User Guide to the ESG MrSID Tools

for ER Mapper

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This document is a user guide to running the "ESG MrSID Tools for ER Mapper. These wizards are developed, maintained and supported by Earthstar Geographics (ESG), and use programs proprietary to LizardTech, Inc.

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Overview and Installation

The ESG MrSID Tools for ER Mapper are designed to help ER Mapper users to get information about MrSID image files and convert them to TIFF and ECW image formats. They are essentially "wizard" interfaces to two command line programs provided free of charge to the public by LizardTech, Inc (mrsiddecode.exe and mrsidinfo.exe).

Important: The ESG MrSID Tools for ER Mapper do *not* allow direct viewing of MrSID images in ER Mapper. The wizards must convert the images to another format which can be read by ER Mapper. In addition, you must download the command line programs from LizardTech's website as we cannot include them with the wizards due to license restrictions.

The ESG MrSID Tools for ER Mapper include the following four wizards:

Get MrSID Image Info–Generates information about all MrSID images in a directory, and also in all directories at the same level. It can create a summary log file for all MrSIDs, create a detailed metadata file for each MrSID, and show total uncompressed file size of all MrSIDs.

Create Thumbnails of MrSID Images–Generates low resolution preview (thumbnail) versions of all MrSID images in a directory, and also in all directories at the same level. A fast way to see what the images look like, build a mosaic or analyze coverage without converting them at full resolution.

Convert MrSID Images to GeoTIFF–Lets you convert a single MrSID or all in a directory to GeoTIFF format. Includes automatic options to divide large MrSIDs into multiple GeoTIFF images (tiles) if needed or desired.

Convert MrSID Images to ECW–Lets you convert a single MrSID or all in a directory to ECW format. Uses TIFF as an intermediate image format before converting to ECW.

Limitations of these wizards

These wizards have only been tested with 1-band (greyscale) and 3-band (RGB) 8-bit MrSID images. Unknown results may occur for other types of MrSID files. The wizards handle both MG2 (older) and MG3 (newer) MrSID formats.

The performance (speed of processing or conversion) is obviously better on high-end PCs with fast processors and lots of RAM. Even on high-end PCs it can take quite a while to convert very large MrSID images. Conversion of many large files should be planned for over night or weekends. (Test one to get an idea of processing time.) Smaller images (less than 500MB uncompressed) are converted fairly quickly.

Downloading the required LizardTech programs

These wizards utilize programs provided by LizardTech, Inc. that you must download yourself because we cannot be distribute them according to the license agreement. We cannot take responsibility for your ability to download these, so we recommend that you do this before purchasing these wizards. At the time of this writing, the two programs could be downloaded using the instructions below. (If they change, access the main LizardTech website and look for them.)

1) Go to this URL address on the LizardTech website:

   `http://www.lizardtech.com/download/dl_options.php?page=tools`

2) Download the "MrSID Info" and "MrSID Decode" programs (Windows versions). You will asked to agree to the license agreement.

3) Unzip the downloaded EXE files into a directory on your PC.

The wizards will ask for the location of these programs the first time you run them, and will remember them after that.

System requirements

To run these wizards, you must have a licensed copy of ER Mapper and have installed the LizardTech programs mentioned previously.

ER Mapper version required: 6.0 or higher
Disk space required: less than 1 MB (not including MrSID programs)

Installing the wizards

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 "esgsidtools10.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 MrSID Tools** from the **Toolbars** menu to display the MrSID Tools 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.) Before running the wizards, you must also download the command line programs from LizardTech as decribed previously.

Accessing the wizards within ER Mapper

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

The **ESG MrSID Tools** toolbar is setup with four buttons; each starts up a wizard with a graphical interface. 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.

Uninstalling the wizard files

There is no "uninstall" utility. However, the wizard files take up very little disk space (less than 1MB) and will not impact other software products.

How to tell your wizard version

To determine which version of the ESG MrSID Tools you have installed, click the 'Help' button on the first page of any wizard. The version described in this document is 1.0.

