A Brief Introduction

Version 10-Oct-2023
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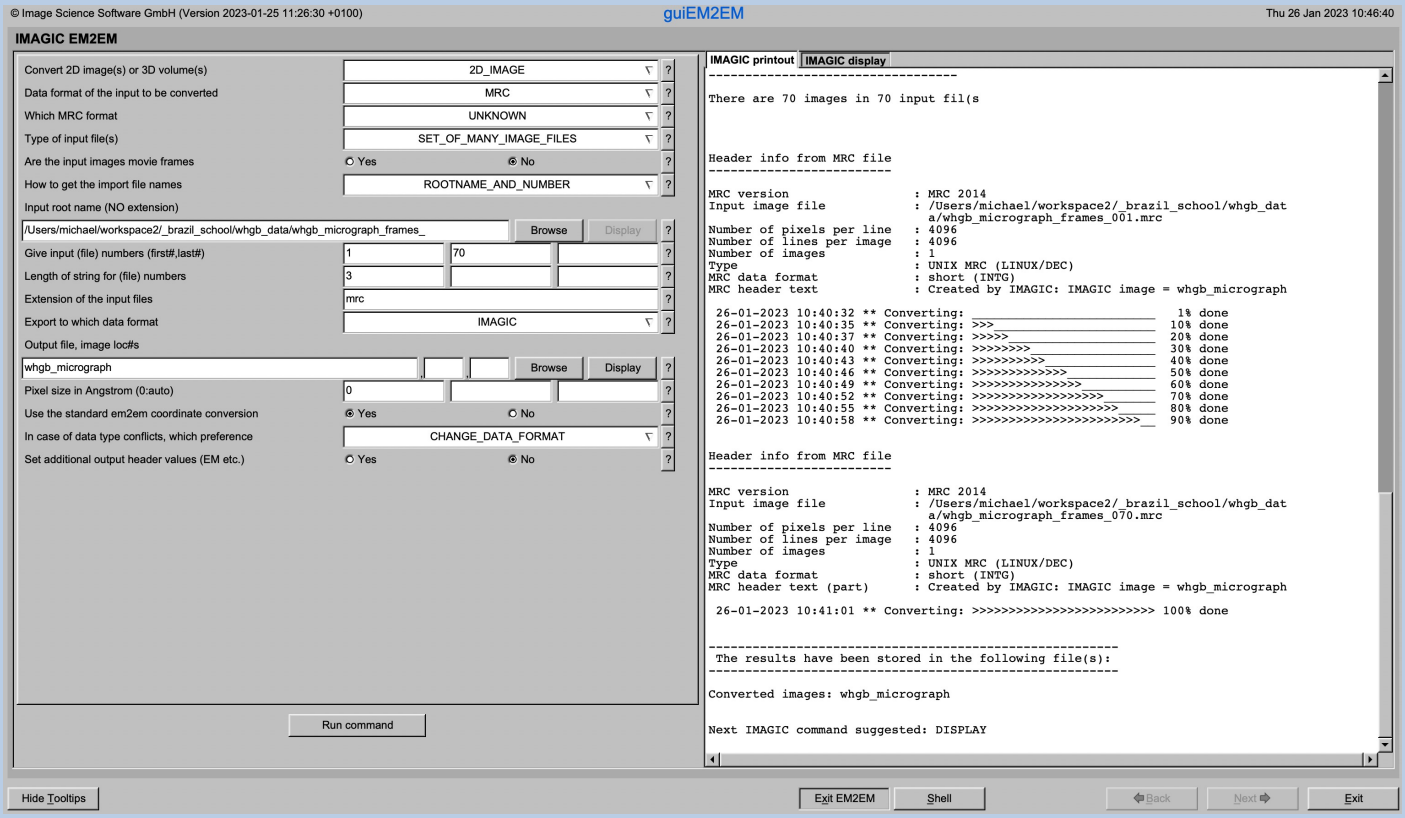
The IMAGIC guiEM2EM program

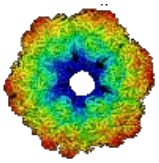


The **guiEM2EM** program converts (image / 3-D volume) files from and to any 3DEM format.

This is a brief hands-on on how to use IMAGIC GUI oriented programs and how to work with **guiEM2EM**:

CONTENT:

- IMAGIC GUI programs — How to use IMAGIC GUI programs
- guiEM2EM — How to convert files from to any 3DEM format
  - > The guiEM2EM Page
  - > User Interaction Block
  - > Typical Questions
  - > Examples
- Error hints — How to send us feedback



IMAGIC

GUI Programs

The Working Directory

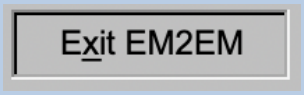
If **guiEM2EM** is called from the programs list, by using an icon or in a command line the working directory will be your default system directory.

