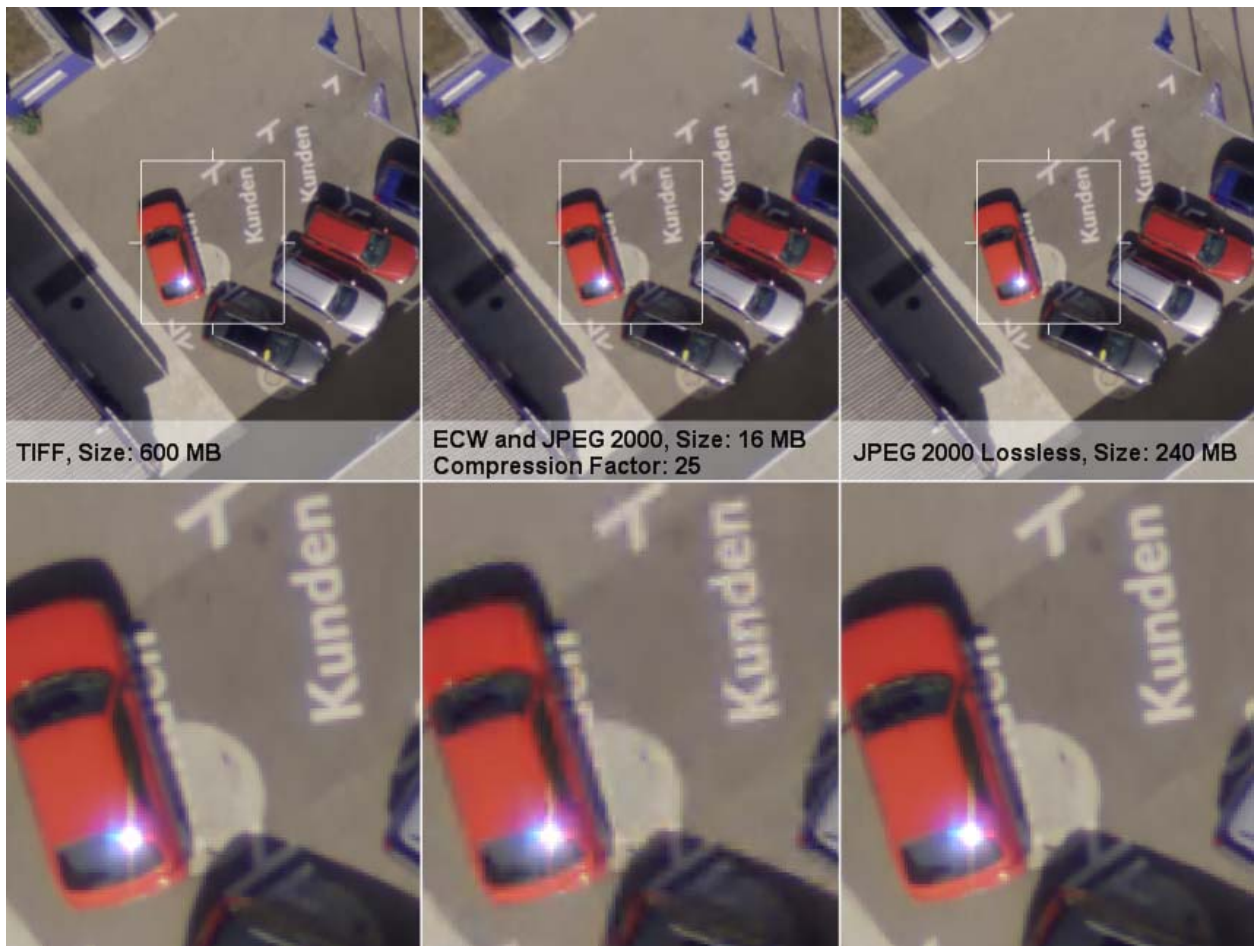


GEO compressor

A Tool to write ECW or JPEG 2000 compressed Image Data maintaining Geo-Information



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May 2012

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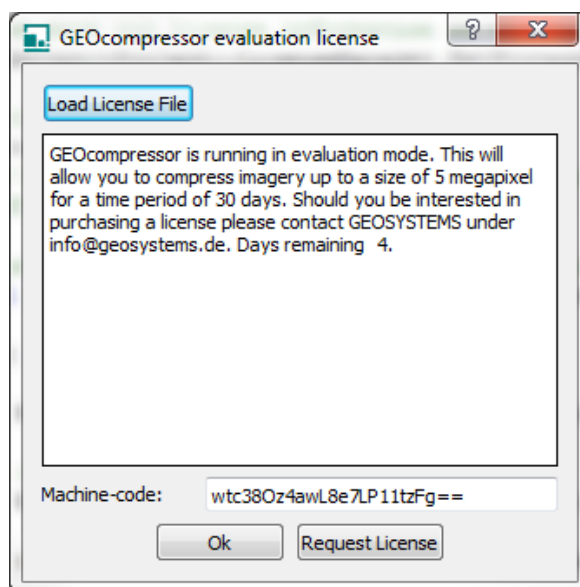
1. Quick start

GEOcompressor compresses image data files of unlimited size into ECW or JPEG 2000 data. It maintains all geo-information, supports alpha channel transparency and boasts an easy to use yet sophisticated user interface.

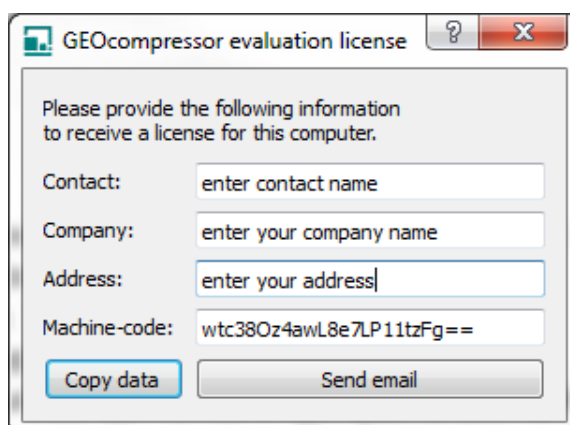
The following procedure explains all the necessary steps to quickly compress your image data.

1.1 License information

Without a valid license, **GEOcompressor** will run in evaluation mode only. This mode allows you to compress imagery with a maximum size of 5 megapixel up to 30 days. Click *Ok* to start **GEOcompressor** in evaluation mode.



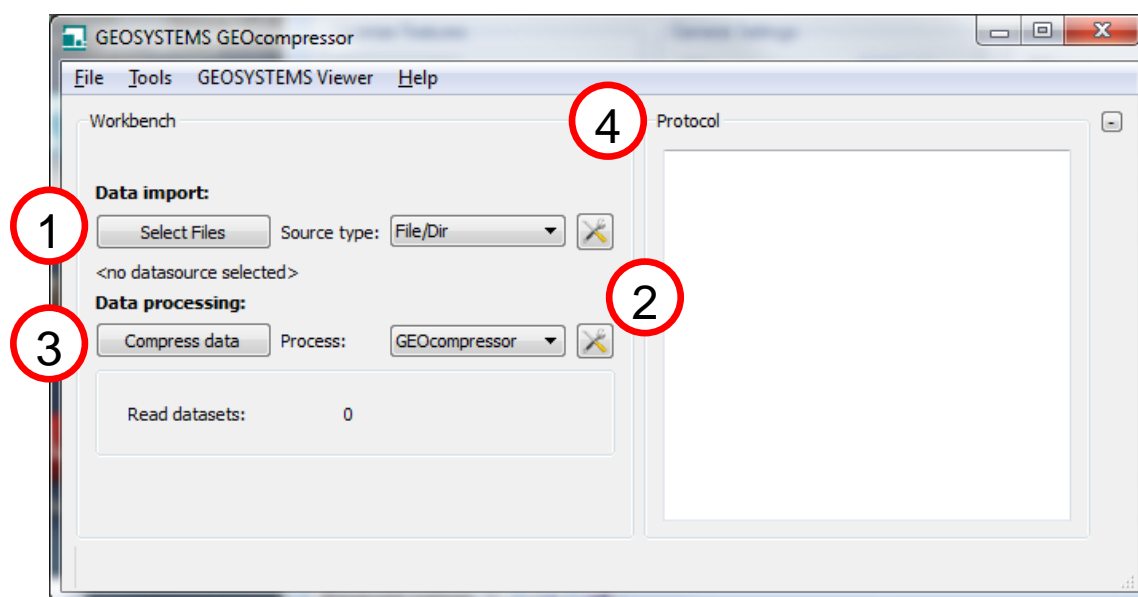
In order to use the full functionality of the **GEOcompressor** you will need to request (see purchase details at www.geocompressor.com) a valid license for each computer. To do so, press *Request License* and enter your contact details. Click *Send email* to open your default email program and to send the provided contact details together with your computer ID to GEOSYSTEMS (Mail: keycode@geosystems.de). We will process your request and get back to you with a valid license.



