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# **RTWTools Documentation**

*Release 0.92*

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Contents:



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## Installation

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### 1.1 System Requirements

A computer running any version of ENVI. (**Note:** RTWTools will only work in the 'Classic' mode of ENVI 5.0 or greater.)

### 1.2 Installation

1. Copy the RTWTools.sav file provided in this zip file to the ENVI *save\_add* directory. This is normally located at `C:\Program Files\ITT\IDL708\products\envi46\save_add\`
2. Start ENVI.
3. You should find a RTWTools menu has appeared on the main ENVI menubar.

**Note:** If you are upgrading from a previous installation of RTWTools you may find that you end up with two RTWTools menus on the ENVI menu bar. To solve this, open the `envi.men` file in `C:\Program Files\ITT\IDL708\products\envi46\menu` and delete all the lines below `0 {RTWTools}`.

Support Support for RTWTools is available from the author, to a limited extent. It should be remembered that the author is in the process of studying for a PhD, and therefore does not have unlimited time. A RTWTools Google Group is available at <http://groups.google.com/group/rtwtools>, and all questions, bug reports and feature requests should be directed there.





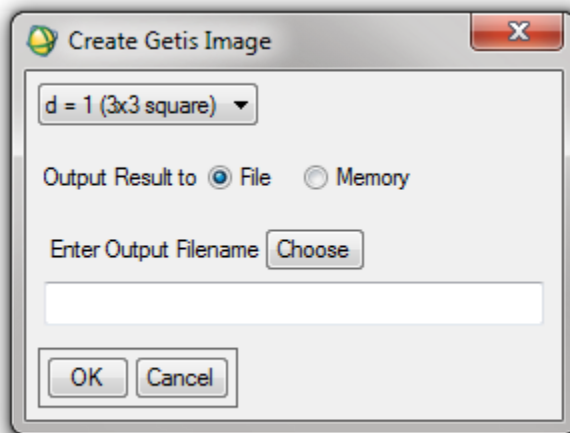
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## Tools: Local Indicators of Spatial Autocorrelation

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### 2.1 Create Getis Image

Calculates Getis-Ord statistics for every band of the input file, with a configurable window size.



#### 2.1.1 Input

ENVI supported image (can be multiband)

#### 2.1.2 Parameters

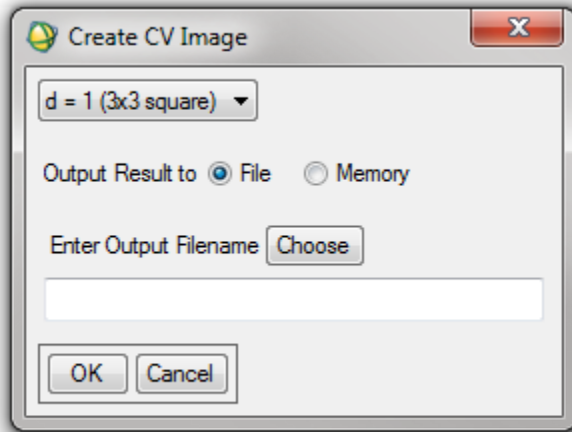
- Size of moving window (d value in the Getis formula)

#### 2.1.3 Output

Image with each band containing the Getis image for the corresponding band in the input file.

## 2.2 Create CV Image

Calculates the Coefficient of Variation in a moving window across the image, for each band of the image. The moving window size is configurable.



### 2.2.1 Input

ENVI supported multi-band image

### 2.2.2 Parameters

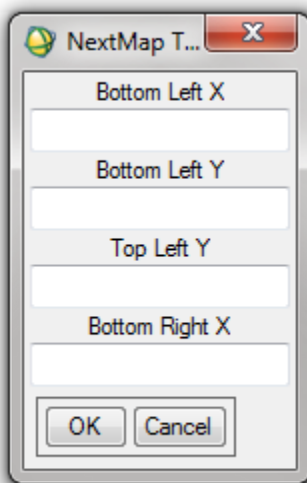
- Size of moving window

### 2.2.3 Output

Multi-band image with each band containing the CV values for the corresponding band in the input file

### 3.1 Select NeXTMap tiles

Selects the DEM tiles from the NeXTMap project (NEODC, 2009) which are needed to cover an image. Can take an input from either a georeferenced image, a set of corner co-ordinates for an image, or the bottom left co-ordinates and length/width of an image.



