GEOGRAPHIC IMAGER
for Adobe® Photoshop®

Geographic Imager 5.0 Help

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by Avenza Systems Inc.

Geographic Imager 5.0 Help

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1 What's new?

Geographic Imager is a powerful suite of tools and functions for Adobe Photoshop that enables spatial imagery to be opened, edited, transformed and saved while retaining all the spatial properties of the image. Geographic Imager expands the amount of formats Adobe Photoshop is able to open. In addition to ensuring a safe and trouble-free editing environment for your geospatial images, Geographic Imager offers specialized tools for performing spatial operations on the image beyond the standard Adobe Photoshop image editing tools. Geographic Imager provides smart support for most image level operations and tracks the changes made to images while updating the reference information accordingly.

Geographic Imager 5.0 is a full release that includes support for Adobe Photoshop CC 2015, enhanced functionality, stability improvements, and additional format support.

Geographic Imager 5.0 introduces many new features. Export your images to map packages that are compatible with the PDF Maps app with an option to upload them directly to the PDF Maps Store in only a few steps. A new Event Log captures operations, errors, and messages. Most Geographic Imager tools link directly to a new and interactive online help system.

Other enhancements in Geographic Imager 5.0 include a redesigned Georeference tool that makes it easier to reference or rectify images, redesigned Geographic Imager preferences with new options, and higher quality web tiles created by Export to Web Tiles feature. You can now export to BIL and ArcInfo ASCII Grid formats.

The following summarizes new features and enhancements in Geographic Imager 5.0:

Adobe Photoshop Creative Cloud 2015 support

Fully compatible with Geographic Imager 5.0 for Adobe Photoshop Creative Cloud 2015.

Georeference

Redesigned Georeference tool includes the ability to interactively match control points with world coordinates from a web map. New ability for the Georeference tool to detect appropriate image coordinate systems depending on requirement to reference or rectify the image.

Additional export formats

Included BIL and ArcInfo ASCII Grid as export DEM formats.

Online help

New Geographic Imager help system is now online. Browse help topics for tools, features, and tutorials using an interactive web interface. Most Geographic Imager dialog boxes now link directly to help topics. Help files are also available locally.

Export and Upload to PDF Maps

New ability to export a map package compatible with the PDF Maps app and upload it directly to the PDF Maps Store.

Event Log

New ability to record Geographic Imager operations, errors, and messages to an event log.

Mosaic options

New mosaic options including ability to apply blending mode and place mosaic layers above destination layer.

Web Tiles optimization

Export to Web Tile optimized and with higher quality. Now includes Adobe Photoshop image interpolation methods and support for OpenStreetMap and TileMill formats.

Scripting

Enhanced scripting support now includes WMS import.

Redesigned Geographic Imager Preferences

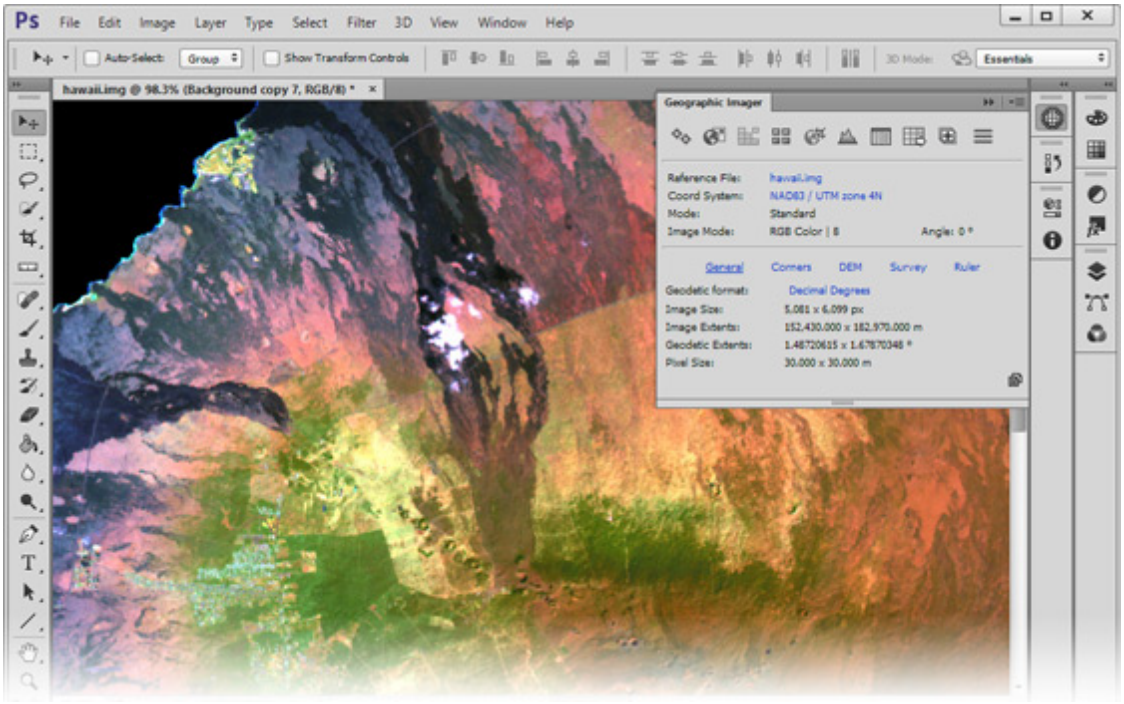
New Geographic Imager Preferences interface.

And more...

Various bug fixes and user experience enhancements.

2 Introduction

Geographic Imager 5.0 is the latest version of Avenza's mapping plug-in for the desktop graphics environment of Adobe Photoshop.



Combined with Adobe Photoshop, Geographic Imager revolutionizes the way spatial imagery is created, edited and maintained by allowing spatial image files to be created, edited and managed in the familiar and widely-used Adobe Photoshop environment. Geographic Imager allows the most common spatial imaging tasks to be performed where they should be done, in a powerful raster editing environment, and adds the dozens of powerful Adobe Photoshop tools and operations to those that one can perform on such imagery.

Geographic Imager is comprised of a series of geospatial tools for Adobe Photoshop that will continually improve on each previous version by adding additional file support, tools and improvements to existing tools. Geographic Imager is also the perfect companion suite for MAPublisher and Adobe Illustrator users.

This help system assumes that you are familiar with Adobe Photoshop and have at least a basic understanding of geographic information systems (GIS) terminology and concepts. Refer to your Adobe Photoshop user guide for more information on using the features of Adobe Photoshop. Refer to the Avenza Projections Guide for more

information on the projections supported in Geographic Imager (the guide is included in the Help and Tutorial Data folder).

By referring to this help system, you'll learn how to work with spatial imagery using the Geographic Imager tools in Adobe Photoshop. This help covers the concepts necessary to open, edit, and save spatial images with Geographic Imager. A variety of sample spatial images have been included with the installation of Geographic Imager for use with the help and tutorials. You're encouraged to experiment with your own data to gain additional experience with Geographic Imager tools and functions.

2.1 Features Overview

The following is a brief overview of the features and tools included in Geographic Imager.

Open/Save spatial imagery

When opening geographic imagery, Geographic Imager automatically recognizes GIS raster formats and attempts to locate matching reference files. This information is displayed in the Geographic Imager panel. When saving a geographic image using the native Adobe Photoshop save commands, Geographic Imager automatically creates a corresponding reference file or GeoTIFF header information. All Adobe Photoshop image export formats are supported by Geographic Imager including the native Adobe Photoshop PSD format and the Adobe Acrobat PDF format. Most formats other than GeoTIFF will be referenced using an external reference file (e.g. a world file). Certain image formats such as MrSID, JPG2000 and DEMs cannot be opened by Adobe Photoshop without Geographic Imager installed. Certain formats cannot be saved to their original format and must be saved to another format such as GeoTIFF. Learn more about Opening Spatial Images.

Transform

Geographic Imager uses GeoTransform technology, a sophisticated image reprojection engine, that includes extensive support for thousands of geodetic and projected coordinate systems that allow spatial imagery to be projected and transformed in Adobe Photoshop. Support for customized projections as well as the ability to save custom definitions for later use is also included. Learn more about Transforming Spatial Images.

Georeference and rectify images

Geographic Imager adds a world coordinate grid to the page and pixel grid systems native to Adobe Photoshop. It allow you to create and maintain image-to-world relationship throughout Adobe Photoshop operations so that the correct georeferencing is preserved when saving images. Specifically, Geographic Imager provides smart support for most image level operations, such as crop and resize, and tracks the changes to the image geometry, updating the reference information accordingly. Geographic Imager allows the referencing of non referenced images, rectification and image correction using known control points by the pixel value, geodetic coordinate, and projected coordinate. Learn more about Georeferencing Images.

Tile

Geographic Imager allows Adobe Photoshop to automatically divide or tile spatial imagery into multiple smaller spatial images while retaining the georeferencing properties in each smaller image. Multiple options are available for determining how the tiled images will be created. Learn more about Tiling Images.

Mosaic

Geographic Imager allows Adobe Photoshop to automatically combine multiple geographic images to create image mosaics while retaining the georeferencing properties in the new larger image. Create a seamless image from individual image files. Learn more about Mosaicking Images.

GeoCrop

Use GeoCrop to crop georeferenced images based on defined crop areas. A very useful tool to trim images to an area of interest. Learn more about GeoCropping Images.

Advanced Import

Advanced Import can import multiple files of differing types and includes many tools including crop/resample, channel management, DEM Schema, Mosaic. Learn more about Opening Images with Advanced Import.

DEM Schema

DEMs provide an effective method of storing information for a continuous surface. DEM data needs to be rendered so it can be displayed visually. Depending on what type of DEM data it is and how it should look, the type of rendering schema needs to be customized or automatically assigned. Also, support for elevation display and

mosaicking of DEM images imported with the same schema. Learn more about Opening DEMs.

Terrain Shader

The Terrain Shader tool dynamically applies terrain shading and color maps to digital elevation models within Adobe Photoshop. Import a DEM and easily and quickly apply colours and shades based on elevation and even apply a specific light source position and intensity to achieve a specific shading effect. Easily generate custom colour maps or import existing Adobe Photoshop gradients to use as colour maps. Learn more about Terrain Shading DEMs.

Channel Management

Geographic Imager Channel Management allows you to control channel mapping and assignment of channel color roles for false-composite multiband imagery. Learn more about Channel Management.

Automate Tools

All Geographic Imager commands are fully compatible with scripts and actions. Easily create custom scripts and actions to automate repetitive tasks. Geographic Imager JavaScript functions can be fully configured with comprehensive parameters. Learn more about Automating Geographic Imager.

Export to many geospatial formats

Geographic Imager is able to save to all supported Adobe Photoshop image file formats. When saving a georeferenced image to a non-geospatial format (e.g. JPEG), Geographic Imager creates an external reference file (e.g. World File). Geographic Imager can also save to files that contain internal reference, such as: GeoTIFF, BigTIFF, DEM TIFF, Geospatial PDF, ERDAS IMAGINE Raster, ECW, MrSID, and NITF. See more about supported spatial image formats. Learn more about Exporting Spatial Images.

Export to PDF Maps

Use Export to PDF Maps to generate map packages and directly upload them to the PDF Maps Store, an in-app map store for the PDF Maps app on iOS, Android, and Windows Phone. The quickest way to get maps from the desktop to mobile. Learn more about Exporting to PDF Maps.

Licence management

Easily manage license options including commercial, academic, multi-user and floating. Activation maintains customer privacy and does not change the terms of the existing Product License Agreement.

Geographic Imager offers a floating license option which enables licenses to be shared across a network by multiple users. In such a scenario, the Geographic Imager client software can be installed on an unlimited number of computers while concurrent use is limited by the number of floating licenses purchased. This multi-platform solution offers support for Windows, Mac and Linux servers alike and includes the ability to check-out a license for remote use on a laptop computer as well as Internet-enable access for remote users. Floating licenses are a wonderful cost-effective way of sharing software amongst multiple users in a network environment. Learn more about License Management.

3 Getting Started

Before using Geographic Imager please read this section thoroughly to ensure that you have a suitable hardware setup, become familiar with the installation and licensing procedure, and adequately prepare your workspace. In particular, review the Compatibility with Adobe Photoshop section to ensure your system is

Topics covered in this section

3.1 System Requirements

Before installing Geographic Imager, ensure that these minimum system requirements are met (recommended requirements are mentioned as necessary):

Windows

- Adobe Photoshop CS6 / CC 2014 / CC 2015 (all including 64-bit)
- 2 GHz or faster Intel Pentium 4 processor (Intel Core 2 Duo or better recommended)
- Windows 7 or Windows 8 (compatible with 64-bit versions)
- 4 GB RAM (8 GB or higher recommended)
- 300 MB of available hard-disk space for installation
- DVD-ROM drive (for DVD version)
- 1024x768 display (1280x800 recommended)

Mac

- Adobe Photoshop CS6 / CC 2014 / CC 2015
- Multicore Intel processor
- Mac OS X 10.8 or higher
- 4 GB of RAM (8 GB or higher recommended)
- 300 MB of available hard-disk space for installation
- DVD-ROM drive (for DVD version)
- 1024x768 display (1280x800 recommended)

Adobe Photoshop CS5 and CC are officially deprecated in Geographic Imager 5.0.

Mac OS X 10.7 is officially deprecated and Windows XP and Windows Vista are officially unsupported in Geographic Imager 5.0.

Not all foreign language versions of Adobe Photoshop may be supported. Contact support@avenza.com for more information.

Memory Recommendations

Occasional Users

A minimum of 4 GB RAM is required. These are graphics or GIS users who use Geographic Imager with medium sized data sets including some low-resolution or small coverage raster images.

Power Users

The recommended memory for a power user is 8 GB RAM or more. These are professional cartographers and GIS users who use Geographic Imager daily and works with large image files.

Memory Usage

Why is so much RAM needed to operate Geographic Imager? Adobe Photoshop

requires a significant amount of RAM itself in order to run smoothly. In addition, image data sets are often large which increases the need for RAM even further. Image data sets contain raster data which must be stored in memory. Since Geographic Imager is adding georeferencing properties to Adobe Photoshop, this increases the file size, which increases the RAM requirements. In addition, Adobe Photoshop loads the entire file into memory rather than just reading it from disk, thus more RAM memory is required.

When importing a large number of files into Adobe Photoshop using Geographic Imager, notice that the amount of available memory will decrease rapidly and the computer may lose performance. This is due to the memory management. Geographic Imager reserves a fairly large amount of memory for each action, which may not properly returned when the procedure is done. The solution is simple: save your file, close it and open it again. It's not even necessary to close Adobe Photoshop itself. By closing the file, the reserved memory is properly returned.

Memory Saving Tips

Many raster data files are large and when a series of such files is opened, you may find that the program starts to run more slowly. This is because scratch and memory allocations are being used up. The best solution is to periodically save your work, quit out of Adobe Photoshop and then restart. This will free up the available scratch memory.

The minimum number of undos can be reduced (since they all reside in memory).

You can set a primary and secondary scratch disk in Adobe Photoshop Preferences (menu Edit > Preferences > Performance) in order to draw additional storage from a partitioned or multi-drive environment.

3.2 Compatibility

Geographic Imager 5.0 is compatible with Adobe Photoshop CS6, CC 2014, and CC 2015. If you are running multiple versions of Adobe Photoshop on your system, please ensure that you have installed Geographic Imager to the appropriate Adobe Photoshop plug-ins folder(s).

Adobe Photoshop CC 2014 (2014.1 and 2014.2) for Mac has a

compatibility issue with Geographic Imager. We recommend using Adobe Photoshop CC 2015 for Mac which is fully compatible. More information can be found at http://www.avenza.com/support/compatibility/gi-cc.

The operations of concern are primarily the ones that affect the image size, pixel size and orientation of the image. Most of the Adobe Photoshop functions that are involved in these operations, such as Crop, are supported. Pixel-level operations, including the majority of plug-ins (e.g. cut and paste), are transparent to Geographic Imager and are assumed not to modify georeferencing. These operations are treated as simple image modifications.

Every attempt has been made to ensure compatibility with Adobe Photoshop. Avenza, as third-party developers, acknowledges that due to various limitations within the Adobe Photoshop development environment, certain notifications and parameters are unable to be received from several native Adobe Photoshop operations. There are also a limited number of procedures within Adobe Photoshop that, when invoked, may adversely affect the georeferencing of a spatial image. A warning message will be displayed whenever an operation is performed and may cause data loss, render georeferencing invalid, closes a document without saving, or in any other way may silently affect the georeferencing of the image document.

Unsupported Tasks and Operations

The following native Adobe Photoshop tasks or operations are not supported by Geographic Imager and may damage image georeferencing if performed.

Task or Operation	Description
File > Save for Web and Devices	Save for Web and Devices will create new files without any georeferencing.
File > Export > Export As	Export As will create new files without any georeferencing.
File > Export > Quick Export as PNG	Quick Export as PNG will create new files without any georeferencing.

Task or Operation	Description
File > Generate > Image Assets (Adobe Photoshop CC)	When enabled, the Adobe Generator will create new files without any georeferencing.
Image > Reveal All	Reveal is not supported and will result in lost georeferencing.
Image > Trim (Partially supported)	Trim works in modes when pixels are trimmed only in one horizontal and/or one vertical direction (e.g. top and left is acceptable, but top and bottom is not). To perform trim for all directions, trim top and left first, followed by bottom and right.
Select > Focus Area	Output To option set to New Document creates a new file without any georeferencing.
Save on application Quit (Mac only)	*This issue only affects CC 2014.1 and 2014.2*. Due to an existing bug in Adobe Photoshop, modified georeferenced images will not retain spatial referencing when quitting the application and saving when prompted. It is recommended to save all modified georeferenced files prior to quitting the application. More information can be found at http://www.avenza.com/support/compatibility/gi-cc.
Measurement	The Measurement feature is not available in Photoshop CS6. It is only available on Photoshop CS6 Extended or higher.

Unsupported Automate Tools: Scripting and Actions

The following Adobe Photoshop scripts or actions are not supported by Geographic Imager and may damage image georeferencing if performed.

Script or Action	Description
File > Automate > Batch (Limitation)	When the Destination drop-down list is Folder, the new image will not be georeferenced.
File > Scripts > Script Event Manager	Performing actions or scripts that change the document's geometry using the Script Event Manager are not supported and will not update georeferencing. Instead, run the script from the Actions panel or run it directly (choose File > Scripts > Browse).
Action Panel > Insert Menu Item	Insert Menu Item from the Actions panel will create incorrect results with some menu items.
File > Import > Geographic Imager: Advanced Import	Accessing Advanced Import through the File menu is not recordable by an Action.
Document switching (Limitation)	Recording document switching actions (through the Window menu or pressing Ctrl +Tab or Command+Tab) may cause incorrect results when using a combination of Geographic Imager tools such as Georeference and Mosaic.

- When using any automate tools, Adobe Photoshop must already be open to ensure correct functionality. In some cases the script will trigger events before Adobe Photoshop has been initialized and the event will not be registered by Geographic Imager. This could result in the georeferencing not being updated.
- If starting a debug session with Adobe ExtendScript Toolkit (by holding the Alt or Cmd (Mac) key during Adobe Photoshop startup), Adobe Photoshop will need to be restarted to fully initialize Geographic Imager.
- To record Geographic Imager events using ScriptListener or actions, choose File > Automate > Geographic Imager [function] instead of using Geographic Imager panel buttons and menu items. Due to Adobe Photoshop API limitations, Geographic

Imager functions triggered by the panel will not be recorded.

- Due to Adobe Photoshop API limitations, Geographic Imager does not automatically read georeferencing from a geospatial PDF when it is opened using a script or action.
- The File > Automate > Create Droplet function is supported when: the destination set to none and the destination is save and close. At this time, it is not supported when the destination is saving to a folder.

Other Special Notes

The following are some additional compatibility and procedural notes to be aware of in order to properly and effectively use Geographic Imager.

Transforming Coordinate Systems

- When transforming an image the background layer will be converted to a layer. This may introduce transparency so when saving to a format that doesn't support transparency be aware the image will be flattened.
- Transformations always results in a north-up affinely referenced image.
- Multiple transformations may introduce an accumulative loss of precision due to the resampling needed when transforming images. It is recommend to transform images only once to the final source coordinate system. To avoid this problem, keep a copy of the original image if it will be needed in another coordinate system.
- In order for Geographic Imager to interpret all transformation parameters it may be necessary to maintain the ArcGIS exported AUX file and store it in the same location as the ARC generated GeoTIFF file. Not including the AUX file may result in WKT parsing errors.
- An image transformed into Azimuthal Equidistant (spherical) may be recognized as "none" when opened in ArcGIS because of a conflict between the ellipsoidal and spherical datums. Furthermore, when an image in WGS84 is transformed into WGS84/Azimuthal Equidistant in ArcGIS, it actually uses a spherical datum.

Georeferencing

- Geographic Imager continuously maintains the proper georeferencing information for all georeferenced image files throughout the duration of the Adobe Photoshop session, as well as during a Save procedure. Documents may become implicitly georeferenced upon the file open process if Geographic Imager can locate proper georeferencing information (reference file with same name as opened image).

- Geographic Imager continuously maintains the proper georeferencing information for all georeferenced image files throughout the duration of the Adobe Photoshop session, as well as during a Save command. Documents may become implicitly georeferenced upon the file open process if Geographic Imager can locate proper georeferencing information. For example, a GeoTIFF stores georeference information internally as metadata within a header while other formats store georeference in an external reference file. When using an external reference file (e.g. TFW or JGW world file) the associated image should have the same name. Otherwise the external reference file can be specified manually.

- Coordinate system information can not always be stored in the reference file. World files only contain image reference data and will never maintain the coordinate system. Some projections and coordinate systems are not supported in GeoTIFF. MapInfo TAB files also contain the same limitation and in absence of the coordinate system information some MapInfo-based program may in fact assume WGS 84 Coordinate System. ER Mapper ERS files must contain an ER Mapper identifier within the coordinate system definition to save the coordinate system with the file. See more about spatial image formats.

- Blue Marble RSF and MapInfo TAB files save the complete reference (point list information) so that it can be loaded again in the future. Esri world files contain a computed relationship between the source image coordinates and the reference coordinates and not the complete reference point information, therefore, reference points cannot be reloaded from an Esri World file. When an Esri world file is loaded into the reference point list the four corners of the source image are recalculated using the world file parameters, and displayed as reference points. If you'd like to keep the original point list, it is recommended to save a MapInfo TAB file so that the raw reference point information can be recalled at a later date.

- New documents created within Adobe Photoshop are never georeferenced unless they are based on georeferenced documents. However, in cases where a new document has been created, a reference file for the newly created document may be specified or created using Geographic Imager.

- When rotating an image in GCP mode, all control points will be lost. A warning will appear when attempting these operations: Crop with rotate, Rotate, Image Size, Transform, and Advanced Import / Resample.

Color Modes

- Most color modes are supported for Geographic Imager operations, however, when exporting files some formats only support certain color modes.
- Support for the various image color modes available within Adobe Photoshop are identical across the various functions and operations available in Geographic Imager except as indicated below.
- Support for transforming 32-bit per channel images is currently limited while work continues to expand 32-bit per channel support within Geographic Imager. User experiences may vary depending upon image sources and workflows. Contact Avenza for more details.
- With color modes that are not supported by all of Geographic Imager operations, the bit per channel information will not be displayed on the panel (e.g. Bitmap, Indexed color and multichannel) and the appropriate buttons will be disabled.

Mosaicking

- Adobe Photoshop allows for duplicate layer names. Therefore, if an image is mosaicked multiple times new layer groups will be generated with the same name within Adobe Photoshop.

Adobe Photoshop start-up

- It is not recommended to use Alt+Tab keyboard command (Option + Tab for Mac) to switch between programs during Adobe Photoshop start-up. Geographic Imager runs a series of scripts that can be interrupted by the Adobe Photoshop debugging tool if this command is used. Using these keys during start-up may interrupt normal application execution and even cause the application to appear unresponsive.

Save Adobe PDF

- Modifying settings in the Save Adobe PDF dialog box may trigger error messages

or may generate a corrupt PDF file. It is recommended to use Quick Save To Format. If necessary, use Adobe Acrobat to adjust PDF document properties (e.g. description, security, etc.).

Saving documents in background (CS6 only)

- Adobe Photoshop CS6 has the ability to save documents in the background. Geographic Imager supports this feature, however, georeferencing may not be stored when saving a document "as a copy". This may affect additional third-party format writers and the Adobe JPEG2000 writer. If you're experiencing Geographic Imager warnings about reference not being stored, you may want to: 1) change your workflow to avoid renaming files on save; 2) choose a different file format; or 3) disable saving in background (Preferences -> File Handling).

Opening multiple files using Open With (CS5 only)

- Due to an Adobe Photoshop CS5 limitation, Geographic Imager cannot open multiple files using the Open With shortcut. Instead, use File > Open, drag and drop, or Advanced Import.

Compatibility with MAPublisher and Other Applications

MAPublisher for Adobe Illustrator

Geographic Imager ability to transform images is a compliment to MAPublisher which can't transform images. Most image formats exported from Adobe Photoshop using Geographic Imager are compatible with Adobe Illustrator using MAPublisher. However, some features such as channels are not supported and should be avoided when creating images for use with MAPublisher.

The two environments employ slightly different methods for handling, encoding, and reading GeoTIFF headers and world files. In some rare instances, the georeferencing data created by Geographic Imager may be incorrectly interpreted by MAPublisher. In severe cases, the image may not be properly registered within Adobe Illustrator even after being recognized as a GeoTIFF. It is recommended to export a world file from Geographic Imager and use it for image registration in MAPublisher if GeoTIFF proves difficult or unsuccessful.

The Adobe Photoshop Export > Paths to Illustrator function creates an Adobe

Illustrator file. To achieve compatibility with MAPublisher, Geographic Imager creates an RSF file upon export. Use the New MAP View for Photoshop Paths in MAPublisher to create a new MAP View based on the exported Adobe Illustrator file and RSF.

Other Third-party Plug-ins

All efforts have been made to develop and engineer Geographic Imager in accordance with the Adobe Photoshop SDK and third-party development schema. However, Avenza cannot verify and validate compliance and compatibility with other third-party plug-in products that may be installed on any particular system and cannot guarantee that the use of Geographic Imager will perform as expected in such environments and will not clash with other plug-ins. Furthermore, Avenza can neither confirm nor guarantee that the use of any particular third-party plug-in, action or script will not damage the georeference data of any spatial image in use with Geographic Imager.

When third-party plug-ins are installed to read the same files as Geographic Imager, conflicts in reading image formats may occur. It is recommended to disable or remove third-party plug-ins before using Geographic Imager.

The use of any other third-party plug-in that in any way alters the geometry of a georeferenced image will damage the georeferencing of the image due to the fact that Geographic Imager has no way of knowing a) that the other plug-in exists; b) that it has been invoked; and c) what it has actually done to the image.
In most instances third-party plug-ins that do not alter the geometry of the image will not have an adverse effect on image georeference data.

Reset Adobe Photoshop Preferences

If you experience uncommon or abnormal results with Adobe Photoshop, try deleting the Adobe Photoshop preference file, Adobe Photoshop [version] Prefs.psp. To do this, hold the Ctr+Alt+Shift (Option+Command+Shift for Mac) keys immediately on Adobe Photoshop start-up. Alternatively, manually delete the preference file. A new preference file will be generated the next time Adobe Photoshop is run. The preference file is located in:

Windows 7/8: C:\Users\[user]\AppData\Roaming\Adobe\Adobe Photoshop [version] \Adobe Photoshop [version] Settings

Mac OS X: /Users/[user]/Library/Preferences/Adobe Photoshop [version] Settings

3.3 Installing Geographic Imager

Geographic Imager is licensed for use on a single computer and, once activated, will be node-locked and will only function on that computer. Therefore, before proceeding with installation and activation, ensure that Geographic Imager is installed on the appropriate computer.

Only one version of Geographic Imager can be installed at a time even if different versions of Adobe Photoshop are installed.

Windows

1. Make sure that a compatible version of Adobe Photoshop is installed on your computer. If Adobe Photoshop is running, exit the program.
2. Ensure that you have administrative privileges for the installation process. If you are unsure whether you have the proper privileges, please consult with your IT department.

   Downloaded version: Extract the contents of **GI50win.zip**. When you have unzipped the files, proceed to the Geographic Imager directory and double-click **Setup.exe**.

   DVD version: Insert the Geographic Imager DVD into your DVD-ROM drive. If Autorun is disabled on your system, navigate to the Geographic Imager for Windows directory on the DVD, and double-click Setup.exe.
3. Proceed through the installation screens as instructed. Note that you will have options to install documentation and tutorial data. If you choose to install these components these files can be subsequently be found in the \Program Files\Avenza \Geographic Imager directory. Additionally you may access the documentation from the Windows Start menu (All Programs > Avenza > Geographic Imager folder).
4. Launch Adobe Photoshop. See the License Management section for product activation details.

The Lizardtech GeoExpress 8 installer is only available for 64-bit versions of Windows. This install is required only if you need to export to MrSID format.

Mac

1. Make sure that you have a compatible version of Adobe Photoshop installed on your computer. If Adobe Photoshop is running, exit the program.
2. Ensure that you have administrative privileges for the installation process. If you are unsure whether you have the proper privileges, please consult with your IT department.

   Downloaded version: Mount the **GI50mac.dmg** file if this operation has not been completed automatically. Then proceed to the Geographic Imager 5.0 mounted disk image and double-click **Geographic Imager Installer 5.0.pkg**.

   DVD version: Insert the Geographic Imager DVD into your DVD-ROM drive. Navigate to the Geographic Imager for Mac directory on the DVD, and double-click **Geographic Imager Installer 5.0.pkg**.
3. Proceed through the installation screens as instructed. Note that documentation and tutorial data may also be installed at your option. After installation, these files can be found in the /Applications/Avenza/Geographic Imager directory.
4. Launch Adobe Photoshop. See the License Management section for product activation details.

Geographic Imager License File Directory

The Geographic Imager license file must be located as follows:

Windows 7/8 (32-bit and 64-bit)

C:\ProgramData\Avenza\Geographic Imager

Mac

/Applications/Avenza/Geographic Imager/Geographic Imager Plug-In

* English versions only. Location may differ in other Adobe Photoshop language versions.

Geographic Imager Help and Tutorial Files

Help and tutorial files are installed in the following locations:

Windows 7/8 (32-bit and 64-bit)

Help: C:\Users\Public\Documents\Avenza\Geographic Imager\Help and Tutorial Data\
Tutorial files: C:\Users\Public\Documents\Avenza\Geographic Imager\Help and Tutorial Data\Tutorial Data\
Sample Scripts: C:\Users\Public\Documents\Avenza\Geographic Imager\Help and Tutorial Data\Tutorial Data\Sample Scripts

Mac

Help: /Applications/Avenza/Geographic Imager/Geographic Imager Plug-in/Help and Tutorial Data
Tutorial files: /Applications/Avenza/Geographic Imager/Geographic Imager Plug-in/Help and Tutorial Data/Tutorial Data
Sample Scripts: /Applications/Avenza/Geographic Imager/Geographic Imager Plug-in/Help and Tutorial Data/Tutorial Data/Sample Scripts

Adobe Photoshop Plug-Ins Directory

The Geographic Imager plug-in is installed in the following directory:

Windows 7/8:

English: C:\Program Files\Adobe\Adobe Photoshop [CS version]\Plug-Ins
Dutch: C:\Program Files\Adobe\Adobe Photoshop [CS version]\Insteekmodules
French: C:\Program Files\Adobe\Adobe Photoshop [CS version]\Modules externes
German: C:\Programme\Adobe\Adobe Photoshop [CS version]\Zusatzmodule
Italian: C:\Programmi\Adobe\Adobe Photoshop [CS version]\Plug-In

Mac

/Applications/Adobe Photoshop [CS version]/Plug-Ins

Related topics

Uninstalling Geographic Imager

3.4 License Management

Both single-user fixed licenses (Basic and Full) and floating licenses of Geographic Imager are available.

Fixed licenses require activation in order to run. Once activated, they are node-locked or fixed to that particular computer based on a unique Machine ID number. Before completing the activation process, be certain that Geographic Imager is installed on the intended computer of use.

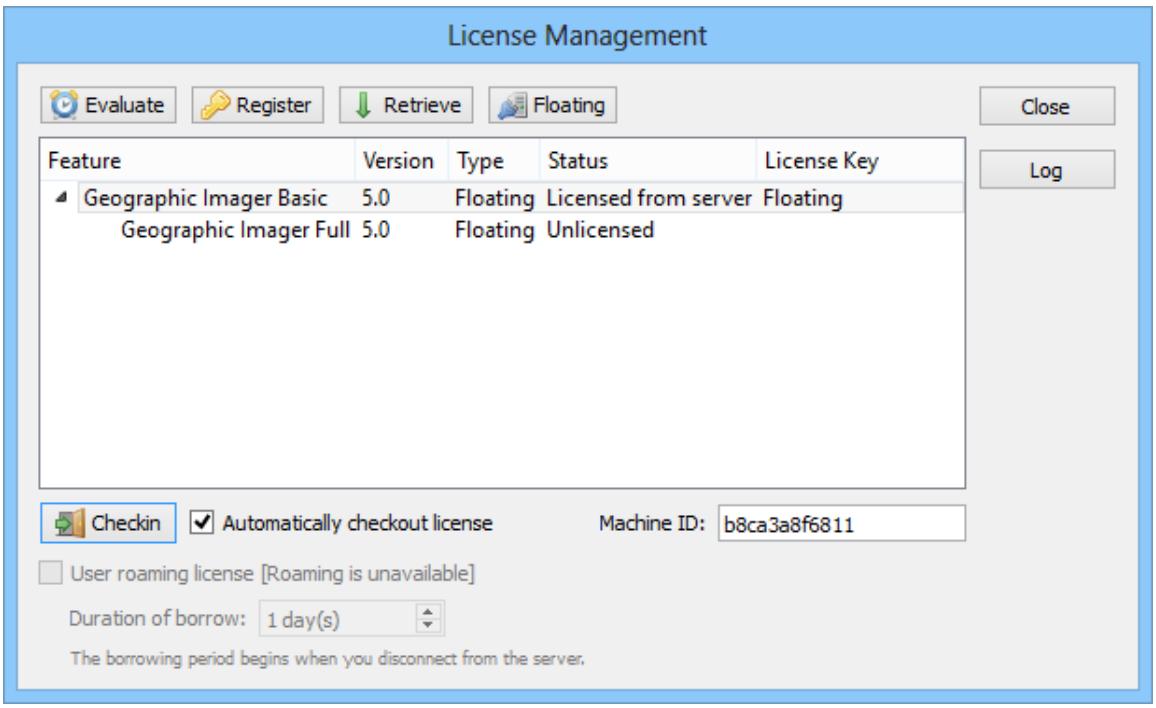
Floating licenses are designed to allow an organization to deploy a specific number of licenses that can be used and shared on any number of computers over a network.

> **IMPORTANT**: Laptop users with a docking station must activate Geographic Imager in the undocked state. All users with wireless and fixed NIC's should disable the wireless NIC temporarily before activating Geographic Imager and then activate using a wired internet connection. Other devices such as mobile phones, GPS devices and microphones should be disconnected as well.

After successfully installing Geographic Imager, launch Adobe Photoshop. The Geographic Imager welcome screen provides four licensing options: Evaluate, Register, Retrieve and Floating.

MAPublisher Welcome dialog box

Alternatively, open the License Management dialog box from the Geographic Imager panel options menu.



MAPublisher License Management dialog box

Related topics

Activate an Evaluation of Geographic Imager

Register a Purchased Copy of Geographic Imager

Retrieve a Geographic Imager License

Basic License

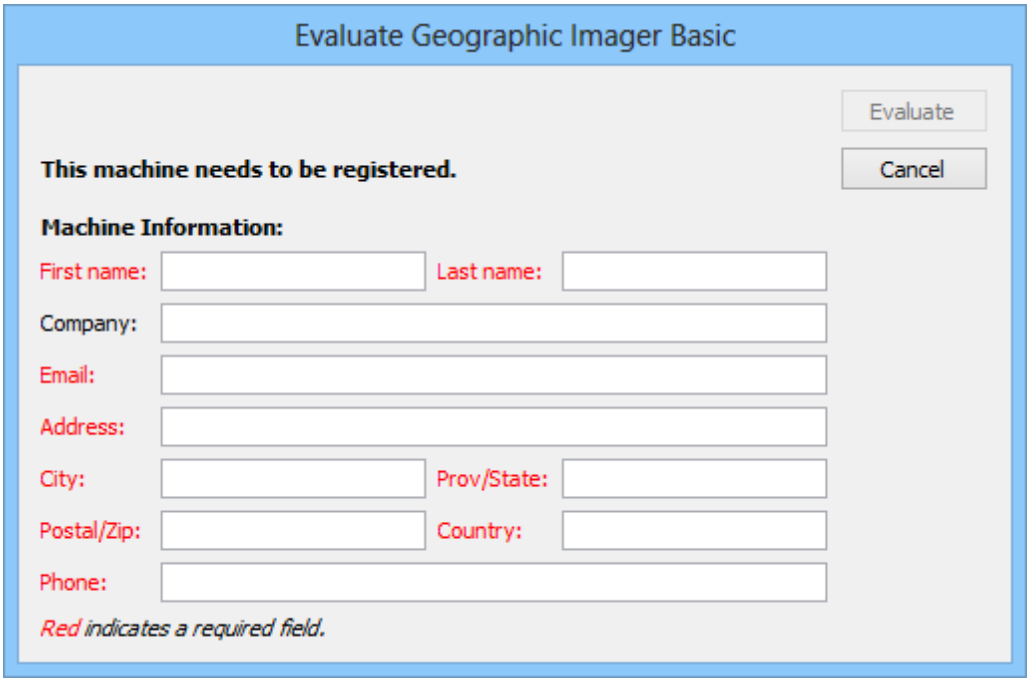
Floating License

License Troubleshooting

3.4.1 Fixed License

Activate an Evaluation of Geographic Imager

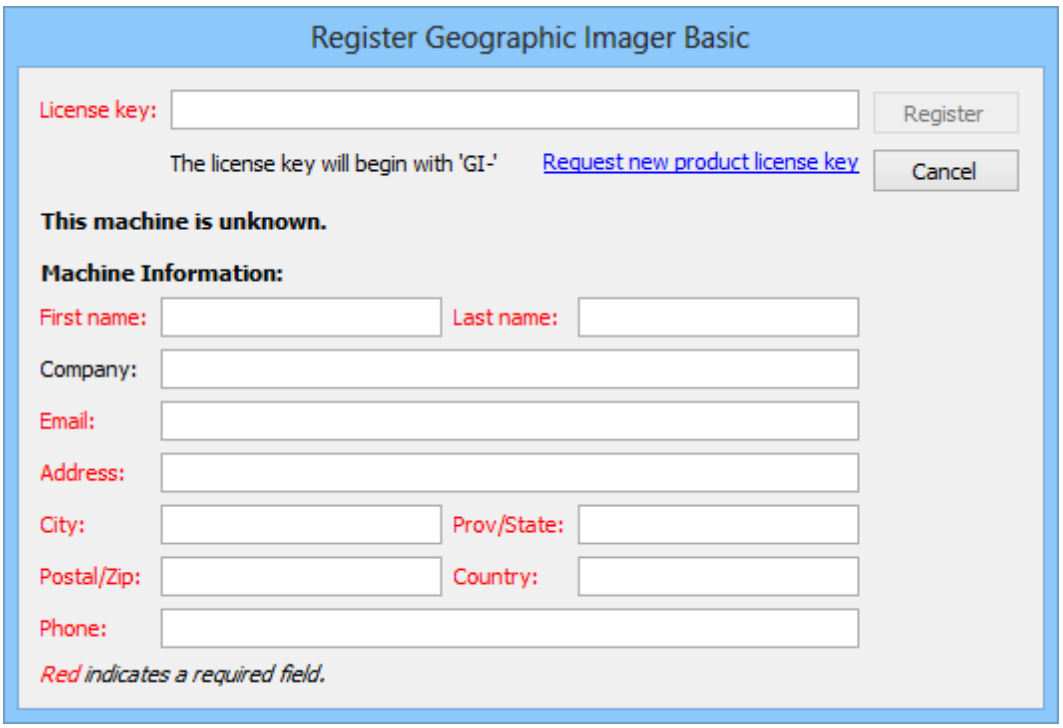
To activate an evaluation version of Geographic Imager, click the **Evaluate** button in either the License Management dialog box or Welcome Screen. Complete the form and click Evaluate.



A Geographic Imager evaluation is fully functional. There are no limitations except that an evaluation license is valid for 14 days from the day of activation.

Register a Purchased Copy of Geographic Imager

To register a purchased copy of Geographic Imager, click the **Register** button in either the License Management dialog box or Welcome Screen. Enter the license key that was provided when the product was purchased. Complete the form and click Register.



The license key for Geographic Imager 5.x starts with "GI-" (e.g. GI-9168B5E2DB7D3841).

Retrieve a Geographic Imager License

To retrieve an activated Geographic Imager license, click the **Retrieve** button in either the License Management dialog box or Welcome Screen. Confirm that you want to retrieve available licenses from the Avenza Systems licensing server.

3.4.2 Basic License

The Geographic Imager Basic license is suitable for occasional users who need to import geospatial images in Adobe Photoshop for editing. Quickly import your imagery or scanned unreferenced maps into Adobe Photoshop and reference them with the easy-to-use Georeference tool that includes coordinate system detection. Enhance images using powerful Adobe Photoshop tools and export to standard industry formats such as GeoTIFF or publish online using PDF Maps App format. The Basic license is is also suitable for QA/QC who review images and need to save to specific image formats to maintain georeference. Below is a table that compares the Basic and Full licenses of Geographic Imager.

The Geographic Imager Basic license is available for Photoshop CS5, CS6 and Creative Cloud (CC) and does not include maintenance. The table below reflects features available in Geographic Imager 5.0. An upgrade to a Geographic Imager Full license is available at any time. See pricing and availability for more information about obtaining a license. Contact sales@avenza.com for further inquiries.

Feature	Basic	Full
Open Geospatial Image Formats	✔*	✔
Web Map Service (WMS)	✔	✔
Advanced Import		
• Reference File	✔	✔
• Source Coordinate System	✔	✔
• Channel Management	✔	✔
• DEM Schema	✔	✔
• Image Extents - Crop/Resample	✔	✔
• Mosaic All Files	✖	✔
Georeference	✔**	✔
Transform	✖	✔
Mosaic	✖	✔
Tile	✖	✔

Feature	Basic	Full
GeoCrop	✗	✓
Terrain Shader	✗	✓
Channel Management	✗	✓
Export to PDF Maps	✓	✓
Upload to PDF Maps Store	✓	✓
Panel Options Menu		
• Specify Reference File	✓	✓
• Export Reference File	✓	✓
• Specify DEM Schema	✓	✓
• Quick Save to Format	✓***	✓
• Specify Coordinate System	✓	✓
• Export Coordinate System	✓	✓
Save to GIS Image Format		
• BigTIFF	✓	✓
• GeoTIFF	✓	✓
• Adobe Photoshop native formats	✓	✓
• Geospatial PDF	✓	✓
• MrSID	✗	✓
• NITF	✗	✓
• IMG	✗	✓
• DEM	✗	✓
• ECW (Maximum export size of 500 MB)	✗	✓
• Other Geographic Imager provided formats	✗	✓

* Up to 1 GB file size on Geographic Imager provided formats. Native Adobe Photoshop formats (e.g. TIFF) are not limited.

** Rectify functionality is not available with a Basic license because it requires Transform.

*** Only several formats available for Quick Save to Format: BigTIFF, DEM TIFF, GeoTIFF, and Geospatial PDF.

Basic License can import images up to 1 gigapixel.

3.4.3 Floating License

System Requirements

Prior to installing your Geographic Imager Floating License for Windows, Mac or Linux servers, ensure that you have sufficient system resources as outlined below:

Windows Server computer

- Windows 2000 with Service Pack 3, Windows XP, Windows Vista, Windows 7, Windows 8
- Intel Pentium 3, 4 processor or better
- 1GB of RAM
- 300 MB of available hard-disk space
- Valid TCP/IP network connection from license server to client computers

Mac Server computer

- Mac OS X 10.4 or higher
- 1GB of RAM
- 300 MB of available hard-disk space
- Valid TCP/IP network connection from license server to client computers

On the client computers

- Geographic Imager 4.0 or higher installed on the appropriate version of Adobe Photoshop

Preparing for the License Server Installation

The Avenza_FloatingLicense_RLMv9.zip installation package contains the following executables:

Package file	Reference file format extension
avenza.exe	The Geographic Imager specific portion (service) of RLM
rlm.exe	The RLM license server
rlmutil.exe	A tool to get all the required information for the floating license

Extract Avenza_FloatingLicense_RLMv9.zip to a convenient location on your hard drive. This will be the folder from which the program will run.

Obtaining a License File for Avenza Products

To obtain a floating license file (GeographicImager.lic), send the following information to activation@avenza.com:

- Machine ID of your server machine
- Name of your server machine
- IP address of your server machine

Important Note: A new license file for the server machine must be obtained from Avenza for all new purchases of MAPublisher, MAPublisher LabelPro, MAPubilsher FME Auto, or Geographic Imager.

Collecting required information (Windows)

1. Open the command prompt window (Start > Run, then type CMD).
2. Navigate to the directory where the rlmutil and other binaries are located.
3. To obtain the Machine ID, type rlmutil rlmhostid ether and press the Enter key.
4. To obtain the server name, type rlmutil rlmhostid host and press the Enter key.

5. To obtain the IP address, type rlmutil rlmhostid internet and press the Enter key.

Collecting required information (Mac or Linux)

1. Open a Terminal window (Application > Utility, then find Terminal).
2. Navigate to the directory where the rlmutil and other binaries are located.
3. To obtain the Machine ID, type ./rlmutil rlmhostid ether, and press the Enter key.
4. To obtain the server name, type ./rlmutil rlmhostid host, and press the Enter key.
5. To obtain the IP address, type ./rlmutil rlmhostid internet, and press the Enter key.

Related topics

Installing the License Server on Windows

Installing the License Server on Mac/Linux

Floating License Management on Client Machine

Managing the License Server

Frequently Asked Questions

3.4.3.1 Installing the License Server on Windows

After receiving the product license file(s) from Avenza Activation, extract the license file and place it in the same folder as the RLM binary files. Installing and configuring RLM will require access to the command prompt. If you have multiple license files for multiple products, place all of the license files in the same folder where the RLM binaries are stored.

Running RLM by clicking the executable

1. Double-click rlm to start the license server.
2. If a security warning message appears, click run to go to the next step.

3. As soon as you click the run button, a new command prompt window will appear.

Using Command Prompt

1. Extract Avenza_FloatingLicense_RLMv9.zip to a convenient location on your hard drive. This will be the folder from which the program will run.
2. Open the Command Prompt window (Start > Run, then type CMD).
3. Navigate to the directory where all the binaries and the license file are stored.
4. Type rlm.

Make sure that avenza, rlm, and all of the license files are placed in the same directory.

Ensure that the license file has the .lic extension (e.g. GeographicImager.lic).

Installing RLM as a Service

Installing RLM as a service can be performed in a command window. RLM will remain running until it is explicitly deleted as a service. Installing RLM as a service does not start RLM; RLM running as a service must be started from the "Services window (Windows Services control panel)".

To install RLM as a service, run it in the command line with specific arguments below:

```
rlm -install_service -dlog (path to the log file) [-service_name
sname]
```

- (path to the log file) must be entered (e.g. c:\RLM_MAPublisher\RLM_Log.log)
- [-service_name sname] is an optional argument (e.g. -service_name RLMMPublisher).
- If the service name is not specified, the service name will be "rlm".

An example of the full line argument is:

```
C:\RLM_MAPublisher>rlm -install_service -dlog c:\RLM_MAPublisher\RLM_log.log
```

This will install service with a service name "rlm" and create a log file in the directory: "c:\RLM_MAPublisher\RLM_Log.log" and the log file name is "RLM_Log.log".

Starting the RLM Service (Windows)

After pressing the enter key at the end of the install command, nothing visible will be displayed in the command prompt window.

To start The RLM service:

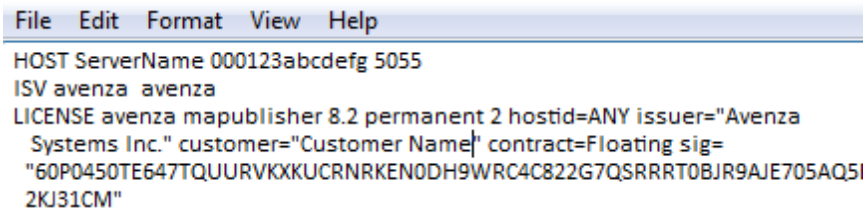
1. Go to Start > Control Panel > Administrative Tools > Services to open the Services dialog box.
2. Find the service named rlm from the list. (If a service name was specified in the command line, find the specified service name from the list. Double-click the service name to open the Service Property dialog box.)
3. If you want RLM to start whenever Windows starts, choose Automatic from the Startup type drop-down.
4. To start RLM, click the **Start** button.

Once RLM is started as a service, RLM server will not have to be run from the command prompt again.

Troubleshooting RLM Server Setup

When setting up RLM, its behaviour may be observed from the log file if RLM is running. The following is a brief list of troubleshooting tips regarding error or warning messages that may appear in the server log.

Issue	Possible Solution
Warning: No license file for this host (Server name); The host name in the license file(s) may be incorrect.	A possible cause of this issue is that the license file does not have the appropriate extension (.lic). Please ensure that the license file has the correct extension (.lic) at the end of the file name.

Issue	Possible Solution
RLM Version: What is the appropriate version of RLM for Geographic Imager 5.x?	The appropriate version of RLM for Geographic Imager 5.x is RLM version 9.x. The version number can be indicated in one of the server log lines, e.g. "01/06 12:17 (rlm) RLM License Server Version 9.3BL2"
Error: (rlm) Port 5053 in use, waiting...	This log line appears when port 5053 is used by other application. RLM version 9.x uses port 5053 (TCP/IP) by default. In order to solve this problem, a port number can be specified in the license file. Enter the port number at the end of the HOST line in the license file. As this port number is not included in the encryption code, any encryption process from Avenza Activation Department will not be required. However, please ensure that the license file has the file extension .lic after saving the file. The example below shows that the port number 5055 is specified.  File Edit Format View Help HOST ServerName 000123abcdefg 5055 ISV avenza avenza LICENSE avenza mapublisher 8.2 permanent 2 hostid=ANY issuer="Avenza Systems Inc." customer="Customer Name" contract=Floating sig= "60P0450TE647TQUURVKXKUCRNRKEN0DH9WRC4C822G7QSRRRT0BJR9AJE705AQ5I 2KJ31CM"
Error: (rlm) Cannot bind Web Server port 5054, existing...	A web browser is required to access the RLM administrator page (shown on page 14 "Managing the license server"). This log line appears when port 5054 is used by other application. RLM version 9.x uses port 5054 for the web server port by default. In order to solve this problem, a port number can be specified with a command prompt line when running RLM (as a service). The argument word to be used to specify the web port number is -ws <port number>; the examples below show the web server port number specified as 5555. When running RLM

Issue	Possible Solution

	`rlm -ws 5555`
	
	When running RLM as a service
	
	`rlm -ws 5555 -install_service -dlog (path to the log file) [-service_name sname]`

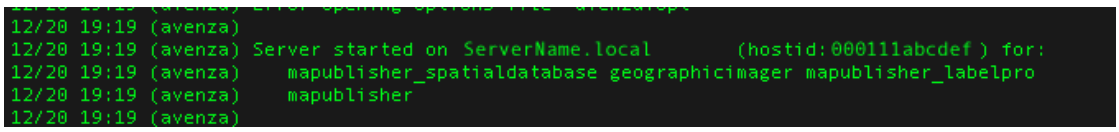
3.4.3.2 Installing the License Server on Mac/Linux

After receiving the product license file(s) from Avenza Activation, extract the license file and place it in the same folder as the RLM binary files. Installing and configuring RLM will require access to the command prompt. If you have multiple license files for multiple products, place all of the license files in the same folder where the RLM binaries are stored.

After receiving the license file(s) from Avenza Activation department, extract the license file and place it in the same folder as the other binary files. Setting up RLM will require access the terminal window.

Using Terminal

1. Extract Avenza_FloatingLicense_RLMv9.zip to a convenient location on your hard drive. This will be the folder from which the program will run.
2. Open the Terminal Window (go to Applications / Utilities, then select Terminal).
3. Navigate to the directory where all the binaries and the license file are stored.
4. Type ./rlm



For example, this line indicates that your server is running properly for Geographic Imager and other Avenza products. Depending on how many product licenses you

have, this line may be different.

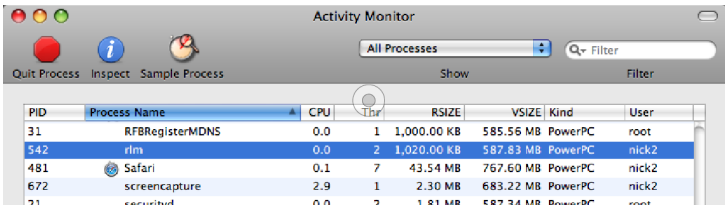
Make sure that avenza, rlm, and all of the license files are placed in the same directory.

Ensure that the license file has the .lic extension (e.g. GeographicImager.lic).

Troubleshooting RLM Server Setup

When setting up RLM, its behaviour may be observed from the log file if RLM is running. The following is a brief list of troubleshooting tips regarding error or warning messages that may appear in the server log.

Issue	Possible Solution
Warning: No license file for this host (Server name); The host name in the license file(s) may be incorrect.	A possible cause of this issue is that the license file does not have the appropriate extension (.lic). Please ensure that the license file has the correct extension (.lic) at the end of the file name.
RLM Version: What is the appropriate version of RLM for Geographic Imager 5.x?	The appropriate version of RLM for Geographic Imager 5.x is RLM version 9.x. The version number can be indicated in one of the server log lines, e.g. "01/06 12:17 (rlm) RLM License Server Version 9.3BL2"
Error: (rlm) Port 5053 in use, waiting...	This log line appears when port 5053 is used by other application. RLM version 9.x uses port 5053 (TCP/IP) by default. In order to solve this problem, a port number can be specified in the license file. Enter the port number at the end of the HOST line in the license file. As this port number is not included in the encryption code, any encryption process from Avenza Activation Department will not be required. However, please ensure that the license file has the file extension .lic after saving the file. The example below shows that the port number 5055 is specified.

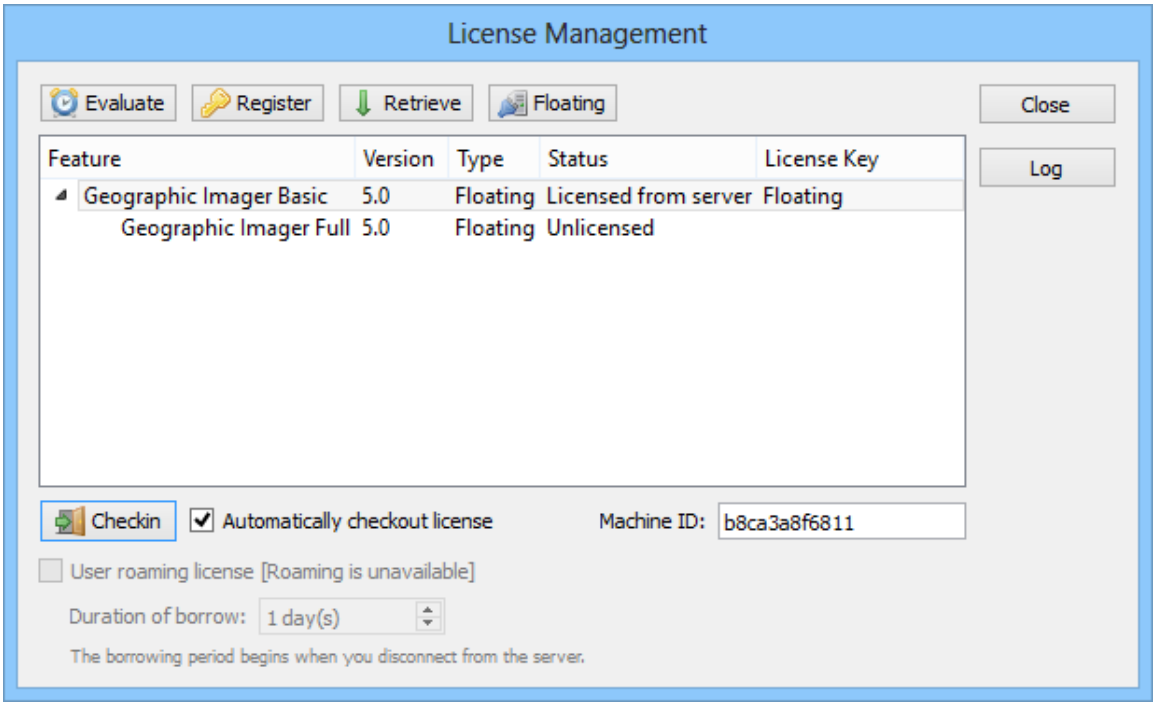
Issue	Possible Solution
	 Another cause of this issue is that RLM is already running. Check whether or not the RLM is running in the Activity Monitor (/Applications/Utility/Activity Monitor). When RLM is running, rlm and avenza will be listed. 
Error: (rlm) Cannot bind Web Server port 5054, existing...	A web browser is required to access the RLM administrator page. This log line appears when port 5054 is used by other application. RLM version 9.x uses port 5054 for the web server port by default. In order to solve this problem, a port number can be specified with a command prompt line when running RLM (as a service). The argument word to be used to specify the web port number is -ws <port number>; the examples below show the web server port number specified as 5555. When running RLM `./rlm -ws 5555`
Error: (avenza) problem with executable - unable to start . . .	This error message appears when the binary file "avenza" does not have appropriate permission to execute when running "RLM". In order to solve this, the file must be assigned an appropriate privilege to

Issue	Possible Solution
(rlm) avenza executable path: avenza	the avenza binary file as suggested below. When running RLM `chmod a+x avenza` This line above can be interpreted as add a permission of executable to all the users on the "avenza" binary file. Run rlm (./rlm) after the privileges of the avenza binary file is modified.
Error: (avenza) cannot set server lock - exiting (rlm) avenza - lockfile problems	This error only affect Mac/Linux This error message appears when the lock file named .rlmlockavenza is interfering with RLM. The solution to this problem is to delete the lock file with a command in the Terminal window. Before the lock file is deleted, both rlm and avenza must be stopped. Otherwise, it is not going to allow to delete the lock file. This process can be stopped from the Activity monitor (/Applications/Utility/ Activity Monitor) or command line. 1. Open the Activity Monitor (/Applications/Utility/ Activity Monitor). 2. Find the name rlm, then click **Quit process**. When prompted, select **Force quit**. 3. Repeat the same step for the process name avenza. 4. Open the terminal window and navigate to the location of the.rlmlockavenza file by typing: **cd /private/var/temp/** 5. The .rlmlockavenza file is a hidden file. In order to view the file in the directory, type **ls -la**. 6. Remove the .rlmlockavenza file by typing: **rm .rlmlockavenza** 7. Navigate to the directory where all the RLM

Issue	Possible Solution
	binaries and the license file are stored. 8. Run rlm.

3.4.3.3 Floating License Management on Client Machine

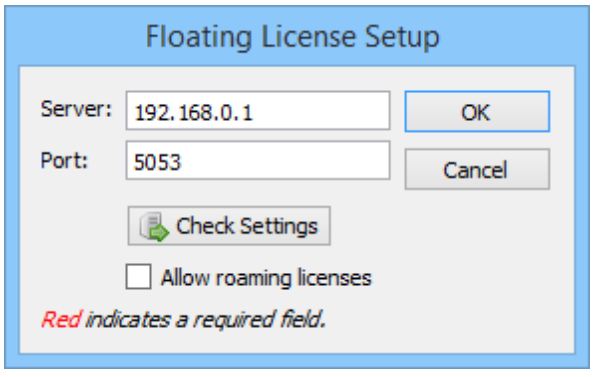
Setting up and checking out a license from a server can be performed on the client machine from the Geographic Imager Welcome Screen or License Management dialog box



MAPublisher License Management dialog box

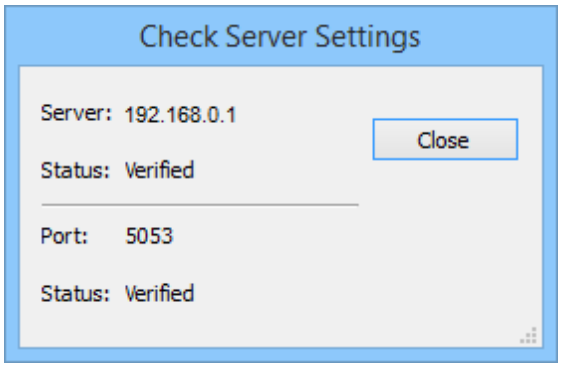
Floating license setup

1. On the Welcome dialog box or License Management dialog box, click the **Floating** button.



2. Enter the server name and port number that was specified during RLM installation.

3. Click the **Check Settings** button to verify the connection to the license server.



Checkout a license

1. Make sure the floating license server is running and setup properly.
2. On the Welcome dialog box or License Management dialog box, click the **Checkout** button. Enable the **Automatically checkout license** check box so that the floating license is checked out every time Adobe Photoshop is launched.

The license status updates to *Licensed from server* when a successful connection is made.

Checkin a license

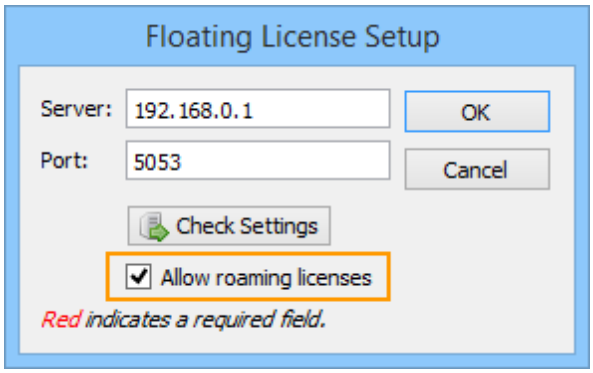
Click the **Checkin** button to return the floating license to the server.

Borrowing a Roaming License

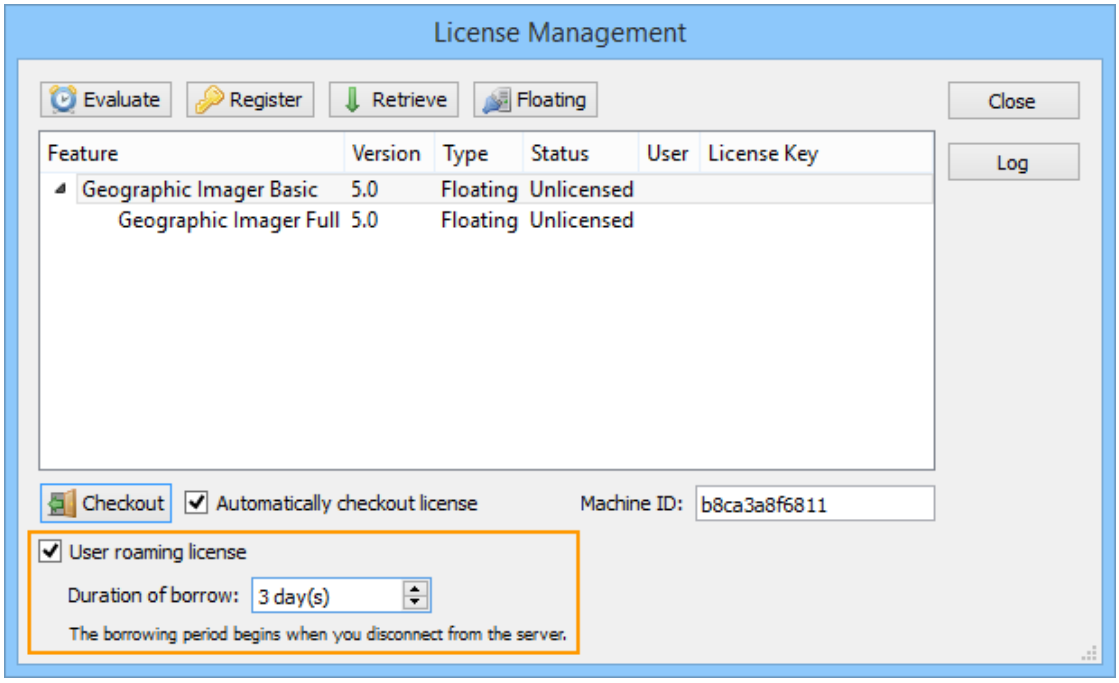
Geographic Imager 5.x allows client machines to borrow licenses from the license server. This is ideal if a computer will be disconnected from the license server for a period of time, such as for traveling, working in the field, or working from home with a laptop computer. Roaming licenses can be allowed from the Floating License Setup dialog box.

Borrowing a roaming license

1. On the Welcome dialog box or License Management dialog box, click the **Floating** button.
2. Click the **Allow roaming licenses** check box and click OK.



3. When you checkin a license, the **User roaming license** option will be enabled.



4. Click the **User roaming license** check box and adjust the duration of borrow (in days).

The borrowing period begins when you disconnect from the network.

If a floating license has already been checked out (i.e. Geographic Imager is being used), the checked out license must be returned (checked in) prior to starting to roam with a floating license.

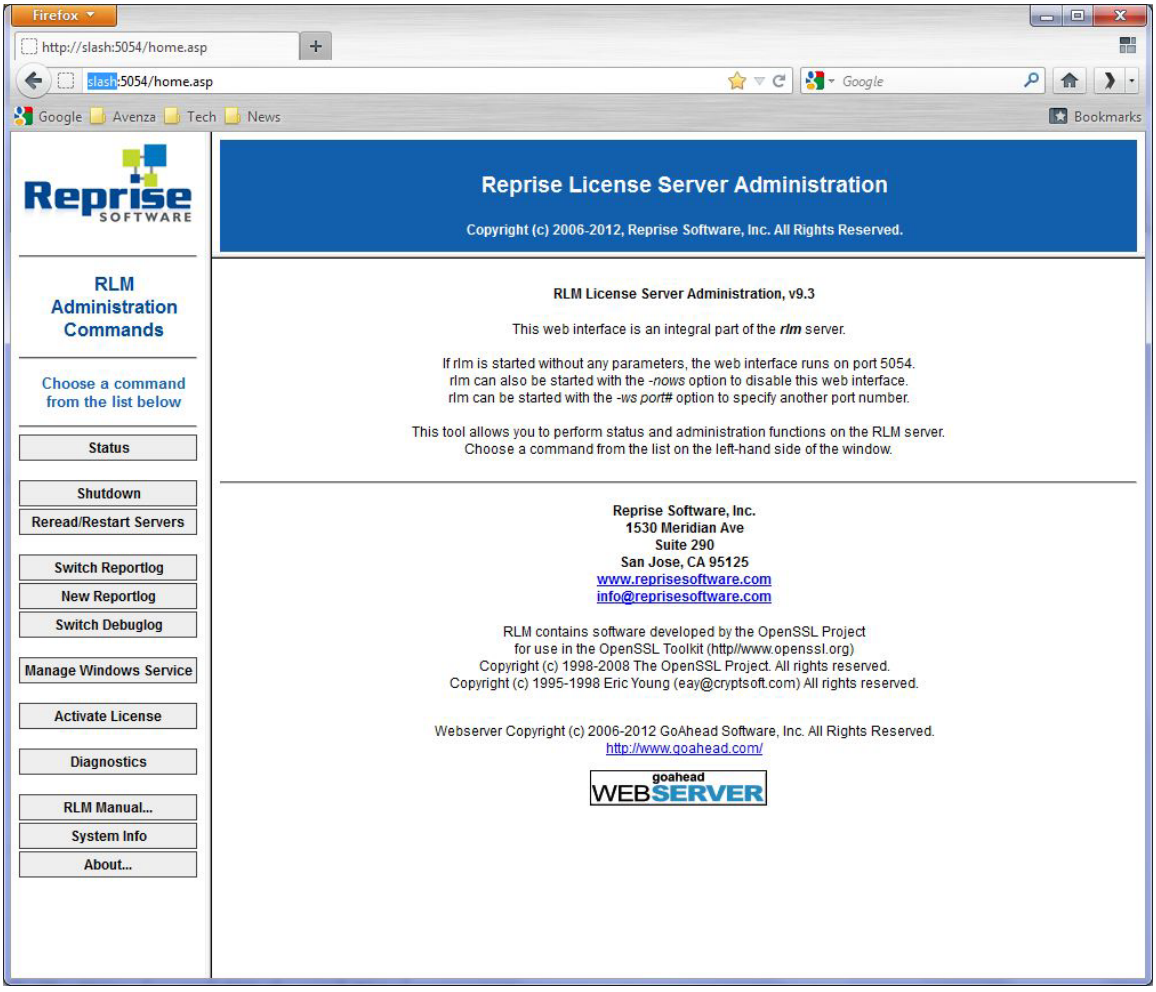
The roaming license can be returned to the server before the time

expires. Connect to the network, click the Return Early button and the roaming license will be returned to the server.

3.4.3.4 Managing the License Server

To manage the rlm server itself, use the Reprise License Server Administration site. In a web browser, enter **http://localhost:5054** (localhost is the server name specified during installation and 5054 is the default port).

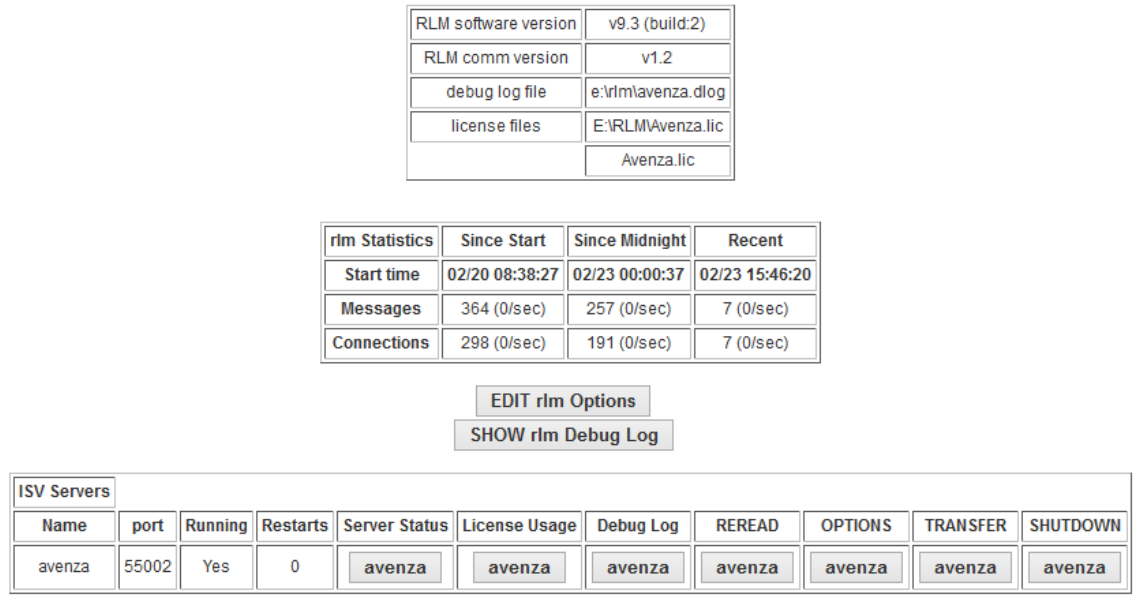
For more detailed information on RLM administration, refer to the RLM End-User Manual at http://www.reprisesoftware.com/RLM_Enduser.html. You can also access the RLM Manual from the Reprise License Server Administration page.



Checking the Server Status

1. Open the Reprise License Server Administration web page.

2. Click the **Status** button on the left frame.



RLM software version	v9.3 (build:2)
RLM comm version	v1.2
debug log file	e:\rlm\avenza.dlog
license files	E:\RLM\Avenza.lic
	Avenza.lic

rlm Statistics	Since Start	Since Midnight	Recent
Start time	02/20 08:38:27	02/23 00:00:37	02/23 15:46:20
Messages	364 (0/sec)	257 (0/sec)	7 (0/sec)
Connections	298 (0/sec)	191 (0/sec)	7 (0/sec)

EDIT rlm Options

SHOW rlm Debug Log

ISV Servers

Name	port	Running	Restarts	Server Status	License Usage	Debug Log	REREAD	OPTIONS	TRANSFER	SHUTDOWN
avenza	55002	Yes	0	avenza	avenza	avenza	avenza	avenza	avenza	avenza

If any other applications use the RLM Floating License Server system, you will also see the other applications in the status tables.

3. In order to check the server status for Geographic Imager, click the **avenza** button in the Server Status field.

On the following page, product information including the name and its version, the number of the floating license you purchased for the product, and any other information related to your floating licenses using the RLM floating license management system will be displayed.

License pool status

Product	Pool	Ver	Expires	count	soft lim	inuse	res	roam	hostid	timeout	share	transactions	Show License Usage
mapublisher	1	9.9	permanent	20	20	3	0	0	ANY	3600	None	25	usage...
mapublisher_labelpro	2	2.0	permanent	20	20	1	0	0	ANY	3600	None	3	usage...
mapublisher_fme_auto	3	1.0	permanent	20	20	0	0	0	ANY	3600	None	4	usage...
geographicimager_basic	4	5.9	permanent	20	20	6	0	2	ANY	3600	None	112	usage...
geographicimager	5	5.9	permanent	20	20	3	0	2	ANY	3600	None	65	usage...
mapublisher	6	9.2	permanent	20	20	0	0	0	ANY	3600	None	0	usage...
geographicimager_basic	7	4.2	permanent	20	20	0	0	0	ANY	3600	None	0	usage...
geographicimager	8	4.2	permanent	20	20	0	0	0	ANY	3600	None	0	usage...

Stopping and Restarting the License Server

1. Open the Reprise License Server Administration web page.
2. Click the **Status** button on the left frame.
3. To stop the license server, click the **Shutdown** button on the left pane or click the **avenza** button in the SHUTDOWN field on the Server Status page.
4. To restart the license server, click the **Reread/Restart Servers** button on the left pane or click the **avenza** button in the REREAD/RESTART field on the Server Status page.

Using the Command Prompt to Manage the License Server

Below are the commonly used commands and brief descriptions to manage the RLM License Server. For further information, please refer to the RLM End User Manual at http://www.reprisesoftware.com/RLM_Enduser.html. Open another command prompt window and navigate to the directory where all the binaries are stored.

Command (Windows)	Command (Mac/Linux)	Description
rlm	**./rlm**	Start the RLM server
rlmutil rlmreread	**./rlmutil rlmreread**	Stop and restart the server

Command (Windows)	Command (Mac/Linux)	Description
avenza	**avenza**	
rlmutil rlmdown avenza	**./rlmutil rlmdown avenza**	Shut down the server. (It may take for a few minutes to shut down RLM)
rlmutil rlmstat -a	**./rlmutil rlmstat -a**	See RLM server information
rlmutil rlmstat -avail avenza	**./rlmutil rlmstat -avail avenza**	Check license availability

3.4.3.5 Frequently Asked Questions

Below is a list of the most commonly asked questions when receiving license files for Avenza RLM license servers. If you have any questions, please do not hesitate to contact Avenza Activation (activation@avenza.com) and Avenza Technical Support (support@avenza.com).

Geographic Imager stopped working since Geographic Imager was upgraded to the 5.x version on client machines. Why does this happen?

When upgrading Geographic Imager to the most recent version, please ensure that the license file on the server is upgraded as well as Geographic Imager installed on the client machines. The new license file can be requested from Avenza Activation (activation@avenza.com). After receiving the license file, simply replace the old license file with the new one.

The license file for the server was upgraded to Geographic Imager 5.x. However, it will be a while before upgrading to a newer version of Geographic Imager on the client machines. Can these client machines check out an older license of Geographic Imager from the license server with a Geographic Imager 5.x license file?

Yes, Avenza RLM floating license server is flexible for older versions of Geographic Imager. When the server machine has the newest version of Geographic Imager, the client machine with an earlier version of those products may check out a license from the server.

I have been using Geographic Imager 5.x for a while. We recently purchased both MAPublisher 9.x and MAPublisher FME Auto and received a license file for each product. Can I just place the three license files in the same folder for the RLM server binary?

Yes, you have three separate license files: one for Geograhpic Imager 5.x, one for MAPublisher 9.x, and one for MAPublisher FME Auto. If your RLM floating license server is running, stop the process, then place all three license files in one folder in the RLM parent folder , and restart RLM. Upon restart, RLM automatically detects all available license files in the RLM folder and indicates on the RLM log which products are available with the floating license system.

I purchased Geographic Imager 5.x, MAPublisher 9.x, and MAPublisher FME Auto, but only received one license file. Does the license file contain all the license information for the products I purchased?

Yes, you have received a license file with all the necessary license information for all three products. Depending on when and method of purchase, Avenza Activation will give you a single license file or separate license files for the purchased products. When running RLM server, the products included in the license file will be displayed in the RLM log file.

3.4.4 License Troubleshooting

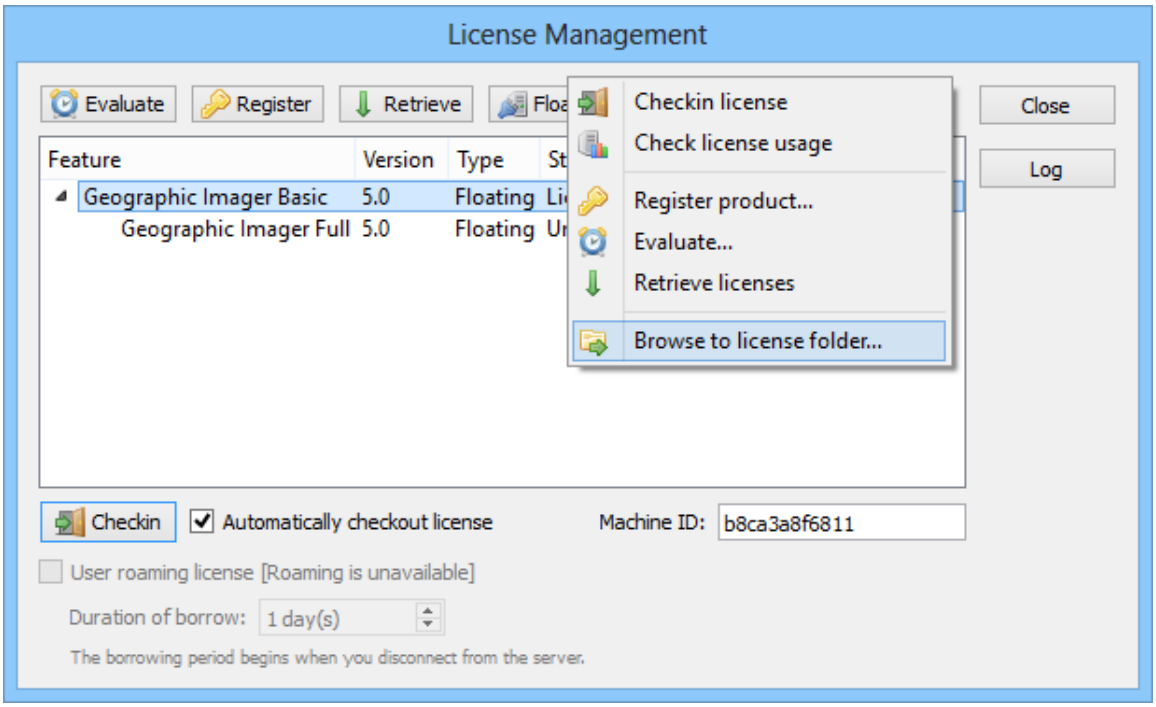
If you cannot register or retrieve an evaluation or purchased license from within Geographic Imager (e.g. firewall limitations), visit the Avenza Systems website (www.avenza.com/activation) and provide the Machine ID displayed in the License Management dialog box. A zipped license file attachment will be sent to the registered email address on record. Unzip this attachment and save the .lic file to the appropriate folder*:

Windows 7/8: C:\ProgramData\Avenza\Geographic Imager
Mac OS X: /Applications/Avenza/Geographic Imager/Geographic Imager Plug-In
* English versions only. Location may differ in other Adobe Photoshop language versions.

After placing the license file in the appropriate directory, restart Adobe Photoshop so that Geographic Imager will recognize any new licenses.

To quickly access the Geographic Imager license file folder, right-click a row in the

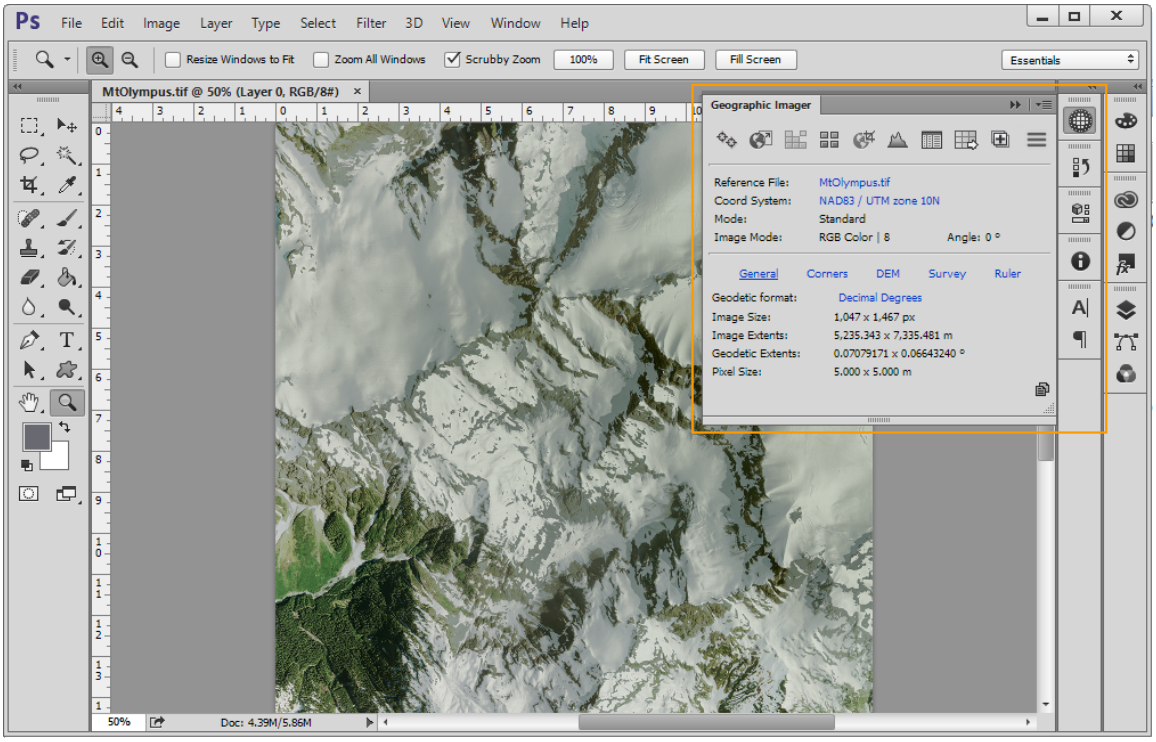
License Management dialog box and click Browse to license folder. Copy or move Geographic Imager license files directly into this location.



Geographic Imager License Management dialog box (right-click to access context menu)

3.5 The User Interface

The Geographic Imager panel, which provides access to all Geographic Imager tools, appears automatically when Adobe Photoshop is first opened (unless it was previously closed).



Adobe Photoshop with the Geographic Imager panel docked.

Geographic Imager features and tools can be accessed from the File Menu and from the Geographic Imager panel.

The File Menu

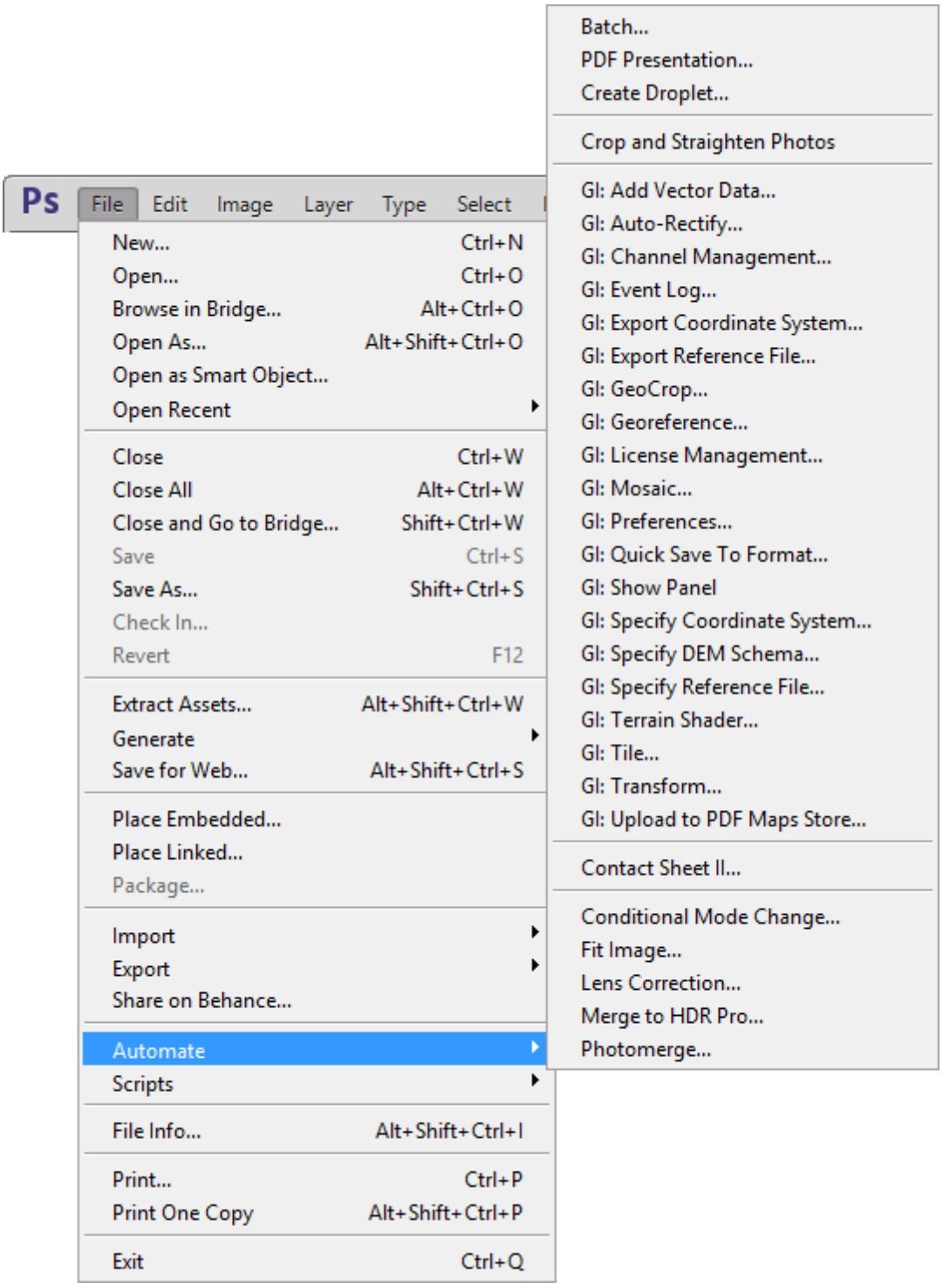
The File menu provides access to all Geographic Imager tools including features such as Upload to PDF Maps and Event Log that are not accessible from the Geographic Imager panel.

The Geographic Imager Panel

The Geographic Imager panel provides access to all the main Geographic Imager tools including Georeference, Transform, Mosaic, Tile, GeoCrop, Terrain Shader, Channel Management, Export Web Tiles, and Advanced Import.

3.5.1 The File Menu

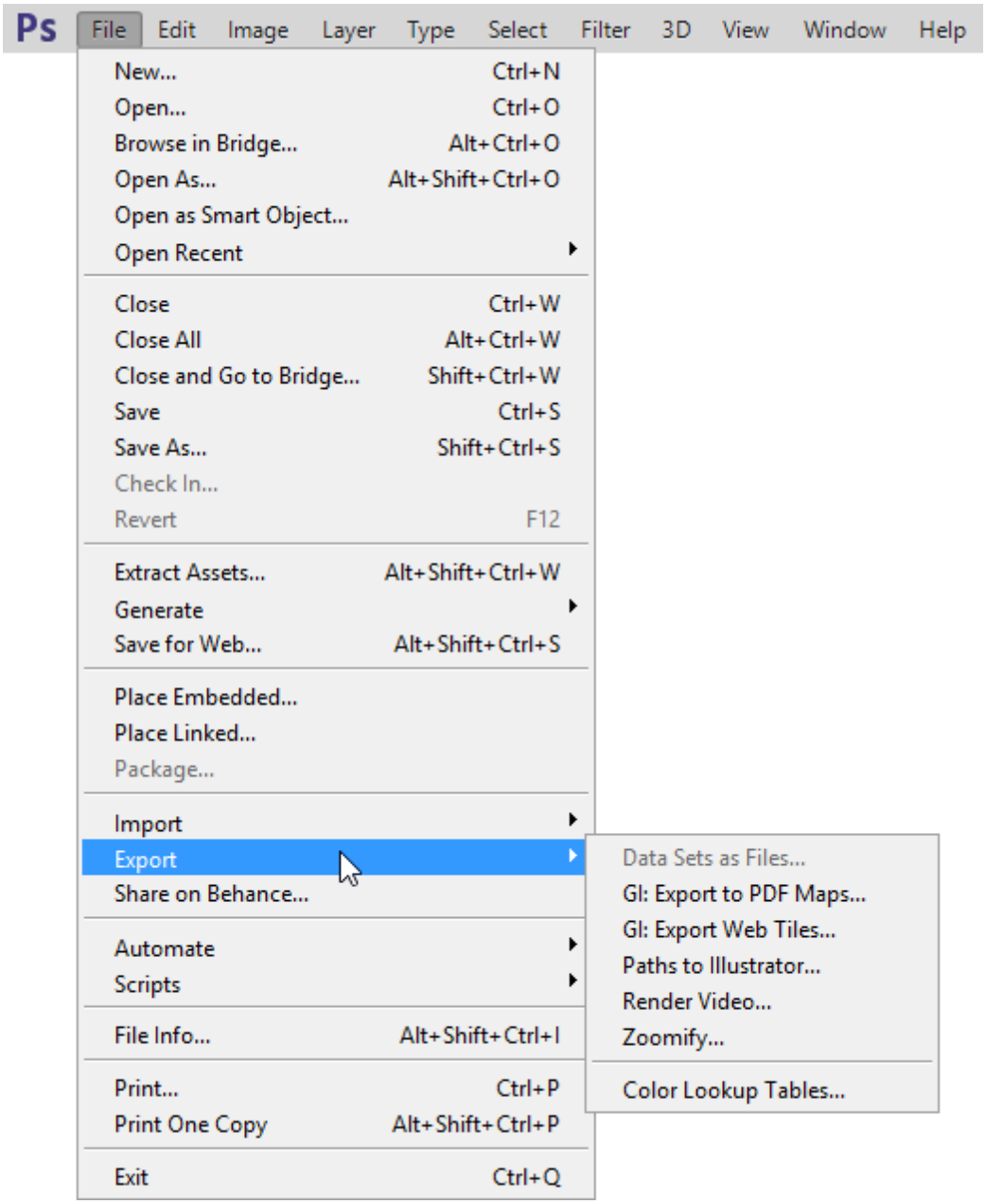
To access Geographic Imager tools and features through the File menu, go to **File > Automate**. Menu items listed with a GI: prefix are Geographic Imager tools and features.



When recording actions, it is required to use the File > Automate menu.

To access Geographic Imager export tools and features, go to **File > Export**. Menu

items listed with a GI: prefix are Geographic Imager tools and features.

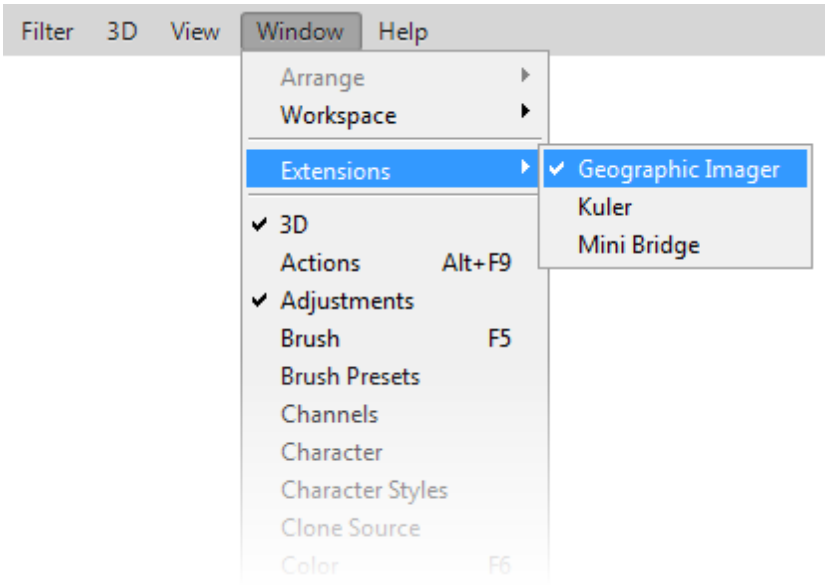


See more about Export to PDF Maps.