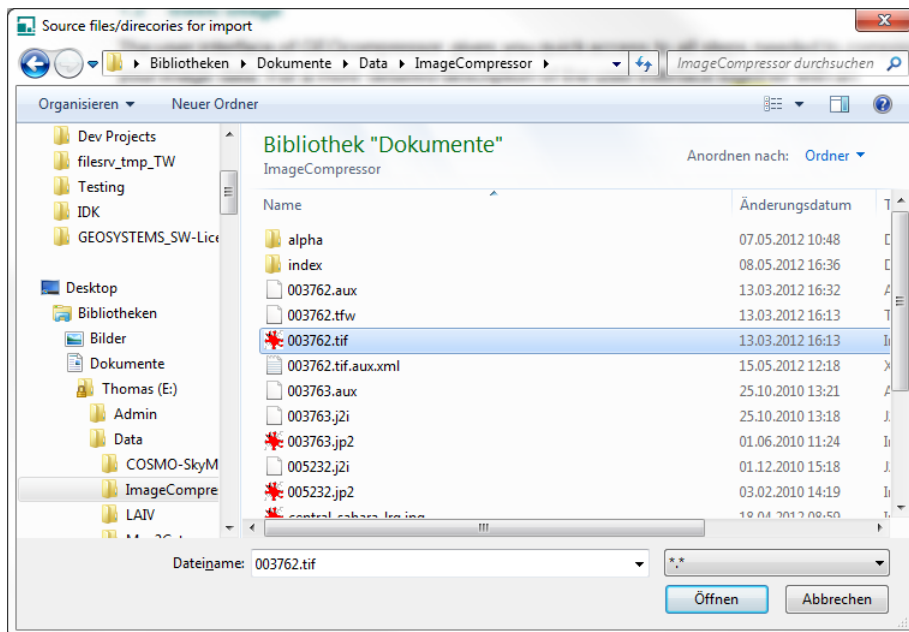
Once you receive your license, click on *Load License File* and select the provided file. This operation requires Administrative privileges. After restarting **GEOcompressor** you can use the full functionality of the software.


1.2 Basic usage

The user interface of **GEOcompressor** gives you quick access to all steps needed to compress your image data. For a more detailed description of the user interface together with an explanation of the workflow philosophy of **GEOcompressor** see section 2.1.

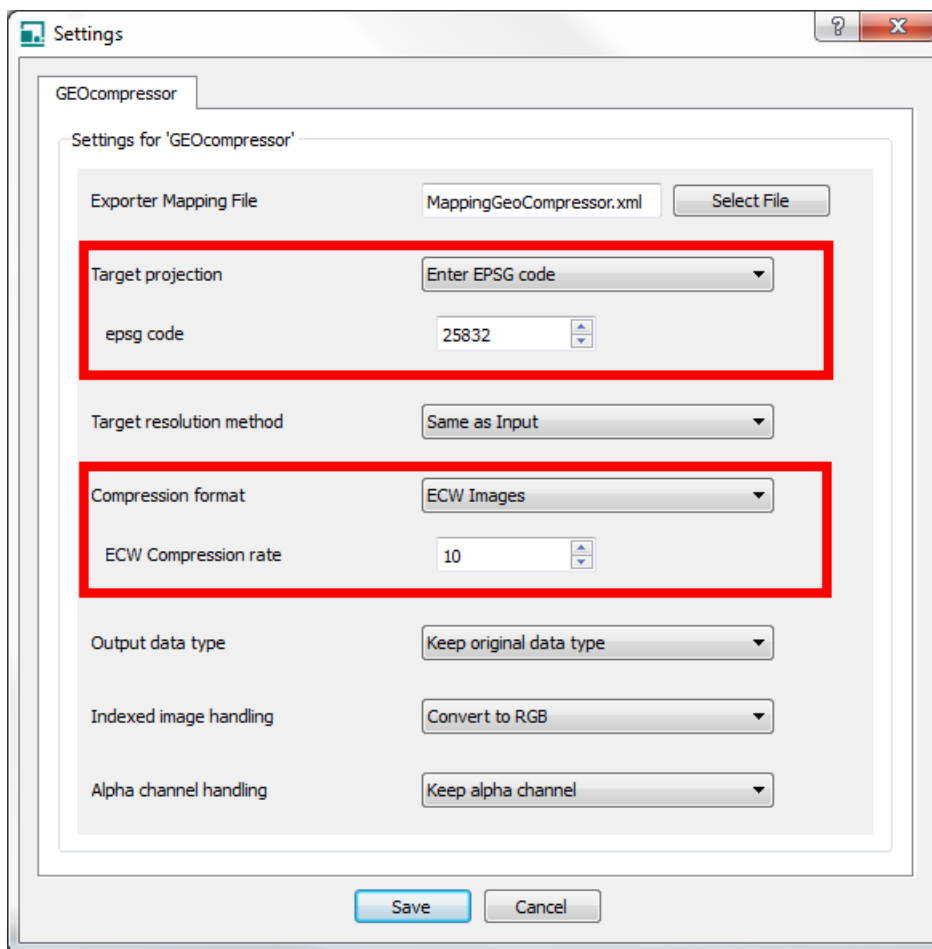


1. The first step is to select the image data you want to compress. To do so, click the *Select Files* button which will open a file selection dialog. You can select several images by pressing the *Ctrl-Key* while selecting files. After confirming, the selected files will be available for compressing. For further configuration options of the file selection see section 3.1.1.

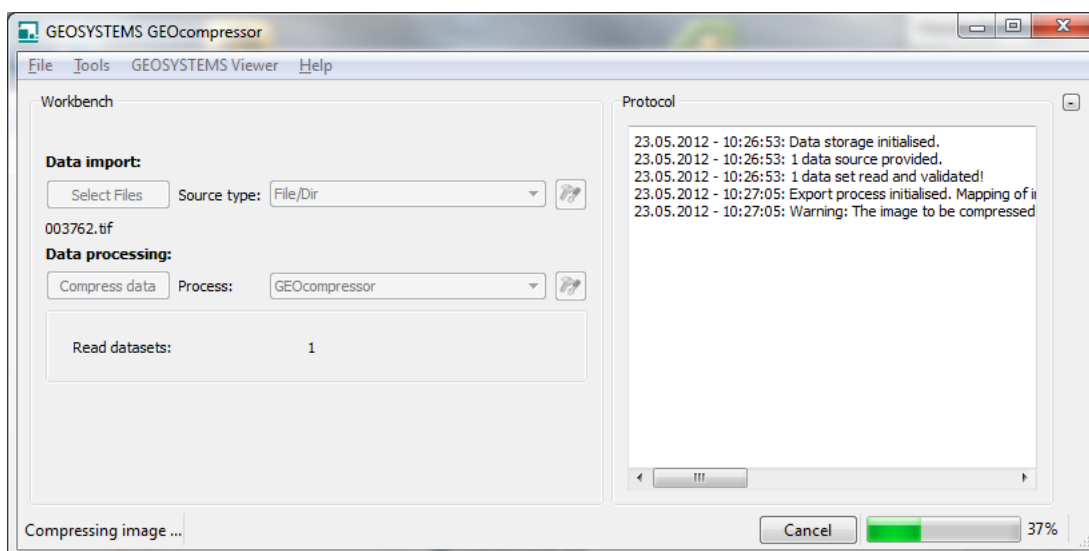


2. Before compressing the imported image data, review the compression settings by clicking on . Pay especially attention to the target projection settings. Here you can either enter an EPSG-Code (European Petroleum Survey Group Geodesy codes) being used for all compressed data or select to create imagery without projection information (RAW). It is important to note, that an existing projection, which may be available for an input image, is not being considered!

A second important setting is of course the actual compression format. Available formats are ECW and JPEG 2000. Select the desired compression rate. JPEG 2000 imageries can be compressed lossless by entering a compression rate of 0. Click the Save button to confirm setting changes and to return to the main user interface. For a detailed explanation of all available settings please see section 3.2.

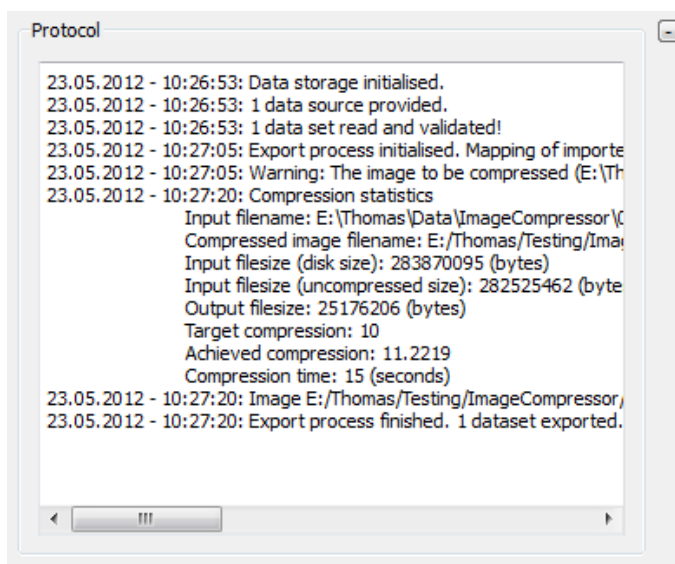


3. To start the actual compression, press the *Compress data* button. This will open a dialog to select the output directory for the compressed data. All files will be created in the selected directory using their original file name and the file extension of the selected compression format (.ecw or .jp2). If a file with the same name already exists in the output directory, the subsequent filename will be changed to <original filename>_1. Confirming the directory selection will start the compression process.



