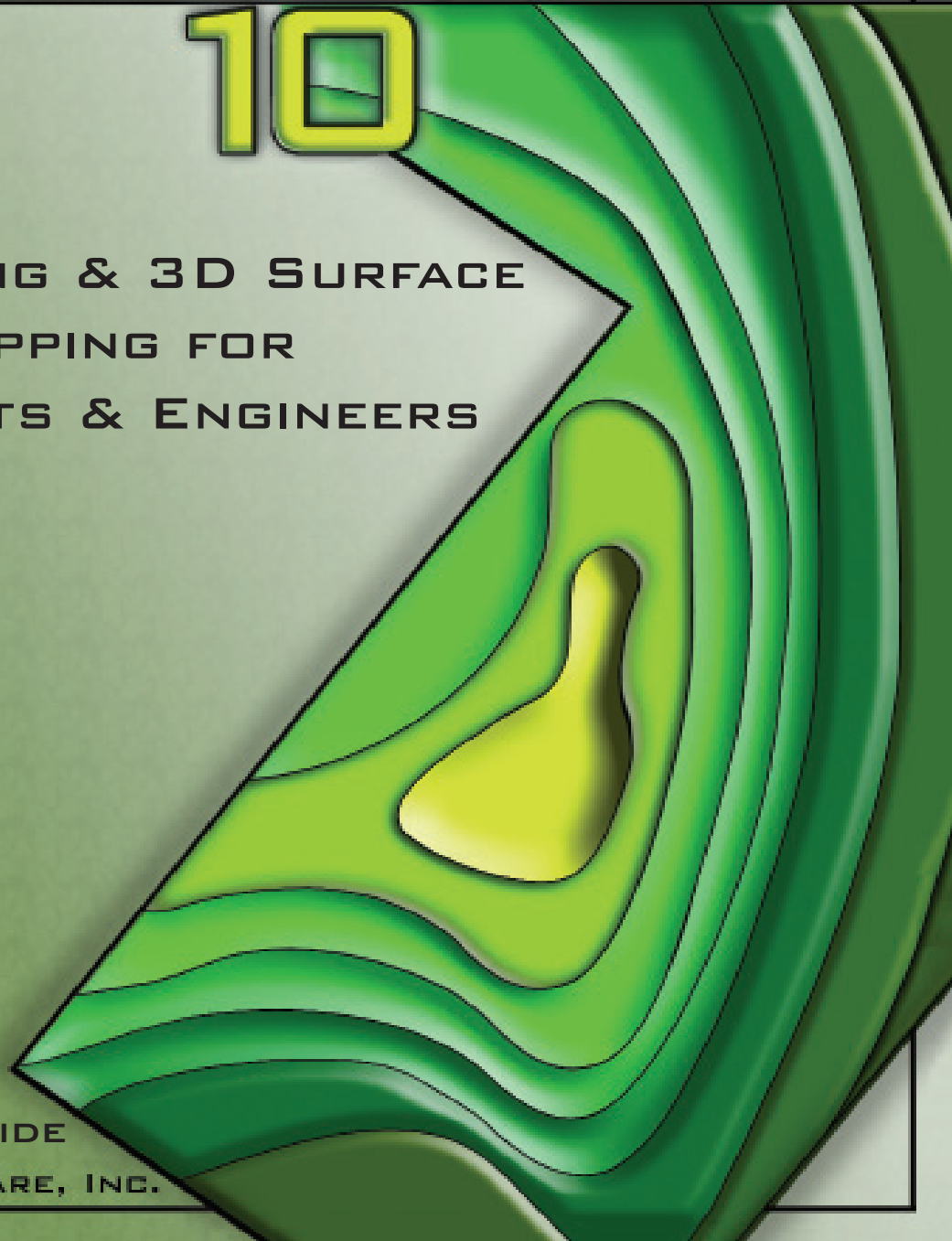


SURFER[®] 10

CONTOURING & 3D SURFACE
MAPPING FOR
SCIENTISTS & ENGINEERS



USER'S GUIDE
GOLDEN SOFTWARE, INC.

Surfer[®] Registration Information

Your **Surfer** serial number is located on the CD cover or in the email download instructions, depending on how you purchased **Surfer**.

Register your **Surfer** serial number online at www.GoldenSoftware.com. Or, complete the *Registration Form.PDF*, located in the main directory of the installation CD. Return the *Registration Form.PDF* by mail or fax. This information will not be redistributed.

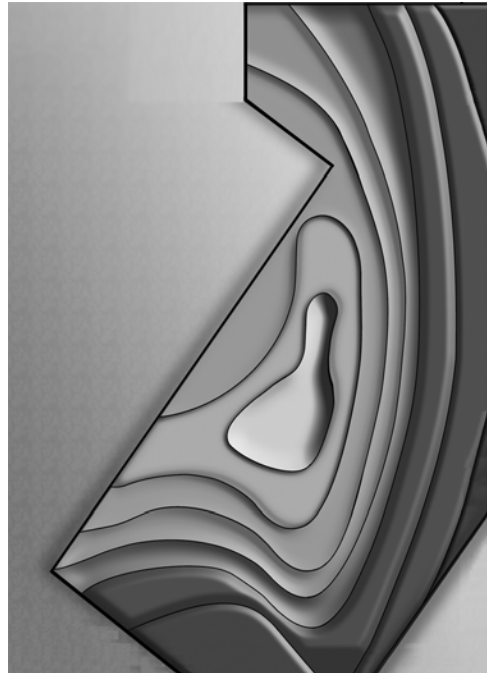
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Surfer[®]

User's Guide

Contouring and 3D Surface Mapping
for Scientists and Engineers



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January 2010

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Chapter 1

Introducing Surfer

Introduction to Surfer®

Surfer is a powerful contouring, gridding, and surface mapping package for scientists, engineers, educators, or anyone who needs to generate maps quickly and easily. Producing publication quality maps has never been quicker or easier. Maps can be displayed and enhanced in **Surfer**. Adding multiple map layers, customizing the map display, and annotating with text create publication quality maps. Virtually all aspects of your maps can be customized to produce exactly the presentation you want.

Surfer is a grid-based mapping program that interpolates irregularly spaced XYZ data into a regularly spaced grid. Grids may also be imported from other sources, such as the United States Geological Survey (USGS). The grid is used to produce different types of maps including contour, vector, image, shaded relief, 3D surface, and 3D wireframe maps. Many gridding and mapping options are available allowing you to produce the map that best represents your data.

An extensive suite of gridding methods is available in **Surfer**. The variety of available methods provides different interpretations of your data, and allows you to choose the most appropriate method for your needs. In addition, data metrics allow you to gather information about your gridded data. Surface area, projected planar area, and volumetric calculations can be performed quickly in **Surfer**. Cross-sectional profiles can also be computed and exported.

