ESG Utilities Wizards 3.2 User Guide

for ER Mapper 6.4 with SP1 or higher

Release 3.2 – May 2004

This document is a user guide to running the "ESG Utilities Wizards" plug-ins (version 3.2) for ER Mapper 6.4 or higher with Service Pack 1 or higher installed. These wizards are developed, maintained and supported by Earthstar Geographics (ESG). This document is organized into the following sections:

- Overview of wizards and installation
- New features in version 3.2
- Workflows for processing multiple images in batch
- Working with GeoTIFFs, and TIFF or JPEG images with "world" files
- Details and tips on running each wizard
- Troubleshooting

Notes: This document is not intended as a user guide for the ER Mapper software. You should be familiar with ER Mapper to gain full benefit from using these wizards. Earth Resource Mapping does *not* provide support for these wizards, so you should read this document thoroughly and only *then* contact Earthstar Geographics if you have support questions.

www.es-geo.com

Note: This document covers version 3.2 of the ESG Utilities Wizards. While some content is the same, it is not intended to be used as a reference for the previous releases of the wizards.

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Wizards and User Guide written by Earthstar Geographics, San Diego, CA (www.es-geo.com)

Wizard overview and installation

The ESG Utilities Wizards for ER Mapper are designed as "power tools" to increase your productivity with ER Mapper. You will find them useful for many purposes, including:

- Batch operations, to let you run time consuming or tedious processes on many files unattended or overnight. Batch wizards include image file imports, rectifications, orthorectifications, rotations, resampling, editing or creating header (ERS) files, printing, and exporting to various image formats.
- Automated creation of useful products that would take much time and effort to create manually, such as cutting a large image or mosaic into tiles of uniform size, creating custom rotated clip regions, and creating mosaic index maps.
- Creating your ER Mapper color tables quickly and easily.
- Creating your own "slideshows," so you can easily display and cycle through a series of algorithms for demonstrations or presentations.
- As template wizards that you can modify for your own purposes. For example, you might modify the graphics import wizard to import additional file formats.

Important: The current release of the ESG Utilities Wizards 3.2 only runs on ER Mapper 6.4 or higher with Service Pack 1 (SP1) installed. Older versions are available for ER Mapper 6.0-6.3 for PCs or ER Mapper 5.5a on Unix with reduced functionality. (Contact us if you are interested.)

System requirements

To run these wizards, you must have a licensed copy of ER Mapper.

ER Mapper version required: 6.4 or higher with Service Pack 1 installed

Disk space required: approx. 2 MB

Important: In addition to ER Mapper 6.4 or higher, you must have Service Pack 1 (SP1) for 6.4 installed. SP1 adds functionality required for several of the wizards, and they will not operate correctly without it.

Using the wizards as templates

The wizards are written in ER Mapper's batch scripting language. Users with some programming aptitude may want to use the wizards as templates to help create your own wizards that perform similar functions. For this reason, the wizard script files contain detailed comments to help you understand their design and logic.

To modify a wizard, open the ".erb" file in a text editor and resave it under a different name. (Be sure to do this immediately to avoid overwriting the original wizard.) Then make your modifications and resave it. You can run your new wizard by selecting **View/Batch Engine Script Control**, then clicking the **Run Script** button. You can also create your own toolbar and run them from there. See the ER Mapper documentation for details on creating batch scripts and wizards.

Installing the wizards

The ESG Utilities Wizards installation file is in ZIP format. If you do not have software installed to read ZIP files, the WinZip software (www.winzip.com) will launch automatically in evaluation mode for you to unzip the file. If you have other software to read zip files, you can use it instead to install the files into the main ER Mapper folder as described below.

Important: You must have the password supplied at the time of sale to run this installation procedure.

1) Close all ER Mapper applications.
2) Double-click on the "esgutwiz32.zip" install file icon in the Windows Explorer. The **WinZip** dialog displays. (If you do not have WinZip installed, click "I Agree" on the WinZip evaluation dialog to continue.)
3) Click the **Extract** button. Under 'folders/drives,' navigate to the directory location of ER Mapper on your system. (This will typically be a directory named ERMAPPER64, ERMAPPER63 or similar.). The 'Extract to' field should now show that location (i.e. C:\ERMAPPER64). Be sure the "All files," "Overwrite existing files" and "Use folder names" options are selected Then click the "Extract" button.
4) Enter the password supplied to you, then click **OK** to extract the wizard install files into the appropriate ER Mapper directories.
5) Close **WinZip** when finished.
6) Restart ER Mapper, then select **ESG Utilities** from the **Toolbars** menu to display the Utilities wizards toolbar.

Note: The installation only adds new files, it does *not* replace any files that ship standard with ER Mapper. (Any custom ER Mapper files you have added are also not disturbed.)

Accessing the wizards within ER Mapper

The wizards are setup as a "toolbar" inside ER Mapper. To gain access to them, select **ESG Utilities** from the **Toolbars** menu on the main ER Mapper menu bar.

The **ESG Utilities** toolbar is setup with thirteen buttons; each starts up a wizard. If you point the mouse to a button, the name of the wizard appears next to it (the "tool tip"). Wizards are referred to by these names in the rest of this document.

Files added during installation

The ESG Utilities wizards installation procedure adds the following files to your ER Mapper 6.3 installation.

Installed into ERMAPPERXX/batch (executable wizard code):

```
ESG_Create_Index_Map.erb
ESG_Rotate_Resample_Batch.erb
ESG_Reproject_Batch.erb
ESG_Rectify_Batch.erb
ESG_Orthorectify_Batch.erb
ESG_Print_PC_Batch.erb
ESG_Edit_ERS_Batch.erb
ESG_Import_Images_Batch.erb
ESG_Export_Images_Batch.erb
ESG_Cut_Alg_Tiles.erb
ESG_Create_Rotated_Clip_Regions.erb
ESG_Color_Table_Wizard.erb
ESG_Slideshow_Wizard.erb
```

Installed into ERMAPPERXX/batch/lib (executable wizard code):

```
ESG_Get_Proj_Units.erb
```

Installed into ERMAPPERXX/config (main menu toolbar file):

```
ESG_Utilities.bar
```

Installed into ERMAPPERXX/icons (toolbar button images):

```
esg-uttb1.tif
esg-uttb2.tif
esg-uttb3.tif
esg-uttb4.tif
esg-uttb5.tif
esg-uttb6.tif
esg-uttb7.tif
esg-uttb8.tif
esg-uttb9.tif
esg-uttb10.tif
esg-uttb11.tif
esg-uttb12.tif
esg-uttb13.tif
```

Installed into ERMAPPERXX/icons/Standard_icons/Wizards (wizard images):

```
esg-utidx.tif
esg-uttfw.tif
esg-utshow.tif
esg-utrprj.tif
esg-utrect.tif
esg-utpcb.tif
esg-utimpg.tif
esg-utrot.tif
esg-uteders.tif
esg-utetab.tif
esg-utetfw.tif
esg-utclip.tif
esg-utegtf.tif
esg-utort.tif
esg-utlut.tif
esg-uttile.tif
```

Uninstalling the wizard files

There is no "uninstall" utility. You can manually delete all the files listed above to accomplish this if desired. (As indicated, most files start with the letters "ESG" or "esg.") However, they take up very little disk space (approx. 2 MB) and will not impact other software products.

Possible limitations on file size and performance

The same limitations inherent in processing imagery through ER Mapper's GUI also pertain to processing through the wizards. Increasing the amount of memory (RAM) on your computer will help processing speed as well.

How to tell your wizard version

To determine which version of the ESG Utilities Wizards you have installed, click the 'Help' button on the first page of any wizard. The latest version is 3.2, and that is the version described in this document. If are running an earlier version, please contact Earthstar Geographics for an upgrade.

Enhancements/changes in version 3.2 (April 2004)

Version 3.2 of the wizards were tested with ER Mapper version 6.4 with Service Pack 1 installed. Some of the wizards will not function properly with ER Mapper 6.4 if Service Pack 1 is *not* installed. The following enhancements and changes have been made to the ESG Utilities Wizards for this version 3.2 release (see the specific section on each wizard for details). Many of these are designed to take advantage to new features in ER Mapper 6.4 such as geocoding of multiple file formats and reprojection of large files:

- All geocoding-related wizards (rectify, orthorectify, rotate/resample and reproject) can now read any raster format supported by **File->Open** and write to ER Mapper Raster (.ers), TIFF/GeoTIFF (.tif) and ECW (.ecw) image formats. This means you can batch reproject GeoTIFFs to GeoTIFFs or ECWs (or other combinations) without creating intermediate ER Mapper Raster files as was necessary before 6.4.
- "Reproject Images in Batch" can now process very large input files (several GB), so cutting large images into pieces in order to reproject them is no longer necessary.
- All geocoding-related wizards can now be run in a background mode via a DOS batch (.bat) file. This lets you continue to use ER Mapper normally while the operations are running in the background. (Before you had to let the wizard finish before resuming normal use of ER Mapper.)
- All wizards with background mode run options via a DOS batch (.bat) file now do not automatically start the batch process. This lets you run the process at any time you want by launching the BAT file (double-click on it) or using the Windows Scheduled Tasks function to start it at a specific time.
- "Cut Algorithm into Tiles" now has an option to cut tiles using a text file containing the tile names and extents. This helps when tiling irregular areas or when specific filenames are required.

- "Import Images in Batch" now imports USGS DEM (both .dem and .cdo extensions), ERDAS IMAGINE, ERDAS LAN, and PCI PIX formats.
- All wizards that export to the ECW format (all geocoding-related, Export Images, and Cut Algorithm Tiles) now allow resampling (changing the resolution/cell size) while exporting to the ECW format.
- "Export Images in Batch" and "Cut Algorithm into Tiles" now handle mosaic algorithms that are reprojected on-the-fly. This means that exported images can be output in a different projection than the source input images.
- "Cut Algorithm into Tiles" can now create up to 99,999 tiles in one batch run.
- "Cut Algorithm into Tiles" has better documentation here on how to create "butt joined" tiles with no overlap.
- "Create Mosaic Index Map" and "Export Images in Batch" (export from mosaic option) now handle mosaic algorithms that contain multiple surfaces.
- "Create Mosaic Index Map" now writes the index boxes as polygons (instead of rectangles), so they can be reprojected if needed.
- The ability to add comments to World files (formerly in Export Images and Cut Algorithm Tiles) has been removed since they did not work with the output via DOS BAT file method.

Enhancements/changes in version 3.1 (January 2003)

Version 3.1 of the wizards were tested with ER Mapper version 6.3 with Service Pack 1 installed. Some of the wizards will not function properly with ER Mapper 6.3 if Service Pack 1 is *not* installed. The following enhancements and changes have been made to the ESG Utilities Wizards for this version 3.1 release (see the specific section on each wizard for details):

- A new "Create Rotated Clip Regions" wizard has been added to let you create clip regions for a set of images in batch that mask out a percentage of the image area, and can be rotated for better results with oblique image mosaics.
- All wizards now handle creating files in directories that contains periods in the directory name (e.g., "C:\Images_12.5m\").
- "Import Images in Batch" now reads rotation terms from World files for input TIFF and JPEG images and transfers them to imported ERS images.
- "Edit or Create ERS File in Batch" now reads rotation terms from World files and transfers them to generated ERS header files.
- "Export Images in Batch" now reads rotation terms from input image files and transfers to World files accompanying TIFF or JPEG output.
- The "Export Images in Batch" and "Cut Algorithm into Image Tiles" wizards now have an option to run the batch process outside ER Mapper via a DOS batch file, instead of a looping ER Mapper script. This option has some limitations, but allows other ER Mapper wizards to be run while the batch process is running.
- "Create Color Tables" wizard is now fixed (was not working in 3.0)

General multi-image workflows

This section describes general workflows you might follow to streamline processing of multiple images. These procedures generally pertain to mosaicking airphotos or similar images, but may be useful for other types of data as well. They reference the use of these ESG Utilities Wizards as well as some wizards that come with ER Mapper (such as the "Image Display and Mosaic Wizard" and the "Balancing Wizard").

Running batch processes with BAT files or scripts

Many of the wizards give you the options of running the final batch process "in the background" or "via an ER Mapper script." Running in the background is usually recommended for most jobs. Here are the differences:

- **Running in the background**–With this option, the wizard creates a DOS batch (.BAT) file that contains all the program commands to run in the batch process. This file can then be run by double-clicking on it in Windows Explorer or via the Windows Scheduled Tasks function to run it at a scheduled time in the future. The other main advantage to this method is that you can continue to run ER Mapper normally while the process runs in the background. While the BAT file is running, a command window is displayed on-screen showing the progress and current command being run. Note that ER Mapper error messages encountered during processing cannot be displayed when running via BAT file, so make sure your input images are properly set up.
- **Running via an ER Mapper script**–With this option, the wizard runs the batch procedure immediately using a looping ER Mapper script. This does give you more on-screen messages, records error messages, and displays a progress bar that you will not see using the run in the background method. However, some important ER Mapper functions may not be available until the script has completed (such as **File->Open**), so you have limited options to use ER Mapper until it completes. This method is therefore useful for smaller jobs of if you don't plan to use ER Mapper while it's running.