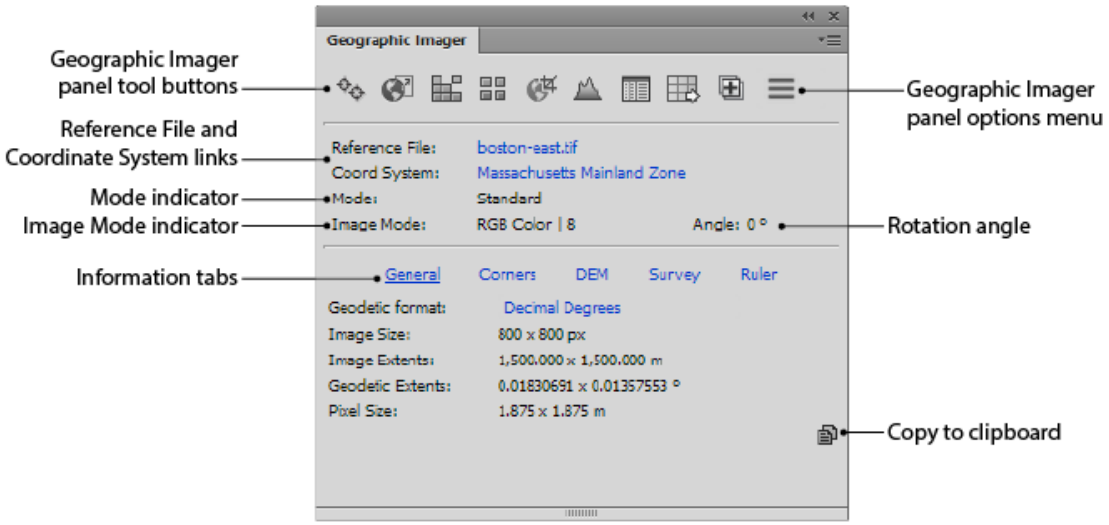
See more about Export Web Tiles.

3.5.2 The Geographic Imager Panel

To show or hide the Geographic Imager panel, go to Window > Extensions > Geographic Imager.

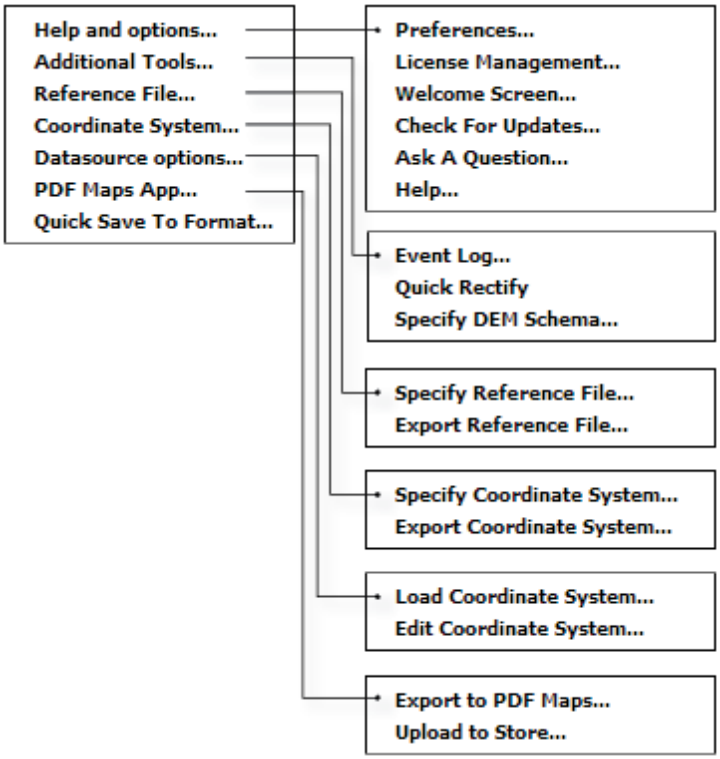


The Geographic Imager panel provides access to all the main Geographic Imager tools and displays image information.

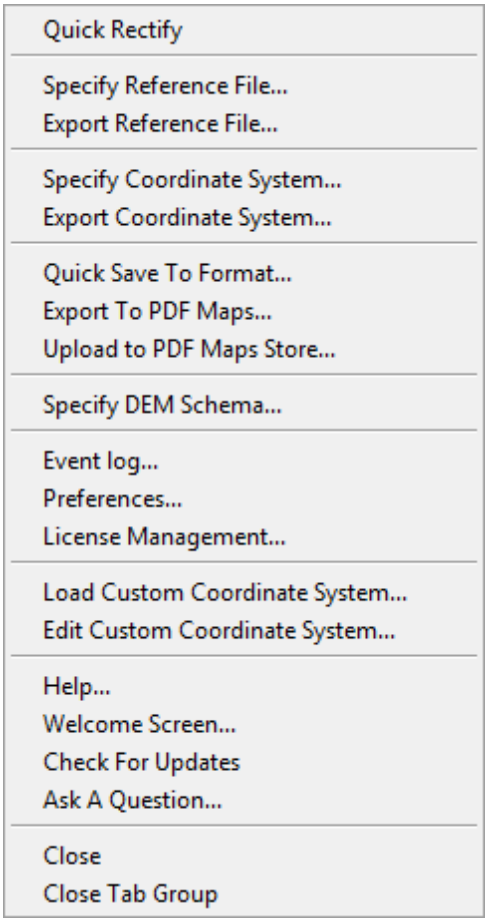


Button	Tool	Description
	**Georeference**	Reference or rectify an image using control points.
	**Transform**	Transform an image into a different coordinate system, change pixel size, and modify pixel dimensions.

	**Mosaic**	Assemble multiple images together into a larger one.
	**Tile**	Split an image into multiple smaller ones by size or number of tiles required.
	**GeoCrop**	Crop images based on location by specifying coordinates of the output image.
	**Terrain Shader**	Apply a color gradient or hill shade to digital elevation models or images.
	**Channel Management**	Adjust color mode and channel role.
	**Export Web Tiles**	Export an image as web tiles and an HTML file compatible with online map services.
	**Advanced Import**	Import multiple images of various formats and apply settings all at once.
	**Panel Options Menu**	Access additional Geographic Imager features including License Management. The Panel Options Menu is accessed different depending on Adobe Photoshop version. CC 2014 and CC 2015: The Panel Options Menu is accessed through the button on the Geographic Imager panel.



CS6: There is no Panel Options Menu button. Instead, use the standard panel options menu that is native to the panel (upper-right corner of the panel).



Reference File / Coordinate System Links

These links display the location of the geographic reference file of the image and the current coordinate system of the image as defined in the Geographic Imager coordinate system database. Click the respective link to choose a new reference file or specify a different coordinate system. Note that this doesn't transform the image and only changes the coordinate system which may cause unpredictable affects on your map. Use Transform to transform the image to a different coordinate system.

Reference File

A geographic reference file contains data that relates the image in pixels to the earth in real world coordinates. Along with other parameters, this file contains either the mathematical transformation information or an explicit list of reference points and the coordinate system (optional).

Coordinate System

Indicates the current coordinate system of the image. Click the Coordinate System information button to open the Geodetic Coordinate System Viewer which shows more detailed information about it.

Mode

The Mode indicator displays whether the image is in GCP or Standard mode. GCP mode means the image requires referencing or rectifying before some Geographic Imager tools and operations can be performed. Standard mode means the image is ready for editing with Geographic Imager tools.

Image Mode

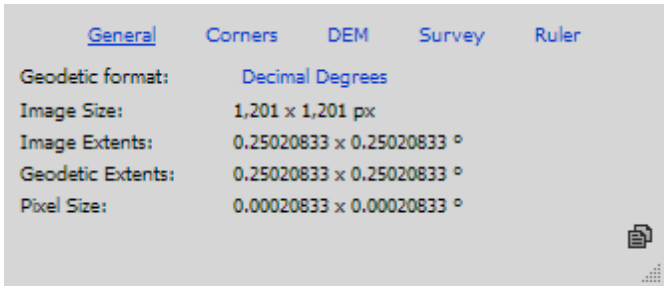
The Image Mode indicator displays information about the current image color mode and bit depth (in bits per channel). For example, RGB | 8 means the image color mode is RGB with 8-bit depth.

Rotation Angle

The Rotation indicator shows the angle of rotation of the image from north being straight up. A negative value indicates a clockwise rotation and a positive value indicates a counterclockwise rotation.

Information Tabs

General

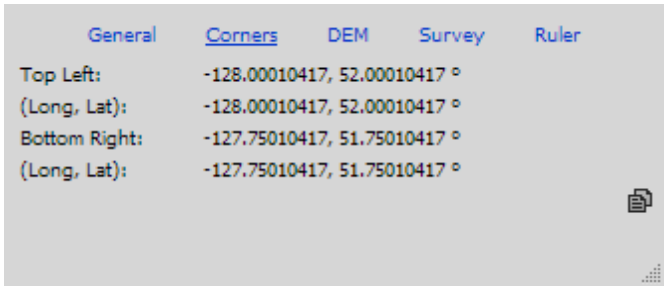


Geodetic Format: The current geodetic display format (click to change).
Image Size: The image size in pixels (x,y pixels).
Image Extents: The geographical extent of the image (x,y world units or units of coordinate system).
Geodetic Extents: The geodetic extent of the image (x,y degrees).
Pixel Size: The relative size of each pixel (x,y world units or units of coordinate system).

Copy to Clipboard button: Click to copy information values to the clipboard.

> Certain world projections may not provide proper values for areas outside of the its extents. This may cause the Geodetic Extents to display N/A.

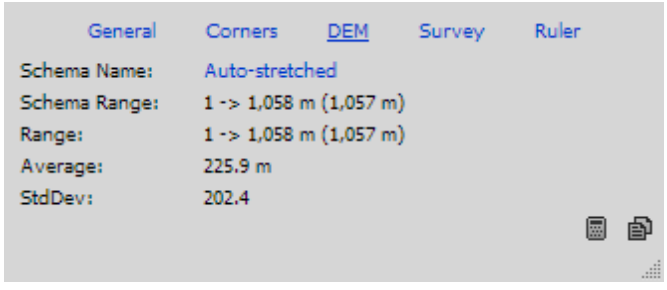
Corners



Geodetic images are displayed in degrees.
Projected images are displayed in units of coordinate system.

Top Left: The projected coordinate of the northwest corner of the image.
(Long, Lat): The geographic coordinate of the northwest corner of the image in WGS 84.
Bottom Right: The projected coordinate of the southeast corner of the image.
(Long, Lat): The geographic coordinate of the southeast corner of the image in WGS 84.
Copy to Clipboard button: Click to copy coordinate values to the clipboard.

DEM



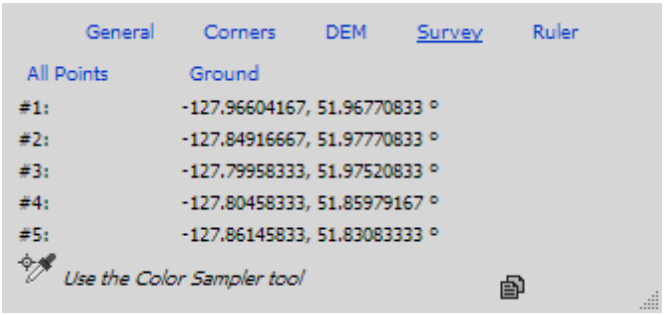
Schema Name: Schema used to map elevation data to grayscale color space.
Schema Range: Range specified in the DEM schema. The actual range value displayed in parenthesis.
Range: Range of values of the current DEM in specified units. The actual range

value displayed in parenthesis.
Average: The average elevation value of the DEM.
StdDev: The standard deviation value of the DEM.
Calculate button: Click Calculate to obtain values for the cropped DEM.
Copy to Clipboard button: Click to copy statistic values to the clipboard.

> Hide the Terrain Shader and Shaded Relief Layers before clicking the Calculate button. The Statistics calculation may be inaccurate if layers above the elevation layer are not hidden.

> Statistics are calculated based on what is viewable on the canvas.

Survey



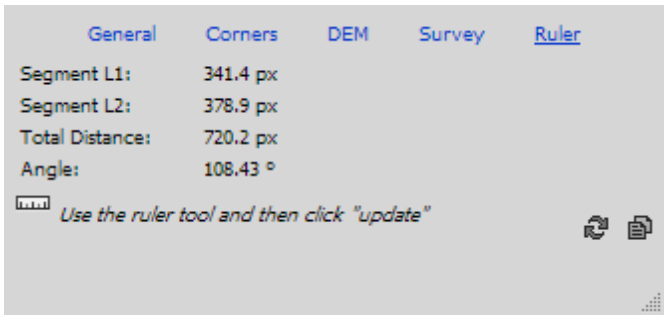
Use the Color Sampler Tool to identify up to ten points on the image.

All points: Choose to view all points or individual points (not all points can be viewed at once).
Measurement units: Choose from Ground, Geodetic, WGS84, Pixel, and DEM. The reported coordinate is the center of the pixel.
Copy to Clipboard button: Click to copy measurement values to the clipboard.

> The Color Sampler Tool can be used to choose up to ten points on the image. Drag and drop individual points with the left mouse button pressed to change their location. Use Ctrl (Win) or Command (Mac) to delete individual points or right-click for additional options.

> Up to 4 points with CS6. Up to 10 points with CC and CC2014.

Ruler



Use the Ruler Tool to identify measure up to two segments. Hold the Alt (Win) or Option (Mac) key and hover over the end point of the first segment to begin measuring the second segment. Click the **Update** button in the Ruler tab to view measurement values including total distance and angle.

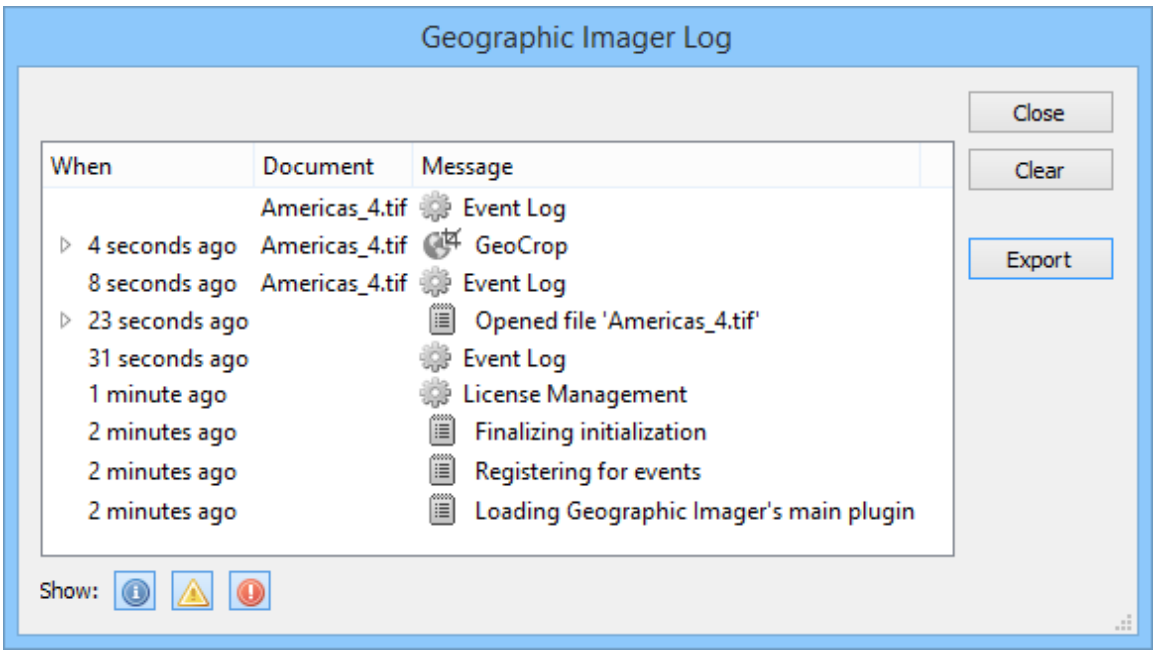
Panel Options Menu

Menu Item	Description
Preferences	Adjust Geographic Imager Preferences. See Preferences.
License Management	Opens the Geographic Imager License Management dialog box. View the Machine ID, evaluate, register, retrieve, or checkout/in floating licenses. See License Management.
Welcome Screen	Opens the Geographic Imager Welcome Screen.
Check For Updates	Check to see if there is a newer version of Geographic Imager.
Ask Avenza A Question	Opens the Avenza Support page in an Internet browser.
Load Custom Coordinate System	Load a custom coordinate system data source. See Load Custom Coordinate Systems.
Edit Custom Coordinate System	Edit a custom coordinate system data source. See Edit Custom Coordinate Systems.
Specify Reference File	Specify a reference file for the current image. See Specifying a Reference File.
Export Reference File	Export the defined coordinate system of an image

Menu Item	Description
	to a reference file. See Exporting a Reference File.
Specify Coordinate System	Specify a coordinate system for the image. Opens the Specify Coordinate System dialog box. See Specifying a Coordinate System.
Export Coordinate System	Export the coordinate system of the image to a WKT Definition File or Esri PRJ file. See Exporting a Coordinate System.
Quick Rectify	Automatically rectify a rotated image to a north/south alignment. This option is enabled when an image has a rotation. View the Geographic Imager panel rotation angle status.
Quick Save To Format (not available with Basic license)	Save a referenced image to BigTIFF, DEM TIFF, USGS DEM, Geospatial PDF, GeoTIFF, NITF, or ECW/ER Mapper. See Quick Save to Format.
Specify DEM Schema	Specify a DEM schema for the current image. Opens the Specify DEM Schema dialog box. See Opening DEMs.
Export to PDF Maps	Export a map package that is compatible with the PDF Maps app. See Export to PDF Maps.
Upload to Store	Upload a map package directly to the PDF Maps Store. See Upload to PDF Maps.
Event Log	View errors, warnings, and system messages. See Event Log.

3.5.3 Event Log

The Geographic Imager Event Log records information about which Geographic Imager tools are used, when they were used, and on which documents. To view the log, go to the Geographic Imager panel options menu and choose Event Log.



When a Geographic Imager tool is used, information such as the tool used, inputs, outputs, warnings and errors are recorded into the log. The log also displays when tools were executed and which layers were involved. Currently, these Geographic Imager tools are logged:

- Georeference
- Transform
- Mosaic
- Tile
- GeoCrop
- PDF Maps Upload and Export
- Advanced Import

The Show toggles filter information, warning and critical messages.

To export recorded log entries, click the Export button to save a text file.

To clear the entire log, click the Clear button. This is permanent and cannot be undone.

A maximum of 10,000 messages can be logged.

3.5.4 Geographic Imager Preferences

Geographic Imager Preferences are options that allow users to customize panels and editors, including those for layer ordering, font for attribute data display and panel style. Settings are available for the following categories:

- General
- Georeference
- Image Formats
- MAPublisher Integration
- Online Maps
- PDF Maps
- Panel

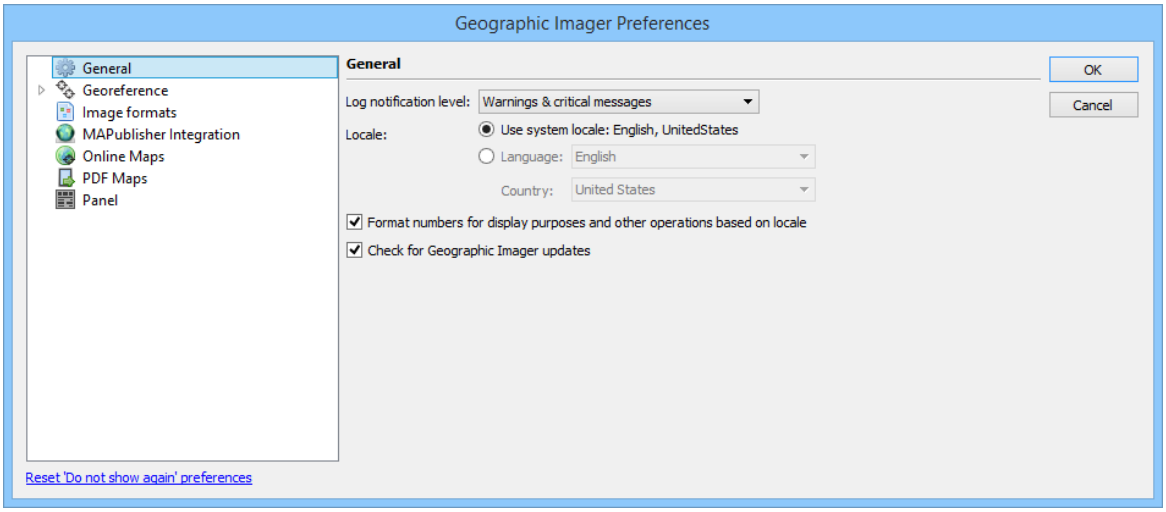
Geographic Imager Preferences are saved in an Adobe Photoshop preference file called **Adobe Photoshop [version] Prefs.psp** or **Adobe Photoshop [version] Prefs.psp** (for Creative Suite users, where X is the version). The preference file is launched each time Adobe Photoshop is started. The Adobe Photoshop preference file is located in following directory:

Windows 7/8: C:\Users\[user]\AppData\Roaming\Adobe\Adobe Photoshop [version] \Adobe Photoshop [version] Settings
Mac: /Users/[user]/Library/Preferences/Adobe Photoshop [version] Settings

Open Geographic Imager Preferences

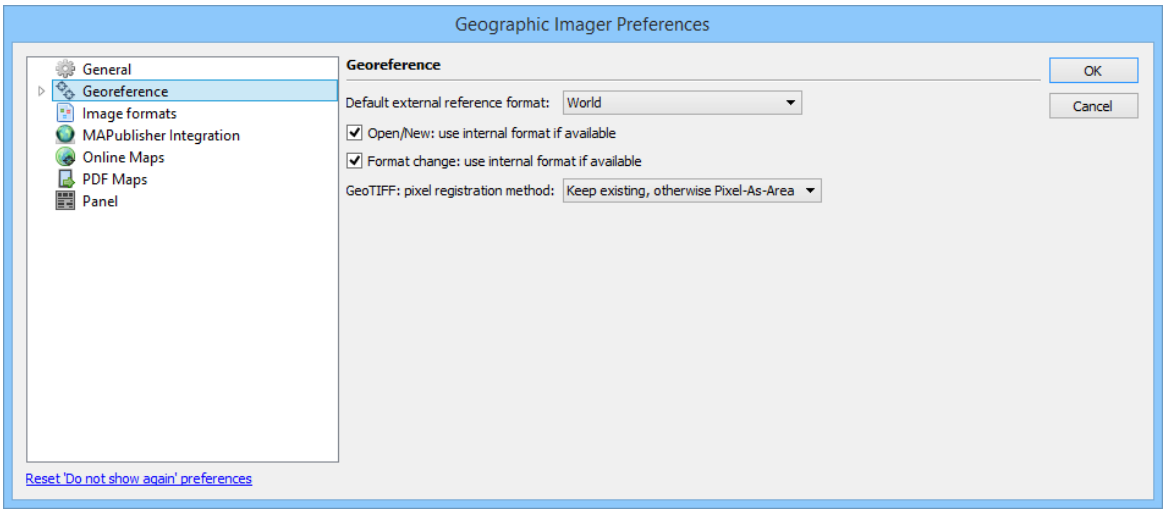
Open Geographic Imager Preferences from the Geographic Imager panel options menu.

3.5.4.1 General Preferences



Log notification level	The types of notifications that are recorded in the log
Locale	Use the system locale or a different one
Format numbers for display purposes and other operations based on locale	Adjusts numbers based on locale settings above
Check for Geographic Imager updates	Automatically checks for updates on start-up

3.5.4.2 Georeference Preferences



Default external reference format	Lists supported reference file formats (excluding GeoTIFF). When multiple reference files are found in the same directory, the Reference File Ambiguity dialog box appears.
Open/New: use internal format if available	This option overrides the chosen default external reference format when any internal reference is detected. This option is checked by default.
Format change: use internal format if available	This option overrides the chosen Default Reference Format when any internal reference is detected. This option is checked by default.
GeoTIFF: pixel registration method	When saving a GeoTIFF, keep existing pixel reference point of current image or override by choosing: Pixel-As-Area (upper left corner) or Pixel-As-Point (center of the pixel)

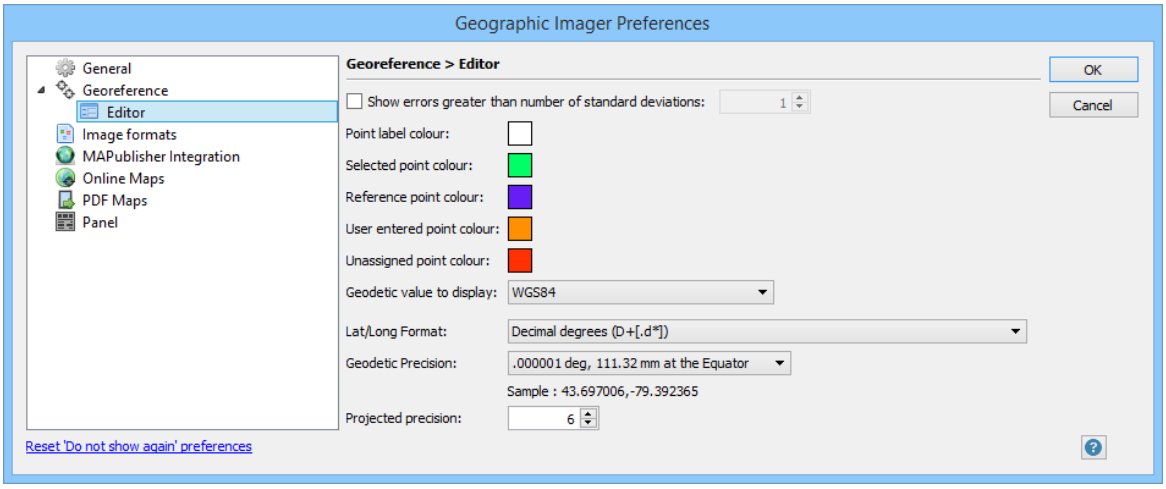
The default external reference formats are World, MapInfo TAB, Blue Marble Reference, and ERS.

When multiple reference files are found in the same directory, the Reference File Ambiguity dialog box will appear and will list the multiple reference files. The default reference format will be selected in the list. Clicking the *Always use the default reference format if available* check box will prevent the Reference File Ambiguity dialog box from appearing again and ensure that the default reference format is used.

Only reference files with the same name as the image are listed in the Reference File Ambiguity dialog box. Reference files with a different name than the associated image will have to be specified manually.

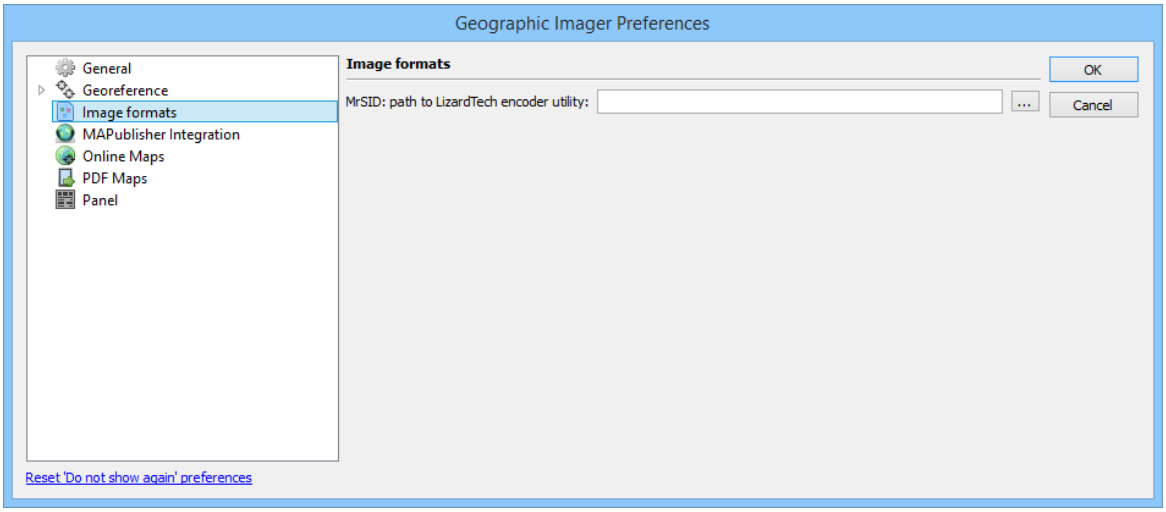
When the *Open/New: use internal format if available* check box is checked, Geographic Imager uses any internal reference files (such as GeoTIFF) as the default and overrides the format from the Default external reference format drop-down list. When georeferencing an image, the format chosen in the Default external reference format drop-down list will be created.

3.5.4.2.1 Georeference Editor Preferences



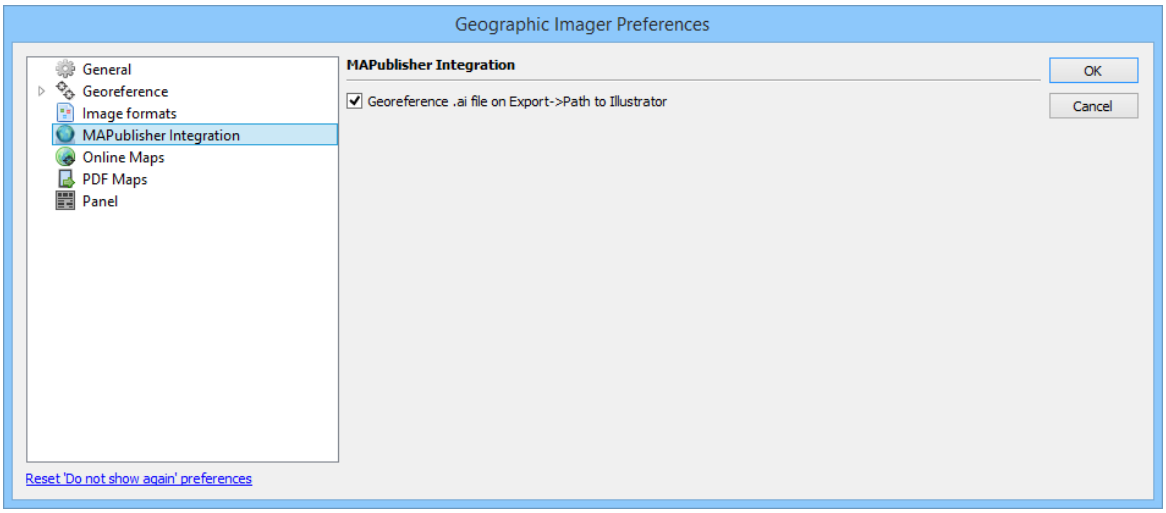
Show errors greater than number of standard deviations	Lists supported reference file formats (excluding GeoTIFF). When multiple reference files are found in the same directory, the Reference File Ambiguity dialog box appears.
Point label colour	Colour of the control point label.
Selected point colour	Colour of the selected control point.
Reference point colour	Colour of existing reference control points.
User entered point colour	Colour of assigned control points.
Unassigned point colour	Colour of unassigned control points.
Geodetic value to display	The default geodetic value to display: WGS84 or Geodetic Base.
Lat/Long Format	The default latitude and longitude format to display. See Coordinate Formats.
Geodetic Precision	The number of decimals a geodetic coordinate displays.
Projected precision	The number of decimals a projected coordinate displays. The default decimal precision is 6.

3.5.4.3 Image Formats Preferences



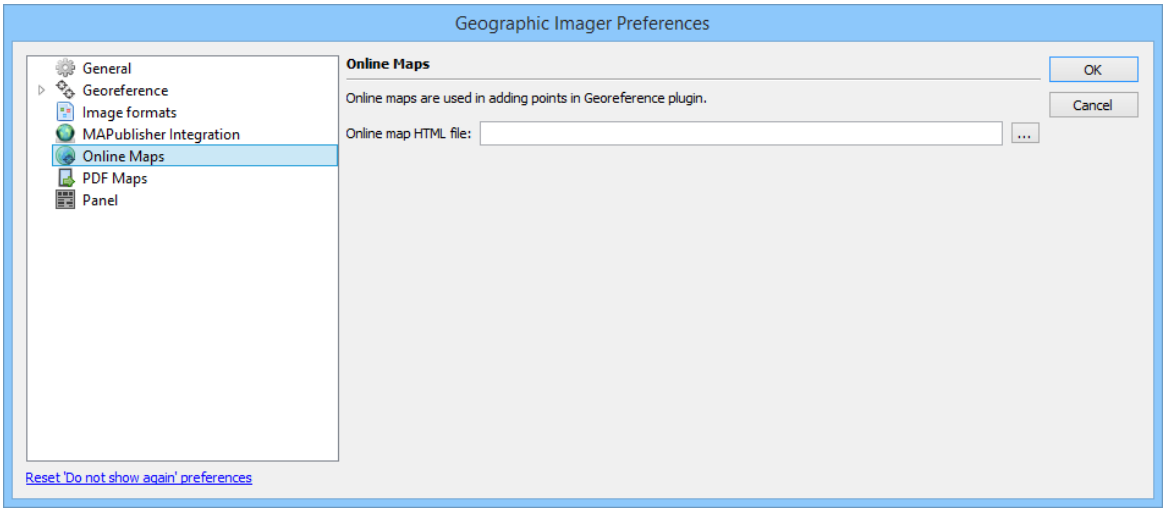
MrSID: path to Lizardtech encoder utility	The directory of the LizardTech MrSID encoder utility.

3.5.4.4 MAPublisher Integration Preferences



Georeference .ai file on Export-> Path to Illustrator	Include georeference with Adobe Illustrator file when Export > Paths to Illustrator is used. This option is checked by default.

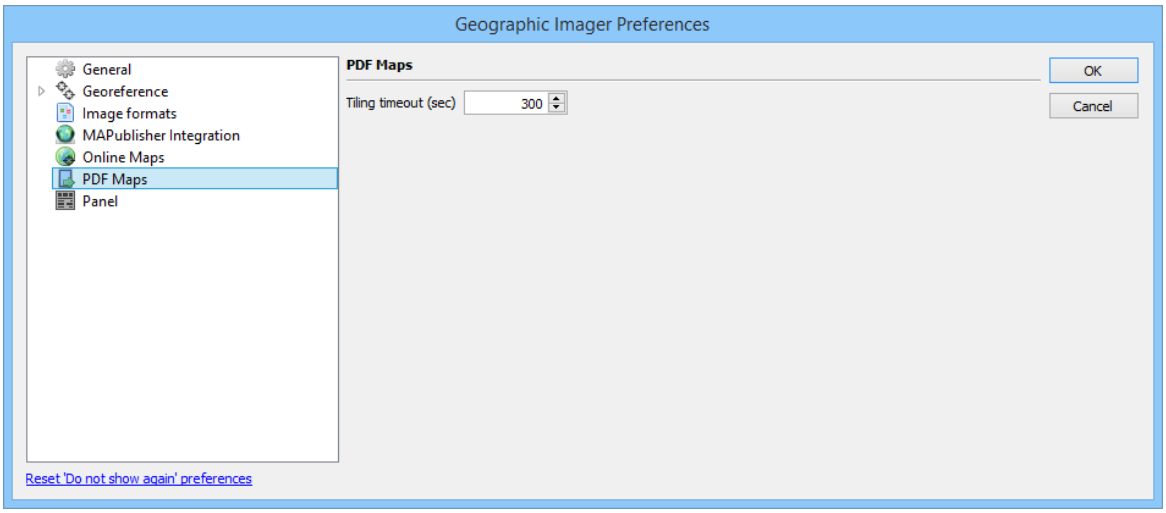
3.5.4.5 Online Maps Preferences



Online map HTML file	Specify an HTML file that points to a different online map service. Leaving this blank will use the default online map service.

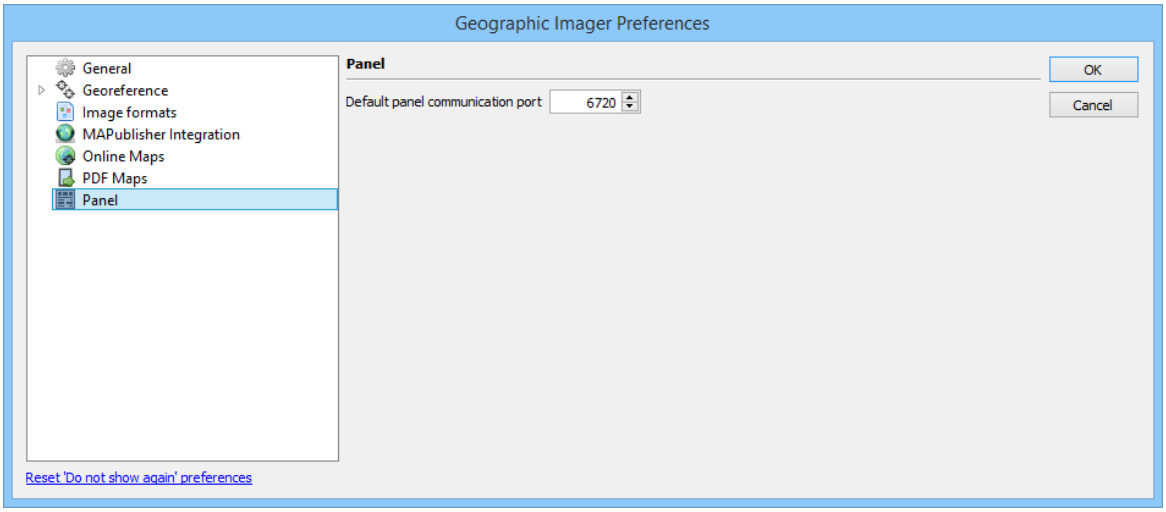
3.5.4.6 PDF Maps Preferences

These preferences affect how images are exported to be compatible with the Avenza PDF Maps app.



Tiling timeout (sec)	How many seconds it takes before the tiling process will timeout

3.5.4.7 Panel Preferences



Default panel communication port	The Geographic Imager panel communication port. Only change if you are experiencing a problem with the Geographic Imager panel not loading properly. Contact Avenza Support for more information.

3.6 Uninstalling Geographic Imager

To uninstall Geographic Imager, follow the instructions for your operating system:

Windows

1. If Adobe Photoshop is running, exit the program.
2. Click the Start button, point to All Programs, click Avenza, click Geographic Imager and click Uninstall.
3. If the User Account Control dialog box appears, click Allow.
4. In the Geographic Imager Uninstall Confirmation dialog box, click Uninstall.
5. A message prompts that all files will be removed from the Geographic Imager program folder. To save custom XML datasource files in the Applications folder, click Yes. To delete them, click No.

Mac

1. If Adobe Photoshop is running, exit the program.
2. In Finder, browse to /Applications/Avenza/Geographic Imager
3. To save the custom XML datasources, move the Data Source Backup folder to a different location. These are files backed up from the last version of GI installed.
4. Delete the entire Geographic Imager folder or delete only the Geographic Imager Plug-In folder to keep the other files (documentation, tutorials, etc.).

On Mac, installing Geographic Imager again (new or previous version) will copy all custom files to the data source backup folder.

Files to back up

You may want to backup certain files so that they can be used again.

File	Description
customsystems.xvw	This view file stores the organization and folder structure of your custom coordinate systems within the geodetic data source.
customsystems.xml	This file stores custom coordinate system definitions.
avenza.xsp	This file contains Avenza-specific supplementary coordinate systems.
geocalc.xsd	This file must be included when loading a custom coordinate system.
geodata.xml	This file stores an unlimited number of custom linear and angular units, ellipsoids, datums, datum shifts and coordinate systems. Also referred to as the geodetic data source.
customeDEMschema.xml	This file stores custom DEM schema information.
customecolormappings.xml	This file stores custom color maps that are used with Terrain Shader.

These files are located in:
Windows: C:\Program Files\Avenza\Geographic Imager\Data Source Files
Mac: /Applications/Avenza/Geographic Imager/Geographic Imager Plug-in

Related topics

The Geodetic Data Source

4 Spatial Image Formats

Image formats that can be opened and displayed by Adobe Photoshop can form the basis for a spatial image. This includes, but is not limited to, the following common formats: TIF, JPG, BMP, PSD, GIF and PNG. With Geographic Imager installed, these common formats can be paired with a reference file that stores spatial information. This provides images that are not traditionally referenced to be fully referenced. Geographic Imager also provides the ability to read many spatial formats that are unavailable with just Adobe Photoshop (see table below). Formats listed below are supported on both Windows and Mac versions of Geographic Imager, unless otherwise indicated.

Note that although any image, in any color mode, can be georeferenced and recognized by Geographic Imager, the performance of some Geographic Imager functions are restricted to certain color modes/bit depths.

Supported Raster/Reference Formats

Format	Extension	Supported since	Read	Write
BigTIFF	*.tfw, *.tifw, *.wld, *.jgw, *.pgw, *.sdw, *.eww, *.blw, *.dmw, *.bpw	Read: 3.0, Write: 3.4	✔	✔
BSB	*.kap	4.1	✔	-
ERDAS IMAGINE Raster	*.img	Read: 3.4, Write: 3.5	✔	✔
ER Mapper ECW	*.ecw	Read: 2.5, Write: 3.4	✔	✔†
Geospatial PDF	*.pdf	3.2	✔	✔
GeoPDF	*.pdf	3.2	✔	-
GeoTIFF	*.tif, *.tiff	1.0	✔	✔

JPEG 2000	*.jp2, *.j2k,*.jpx,*.jpc, *.j2c,*.jpf	Read: 2.5, Write: 3.2	✔	✔
LizardTech MrSID	*.sid	Read: 2.5, Write: 4.1	✔	✔*
MrSID/MG4 LiDAR	*.sid	3.4	✔	-
NITF	*.ntf	Read: 3.0, Write: 3.4	✔	✔
PCI EASI/ PACE	*.pix	2.5	✔	-
SGI Image format	*.rgb, *.rgba, *.int, *.inta, *.bw	2.5	✔	-
Web Map Service (WMS)	*.tiff, *.png, *.jpg, *.gif	3.4	✔	-

* Windows only

† Maximum export size of 500 MB

Supported DEM Formats

Format	Extension	Supported since	Read	Write
Esri ArcInfo ASCII Grid	*.agr, *.asc	Read: 2.5, Write: 5.0	✔	✔
Esri ArcInfo Binary Grid	*.adf	2.5	✔	-
Esri ArcInfo Floating Grid	*.flt	3.4	✔	-
BIL	*.bil	Read: 3.0, Write: 5.0	✔	✔
ERDAS IMAGINE	*.img	3.4	✔	-

Grayscale GeoTIFF DEM	*.tiff	Read: 3.4, Write: 4.2	✔	✔
Military Elevation Data / DTED	*.dt0, *.dt1, *.dt2	2.5	✔	-
USGS SDTS	*.ddf	2.5	✔	-
USGS DEM	*.dem	Read: 2.5, Write: 4.3	✔	✔
SRTM	*.hgt	2.5	✔	-

Supported External Reference Formats

Format	Extension	Supported since	Read	Write
World Files	*.tfw, *.tifw, *.wld, *.jgw, *.pgw, *.sdw, *.eww, *.blw, *.dmw, *.bpw, *.gfw	1.0	✔	✔
Blue Marble Reference	*.rsf	1.0	✔	✔
MapInfo TAB	*.tab	1.0	✔	✔
ER Mapper	*.ers	1.0	✔	✔

Supported Web Tile Formats

Format	Extension	Supported since	Read	Write
Google Maps	*.html, *.png	4.2	-	✔
Bing Maps	*.html, *.png	4.2	-	✔

OpenStreet Map (OSM)	*.html, *.png	5.0	-	✔
Tile Map Service	*.xml, *.png	5.0	-	✔
Mapbox TileMill	*.mbtiles	5.0	-	✔

4.1 Supported Raster/Reference Formats

Adobe Geospatial PDF, TerraGo GeoPDF® (pdf)

Read and Write

The geospatial PDF is considered an Adobe Acrobat Portable Document Format (following the PDF 1.7 specification) that contains information that is required to georeference location data. It is an open specification developed and maintained by Adobe Systems. See detailed specifications in Section 8.3 at http://www.adobe.com/devnet/acrobat/pdfs/PDF32000_2008.pdf. The TerraGo GeoPDF is a proprietary format that is compatible with Geographic Imager, but with limitations.

The Adobe PDF file format cannot reference non-PDF images; it can only reference other PDF images.

BigTIFF (tif, tiff)

Read and Write (write not available with Basic license)

BigTIFF extends the original TIFF file format specification to support 64-bit (for images larger than 4 GB). It is the result of work by a variety of parties including Adobe Systems. BigTIFF is expected to be useful for people and vendors that are confronted with unusually large images and still seek to use an open, simple, and extendable format. BigTIFF is not yet an official standard and is still awaiting final approval.

BSB (kap)

Read only

The BSB file format is a compressed raster format used for distributing raster nautical charts by various organizations in North America, most notably the NOAA. KAP file contains the content/image and the BSB file contains text information

about the image. A BSB file can store many control points and should be referenced with Georeference prior to use.

ERDAS IMAGINE Raster (img)

Read and Write (write not available with Basic license)

ERDAS IMAGINE uses IMG files to store raster data. These files use the ERDAS IMAGINE Hierarchal File Format (HFA) structure. A tiled format is used to store raster layers. This allows raster layers to be displayed and resampled quickly. Each raster layer within an IMG file has its own ancillary data, including the following parameters: height and width (rows and columns), layer type (continuous or thematic), data type, compression, and lock size.

Enhanced Compression Wavelet (ecw)

Read and Write

ECW is a proprietary wavelet compression image format optimized for aerial and satellite imagery. It was originally developed by Earth Resource Mapping. The lossy compression format efficiently compresses very large images with fine alternating contrast.

Geographic Imager can only export ECW files up to 500 MB in raw size. There is no limit on import.

GeoTIFF File (tif, tiff)

Read and Write

Tagged Image File Format (TIFF or TIF) is a common raster graphic file format and one of the most common geospatial image formats (in the form of GeoTIFF). A GeoTIFF is a TIFF file with embedded geographic information such as position and scale in world coordinates, affine transformation or an explicit list of control points. Many raster geographic images from GIS systems are stored in this format.

Unlike other georeferenced image formats discussed in this section, a GeoTIFF does not require a separate reference file. Geographic information is automatically detected when a GeoTIFF is opened in Geographic Imager. When saving a georeferenced image to the TIF or TIFF format, Geographic Imager writes the appropriate georeference header information into the file. It also supports storage of coordinate system information and control points.

Supported projections when saving a coordinate system to GeoTIFF:

Albers Equal-Area Conic	Lambert Azimuthal Equal Area	Polyconic
Azimuthal Equidistant	Lambert Conic Conformal (1SP)	Robinson
Cassini-Soldner	Lambert Conic Conformal (2SP)	Rosenmund Oblique Mercator
Cylindrical Equal Area	Lambert Conic Conformal (2SP Belgium)	Sinusoidal
Eckert IV	Lambert Cylindrical Equal Area	Stereographic
Eckert VI	Mercator	Swiss Oblique Cylindrical
Equidistant Conic	Miller Cylindrical	Swiss Oblique Mercator
Equidistant Cylindrical	Mollweide	Transverse Mercator
Equirectangular	New Zealand Map Grid	Transverse Mercator (modified Alaska)
Gall Stereographic	Oblique Mercator	Transverse Mercator (South Oriented)
Gnomonic	Oblique Stereographic	Tunisia Mining Grid
Hotine Oblique Mercator	Orthographic	VanDerGrinten
Laborde Oblique Mercator	Polar Stereographic	

Geographic Imager supports every coordinate system it can write, regardless of projection. However, this does not guarantee that a third-party GIS software will recognize all coordinate systems or projections.

When a GeoTIFF contains rotation or the coordinate system direction is reversed, it may not open in legacy applications.

Images in a multichannel color mode are not supported when using Save or Quick Save To Format to save to GeoTIFF. Saving layers and extra channels is supported.

It is recommended to open 12-bit TIFF images with Advanced Import, otherwise it will not open.

JPEG 2000 (jp2, j2k, jpx, jpc, j2c, jpf)

Read and Write

JPEG 2000 is a wavelet-based image compression standard. It was created by the

Joint Photographic Experts Group committee in the year 2000 with the intention of superseding their original discrete cosine transform-based JPEG standard (created 1992). The standardized filename extension is JP2 for ISO/IEC 15444-1 conforming files and JPX for the extended part-2 specifications, published as ISO/IEC 15444-2, while the MIME type is image/JP2.

Adobe Photoshop can only save JPEG 2000 files less than 2 GB in size.

LizardTech MrSID* and MrSID/MG4 LiDAR (sid)

Read and Write* (write not available with Basic license)

Multi-resolution Seamless Image Database (MrSID) is a powerful wavelet-based image compressor, viewer and file format for large raster images. Developed by LizardTech Inc., MrSID enables instantaneous viewing and manipulation of images locally and over networks. Features include high and efficient compression ratios while maintaining true multiple resolutions, selective decompression, seamless mosaicking and browsing. Files in the MrSID/MG4 compressed LiDAR file can be opened and viewed as a raster DEM.

To write MrSID files through Geographic Imager, GeoExpress must also be installed (unavailable with a trial GeoExpress license). * Write ability for MrSID on Windows only. For more information, please visit http://www.avenza.com/geographic-imager/lizardtech-mrsid.

NITF (ntf)

Read and Write (write not available with Basic license)

The National Imagery Transmission Format (NITF) data format is widely used by geospatial analysts in the defense and intelligence communities. The NITF format contains imagery and associated metadata in a single file.

PCI EASI/PACE (pix)

Read only

PCIDSK database files are used by PCI EASI/PACE software for image analysis. All pixel data types, and data organizations (pixel interleaved, band interleaved, file interleaved and tiled) should be supported, but compressed PCIDSK files are not supported. Currently LUT and PCT segments are ignored. Overall file, and band specific metadata should be correctly associated with the image or bands.

Georeferencing is supported though there may be some limitations in support of datums and ellipsoids. If control point segments are present, the first will be used, and the rest ignored. Internal overview (pyramid) images will also be correctly read though newly requested overviews will be built externally as an OVR file.

SGI Image Format (rgb, rgba, int, inta, bw)

Read only

The SGI image file format is part of the SGI image library found on Silicon Graphics machines. The driver currently supports 1, 2, 3, and 4 band images. The driver currently supports "8 bit per channel value" images. The driver supports both uncompressed and run-length encoded (RLE) images for reading, but created files are always RLE compressed. The *.rgba, *.int, *.inta, and *.bw extensions supported since Geographic Imager 5.0.

Web Map Service

Read only

Web Map Service is an interface standard designed by the Open Geospatial Consortium (OGC) for GIS raster data
transactions through http protocol. The Geographic Imager WMS import connects to servers that use version 1.1.1 of the OGC standard. WMS data formats include TIFF, GIF, PNG, and JPEG. See Advanced Import.

4.2 Supported DEM Formats

ArcInfo ASCII Grid (agr, asc)

Read and Write

ArcInfo ASCII Grid refers to a specific interchange format developed for ArcInfo rasters in ASCII format. The format consists of a header that specifies the geographic domain and resolution, followed by the actual grid cell values. Export is supported through the ASC format with an associated PRJ file.

ArcInfo Binary Grid (adf)

Read only

dblbnd.adf, hdr.adf, log, prj.adf, sta.adf, vat.adf, w001001.adf, w001001x.adf
The ArcInfo Binary Grid is formed from a set of the files contained in a directory (listed above). When loading a raster into ArcGIS, it sees the containing directory as a single DEM, not as a directory containing other files. Due to software

limitations, Geographic Imager does not see the whole directory as a single DEM and instead requires that the appropriate ADF file to be selected for use (navigate to the directory containing w001001.adf file).

ArcInfo Binary Float Grid (flt)

Read only

The ArcInfo Binary Fload Grid is a binary file that stores floating point data (topological elevation values) line by line from north to south. It must be used with an accompanying header file (HDR) that contains the georeferencing information (both files must be stored in the same directory to function).

BIL (bil)

Read and Write (can be opened as raster with color file)

The BIL format, meaning "band interleaved by line", is an uncompressed file containing the actual pixel values of an image. Pixel information is stored in separate bands within the file. It is possible to display one specific band in a multi-band BIL image. BIL files can consist of black and white, grayscale, pseudocolor, true color, and multi-spectral images. There are four image description files (ASCII text file format) that can accompany a BIL file: a header file, a statistics file, a resolution file, and a color file.

The header file (HDR) provides a description of the data through the use of keywords and values. The statistics file (STX) is an optional file that describes the image statistics for each spectral band. It records the minimum and maximum pixel values, the mean, the standard deviation, and the two linear contrast stretch parameters. The resolution file (BLW) describes the height and width of each cell and the coordinate position of the top left cell of the data. The color file (CLR) is an optional file that describes the image colormap.

ERDAS IMAGINE DEM (img)

Read only

ERDAS IMAGINE uses IMG files to store raster data. These files use the ERDAS IMAGINE Hierarchal File Format (HFA) structure. A tiled format is used to store raster layers. This allows raster layers to be displayed and resampled quickly. Each raster layer within an IMG file has its own ancillary data, including the following parameters: height and width (rows and columns), layer type (continuous or thematic), data type, compression, and lock size.

Grayscale GeoTIFF DEM (tif, tiff)

Read and Write

GeoTIFF DEM is unique in that it uses a floating point 32-bit data type as opposed to a more typical signed 16-bit data type for elevation data. GeoTIFF DEM must be imported using Geographic Imager Advanced Import and is converted from 32-bit to 16-bit on import. Cropping when using Advanced Import will create a new DEM schema range based on the cropped area's elevation.

Military Elevation Data / DTED (dt0, dt1, dt2)

Read only

The National Geospatial-Intelligence Agency (NGA) developed a standard digital dataset called the Digital Terrain Elevation Data (DTED®). It is a dataset of terrain elevation values that provides basic quantitative data for systems and applications that require terrain elevation, slope, and/or surface roughness information. DTED datasets come in three levels: Level 0, Level 1 and Level 2.

DTED Level 0 elevation post spacing is 30-arc-second (nominally one kilometer). DTED Level 0 was derived from NGA DTED Level 1 to support a federal agency requirement. DTED Level 1 is a uniform matrix of terrain elevation values with post spacing every 3-arc-seconds (approximately 100 meters). The information content is approximately equivalent to the contour information represented on a 1:250,000 scale map. DTED Level 2 is a uniform gridded matrix of terrain elevation values with post spacing of one-arc-second (approximately 30 meters). The information content is equivalent to the contour information represented on a 1: 50,000 scale map.

USGS SDTS (ddf)

Read only

The Spatial Data Transfer Standard (SDTS) is a robust way of transferring earth-referenced spatial data between dissimilar computer systems with the potential for no information loss. It is a transfer standard that embraces the philosophy of self-contained transfers, i.e. spatial data, attribute, georeferencing, data quality report, data dictionary, and other supporting metadata all included in the transfer.

USGS DEM (dem)

Read and Write

This is the traditional format used by USGS before being replaced by SDTS, and is

the format used for CDED DEM data products from the Canada. Most popular variations on USGS DEM files should be supported, including correct recognition of coordinate system, and georeferenced positioning.

The USGS Digital Elevation Model (DEM) data files are digital representations of cartographic information in a raster form. DEMs consist of a sampled array of elevations for a number of ground positions at regularly spaced intervals. These digital cartographic/geographic data files are produced by the U.S. Geological Survey (USGS) as part of the National Mapping Program and are available in 7.5-minute, 15-minute, also known as 30-minute and 1-degree units. The 7.5- and 15-minute DEMs are included in the large scale category while 30-minute DEMs fall within the intermediate scale category and 1-degree DEMs fall within the small scale category.

SRTM (hgt)

Read only

SRTM is an international project spearheaded by the National Geospatial-Intelligence Agency (NGA) and the National Aeronautics and Space Administration (NASA). Digital elevation models of the earth's surface were created with measurements derived from the return signals received from two radar antennae on a spacecraft. Each data file covers a one-degree-of-latitude by one-degree-of-longitude block of the earth's surface. SRTM consisted of a specially modified radar system that flew on board the Space Shuttle Endeavour during the 11-day STS-99 mission in February 2000, based on the older Spaceborne Imaging Radar-C/X-band Synthetic Aperture Radar (SIR-C/X-SAR).

DEM Data Considerations, Limitations and General Information

Geographic Imager imports DEM files into Adobe Photoshop as grayscale 16-bit files. Currently, Geographic Imager can only save to Grayscale DEM GeoTIFF, USGS DEM, ASCII Grid, and BIL.

The Raw Data DEM Schema creates a potentially low-contrast image and keeps the source elevations directly mapped to actual pixel values. Mosaicking DEM files using Advanced Import is recommended. Geographic Imager will create a DEM schema to fit the range of the images being imported.

To view DEM values, use the Geographic Imager panel Survey tab. Use the Color

Sampler Tool to choose up to four points on the image to view its DEM value. Drag and drop individual points with the left mouse button pressed to change their location. Use Ctrl (Win) or Command (Mac) and click to select individual points to move or delete or right-click for additional options. Another way to view DEM values is to use the Georeference dialog box. The elevation value is displayed below the preview image.

4.3 Supported External Reference Formats

World File (tfw, tifw, wld, jgw, pgw, sdw, eww, blw, dmw, bpw, gfw)

Read and Write

World files contain the affine relationship between source image coordinates (pixel locations) and real-world reference coordinates (lat/long or other real-world coordinate units). World files simply contain a computed relationship between source image coordinates and reference coordinates. It consists of the pixel sizes in x and y direction, rotations about x and y axis and x and y coordinates of the center of the upper left pixel. Reference points cannot be loaded from a world file because they do not exist in the file. World files do not support storing coordinate system information. You may export the coordinate system information as an external WKT or PRJ file using the Export Coordinate System function.

Blue Marble Reference File (rsf)

Read and Write

The Blue Marble Reference Settings File saves the complete reference point list information such that it can be loaded again in the future. Within a Blue Marble Reference File, the first line contains the version of the file format (not to be confused with the version of the software) and the total number of points in the file. The remaining lines contain, in each line, the point ID, the x (row) pixel, the y (column) pixel, the z (elevation) value which is usually 0.00, followed by the ground coordinates expressed as Latitude or Northing (Y), Longitude or Easting (X) and Elevation (Z). The last value indicates whether the point described on that line is included in the solution, 0 = not included and 1 = included. Blue Marble Reference files support storing coordinate system information and control points. Blue Marble Reference files

MapInfo TAB File (tab)

Read and Write

MapInfo Table file formats save the complete reference point list information such that it can be loaded again in the future. MapInfo TAB files support storing coordinate system information and control points.

Supported projections when saving a coordinate system to TAB:
Albers Equal-Area
Azimuthal Equidistant
Hotine Oblique Mercator
Hotine Oblique Mercator 1pt
Lambert Conic Conformal
New Zealand Map Grid
Polyconic
Swiss Oblique Mercator
Stereographic Transverse Mercator

ER Mapper Raster File (ers)

Read and Write

The ER Mapper header file is an ASCII file describing the raster data in the data file. The entire header file holds information about the data source and is contained in the DatasetHeader block. There are two compulsory sub-blocks, the CoordinateSpace block (to define the coordinate space and location) and the RasterInfo block (to define the characteristics of the data in the accompanying data file). The RasterInfo block my contain a number of optional sub-blocks. To completely define coordinate information in an ER Mapper header file you need to include the following data: datum, projection, coordinate type, units, X and Y dimensions for cell size, registration cell X and Y values, registration cell coordinates, and possibly null cell value. Coordinate information is frequently, but not always, given for the upper left corner of an image. This would be registration cell X and Y values of 0.0 and 0.0. For most projections registration coordinates are entered as eastings and northings, the coordinate type will be "EN", and units will be meters (or occasionally feet). If you are using latitude and longitude the projection is Geodetic, coordinate type will be "LL" and the X and Y dimensions for the cell size will be in decimal degrees.

ER Mapper files support storing a limited number of pre-defined coordinate systems. Check the coordinate system details to ensure the ER Mapper identifier exists as the issuer for the coordinate system to be saved. The file will still be exported however the coordinate system will not be saved with the reference file.

ER Mapper reference files do not support rotated images. When attempting to export a reference file with a rotated image ER Mapper will not be listed.

4.4 Data Considerations and Limitations

When obtaining spatial imagery for use with Geographic Imager, whether from an online source, commercial vendor, government office or a source within your organization, there are a number of important considerations to keep in mind. Use the File > Open command to view the list of reference files supported by Geographic Imager and try to obtain data in one of the formats supported. In cases where the file format is native to a particular mapping application and is not supported by Geographic Imager, you can often request the data provider to export a file in one of the supported formats.

When obtaining data, acquire as much metadata as possible. If an image is received in any format other than GeoTIFF, obtain a reference file in one of the formats supported by Geographic Imager. It is important to obtain the name of the projection, the datum and the units because subsequent reprojection of data relies on this information.

TIFF and BigTIFF files opened using Advanced Import do not support layers, text and other Adobe Photoshop specific image features. Generally, satellite imagery would not contain any of these features which are added later using Adobe Photoshop. TIFF files that are opened using just Adobe Photoshop (e.g. not with Advanced Import) are not affected.

Opening any files over a cross platform network may increase load times.

Known Adobe Photoshop Limitations

Task or Operation	Limitation
Select > Color Range	The preview is based on an 8-bit image. The actual selection on a 16-bit image may be different from the preview.
Magic Wand tool	This tool makes a selection based on an 8-bit image, even if the image is in 16-bit mode. It is preferable to select by Color Range.
Filter > Render >	This filter only works on 8-bit images. Converting an

Task or Operation	Limitation
Lighting Effects	imported DEM from 16-bit to 8-bit incurs data loss in height resolution, therefore this filter should be used at the end of a workflow.
Gradient Map Adjustment Layer	A gradient map adjustment layer can be used to colorize a DEM. Adobe Photoshop uses the gray scale value of every pixel to assign a new color. This means that the gradient map is scaled to (0 to 100) the DEM elevation range. Applying the same gradient map to two separate DEM files will give different colors to the same elevation values. This must be taken into consideration before using the Geographic Imager Mosaic function.

5 Opening Spatial Images

The ability to automatically recognize georeferenced images is at the foundation of Geographic Imager.

Opening a spatial image is the main starting point for most users wanting to use Geographic Imager in Adobe Photoshop.

Geographic Imager supports all the image formats supported by Adobe Photoshop as well as several formats supported by Geographic Imager.

This section provides information on how to open a spatial image, select and apply a reference file and coordinate system.

Topics covered in this section

5.1 Opening Images

When an image is opened, Geographic Imager will try to read associated spatial reference information. External reference files that are not named the same will need to be manually specified.

There are several common ways to open a geospatial image in Adobe Photoshop:

- from the Adobe Photoshop File menu
- double-click an image in operating system file browser*
- by drag-and-drop (drag file to the application icon)*
- using Advanced Import

* some geospatial image formats may be composed of multiple files. It is recommended to open images from the Adobe Photoshop File menu or Advanced Import.

From the Adobe Photoshop menu bar

1. From the Adobe Photoshop menu bar, go to File > Open.
2. Navigate to an image's location, select it, and click Open.

Double-click to open an image

1. In a file system browser, navigate to the image's location.
2. Double-click the document to open it.

This is assuming the file format being opened is associated with Adobe Photoshop.

Drag-and-drop into Adobe Photoshop

1. In a file system browser, navigate to the image's location.
2. Select the image and drag it into Adobe Photoshop or drag it onto the Adobe Photoshop application icon.

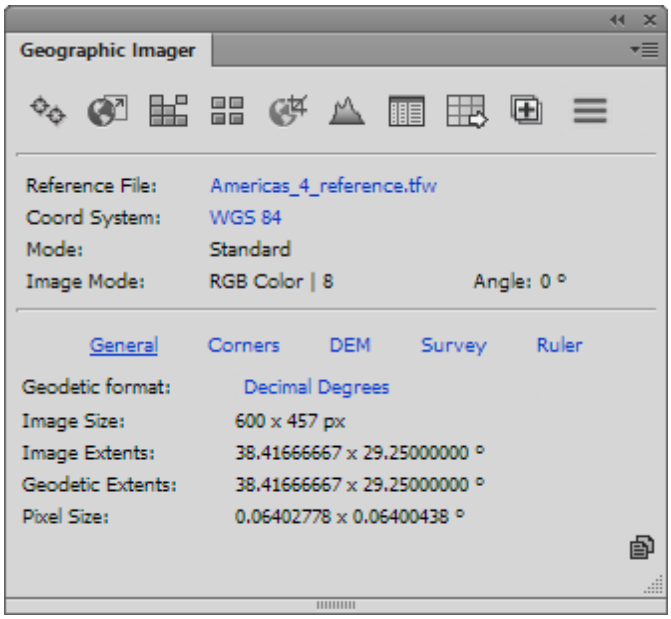
Use Advanced Import

Advanced Import provides a way to import multiple images that can comprise of different formats and different coordinate systems. Advanced Import has settings to change reference file, source coordinate system, manage color channels, choose DEM schema, adjust image size and extents and mosaic. It is also useful to quickly crop large sized images to a specific geographic extent which may have initially required a long load time.

Check for open image in the Geographic Imager panel

When an image opens, the Geographic Imager panel displays different coordinate systems. Advanced Import has settings to change reference file, source coordinate

system, manage color channels, choose DEM schema, adjust image size and extents and mosaic. It is also useful to quickly crop large sized images to a specific geographic extent which may have initially required a long load time.



Related topics

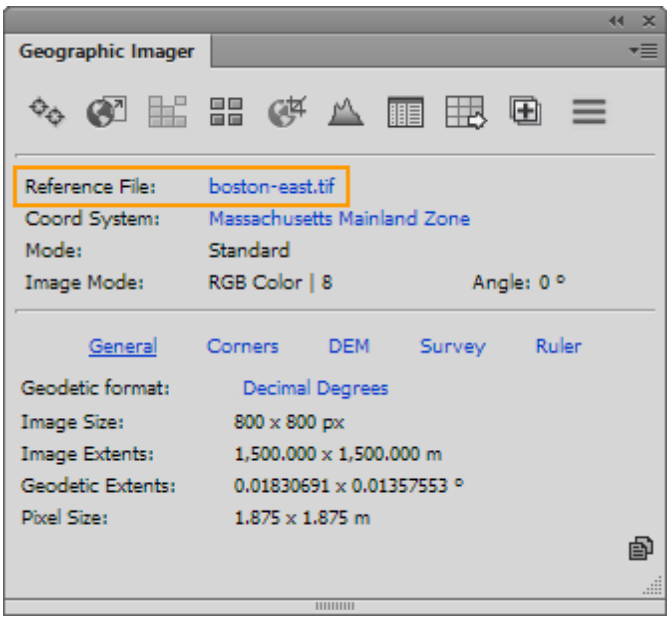
The Geographic Imager Panel

Opening Images with Advanced Import

Pixel Registration

5.2 Specifying a Reference File

When a spatial image is opened, Geographic Imager will automatically detect whether it is georeferenced or not. When an image is recognized as a spatial image, the Geographic Imager panel displays the name of the reference file and additional information: the northwest (top left) and southeast (bottom right) corner coordinates, image size, pixel size and rotation angle. Units are not indicated if no coordinate system is specified. For a spatial image to be recognized, an external reference file (e.g. World file) needs to be in the same folder as the image, except for files that have internal referencing (e.g. GeoTIFF).

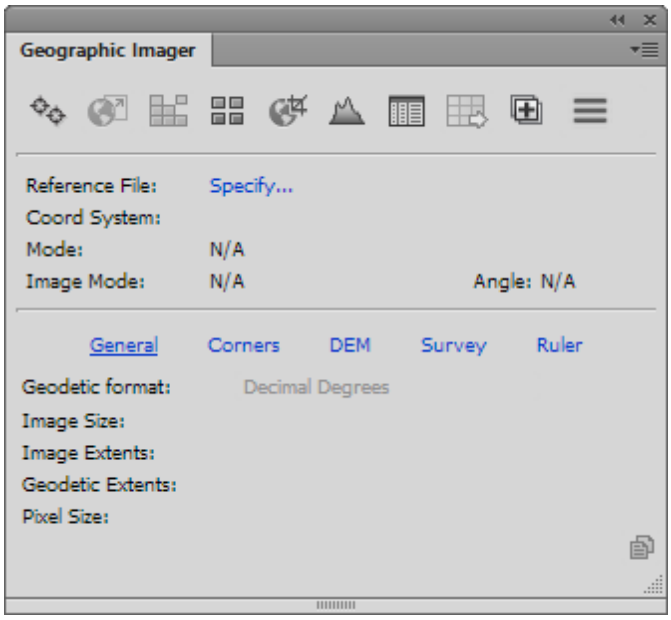


An opened image (GeoTIFF) has an internal reference file and is listed as "boston-east.tif"

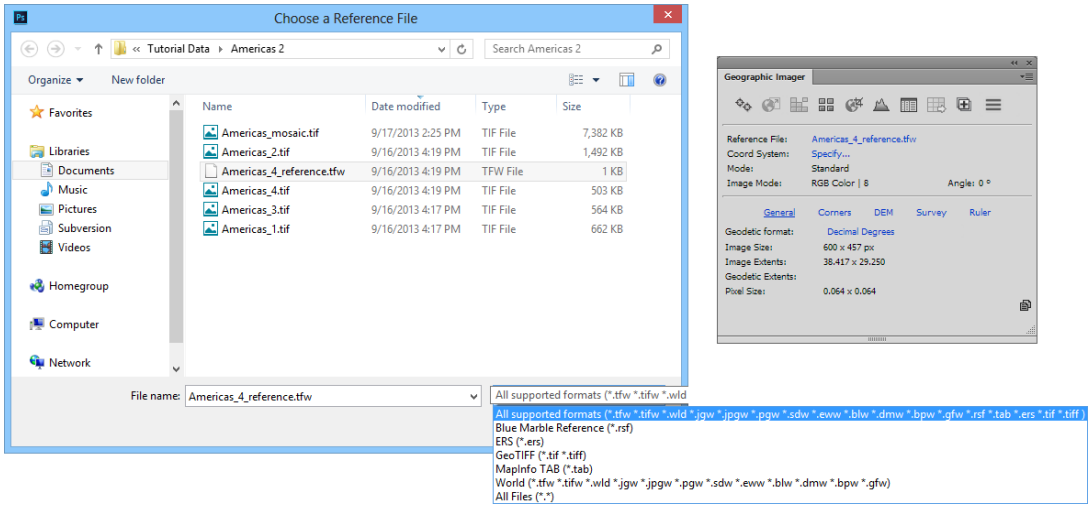
When a reference file is not found, it may be necessary to manually specify one. Once a reference file is specified, any changes to an image's referencing will be reflected in the reference file when the image is saved.

How to specify a reference file

1. Click the Reference File Specify link in the Geographic Imager panel.



2. Alternatively, in the Geographic Imager panel options menu, choose Specify Reference File. In the Choose a Reference File dialog box, browse and select a reference file of one of the supported external reference formats listed in the File Type drop-down list.



When multiple reference files match the image name are located in the same folder, you will be prompted to choose the appropriate reference file. Any changes in document georeferencing will be saved to the chosen reference file.

If no reference file is available but a collection of point coordinate locations are known (such as the Top Left corner and Bottom Right corner coordinates), a custom reference file can be created. See more about Georeferencing.

Related topics

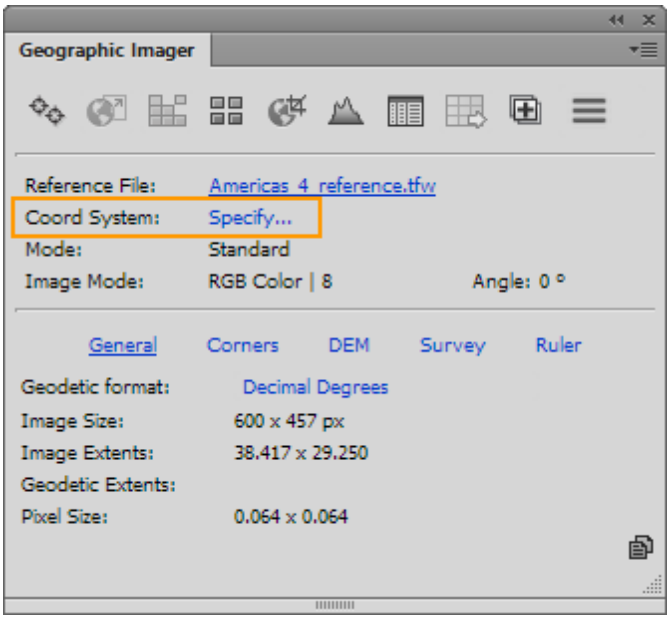
Opening Images with Advanced Import

Georeferencing Images

5.3 Specifying a Coordinate System

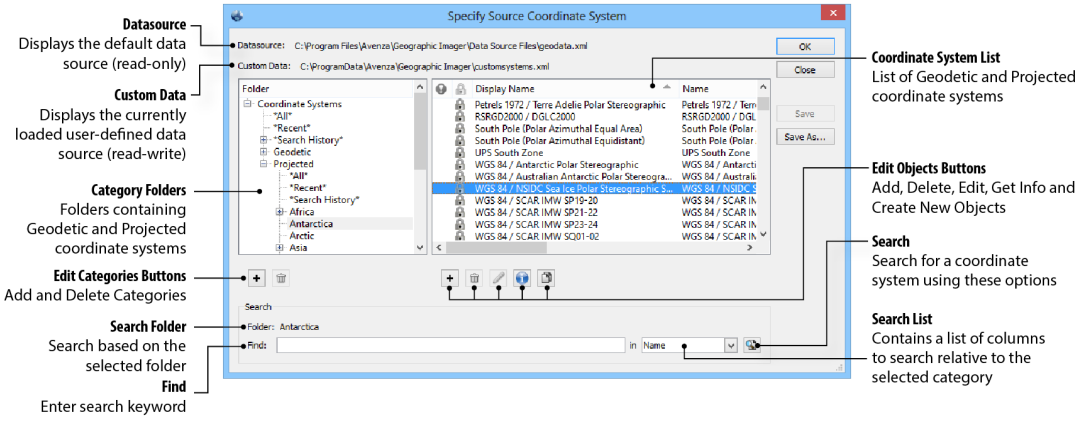
When a spatial image is opened, Geographic Imager will automatically detect whether it has a coordinate system specified in the reference file or not. Before you can transform an image and perform any spatial related operations (like GeoCrop or Mosaic), Geographic Imager needs to know the current coordinate system. If the coordinate system information is not present in the image reference file, it is necessary

to specify one.



An image without a coordinate system, but with a valid World reference file.

Specify Source Coordinate System



Category Folders

The area on the left contains the folders of coordinate systems and subcategories for both recently used coordinate systems and performed searches. Coordinate systems are organized into two categories: Geodetic (unprojected, in latitude and longitude) and Projected. Right-click a folder to rename it or create a new subfolder in it.

Coordinate System List

The coordinate system list displays the name, horizontal datum, point style units, EPSG code and envelope of each coordinate system. Columns can be resized and sorted alphabetically or numerically. Geodetic and Projected coordinate system categories are sub-divided into world regions (continent/country/state or province) to ease selection. To set a coordinate system, click the desired folder on the left and click the desired coordinate system from the list on the right. Right-click a coordinate system to access a context menu to View Info, Copy Object, Rename Display Name or create New Object.

Search

All categories and subcategories can be searched by specific or all criteria. Geodetic coordinate systems can be searched by name, horizontal datum, point style units, envelope and EPSG code. In addition to the previous criteria, projected coordinate systems can be searched by geodetic, projection type and projection name. When searching for a coordinate system, the results are displayed in the coordinate system list. Note that the search is always relative to the folder selected category in the coordinate systems folder list. Choose the top level Coordinate Systems folder to search through all geodetic and projected coordinate systems.

Three subcategories contain specific information:

- **All**: Displays all of the coordinate systems within that category.
- **Recent**: Displays all of the recently used coordinate systems within that category.
- **Search History**: Displays all of the search results for that category.

The subcategories All, Recent and Search cannot be searched.

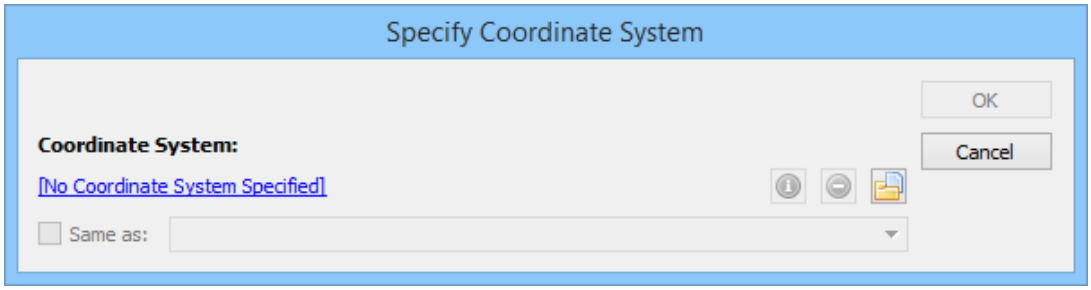
To clear the Recent and Search subcategories, right-click and choose Clear Recent (Search) History.

For a more information on projections and coordinate systems, as well as details on editing and adding to the coordinate system database and loading and importing a coordinate system file or database, see Transformations and Coordinate Systems.

How to specify a coordinate system

1. Click the Coordinate System link in the Geographic Imager panel or choose Specify Coordinate System from the panel options menu.

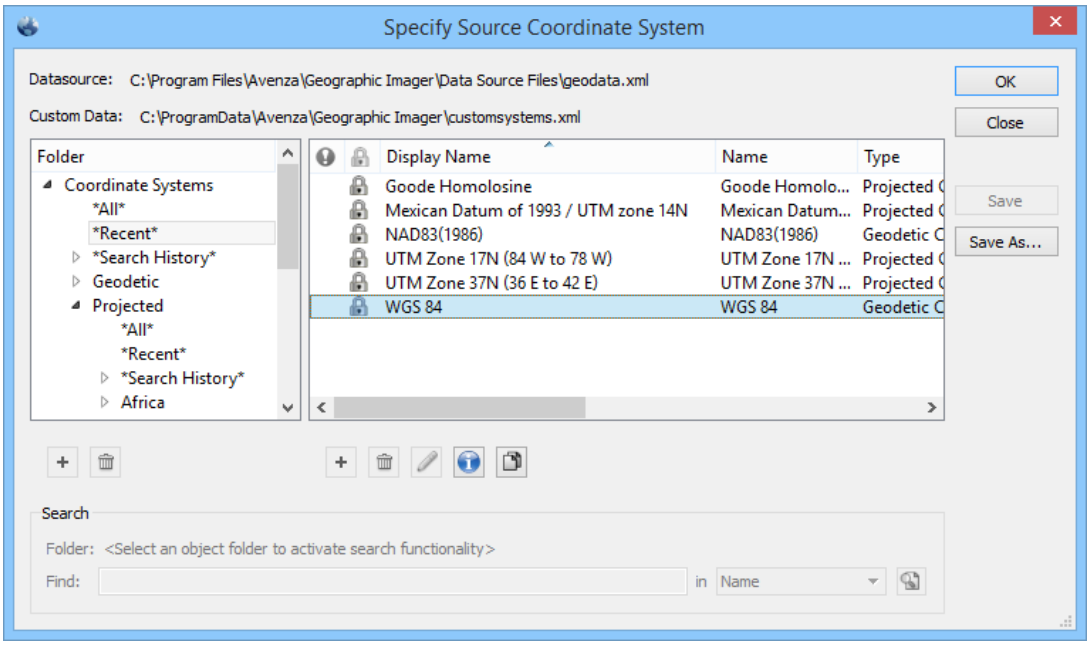
2. The Specify Coordinate System dialog box provides three ways to specify the coordinate system: From File, Same As, and Specify link.



- To set the coordinate system based on a reference file, click the **From File** button. The Import Source Coordinate System From File dialog box appears. Choose an existing reference file.

- To set the coordinate system to be the same as that of another open image with a coordinate system, click the Same As check box and then choose the image to match from the drop-down list. This option is disabled if there are no other referenced images open.

- To set a coordinate system from the Geographic Imager data source, click the coordinate system hyperlink. The Specify Source Coordinate System dialog box appears and displays the contents of the current coordinate system database. Navigate the category folders to view available coordinate systems.



To find more information about the file, click the **View coordinate system information** button (enabled when a coordinate system is selected).

To remove a coordinate system from an image, click the **Clear current coordinate system** button.

An image can't be transformed until the coordinate system is known.

Important Notes

Mac only: When opening a geospatial PDF and a copy of it (i.e. saved as a different name) at the same time, the georeferencing will not be read on the image that is opened second. Referencing will have to be specified manually. This is due to a limitation in Adobe Photoshop.

Related topics

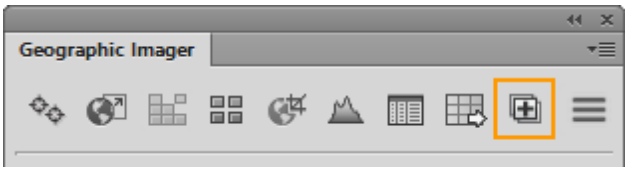
Transformations and Coordinate Systems

The Geodetic Datasource

5.4 Opening Images with Advanced Import

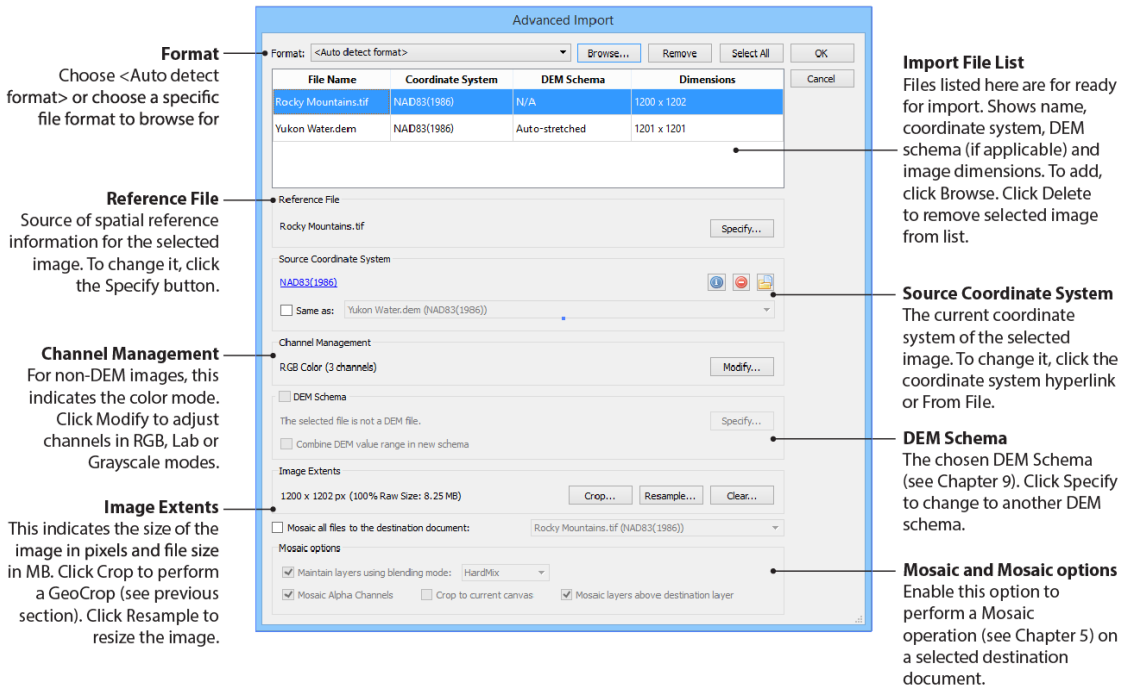
Advanced Import provides a way to import multiple images that can comprise of different formats and different coordinate systems. Advanced Import has settings to change reference file, source coordinate system, manage color channels, choose DEM schema, adjust image size and extents and mosaic. It is also useful to quickly crop large sized images to a specific geographic extent which may have initially required a long load time.

Click the **Advanced Import** button on the Geographic Imager panel.



Advanced Import button

Advanced Import Dialog Box



Format

In the Format drop-down list, select an image format (or leave as <Auto detect

format>) then click Browse. Alternatively, drag and drop files into the file list. These supported formats are compatible with Advanced Import:

• Web Map Service	• GeoTIFF*/BigTIFF/TIFF (including GeoTIFF DEM)	• MrSID
• ArcInfo ASCII Grid	• USGS DEM	• NITF
• ArcInfo Binary Grid	• ECW	• PCI EASI/PACE
• ArcInfo Binary Float Grid	• ERDAS IMAGINE Raster	• SDTS Transfer
• BIL	• JPEG 2000	• SGI
• BSB	• Military Elevations Data/DTED	• SRTM

* Adobe Photoshop layers are not supported when imported through Advanced Import. Multi-layer GeoTIFF files will be flattened.

Multiple images of varying formats can be imported at a time and are shown in the Import File List. Additional information including coordinate system, DEM schema (if applicable), and image dimensions are shown in the list. When a file is selected in the list, it enables or updates the Reference File, Source Coordinate System, Channel Management (if applicable), DEM Schema (if applicable), and Image Extents areas below it. As settings in the dialog box are changed, the file list will update. To remove a file from the list, click to select it, then click the **Delete** button.

Reference File

The associated reference file is displayed in this section (e.g. Rocky Mountains.tif). To change the reference file, click Specify and browse for a new one. See Specifying a Reference File.

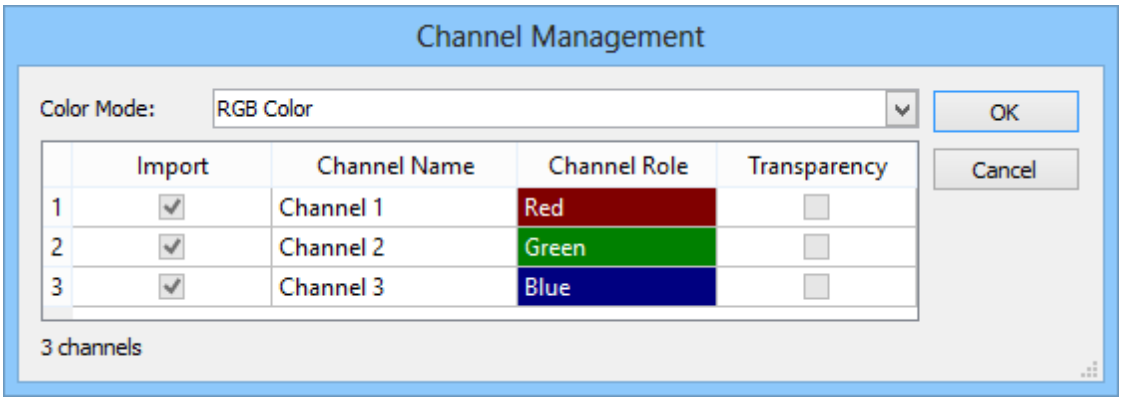
Source Coordinate System

The coordinate system used in the reference file is displayed in this section (e.g.

NAD27). To specify a new a new coordinate system, click the coordinate system hyperlink to open the Specify Source Coordinate system dialog box (see Specifying a Coordinate System). Alternatively, choose a coordinate system from a file or assign a coordinate system from an existing image in the File Import List.

Channel Management

The color mode is displayed in this section (e.g. RGB Color - 3 channel). To edit how the color mode channels are assigned, click the **Modify** button to open the Channel Management dialog box (see Channel Management). Change the Color Mode in the drop-down list. Click a channel role color drop-down list to assign that specific channel a new color. To create image transparency based on a channel, click the according check box in the Transparency column. These changes are displayed in the list and will be reflected in the Adobe Photoshop Channels panel. For multiple selected files that have same number of bands and color mode, the **Modify** button will be enabled to allow for channel management modifications.



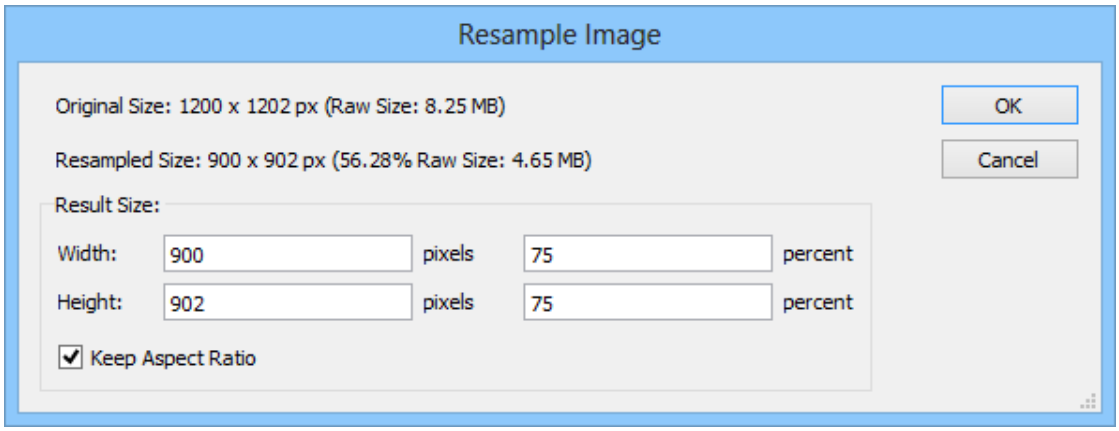
DEM Schema

The DEM schema is displayed in this section (e.g. Auto-stretched) and is only applicable to DEM files. To change the schema, click the **Specify** button to open the Import DEM file dialog box (see DEM Schema). The Import DEM file dialog box provides options to apply a schema (custom , preset or saved) based on the statistics of the raster data set. Use the Include DEM value range as part of the Auto-stretch schema setting when importing multiple files that may be of similar data range or geographic location. This will find the minimum and maximum values of all DEM files and use a broader range than just a single file (indicated in the DEM Schema as Combined.) To apply the same DEM schema to all files, ensure that the Apply to all DEM files in

import list is checked.

Image Extents, Crop and Resample

The image extents of the selected file is displayed in this area (in pixels). Also displayed are its scale and raw file size. There are two options available here: Crop and Resample. Click the **Crop** button to open the GeoCrop dialog box to crop the image. Click the **Resample** button to open the Resample Image dialog box to adjust the size of the image by width/height or percentage value.



When a crop is performed on a DEM with Auto-stretched schema type, the DEM schema in the file list will update to specify it as Crop auto-stretched.

To crop WMS data, use the Crop tool in the Select Web Map Layer dialog box when choosing a WMS layer.

Mosaic

When an image is already open or more than one image is listed in the Advanced Import dialog box, the **Mosaic all files to the destination document** option will be available. Enable the option and choose the appropriate destination document to mosaic into (either an existing open document or one of the images listed). The destination document changes depending on which listed image is selected. The images will mosaic upon import. See more about Mosaic.

It is not recommended to mosaic DEMs with different schemas. Enable the *Combine DEM value range in new schema* option before mosaicking.

Mosaic is not available with Basic license.

Mosaic Options

The mosaic options available in the Advanced Import dialog box are the same as the mosaic options in the Mosaic dialog box. See Mosaic Options.

Advanced Import Notes

Any image with multiple layers will be flattened. As a result of this, any transparency that exists on layers is lost, however, channels are preserved. To maintain transparency, use the File > Open command instead.

If you're using a custom DEM schema and use GeoCrop, the cropped result will still use the custom schema. It is recommended to use an Auto-stretched schema when using Geocrop so that the new schema range for the cropped result will be "Crop auto-stretched".

Image rotation may not be read with some files exported from ArcGIS. The Angle may display as "N/A" (not available) in the Geographic Imager panel.

When importing data using a Web Map Service, the "Set Background Transparent" option is only a suggestion for the server to create a transparent background. The WMS server may ignore this request, which will result in an opaque background.

When using drag and drop to add files, any files contained within subfolders will not be added. Only files contained in the parent folder will be added.

Adobe Photoshop saves TIFF images in a way that channel transparency

information is not compatible with Geographic Imager. A work around is to save to BigTIFF because channel transparency information in this format is compatible with Geographic Imager. If required, save it to TIFF since Geographic Imager had previously written the channel transparency correctly.

Related topics

Spatial Image Formats

Specifying a Reference File

Specifying a Coordinate System

Channel Management

Opening DEMs

Mosaicking Images

GeoCropping Images

5.5 Opening DEMs

Digital Elevation Models (DEM) and Digital Terrain Models (DTM) provide an effective method of storing information for continuous surfaces. Measured elevation values of the earth's surface is the most common application of DEMs, however, other applications include measurable phenomena such as rainfall, temperature and density. DEM data needs to be rendered so it can be displayed visually. Depending on what type of DEM data it is and how it should look, the type of rendering schema needs to be customized or automatically assigned.

Requirements

The image must be a supported form of elevation or terrain data to invoke the Import DEM file dialog box:

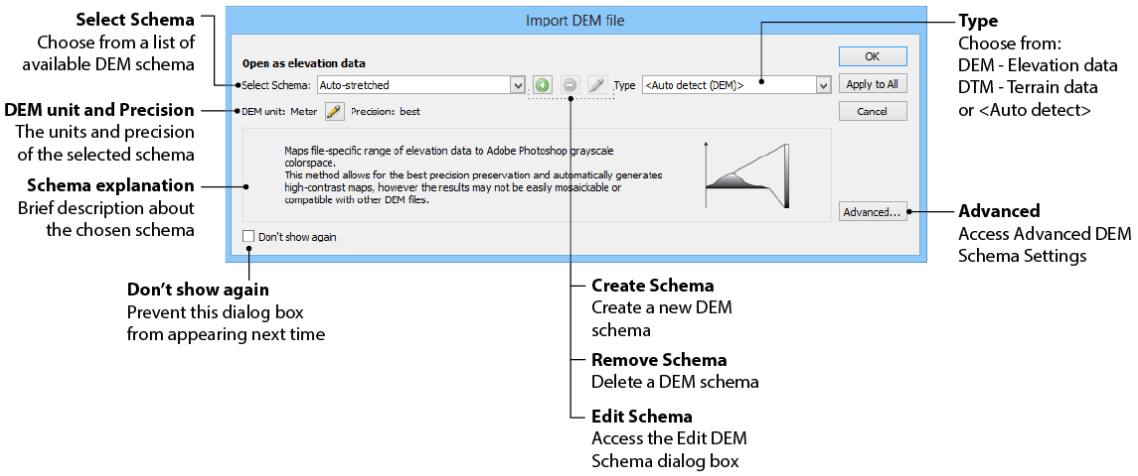
• ArcInfo ASCII Grid	• BIL	• USGS DEM

• ArcInfo Binary Grid	• ERDAS IMAGINE	• USGS SDTS
• ArcInfo Binary Floating Grid	• Military Elevation Data / DTED	• SRTM

See detailed information about each supported DEM format

Import DEM File Dialog Box

Open a supported DEM format using one of the methods described here. A detected DEM will prompt the Import DEM File dialog box.



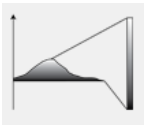
The Import DEM file dialog box provides options to apply a schema based on the statistics of the raster data set. Use a custom DEM schema, an auto-stretched schema or a raw data schema. A DEM schema increases the visual contrast of the raster display. Depending on the required appearance of the DEM, apply a schema suitable for the range of data within it. For example, DEMs may not contain the entire range of values that can be displayed; therefore, applying an appropriate schema may result in a sharper image and certain physical features may become easier to see.