If **guiEM2EM** is called by an IMAGIC command in a terminal / command window

```
IMAGIC-COMMAND : guiEM2EM
```

the working directory will be the directory used in this window.

If you want to change this directory use the “Exit EM2EM” button



to navigate to the “Start” page where you can specify the working directory of **guiEM2EM**.

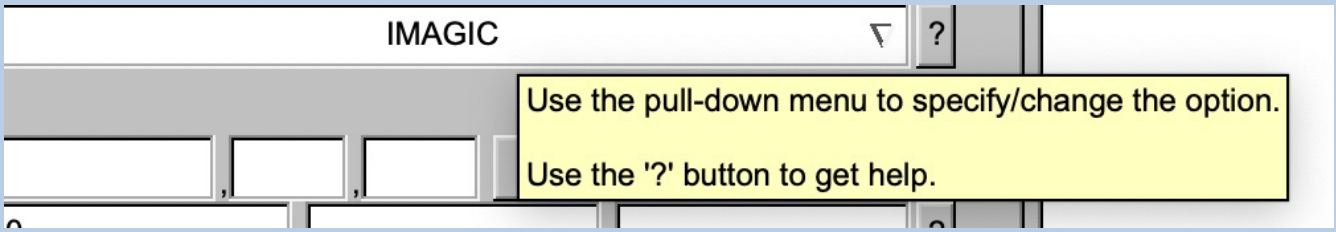
All output files will be stored in the working directory which you have specified on the start page.

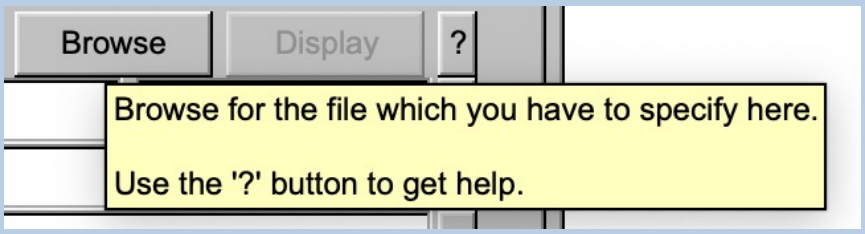
Input files can be chosen from other directories.

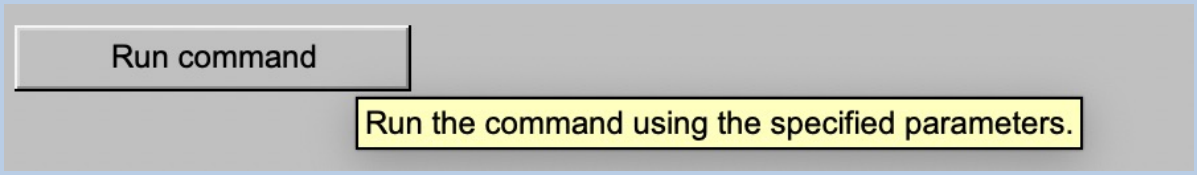
Click the “EM2EM” button to return to the “IMAGIC EM2EM” page.

Help

Move the cursor on (nearly) any item (questions, radio buttons, display windows…) shown on the pages and you will get context sensitive help.



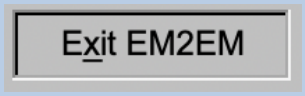




The “Start” Page

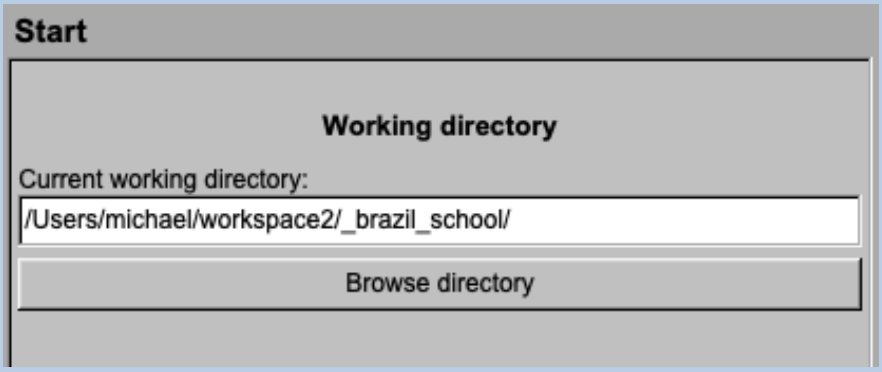
guiEM2EM starts with the “IMAGIC EM2EM conversion” page.