Launching a BAT file immediately

To launch a BAT file created by a wizard immediately, simply double-click on the file's icon in Windows Explorer.

Using Windows Scheduled Tasks

To use Windows Scheduled Tasks to run a BAT file created with a wizard:

1) Open the **Control Panel** and double-click **Scheduled Tasks**.
2) Double-click **Add Scheduled Task**.
3) On the **Scheduled Task Wizard**, click **Next>**.
4) Click the **Browse** button, then select the .bat file created by the wizard. (All wizards tell you this file's location, most in a log file in the output directory.)
5) Click **One time only**, then click **Next>**.
6) Select the time and date to run the BAT file, **Next>**.
7) Enter the user and password, **Next>**. (Note: The script may not run unless you enter the user name and password.)
8) Click **Finish**. The task is added to the list and runs at the scheduled time with status/error messages shown in a command window.

Importing Files vs. Creating ERS Headers

If you have TIFF file with World (.tfw) or JPEG with World (.jgw, .jpw or .jpegw) files, you have two options for using the ESG Utilities to allow display and processing in ER Mapper. Use the following guidelines to determine when you need to import them, or when you can simply create ERS headers:

- **Creating ERS header files–**Use this procedure when you want to simply display, mosaic, or color balance the existing image files. In this case, there is no need to import each file to create a second copy of the data. You simply need to create an ERS header file for each TIFF or JPEG image so ER Mapper can display them with the proper georeferencing information. Use ESG's "Edit or Create ERS Files in Batch" wizard to do this. (See the following section "Mosaicking and Balancing Images with World or TAB Files" for more information.)
- **Importing files–**Importing used to be necessary in ER Mapper 6.3 or earlier because geocoding operations could not be performed directly on files in TIFF, JPEG, ECW, etc. image formats. With 6.4, ER Mapper now reads these formats directly for geocoding operations. However, importing can still be useful for Targa, USGS DEM, ERDAS LAN and other formats that ER Mapper does not read directly. To run batch imports, use ESG's "Import Image Files in Batch."

Mosaicking and Balancing Images with World or TAB Files

If you want to simply mosaic and/or color balance TIFF, JPEG or BMP images with World or TAB files, you can use the images directly within ER Mapper without having to first import them to ER Mapper format. This typically involves creating ER Mapper header (ERS) files for each TIFF or JPEG that contains the correct georeferencing information. ESG's "Edit or Create ERS Files in Batch" wizard lets you create ER Mapper ERS headers for the following data types:

- TIFF (.tif), JPEG (.jpg) or BMP (.bmp) images with MapInfo table (.tab) files
- TIFF (.tif) with World (.tfw) files
- JPEG (.jpg) with World (.jgw, .jpw or .jpegw) files
- Windows Bitmap (BMP) with World (.bpw) files

To do this, use ESG's "Edit or Create ERS Files in Batch" wizard to create ER Mapper header (ERS) files for each TIFF, JPEG or BMP in the directory. You will need to know the correct ER Mapper datum and map projection of your TIFF, JPEG or BMP images because this information is not contained in World files, and cannot be interpreted by the wizard from TAB files.

After doing this, you can mosaic, color balance, compress and otherwise process the images directly in ER Mapper as desired. (Be sure to open or mosaic the ERS files, not the .tif, .jpg or .bmp files.)

Note: If your TIFF, JPEG or BMP files do not have corresponding World or TAB files, you cannot mosaic them because these files contain the georeferencing information. The exception are GeoTIFF files, which can be displayed and processed directly in ER Mapper because the georeferencing information is embedded in the TIFF file itself.

Geocoding "raw" Image Files

In some cases you may have "raw" image (TIFF, JPEG, BMP, etc.) files such as airphotos or scanned maps, and you want to use ER Mapper to geocode them. ER Mapper 6.4 can now perform geocoding operations directly on graphics formats such as TIFF, JPEG, and BMP. Here is the procedure:

1. Use ER Mapper's "Geocoding Wizard" to define ground control points (GCPs) or define orthorectification information for each image, but do not perform the final "Rectify" step in the "Geocoding Wizard." (I.e., hit the "Save" button, not "Save File and Start Rectification," then exit.) It is recommended that all your images to be geocoded be placed in the same directory because this will make it easier to batch process them in the next step.

2. Use ESG's "Rectify Images in Batch" wizard to rectify all the images for which you selected GCPs in step 2. Or, if you defined orthorectification parameters for

the images, use ESG's "Orthorectify Images in Batch" wizard to orthorectify all the images.

3. If desired, use ER Mapper's "Image Display and Mosaic Wizard" to mosaic all the output rectified or orthorectified images.

4. If desired, use "ESG's Export Images in Batch" wizard to export each rectified image to any of several export formats.

5. If desired, use ESG's "Create Mosaic Index Map" wizard to create an index map of each rectified image in a mosaic. (First use ER Mapper's "Image Display and Mosaic Wizard" to mosaic the rectified images, then use that algorithm as input to ESG's "Create Mosaic Index Map" wizard.)

Options for exporting TIFF Images

ER Mapper provides great flexibility for exporting TIFF images in many different variations. The "ESG's Export Images in Batch" and "Cut Algorithm into Image Tiles" wizards provide all these options. You need to select the options that pertain to the way you want the images exported, and the products that will used to read them later. Use the following guidelines to determine how to select TIFF export options.

Note: The goecoding-related wizards use a different program to create TIFFs that don't allow selection of the options below. They generally export the TIFF in with characteristics matching the input images.

TIFF Output Type

Output types refer to the color depth or number of bands in the output TIFF image:

- **RGB (truecolor)**–Saves the TIFF image as a 3-band file with Red, Green and Blue layers (channels). RGB should normally always be used when saving color images such as airphotos or satellite images to retain the full range of colors.
- **Greyscale**–Saves the TIFF image as a 1-band greyscale image. Greyscale should normally always be used when saving black and white (greyscale) images such as airphotos or panchromatic satellite images. If the input image is color, selecting Greyscale will cause the color image to be transformed to a greyscale representation (basically image brightness) in the output image.
- **256 Color**–Saves the TIFF image a 1-band file with a color palette containing up to 256 colors. This option is useful for saving images with few colors, such as scanned topo maps or classifications because it creates a color image file 1/3 the size of an RGB image. In addition, LZW compression is especially effective on these types of images. This option should normally *not* be used to export color images such as airphotos because the number of colors (often millions) will be thinned to 256 during export which can cause great loss of color resolution.

- **Multi Layer**–Designed to save the TIFF image as a 1-, 3- or 4-band file with options for 8-bit or 16-bit data types. Typically this would be used to export raw data values to the TIFF, rather than a contrast enhanced image. For example, the original values of a 16-bit DEM could be saved to TIFF format by selecting Multi Layer, Signed 16-bit data format, and Delete output transforms options.

TIFF Data Type

When the Multi Layer output type is selected, you have options for a data type. The Data Type options only apply if Multi Layer is selected (RGB, greyscale and 256-color images are always output as unsigned 8-bit data type).

The different data type options are designed to encode a specific value range in the output TIFF. Here are some examples to use as guidelines:

- **Exporting DEM data**–DEMs can have data ranges from zero (or negative) to several thousand. If your DEM had ranges between 0 and 2000, you could save it to an Unsigned 16-bit data type to retain those values in the output TIFF. If your DEM included negative elevations, you would need to save as Signed 16-bit so both positive and negative values would be retained. In this case, you should almost always select "Delete output transforms" option, otherwise the original values will be rescaled to 0-255 no matter what data type you select.

  If all values in your DEM were less than 255, then you could safely save it as 8-bit. If your DEM values were floating point (i.e., 250.345), then they will be rounded to the nearest integer value (250) in the output TIFF.
- **Exporting 11-bit data**–IKONOS, Quickbird and some other high resolution images store values in 11-bit format, and several other satellite image types contain values up to 16-bit format. To export these original values to a TIFF file (for example to crop or subset a small area from a larger image), you need to select the Multi Layer format with Unsigned 16-bit data type and select "Delete output transforms." If you want to export a contrast stretched version as a "final" image, then save as RGB or greyscale without deleting transforms.
- **Consolidating separate images**–In some cases, you might have separate image files that you want to consolidate into a single 3- or 4-band image. (For example, images that are shipped as one file per band, or 3 different co-registered dates covering the same area.) Create an algorithm with a layer for each image (4 layers maximum), then save it as a Multi Layer with the appropriate data type and transform deleted. The same thing could be done to subset 3 or 4 bands of a Landsat image into one 3- or 4-band TIFF file.

Note: Many applications will not properly read 16-bit TIFFs or TIFFs that contain 4 bands of data. Most remote sensing products will read these files, but you should check that your application can read them before creating them in batch.

Deleting transforms for TIFF images

Whether to select the "Delete output transforms" option depends on whether you want to export images with or without the contrast enhancements you've made to the screen. ER Mapper's Transform (the histogram tool) is designed to let you transform raw image values into a nice picture on the screen.

- To output the exact image you see on the screen (in the image window), always *turn off* the "Delete output transforms" option. (This will also cause the output image data range to be 0-255.)
- To output the raw images values in the input image to the output TIFF file, always *turn on* the "Delete output transforms" option. (This throws away any contrast enhancements in the input algorithms.)

Running the wizards

This section describes basics on running each wizard and details on features and capabilities. It also lists special tips for getting the most from the wizards, as well as limitations and things to be aware of before running them. You will achieve best results if you read these sections before running the wizards.

Note: For general tips and troubleshooting, see the section "Troubleshooting" following this. *Please be sure you consult the troubleshooting section before reporting problems.*

 Import Image Files in Batch

This wizard lets you import TIFF, GeoTIFF, DOQQ, ECW, BMP, JPEG, GIF, Targa, PCX, USGS DEM, ERDAS IMAGINE and LAN, and PCI PIX image files to ER Mapper Raster Image (.ers) format in batch. This can be handy when you have multiple files to import and don't want to import them one at a time through the standard interface. Output ER Mapper images are given the same name as the input file (e.g., 'image1.tif' imports to files 'image1' and 'image1.ers').

ER Mapper 6.4's ability to perform geocoding operations on all supported formats has removed many reasons you had to import files in the earlier versions. Batch importing can still be useful to convert raster formats that are not supported directly (USGS DEM, IMG, PIX, etc) and for using the Traverse feature that only supports ER Mapper Raster format. You can also batch uncompress ECW files. Options include:

- Import up to seven files from various locations, all files in a directory, or all files listed in a text file.
- Import TIFF or JPEG with "World" files, and encode the coordinates, datum, projection and units in the ER Mapper files.
- Import ECW compressed image files to uncompress them into ER Mapper Raster image format.
- Import 11-bit and 16-bit GeoTIFF files (IKONOS, Quickbird and others).
- Automatically calculate multivariate and/or balancing statistics for each image after import.
- Pop-up status dialog to indicate progress of the imports, including current file and percent complete bar showing progress of the batch operation.

Why import image formats that ER Mapper can read directly?

This wizard is an alternative to opening each image one at a time and then saving as an ER Mapper Raster image. ER Mapper can directly read some image formats such as TIFF and JPEG, but does not create an ER Mapper-format data file when it does this. While this is a nice feature, you still need ER Mapper-format images to use the Traverse function or perform certain other operations. Also, very large TIFFs (especially 11-bit or 16-bit tiled images) can take quite a bit of time to load when direct opening them using the raster translators. Therefore, you might use this utility when you want to create ER Mapper-format images from your images (which open more efficiently) as a batch process for multiple files.

Importing TIFF or JPEG with World files

The wizard includes filetype options for importing TIFF or JPEG with World files. The world files contain the upper-left corner coordinate, rotation, and cell size of the image, and this information is automatically transferred to the imported ER Mapper image. If a world file is not present in the same directory, the TIFF or JPEG is imported but the imported image contains no georeferencing information. (The wizard notifies you if this occurs in status messages and in the log file).

In addition, the wizard prompts for the datum and map projection of the TIFF or JPEG images because this *not* included with the world file. This lets you import a large list of TIFF or JPEG with World files and have all the correct georeferencing information entered into the ER Mapper images.

If your input TIFF or JPEG World files contains rotation parameters, these are transferred to the ER Mapper image header (ERS) files automatically. (The ERS header will have a single rotation value and the cell sizes may be different than listed in the World files. This is normal.)