Assign a DEM Schema

When a supported DEM is opened, the Import DEM file dialog box appears. To prevent it from appearing every time, click the **Don't show again** check box. This forces all DEMs to use the last used schema every time. This is only recommended if you're using Auto-stretched schema all the time. To reset when the Import DEM

file dialog box appears, click the **Reset 'Do not show again' preferences** link in the Geographic Imager Preferences dialog box.

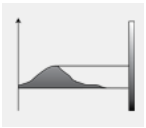
In the Select Schema drop-down list, several schema are available and are discussed below. To assign a DEM schema, click the OK button to accept the settings of the Import DEM file dialog box.



Auto-stretched

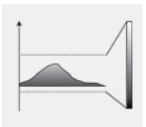
The Auto-stretched schema displays continuous raster cell values across a gradual ramp of Adobe Photoshop grayscale colour space. This schema displays a single band of continuous data and works well when a large range of values need to be displayed. Auto-stretched allows for the best precision preservation and automatically generates high-contrast images.

> You can't mosaic files unless they have the same schema. Use Advanced Import to import DEMs with different schemas and mosaic them using a combined value range in a new schema.



Raw Data and Negative Raw Data

These schemas assign elevation data directly to the Adobe Photoshop grayscale colour space. The Raw Data schema facilitates mosaicking with other raw imported images. Since it does not produce a high-contrast image, use Adobe Photoshop adjustment tools such as Levels and Curves. Use the Negative Raw Data schema with negative elevation values. The image preview in the Georeference dialog box or the Survey tab of the Geographic Imager panel can be used to view elevation data values. More information on this in the Important Notes section at the end of this topic.



Custom Schema

Custom schema are designated by blue text (or in its own list group) in the Select Schema drop-down list. When a custom schema is chosen, the **Remove Schema** and **Edit**

	Schema buttons are enabled.

DEM units and Precision

The default DEM units are displayed during import. To change the default units, create or edit a DEM schema and click the **Change Schema Units** button . The precision of the DEM is displayed but cannot be edited.

Delete a DEM Schema

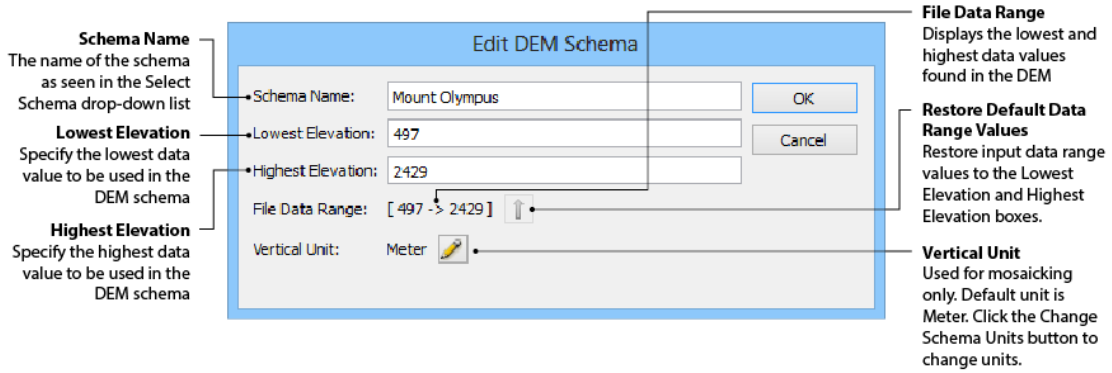
To remove a DEM schema from the Select Schema drop-down list, click the **Remove Schema** button .

Edit a DEM Schema

To edit a DEM schema, click the **Edit Schema** button . Geographic Imager analyzes the DEM to be edited and opens the Edit DEM Schema dialog box.

Creating a DEM Schema

To create a DEM schema, click the **Create Schema** button. Geographic Imager analyzes the DEM to be imported and opens the Edit DEM Schema dialog box. The Edit DEM Schema is populated with information available from the DEM. Any of the boxes can be edited to customize the schema.



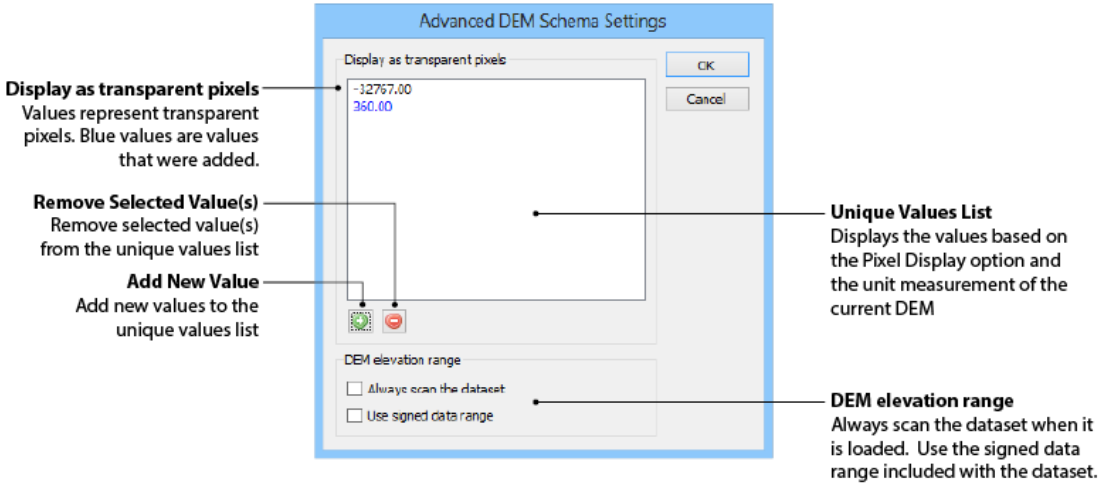
The Lowest Elevation and Highest Elevation values represent the lowest and highest data values to be mapped in the Adobe Photoshop grayscale colour space. Editing these values will change how the image is displayed. The File Data Range shows the lowest and highest data values in the current DEM. Use it as a guide when entering custom elevation values.

The **Restore Default Data Range Values** button is only enabled when either the Lowest Elevation or Highest Elevation box have a custom value entered. Click the button to restore the data range as specified in the File Data Range display.

Vertical units is only used for mosaicking. The meter unit is displayed by default, which is not dependent on the reference file of the current document. To change the Vertical Unit, click the **Change Schema Units** button and choose a new unit in the Select a unit for the DEM file dialog box.

Advanced DEM Schema Settings

Advanced DEM schema settings must be used in conjunction with a custom schema. To access the advanced DEM schema settings, click the **Advanced** button in the Import DEM file dialog box. These advanced schema settings affect how specific values in the DEM are displayed.



Display as transparent pixels

For DEM files where a No Data value can not be detected, specify any value to be displayed as transparent. The unique values list displays any data values specified to be a transparent pixel. The pixels are not removed or deleted from the DEM when specified as transparent. A No Data value (-32767.00) is always displayed as transparency and cannot be removed from this list.

Add and Remove values

Click the **Add New Value** button to add a new value to the list (range values are

not supported). Double-click the <new value> item and type in a new value (displayed with a blue color). To remove a value from the list, select value(s) and click the **Remove Selected Value(s)** button.

DEM elevation range

When the **Always scan the dataset** option is enabled, the whole DEM dataset is scanned for values when first opened instead of reading a data range from the DEM header (if it exists). By default, this option is disabled, which improves performance. However, sometimes the values stored in DEM header may be incorrect, so this option to scan the entire file will attempt to obtain the correct DEM elevation range.

Some values in a DEM can be interpreted a positive or a negative integer. If a DEM dataset doesn't specify whether it is signed or unsigned, the **Use signed data range** option can be enabled to specify it as signed. Essentially this option allows you to change the data type (singed/unsigned) interpreted from DEM.

Important DEM Schema Notes

Mosaic DEM files

When mosaicking DEM files together, each file must have the same DEM schema and an appropriate Vertical Unit specified. It is important to know the data range of all the DEM files that will be mosaicked so that a DEM schema can be created that encompasses the highest and lowest elevation of all the DEM files. It is recommended to use Advanced Import to mosaic multiple files that have different DEM schemas.

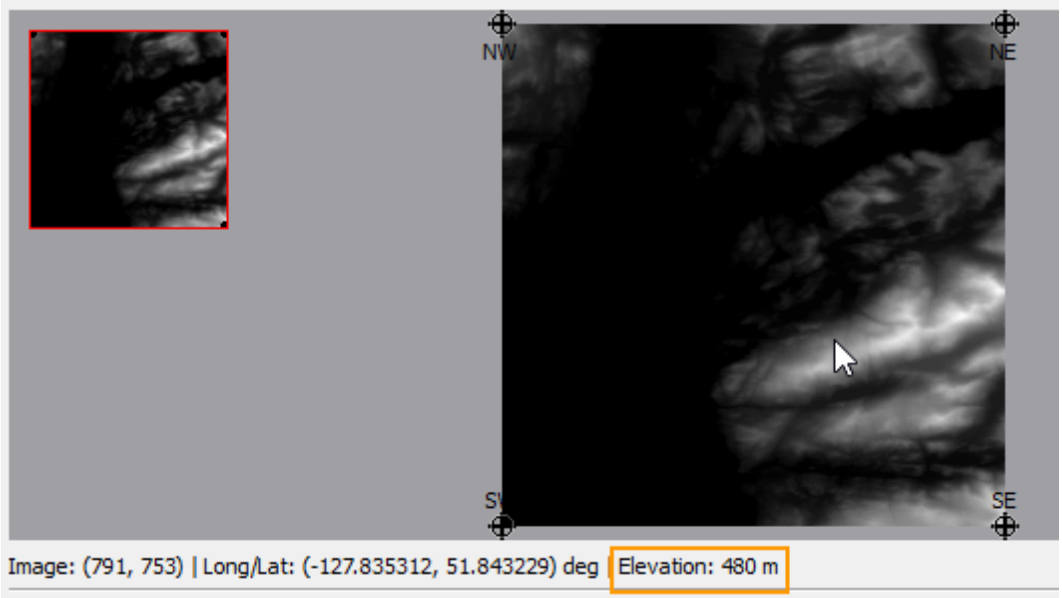
Esri BIL files

When opening BIL files without a colour table, the Import DEM file dialog box will show the options to Open as raster image or Open as elevation data. When a colour table (.clr file) is present in the same folder as the BIL file, it is automatically opened as a raster image.

View Elevation Values of a DEM

There are two ways to view DEM elevation values. Open the Georeference dialog box, the actual elevation value is displayed below the image preview. Move the mouse cursor to any position within the image view to see the values (updated in

real time).



The other way is to plot points with the Color Sampler Tool and view DEM elevation values in the Survey tab of the Geographic Imager panel. Up to four different points can be viewed at a time.

DEM Schema and Scripting

The creation of DEM schema cannot be recorded by Adobe ScriptListener or by using example scripts. Any DEM schema will have to be created prior to using automation.

Out of Range DEM Values

A warning is displayed when DEM files that contain low or high elevation values out of the shema range are imported. These out of range images may import incorrectly.

Negative Raw Data

The Negative Raw Negative schema only imports negative elevation values. To work with both positive and negative values, duplicate the DEM and re-open each with the appropriate DEM schema.

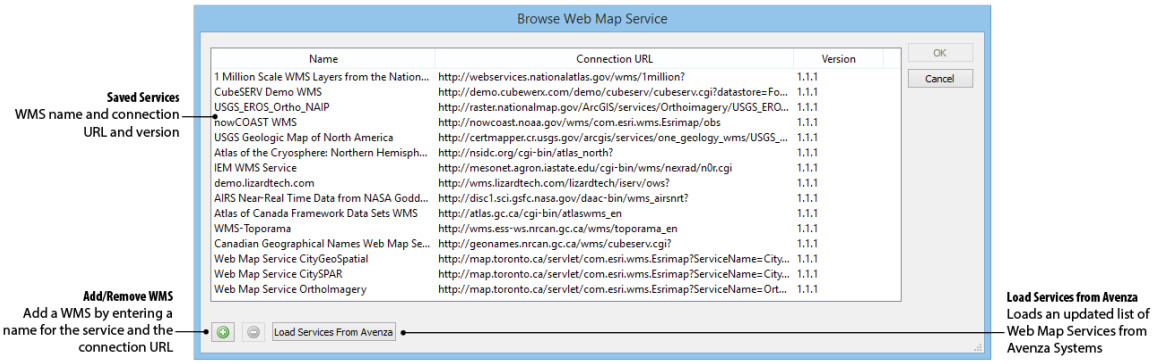
Related topics

Opening Images with Advanced Import

Terrain Shading DEMs

5.6 Importing WMS

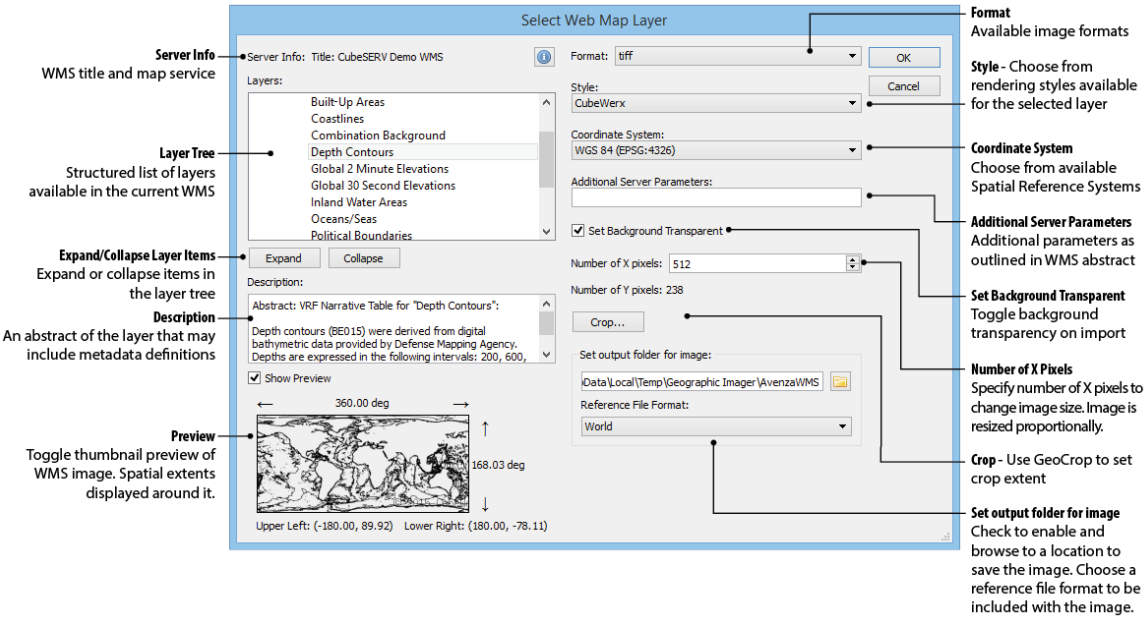
Import raster data with the Web Map Service (WMS). It accesses web servers that deliver raster content in a variety of formats. There are no format specific settings associated with this importer. To access WMS, go to Advanced Import and choose Web Map Service in the Format drop-down list, then click Browse.



The Browse Web Map Service dialog box is used to manage web services. Click Load Services From Avenza to populate the list with a number of services aggregated by Avenza Systems. To add a new service click the Add button, then add the service URL.

Geographic Imager WMS importer only supports WMS version 1.1.1.

Select Web Map Layer



Layers

On the Select Web Map Layer dialog box, choose a layer from the layer tree. Only one layer can be imported at a time. A description and preview provides more information about the layer and its extents.

Format

Choose from a variety of formats including: TIFF, GIF, PNG, and JPG.

Number of X pixels

Specify an X pixel (width) to change the imported image size. The Y pixel (height) is proportional. Depending on the layer, specifying a large X pixel value larger than the layer will prevent it from being imported.

Crop

Optionally, click Crop to open the GeoCrop dialog box. Use GeoCrop to specify a crop area.

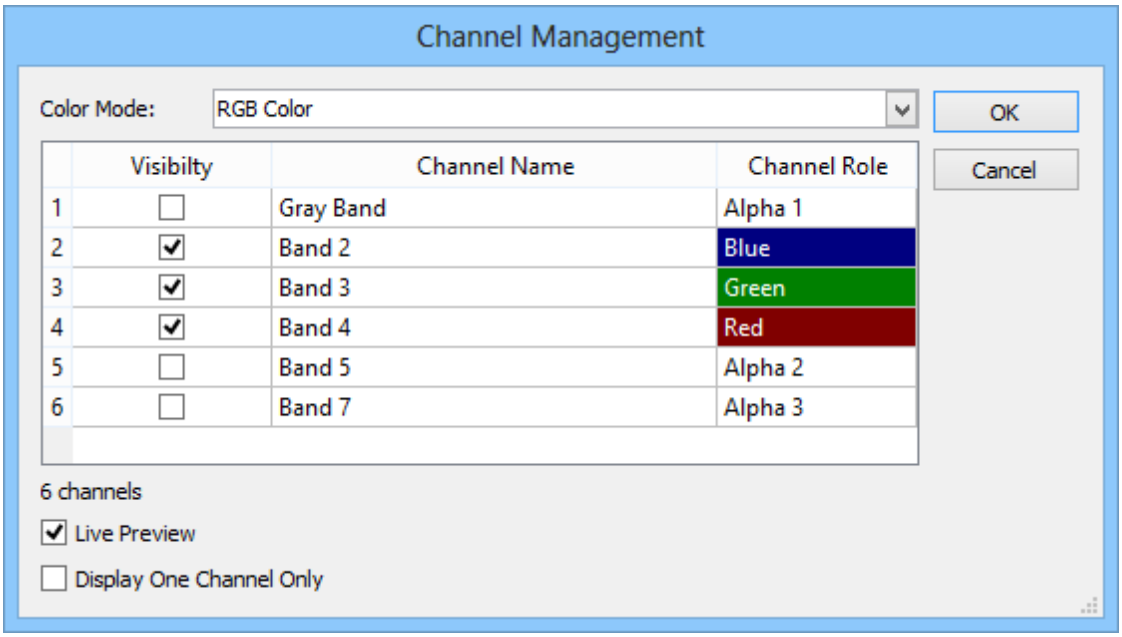
Related topics

Opening Images with Advanced Import

GeoCropping Images

5.7 Channel Management

Adobe Photoshop uses channels to store color information about an image. Geographic Imager Channel Management allows you to control channel mapping and assignment of channel color roles for false-composite multiband imagery. Channel Management is available on the Geographic Imager panel and when using Advanced Import.



The **Color Mode** drop-down list provides available color modes: RGB Color, Lab Color, Grayscale, and CMYK Color. Each color mode has its own set of channel colors:

Color Mode	Color Mode Channels
RGB Color	Red, Green, Blue
Lab Color	Lightness, A, B
Grayscale	Gray
CMYK Color	Cyan, Magenta, Yellow, Black

To edit how the color mode channels are assigned, click the Channel Role drop-down list to assign that channel a new color (such as Red, Green, or Blue, for an RGB color mode). To change a channel name, double-click one in the Channel Name column and type a new name. Enable the **Live Preview** option (Windows only) to see how the visibility and channel role adjustments affect the image. Enable the **Display One Channel Only** option to isolate visibility of a selected channel. When these changes

are confirmed, they are reflected in the Adobe Photoshop Channels panel.

Important Channel Management Notes

Live Preview and Display One Channel Only options are not available on Geographic Imager for Mac.

By default, if the color mode of an image can't be detected, the color mode is set to Grayscale Color with alpha channels if it has fewer than three channels. Otherwise Color Mode is set to RGB Color with alpha channels.

Channel management is not compatible with 32-bit images.

Color Mode is not available for images imported from a Web Map Service.

Channel name read and write capability is only supported with the IMG format.

Changing color modes will flatten layers and any transparencies will be lost.

When using Advanced Import, the MrSID encoder (MG4) adds an extra alpha channel as transparency when it saves an image. This means that one channel is used as transparency and the total number of alpha channels is less than is shown in the channel management dialog box.

You can only apply transparency from a channel using Advanced Import.

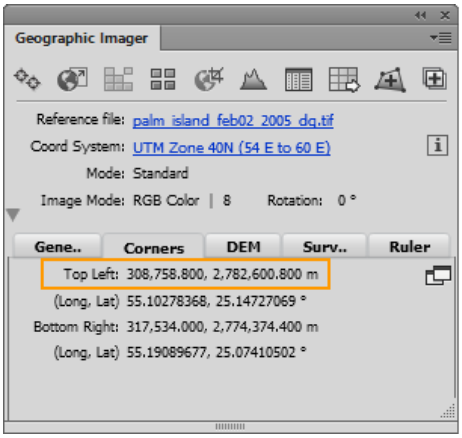
Related topics

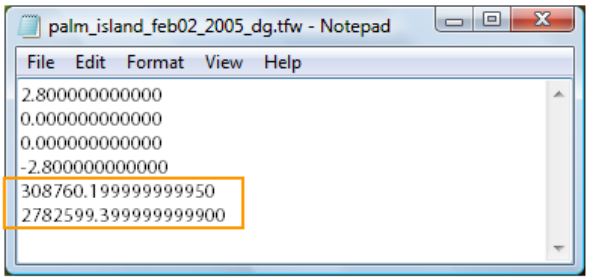
Opening Images with Advanced Import

5.8 Pixel Registration

The coordinate information shown in a World file (tfw) and the Geographic Imager panel are different because World files use the center of the pixel to derive coordinate

information while the Geographic Imager panel uses: 1) the top left corner coordinates of the pixel placed on the very top left corner of the image; and 2) the bottom right corner coordinate of the pixel placed at the very bottom right corner of the image. The second and third values in the World file are zero because there is no rotation or skew.





When saving to GeoTIFF, it is possible to choose a different reference method: Pixel-As-Area or Pixel-As-Point. Pixel-As-Area uses the upper left corner of a pixel as registration. Pixel-As-Point uses the center of the pixel as registration. A Geographic Imager preference allows you to keep existing pixel reference point of current image or override by choosing Pixel-As-Area or Pixel-As-Point.

Related topics

The Geographic Imager Panel

Opening Images

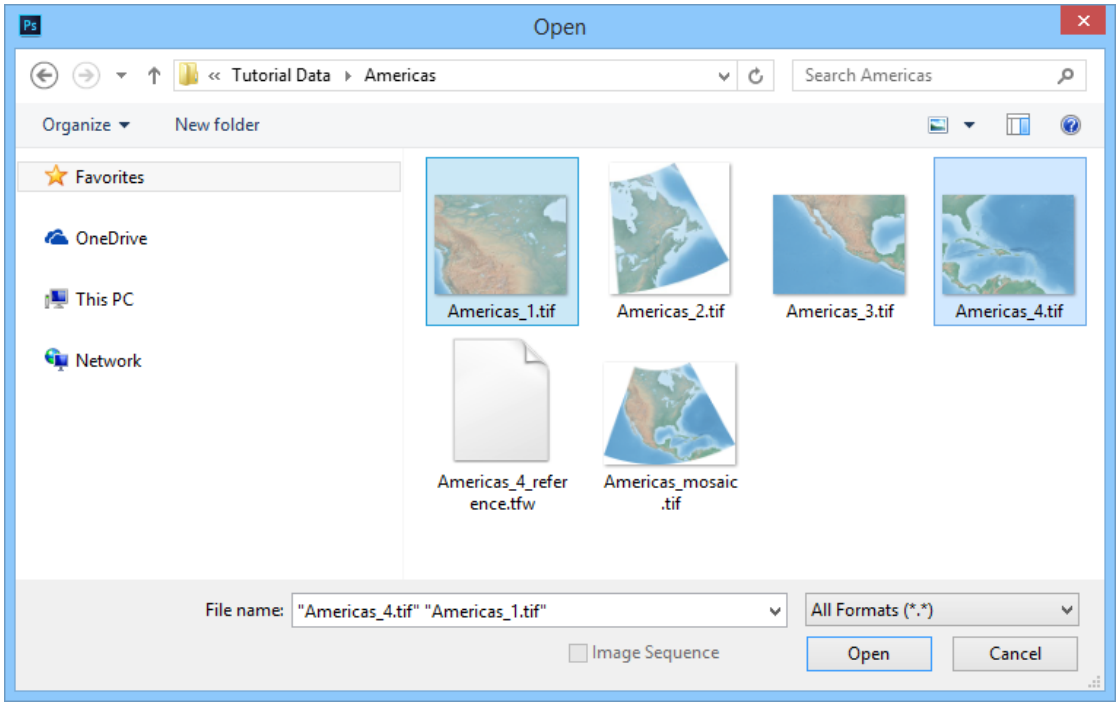
5.9 Open Image Tutorials

5.9.1 Open Images and Transform Tutorial

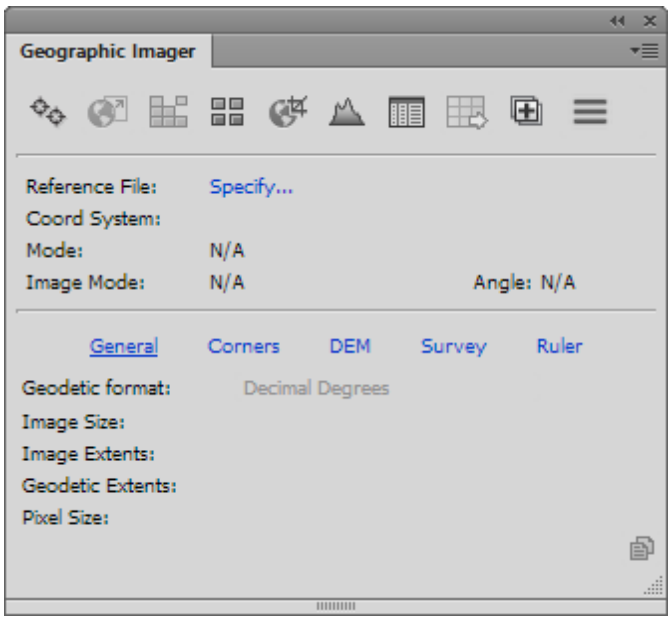
Open Images

Opening a spatial image is similar to opening up any other image in Adobe Photoshop.

1. Make sure you have installed Geographic Imager.
2. In Adobe Photoshop, choose File > Open. Browse to the \Tutorial Data\Americas folder and open both **Americas_1.tif** and **Americas_4.tif**.



Make the Americas_4.tif file the active document and open the Geographic Imager panel. If the panel is not visible, choose Window > Extensions > Geographic Imager.

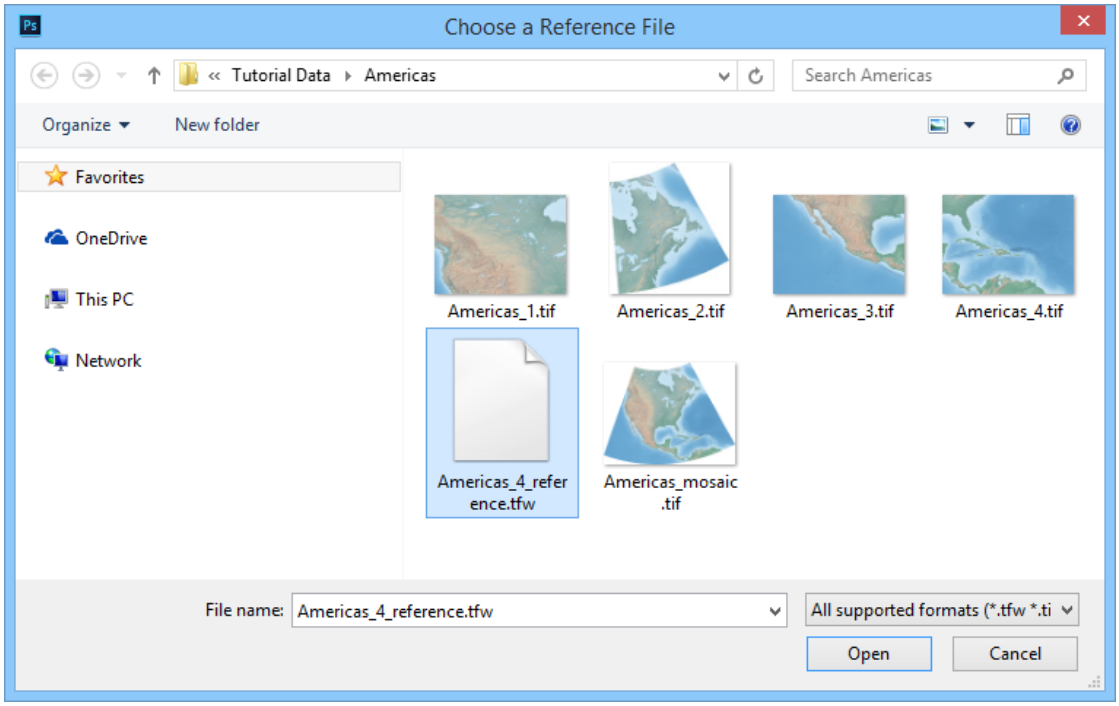


The Americas_4.tif has no spatial data, however, you can specify reference information and a coordinate system using the Geographic Imager panel.

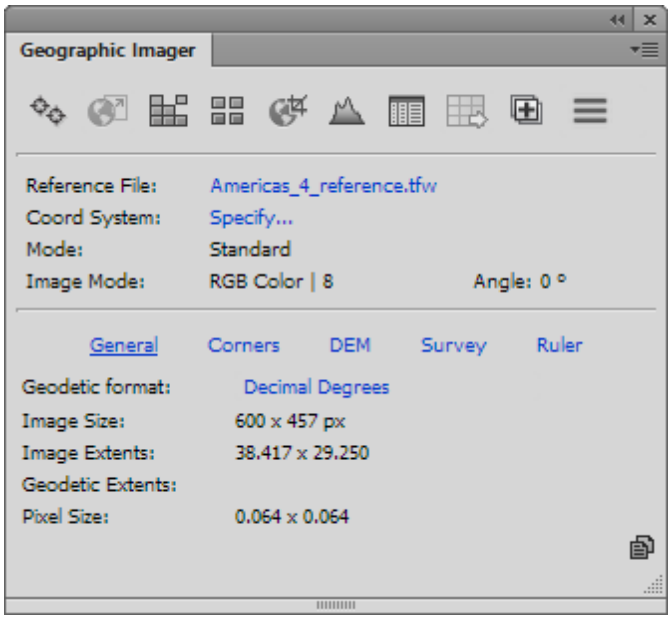
A reference file contains coordinates that describe the location, image size, pixel size, and rotation of an image file. It does not contain actual image data. Next, you'll specify a reference file for the Americas_4 document.

3. With the Americas_4.tif file as the active document, click the Reference file **Specify** link in the Geographic Imager panel.

4. Select **Americas_4_reference.tfw** and click Open.



The reference file Americas_4_reference.tfw (World reference file) is listed in the Geographic Imager panel. On the General and Corners tab, there is some spatial information displayed as well, including image extents, pixel size and top-left and bottom-right coordinates.



The next step is to provide a coordinate system for the image.

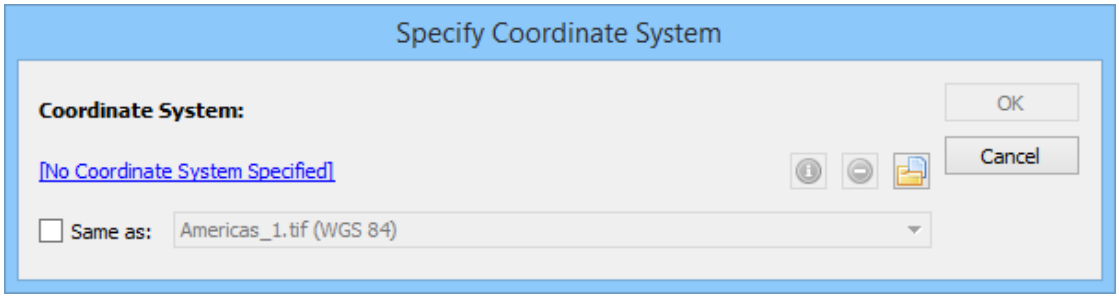
5. Keep these images open for the next tutorial.

Specify a Coordinate System

Some reference files do not store coordinate system information. For example, the previously used tfw world file does not contain any coordinate system. To continue the tutorial, you need to specify a source coordinate system. For more information on reference files, see Specifying a Reference File.

The Americas_4.tif currently has no coordinate system assigned. You'll specify a coordinate system similar to the Americas_1.tif using these steps.

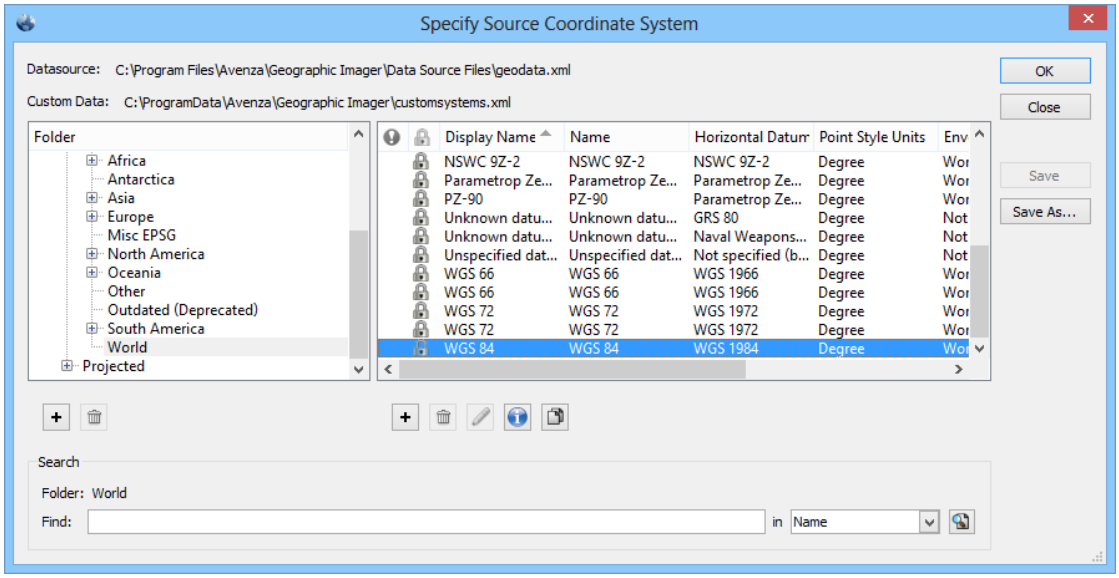
1. With the Americas_4.tif file still the active document, click the Coordinate System **Specify** link in the Geographic Imager panel.



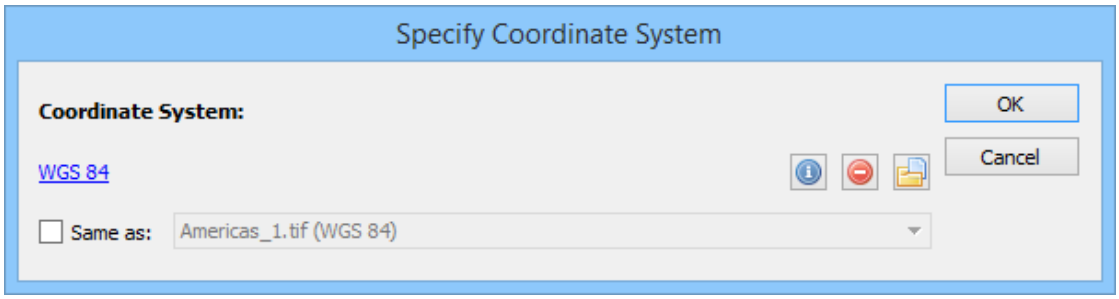
You can specify a coordinate system for the active document in one of two ways: choosing from a database of coordinate systems or choosing one that another open image has. First, choose from a database of coordinate systems:

2. In the Specify Coordinate System dialog box, click the **[No Coordinate System Specified]** link.

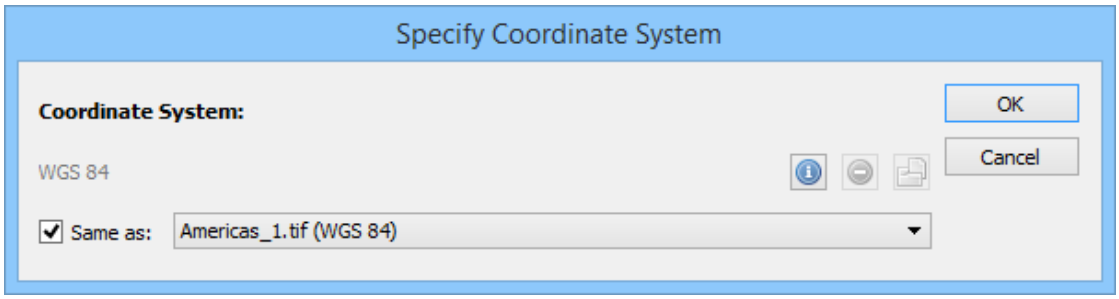
3. In the Select Coordinate System dialog box, expand the Coordinate Systems > Geodetic > World category, select **WGS 84** in the coordinate system list and click OK.



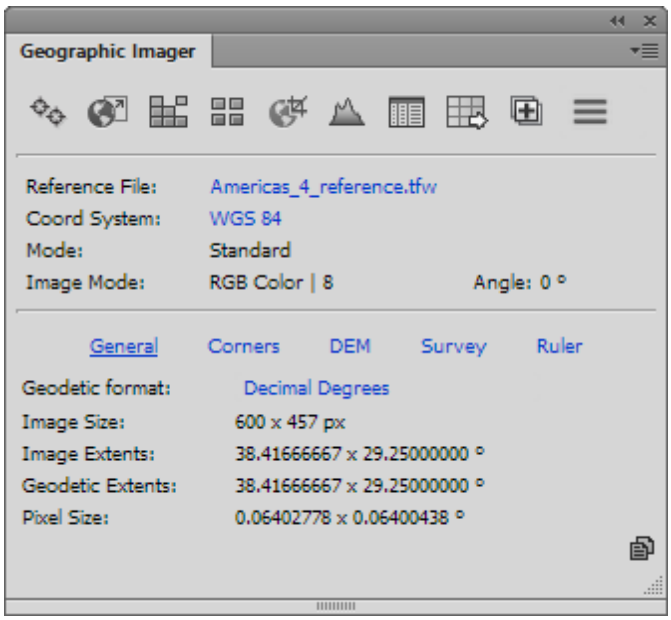
4. Click OK in the Specify Coordinate System dialog box.



Alternatively, you could use the Same as option since Americas_1.tif also has a WGS 84 coordinate system.



This assigns the WGS 84 coordinate system to the Americas_4.tif document. The information is updated on the Geographic Imager panel.

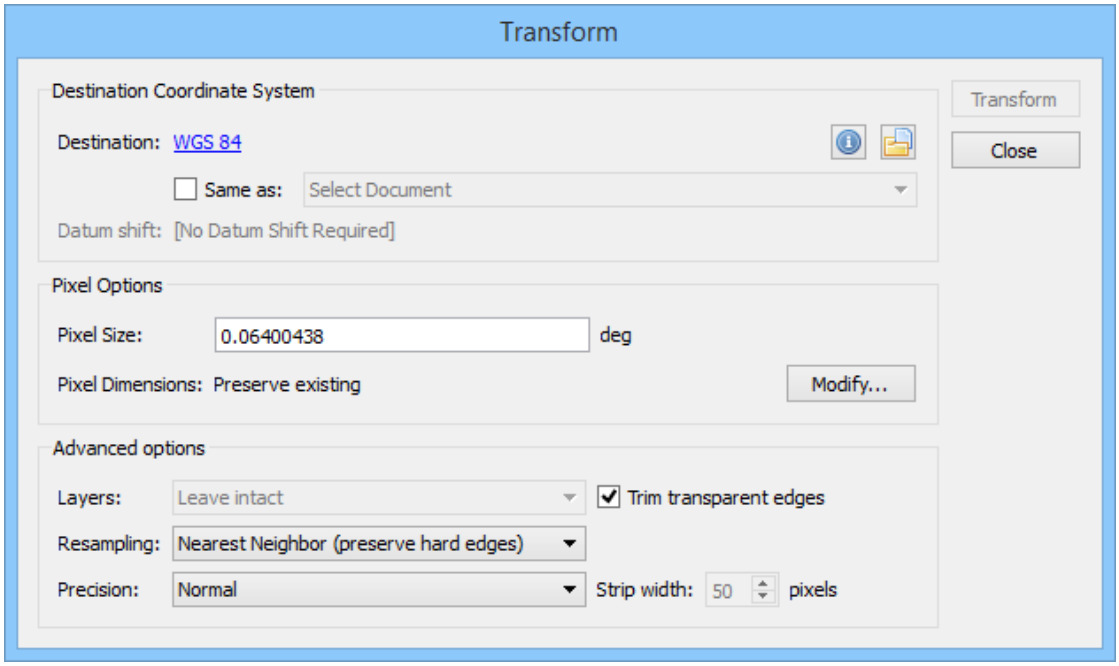


5. Keep these documents open for the next tutorial.

Transform a Coordinate System

Transforming a coordinate system transforms a georeferenced source image into a destination georeferenced image with a different coordinate system. In this exercise, the image will be transformed from WGS 84 coordinate system to British National Grid coordinate system.

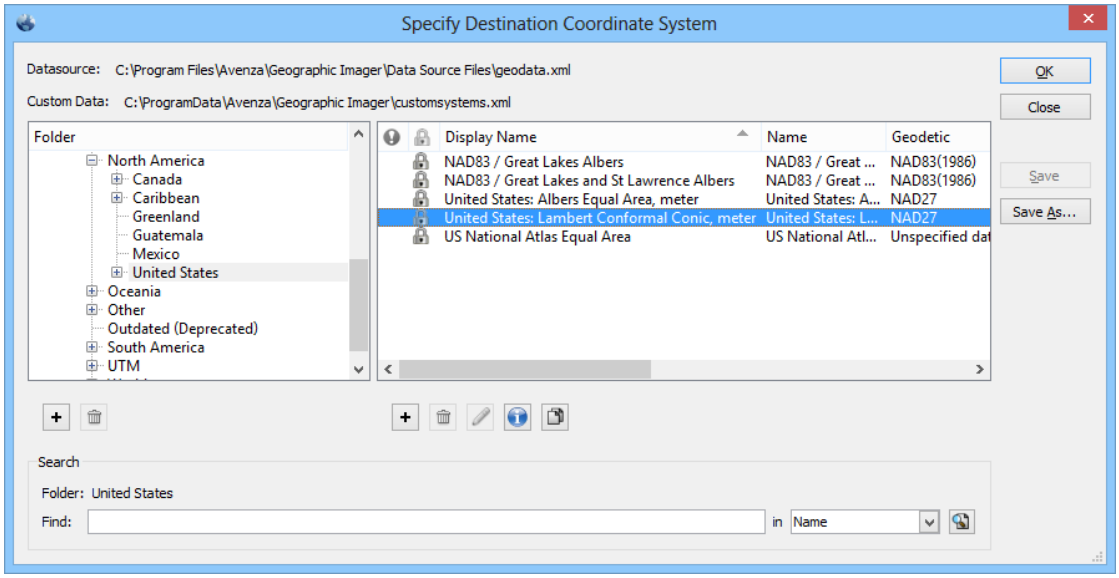
1. With Americas_4.tif still the active document, click the **Transform** button on the Geographic Imager panel.



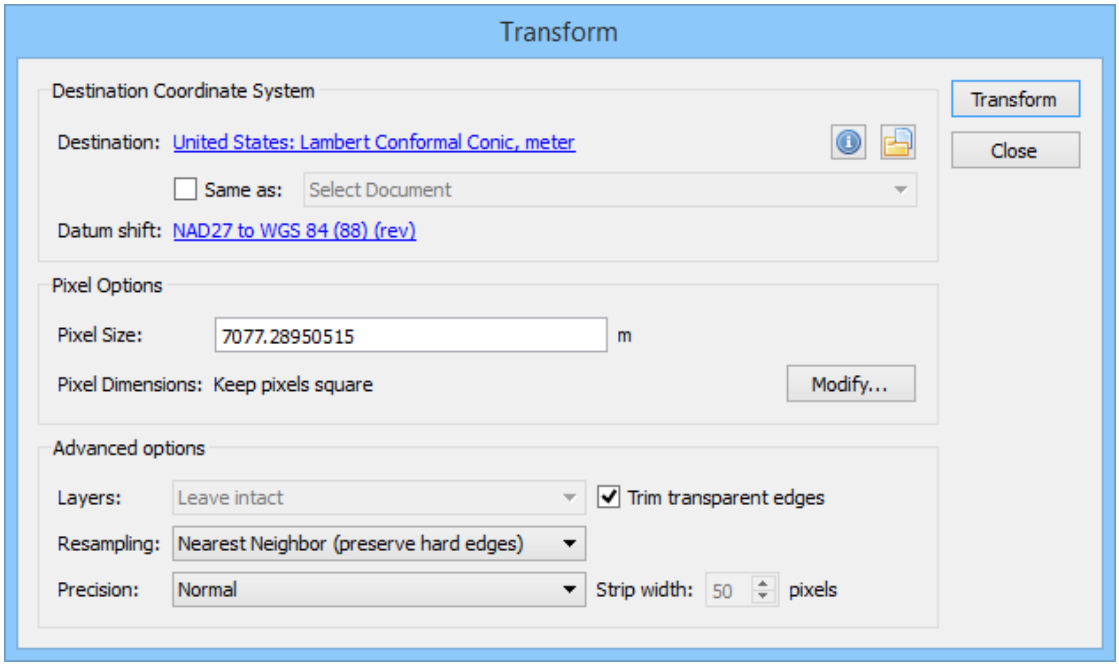
2. In the Transform dialog box, click the **WGS 84** link to select a different destination coordinate system.

This is different than specifying a source coordinate system. A destination coordinate system is the coordinate system of the image after it is transformed.

3. Expand the Coordinate Systems > Projected > North America > United States category, select **United States: Lambert Conformal Conic, meter** from the coordinate system list and click OK.

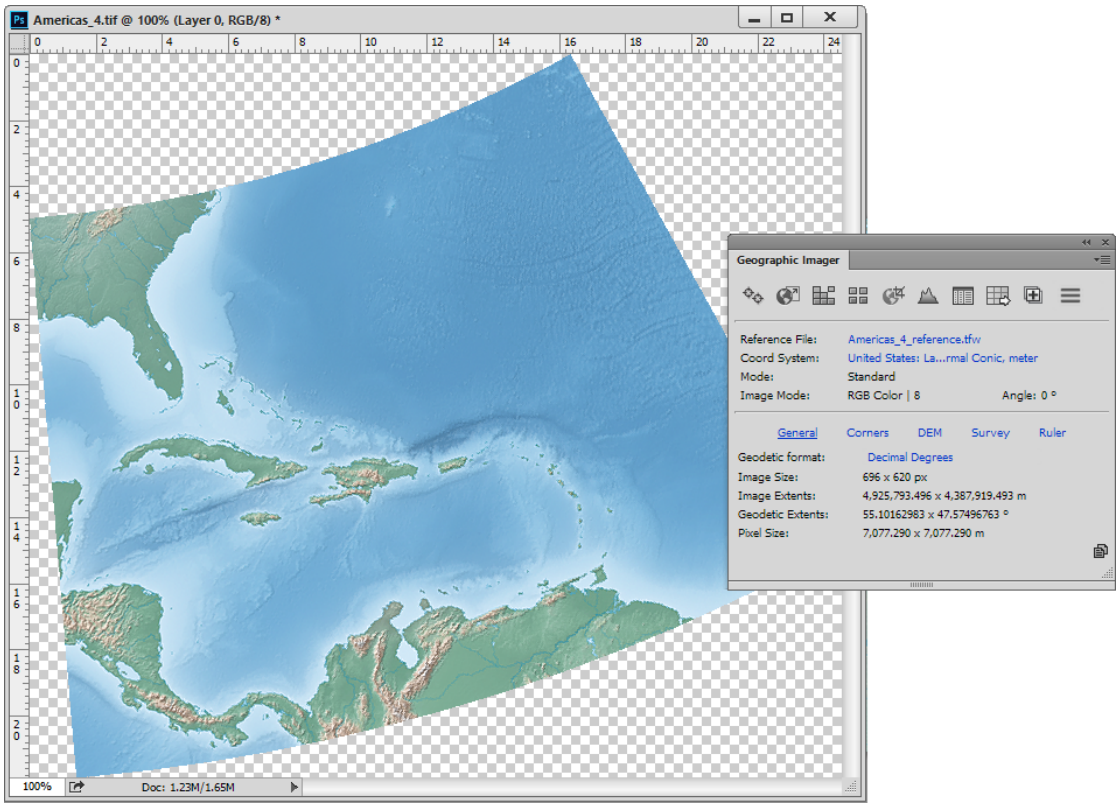


This sets the destination coordinate system that will be used for the transformation. At this point, Geographic Imager automatically selects an appropriate datum shift to be performed during the transformation process. If this datum shift needs to be changed, click the Specify button to open the Specify Datum Shift dialog box and select the desired datum. See page Geographic Imager user guide for an explanation of datum shift.



Note that the Pixel Size is 7077.28950515 meters. The pixel size can be changed to any user specified value. This essentially changes the size of the image as each pixel represents a geographic unit. In this instance, we will leave the pixel size as the default.

4. Click the **Transform** button.



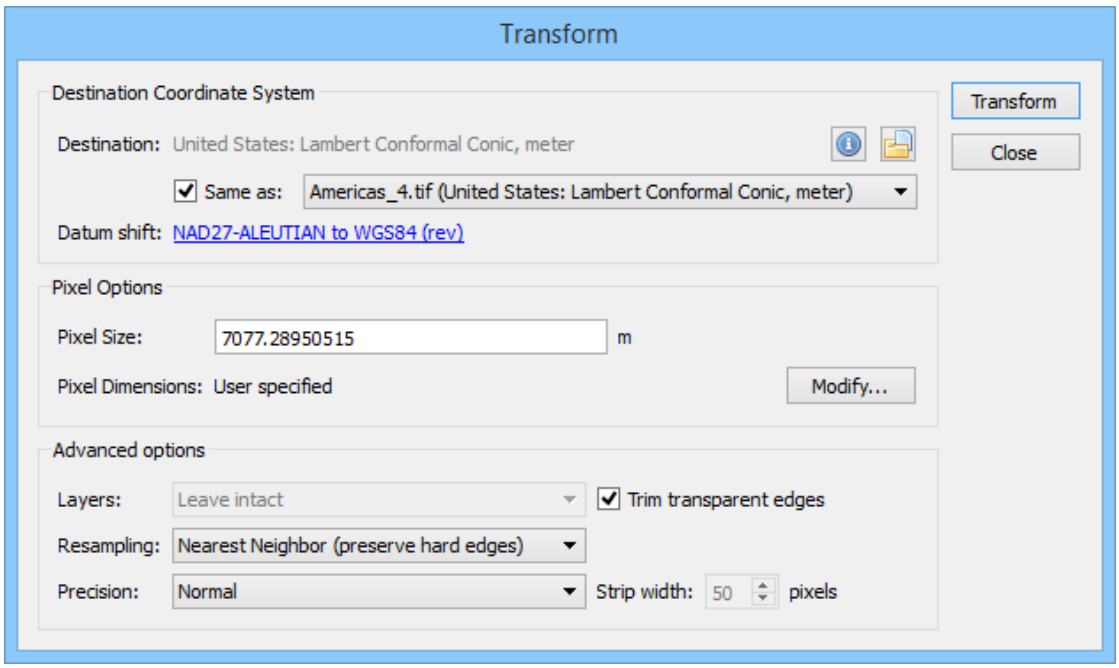
The image is transformed to a Lambert Conformal Conic projected coordinate system.

5. Make the Americas_1.tif file the active document and click the Transform button on the Geographic Imager panel.

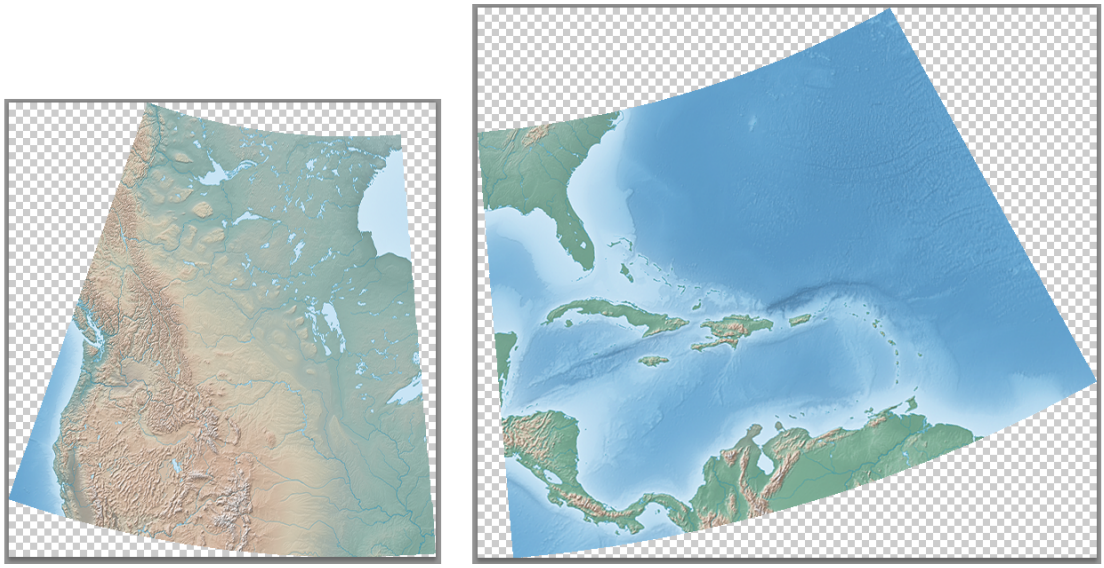
The panel displays the coordinate system as WGS84. You'll also transform it to the Lambert Conformal Conic projected coordinate system.

6. Click the Same As check box and choose **Americas_4.tif (United States: Lambert Conformal Conic, meter)** from the drop-down list.

7. Click **Update pixel dimensions to match the selected document** when prompted.



8. Click the **Transform** button.



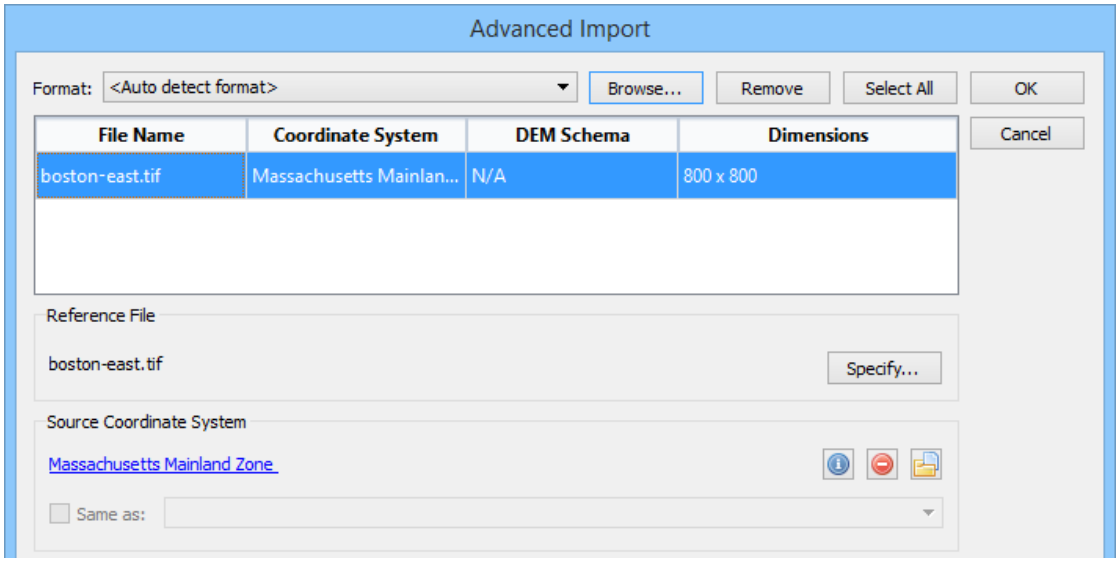
Both images are now in the same projected coordinate system (United States: Lambert Conformal Conic, meter) and have the same pixel size. From here, the images could be mosaicked together or saved to retain referencing.

5.9.2 Advanced Import Tutorial

Advanced Import allows you to imports images and provides useful settings to change

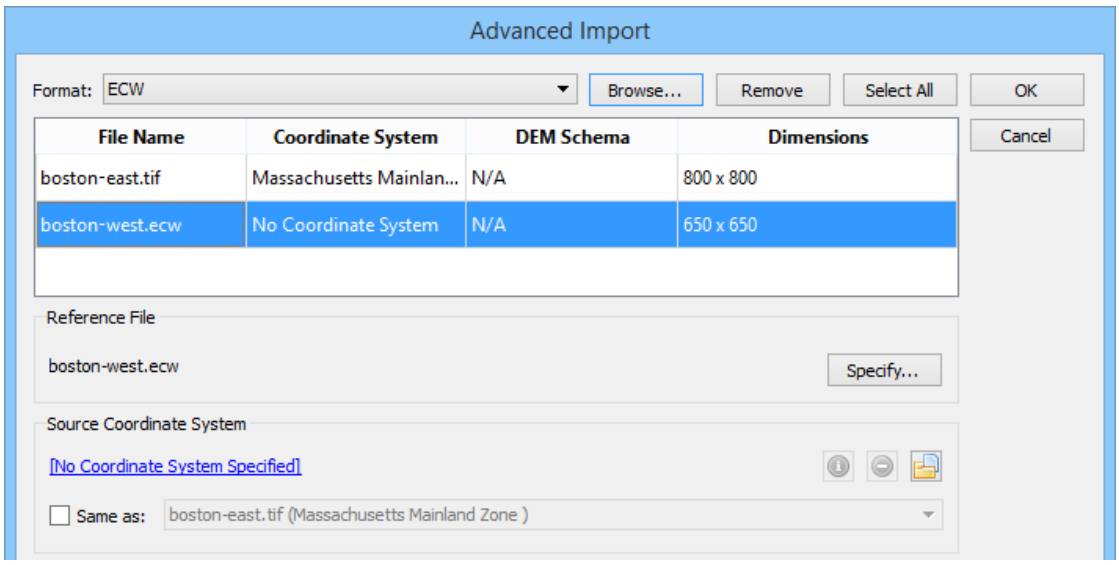
reference file, coordinate system, color channel management, DEM schema, adjust image size and extents and even mosaic. It is also useful for quickly cropping large sized images to a specific geographic area which may have initially required a long load time. In this exercise, you'll import two images of different formats, image sizes, and coordinate systems and then mosaic them together.

1. On the Geographic Imager panel, click the **Advanced Import** button.
2. On the Advanced Import dialog box, choose GeoTIFF/BigTIFF/TIFF from the Format drop-down list and click Browse.
3. Navigate to the Tutorial Data folder, choose **boston-east.tif**, and click Open. If necessary, click OK to close the message box that warns about transparency and layer effects.



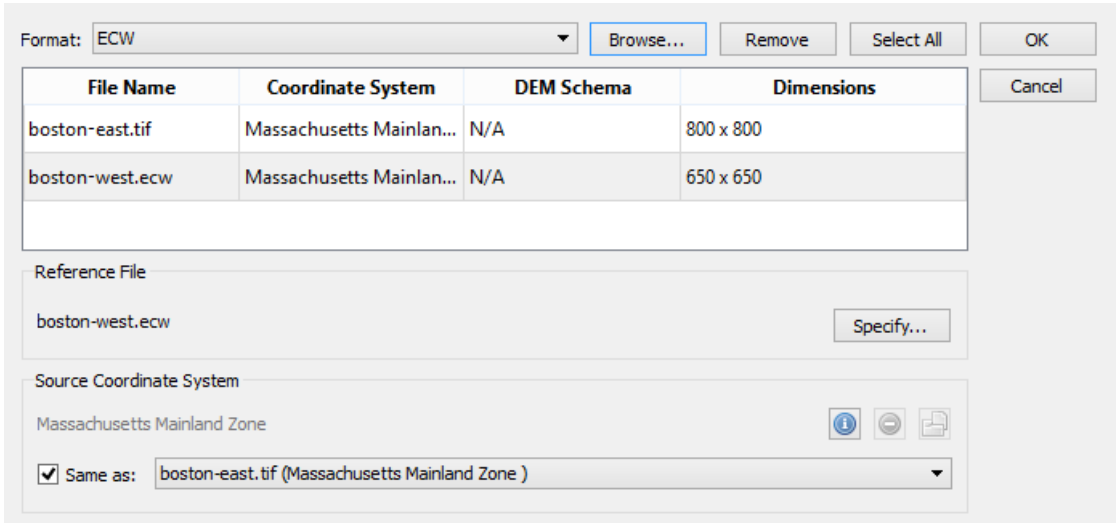
Information about boston-east.tif is displayed in the Import File List and shows that it has a Massachusetts Mainland Zone coordinate system and an 800 x 800 pixel image dimension.

4. Choose ECW from the Format drop-down list and click Browse.
5. Navigate to the tutorial data folder, choose **boston-west.ecw**, and click Open.



Information about boston-west.ecw is displayed in the list and shows that it has no coordinate system and a 650 x 650 pixel image dimension. You'll use the Advanced Import options to make the images compatible so that they can be used in a mosaic.

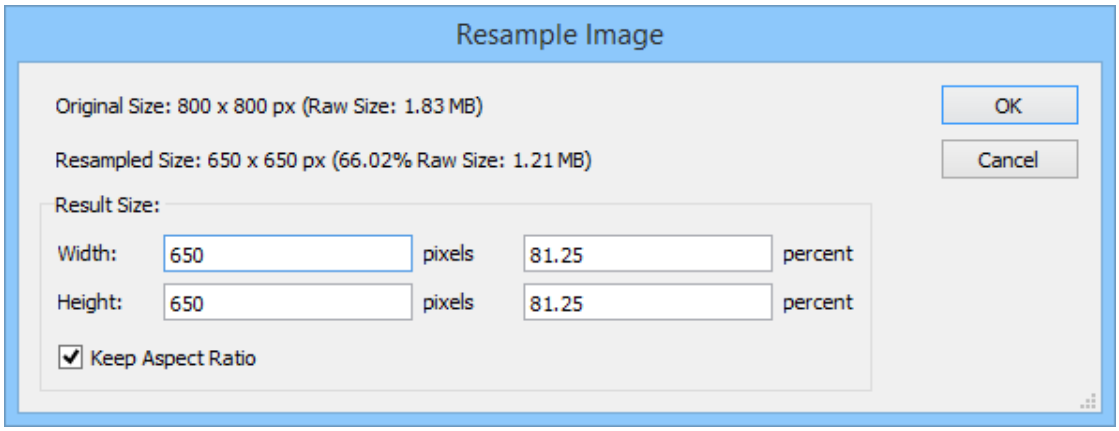
6. Make sure boston-west.ecw is highlighted in the file list. Below it, in the Source Coordinate System frame, click the **Same As** check box.



Only boston-east.tif is available in the coordinate system drop-down list because it is the only other file available in the file list. The coordinate system is updated to Massachusetts Mainland Zone in the file list for boston-west.ecw. Next, you'll change the image dimensions for the GeoTIFF image by entering a resample value.

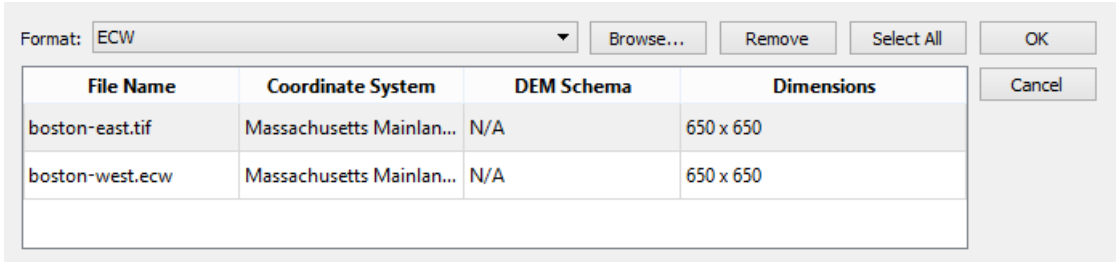
7. Make sure boston-east.tif is highlighted in the file list. Below it, in the Image Extents frame, click the Resample button to open the Resample Image dialog box.

8. Change the Width to 650 pixels. The Keep Aspect Ratio option ensures the height is also 650.

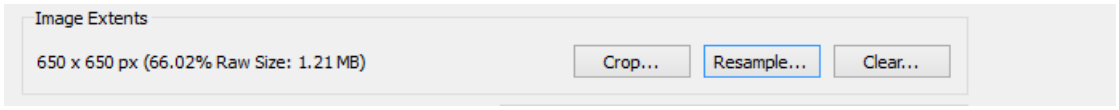


9. Click OK.

10. The Dimensions column values update to reflect the resample size that you just entered.

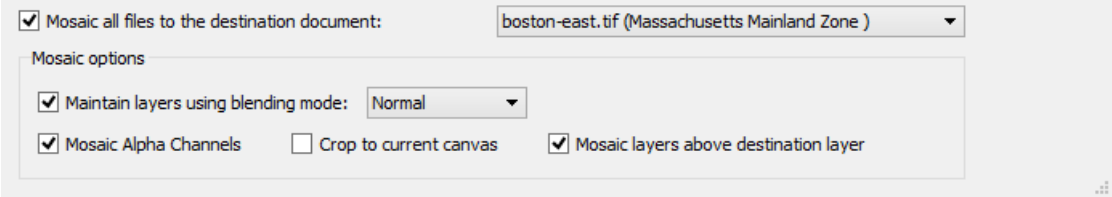


The Image Extents frame also updates to reflect the resample size.



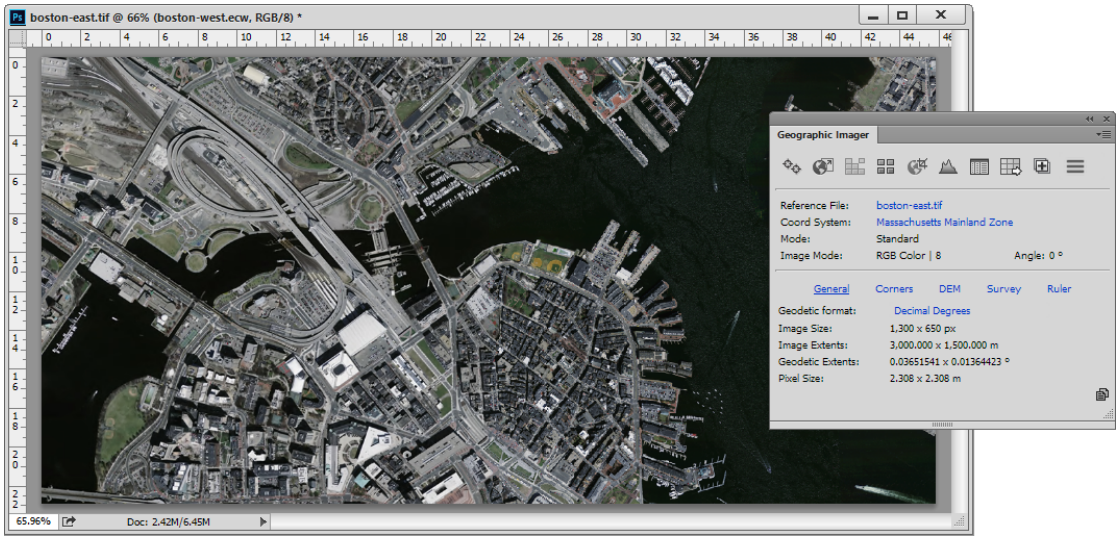
Lastly, you'll setup the mosaic option so that the files can be mosaicked together.

11. At the bottom of the dialog box, click the **Mosaic all files to the destination document** check box.



The boston-east.tif file is shown in the list and will be the destination document for the mosaic.

12. Click OK to complete the Advanced Import process.



The two image formats are now mosaicked together to create one seamless image. This is a similar result to a workflow that would have required you to open the images separately, adjust the coordinate system, change the image size, and then create a mosaic.

In the Layers panel, notice that there is only one layer created from the two images. To maintain separate layers, ensure the Keep source data on separate layers option is checked in the Advanced Import dialog box.

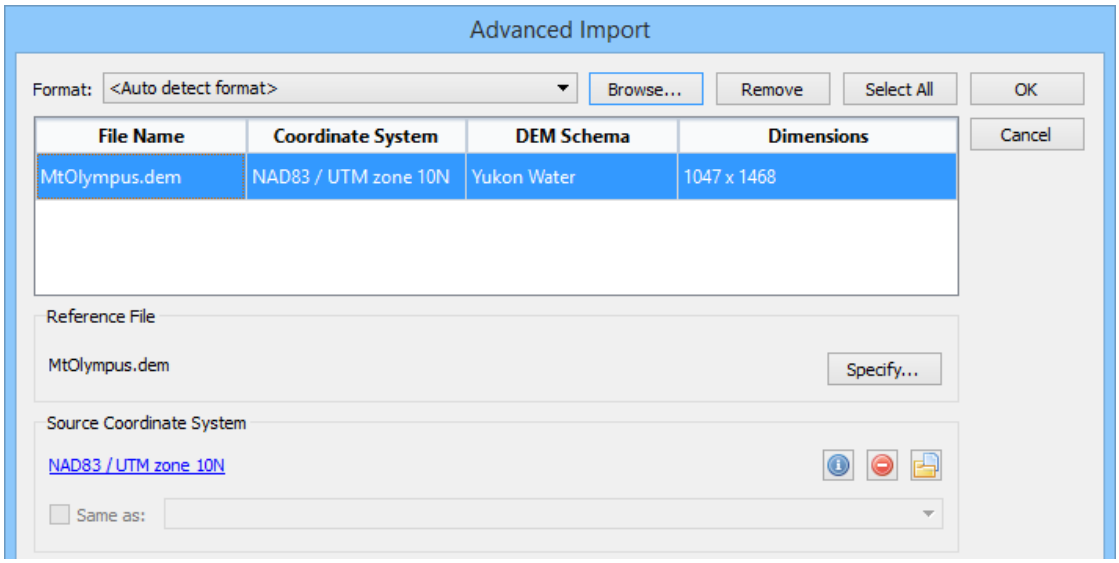
5.9.3 Advanced Import DEM Tutorial

Advanced Import can also import DEM files and provide DEM schema settings. In this exercise you'll also specify coordinates to create a crop of the image. To learn more about cropping just an image, see the GeoCrop Tutorial.

1. On the Geographic Imager panel, click the **Advanced Import** button.

2. On the Advanced Import dialog box, choose USGS DEM from the Format drop-down list and click Browse.

3. Navigate to the \Tutorial Data\Mt Olympus 3D Landscape Data folder, choose **MtOlympus.dem**, and click Open.



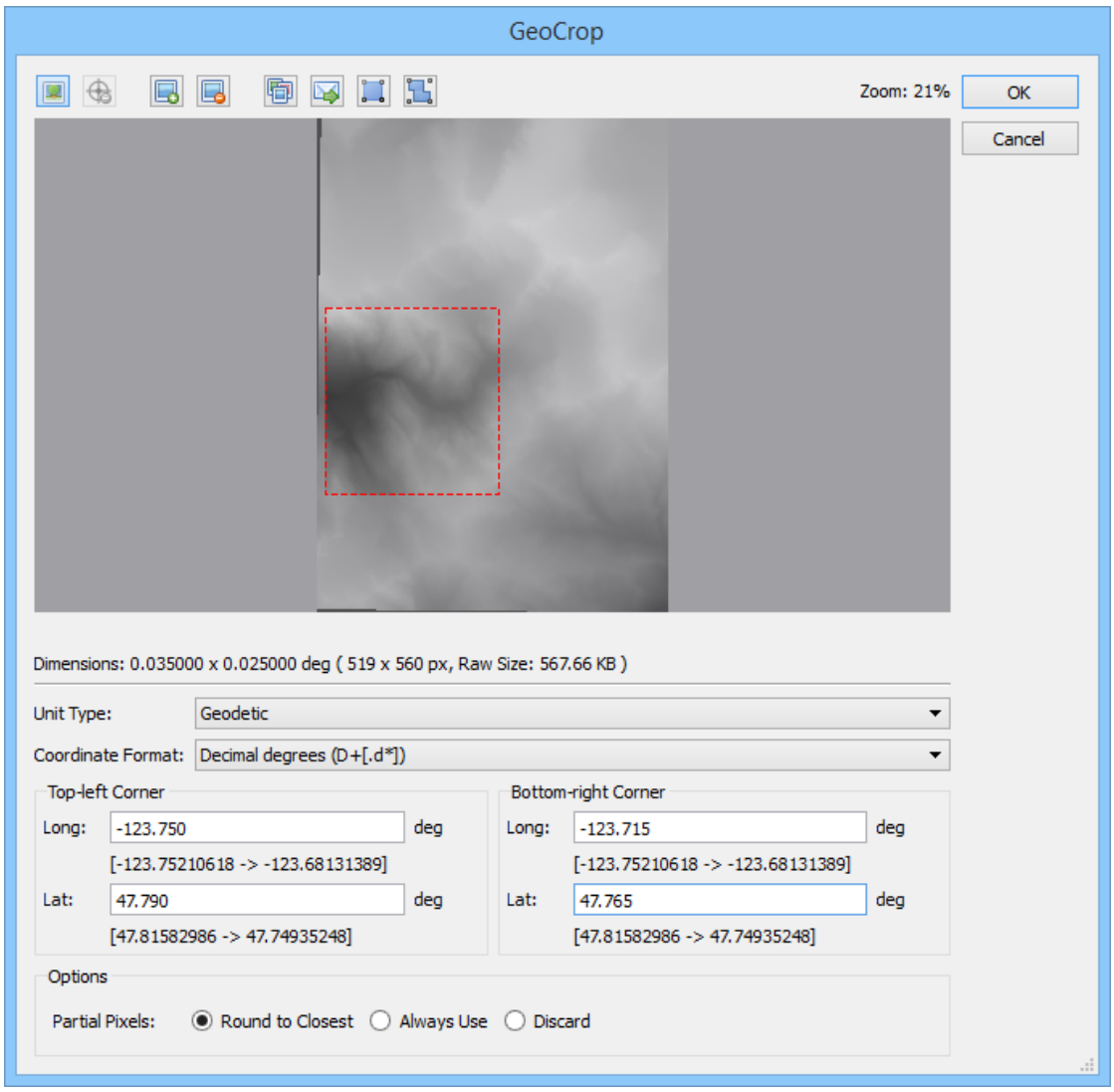
The Mount Olympus DEM is displayed in the Import File List and shows that it has a NAD83 / UTM zone 10N coordinate system and an 1047 x 1468 pixel image dimension. Below the list, in the DEM Schema frame, the schema is displayed (as Yukon Water). If the DEM Schema is not listed as Auto-stretched, click the **Specify** button and choose the **Auto-stretched** schema. This will help the DEM to be displayed using a colour ramp that is auto-stretched to it's values.

4. In the Image Extents frame, click the **Crop** button.

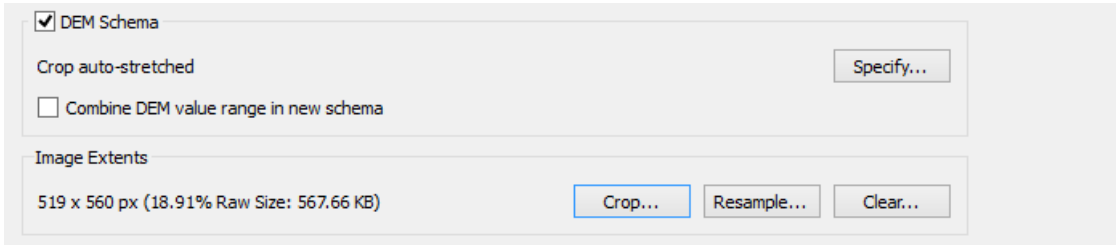
5. Choose **Geodetic** from the Unit Type drop-down list and choose **Decimal degrees** from the Coordinates drop-down list.

6. In the Top-left Corner frame, enter **-123.750** into the Long box and enter **47.790** into the Lat box.

7. In the Bottom-right Corner frame, enter **-123.715** into the Long box and enter **47.765** into the Lat box.



8. Click OK.

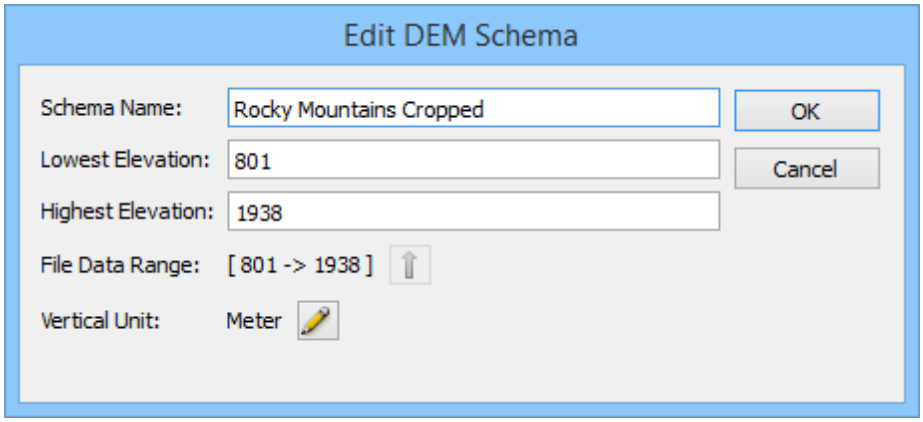


The image dimensions are now 519 x 560 pixels (cropped from 1047 x 1468 pixels) according to the crop coordinates you specified. The DEM Schema also changes to "Crop auto-stretched" to indicate that not all of the values in the DEM are included in the schema.

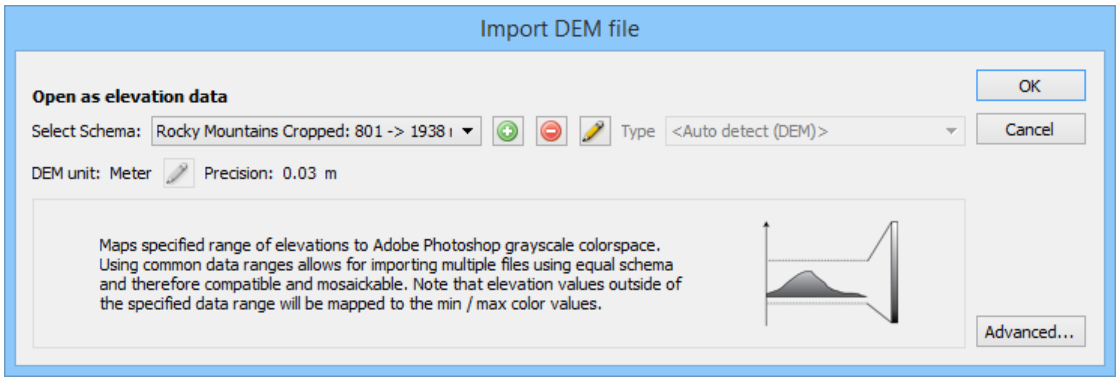
9. You'll save the DEM Schema so that it has a proper name and so you can see its range values.

10. In the DEM Schema frame, click the **Specify** button.

11. In the Import DEM File dialog box, click the green **Create New Schema** button. Enter **Rocky Mountains Cropped** as the new schema name, then click OK.



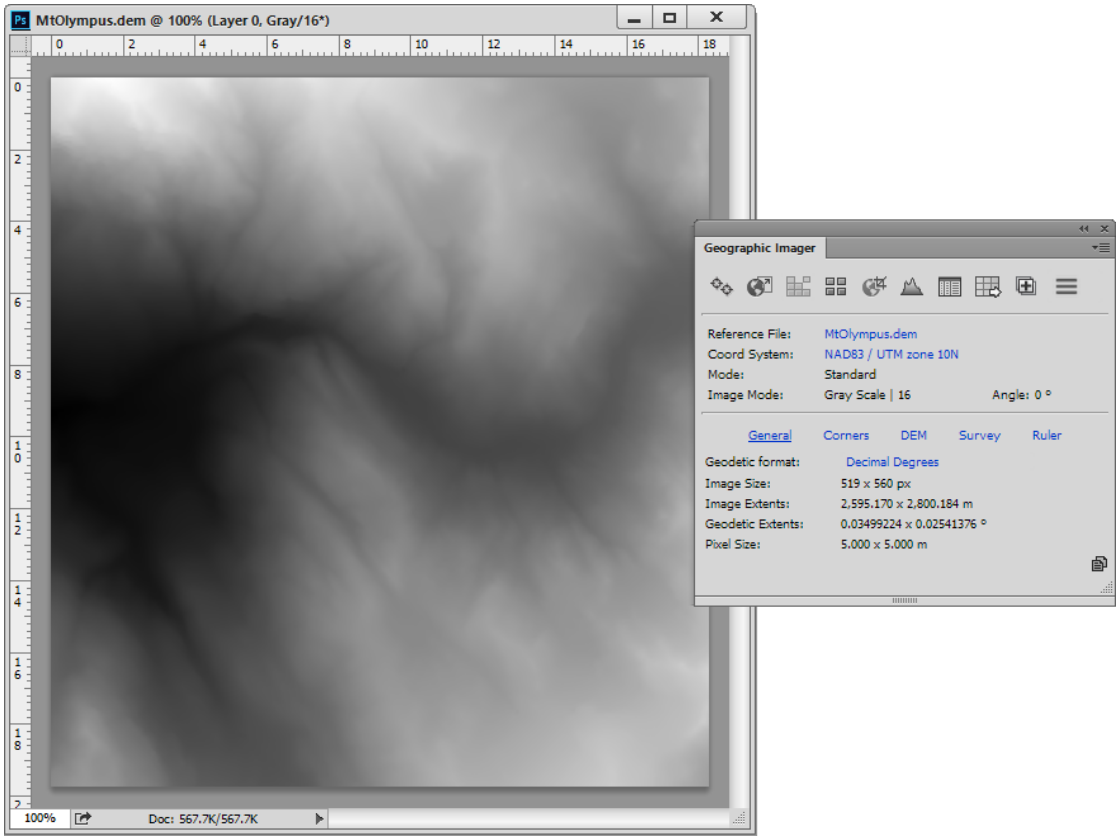
The elevation range values for the cropped image are 801 meters (lowest) to 1938 meters (highest). Before the crop, the range was 496 meters to 2429 meters. The crop cut some of the lower and upper range elevations.



12. Click OK to close the dialog box.

The DEM Schema name is updated in the file list and in the DEM Schema frame below. Its range values are also shown. The image dimensions also updated below in the Image Extents frame.

13. Click OK to import the DEM.



6 Transforming Spatial Images

Geographic Imager adds a new dimension to Adobe Photoshop by having the ability to transform georeferenced images into a common coordinate system. It also allows you to specify a custom coordinate system for transformation. Transforming spatial images into another coordinate system is an integral part of Geographic Imager.

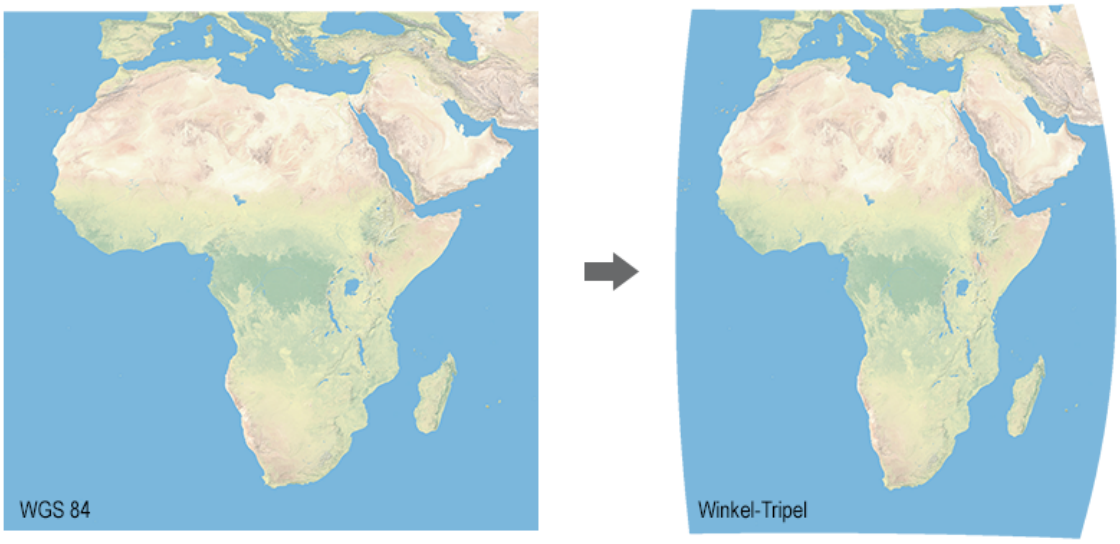


Image transformed from WGS 84 to the Winkel-Tripel projection.

Geographic Imager supports many coordinate systems ranging from local US State Plane projects to world projections.

This section provides information on how to transform a spatial image, select and apply a coordinate system, and create, load, edit and import a custom coordinate system.

Topics covered in this section

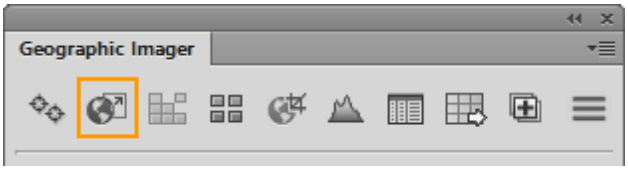
6.1 Using Transform

The Transform feature reprojects an existing georeferenced image from its original coordinate system to another one. The resulting transformed or destination image and associated reference file can be used in many GIS, CAD and desktop mapping systems

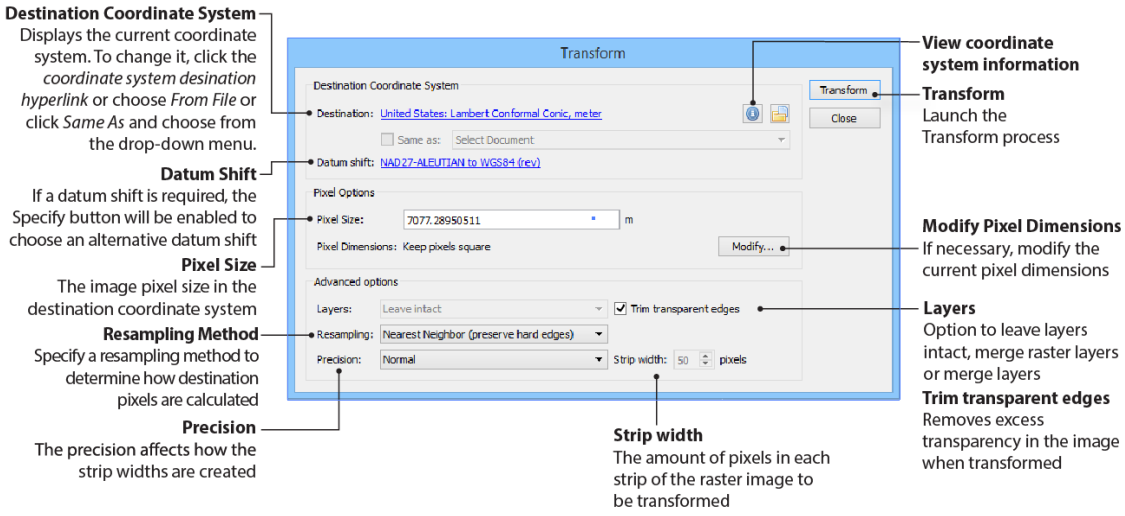
including MAPublisher for Adobe Illustrator.

Transform Dialog Box

When an image has a coordinate system specified, the Transform button in the Geographic Imager panel will be enabled. Click the **Transform** button to open the Transform dialog box—which displays the current geographic parameters of an image and settings to transform it.



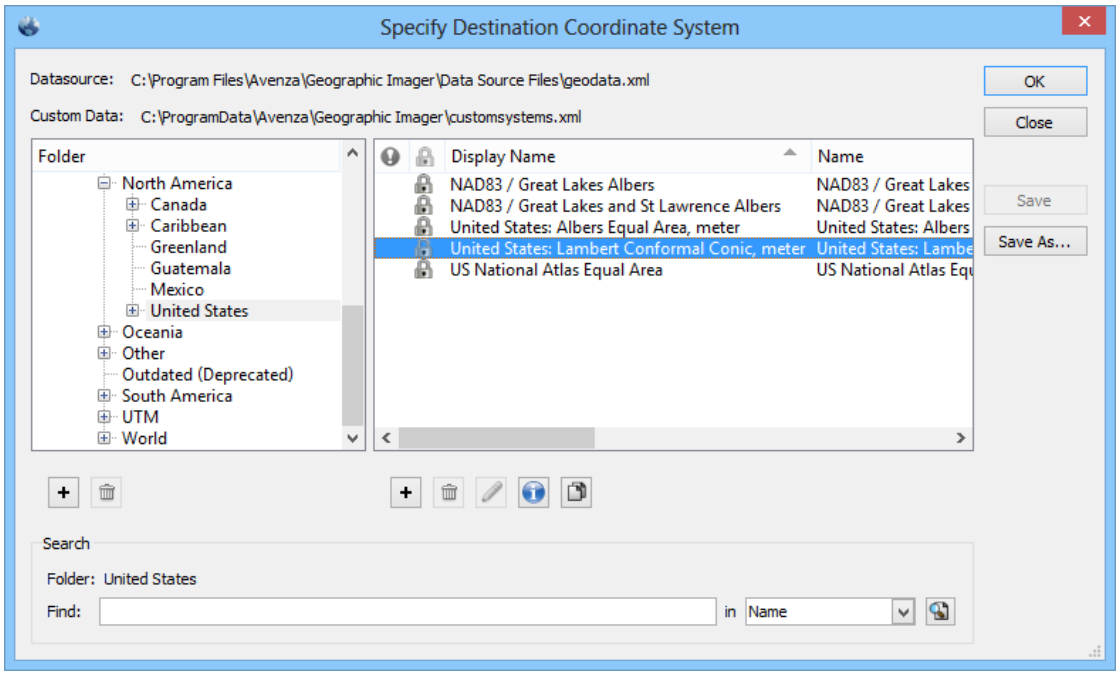
Transform button



Destination Coordinate System

Destination

To set a destination coordinate system, click the coordinate system hyperlink. The Specify Destination Coordinate System dialog box opens and displays coordinate systems and projections available in the Geographic Imager data source. This dialog box is similar to the Specify Source Coordinate System dialog box, however, here you are specifying a *destination* coordinate system instead of a source. The destination coordinate system is the coordinate system you want to transform the image to. Explore the categories to find and select the desired destination coordinate system.



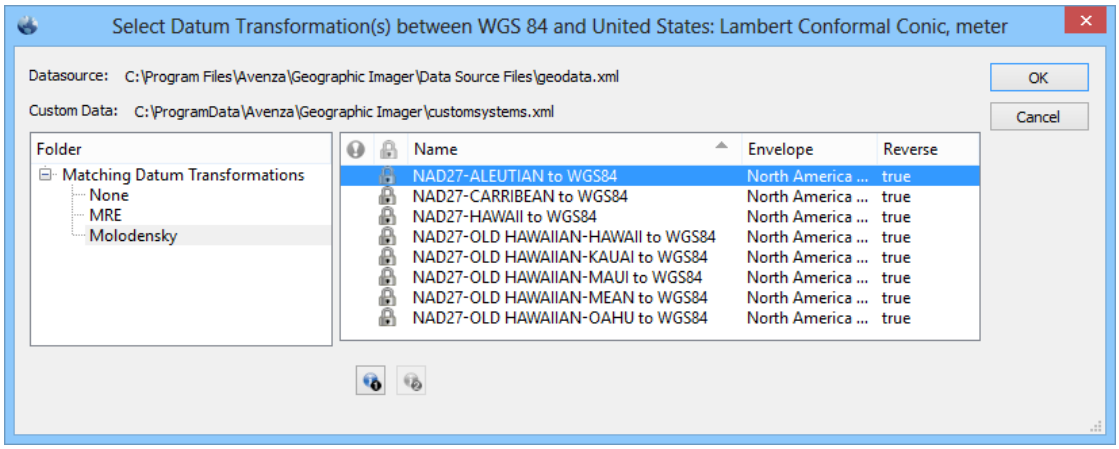
Coordinate systems are tested upon selection/transformation to verify its suitability for a referenced image. A warning will appear if the coordinate system appears to be partially or fully incompatible (based on the coordinate system envelope).

To set the coordinate system to be the same as that of another currently open and referenced image, choose the Same As option and the desired image from the drop-down list. If there are no other referenced images open this option will be disabled. Modifications to pixel size, resampling method, and strip width are available as options (explained in detail below).

Alternatively, click the **From File** button to use a coordinate system definition from a coordinate system definition file (.wkt or .prj).

Datum shift

Geographic Imager automatically selects an appropriate datum shift for the transformation if required. If the selected datum shift is not the desired one, click the coordinate system hyperlink to open the Select Datum Shift dialog box. Datum shift types are displayed in the left category column titled Matching Datum Transformations.



Each category contains the associated datum shift(s) for that reference network. To view the information associated with the datum shift(s), click the View Datum Transformation button. If a second datum shift is necessary, reference networks will be listed in a subcategory called Using (coordinate system) as Intermediate Datum. The **View Second Datum Transformation** button will be enabled to view the secondary datum shift information.

Due to the complex nature of performing such transformations, this process may require extended processing time depending on the original image size, destination pixel size, strip width, resampling method and other parameters. For multiple transformations, consider running scripts or actions to automate tasks.

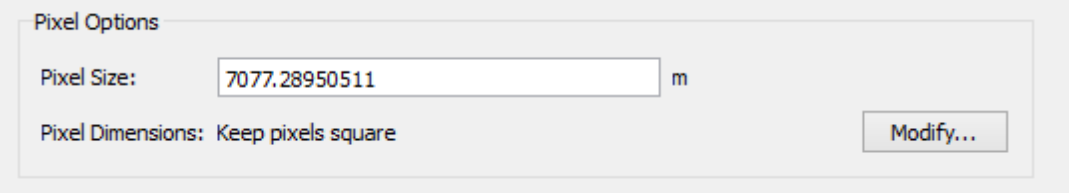
Multi-layer transformations can be transformed without flattening the image, maintaining the original layers. Existing transparency is properly maintained during transformation. To guarantee a seamless destination image (i.e. with no gaps between the adjacent layers), make sure there is a sufficient pixel overlap between the layers (e.g. when tiling the original image). Using Nearest-Neighbor method or a smaller strip width may also solve the problem.