The grid files themselves can be edited, combined, filtered, sliced, queried, and mathematically transformed. For example, you can create an isopach map from two grid files. You will need the original surface grid file and the surface grid file after a volume of material was removed. Subtract the two surfaces to create an isopach map. The resulting map displays how much material has been removed in all areas.

The **Scripter™** program, included with **Surfer**, is useful in creating, editing, and running script files that automate **Surfer** procedures. By writing and running script files, simple mundane tasks or complex system integration tasks can be performed precisely and repetitively without direct interaction. **Surfer** also supports ActiveX Automation using any compatible client, such as Visual BASIC. These two automation capabilities allow **Surfer** to be used as data visualization and map generation post-processor for any scientific modeling system.

Who Uses Surfer?

People from many different disciplines use **Surfer**. Since 1984, over 100,000 scientists and engineers worldwide have discovered **Surfer's** power and simplicity. **Surfer's** outstanding gridding and contouring capabilities have made **Surfer** the software of choice for working with XYZ data. Over the years, **Surfer** users have included hydrologists, engineers, geologists, archeologists, oceanographers, biologists, foresters, geophysicists, medical researchers, climatologists, educators, students, and more! Anyone wanting to visualize their XYZ data with striking clarity and accuracy will benefit from **Surfer's** powerful features.

New Features

This is an overview of some of **Surfer 10's** new features. The new features are also summarized:

Online at: www.GoldenSoftware.com/products/surfer/surfernew.shtml

In the program: click **Help** | **Contents** and click on the *New Features* page in the *Introduction* book

User Friendly

- Install 32-bit or 64-bit version of **Surfer 10**.
- Access and change properties for all objects in the always available **Property Manager**.
- Updated to modern Windows look.
- Use the mouse scroll wheel in the **Object Manager**.
- **View** | **Reset Windows** returns the managers to the default location and size.
- **Tools** | **Options** can be accessed from any open window.
- Blanked nodes displayed in Grid Node Editor window as different color and shape.

Map Features

- Import maps in projected coordinates.
- Change the projection of maps.
- Overlay maps from different coordinate systems with all maps appearing at the correct location.
- Save time! **Grid** | **Math** and **Grid** | **Function** save the equation used between **Surfer** sessions. Up to 10 functions are saved in the drop down box.
- Reverse any color map.
- Due to popular demand, **Map** | **Overlay Maps** command is again available.

- Option to automatically delete empty map layers when dragging and dropping maps.
- Save a data file from any post or classed post map.
- Extract a grid file from any grid based contour, image, shaded relief, vector, wireframe, or surface map.
- Increase post map label distance to 4 inches in either direction.
- Specify starting and ending rows for post map data files.
- Status bar option shows XYZ value for selected map layer.
- Export contour lines to XYZ data file using **Map | Export Contours**.
- Export to Google KML and KMZ file formats.
- Set contour map levels using either the *Simple* or *Advanced* contour level method.

Drawing and Digitizing Features

- New spline polyline drawing tool creates smooth lines between polyline points.
- Digitize X, Y, and Z values using the **Map | Digitize** command.
- Set number of digits and numeric format for digitized values in **Map | Digitize** dialog.

Data Features

- **Surfer** now supports Access ACCDB file format.
- Import queries from Access MDB and ACCDB files.
- Assign a coordinate system to a data file. Save the coordinate system information to an external file.

Grid Features

- Combine as many grid files as desired in the **Grid | Math** process.
- Define how to treat blank nodes using **Grid | Math** command. Either blank the output or remap to a value. You determine what value to use for each grid individually.
- New **Grid | Grid Info** command determines information about a grid without first creating a map.
- More convenient! Grid line geometry settings are remembered when changing gridding method or properties in the **Grid Data** dialog.
- When using a *Data Exclusion Filter* for **Grid | Data**, **Grid | Variogram**, or in a worksheet using **Data | Spatial Filter**, data can be excluded based on numeric information in any column.

- New sum overlap method for **Grid | Mosaic** allows overlapping grids to be added together.
- Assign a coordinate system to a grid file. Save the coordinate system to an external file.

Automation

- Load .CLR file for a contour map from a script.
- Reverse any color map from a script.
- Change the grid file for a surface map and wireframe map from a script.
- Show or hide the position/size toolbar from a script.

System Requirements

The minimum system requirements for **Surfer** are:

- Windows XP SP2 or higher, Vista, 7 or higher
- 512MB RAM minimum for simple data sets, 1GB RAM recommended
- At least 100MB free hard disk space
- 1024 x 768 or higher monitor resolution with a minimum 16-bit color depth

Installation Directions

Installing **Surfer 10** requires logging onto the computer with an account that has Administrator rights. Golden Software does not recommend installing **Surfer 10** over any previous versions of **Surfer**. **Surfer 10** can co-exist with older versions (i.e. **Surfer 9**) as long as they are installed in different directories, which is the default. For detailed installation directions, see the Readme.rtf file.

Installing Surfer

To install **Surfer** from a CD:

1. Insert the **Surfer** CD into the CD-ROM drive. The install program automatically begins on most computers. If the installation does not begin automatically, double-click on the Autorun.exe file located on the **Surfer** CD.
2. Choose **Install Surfer (32-bit)** or **Install Surfer (64-bit)** to begin the installation.

To install **Surfer** from a download:

1. Download **Surfer** according to the directions you received.

2. Double-click on the downloaded file to begin the installation process.

Updating Surfer

To update **Surfer**, open the program and click the **Help | Check for Update** command. This will launch the Internet Update program which will check Golden Software's servers for any updates. If there is an update for your version of **Surfer** (i.e. **Surfer** 10.0 to **Surfer** 10.1), you will be prompted to download the update.

Normally, no new features are added in updates. A list of changes is located at www.GoldenSoftware.com/surferhistory.shtml.

Before using this command, make sure your computer is connected to the internet. Follow the directions in the dialog to complete the update if an update is available.

Check for Internet Update

- Click the **Help | Check for Update** command, the **Internet Update** dialog appears. If you are running in Windows Vista or 7 as a user, a dialog appears asking for Administrator permissions. Click the *Allow* button.
- Click the *Next* button to proceed. **Surfer** will attempt to connect to the Golden Software server and check if an update exists for your version of the product.
- If no update exists and/or you are already running the latest version, a dialog will appear letting you know there are no updates for your current version of **Surfer**. Click the *OK* button and the Internet Update program will exit.
- If an update is available, the dialog will inform you about the specifics of the update and allow you to click the *Cancel* button should you decide not to download the update at this time. It is highly advised that updates be installed when available as updates contain corrections to known issues in the software.
- Click the *Next* button to download the update file. A progress gauge displays.
- When the download is finished, the **Install Updates** dialog will appear.
- Exit the **Surfer** program and click the *Install* button to proceed with the update.