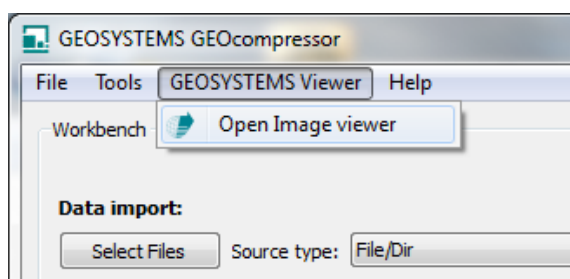
The progress bar gives a good indication on how long the process may take. In order to interrupt the compression process press *Cancel*. The process will be stopped at the next possible interruption point.

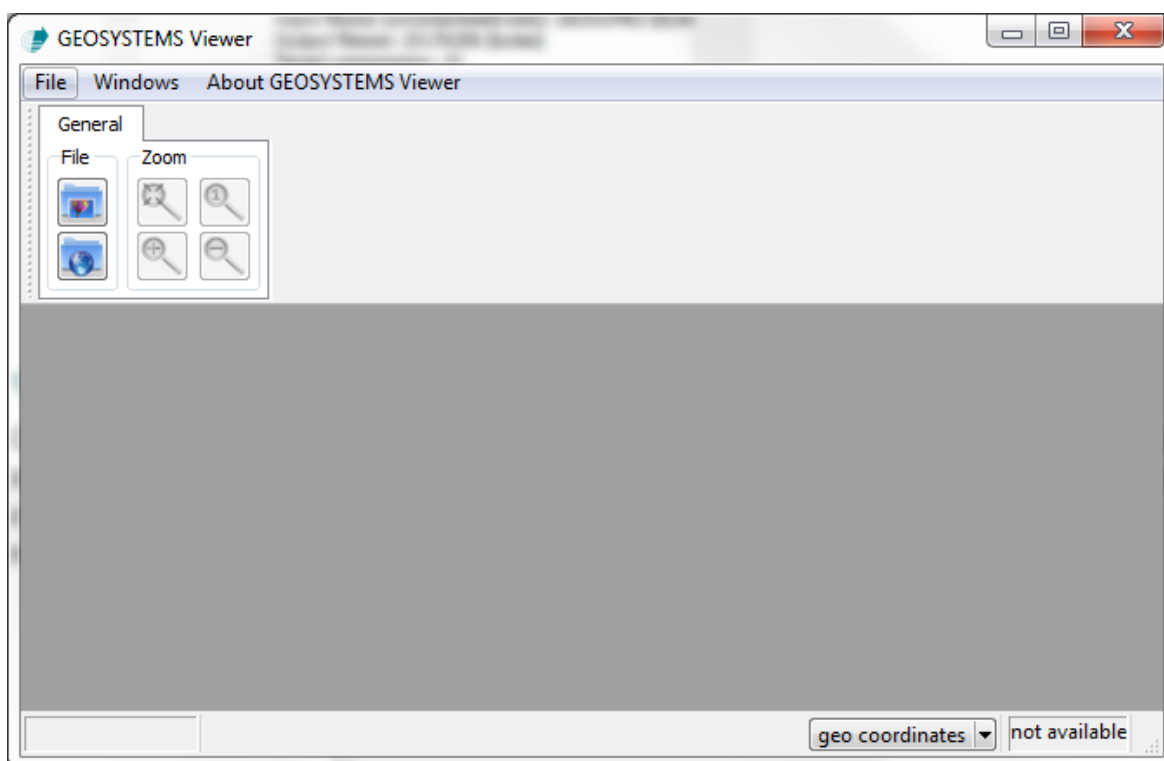
4. In the protocol area important information, warnings and error messages are logged. In case the compression fails, review the logged information carefully. For each successfully created image a short compression report is being logged as well.




1.3 GEOSYSTEMS Viewer

GEOcompressor also features a fast image viewer for raster images and data streams (ECWP) including zooming/roaming/panning, data scaling, band selection and display of image and projection information. The viewer supports a variety of image formats such as TIFF, NITF, JPG, PNG, IMG, GIF, BMP, ECW and JPEG 2000 and can handle image data from 1 to 32 bit data depth. Furthermore it can utilize overview (pyramid) files to speed up image display. To open the viewer select *Open Image viewer* from the menu *GEOSYSTEMS Viewer* in the menu bar.




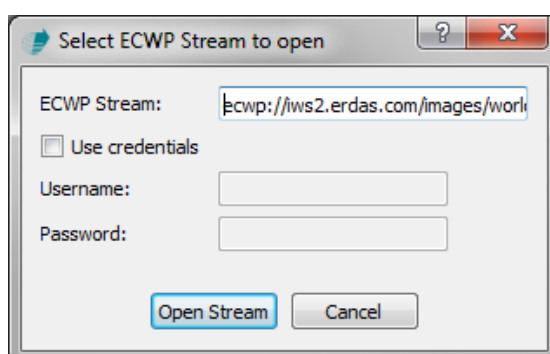


1.3.1 Opening image files

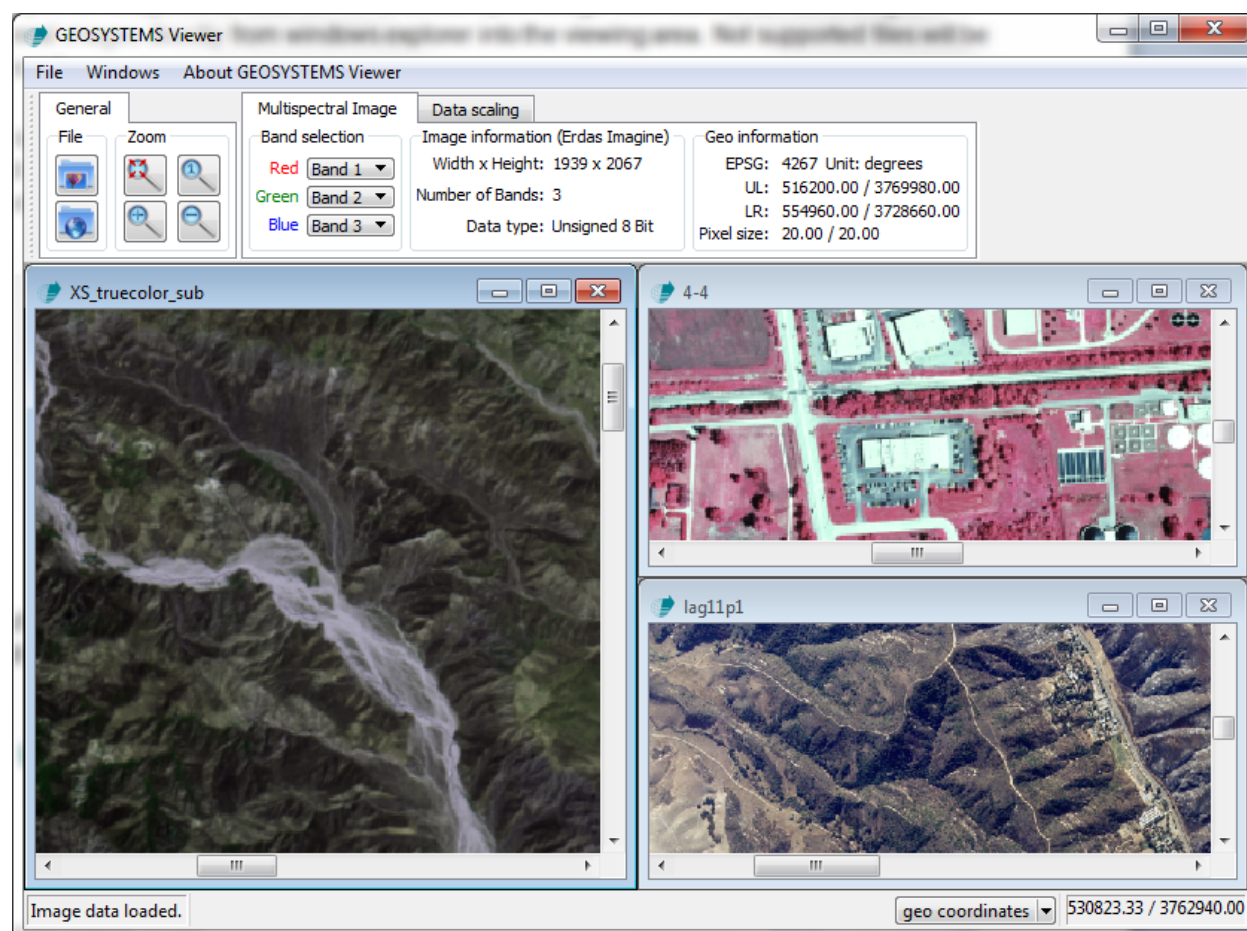
To open an image either click on  or select *Open Image* from the menu *File* or drag one or several images directly from Windows Explorer into the viewing area. Not supported files will be ignored.

1.3.2 Opening ECWP streams





To open an ECWP stream either click on  or select *Open ECWP Stream* from the menu *File* and enter the full URL of the desired stream. In order to access a secured stream, tick *Use credentials* and enter *Username* and *Password* accordingly.