Multi-spectral images are supported and maintained for transformations, including support for infrared (RGBI), alpha and spot channels.

Layer masks are ignored during the Transformation process. Layers masks are retained, however they may cause unforeseen errors if used in a workflow. It is recommended that layers masks be removed before any transformations are performed.

When saving an image after a transformation has been performed, Geographic Imager will update and overwrite the original reference file. In order to keep the original image and reference files, use the Save As command with a new file name or file location rather than using the Save command.

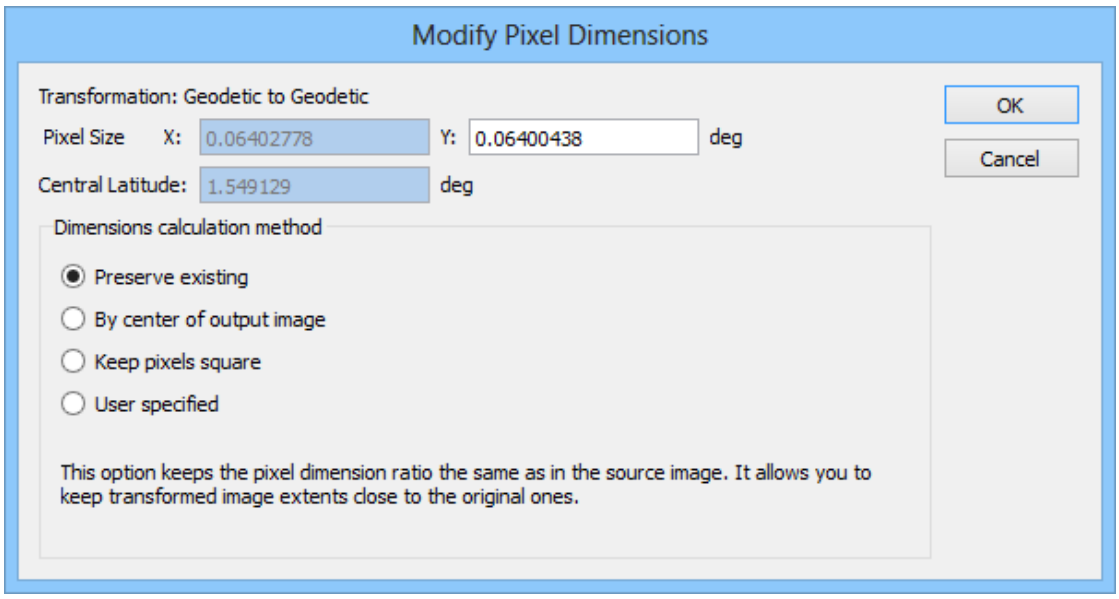
Pixel options



The Pixel Size indicates the pixel resolution as the ground distance covered by each pixel of the image. The pixel dimension and unit (corresponding to the selected destination coordinate system) are displayed. Pixels are commonly square for projected coordinate systems. In a geodetic coordinate system, pixels are not necessarily square due to a varying size of degree of latitude depending on geographic location. Therefore, the x-to-y ratio of a pixel could be determined by the value of the Central Latitude which is commonly estimated by the center of the image.

Modify Pixel Dimensions

Click the **Modify** button in the Transformation dialog box to open the Modify Pixel Dimensions dialog box.



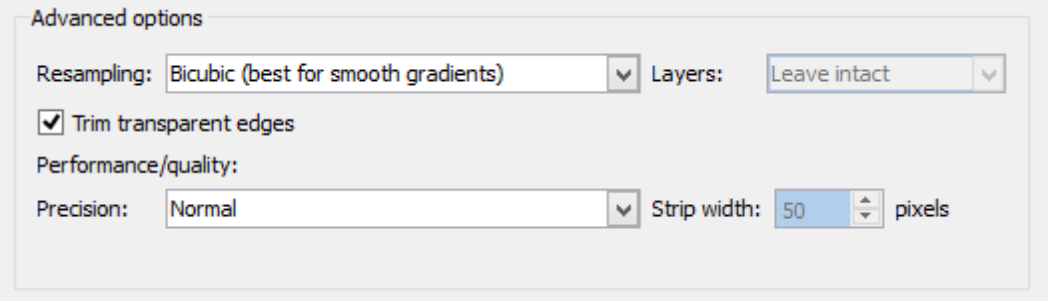
The following are the available methods to calculate pixel dimensions:

Preserve existing	Keeps the pixel dimension ratio the same as in the source image. It keeps the transformed geographic extents close to the original.
By center of output image	Calculate the pixel ratio based on the central latitude of the outgoing image which will be the latitude of the true scale. Choose this option to minimize the distance of distortion.
Keep pixels square	Ensures the pixels of the transformed image are square.
User specified	Specify a custom x-to-y ratio. Enables Pixel Size text boxes above.

Certain methods such as Preserve existing and By center of output image methods are not available for all transformations. To use the Preserve existing method, the transformation needs to be either Geodetic to Geodetic or Projected to Projected. If the destination image is geodetic, "y" pixel dimension is effectively determined by the choice of the central latitude (which is also the latitude of the true scale), therefore the option to set the pixel ration By center of output image is only available when the

transformation outcome is indeed Geodetic.

Advanced Options



Resampling Methods

There are several options for resampling the image during transformation:

Nearest Neighbor (preserve hard edges)	Takes the value of the pixel that is closest to the transformed location in the source image. This is the fastest method in terms of processing time and is the method to use to preserve a colour panel during image transformation. It is also the best method to preserve original colours in some non-RGB colour modes, such as CMYK, by avoiding the internal conversion to/from RGB.
Bilinear	Takes a weighted average value of the four pixels closest to the transformed location in the source image. This method results in a smoother image than the nearest neighbor method but at the expense of more processing time.
Bicubic (best for smooth gradients)	Takes a weighted average value of the sixteen pixels closest to the transformed location in the source image.

A coordinate system transformation will resample an image, therefore any image analysis or classification should be performed prior to a

transformation.

Layers

There are several options to handle layers during transformation:

Leave intact	Maintains the original layer structure.
Merge raster layers	Combines only raster layers while maintaining vector layers, for example text and transparency. Choose this option to guarantee seamless edges between different layers, especially if they don't have overlapping margins. Shaded relief effects will be disappear after transformation is performed using "Merge raster layers".
Merge layers	Combines all layers into one layer, maintaining transparency.

Trim transparent edges

Enabled by default, this option trims any excess transparency while maintaining the extents of the image.

Precision and Strip width

To provide necessary transformation performance, Geographic Imager transforms one horizontal strip of the image at a time. Change the Precision to adjust the strip width being transformed:

Maximum (slow; best for World Projections)	Recommend when performing transformations on images with the extent of the world.
High	Uses a strip width of 10 pixels—high quality results and slightly slower transformation performance.
Normal	The default setting using a strip width of 50 pixels—a reasonable value for the majority of raster imagery

	combining good quality results and high transformation performance.
Medium (fast)	Uses a strip width of 250 pixels—good quality results and faster transformation performance.
Custom	Set a custom strip width.

Some images may be optimized by setting a custom strip width, which may be especially true when working with very small/world scale data, high latitude/polar area imagery or projections that introduce severe spatial distortions. If the result contains visible horizontal stripping artifacts or transparent gaps, choose a smaller strip width or the Maximum precision setting. Choosing a smaller strip width will result in a higher-precision transformation, but the transformation process may be slower. Alternatively, for low-deformation, large-scale data or for a quick preview of transformation results, a larger strip width can be used.

For example, if an image being transformed displays a spherical curve, a smaller strip width may be necessary to maintain a smooth image edge. If a larger strip width is used there may a be a stepped edge to the image.

Related topics

The Geodetic Data Source

Georeferencing Images

6.2 The Geodetic Datasource

Geographic Imager includes an extensive geodetic parameter database called the Geodetic Datasource. It contains all the latest updates from the widely used EPSG Geodetic Parameter Dataset maintained by the Geodesy Subcommittee of OGP (International Association of Oil and Gas producers) as well as custom systems maintained by Avenza.
In addition, the Geographic Imager Geodetic Datasource supports your custom definitions and allows you to import external WKT (Well-Know Text) and PRJ (Esri projection file) parameter files.

Over 3500 pre-defined coordinates systems are readily available for use in most cartographic projects. Even though the current list of systems is comprehensive, there

may be instances where the end users may wish to add a brand new coordinate system to meet their particular needs, or perhaps to duplicate and modify an existing definition to
change the units for example. A complementary Avenza Projections Guide is installed with Geographic Imager. It describes all the projections and datum shifts methods supported by Geographic Imager, to assist users in the process of creating or editing a coordinate system.

The default parameters installed with Geographic Imager are stored within read-only XML database files referred to as the Geodetic Datasource (files named **geodata.xml** and **avenza.xsp**). The base data source files shipped with Geographic Imager are installed in the Data Source Files folder at the following location:

Windows 7/8: \Program Files\Avenza\Geographic Imager\Data Source Files
Mac: /Applications/Avenza/Geographic Imager/Geographic Imager Plug-in/Data Source Files

Geographic Imager allows the creation of custom definitions where parameters are stored in a separate XML file that can be saved or loaded—named **customsystems.xml** by default. It is recommended to use the default name and default save location as Geographic Imager will have an option to keep a backup of these files when uninstalling (Windows only) or re-installing. The backup files are located in:

Windows 7/8: \ProgramData\Avenza\Geographic Imager
Mac: /Applications/Avenza/Geographic Imager/Data Source Backup

Geographic Imager will also create a file called **customview.xvw**. This view file stores the organization and folder structure of your custom coordinate systems within the geodetic data source. This file will also be included in the above locations when uninstalling (Windows only) or re-installing.

For Mac users, to restore the geodetic data source, copy the backup files from the backup folder to the appropriate locations. For Windows users, the custom geodetic data source is restored automatically if the option to backup files was chosen during the uninstall process.

Load Custom Coordinate System

A geodetic data source or coordinate system database can be loaded into Geographic Imager, greatly extending the coordinate systems available for use. From the Geographic Imager panel options menu, click Load Coordinate Systems and browse for a geodetic data source.

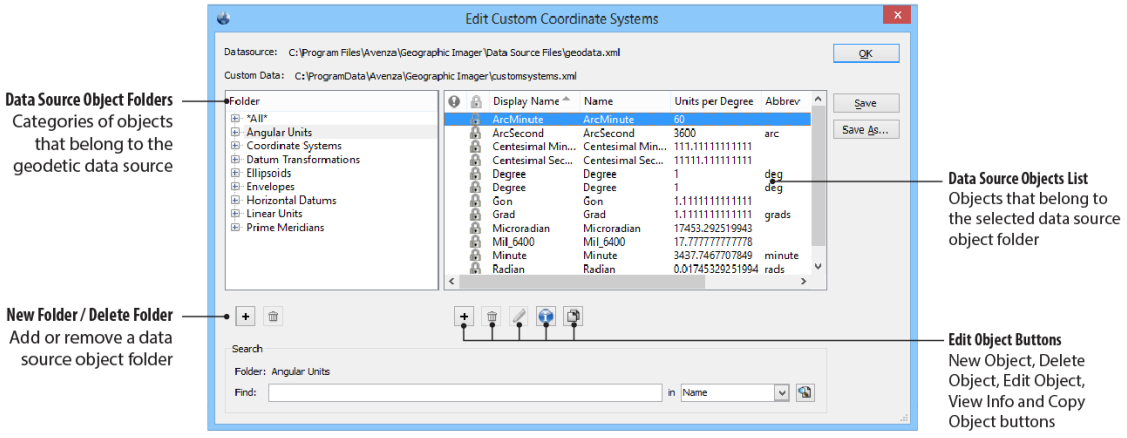
When loading a custom coordinate system, remember that an accompanied schema file named geocalc.xsd must be present with the XML file. If not present, the **geocalc.xsd** file can be copied from the Data Source Files folder located in:

Windows 7/8: \Program Files\Avenza\Geographic Imager\Data Source Files

Mac: /Applications/Avenza/Geographic Imager/Geographic Imager Plug-in/Data Source Files

Edit Custom Coordinate System

Geographic Imager can be extended to support custom coordinate systems. By editing the geodetic data source, it is possible to transform coordinates to and from a coordinate system that is based on a standard map projection but is not predefined within Geographic Imager. To edit a custom coordinate system, click Edit Custom Coordinate Systems in the Geographic Imager panel options menu.



At the top of the Edit Custom Coordinate Systems dialog box, two directory paths are listed: the geodetic data source path and the custom data path.

The geodetic data source file is protected (read-only). Any additions or modifications to coordinate systems are stored in a separate XML file called customsystems.xml.

On the left-hand side of the dialog box is the data source object folders. To expand a folder to see its subfolders, click the plus sign (Windows) or arrow (Mac) to the left of the category name. To see the entries at any particular level of category, click the category itself. When an object, folder or subfolder is selected, the data source objects list box to the right displays the information stored within each one. User defined coordinate system objects can be organized using drag-and-drop between folders. Columns can be resized and sorted alphabetically/numerically. Right-click on a column header to show or hide it. Entries loaded from the main geodetic data source will be shown in black text, while entries from the custom data file will be shown in blue.

To create a new folder, click the **New Folder** button. A new folder will be titled "New Folder" by default and can be renamed. Subfolders can also be created using the same method. Only user-defined categories can be deleted using the **Delete Folder** button.

Create New Data Source Objects

In the Edit Custom Coordinate Systems dialog box, click the **New Object** button to create a new data source object. When creating new data source objects, the identification information and definition parameters need to be completed. Complete this information in the respective Identification and Definition tabs.

The Identification tab is used to name the object and associate identification codes with it (if applicable). It is important to enter an appropriate name for the object. The Remarks field can be used to add notes on a definition and is optional. The Identifiers list may be used to add identifying codes for an object that may come from other databases. The GC code is a unique identifier assigned by Geographic Imager and should not be altered. To enter additional codes use the space below it. When using automation, the Issuer and Issuer code are used to identify coordinate systems. For more a complete list of EPSG codes, visit www.spatialreference.org.

The Definition tab is used to define the parameters of an object. Each object has parameters unique to it. Refer to the list below when creating new objects.

Refer to the Avenza Projections Guide for more information on supported projections and their parameters as well as supported datum

transformations methods.

Edit Objects

To edit a custom or user-defined object, click the **Edit Object** button . Edits may be made in the respective object editor dialog box. Alternatively, double-click an object to open the editor dialog box. When a data source object belonging to the master data set is selected, the Edit Object button is disabled (because these objects are read-only). To modify an original object, create a copy of the object first then edit it.

Delete Objects

When a data source object belonging to the master data set is selected, the **Delete Object** button is disabled. Only user-defined objects can be deleted.

Copy Objects

Any object can be copied. To create a copy of an object, select an object and click the **Copy Object** button . A dialog box will appear with "Copy of:" preceding the object name in the Name box.

Move Objects

Any user defined object can be moved. Drag-and-drop an object from the Data Source Objects List to a Data Source Object Folder. A dialog box will prompt you to move the object or to create a shortcut to it.

Load Coordinate System Definitions

In some instances, the coordinate system of an image is not listed in the geodetic data source or the reference file format does not support the coordinate system. In such cases, it may be useful to load custom coordinate system definitions. In the Geographic Imager panel options menu, click Load Coordinate System. Geographic Imager can use the following coordinate system file formats: WKT definitions (.wkt), MapInfo MAP files (.map), MapInfo TAB files (.tab) and Esri projection files (.prj).

When a coordinate system is loaded from a file (WKT or PRJ), it is added to the geodetic data source but not saved. If the loaded file

matches an existing definition, the original definition will be used and the loaded definition will not be added. All new definitions are located at the top level of the appropriate category in the Coordinate Systems folder list (in either Geodetic or Projected). Before exiting Adobe Photoshop, be sure to save your geodetic data source if you wish to use the coordinate system definition again. This can be done through the Edit Custom Coordinate System option.

6.2.1 Data Source Objects

Working with Data Source Objects

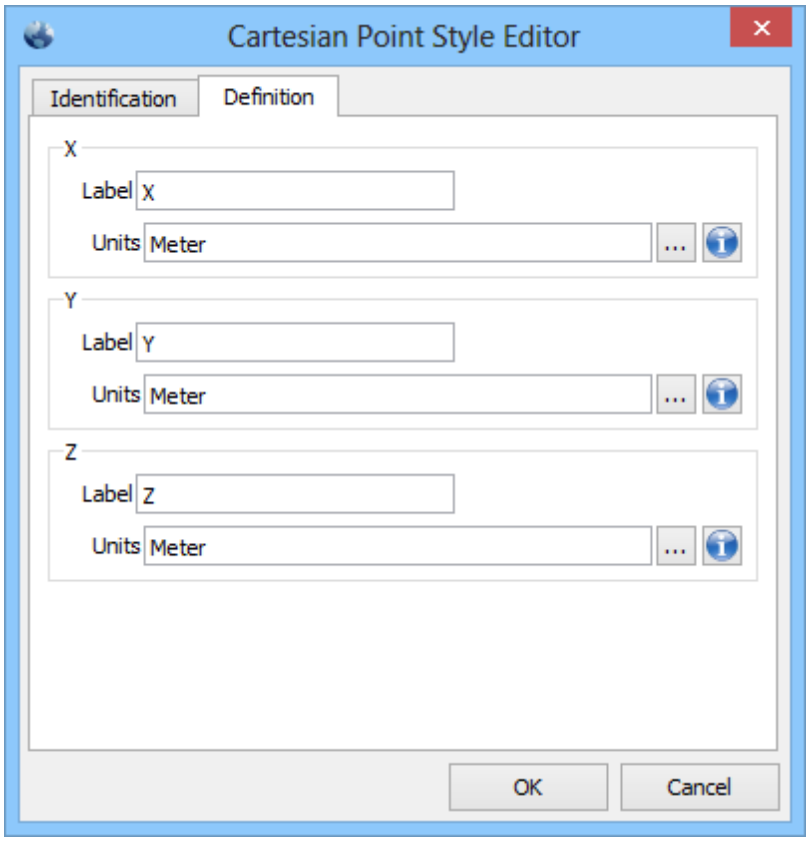
Individual entries in the geodetic data source are known as Data Source Objects. Geographic Imager can support an unlimited number of custom objects. There are different types of objects for different types of definition. Objects contained in the geodetic data source are:

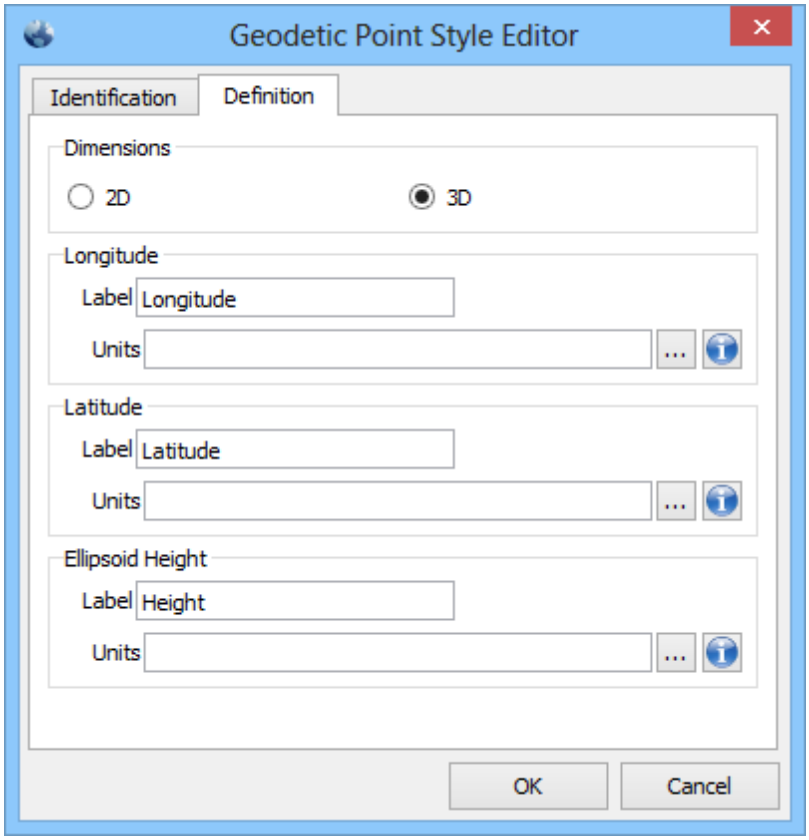
Data object	Description
All	Used to define the orientation of axes used and the type of units used in the system.
Angular Units	Type of units for measuring rotation.
Coordinate Systems	A complete definition needed to express the context of a set of map data.
Datum Transformations	Parameters to transform coordinates from one datum to another.
Ellipsoids	An ellipsoid gives a horizontal datum its size and shape. An ellipsoid does not have an origin and cannot be used as a base model for coordinates on its own.
Envelopes	Defines a geographic area of use for a particular object.
Horizontal	More commonly referred to as just "datum" is the

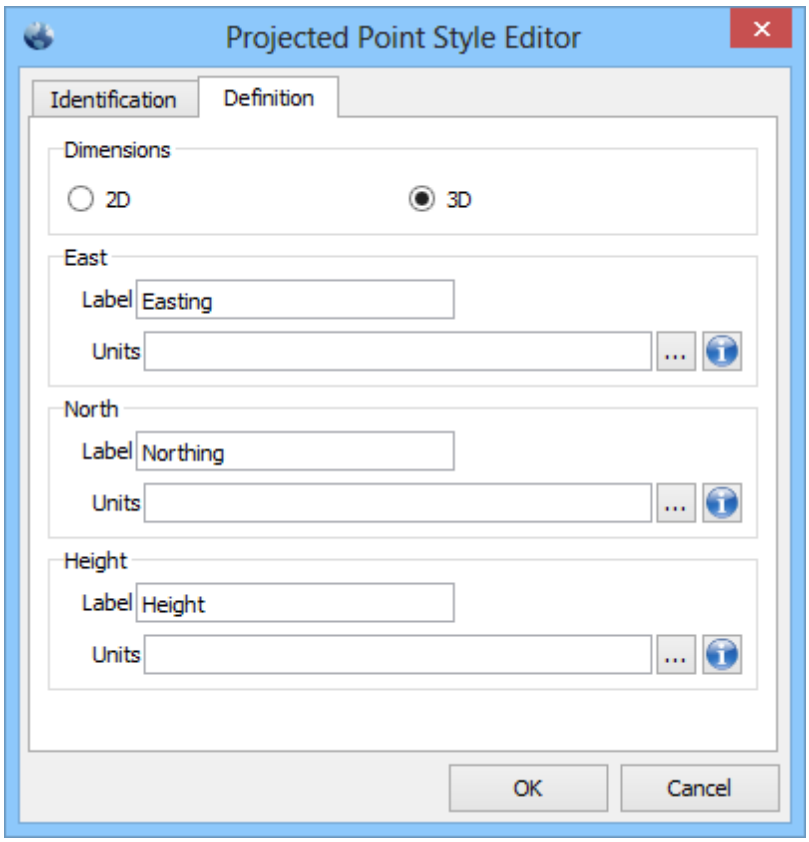
Datums	base model maps are built on. All coordinate systems must have a datum associated with them to be related to any other map. Without a known datum, coordinates are meaningless.
Linear Units	Units for measuring straight line, Cartesian distances.
Prime Meridians	Defines longitude values of meridians.

All

For coordinate points, specify the coordinate point dimensions in either 2D or 3D. For Geodetic and Projected Coordinate Points, the Longitude and Latitude style of units must be entered for all 2D Dimensional Points. The Longitude, Latitude and Ellipsoid Height style of units must be entered for 3D Dimensional Points.

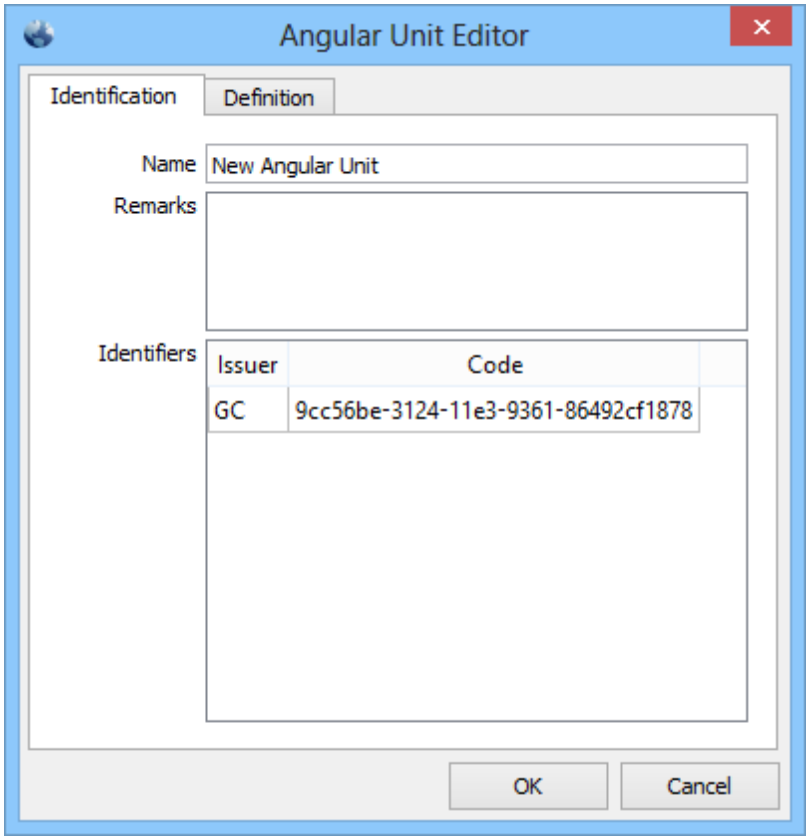


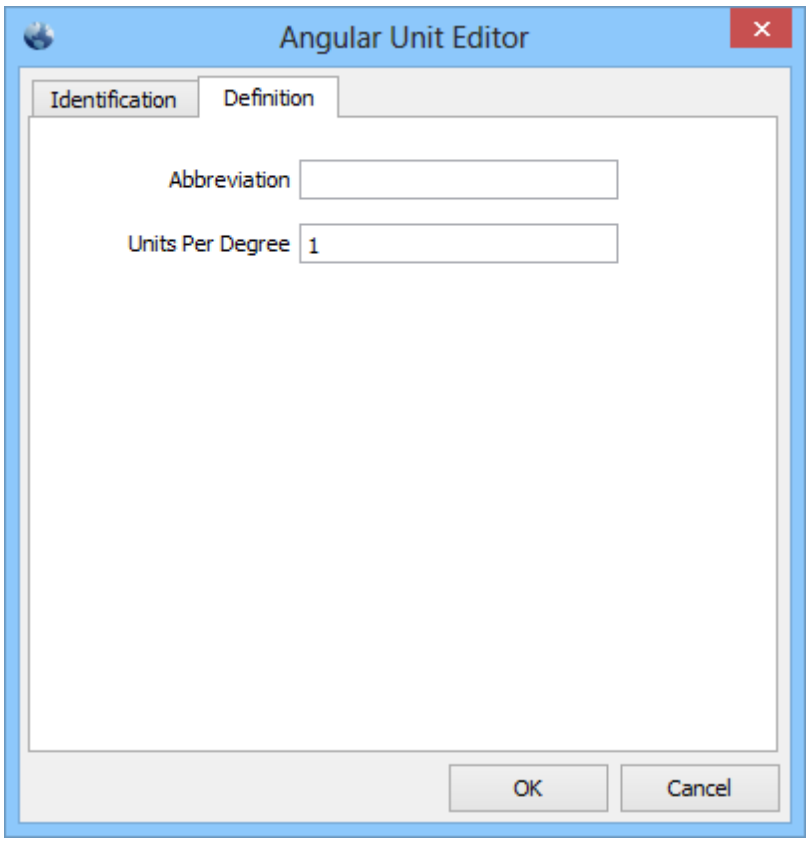




Angular Units

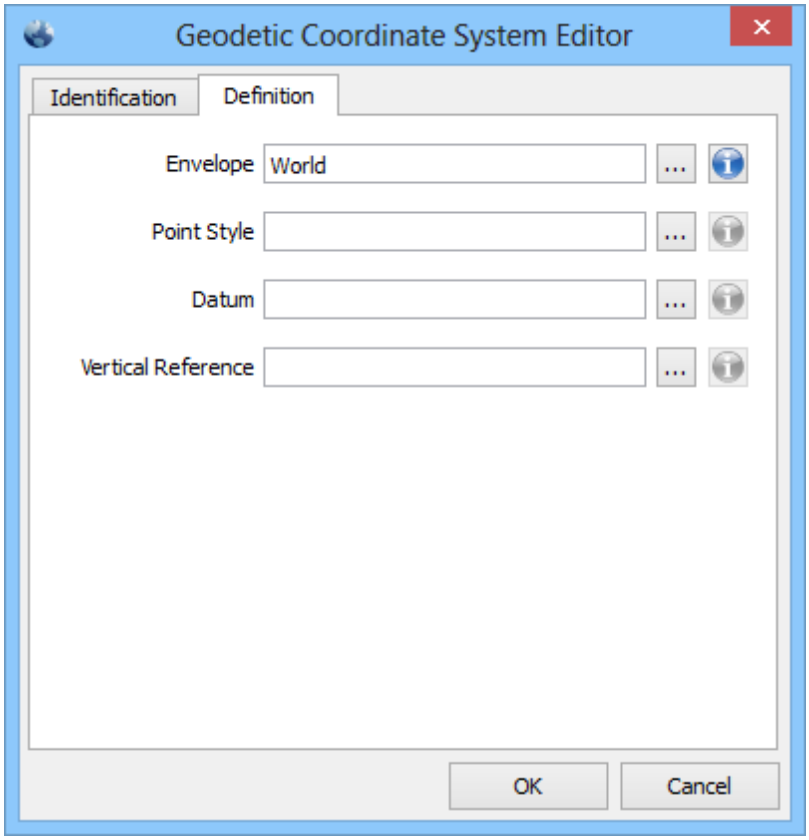
For angular units, enter a conversion for the new unit in terms of the scientific standard Degrees. The Abbreviation is used to identify the unit within the application interface (Example: The abbreviation for degrees is "deg").

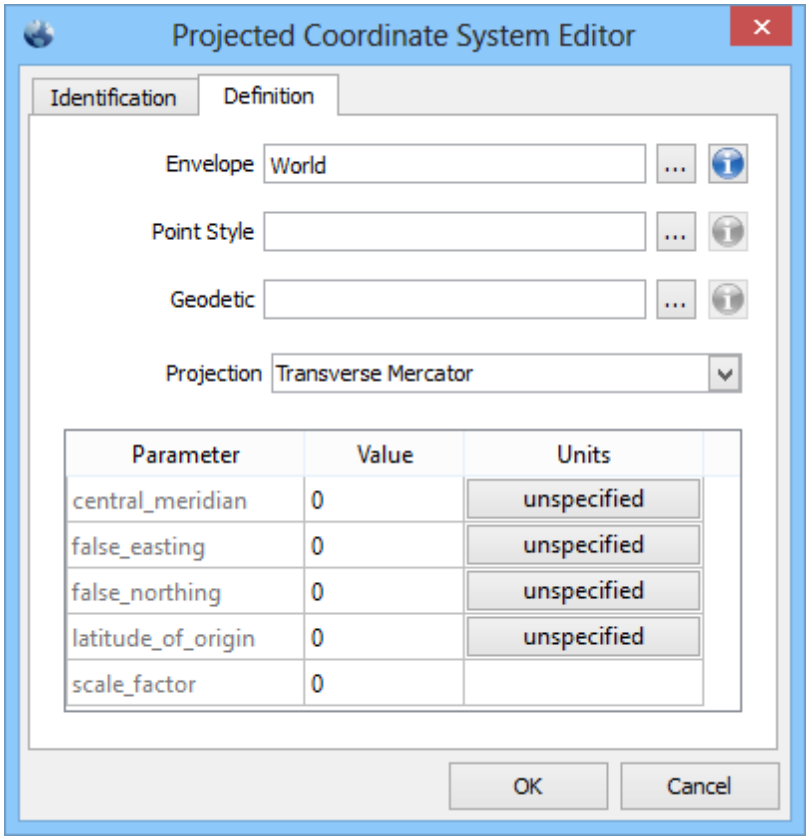




Coordinate Systems

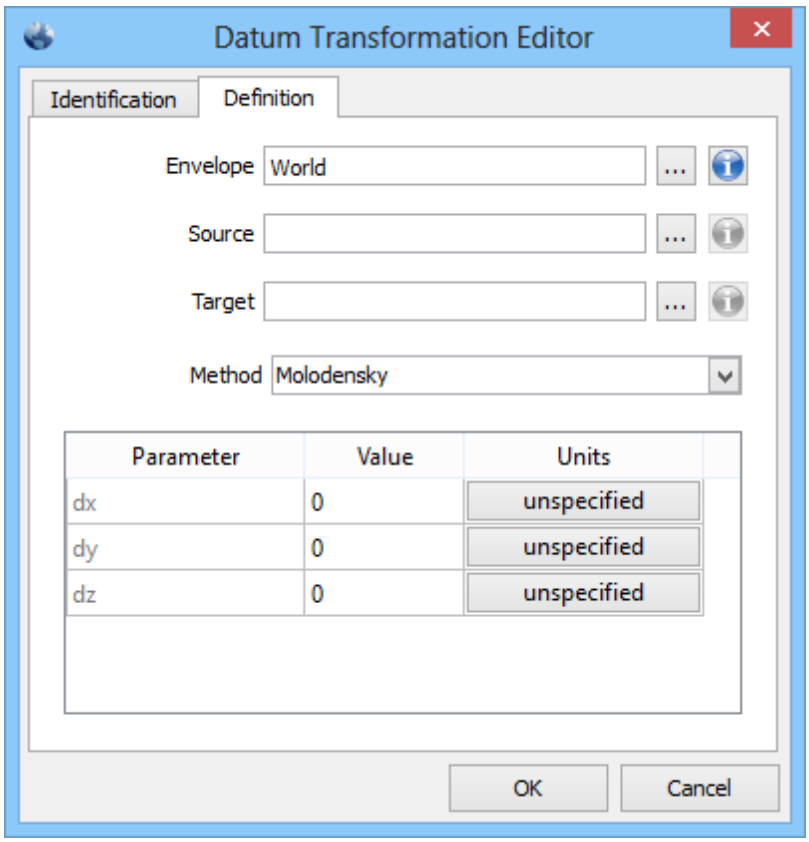
For Coordinate Systems, select an Envelope defining the appropriate area of use. If you are unsure of the appropriate envelope, you can leave it set to the default World envelope. The Point Style is how you will select the style of linear units for your system. For most projected systems, you will want to select "Projected point in (units)". Then select the Geodetic model that using the appropriate datum for your system. When you select the appropriate projection for your system, the parameters needed to define the system will appear in the table below. Enter the needed parameters and define the units each parameter is specified in.





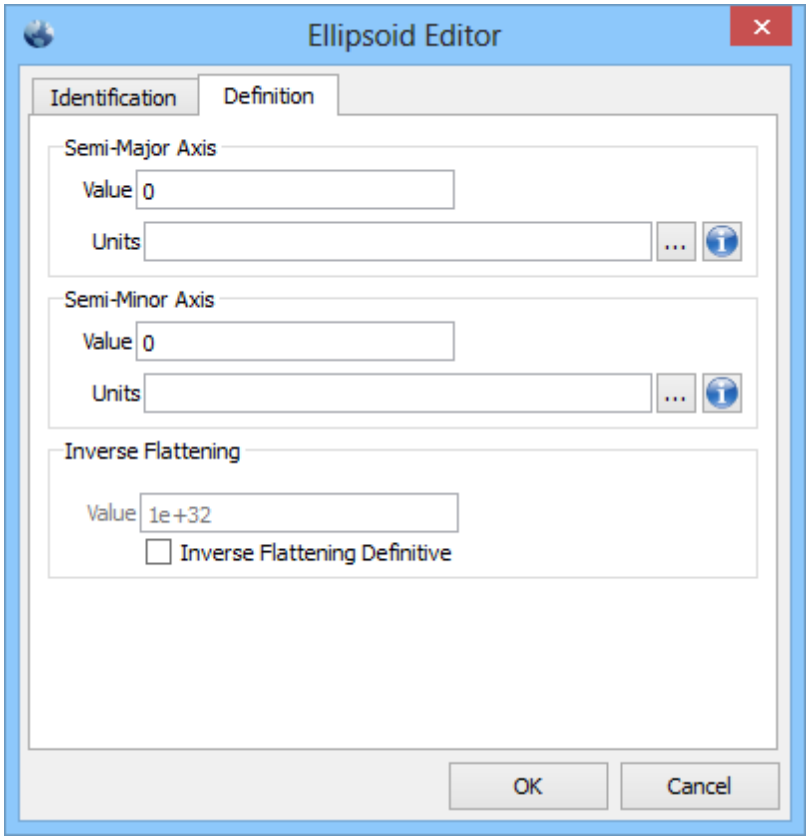
Datum Transformations

For Datum Shifts, select an Envelope (appropriate geographic area of use), Source, Target and Method. If you are unsure of a more specific envelope, leave it set to the default "World" Envelope. The Source and Target fields are used to specify the two geodetic models the Transformation is valid for. The Method specifies the necessary parameters to define a particular datum transformation. With the proper method selected, enter the appropriate parameters for your datum transformation. Be sure to define the appropriate units for each parameter by clicking the **Units** button.



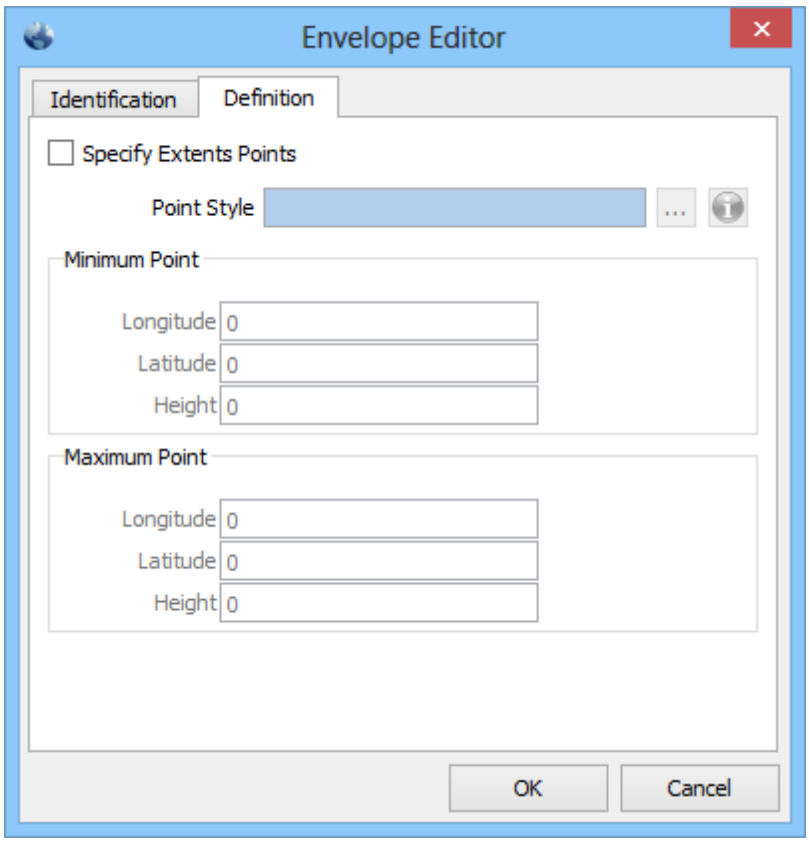
Ellipsoids

For Ellipsoids you must enter the parameters for the Semi-Major Axis and Semi-Minor Axis (often noted as "a" and "b" respectively) define the linear units the axes are specified in by selecting a predefined unit in the appropriate fields. The Inverse Flattening (often noted as "1/f") will automatically calculate in the field below. Alternately, you can make the Inverse Flattening definitive by enabling the check box at the bottom. You can then manually enter the Inverse Flattening rather than the Semi-Minor Axis parameter.



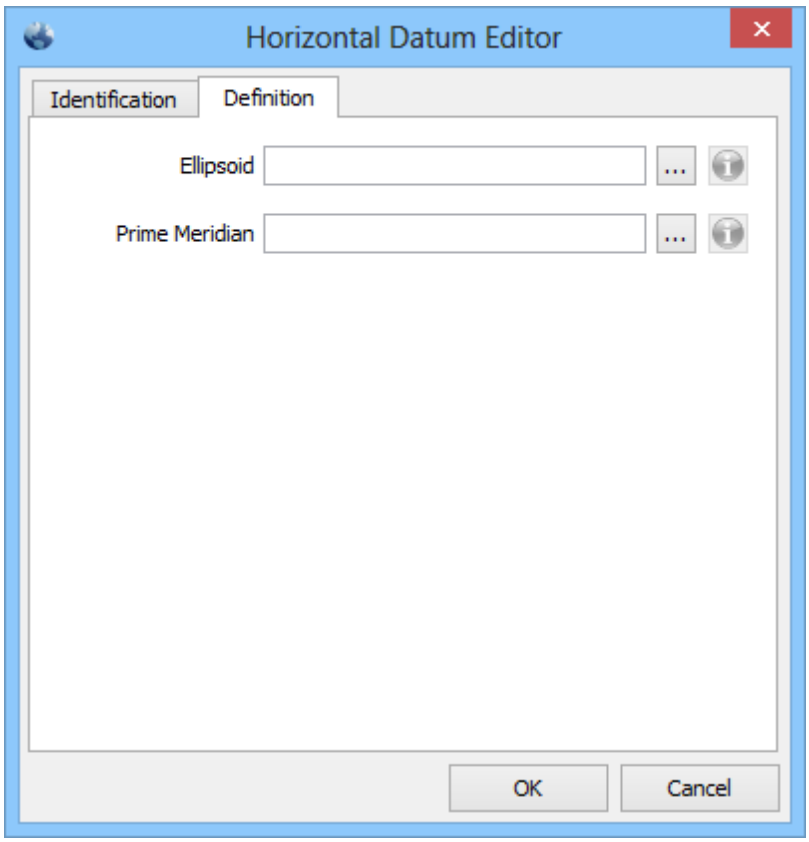
Envelopes

For Envelopes, specify the extents of the envelope (it is not required but recommended). If the Specify Extents Points check box is checked, it is required to enter the minimum and maximum points of the envelope and the point style the value represent.



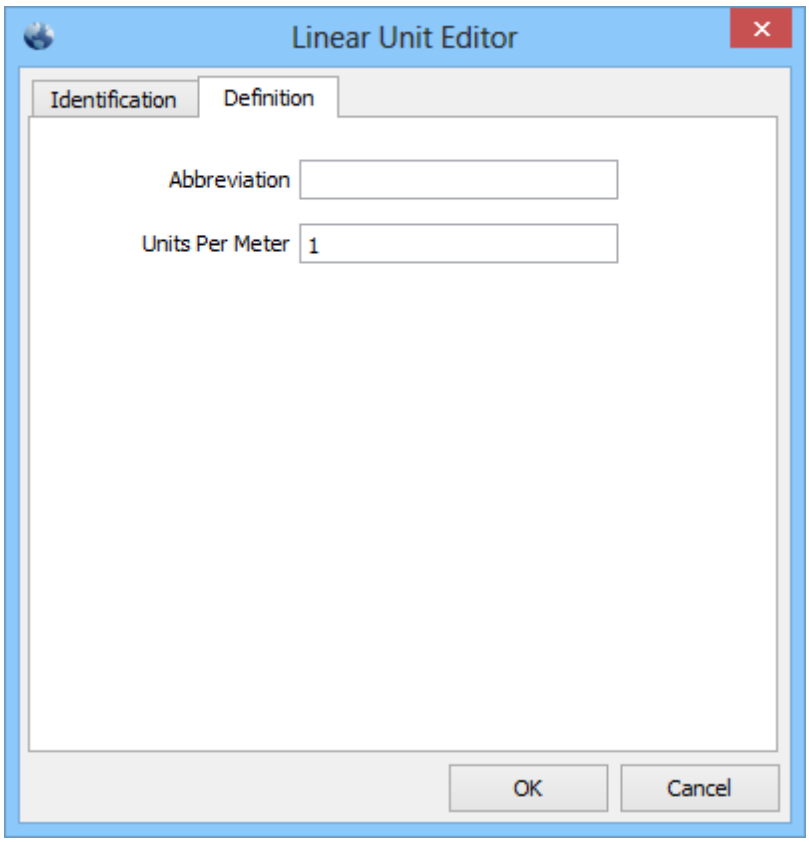
Horizontal Datums

For Horizontal datums you must select the Ellipsoid the datum is based on, as well as the prime meridian used.



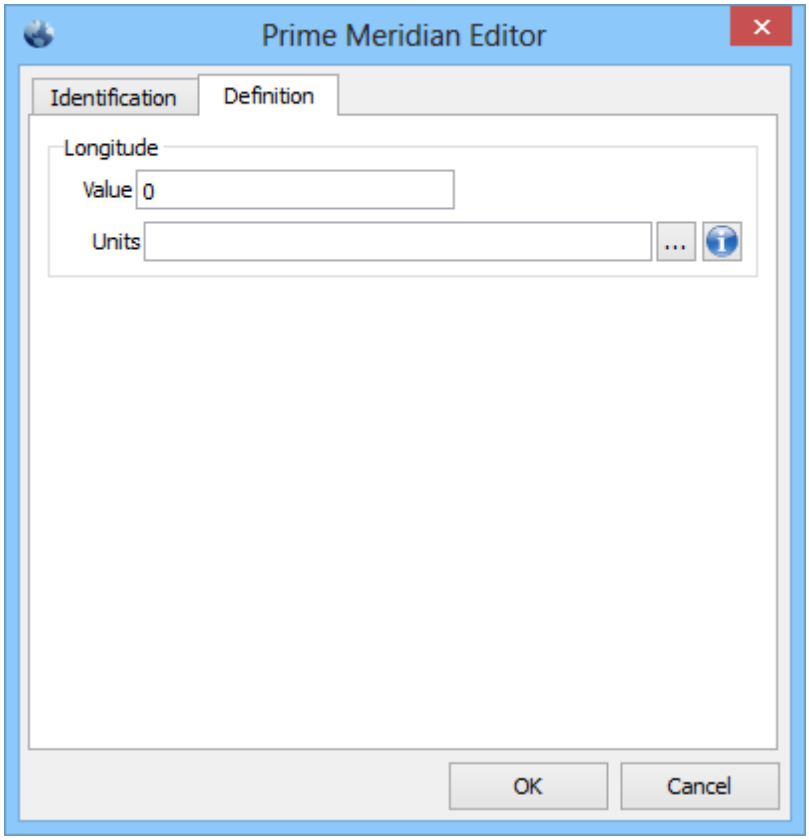
Linear Units

For Linear units, enter a conversion for the new unit in terms of the scientific standard Meters. The Abbreviation is used to identify the unit within the application interface (Example: The Abbreviation for Meters is "m")



Prime Meridians

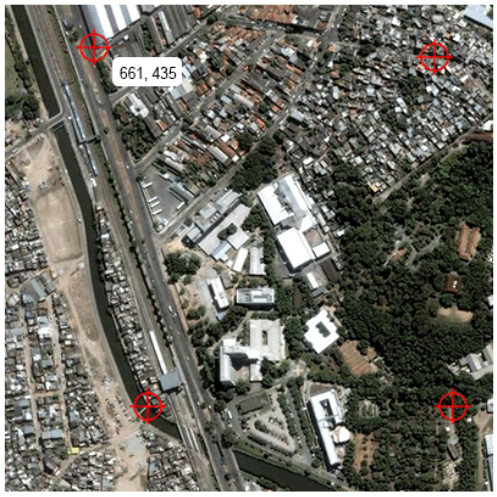
For Prime Meridians you must enter the longitude value of the Prime Meridian and the angular unit that value is in.



7 Georeferencing Images

Use the Georeference feature to reference an image by establishing ground control points, choosing a transformation method, and specifying a coordinate system. It can also be used to rectify—transform or warp—an image to match the image coordinate system specified. Another important use of the Georefrence dialog box is to verify or validate a georeference and see how it compares to its image extents online. The Georeference dialog box also allows you to edit the existing referencing information of an image and can be used to display and examine precise pixel coordinates, projected or geodetic, and point elevations (for DEM images).

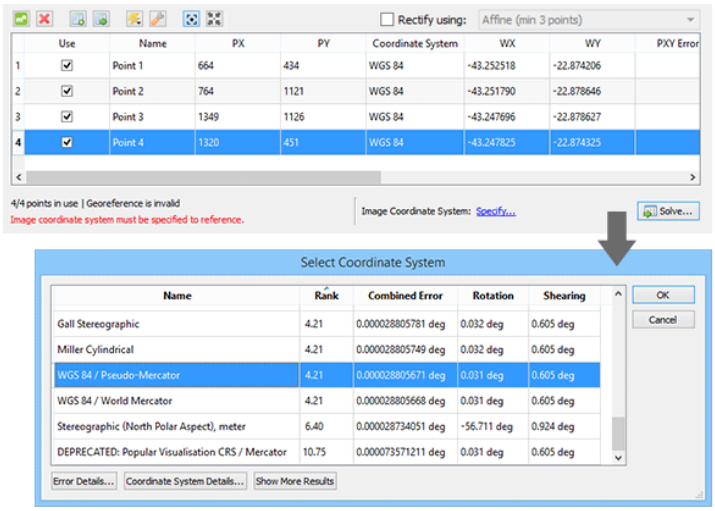
To reference or rectify an image, control pairs need to be created. A control pair is created when a control point has its pixel coordinate related to a corresponding real-world coordinate. Control points can be entered on the image view or manually specified. World coordinates can be entered using an input coordinate format (e.g. in latitude/longitude for a projected image) or by assigning world coordinates using an online map service.



Add control points to an unreferenced image that are easy to identify when adding world coordinates. Control points are assigned pixel coordinates (PX and PY).

Assign world coordinates to the control points (WX and WY). These can be assigned manually or by using an online map service to do it interactively.

A referencing solution is calculated when sufficient control pairs are added for the transformation method being used and an image coordinate system is specified. Associated errors (the difference between computed values and the values specified) are displayed for each control point. Modify control points in order to minimize the referencing error before referencing or rectifying the image.

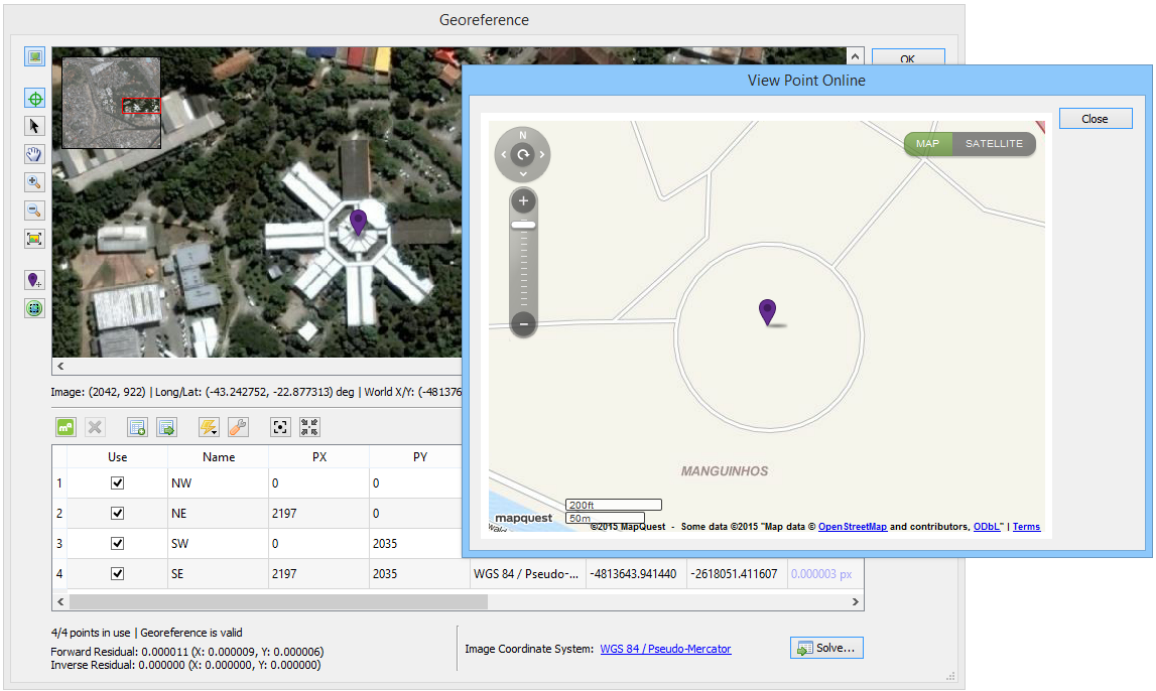


When the required amount of control pairs are created, choose the appropriate reference method (affine is suitable for most referencing) and specify an image coordinate system.

If you don't know the image coordinate system, use Solve to let Geographic Imager calculate an appropriate reference solution for you.

Solve will provide a list of coordinate systems based on your inputs. Choose a suitable coordinate system to reference the image as. You may need to adjust your control pairs if control point errors are too high.

Use the Validate tool to check how accurate your referencing is. If it is not accurate, try modifying control points to minimize error.



Topics covered in this section

Using Georeference

7.1 Using Georeference

Requirements

Index colour mode is not supported. Any referenced or unreferenced image can be used with the Georeference dialog box—verify a referenced image or reference an unreferenced image.

Georeference Workflow

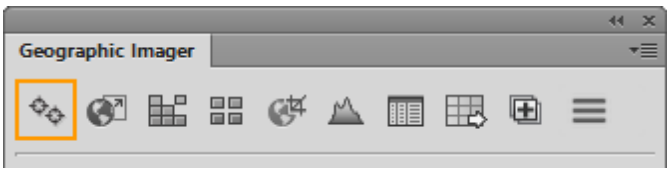
In general, the steps for georeferencing an image are as follows:

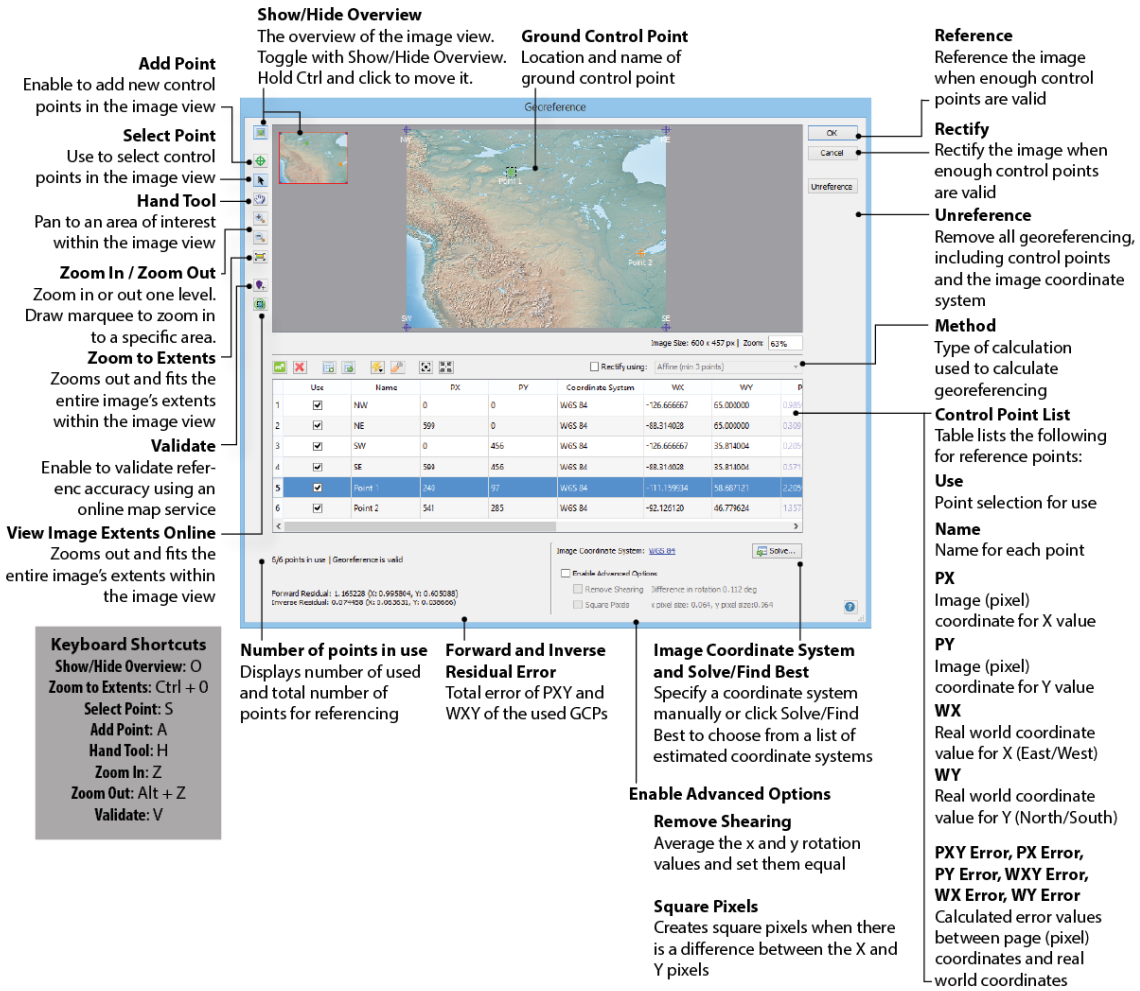
1. Add control points. Through the image view or import into the Control Point List.
2. Assign world coordinates (WX and WY) to each control point (PX and PY) to create a control pair. Enter manually or assign world coordinates using an online map service.
3. By default, the Georeference dialog box is set to reference an image without rectification. If you want to rectify the image, choose an appropriate transformation method (rectify is generally used to scale, stretch, rotate, and distort an image).
4. Choose an appropriate image coordinate system. Specify one or use Solve/Find Best and choose one from a list of estimated coordinate systems.
5. Check total world error of control points and adjust as necessary.
6. Validate the accuracy of the georeference.
7. Reference or rectify the image when you're satisfied with the registration.

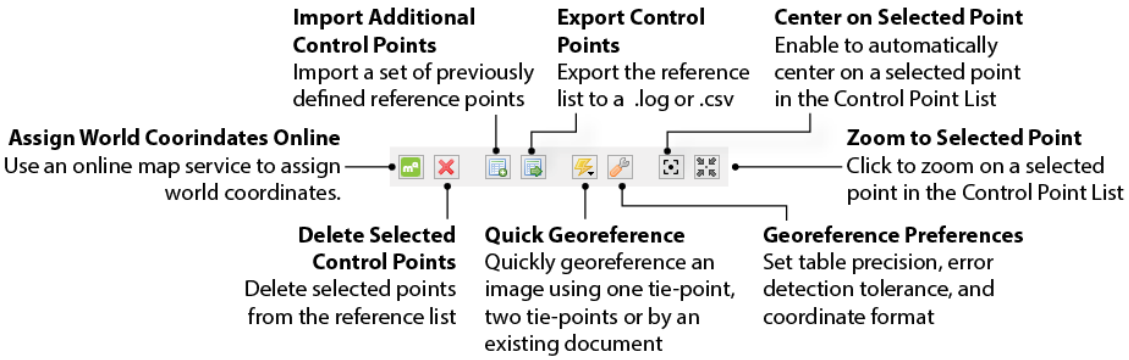
Georeference Dialog Box

With an opened image (referenced or unreferenced), click the **Georeference** button

in the Geographic Imager panel to open the Georeference dialog box. The image view shows the current image and any existing control points. These control points and their coordinate and error values (if available) are shown in the Control Point List.







Add a Control Point Using Image View

To add control points in the image view, first click the **Add Point** button to enable it. The cursor in the image view becomes a cross hair. Click within the extents of the current image to add a control point. Pixel and coordinate locations of the cross hair are displayed along the bottom of the image view. Points are added to the Control Point List below the image view and are automatically assigned a name and pixel coordinates (PX and PY). If you are assigning world coordinates online you can add points later with the Assign World Coordinates Online dialog box open. This way you can ensure you can identify the location online before creating the control point.

Add Control Points from a File

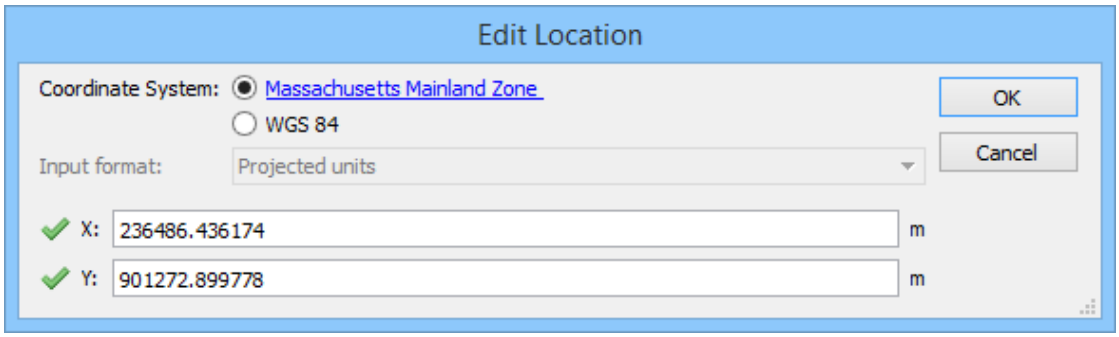
To import a set defined control points, click the **Import Additional Control Points** button. Supported reference point file formats include Blue Marble Reference files (.rsf), MapInfo Tab files (.tab), Comma Delimited files (.csv). Imported control points are added to the existing list. See Additional Georeference Features for more information about formats. Exported CSV files created with Geographic Imager contain the control point name, pixel location, world coordinates and the associated coordinate system the world coordinates are entered in.

When a CSV file contains control points that don't have coordinate system information, the imported points will be assigned the image's coordinate system. If no image coordinate system is specified, it will be assigned "Image CS" until one is specified.

Enter World Coordinates Manually

For each control point, enter the corresponding real-world coordinates (WX and

WY) in the Control Point List to create a control pair. Double-click the Coordinate System, WX or WY cell of a control point to enter or edit its world coordinates manually in the Edit Location dialog box.



You can specify a control point coordinate system using the Coordinate System hyperlink. Any coordinate system can be used to specify coordinates. If it is unknown, entering X and Y values will use an Image Coordinate System. It is common for lat/long values in WGS 84 coordinates are used. See the Coordinate Formats section to learn about the types of coordinate formats that can be entered.

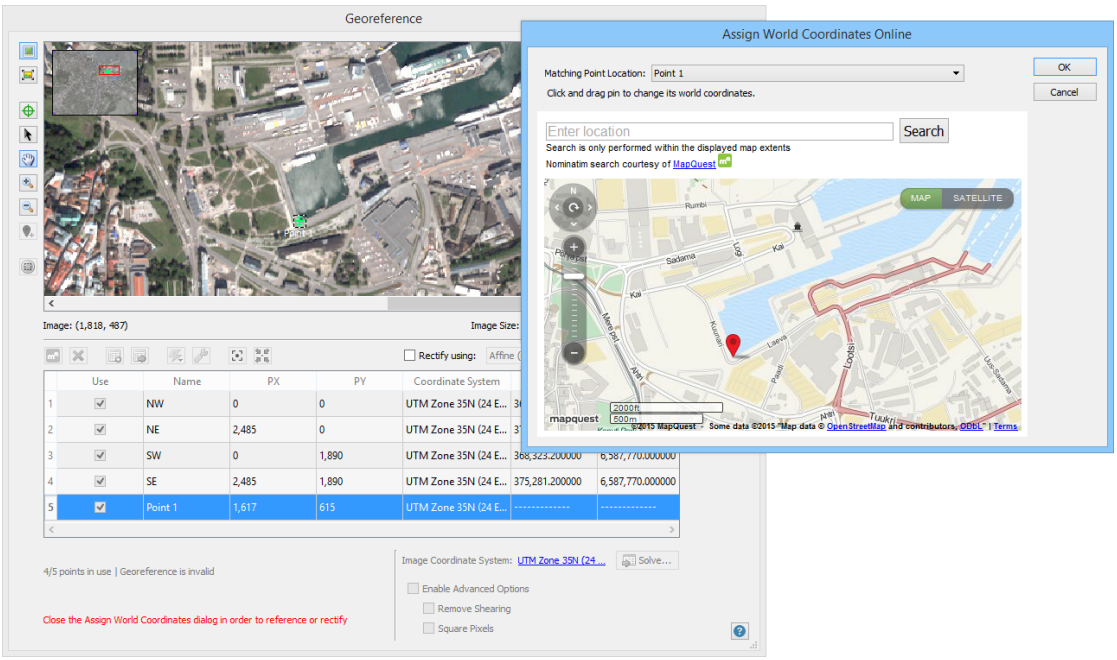
World coordinates can be sourced from information displayed on the image itself (such as grids or graticules), from external sources (e.g. survey, corresponding maps, etc), or from online map sources.

The display format of world coordinates in the table is set in Georeference Preferences.

Assign World Coordinates Online

A control point must be created prior to assigning it a world coordinate online. Click the **Assign World Coordinates Online** button to assign real-world WGS 84 coordinates using an online map service (an Internet connection is required). In the Add World Coordinates Online dialog box, choose an unassigned control point location in the Matching Point Location drop-down list, then click the corresponding location on the online map to assign it a world coordinate. It is best practice to zoom in to the image to ensure the point is in the correct location. You can create/move/edit or delete a control point at any time with the Assign World Coordinate Online dialog box open.

Both the online map window and image view in the Georeference dialog box can be navigated at the same time, often side by side. To navigate the online map, pan and zoom with the mouse (and mouse wheel) or use the navigation control slider. Optionally, enter street or city names into the Place search bar to find places quickly. To navigate the image view of the Georeference dialog, use Ctrl (or Command) and the mouse wheel to move left or right, use shift and the mouse wheel to move up or down, use Alt (or Option) and the mouse wheel to zoom in or out, and use the keyboard shortcuts to quickly switch between tools. (Keyboard shortcuts for tools can be seen by hovering over each button.)



World coordinates in the Control Point List are updated after assigning matching points in the Assign World Coordinates Online dialog box. When a control point has both pixel coordinate and world coordinate entered, it is considered a control pair.

When at least four control pairs are valid and an image coordinate system chosen, an image extents border is drawn in the Assign World Coordinates Online dialog box.

Edit a Control Point

When adding control points, some inaccuracy can occur and may result in larger than desired error values. Editing the location of control points can greatly improve the error statistics to fine tune the georeferencing. Modifying control points in the Control Point List or directly in the image view. To edit the world coordinates,

double-click the corresponding world coordinate cells or click the **Assign World Coordinate Online** button.

Delete or Disable a Control Point

To delete a control point in the image view, right-click one to open the context menu and choose Delete Selected Point. Optionally, choose Disable Selected Point to disable the control point and prevent it from being used in the calculation for georeferencing

To delete a control point in the Control Point List, click a control point row to select it and click the **Delete Selected Control Points** button. To disable a control point in the Control Point List, under the Use column, click the corresponding check box to uncheck it.

Reference an Image

By default, the Georeference dialog box is set to reference an image without rectification. Georeference requires a minimum of three valid control points to exactly locate an image to a spatial location. When more than three control points are used, residual errors are introduced. These errors should not be seen in a negative light as they can provide feedback on the accuracy of the reference. It is common to use more than three control points because if one control point is in the wrong location, it can greatly affect the reference. Thus, even though the residual error may increase as you add more control points, the overall accuracy of the reference may increase as well.

Rectify Using a Transformation Method

To rectify an image, click the **Rectify using** check box and choose a transformation method. The control points are used to build a polynomial transformation that will shift the image from its existing location to the correct spatial location. Depending on how many control points are valid, one method may be better than another. Depending on the method, a minimum number of control points are required:

Format	Control Points Required	Used to
Affine (3 pts)	minimum 3	Reference/ Rectify

Linear Polynomial (3 pts)	minimum 3	Rectify
Quadratic Polynomial (6 pts)	minimum 6	Rectify
Cubic Polynomial (10 pts)	minimum 10	Rectify
Quartic Polynomial (15 pts)	minimum 15	Rectify
Quintic Polynomial (21 pts)	minimum 21	Rectify

An affine method preserves collinearity (i.e. preserves points, straight lines and planes) and ratios of distances (e.g. the midpoint of a line segment remains the midpoint after transformation). In this sense, typical maps you are working with are affinely referenced to their respective plane of projection and may only need a slight shift to improve referencing. Rectifying an image using the affine method will perform a transformation and create a north-up image without correcting any distortion.

Higher transformation methods than affine have the ability to correct complex image distortions, also known as rectifying. However, it is not common to use transformations higher than third-order. Higher-order methods require more control points and will require more inputs, processing, and adjusting to achieve an acceptable result. In general, if your image needs to be scaled, stretched, and rotated, use a lower-order method (quadratic). If the image must be distorted even more (i.e. bent or curved) it may be more appropriate to use a third-order method.

While an image with a large set of control points should provide the best results, using an affine or a second-order method may not take advantage of the additional control points. In general, your control points should be accurate, have good coverage across the image, and are well spread out when attempting to rectify. Having the sufficient number of points does not guarantee that the highest degree polynomial available will result in a plausible solution; a trial-and-error approach may be appropriate to obtain the best results.

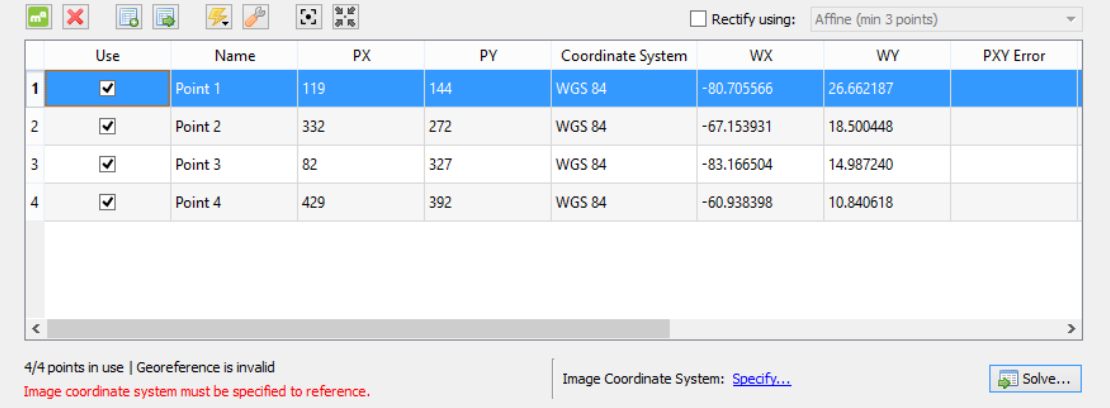
All control points will be maintained and can be edited until the document is closed, rectified or transformed. Maintaining the control points will allow you to make adjustments until the desired referencing is achieved. Control points are not saved with the image itself. To save

control points to a file, use Export Control Points.

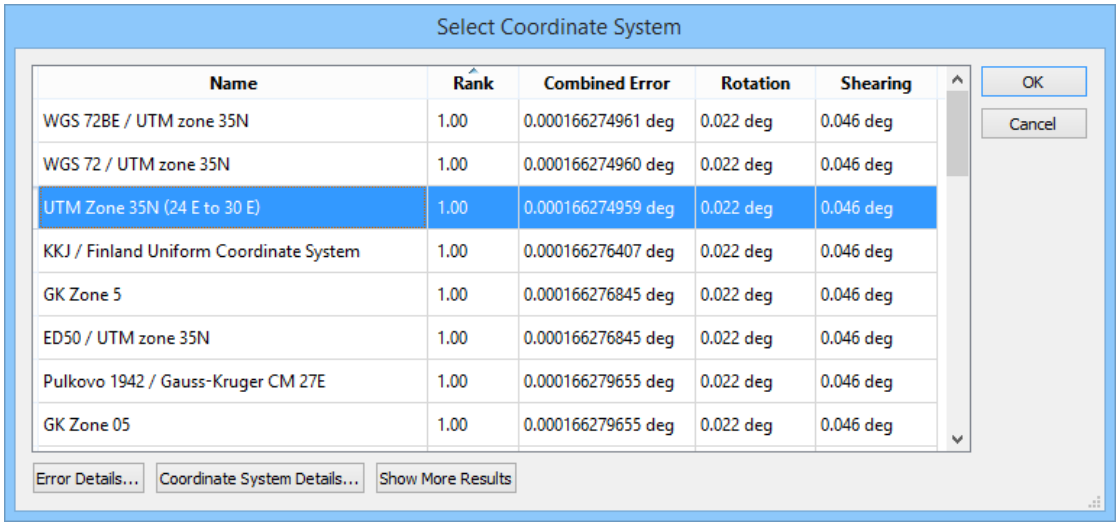
Control points are maintained in the coordinate system they are entered.

Choose an Image Coordinate System

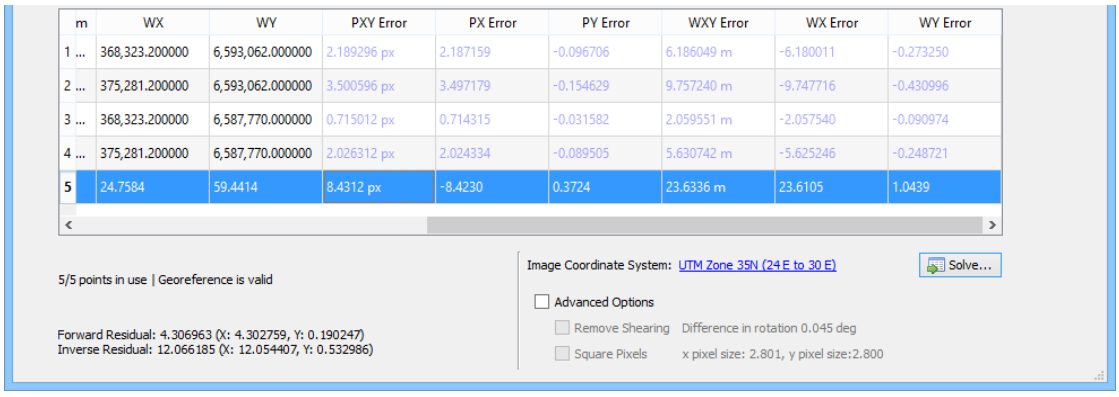
With a sufficient number of control pairs and a chosen transformation method, the next step is to choose an image coordinate system. If you know the image coordinate system, click the Specify hyperlink and choose a coordinate system. If you do not know the image coordinate system, click the **Solve** button to see a list of suggested coordinate systems. The Solve feature is only available for referencing. When rectifying and using a transformation method, click the **Find best** button to see a list of coordinate systems to rectify the image to.



When you click the **Solve** or **Find best** button, a list of coordinate systems that are estimated based on calculations made with the selected transformation method and control pairs provided is shown. The table is initially sorted by descending rank. A rank of 0.00 or 1.00 means that it is a highly suitable coordinate system based on the control pairs you specified, however, it doesn't necessarily mean the reference is perfect. The Rotation column shows how much rotation the image is subject to for a selected coordinate system. The Shearing column shows how much the image will be skewed for a selected coordinate system. Selecting a coordinate system is based on additional information such as your knowledge of the image, geography that the image represents, and your project requirements. It is recommended to view and compare combined error before selecting a coordinate system to reference or rectify to.



To use a coordinate system as the reference solution, select it from the list and click OK. In the Control Point List, errors are populated in the error columns for each control point. Try to minimize combined error by removing or adjusting control points with high error. Each time you remove or modify a control point's coordinates to minimize error, the Solve or Find best coordinate system list may be different and results could have improved. It is an iterative process to achieve the best results.



The following are the types of errors provided:

Format	Extension
PXY Error	Total pixel coordinate error
PX Error	X pixel coordinate error
PY Error	Y pixel coordinate error
WXY Error	Total world coordinate error

WX Error	X world coordinate error
WY Error	Y world coordinate error
Forward Residual	Error in pixel units Sum of Error in pixels (X and Y individual errors)
Inverse Residual	Error in the same units as the image coordinate system Sum of Error in units of the coordinate system (X and Y individual errors)

Interpret Residual Errors

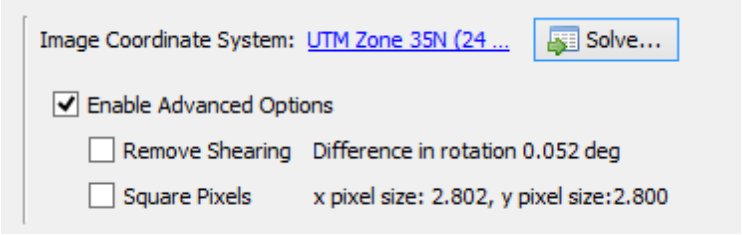
When there are enough control pairs to compute a georeferencing solution, residual errors for each control point are calculated. A residual error is the computed difference between an observed source coordinate and a calculated source coordinate. It is the measure of the fit between the true locations and the transformed locations of the output control points.

A high residual error indicates possible error in either the observed source coordinates or the reference coordinates of the reference point in question. The forward residual is displayed in the same units as the spatial reference. The inverse residual is displayed in pixel units. All residuals closer to zero are considered more accurate.

When the error is particularly large, you may want to remove and add control points to adjust the error. As a general rule, apply several different transformation methods, select/deselect questionable points, and select the method and reference points that yield the minimum residual error, assuming that the defined reference points are correct.

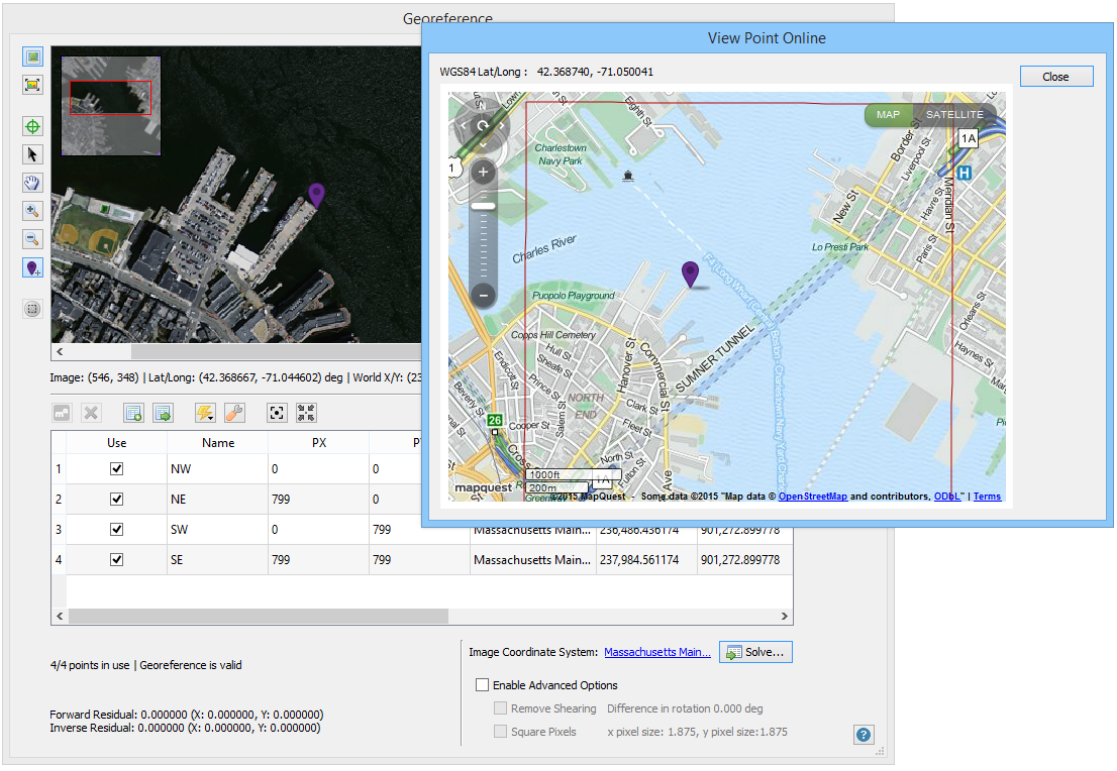
Advanced Options

Click the **Enable Advanced Options** check box to enable the Remove Shearing and Square Pixels options. Enable the Remove Shearing check box to remove any shearing that may result (averages the X and Y rotation values and makes them the same). Enable the Square Pixels check box to ensure that the X and Y pixel dimension size is equal. The combination of these options will affect both pixel coordinate and world coordinate errors.



Validate (Show point online)

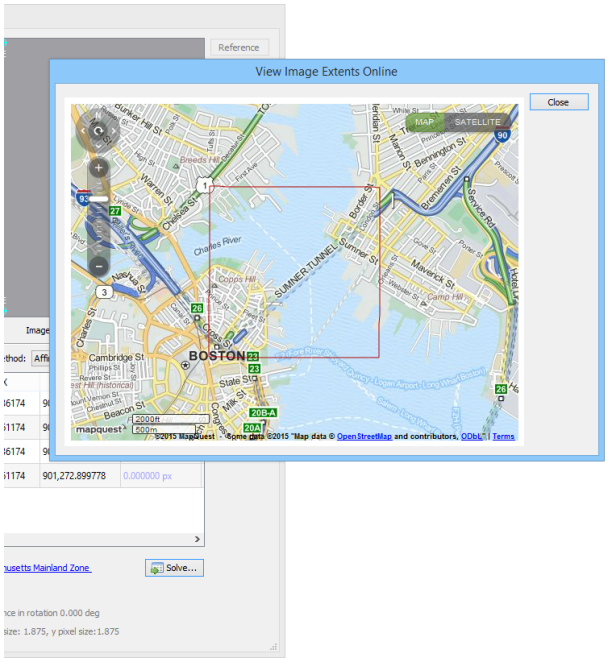
When a georeference solution has been applied to the image, you can use the Validate tool to visually check how close your georeferencing is. Click the **Validate** button and click a location on the image view. An online map service will open and a corresponding placemark is placed on the web map with its WGS 84 Lat/Long coordinates displayed. The extent (red outline) is also displayed on the web map to show the extents of the image. You can continue to click the preview image to validate locations and review them on the online map. Like the Assign World Coordinates dialog box, the zoom of both the image view and the online map can be independently changed.



The Validate tool is disabled when the georeferencing solution is not complete.

View Image Extents Online

You can use View Image Extents Online to see the extents (red outline) of the image on a web map. It is a useful tool to help verify how close the extents are from image to real world.



The View Image Extents Online tool is disabled when the georeferencing solution is not complete.

Additional Georeference Features

Import Control Points Formats

A CSV or TXT file can be formatted with the following syntax so that Geographic Imager will recognize the values when importing it into the Georeference dialog box.

Format	Syntax
CSV	pixel X value, pixel Y value, ground X value, ground Y value
TXT	pixel X value [TAB] pixel Y value [TAB] ground X value [TAB] ground Y value

Importing a file with mixed delimiter formats is not supported.

Log file format cannot be imported.

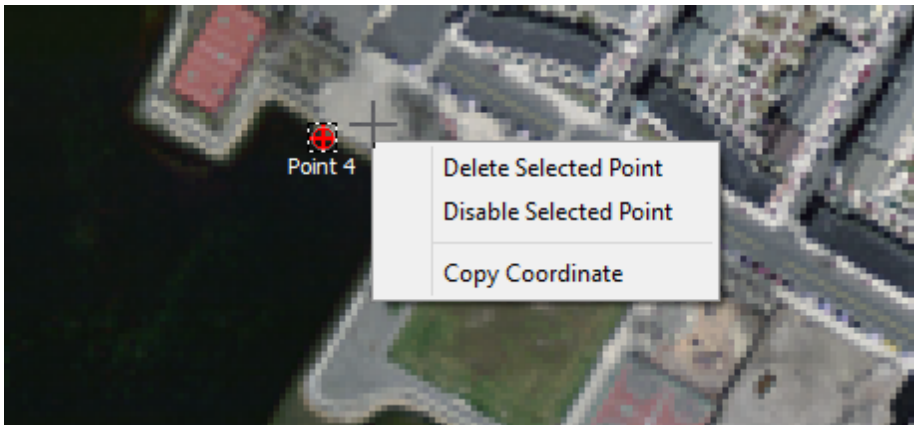
Export Control Points

Click the **Export Control Points** button and save the points using the available export reference formats: log files (.log) and comma delimited (.csv).

The exported log file will contain all of the reference point pixel and world coordinates (including used and unused points), referencing method, residual error values, and points used. The exported comma delimited file will include pixel name, reference point pixel, world coordinates and coordinate system of the world coordinates, no error values or indication if the point is used and unused.

Context Menus

In the image view, for any control point, right-click to open a context menu that allows you to delete the selected point, disable the selected point, or copy the coordinate values.



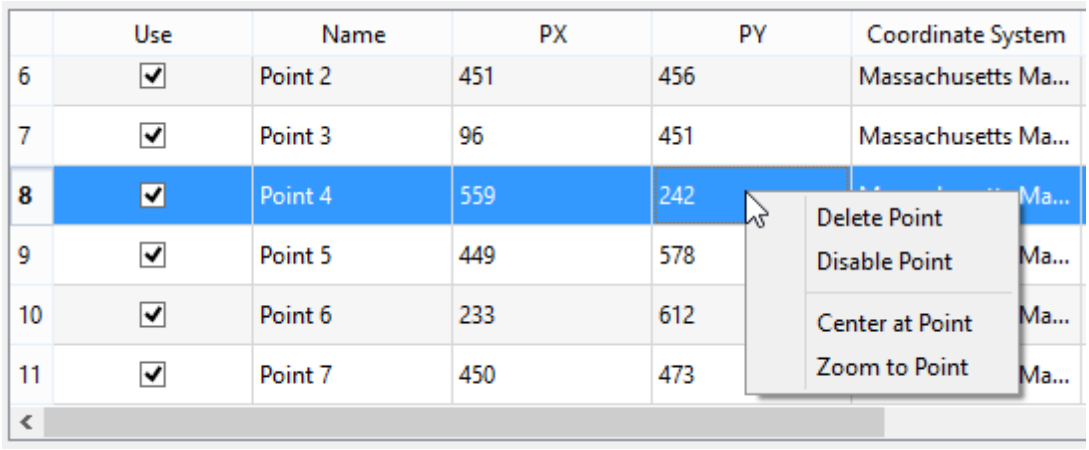
When copying coordinate values, several formats are copied to the clipboard. For example, pasting the values into a text editor will result in the following:

```
220   288   42.3697     -71.0520
      236898.936174
902231.024778
```

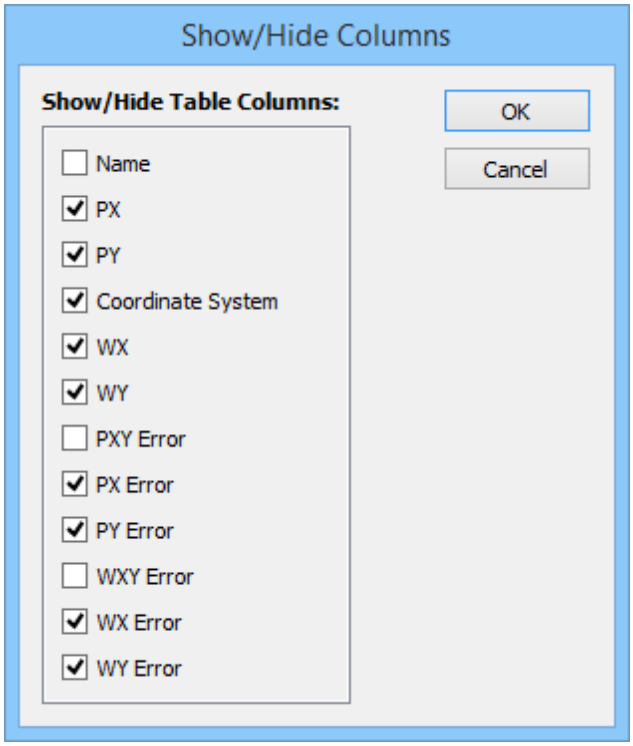
220, 288 represents the pixel coordinates (PX/PY)

42.3697, -71.0520 represents the geodetic base coordinates (Lat/Long)
236898.936174, 902231.024778 represents the world coordinates (WX/WY)

In the Control Points List, right-click any control point entry to open its context menu. You can delete or disable the point as well as center at or zoom to the point.



Right-click any column heading in the Control Points List to open the Show/Hide Columns context menu. In the Show/Hide Columns dialog box, uncheck any of the columns to hide them in the Control Points List.



Unreference

Click the **Unreference** button to remove all control points and any reference information associated with the image within Adobe Photoshop. The unreference action can't be undone within the same work session (i.e. you can't step backward using Adobe Photoshop history). This does not delete any reference information in the actual file unless you overwrite it during a save or export.

View DEM/DTM Elevation Values

To view the elevation value of a DEM or DTM, it must be imported using a DEM schema. In the Georeference dialog box, actual elevation values are displayed below the image view. Move the mouse cursor to any position within the image view to see the values (updated in real time). Note that after applying Terrain Shader, the elevation value will not be available.

Related topics

Transforming Spatial Images

Coordinate Formats

Using Quick Georeference

Georeference Preferences

7.2 Using Quick Georeference

An image can be georeferenced using one reference point and the pixel or image size, two reference points, copy from an existing document or copy from a file. Certain conditions and information are needed using this approach.

To start, click the **Quick Georeference** button in the Georeference dialog box. Choose one of the four Quick Georeference options:

- By Two Reference Points (North/South aligned)
- By Tie Point (North/South aligned)
- Copy From Document (same size/reference)
- Copy From File (same size/reference)

By Two Reference Points (North/South aligned)

Requirements to use two points:

- Two reference point coordinates are known, however these points must not contain the same coordinates in either the pixel (X/Y) or world (WX/WY) values.
- The image is not rotated (image is North/South aligned).

Using this method changes the mode back to Standard. In this process, the four corner coordinates of the image are generated to define the referencing. Points that were not chosen to be used in the georeferencing are discarded. No dialog box opens for this method, the changes are implemented immediately.

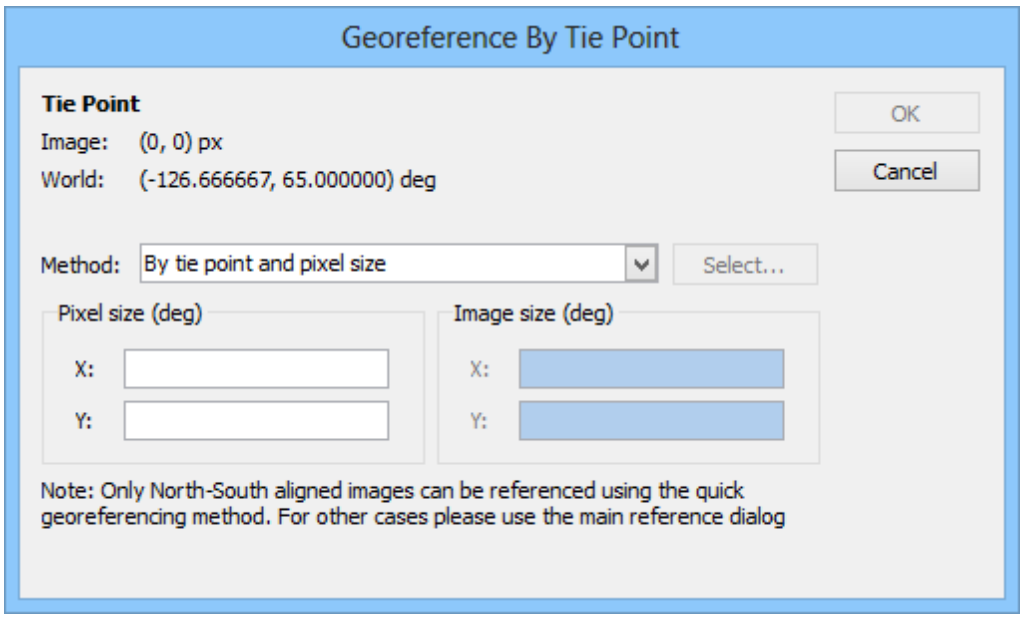
Placement of the two reference points used for Quick Georeference should be far apart to achieve a better reference.

By Tie point (North/South aligned)

Requirements to use one tie point:

- One reference point coordinate is known (pixel and world location).
- The image is not rotated (image is North/South aligned).
- The pixel size or image size in world units is known.

Pixel size or image size must be in world units (geodetic or projected). Change the method to enter either pixel size or image size.



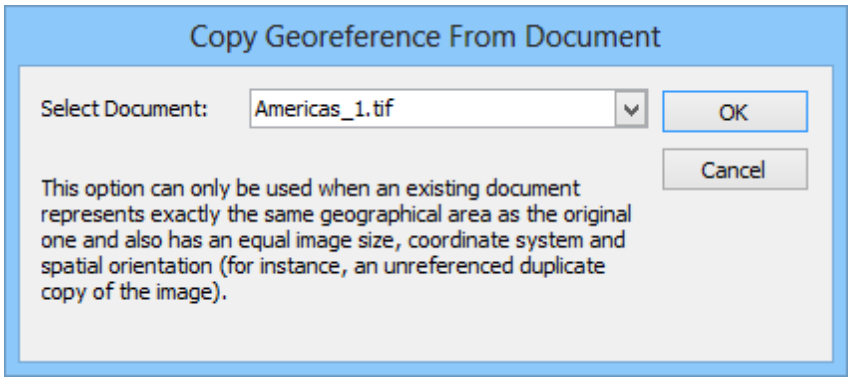
Quick georeference by one tie point and existing document uses a georeferenced image as the source to georeference an unreferenced image (as long as the

second condition above is met). An existing document must have the same coordinate system and pixel size but does not have to contain the geographic extents of the image being georeferenced. Select By tie point and existing document from the drop-down list to use this method.

