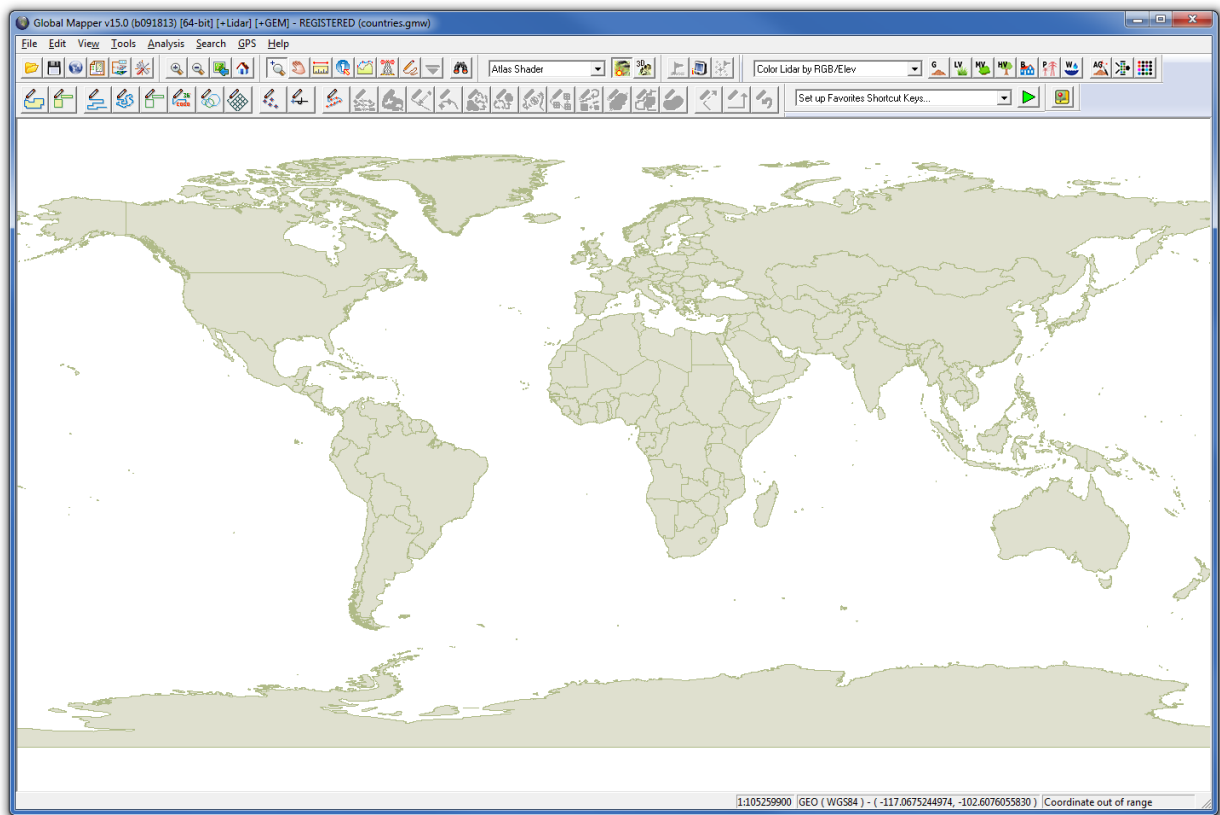# Blue Marble
GEOGRAPHICS
MIND THE GAP BETWEEN WORLD AND MAP

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Global Mapper®
Getting Started Guide

Welcome to Global Mapper

Thank you for downloading Global Mapper®, the all-in-one GIS application that everyone can use. This remarkable software combines a powerful array of spatial data processing tools with an unmatched list of compatible file formats resulting in a program 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 unique software tool. Nowhere else will you find a single application that offers the level of data support, digitizing capabilities, spatial analysis, and map creating tools, at a cost that will ensure a rapid return on your investment.

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

This Getting Started Guide is designed to assist you 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.

Contents

Installation and Registration

Installing Global Mapper

The current version of Global Mapper is freely downloadable from the following web page:
www.bluemarblegeo.com/global-mapper/product/download_complete.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. To install Global Mapper, simply double-click or run the downloaded executable file (global_mapper_setup.exe or global_mapper_setup_64bit.exe). 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 level of functionality available to you when you run the software.

- **Order ID from Recent Purchase**
  Enter your order number and Global Mapper will be automatically registered, unlocking the full functionality of the software. This procedure requires an internet connection.
- **Connect to a Network License Server**
  If your company has chosen to deploy Global Mapper using the convenient network licensing option, you can connect to the appropriate server to register your version of Global Mapper
- **Select a License File (.lic) File Provided via Email**
  If you work in an offline environment, you may request a License File to manually register Global Mapper. If this is the case, you will be prompted to browse to the location where you saved this file, after which, you will have full access to the software. To request a .lic file, please contact Blue Marble at authorize@bluemarblegeo.com
- **Request a 2-Week Trial License**
  To evaluate Global Mapper, you can request a 14-day trial license that will allow you to test all of its features and functions. During this time, you will be limited to two exports for each file type (vector, raster, and elevation).