Advanced Settings

Internet Update connects to the Golden Software server to obtain the information necessary to update your existing product files to the latest versions available. Some users on corporate networks may need to specify certain *Advanced Settings*, but most users will not. We recommend you first try using the default settings and only if you encounter connection problems with the Golden Software server should you modify any of the settings.

When connection is restricted on computers that are not part of your organization's private network (such as the Golden Software server), you may need to set the advanced settings to update **Surfer**. One way to do this is to implement a "proxy server" on your private network that must authenticate you (using an *ID* and a *password*) before allowing access to the outside computer. Your network administrator will know if this is the case and, if so, the address and port number of your proxy server. Tell your network administrator you need access to the HTTP server located at www.GoldenSoftware.com.

If you must go through a proxy server, follow the steps below:

1. Click the **Help | Check for Update** command.
2. In the **Internet Update** dialog, click the *Advanced* button.
3. Select the *Specify proxy server information* option.
4. Enter the address and port number of the appropriate proxy server in the *Proxy Server* and *Port Number* boxes.
5. Click *OK* to return to the **Internet Update** dialog.
6. Proceed as described above.
7. If you are prompted for a *user name* and *password*, enter the ones assigned to you by your network administrator. If your *user name* and *password* aren't validated, you will be prompted to enter them again. If, after several tries, you are still unable to connect to the Golden Software server, recheck with your network administrator that the *proxy server address*, *port number*, *user name* and *password* are correct. If you are still unable connect, contact Golden Software technical support at SurferSupport@GoldenSoftware.com.

Automatic Update

When **Surfer** is initially launched, the **Surfer** dialog appears, allowing you to specify your automatic update preference. This preference can be adjusted at any time using the **Tools | Options** command. Automatic updates allow the program to periodically check for an available update. Enabling automatic updates will allow your copy of **Surfer** to always automatically stay up-to-date.

Uninstalling Surfer

Windows XP: To uninstall **Surfer**, go to the Control Panel and double-click *Add/Remove Programs*. Select **Surfer 10 (32-bit)** or **Surfer 10 (64-bit)** from the list of installed applications. Click the *Remove* button to uninstall **Surfer 10**.

Vista and 7: To uninstall **Surfer** when using *Regular Control Panel Home*, click *Uninstall a program*. Select **Surfer 10 (32-bit)** or **Surfer 10 (64-bit)** from the list of installed applications. Click the *Uninstall* button to uninstall **Surfer 10**.

Vista: To uninstall **Surfer** when using *Classic View Control Panel*, double-click *Programs and Features*. Select **Surfer 10 (32-bit)** or **Surfer 10 (64-bit)** from the list of installed applications. Click the *Uninstall* button to uninstall **Surfer 10**.

Upgrading Surfer

For your convenience, you can purchase an upgrade (i.e. **Surfer** version 9 to **Surfer** version 10), at Golden Software's website, www.GoldenSoftware.com. For additional information, contact Golden Software at sales@GoldenSoftware.com.

A Note about the Documentation

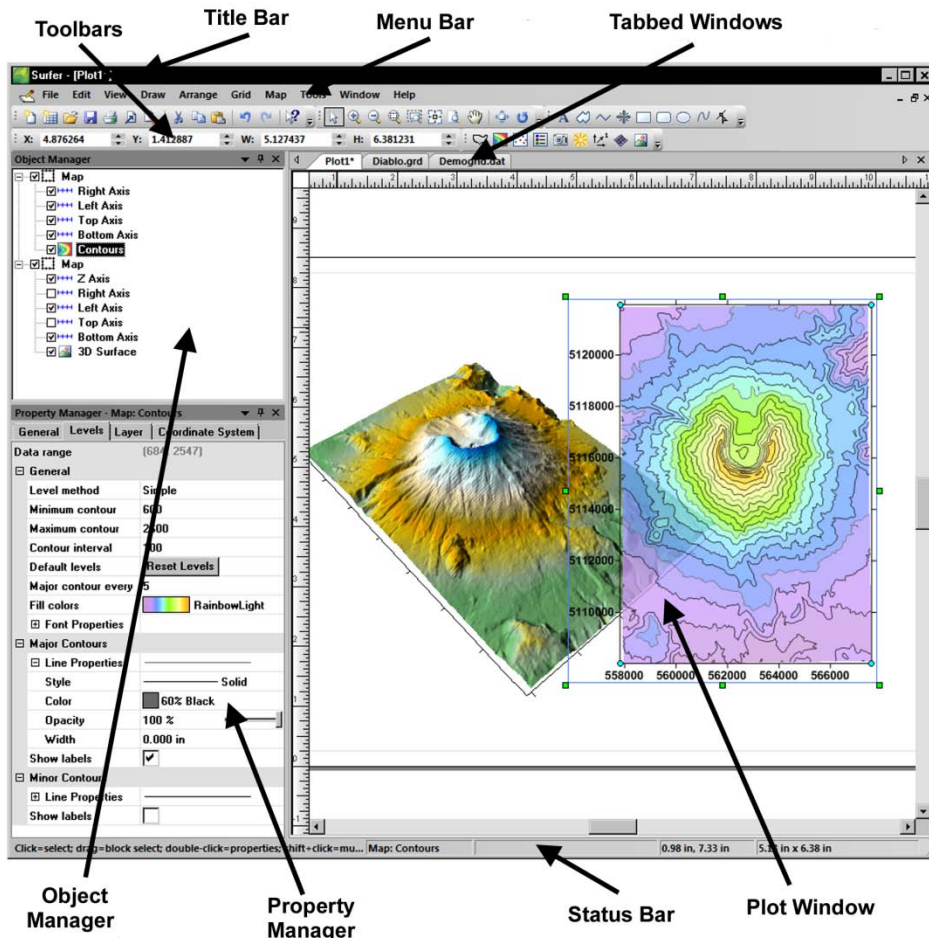
The **Surfer** documentation includes this full length guide, a quick start guide, and the online help. Use the **Help | Contents** command in the program to access the detailed online help. Information about each command and feature of **Surfer** is included in the online help. In the event the information you need cannot be located in this full length guide, in the quick start guide, or in the online help, other sources of **Surfer** help include our support forum, knowledge base, FAQs, and contacting our technical support engineers.

Various font styles are used throughout the **Surfer** documentation. **Bold** text indicates menu commands, dialog names, window names, and page names. *Italic* text indicates items within a dialog such as group box names, options, and field names. For example, the **Save As** dialog contains a *Save as type* drop-down list. Bold and italic text occasionally may be used for emphasis.

In addition, menu commands appear as **File | Open**. This means, "click the **File** menu at the top of the **Surfer** window and click the **Open** command on the **File** menu list." The first word is the menu name, followed by the command within the menu list.