I Get MrSID Image Info

The Get MrSID Image Info wizard lets you generate a variety of information about the MrSID images that can helpful for understanding their characteristics. You can have the wizard generate information for all images in a directory, and also in all directories at the same level. The first time you run the wizard you will be asked to load the "mrsidinfo.exe" file, and it will remember this location in the future. The two information options are:

Create summary log file for all MrSIDs

This option creates a log file named "mrsid_summary.log" in the selected input directory that lists basic information about each MrSID image. It also shows the total uncompressed file size of all MrSID images at the end. An example is shown below:

```
--- MRSID SUMMARY LOG FILE ---
Master input MrSID images directory: C:\MrSID_Files
Total MrSID images to be processed: 7
MrSIDs in following directories to be processed:
   C:\MrSID_Files
---------------------------------------------------------
File: C:\MrSID_Files\38121D31.sid
   Image height (lines/rows): 7649 pixels
   Image width (cells/columns): 6272 pixels
   Number of bands: 1
   Uncompressed file size: 45.75MB (0.04GB)
---------------------------------------------------------
File: C:\MrSID_Files\N-14-15.sid
   Image height (lines/rows): 39013 pixels
   Image width (cells/columns): 53184 pixels
   Number of bands: 3
   Uncompressed file size: 5936.24MB (5.8GB)
     .
     .
     .
     . (more files)
     .
     .
---------------------------------------------------------
TOTAL COMBINED UNCOMPRESSED FILE SIZE: 16.45GB
---------------------------------------------------------
```

Create metadata file for each MrSID

This option creates a text metadata file for each MrSID that lists details about the image. The metadata date file has the same filename as the MrSID with a ".met" extension attached. An example is shown below:

```
basic image info:
  format:           MRSID
  width:            6272
  height:           7649
  nband:            1
  color space:      GREYSCALE
  datatype:         uint8
  dyn range min:    (natural)
  dyn range max:    (natural)
  background color: (0)
  nodata color:     (none)
  metadata records: 30

geo coordinate info:
  X UL:             641307.500000
  Y UL:             4262943.500000
  X res:            1.000000
  Y res:            -1.000000
  X rot:            0.000000
  Y rot:            0.000000

geo points (pixel centers):
  upper left:       (641307.500000, 4262943.500000)
  upper right:      (647578.500000, 4262943.500000)
  lower left:       (641307.500000, 4255295.500000)
  lower right:      (647578.500000, 4255295.500000)
  center:           (644443.000000, 4259119.500000)

MrSID-specific image info:
  number of levels: 4
  is locked:        false
  file version:     1.0.1.

MrSID/MG2-specific image info:
  is dithered:      true
```

Create Thumbnails of MrSID Images

The Create Thumbnails of MrSID Images wizard lets you generate small size, low resolution preview (thumbnail) versions of MrSID images in a directory, and also in all directories at the same level. Since MrSID images cannot be viewed directly in ER Mapper, this wizard provides a fast way to see what the images look like, build a mosaic or analyze coverage without converting them at full resolution. The first time you run the wizard you will be asked to load the "mrsidinfo.exe" and "mrsiddecode.exe" files, and it will remember their locations in the future.

The wizard lets you reduce MrSID images to sizes ranging from 250x250 to 3000x3000 pixels. (Larger sizes obviously contain more image detail.) Output images will be equal to or less than the size option you select.

The wizard works by selecting the level of the MrSID image that is closest to the size you requested. In some cases, if an image cannot be output at the size you select, the next size up will be used. (This depends on the number of levels in the MrSID image.) Output formats are GeoTIFF or JPEG with World files.

Note: Output thumbnail images contain registration information (via World files or GeoTIFF tags), but not datum or projection information. This means that the images can be displayed or mosaicked in ER Mapper. However, the datum and projection will be read as WGS84/LOCAL in ER Mapper, so their Latitude Longitude cannot be displayed. To generate ERS headers for the images with the correct datum and projection, use the "Change Datum/Projection" wizard on ER Mapper's Batch Processing toolbar. Then Latitude Longitude can be calculated based on the map projection.