1.3.3 Viewer interaction

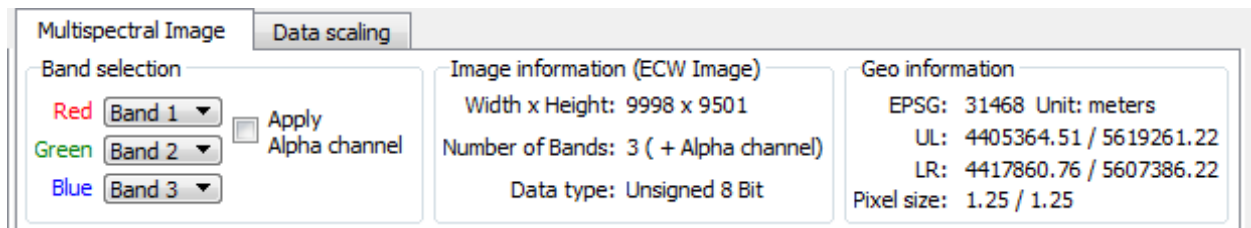


Each opened image or stream will be displayed in a separate window, which can be freely moved, resized and closed. The menu *Window* provides some convenient functionality to tile or close all open windows.

To zoom in or out of an image you can either use the mouse wheel or the designated icons  and  in the tool bar. Zooming to the full extent of an image can be achieved by clicking on . To display the image with a zoom factor of 1 click on .

Roaming thru the image is done by holding down either the left or middle mouse button while dragging the mouse.

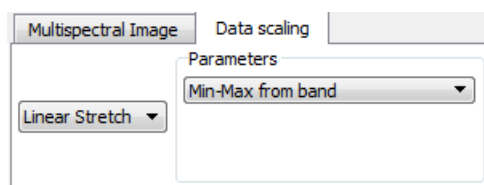
For the currently active image window some basic information is shown in the tool bar which may vary depending on the number of available image bands and presents of an alpha channel.



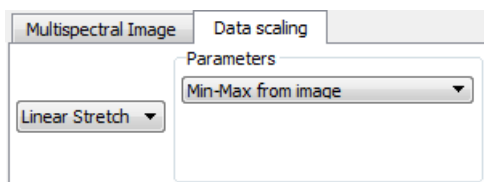
The section *Band selection* can be used to change the shown combination of image bands. If the viewer recognizes an alpha channel the option *Apply Alpha channel* becomes visible allowing you to turn on/off transparent pixels.

The sections *Image information* and *Geo information* are for display only. They can be used to view basic information about the image.

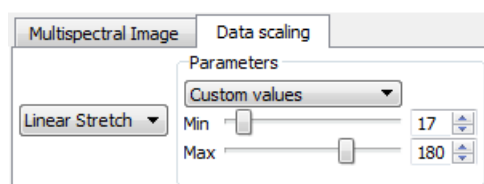
The second tab in the tool bar (*Data scaling*) allows the user to modify the histogram of the displayed imagery. Currently only a *Linear Stretch* is available, which has the following parameters.



If this option is selected, each band is stretched individually between the smallest and highest pixel value of that band.

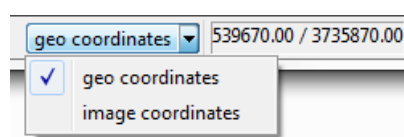


If this option is selected, each band is stretched identical between the smallest and highest pixel value of the entire image.



This option allows the user to stretch the full image between the provided minimal and maximal value. The same stretch is applied to all bands.

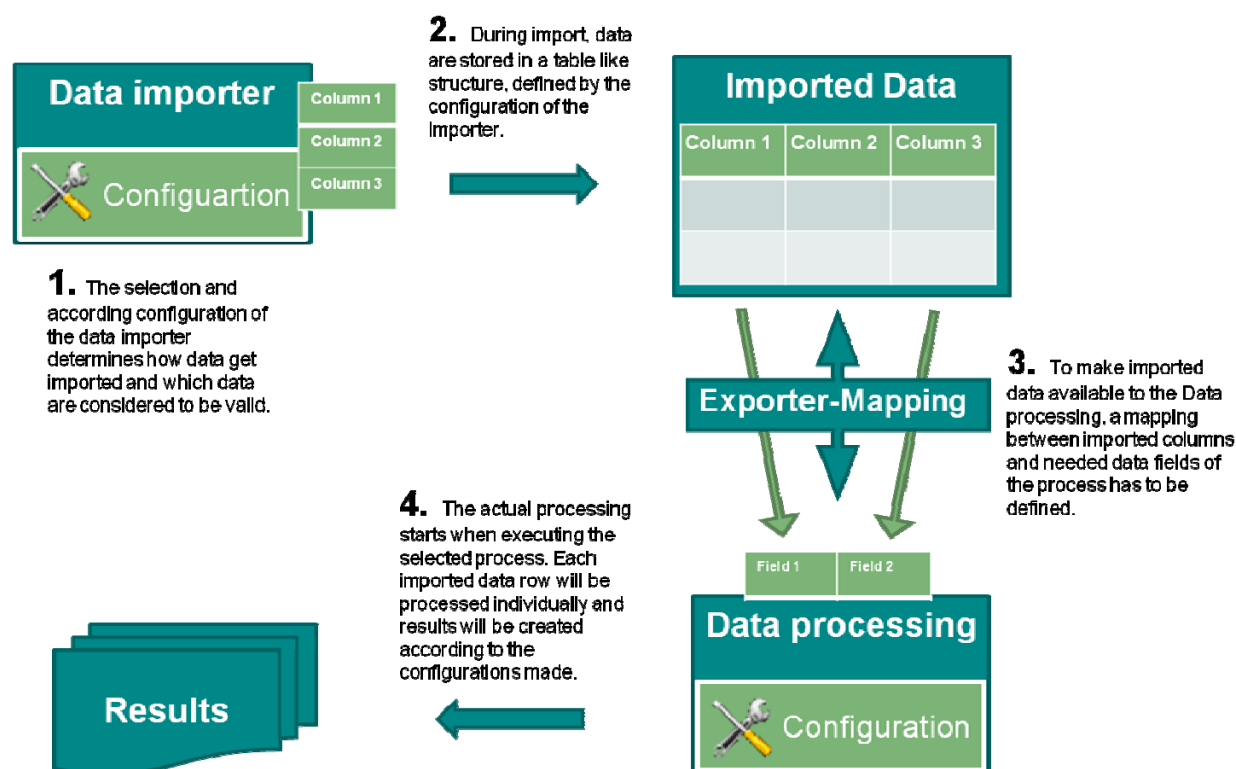
The status bar shows the position of the mouse cursor in the current active image in either image or geo coordinates, if available. To change between both display modes, select the desired mode from the list.



2. Detailed description

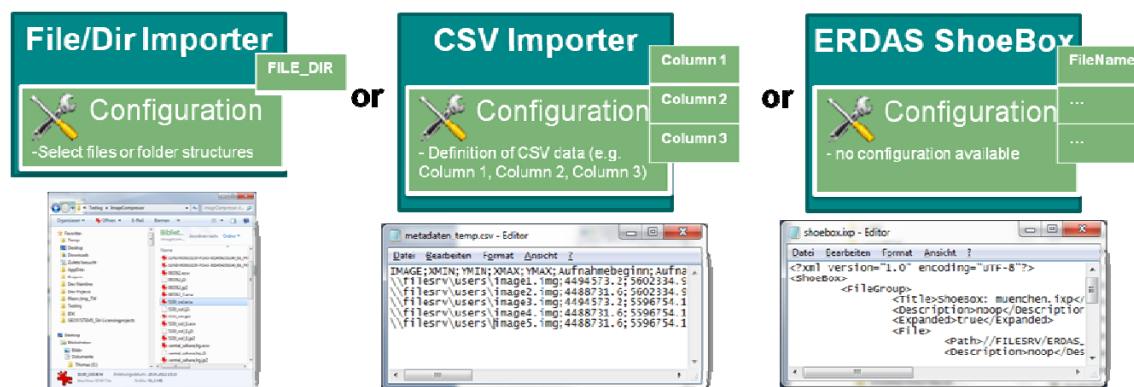
2.1 General overview

The program **GEOcompressor** has been developed by GEOSYSTEMS GmbH and is based on a framework which allows to model arbitrary workflows. In general, the framework consists of two steps, a *Data import* step and a *Data processing* step. The import step allows the user to load data from a variety of different data sources and is fully independent from the actual processing step. Each available data source can be configured individually, determining how data get imported. Imported and validated data are stored in a table like structure. The processing step encapsulates usually the actual task being executed and can also be configured by the user. The process defines certain data fields which are required to run the task. In order to start the task for each imported data row a mapping between the imported data columns and the required data fields has to be defined. After such mapping has been provided, each data row is processed individually and results are created accordingly.



Additionally, the behavior of **GEOcompressor** can be modified through general configurations such as output level of the protocol or language of the graphical user interface.