Copy From Document (same size/reference)

This method copies all the geographic details from a georeferenced image into an unreferenced image. An open georeferenced document must contain the same geographic details as the image being georeferenced:

- Geographic extents (top left and bottom right corner coordinates)
- Image size
- Pixel size
- Rotation



When Quick Georeference is used, the precision needs to be set to the longest pixel value. When the precision is less than the pixel value, the pixel value may be modified. When it is modified, the image will not be able to be mosaicked with other images of the same pixel value.

Copy From File (same size/reference)

This method copies all details from a georeferenced image to the current image. This is similar to the Copy From Document method, except that the source document does not have to be opened in Adobe Photoshop. Choose a supported file format and appropriate reference file to use for georeferencing and click Open to load its control points and coordinate system information.

7.3 Coordinate Formats

Different coordinate formats can be used when adding world coordinates in the Control

Points List. The coordinate format depends on whether the coordinate system specified is projected or geodetic. For projected coordinate systems (e.g. UTM Zone 17N), world X and Y coordinates are entered in the units of the coordinate system (e.g. meter, kilometer, feet). For geodetic coordinate systems (e.g. WGS 84), world coordinates are entered as degrees of latitude and longitude. Depending on what coordinate format you want to enter coordinates as, choose a coordinate format type from the Input Format drop-down list. You can control how coordinates are displayed in the Control Points List by changing the Lat/Long Format drop-down list in Georeference Preferences.

Coordinate format	Coordinate format style	Input/Display
Decimal degrees	(D+[.d*])	Input and display
Delimited Degrees Minutes Seconds	(D+ MM SS[.s*])	Input and display
Delimited Degrees Minutes Seconds with symbols	(D° MM' SS[.s*]")	Display only
Delimited Degrees Minutes Seconds with symbols & suffix	(D° MM' SS[.s*]" [NESW])	Display only
Degrees.Minutes	(D+.MM)	Input and display
Degrees.Minutes with symbols	(D+° MM')	Display only
Degrees.MinutesSeconds	(D+.MMSS[s*])	Input and display
Packed DMS with decimal point	((D)DDMMSS[.s*])	Input and display
Packed DMS	((D)DDMMSS[s*])	Input and display

Items in [ ] are optional, * means zero or more digits, + means one or more digits.

Degrees coordinate format examples:

	Decimal Degrees	Delimited Degrees Minutes Seconds	Delimited Degrees Minutes Seconds with symbols	Delimited Degrees Minutes Seconds with symbols & suffix	Degrees. Minutes	Degrees. Minutes with symbols	Degrees.MinutesSeconds	Packed DMS with decimal point	Packed DMS
Lat	43.6969	43 41 48.84	43° 41' 48.84"	43° 41' 48.84" N	43.418140	43° 42'	43.414884	434148.84	43414884
Long	79.3922W	-79 23 32.92	-79° 23' 31.92"	-79° 23' 31.92" W	-79.235320	-79° 24'	-79.233192	-0792331.92	-079233192

Lines of latitude run east-west (e.g. the Equator) and lines of longitude run north-south (e.g. Greenwich Meridian). Positive degree values represent north latitudes and east longitudes. Negative degree values represent south latitudes and west longitudes. Directions can be entered either with positing/negative values or using the letters N, S, E or W preceding or following the numerical values, separated or not with a space.

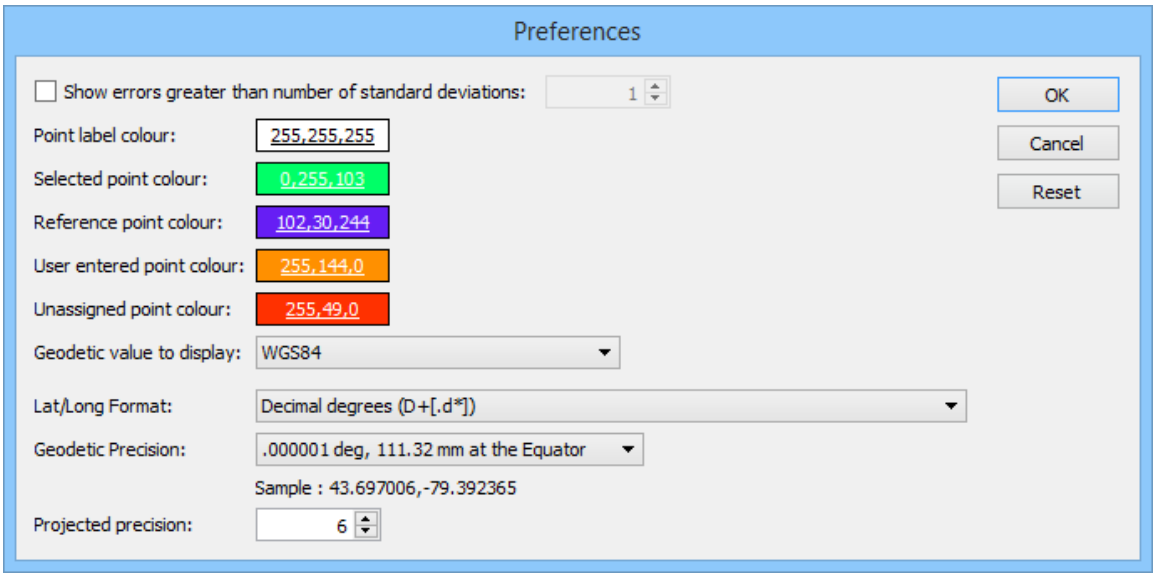
Valid delimiters for Delimited Degrees Minutes Seconds format are:

- space, hyphen (-), colons (:) or underscore (_) : e.g. 43 41 48.98N, 43-41-48.98N, 43:41:48.98N or 43_41_48.98N
- d (degree), single quote (minute), double quote (second): e.g. 43d41’48.98"N

Packed formats require the use of two digits for degrees of latitude (e.g. 1°N must be written 01) and 3 digits for degrees of longitude (e.g. 1°E must be written 001).

7.4 Georeference Preferences

Georeferences Preferences contains options that can help customize the interface. Click the **Preferences** button to access Georeference Preferences.



Error Detection Tolerance

The standard deviation is calculated from the residual errors of the control points. It is a statistic that indicates how much the control points match with the computed values (depending on the chosen transformation method). Enable the Show errors greater than number of standard deviations option to change the

multiplier coefficient. Depending on the accuracy of the control points, the multiplier coefficient and the transformation method used, points that fall outside of the standard deviation range are considered as error. To set the threshold to tolerate more error, change the multiplier coefficient to a larger value. To set a threshold that will tolerate less error, change the multiplier coefficient to a smaller value. Points that do not comply with the tolerance range (standard deviation multiplied by coefficient) will be shown in red.

This method of error detection can be turned off by unchecking the Show errors greater than number of standard deviations option. This will ensure all the control points are listed in black.

The values displayed in the Error Detection Tolerance correspond to the PXY error and the WXY error respectively. As the tolerance level is changed these values will update indicating the maximum tolerance value allowed. Values that exceed the maximum tolerance will be displayed in red in the list of GCP points.

Control Point and Label Colours

Choose colours for the control points and control point labels in the image view.

Lat/Long format and Geodetic Precision

Use the Lat/Long preference to change how world coordinates are displayed in the Control Point List. In addition, use the Geodetic Precision preference to change how many decimal places are displayed. A degree precision of one decimal place (e.g 0.1 decimal degrees) has a qualitative scale of a large city, while a precision of six decimal places (e.g. 0.000001 decimal degrees) has a qualitative scale of individual humans. An example is displayed as to how these preferences affect the display of geodetic coordinate values.

Projected Precision

Adjust the value in the Projected precision to change the number of decimals a projected coordinate displays. Each coordinate format has its own default minimum and maximum decimal precision. The default decimal precision is 6.

Related topics

Georeference Editor Preferences

7.5 Georeference Tutorials

7.5.1 Georeference an Image Tutorial

The orthoimage used for this tutorial is of an area of Lafayette, Indiana, US courtesy of the Indiana Spatial Data Portal. The image has no georeferencing, however for the purpose of this tutorial, it has six green arrows indicating the positions of where you will place control points while you georeference it.

1. In Adobe Photoshop, browse to the tutorial folder and open **Lafayette.jpg** from the Tutorial Data folder.

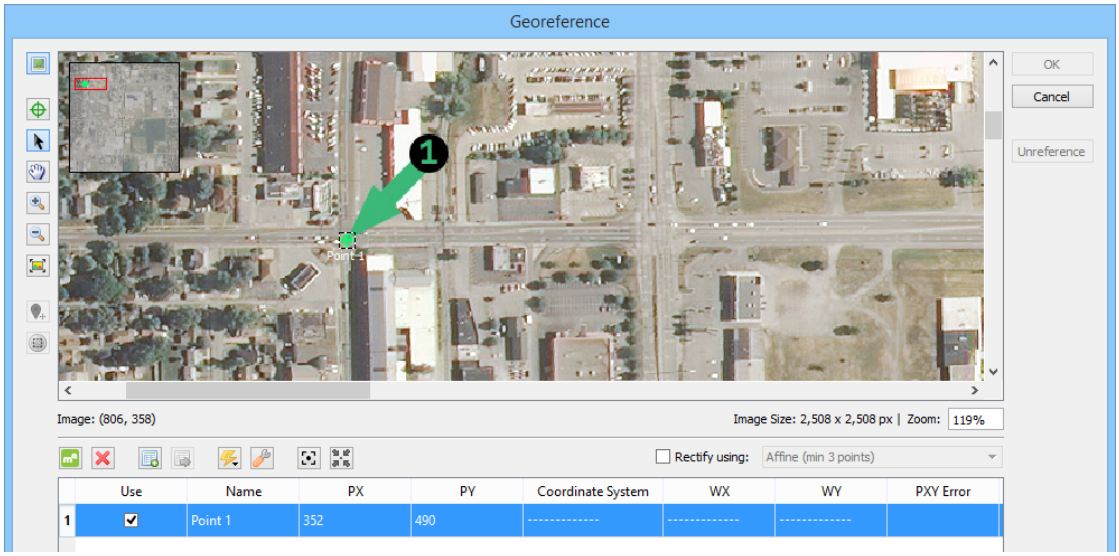
On the Geographic Imager panel, the Reference file field is not specified because no corresponding reference file is present in the image folder. Similarly, there is no coordinate system specified.

2. On the Geographic Imager panel, click the **Georeference** button.

The image was originally in a NAD83 / UTM Zone 16N projected coordinate system. You can enter world coordinates as projected coordinates, but to make it simpler you can enter world coordinates as latitude and longitude in the WGS 84 geodetic system.

3. To the left of the image preview, use the navigation controls to pan and zoom to green arrow 1 located at the upper-left corner of the image.

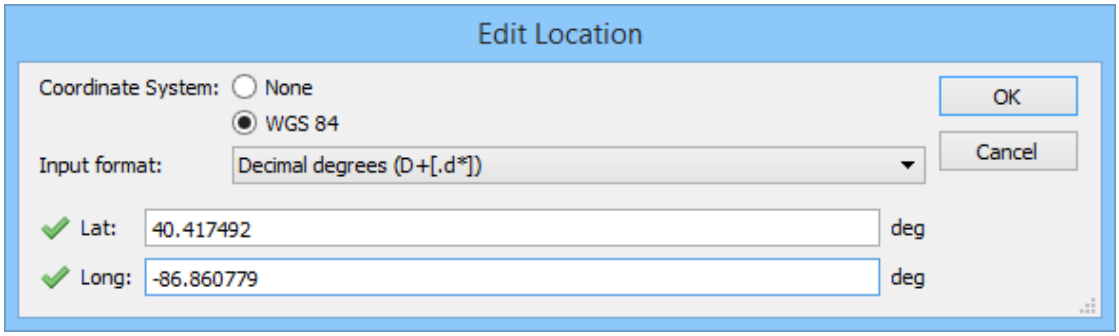
4. Click the Add Point button and click precisely at the tip of the green arrow on the image preview (zoom-in more if necessary).



This adds the first control point named Point 1 at a pixel location of 352,489. A new row is added in the control point table. You'll add a world coordinate to Point 1 to create a control pair. Good locations to place control points are at identifiable locations like road intersections, building corners or property boundaries.

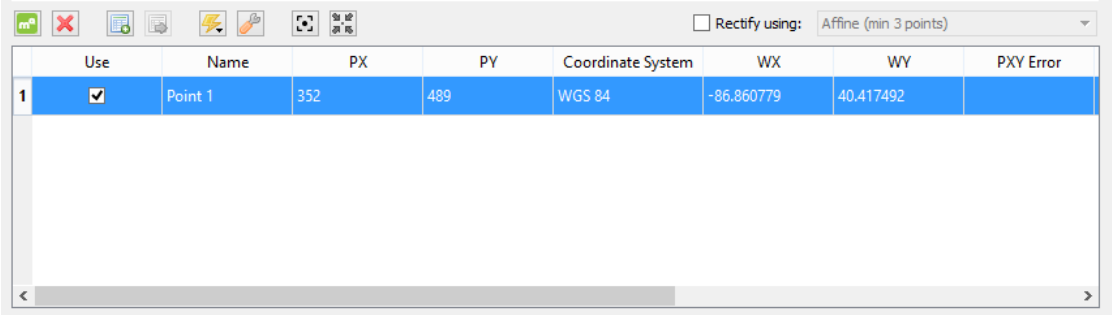
5. In the control point table, double-click the Coordinate System, WX, or WY cell.

6. Choose the WGS 84 coordinate system, and enter:
   - Lat: **40.417492**
   - Long: **-86.860779**



7. Click OK.

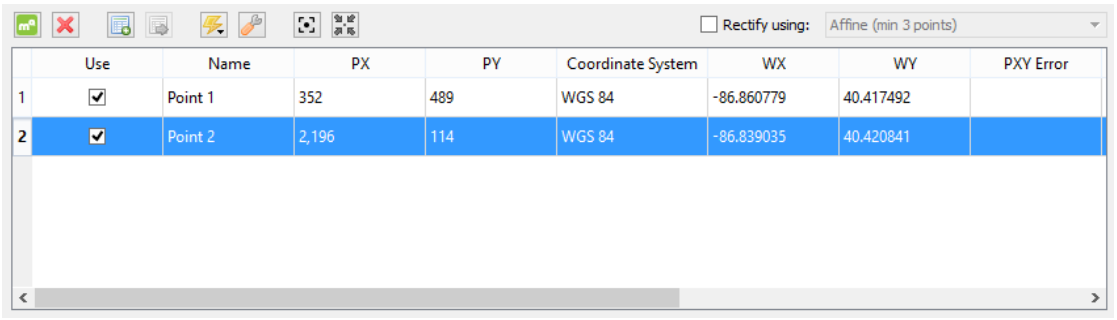
The world coordinates are added to the point and the table is updated.



8. Using the navigation controls, go to green arrow number 2 at the upper-right corner of the image.

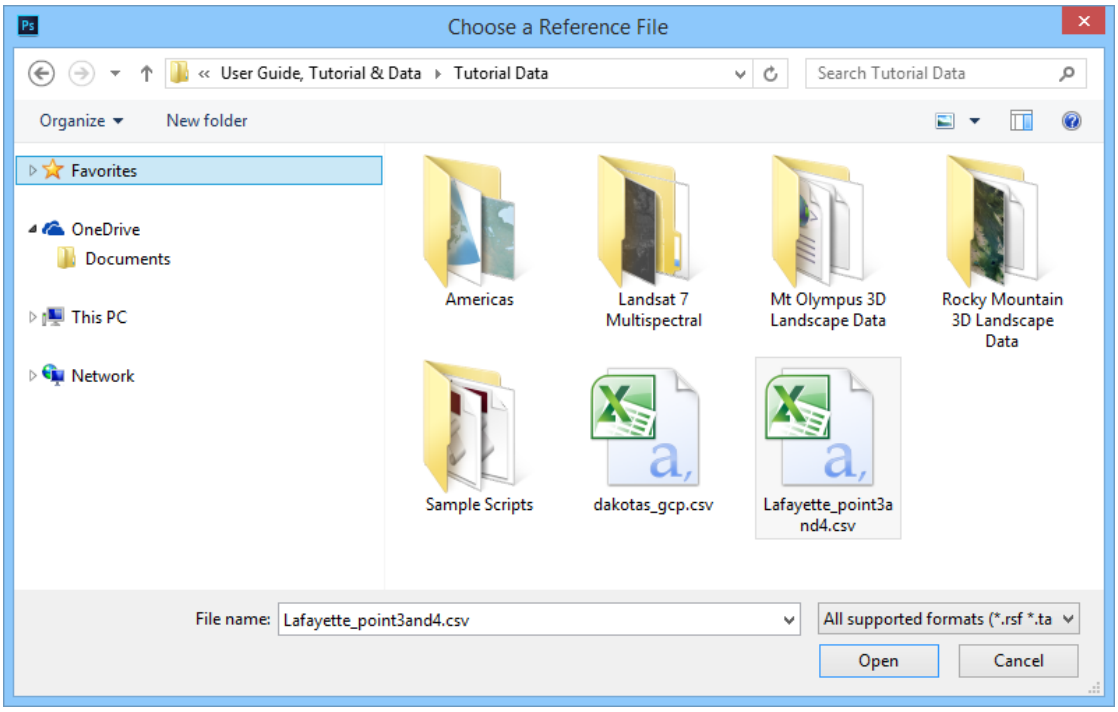
9. Click the Add Point button and click precisely at the tip of second pushpin.

10. In the control point table, enter the world coordinate for Point 2 as follow:
    - Lat: **40.417492**
    - Long: **-86.860779**

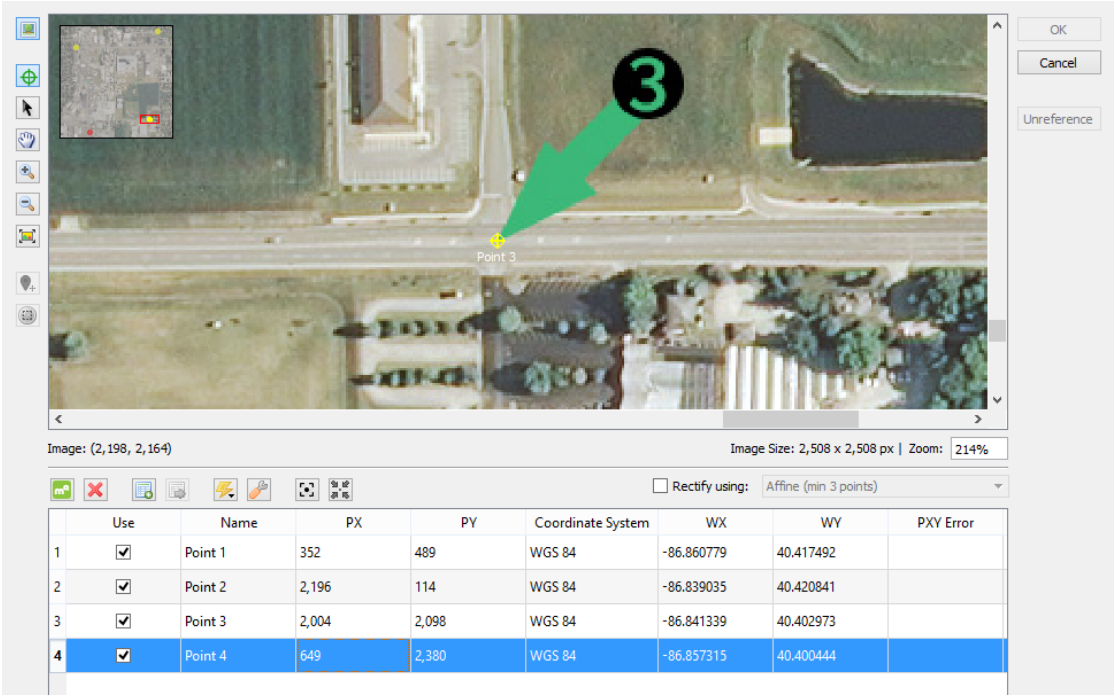


To add the control points for the third and fourth points, you'll import a CSV file.

11. Click the **Import Additional Control Points** button. Navigate to the Tutorial Data folder, select **Lafayette_point3and4.csv** and click Open.



The control points — Point 3 and Point 4 — are added to the table and the image view. The CSV file includes both pixel and world coordinates. You can move the image view to see the green arrows for the third and fourth control points. You'll continue to add the fifth and sixth control points.



12. Add a control point for green arrow 5.

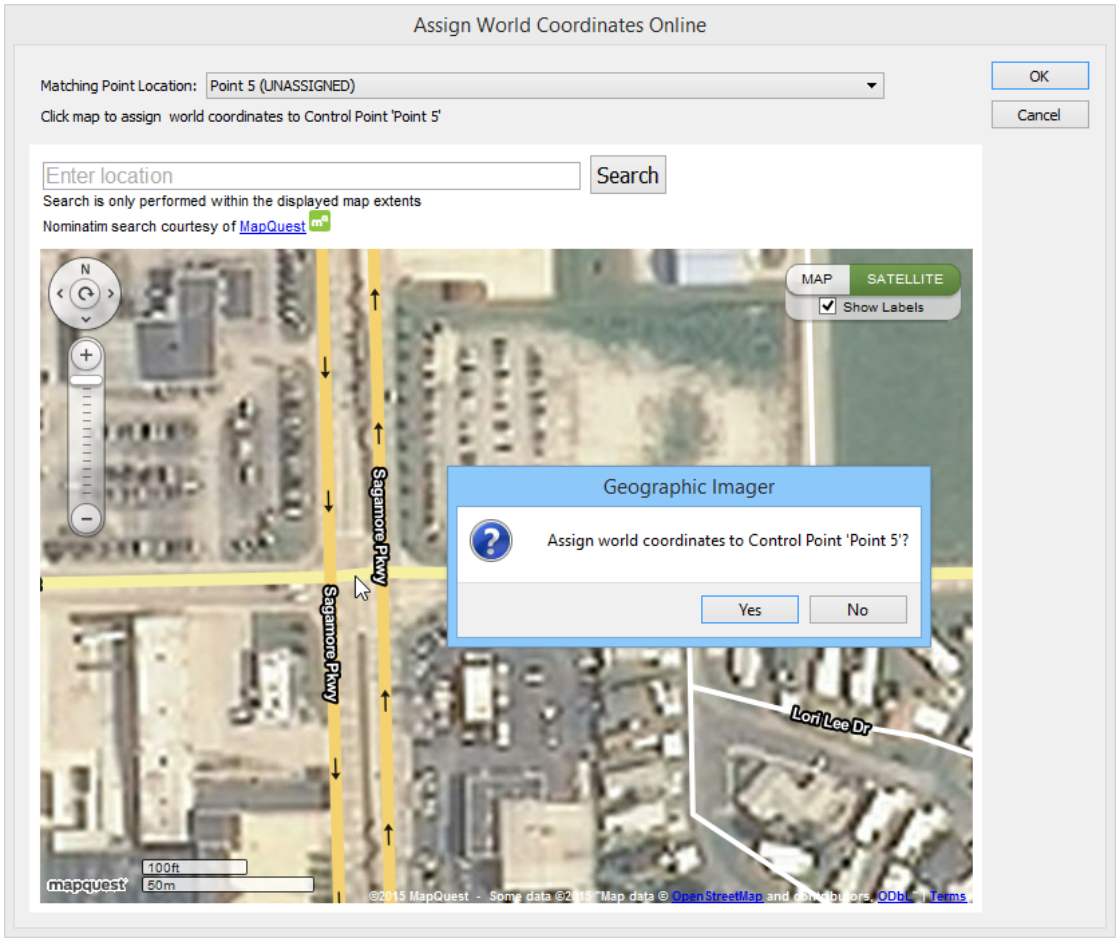
13. Click the **Assign World Coordinates Online** button.

The Assign World Coordinates Online dialog box opens a web map. The purpose of this feature is to find the matching location on the web map to assign it to the fifth control point.

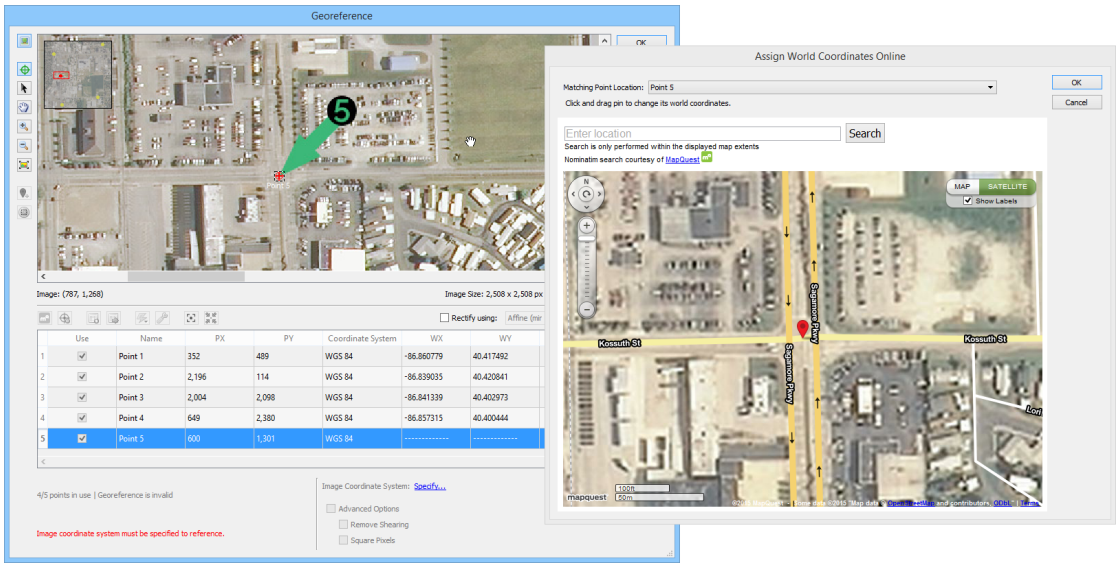
14. Make sure **Point 5 (UNASSIGNED)** is chosen from the Matching Point Location drop-down.

15. Click the **SATELLITE** button to switch to a satellite web map view.

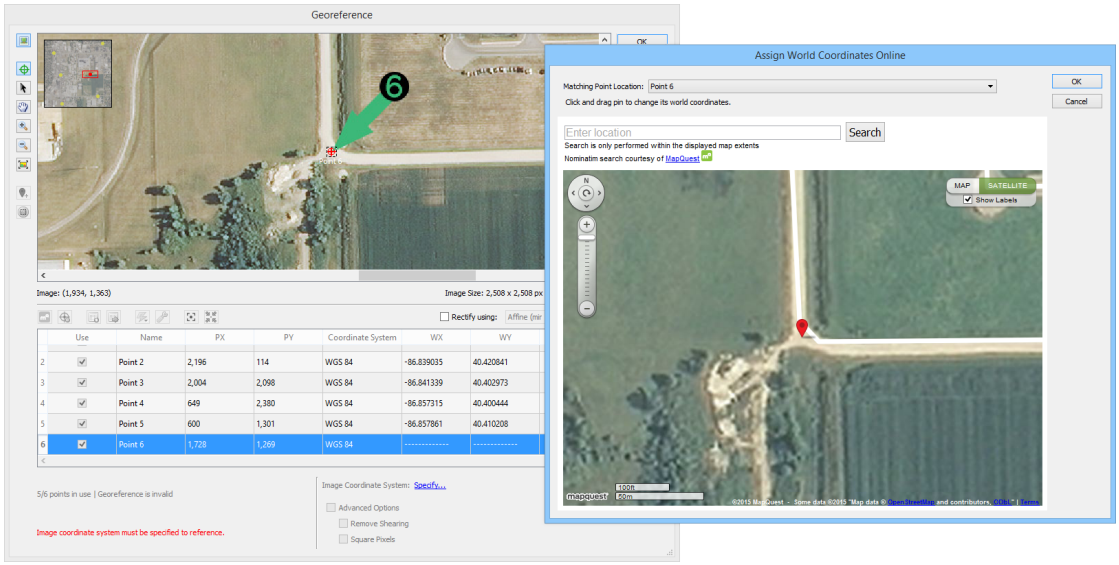
16. Using the other points as a proximity reference, find the location of the fifth control point. (It's at the intersection of Sagamore Pkwy and Kossuth St). When you have found this location, click the exact location you want to use as a world coordinate (in the middle of the intersection). Click **Yes** to assign the world coordinate to Point 5.



You can navigate and interact with both the Georeference dialog box and Assign World Coordinates Online dialog box at the same time.



17. Repeat the same procedure for the sixth (and final) control point.

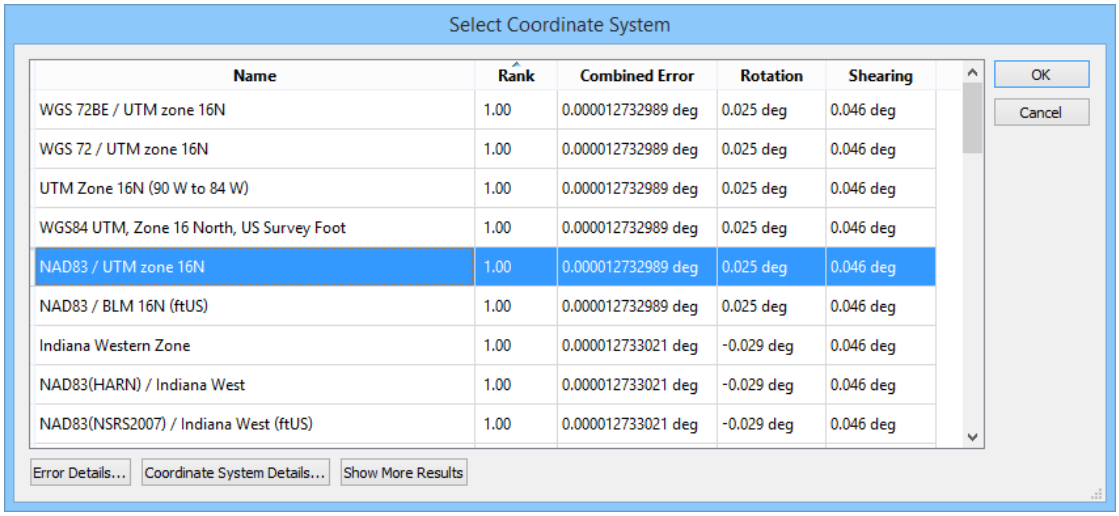


The reference Method is set by default to Affine which requires a minimum of three points. Affine is used for referencing images and higher methods are generally used for rectifying images. It is recommended to use as many control points as necessary to calculate a good reference (six or more control points is good practice).

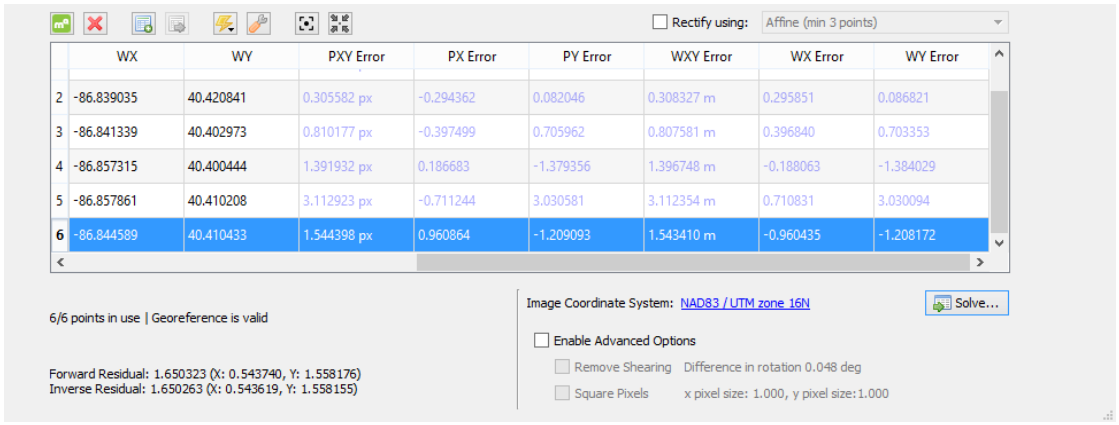
18. Click the **Solve** button.

The Solve feature calculates the optimal coordinate system to use based on the control points you specified (that's why six control points were used). These coordinate systems are very similar with similar combined errors. While anyone of these could be used, it's best to use the coordinate system that matches data in your own project. In this case, remember that the image was originally in a NAD83 / UTM Zone 16N projected coordinate system.

19. In the coordinate system list, select **NAD83 / UTM zone 16N** and click OK.



The control point table contains several columns on the positioning error of each control point (in pixel or world units).



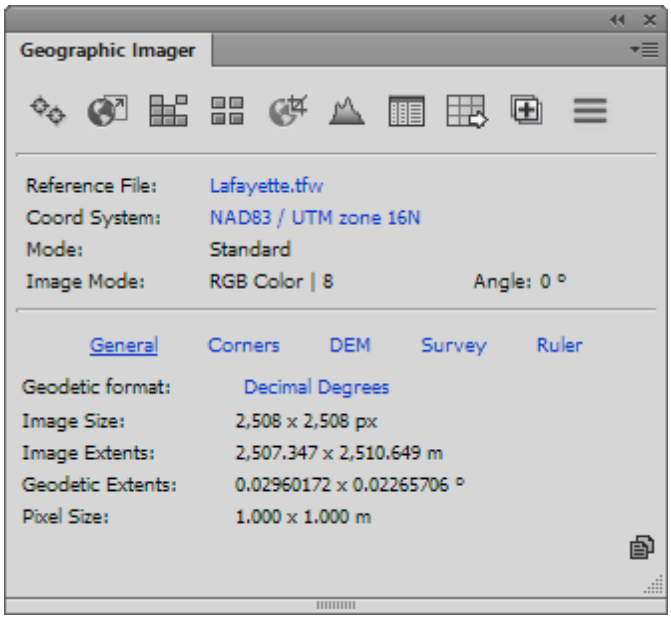
To reduce the error values, you could navigate and adjust the position of control points. Look at the error columns in the control point table to see if this improves the positioning accuracy. In addition, use the Validate tool and View Image Extents Online to check how close your georeferencing is.

20. Use the Validate tool to check the accuracy of your referencing.

When using the Validate tool, you can still interact with the Georeference dialog box at the same time.

21. Click **Reference** to complete the georeference. If a message appears, click **Continue to reference the image**.

The image is now georeferenced. The Geographic Imager panel indicates a reference file named Lafayette.tfw and the coordinate system (NAD83 / UTM zone 16N). The World (tfw) reference file format is the default reference format. It can be changed in Geographic Imager Preferences.



22. To save the reference file and image file (although the image itself has not been modified), choose File > Save in the Adobe Photoshop main menu. The reference file, Lafayette.tfw, is saved in the same folder as the image file. Alternatively, use Save As to save as a different format, including TIFF (which will save the image as a GeoTIFF).

7.5.2 Quick Georeference Tutorial

Quick Georeference is a fast method to georeference an image. This method requires two conditions:

- The image is not rotated (image aligned to True North).
- Only two points are needed to georeference, however these points must not contain the same coordinate in either the X or Y pixel or world unit (i.e. two points cannot be aligned on the same X or Y axis on either the image or world system).

In this tutorial, you're going to Quick Reference an image to the WGS 84 coordinate system.

1. In Adobe Photoshop, open **Americas_4.tif** from the Tutorial Data folder.

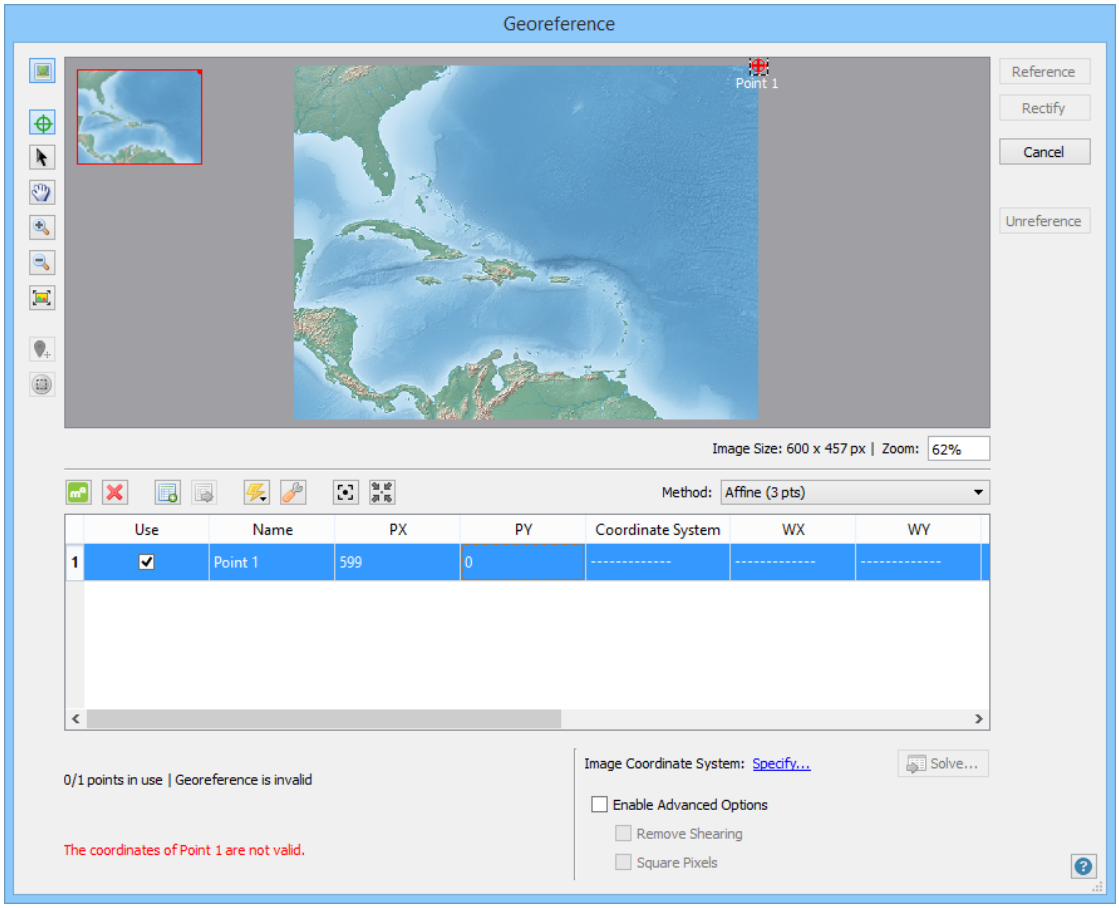
The image is unreferenced. It also meets the two conditions noted above - it isn't rotated and is aligned to True North.

2. In the Geographic Imager panel, click the **Georeference** button.

3. On the Georeferencing dialog box, to the left of the image view, click the **Add Control Point** button. Click anywhere on the image view to add a point.

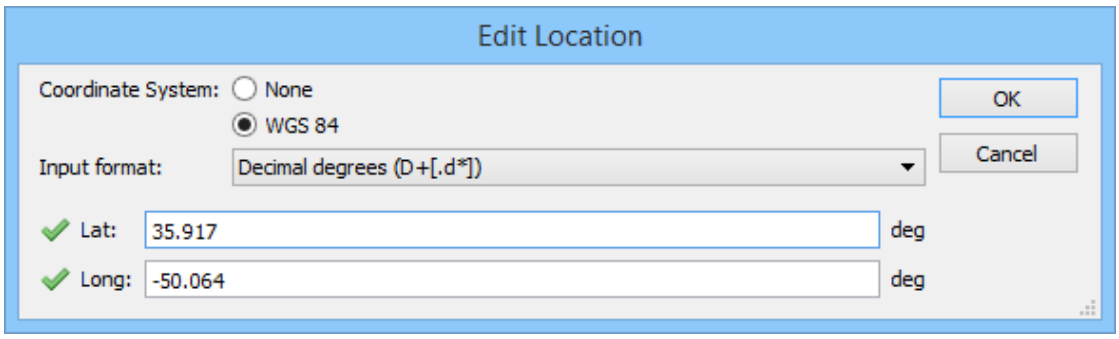
Point 1 is added to the control point list. You'll adjust the pixel coordinates (PX and PY) and add world coordinates (WX and WY).

4. Double-click the PX cell and enter **599**. Double-click the PY cell and enter **0**.

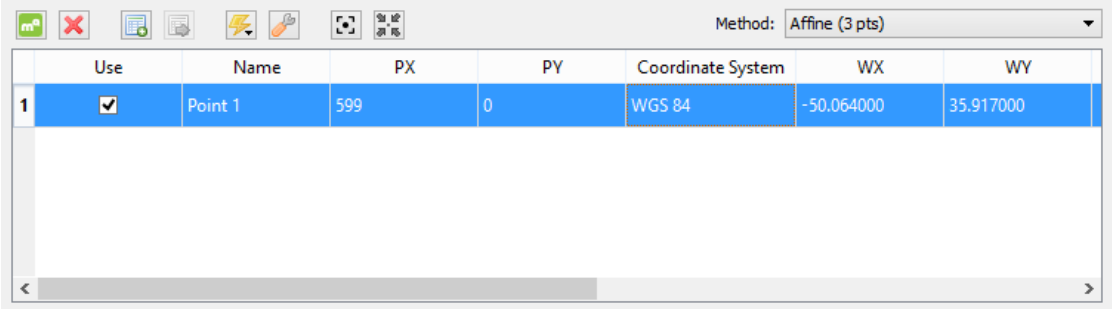


5. Double-click the Coordinate System, WX, or WY cell.

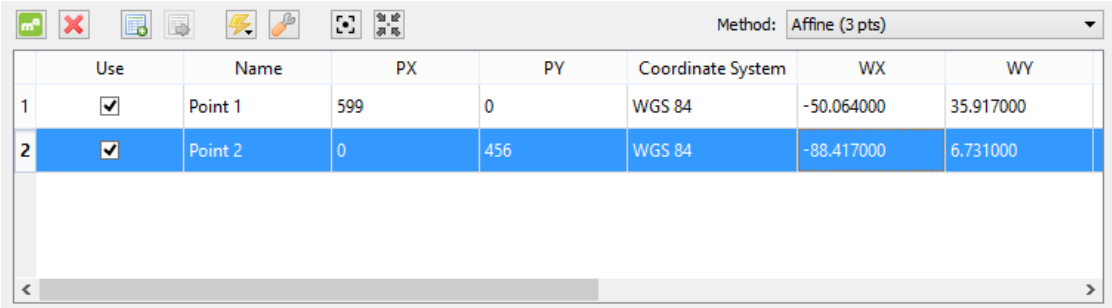
6. Choose the **WGS 84** coordinate system. Enter **35.917** into the Lat box and enter **-50.064** into the Long box, then click OK.



The world coordinates are updated in the control point list



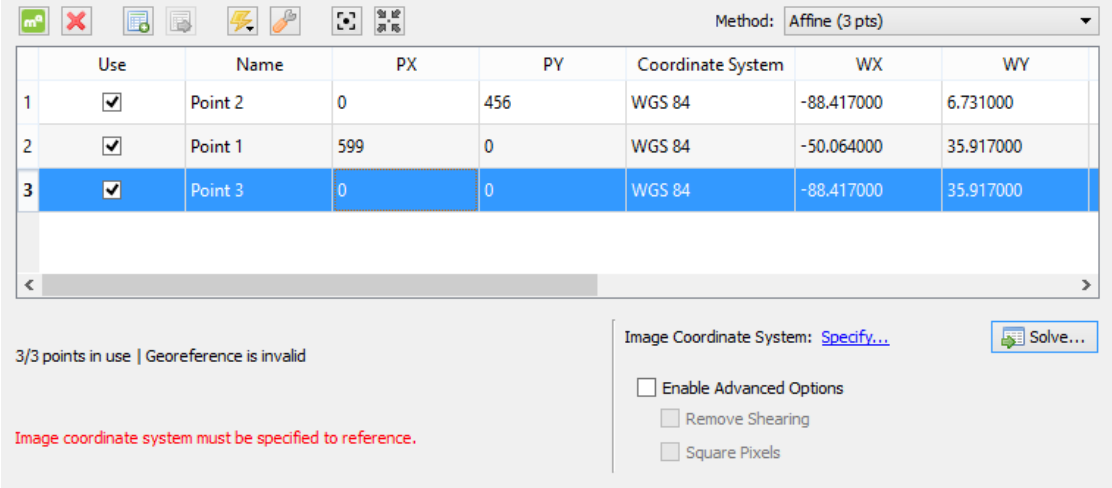
7. Add a second point to the image view. This time, use the pixel coordinates: PX = **0**, PY = **456**; and use the world coordinates: Lat = **6.731**, Long = **-88.417**.



Now that two control point pairs are ready, you'll next use the Quick Georeference feature.

8. Click the **Quick Georeference** button and select the option **By Two Reference Points (North/South aligned)**.

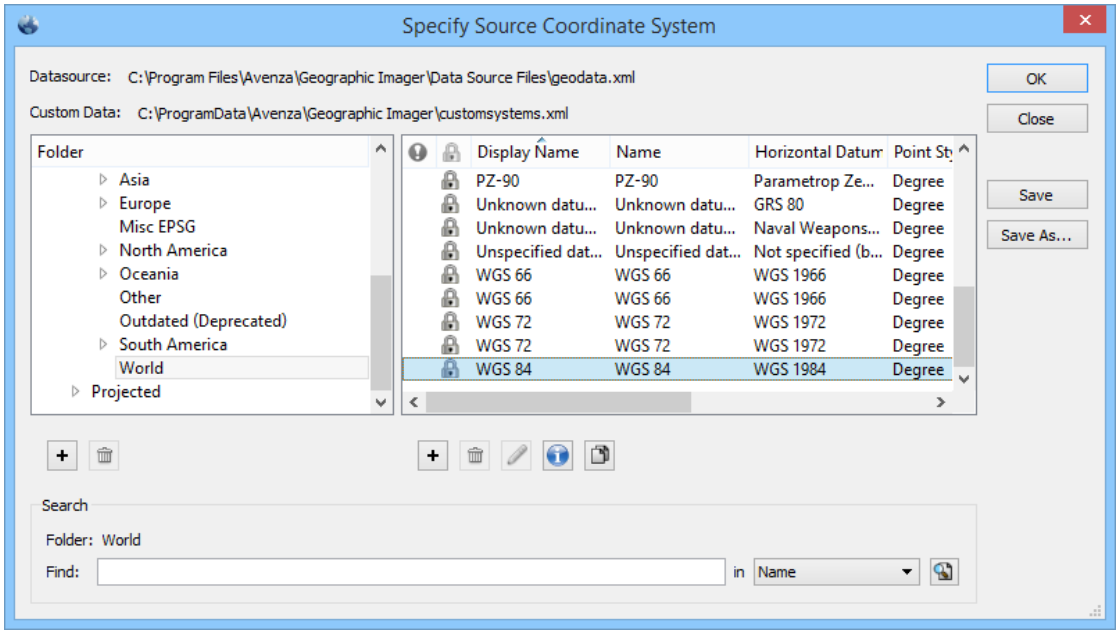
An additional control point is added to the control point list and image view. Its world coordinates were calculated based on the existing two control point pairs. A minimum of three control points are required to reference the image. Next, you'll choose the image coordinate system.



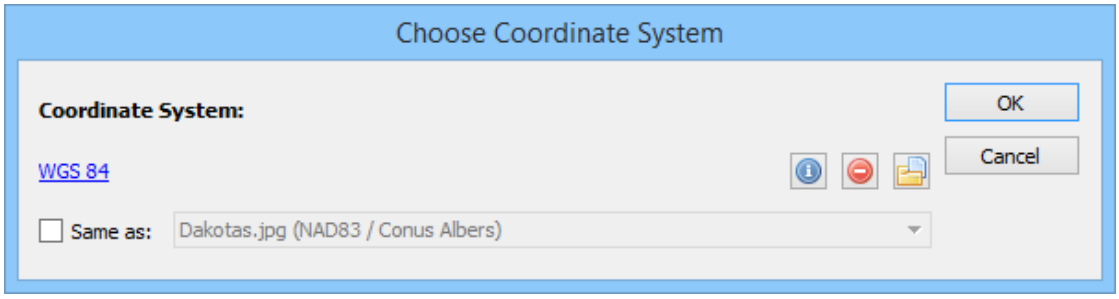
9. Click the Image Coordinate System **Specify** link.

10. On the Choose Coordinate System dialog box, click the **[No Coordinate System Specified]** link.

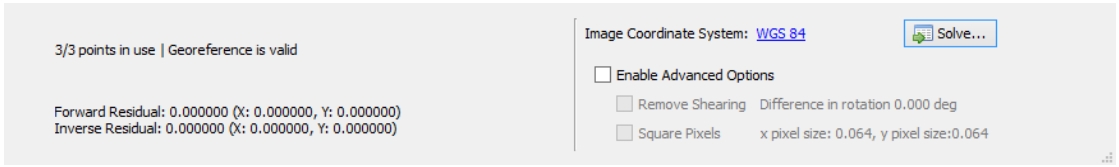
11. In the Specify Source Coordinate System dialog box, expand the Coordinate Systems > Geodetic > World category, select the **WGS 84** coordinate system and click OK.



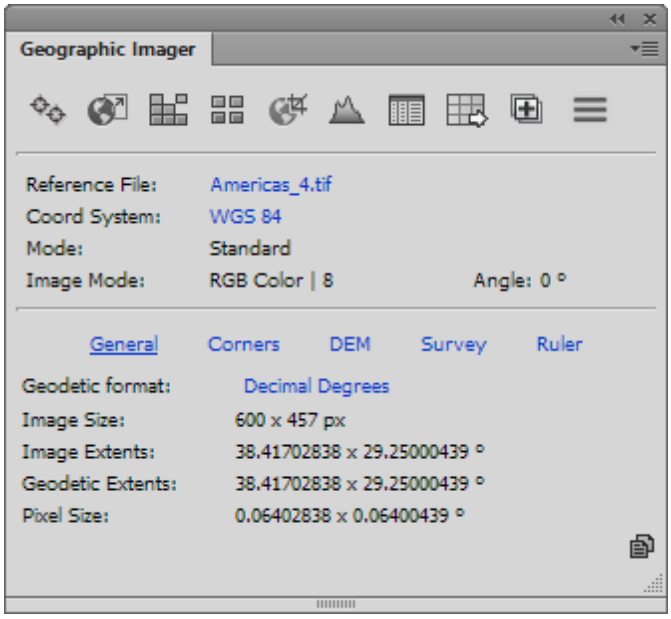
12. Click OK to close the Choose Coordinate System dialog box.



The image coordinate system is updated and the image is now ready to complete referencing.



13. Click **Reference** to complete the georeference.



The document has been successfully georeferenced.

7.5.3 Rectify an Image Tutorial

Rectification or "rubber sheeting" changes the geometry of a raster image using

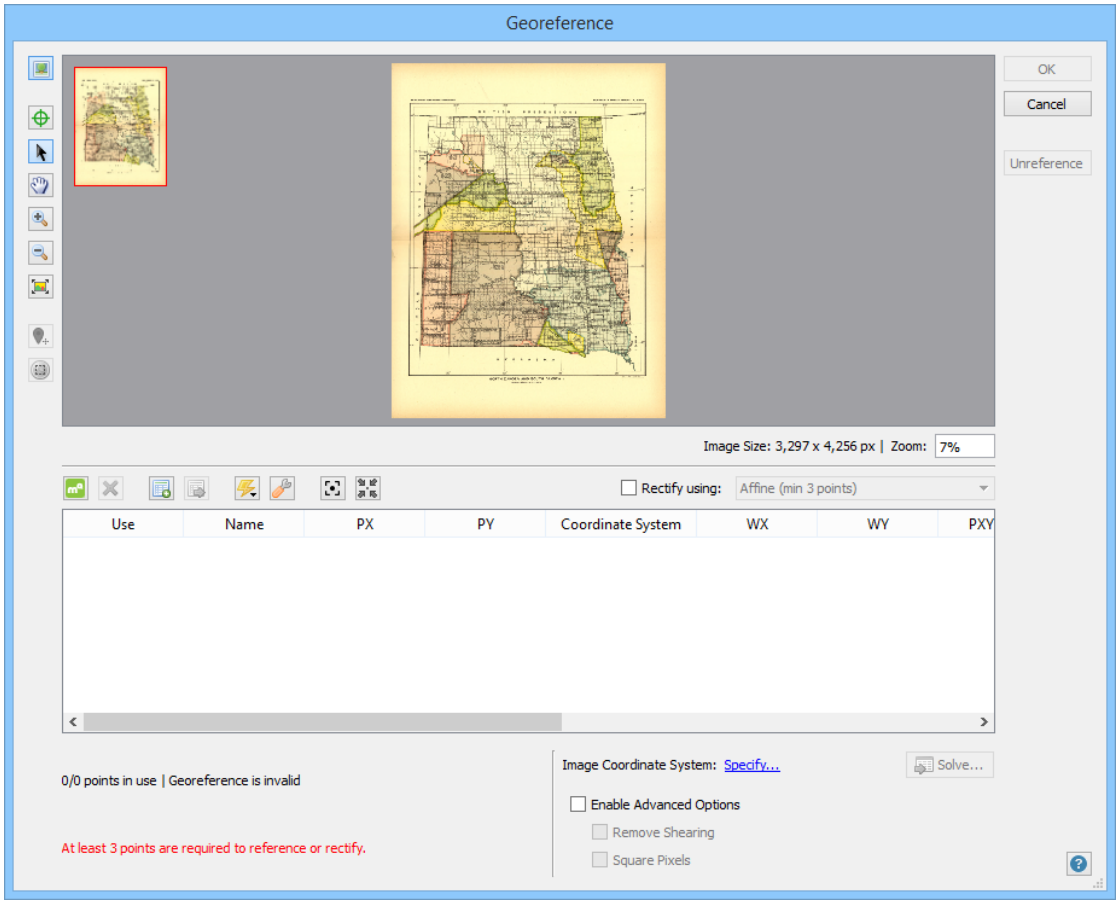
multiple control points that provide georeference control. Depending on the chosen geometric transformation (referencing) method, the correct process can decrease geometric distortions, reorient and rescale an image so that its lines are parallel to the axes of a specified geographic coordinate system.

In this example, you'll take a historic map of an unknown projection and georeference and rectify it to the WGS 84 coordinate system. The map has intersecting lines of longitude and latitude which will serve as good locations for control points. A sufficient number of ground control points distributed evenly across an image will need to be specified. To rectify the image, the Quadratic transformation method will be used.

1. In Adobe Photoshop, open **Dakotas.jpg** from the Tutorials Data folder.

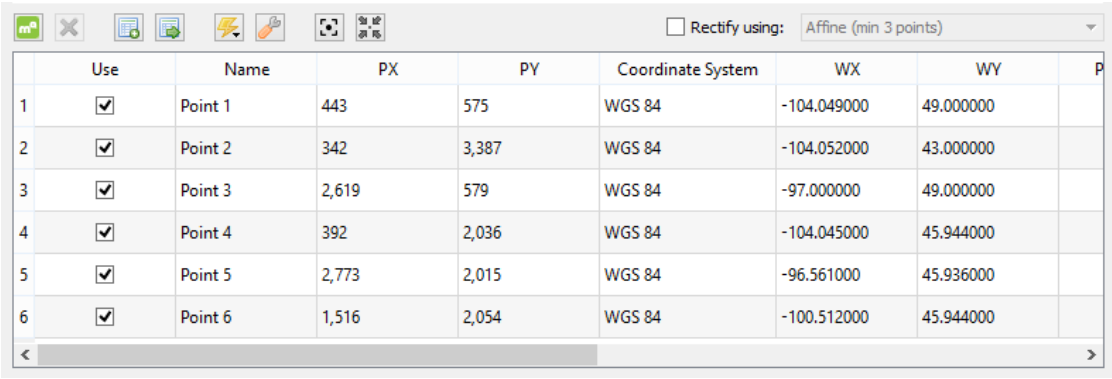
Notice that the image is not georeferenced. Next, you'll import existing ground control points, move several of them to the correct position, and add two additional points to complete referencing.

2. In the Geographic Imager panel, click the **Georeference** button.



Next, you'll add some control points.

3. Click the **Import Additional Control Points** button. Browse for **dakotas_gcp.csv**, then click Open to add them to the Georeference dialog box.



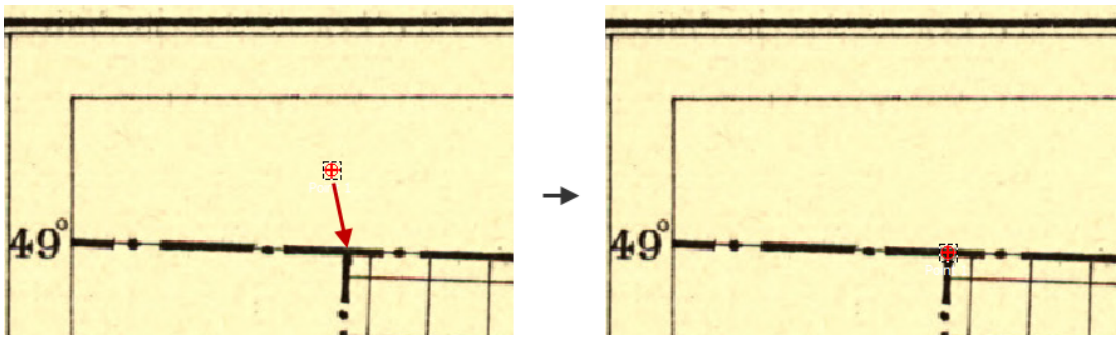
Rectify using: Affine (min 3 points)

	Use	Name	PX	PY	Coordinate System	WX	WY	P
1	☑	Point 1	443	575	WGS 84	-104.049000	49.000000	
2	☑	Point 2	342	3,387	WGS 84	-104.052000	43.000000	
3	☑	Point 3	2,619	579	WGS 84	-97.000000	49.000000	
4	☑	Point 4	392	2,036	WGS 84	-104.045000	45.944000	
5	☑	Point 5	2,773	2,015	WGS 84	-96.561000	45.936000	
6	☑	Point 6	1,516	2,054	WGS 84	-100.512000	45.944000	

Six ground control points appear in the image view as well as the control point list. For the purpose of this tutorial, four of the points have already been placed in the correct location. Next, you'll move two control points (Point 1 and Point 3) to their

correct positions. Notice that Point 1 has a world X and Y coordinate of -104.049 and 49.000 decimal degrees.

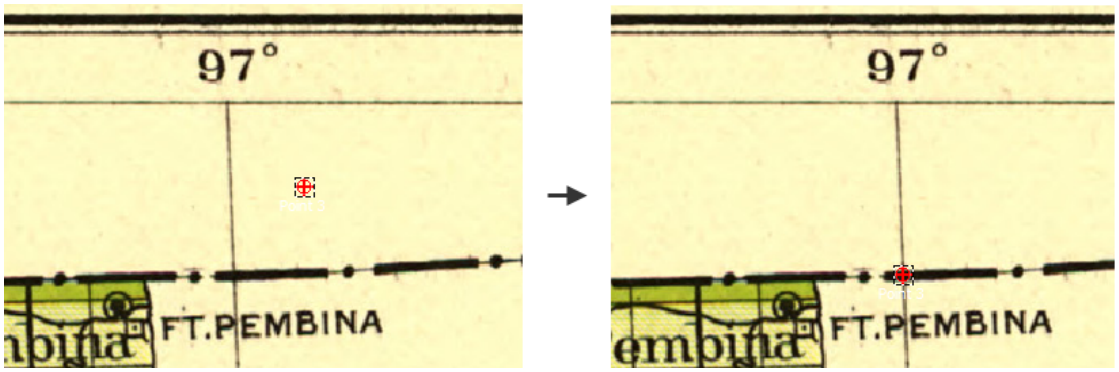
4. On the image view, zoom into Point 1 (top-left area of the image). Enable the **Select Points** button, then click and drag Point 1 to where the 49° line first perpendicular line intersect (see the following graphic).



Point 1 is now in the correct position of approximately -104.000 and 49.000 decimal degrees.

In the reference list, notice that Point 3 has a world coordinates of -97.000 and 49.000 decimal degrees. You'll move Point 3 to the correct position as well.

5. On the image view, zoom into Point 3 (top-right area of the image). Move Point 3 to where the 49° line intersects with the 97° line.

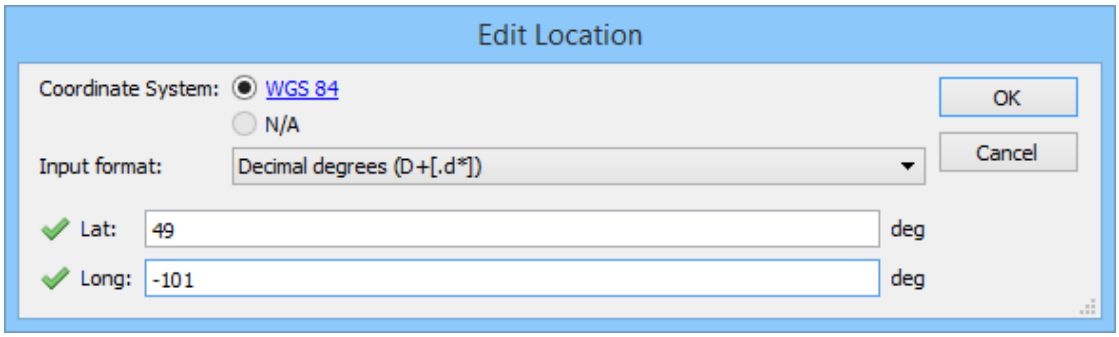


Point 3 is now in the correct position of approximately -97.000 and 49.000 decimal degrees. Next you'll add two more ground control points and then choose the appropriate reference method.

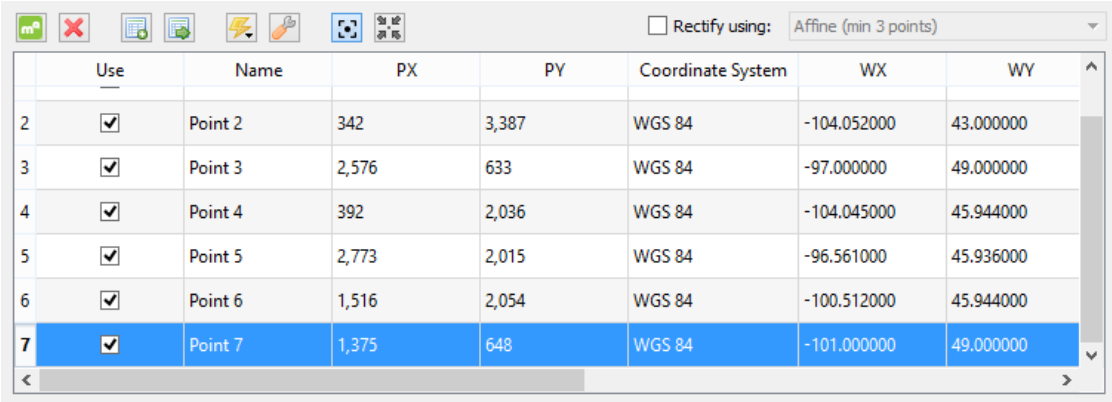
6. Click the **Add Point** button. Pan to the top-center area of the map. Click where the lines of 101° and the 49° intersect. (If necessary, use the Select Points tool to

move it into the proper position.) In the control point list, double-click the WX or WY cell.

7. On the Edit Location dialog box, enter **49** into the Lat box and **-101** into the Long box, then click OK.

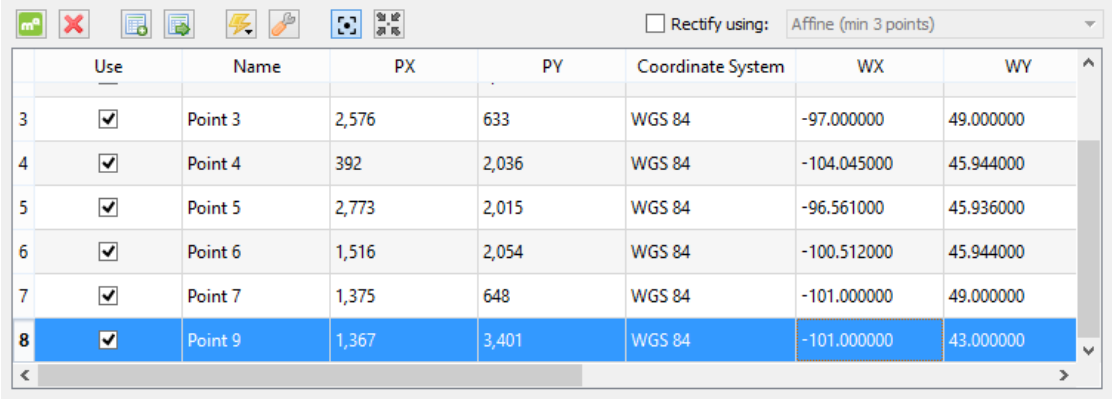


Point 7 has its world coordinates updated.



	Use	Name	PX	PY	Coordinate System	WX	WY
2	☑	Point 2	342	3,387	WGS 84	-104.052000	43.000000
3	☑	Point 3	2,576	633	WGS 84	-97.000000	49.000000
4	☑	Point 4	392	2,036	WGS 84	-104.045000	45.944000
5	☑	Point 5	2,773	2,015	WGS 84	-96.561000	45.936000
6	☑	Point 6	1,516	2,054	WGS 84	-100.512000	45.944000
7	☑	Point 7	1,375	648	WGS 84	-101.000000	49.000000

8. With the **Add Point** button still enabled. Pan to the bottom-center area of the map. Click where the lines of 101° and the 43° intersect. For Point 8, double-click the WX or WY cell. Enter the world coordinates of **43** into the Lat box and **-101** into the Long box, then click OK.



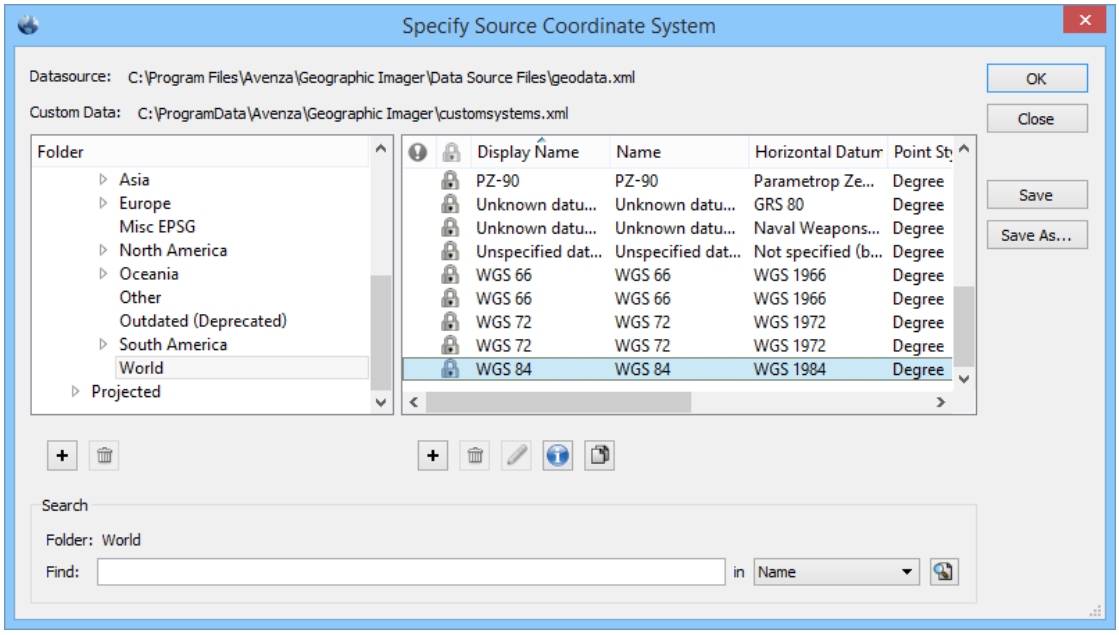
	Use	Name	PX	PY	Coordinate System	WX	WY
3	☑	Point 3	2,576	633	WGS 84	-97.000000	49.000000
4	☑	Point 4	392	2,036	WGS 84	-104.045000	45.944000
5	☑	Point 5	2,773	2,015	WGS 84	-96.561000	45.936000
6	☑	Point 6	1,516	2,054	WGS 84	-100.512000	45.944000
7	☑	Point 7	1,375	648	WGS 84	-101.000000	49.000000
8	☑	Point 9	1,367	3,401	WGS 84	-101.000000	43.000000

With eight control point pairs, you can use a higher order method to rectify the image.

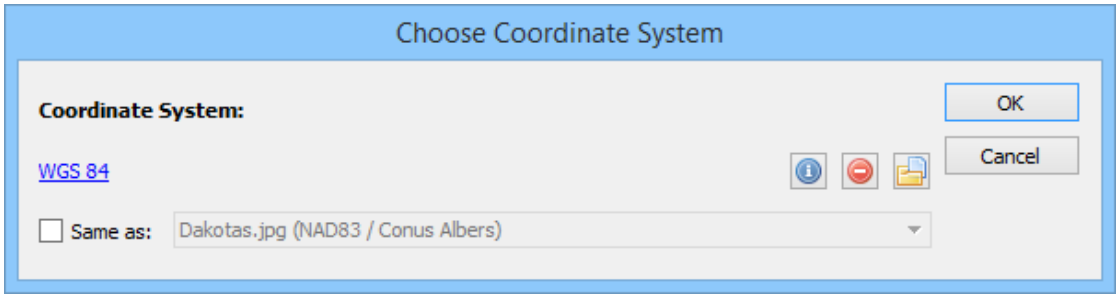
> Having a sufficient number of control points does not guarantee the result will be a plausible solution; a trial-and-error approach may be appropriate to obtain the best results. See Using Georeference for more information about georeferencing and polynomial methods.

Next you'll specify WGS 84 as the image coordinate system and then choose a method to complete the rectification.

9. Click the Image Coordinate System **Specify** link.
10. On the Choose Coordinate System dialog box, click the **[No Coordinate System Specified]** link.
11. In the Specify Source Coordinate System dialog box, expand the Coordinate Systems > Geodetic > World category, select the **WGS 84** coordinate system and click OK.



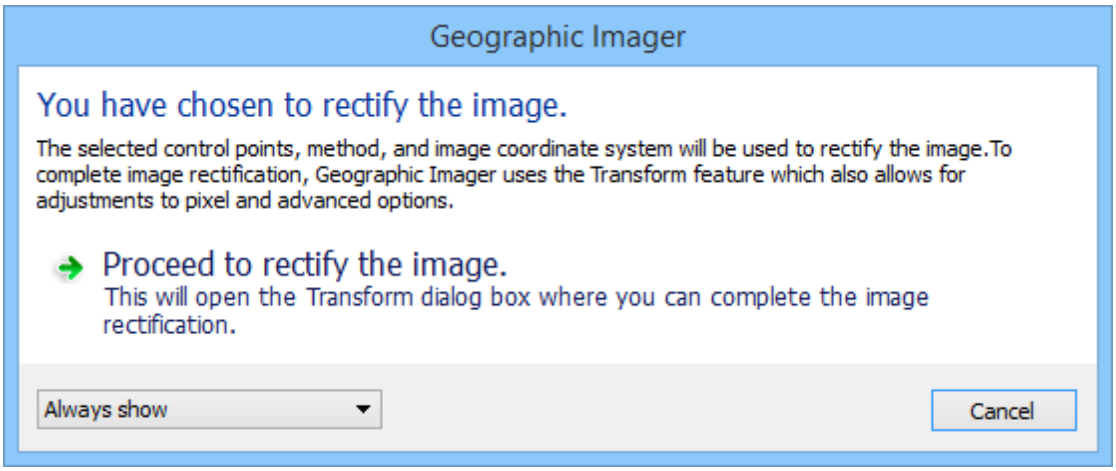
12. Click OK to close the Choose Coordinate System dialog box.



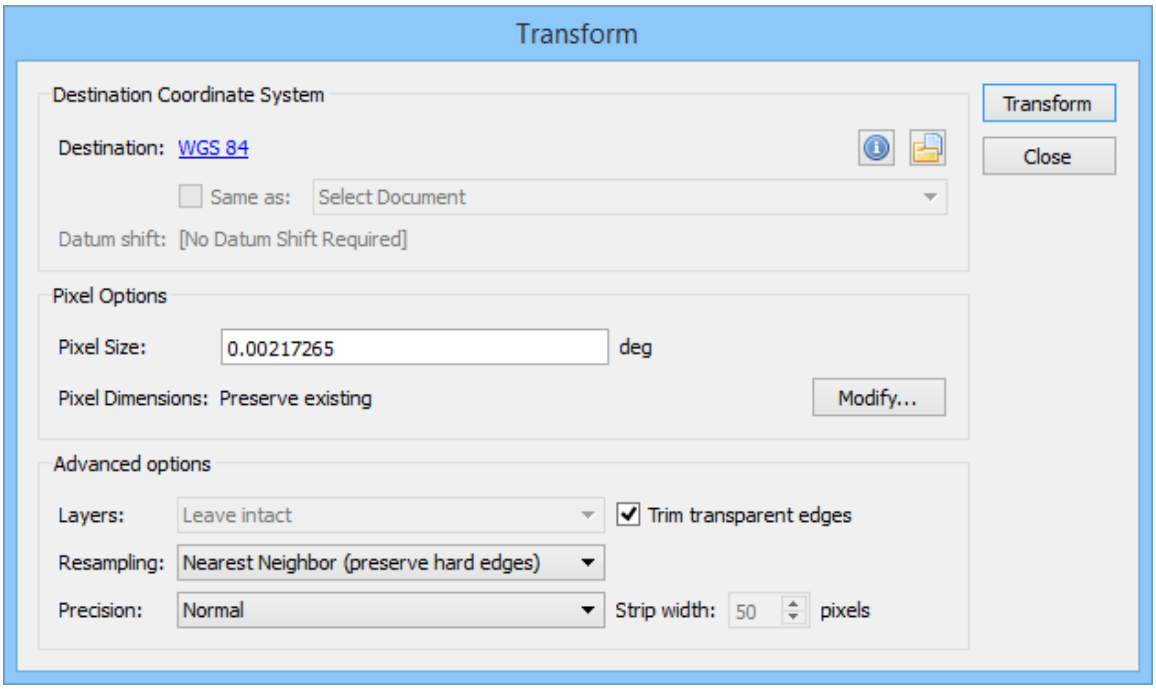
13. To rectify, click the **Rectify using** check box and and choose **Quadratic Polynomial (min 6 points)**.

The Quadratic Polynomial method uses at least six ground control points to calculate better georeferencing. The pixel and world error values will have minimized (horizontally scroll the reference list to see error values.) WGS 84 is being used as the image coordinate system because of the easily recognizable longitude and latitude lines as reference. Using a combination of the quadratic polynomial method and WGS 84 coordinate system will help rectify this image into a useable georeferenced map.

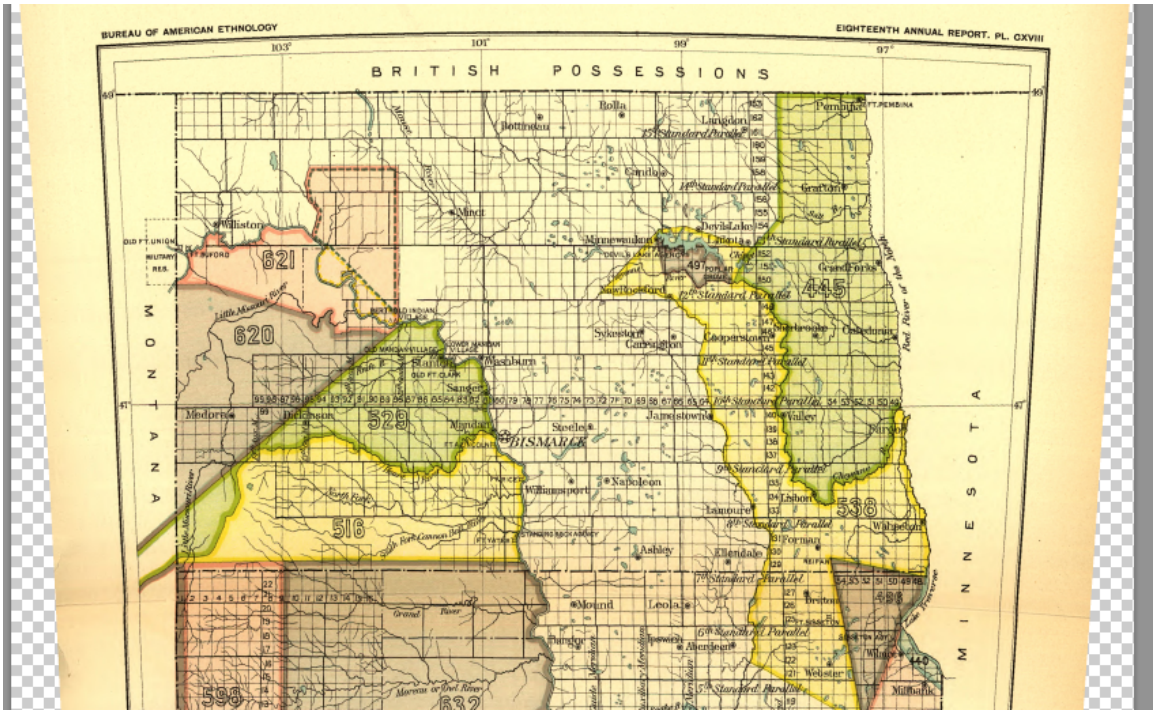
14. Click OK. Click Proceed to rectify the image when the command window appears.



15. To finish the image rectification, click **Transform**.



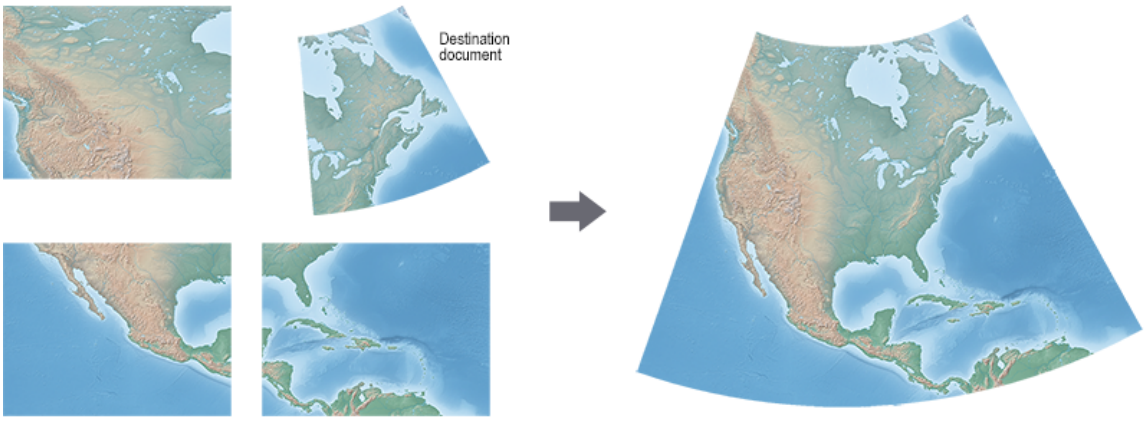
The image uses the Transform tool to complete the rectification. After the Transform tool finishes, the image is rectified to the WGS 84 geographic coordinate system. Notice that the lines of longitude and latitude on the map are straight. To verify the georeference, use the Validate tool in the Georeference dialog box.



8 Mosaicking Images

Data providers and government agencies provide many types of rasters including orthophotos and DEM files, many of which are available without charge. Often, these rasters are tiled and must be merged to generate a single and seamless coverage area. Using Geographic Imager, you can mosaic images to create a single composite spatial image.

The Mosaic feature creates a single composite georeferenced image from multiple input georeferenced images, including DEM files. Available documents for the mosaic process are allowed to have different properties such as coordinate system, pixel size and rotation angle. These documents are transformed to match the properties of the destination document. Advanced transformation options may be used when performing a mosaic that requires a coordinate system transformation, resampling to match pixel size or rectify a rotation.



Mosaicking four images together, where the destination document has a projected coordinate system. The result is a mosaic that has a projected coordinate system of the destination document.

Transformations during mosaic are not supported when the destination document contains a rotation angle. To mosaic into a destination document containing rotation the available documents to be mosaicked must have the same coordinate system, pixel size and rotation angle.

8.1 Using Mosaic

Requirements

Mosaic requires images to be georeferenced. Images that have no coordinate system

specified can still be mosaicked, however is assumed that all images being mosaicked have the same coordinate system with the same pixel size. This is because a transformation cannot be performed if no coordinate system is specified.

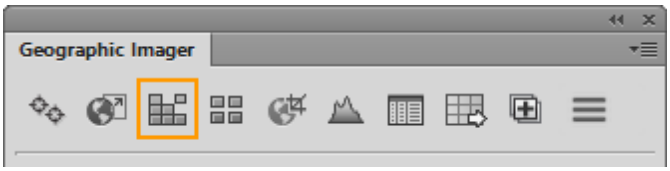
If the destination document contains a rotation, the input images must also contain the same angle of rotation, coordinate system, and pixel size or else a transformation can't be applied. Remove the rotation of the destination document to mosaic images with rotation.

If an image is flattened with white space where transparency should be, it is recommended to convert that background layer to a layer and remove the whitespace to ensure the mosaic will be seamless between the input images.

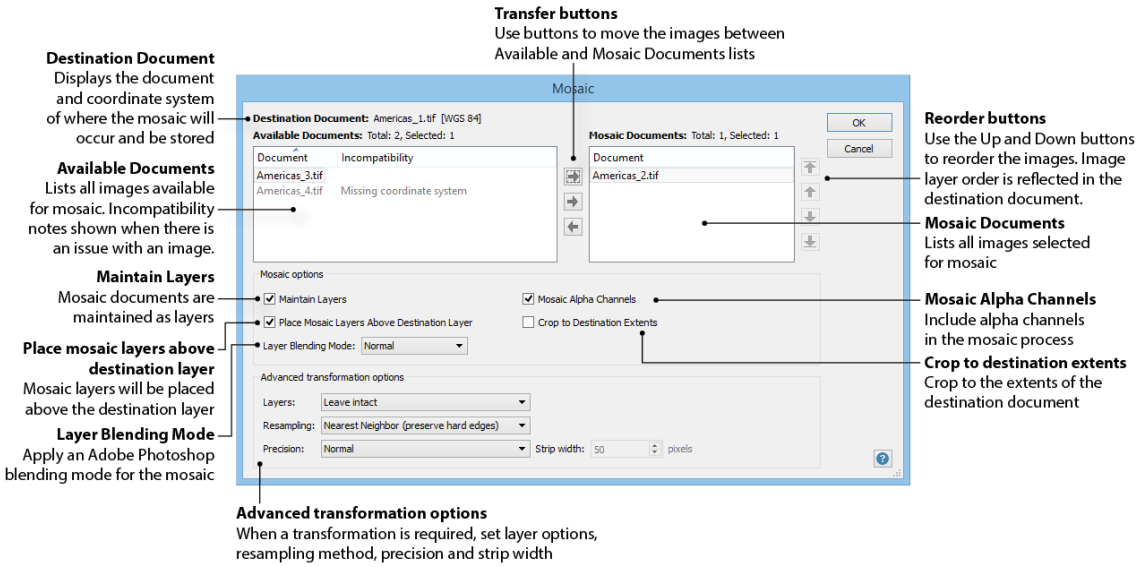
Input images with a different coordinate systems than the destination document will be transformed to match the destination document.

Mosaic Dialog Box

Open all the georeferenced image files (at least two) required to make the mosaic. The document that is active/selected will be the destination document, all other documents can be mosaicked into the destination. Click the **Mosaic** button in the Geographic Imager panel.



Mosaic button



Destination Document, Available Documents, and Mosaic Documents

The Mosaic dialog box displays the destination document and destination coordinate system at the top. The Destination Document displays the active document. The Available Documents list displays all open documents that can be included in the mosaic. Images that do not satisfy the mosaic conditions of the destination document (e.g. non-georeferenced image) cannot be included in the mosaic and are displayed in gray with the reason why it is incompatible.

Images that meet the mosaic conditions of the destination document can be added to the Mosaic Documents list using the transfer buttons - **Transfer All** or **Transfer Right**. At least two documents are needed to create a mosaic image (the destination document and at least one document in the Mosaic Documents list). All documents in the Mosaic Documents list will be used in the mosaic. To remove a document from the Mosaic Documents list, click the **Transfer Left** button. Mosaic documents can be reordered by using the **Up** and **Down** buttons. The document at the top of the Mosaic Documents list will be the first layer at the top of Adobe Photoshop Layers panel after the mosaic is created.

Mosaic Options

Maintain Layers	Enable to maintain mosaic documents as layers.

Place Mosaic Layers Above Destination Layer	Input mosaic documents will be positioned above the destination document. Mosaic and destination documents order can be viewed in the Layers panel.
Layer Blending Mode	Apply an Adobe Photoshop blending mode for the mosaic. Learn more about Photoshop blend modes.
Mosaic Alpha Channels	Enable to include all alpha channels in the mosaic process.
Crop to Destination Extents	Enable to crop to the extents of the destination document. When this option is enabled, any documents outside the destination extents are disabled from being included in the mosaic.

Advanced Transformation Options

The Advanced transformation options frame is enabled when a transformation during Mosaic is required (the destination document has a coordinate system that differs from the mosaic documents).

Layers

There are several options to handle layers of the mosaic document's layers during their transformation into the mosaic:

Leave intact	Maintains the original layer structure of mosaic documents being mosaicked
Merge raster layers	Combines only raster layers while maintaining vector layers, for example text and transparency. Choose this option to guarantee seamless edges between different layers, especially if they don't have overlapping margins. Shaded relief effects will be disappear after transformation is

	performed using "Merge raster layers".
Merge layers	Combines all layers into one layer, maintaining transparency.

Resampling Methods

There are several options for resampling the image during transformation:

Nearest Neighbor (preserve hard edges)	Takes the value of the pixel that is closest to the transformed location in the source image. This is the fastest method in terms of processing time and is the method to use to preserve a colour panel during image transformation. It is also the best method to preserve original colours in some non-RGB colour modes, such as CMYK, by avoiding the internal conversion to/from RGB.
Bilinear	Takes a weighted average value of the four pixels closest to the transformed location in the source image. This method results in a smoother image than the nearest neighbor method but at the expense of more processing time.
Bicubic (best for smooth gradients)	Takes a weighted average value of the sixteen pixels closest to the transformed location in the source image.

A coordinate system transformation will resample an image, therefore any image analysis or classification should be performed prior to a transformation.

Precision and Strip width

To provide necessary transformation performance, Geographic Imager transforms one horizontal strip of the image at a time. Change the Precision to adjust the strip width being transformed:

Maximum (slow; best for World Projections)	Recommend when performing transformations on images with the extent of the world.
High	Uses a strip width of 10 pixels—high quality results and slightly slower transformation performance.
Normal	The default setting using a strip width of 50 pixels—a reasonable value for the majority of raster imagery combining good quality results and high transformation performance.
Medium (fast)	Uses a strip width of 250 pixels—good quality results and faster transformation performance.
Custom	Set a custom strip width.

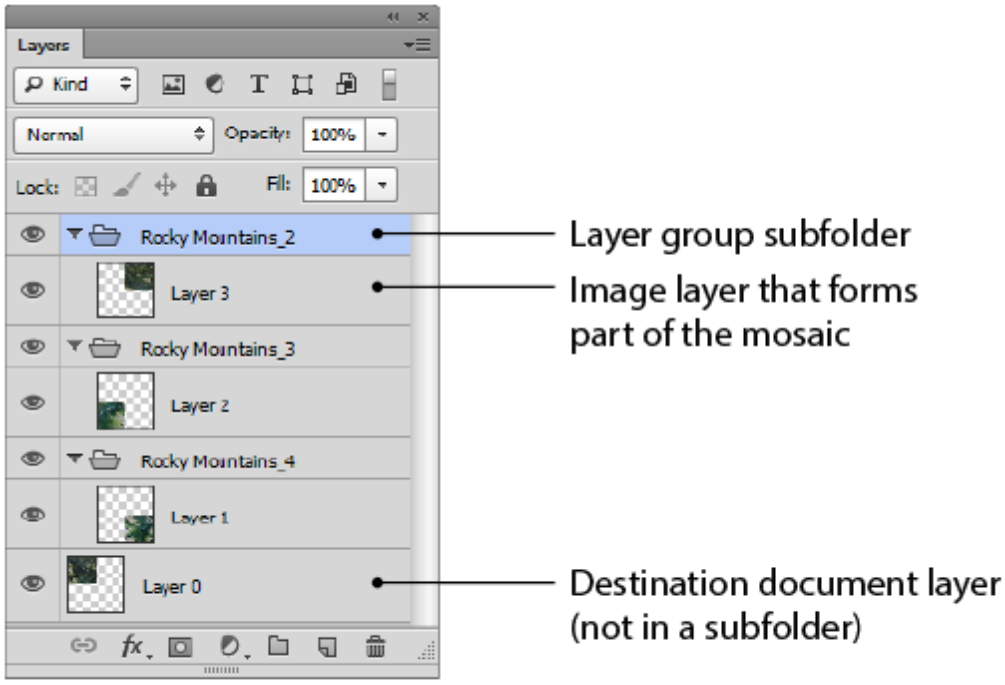
Some images may be optimized by setting a custom strip width, which may be especially true when working with very small/world scale data, high latitude/polar area imagery or projections that introduce severe spatial distortions. If the result contains visible horizontal stripping artifacts or transparent gaps, choose a smaller strip width or the Maximum precision setting. Choosing a smaller strip width will result in a higher-precision transformation, but the transformation process may be slower. Alternatively, for low-deformation, large-scale data or for a quick preview of transformation results, a larger strip width can be used.

For example, if an image being transformed displays a spherical curve, a smaller strip width may be necessary to maintain a smooth image edge. If a larger strip width is used there may a be a stepped edge to the image.

Mosaic Results

When the *Maintaining layers using blending mode* option is enabled, the mosaic documents will be grouped into image specific subfolders (the subfolder is named after the image file name). Disabling the *Maintain layers using blending mode* option will

respect the Merge layers setting in the Advanced Transformation frame (only when a transformation is performed). When *Mosaic layers above destination layer* is enabled, the input mosaic layers are placed above the destination document layer.



The mosaic can be treated like any other spatial image (e.g. toggle visibility, lock layers, adjust colours). Other Geographic Imager tools can be used on the mosaic such as Georeference, Transform, Tile and GeoCrop. However, some functions may merge the layers, while others will keep the mosaic layers intact.

Important Notes and Limitations

Unsupported image colour modes for the destination document are Indexed Colour, Bitmap and Adobe Photoshop Multichannel. The colour mode of the resulting mosaic is the colour mode of the destination document.

Images with multiple channels will maintain them. However, channels will be merged regardless of the channel type. Alpha channels will always maintain order when merged (e.g. the alpha channel in the first position will

be merged). When mosaicking images that contain mismatched alpha channels, it is recommended to manage the alpha channels prior to mosaic.

It is recommend to perform any coordinate system transformations as early as possible during the image editing process to minimize potential adverse effect on a complex layer structure.

Shaded relief effects will be merged when a transformation is performed using the Merge raster layers option.

Images that are mosaicked or combined using the Adobe Photoshop Photomerge operation will not retain georeferencing information.

When mosaic documents don't have any overlap and a transformation is being performed in the mosaic, gaps are likely to be seen.

When mosaic documents don't have any overlap and a transformation is being performed in the mosaic, gaps are likely to be seen.

Related topics

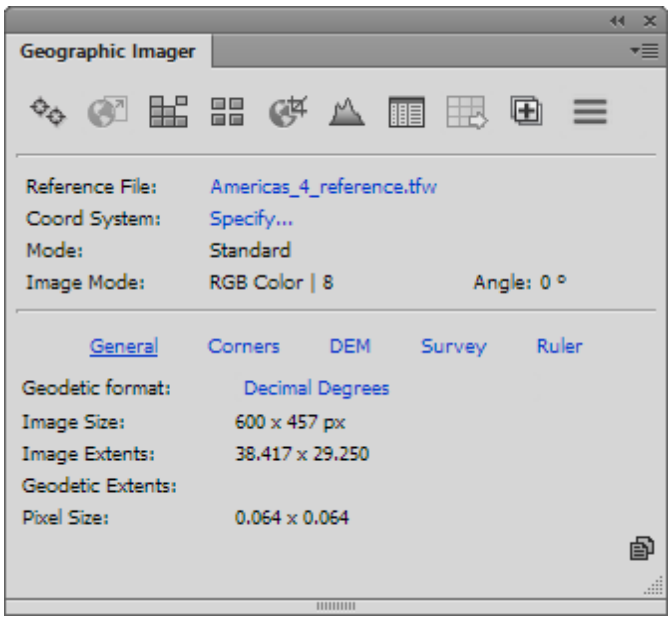
Opening Images with Advanced Import

Transforming Spatial Images

8.2 Mosaic Tutorial

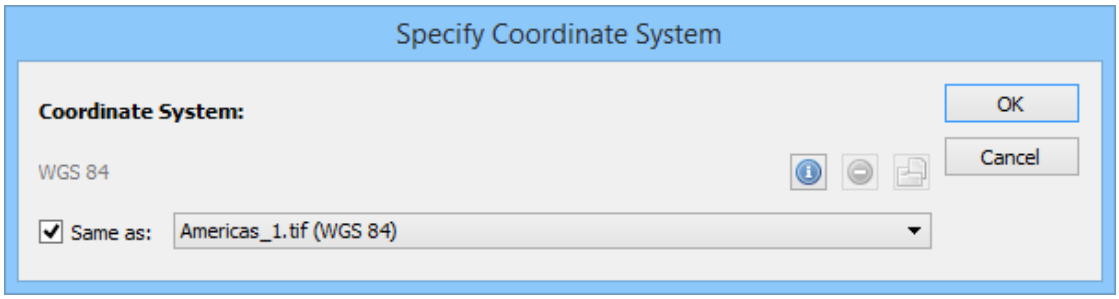
In this tutorial, you'll mosaic several images of different coordinate systems together to create one image that contains a projected coordinate system.

1. In Adobe Photoshop, open the **Americas_1.tif**, **Americas_2.tif**, **Americas_3.tif** and **Americas_4.tif** files from the \Tutorial Data\Americas folder.
2. On the Americas_4.tif document, click the Reference file **Specify** link on the Geographic Imager panel. Choose Americas_4_reference.tfw, and click Open.