TIFF or JPEG with World images in foot-based projections

If you select an ER Mapper projection with units of feet (such as US State Plane), the wizard will automatically convert the cell sizes from the World files (in feet) to their meter-equivalent values in the ERS headers of the imported files. (The wizard informs you of this before proceeding.) This is needed because ER Mapper must have cell sizes expressed internally in meters, even for projections whose XY units are feet.

Importing a directory of USGS DOQQ images

USGS DOQQ (Digital Ortho Quarter Quad) images can have several different file extensions. If you are using the "Import all files in a directory" option, the wizard must assume that all files in the input directory are DOQQs. Therefore, be sure that the input files directory contains *only* DOQQ images (no other files or subdirectories). If other files or subdirectories are present, you will receive error messages about these but the wizard should continue on to import all valid DOQQ files.

Note: Sometimes DOQQs are provided in other formats such as GeoTIFF or TIFF with World. Use the appropriate import option for these (not the DOQQ option).

Importing USGS DEM, ERDAS and PCI formats

The import programs for USGS DEM, ERDAS IMAGINE and LAN and PCI PIX support most, but not all variants of the formats. Therefore some files may not import correctly. You can try a test by using the **Utilities->Import Image Formats** options in ER Mapper. If the file imports there, it will import correctly using the wizard.

Importing from a text file list

You can specify the files to be imported by creating a text file listing the full path and filename of each file. This allows the input files to be stored in different areas on your system. An example text file might look like this:

```
D:\Images_NW\image01.tif
D:\Images_NW\image02.tif
C:\Images_SW\image03.tif
C:\Images_SW\image04.tif
```

No other information or lines can be in the text file, only full path filenames (each line separated by a carriage return). Input filenames should be unique because the output files will be written to a single directory. The wizard will parse your text file and warn you if it can't understand the format, or if some of the listed images don't exist.

Supported file extensions

The wizard only looks for files with the 3-character file extension listed in the "File type to import" list. (Files with other extensions, for example "image1.tiff" or "photo.jpeg" will not be recognized.) The exception to this rule is USGS DOQQ images that can have many different file extensions (so the wizard allows any extension).

GeoTIFF datum and projection

When importing GeoTIFF files, the datum, projection and other georeferencing information are encoded automatically in the output ER Mapper image during the import. If the projection in the GeoTIFF file has no direct match in ER Mapper's projection database, some georeferencing information cannot be set automatically. This wizard uses the latest version of the ER Mapper GeoTIFF library.

GeoTIFF files with World TFW files

Sometimes vendors will supply images in GeoTIFF format, but also supply an accompanying World (.tfw) file for software that cannot interpret the GeoTIFF information. If you know the images are in GeoTIFF format, you should always select the filetype "TIFF or GeoTIFF (.tif)," ***not*** the "TIFF (.tif) with World" type. Only use "TIFF (.tif) with World" for plain TIFF images with World files.

Note: To determine if your TIFF files are in GeoTIFF format, select **File->Open**, click once on the desired TIFF file, then click **Info**. If you see a projection of "RAW" or "LOCAL" then the image is *not* a GeoTIFF. (You may see a valid datum and projection if an ERS header file has been created for the TIFF. If this is the case, make a copy of the TIFF in a separate directory without the ERS, then perform the above test on it to determine whether it is a GeoTIFF or plain TIFF.)

Rectify Images in Batch

This wizard lets you rectify all images in a directory in batch. Since rectification of large files can take quite a bit of processing time, this lets you take advantage of overnight batch processing. You must first have selected and saved ground control points (GCPs) for each image using ER Mapper's Geocoding Wizard. Options include:

- Polynomial or Triangulated rectifications.
- Input images can be in any format supported by ER Mapper (those listed on **File->Open->All Supported Files**).
- Use output cell size and null value parameters pre-defined for each image (using ER Mapper's Geocoding Wizard), or override them by specifying a common output cell size and null value applied to all rectifications.
- Output to ER Mapper Raster (.ers), TIFF/GeoTIFF (.tif) or ECW compressed (.ecw) image formats.
- Append a text string to output filenames to differentiate them from input files of the same name, for example "geocoded." (Otherwise, output files get the same name as input files in which case they must be written to a different directory.)
- Output via an ER Mapper script, or a DOS BAT file that can be run now or at a later time.

Note: The wizard cannot predict the amount of disk space required to store your output rectified files, so you must make sure the output directory has sufficient space before running the wizard.

Output filenames

This wizard always creates it's own output filenames, and cannot use output filenames pre-defined for images using the Geocoding Wizard. You may choose to have the output filenames be the same as the input filenames (for saving to a different directory), or you may append the input filenames with a text string (which allows saving to the same directory as the input files).

Rectification parameters that can be overridden

As noted, you must select GCPs for each image beforehand using ER Mapper's Geocoding Wizard. However, some information cannot be read from the ER Mapper files by this wizard during batch rectification and some can as follows:

- The output filename, polynomial order (for polynomial rectifications), and rectify background areas setting (for Triangulation rectifications) *cannot* be read from the input images so must be specified in this wizard. (The wizard creates its own output filenames as described later.)
- Output cell size, null value and resampling method can be read and used to rectify each input file (by selecting the 'Use rect. parameters stored in each image' option), or can be overridden in this wizard to use a common set for rectification of all images (by selecting the 'Enter common parms used for all images' option).

Rectifications to the GEODETIC projection

When rectifying images to the GEODETIC projection, *only* use the 'Use rect. parameters stored in each image' option in this wizard. Do not use the 'Enter common parms used for all images' option because cell sizes (in degrees) entered in the wizard cannot be recognized correctly (and output files will be highly subsampled).

Output cell sizes

When using the 'Enter common parms used for all images' option, be sure to select an output cell size that makes sense for your images. The default value of 1 is only appropriate for very high resolution images such as airphotos. You should determine the desired output cell size before running the wizard. Unreasonable cell sizes will produce overly large output files if the cell size is too small, or cause loss of image detail if the cell size is too large. As in the ER Mapper GUI, the output cell size must always be expressed in meters, even if you are rectifying to a foot-based map projection such as U.S. State Plane.

Polynomial order and number of GCPs

Each image to be rectified must have sufficient GCPs selected for the type of rectification you select. If you select a polynomial order of Quadratic, for example, each image must have at least six GCPs selected. The wizard will attempt to skip images with insufficient GCPs and rectify the others, but you should verify this ahead of time. System messages will be displayed on screen and written to the log file if this occurs.

Reproject Images in Batch

This wizard lets you reproject (map-to-map transform) or datum shift all images in a directory in batch. Since reprojection of large files can take quite a bit of processing time, this lets you take advantage of overnight batch processing. Options include:

- Input images can be in any format supported by ER Mapper (those listed on **File->Open->All Supported Files**).
- Output to ER Mapper Raster (.ers), TIFF/GeoTIFF (.tif) or ECW compressed (.ecw) image formats.
- Resampling type, speed optimization and null cell value setting.
- Images with different input cell sizes can retain the same cell sizes when output, or can be resampled to a single common cell size for all output images.
- Append a text string to output filenames to differentiate them from input files of the same name, for example "UTM23." (Otherwise, output files get the same name as input files in which case they must be written to a different directory.)
- Output via an ER Mapper script, or a DOS BAT file that can be run now or at a later time.

Note: This wizard cannot predict the amount of disk space required to store your output reprojected files, so make sure the output directory has sufficient space beforehand.

Understand the projections you are using

When reprojecting images, it is important to understand the parameters of the "from" and "to" projections you are using. Choosing an inappropriate output projection for your input data can cause errors. For example, you would not want to reproject an image that covers an entire continent to a UTM projection that is designed only for areas up to 6 degrees wide. It is a good idea to test the reprojection of one of your images in the Geocoding Wizard to make sure the results are appropriate before using this wizard to batch process all of them.

Datum shift parameters must be defined

When using this wizard to shift datums (for example NAD27 to NAD83), be sure that the datum shift you want to perform has been defined in ER Mapper's database. (ER Mapper supports many datums, but does not have predefined shift parameters between all combinations of them.) If a datum change has not been defined, you may get an error such as "`Geodetic transform error: S2:(trn_init)`" when attempting to perform the reprojections. See the ER Mapper documentation for instructions on defining datums changes. It is a good idea to test the datum shift of one of your images in the Geocoding Wizard to make the shift is supported before using this wizard to batch process them.

Output filenames

This wizard always creates it's own output filenames. You may choose to have the output filenames be the same as the input filenames (for saving to a different directory), or you may append the input filenames with a text string (which allows saving to the same directory as the input files).

Output cell sizes

You can resample (change the cell size) or all output reprojected images if desired. This can be useful, for example, if all your input images have slightly different cell sizes (0.98m, 1.02m, etc.) and you want to resample them all to a common size (1.0m).

If you do not select to resample to a common cell size, the wizard will assign each output image the same cell size as the corresponding input image. When doing this, you have an option to force the X and Y output cell sizes to be the same value (whichever is smaller). Using this option will result in larger output files. Not using the 'Make output X and Y sell size equal' option will optimize the output file sizes, but you may get images with different X and Y cell sizes (especially if reprojecting to or from the GEODETIC projection).

When reprojecting from any meter-based projection (UTM, etc) or foot-based projection (U.S. State Plane, etc.) to the GEODETIC projection, the image cell sizes will be converted to their equivalent values in decimal degrees. When doing the opposite, cell sizes will be converted to from degrees to meters.

Output null cell values

When reprojecting images, the output images are typically stretched and/or rotated slightly by the transformation. Any "empty" areas created on the edges where no real image data exists should normally be filled with a "null cell value" when running the wizard. This allows these empty areas to be ignored when mosaicking the output images to create a seamless mosaic. (For typical satellite images or airphotos, the null value would usually be set to zero. If using the 'Use parms defined with Geocoding Wizard' option, the null value is defined with the Geocoding Wizard.)

If you do not set a null cell value (do not check the 'Use null value below' checkbox), the output images will not have a null value. This means all data is considered valid data and will be displayed as such. So, empty edge areas may overlap with areas of real data when a mosaic is created, which may not be desirable.

Rotate or Resample Images in Batch

This wizard lets you rotate or resample (change the pixel size) of all images in a directory in batch. Since rotation and resampling of large files can take quite a bit of processing time, this lets you take advantage of unattended batch processing. You might use this to rotate scanned images 90 degrees to aid geocoding, rotate images to point north, resample images to reduce the resolution or set all to a common resolution, and so on. Features include:

- Input images can be in any format supported by ER Mapper (those listed on **File->Open->All Supported Files**).
- Output to ER Mapper Raster (.ers), TIFF/GeoTIFF (.tif) or ECW compressed (.ecw) image formats.
- Select to rotate all images by a fixed amount, rotate all to the same orientation, or resample the pixel size only.
- For rotation by fixed amount, select the amount and clockwise or counter-clockwise rotation.
- Automatically rotate all images to point to the same orientation (for example north) regardless of the current orientation of each image.
- Resample to a different cell size while rotating if desired.
- Append a text string to output filenames to differentiate them from input files, for example "north" or "50m."
- Output via an ER Mapper script, or a DOS BAT file that can be run now or at a later time.

Note: The wizard cannot predict the amount of disk space required to store your output rotated or resampled files, so you must make sure the output directory has sufficient space before running the wizard.

Output filenames

This wizard always creates it's own output filenames. You may choose to have the output filenames be the same as the input filenames (for saving to a different directory), or you may append the input filenames with a text string (which allows saving to the same directory as the input files).

Batch rotations

Batch rotations can be helpful, for example, for rotating a series of scanned images or maps 90 degrees to orient them with other images, or make it easier to pick GCPs while geocoding. Batch rotations are also useful for seismic or geophysical images that were rotated by ER Mapper during the import process. Rotating them all north or to a common orientation lets you "undo" the rotation ER Mapper applied, so the images have the same orientation as in the software from which they were imported.

Rotations to a common orientation

Batch rotations to a common orientation (i.e., north) can only be performed correctly if each input ER Mapper image has the correct orientation in the header (ERS) file. For example, if you have a group of "RAW" files whose true orientation is not known, the wizard will look at the current rotation value (usually 0.0) and rotate them accordingly to achieve the desired output rotation value. However the output files orientation is not necessarily north or east, etc. since the true input rotation was not known.

Batch resampling

Batch resampling can be useful in cases where you wish to decrease the amount of image detail to reduce file sizes, or if you need to resample images with different X and Y sizes to one common size. For example, you have a series of 1-meter resolution airphotos, but your client or colleague only needs 3-meter resolution. By resampling to three meters, you decrease the file size of each image by a factor of nine. (You can also use ER Mapper's ECW compression option to decrease file sizes while maintaining the full image detail.)