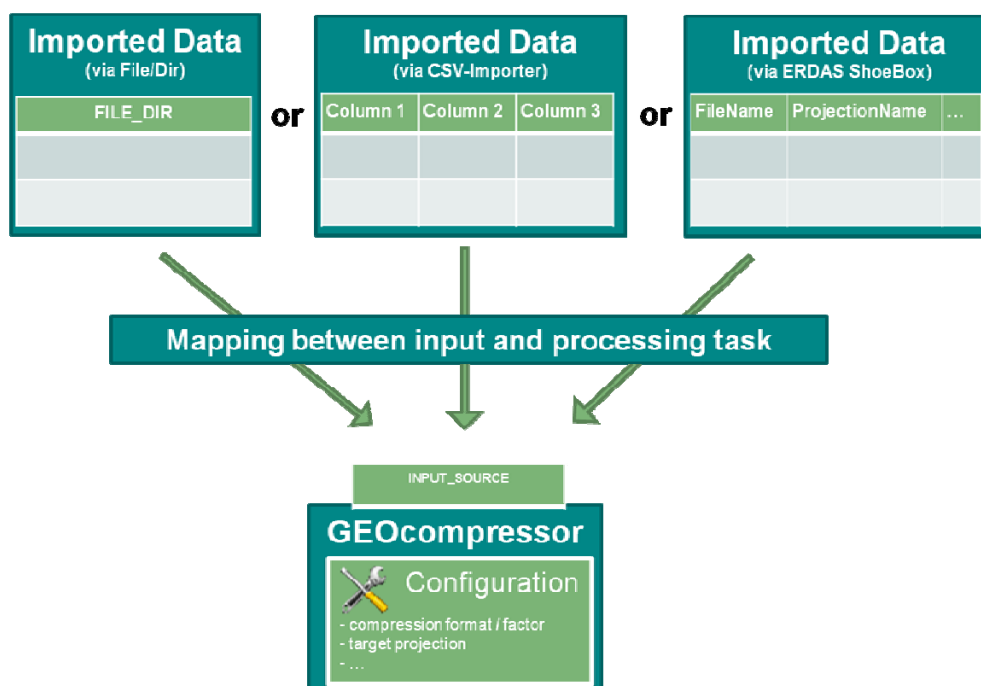
By default **GEOcompressor** comes with three import classes, a direct *File/Directory* importer, a general *CSV File* importer and an *ERDAS IMAGINE ShoeBox* importer. The actual compression is implemented in the Data processing step.



The easiest way to import image files for compression is the File/Dir Importer. Therefore it's also selected as the default importer. The File/Dir Importer can be configured to either load single files only, multiple files directly selected or even all files of a selected directory matching a customizable file filter. The result of this importer is a single column (*FILE_DIR*) containing the full file name of each loaded file.

A second way of importing files is the usage of the CSV file Importer. This importer can be configured to load any kind of CSV file. With an according mapping between the column containing the full file path and the GEOcompressor process the user can easily use existing CSV files for processing.

A third method would be the import of an ERDAS IMAGINE ShoeBox file to load the image files referenced in that file. For both CSV file importer and ERDAS IMAGINE ShoeBox importer the mapping between processing step and imported data needs to be adjusted. See below for instructions on how to create (2.6) and load such mapping (3.2).



The data processing step **GEOcompressor** requires only the single field *INPUT_SOURCE*, which expects the full path of an input image file. Any data import step which maps an according element to the field *INPUT_SOURCE* can be used for compression.

When installing **GEOcompressor**, according mappings for the File/Dir and ERDAS ShoeBox importers are already provided in the subdirectory **GEOcompressor** contained in the installation directory. By default **GEOcompressor** uses the mapping for the File/Dir importer.

As soon as one or several image files have been imported and the data mapping for the **GEOcompressor** process has been established, the user can start the actual compression task.

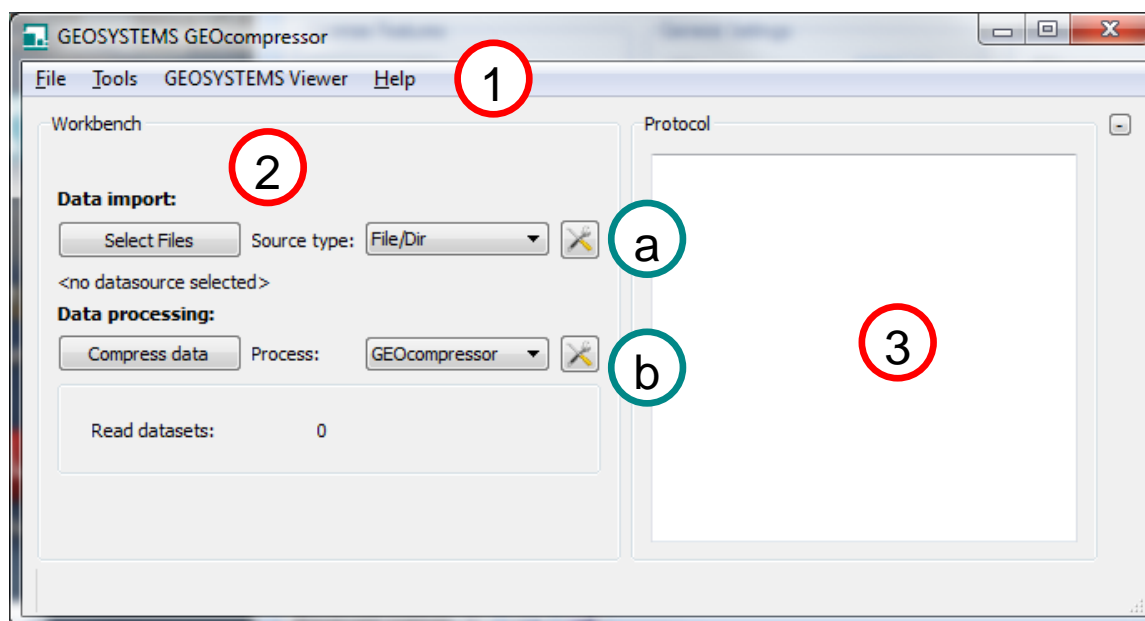
2.2 Usage

As described in section 2.1 a typical workflow consist of two steps, a *Data import* step and a *Data processing* step. **GEOcompressor** comes with a variety of importers allowing the user to import data which get stored in a table like structure. With an established mapping between the imported data and the required data fields of the processing step, providing the actual functionality, processing can be started. Both steps together can be understood as the workflow provided to the user. The following sections describe how to use the graphical interface of **GEOcompressor** to configure and to run the compression workflow successfully.

2.3 Main window

GEOcompressor starts up with the following main window. It can be divided into three functional parts.

1. Menu bar
2. Workbench
3. Protocol area



2.3.1 Menu bar

The menu bar has four items.


- **File**
 - **Settings** – This item opens the settings dialog allowing the modification of the settings of all available import and processing steps as well as the general settings. More see 2.4.
 - **Close** – Closes **GEOcompressor** and saves the current settings on disk.
- **Tools**
 - **Create CSV-Definition** – Opens a dialog to create definitions for the CSV file importer. Such definition is used to define how CSV data look like and how they can be validated. More see 2.5.
 - **Create Exporter-Mapping** – Opens the dialog for the creation of exporter mappings. Those are necessary to map imported data with the required data fields a processing step defines. More see 2.6.
- **GEOSYSTEMS Viewer**
 - **Open Image viewer** – Opens the GEOSYSTEMS viewer in a separate window. For the general usage of the viewer see 1.3.
- **Help**
 - **About GEOcompressor** - Shows license and version information


2.3.2 Workbench

The workbench area is the main area the user is managing the actual workflow in. It can be divided in two functional parts.

a – Data import

b – Data processing

Data import (2a) - the user selects the Importer to load data into **GEOcompressor**. By default three importers are available (*File/Dir Importer*, *CSV File Importer*, *ERDAS ShoeBox Importer*). Each Importer offers a set of configuration possibilities which can be accessed directly by clicking on  or by opening the *Settings* dialog via the main menu and selecting the Importer-Tab (see 2.4). Changing the selected Importer automatically removes the currently imported data. The actual import is started by clicking on the button *Select Files*.

Data processing (2b) – for GEOSYSTEMS **GEOcompressor** only the processing step **GEOcompressor** is available. It is important to note, that this processing step is only available when an according mapping for the selected importer as been selected in the configuration of **GEOcompressor**. To create such mapping use the *Exporter-Mapping* dialog (2.6) or use one of the provided mapping files. To assign a created mapping or to modify any other setting of the processing step **GEOcompressor** open the *Settings* dialog by clicking on the icon  or by opening the settings dialog via the main menu and selecting the Exporter-Tab (see 2.4).

2.3.3 Protocol

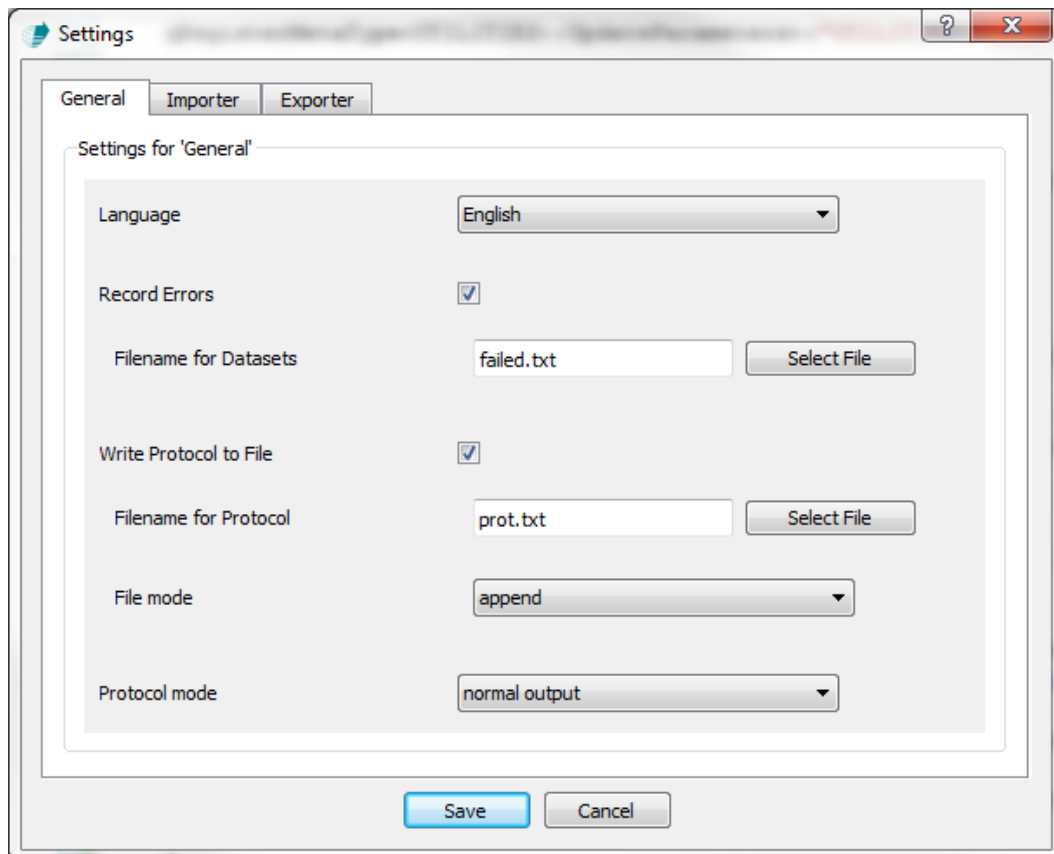
If not configured differently in the general settings of **GEOcompressor**, the protocol area will log processing steps being executed during workflow run. It is possible to change the level of detail in the general settings.