Surfer User Interface

Surfer contains three document window types: the plot document, worksheet document, and grid node editor. Maps are created and displayed in the plot document. The worksheet document displays, edits, transforms, and saves data in a tabular format. The grid node editor displays and edits Z values for the selected grid.



*This is the **Surfer** plot window with the **Object Manager** and **Property Manager** displayed on the left, the worksheet and grid node editor tabs on the top of the horizontal ruler.*

The following table summarizes the function of each component of the **Surfer** layout.

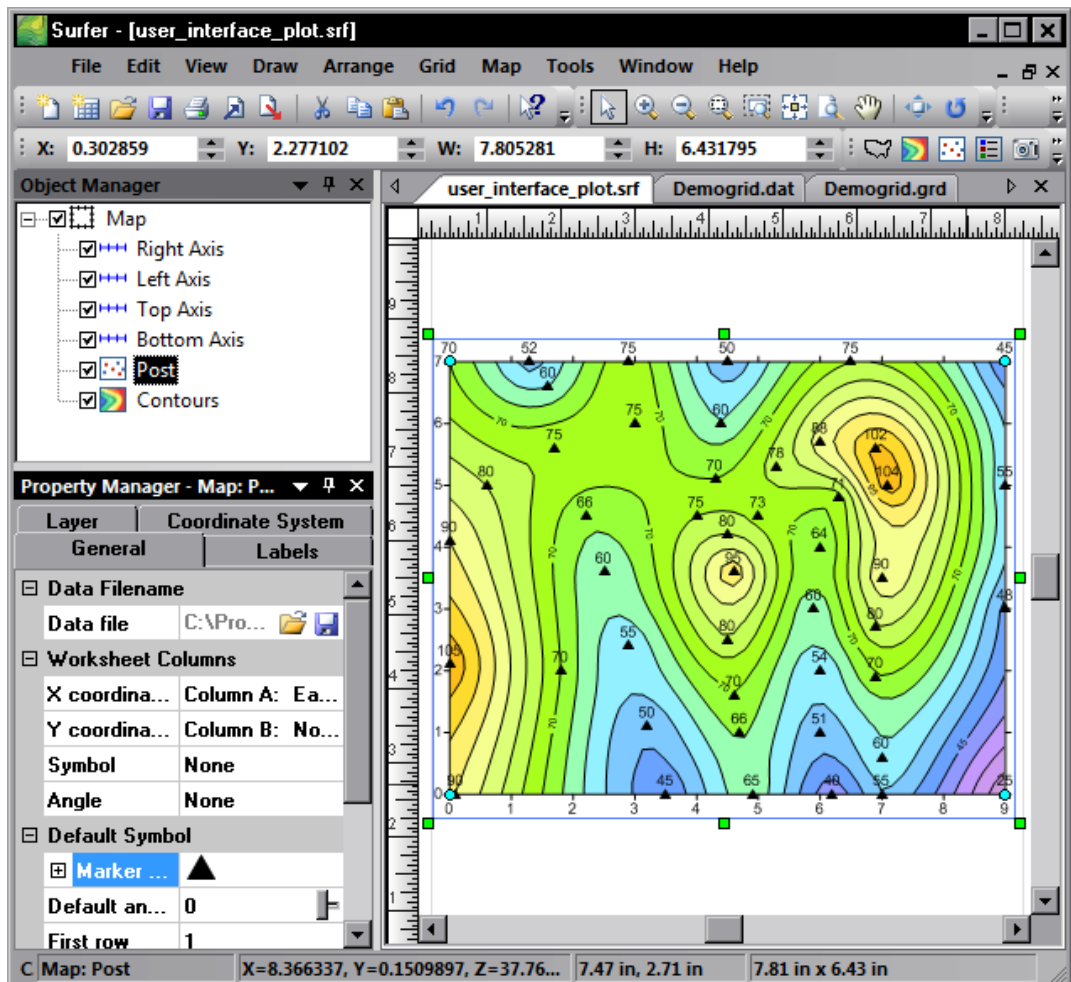
Component Name	Component Function
Title Bar	The title bar lists the program name plus the saved Surfer .SRF file name, if any. An asterisk (*) after the file name indicates the file has been modified since it was last saved.
Menu Bar	The menu bar contains the commands used to run Surfer .
Toolbars	The toolbars contain Surfer tool buttons, which are shortcuts to menu commands. Move the cursor over each button to display a tool tip describing the command. Toolbars can be customized with the Tools Customize command. Toolbars can be docked or floating.
Tabbed Windows	Multiple plot windows, worksheet windows, and grid windows can be displayed as tabs. Click on the tab to display that window.
Object Manager	The Object Manager contains a hierarchical list of the objects in a Surfer plot window. These objects can be selected, added, arranged, edited, and renamed in the Object Manager . The Object Manager is initially docked on the left side above the Property Manager . Changes made in the Object Manager are immediately reflected in the plot window. The Object Manager can be dragged and placed at any location on the screen.
Property Manager	The Property Manager allows you to edit any of the properties of a selected object. Multiple objects can be edited at the same time by selecting all of the objects and changing the shared properties. Changes made in the Property Manager are immediately reflected in the plot window.
Status Bar	<p>The status bar displays information about the activity in Surfer. The status bar is divided into five sections. The sections display basic plot commands and descriptions, the name of the selected object, the cursor map coordinates, the cursor page coordinates, and the dimensions of the selected object.</p> <p>The status bar also indicates the progress of a procedure, such as gridding. The percent of completion and time remaining will be displayed.</p>

Opening Windows

Click the **File | Open** command to open any of the three window types, depending on the type of file selected. The **File | New | Plot** command creates a new plot window. The **File | New | Worksheet** command creates a new worksheet window.