 Orthorectify Images in Batch

This wizard lets you orthorectify all airphoto images in a directory in batch. Since rectification of airphotos can take quite a bit of processing time, this lets you take advantage of overnight batch processing. You must first have selected and setup the orthorectification parameters for each image using ER Mapper's Geocoding Wizard (but do not perform the final "Rectify" step). Output orthorectified files may be given the same filename as their corresponding input file, or may have a text string added to differentiate them. Options include:

- Input images can be in any format supported by ER Mapper (those listed on **File->Open->All Supported Files**).
- Output to ER Mapper Raster (.ers), TIFF/GeoTIFF (.tif) or ECW compressed (.ecw) image formats.
- Orthorectification using GCPs or Exterior Orientation.
- Use the ortho parameters already defined for each input image, or specify different output resampling, cell size and/or null value to be used for all images.
- Append a text string to output filenames to differentiate them from input files of the same name, for example "ortho." (Otherwise, output files get the same name as input files in which case they must be written to a different directory.)
- Output via an ER Mapper script, or a DOS BAT file that can be run now or at a later time.

Note: The wizard cannot predict the amount of disk space required to store your output orthorectified files, so you must make sure the output directory has sufficient space before running the wizard.

How to use the Ortho Batch Wizard

To use this wizard, you must first setup the orthorectification parameters for each image using ER Mapper's Geocoding Wizard. When you get to the "Rectify" step, save the information you defined (click the 'Save' button), but *do not* perform the orthorectification at that time. Instead, use this wizard to perform the final "rectify" step later as a batch process for all the images.

Overriding parameters defined with the Geocoding Wizard

When you setup the orthorectification parameters for each image using ER Mapper's Geocoding Wizard, this information is stored in a header (ERS) file of each image. This wizard gives you the option of using the resampling, cell size and null values defined for each image during ortho setup, or overriding them by selecting one common set of parameters. You might want to do this, for example, when you want to be sure that all output ortho images have exactly the same cell size. (Be sure to select an output cell size that makes sense for your images, as unreasonable cell sizes can produce overly large output files or cause loss of image detail.)

Output filenames

When you define the ortho parameters for each image using ER Mapper's Geocoding Wizard, you may also select an output filename at that time. However, the wizard cannot read this filename from the input files, so it assigns its own output filenames automatically. These are either the same as the input filename (in which case you must choose a different output directory), or the input filename appended with a text string of your choice (in which case you may write to orthorectified files to same directory as the input files).

Print to PC Printer in Batch

This wizard lets you print multiple algorithms in batch to any PC printer accessible from your computer. This is a batch interface to the "PC Printing" option on the ER Mapper **Print** dialog. This can be handy for batch printing map sheets overnight, printing multiple copies of the same image, or other purposes. Options and features include:

- Select the printer and print settings from within the wizard.
- Select up to seven algorithms from any locations to print, or print all algorithms in a directory.
- Print multiple copies of each algorithm.
- Select a "timeout" wait period between prints to let the printer actually print the image before ER Mapper starts to process the next one.
- Display each algorithm onscreen before printing it.
- Pop-up status dialog to indicate progress of the print operations, including ER Mapper rendering and printer rendering stages for each algorithm and percent complete bar showing progress of the batch operation.

Note: This wizard cannot be used for Windows drivers that print to a file, only those that print directly to an attached printer. The reason is that printing to a file requires assigning a unique filename to each output file, and this cannot be controlled directly from an ER Mapper wizard.

Selecting printer and settings

This option lets you select the PC printer to use, and any settings you wish to use for the subsequent print run. To select the printer settings, click the Printer icon button in the wizard, then click Properties on the **Print Setup** dialog.

Wait time between prints

Just as in the standard ER Mapper printing, the printing is done in two stages: ER Mapper renders the algorithm into the printer format, then the printer prints the image. The wizard has a "timeout" feature to let the printer actually complete printing the current image before ER Mapper starts to process the next one. This may not be necessary for all printers, but was found to be helpful on those tested to avoid swapping the CPU between rendering and actual printing operations. (This lets the CPU devote full time to one or the other.)

You should select the time it typically takes for your printer to actually print an image as your wait period setting. If a wait period is not important for your printer, just select the minimum "1 minute" setting.

Printing multiple copies

The 'Number of copies' option lets you print multiple copies of each algorithm. The choices are predefined to simplify, but range from one to 10 copies. Note that each "copy" is actually a separate print operation, and will take as long as a single print. Therefore, multiple copies will not print faster than printing the same algorithm multiple times.

In some cases, you may want to print three copies of one algorithm and one copy each of two others. In these cases, it is easiest to use the "Select up to 7 individual files" option. Set the number of copies to one. Then load the first algorithm into three of the seven slots, and the others in one slot each. (You are of course limited to seven total prints with this method.)

Export Images in Batch

This wizard lets you export a set of images to other common formats in batch. Output files get the same base filename as the input images (for example "photo1.alg" creates "photo1.tif").

Options and features include:

- All images in a directory may be exported, all images listed in a text file, or all images loaded into a mosaic algorithm. (The mosaic algorithm option lets you, for example, color balance the images and then export them back to individual images again.)
- Supported input formats include ER Mapper Algorithm (.alg), ER Mapper Raster (.ers) and ECW Compressed (.ecw).

  Note: Images in raster translated formats (such as TIFF, JPEG or BIL/HDR) can be exported by first creating ERS header files for them that contain the correct registration information, then selecting ERS as the input format.
- Supported output formats include GeoTIFF (.tif), JPEG (.jpg), BIL with HDR (.bil and .hdr), ER Mapper Raster (.ers), ECW Compressed (.ecw) and ER Mapper Algorithm (.alg).
- Images can be exported at the full resolution of each input image, or resampled to a common output resolution for all images. (Resampling does not apply to algorithm (.alg) output since it does not create new image files.)
- TIFF files can be exported to RGB, greyscale, 256-color or Multi Layer GeoTIFF or plain TIFF files (with 8- or 16-bit data format for Multi Layer).
- Images with different coordinate systems (UTM, State Plane, Lat Long, etc.) can be processed in the same batch run if resampling is not selected. (With resampling, images in meters/feet *or* decimal degrees can be processed, but not both.)
- Output via an ER Mapper script, or a DOS BAT file that can be run now or at a later time.

Exporting images from a text file list

You can specify the files to be exported by creating a text file listing the full path and filename of each file. This allows the input files to be stored in different areas on your system. An example text file might look like this:

```
D:\Images_NW\image01.alg
D:\Images_NW\image02.alg
C:\Images_SW\image03.alg
C:\Images_SW\image04.alg
```

No other information or lines can be in the text file, only full path filenames (each line separated by a carriage return). Input filenames should be unique because the output files will be written to a single directory. The wizard will parse your text file and warn you if it can't understand the format, or if some of the listed images don't exist.

Exporting images from a mosaic algorithm

The 'All images in a mosaic algorithm' export option lets you export all images in a mosaic with whatever processing has been applied to them. For example, color balanced versions of each image can be exported using this option. This option exports the full extents of each image in the input mosaic algorithm, and only works for algorithms in Red Green Blue or Pseudocolor color modes (not HSI). If RGB, the algorithm must be set up with the Red, Green and Blue layers for each image in that order. If the algorithm has multiple surfaces, images in all surfaces are processed.

You also have the option of whether to include or not include overlap from neighboring images in the mosaic. If 'Turn off all neighbor images' is selected, then only the current image will be exported (which may include null or background color areas on the sides if the image is not rectangular). If clip regions are used, null or background color will fill areas masked by the clip regions. (This option is the equivalent of turning off all layers except those for the current image, zooming in to that image's extents, then exporting the current view.) If 'Export images with overlap from neighbors' is selected, then the full extents of each image are exported including any data from overlapping images in the mosaic.

Output files are saved in the datum and projection selected for the *input algorithm*. So if this is different than the projection of the input images (i.e., reprojected "on-the-fly" using the algorithm's **Coordinate System** tab), then output files will be reprojected into the algorithm's datum/projection. This is an alternative way to reproject a set of images.

Note: You should not use "on-the-fly" reprojected algorithms that are reprojected to or from the GEODETIC projection or the output images may be invalid. You can use "on-the-fly"reprojected algorithms between any meter- or foot-based projections.

Tip: With the 'All images in a mosaic algorithm' option, the input images in the mosaic algorithm can be in any format supported by ER Mapper. For example, the input images in the mosaic can be in TIFF or JPEG format, not just ALG, ERS or ECW.

Output file sizes

Output TIFF files cannot exceed 2GB due to that limitation in the TIFF format specification. (We recommend that you make TIFFs less than 600MB as most software will have trouble reading very large TIFF.) Output file sizes for ERS, JPEG, ECW and BIL/HDR formats are generally unlimited, although certain system limitations may be encountered, or product limitations when trying to open them.

Exporting from ECW to other formats

ECW files can be ***very*** large when uncompressed, and can sometimes be too large to save to other formats such as TIFF. You should check what the uncompressed file sizes would be before running the batch export. (Generally files less that 2GB uncompressed will work OK.) If needed, you can tile large ECW files into smaller pieces using the "Cut Algorithm into Image Tiles" wizard.

Exporting at current resolution vs. resampling

These two options allow a great deal of versatility to export images. Details on the two options and when to use them follow:

Export each image at current resolution–Use this option when you want to export each image at the same resolution as the original data. With this option, input images can be in a variety of projections if desired. For example, algorithms in meter-based projections (like UTM), foot-based projections (like US State Plane) and the GEODETIC projection (degrees of Lat/Long) can all be exported in a single batch run.

Note: When using algorithm files as input, the default export resolution is determined by the highest resolution image in your algorithm. So, if your algorithm contains images with 30-meter and 10-meter resolutions, the default output pixel size will be 10 meters.

Resample all images to common pixel size–This option is available when exporting to ERS, ECW, TIFF, JPEG or BIL/HDR formats (not ALG). Use it to export all images to a single, common resolution (pixel size) that you select. For example, if you have a directory of images with slightly different pixel sizes, you can resample all the output images to a single common pixel size. Or, if your input images have different X and Y pixel sizes, you can resample them to equal X and Y sizes so the images will display correctly on less sophisticated software. (See 'Unequal input cell sizes' later.)

One limitation when resampling is that images with GEODETIC projections and other projections cannot be processed in the same batch run. (This is because a cell size specified in meters cannot be applied to resampling images in degrees, and vice versa.) The cell size units from the first input image are displayed in the wizard. When processing begins, any images with different cell size units will be automatically skipped. (Therefore, all input images should usually have a common map projection type when using the resampling option.)

Page size ignored

This wizard is not designed to create images at a particular "print size" or "page size" because these will typically alter the original data resolution. If using algorithms as input, page size settings (defined with Page Setup) are ignored when generating output files. The image will be exported to display the full area at the resolution of the input images (unless you choose to resample the pixel size).

Exporting images to algorithm format

Exporting images to algorithm files lets you perform some basic image processing (such as contrast enhancements) on input images before exporting them to other formats. You could, for example, apply a 99% contrast stretch to each image when creating the algorithms, then export the algorithms to TIFF or ECW to create contrast stretched versions of the input images. Creating algorithms also lets you prepare images for multi-band output if desired (see "Exporting to multi-band images").

Using TIFF, JPEG, and other formats as input

The wizard is limited to ALG, ERS and ECW as input formats because it is important that georeferencing information be present in order to export the images correctly. Many of the other formats ER Mapper supports do not always contain complete georeferencing information in the files (such as datum and projection) and it's complicated for the wizard to try to check every file. To use TIFF, JPEG, BIL/HDR or other raster translated formats as input, you have two options:

- Create ERS header files for the TIFF, JPEG, etc. images that contain the correct georeferencing information. (You can do this using the 'Edit or Create ERS Files in Batch' wizard.) Then specify ERS as the input format when using this export wizard.
- Create a mosaic of the images (if this makes sense for your images), then select the 'All images in a mosaic algorithm' option as the method for specifying the input file list. This may be an easier option for GeoTIFFs that do contain georeferencing information so you don't have to generate ERS headers. (Images in mosaic algorithms are assumed to be correctly georeferenced.)

Exporting to multi-band images

Each band in an input image can be exported to a multi-band output image by first creating an algorithm that places each band in its own algorithm layer. The easiest way to do this is to run the wizard once and specify algorithm output with the "Layers for all bands" option, then run the wizard a second time to export the algorithms to the desired format. (This could, for example, be used to convert several multi-band ERS images to BIL/HDR or ECW formats.)

Note that only ERS, ECW and BIL/HDR support large numbers of output bands. TIFF supports up to four output bands, JPEG 1 or 3 bands.