If you would like to adjust some **guiEM2EM p**rograms setting before importing the images use the “Back” button to navigate to the “Start” page.



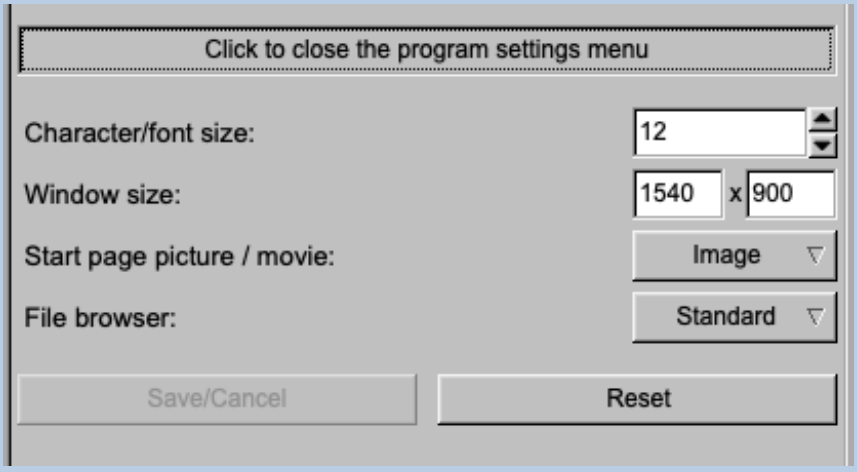
On the “Start” page you can set some program parameters:

a) the working directory



b) the size of the **guiEM2EM** program windows and/or text (a re-start is needed)

c) the type of file browser

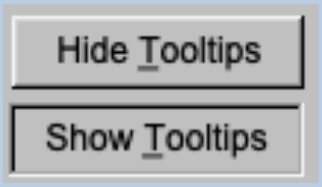


Having adjusted all setting use the “EM2EM” button to navigate back to the “IMAGIC EM2EM” page.

The Toolbar

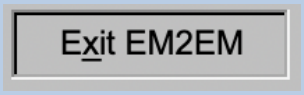
There is a toolbar at the bottom of each **guiEM2EM** page.

The toolbar buttons:



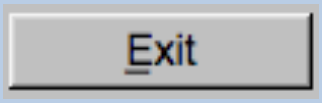
Show or hide the context sensitive tooltips
(the help text may sometimes disturb)