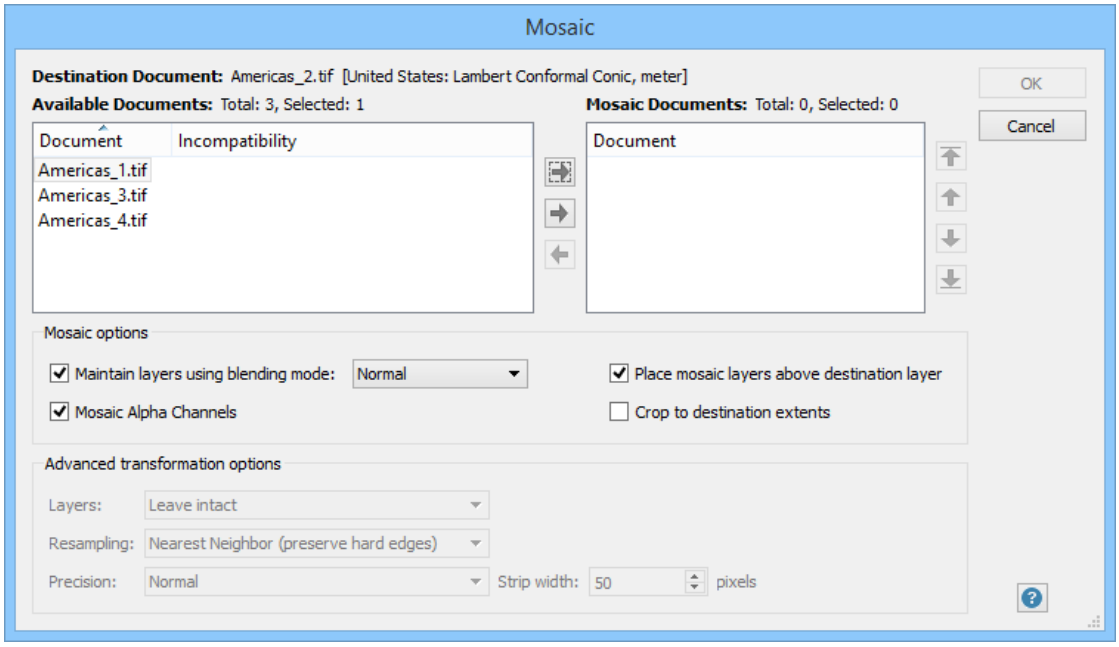
The Reference file is loaded, but the Americas_4 document still needs coordinate system information.

3. Click the Coordinate System **Specify** link on the Geographic Imager panel, click the **Same As** check box and choose **Americas_1.tif (WGS 84)** from the drop-down list.



4. Click OK.

5. Make the Americas_2.tif the active document and click the **Mosaic** button on the Geographic Imager panel.

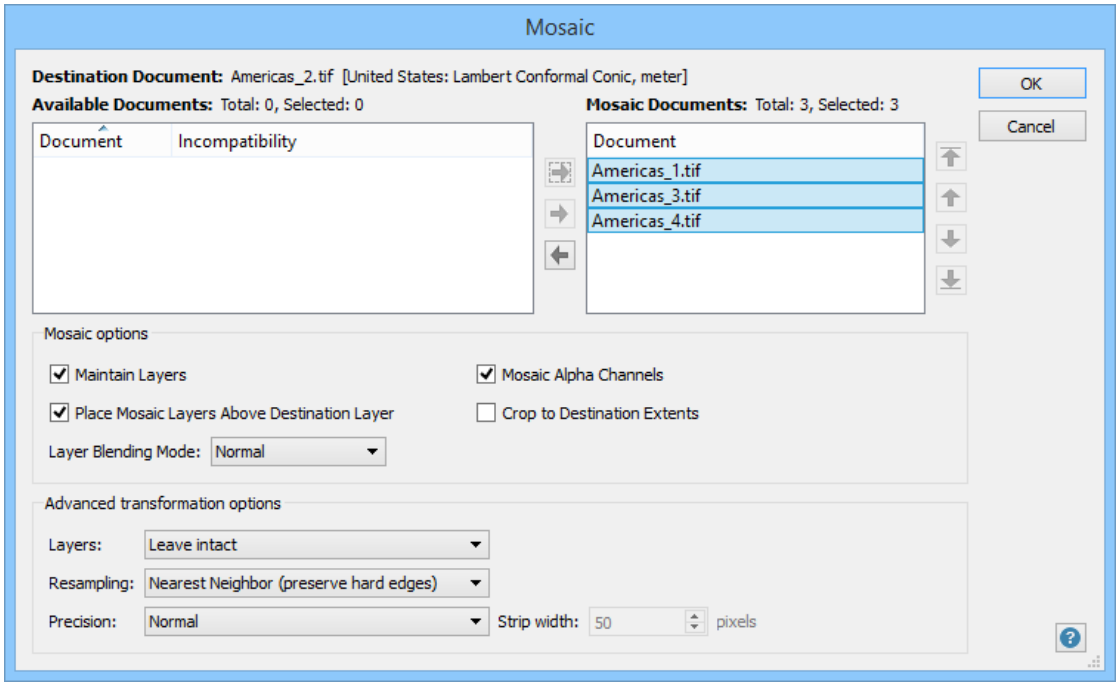


Notice that Americas_2.tif is in the Lambert Conformal Conic projected coordinate system. It will be the destination document, meaning other images will be transformed to the same coordinate system and then mosaicked. Available documents can have different coordinate systems, different pixel sizes or contain rotation and still be mosaicked. The images will inherit the coordinate system and pixel size of the destination document.

> Transformations during mosaic are not supported when the destination document contains a rotation. To mosaic into a destination document containing rotation the images to be mosaicked must have the same coordinate system, pixel size and rotation angle.

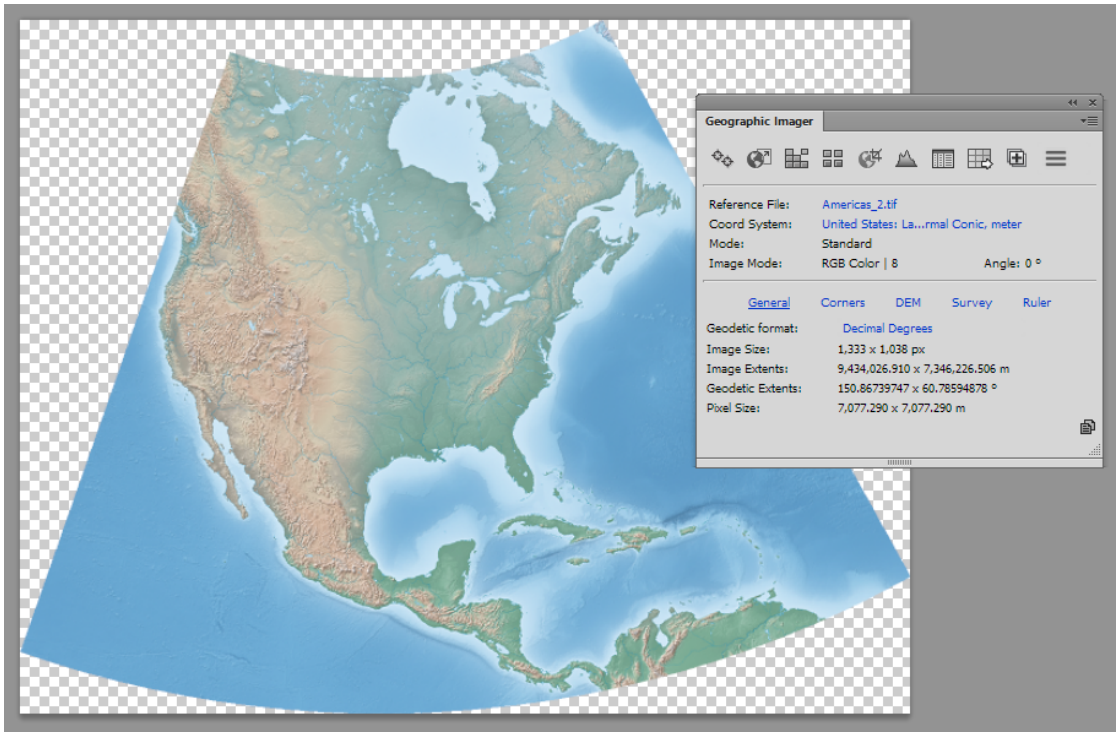
A list of available documents for mosaicking are displayed in the Available Documents list of the Mosaic dialog box. You will specify the Mosaic Documents next.

5. Click the **Transfer All** button to move all available documents into the Mosaic Documents list.

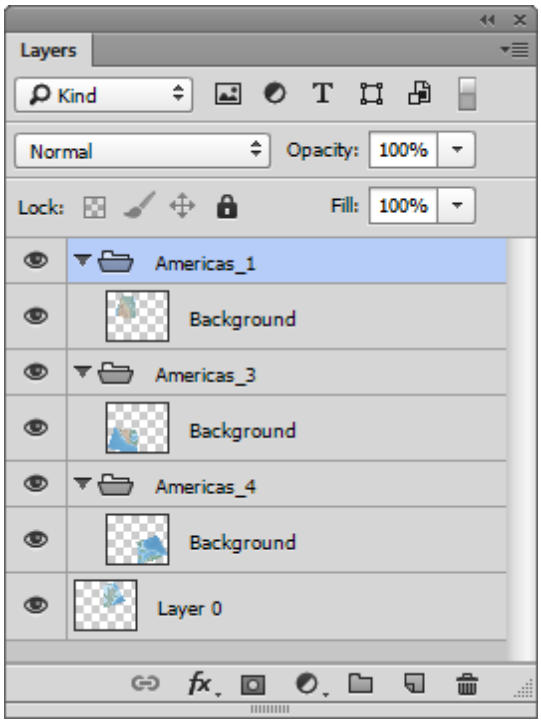


The Advanced Transformation Options allow you to resample documents, set strip size and leave the layers intact or merge them. In this tutorial, leave them as their default settings.

6. Click OK to begin processing the mosaic.



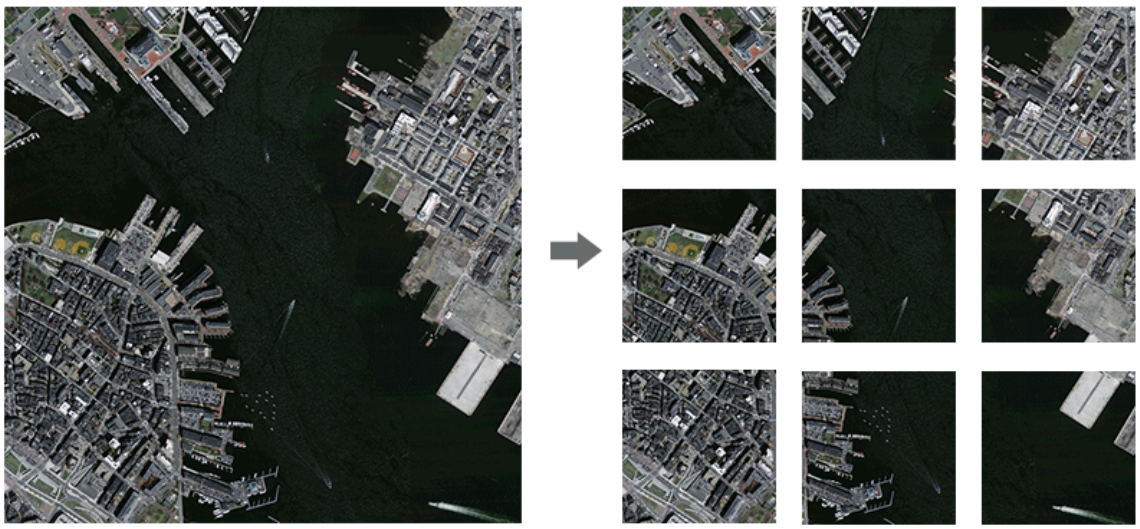
The image is mosaicked in the Americas_2.tif document in a Lambert Conformal Conic projected coordinate system.



Inspect the Adobe Photoshop Layers panel. Notice that the other documents are now mosaicked in the Americas_2.tif document. The layers are kept intact because you specified it to be with the Keep source data on separate layers option. You can individually make layers visible or invisible or lock them. This makes for image editing more flexible. To flatten the entire image, choose Layer > Flatten Image.

9 Tiling Images

The Tile feature creates multiple images from a single image. Tile an image using one of two available methods: by number of tiles or by size of tiles. If the original image is georeferenced, the multiple image files will be accompanied by a reference file (or an internally referenced format such as GeoTIFF, BigTIFF or TIFF). Tiles can be named sequentially, by row and column numbers, or based on corner coordinates.



One image tiled into 9 equal image tiles.

9.1 Using Tile

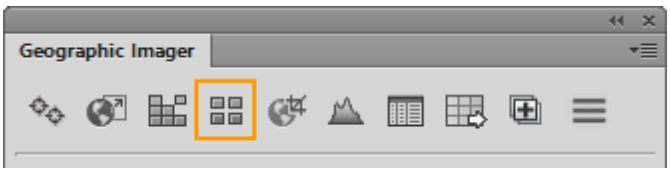
Requirements

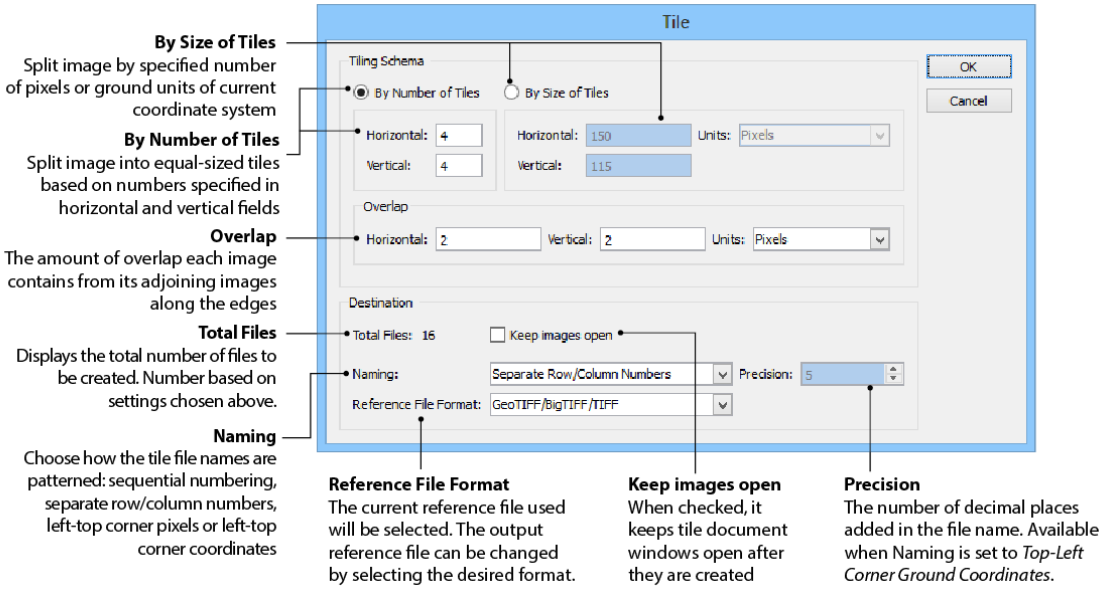
Any image, whether it is a spatial image or not, can be tiled using the Tile function. It is recommended that all images be flattened before tiling. If a multi-layered image is tiled without flattening first, it will result in each tile containing all of the layers from the original image. In some cases this may result in blank layers in one or more of the resultant tiles if all layers do not contain image content that covers all image pixels.

Any non-georeferenced images can be tiled; however, the output files will contain no georeferencing.

Tile Dialog Box

With an open image, click the **Tile** button in the Geographic Imager panel to open the Tile dialog box.





Tiling Schema

The Tile dialog box displays two options for creating tiled images: **By Number of Tiles** or **By Size of Tiles**.

By Number of Tiles

This option creates a series of equally-sized georeferenced image tiles from the original image. Specify the number of horizontal and vertical tiles. The total number of tiles are displayed in the Destination frame. Using this option creates tiles that are divided evenly into the extent of the image. Notice the horizontal and vertical dimensions of each tile is shown in the read-only (blue shaded) boxes.

By Size of Tiles

There are two options for creating tiles by a specific size: by number of pixels or by ground units of the coordinate system of the current image. For instance, if an image is in a coordinate system using meters, then the ground units option would be meters. Specify the horizontal and vertical tile dimensions. The total number of

tiles are displayed in the Destination frame. Creating tiles by size may create smaller edge tiles that vary in size.

Overlap

Specify the amount of overlap that each tile has with its adjoining tiles. The amount of overlap for each tile can be set to either the number of pixels, ground units, or by a percentage (of the tile). The amount of overlap may be the same for both horizontal and vertical directions or different in each direction. This option is especially useful to guarantee gap-free mosaicking of individually transformed tiles.

Destination

Total Files

Displays the total number of tiled image files that will be created for the current tiling operation. This value is updated as the number or size of each tile changes. Check the Keep images open check box to keep the tiled images open after the tile process is completed. It is unchecked by default.

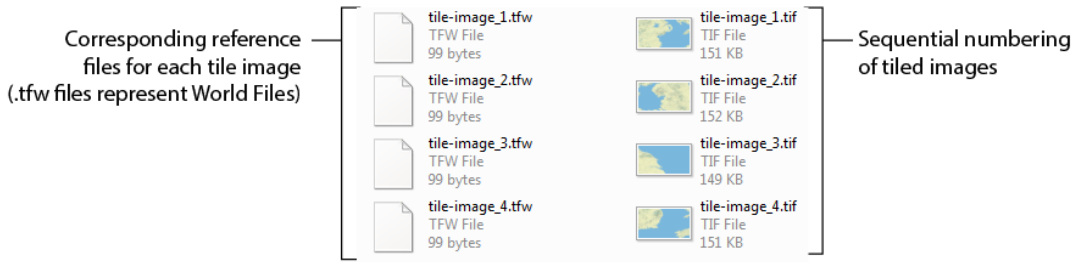
Keep Images Open

By default, this option is unchecked. Check this option to let tiles remain open, however, having many tiles open may cause Adobe Photoshop performance issues.

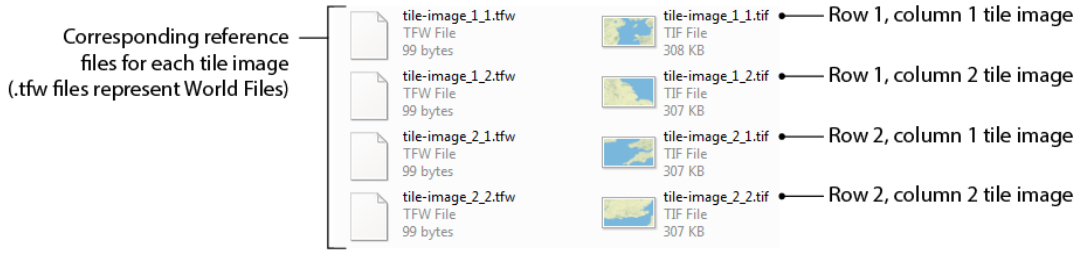
Naming

There are four naming conventions for tiled image files: **Sequential Numbering**, **Separate Row/Column Numbers**, **Top - Left Corner Pixel Coordinates**, and **Top - Left Corner Ground Coordinates**. To specify a file name and folder location to save the tiles, click OK in the Tile dialog box after all settings have been made.

The **Sequential Numbering** option begins numbering at the first tile in the top-left corner of the image and continues left to right, numbering each tile starting with the number 1 (e.g. tile-image_1.tif, tile-image_2.tif, etc). Both reference files and TIFF files are suffixed with the sequential tile number.



The **Separate Row/Column Numbers** option suffixes both row and column number of the position of each tile, beginning at the top-left corner and moving left to right. The row is the first number and the column is the second number. Both rows and columns start numbering at 1 (e.g. tile-image_1_1.tif, tile-image_1_2.tif, tile-image_2_1.tif, tile-image_2_2.tif, etc).

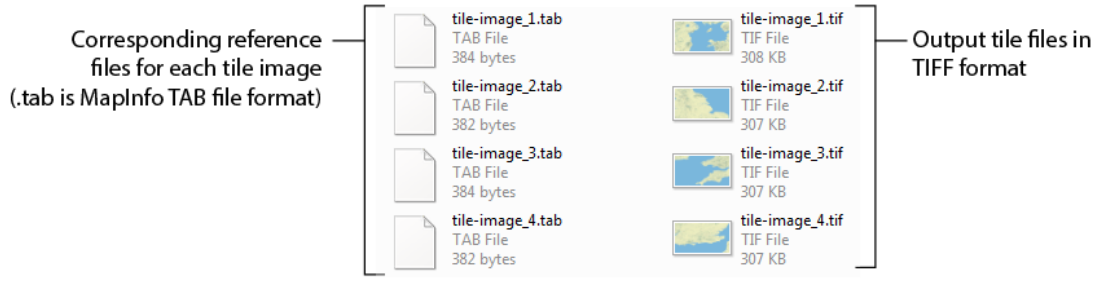


The **Top - Left Corner Pixel Coordinates** option suffixes the top-left pixel coordinate of each tile to the file name. In the four-tile example below, the pixel coordinates are shown for each file. The number of decimal places in the file name can be adjusted in the Precision box.

The **Top - Left Ground Pixel Coordinates** option suffixes the top-left ground coordinate of each tile to the file name. In the four-tile example below, the ground coordinates (in meters) are shown for each file.

Reference File Format

The Reference File Format drop-down list contains all the georeferenced files that can be written. Use any external reference file format to save with any Adobe Photoshop format: World files, Blue Marble Reference, MapInfo TAB and ERS. Other supported internal referenced formats are ArcInfo ASCII Grid, BIL, ECW, Geospatial PDF, GeoTIFF/BigTIFF/TIFF, NITF, ERDAS IMAGINE Raster, USGS DEM, and MrSID.



Important Notes

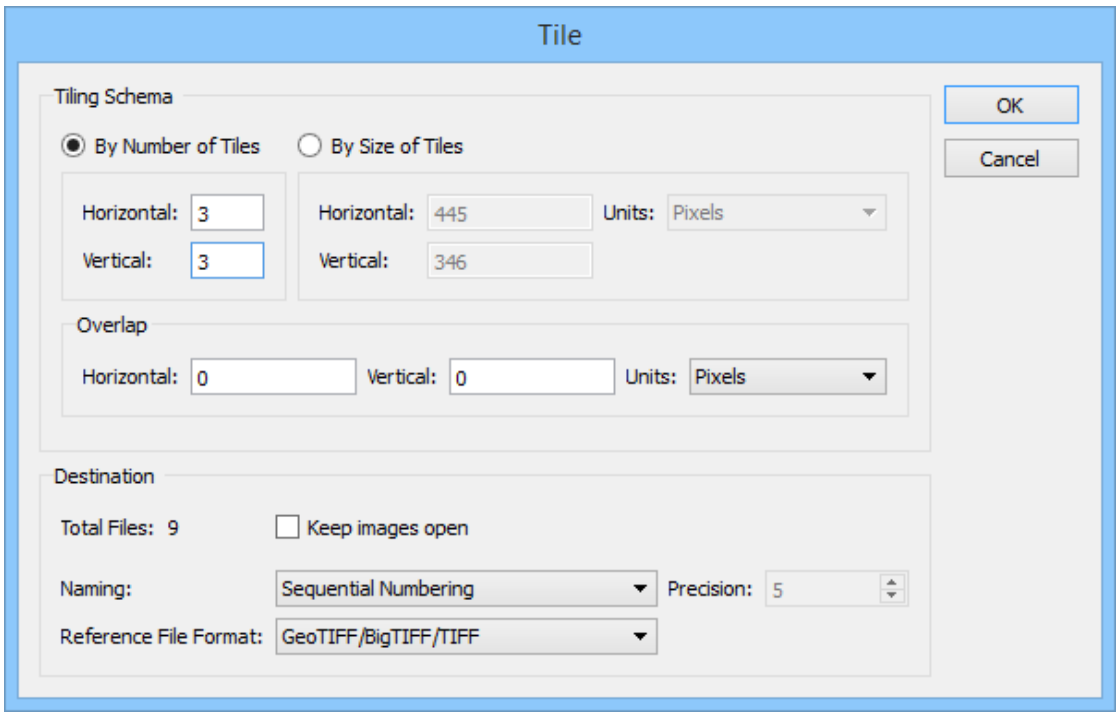
When tiling an image whose resolution is greater than 72 dpi, ECW and NITF output files will result in 72 dpi. ECW and NITF formats do not support change in storing and restoring resolution values.

When creating greater than 200 tiles, the Keep images open option will be disabled.

9.2 Tile Tutorial

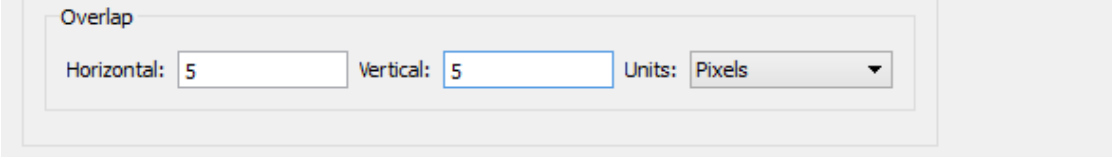
In this tutorial, you'll create tiles from a single image.

1. In Adobe Photoshop, open Americas_mosaic.tif from the \Tutorial Data\Americas folder.
2. On the Geographic Imager panel, click the Tile button.
3. In the Tile dialog box, choose the By Number of Tiles option, and enter 3 into both the Horizontal and Vertical text boxes.



In the Destination frame, the total number of files that will be created is listed as 9.

4. In the Overlap frame, enter **5** into both Horizontal and Vertical text boxes. Ensure Pixels is chosen in the Units drop-down list.

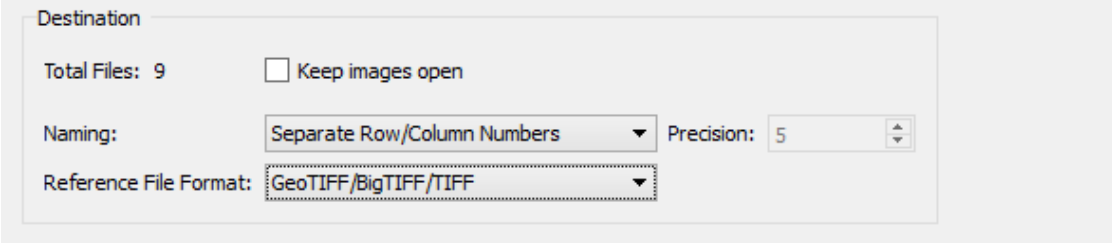


This creates an overlap of 5 pixels for each adjacent image.

5. Choose **Separate Row/Column Numbers** from the Naming drop-down list.

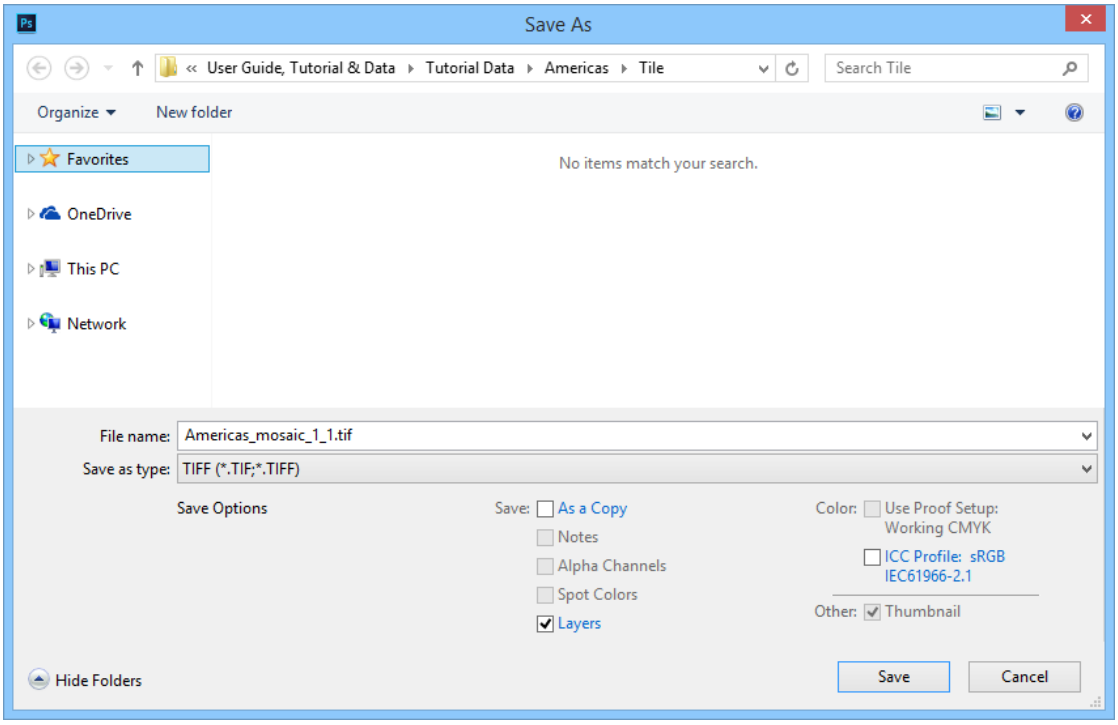
Each image will contain the name of the original image plus a reference to the row and column to which it represents.

6. Choose **GeoTIFF/BigTIFF/TIFF** from the Reference File Format drop-down list.

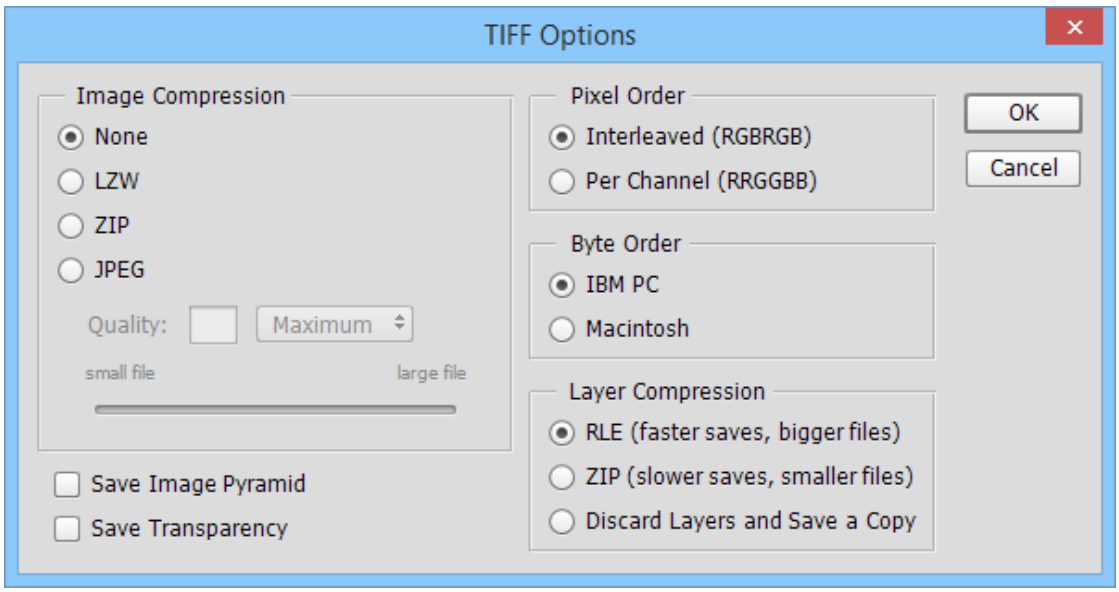


7. Click OK.

8. Create a new Tiles directory to save the tile images in. In this case, use the default file name (Americas_mosaic_1_1.tif) and click Save.

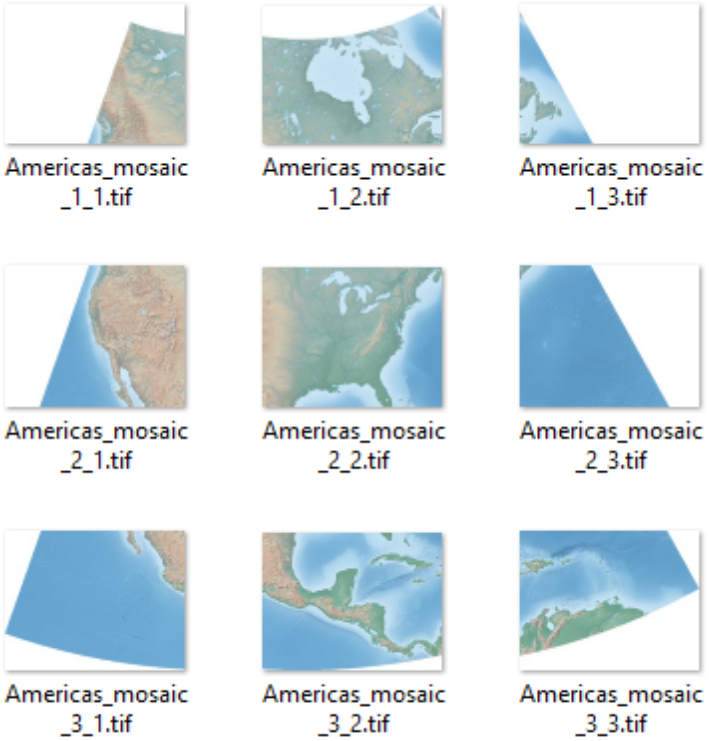


9. When the TIFF Options dialog box appears, click OK to accept the default settings.



Any TIFF options are applied to all subsequent files (in this case, nine files). These options are good to use if you need to optimize or compress your TIFF images.

10. When the tile process is completed, navigate to the destination directory and view the tile images.



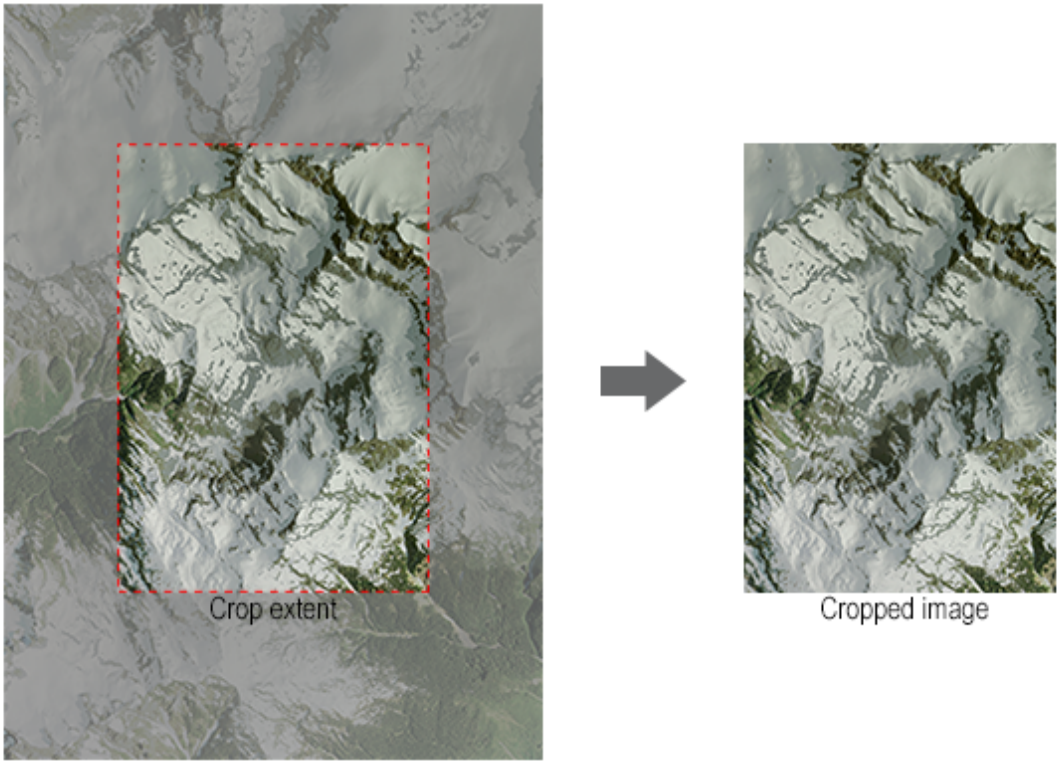
The naming separate row/column numbers format is appended to the file name: the tile America_mosaic_1_1.tif belongs in the first row and first column;
America_mosaic_1_2.tif in the first row and second column; and
America_mosaic_1_3.tif in the first row and third column, and so on.

10 GeoCropping Images

Use GeoCrop to crop georeferenced images based on defined crop areas. There are several ways to specify a crop area:

- manually
- by pixel
- by geodetic or projected coordinates
- by using another document
- by using a coordinate system envelope
- by proximity
- by extents of a vector file.

When crop parameters are specified, the preview image in the GeoCrop Dialog box will update to show the preview crop area. Cropped spatial images retain georeferencing. The Advanced Import uses the features of GeoCrop to import large images without having to open them first. An image cropped with layers (e.g. mosaic image) will maintain its layers structure and alpha channels.



GeoCrop can be based on pixels or geodetic or project coordinates.

10.1 Using GeoCrop

Requirements

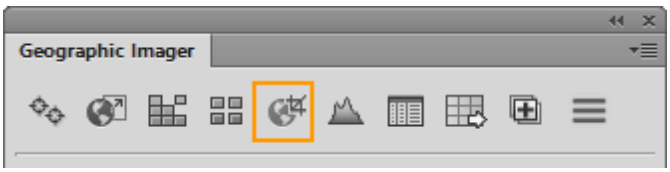
Any image can be cropped using GeoCrop. However, only georeferenced images will enable certain options in the GeoCrop dialog box. Images without georeferencing can only be cropped manually or by specifying pixel values.

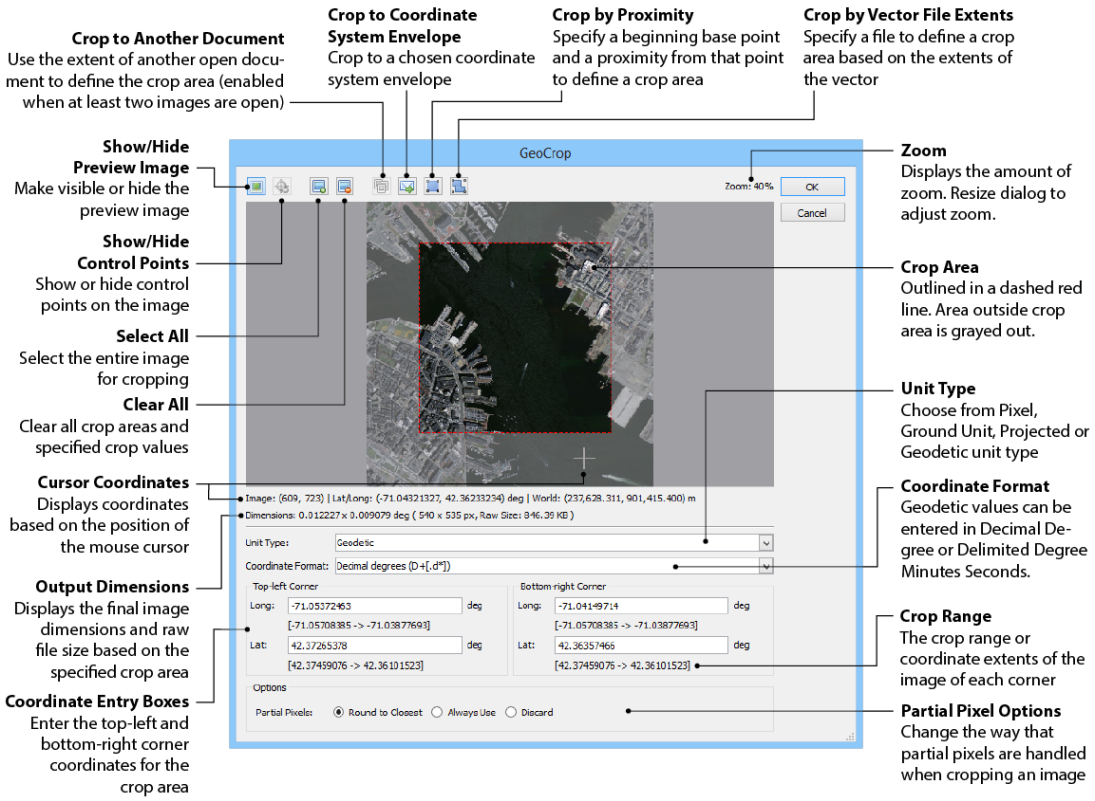
To use the Crop to Coordinate System Envelope option, the current image must be georeferenced.

To use the Crop to Another Document option, at least one other georeferenced document must be opened.

GeoCrop Dialog Box

With an opened image, click the **GeoCrop** button in the Geographic Imager panel to open the GeoCrop dialog box.





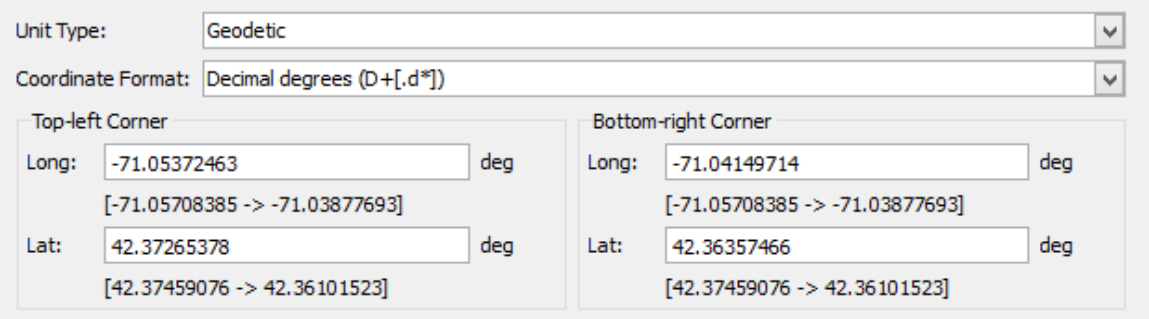
To GeoCrop an image, use one of the following crop options:

Manual Crop

Manual GeoCrop is the quickest and simplest method to crop an image. In the preview image, click and drag to draw a crop area—a dashed red border defines the crop extent. The area outside of the crop area is shaded in gray. Use the cursor coordinates below the preview image to more accurately crop an image. The crop area can be only as large as the extent of the image and only one crop area can be defined at a time.

> You can also use the Adobe Photoshop Crop Tool which is fully supported and maintains georeferencing.

Crop By Pixel or Coordinate



Specify Pixel, Ground Unit, Geodetic or Projected in the Unit Type drop-down list to define a precise area. If an image is unreferenced, only Pixel can be specified for cropping unit (the Unit type drop-down list is disabled). When Pixel unit type is chosen, the crop area is measured in actual pixel values from the image. In the case that a reference file exists but no coordinate system is specified, Ground Unit can be chosen from the Unit Type drop-down list. GeoCrop coordinates are dimensionless but correspond to the same unit as the reference file (e.g. meters, feet, decimal degrees, etc). Specify both the top-left and bottom-right corner X and Y values in the coordinate entry boxes to define the crop area.

The Geodetic Unit type can be chosen from the Unit type drop-down list when an image is specified to a geodetic or projected coordinate system. Pixel and Geodetic are the only unit type options when the coordinate system is geodetic. In the Coordinate Format drop-down list, choose from two options: Decimal Degrees or Delimited Degrees Minutes Seconds (DMS). In the Lat/Long boxes below the drop-down list, specify both the top-left and bottom-right corner Lat/Long values (in either decimal degrees or DMS) in the coordinate entry boxes to define the crop area. The preview image reflects the values entered to draw the crop area.

The Projected unit type can be chosen from the Unit Type drop-down list when an image is in a projected coordinate system. The units specified will be the same as the current coordinate system of the selected image (meters, feet, etc). Also note that the Pixel and Geodetic unit types can be chosen from the Unit Type drop-down list when an image is in a projected coordinate system. Switching unit types when a crop area has already been defined will automatically convert the values to the new selected unit in the coordinate entry boxes.

Crop to Another Document

This feature uses the spatial extent of another open document to define the crop area in the current document. In the Crop to Another Document dialog box, choose an

open document from the Same As drop-down list. The preview image updates and draws the crop area using the extents of the document specified. It is important to use a document that falls within the extents of the current document. If only a portion of it falls within the image extents, it will still be cropped. If an open document is outside of the current document's extents, it will fail to crop and a warning will appear.

Other documents don't have to be in the same coordinate system as the image being cropped.

Crop to Coordinate System Envelope

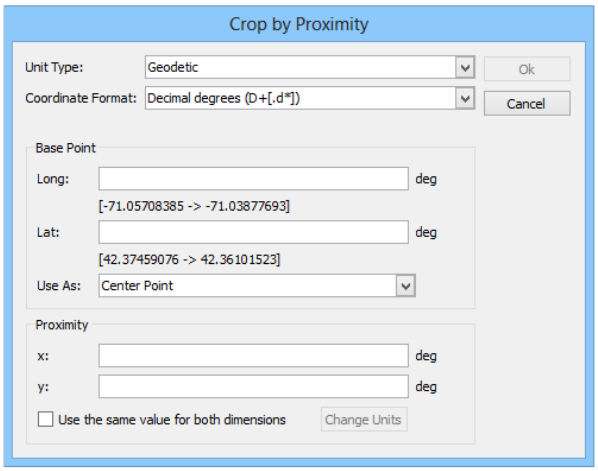
This feature uses the envelope of a coordinate system to define the crop area in the current document. Click the **Crop to Coordinate System Envelope** button to choose a coordinate system. The preview image updates and draws the crop area using the extents of the coordinate system envelope specified. It is important to use a coordinate system envelope that falls within the extents of the current document. If only a portion of the envelope falls within the extents, it will still be cropped. If a coordinate system envelope is outside of the current document's extents, it will fail to crop and a warning will appear.

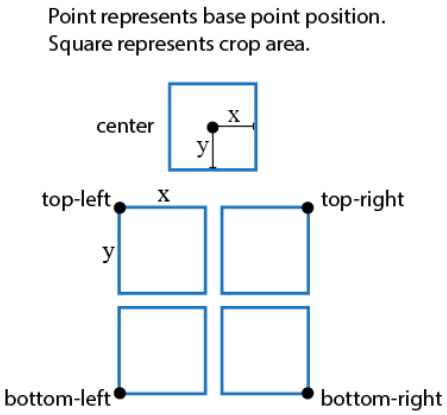
To maintain a high-precision transformation, choose an appropriate coordinate system envelope. There may be instances where by choosing a coordinate system envelope that no datum shift exists. This may cause imprecise results. A warning appears if this should ever happen.

Crop by Proximity

Use this feature to crop an image based on proximity from a specific base point. Begin by setting the unit type (pixel, ground unit, geodetic or projected) and if necessary, the coordinate format (only for geodetic coordinate systems). Choosing a unit type changes both base point and proximity units.

In the Base Point frame, specify the X and Y values (or Lat/Long if geodetic) of the point of which the proximity will be based on. In the Use As drop-down list, choose a position for the base point. This position defines where the crop area is created relative to the base point. The diagram below explains base point positioning.





In the Proximity frame, specify x and y values (in the same units as the base point) of which the crop area dimensions will be drawn to. If needed, check the Use same value for both dimensions check box to create a square proximity. If the unit type is Projected, it is possible to change the proximity units. Click the **Change Units** button and choose a new measurement unit. Accept the settings and the preview image updates and draws the crop area using the base point and proximity specified.

Crop by Vector File Extents

Use this feature to crop an image based on the geographic extents of a vector file. Click the **Crop by Vector File Extents** button to select a vector dataset. Choose from a variety of vector formats including shapefiles, KML/KMZ, GPX, and DWG. Note that this does not crop to the boundary defined by the vector, only a rectangular shape defined by its geographic extents.

Esri formats such as geodatabases (GDB, MDB, MXD) and text formats (TXT, CSV, XLS) are not supported.

GeoCrop Options

Pixel Round Options

When using a unit type other than Pixel, the coordinate values will not correspond exactly to a round pixel value, hence creating partial pixels. Partial pixels are created when a geodetic or projected coordinate falls between a range of pixels.

Users may choose to keep these partial pixels, however they may make the image unreadable other software packages.

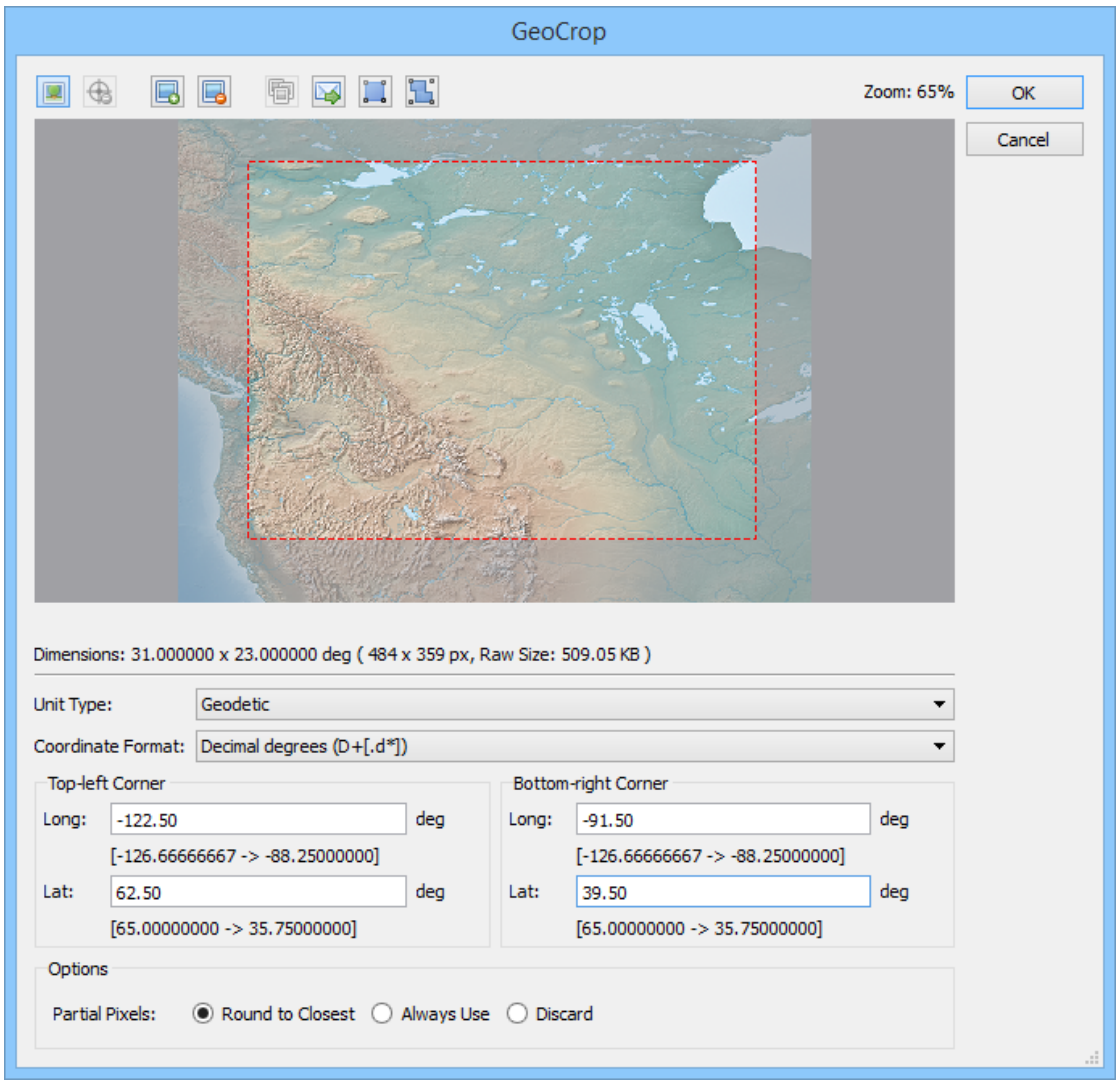
Decide how the output image pixels are handled with one of these options:

Round to closest	Partial pixel values rounded to the closest pixel
Always use	Keeps partial pixels and uses it in the output image
Discard	Drops partial pixels from the final output image

10.2 GeoCrop Tutorial

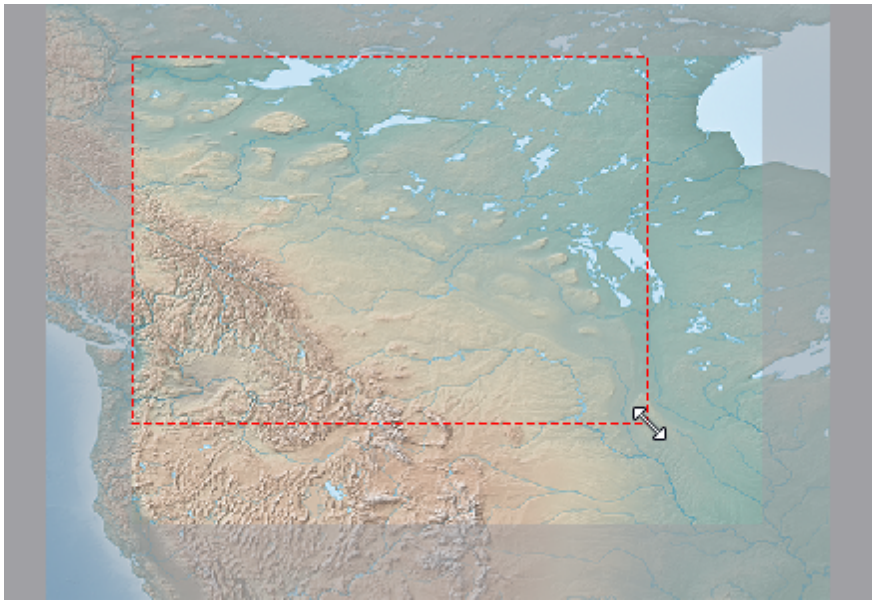
The GeoCrop function crops georeferenced images based on defined crop areas.

1. In Adobe Photoshop, open **Americas_1.tif** from the \Tutorial Data\Americas folder.
2. On the Geographic Imager panel, click the **GeoCrop** button.
3. Choose Geodetic from the Unit Type drop-down list and choose Decimal degrees from the Coordinate Format drop-down list.
4. In the Top-left Corner frame, enter **-122.50** in the Long box and **62.50** in the Lat box.
5. In the Bottom-right Corner frame, enter **-91.50** in the Long box and **39.50** in the Lat box.

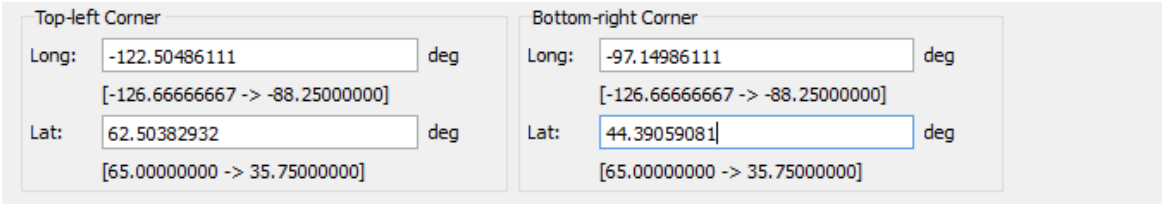


The top-left and bottom-right corner coordinates form a crop area designated by the red dashed marquee. This functions similarly to the Adobe Photoshop Crop Tool except it uses precise geographic coordinates to determine the crop extents.

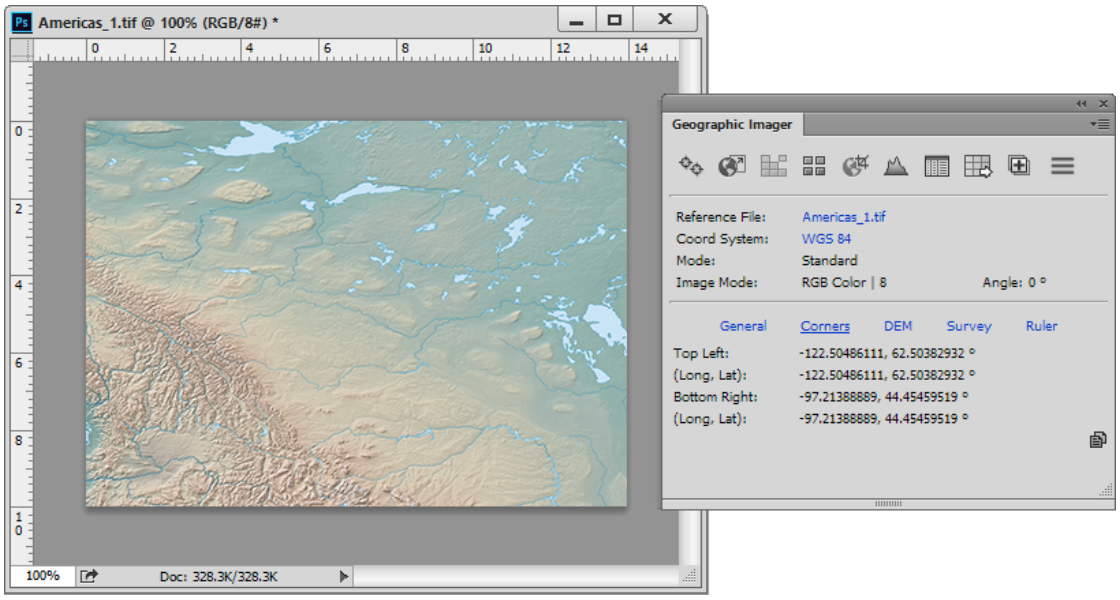
6. To manually resize crop area, click a corner or edge of the marquee and drag to resize it.



The corner coordinate values are updated. This can be used as a quick way to crop an image to an area of interest.



7. Click OK to complete the GeoCrop.



The image is cropped to the area specified in the GeoCrop dialog box. It's also possible

to use the Adobe Photoshop Crop Tool to crop images. Geographic Imager will respect crops made by the Crop Tool and maintain proper spatial referencing. The Crop Tool is useful for situations where you prefer an spatial image to be a particular size because it has settings for dimension and resolution (W x H x Resolution).

11 Terrain Shading DEMs

Shaded relief is a method for representing topography on physical and digital maps in a natural and intuitive way.

The Terrain Shader provides options to apply colorization schema and shaded relief to supported elevation data formats (e.g. DEM, SRTM, etc.). There are two ways to apply a colorization schema: using a color map or an overlay image. There are also two methods to apply a color map: stretch a gradient along the image's DEM schema or use a preset color map. When color map, overlay image or shaded relief settings are applied, the preview image will update to show how the settings affect it.

Animation that shows the an image with and without Terrain Shader applied.

11.1 Using Terrain Shader

Requirements

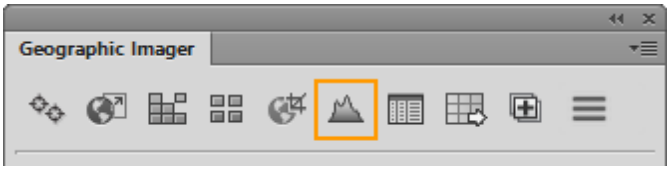
Any image (except 32-bit images) can be manipulated with Terrain Shader. However, only images with elevation data can have its elevation values mapped to a color ramp or gradient. Images that do not have elevation data has its values stretched to a percentage of the color gradient. Terrain Shader is not available for images in Duotone or Bitmap color modes.

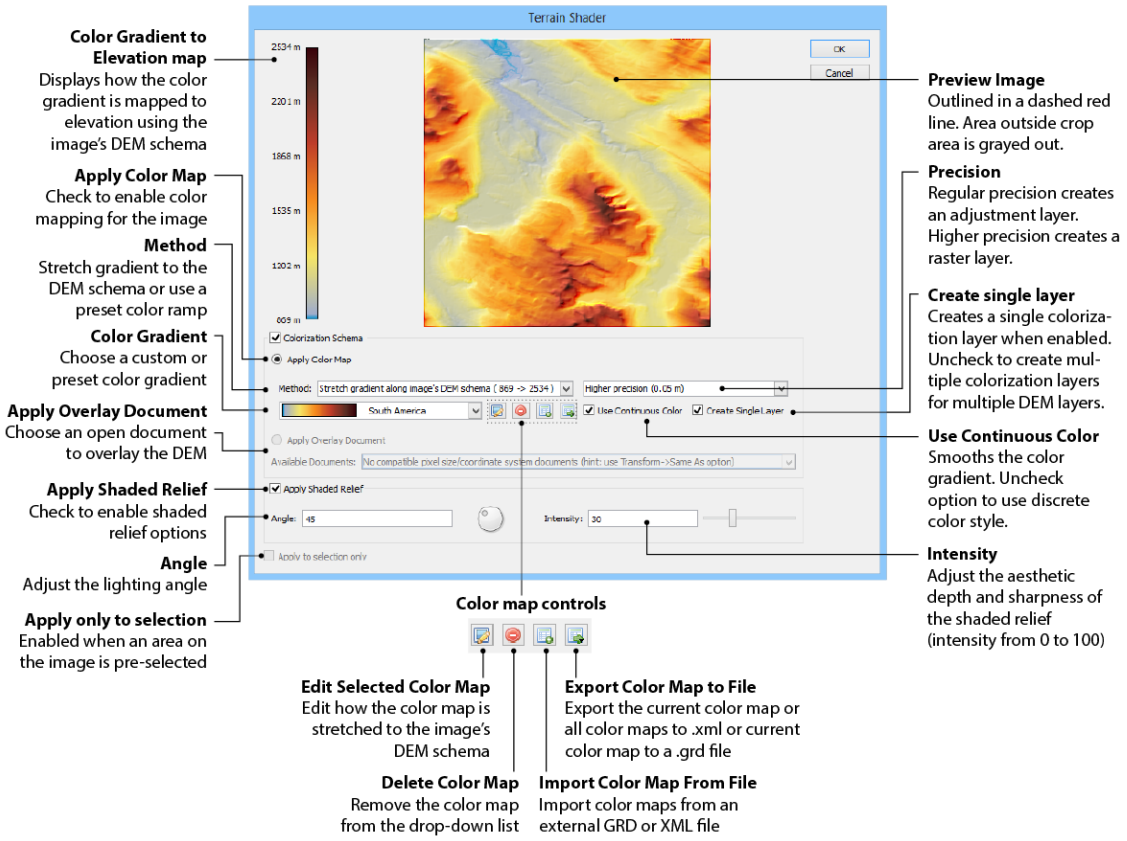
Apply Color Map and Shaded Relief Only to Selection

It is possible to apply Terrain Shader only to a selection on the image. Before opening the Terrain Shader dialog box, use any of the Adobe Photoshop selection tools (Marquee tool, Lasso tool, Magic Wand tool or Quick Selection tool) to create a selection (or multiple selections of the same layer). Open the Terrain Shader dialog box and make sure the **Apply to selection only** check box is checked. If the option was unchecked, checking it will display a warning message that indicates only color maps and shaded relief will be applied to the selected area even though the preview doesn't show it.

Terrain Shader Dialog Box

With an opened image, click the **Terrain Shader** button in the Geographic Imager panel to open the Terrain Shader dialog box.





Colorization Schema

Click the Colorization Schema check box to enable its two main options: 1) Apply Color Map and 2) Apply Overlay Document.

Apply Color Map

There are two available methods to apply a color map: Stretch gradient along image's DEM schema and use a preset color map. Choose **Stretch gradient along image's DEM schema** to extend the color gradient to the minimum and maximum values of the DEM schema. Choose a color gradient in the drop-down list to map it to the DEM schema. The Color Gradient to Elevation map to the left of the Preview Image updates to show how the color schema is stretched.

Choose **Use preset color map** to use only the colors specified in the gradient that fall within the range of the DEM schema. This does not stretch the color gradient to the minimum and maximum values of the schema. Choose a color gradient in the drop-

down list to map it to the DEM schema. The Color Gradient to Elevation map to the left of the Preview Image updates to show how the color schema is stretched.

Precision

Terrain Shader has a precision setting that affects how colors are mapped to a DEM. The precision value is listed in the drop-down list (e.g. 0.3 m). A Regular precision setting quickly creates an Adobe Photoshop adjustment layer and a shaded relief layer at the cost of slightly lower precision. A Higher precision setting creates a colorized raster layer and a shaded relief layer, however, this process uses more memory and takes longer to calculate.

> The DEM precision (displayed in the Import DEM File dialog box) is different that the precision used in the Terrain Shader dialog box.

Use Continuous

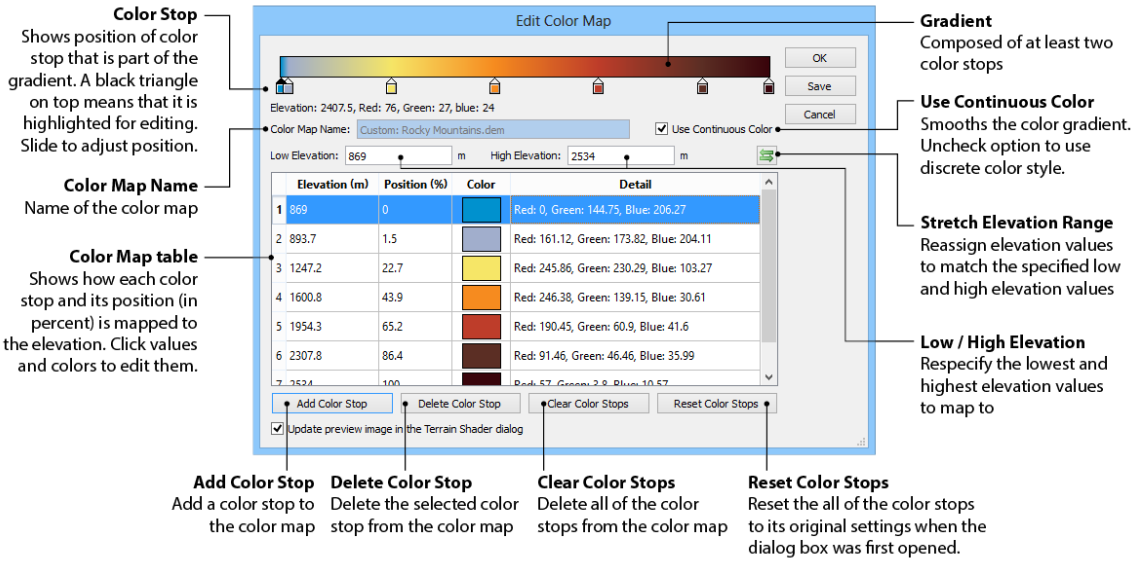
The **Use Continuous Color** option smooths the color gradient between color stops. Uncheck the Use Continuous Color check box to use discrete color breaks.

Create Single Layer

The **Create Single Layer** option is enabled by default when the Higher Precision setting is chosen. When checked, it creates a single colorization layer when multiple DEM layers are present. When unchecked, each DEM layer will have its own colorization layer.

Edit Selected Color Map

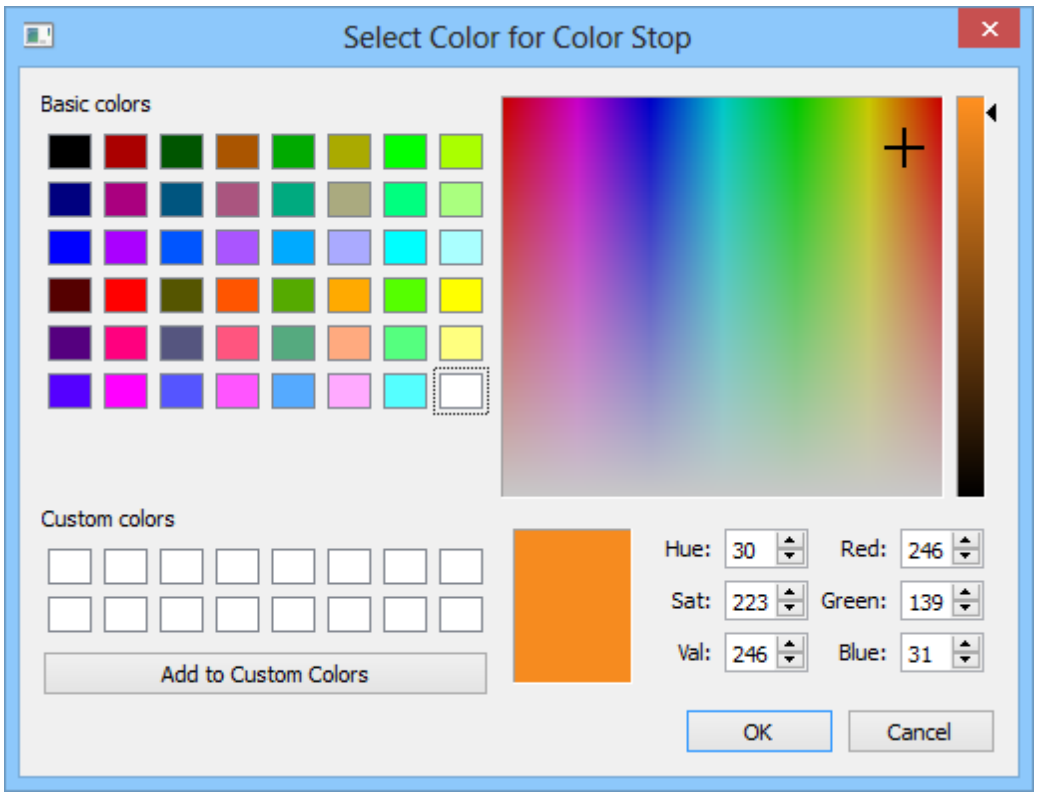
Click the **Edit Selected Color Map** button to edit how the color gradient stops and elevations are positioned. At the top of the Edit Color Map dialog box, the current gradient and color stops in it are displayed.



Edit a Color Stop

The color map table shows how each color stop is mapped to a corresponding elevation value. To adjust the position of the color stop, click and slide it left or right. When a color stop is adjusted, the respective Elevation and Position values in the color map table are updated. Similarly, changes made directly to the color map table are reflected in the gradient color stop. The changes can be viewed in real time when the **Update preview image in the Terrain Shader dialog** option is checked.

To edit the color of a color stop, double-click either the color stop itself or the color square in the corresponding row in the color map table. A selected color stop is highlighted in the table and is designated by a black triangle in the gradient. In the Select Color for Color Stop dialog box, use the options available to choose a basic or custom color.



Use Continuous Color

The **Use Continuous Color** option smooths the color gradient between color stops. Uncheck the Use Continuous Color check box to use discrete color breaks.

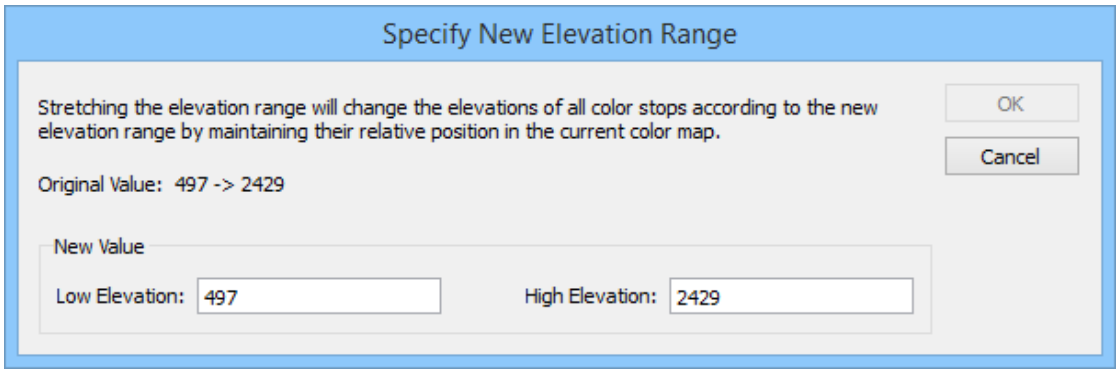
Adjust Low and High Elevation values

Specify new values in the Low and High Elevation boxes. Changing these values will alter the relative position (in percentage) for all color stops that are mapped to the elevation. When a specified color stop is not within the elevation range, the text is grayed out in the table (but can still be edited) and the color stop itself is not shown in the gradient (negative position value). If needed, edit the Elevation value to set it within range or set a positive Position value.

Stretch Elevation Range

Click the **Stretch Elevation Range** button to specify new elevation range values. This is applied to all color stops and stretches them to the new specified range. The color stops maintain their relative position in the color map. However, when a specified color stop exceeds a position value greater than 100%, the text is grayed out in the table (but can still be edited) and the color stop itself is not shown in

the gradient. If needed, edit the Position value so that it is less than 100%.



Add a Color Stop

Click the **Add Color Stop** button to add a color stop to the gradient. In the Select Color for Color Stop dialog box, use the options available to choose a basic or custom color. After a color stop is added, adjust its position by sliding it left or right in the gradient bar.

Delete a Color Stop

Click a color stop (in the gradient or color map table) to select it and click the **Delete Color Stop** button.

Clear Color Stops

Click the **Clear Color Stops** button to remove all color stops. A confirmation warning appears to confirm your decision.

Reset Color Stops

Click the **Reset Color Stops** button to reset all color stops to how they were when the Edit Color Map dialog box was first opened. This is particularly useful in situations where you may want to return to the original settings without closing the dialog box. A confirmation warning appears to confirm your decision.

Save Color Map

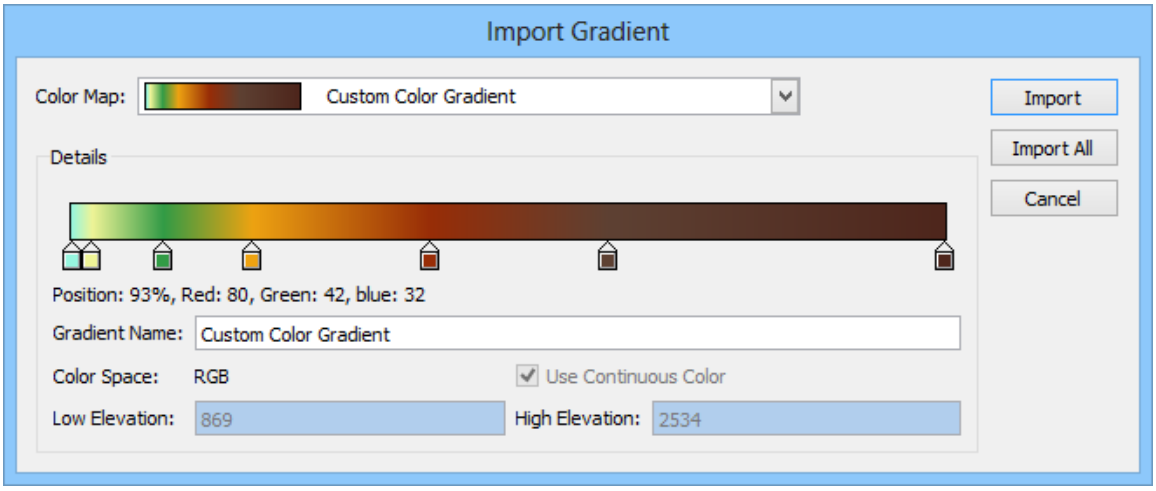
Click the **Save** button to save the color map. There are two options to save the color map: update the base color map or save as a new color map. Specify a color map name if saving as a new color map. The new color map will appear in the Color Map drop-down list. When updating a base color map without saving it as a new color map, it will appear as (1) Custom: [color map name].

Delete Color Map

Choose a color map from the Color Map drop-down list and click the **Delete Color Map** button to remove it.

Import Color Map from File

Adobe Photoshop gradient and color map files can be imported as GRD and XML files. Click the **Import Color Map From File** button to open the dialog box and navigate to gradient or color map files to import. The details of the color map are opened before import. Choose a gradient from Color Map drop-down when multiple gradients and color map files are being imported at the same time. Hover over the color stops to see its position and color space values. The color stops can't be adjusted, however, the gradient name can be edited. Click the **Import** button to only import the current gradient or color map. Click the **Import All** button to import multiple files at once.



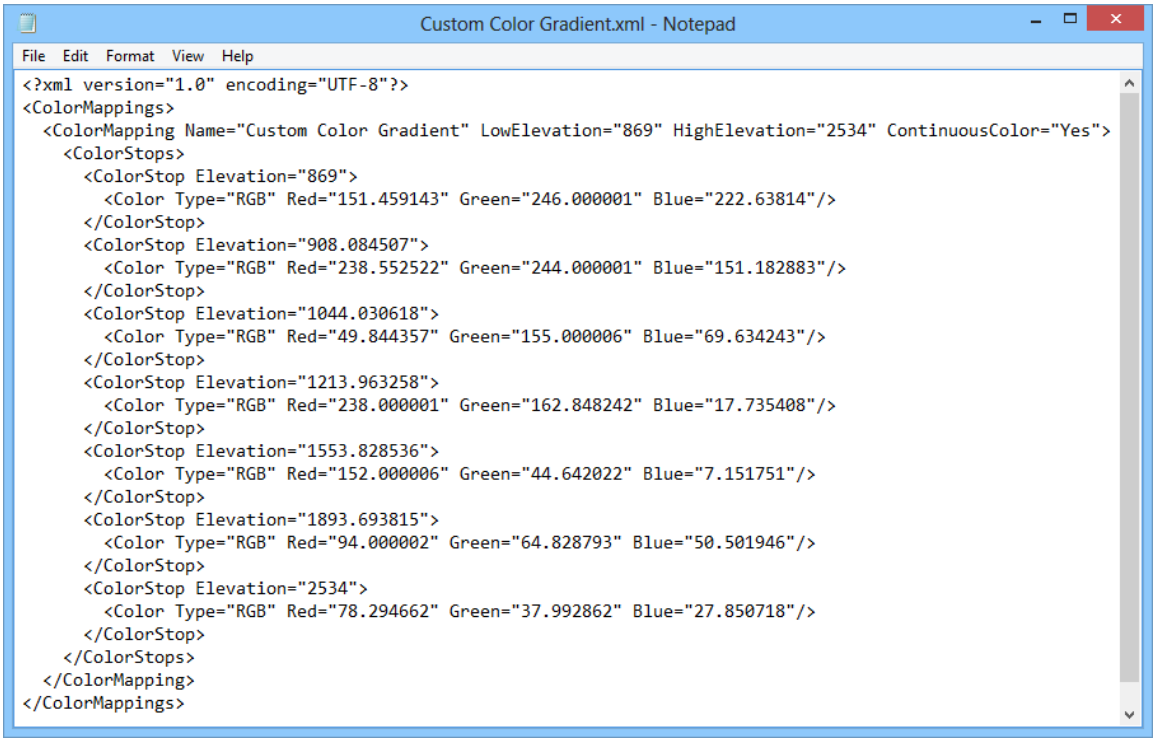
Export Color Map to File

Adobe Photoshop gradient and color map files can be exported as GRD and XML files. An Adobe Photoshop GRD file will have its gradient automatically stretched to the image's DEM schema, however, will not contain elevation values for color stops. Instead, the XML exported from Geographic Imager will contain all the information of the color stops elevation and color settings. Click the **Export Color Map to File** button and choose one of the following:

To XML File	Exports the selection in the Color Map drop-down list

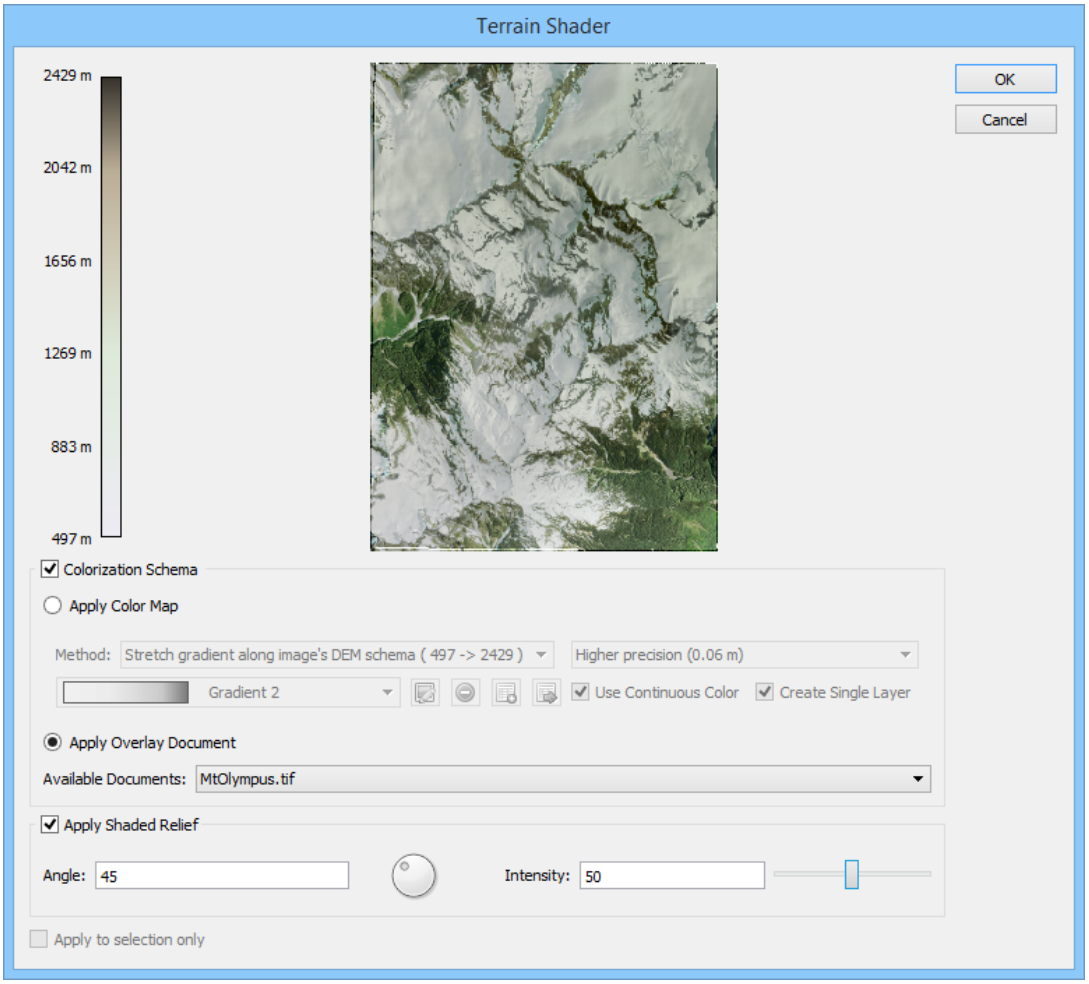
	to an XML file
All to XML File	Exports the entire Color Map drop-down list to an XML file
To Photoshop Gradient	Adds the selection to the Color Map drop-down list

A sample that shows the structure of the XML file:



Apply Overlay Image

The **Apply Overlay Image** option overlays another open document above the current elevation data. The overlay must be in the same coordinate system and pixel size as the image Terrain Shader is being applied to. The overlay image is added as a layer above the DEM in the Layers panel.



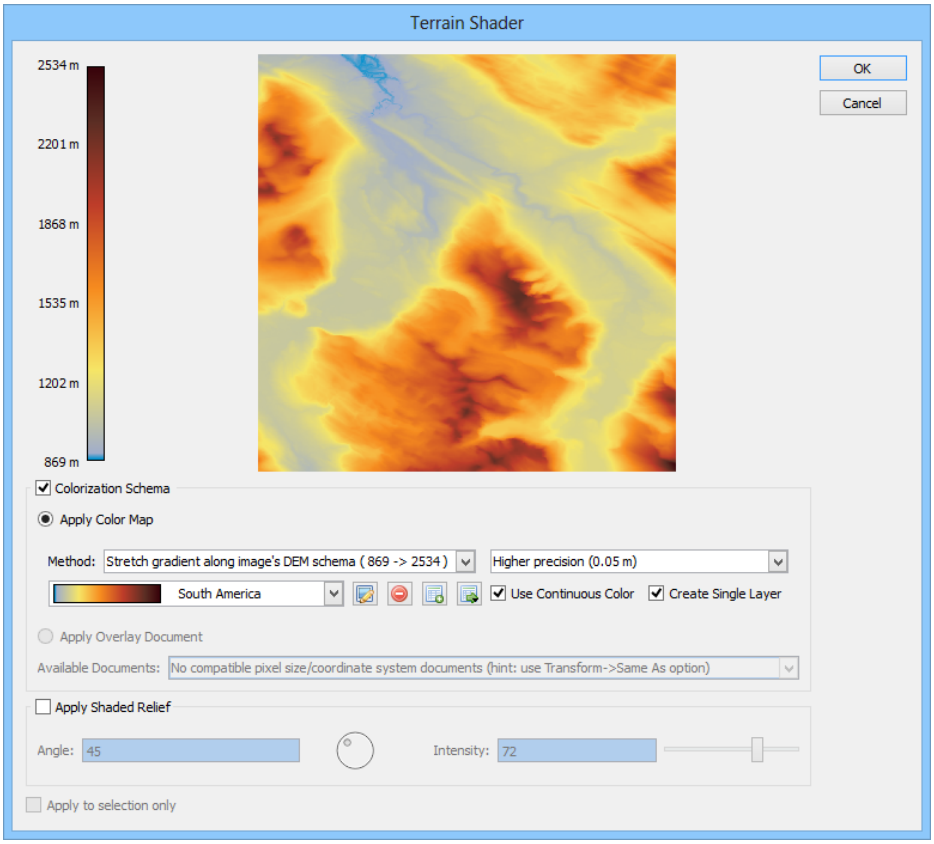
Apply Shaded Relief

Ensure the **Apply Shaded Relief** check box is checked (unchecked by default). Shaded relief can be applied whether Colorization Schema is enabled or disabled. The preview image is immediately updated to reflect the Angle and Intensity settings.

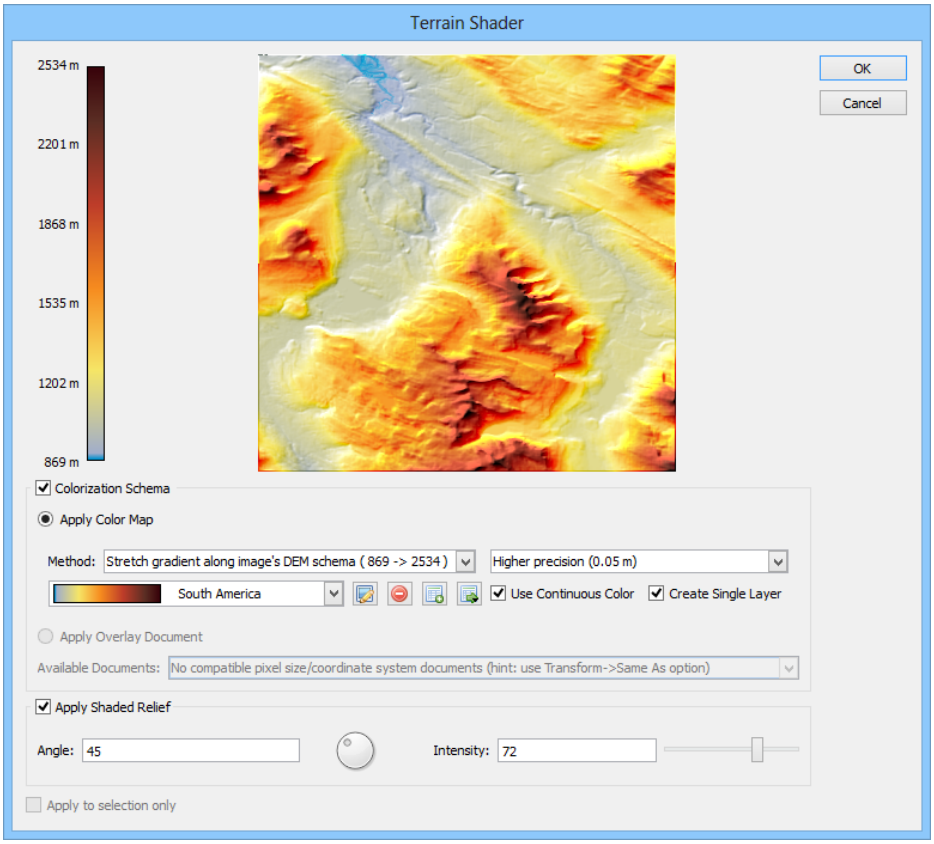
The Angle setting represents the lighting angle at which the elevation is rendered. Edit the value (degrees) in the Angle box or rotate the jog dial to the right of it. Shaded relief is commonly used with an overlay document (see the main topic example). The lighting is global and affects the entire image. The default Angle setting is 45 degrees, a commonly used lighting angle.

The Intensity setting represents how soft are hard the lighting effect is. Edit the value in the Intensity box or use the slider. A lower intensity value creates a softer looking shaded relief (below left) while a higher intensity value creates a sharper looking shaded relief with more shadows and contrast (below right). The default

Intensity value is 2; with a minimum of 0 and a maximum of 100.



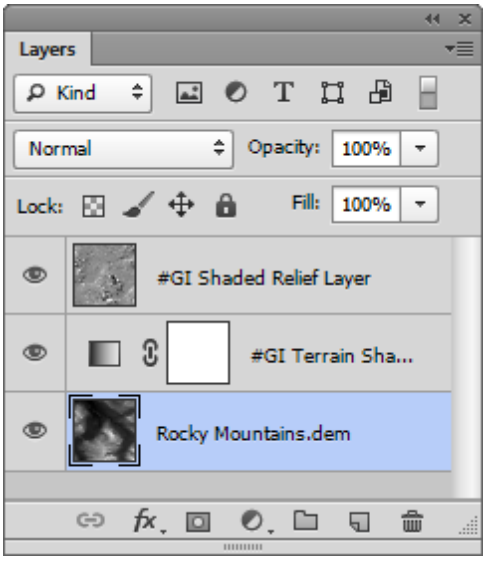
Shaded relief not applied.



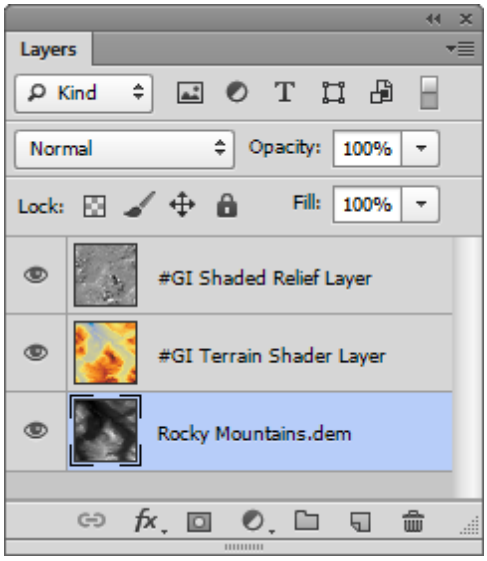
Shaded relief applied.

Results

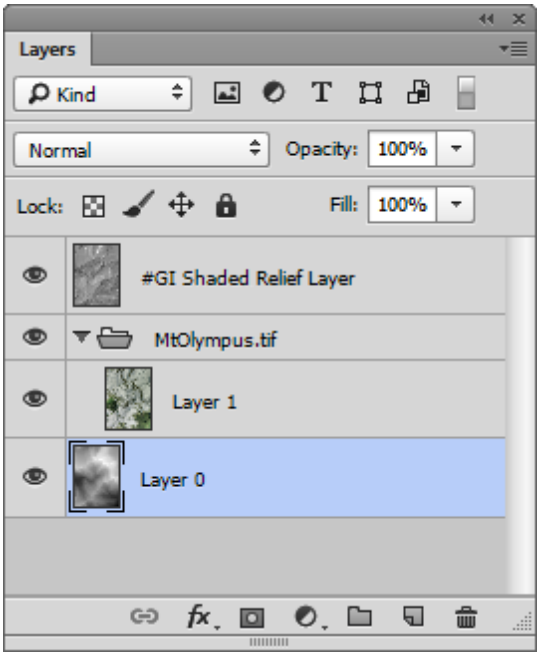
After successfully applying a color map, the Adobe Photoshop color mode will change to RGB (and will maintain the respective 8 or 16 Bits/Channel). Depending on the precision setting chosen, an adjustment layer or full raster layer will be created along with a separate layer for the shaded relief in the Adobe Photoshop Layers panel. They can be hidden to reveal only the color map, the shaded relief or the elevation layer.



Layers when regular precision is used.



Layers when higher precision is used.



Layers after an overlay image is used.

Important Notes

Color mode compatibility

Terrain Shader is not supported with the following Adobe Photoshop color modes:

- Bitmap
- Duotone
- Indexed Color

- Multichannel

Applying color to images that do not contain elevation data

Color maps will only work correctly if the image was converted from a DEM by Geographic Imager (or using a similar software). If an image is generated from a DEM by some method that is unknown to Geographic Imager, there is no guarantee that color maps will work correctly. For example, an image that may use white (which is often the highest value) to represent low value areas, Geographic Imager and Adobe Photoshop will incorrectly apply color corresponding to the highest value to such areas. To prevent this from happening, use images converted by Geographic Imager.