Exporting to greyscale images

The TIFF, JPEG and ECW export formats have a "Greyscale" option that can be used to export single-band or greyscale input images to greyscale output, or to convert color input images to a greyscale representation. The ERS and BIL/HDR formats do not store images as greyscale internally, and single-band input images should be output as "Multi Layer" to create equivalent single-band output files. TIFF and JPEG do store greyscale internally in the files.

Creating TIFF or JPEG World files

The setting for adding creating World files for exported TIFF or JPEG images internal to ER Mapper. To create World files for exported images, select **Edit->Preferences** in ER Mapper, click the **General** tab, then turn on the 'Write world file on save' option.

Creating GeoTIFF files

GeoTIFF information (tags) are added to the output TIFF files if either 'Add GeoTIFF information' is turned on in the wizard *or* in ER Mapper's **File->Save As->TIFF->Options**. If you do not want GeoTIFF files, then 'Add GeoTIFF information' *must be turned off in both places*. (If either is on you will get GeoTIFF files.)

TIFF LZW compression

The wizard gives you the option of creating uncompressed or LZW-compressed TIFF files. Some applications cannot read LZW-compressed TIFF files, or require a special license to read them. LZW is a "lossless" compression can reduce file sizes significantly depending on the amount of color variation in the images. It works best on images that have large areas with a common color, such as classifications or scanned maps.

ECW and JPEG compression ratios

When exporting to ECW images, you select a target compression ratio. This is a target only, and the actual amount of compression will vary depending on the image qualities and amount of spatial variation. Recommended values are 1 to 40 for color images and 1 to 25 for greyscale. Higher values give more file size compression, lower values give better image quality.

When exporting to JPEG images, you select a compression factor. This determines the amount of file size compression versus image quality. Values between 1 and 100 may be entered. Higher values give better image quality, lower values more file size compression.

Resample type for common resolution output

When you select the 'Resample all images to common pixel size' option, you also can select the type of interpolation technique used to resample output images to their new resolution. The resample options are:

Use bilinear interpolation–This option forces bilinear interpolation when resampling all output images. (The same as turning on the 'Smoothing' option for all algorithms.) When resampling to a smaller cell size than the original input images, bilinear interpolation creates a smoother, more visually pleasing image than nearest neighbor (so it is recommended). For resampling to larger cell sizes, the difference is negligible.

Use nearest neighbor interpolation–This option forces nearest neighbor interpolation when resampling all output images. (The same as turning off the 'Smoothing' option for all algorithms.) When resampling to a smaller cell size than the original input images, nearest neighbor tends to create more jagged, "pixelated" output images then bilinear. However nearest neighbor is recommended if retaining the original values as closely as possible is desired for output images (such as DEMs).

Unequal input cell sizes

If your input image has different X and Y cell sizes (for example 15 and 25 meters), the output image is created to maintain this relationship (unless resampling is selected). If your software product cannot handle images with different X and Y cell sizes (e.g., Photoshop, etc.), the images will appear stretched or compressed.

You can use the 'Resample all to common pixel size' option in this wizard to set equal X and Y cell sizes to overcome this.

Rotation in TIFF and JPEG World files

If your input images are rotated from north (i.e., the rotation value is not zero), the rotation values are written to the second and third fields in the output World files. In addition, the cell sizes and registration coordinates may be adjusted to account for the rotation, as World files express this information differently than ER Mapper does internally. The output images should open correctly in other software that can interpret rotation terms in World files (many do not).

Conversion of World file cell sizes for foot-based projections

If your data is in units of feet, the wizard will convert the ER Mapper cell size (always internally in meters) to the correct values in feet in the World files created for TIFF and JPEG images. This is performed for you automatically for input images whose projection units are feet. This means the images will open and display properly in other software that allows cell sizes to be expressed in feet.

In addition, the coordinate location of the upper-left pixel in the World file is adjusted to reference the *center* of the pixel as is standard for ESRI products. This means that the coordinates in the World file will be slightly different than the upper-left coordinate viewed for the algorithm in ER Mapper's "Geoposition" dialog. (ER Mapper references the upper-left corner of the upper-left pixel as the origin.)

Output data types for ERS, BIL and TIFF exports

When exporting to ERS, TIFF or BIL/HDR, you have options to select the data type (i.e., 8-bit versus 16-bit). The data type option only pertains when exporting as Multi Layer. (RGB, greyscale and 256-color TIFFs and RGB ERS and BIL/HDR files are always exported as unsigned 8-bit images.) The output data type you select should normally be the same as the data type of the input images unless you want to recode the data ranges, or your processing algorithm produces a range of values that require a certain data type to store them.

TIFF data types–Options are signed or unsigned 8- or 16-bit. 16-bit should be used when exporting images with 16-bit value ranges (i.e., 0-65767) that you want to retain (such as DEMs or 11-bit IKONOS images). Use "signed" when the images contain negative values to retain them.

BIL/HDR data types–Options are signed or unsigned 8-, 16- or 32-bit. Use the appropriate type for the value range in your input images, and use "signed" when the images contain negative values to retain them.

ERS data types–Options are the same as provided in the ER Mapper GUI. Use the appropriate type for the value range in your input images, and use "signed" when the images contain negative values to retain them. Use the "real" options if your processing creates floating point numbers and you want to retain them in the output files.

Edit or Create ERS Files in Batch

This wizard lets you edit or create ER Mapper header (ERS) files as a batch process. There are five primary options explained following:

- **Change ERS file parameters**–This lets you batch edit a directory of ERS files at once as an alternative to editing the files one at a time through ER Mapper's Image Header Editor. You can change the current datum, projection, null cell value or image rotation value. You can also change the Units setting to Meters or Feet, and automatically convert cell sizes in feet to the their meter-equivalent values.
- **Restore previous ERS files**–When you batch edit a directory of ERS files using the first option above, each ERS file is copied to a backup copy. This option lets you restore the previous set of ERS files if results are not correct. (Only the last saved version can be restored.)
- **Create ERS files for World file images**–If you have TIFF, JPEG or BMP images that have associated World header files, this option automatically creates an ER Mapper ERS header for each image. The wizard transfers the georeferencing information into an ERS header, so ER Mapper can display the fully georeferenced TIFF, JPEG or BMP images directly without having to import them. Recognized World file extensions are .tfw for TIFF, .bpw for BMP, and .jgw, .jpw and .jpegw for JPEGs.
- **Create ERS files for TAB file images**–If you have TIFF, JPEG or BMP files from MapInfo that have associated TAB (table) header files, this option automatically creates an ER Mapper ERS header for each TAB file. The wizard transfers the georeferencing information into an ERS header, so ER Mapper can display and georeference the images directly without having to import them.
- **Create ERS files for GeoTIFF files**–ER Mapper can read GeoTIFF files directly, so you usually don't need to create ERS headers for them. Reasons you might want to create them are so the GeoTIFF images can be exported to other formats using the 'Export Images in Batch' wizard, or to override the GeoTIFF information by editing the ERS headers.

Notes: ERS files cannot be edited if the 'read only' file attribute is turned on. The wizard will automatically check the first file and warn you if this is the case. Make sure all the ERS files in the directory to be edited have the 'read only' attribute turned off. (Select Properties for the files and folder in Windows Explorer.)

The wizard automatically skips editing any Virtual Images in the same directory (as these should not be edited, only the source ERS files they reference). ERS files to be edited must not be 'read only.'

When to use this wizard

This wizard can be useful when working with a large number of related images, such as a mosaic. When you open or import the images, you may discover that you entered the wrong information, and would like to change all the ERS files as a batch process rather than editing them one at a time. In addition, pixel (cell) sizes for images in foot-based projections my be interpreted as meters by ER Mapper. This wizard lets you convert pixel sizes that are actually feet to their meter-equivalent values (since ER Mapper only understands pixel sizes in meters or degrees, not feet). It is especially useful when working with images with World or TAB files because you can edit the needed information without having to import the files.

Note: ER Mapper 6.2 and higher ships with a "Change Datum/Projection/Cell Size for many images" wizard (on the Batch Processing toolbar) that can batch perform some of these changes as well.

Testing the results of the batch editing

It is ***highly recommended*** that you test the results of the batch editing immediately after each time you run the wizard. (I.e., try mosaicking or otherwise displaying your images to see if the results are correct.) This lets you revert back to the previous versions of the ERS files in case something went wrong or you made a mistake.

Restoring original ERS files

When you run this wizard, it creates a backup copy of each original ERS file with a ".bak" file extension. So, if you batch-edited your files and made a mistake or don't like the result, you can revert back to the original ERS files. You do this by running the wizard again and selecting the "Restore original ERS files" option.

Note: The "Restore" option only reverts to the *last saved version* of the ERS files. So, if you run this wizard three times and specify different changes each time, the Restore option will only restore the ERS files created after the third time you ran it.

Projection information for World or TAB images

When creating ERS files for image with World files or TAB files, it is important to know the datum and map projection of the images. This information is not stored in the World files, and cannot be interpreted by the wizard from TAB files (although it is technically stored there). If you are in doubt, contact the person who gave you the images to be sure.

Note: For U.S. State Plane projections, it is important to know whether the projection is in units of Feet or Meters. If you select the wrong version, the georeferencing will not be correct.

Rotation in World files

If your input World file images are rotated from north (i.e., the rotation value is not zero), the rotation values are transferred to the ER Mapper ERS headers files as a single rotation value. In addition, the cell sizes and registration coordinates may be adjusted to account for the rotation, as World files express this information differently than ER Mapper does internally.

Cut Algorithm into Image Tiles

This wizard lets you subset (or "cut") a geocoded algorithm into tiles of standard geographic sizes (10 Km, 7.5 minutes, etc.), numbers of pixels (512 by 512, etc.), numbers of tiles (3 by 3, etc.) or reading names and extents from a text file. This can be handy for subsetting a large image for output to another format, or creating a series of equal size images for map sheets. Each tile is automatically saved as a separate image file or algorithm with a filename indicating its position within the whole. When using geographic tiling, tiles sizes must be specified in the same units as the map projection (meters, feet, or degrees).

Options and features include:

- Select from standard tile size lists, or enter your own custom X and Y sizes.
- Use a text file containing the tile names and extents to help tile irregular areas or when specific tile filenames are needed.
- Automatic naming conventions for algorithm tiles include row-column number, upper-left Easting/Northing coordinate, or tile number of the whole. (Easting/Northing coordinate option is not available for Geodetic images.)
- Options to save tiles in GeoTIFF (.tif), JPEG (.jpg), BIL with HDR (.hdr), ER Mapper Algorithm (.alg), ER Mapper Raster (.ers), or ECW Compressed (.ecw) formats.
- Specify adjacent tiles to adjoin exactly, or overlap by a fixed amount (for example 20 meters).
- Automatically trims tiles in the last row or column to avoid creating tiles outside the extents of the input algorithm.
- Display the number of tiles your selected tile sizes would create beforehand, so you can quickly see the effect of different tile sizes.
- Output via an ER Mapper script, or a DOS BAT file that can be run now or at a later time.

Note: This wizard does not accept "raw" algorithms (those that contain images that are not geocoded), or algorithms containing rotated images. See "Cutting up "raw" images" following for information on possible workarounds.

Preparing the input algorithm for tiling

To prepare your input algorithm for tiling, set the exact area you want to tile using ER Mapper's **View/Geoposition/Extents** option. This can be the entire extents of a large image or mosaic of images, or any subarea. The wizard does not allow you to define a starting point to begin tiling from because this is much easier and more efficient to do on the **Geoposition** dialog (where you can visually see the result to verify it).

If you choose to cut the algorithm using "Geographic sizes," be prepared to define the tile sizes in the same measurement units as your map projection. For example, if you are using a UTM projection in units of meters, you must specify tile sizes in meters also (not feet or degrees).

Note: It may not be possible to efficiently tile mosaic algorithms containing very large numbers of images (500 or more). This is because the filesize of the input algorithm file (possibly several MB) makes it very slow to open, save and process for each tile. The wizard will warn you if the input algorithm file size is over 2MB. In these cases, we recommend that you export the area in several sections, then re-mosaic the sections and tile that algorithm. You can also use Virtual Datasets to do this, but the processing time will be longer than if dividing into image files.

Why save tiles in Algorithm format?

Saving tiles in ER Mapper Algorithm (.alg) format does not actually create new image files. This can be useful for several reasons, here are two:

- Sometimes you need to tile areas with irregular coverage, such as a mosaic of images with areas of empty space. After the wizard has created tiles for the entire area, you can delete ones that cover empty areas or optimize the extents of tiles along the edge by opening, adjusting and re-saving them. You can then export all the ALG tiles to image files using the Export Images in Batch wizard.
- You can generate a vector index map showing the tile layout before generating the actual images by mosaicking the algorithm tiles and then running the Create Mosaic Index Map wizard it. This can help in determining which tiles can be deleted that cover empty or unneeded areas.

