

LizardTech

# GeoExpress

**Command Line Applications**

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# Command Line Applications

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## Command Line Applications Overview

GeoExpress Command Line Applications are free tools that you can use to interact with MrSID and JPEG 2000 images.

The following utilities are included in the free Command Line Applications:

- mrsidgeodecode. Convert a MrSID or JPEG 2000 image to an uncompressed image format.
- mrsidgeoinfo. Display information about images in several common image formats.
- mrsidgeometa. Edit metadata for a MrSID or JPEG 2000 image.

### mrsidgeoinfo

The mrsidgeoinfo tool displays basic information about an image, such as width, height, file format, and more. Various image formats are supported. For compressed images, GeoExpress also displays the compression ratio of the image and the nominal size.

*TIP: For MrSID images, the mrsidgeoinfo tool also displays the generation of the MrSID format used during compression. For example, the tool displays that the image is stored in the MrSID Generation 4 (MG4) format.*

## Switches

### File Control

mrsidgeoinfo File Control Switches

Switch	Value	Notes
-input-format/-if	string	<p>Identifies the input file format. Accepted values are:</p> <ul style="list-style-type: none"> <li>tif – TIFF 6.0</li> <li>bil – (a BBB format) Band interleaved by line</li> <li>bip – (a BBB format) Band interleaved by pixel</li> <li>bsq – (a BBB format) Band sequential</li> <li>doq – Digital Orthophoto Quadrangle (DOQ)</li> <li>doq_nc – DOQ (no clipping)</li> <li>ras – Sun Raster</li> <li>lan – ERDAS LAN</li> <li>sid – MrSID</li> <li>jpg – "old-style" JPEG (not JPEG 2000)</li> <li>jp2 – JPEG 2000</li> <li>bmp – Windows bitmap (BMP)</li> <li>nitf – National Imagery Transmission Format 2.0 and 2.1 (NITF)</li> <li>img – ERDAS Imagine</li> </ul>
-mosaic/-mos		Identifies the input file as an AUX file of mosaic images. Using the <code>-mosaic</code> switch creates a flat output file.

### Main Switches

Main mrsidgeoinfo Switches

Switch	Value	Notes
-metadata/-meta		Show metadata tags and values.
-tiles/-tile		Show tile information (composite MG3 only).
-genProfile/-prof	string	Generate JP2 profile.

Switch	Value	Notes
-worldFile/-wf		Generate world file.
-ignoreWorldFile/-ignorewf		Ignore georeferencing from world files.
-tifwOverride/-tifw		Use .tifw file (for TIFF images only).
-projectDims/-dims		Show image dimensions at various resolution levels.
-wkt		Display any well-known text string (WKT) information for the image.
-aoi		Display any area of interest (AOI) information for the image.
-inputFile/-input	string	Name of input file (required).
-stats		Display image statistics for each image band. The image statistics include the minimum value, the maximum value, the mean value, and the standard deviation.

## Other Switches

### Other mrsidgeoinfo Switches

Switch	Value	Notes
-h/-?		Show short usage message.
-help		Show detailed usage message.
-version/-v		Show version information.
-quiet		Don't show informational message.
-log	string	Write output to log file.
-progress	string	Progress meter style. Acceptable values: none default timer

## Examples

In the following example, the command displays the basic image information for a MrSID image named "image.sid":

```
mrsidgeoinfo image.sid
```

In the following example, the command line displays the basic image information and the metadata for a TIFF image named "foo.tif":

```
mrsidgeoinfo -meta foo.tif
```

In the following example, the command line displays metadata information for an AUX file containing JPEG format images named "mosaic.txt":

```
mrsidgeoinfo -mos -if jpg mosaic.txt
```

## mrsidgeodecode

The mrsidgeodecode tool extracts (decodes) all or a portion of a MrSID or JPEG 2000 image to one of several image formats.