Plot Document

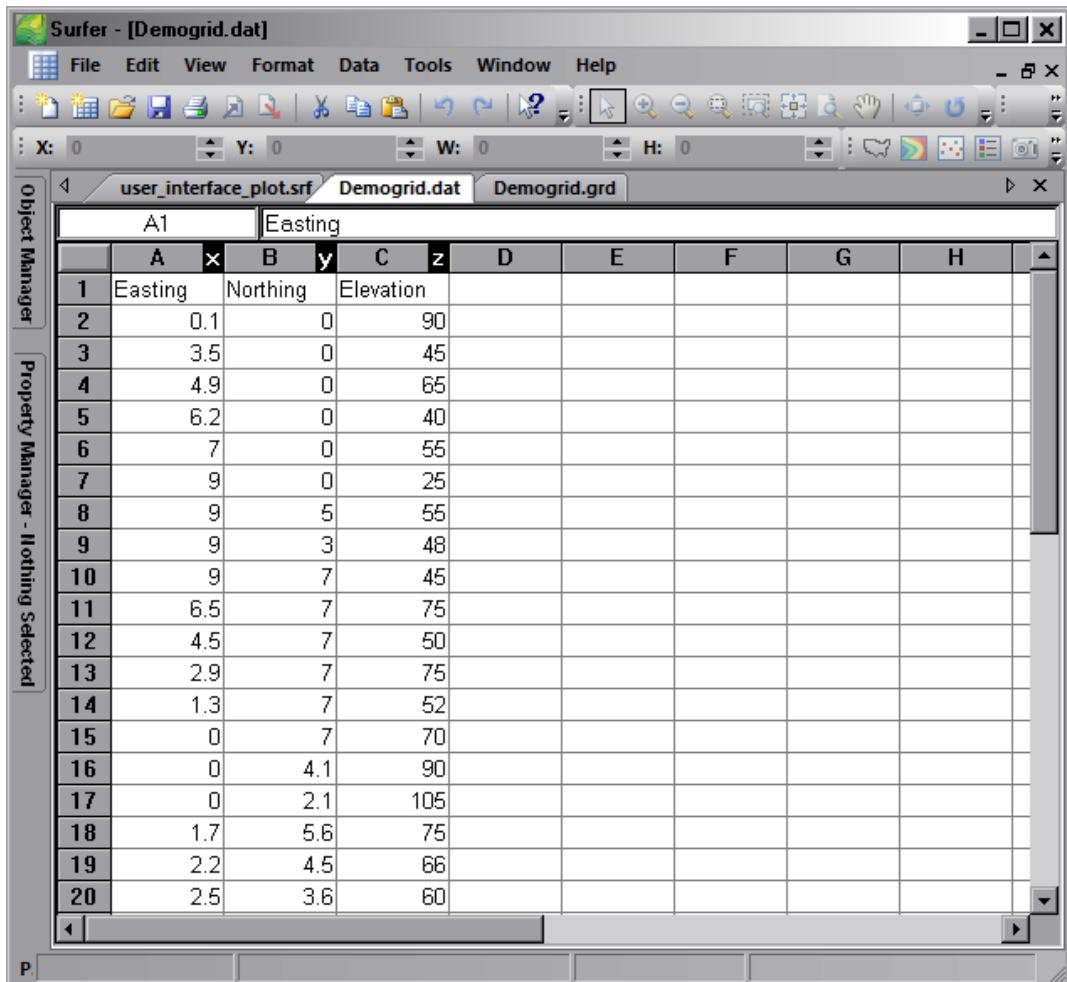
Plot windows contain the commands for creating and modifying grid files, and for creating all types of maps. When you first start **Surfer** you are presented with an empty plot window.



*This is the **Surfer** plot window with the **Object Manager** and **Property Manager** on the left, the plot, worksheet, and grid node editor tabs at the top of the horizontal ruler.*

Worksheet Document

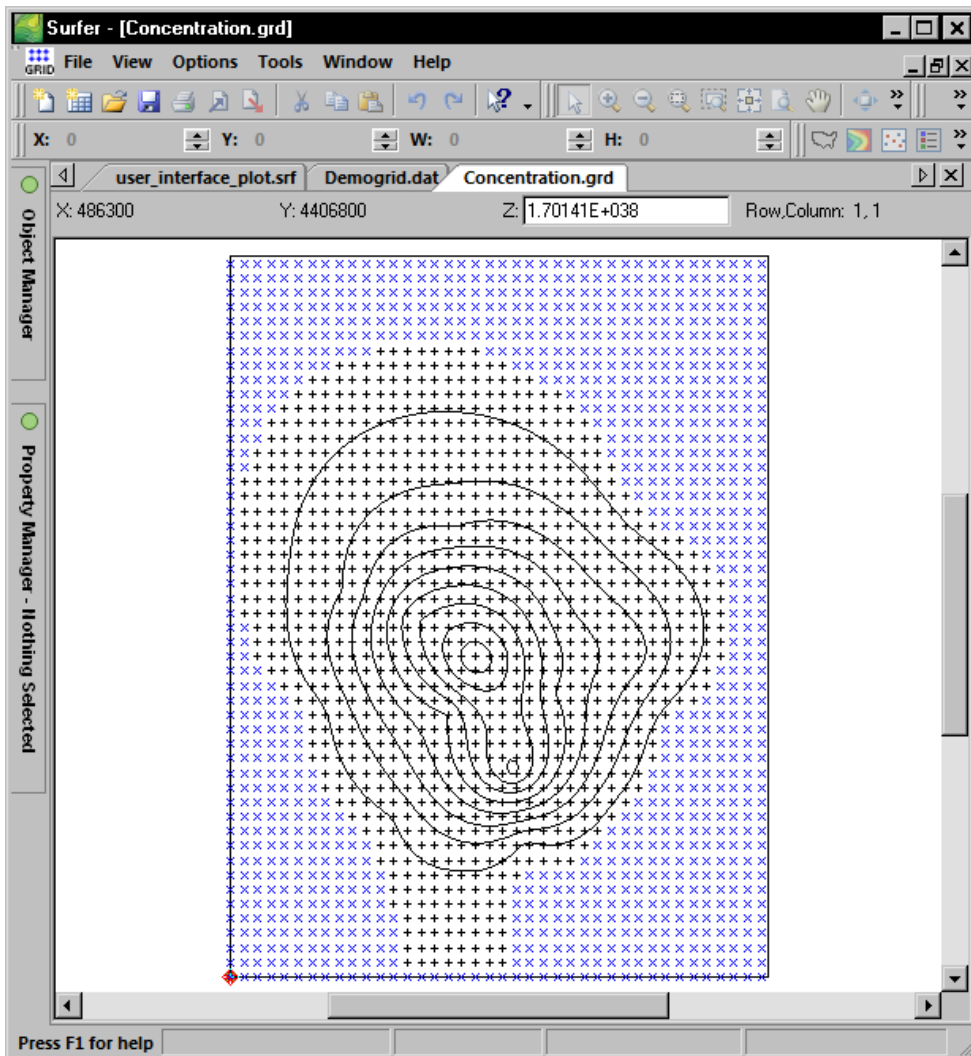
Worksheet windows are a view of the data file and are designed to display, edit, enter, and save data. The worksheet windows have several useful and powerful editing, transformation, and statistical operations available. Several import and export options are available for opening data files from other spreadsheet programs.



*This is the **Surfer** worksheet document with the **Object Manager** and **Property Manager** in auto hide mode on the left, and the plot document and grid node editor tabs at the top of the worksheet.*

Grid Node Editor

The grid node editor allows you to change or blank Z values at individual grid nodes in a grid file. Each grid node is indicated with a "+" in the grid editor window by default. Each blanked grid node is indicated with a blue "x" by default. The active node is highlighted with a red diamond. To move between grid nodes, press the arrow keys, or click a node to make it the active node.