Convert MrSID Images to GeoTIFF

The Convert MrSID Images to GeoTIFF wizard lets you convert a single MrSID or all in a directory to GeoTIFF format. Since large MrSID files may not be able to be saved to a single GeoTIFF file (due to file size limits of the TIFF format), the wizard includes automatic options to divide large MrSIDs into multiple GeoTIFF images (tiles) if needed or desired. World (.tfw) files are automatically generated for each GeoTIFF image. The first time you run the wizard you will be asked to load the "mrsidinfo.exe" and "mrsiddecode.exe" files, and it will remember their locations in the future.

Note: GeoTIFF files generated by the "mrsiddecode" program do not contain embedded datum, projection or units information (since it is not contained in the MrSID format).

File naming for single versus multiple file conversions

The wizard works the following way regarding output filenames and locations:

- If you choose to convert a single MrSID image to GeoTIFF, you are prompted to select the output filename (and you can use any name you want).

- If you choose to convert a directory of MrSID images to GeoTIFFs, you are prompted to select the output directory. Output GeoTIFF files get the same base filename as the corresponding MrSID image (i.e., image01.sid gets converted to image01.tif). Since the extensions are different, output files can be written to the same directory as the input MrSID files.

Dividing MrSID images into multiple GeoTIFFs

Although the TIFF 6.0 format specification allows single TIFF files up to 4GB in size, we use 2GB as a practical limit. The wizard determines when to cut a MrSID image into multiple GeoTIFFs using the following criteria:

- If the image (or all images in the directory) are less than 500MB when uncompressed, they are converted to single GeoTIFF files.

- If the image (or all images in the directory) are greater than 500MB but less than 2GB when uncompressed, you are given the option to divide them into multiple GeoTIFFs and the maximum tile size you desire. The images are divided into GeoTIFF tiles of equal size. (Files less than 500MB uncompressed are always output to single GeoTIFFs.)

- If the image (or all images in the directory) are greater than 2GB when uncompressed, all are automatically divided into multiple GeoTIFFs. You can control the number of tiles generated by specifying the maximum tile size between 100MB and 2GB (smaller tiles equals more files). The images are divided into GeoTIFF tiles of equal size. (Files less than 500MB uncompressed are always output to single GeoTIFFs.)

GeoTIFF tiles are automatically named according to a row/column convention, where the tile in the upper-left corner is row 1 column 1 (r1c1), and the tile in the lower right corner is the last row and last column (depending on the number of tiles created). The row and column number are appended to the input MrSID file name, so the image "image.sid" would be divided into GeoTIFF tiles named "image_r1c1.tif," image_r1c2.tif," and so on.

r1c1	r1c2	r1c3	r1c4
r2c1	r2c2	r2c3	r2c4
r3c1	r3c2	r3c3	r3c4
r4c1	r4c2	r4c3	r4c4

Checking for sufficient free disk space

After you have specified which image (or images) you want to convert, the wizard will run through the file list and attempt to check if there is enough free disk space on the output drive to save the GeoTIFF image (or images). It reads the metadata for each image and totals the amount of disk space required to create uncompressed GeoTIFF files. If it warns that there is not enough, you should free the required amount of disk space before continuing. (The Get MrSID Image Info wizard can also be used to check the total uncompressed file size, which is the same as the this wizard is doing.)

The strip size setting

The "Strip size" setting sets the pixel height of data strips to be extracted (amount of MrSID image data) by the "mrsiddecode" program as it processes a file. Larger strip sizes should enable faster conversion of very large MrSID images (but will use more memory). For PCs with less RAM, use smaller strip sizes. For PCs with 1GB or more of RAM, use the highest setting (1024) to get the fastest output speed. (Experiment for best results.)

Note: The "mrsiddecode" program appears to be single-threaded, so you may not see any performance gains when running on multi-processor PCs.

Output run with DOS batch (.bat) files

After the wizard has assembled all the required information and your requested settings, it creates a DOS batch (.bat) file that is used to actually run the conversion process. This allows the process to run in the background independent of ER Mapper. The batch file is named "sid_to_tiff.bat" and is stored in the output directory you select.