## Switches

### File Control

mrsidgeodecode File Control Switches

Switch	Value	Notes
-input/-i	string	Input file (required).
-output/-o	string	Output file (required).
-outputFormat/-of	string	Output image format. Acceptable values:  tif - TIFF  tifg - GeoTIFF  jpg - JPEG (not JPEG 2000)  bil - (a BBB format) Band interleaved by line  bip - (a BBB format) Band interleaved by pixel

Switch	Value	Notes
		bsq – (a BBB format) Band sequential bmp – Windows bitmap (BMP)
-inputFormat/-if	string	Input image format

## Main Switches

### Main mrsidecodecode Switches

Switch	Value	Notes
-watermarkFile	string	Watermark file
-watermarkPosition	string	Position of watermark. Acceptable values: center center_left center_right upper_left upper_center upper_right lower_left lower_center lower_right (default)
-dynRangeMin/-drmin	uint	Minimum dynamic range.
-dynRangeMax/-drmax	uint	Maximum dynamic range.
-autoDynRange/-drauto		Automatic dynamic range adjustment.
-worldFile/-wf		Generate world file.
-stripHeight/-sh	uint	Strip height.
-endian	string	Endianness (BBB output only). Acceptable values: little big
-bsq		Output is .bsq (BBB output only).

## MrSID Options

mrsidgeodecode MrSID Switches

Switch	Value	Notes
-password/-pwd	string	Password to decode image.

## JPEG 2000 Options

mrsidgeodecode JPEG 2000 Switches

Switch	Value	Notes
-qualityLayers/-layers	uint	Number of quality layers (JPEG 2000 only).

## Scene Selection

mrsidgeodecode Scene Selection Switches

Switch	Value	Notes
-ulxy	float0 float1	Upper left of scene (x,y).
-lrxy	float0 float1	Lower right of scene (x,y).
-cxy	float0 float1	Center of scene (x,y).
-wh	float0 float1	Size of scene (width, height).
-scale/-s	sint	Scale of scene.
-coordspace/-coord	string	Coordinate space of scene. Acceptable values: <p style="margin-left: 40px;">geo</p> <p style="margin-left: 40px;">image</p> <p style="margin-left: 40px;">resrel</p>

## Other Switches

Other mrsidgeodecode Switches

Switch	Value	Notes
-h/-?		Show short usage message.
-help		Show detailed usage message.



Switch	Value	Notes
-version/-v		Show version information.
-quiet		Don't show informational message.
-log	string	Write output to log file.
-progress	string	Progress meter style. Acceptable values: none default timer

## Examples

To decode a MrSID file to a JPG file:

```
mrsidgeodecode -i input.sid -o output.jpg
```

To decode a MrSID file to a GeoTIFF file:

```
mrsidgeodecode -i input.sid -o geotiff.tif -of tiff
```

To decode the upper-left 50x50 pixel scene from a JPEG 2000 image:

```
mrsidgeodecode -i input.jp2 -o output.tif -ulxy 0 0 -wh 50 50
```

To decode an image at scale 2, i.e. one-quarter resolution:

```
mrsidgeodecode -i input.jp2 -o output.tif -s 2
```

## Some Definitions

Let us define "input scene" (or just "scene") to be the portion of the MrSID image to be decoded.

The scene may be the whole image or some subset. The scene may extend "outside" of the image proper.

Let us also define "output window" (or just "window") to be the region occupied by the image produced by the decoder, e.g. the generated TIFF. Note that the output window may not be the same size as the input scene.

Finally, let us define "coordinate space" to refer to one of three possible ways of specifying regions of the image:

- image space: what we normally think of as "pixel" space, at full resolution
- geo space: the image's geographic space
- resrel space: "resolution relative" space, which is the same as image space but in terms of a given resolution (scale)

## Basic Scene Selection

The command line decoder allows you to specify the input scene explicitly in one of three ways:

- upper-left (x,y) corner of scene, and (width,height) of scene

```
-ulxy X Y -wh W H
```

- upper-left (x,y) corner of scene, and lower-right (x,y) corner of scene

```
-ulxy X Y -lrxy X Y
```

- center (x,y) of scene, and (width,height) of scene

```
-cxy X Y -wh W H
```

For example, consider a 100x100 image. To select the upper-left quarter of the image, the following three ways are equivalent:

```
-ulxy 0 0 -wh 50 50
```

```
-ulxy 0 0 -lrxy 49 49
```

```
-cxy 25 25 -wh 50 50
```

(The reader is strongly encouraged to work these examples through manually, to ensure full understanding of the material being presented.)