This is the **Surfer** grid node editor with the **Object Manager** and **Property Manager** in auto hide mode on the left and the plot document and worksheet document tabs at the top of the grid node editor.

Changing the Window Layout

The windows, toolbars, managers, and menu bar display in a docked view by default; however, they can also be displayed as floating windows. The visibility, size, and position of each item may also be changed. Refer to the *Changing the Windows Layout* topic in the online help for more information on layout options.

Docking Managers

Surfer has a docking mechanism feature that allows for easy docking of managers. Left-click the title bar of a manager and drag it to a new location while holding down the left mouse button. The docking mechanism displays arrow indicators as you move the manager around the screen. When the cursor touches one of the docking indicators in the docking mechanism, a blue rectangle shows the window docking position. Release the left mouse button to allow the manager to be docked in the specified location.

Customizing Toolbars and Buttons

You may customize **Surfer's** toolbars and menus by clicking the **Tools | Customize** command. This is useful to create custom toolbars, rearrange menus, menu commands, and toolbar buttons. You can display image, text, or image and text depending on your preference. You can also create a new button appearance for a command.

Object Manager

When **Surfer** starts, the **Object Manager** is visible in the plot window by default. It contains a hierarchical list of the objects in the **Surfer** plot window. The **Object Manager** is initially docked at the left side of the window, giving the window a split appearance; however, it can be dragged and placed anywhere on the screen. The **Object Manager** can also be hidden as a tab, or displayed as a floating dialog.

Property Manager

When **Surfer** starts, the **Property Manager** is visible in the plot window by default. It contains all the properties of the selected object in multiple tabs to quickly and easily access and change properties. The **Property Manager** is initially docked at the left side of the window, below the **Object Manager**, giving the window a split appearance; however, it can be dragged and placed anywhere on the screen. The **Property Manager** can also be hidden as a tab, or displayed as a floating dialog.

Toolbars

All window types in **Surfer** include toolbars that contain buttons for many common commands. The toolbars are initially docked, but they can be dragged and placed anywhere on the screen, or displayed as floating dialogs. Toolbars can be customized to add or remove buttons with the new **View | Toolbars | Customize** command.

Tab View

The plot, worksheet, and grid node editor windows are displayed as tabbed documents. When more than one window is open, tabs appear at the top of the document, allowing you to click on a tab to switch to a different window. The tabs may be dragged to reorder them. When a document contains unsaved changes, an asterisk (*) appears next to its tabbed name. The asterisk is removed once the changes have been saved.

Three-Minute Tour

We have included several example files so that you can quickly see some of **Surfer's** capabilities. Only a few example files are discussed here, and these examples do not include all of **Surfer's** many map types and features. The **Object Manager** is a good source of information as to what is included in each file.

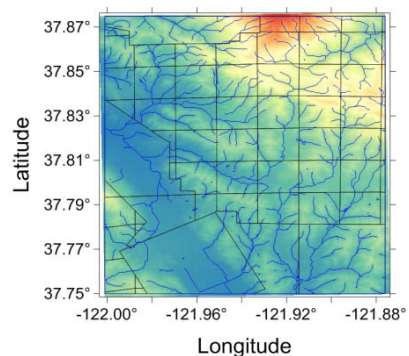
Example Surfer Files

To see example **Surfer** files:

1. Open **Surfer**.
2. Click the **File | Open** command and click on an .SRF file located in the Samples folder. By default, the **Surfer** installation folder is located in C:\Program Files\Golden Software\Surfer 10\Samples.

CoordinateSystems.srf

The coordinate systems sample file contains a map with multiple map layers. The image map layer is color filled and in a State Plane coordinate system. The two base map layers show land areas and rivers and contain polylines and polygons in a UTM coordinate system. The target coordinate system, as shown by the axes, is in latitude and longitude.



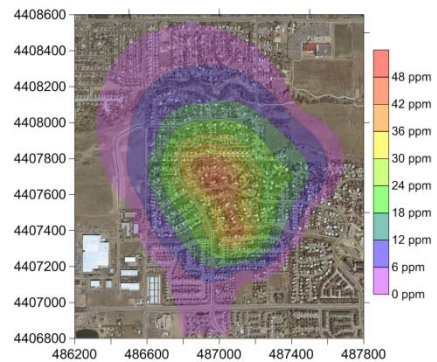
The CoordinateSystems.srf shows a map with multiple layers from different coordinate systems.

Transparent.srf

The transparent sample file contains two map layers: a contour map layer and a base map layer.

The contour layer is partially transparent and shows a contamination site.

The base map layer is an aerial photograph that displays the area below the contamination. The map layers are overlaid onto the same set of axes.



The Transparent.srf file shows a partially transparent contour layer overlaid onto an aerial photograph.

Using Surfer

The general steps to progress from a XYZ data set to a finished, grid-based map are as follows:

1. Create a XYZ data file. This file can be created in a **Surfer** worksheet window or outside of **Surfer** (using an ASCII text editor or Excel, for example).
2. Create a grid .GRD file from the XYZ data file using the **Grid | Data** command.
3. To create a map, click the **Map | New** command, select a map type, and use the grid file from step two. Grid-based maps include contour, image, shaded relief, vector, 3D wireframe, and 3D surface maps.
4. Click on the map to display the map properties in the **Property Manager** where you can customize the map to fit your needs.
5. Click the **File | Save** command to save the project as a **Surfer** .SRF file which contains all of the information needed to recreate the map.

Using Scripter

Tasks can be automated in **Surfer** using Golden Software's **Scripter** program or any ActiveX Automation-compatible client, such as Visual BASIC. A script is a text file containing a series of instructions for execution when the script is run. **Scripter** can be used to perform almost any task in **Surfer**. You can do practically everything with a script that you can do manually with the mouse or from your keyboard. Scripts are useful for automating repetitive tasks and consolidating a sequence of steps. **Scripter** is installed in the same location as **Surfer**. Refer to the *Surfer Automation* help book in the online help for more information about **Scripter**. We have included several example scripts so that you can quickly see some of **Scripter's** capabilities.

Example Scripter Files

To run a sample script:

1. Open **Scripter** by navigating to the installation folder, C:\Program Files\Golden Software\Surfer 10\Scripter. Double-click on the Scripter.exe application file.
2. Click the **File | Open** command and select a sample script .BAS file in the C:\Program Files\Golden Software\Surfer 10\Samples\Scripts folder.
3. Click the **Script | Run** command and the script is executed.
4. Most sample scripts will open **Surfer** and display a map in the plot window.

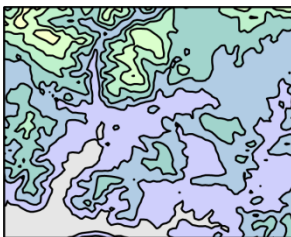
Map Types

Several different map types can be created, modified, and displayed with **Surfer**. A description and example of each map is listed below.