2.4 Settings

The menu item *File* → *Settings* opens the settings dialog which shows the *General* as well as the *Importer* and *Exporter* settings. Clicking on *Save*, the current set of settings on the local hard drive under <AppData>METAmorphit\METAmorphit.ini are stored. Saving the settings will automatically remove currently imported data. Settings for the available Importers and Exporters can be found under the tabs Importer and Exporter. Those settings are described further below.

2.4.1 General Settings

The tab *General* shows settings of **GEOcompressor** to modify the general program behavior.



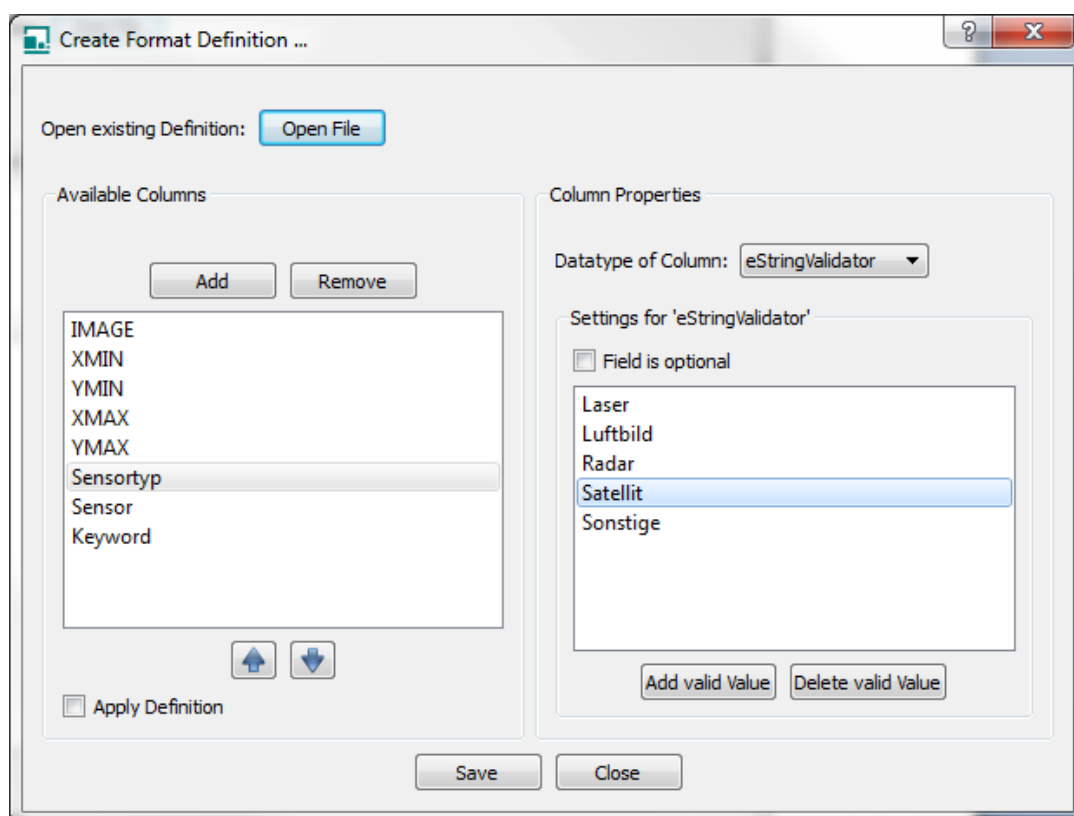
The following settings can be modified:



- **Language** – Select the language of the graphical user interface. Changes will be applied after closing the settings dialog.
- **Record Errors** – Records failed datasets during data processing will be recorded. A list with the according input data will be created. This is not for all Data importers supported (supported e.g. for CSV Importer and ERDAS ShoeBox Importer).
- **Filename for Datasets** – Specifies the filename used to store the list of failed datasets. This option is only available when **Record Errors** has been selected.
- **Write protocol to File** – Logged processing information can be written to a file instead of being shown in the graphical user interface.
- **Filename for Protocol** – Specifies the filename of the logfile.

- **File mode** – Specifies the mode to write the logfile. When *append* is selected new logging information will be appended to the current file. Selecting *replace* a new file is created each time the software starts up.
- **Protocol mode** – Specifies the level of detail of the logged information.

2.5 Create CSV Definition

The menu item *Tools* → *Create CSV Definition* opens the dialog to create CSV data definitions, used to configure the CSV Importer. A configured CSV Importer allows the user to load and validate data exactly in the defined format. The definition is stored as a XML file. It can be specified in the settings of the CSV Importer to use only those defined data formats for reading and validating.



Click *Add* to create a new column definition. This will add an item in the list of available columns with the name *New column*. Double click on the new item to change its name. Names of items have to be unique! When reading the CSV data later, a column with exactly that name is expected on exactly the provided column position. To change the order of the created column definitions use the buttons  and . To remove a column definition click on *Remove*.

For all columns the user can specify their data type which is used to validate the data when reading. The data type can also be used to restrict the allowed data to be read and valid. Additionally, columns can be marked as optional, which mean the value of that column in the CSV data file can be empty. Only CSV data which are valid are read by **GEOcompressor**. The following data types are available which can be assigned to the currently selected column definition from the drop down list *Datatype of Column*.

- String – If no valid values are provided, columns with this data type can contain any data to be valid. As soon as valid values have been added, columns with this data type must match one of those provided valid values. To add a valid value click on *Add valid value*. The provided values have to be unique! Values can be removed by selecting them and clicking on *Delete valid value*.
- Double – Restrict data to double values between *Min* and *Max* interval.
- Integer – Restrict data to integer values between *Min* and *Max* interval.
- Path, Date, Time – For those data types no further restriction can be specified.

By clicking on *Save* the user can write the created CSV Definition as a XML file to disk. If the option *Apply Definition* has been selected, the saved XML file will be automatically added to the configuration of the CSV Importer, which can then be used directly with the new definition.

To modify an already existing CSV Definition, click on *Open File* and load the according XML file. The list of available column will be filled with the loaded definitions.

2.6 Create Exporter Mapping

To create a mapping the user should first configure the desired Importer so that its data columns are known and the according data are read successfully.

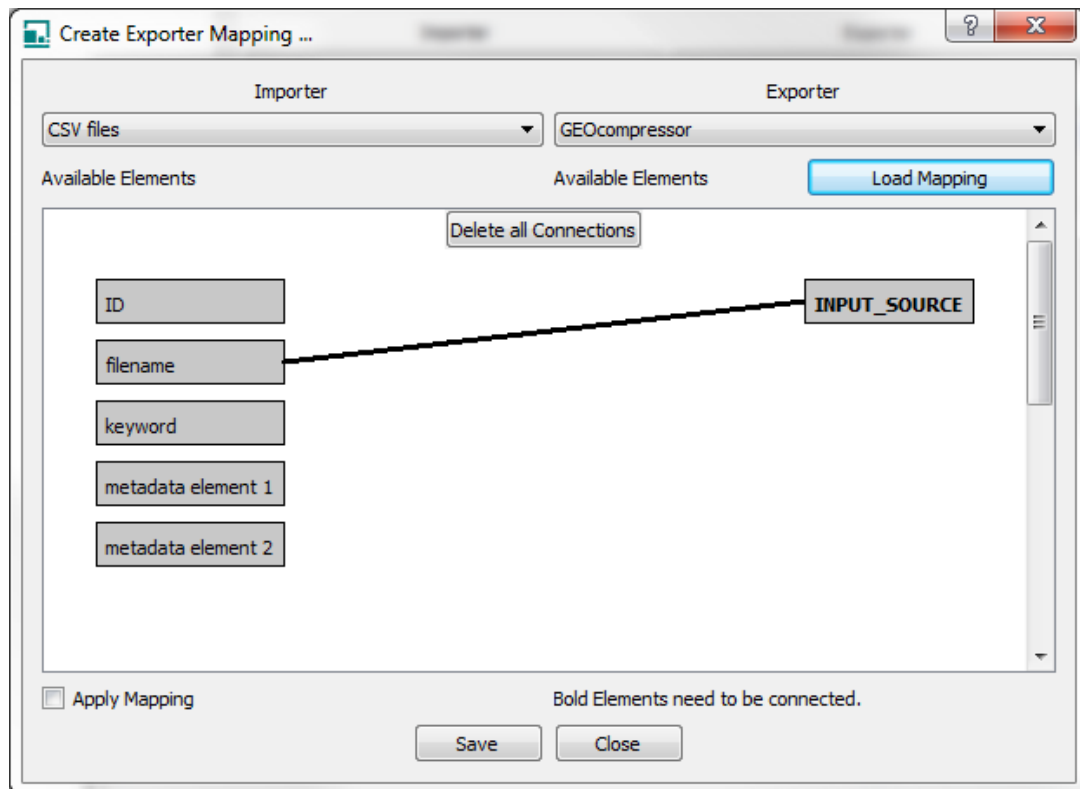
The menu item *Tools → Create Exporter Mapping* opens the dialog for the creation of exporter mappings.