#### 3.1.1 Input

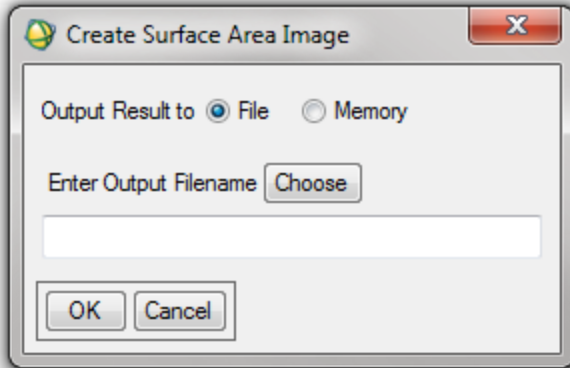
Image co-ordinates (from one of the above options)

#### 3.1.2 Output

List of NeXTMap tiles needed to cover the image.

### 3.2 Calculate Surface Area

Calculates an estimate of the 3D surface area of a DEM using the Jenness (2004) method.



### 3.2.1 Input

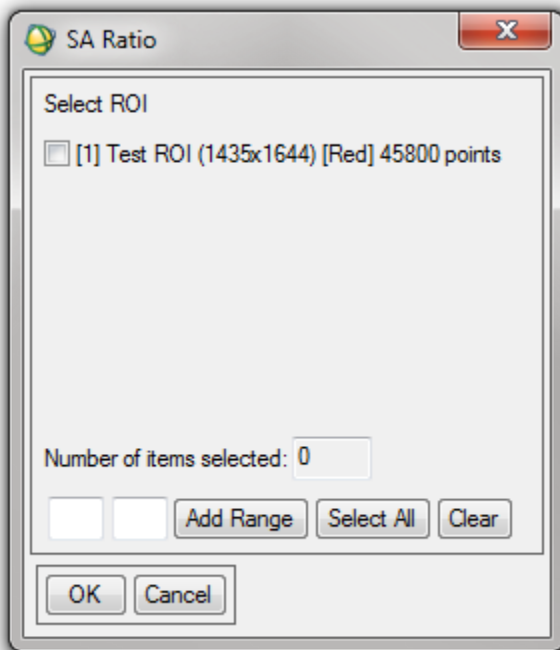
DEM with associated map information including pixel size

### 3.2.2 Output

New image band containing a 'surface area image' (similar to the slope and azimuth images created by the ENVI Topographic Modelling command) where the value of each pixel is the surface area of that pixel.

## 3.3 Calculate Surface Area Ratio

Calculates the ratio of 3D surface area to planimetric surface area, which is useful for estimating the topographic roughness of an area.



### 3.3.1 Input

- Surface Area image
- One or more ROIs

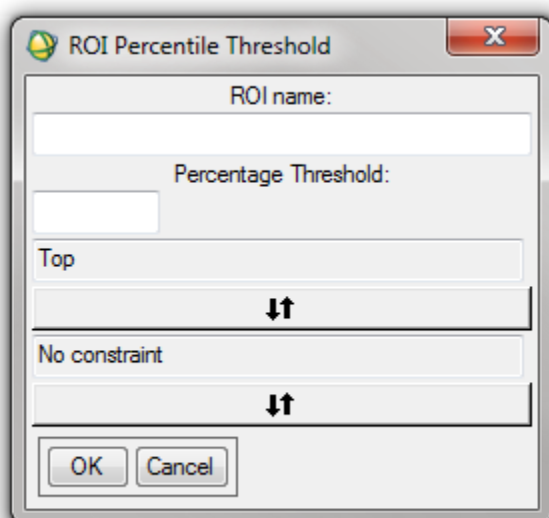
### 3.3.2 Output

Table showing the ratio for each of the selected ROIs



## 4.1 ROI Percentile Threshold

Performs similarly to the Band Threshold to ROI function in ENVI, but allows the threshold to be specified as a percentage to be taken from the top or bottom of the range of values. Allows constraints (such as ensuring the resulting values are above zero) to be applied to the pixels selected.