Tiling "on the fly" reprojected algorithms

With ER Mapper 6.4, algorithms can be reprojected "on the fly" to the screen to a projection different than the native projection of the images. If you load one of these algorithms into the tiling wizard, it will export the tiles in the new projection. This can be an alternative way to reproject images, but there are some important considerations:

- Tiles cannot be cut properly from algorithms with the fly reprojection either to or from the GEODETIC (Lat Long) projection. The wizard will try to flag this for you to prevent it, but may not always be able to so be aware. You can use algorithms with on the fly reprojection between any meter- or foot-based projections.
- It can take much longer (100% or more) to output the tiles if the algorithm is reprojected on the fly versus tiling an algorithm in the native projection of the input image(s) it contains. This is due to the extra processing that has to be done to reproject the image data before writing it to a file.

How the tiling works

The tiling wizard works by creating temporary algorithm files defining the extents for each tile in the output directory. (If your output format is Algorithm, these are the final tiles.) Each temporary tile algorithm is then used to export the area to a disk file such as TIFF or ECW, then deleted. If you choose the 'Run batch process with ER Mapper script' option to export the tiles, each temporary algorithm is deleted immediately after it's TIFF, ECW, etc. file is created. If you choose the 'Run batch process in background' option, temporary algorithms for ***all*** the tiles are created up front in the output directory. When you run the batch file, each one is then deleted after it's tile image is created from it.

Using a text file to define tile names and extents

The 'Text file with names & extents' option for cutting tiles lets you define an exact set of areas to be exported. This can be helpful for cutting up only sections of irregular mosaics that contain lots of empty space, or when a specific filenaming convention for tiles is required.

The format for the text file is very specific. It must contain the name of the tile followed by the minimum X, maximum X, minimum Y and maximum Y values separated by commas. Each line must end with a carriage return, and the file cannot contain blank lines. Decimal X and Y values are permitted. Here is a simple example:

```
tile01,200000,250000,3000000,3050000
tile02,250000,300000,3050000,3100000
tile03,300000,350000,3100000,3150000
```

The name (first field) should not be a complete filename (i.e., C:\Temp\tile01.tif) because the wizard will create the full filename based on the output directory and file format you select. It should be a text or number string with no spaces, commas, slashes or colons. For example, if you select C:\Temp as the output directory and TIFF as the file type, the wizard will create the tile C:\Temp\tile01.tif during processing using the above example.

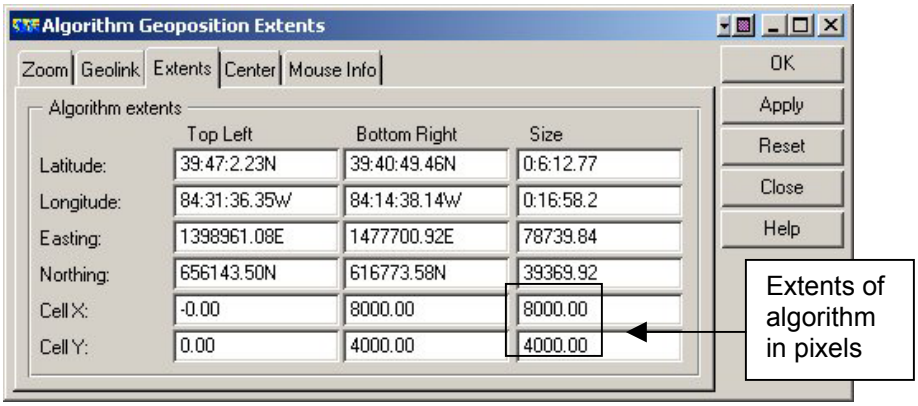
Note: Tile extents must fall inside the input algorithm extents of incorrect results may occur.

Creating "butt joined" tiles

The term "butt joined" is used to describe tiles that meet exactly at the edges with no overlap. Even with no (zero) overlap specified, you may still get one pixel overlap in some cases when using the "Geographic sizes" or "Number of tiles" options because the output files may have to be rounded to an integer number of pixels. We recommend that you use the "Number of pixels" option to accomplish this using the procedure below.

Note: If you plan to reproject the tile images later, you should always specify a small overlap. Otherwise you may get some one-pixel wide gaps between the reprojected tiles due to resampling.

1) Open your input algorithm. If the algorithm contains more than one image (i.e., a mosaic), select one of the layers of the image in the upper-left corner.
2) Using **View->Geoposition->Extents**, setup the extents of your input algorithm so that it starts and ends on an integer number of pixels that is evenly divisible by the number of pixels of your tile size. For example, the following extents of 8000 X and 4000 Y would work for 1000x1000 or 500x500 pixel tiles:



3) Save your algorithm, and load it into the Cut Algorithm into Tiles wizard. Select to cut by "Number of pixels." When asked to select a tile size, use one that is evenly divisible by the algorithm extents in pixels in step 2. The output tiles should butt join exactly with no overlap.

Exporting tiles in "multi band" format

When exporting to ERS, ECW, TIFF and BIL/HDR, you have the option of exporting the tiles as "multi band" image files. This option is typically used when you want to export all bands in a multi-band image, rather than an enhanced image such as RGB. Here are some general guidelines for exporting as multi-band:

- The input algorithm should be set up so that each band to be output has a layer with a unique label in the algorithm.
- If you want to output the original values in your source algorithm's images, select the 'Delete output transforms' option. If 'Delete output transforms' is not selected, images will be exported with output value ranges scaled by the transforms in each layer.
- If layers of the same type (Red, Pseudo, etc.) in your input algorithm have labels that match, those layers will be combined and output as a single band. If layers of the same type (Red, Pseudo, etc.) have labels that *do not* match, those layers will be output as individual bands.

Creating TIFF or JPEG World files

The setting for adding creating World files for exported TIFF or JPEG images internal to ER Mapper. To create World file for exported images, select **Edit->Preferences** in ER Mapper, click the **General** tab, then turn on the 'Write world file on save' option.

Creating GeoTIFF files

GeoTIFF information (tags) are added to the output TIFF files if either 'Add GeoTIFF information' is turned on in the wizard *or* in ER Mapper's **File->Save As->TIFF->Options**. If you do not want GeoTIFF files, then 'Add GeoTIFF information' *must be turned off in both places*. (If either is on you will get GeoTIFF files.)

Specifying custom tile sizes

The wizard allows custom tile sizes so you can specify a size not listed on the predefined menus, or use different X and Y sizes. In addition, you may want to specify a size that corresponds to a different type of coordinate units. (For example, if your algorithm is in a UTM/meters projection and you want to cut it into tiles 1 mile by 1 mile, convert one mile to its meter-equivalent value and enter that as the custom tile size.)

Tile naming conventions

Output algorithm tiles are named with either row/column, UL coordinate values, or tile number in sequence to indicate each tile's position within the whole. (Unless you select to cut tiles using names in a text file). You can prepend a text string to the base tile name. For example, if your select the row/column naming and the text string "Jakarta_," the first tile created is could be named "Jakarta_r1c1.tif." If you choose to name output algorithm tiles with the row/column convention or tile number in sequence conventions, the first tile originates in the upper-left as shown in the following examples and the last tile is in the lower-right:

r1c1	r1c2	r1c3
r2c1	r2c2	r2c3
r3c1	r3c2	r3c3

row-column

01	02	03
04	05	06
07	08	09

tile number

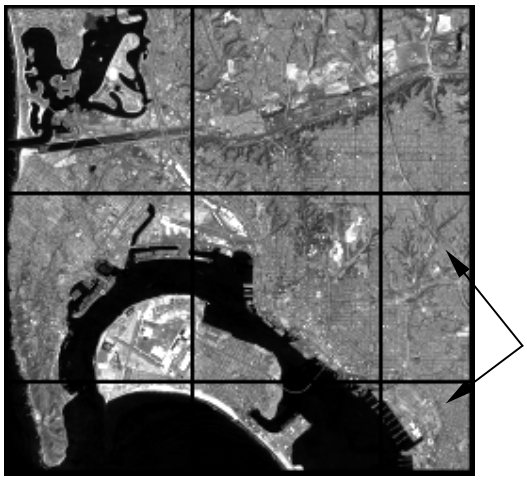
Tile number naming option

If you choose to name tiles by tile number, the tiles are created in sequence starting from the upper-left tile and finishing at the lower-right tile. The number of digits in the tile names are automatically adjusted depending on the total number of tiles to be created. If you are creating fewer than 100 tiles, for example, tiles will be named 01.alg, 02.alg, and so on. If you are creating more than 99 but fewer than 1000 tiles, tiles are named 001.alg, 002.alg, and so on. A maximum of 99,999 tiles may be created.

When using this option, you can also specify the starting tile number (the number the wizard will assign to the first tile it creates). For example, suppose you are tiling two large mosaics each into 200 tiles as separate processes (400 tiles total). You might use a start number of 1 for the first set to create tiles named 001, 002 and so on to 200. Then start the second set at 201 to create tiles named 201, 202 and so on to 400. This avoids overlapping filenames. (The start number is only used if you select the tile number naming option, otherwise it is not used by the wizard.)

Trimming of last row or column

The wizard automatically trims the size of tiles in the last row or column if the tile extents would extend beyond the extents of the input algorithm. This feature avoids adding empty areas if no data exists there, and also honors the original extents of the input algorithm. If you select to cut your algorithm into an exact number of tiles, or specify a tile size that divides equally into your algorithm extents size, no trimming is needed. In the example below, tiles in the last column and row have been trimmed to the extents of the input algorithm:



Note: When exporting to ECW format, very small edge tiles may be too small to compress (files that would be < 100KB in size). An error message window will appear if this happens, and you will have to validate the error dialog to continue the tiling process. (The wizard cannot currently trap this error automatically.)

Evaluating the tiling results

Once you have subset your algorithm into tiles, you can easily evaluate the results by using ER Mapper's Image Display and Mosaic Wizard to mosaic all your image tiles together into a single mosaic image again. You can also load the individual tile algorithms one at a time and verify the size and extents using **View/Geoposition/Extents**.

Tip: It can also be helpful to generate a mosaic index map of your tiles. Create a mosaic with the Image Wizard, save the algorithm, then run the Create Mosaic Index Map Wizard and load the mosaic algorithm as input. A vector index map will be created that shows the extent and filename of each algorithm tile.

Creating tiles with overlap for reprojection

If you have a set of images that adjoin exactly with no overlap, reprojecting them may cause a 1-pixel gap in some areas when the reprojected images are mosaicked. One way to overcome this is to cut the original mosaic into tiles with a small overlap. Then batch reproject the files with overlap. (Only 2-3 pixels of overlap is needed.)

Creating map sheets

You can easily create individual map sheets from the tiles. Define the desired Page Setup parameters for the first tile, and create a vector image with any standard map items you desire. Once the first map sheet is done, you can quickly create the others using the Page Setup Wizard included with ER Mapper. (The Page Setup Wizard lets you use the first map sheet as a template to create all the others with the same parameters.)

Cutting up "raw" images

The wizard cannot cut up "raw" images that have not been geocoded to a datum and map projection. (The wizard checks this and informs you.) However, you can get around this if needed by modifying the image's header (.ers) file information to enter false projection information. To do this, open the image header editor (**Load Image/Info/Edit**). Click **Coord Space** and enter a datum, projection and units (not "RAW"). Click **Raster Info** and enter the X and Y cell sizes (the correct ones if you know them, other wise enter 1). Then click **Registration Point** and enter false values in the Easting and Northing fields (for example 1000 and 1000).

A registration coordinate (even a false one) is *very important* because the wizard uses this as the initial starting point and adds to and subtracts from it to calculate individual tile extents (so it can't be zero). Then save the changes, load your "false" geocoded image into an algorithm, and run it through the tiling wizard. (Use the row/column naming convention since the coordinates are false and would not make sense.)

Create Mosaic Index Map

This wizard lets you create an ER Mapper-format vector image showing the extents and image name of each image in a mosaic algorithm. This can be useful to visually locate each image quickly by filename within the whole mosaic, or to create an index map for use in map composition. The wizard creates a rectangular "index box" drawn to the exact corners of each image. Options and features include:

- Select the layer type in the algorithm for which index boxes will be created (Pseudo, Red, etc.).
- Print or not print the image name inside each index box.
- Assign a single color to all index boxes and text, or cycle through a set of rainbow colors (useful to assess boundaries of highly overlapping images).
- Set index box line thickness, and image name font, size and position (either the upper-left corner or roughly centered in the index box).
- For rainbow color index boxes, specify no fill, or stippled or diagonal line fill patterns for the index boxes.
- Export the index map vector file to Shapefile and DXF formats.
- Pop-up status dialog to indicate progress, including images found in the input algorithm.