Those mappings are needed to make imported data available to a processing step using that mapping. A processing step defines certain fields which are required to run the process. Those fields cannot be changed by the user. They are selected during workflow definition and development and typically reflect data values changing for every dataset to be processed.

It is not important that imported data match exactly the names of the required fields nor is it important that imported data have exactly the same number of columns as required by the exporter. As soon as all mandatory fields of a processing step have a mapping to imported data columns those data can be used for processing.

The actual validation, if mapped data comply with the expected format or structure, is done by the processing step when executing it.

The result which gets created by this dialog is a XML file containing the mappings between imported data column names and the required field names. In order to establish a mapping the created file must be assigned to the Exporter. If the imported data columns are changed later, the mapping becomes invalid and must be changed as well.



To start with the creation of a mapping, select the desired Importer from the list of available Importers. Its data columns are shown on the left side of the dialog. Holding the mouse pointer above the shown elements will show the data type and possible data restrictions.

The next step is to select the export functionality from the list of the available Exporters for which the mapping should be created. Once the Exporter has been selected, its required fields are shown on the right side of the dialog. Elements with bold text must be mapped to an import data element. All other fields are optional.

To create a mapping, drag & drop the importer data elements onto the desired exporter elements. A mapping will be shown as a black line. Click an existing mapping to select it. By holding down the key *Ctrl* several mappings can be selected at once. Pressing the key *Del* will remove all selected mappings. To remove all mappings click on *Delete all Connections*.

Depending on the implemented functionality of the selected workflow an exporter data field might allow several mappings. An importer data column can be mapped to any number of exporter fields.

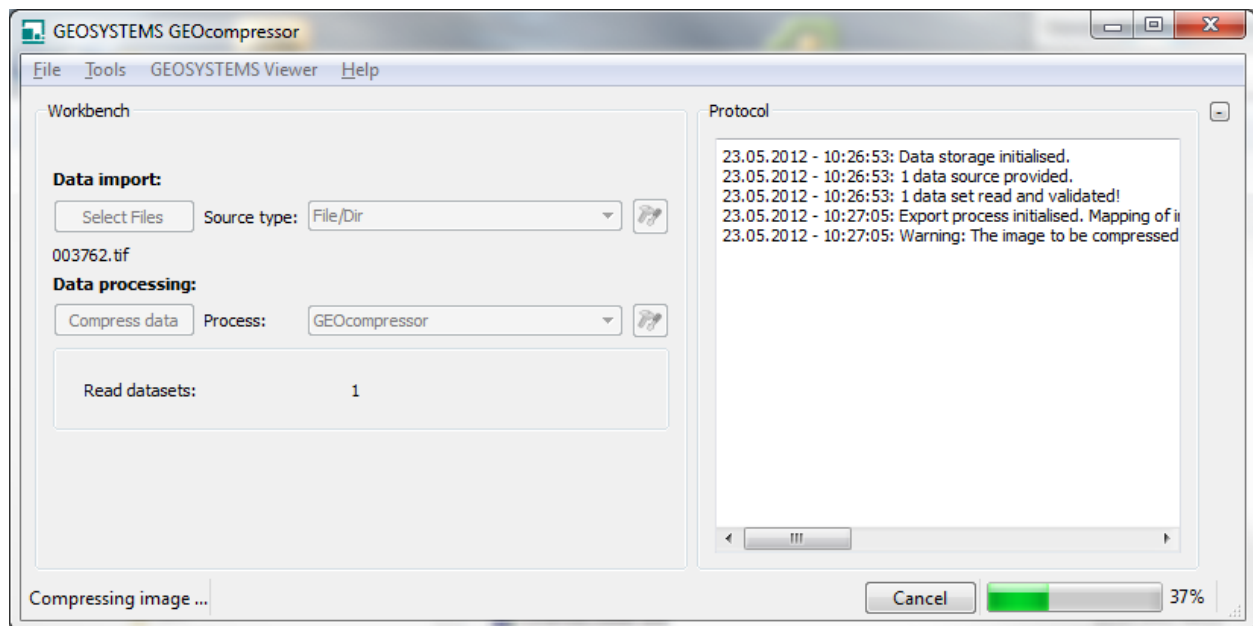
By clicking on *Save* the XML file with the created mappings will be written to disk. If additionally the option *Apply Mapping* has been selected, the saved XML file will automatically be added to the configuration of the currently selected Exporter which is now ready to process data.

Via its configuration, a saved mapping can also be assigned later to an Exporter.

To modify an existing mapping load it into the dialog by clicking on *Load Mapping* after Importer and Exporter, for which the mapping should be modify, have been selected. The existing mappings will be shown automatically.

3. GEOcompressor workflow

This section describes the settings of the *Data import and Data processing* steps of **GEOcompressor** workflow.

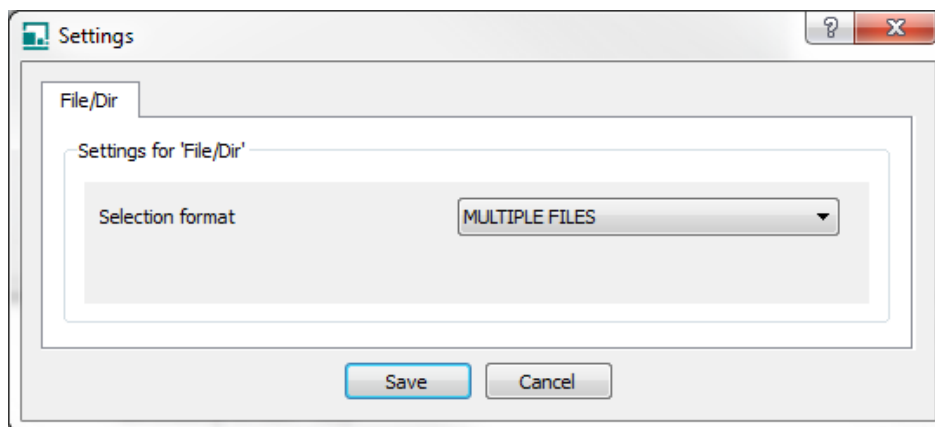


3.1 Import

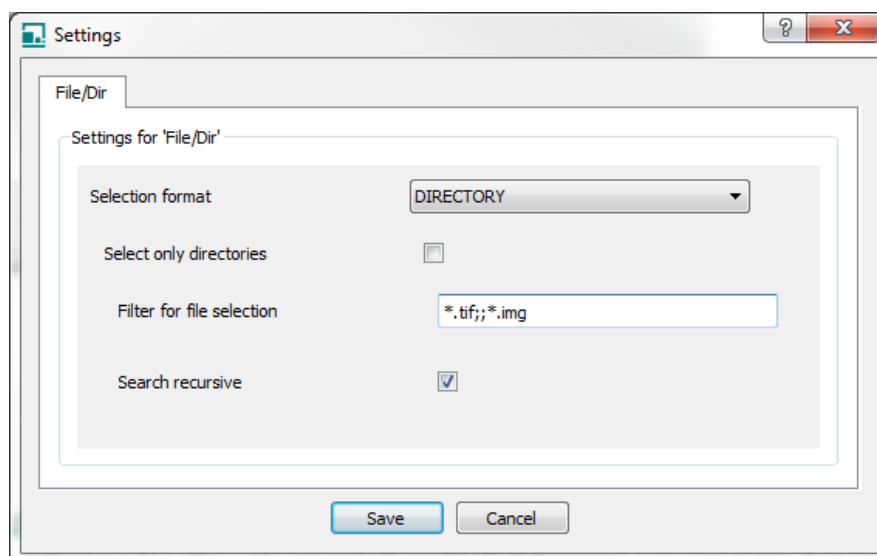
For the **GEOcompressor** workflow image files with full path information act as input. Those image files can be imported in different ways either by directly selecting one or several file via the File/Dir Importer, loading CSV files with an according column or opening an ERDAS ShoeBox.

3.1.1 File/Dir Importer

In general the File/Dir Importer allows the direct selection of files and directories. The **GEOcompressor** workflow uses files as input. Therefore the importer needs to be configured accordingly.