### 4.1.1 Input

ENVI supported multi-band image

### 4.1.2 Parameters

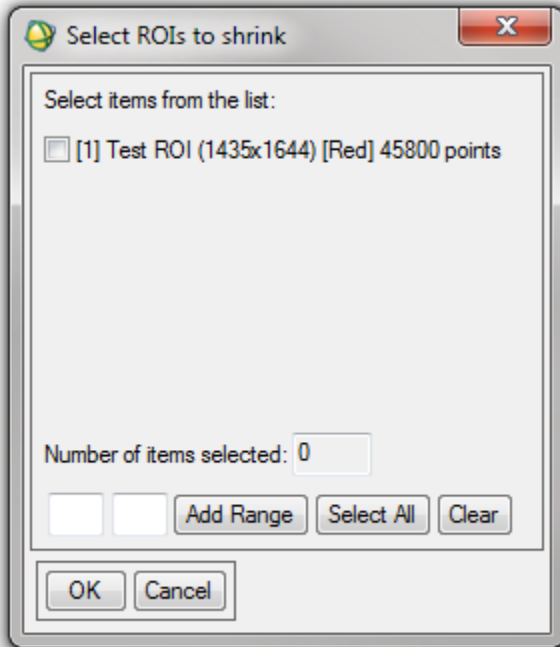
- ROI Name
- Percentage - the percentage to be taken from the top or bottom. For example, 0.3 takes the top or bottom 0.3%.
- Top/Bottom – the end of the data from which to take the threshold
- Constraints – No constraint, Ensure above zero (ensures that all resulting pixels have values greater than zero), Ensure below zero (ensures that all resulting pixels have values less than zero).

### 4.1.3 Output

ROI containing all the points which satisfy the threshold and the constraints across all bands (ie. not done on each band individually).

## 4.2 Shrink ROIs

Shrinks the selected ROIs by one pixel around their perimeter. NB: This routine creates new ROIs and does not overwrite the old ROIs.



### 4.2.1 Input

One or more ROIs

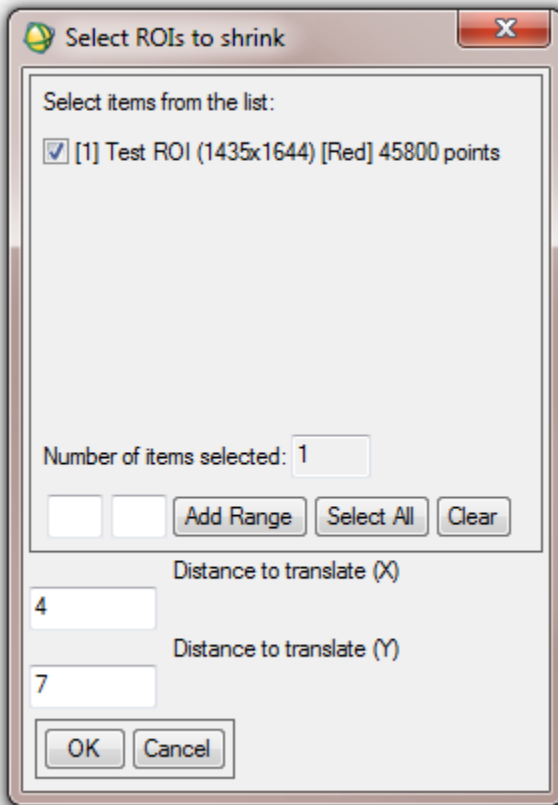
### 4.2.2 Output

The same number of ROIs selected as input, each shrunk by one pixel around their circumference.