*NOTE: If no scene is specified, the decoder defaults to the entire image.*

## Scaled Scene Selection

Consider again the 100x100 image. At scale 1 (half-resolution), this is a 50x50 image. To decode the same upper-right quarter at half-res -- a 25x25 image -- these three are equivalent (modulo round-off errors):

```
-s 1 -ulxy 0 0 -wh 25 25
```

```
-s 1 -ulxy 0 0 -lrxy 25 25
```

```
-s 1 -cxy 25 25 -wh 25 25
```

The first form is straight-forward: it just says make a scale 1 image, starting at the upper-right corner, of size 25x25. The second form is also clear: make a scale 1 image, starting at the upper-right corner and extending down to (25,25). And the third form is really just a variation of the first: make a scale 1 image, centered at (25,25), of size 25x25...

If our center is at (25,25) and we're only 25 pixels square, wouldn't our output image run from about (12,12) to (37,37)?

Surprisingly, the answer is no, because the image is scaled. The center point is defined in the normal, full-resolution space of the input scene – (25,25) is correct. But when the image is decoded, that center point is really treated as (12,12), which is where it is on the scale 1 image. The output window size is expressed in pixels relative to that scaled center point, and so the output image runs from about (0,0) to (25,25).

## Input Scenes and Output Windows

Recall that in the definitions above, we noted the output window may be different than the input scene. Here's how that can happen.

Consider the following decode on our 100x100 image:

```
-s 0 -ulxy 0 0 -wh 125 125
```

This is a normal scale 0 decode, but the output window is 125x125 – considerably larger than our input scene. The result is an image that really is 125x125, with the right and bottom edges left as black (technically, the background color).

One could reasonably argue that allowing the user to specify a decode "outside the image" is a bug, but for an end-user app it's actually a nice feature to have: it lets the user extract out some arbitrarily-sized region of her image, but turn it into a more well-formed size. The classic example of this feature is a decode along these lines:

```
-s 4 -ulxy -wh 32 32
```

which extracts the scaled image into a stock 32-x32 icon (we assume here that the scale 4 image is of some size less than or equal to 32x32, otherwise they'd have to use a smaller scale).

The input scene is always positioned in the upper-left corner of the output window – unless you are using the `-cxy` scene selection mechanism, in which case the input scene is always positioned in the center of the output window.

## Geo Coordinate Spaces

The above examples are all done in the familiar "pixel space", where (0,0) is the upper-left corner and the lower-right corner is (width-1,height-1) and each pixel is a 1x1 object. We call this "image" space and it is the default.

For geo images, however, we often prefer to express points on the image and dimensions in terms of geo coordinates. That is, the upper-left might be (32929.00,28292.25) and the size of the pixel might be (0.0005,0.0005).

To accommodate this, we allow the above scene selections to be done in "geo" space. If our 100x100 image had an upper-left coordinate of (100.0,50.0) and an x,y resolution of (10.0,5.0), we would use the following to decode the whole image:

```
-coord geo -ulxy 100 50 -wh 1000 500
```

That is, the input scene starts at the upper-left position of (100.0,50.0) and the output window is the full size of the input image (100\*10=1000 and 100\*5=500).

## Resrel Coordinate Spaces

We also allow the user to specify the scene using a resolution relative coordinate system ("resrel" for short). In this system, the (x,y) points and the (width,height) dimensions are given in the scale of the decode request instead of the normal scale 0 pixel space.