You can run this file immediately by double-clicking on it in Windows Explorer. You can start the process at a specific time by using Windows Scheduled Tasks (Start->Control Panel->Scheduled Tasks). A command (DOS) window opens to show the current status of the job.

It is also possible to create several BAT files to process different sets of images and run them in a staggered fashion (over a weekend for example) using Scheduled Tasks. This may be necessary if you have multiple MrSID images in different map projections (which may need to be processed in separate groups). Since all batch files get the same name ("sid_to_tiff.bat"), make sure you rename them before creating a new ones to avoid overwriting existing ones.

Note: If you need to stop a batch job, open the Task Manager, click on the "CMD.EXE" image name, then click **End Process**. Then stop the current file's conversion by clicking on "mrsiddecode.exe" and clicking **End Process**.

Adding datum and projection information

One of the weaknesses of the MrSID image format is that it does not contain embedded datum and projection information. Because of this, output GeoTIFFs produced by the "mrsiddecode" program also do not contain it. (They do contain registration coordinate and pixel size info, so the images can be mosaicked if needed.) To help you use the images in ER Mapper, the wizard prompts you to select the proper ER Mapper datum and projection information.

If you add this information, then the GeoTIFFs will be fully georeferenced when opened in ER Mapper (Latitude Longitude can be calculated, etc.). The wizard does this by generating an ERS header file for each GeoTIFF with the datum and projection information included. If you don't (i.e., leave the defaults), the images will be treated as being in the "LOCAL" projection when opened in ER Mapper. (ERS headers are still generated in case you want to change them later.)

If your MrSID images are in a foot-based map projection (such as US State Plane projections in feet), select **Feet** for **XY Units**. If you do not do this, the GeoTIFF images may not be georeferenced or mosaic properly. If your images are in the Geographic (Lat Long) projection, select the "GEODETIC" projection and **Degrees** for **XY Units**.

Note: To create "true" GeoTIFFs with embedded datum and projection information, you must write a new set of GeoTIFFs from ER Mapper. (I.e., open the GeoTIFF created by this wizard, then do a File->Save As to a new GeoTIFF file.)

Convert MrSID Images to ECW

The Convert MrSID Images to ECW wizard lets you convert a single MrSID or all in a directory to ER Mapper's ECW compressed image format. Since it is not possible to convert directly from MrSID to ECW, TIFF is used as an intermediate image format during the conversion. When an ECW file is completed, any intermediate TIFFs are automatically deleted. The first time you run the wizard you will be asked to load the "mrsidinfo.exe" and "mrsiddecode.exe" files, and it will remember their locations in the future.

Note: The conversion from MrSID to ECW adds additional wavelet artifacts to the ECW files since the imagery is being compressed for a second time. These usually do not substantially affect the quality of the data, but should be noted. Lower target compression ratios can be used to minimize this effect.

File naming for single versus multiple file conversions

The wizard works the following way regarding output filenames and locations:

• If you choose to convert a single MrSID image to ECW, you are prompted to select the output filename (and you can use any name you want).

• If you choose to convert a directory of MrSID images to ECWs, you are prompted to select the output directory. Output ECW files get the same base filename as the corresponding MrSID image (i.e., image01.sid gets converted to image01.ecw). Since the extensions are different, output files can be written to the same directory as the input MrSID files.

MrSID to TIFF to ECW conversion sequence

When needed, the wizard automatically divides (tiles) a MrSID image into multiple GeoTIFF files that are then used to create the ECW image. Following is how the wizard operates depending on the uncompressed size of the MrSID image:

- If a MrSID image is less than 500MB when uncompressed, it is converted to a single GeoTIFF which is then compressed to an ECW image file. The intermediate GeoTIFF is then deleted.

- If an image is 500MB or more when uncompressed, it is first divided (tiled) into multiple GeoTIFFs. Then an ER Mapper Algorithm (.alg) file is created to mosaic the GeoTIFFs, and the algorithm is then compressed to a single ECW file. When the ECW is completed, all intermediate TIFFs and the algorithm file are deleted.