Note: This wizard cannot operate on algorithms containing rotated images, and only images in the first surface of the algorithm are processed.

Preparing an algorithm for index map creation

Before running the wizard, you need to prepare an algorithm appropriately for index map creation. Since only images in the first surface are processed, images in other surfaces will be skipped. In addition, only images in a specific layer type are processed, and you can choose the type in the wizard. For example, if you have an RGB mosaic, you can choose Red, Green or Blue (or Intensity if used) as the layer type.

You may want to create a specific algorithm solely for use in creating the index map. This does not have to be enhanced in any way, it only has to contain the images you want to include in the index map. You can use ER Mapper's "Image Display and Mosaic Wizard" to do this if needed. Once the index map is created, you can display it on any other algorithm, for example a color balanced mosaic of all the images or an algorithm containing a Virtual Image mosaic.

As with all vector annotation in ER Mapper, it is desirable to setup a page size for your algorithm first before running this wizard. (This is not essential, but recommended.) The reason is that line thickness and text sizes are plotted relative to the algorithm page size. For example, if you choose an 8x10 inch page size and select 12 point text in the wizard, the 12 point text will appear in its correct size relative to the 8x10 inch algorithm page. If you do not setup a page size, the text may appear very large or the lines very thick because it is not being displayed proportional to the point sizes you selected.

Text size and position

You must choose a text size that will allow the text to fit inside the index box, so some experimentation may be needed to get the best result. Many different text size options are provided for different sizes and scales of maps. If you have very long image names, you can use the upper-left corner text position option to allow more room. The centered text position option does not center the text exactly within the box, only approximately. (Some slight shifting left or right is to be expected. You can try a smaller text size, or edit the vector image and move the text strings if needed.)

Exporting to Shapefile and DXF formats

The wizard can automatically export the ERV vector image it creates to Shapefile and DXF formats. The index boxes are encoded as polygons, so they can be reprojected if needed. The following considerations apply:

- Shapefiles will not contain the vector colors or text objects. The image filename for each index box is stored as an attribute in the Shapefile named "Erv_attr."
- DXF files will contain the polygon objects and line colors, but text will not be transferred. The image filename for each index box is stored as an attribute in the DXF named "Erv_attr."

Converting the index boxes to regions

Once you have created a vector index map, you can convert the index box rectangles to regions in a raster image. For example, save the mosaic algorithm as a Virtual Image (VDS), then convert the index map to regions in the VDS. This lets you perform "inregion" processing on specific image areas within the VDS, calculate separate statistics for each image area, and other possibilities. To do this, use the **Process/Polygon<->Region Conversion/Vector image polygons to Regions** option on the main ER Mapper menu. (The image names are stored as text attributes for the index box vector objects, so they become the region names after conversion.)

Using the index map in map composition

To plot your index map as a map object, first generate the index map using the "single color" option. Then display it in an algorithm and turn off any raster layers. If you want a black index map on a white background, for example, set the page background to white (in Page Setup), and the vector layer color in the algorithm to black. Save the algorithm, and plot it as a map object using the category "Algorithm" map object in annotation.

Create Rotated Clip Regions

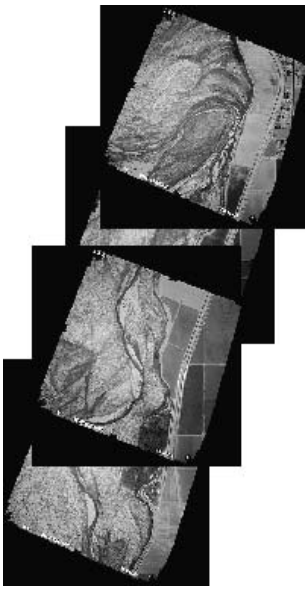
This wizard lets you create custom clip regions for a set of images in batch that mask out a specific percentage of the outer image area. The regions can also be rotated to aid mosaicking of images acquired on oblique flight lines. Features include:

- Specify different X (horizontal) and Y (vertical) percentages for clipping.
- Specify X and Y offsets to shift the region center to best fit images.
- Rotate clip regions to help fit them better on image sets acquired with oblique flight lines (i.e., not directly north or south).
- Preview the settings on any image, and adjust them as many times as needed to optimize the clip percentage and rotation.
- Specify the region name to used for all images.
- Automatically create a vector (ERV) index map showing the locations and overlap of all regions.
- Each image filename is encoded as the text attribute of it's corresponding polygon in the ERV index map vector file.

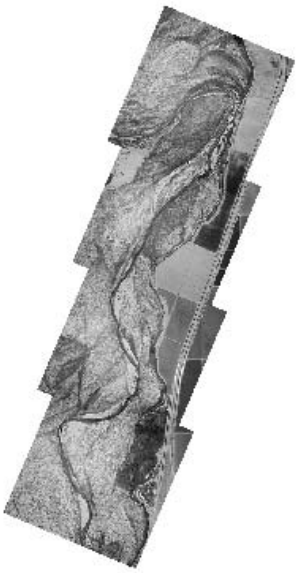
Why create rotated or percent clip regions?

This wizard lets you create clip regions that may help you achieve better results when mosaicking and/or color balancing images. For example, orthophoto images are sometimes acquired along oblique (non north-south) flight lines. So, although the images face north, they are rotated with large empty areas on the sides. This wizard can help by creating regions that match the image rotation, and that can clip out outer areas containing fiducial marks or dark edges. This can be useful even on images that are not rotated to create clip regions in batch with the same characteristics for all images.

These regions can be used as an alternative to the 'Image' and 'Image Clip' regions created automatically by ER Mapper's Image Balancing Wizard. (Sometimes these do not work well with rotated images.) Creating custom regions can also be useful when working with compressed images (ECW, JPEG, etc.) whose outer empty areas do not contain a single "null" value that can used to mask empty areas when mosaicking.



Original image mosaic



With rotated clip regions applied

How do I use the clip regions?

After creating the clip regions, you can use them with ER Mapper's Image Display and Mosaic Wizard, and also the Image Balancing Wizard:

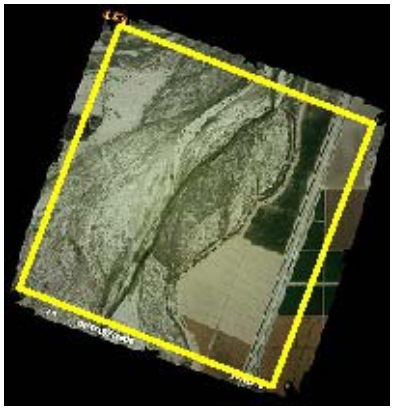
- With the Image Display and Mosaic Wizard, select 'Manually set mosaic method' on the first page, then 'Manually set mosaic properties' on the next page. One the next page, check the 'Use stitch region for mosaic' box and enter the name of the region (check spelling). Your clip regions will be applied when the mosaic is created.
- With the Image Balancing Wizard, select the 'Balanced with clip regions' option. On the next page, check the 'Use custom clip regions' box and enter the name of the region (check spelling). Your clip regions will be applied when the balanced mosaic is created.

Notes: Misspelling the region name will cause the wizard to fail in both cases above, so be sure it is correct. You can also apply the regions manually in the **Algorithm** dialog by loading the 'Inside region polygon test' formula from the Standard menu on the **Formula Editor** dialog, then selecting the region name.

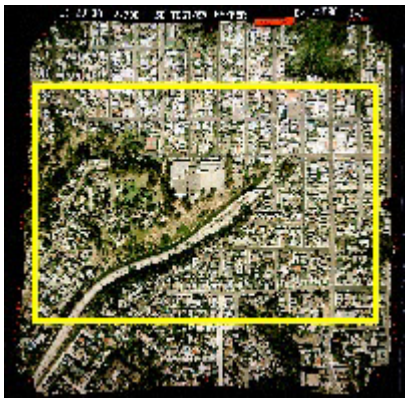
Using X and Y clip percentages

The X and Y clip percentage settings let you specify the amount of the image interior areas to retain in the regions. For example, a value of 80 for the X clip retains the interior 80% of the image, and clips out 10% on the left and right sides.

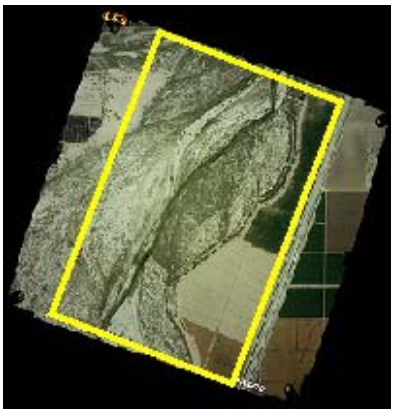
Xclip = 80, Y clip = 80



Xclip = 70, Y clip = 70



Xclip = 85, Y clip = 60



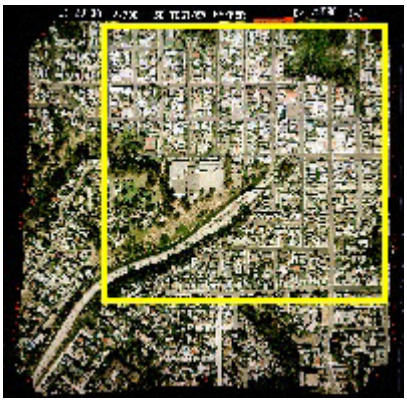
Xclip = 50, Y clip = 65

Using X and Y offset percentages

The X and Y offset percentage settings let you shift the center point of the region in any direction. Shifting the center point may help fit the regions better on images that have more image data on one side or another. When rotation is applied, regions are rotated around the center point.

X values move the clip region center left or right, Y values moves it up or down. Negative values (e.g., -10) move the X center left and the Y down. Positive values (e.g., 10) move the X center right and the Y up. Setting both values to zero uses the true center point of the image.

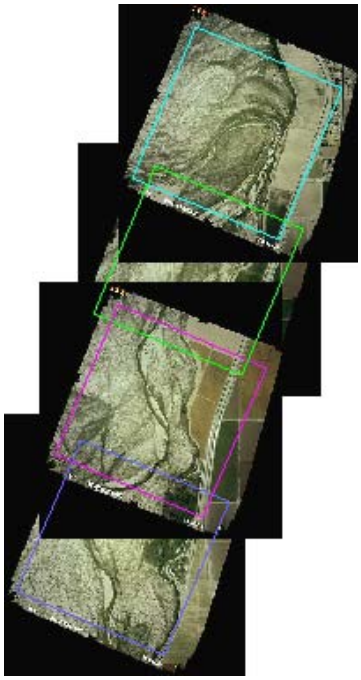
X offset = -10, Y offset = 0



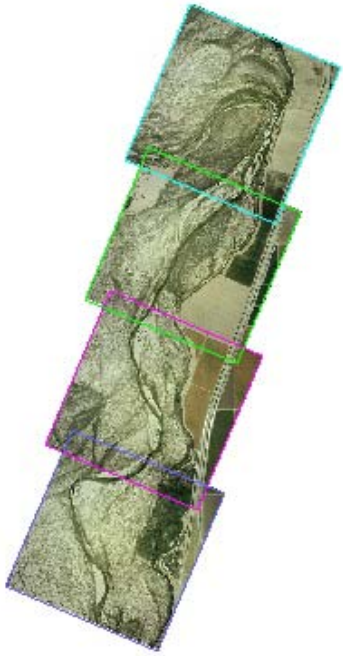
X offset = 10, Y offset = 10

The clip region index map vector file

When you select the option to create a vector file showing the region outlines, the wizard creates and ERV vector file with colored polygon for each region that was created. This vector file can then be overlaid on top of the image mosaic to help evaluate where the regions occur and how much overlap they have.



Region index map on original mosaic



Index map on region clipped mosaic

Using the index map to get image filenames

The vector index map file assigns the image filename as the text attribute for each polygon it creates. This can sometimes be helpful to get the filename of a specific image in a mosaic:

- Display the mosaic algorithm, then load the region index map in an Annotation/Map Composition layer.
- Click the Annotation layer's  button to open the **Tools** dialog.
- Click the  button on the **Tools** dialog to open the **Map Composition Attribute** dialog.
- Click the **Select**  button, then click on the polygon. The image filename appears in the **Map Composition Attribute** dialog.

Note: The order of polygon overlap in the vector file usually does not match the order of the images in the mosaic algorithm. (This is because the wizard is operating on the order of files in the directory which may be different than a mosaic.) To evaluate overlap, use the 'Create Mosaic Index Map' wizard with the mosaic algorithm. It will create the index boxes in the same order (display priority) as images in the mosaic algorithm.

Color Table Wizard

This wizard lets you interactively create ER Mapper color tables. You must restart ER Mapper after running the wizard so it recognizes your new color tables. Features include:

- Select up to seven colors graphically using the standard ER Mapper color chooser buttons, or type in RGB values or color names.
- Create smoothly interpolated or stepped color tables.
- Specify the color table filename and description.
- Automatically saves the new color table in ER Mapper's color table directory (/lut).