For example, these are all equivalent ways of taking a small scaled scene from the middle of our 100x100 image:

```
-s 1 -ulxy 20 20 -lrxy 39 39 -coord image
```

```
-s 1 -ulxy 20 20 -wh 20 20 -coord image
```

```
-s 1 -ulxy 10 10 -lrxy 19 19 -coord resrel
```

```
-s 1 -ulxy 10 10 -wh 10 10 -coord resrel
```

Note that resrel only makes sense for decodes at other than scale 0. When decoding at scale 0, resrel is that same as the default image coordinate space.

## More Examples

To conclude, the following groups of scene selections using our 100x100 image with UL=(100,50) and res=(10,5) are all equivalent.

- Full scene, full res (100x100 image, all picture at full res):

```
-ulxy 0 0 -wh 100 100 -s 0 -coord image
-ulxy 0 0 -lrxy 99 99 -s 0 -coord image
-cxy 50 50 -wh 100 100 -s 0 -coord image
-ulxy 100 50 -wh 1000 500 -s 0 -coord geo
-ulxy 100 50 -lrxy 1090 -445 -s 0 -coord geo
-cxy 600 -200 -wh 1000 500 -s 0 -coord geo
-ulxy 0 0 -wh 100 100 -s 0 -coord resrel
-ulxy 0 0 -lrxy 99 99 -s 0 -coord resrel
-cxy 50 50 -wh 100 100 -s 0 -coord resrel
```

- Part scene, full res (50x50 image, UL quarter of image at full res):

```
-ulxy 0 0 -wh 50 50 -s 0 -coord image
-ulxy 0 0 -lrxy 49 49 -s 0 -coord image
-cxy 25 25 -wh 50 50 -s 0 -coord image
-ulxy 100 50 -wh 500 250 -s 0 -coord geo
-ulxy 100 50 -lrxy 590 -195 -s 0 -coord geo
-cxy 350 -75 -wh 500 250 -s 0 -coord geo
-ulxy 0 0 -wh 50 50 -s 0 -coord resrel
-ulxy 0 0 -lrxy 49 49 -s 0 -coord resrel
-cxy 25 25 -wh 50 50 -s 0 -coord resrel
```

- Full scene, half-res (whole image at half res, in UL quadrant of 100x100 image):

```
-ulxy 0 0 -wh 100 100 -s 1 -coord image  
-ulxy 0 0 -lrxy 99 99 -s 1 -coord image  
-ulxy 100 50 -wh 1000 500 -s 1 -coord geo  
-ulxy 100 50 -lrxy 1090 -445 -s 1 -coord geo  
-ulxy 0 0 -wh 50 50 -s 1 -coord resrel  
-ulxy 0 0  
-lrxy 49 49 -s 1 -coord resrel
```

- Full scene, half-res (centered) (whole image at half res, in center quadrant of 100x100 image):

```
-cxy 50 50 -wh 100 100 -s 1 -coord image  
-cxy 25 25 -wh 50 50 -s 1 -coord resrel
```

- Full scene, half-res (centered) (whole image at half res, in center of a 50x50 image):

```
-cxy 600 -200 -wh 1000 500 -s 1 -coord geo
```

## mrsidgeometa

The mrsidgeometa tool is a simple metadata editor.

### Switches

mrsidgeometa Switches

Switch	Value	Notes
-file/-f	string	Name of input file (required).
-tempDir/-t	string	Name of temporary directory to use.
-tpc	string	Set values for transparency metadata.
-define/-d	string	"name=value" string.
-remove/-r	string	Remove 'tagname' string.
-rtpc		Remove transparency metadata.