Activating Optional Modules or Extensions

With the release of Global Mapper 15, additional functionality can be added to the software through preconfigured modules or third party extensions. To activate these add-on components, click the Help menu and choose **Module/Extension License Manager**. Modules require the purchase of the appropriate license and include Global Energy Mapper (for more information, see page 21) and the LiDAR module (for more information, see page 16). Extensions are typically developed and registered by third party developers. Two preconfigured extensions are installed with Global Mapper: the Overview Map extension and the COAST extension for analyzing 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 **Toolbar** offers 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 a customizable list of frequently-used tools. For more information, see page 5.
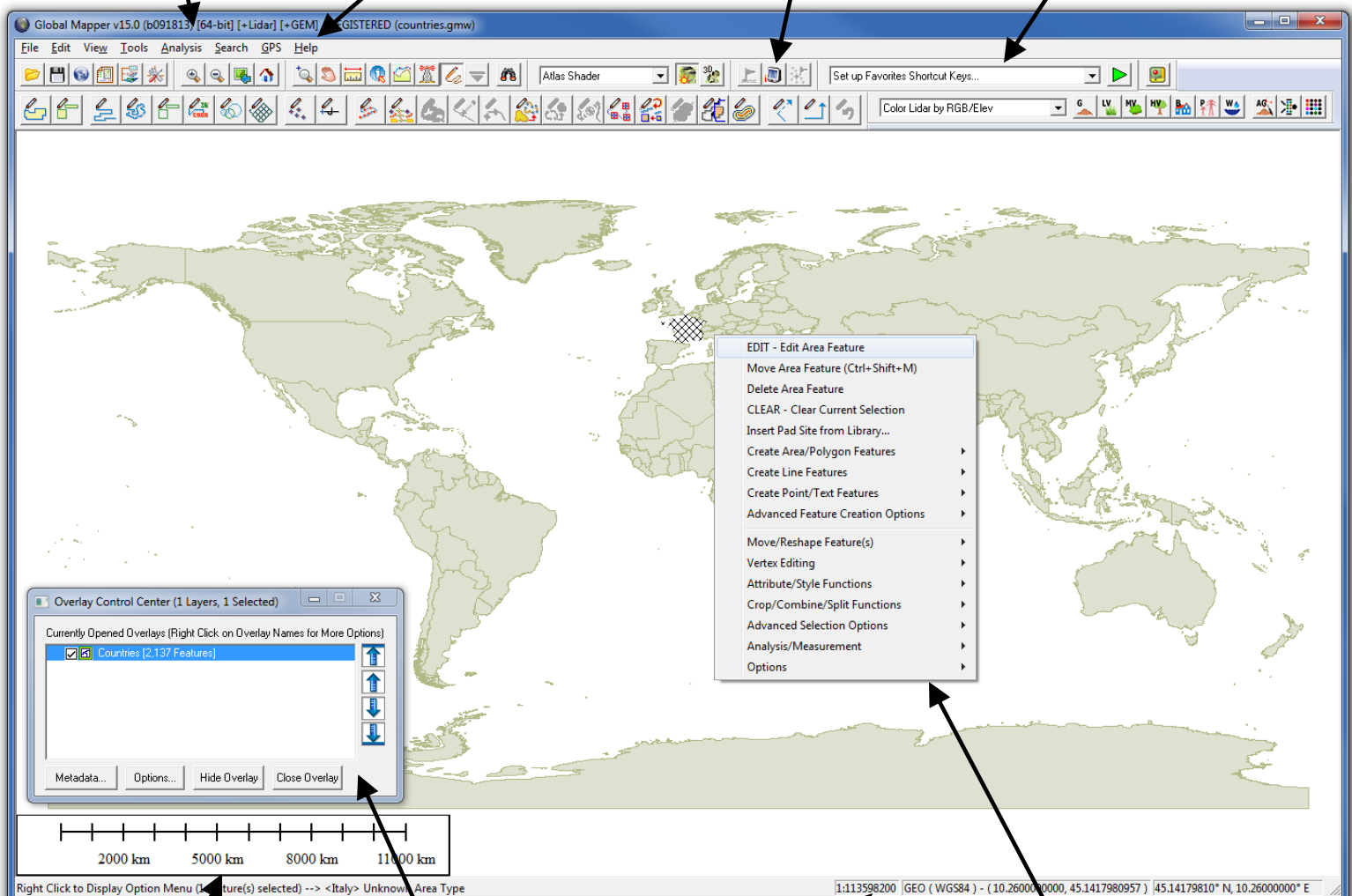
The **Scale Bar** and other display features are managed using the **Map Layout** function.

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

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

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.