Run a shell / terminal page. command

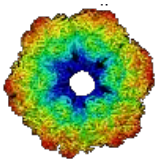


Go to the “Start” page

Go back to the EM2EM page



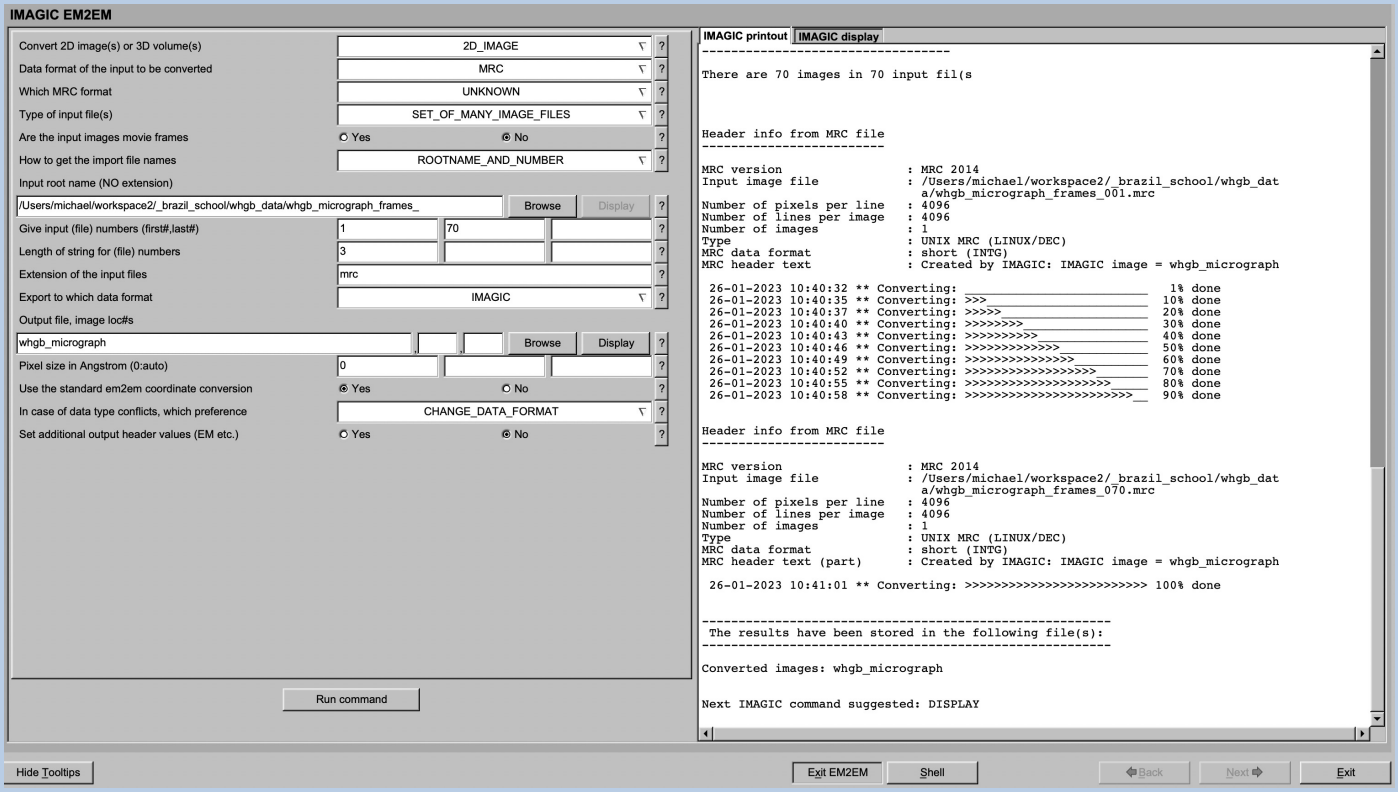
Exit **guiEM2EM**



IMAGIC

guiEM2EM

The “IMAGIC EM2EM” page

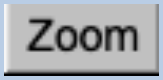


On the left-hand side is a list of questions (the “user interaction block”) asking for all parameters needed to run the conversion.

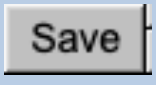
You will also find the “Run Command” button to start the conversion:

On the right-hand side you find the print-out / display page. The various tabs are used to show the print-outs, plotted curves or displayed images

Move the cursor into the print-out window and click the “Zoom” button to enlarge the print-out window



The “Save” button will store the print-out in a text fil.

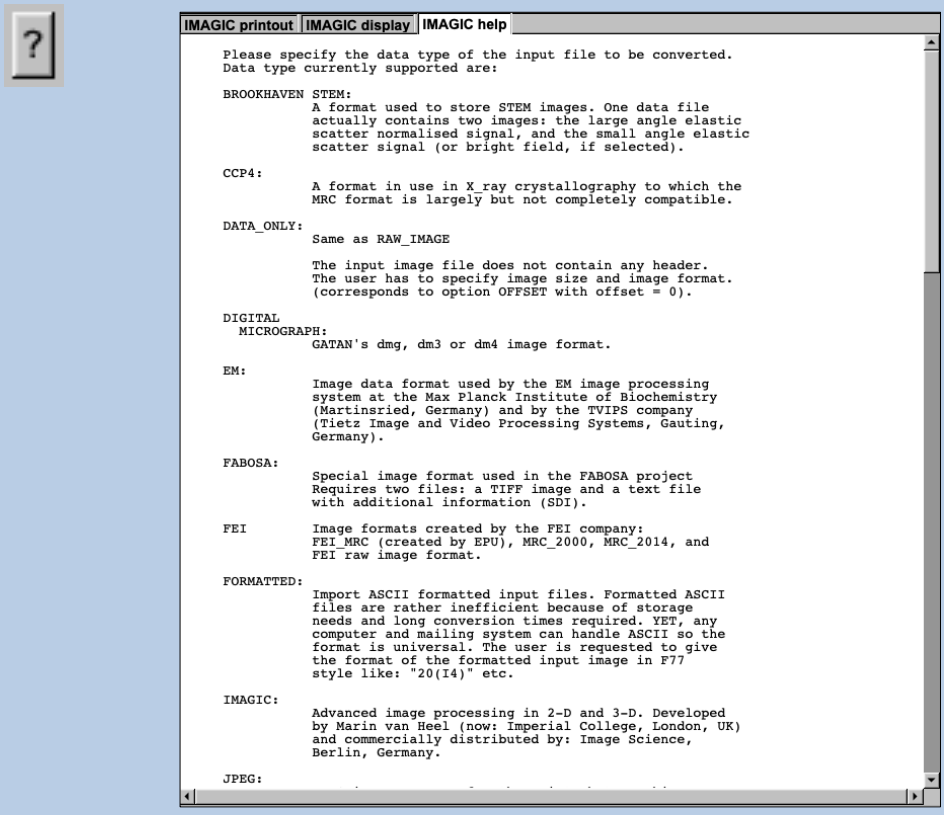


The User Interaction Block (UIB)