Switch	Value	Notes
-addWL/-awl	float0 float1	Add window/level metadata.
-removeWL/-rwl		Remove window/level metadata.
-generateDR/-gdr	string	Calculate dynamic range information from the image statistics and write the dynamic range to the metadata. See possible values below.
-removeDR/-rdr		Remove dynamic range metadata.
-addAffine/-aa	float0 float1 float2 float3 float4 float5	Add Affine Transformation (world file order).
-removeAffine/-ra		Remove Affine Transformation.
-addWKT/-awkt	strings	Add well known text string (WKT).
-removeWKT/-rwkt		Remove well known text string (WKT).
-template/-tm		Template file containing options.
-worldFile/-wf		Import world file.
-jp2_tlm	unsigned int	Set the maximum number of tile length markers. Acceptable range: 0-255. Specify zero to disable.
-jp2_plt		Use packet length markers.
-jp2_nopl		Do not use packet length markers.
-jp2_tilePart		Set tile parts. Acceptable values: C L R None.
-h/-?		Show short usage message.
-help		Show detailed usage message.
-version/-v		Show version information.

Switch	Value	Notes
-verbose		Enable verbose output (diagnostics).

### Dynamic Range Generation Methods

When you generate dynamic range metadata, you must enter a dynamic range generation method.

You can enter one of the following methods for generating the dynamic range:

#### **rgb**

Calculate the minimum and maximum dynamic range values for an image with red, green, and blue bands. Select the **rgb** method to minimize color shifting for RGB images. When you select the **rgb** method, GeoExpress calculates the combined dynamic range of the red, green, and blue bands.

#### **merge**

Calculate the minimum and maximum dynamic range values for an image with multiple bands. Select the **merge** method to preserve the proportions of pixel values across bands. For example, if you want to compare multiple bands in a multispectral image, you may want to select the **merge** method. When you select the **merge** method, GeoExpress calculates the combined dynamic range of all bands.

#### **per-band**

Calculate the minimum and maximum dynamic range values for an image with one or more bands. Select the **per-band** method to calculate the dynamic range of each band individually. For example, if you have a multispectral image and you only want to view one band at a time, select the **per-band** method. When you select the **per-band** method, GeoExpress calculates the dynamic range of each band separately.

### Automatic and Strict Dynamic Range

For all images except for 16-bit images with unsigned integer data, GeoExpress uses the exact dynamic range values from the dynamic range generation method that you select. For 16-bit images with unsigned integer data, GeoExpress automatically modifies the calculated dynamic range values to minimize color shifting.



The modified or automatic dynamic range sets the maximum dynamic range value to the estimated bit-depth and sets the minimum dynamic range value to zero. The estimated bit-depth is the next whole number of bits that contains the calculated maximum value in the image. For example, if the maximum value in the image is 3950, GeoExpress estimates that the image was taken with a 12-bit camera and sets the maximum value to 4095. Because GeoExpress sets a wider dynamic range for the image, you can minimize color shifting when you display the image.

For 16-bit images with unsigned integer data, you can force GeoExpress to use the exact dynamic range values calculated by GeoExpress rather than the modified dynamic range values. To use the exact dynamic range values calculated by GeoExpress, append `-strict` to the dynamic range generation method that you select. For example, you might change the dynamic range generation method to `merge-strict`.

## Examples

Following are some examples of usage.

The following command adds a `USER:: metadata` value to "lena-jp2.jp2":

```
mrsidgeometa -f lena-jp2.jp2 -d OnePlusOne=Two
```

The following command deletes the tag you just added:

```
mrsidgeometa -f lena-mg3.sid -d OnePlusOne=Two
```

The following command adjusts the dynamic range of the file to a window of 123.456 centered at the level value of 67.89:

```
mrsidgeometa -f lena-jp2.jp2 -awl 123.456 67.89
```

The following command removes the dynamic range adjustment you just made, returning it to the "natural" dynamic range based on the pixel depth:

```
mrsidgeometa -f lena-jp2.jp2 -rwl
```

The following command sets the georeference coordinates of the file to those specified in the world file "lena-jp2.j2w" (in the same directory as the .jp2 file):

```
mrsidgeometa -f lena-jp2.jp2 -wf
```

The following command removes an existing metadata tag (in this case a non-`USER::` tag).

```
mrsidgeometa -f nokia-jp2.jp2 -r ICC::Profile
```

The following command generates exact minimum and maximum dynamic range values for an RGB image:

```
mrsidgeometa -f 4band.sid -gdr rgb-strict
```