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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 function 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 singular 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 what 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**
  New in version 14, the Analysis menu consolidates many of the analysis functions into a convenient single list. With an elevation layer loaded, you can perform a variety of terrain analysis processes, such as generating contours and delineating watersheds.
- **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, your position can be represented by a symbol on the map. The GPS menu controls the configuration and interaction between Global Mapper and your 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.
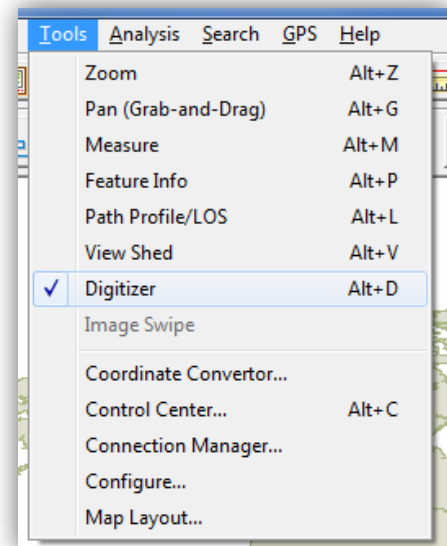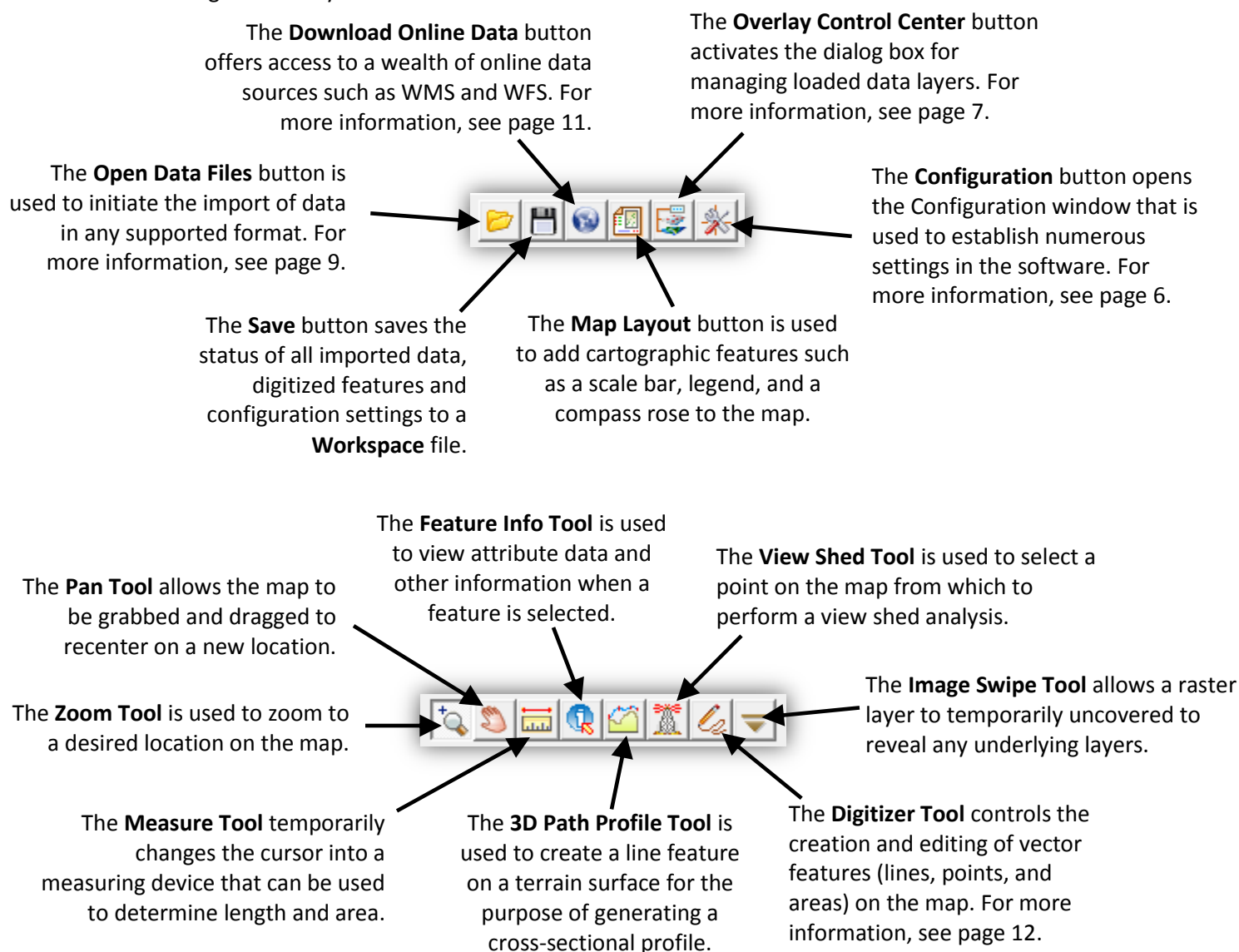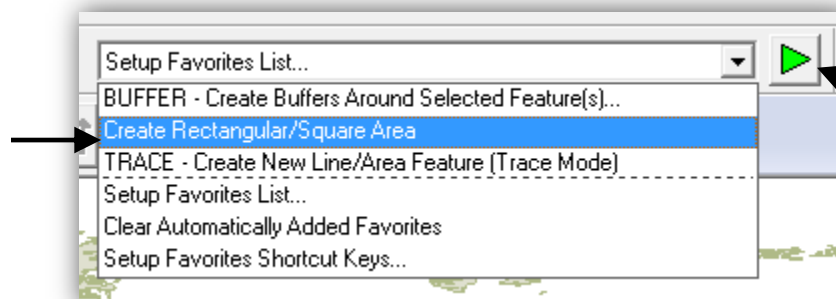
Navigating the Interface (continued)

The Toolbar

The various buttons on Global Mapper's toolbar offer the most convenient way to select a tool, to open certain dialog boxes, or to switch between one function and another. If necessary, button groups, denoted by a dividing line, can be removed from the toolbar using the Toolbars option in the View menu, or can be undocked or moved to another position in the toolbar.

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

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 add cartographic features such as a scale bar, legend, and a compass rose to the map.

The **Feature Info Tool** is used to view attribute data and other information when a feature is selected.

The **View Shed Tool** is used to select a point on the map from which to perform a view shed analysis.

The **Pan Tool** allows the map to be grabbed and dragged to recenter on a new location.

The **Image Swipe Tool** allows a raster layer to temporarily uncovered to reveal any underlying layers.

The **Zoom Tool** is used to zoom to a desired location on the map.

The **Measure Tool** temporarily changes the cursor into a measuring device that can be used to determine length and area.

The **3D Path Profile Tool** is used to create a line feature on a terrain surface for the purpose of generating a cross-sectional profile.

The **Digitizer Tool** controls the creation and editing of vector features (lines, points, and areas) on the map. For more information, see page 12.

The customizable **Favorites List** provides easy access to frequently used tools and allows keyboard shortcuts to be assigned to selected functions.

Setup Favorites List...	▼	▶
BUFFER - Create Buffers Around Selected Feature(s)...		
Create Rectangular/Square Area		
TRACE - Create New Line/Area Feature (Trace Mode)		
Setup Favorites List...		
Clear Automatically Added Favorites		
Setup Favorites Shortcut Keys...		

The **Run Favorite** 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. Organized in a series of tabs, it provides a single location for establishing personal settings and preferences that control many of the features and functions of the software.

The following summarizes the settings available in each tab:

- **General**
  The General tab options include the establishment of default units of measurement, map grid display, coordinate format, as well as numerous miscellaneous settings.
- **Vector Display**
  The function of the Vector Display tab is to control the appearance of point, line, and area features on the map. Specific options include filtering data types, adjusting the layer display order, rendering deleted features, and enabling or disabling snapping when drawing new features.
- **Area Styles**
  The Area Styles tab is used to manage the feature types that can be assigned to area features or polygons. Assigning a feature type to an area or areas will automatically adjust the appearance and the availability of attribute fields.
- **Line Styles**
  The Line Styles tab is used to edit or create line types that control the visual characteristics and attribute fields for linear features.
- **Point Styles**
  The Point Styles tab contains a customizable list of available point or symbol types with accompanying attributes. If necessary, new types can be added and custom symbols can be created from imported graphic files.
- **Vertical Options**
  The Vertical Options tab offers a number of settings that control the display of elevation or terrain layers. These settings include the selection of a shader pattern, customization of the hill shading or shadow display, and the rendering of a simulated water level at a defined height.
- **Shader Options**
  The Shader Options tab controls the visual display of several preconfigured elevation and slope shader patterns and allows new patterns to be created.
- **Projection**
  The Projection tab is used to alter the coordinate reference information for both onscreen display and export of data. Numerous preconfigured projection and datum options are available and custom systems can be added as needed. This is the feature to use if you need to reproject a layer from one system to another before exporting.
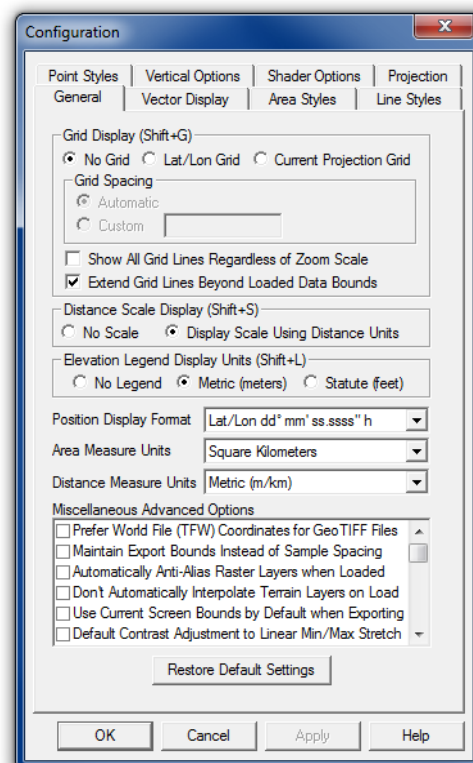
While the Configuration dialog box offers access to most of Global Mapper's preferences and settings options, many other components of the software contain feature-specific settings that are established when performing that function. For example, when exporting a file in a particular format, many of the preferences associated with the exported file are set in the Export Options dialog box.