Color map and DEM schema folder locations

Default color maps are stored in ColorMappings.xml in the following folder:
Windows: C:\Program Files\Avenza\Geographic Imager\Color Mappings
Mac: /Avenza/Geographic Imager/Georaphic Imager Plug-in/Color Mappings

Custom color maps are stored in CustomColorMappings.xml in the following folder:
Windows: C:\ProgramData\Avenza\Geographic Imager
Mac: /Avenza/Geographic Imager/Geographic Imager Plug-in

Custom DEM schemas are stored in CustomDEMSchema.xml in the following folder:
Windows: C:\ProgramData\Avenza\Geographic Imager
Mac: /Avenza/Geographic Imager/Geographic Imager Plug-in

Related topics

Opening DEMs

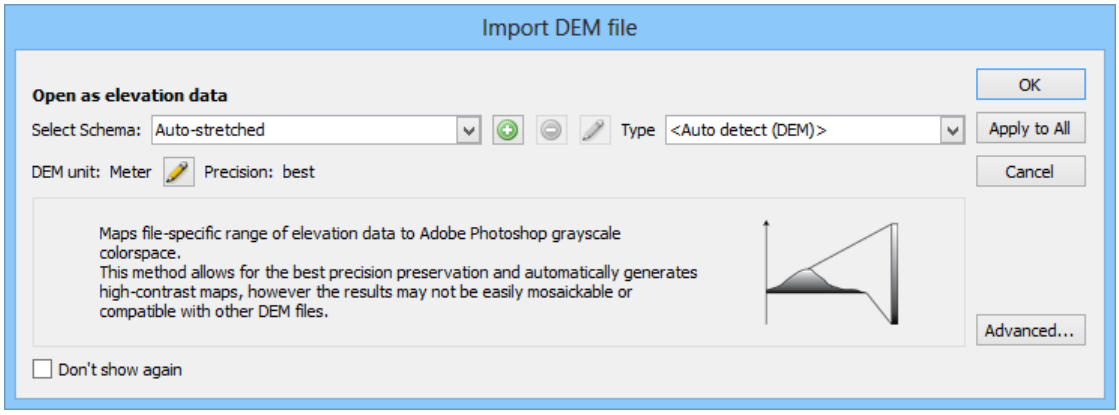
11.2 Terrain Shader Tutorial

Import DEM File

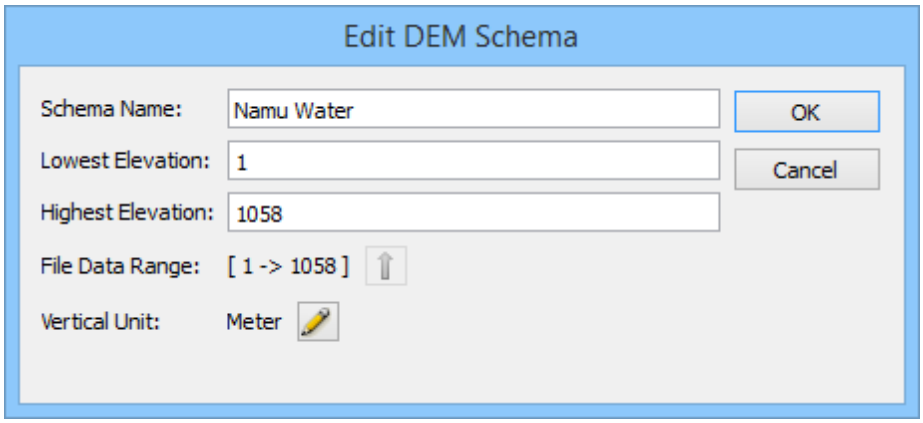
Geographic Imager will detect when elevation data is being opened in Adobe Photoshop. The Import DEM File dialog box will automatically open where you can specify a DEM schema and other settings.

1. In Adobe Photoshop, browse to the Tutorial Data folder and open **Namu Water.dem** from the \Tutorial Data\Americas folder.

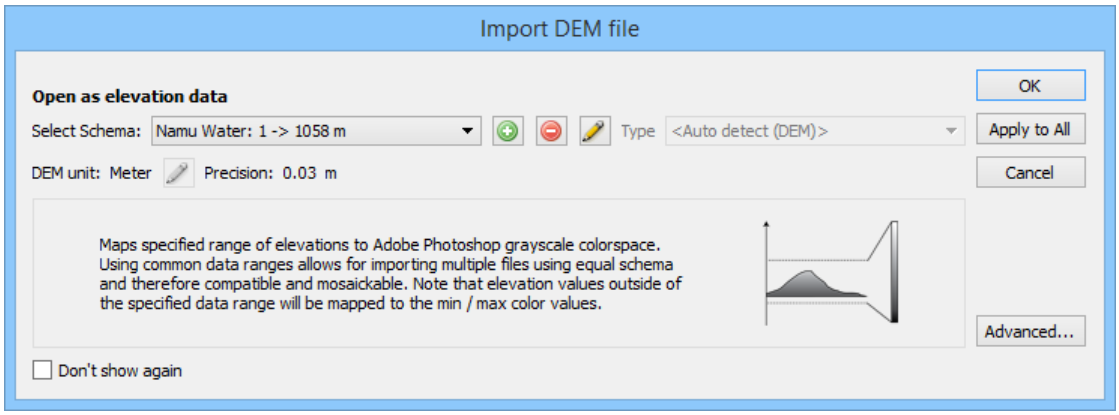
2. In the Import DEM file dialog box, click the **Create New Schema** button.



This opens the Edit DEM Schema dialog box. The Schema Name is already populated with the name of the file. It also populates the Lowest and Highest Elevation values according to the DEM's data range.

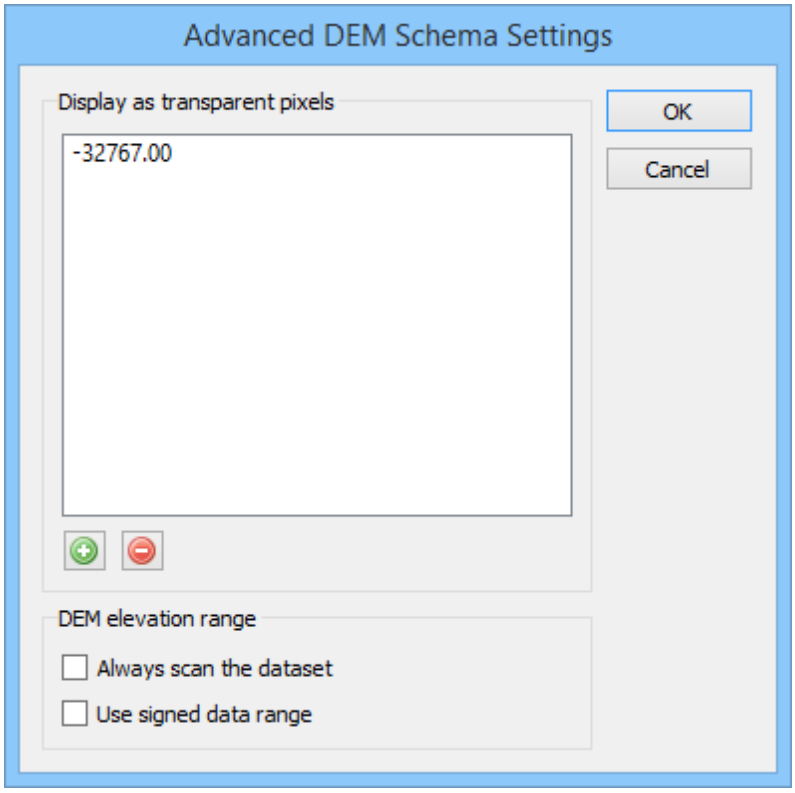


3. Since these values are acceptable, they do not need to be modified. Click OK.



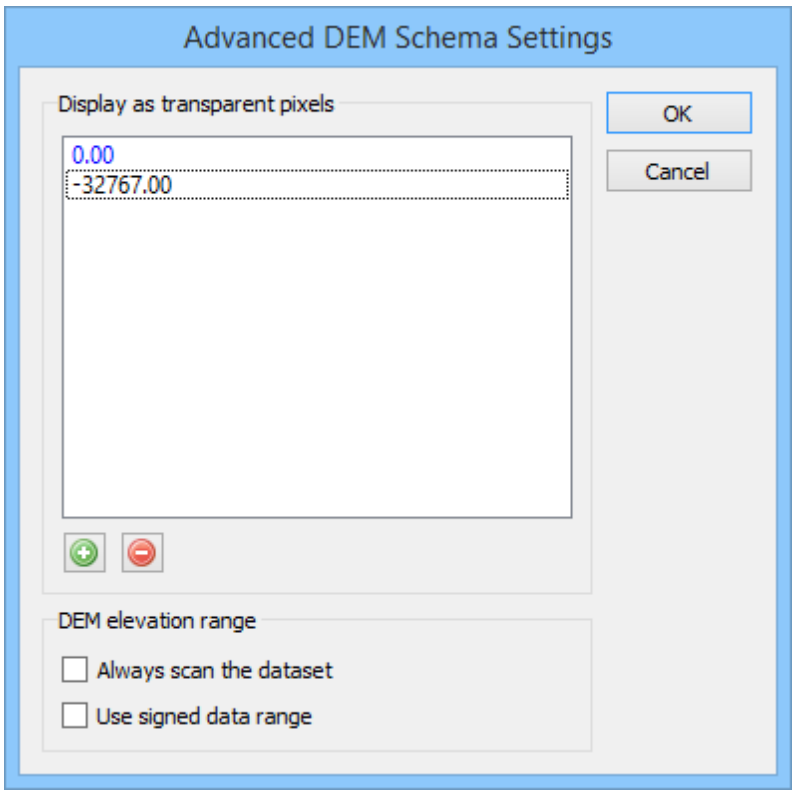
4. The Select Schema now reflects the data range of the DEM.

5. In the Import DEM file dialog box, click the Advanced button.

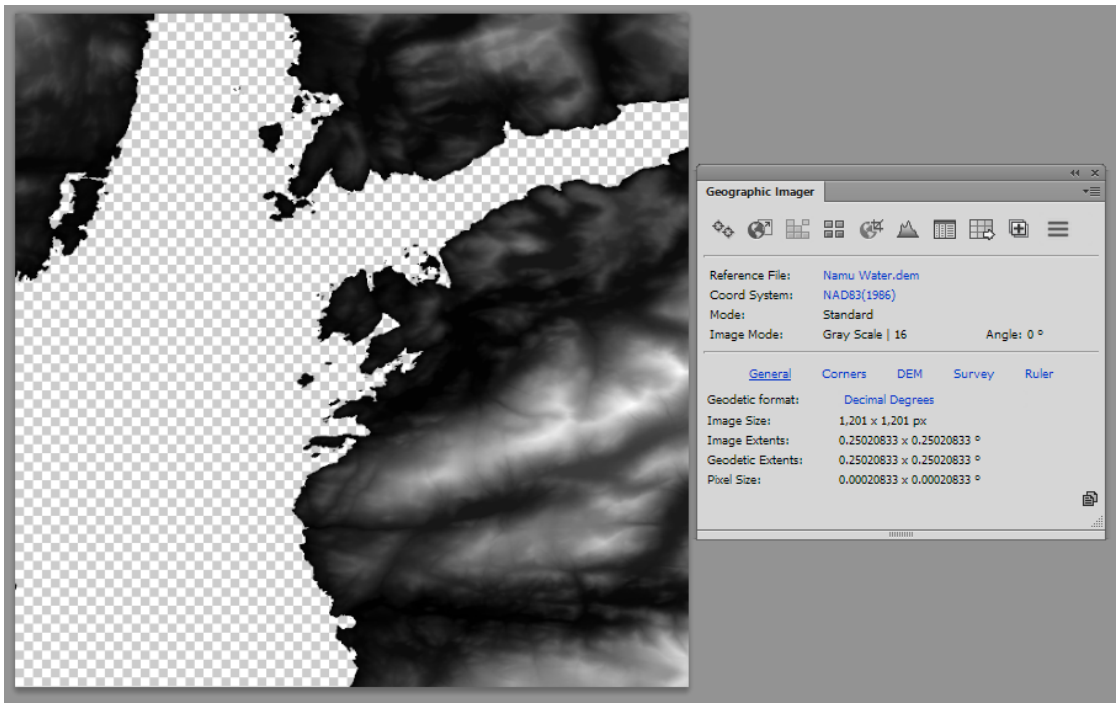


The value -32767.00 in the Display as transparent pixels list is a predefined value that represents no data. This value can't be deleted and is common to all DEM files. To display elevations as transparent pixels, populate this list with elevation values.

6. Click the Add new value button. Double-click <new value> and enter a value of **0**.



7. Click OK to close the Advanced DEM Schema Settings and click OK to accept the settings of the Import DEM file dialog box to finish the import.



The chosen custom DEM schema maps the range of elevation to the Adobe Photoshop grayscale color-space, displaying the highest contrast possible. A transparent area is visible where all elevations with a value of 0 that was specified in Advanced DEM Schema Settings.

The elevation value of 0 is considered water for this DEM. Since the area that represents water is now transparent, it is now very easy to create a background layer and apply a different color to it (remember that the color-space is grayscale). In the next exercise, you will apply a gradient map to the elevation data layer using the Terrain Shader and also create a background.

8. Keep this document open for the next Terrain Shader tutorial.

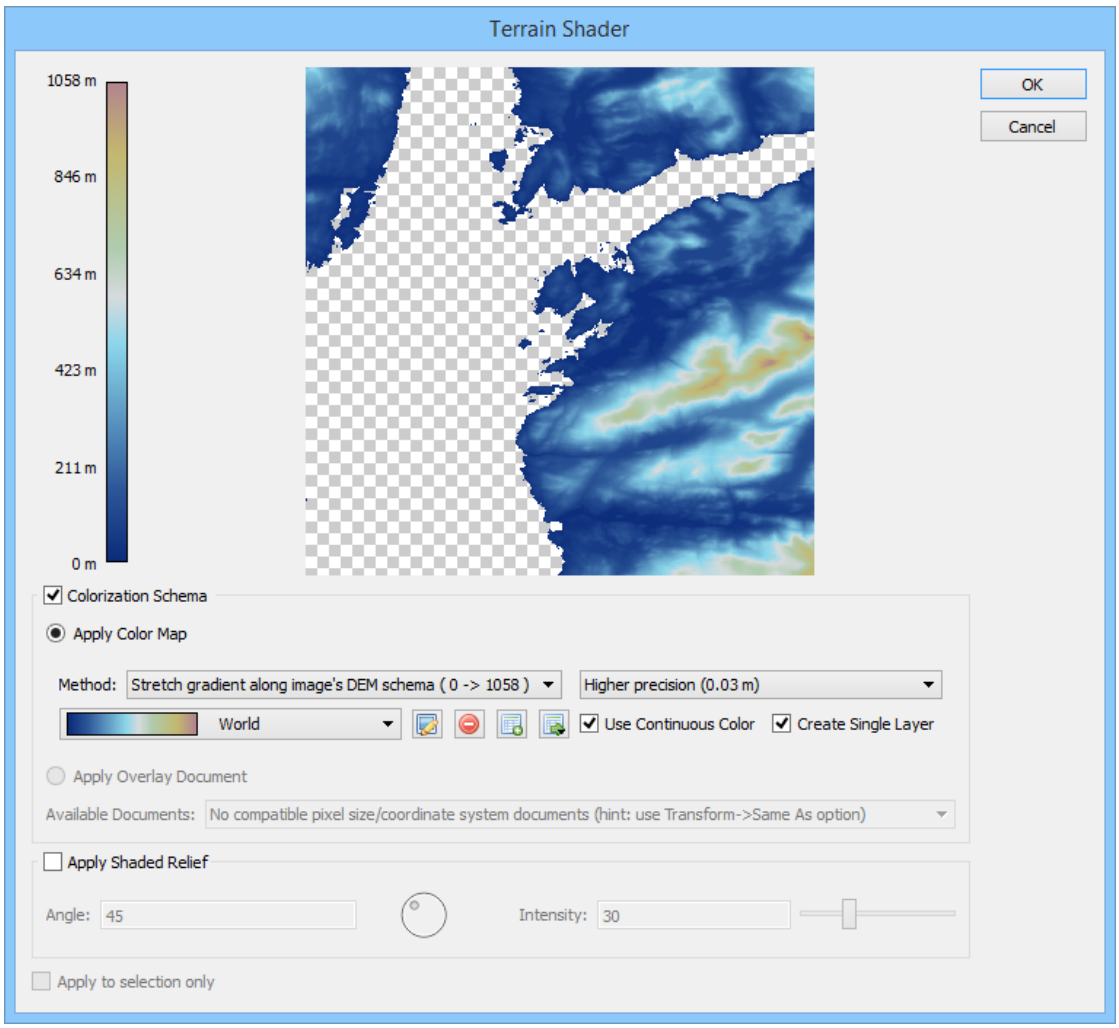
Terrain Shader

Terrain Shader is used to style images with elevation data. You can quickly create a gradient map adjustment layer using predefined or custom color maps.

1. Continue working with **Namu Water.dem** from the previous Import from DEM tutorial.

2. On the Geographic Imager panel, click the **Terrain Shader** button.

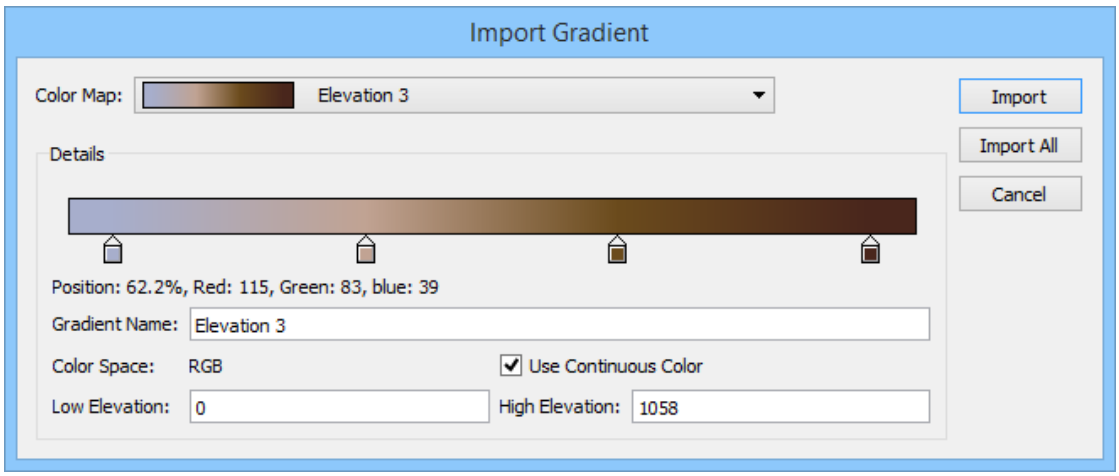
3. Click the Colorization Schema check box to enable its frame options. The Apply Color Map option is chosen and automatically applies the first color map (or the last color ramp used) in the list. If it’s different than what you see in your dialog box, choose the World color map.



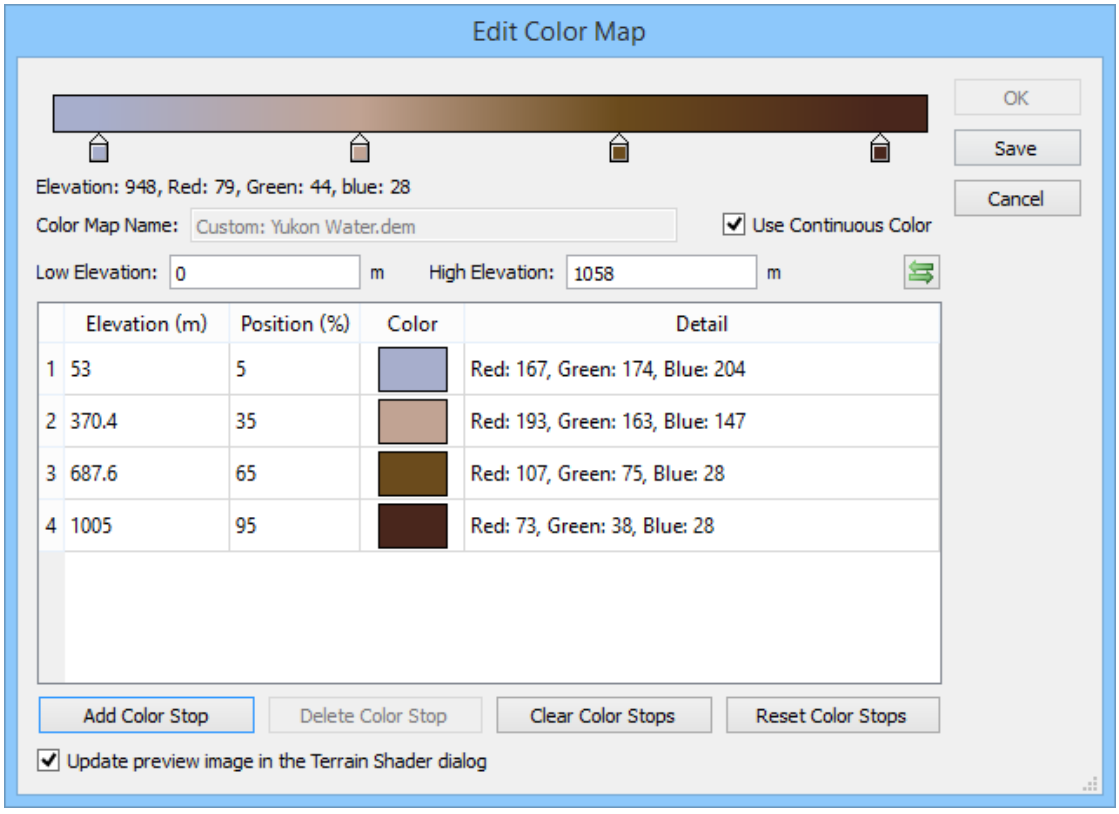
The Create Single Layer option is checked by default which creates one gradient map adjustment layer. Unchecking this option will create a gradient map adjustment layer for each layer. The Use Continuous Color option is also checked by default. It ensures the color ramp has smooth transitions between colors instead of discrete colors.

4. Click the **Import Color Map From File** button in the Colorization Schema frame (third button to the right of the color map).Choose the file **Colour Ramp Examples.grd** from the Tutorial Data folder.

5. Choose **Elevation 3** from the Color Map drop-down list and click Import.



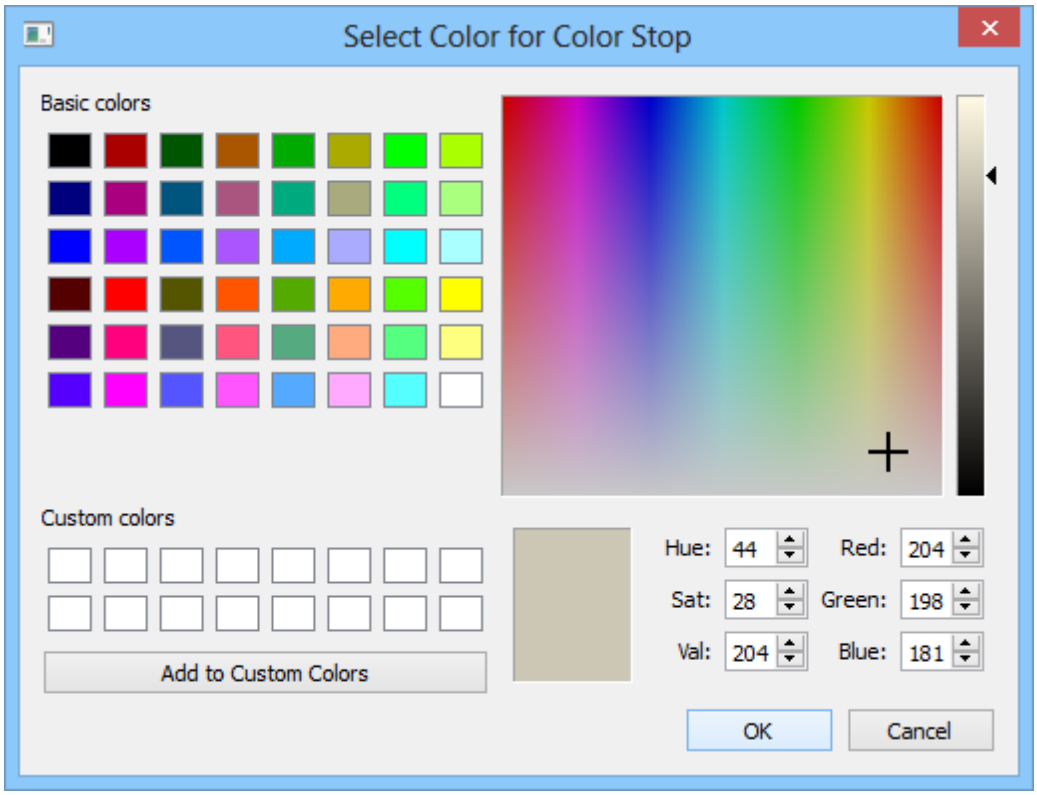
6. Choose **Elevation 3** from the Color Ramp drop-down list and then click the **Edit Selected Color Map** button.



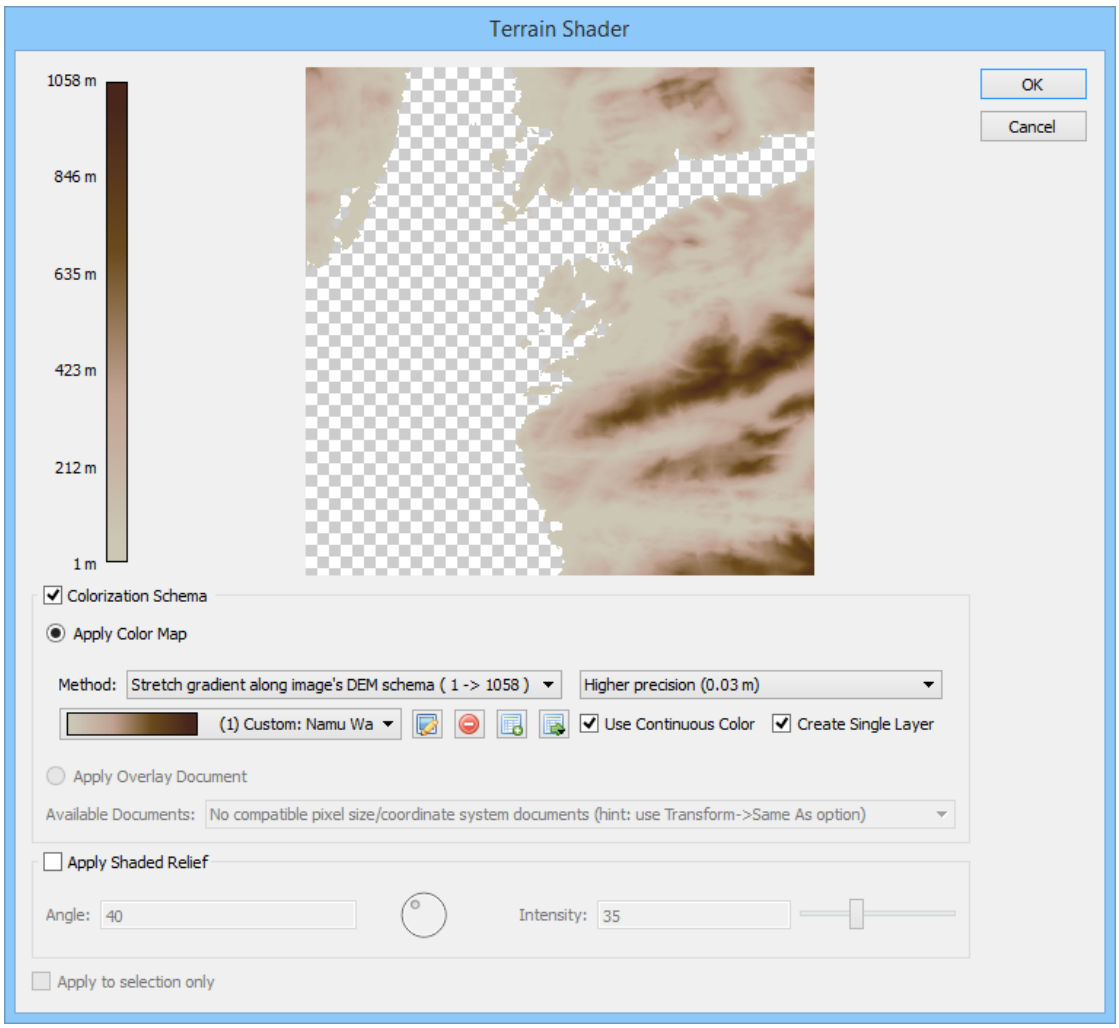
The Edit Color Map dialog box shows how the elevation is mapped to the color ramp. Hover over the color ramp to see how the elevation values correspond to the chosen color ramp.

7. Right-click the color swatch of the table entry for Color Stop 1 (at the top of the list) and click **Edit Color Stop**. Alternatively, click the color chip slider on the color ramp.

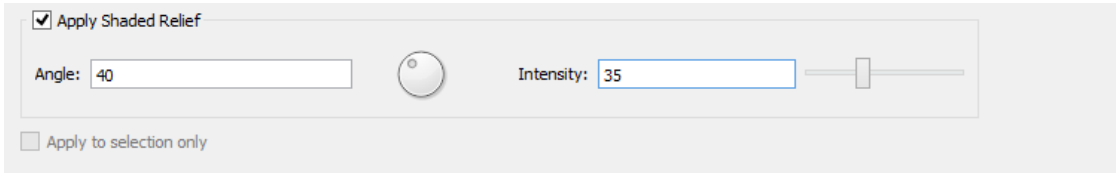
8. In the Select Color for Color Stop dialog box. Enter new color values of Red: **204**, Green: **198**, Blue; **181**.



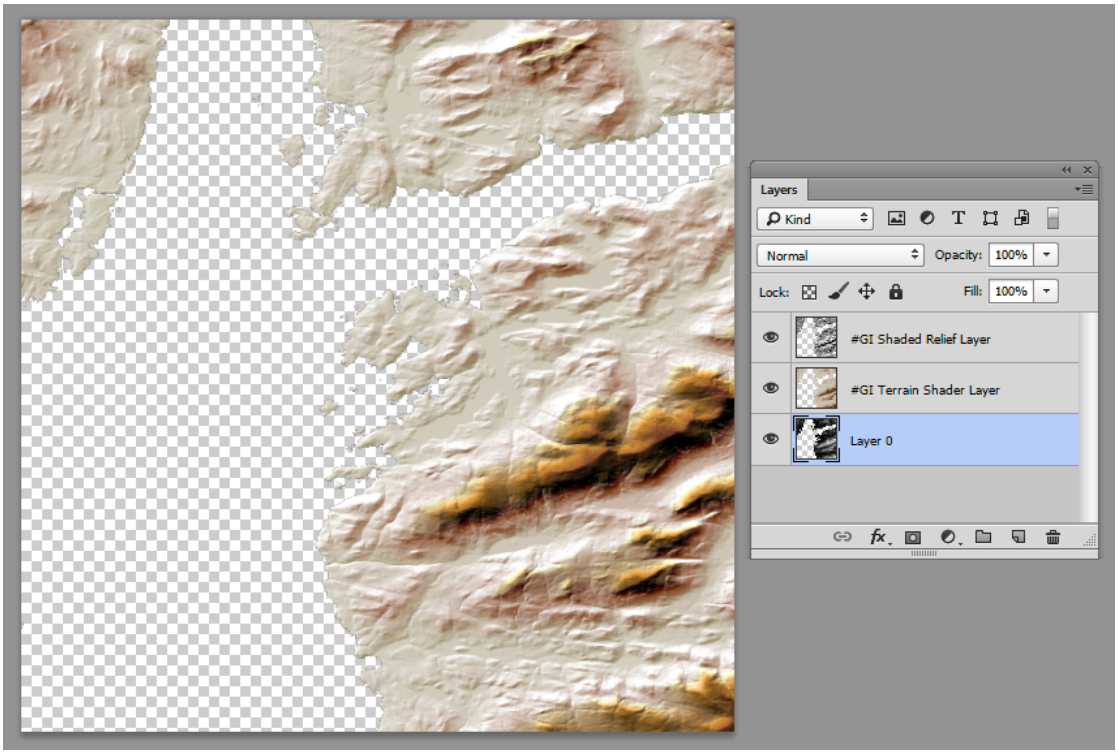
9. Click OK to close the color dialog box. Click OK again to close the Edit Color Map dialog box.



10. Click the **Apply Shaded Relief** check box. Change the angle to **40** and adjust the Intensity to **35**.



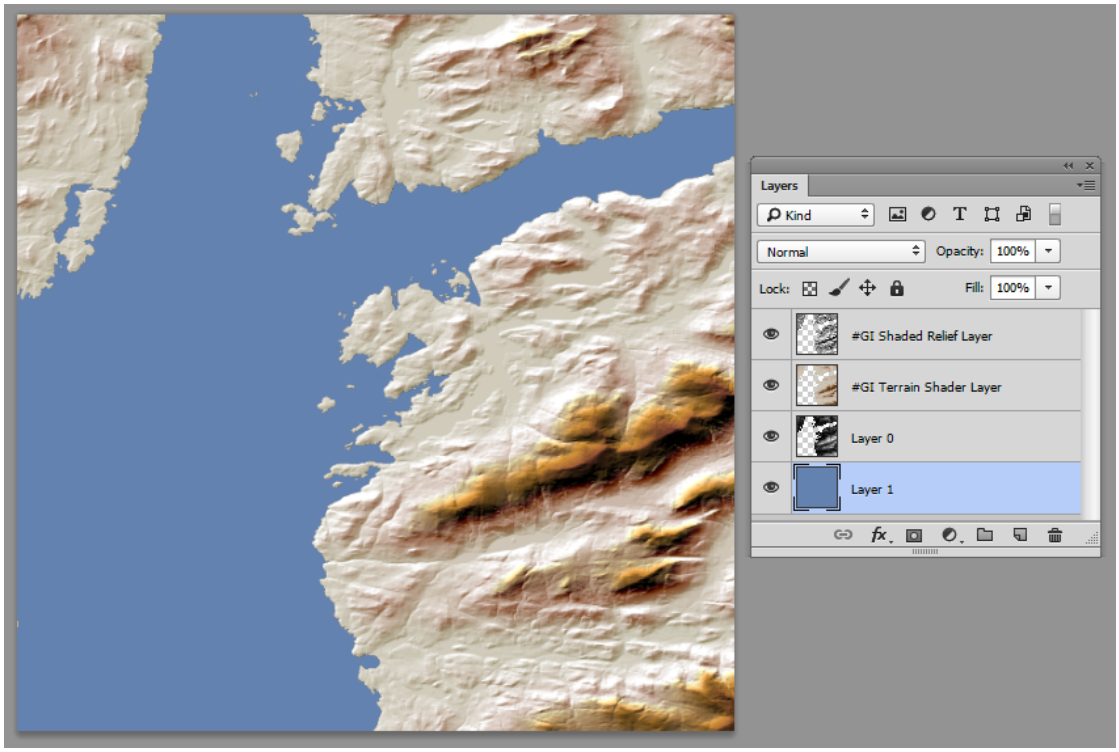
11. Click OK.



Your customized color ramp is applied to the DEM. In the Layers panel, notice that the original DEM (and background) is maintained. The shaded relief and color map layer are at the top of the layers list.

To add a background, simply create a new layer and position it at the bottom of the Layers list.

12. Create a new layer and rename it to Background. Use the Adobe Photoshop Paint Bucket Tool and fill the layer with a blue color (R: 100, G: 130, B: 175).



12 Exporting Spatial Images

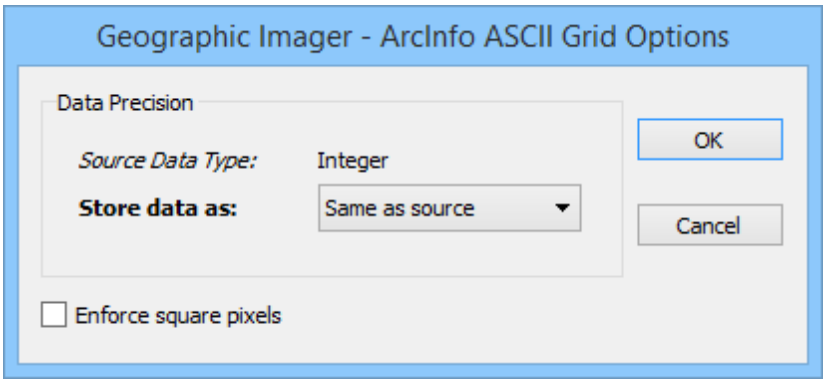
Save Image Files with Georeferencing

When saving images that are considered Geographic Imager added formats, it will save reference information internally. Formats that contain internal reference, include: GeoTIFF, BigTIFF, DEM TIFF, Geospatial PDF, ERDAS IMAGINE Raster, ECW, MrSID, and NITF. When working with any of these formats, use the Adobe Photoshop Save command to save the image and to update the reference file.

GeoTIFF is simply represented in the Adobe Photoshop Save As dialog box as TIFF (*.TIF, *.TIFF) and geospatial PDF is represented as Photoshop PDF (*.PDF, *.PDP). Depending on the originating image format, certain format types may not be available during save.

When saving images to any Adobe Photoshop format, an external reference file will automatically be created. For example, when saving a georeferenced image to a non-geospatial format (e.g. JPEG), Geographic Imager creates an external reference file (e.g. World File). To save to any of the supported image formats, use the Adobe Photoshop Save As command and choose the appropriate format in the Format drop-down list.

During a Save As process, each supported format may have its own native Adobe options dialog box. For example, when saving as a GeoTIFF, the TIFF Options dialog box will appear. When saving as Photoshop PDF, the Save Adobe PDF dialog box will appear. The following Geographic Imager format option dialog boxes will appear for BigTIFF/DEM TIFF, ECW, DEM, USGS DEM, ASCII GRID, and MrSID formats. Geographic Imager added formats may also have its own options dialog box.



Example: Options dialog box when exporting to ArcInfo ASCII Grid.

When saving a non-spatial image format (e.g. JPEG or PNG), an external reference file

is created in the same name. For example, an image with the file name VancouverCity.jpg will have an external reference file called VancouverCity.tfw (World reference format). Geographic Imager automatically updates associated reference files based on the latest transformation settings when saved. Change the default external reference format in Geographic Imager Preferences.

⚠ **Caution**: When saving an image after a Geographic Imager function is performed, Geographic Imager automatically updates the reference file. In this process, the original reference file is overwritten. In order to avoid damaging the original image and reference files, use the Save As command with a new file name or file location rather than using the basic Save command.

ⓘ When saving to BigTIFF format, an image that has more than four color bands cannot be saved using the JPEG image compression option. For BigTIFF images in RGB or Grayscale color mode, using the JPEG image compression option only supports 8 bit RGB, RGBK or grayscale with less than four bands. Caution should be used when saving to BigTIFF using a script because it is possible to use the JPEG image compression option (doing so will produce incorrect results).

When saving to BigTIFF format with JPG compression enabled, the file size may be differ significantly when compared to saving to the TIFF format with JPG compression enabled. The image quality is on par between both formats.

ⓘ When saving a DEM format with the Alpha Channel check box checked, the result will be that no alpha channels is saved. Digital elevation model formats like DEM, BIL and ASC don't support alpha channels.

ⓘ Saving a USGS DEM format with the floating precision option creates files that may not be fully supported by some legacy DEM applications (values may be misread as integer).

Export Coordinate System Data

The defined coordinate system can be exported as a WKT Definition File (.wkt) or Esri

Projection file (.prj) through the Geographic Imager panel options menu. Select Export Coordinate System from the panel options menu to access the Export dialog box.

Some reference files that do not store the coordinate system information (e.g. world file .tfw) will benefit from a WKT Definition File or Esri Projection file. These files stores all the parameters of the coordinate system that was exported.

Some projections are not supported when saving to a reference file and will not store the coordinate system. It is highly recommended to export a coordinate system file as well. See Reference Formats.

Export a Reference File

The defined coordinate system for a georeferenced image can be exported as a reference file through the Geographic Imager panel options menu. Go to Export Reference File from the options menu and choose one of the follow reference file formats to export to:

Reference file format	Reference file format extension
Blue Marble Reference File	.rsf
ER Mapper	.ers
GeoTIFF*	.tif
MapInfo TAB File	.tab
World Files	.tfw, .tifw, .wld, .jgw, .pgw, .sdw, .eww, .blw, .dmw, .bpw

* The GeoTIFF option is only available when the current document is TIFF. Exporting a reference file to GeoTIFF is another way to convert a non-spatial TIFF to GeoTIFF.

Export functionality may also be used to change the referencing file format of an image. The georeferencing information should be first exported into the desired reference file format, then click the Reference File link in the Geographic Imager panel

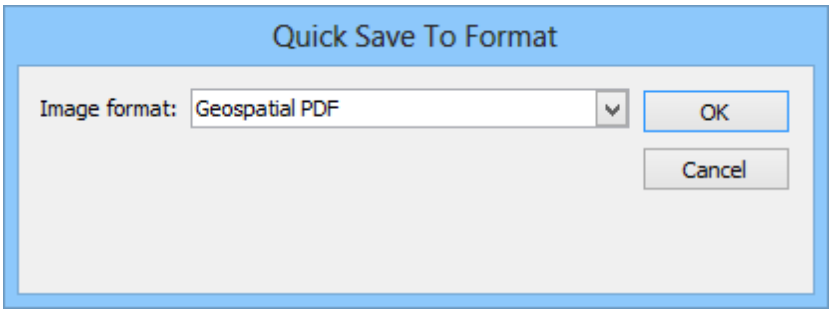
to specify it as the new reference.

If referencing of an image was changed after export, only the current referencing file will be updated; previously exported reference files will not be deleted or updated. The current reference file will be used and the old reference file will not. Keep this in mind when reopening images.

Topics covered in this section

12.1 Quick Save to Format

The Quick Save To Format command provides the ability to save a georeferenced image as another format. It functions similarly to the Adobe Photoshop Save As command, except that it uses default settings to expediate the save process (no options dialog box will appear). Go to Geographic Imager panel options menu and choose Quick Save to Format.



Quick Save to Formats and Default Save Settings

These are the available formats and their default save settings when using Quick Save to Format:

Format	Default save settings

BigTIFF	Image Compression = LZW, Pixel Order = Interleaved
DEM TIFF	Image Compression = LZW, Pixel Order = Interleaved
USGS DEM	Metadata = unchecked, Precision = Integer
ArcInfo ASCII Grid	None
BIL	None
ECW	Reduction = 75
ERDAS IMAGINE Raster	Block Size = 64, Pixel Type = Default
Geospatial PDF	Default Adobe Photoshop Save settings
GeoTIFF	Image Compression = LZW, Pixel Order = Interleaved
MrSID	Format = MrSID Generation 4, Compression Method: Ratio (20:1), Block Size = 64, Target Thumbnail Size = 32
NITF	No Settings

Quick Save to GeoTIFF Notes

Quick Save to GeoTIFF cannot be used with Adobe Photoshop Multichannel images. Instead, convert to RGB mode first (it will keep the additional channels), then save.

Quick Save to Geospatial PDF Notes

The Quick Save to Geospatial PDF command exports any open image with a specified coordinate system to the Adobe Acrobat Geospatial PDF format. There is no external reference file associated with it because it retains all of the georeference information within the PDF itself. It is exported using the Adobe Acrobat PDF 1.7 specification which is fully compatible with Adobe Acrobat 9 and later.

The Adobe Acrobat Analysis Tools allow viewing and marking coordinates, viewing attributes, measuring distances, perimeters and areas. With Acrobat Pro and Pro Extended, the measurement tool is always enabled. To enable this tool in Acrobat Reader 9 (standard), the file must first be opened in Acrobat Pro to enable annotations on the PDF (menu Comments > Enable for commenting and analysis).

32-bit images are not supported when exporting to geospatial PDF.

Quick Save to MrSID Notes

Quick Save to MrSID is only available on Windows. An installation of Lizardtech GeoExpress is required to output to MrSID format. Refer to Lizardtech support (http://www.lizardtech.com/support) and documentation for more information about the MrSID format.

Visit the Avenza website for more information about the MrSID writer and to purchase data cartridges and Lizardtech GeoExpress licenses (http://www.avenza.com/geographic-imager/lizardtech-geoexpress).

Quick Save to DEM TIFF Notes

- Only 16-bit grayscale modes are supported when saving as DEM TIFF format
- DEM raw values are saved
- GeoTIFF DEM must be imported using Advanced Import.

Quick Save to USGS DEM Notes

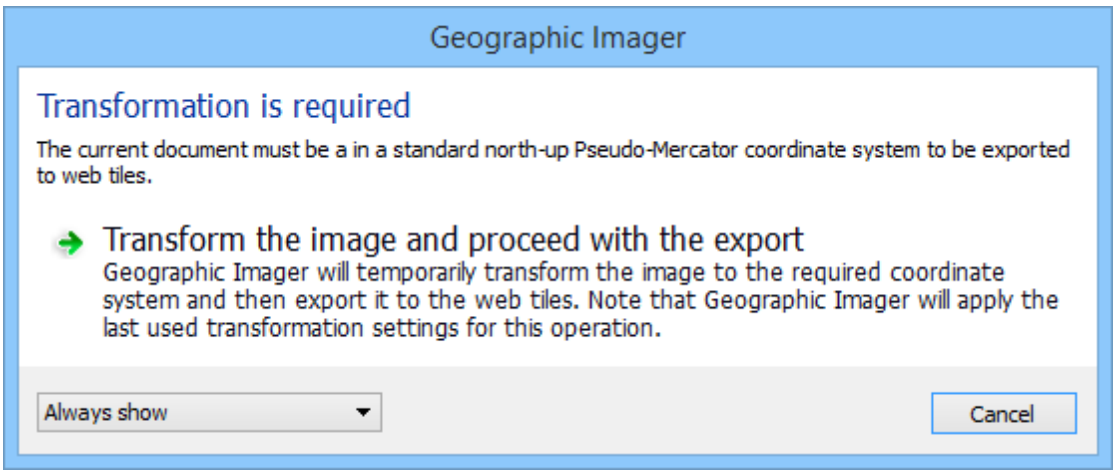
- The USGS DEM quick save only supports 16-bit grayscale image mode.
- Saving a rotated USGS DEM is not supported.

12.2 Export to Web Tiles

Use Export Document to Web Tiles to generate image tiles that can be used for online map purposes. Google Maps, Bing Maps, OpenStreetMap, Tile Map Service, and MapBox formats are supported.

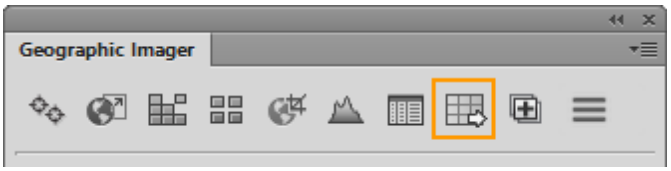
Requirements

Web Tiles are always shown in a north-up Pseudo-Mercator coordinate. Documents in other coordinate systems will be temporarily transformed to the Pseudo-Mercator coordinate system and then exported to web tiles. Geographic Imager will return the document to its original coordinate system after export.



Export to Web Tiles Dialog Box

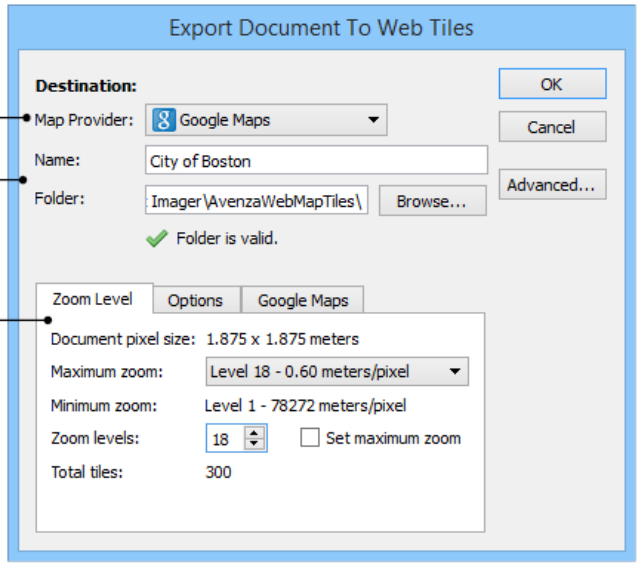
Click the **Export to Web Tiles** button in the Geographic Imager panel to open the Georeference dialog box.



Map Provider
Choose a map provider to create compatible tiles

Name and Folder
Specify destination folder and a name. This location will store web tiles and associated HTML file.

Zoom Level tab
Choose maximum zoom level (from Level 1 to Level 23). Then choose number of zoom levels (which calculates minimum zoom). A higher resolution level has a smaller meters per pixel value. Total tiles is displayed.



Using Export Document to Web Tiles

Map Provider

Map tiles are created based on the map provider and can generate web tiles compatible with Google Maps, Microsoft Bing Maps, OpenStreetMap, Tile Map Service, and MapBox.

Google Maps, Bing Maps, and OpenStreetMap map providers each generate web tiles and an HTML file which consists of a web map with the tiles in place. The HTML file can be further edited to suit specific needs or to reference exported tiles at a different location. The MapBox map provider generates an MBTILES file that can be used with the MapBox service. The Tile Map Service map provider generates web tiles and an XML file (which must be referenced by a URL).

Name and Folder

Specify a path and a file name to save to. Web tiles and associated files are saved to the same location. A path is provided by default, click the **Browse** button to choose a different path.

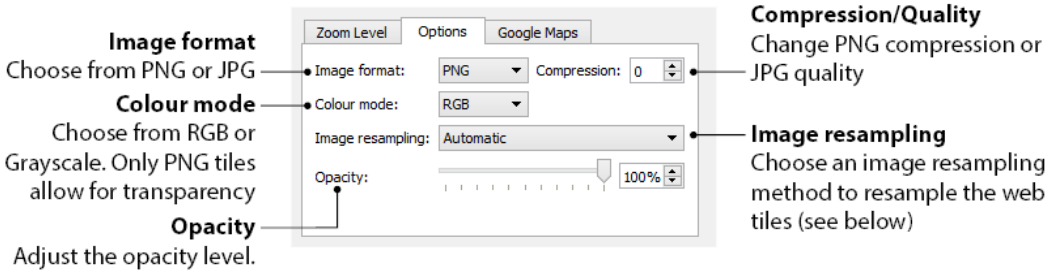
Zoom Level tab

Choose a maximum zoom to use for the maximum detail level in the exported tiles. The Zoom levels box indicates the number of zoom level to use and determines the minimum zoom. The Maximum zoom drop-down list provides a number of zoom levels from Level 1 to Level 23 and an associated resolution in measurement units to pixel. Higher resolution levels will create more web tiles (indicated by the Total tiles value). A minimum of 1 zoom level is required up to a maximum of 23 zoom levels.

Options tab

Web tiles can be exported to two image formats types: PNG and JPG. Depending on the image format chosen, each format has specific options availabe in the Options tab. The Compression option is only available for the PNG format, with a compression range of 0 to 9 (where 0 is the lowest and 9 the highest). The Quality option is only available for the JPG format, with a quality range of 1 to 12 (where 1 is the lowest and 12 the highest). Depending on the compression or quality value, generated web tile file sizes will vary. Use the Opacity slider to choose the transparency of the web tiles. 0% is completely transparent and 100% is

completely opaque.



Choose an Image resampling method to resample web tiles. The resampling method assigns color values to any new pixels based on the color values of existing pixels. By default, the Adobe Photoshop resampling method will be used. You can change the default resampling method in Adobe Photoshop preferences.

The following are available image resampling methods:

Image resampling method	Description
Automatic	Chooses the best interpolation method for the image.
Preserve details (enlargement)	A good option for enlarging an image.
Bicubic Smoother (enlargement)	A good method for enlarging images and produce smoother results.
Bicubic Sharper (reduction)	A good method for reducing the size of an image with enhanced sharpening.
Bicubic (smooth gradients)	A slow but more precise method that is good for smooth gradients.
Nearest Neighbor (hard edge)	A fast but less precise method and preserves hard edges.
Bilinear	Adds pixels by average colour values of surrounding pixels. Medium-quality results.

The Image resampling options may differ depending on your Adobe Photoshop version.

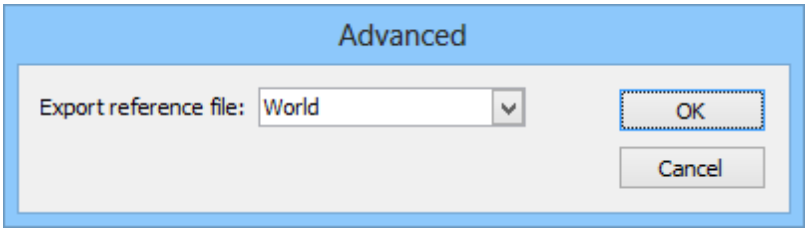
Google Maps tab

These options only apply when the Google Maps map provider is chosen. The available Google Map controls are added to the web map aid in navigation. Uncheck options to disable them so that they are not included in the HTML file.

Option	Description
Map type selector	An option to choose standard Map view or a Satellite view
Scale bar	A scale bar at the lower-left of the map
Zoom	A zoom slider widget
Overview map	An overview map available at the lower-right of the map (collapsed by default)
Pan	A pan widget
Street View	The Google Street View feature

Advanced

Use the Export reference file option to output an associated georeference file with each tile in World or Blue Marble Reference format. This option is disabled by default and does not output any reference files.



World formats do no support coordinate systems. Choose Blue Marble Reference if there is a need to include the coordinate system information.

12.3 Export to PDF Maps

Use Export to PDF Maps to generate map packages that can be directly uploaded to the PDF Maps Store, an in-app map store for the PDF Maps app on iOS, Android, and Windows Phone. You can also generate map packages and load them on your own devices through iTunes File Sharing or the Android file system, Dropbox, or specify a URL to your own location. When maps are uploaded using the Upload to PDF Maps feature, it is put into the Prepare for Review state on the PDF Maps Store.

All maps submitted to the PDF Maps Store are reviewed to ensure they are referenced accurately, perform as expected, and contain appropriate content. As you plan and create your maps, be sure to keep our review and design guidelines in mind so that you can get through the map review stage.

Requirements

While any document with a specified coordinate system can be exported as a map package using Export to PDF Maps, you must have a PDF Maps Store vendor account to use Upload to PDF Maps. Visit www.pdf-maps.com/vendors for more information on how to be a PDF Maps Store vendor.

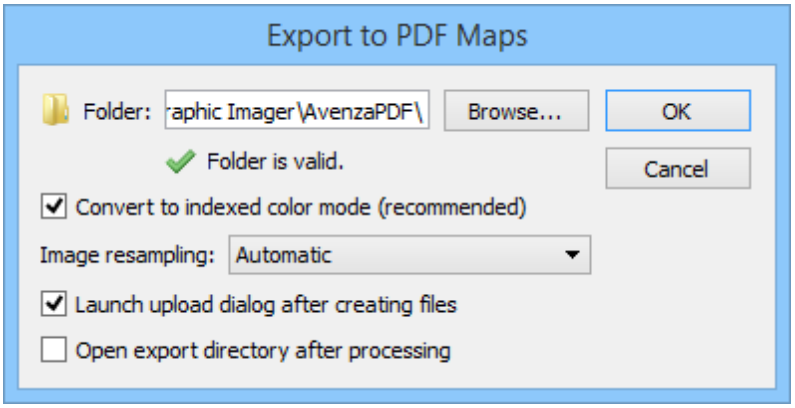
Exporting to PDF Maps app

Getting your maps ready for the PDF Maps app is a two part process depending on how you send or load the map package.

Scenario 1	1. Use Export to PDF Maps to create map packages. 2. Use Upload to PDF Maps to prepare map packages and upload for submission review. The advantage of using Upload to PDF Maps is the ability to easily populate details of your maps within Adobe Photoshop without having to go to the PDF Maps vendor site.
Scenario 2	1. Use Export to PDF Maps to create map packages. 2. Go to the PDF Maps Vendor website to upload and prepare map packages for submission review.
Scenario 3	1. Use Export to PDF Maps to create map packages. 2. Use iTunes File Sharing or the Android file system, Dropbox, or

	specify a URL to transfer your map packages to your device. This scenario doesn't upload map packages to the PDF Maps Store. It only loads map packages to your mobile device. It is a good way to quickly test your maps without having to go through the review process of the PDF Maps Store.

With an open image, go to File menu > Export > **Export to PDF Maps**. Choose a folder to export map packages to and specify any of the available options.



Folder	Browse to a directory that contains map packages ready for export.
Convert to indexed color mode (recommended)	Create map packages in index color mode. These map packages create a small footprint on mobile devices. Note that this will not retain the full spectrum of RGB color space. It is recommended to have this option enabled.
Image resampling	The resampling method assigns color values to any new pixels based on the color values of existing pixels. By default, the Adobe Photoshop resampling method will be used. You can change the default resampling method in Adobe Photoshop preferences.
Launch upload dialog after creating files	This will prompt the Upload to PDF Maps dialog after export.
Open export directory	Open the file browser of the specified folder after

after processing	exporting is complete.

The following are available image resampling methods:

Image resampling method	Description
Automatic	Chooses the best interpolation method for the image.
Preserve details (enlargement)	A good option for enlarging an image.
Bicubic Smoother (enlargement)	A good method for enlarging images and produce smoother results.
Bicubic Sharper (reduction)	A good method for reducing the size of an image with enhanced sharpening.
Bicubic (smooth gradients)	A slow but more precise method that is good for smooth gradients.
Nearest Neighbor (hard edge)	A fast but less precise method and preserves hard edges.
Bilinear	Adds pixels by average colour values of surrounding pixels. Medium-quality results.

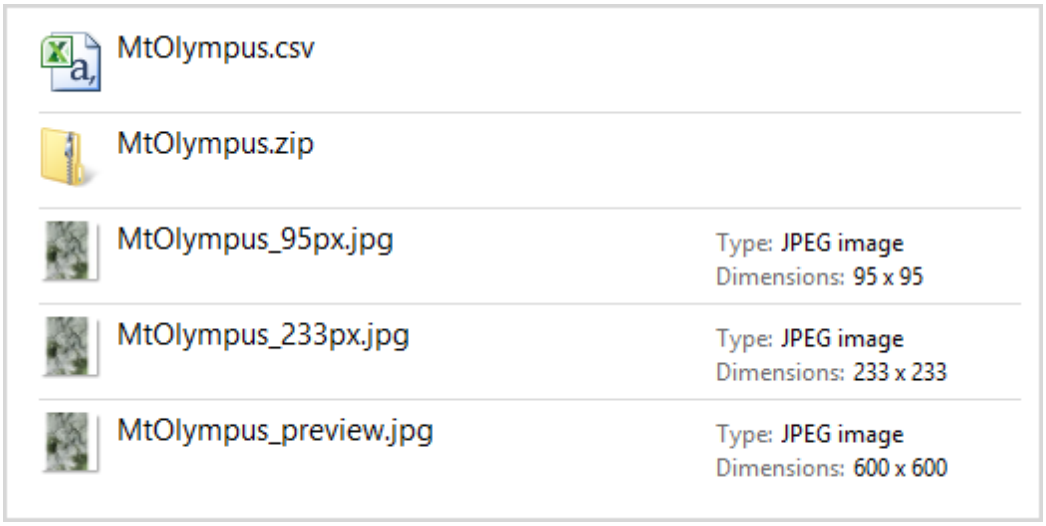
The Image resampling options may differ depending on your Adobe Photoshop version.

Map Package Contents

A map package contains all of the content required to allow it to work on the PDF Maps app. When uploading a map package to the PDF Maps Store, the ZIP file must be accompanied by all four associated files. For example, if you have an exported map called MtOlympus, the ZIP would be called MtOlympus.zip and its four associated files would be called MtOlympus_preview.jpg, MtOlympus_95px.jpg, MtOlympus_233px.jpg, and MtOlympus.csv. These files must have the same name as the ZIP file and should not be renamed independently. A map package will not get uploaded if any of the associated files are missing.

When loading a map onto your device through iTunes File Sharing or the Android file system, Dropbox, or a URL, only the ZIP file is required.

When viewing a map package folder, it will look like the following:



Map Package Contents	Description
***.csv**	A comma separated value file with coordinates that define spatial extent.
***.zip**	ZIP file contains a tiles folder containing the images required to render the map in the PDF Maps app. The ZIP also contains a thumbnail file and reference file, both of these are required in the zip package. The zip package structure should not be altered.
***_95.jpg**	Small preview image; can be customized and used on vendor site.
***_233.jpg**	Large preview image; can be customized and used on vendor site.
***_preview.jpg**	Main preview image; can be customized, however the image size, color mode and name should not be modified. You can create custom preview images to branding purposes.

A map package will not get uploaded if any of the map package files are missing.

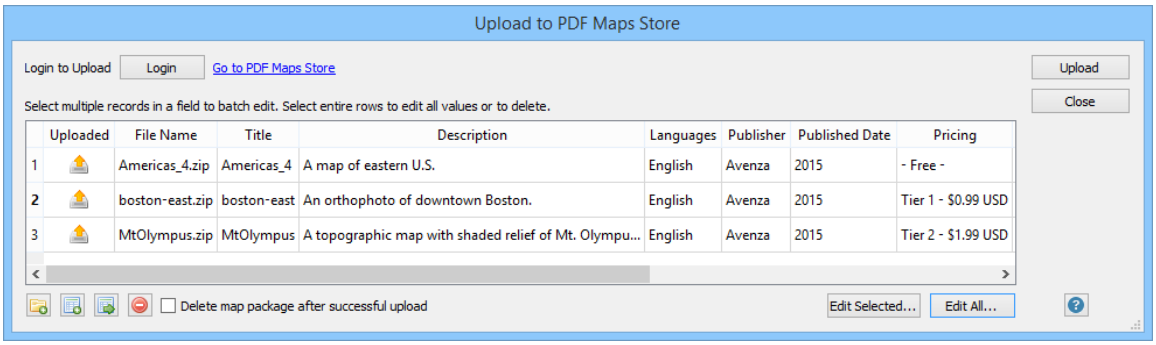
Related Topics

Upload to PDF Maps Store

12.3.1 Upload to PDF Maps Store

Use the Upload to PDF Maps Store feature to directly upload your map package zip file to the PDF Maps Store vendor site. This makes the process of staging your maps on the vendor site easier as you can upload multiple map packages at once. Map details such as title, description, and price can optionally be completed in the Upload to PDF Maps Store dialog box. You must be a registered vendor on the PDF Maps Store to use this feature, as you're required to login through the dialog box before uploading.

Upload to PDF Maps Store Dialog Box



Login to upload

Login with your PDF Maps Store vendor account email and password. You must be logged in before you can upload map packages for submission.

To become a PDF Maps Store vendor, apply here https://mapstore.avenza.com/vendor/login.

Loading Maps

Load maps from folder

Click the **Load maps from folder** button to specify a folder that contains map packages. All map packages in the specified folder are added to the map table.

Load from CSV

Load maps and map details from a CSV file. This CSV file could be one that was manually created or one that was exported by the Upload to PDF Maps dialog box.

Export table to CSV

Export the map details to a CSV file so that the table information can be imported and uploaded at a later time.

Editing Map Details

Populating the map details can be done easily for multiple maps prior to upload. It is not mandatory to populate the map details prior to upload, however, it will need to be completed on the PDF Maps Store vendor site before submitting for review.

All available fields that can be edited include:

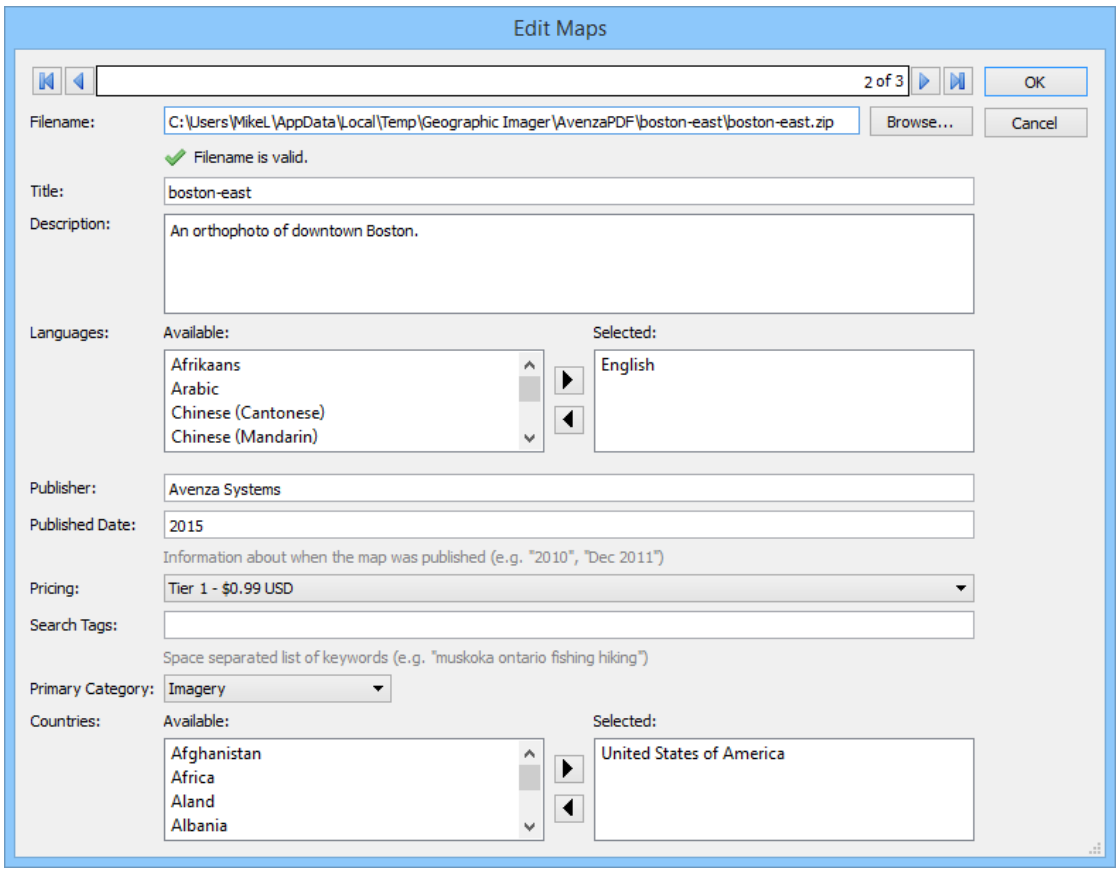
Title	Give the map a concise, but descriptive title.
Description	Write a map description that may include details about general or special map features.
Languages	Choose languages that apply to the map.
Publisher	Provide your company, agency or vendor name.
Published Date	A general time of when the map was published (e.g. 2015 or Jan 2015).
Pricing	Choose a pricing tier to sell the map at. Ranges from Free to Tier 77 - $249.99 USD.
Search Tags	Include descriptive keywords (space separated) to help users find the map when searching.
Primary Category	Choose a PDF Maps Store map category that pertains to the map.
Countries	Choose countries that the map area includes.

Batch Edit Selected

You can populate multiple fields that share the same map detail. To edit selected fields in a column, select multiple fields (Ctrl + click or Shift + click) and click the **Edit Selected** button or right-click and choose **Batch edit selected**. To batch edit an entire column, click a column heading to select the column and click the **Edit Selected** button.

Edit All

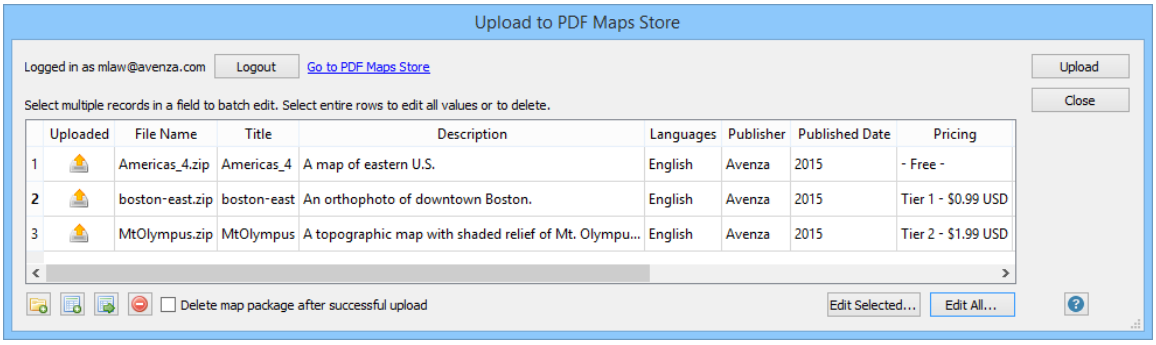
See all of the editable fields of one map at once to make it easier to edit map information. Use the navigation controls to go to the previous or next map.



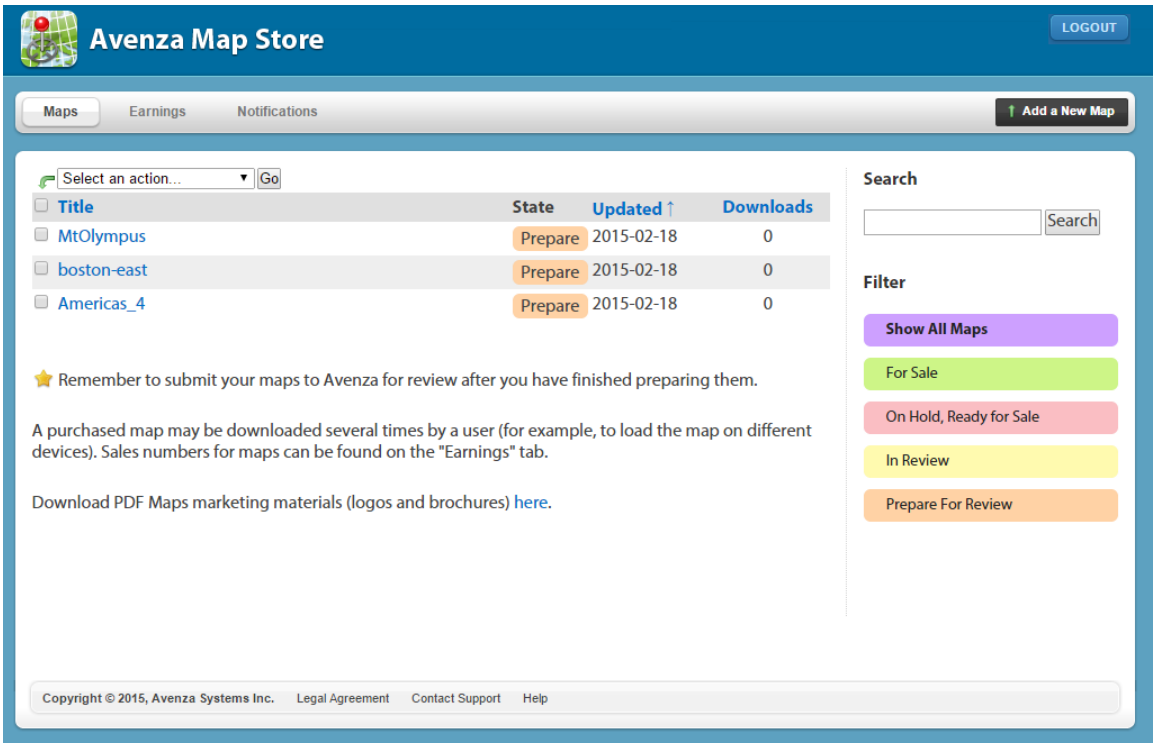
Uploading Maps

When you are ready to upload map packages, click the **Upload** button (you'll have to be logged in first). Check the **Delete map package after successful upload** check box if you want to delete the files from the source folder after the map packages are

finished uploading.



When you log into the PDF Maps vendor website, the maps that were uploaded will be available and set to the Prepare state. When you have completed all the necessary map details, you can submit the maps for review. Maps are submitted to are reviewed by the PDF Maps team and when they are approved, are changed to the On Hold, Ready for Sale state. Your maps can be set to For Sale at any time. Thousands of users use PDF Maps everyday and the PDF Maps Store is a great way to sell your maps and generate revenue.



PDF Maps vendor site.

See the PDF Maps Store help section to learn more about map status and other details.

12.4 Export Tutorials

12.4.1 Export to Web Tiles Tutorial

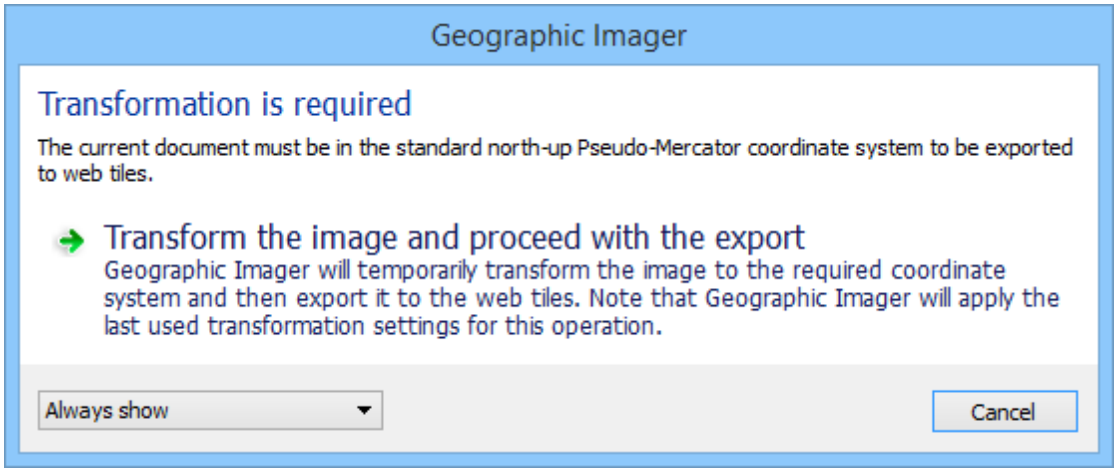
The Export Web Tiles feature generates image tiles that can be used for online map purposes. An HTML file is created with the web tiles which consists of a web map with the tiles in already in place. Use the Web Tile Export Options dialog box to adjust tile options.

1. In Adobe Photoshop, open **boston-east.tif** from the Tutorial Data folder.

2. On the Geographic Imager panel, click the **Export Web Tiles** button.

Before an image can be exported to web tiles, it must be in the WGS 84/Pseudo-Mercator coordinate system. The Export Web Tiles feature will conveniently and temporarily transform the image from Massachusetts Mainland Zone to WGS 84/ Pseudo-Mercator so that it is compatible.

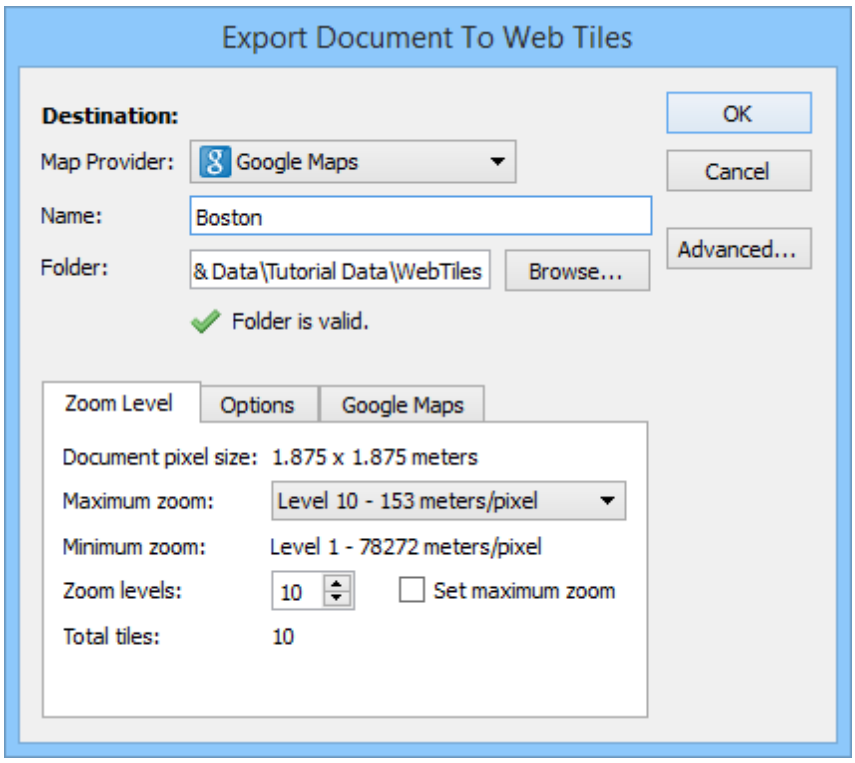
3. Click **Transform the image and proceed with the export**.



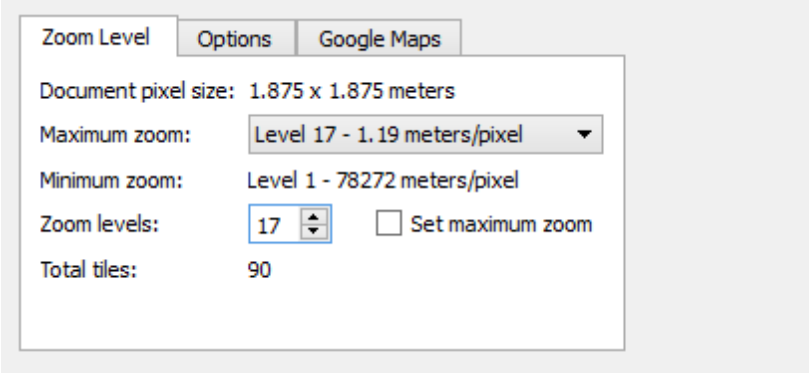
4. On the Export Document to Web Tiles dialog box, choose **Google Maps** from the Map Provider drop-down list.

5. In the Name box, rename to **Boston**.

6. For the Folder, click Browse and create a folder called **WebTiles** in the Tutorial Data folder.

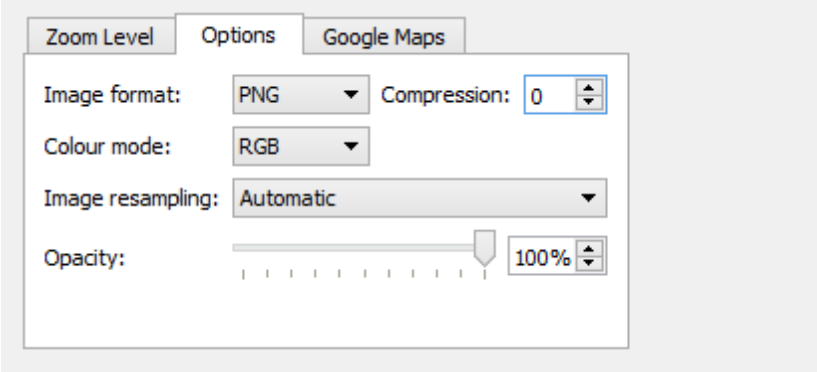


7. On the Zoom Level tab, choose a Maximum zoom of **Level 17 - 1.19 meters/pixel** and change the number of zoom levels to **17**.



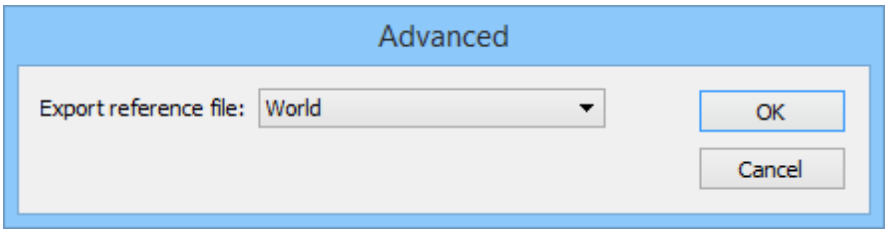
A total of 90 web tiles will be created. The Minimum zoom is Level 1 - 78272 meters/pixel which is basically be a small map scale.

8. Click the Options tab. Choose **PNG** from the Image format drop-down and change the Compression to **0**.



The Compression value of 0 will ensure a high image quality. You'll leave the Google Maps tab settings as is. (You can experiment on your own how these settings affect the web map.)

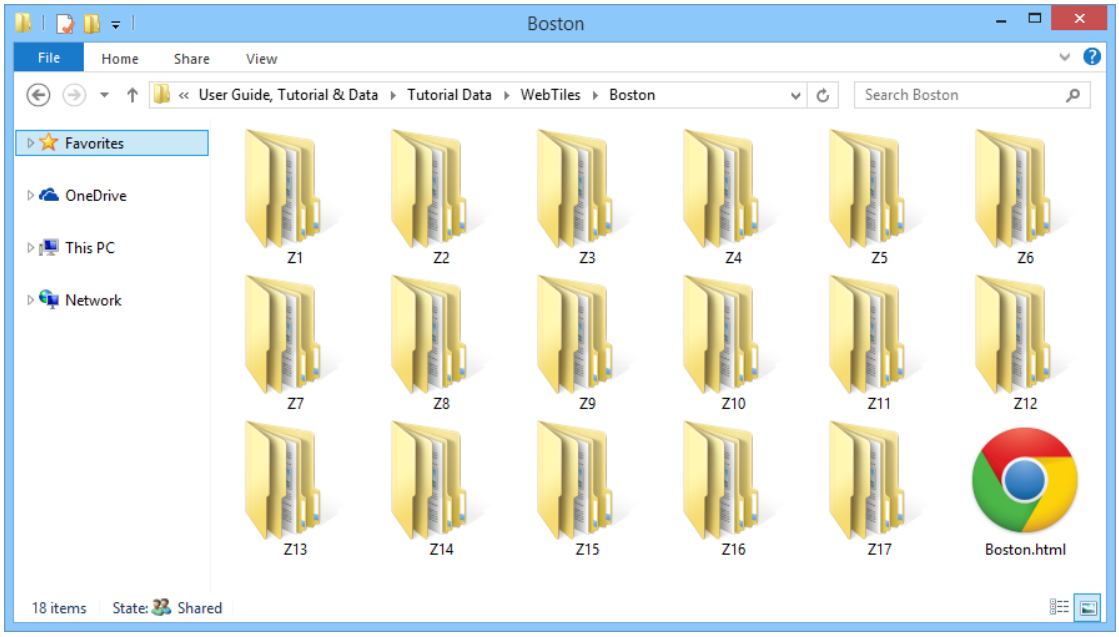
9. Click the **Advanced** button. Choose a **World** export reference file, then click OK.



Creating a reference file is not required, but may be useful if the web tiles were to be used elsewhere.

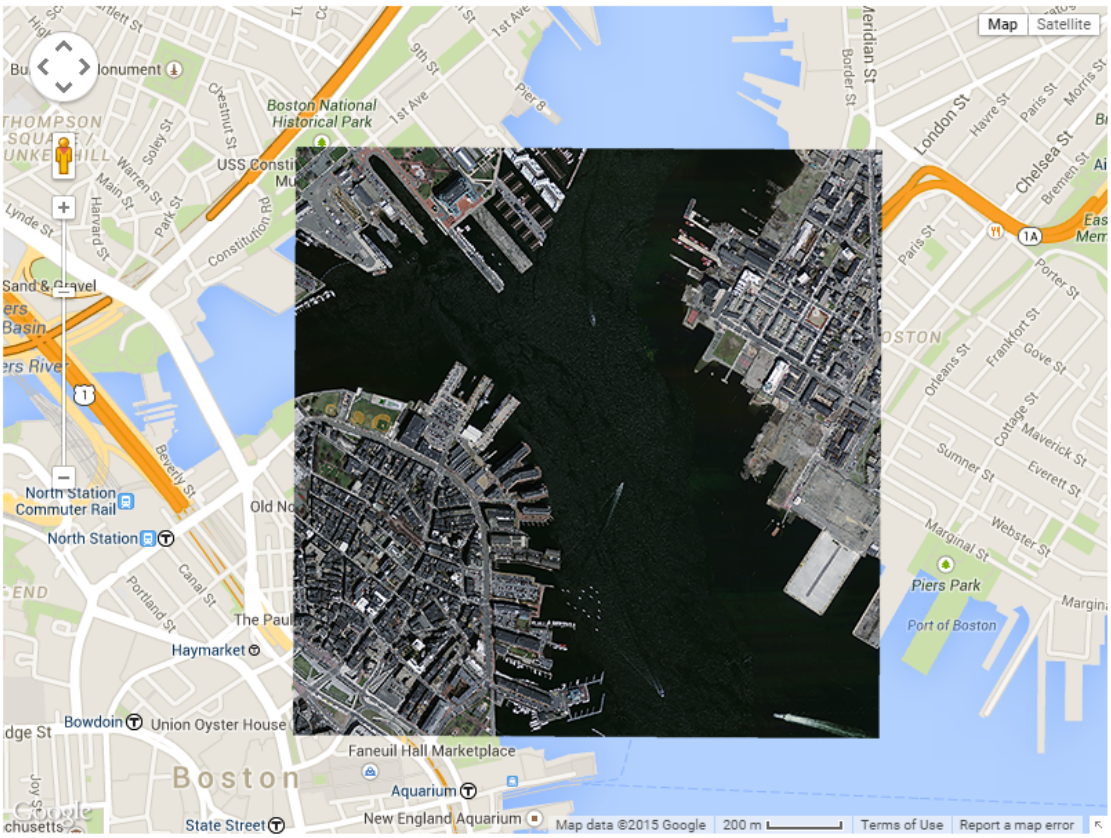
10. Click OK to begin the export process.

11. After the web tile export completes, navigate to the export folder you specified.



In the export folder, several new folders were created (Z1 to Z17). These folders hold the PNG images that make up the web tiles and represent the 17 zoom levels you specified. Also included in the folders are TFW world reference files associated with each tile image.

12. Double-click **Boston.html** to open it in a web browser.



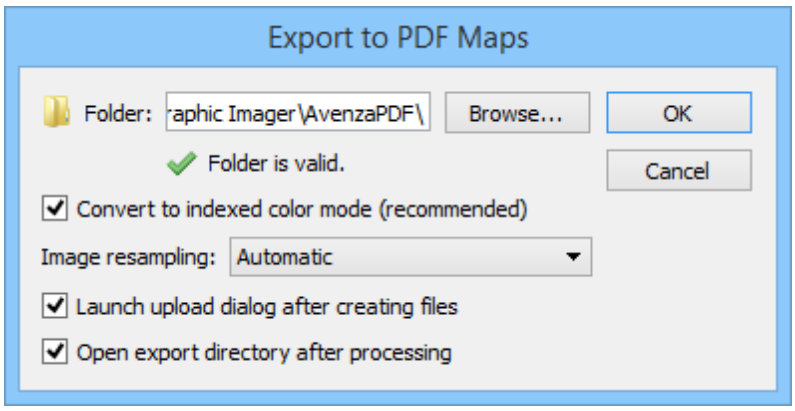
The Boston.html file contains the web map that includes all the tiles exported from Geographic Imager.

12.4.2 Export and Upload to PDF Maps Tutorial

The Export to PDF Maps feature generates a map package that can be uploaded directly to the PDF Maps Store, an in-app map store for the PDF Maps app on iOS, Android, and Windows Phone. Uploading maps using this feature puts them into the Prepare for Review state on the PDF Maps Store. To upload maps, you'll need a PDF Maps Store vendor account.

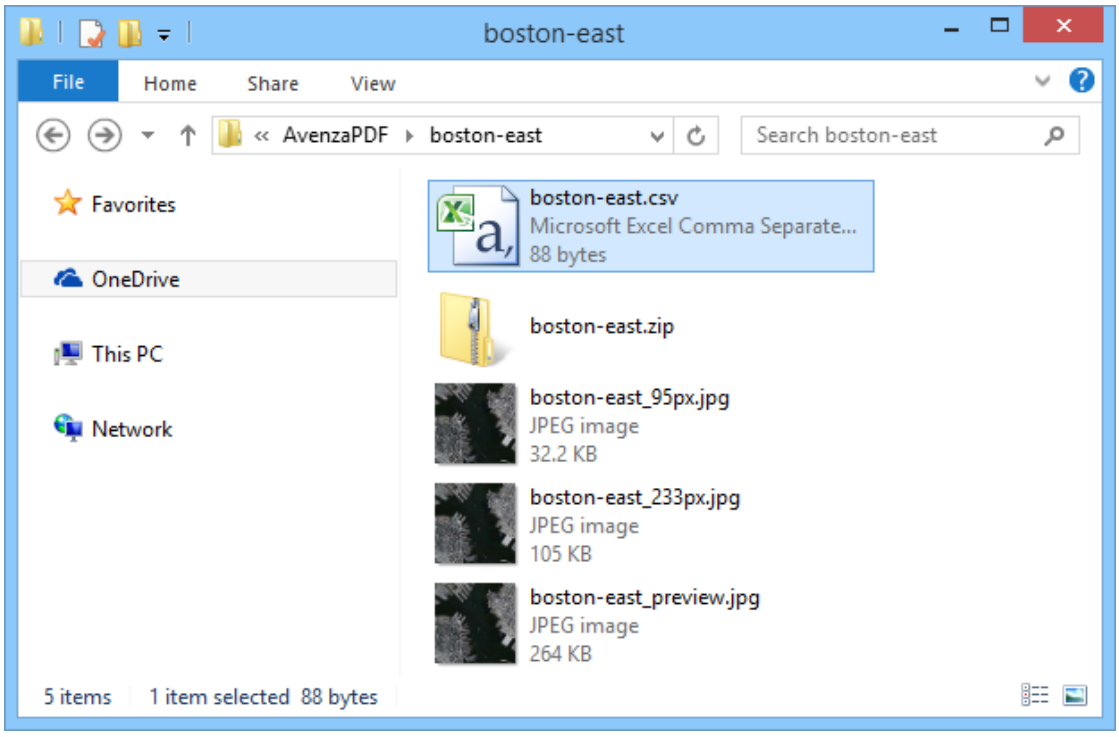
1. In Adobe Photoshop, open **boston-east.tif** from the Tutorial Data folder.

2. From the File menu, go to Export > **Export to PDF Maps**.



The Export to PDF Maps dialog box appears. You can specify a different export folder and set options here. With the options all checked, it will convert the image to indexed color mode, launch the Upload to PDF Maps dialog box after the export is finished, and open the file browser to the specified export folder.

3. Click OK.

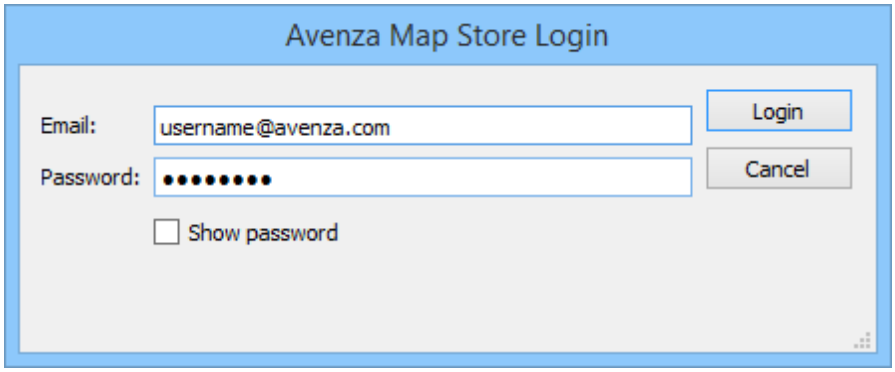


The export folder shows the map package files. When uploading to the PDF Maps Store, all of the files in the folder are required. When loading on your device, only the ZIP file is required.

The Upload to PDF Maps dialog box also appears. To upload maps, you'll need to login to your PDF Maps Store vendor account.

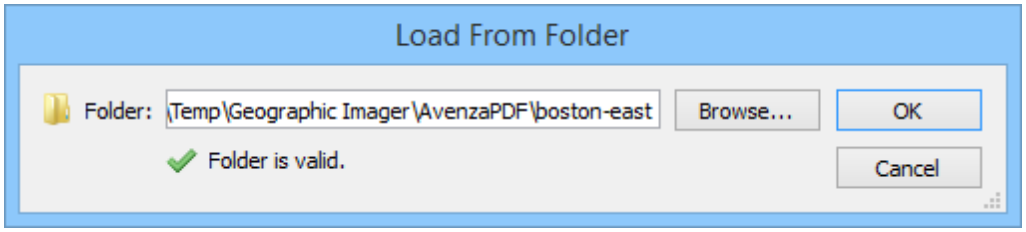
4. On the Upload to PDF Maps dialog box, click the Login button.

5. Enter your account email and password, then click Login.

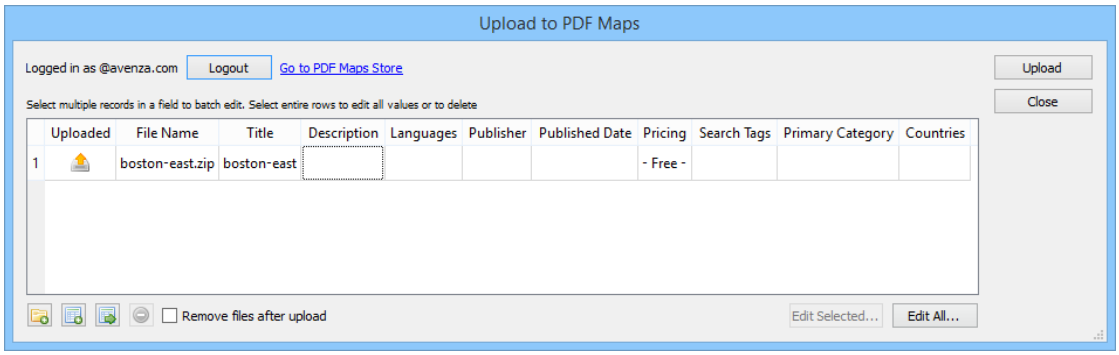


6. On the Upload to PDF Maps dialog box, click the **Load maps from folder** button.

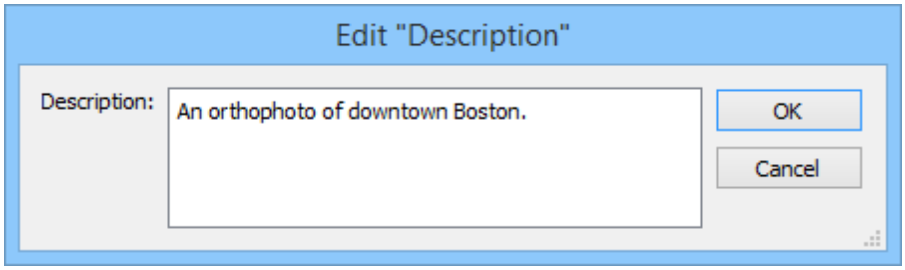
7. On the Load From Folder dialog box, choose the export folder (in this case it was \Geographic Imager\AvenzaPDF\boston-east), then click OK.



The map package is added to the table in the Upload to PDF Maps dialog box and is ready to have it's map details completed.