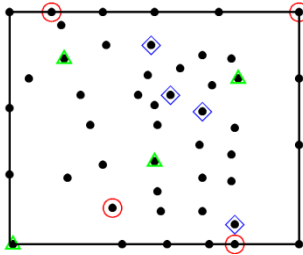
Base Map

Base maps display boundaries on a map and can contain areas, curves, points, text, images, or metafiles. Base maps can be overlaid with other map layers to provide details such as roads, buildings, streams, city locations, areas of no data, and so on. Base maps can be produced from several file formats. Individual base map objects can be edited, moved, reshaped, or deleted. Refer to *Chapter 7 – Base Maps* for more information.



Contour Map

Contour maps are two-dimensional representations of three-dimensional data. Contours define lines of equal Z values across the map extents. The shape of the surface is shown by the contour lines. Contour maps can display the contour lines and colors or patterns between the contour lines. Refer to *Chapter 6 – Contour Maps* for more information.



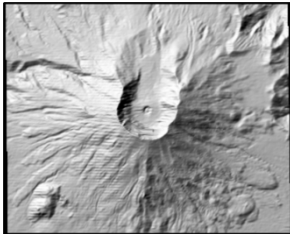
Post Map and Classed Post Map

Post maps and classed post maps show data locations on a map. You can customize the symbols and text associated with each data location on the map. Classed post maps allow you to specify classes and change symbol properties for each class. Classes can be saved and loaded for future maps. Refer to *Chapter 8 – Post Maps* for more information.



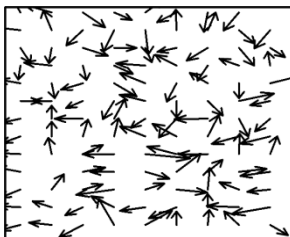
Image Map

Image maps are raster images based on grid files. Image maps assign colors based on Z values from a grid file. Blanked regions on the image map are shown as a separate color or as a transparent fill. Pixels can be interpolated to create a smooth image. Refer to *Chapter 9 – Image Maps* for more information.



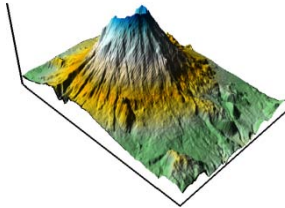
Shaded Relief Map

Shaded relief maps are raster images based on grid files. Shaded relief maps assign colors based on slope orientation relative to a light source. **Surfer** determines the orientation of each grid cell and calculates reflectance of a point light source on the grid surface. The light source can be thought of as the sun shining on a topographic surface. Refer to *Chapter 10 – Shaded Relief Maps* for more information.



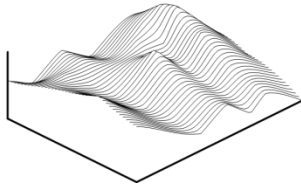
Vector Map

Vector maps display direction and magnitude data using individually oriented arrows. At any grid node on the map, the arrow points in the downhill direction of the steepest descent and the arrow length is proportional to the slope magnitude. Vector maps can be created using information in one grid file (i.e. a numerically computed gradient) or two different grid files (i.e. each grid giving a component of the vectors). Refer to *Chapter 11 – Vector Maps* for more information.



3D Surface Map

3D surface maps are color three-dimensional representations of a grid file. The colors, lighting, overlays, and mesh can be altered on a surface. Multiple 3D surface maps can be layered to create a block diagram. Refer to *Chapter 13 – Surface Maps* for more information.



3D Wireframe Map

3D wireframe maps are three-dimensional representations of a grid file. Wireframes are created by connecting Z values along lines of constant X and Y. Refer to *Chapter 12 – Wireframe Maps* for more information.

Map Layers

It is possible to combine several maps to create one map object with multiple layers. The **Map | Add** command allows you to add a map layer to the selected map. Most combinations of map types can be combined. You can add any combination of contour, base, post, image, shaded relief, vector, or 3D surface maps. You can add any combination of contour, base, post, and vector maps with 3D wireframe maps.

A *Map* uses a single set of X, Y, and Z axes. Individual map layers are positioned according to the map layer's coordinate system. If two or more map layers have the exact same X and Y values, the two layers will occupy the same map space. If two layers cover adjacent X and Y areas, the two layers will overlay next to each other in the correct relative position. Layered maps become a single *Map* object and are moved and scaled together. The opacity of each map layer can be adjusted individually to make a layer transparent or semi-transparent.

Refer to *Chapter 18* for information about map layers.

Coordinate Systems

A coordinate system is a method of defining how a file's point locations display on a map. Different types of coordinate systems exist that control how the coordinates are shown on the map. In **Surfer**, a map can be in local coordinates, in a geographic latitude and longitude system, or in a known projection and datum.

A *local coordinate system* is considered unreferenced by **Surfer**. A local system has a location that begins numbering at an arbitrary location and increments numbers from this location. This is frequently referred to as a Cartesian coordinate system. Most maps are created in local coordinate systems. In these cases, you can ignore the options on the **Coordinate System** tab in the **Property Manager**, as long as all map layers contain the same X and Y coordinates.

A *geographic coordinate system* uses a spherical surface to define locations on the earth. Geographic coordinate systems are commonly called unprojected lat/long. **Surfer** has several predefined geographic coordinate systems available. Each system has a different datum. The same latitude and longitude value will plot in different locations depending on the datum.

A *projected coordinate system* consists of a projection and a datum. Each projection distorts some portion of the map, based on the ellipsoid and datum specified. Coordinates can be lat/long, meters, feet, or other units. Different projections cause different types of distortion.

In **Surfer**, data, grids, map layers, and maps can have an associated coordinate system. All coordinate systems defined by the data, grids, and map layers are converted "on the fly" to the map's target coordinate system. This allows maps with different coordinate systems to be easily combined in **Surfer**.

It is recommended that you do not use projected coordinate systems if you do not need to convert between coordinate systems or if all your data are in the same coordinate system.