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Layer and File Management

The Overlay Control Center

The Overlay 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 Overlay Control Center can remain open while using other tools in the software. Many Global Mapper users prefer to keep this dialog box visible as it is frequently needed to hide or show specific layers, to adjust certain charcteristics of the layers, or to perform other layer-specific functions.
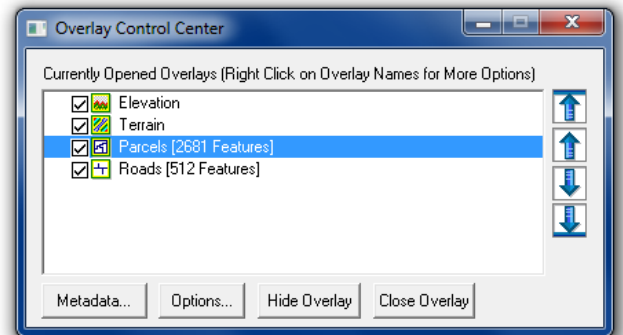
There are two ways in which a layer or overlay can be removed from the map display: the adjacent box in the Overlay Control Center can be unchecked or the selected layer can be removed completely by clicking the Close Overlay button. Using the uncheck option, the layer is retained and can be simply checked on again when needed. Closing an overlay permanently removes it and any unsaved edits or created features will be lost.

The key functional components of the Overlay Control Center are the Options button, which opens the Options dialog box that is used to adjust certain settings pertaining to a layer, and the list of tools or commands that is displayed after right-clicking on a layer. In both cases, the available functions and tools apply only to the selected layer and will vary depending on the type of data (raster, vector, or elevation) contained within this layer.

The Options Dialog Box

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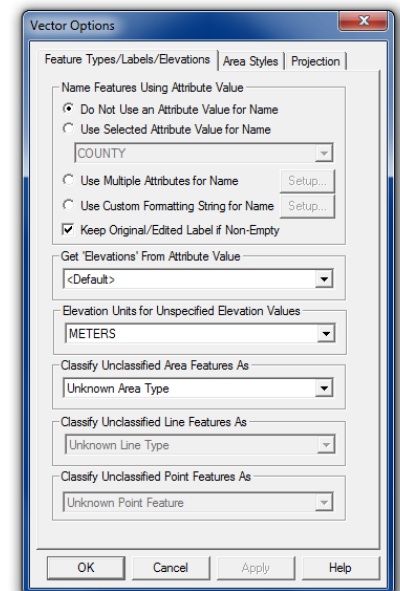
Each of the Options dialog boxes includes a Projection tab, which is used to reinterpret the coordinate values associated with the selected layer. Adjusting these projection parameters will result in the contents of the layer being physically moved to a new location and should only be performed when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

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Saving Your 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 possible 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.
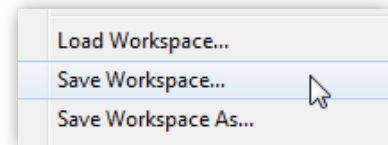
Working with Imported Layers

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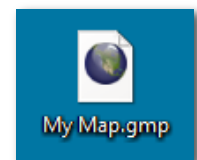
Global Mapper package files also offer a simple way to create backups of important datasets that can easily be reimported in the event of a loss of the original data or hardware failure.

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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 200 file-types are supported, including all common spatial formats, such as ESRI shapefiles, KML files, MrSID imagery and LiDAR elevation files. Virtually any type of geospatial data is supported in Global Mapper, including raster, vector, 2D, and 3D, whether referenced or not. If Global Mapper doesn't support your data, let us know and Blue Marble developers will do their best to add it as a supported format. A list of the currently supported formats is available in the Global Mapper section of bluemarblegeo.com

Importing Vector, Raster, and Elevation Layers

There are several ways to import data into Global Mapper. You can use the File > Open Data File(s) command; you can click the Open Data File(s) button in the toolbar; or you can use 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 different 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 > Import Generic ASCII 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.
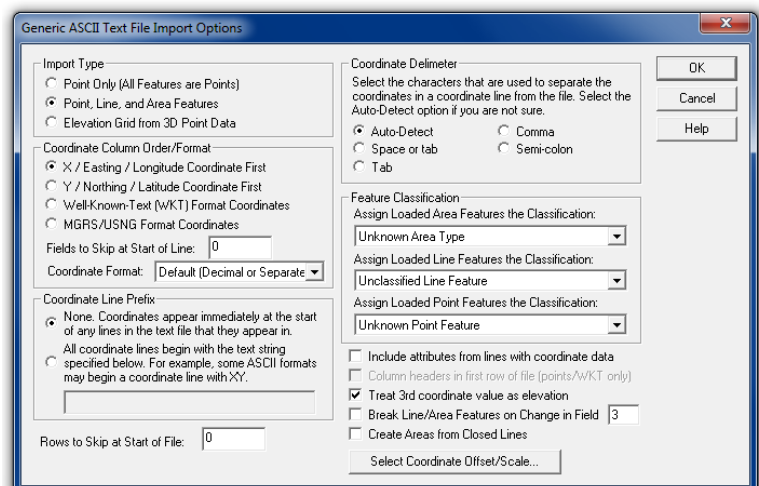
Importing Data (continued)