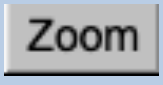
guiEM2EM first asks for all file names and parameters needed before any calculation can be started.

guiEM2EM questions will often have default values which appear in the text/value boxes. Of course, values and file names are only suggested. You are free to choose whatever you wish.

guiEM2EM questions always have an associated help, which can be accessed by clicking the related “?” button:



Move the cursor into the print-out window and click the “Zoom” button to enlarge the print-out window

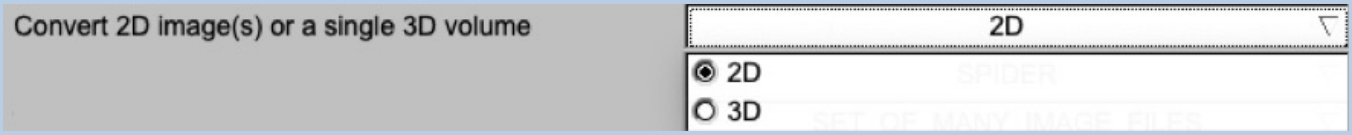


The “Save” button will store the print-out in a text fil.

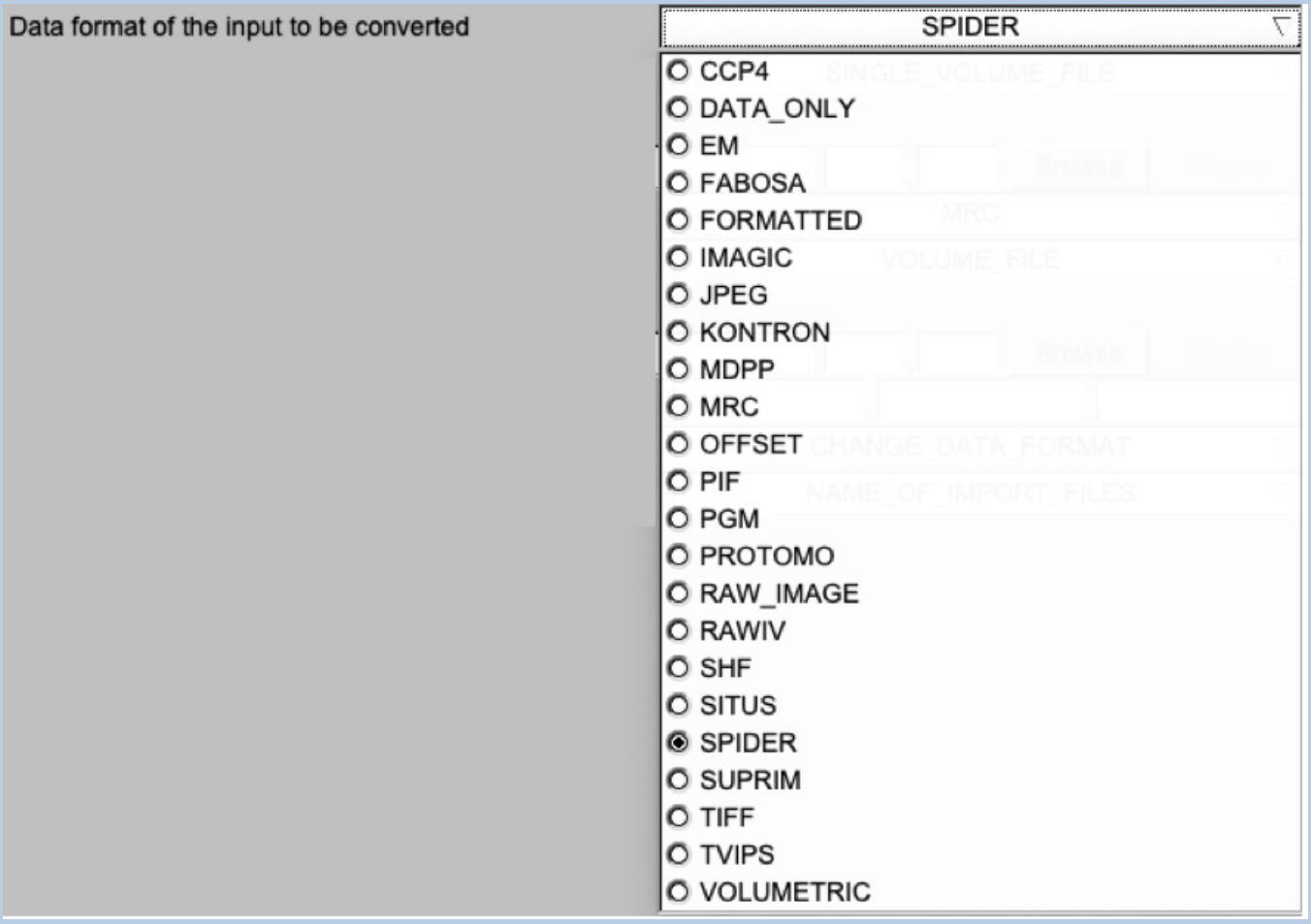
Typical UIB Questions

Typical **guiEM2EM** questions are:

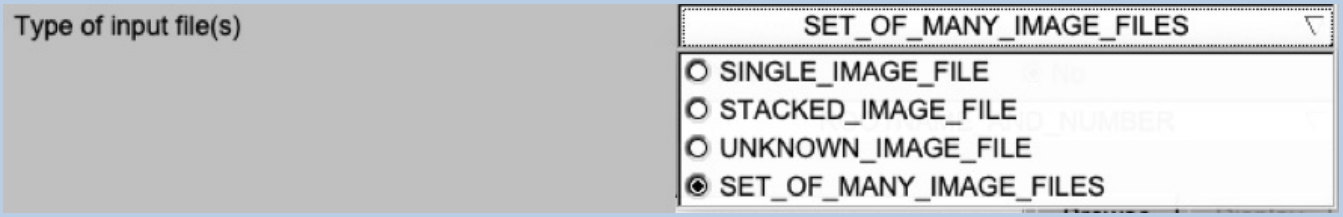
>> Do the input file(s) contain 2-D image(s) or 3-D volumes :



>> The format of the input images:



>> The way the input images are stored:

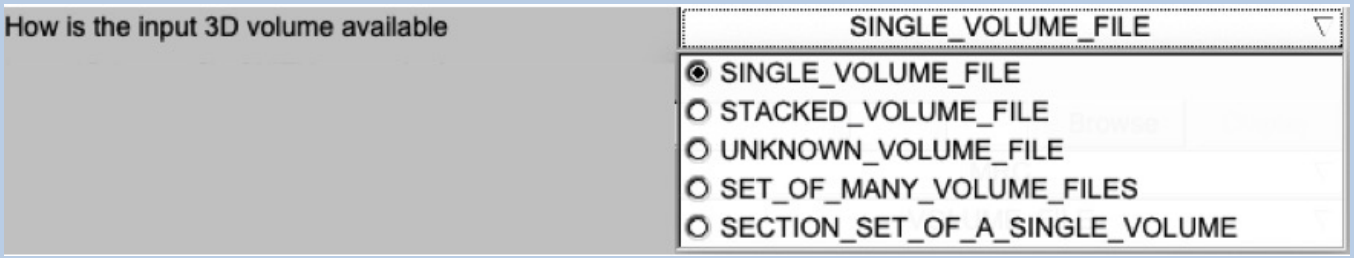


>>The options depend of the input format given.

Possible options are:

Single image file	Input is a single file containing a single 2-D image