Source Coordinate System - Map Layer

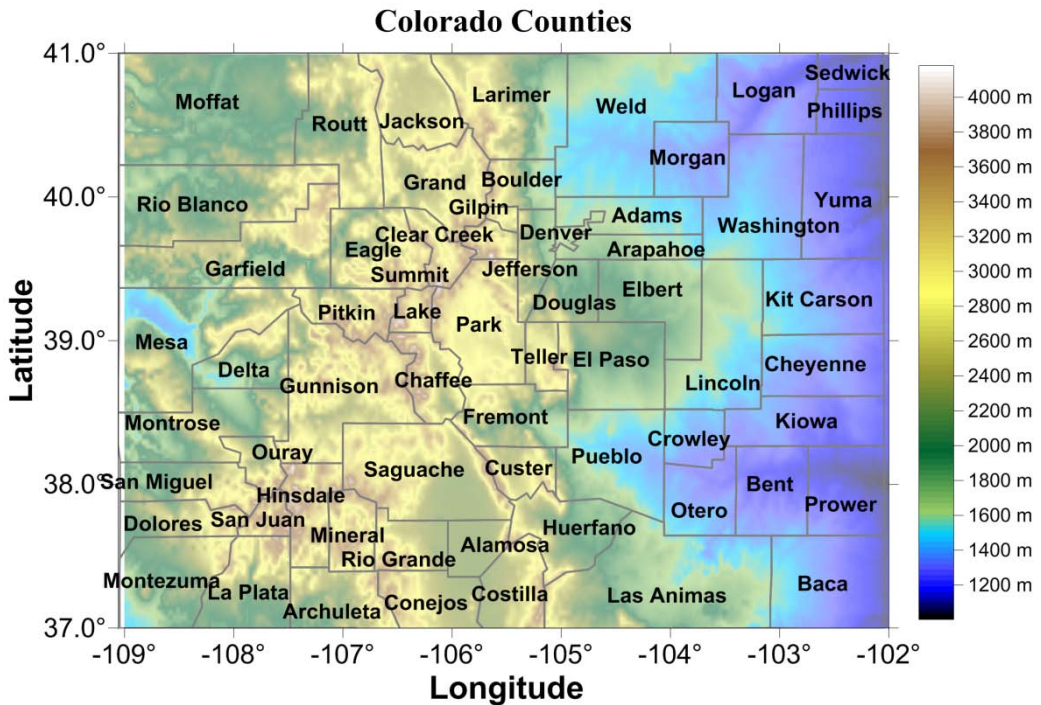
Maps can be created from data, grids, or base map files in any coordinate system. The *Source Coordinate System* is the coordinate system for the data, grid, or base map file used to create the map layer. Each map layer can reference a different projection and datum. When a map layer has a source coordinate system different than what you want the map to display, the map is converted to the map's *Target Coordinate System*.

3D surface maps and wireframe maps do not have a coordinate system associated with them. When a map with a coordinate system is overlaid onto either of these map types, the map coordinate system is removed and the maps are displayed in the Cartesian coordinates.

Target Coordinate System - Map

Maps can be displayed in any coordinate system. The map is displayed in the coordinate system defined as the *Target Coordinate System*. A coordinate system normally has a defined projection and datum. When a map layer uses a different source coordinate system than the map's target coordinate system, the map layer is converted to the map's *Target Coordinate System*. The map's *Target Coordinate System* is the coordinate system in which you want to display your map.

Refer to *Chapter 15* for more information on coordinate systems.



This map has multiple map layers that share axes. The map object controls the limits and scale. The individual map layers display the state and county boundaries, the county labels, and the image map showing elevation.

Getting Help

Surfer comes with a quick start guide that provides a quick way to learn the basics of **Surfer**. There are other sources of help, including this full length guide, that will help you learn **Surfer**.



Online Help


Use the **Help | Contents** command in the program to access the detailed online help. Information about each command and feature of **Surfer** is included in the online help.

Automation Help

Use the **Help | Automation Help** command to display the *Introduction to Scripter* help page and open the **Scripter** help book with all of the **Surfer Automation** help information.

Context Sensitive Help

Surfer contains context sensitive help for help on menu commands, dialogs, buttons, and screen regions. To obtain context sensitive help for an item, click on the item and press the F1 key. Alternatively, click the  button. The cursor will appear as , and you can select the item for which help is desired with the modified pointer and a help window appears. This method will produce a detailed help page for the item of interest.

In addition, most dialogs contain a help button. Click the  button in the dialog title bar to obtain help for that dialog or click the *Help* button at the bottom of the dialog.

Internet Help

Golden Software's website is located at www.GoldenSoftware.com. The website contains information about **Surfer** and other Golden Software products. In addition, there is a knowledge base and a user support forum on the website.

Frequently Asked Questions

Use the **Help | Golden Software on the Web | Frequently Asked Questions** command to access the most current **Surfer** FAQs. Open a connection to the Internet before selecting this command. The frequently asked questions page is located at www.GoldenSoftware.com/faq.shtml.

Golden Software User Forums

The online forums are located on the Golden Software website. The forums are moderated by Golden Software, but also allow peer interaction. Once you create a free user name, you can post new questions, or comment on current questions or discussion. No question goes unanswered.

Find answers to your technical questions and interact with our technical support staff and fellow Golden Software users through the online **Surfer** forum.

The forums are located at www.GoldenSoftware.com/forum/.

Golden Software Knowledge Base

The knowledge base is a repository of constantly updated product frequently asked questions, troubleshooting suggestions, program tips, and common procedures.

Use the **Help | Golden Software on the Web | Knowledge Base** command to connect to Golden Software's knowledge base. Open a connection to the internet before selecting this command. The knowledge base page is located at www.GoldenSoftware.com/activekb/.

Golden Software Technical Support

Golden Software's technical support is free to registered users of Golden Software products. Our technical support staff is trained to help you find answers to your questions quickly and accurately. We are happy to answer all of your questions about any of our products, both before and after your purchase. We also welcome suggestions for improvements to our software and encourage you to contact us with any ideas you may have for adding new features and capabilities to our programs.

Technical support is available Monday through Friday 8:00 AM to 5:00 PM Mountain Time, excluding major United States holidays. We respond to email, phone, and fax technical questions within one business day. When contacting us with your question, have the following information available:

- Your **Surfer** serial number (located on the CD shipping cover or in **Help | About Surfer**)
- Your **Surfer** version number, found in **Help | About Surfer**, including whether it is the 32-bit or 64-bit version of **Surfer**
- The operating system you are using (i.e. Windows XP, Vista, or 7), including whether it is 32-bit or 64-bit operating system

If you encounter problems with **Surfer**, you are welcome to send an email message to Golden Software using the **Help | Feedback | Problem Report** command. This message is delivered directly to SurferSupport@GoldenSoftware.com. Report the steps you perform when the problem occurs and include the full text of any error messages that are displayed. You are welcome to attach a .ZIP file (10 MB maximum) containing the .SRF file and other files that illustrate the problem. Larger files may be uploaded to our FTP site at <ftp://ftp.GoldenSoftware.ws/incoming/Surfer/>.

Golden Software Contact Information

The Golden Software mailing address, sales phone number, and technical support phone number are listed by clicking the **Help | About** command. You can also use the **Help | Feedback** command to contact technical support.

Telephone: 303-279-1021

Fax: 303-279-0909

Email: SurferSupport@GoldenSoftware.com

Web: www.GoldenSoftware.com (includes FAQs, knowledge base, support forum, training videos, newsletters, downloads, and more!)

Mail: Golden Software, Inc., 809 14th Street, Golden, Colorado 80401-1866, USA