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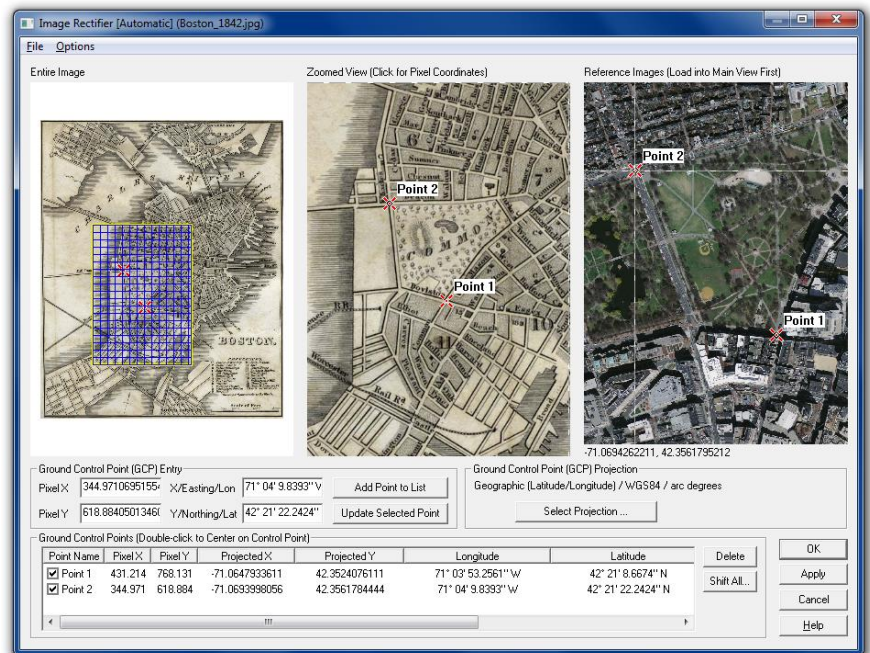
After all of the control points have been assigned, click the OK button to create a new raster layer. To correct any errant registration points, select the layer in the Overlay Control Center, right-click and choose RECTIFY – Modify Layer Position/Projection.

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 vector data directly from the database tables. Among the supported database types are ESRI ArcSDE, ESRI File and Personal Geodatabases, My SQL Spatial, Oracle Spatial, PostGIS, and Spatialite. The ESRI databases also support raster data formats and are only available in the 32-bit version of Global Mapper.

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 to download some of the many free online datasets. Numerous government agencies, organizations, and commercial companies provide direct streaming access to their spatial data archives though Web Map Service (WMS), Web Coverage Service (WCS) and other online protocols and Global Mapper includes preconfigured links to many of these servers.

To initiate the download process, click the Download Free Maps/Imagery from 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 a number of 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 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 downloaded 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.

11

Using the Digitizer

The Digitizer Tool

Arguably the most powerful 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 toolbar at the top of the map window 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:

Use this tool to create area features or polygons by repeatedly left-clicking on the map. Right-click to add the final point, which is automatically connected to the first point.

Regular rectangle areas are created using this tool by left-clicking and dragging your mouse to the opposite corner. To create a square, hold the Shift button down while dragging.

The vertex-mode line tool is used to create line features by clicking at each desired shape point on the map. The line is terminated using the right mouse button.

Use the trace-mode line tool to create freehand lines by clicking and holding the left mouse button while moving the mouse.

Similar to the rectangle area tool, the rectangle line tool creates squares or rectangles by left-clicking and dragging your mouse. In this case, only the perimeter line is drawn.

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

When using any of these tools, the completion of the drawing function triggers the Modify Feature Info dialog box, in which the name, feature-type, attributes, and target layer are assigned.

Additional Digitizer Buttons

The Global Mapper toolbar contains a number of additional buttons for activating specialized vector creation tools. The CoGo tool is used to create line or area features by entering specific dimensions and bearings; the Range Ring tool generates concentric circular area features of a specified dimension around a selected point; and the Grid tool is used to create an array of grid tiles of a user-specified width and height.

Most of the remaining buttons on the Digitizer toolbar are for editing selected vector features and will be discussed below.

# Using the Digitizer (continued)

Advanced Digitizing Tools

While most standard vector features can be created using the previously listed buttons, there are a number of additional Digitizer tools that are accessed by right-clicking on the map. These tools are organized in submenus by type (areas, lines, and points) and provide more advanced drawing functionality.
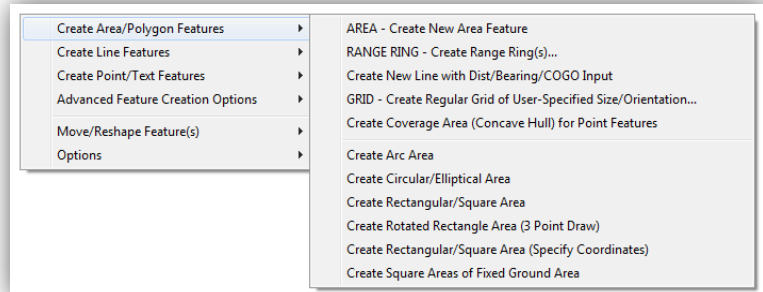
Editing Vector Features

Global Mapper provides tools for editing both the geometry or physical appearance of vector objects as well as the attributes or information that is associated with each feature. Edits can be applied to features created in Global Mapper or to features from an imported vector layer. Note modifications made to an imported layer are not applied to the source file and the layer must be exported to apply these updates in the original file format.
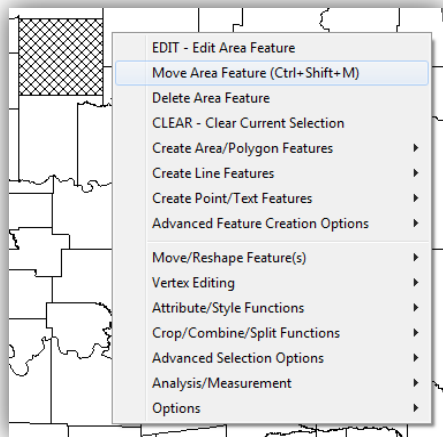
Before initiating any editing function, the feature or features must be selected with the Digitizer tool as previously described. The act of selecting a feature activates several additional buttons in the toolbar that offer such options as moving, rotating, scaling, and converting features. Additional 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

The Modify Feature Info Dialog Box

The Modify Feature Info dialog box appears whenever 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 offers several tools for establishing the style settings of the features and for adding or editing attributes either individually or collectively.