Stacked image file:	Input is a single file containing a stack of 2-D images
Unknown image file:	Input is a single file either containing a single or a stack of 2-D images
Set of many image files:	Input is a set of 2-D image files.

>> The format of the input images:



The options depend of the input format given.

Possible options are:

Single volume file	Input is a single file containing a single 3-D volume
Stacked volume file:	Input is a single file containing a stack of 3-D volumes
Unknown volume file:	Input is a single file either containing a single or a stack of 3-D volumes
Section set of single 3-D	Input is a set of 2-D image files each file containing a single section of a single 3-D volume

>> The name of the input images:

Usually you can type the file name into the text box or browse the file

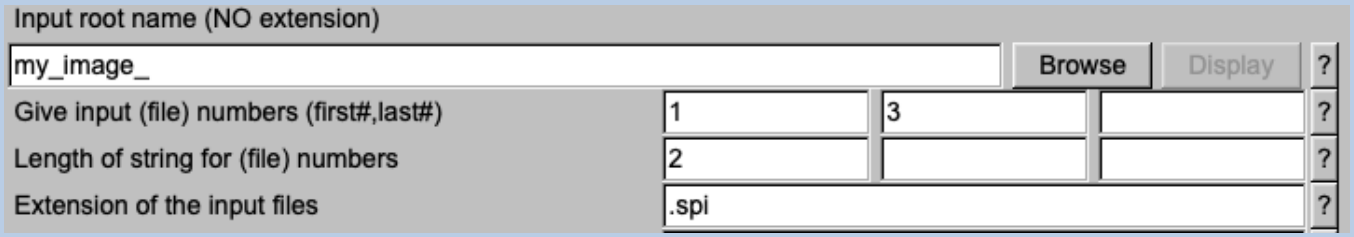
If the input is a set of files you can specify the input file names in two ways

The options are:

Root name and number: The input file names have a common root name followed by a number.