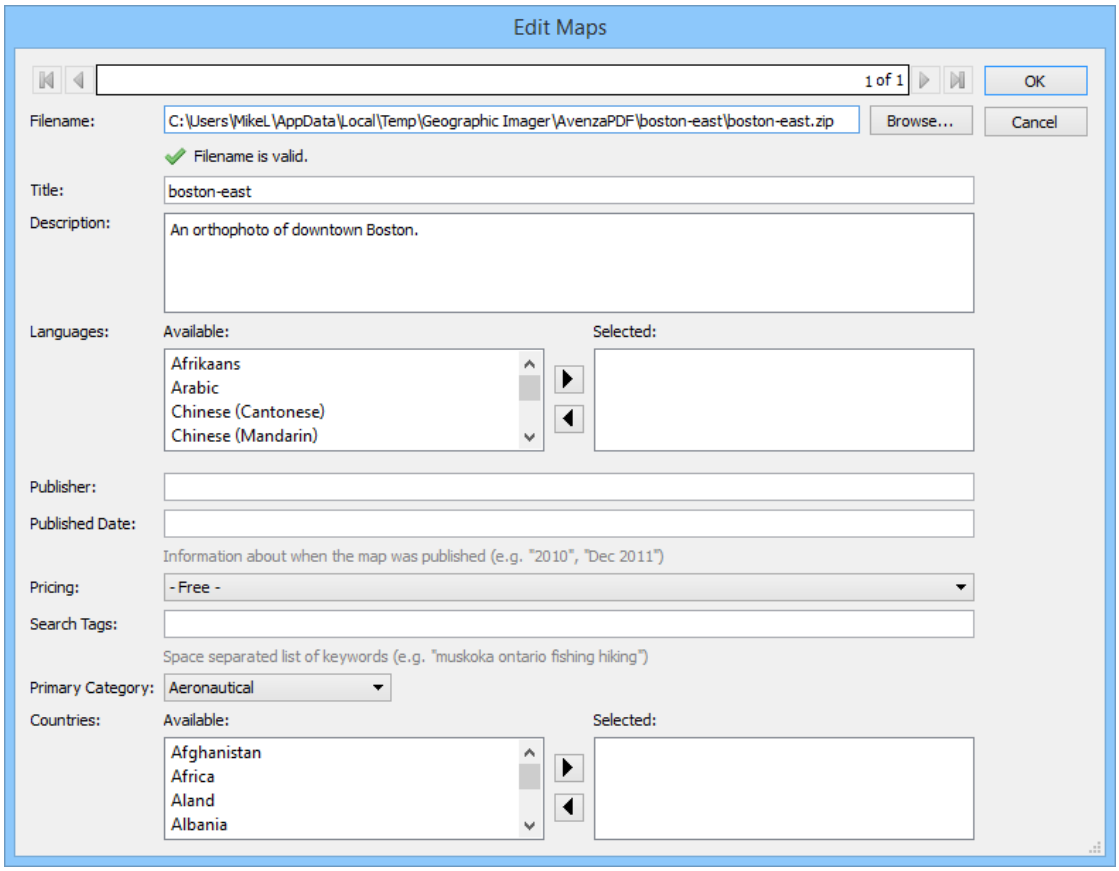
8. Double-click the Description cell. On the Edit "Description" dialog box, enter a description into the Description text box, then click OK.



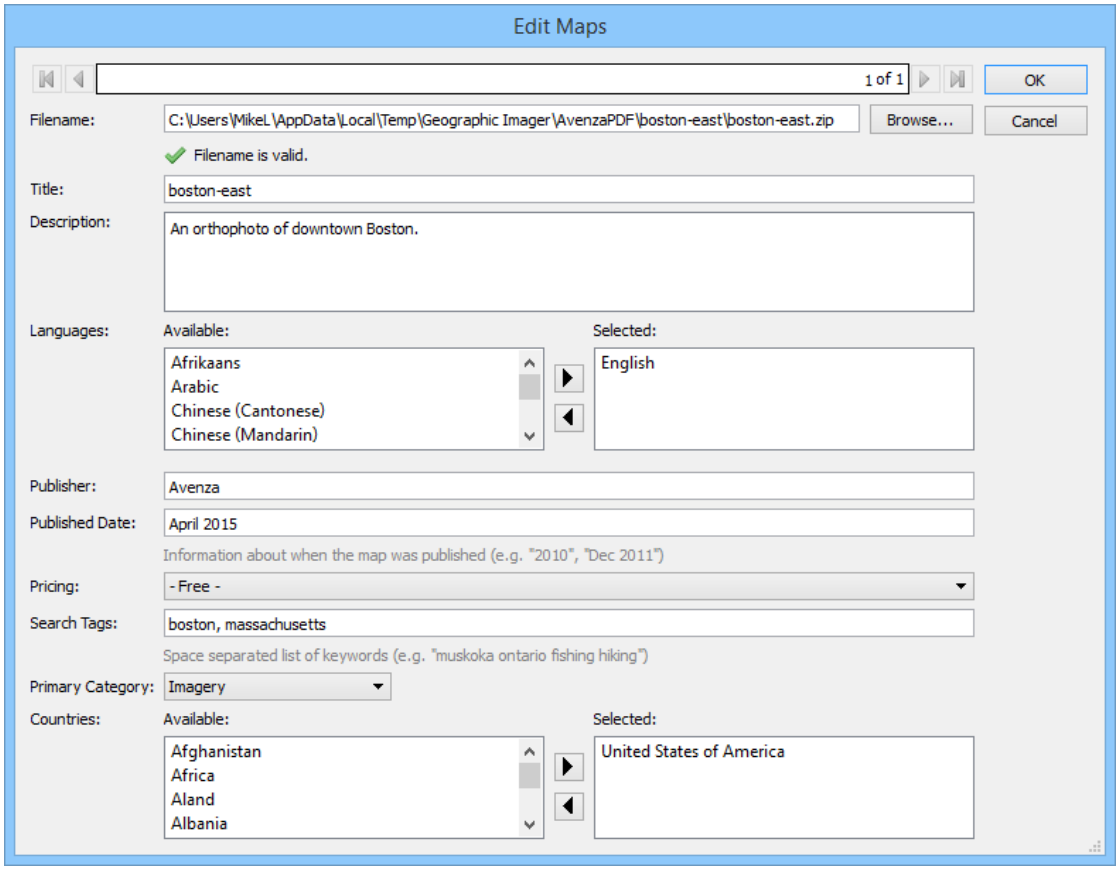
The Description is completed with a short text description of the map.

9. Click the **Edit All** button.

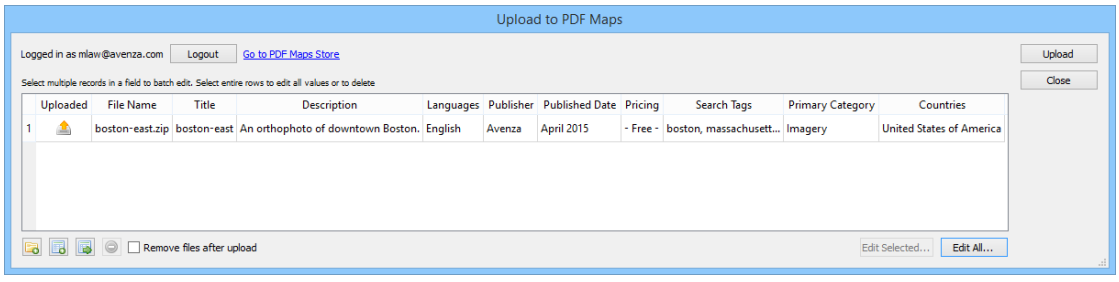
The Edit Maps dialog box allows you to edit all map details in one convenient location. If multiple maps are available, you can move to the previous or next one using the navigation controls.



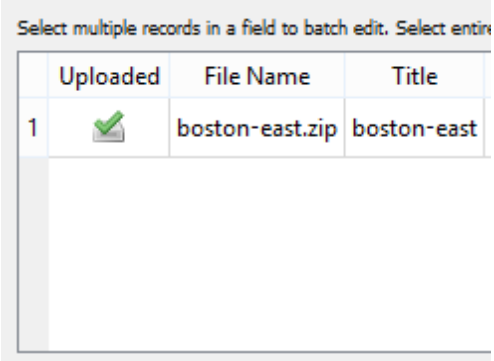
10. Complete the other map details, like the following, then click OK.



These map details are the same as the details that can be completed on the PDF Maps Store vendor site. You have the option of completing it here or on the vendor site. In any case, map details should be accurate and complete so that users can search for your map more easily on the PDF Maps Store.

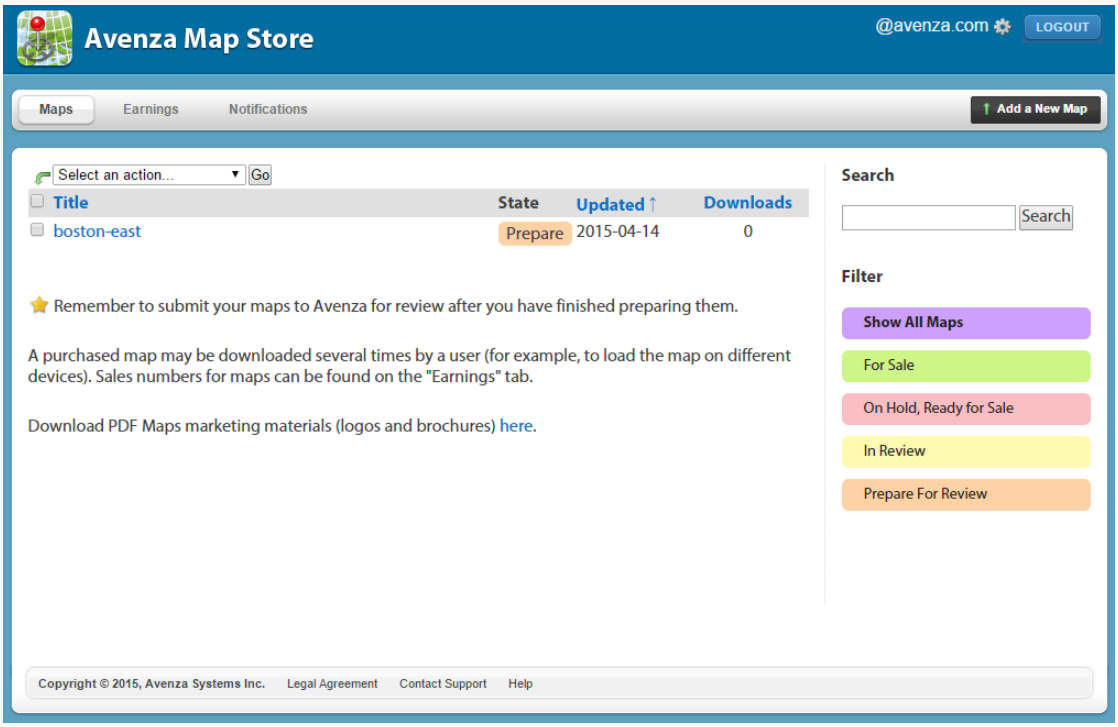


11. Click the **Upload** button.



The icon changes in the Uploaded column to confirm that it was uploaded successfully.

12. Click the **Go to PDF Maps Store** link on the Upload to PDF Maps dialog box or go to https://mapstore.avenza.com/vendor/login/ in a web browser. Login with your vendor account details to see your uploaded maps.



On the Maps page, you'll see the maps that you uploaded. Maps that were just uploaded are put in the Prepare state, meaning they are still being prepared for review. When you have entered all map details, you can submit the map for review. When your map is in review, its state will change to In Review. The PDF Maps team reviews maps daily and when a map is approved, it will be put into the On Hold, Ready

for Sale state. At this point, you can set the map to the For Sale state and it will be available on the PDF Maps Store.

13 Automating Geographic Imager

Adobe Photoshop actions and scripts are supported in Geographic Imager and can be automated using Javascript and actions (but currently not with Visual Basic or Applescript).

Actions and scripts automate repetitive tasks and will greatly assist in time consuming manual tasks. Scripts have a benefit over actions because conditional logic can be written into them so that it can make decisions based on the current task. Scripts can also involve multiple applications. Another benefit is that it can use variable paths while actions only use an absolute path of the file location. Since scripts are written in Javascript, they are cross platform compatible and will work with different computers, whereas actions may not always work with different systems.

Scripts can be viewed and edited in any text editor such as TextEdit and Notepad as long as the extension remains as jsx. Ideally, scripts should be created and run using Adobe ExtendScript Toolkit supplied with Adobe Photoshop. This application provides many debugging tools and assistance with creating scripts. Scripts can also be created using the ScriptListener plug-in that may be installed with Adobe Photoshop. Actions are recorded into a log and is used to create a script. Adobe Photoshop CS6 / CC 2014 does not install the Scripting folder. Please visit to the Adobe Photoshop Scripting site for more information: http://www.adobe.com/devnet/photoshop/scripting.html.

Supported / Unsupported Functions

Adobe Photoshop operations used in actions or scripts will maintain georeferencing information. Note that there are some functions that are not yet supported due to Adobe Photoshop API limitations.

Supported Functions

- ExtendScript Toolkit
- Run script using File > Scripts > Browse
- Run script by double-clicking script
- Run script by drag-and-drop into Adobe Photoshop

- Run action using Action Panel
- Image Processor
- Create Droplet (see Compatibility)
- Actions that run a script or another action
- File > Automate > Batch, where the Source drop-down list is set as Folder or Open Files.
- File > Automate > Batch, where the Destination drop-down list is set as None or Save and Close.
- Scripts that run another script or action
- Actions that run a script or action that run another script or action
- Scripts that run a script or action that run another script or action

Unsupported Functions

- Adobe Photoshop closed when using automate tools
- Insert menu item from Action panel
- Script Events Manager
- File > Automate > Batch, where the Destination drop-down list is set as Folder. Specifying new folder names and new file names are unsupported.
- File > Automate > Batch, where the Source drop-down list is set as Advanced Import. The action is not completed because Advanced Import parameters have to be set manually.

Topics covered in this section

Creating Actions and Scripts

Using Scripts to Automate Geographic Imager Functions

13.1 Creating Actions and Scripts

Geographic Imager panel buttons, links and option menu cannot be detected using actions or scripts with the ScriptListener plug-in.

When recording actions or scripts, use the following from the File > Automate menu:

Geographic Imager: Quick Rectify	Used when recording an action to quick rectify an image.
Geographic Imager: Channel Management	Used when recording an action to change channel management settings.
Geographic Imager: Export Coordinate System	Used when recording an action to export the coordinate system of an image.
Geographic Imager: Export Reference File	Used when recording an action to export the reference file of an image.
Geographic Imager: GeoCrop	Used when recording an action to perform a GeoCrop on an image.
Geographic Imager: Georeference	Used when recording an action to perform georeferencing.
Geographic Imager: Mosaic	Used when recording an action to mosaic an image.
Geographic Imager: Quick Save To Format	Used when recording an action to create a DEM TIFF, USGS DEM, ECW, ERDAS IMAGINE Raster, geospatial PDF, GeoTIFF, MrSID, and NITF.
Geographic Imager: Show Panel	Show/hide the Geographic Imager panel.
Geographic Imager: Specify Coordinate System	Used when recording an action to specify the coordinate system of an image.
Geographic Imager: Specify DEM Schema	Used when recording an action to specify the DEM schema of an image.
Geographic Imager: Specify Reference File	Used when recording an action to specify the reference file of an image.

Geographic Imager: Terrain Shader	Used when recording an action to apply color or hill shading to an image.
Geographic Imager: Tiling	Used when recording an action to tile an image.
Geographic Imager: Transform	Used when recording an action to perform a coordinate system transformation.

When recording actions or scripts, use the following from the File > Export menu:

Export to PDF Maps	Used when recording an action to export map packages to PDF Maps.
Export to Web Tiles	Used when recording an action to export web tiles.

13.2 Using Scripts to Automate Geographic Imager Functions

There are two primary methods to create scripts for Adobe Photoshop. The first method requires basic familiarity with the Adobe Photoshop object model and basic JavaScript programming skills. For structured scripts, use functions conveniently provided in the GeographicImager.jsxinc file that wrap low-level Adobe Photoshop calls to Geographic Imager functionality. The second approach to create scripts involves using the Adobe ScriptListener plug-in that records actions performed by the user (including those of Geographic Imager) and stores the results as a ready-to-execute text script-file. While it may allow to quickly create a script that performs the required sequence of action, the automatically created script is somewhat harder to modify and maintain, since it contains all the parameters hard-coded (such as paths to files). It is also harder to read and less structured, as it directly invokes Adobe Photoshop low-level functions by directly populating so-called Adobe Photoshop descriptors with the parameters required for each Adobe Photoshop or Geographic Imager command. If you choose to record your scripts using the Script Listener, you may want to carefully read GeographicImager.jsxinc to learn about the specific parameters that can be passed to Geographic Imager commands.

Refer to Adobe scripting documentation, Adobe forums (http://forums.adobe.com) and third-party sites that provide helpful information regarding scripting Adobe Photoshop functionality.

Geographic Imager installs a directory named Sample Scripts located at:

Windows 7/8 (32-bit and 64-bit)

C:\Users\Public\Documents\Avenza\Geographic Imager\Help and Tutorial Data\Tutorial Data\Sample Scripts

Mac

/Applications/Avenza/Geographic Imager/Geographic Imager Plug-in/Help and Tutorial Data/Tutorial Data/Sample Scripts

The Sample Scripts folder contains:

ScriptExamples.jsx	Provides information on all Geographic Imager scripting functions and samples.
ScriptBatchProcessingExample.jsx	Contains an example script for batch processing.
3D Overlay Script.jsx	A script to create a DEM in 3D with an optional overlay image.
Mt Olympus.jsx	Used with Geographic Imager tutorials.
Batch export to PDF Maps.jsx	Used for exporting multiple files to PDF Maps.

⚠ Two separate folders, StartupRegistrationScripts and IncludeScripts, contain scripts used to enable actions and scripting for Geographic Imager. These folders and its contents should not be renamed or deleted or else Geographic Imager automation will not be supported. If renamed or deleted, fix it by renaming the folders to their original names or reinstalling Geographic Imager.

ⓘ Scripted Adobe Photoshop actions that trigger Geographic Imager dialog boxes (e.g. saving a non-compliant document) will always assume a "show-errors-only" mode.

ⓘ Geographic Imager dialog boxes, sub-dialog boxes or warnings that may

appear during the execution of supported functions should respect whatever option is passed to them. Only the option that is explicitly scriptable through script parameters (and also displayed as action parameters if run from an action) will be recorded. All others will assume their default selections. This can be changed by checking the "Don't show again" option (wherever it applies).

Due to Adobe Photoshop API limitations, Geographic Imager does not automatically read georeferencing from a geospatial PDF when it is opened using a script or action.

Unicode characters are not supported for DEM schema names when used in a script.

The creation of DEM schema cannot be recorded by Adobe ScriptListener or by using example scripts. Any DEM schema will have to be created prior to using automation.

14 Tutorials

This topic provides a set of links to Geographic Imager tutorials throughout the used to perform a number of common tasks. Find the tutorial that you would like to work through by clicking the links in the tables below.

To work through the Geographic Imager and Adobe Photoshop tutorials, you need to access the tutorial data that was installed in:

Windows 7/8: C:\Users\Public\Public Documents\Avenza\Geographic Imager\Help and Tutorial Data
Mac: /Applications/Avenza/Geographic Imager/Help and Tutorial Data

Most of the Geographic Imager tutorials were written in a generic way so that you can follow the steps using your own datasets.

Geographic Imager Tutorials

Tutorial	Description	Link
Open Image and Transform	This tutorial shows you how to open an image, specify a coordinate system, and transform the image to another coordinate system.	Open Images and Transform Tutorial
Advanced Import	This tutorial shows you how to open multiple images simultaneously that includes image resampling and specifying mosaic settings to mosaic them together.	Advanced Import Tutorial
Advanced Import	This tutorial shows you how to open a DEM image while specifying coordinates to crop the image and creating a DEM schema based on the cropped area.	Advanced Import DEM Tutorial
Georeference	This tutorial shows you how to georeference an image using a combination of values entered manually and through the online map service.	Georeference an Image Tutorial
Georeference	This tutorial shows you how to quick georeference an image based on two	Quick Georeference

	points.	Tutorial
Georeference	This tutorial shows you how to rectify an image.	Rectify an Image Tutorial
Mosaic	This tutorial shows you how to mosaic multiple images together, even if they are of different coordinate systems.	Mosaic Tutorial
Tile	This tutorial shows you how to tile an image to create multiple images with a separate row/column naming convention and GeoTIFF reference format.	Tile Tutorial
GeoCrop	This tutorial shows you how to crop a spatial image using exact coordinates as well as manually defining a crop area.	GeoCrop Tutorial
Terrain Shader	This tutorial shows you how to open elevation data, apply a DEM schema, and use the Terrain Shader to apply a custom color ramp and hill shading.	Terrain Shader Tutorial
Export to PDF Maps	This tutorial shows you how to create a map package that can be uploaded to PDF Maps.	Export and Upload to PDF Maps Tutorial
Export to Web Tiles	This tutorial shows you how to create web tiles that can be used for online web maps.	Export to Web Tiles Tutorial

Adobe Photoshop Tutorials

The following tutorial exercises use existing Adobe Photoshop functions to manipulate spatial imagery to create affects such as shaded relief, colour ramps, 3D elevation models, false-colour composite and pan sharpened images. In addition, learn how to record measurements with the Ruler Tool and resample and sharpen images.

These tutorial exercises differ from the previous set of exercises because they mainly involve the use of Adobe Photoshop tools, functions and filters. Geographic Imager allows non-native formats such as DEM files, MrSID, ECW and JPEG 2000 to be imported and used with an Adobe Photoshop environment while streamlining the

cartographic work flow.

These exercises are only basic examples of what Geographic Imager for Adobe Photoshop is capable of doing. Combined with creative uses of both sets of tools, a wide range of image manipulation techniques are achievable.

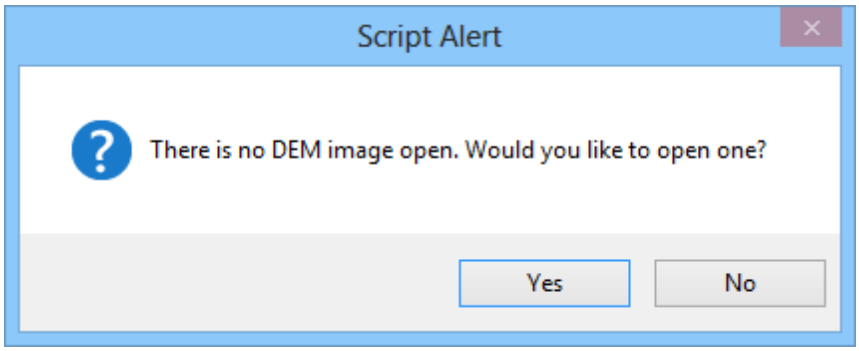
Tutorial	Description	Link
3D Representation with a Script	This tutorial shows you how to use run a script to create a 3D representation of a mountainous area.	3D Representation Script Tutorial
Ruler Tool and Ruler Tab	This tutorial shows you how to use the Ruler Tool and Measure Tab to measure spatial images in addition to using the Geographic Imager panel Ruler tab.	Ruler Tool and Ruler Tab Tutorial
Measurement Scale	This tutorial shows you how to use Measurement Scale.	Measurement Scale Tutorial
False-Colour Composite with Multiple Images	This tutorial shows you how to create a false-colour composite using multiple images.	False-Color Composite with Multiple Images Tutorial
False-Colour Composite with Channel Management	This tutorial shows you how to create a false-colour composite using Geographic Imager Channel Management.	False-Color Composite with Channel Management
Pan Sharpen	This tutorial shows you how to pan sharpen an image, including sharpening with resampling.	Pan Sharpen Tutorial

14.1 Adobe Photoshop Tutorials

14.1.1 3D Representation with a Script Tutorial

This exercise demonstrates how to use a custom script with Geographic Imager to open a DEM, overlay it with an image and to create a 3D effect. See Automating Geographic Imager for more details.

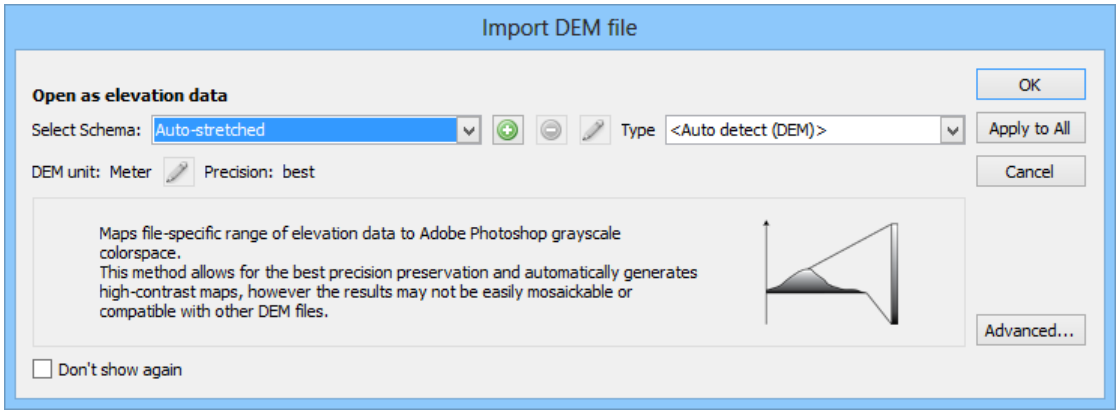
1. In Adobe Photoshop, click File > Scripts > Browse. Browse to the \Tutorial Data \Sample Scripts folder, click **3D Overlay Script.jsx**, then click Load.



No images are open, so you are prompted to open a DEM. This script also works if a DEM is already open.

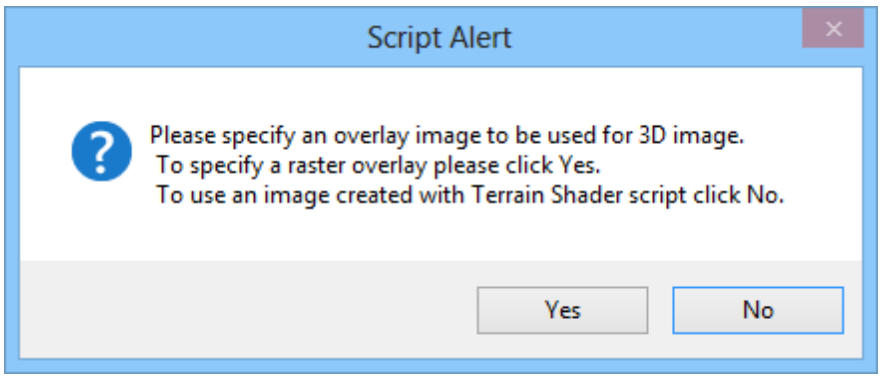
2. Click Yes.

3. Browse to the Mt Olympus 3D Landscape Data folder, select **MtOlympus.dem**, then click OK.



The Import DEM File dialog box appears.

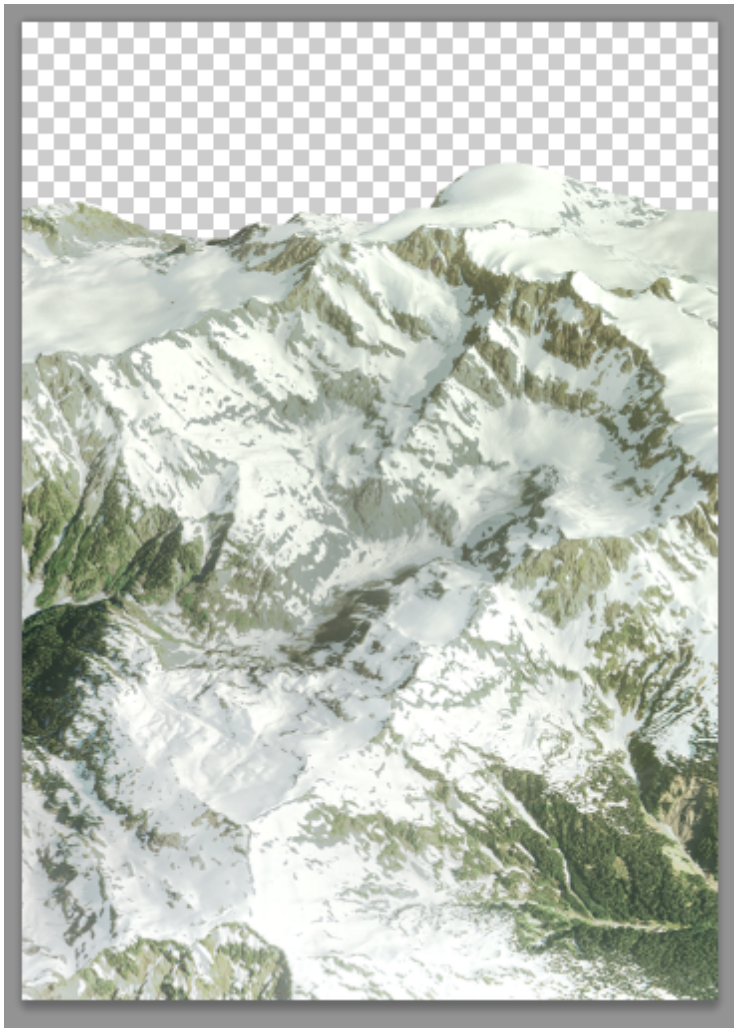
4. Choose Auto-stretched from the Select Schema drop-down list and click OK.



5. This script allows you to choose a image to overlay the DEM. If no image is chosen, Terrain Shader can be used to create a color map for it. You'll choose the accompanying Mt. Olympus GeoTIFF image to overlay.

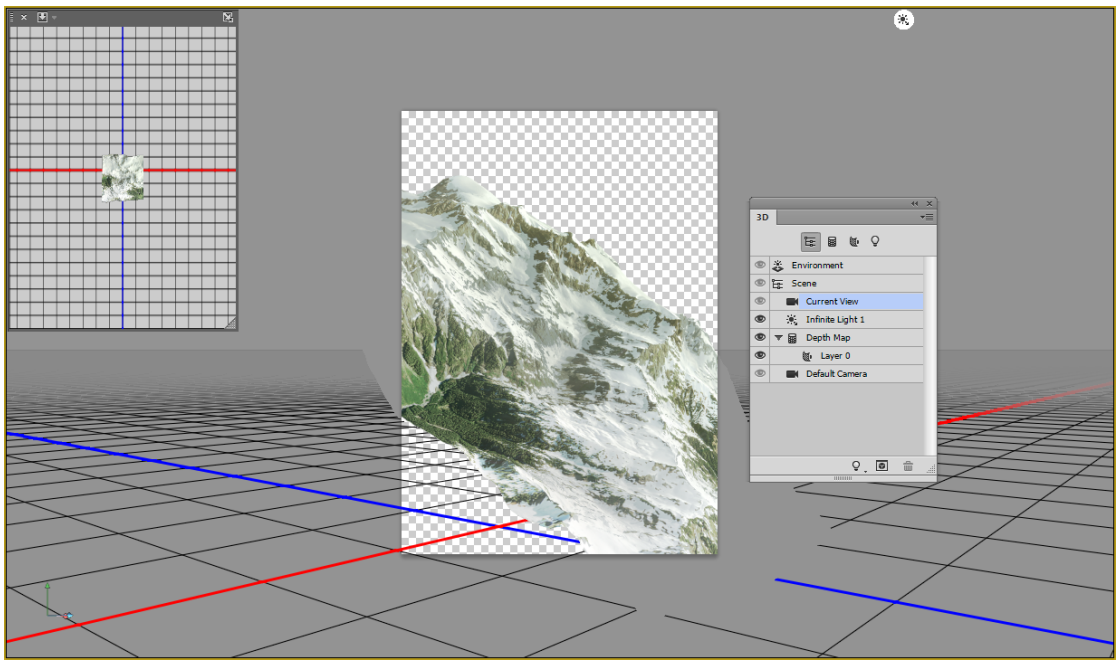
6. Click Yes.

7. Browse to the Mt Olympus 3D Landscape Data folder, select **MtOlympus.tif**, then click OK.



A 3D operation is performed to the Rocky Mountains DEM and the Rocky Mountains GeoTIFF is overlaid on top of it. This image is still considered a dynamic object in Adobe Photoshop and it can be controlled with the 3D panel (Window > 3D) and the Object Rotate Tool and Camera Rotate Tool in the Tools toolbar.

The 3D panel has options to change lighting settings (such as opacity, light source, intensity) and render settings (such as 3D options, cross section, quality). The vertical exaggeration can be adjusted with the Object Rotate Tool and the green axis adjustment.

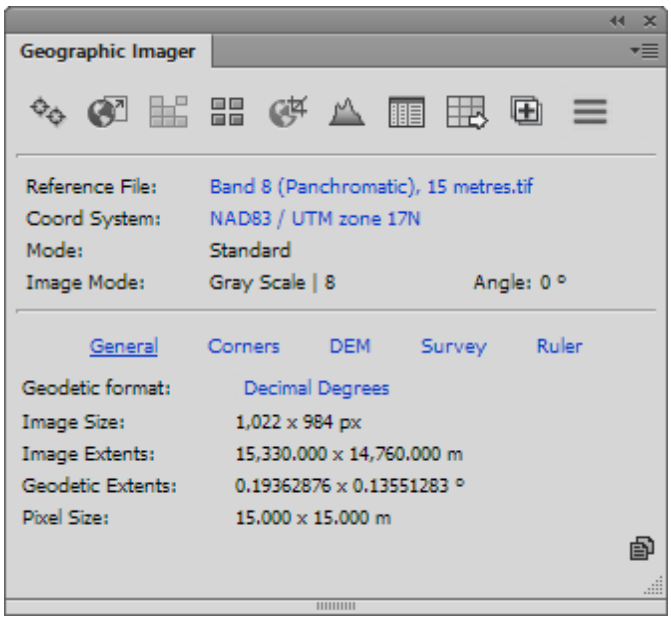


When creating a 3D representation, georeferencing is not maintained.

14.1.2 Ruler Tool and Ruler Tab Tutorial

Measurement tools can be used to record and export measurements with georeferenced images. This exercise uses the Adobe Photoshop Ruler tool in combination with the Geographic Imager Ruler tab located in the panel.

1. In Adobe Photoshop, choose File > Open and browse to the Landsat 7 Multispectral folder and open **Band 8 (Panchromatic), 15 meters.tif**.



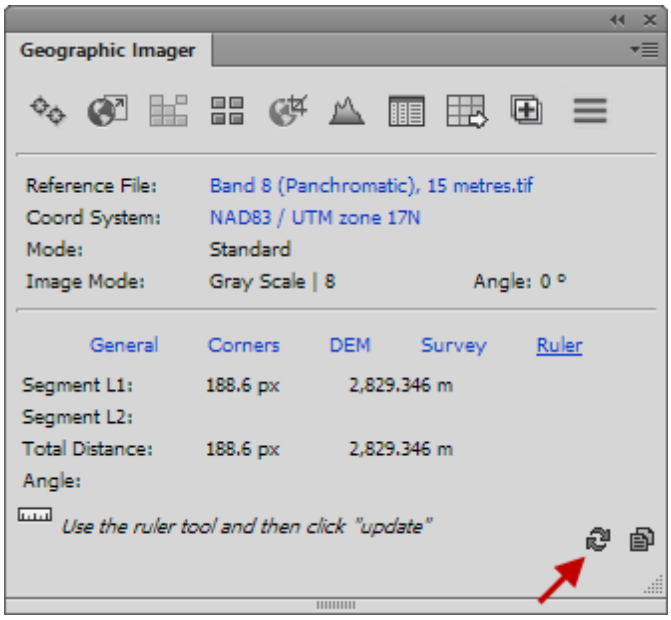
This is an image of downtown Toronto. The projected coordinate system is NAD 83 UTM Zone 17N in meters. The Geographic Imager panel displays the pixel size. A precise measurement is dependent on the pixel size. For this example, 1 pixel is equal to 15 x 15 meters and provides a moderately accurate measurement.

> Non-square pixels prevent the recording of correct measurements when using measurement tools. This can be rectified by using the Geographic Imager Transform function and changing the Pixel Options to keep pixels square.

2. On the Adobe Photoshop Tools panel, click the **Ruler Tool** button. (If it isn't visible, click and hold the Eyedropper Tool button to display the flyout menu, then choose the Ruler Tool).

3. Click anywhere on the map and drag the Ruler Tool. Click again to complete the measurement. A measurement line is drawn on the image.

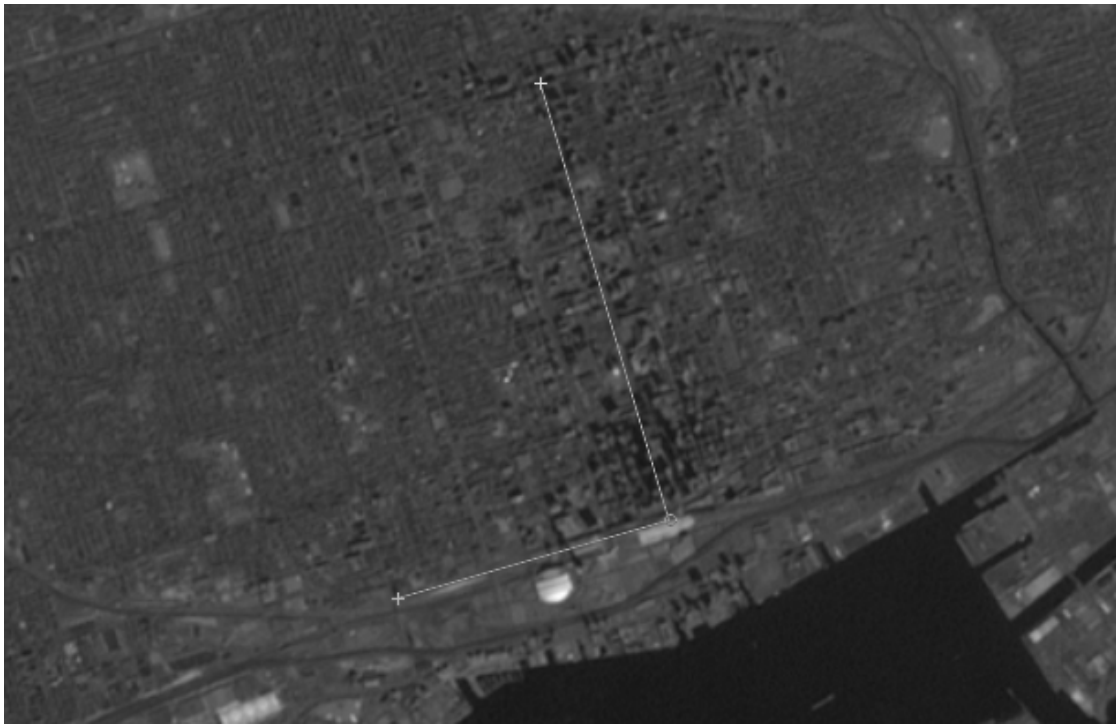
4. On the Geographic Imager panel, click the **Ruler** tab. Click the **Update** button.



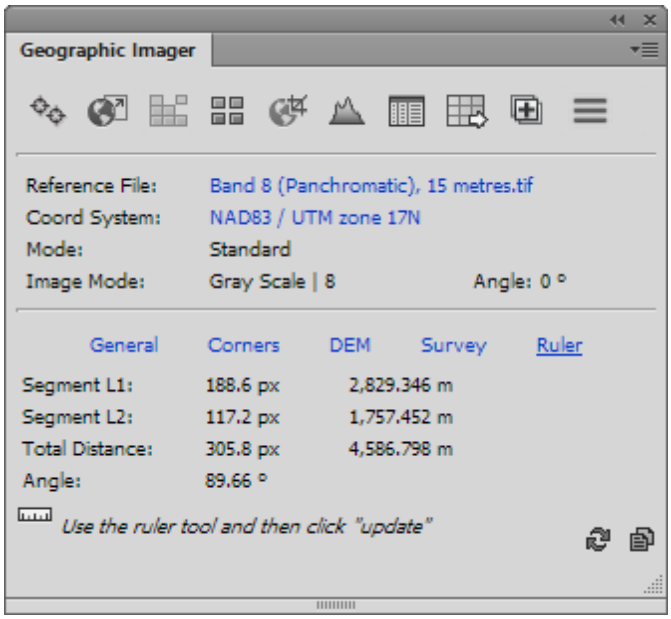
The measurement is shown in page (pixels) and cartesian units (meters) for Segment L1. Next you'll use the Ruler Tool to measure another segment.

5. Click the **Ruler Tool** again. Hold the **Alt** (Windows) or **Option** (Mac) key and hover over the end of the first segment. The icon changes to signify that an additional angled segment can be drawn. Click and draw a measurement that is 90-degrees

west of the first segment.



6. On the Geographic Imager panel, click the **Update** button again (in the Ruler tab).

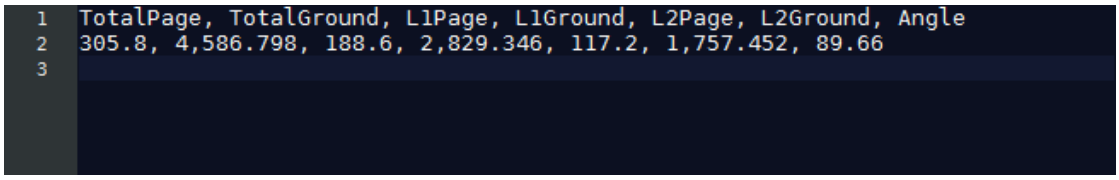


A second segment value is updated in the panel. However, this does not record or save your measured distance. For the above example, the distance recorded is

approximately 4,586 meters. Your results may vary depending on how long of a ruler line you drew. The measurements can be saved to the clipboard.

7. At the bottom-right of the Ruler tab, click the **Copy to Clipboard** button.

8. On your desktop, create a new text document and paste the measurements into it. Rename the output file to **measurements.txt** and save it.



Remember the resolution of the image will reflect how accurate the measurements will be. Measurement tools can not be used with non-square pixels because each side has a different length.

14.1.3 Measurement Scale Tutorial

The Measurement Scale can be used to record and export area measurements with georeferenced images. This exercise demonstrates how to set a custom scale using the Adobe Photoshop Measurement Log panel. It is recommended to use measurement scale only for area measurements.

Measurement features are only available with Photoshop CS6 Extended, CC, and CC 2014 and higher.

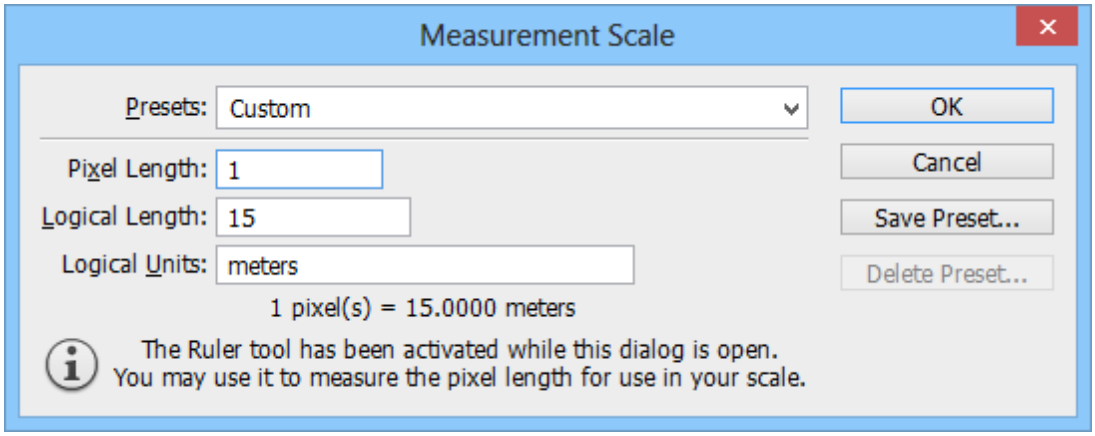
1. In Adobe Photoshop, choose File > Open and browse to the Landsat 7 Multispectral folder and open **Band 8 (Panchromatic), 15 meters.tif**.

Remember that for this image, 1 pixel is equal to 15 x 15 meters.

2. Before measuring, choose Window > Measurement Log to open the Measurement Log panel. The panel appears either as floating or docked at the bottom of the screen. In the panel options menu, choose Set Measurement Scale > Custom.

3. In the Measurement Scale dialog box, change the Logical Length to **15** and the Logical Units as **meters**.

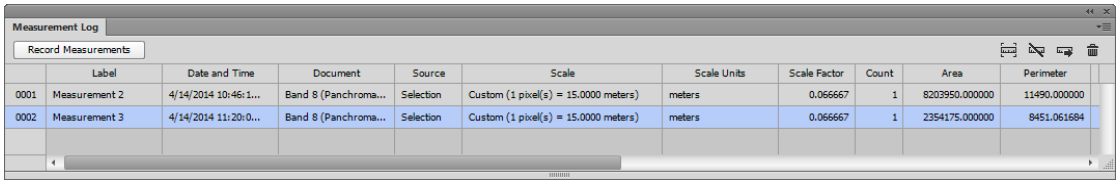
The Logical Units box stores what unit the pixel size is in. A custom preset measurement scale is useful when using images with the same pixel size.



4. On the Adobe Photoshop Tools panel, click the **Polygonal Lasso Tool**. (If it isn't visible, click and hold the Lasso Tool button to display the flyout menu, then choose the Polygonal Lasso Tool).

5. Draw a polygon shape anywhere on the image, making sure to complete the polygon.

6. On the Measurement Log panel, click **Record Measurements**.



For the above example, the area and perimeter were recorded based on polygons drawn. Similar to Rule measurements, recorded values can be exported to a text file.

14.1.4 False-Color Composite with Multiple Images Tutorial

Another powerful remote sensing tool in Adobe Photoshop is the ability to create a false-colour composite image. Multispectral images contain information inside and outside the visible electromagnetic spectrum. To use this information, the wavelengths outside the visible spectrum need to be reassigned to the visible spectrum so that it is visible to the human eye. This tutorial will create a false-colour composite of downtown Toronto and surrounding suburban areas.

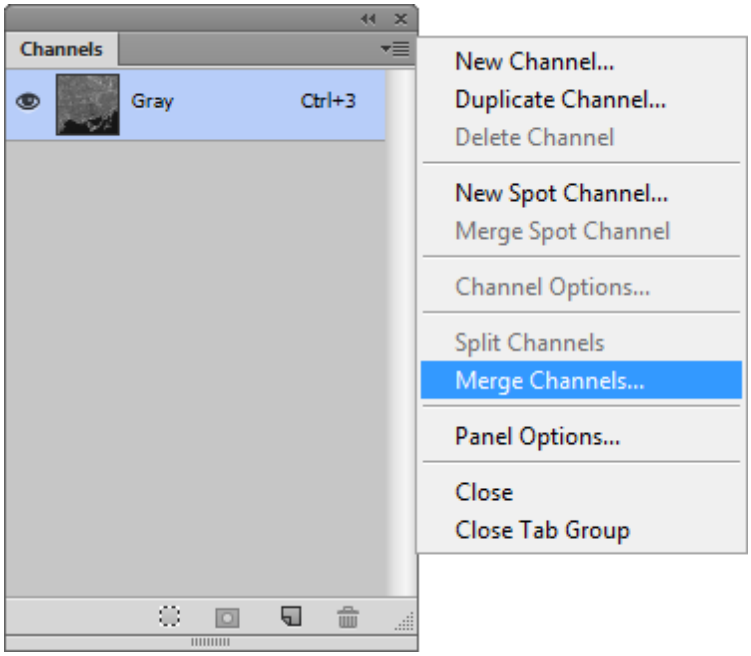
Often multispectral satellite images will consist of several grayscale images, with each image containing one of the wavelengths or bands of the electromagnetic spectrum. These images need to be combined into one image. The Adobe Photoshop function

called Merge Channels merges images to create false-colour or true-colour composites. You may easily identify distinct features by their unique spectral signature.

1. In Adobe Photoshop, browse to the Landsat 7 Multispectral folder and open the following images:
   - **Band 2 (Green), 30 meters.tif**
   - **Band 3 (Red), 30 meters.tif**
   - **Band 4 (Near Infrared), 30 meters.tif**

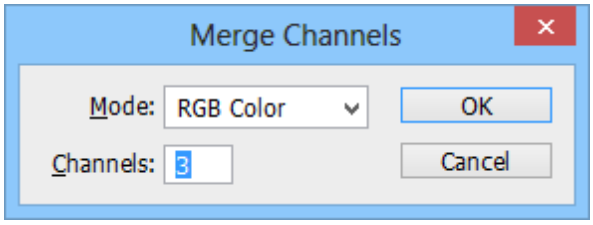
> When creating false-colour composites, images must be of the same image resolution and have the same spatial extents. If the images need to be cropped, it is recommended to use the Geographic Imager GeoCrop function to assure that the extents of the images remain consistent.

2. From the Windows menu, choose **Channels** to open the Channels panel.
3. In any of the active document windows, click **Merge Channels** in the Channels panel options menu.

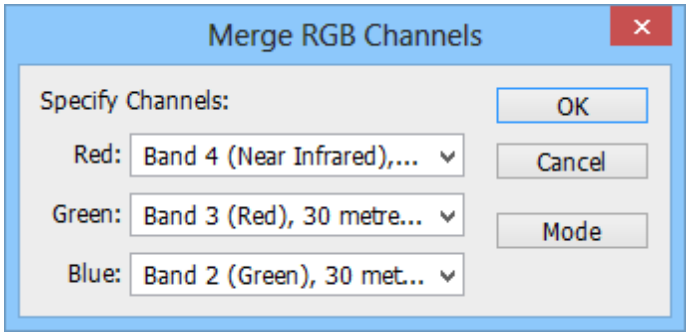


4. In the Merge Channels dialog box, choose RGB Color in the Mode drop-down list and

ensure there are 3 channels. Click OK.

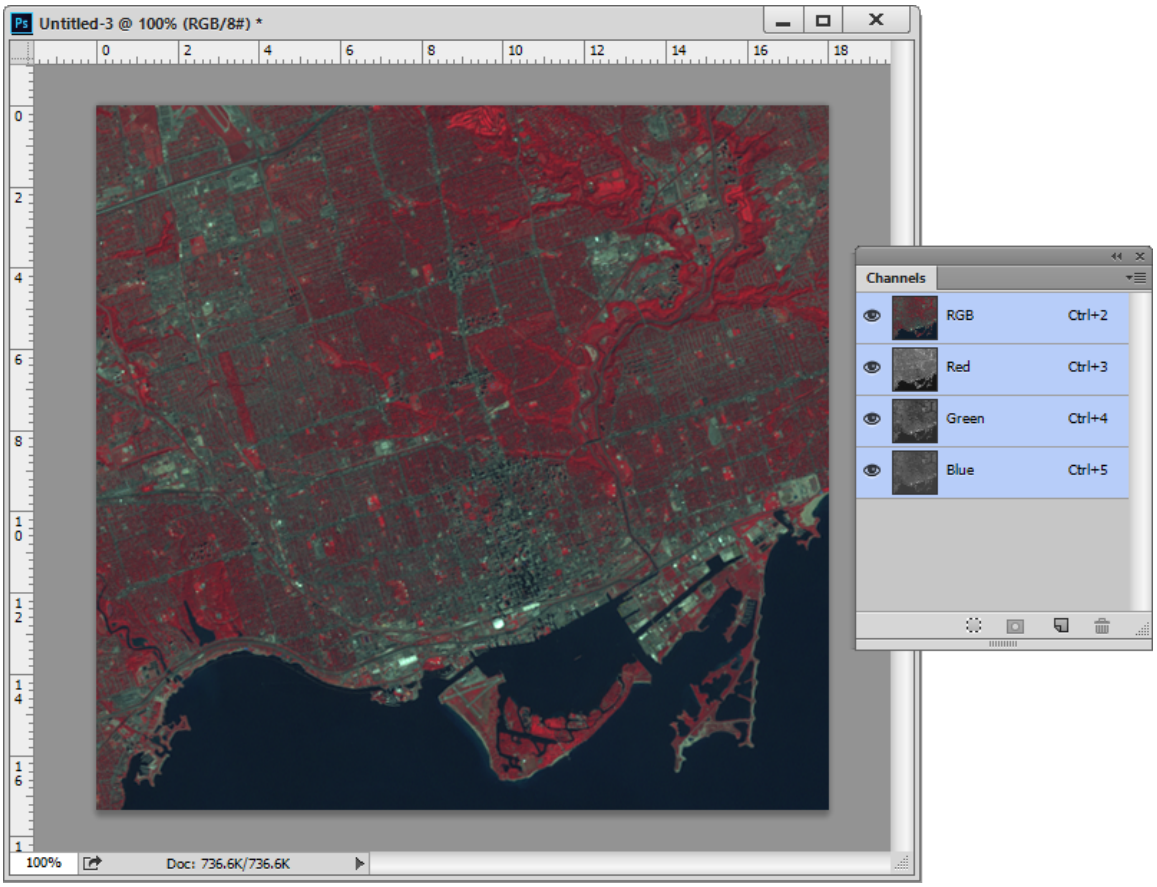


5. In the Merge RGB Channels dialog box specify the following channels:
   - **Red: Band 4 (Near Infrared), 30 meters.tif**
   - **Green: Band 3 (Red), 30 meters.tif**
   - **Blue: Band 2 (Green), 30 meters.tif**



6. Click OK to complete the merge.

A reference file called Untitled-x.tfw (the x value may change depending on if you have other reference files named something similar) is created in the default reference format specified in the Geographic Imager Preferences dialog box.



A false-colour composite image with georeferencing is created. The band combination chosen makes vegetation appear in shades of red because vegetation reflects a lot of near infrared light. The brighter the red, the healthier the vegetation. Urban areas appear blue-grey. The bright red areas at the top of the image belong to the prestigious Rosedale Golf Club.

More about Landsat 7 band combinations

R,G,B	Description
3,2,1	The "nature colour" combination. It provides the most water penetration.
4,3,2	Standard "false-colour" combination. Vegetation shows in red.
7,4,2	The "nature-like" combination. Sand, soil and minerals show in multitude of colour. Fires would appear in red. It provides

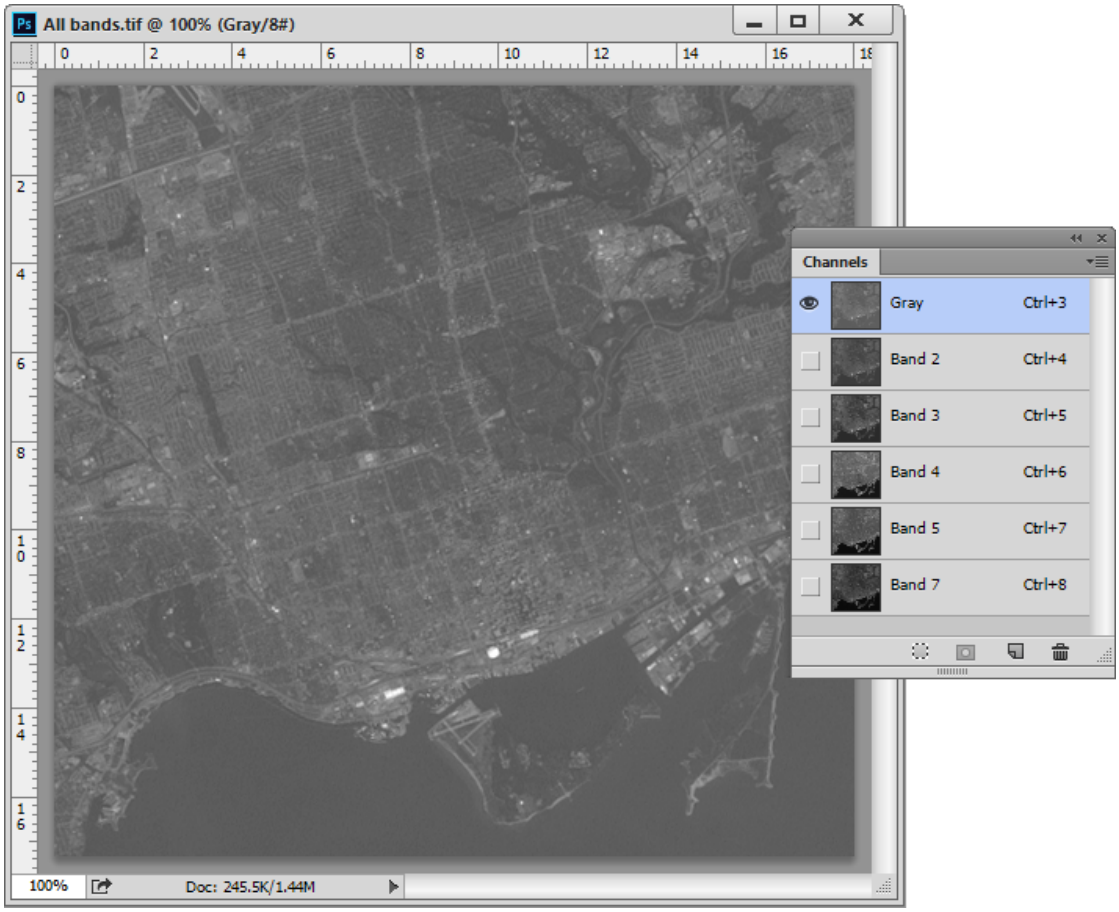
	clear imagery in desert region.
7,5,3	The "nature-like" combination. Sand, soil and minerals appear in variety of colour.
5,4,1	Good for agricultural studies. Healthy vegetation shows in bright green colour.
7,5,4	Provides best atmospheric penetration. Vegetation shows in blue. Useful for geological study.
7,3,1	Rocks may appear in variety of colour. Good for the geological study.

Some multispectral images may be provided as a single image that stores extra channels (called alpha channels in Adobe Photoshop). To create false-colour composites from these images in Adobe Photoshop, the channels must first be split into single gray scale images (Channels panel option menu > Split Channels). Then channels can be merged and reordered as described above.

14.1.5 False-Color Composite with Channel Management

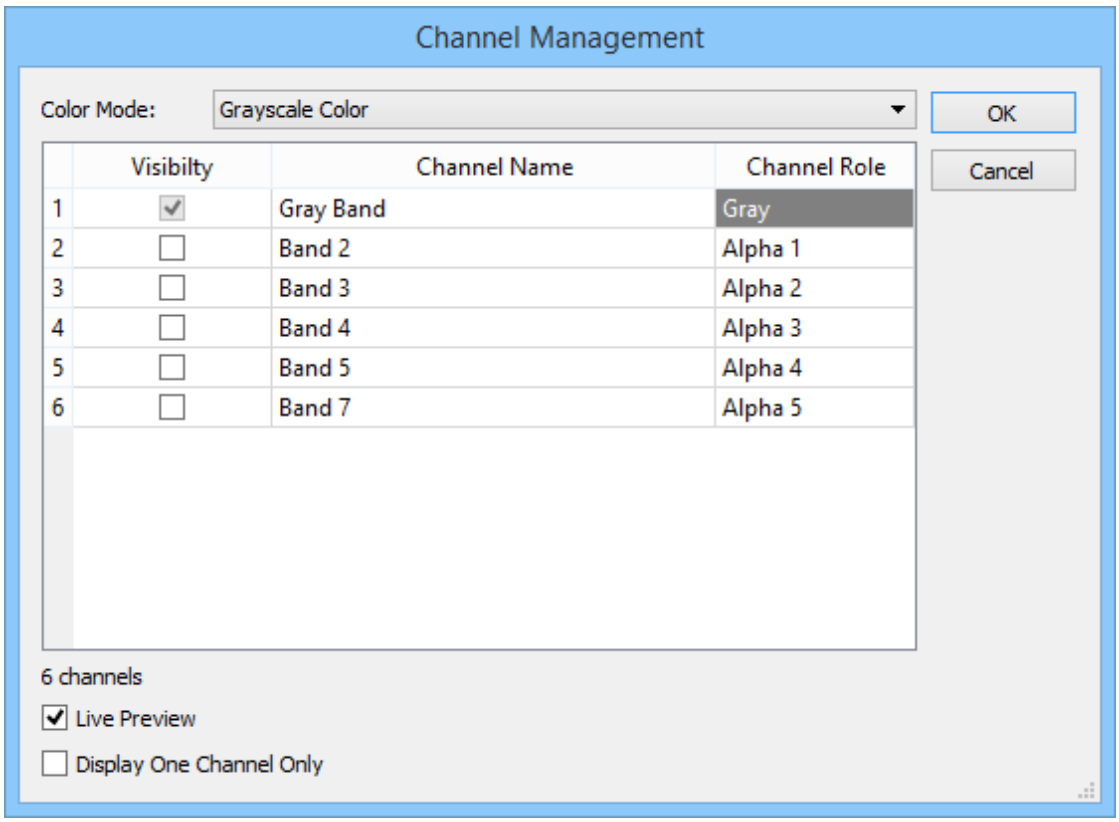
Creating a false-colour composite image with an image that contains an extra band of information (alpha channel) is best done with Geographic Imager Channel Management.

1. In Adobe Photoshop, browse to the Landsat 7 Multispectral folder and open **All bands.tif**.



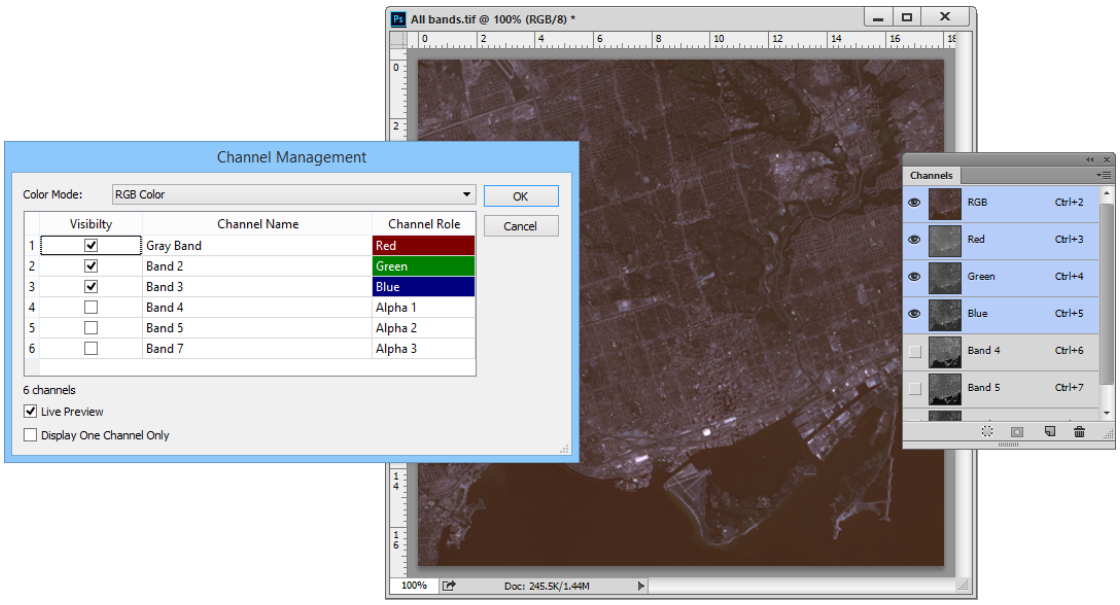
This image has all the Landsat bands (channels) already merged into it. You'll use Geographic Imager Channel Management to create a false-colour composite.

2. On the Geographic Imager panel, click the **Channel Management** button.



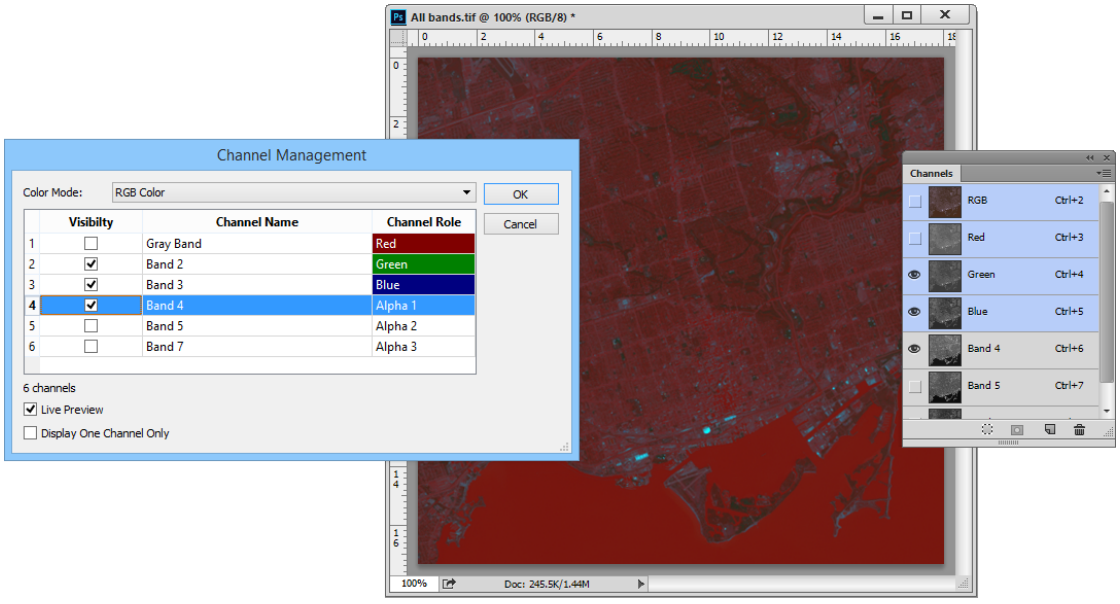
The current Color Mode is Grayscale Color which explains why the image is displayed as such.

3. Make sure Live Preview option is enabled (Windows only). Choose RGB Color from the Color Mode drop-down list.



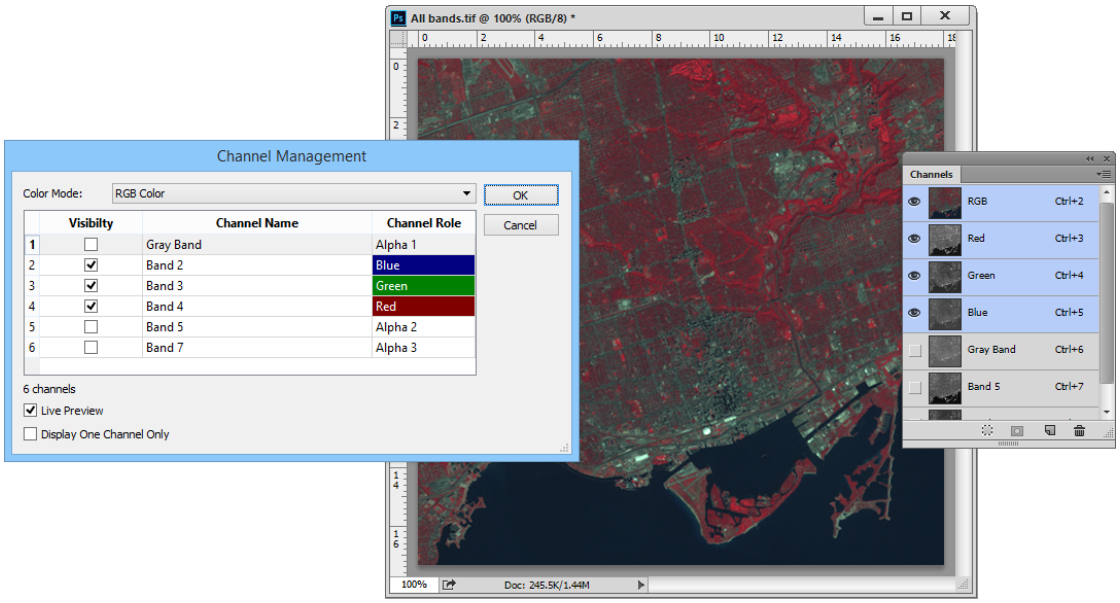
The Gray Band is assigned a channel role of Red, Band 2 is assigned Green, and Band 3 is assigned Blue. You'll change the visibility of the Gray Band and reassign the channel roles for bands 2, 3, and 4 to create the correct false-colour composite appearance.

4. Click the Visibility check box for Gray Band to disable it. Click the Visibility check box for Band 4 to enable it.



The Channel Management also takes into account roles of available alpha channels.

5. Click the Band 4 Channel Role (it is set as Alpha 1) and choose Red in the drop-down list. Change the Band 3 Channel Role to Green. The Band 2 Channel Role should automatically update to Blue.



6. Click OK to confirm the reassignment of channels.

A false-colour composite image using Channel Management is created. These changes are reflected in the Geographic Imager Channels panel.

14.1.6 Pan Sharpen Tutorial

Another useful tool Adobe Photoshop provides is the ability to intelligently resample images. Pan sharpening (short for panchromatic sharpening) the use of a single band to increase the spatial resolution of a multispectral image. A multispectral image contains a higher spectral resolution of a panchromatic image, while often a panchromatic image will have a higher spatial resolution than of a multispectral image. A pan sharpened image represents the best of both worlds which is essentially a sensor fusion that gives a multispectral image higher spatial resolution.

1. In Adobe Photoshop, browse to the Landsat 7 Multispectral folder and open the following images:
   - **Band 8 (Panchromatic), 15 meters.tif**
   - **Band 1 (Blue-green), 30 meters.tif**

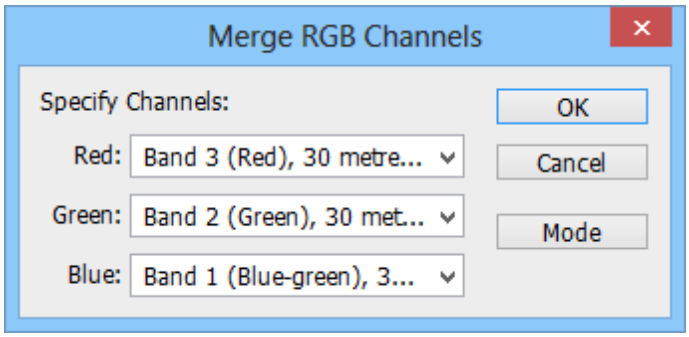
- **Band 2 (Green), 30 meters.tif**
- **Band 3 (Red), 30 meters.tif**

In this tutorial, the panchromatic image will be combined with a multispectral image in true colour, however, any false-colour composite combination can be used.

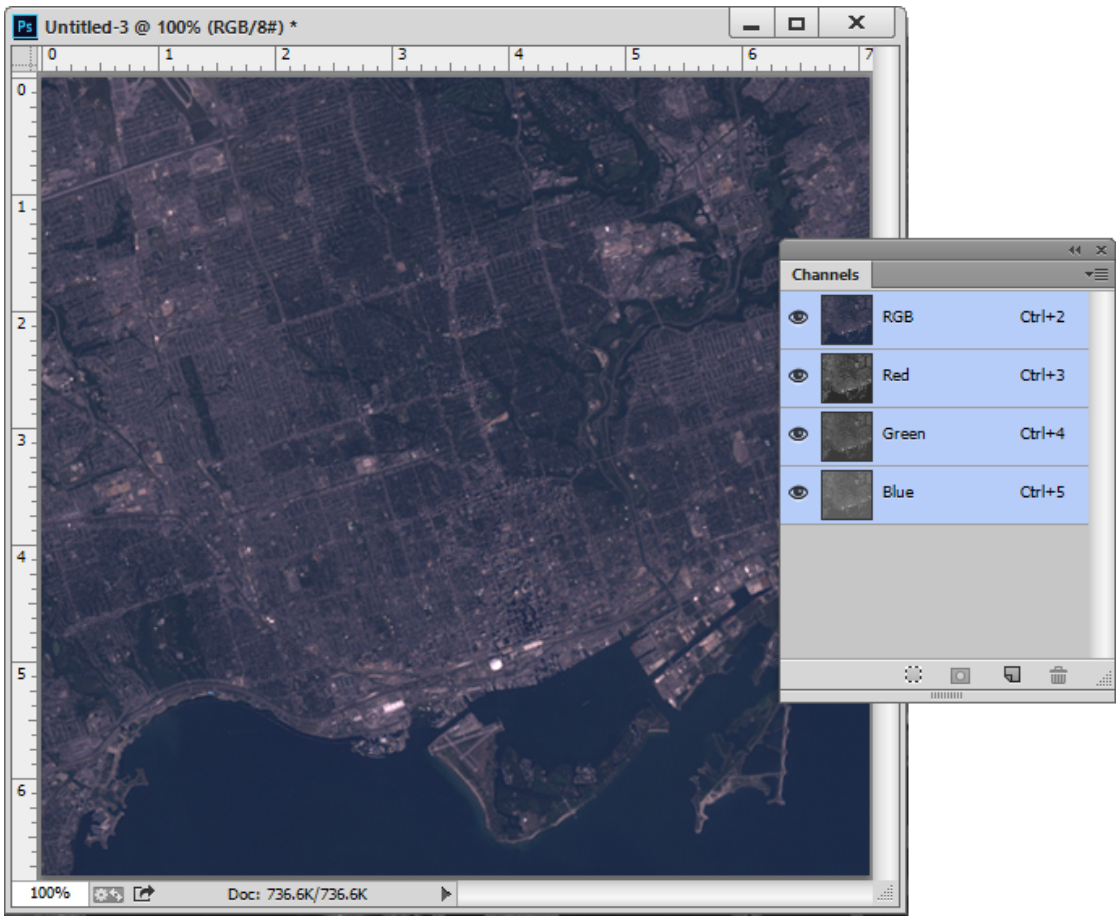
2. From the Window menu, choose **Channels** to open the Channels panel.
3. In any 30 meter resolution active document window (Band 1, 2 or 3), click **Merge Channels** in the Channels panel options menu.

> If Band 8 is chosen, Merge Channels will be disabled.

4. In the Merge Channels dialog box, choose **RGB Color** from the Mode drop-down list and click OK.
5. In the Merge RGB Channels dialog box specify the following channels:
   - Red: **Band 3 (Red), 30 meters.tif**
   - Green: **Band 2 (Green), 30 meters.tif**
   - Blue: **Band 1 (Blue-green), 30 meters.tif**

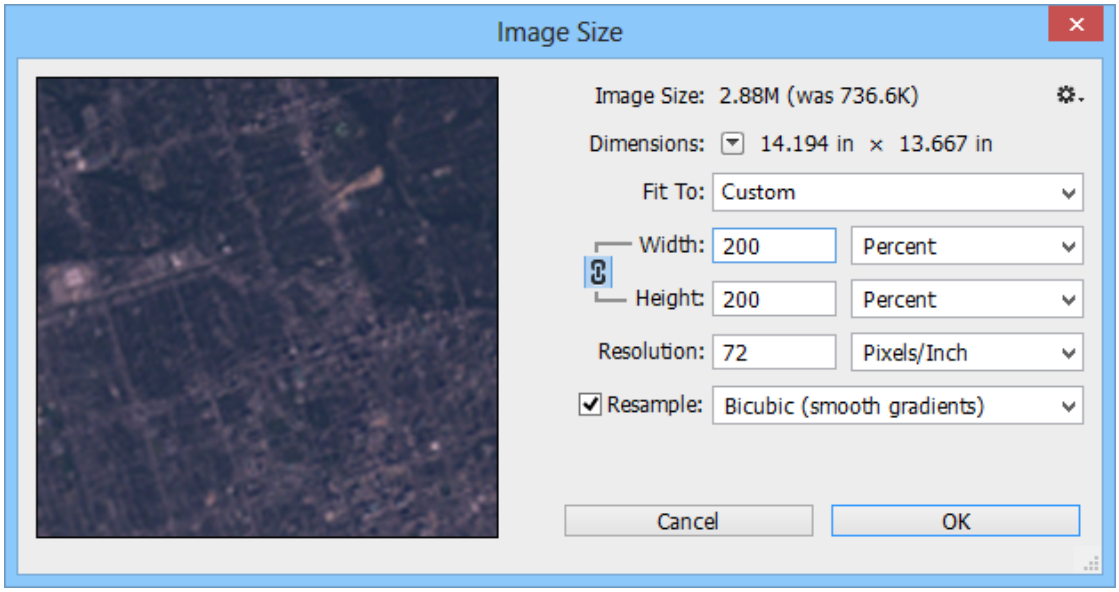


6. Click OK to complete the merge.



Since the merged image is at 30 meter resolution, it is necessary to resample it to match the resolution of the panchromatic image (15 meter resolution).

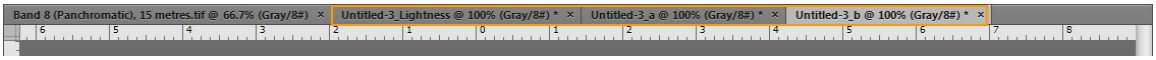
7. With the merged document window active, choose Image > Image Size.
8. Ensure Constrain Proportions and Resample Image check boxes are checked. Choose **Bicubic (best for smooth gradients)** as the resampling method.
9. In the Pixel Dimensions frame, select **Percent** from the units drop-down list.
10. Enter **200** in the width dimension and click OK.



11. From the Image menu, choose Mode > Lab Color.

12. In the Channels panel options menu, click **Split Channels**.

The merged image is split into three images: Lightness, a and b.



The split images have a "_Lightness", "_a", or ,"_b" added to the end of the document name. The a and b channels carry green-red and blue-yellow information respectively. Our process is to substitute the panchromatic image for the Lightness channel.

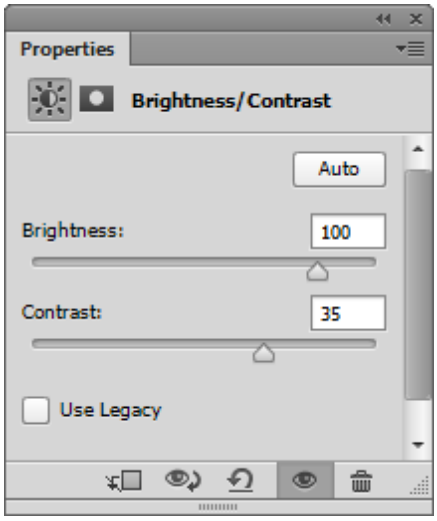
The following step involves some trial and error. The intent is to make the image brightness and contrast match the Lightness channel as much as possible. Ignore areas of water or vegetation and concentrate on roads and buildings. Often panchromatic images contain data that extend into the infrared, therefore vegetation and areas of water appear differently. The higher resolution of the panchromatic image, the more contrast it will appear to have.

> Ignore vegetation and areas of water because panchromatic images often contain near infrared data.

13. Make **Band 8 (panchromatic), 15 meters.tif** active and create a Brightness/ Contrast adjustment layer. Choose Layer > New Adjustments Layer > Brightness/

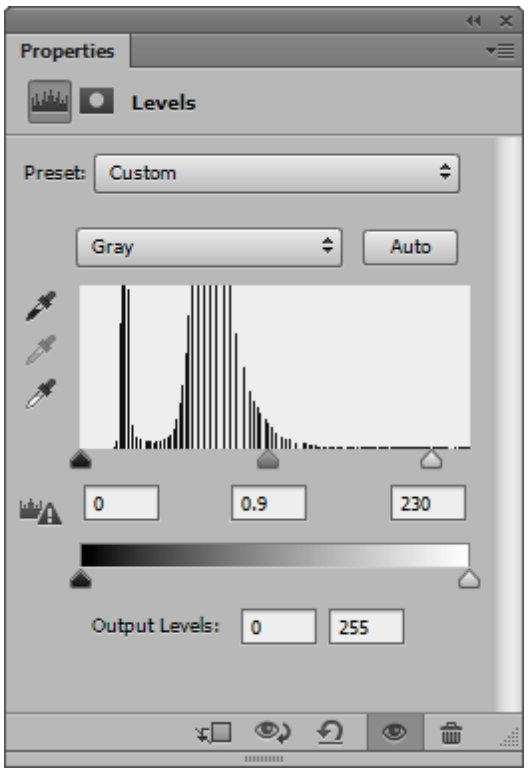
Contrast. Click OK to accept the default name and settings.

14. In the Brightness/Contrast settings (Adjustment panel), adjust Brightness to **100** and Contrast to **35**.



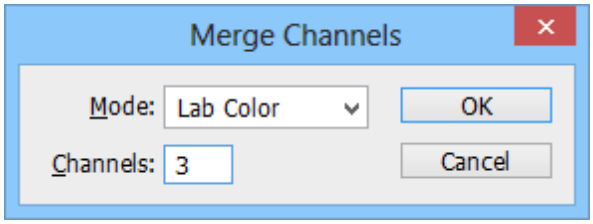
15. Create a second adjustment layer. Choose Layer > New Adjustments Layer > Levels. Click OK to accept the default name and settings.

16. In the Levels settings (Adjustment panel), change the midtone input level to **0.9** and the highlight input level to **230**.

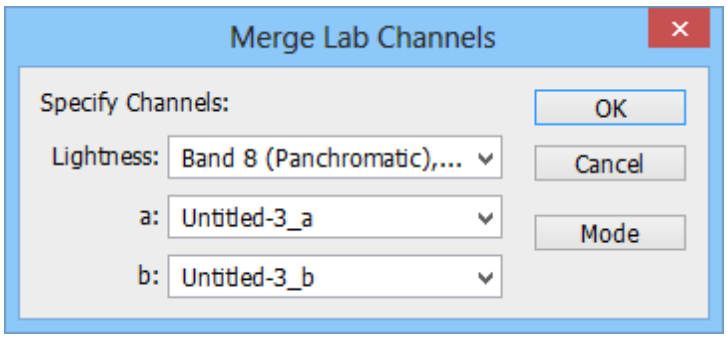


17. To properly merge channels, the layers need to be flattened first. Choose Layer > Flatten Image.

18. In the Channels panel options menu, click Merge Channels. In the Merge Channels dialog box, select Lab Color in the Mode drop-down list and click OK.



19. In the Merge Lab Channels dialog box specify the following channels:
    - **Lightness: Band 8 (Panchromatic), 15 meters.tif**
    - **a: Untitled-1_a**
    - **b: Untitled-1_b**



The Untitled documents were created from splitting the channels in step 14. Untitled documents may not be appended with the number 1, however, be sure that the final character corresponds to the channel e.g. a = "Untitled-4_a".

20. Click OK to complete the merge.

21. Choose Mode > RGB to convert the image back to RGB mode.

22. Leave the document open for the next tutorial.

This exercise is a guide to enhance images for display or printing purposes, this method involves subjective judgment to pixel colour adjustments and should not be used for scientific purposes. The colours of the pan-sharpened image will look different from the original RGB image because panchromatic data (from Landsat 7) extend into the infrared, most notably vegetation and areas of water.

Resample and Sharpen

Adobe Photoshop sharpen filters can increase the detail of the image. The Sharpen filter menu has a variety of sharpening tools. These tools also involve some trial and error to achieve enough sharpening without overdoing it. Two sharpening filters are explained below.

The Unsharp Mask

This filter sharpens an image by increasing contrast along the edges of an image. It locates pixels that differ in value from the surrounding pixels, this option can be modified by changing the threshold. The radius of the region to which each pixel is compared is also an option that can be modified.

Smart Sharpen

This filter has more advanced controls not available in the Unsharp Mask filter. This filter will allow control over the amount of sharpening that occurs in shadow and highlight areas. The document should be viewed at 100% to get an accurate view of the sharpening.

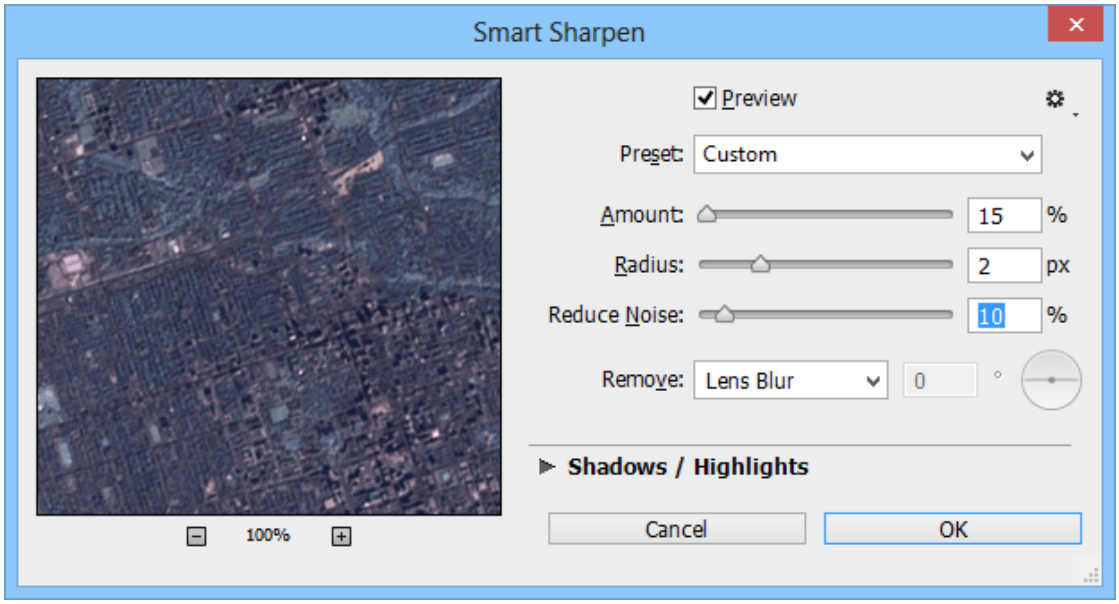
- Amount: Sets the amount of sharpening. A higher value increases the contrast between edge pixels, giving the appearance of greater sharpness.
- Radius: Determines the number of pixels surrounding the edge pixels affected by the sharpening. The greater the radius value, the wider the edge effects and the more obvious the sharpening.
- Remove: Sets the sharpening algorithm used to sharpen the image. Gaussian Blur is the method used by the Unsharp Mask filter. Lens Blur detects the edges and detail in an image, and provides finer sharpening of detail and reduced sharpening halos. Motion Blur attempts to reduce the effects of blur due to camera or subject movement. Set the Angle control if you choose Motion Blur.
- Angle: Sets the direction of motion for the Motion Blur option of the Remove control.
- More Accurate: Processes the file more slowly for a more accurate removal of blurring.

In the Smart Sharpen dialog box, click the Advanced option to display the Shadow and Highlight tabs. Adjust sharpening of dark and light areas using these tabs. If the dark or light sharpening halos appear too strong, reduce them with these controls, which are only available for 8-bits and 16-bits-per-channel images:

- Fade Amount: Adjusts the amount of sharpening in the highlights or shadows.
- Tonal Width: Controls the range of tones in the shadows or highlights that are modified. Move the slider to the left or right to decrease or increase the Tonal Width value. Smaller values restrict the adjustments to only the darker regions for shadow correction and only the lighter regions for highlight correction.
- Radius: Controls the size of the area around each pixel that is used to determine whether a pixel is in the shadows or highlights. Moving the slider to the left specifies a smaller area, and moving it to the right specifies a larger area.

1. With the image still open from the previous exercise, choose Filter > Sharpen > Smart Sharpen.

2. Set the following parameters in the Smart Sharpen dialog box:
   - Amount: **15%**
   - Radius: **2.0 pixels**
   - Reduce Noise (if applicable): **10%**
   - Remove: **Lens Blur**
   - Check the **More Accurate** check box (if applicable)



3. Click OK.

Features appear to have more detail when compared to the image prior to sharpening. Again, this will involve some trial and error if the results are not satisfactory, experiment with settings if more sharpening is needed.

15 Glossary

Advanced Import
Advanced Import provides a way to import multiple images that can comprise of different formats and different coordinate systems.

Channel Management
Geographic Imager Channel Management allows you to control channel mapping and assignment of channel color roles for false-composite multiband imagery.

control pair
When georeferencing, a control point has both pixel (x,y) coordinate and world coordinate specified is considered a control pair.

control point
In georeferencing, a point on the map with known pixel (x,y) coordinates.

coordinate system
Coordinate systems enable geographic datasets to use common locations for integration. A coordinate system is a reference system used to represent the locations of geographic features, imagery, and observations such as GPS locations within a common geographic framework.

datasource objects
Individual entries in the geodetic datasource are known as data source objects. Different types of data objects are available for different types of definition. Objects contained in the geodetic data source are: Angular Units, Coordinate Systems, Datum Transformations, Ellipsoids, Envelopes, Horizontal Datums, Linear Units, and Prime Meridians.

destination coordinate system
The coordinate system of the destination image. For example, the coordinate system of an image after transformation.

DEM
A Digital Elevation Model (DEM) is a representation of ground surface topography or terrain and is generally represented as a raster or as a triangular irregular network (TIN). DEMs are often used for shaded relief maps.

coordinate system
A coordinate system provides the basis for identifying locations on the earth's surface.

custom coordinate system
A user defined coordinate system with custom parameters .

GeoCrop
A Geographic Imager tool that crops spatial images based on crop areas defined by pixel coordinates, by geographic coordinates, by using a coordinate system envelope, by proximity, or by extents of a vector file.

geodetic datasource
An extensive geodetic parameter database included in Geographic Imager. It contains all the latest updates from the widely used EPSG Geodetic Parameter Dataset maintained by the Geodesy Subcommittee of OGP (International Association of Oil and Gas producers) as well as custom systems maintained by Avenza.

geographic coordinate system
Geographic coordinate system locations are defined in terms of the position on a globe using latitude and longitude values. The angles of latitude and longitude are based on a point at the centre of the earth. As the earth is not a perfect sphere a number of globes (spheres, spheroids) exist in mapping each with slightly different centre points and characteristics. As locations are defined by degrees, distances cannot be accurately measured. The most common geographic coordinate system is the World Geodetic System 84 (WGS84).

Georeference
A Geographic Imager tool used to reference or rectify images. The tool allows you to reference or rectify images.

map package
A folder that contains files compatible with the PDF Maps app. A map package can be uploaded by a vendor to be put for sale on the PDF Maps Store.

Mosaic
A Geographic Imager tool that creates a single composite georeferenced image from multiple input georeferenced images.

PDF Maps
PDF Maps is a mobile map application that allows users to download maps for offline use on an iOS or Android smartphone or tablet.

PDF Maps Store
The PDF Maps Store is an in-app map store that contains more than 150,000 maps for sale.

projected coordinate system
Projected coordinate system locations are defined using Cartesian x, y coordinates on a flat, two-dimensional surface. This enables accurate measurements of distance, angles and areas. Projected coordinate systems are based on a sphere (for example WGS84) that is projected onto a flat plane. Projected coordinate systems are often referred to as projections. Common projected coordinate systems include Universal Transverse Mercator (UTM) and Lambert Conformal Conic.

Rectify
In the Georeference tool, the process of applying a transformation method to an image, often to remove distortion. Image rectification may involve rotating, scaling, and skewing the image.

Reference
In the Georeference tool, the process of aligning geographic data to a known coordinate system.

reference file
A file that contains the relationship between source image coordinates (pixel locations) and real-world reference coordinates (lat/long or other real-world coordinate units). Common reference files include World files, Blue Marble Reference files, MapInfo Tab files, and ER Mapper Reference files. Some reference file formats can hold additional information such as coordinate system information.

scripting
A series of commands that tells Adobe Photoshop to perform a set of specified actions, such as applying different filters to selections in an open document. Scripts automate repetitive tasks and are often used as a creative tool to streamline tasks that might be too time consuming to do manually.

shaded relief
Shaded relief, or hill-shading, simulates the cast shadow thrown upon a raised relief map.

source coordinate system
The coordinate system of the original image. For example, the coordinate system of an image before transformation.

Terrain Shader
A Geographic Imager tool that is used to create the look of shaded relief.

Transform
A Geographic Imager tool used to specify a destination coordinate system for image transformation (projection).

Tile
A Geographic Imager tool that creates multiple images from a single image.

web tiles
Image tiles that can be used for online map purposes. Google Maps, Bing Maps, OpenStreetMap, Tile Map Service, and MapBox formats are supported.

16 Technical Support Options

Consult Geographic Imager help as well as the following online options before contacting Avenza technical support.

Geographic Imager User Forum

The Geographic Imager User Forum is located at http://www.avenza.com/forum. Answers to common technical questions may be found in the Common Support Issues and FAQs category. All users with a Geographic Imager license (evaluation or permanent) can post and read topics under the General Questions for Evaluation & Licensed Users category. Additionally, users with maintenance have access to the Maintenance Users category. There, users can find additional information relative to software updates and other important details pertaining to maintenance.

Contacting Avenza Technical Support

Avenza offers a number of methods for direct communication with our qualified and experienced technical experts. Please have your Geographic Imager registration details handy to get prompt attention and include it in any e-mail correspondence. Support issues are handled on a first come, first-served basis. There is a charge of $49USD per incident for non-maintenance program users.

- E-mail: support@avenza.com
- Web: www.avenza.com/support
- Online form: www.avenza.com/support/form
- User forum: www.avenza.com/forum
- Phone: 1 (416) 487-6442

Geographic Imager Maintenance Program (GMP)

Your Geographic Imager purchase includes a one-year membership in the Geographic Imager Maintenance Program. Enjoy worry-free use of Geographic Imager and all the benefits of the GMP. All GMP subscriptions begin on the date of purchase. Maintenance users can post questions under the Maintenance Users category of the Avenza user forum where Avenza support staff will be happy to post solutions and answers. The Geographic Imager Maintenance Program is guarantees its members:

- Unlimited priority technical support—guaranteed same business day (9am to 4pm EST) or next business day response
- GMP only telephone support
- Free Geographic Imager updates
- Free Geographic Imager version upgrades
- Additional discounts and offers only available to GMP members

For GMP subscribers, you will be notified about the latest news and updates about Geographic Imager. If you purchased your Geographic Imager license from a reseller or are the end user but not the person who purchased the software, please contact us at sales@avenza.com to ensure that we add your e-mail address to the GMP email group.

Maintenance Renewal

Approximately 6-8 weeks prior to the expiration of your annual GMP subscription you will be notified regarding renewal options. You will be contacted a minimum of five times prior to expiration in order to ensure that you have ample opportunity to renew or not at your discretion. You will have the option of renewing your GMP for an additional year at the then prevailing price or canceling without penalty. Of course, if you cancel or let your GMP lapse you will no longer be entitled to the benefits of the program as outlined above and will thus have to purchase future upgrades at the upgrade price.

There is a grace period of approximately 30 days from the time of the GMP expiry during which you may still renew without penalty. All post-expiration renewals will be backdated to the actual expiry date.

Lapsed Subscriptions

Failure to renew your GMP within 30 days from the expiry date will result in a lapsed GMP subscription. Lapsed subscriptions may not be renewed and the licensee will be required to purchase support and upgrades accordingly. Please direct all GMP questions and purchase inquiries to sales@avenza.com.

Wishlist

As either a new or experienced Geographic Imager user we value your opinions on how we can improve our product. Let us know what functions you would like to see incorporated into future versions of Geographic Imager. Post to our user forum with the subject "Feature Request" at www.avenza.com/forum.

17 Copyright Information

18 License Agreement

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19 Acknowledgements

Avenza Systems Inc. would like to acknowledge and thank the following companies for their contributions to Geographic Imager and for data and other files that may be included in the installation. In addition to those mentioned below we wish to thank the many beta-testers who helped us design and test this product.

Adobe Systems Inc.
www.adobe.com

Blue Marble Geographics
www.bluemarblegeo.com

Geospatial Data Abstraction Library
www.gdal.org

ImageMagick Studio, LLC
www.imagemagick.org

Leica Geosystems Geospatial Imaging, LLC
www.leica-geosystems.us

LizardTech
www.lizardtech.com

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Geographic Imager 5.0 Help