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.

Attributes can also be manually added or edited for selected features using the appropriate buttons at the bottom of the Modify Feature Info dialog box.
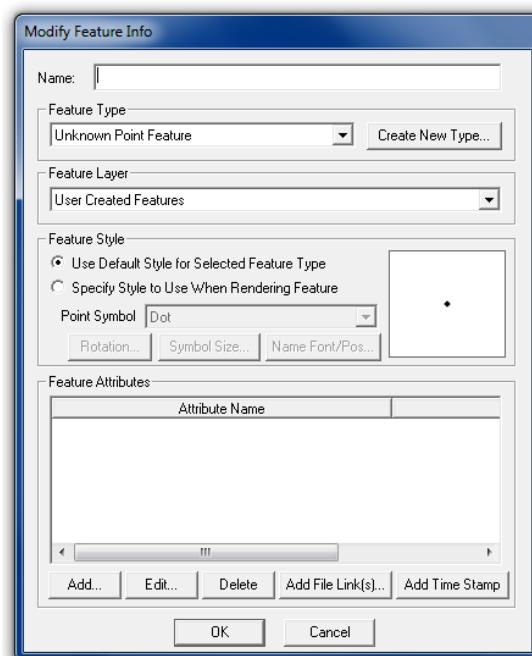
Advanced Attribute Options

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.

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 the 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 just one feature on the map, or it can be based on a one-to-many approach, where an individual record in the data being joined is assigned to several features on the map.

To initiate the join process, right-click on the target layer in the Overlay Control Center and choose JOIN TABLE. Supported formats for the external tabular data include .txt, .csv, and dbf.
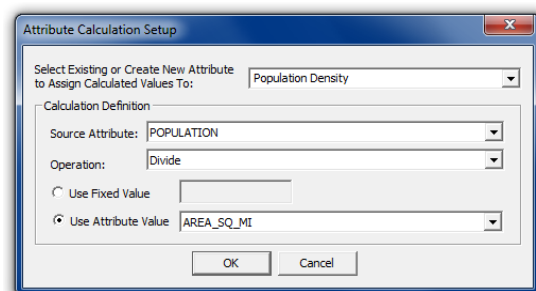
The attribute calculation function, which is also accessed by right-clicking on the layer in the Overlay Control Center, is used to create a new attribute field by applying a calculation to an existing attribute. Calculation options include standard numeric operations, such as add and multiply, and can use a fixed value or the value in a second field for the calculation.

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 that 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 16.

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 Overlay Control Center and choose GRID or, if gridding several layers, choose Create Elevation Grid from 3D Vector Data from the Analysis menu. 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 in the toolbar. 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 in the toolbar.

Additional 3D options can be established in the Configuration dialog box. For more information, see page 6.
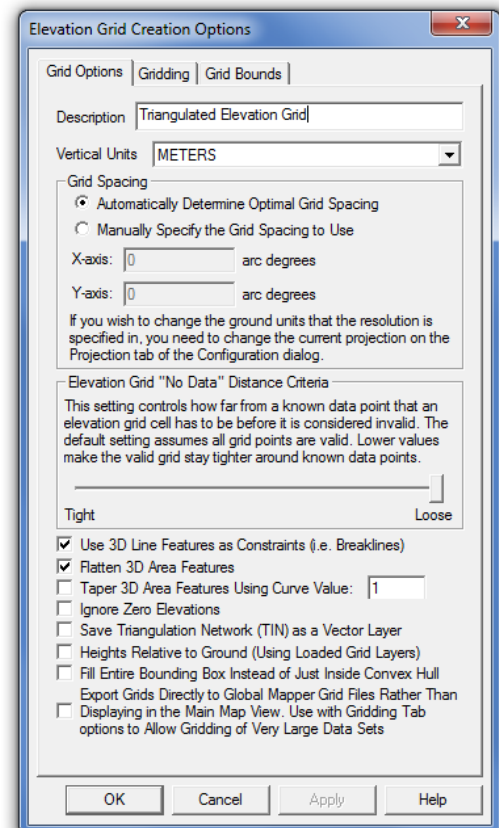
Using the 3D Functionality (continued)

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 ; the Show 3D View button in the toolbar.

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.
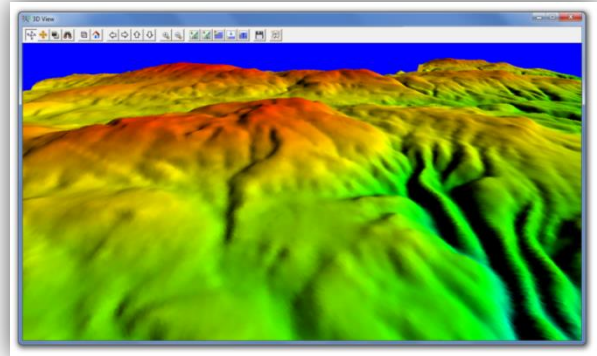
Working with LiDAR Data

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 elevation-derived 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) as well as the compressed version of the format (.laz). An optional LiDAR module is available that offers advanced LiDAR processing tools for more information or to purchase the LiDAR module, visit the Blue Marble web site.
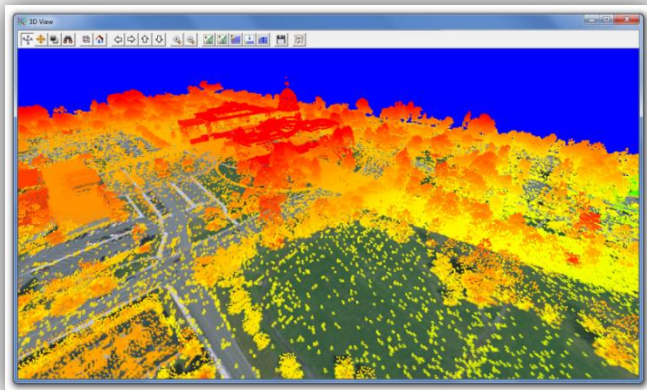
LiDAR data is imported using the standard import procedure (Ctrl+O) however the subsequent import options dialog box is unique to this format. In this window, the data can be filtered, sampled, and if required, can be directly gridded, avoiding the need to render the point data.