File of file names: The input file names will be read from a text file which is to be provided

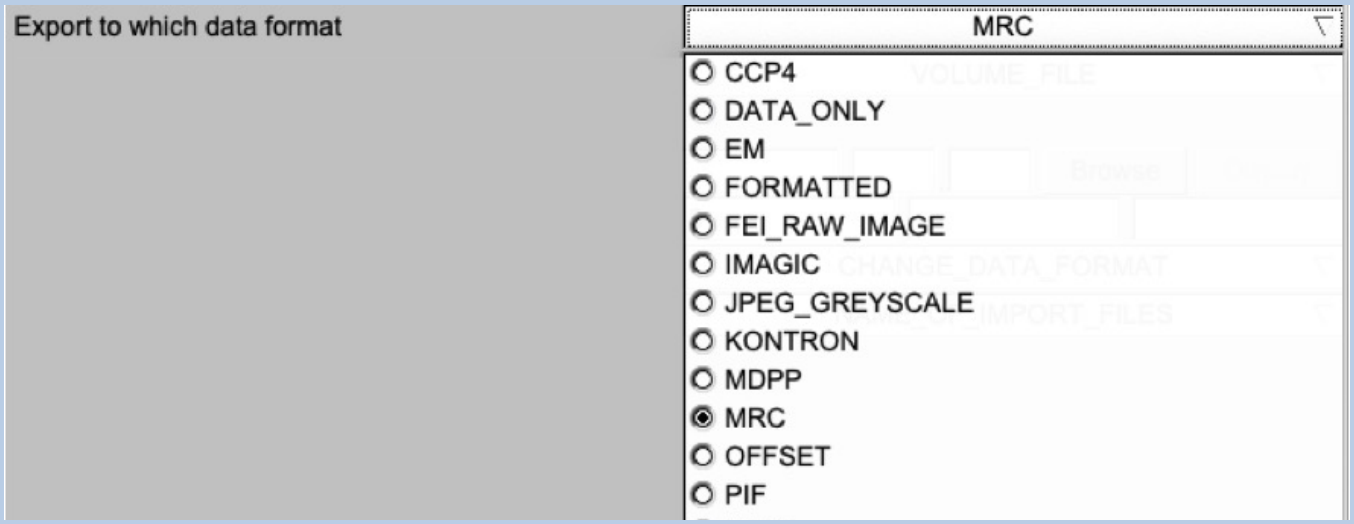
Choosing root-name and numbers you have to answer these questions:



Click the "?"button button to get additional help:

>> Do the input files contain movies (2-D mode only)

>> The wanted format of the output images:



>> The way the output images are to be stored
(options depend on the input and output files and formats used):

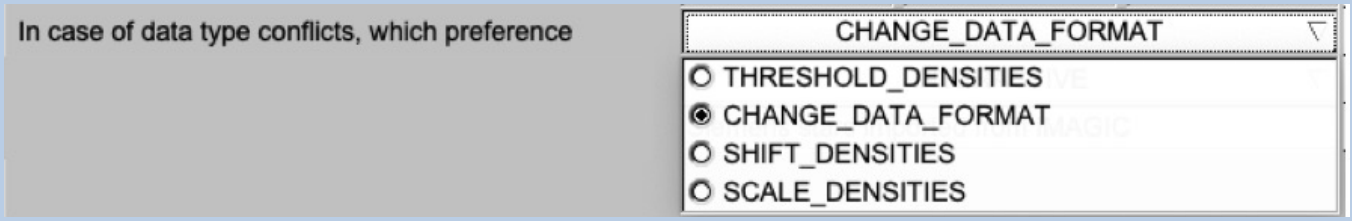
>> The name of the output file:

>> The pixel size to be stored in the header(s) of the output image(s):

>> How to handle different coordinate systems.

Sometimes the import format and the export format have different coordinate systems. Usually **EM2EM** does a related conversion. By choosing NO, you will obtain mirrored or flipped 2D images/volumes or 3-D volumes with the wrong handedness. This option was the special request of specific users.