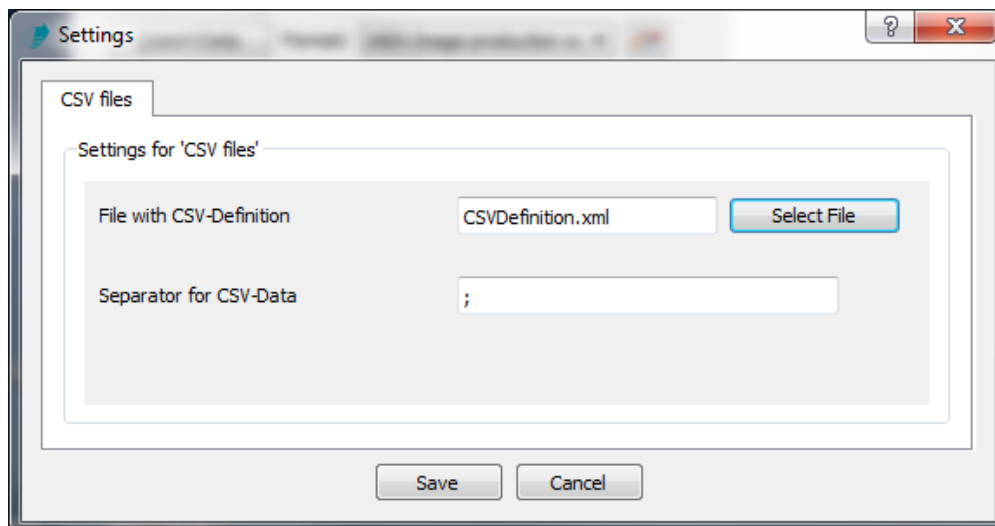
- **Selected format** – Specifies the items which can be imported. The list items *SINGLE FILE* or *MULTIPLE FILES* allow the selection of files. No further restriction is possible. The list item *DIRECTORY* allows the single or multi selection of directories. If this item is selected more settings become available.
- **Select only directories** – If this option is selected, the selected directories will be imported. If the option is not selected, further settings become available. **Do not use this setting with GEOcompressor as only the actual directories are imported!**



- **Filter for file selection** – Instead of the directory itself files matching the provided filter will be imported. For the usage with **GEOcompressor**, restrict the imported image files by specifying an according filter string. Several file types are separated by two semicolons (e.g. to select all TIFF images and all ERDAS IMAGINE images in a directory enter *.tif;*.img)
- **Search recursive** – If this option is selected files matching the provided filter in all subdirectories are considered for the import. Otherwise only files in the selected directory can be imported.

3.1.2 CSV Importer

The CSV Importer allows the import of any kind of character separated data format. The user can define the format of its data using the CSV Definition dialog (see 2.5).



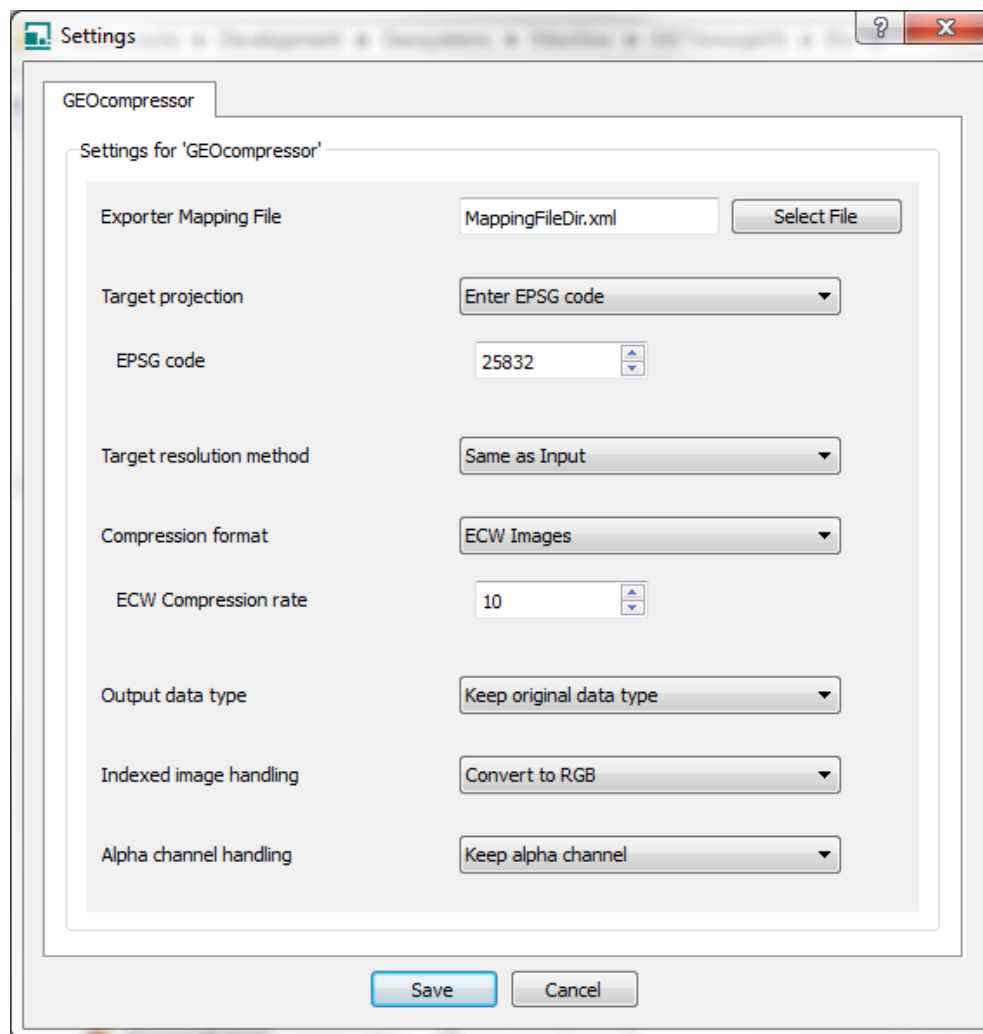
- **File with CSV Definition** – Select the file **CSVDefinition.xml** with the CSV definition matching your CSV data which has been created using the CSV Definition dialog (2.5).
- **Separator for CSV Data** – Specifies the character separating the CSV data.

3.1.3 ERDAS ShoeBox

There is no configuration available when importing ERDAS ShoeBoxes. Just load them directly after selecting the importer.

3.2 Export

The actual compression functionality is implemented in the processing step **GEOcompressor**. The installation of **GEOcompressor** comes with an input data mapping which matches data imported via the File/Dir Importer and the ERDAS ShoeBox Importer. The mapping files can be found in the installation directory in the subdirectory **GEOcompressor**. The following settings can be modified:



- **Exporter Mapping File** – Select either one of the provided mapping files for the File/Dir Importer (**MappingFileDir.xml**) or ERDAS ShoeBox Importer (**MappingERDAS_ShoeBox.xml**) or a newly created one, matching your CSV data to establish a mapping between data imported and the GEOcompressor process. Each time the selected import step is changed, the selection of this mapping file needs to be adjusted as well!
- **Target projection** – Specifies how to determine the target projection of the compressed imagery. Possible options are to either enter the epsg code (*Enter EPSG code*) manually or to create images without projection information (*No Projection (RAW)*). All images which are compressed will be assigned with the selected projection.
- **EPSG code** – When selecting *Enter EPSG code*, this parameter becomes available to enter the actual EPSC code. For more information see e.g. <http://www.epsg-registry.org>.
- **Target resolution method** – Specifies the method to determine the target resolution. Possible options are to either keep the resolution as provided by the input (*Same as Input*) or to specify a custom resolution for the created imagery (*Custom*).

- **Target resolution** – When selecting *Custom* as the target resolution method, this parameter becomes available allowing the specification of the exact resolution to be used for the compressed imagery.
- **Compression format** – Specifies the actual compression format to be used. Available formats are *ECW Images* or *JPEG 2000 Images*.
- **ECW/ JPEG 2000 Compression rate** – Depending on the selected compression format this parameter specifies the actual compression rate to be used. For ECW valid values start with 1. In order to create lossless JPEG 2000 imagery enter 0.
- **Output data type** – This parameter specifies whether the data type of an input images should be changed or not when compressing the imagery. E.g. when creating ECW (only 8-bit) from 16-bit a downscaling of the pixel depth has to be performed. Possible options are to use the original data depth (*Keep original data type*) or to change the data type (*Change data type*), which will also make more parameters available.
- **Data scaling format** – The current version only allows scaling of the data with a *Linear Stretch*. Under **Target Bit depth** select the desired data type. Under **Min-Max selection**, specify how to scale the data. Possible options are *Min-Max from band*, meaning each band is stretched individually between minimal and maximal value of the band, *Min-Max from image*, meaning that all bands are stretched with the image wide minimal and maximal values and *Custom values*, to specify minimal and maximal value manually.
- **Indexed image handling** – Specifies the method how to handle indexed input images. Possible options are to convert an indexed image to RGB (*Convert to RGB*) or to write it as panchromatic image (*Write as panchromatic*). The creation of indexed ECW or JPEG 2000 imagery is not supported.
- **Alpha channel handling** – Specifies the method how to handle input imagery with existing alpha channel. Possible options are to keep an existing alpha channel (*Keep alpha channel*) or to remove the alpha channel from the compressed image (*Ignore alpha channel*). A third option (*Create custom alpha channel*) allows the creation of a new alpha channel. The current version only supports the creation based on discrete values. Under **Alpha channel values** enter one or several values (separated by a comma) to be considered for the alpha channel creation. If the input image has several bands, all bands need to match the same specified alpha channel value to be considered.