If the point cloud itself is imported, the points will inherit the colors of the currently selected shader and will reflect the elevation value if no actual color values have been assigned to each point. Using the layer's options dialog box, the color 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 on the map. In this dialog box, the point's classification can be edited and other attributes modified.

Creating a terrain surface from loaded LiDAR data involves using Global Mapper's standard gridding tool (for more information, see page 15) and using the resulting elevation layer, any of the 3D analysis processes can be performed with a high level of precision.

3D Analysis Functions

Global Mapper offers a number of analysis tools that utilize loaded elevation or terrain layers. Unless noted, these tools are accessed from the Analysis menu:

- **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 analysis 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.

- **Generating Contours**
  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.
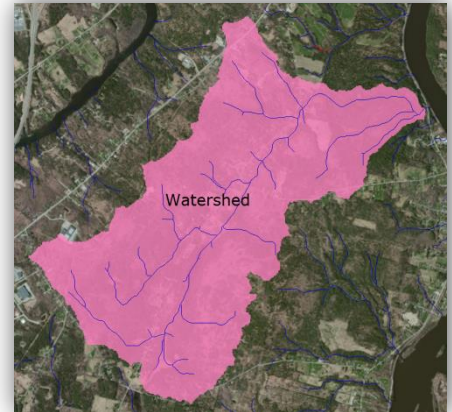
For more information or specific instructions on the use of these analysis tools, refer to the help documentation that is accessible in the Help menu in the software.
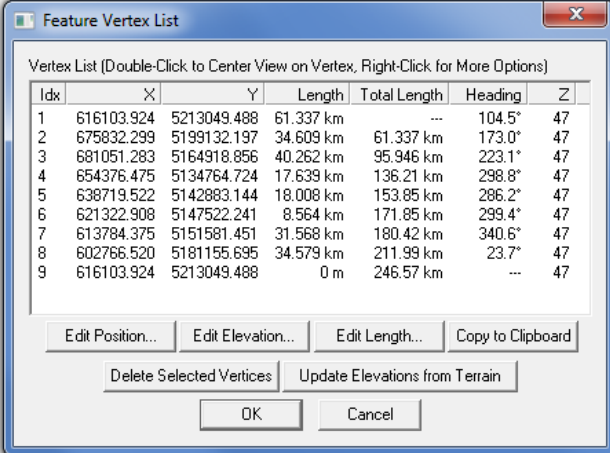
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Using the 3D Functionality (continued)

Assigning Height or Depth to Vector Features

Any point, line, or area feature can have a z value associated with it, which allows it to be modeled in a 3D environment relative to other vector features or to a loaded terrain surface.
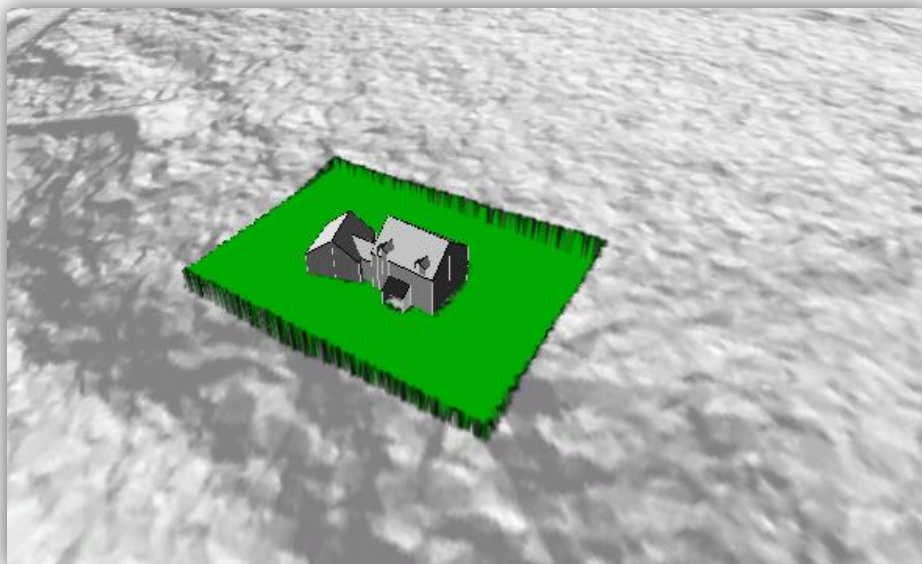
When importing a vector layer, Global Mapper will automatically look for an existing vertical attribute, such height or elevation and use that as the z value. To manually assign a z value, simply add a new attribute to the required feature or features and type the elevation, height, or depth. To make sure Global Mapper recognizes this attribute as a z value, open the Options dialog box for the layer in the Overlay Control Center and choose the appropriate attribute field from the Get 'Elevations' from Attribute Value dropdown list.

It is also possible to add a different 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. If an elevation value does not already exist for each listed vertex, click the Add Elevs button and update each individual vertex as needed.

When rendered in Global Mapper's 3D window, vector features with an associated z value will appear above or below a loaded terrain surface layer. The 3D View Properties dialog box provides several check boxes that are used to control the display of these vector features.

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 exporting ensuring Global Mapper's interoperability with countless 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 layers by merging multiple layers into one file. In order to export the contents of a specific layer, it will first be necessary to deselect the unrequired layers in the Overlay Control Center.
- 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.

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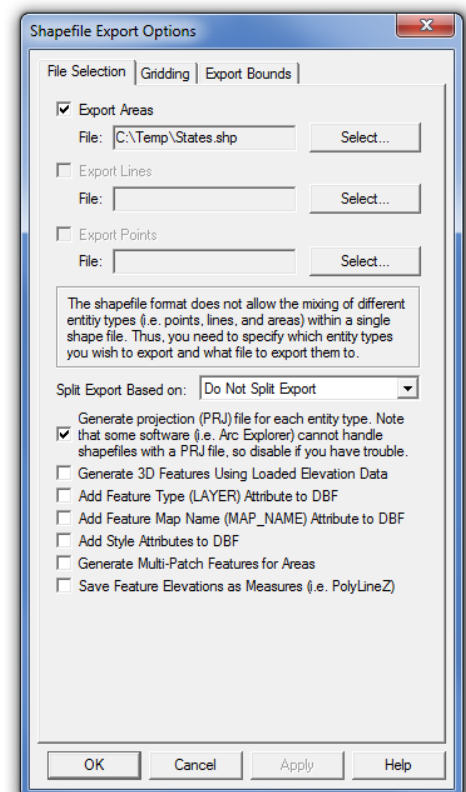
Exporting to a Spatial Database

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.