Creating color tables

This wizard is a graphical interface to the "makelut" command line program included with ER Mapper. (However, makelut does not let you create stepped color tables as this wizard does.) You can create color tables with from two to seven different colors. The wizard interpolates between the colors you choose to create a color table with smooth or stepped transitions.

It is recommended that you use fairly short filenames when creating your color tables because this is the name that will appear under the **Color Table** list in ER Mapper. You can easily experiment and quickly create several color tables, then delete the ones you don't like after restarting and viewing them ER Mapper. (To remove unwanted color tables, delete the files with ".lut" extensions in the ER Mapper's /lut subdirectory.)

Using new color tables

After creating new color tables with this wizard, you must close and re-start ER Mapper in order to use them. (ER Mapper reads the color table list upon startup, so new ones added while the software is running will not show up in the list.)

Default color table

When you close ER Mapper, it remembers the last color table selected. If you then delete this color table and restart, ER Mapper will complain that it cannot find the color table. Simply select a different color table, close a restart ER Mapper to correct this.

Smooth versus stepped color tables

Smooth color tables have a gradual transition between the colors you select in the wizard. The wizard uses ER Mapper's "makelut" program to create the color table, so the results are identical.

Stepped color tables have blocks of discrete color, and can have 4, 8, 16 or 32 "steps" of color. The stepped color table is created to include the top and bottom colors you select in the wizard as the first and last steps, and intermediate colors are created by evenly stepping through the remaining transitional colors in between. Stepped color tables are commonly used for topographic and contour maps, and are useful as an alternative to ER Mapper's "level slice" transform.

Run Algorithm Slideshow

This wizard lets you display all algorithms in a directory one after another, so you can create your own "slideshow." This is handy for self-running demos at tradeshows, or easily cycling through a series of algorithms during a presentation. Options and features include:

- Automatic (unattended) or manual control
- Number of cycles to run, time between images and image window size (for automatic control)
- Start, move ahead or move back one slide (algorithm) for manual control.
- Automatically shapes each image window to fit the current algorithm shape, and lets you select the maximum allowable window size.
- Preferences to remember the algorithm directory and other settings from the last time the wizard was run.
- Pop-up status dialog to indicate slideshow progress, including start of new cycle (for Automatic control) and current algorithm name.

Auto vs. manual control

Automatic control lets you run the slideshow unattended, and it ends when the number of cycles through the algorithms has been completed. This is typically used for self-running demonstrations. You can kill the slideshow early by closing the image window, but an error message will appear when the next algorithm tries to load into a non-existent window. You can resize the image window at any time and it will be used for all other algorithms.

Manual control lets you cycle through the algorithms, advance or back up at your direction. This is typically used for presentations. Be sure to wait until the current algorithm finishes displaying before clicking the "Next slide>>" or "<<Previous slide" buttons. (They do not take effect until the current algorithm completes.) You can resize the image window at any time and it will be used for all other algorithms.

Note: Do not switch between auto and manual control in the same session. Instead, close the wizard and restart it.

Algorithm display order

Algorithms are displayed in alphabetical order, or as they appear in a directory listing. One way to specify an exact order is to name them with filenames starting with 2-digit numbers. For example:

01_1985_image.alg

02_1992_image.alg

03_1999_image.alg

•

•

•

12_1992_1999_change.alg

Maximum image window size

The wizard automatically resizes the image window to fit the shape of the algorithm as each one is displayed. You can specify the maximum image window size (in screen pixels) that you wish to use, so you can tailor the image displays to a particular monitor or screen size. If you specify a maximum of 600, for example, windows will never be taller or wider than 600 pixels.

Time between images setting

When using automatic control, the "Time between images" setting controls the amount of time the wizard waits before loading the next algorithm. This time does *not* include the time it takes for raster or vector processing or 3D rendering. (That is, the time period starts *after* processing completes.)

However, time to render terrain detail levels for 3D algorithms *is* included. This means that using low time settings (such as 5 seconds), some 3D algorithms with high terrain detail settings may not finish fully rendering detail before the next algorithm starts loading. If this happens, use a larger setting for "Time between images" to let detail levels fully render (or reduce the terrain detail setting for the algorithm).

Troubleshooting

This section provides information on troubleshooting and reporting problems.

Common mistakes, questions, and tips

This section lists common mistakes that new users especially may encounter when running the wizards, and tips on how they actually work that may be helpful. Please look through this list thoroughly before reporting problems.

Preparing directories of files for input to the wizards

Several of the wizards read a directory of files and perform operations on them (import, rectification, etc.). Since the wizard is designed to run unattended in batch, it is *very important* to make sure that all files in the input directory are set up correctly so they can be run through the wizard without problems.

For example, if you want to rectify all images in a directory, be sure ahead of time that they all have GCPs selected and the appropriate number for the polynomial order you plan to select in the wizard. Also, be sure that you have write access to output directories, and enough disk space to store all the output files.

Specifying input or output directories

Several of the wizards require you to specify input and/or output directory locations.

- In most cases, the wizards determine the input directory by asking you to select one file that directory, then get the directory path from that file. (The "Export Images in Batch" wizard will ask for an input directory directly.)
- For output, you to choose a directory directly by clicking the file chooser button, clicking once on the desired directory folder, and then clicking the 'Select' button. (Typing directory paths manually is not recommended because of syntax errors.)

For output files directories, the wizards usually set the input directory as the default output directory. You can change this as desired, and in some cases you will be asked to change it. *Be sure you have write permissions to the output directory* or the wizard cannot write files to it. Also, be sure your output directory is not referencing a CD-ROM or other non-writable drive.

File not found errors

Error messages indicating that no files were found are usually due to incorrect directory specification or directory does not have read access.

Could not open file errors

Errors indicating that an output file could not be opened are usually due to one of two things:

- Incorrect directory specification.
- You do not have write permission to the output directory you specified.

Maximum number of files in a directory

Wizards that are designed to read a list of files from a directory have been tested with up 1500 files in a directory. Although the wizards are designed to read an unlimited number, there may be a limit encountered at the system level. If this happens, split your files into groups (directories) of fewer files and run the wizard again.

Import wizard may "hang" on invalid files

The "Import Images in Batch" wizard will attempt to skip over an invalid file if possible and move on to try the next one. However, this is not always possible, and the wizard may "hang" sometimes if an invalid file is encountered. (This is especially known for invalid TIFF files.) If this happens, you may need close and restart ER Mapper to kill the process.

If a file does not import, try opening or importing it with the standard ER Mapper interface. If it does open or import there, report the problem (see the "Reporting Problems" section). If it does not import, you need to open the file in a graphics editor and resave it in a format supported by ER Mapper.

GeoTIFF datum or projection not matched

When importing GeoTIFF files, the datum, projection and other georeferencing information is encoded automatically in the output ER Mapper image during the import. However, if the projection in the GeoTIFF file has no direct match in ER Mapper's projection database, the georeferencing information may not be set automatically and defaults are used. You can see the datum and projection assigned by opening the GeoTIFF file using **File->Open** in ER Mapper.

Imported TIFF or JPEG with World files don't mosaic correctly

When importing TIFF or JPEG with World files, or creating ERS headers for them, you must specify the datum and projection of the TIFF or JPEG images. This is needed because the World file format does not contain this information, but ER Mapper needs it to properly register each image.

If the images are not properly registered after import or header creation, the usual reason is that you selected the wrong datum or map projection for the images. If you do not have this information, contact the person who gave you the TIFF or JPEG files and have them get this information. If your data is in a US State Plane projection, be sure you select the correct ER Mapper projection for feet or meter versions of those projections.

World files or GeoTIFF Info not generated for TIFFs or JPEGs

The setting for adding creating World files for exported TIFF or JPEG images internal to ER Mapper. To create World file for exported images, select **Edit->Preferences** in ER Mapper, click the **General** tab, then turn on the 'Write world file on save' option.

GeoTIFF information (tags) are added to the output TIFF files if either 'Add GeoTIFF information' is turned on in the wizard *or* in ER Mapper's **File->Save As->TIFF->Options**. If you do not want GeoTIFF files, then 'Add GeoTIFF information' *must be turned off in both places*. (If either is on you will get GeoTIFF files.)

Stretched or compressed TIFF files

If your input ER Mapper images have different X and Y cell sizes and you export these to TIFF or JPEG images, these images may appear stretched or compressed when viewed in products that do not understand georeferencing (e.g., Photoshop, etc.) This is not a bug, but a limitation due to the inability of those products to understand the concept georeferencing and different X and Y pixel sizes.

If you have images with different X and Y cell sizes and want to output a "universal" TIFF file that will display correctly in any product, you can resample them to a common X and Y cell size by selecting to resample the cell size when exporting the images. (The 'Export Images in Batch' and 'Cut Algorithm into Image Tiles' wizards both provide this option.)

Very large or small rectified, resampled or rotated files

When rectifying, rotating, or resampling images, you may create very large or very small output files if you specify an output cell size that is not appropriate for your images. For example, if you are rectifying a 30-meter Landsat image and specify an output cell size of 10 meters, the output file will be nine times larger than the input file. Conversely, a 100-meter cell size would create a very small output file with much loss of resolution and image detail. Be sure you research and determine an appropriate cell size before running these wizards.

Empty space on sides of rotated images

Rotating images may create output images with extra empty (null) areas around the actual image data. This is a byproduct of the rotation process and cannot be avoided. It may be desirable to cut the empty areas out after doing the rotations by zooming in to data area and saving as a new image file.

Killing wizards

Once a wizard has begun batch processing at the system level, it may be difficult to stop or "kill" it. You can try by selecting **View/Batch Engine Script Control**, then clicking the **Cancel Script** button. This may not take effect immediately, but will typically work to kill the batch process after the current operation is completed (for example the current file being imported). As a last resort, you can kill the ER Mapper process ("g_ermapper.exe") at the system level and all batch script operations will also be closed down.

PC print wizard problems

If your algorithms begin the rendering stage before the current one has finished printing on your printer, your system may run slowly because the CPU is swapping between two operations at once. (Trying to print one image while rendering another.) If this happens, increase the timeout setting so your printer has time to complete the print before the next algorithm begins rendering.

As with printing directly from ER Mapper, you must have sufficient disk space to store temporary Postscript files that are created by ER Mapper when rendering vector layers in your algorithm. If you do not have sufficient disk space for this, printing may halt.

The PC Print wizard cannot be used to print to files, i.e., you cannot use Windows printer drivers that print to files instead of attached printers. The reason is that an individual filename would need to be assigned to each output file during the batch print run, and this cannot be controlled directly from within ER Mapper batch scripts. You will have to manually print each algorithm to a file instead.

Reporting problems

Earthstar Geographics provides basic support via email for these ER Mapper wizards. (Please do *not* contact Earth Resource Mapping or their resellers for support.) However, it is *very important* that you use all the resources provided here before emailing us with your problem. If you have a problem, please follow this procedure:

1) Thoroughly read all the documentation provided with the wizards. *Support will not be provided to those who unlawfully copied the software, and you may be asked to provide proof of purchase if you are not the purchaser of record.* Please do not send questions that you can answer yourself with a few minutes of investigation. (That is why this user guide and wizard online help are provided-please use them!)

2) Try the same operation (if applicable) through the standard ER Mapper interface. For example if a file does not import or a image does not rectify, try doing that as you normally would in the ER Mapper interface. If the file fails there as well, it is *not* a problem with the wizard, but a problem with your data or limitation inherent in ER Mapper.

   Note: If applicable, open the log file created by the wizard and read any error messages. When possible, system messages are written to the log file and this may provide clues as to why the process failed.

3) After you have tried 1 and 2 above, email your problem to this address:

   `esgwizards@es-geo.com`

   Be sure to specify the following information in your message:

   - Your name, company, telephone number and email address.
   - Operating system (Win95 or 98, or WinNT/2000 or XP).
   - Wizard exhibiting the problem.
   - Input to the wizard and output you expected to achieve.
   - Copy of the log file created by the wizard (if applicable).
   - Complete description of the problem *with as much detail as possible, including all options you selected in the wizard and any error messages.* Please avoid simple descriptions like "it doesn't work." Questions cannot be answered unless you clearly define the problem the first time.

All attempts will be made to answer support queries in a timely manner, however it may sometimes require 3-5 working days for a response due to vacations and travel.

Enhancement requests

Feel free to email any enhancement requests to us, or requests for new wizards you would find useful. We will log these and evaluate them for inclusion in future releases of the wizards. (We also perform custom wizard development to your specifications if desired.)

Please send email about enhancements to the following address with the title "wizard enhancement request."

esgwizards@es-geo.com