Important: *Do not delete* algorithm (.alg) files created by the wizard in the output directory or the compression to ECW will fail. They will automatically be deleted during processing when no longer needed.

Checking for sufficient free disk space

After you have specified which image (or images) you want to convert, the wizard will run through the file list and attempt to check if there is enough free disk space on the output drive to create the ECW file (or files). As a rule of thumb, you must have enough space to store all the ECW files as well as space to store intermediate GeoTIFF files for the *largest* MrSID image. After each ECW is created, the wizard deletes intermediate TIFFs to help reduce the amount of disk space required to the minimum possible.

You should make sure you have enough space beforehand plus a reasonable extra margin to avoid problems. (The Get MrSID Image Info wizard can also be used to check the total uncompressed file size, from which you calculate rough estimate of how much space will be needed and the uncompressed size of the largest file.)

The strip size setting

The "Strip size" setting sets the pixel height of data strips to be extracted (amount of MrSID image data) by the "mrsiddecode" program as it converts a file to GeoTIFF format. Larger strip sizes should enable faster conversion of very large MrSID images (but use more memory). For PCs with less RAM, use smaller strip sizes. For PCs with 1GB or more of RAM, use the highest setting (1024) to get the fastest output speed. (Experiment for best results.)

Note: The "mrsiddecode" program appears to be single-threaded, so you may not see any performance gains for the MrSID to GeoTIFF stage when running on multi-processor PCs. The ECW compressor is multi-threaded, so the GeoTIFF to ECW stage will take advantage of multi-processor PCs.

Output run with DOS batch (.bat) files

After the wizard has assembled all the required information and your requested settings, it creates a DOS batch (.bat) file that is used to actually run the conversion process. This allows the process to run in the background independent of ER Mapper. The batch file is named "sid_to_ecw.bat" and is stored in the output directory you select.

You can run this file immediately by double-clicking on it in Windows Explorer. You start the process at a specific time by using Windows Scheduled Tasks (Start->Control Panel->Scheduled Tasks). A command (DOS) window opens to show the current status of the job.

It is also possible to create several BAT files to process different sets of images and run them in a staggered fashion (over a weekend for example) using Scheduled Tasks. This may be necessary if you have multiple MrSID images in different map projections (which may need to be processed in separate groups). Since all batch files get the same name ("sid_to_tiff.bat"), make sure you rename them before creating a new ones to avoid overwriting existing ones.

Note: If you need to stop a batch job, open the Task Manager, click on the "CMD.EXE" image name, then click **End Process**. Then stop the current file's conversion by clicking on "mrsiddecode.exe" or "ecw_compress.exe" and clicking **End Process**.

Adding datum and projection information

One of the weaknesses of the MrSID image format is that it does not contain embedded datum and projection information. Because of this, intermediate GeoTIFFs produced by the "mrsiddecode" program also do not contain it. The wizard therefore prompts you to select this information so it can applied to the output ECW images.

By adding the projection information, output ECW files will contain embedded datum and projection information, which is usually preferred. The wizard does this by generating an ERS header file for each intermediate GeoTIFF with the datum and projection information included. If you don't select the correct projection (i.e., leave the defaults), the output ECWs will be generated with a default placeholder datum of "WGS84" and a projection of "LOCAL." This can OK for some applications, but creating ECWs with proper embedded projection information is usually preferred.

If your MrSID images are in a foot-based map projection (such as US State Plane projections in feet), select **Feet** for **XY Units**. If you do not do this, the ECW images may not be georeferenced or mosaic properly. If your images are in the Geographic (Lat Long) projection, select the "GEODETIC" projection and **Degrees** for **XY Units**.

Technical Support

The ESG MrSID Tools for ER Mapper are supported by Earthstar Geographics. You can send email to esgwizards@es-geo.com for technical support questions.

Questions or problems regarding the "mrsidinfo" and "mrsiddecode" programs must be addressed to LizardTech, Inc. as they are the developers of those programs. You can send them the .bat files generated by these wizards to document how the programs were being run.