Exporting Web-Ready Files

Global Mapper offers several options for creating web-ready files from any loaded data layers. Under the File menu, the Export submenu offers the Export Web Format option that opens a dialog box in which the required format can be chosen. Several raster tile options are available including Google and Bing Map Tiles. Selecting a tiled format will produce multiple image tiles as well as an accompanying HTML file that automatically renders the map display interface, map controls, and base map data for the chosen format.

The Export Web Format command also offers the option to create Keyhole Markup Language (KML or KMZ) files that can be imported into Google Earth or Google Maps.

Printing the Map

Before sending a map to a connected printer, Global Mapper offers several page layout options that can be used to add cartographic elements such as a title, legend, and scale bar to the map. The Map Layout button in the toolbar provides access to the Page Layout Setup dialog box. Additionally, the File > Open Data File at Fixed Screen Location… command allows any supported image file, such as a company logo, to be placed a specified location within the page layout.

In the File menu, the Print Preview command displays a low resolution view of the map to be printed allowing the layout to be modified if needed. The Print… command will send the map to the selected printer based on the Print Setup settings (page size, orientation, etc.) that were previously established.

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…

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 third party GIS application.

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Global Energy Mapper Functions

What is Global Energy Mapper?

Global Energy Mapper is a parallel version of Global Mapper that has been developed to meet the needs of the oil & gas, energy production, and extraction industries. Originally released in partnership with Spatial Energy, it includes an enhanced online data (WMS) function providing direct access to Spatial on Demand® imagery and other datasets. GEM offers all of the features and functions of the standard version of the software and incorporates several additional tools.

Features and Functions Unique to GEM

Global Energy Mapper offers a number of supplementary data creation and processing tools:

- **The Pad Site Placement Tool**
  Designed to streamline the process of digitizing or drawing the same structure at every jobsite, the Pad Site Placement Tool offers the means to create a library of frequently-mapped features that can be manually placed at the required location. To initiate this procedure, select the Digitizer tool, right-click on the map, and choose Insert Pad Site from Library. You will be prompted to select from the available templates or to add existing vector files to create your own template library. Although designed primarily for oil & gas operations, this tool can be readily applied in any situation in which the same features are drawn at multiple locations.

- **Creating a Flattened Site Plan**
  This advanced cut and fill calculation and terrain modification utility is a significantly enhanced version of the cut and fill tool that is available in the standard version of Global Mapper. Accessed from the Advanced Feature Creation Options submenu after selecting an area feature and right-clicking on the map, this tool combines the calculation of the optimal cut and fill values with the creation of a terrain surface that reflects the calculation parameters. Options include the determination of slopes or benches that smoothly integrate the flattened site into the surrounding terrain.
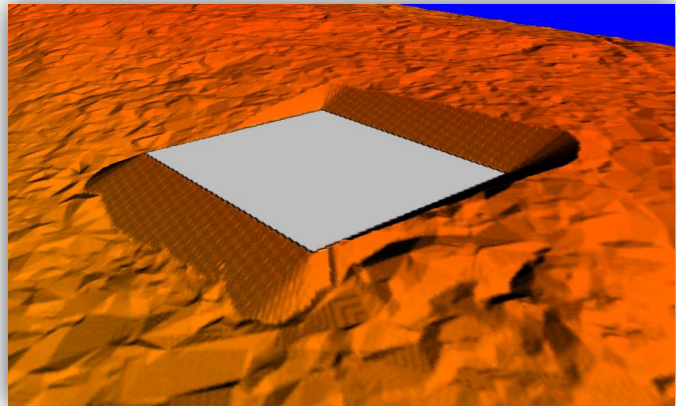
- **Placing Oil and Gas Symbols**
  GEM includes numerous industry standard oil and gas symbols or icons that can be used to mark well locations and that reflect the status of the well. To place a well symbol on the map, simply click at the required location with the New Point Feature tool (for more information, see page 12) and choose from the Oil and Gas symbol options in the Feature Type dropdown list in the Modify Feature Info dialog box.

Upgrading to Global Energy Mapper

Upgrading to Global Energy Mapper requires the registration of the GEM module in the Module/Extension License Manager in the File menu. To upgrade your license from the standard version of Global Mapper, contact Blue Marble Sales at gmorders@bluemarblegeo.com.

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.
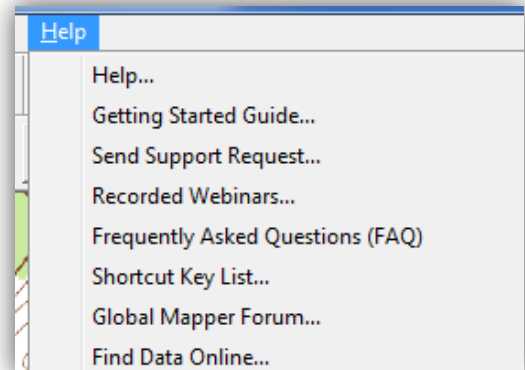
Online Resources

- An online version of the complete User's Manual is available here:
  www.bluemarblegeo.com/knowledgebase/global-mapper/Help_Main.html
- The content of the various help pages are also available in PDF format:
  www.bluemarblegeo.com/knowledgebase/global-mapper/GlobalMapperHelp.pdf
- Recordings of the monthly Global Mapper webinar series, which cover a variety of topics in the software can be viewed here: www.bluemarblegeo.com/products/previous-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/solutions/geodesy-training.php

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. All 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.

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How do I...?

How do I register Global Mapper?

After installing Global Mapper, launch the software and you will see the Register Global Mapper widow. If you purchased a license, enter the order number 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 tab 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 retained for all future Global Mapper sessions.

How to 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.

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

Select the New Point tool from the 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

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