## 4.3 Translate ROIs

Translates the selected ROIs by the given X and Y distances. NB: This routine creates new ROIs and does not overwrite the old ROIs.





### 4.3.1 Input

One or more ROIs

### 4.3.2 Parameters

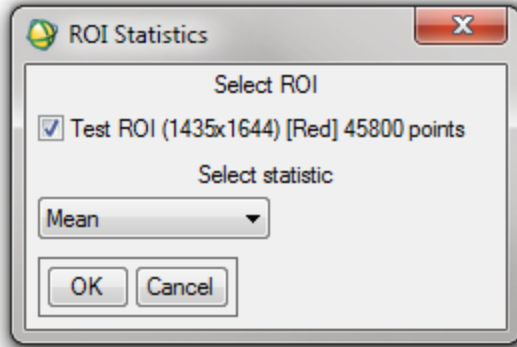
- X translation distance
- Y translation distance

### 4.3.3 Output

The same number of ROIs selected as input, each translated by the distances given.

## 4.4 ROI Statistics

Calculates statistics such as sum, mean and max on the data covered by a ROI.



#### 4.4.1 Input

One or more ROIs attached to an image

#### 4.4.2 Parameters

- Statistic to calculate, from the following list: \* Sum \* Mean \* Median \* Standard Deviation \* Minimum \* Maximum

#### 4.4.3 Output

Results of the statistics presented in onscreen in text format.

## 5.1 Create GLT file

Creates an image which can be used as a GLT file for the atmospheric correction software ATCOR. See use cases at the end of this manual for more information. With the default options this routine creates two files as shown below.

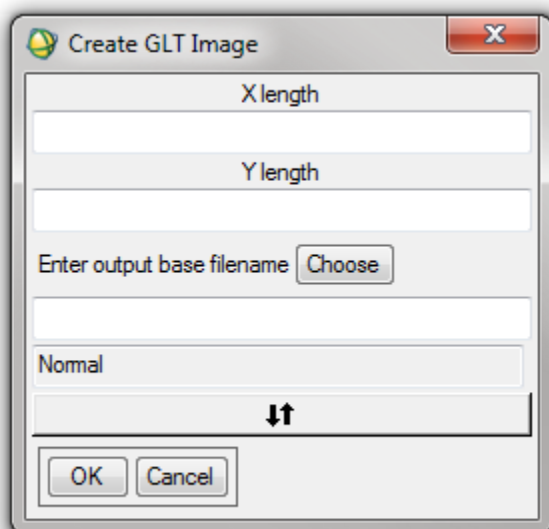
### Columns Image:

```
1 2 3 4 5 6 7 8 9 10 ... n
1 2 3 4 5 6 7 8 9 10 ... n
1 2 3 4 5 6 7 8 9 10 ... n
...
```

### Rows Image:

```
1 1 1 1 1 1 1 1 1 ... 1
2 2 2 2 2 2 2 2 2 ... 2
3 3 3 3 3 3 3 3 3 ... 3
...
n n n n n n n n n ... n
```

The parameters allow the ordering of numbers in the X and Y directions to be reversed (ie. n ... 5 4 3 2 1).



### 5.1.1 Parameters

- X and Y dimensions of the output image
- Base filename for the output image
- Ordering option

### 5.1.2 Output

Two output files, named with the base filename with `_RowIndices` or `_ColIndices` appended.

## 5.2 Output band to CSV

Outputs the selected image band to a CSV file.

### 5.2.1 Input

Band of an ENVI image file

### 5.2.2 Parameters

- Filename for the CSV output

### 5.2.3 Output

CSV file containing the DNs from the ENVI image file band

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## Indices and tables

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- *genindex*
- *modindex*
- *search*