>> What to do in case of data type conflicts:



If import and export format do not support the same data type (REAL, LRGE, LONG, INTG, PACK) and/or do not have the same signed / unsigned data properties the image density values cannot be simply taken over.

Here you have to specify what to do if such a conflict occurs.

THRESHOLD_DENSITIES:

In case of an import/export data type conflict threshold the too large and/or the too small density values.

NOTE:
The import/export data type will be the same as well as the file size. But due to possible thresholding some (too high and/or too low) density values can be changed.

EXAMPLE: MRC images created by FEI are stored in the non-standard unsigned INTG format. But since FEI never uses densities larger than the maximal value allowed by INTG one can use option THRESHOLD_DENSITIES to keep the data type INTG (and hence can also keep the file size).

CHANGE_DATA_FORMAT:

In case of an import/export data type conflict change the export data type (for example from PACK/byte to INTG/int).

NOTE:
The density values remain the same but the file size will increase.

EXAMPLE: MRC PACK/byte images are stored as non-standard signed bytes. To keep all density values unchanged one can use option CHANGE_DATA_FORMAT to store the export image in INTG/int format.

SHIFT_DENSITIES:

In case of an import/export data type conflict shift all image densities accordingly.

NOTE:
The density values change but the data type (and hence the file size) remain unchanged.

EXAMPLE: MRC PACK/byte images are stored as non-standard signed bytes. Using the option SHIFT_DENSITIES the non-standard image density values (-128 to 127) are shifted to 0 - 256 so that they can be stored as standard PACK/byte images.

NOTE:
Sometimes the import/export data type conflict cannot be solved by shifting all image densities. In this case the image densities MUST be scaled to the export data type.

SCALE_DENSITIES:

In case of an import/export data type conflict scale the image densities so that the minimum/maximum values of the scaled image fit to the minimum/maximum values allowed by the export data type.

EXAMPLE:
A REAL/float image should be exported to a JPEG image. JPEG only allows PACK format. Because the range of REAL values is much larger than the range of PACK values the REAL image densities will be scaled to PACK format (0 - 256).

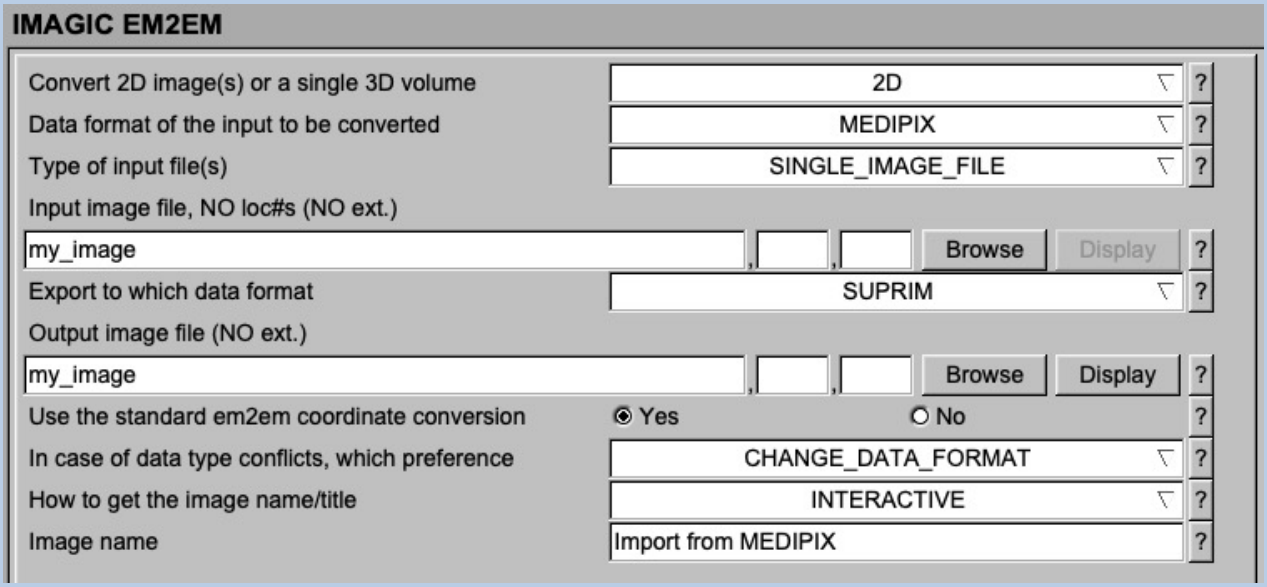
NOTE:
If there is no import/export data type conflict the image densities and the data type will remain the same.

>> Text in headers:

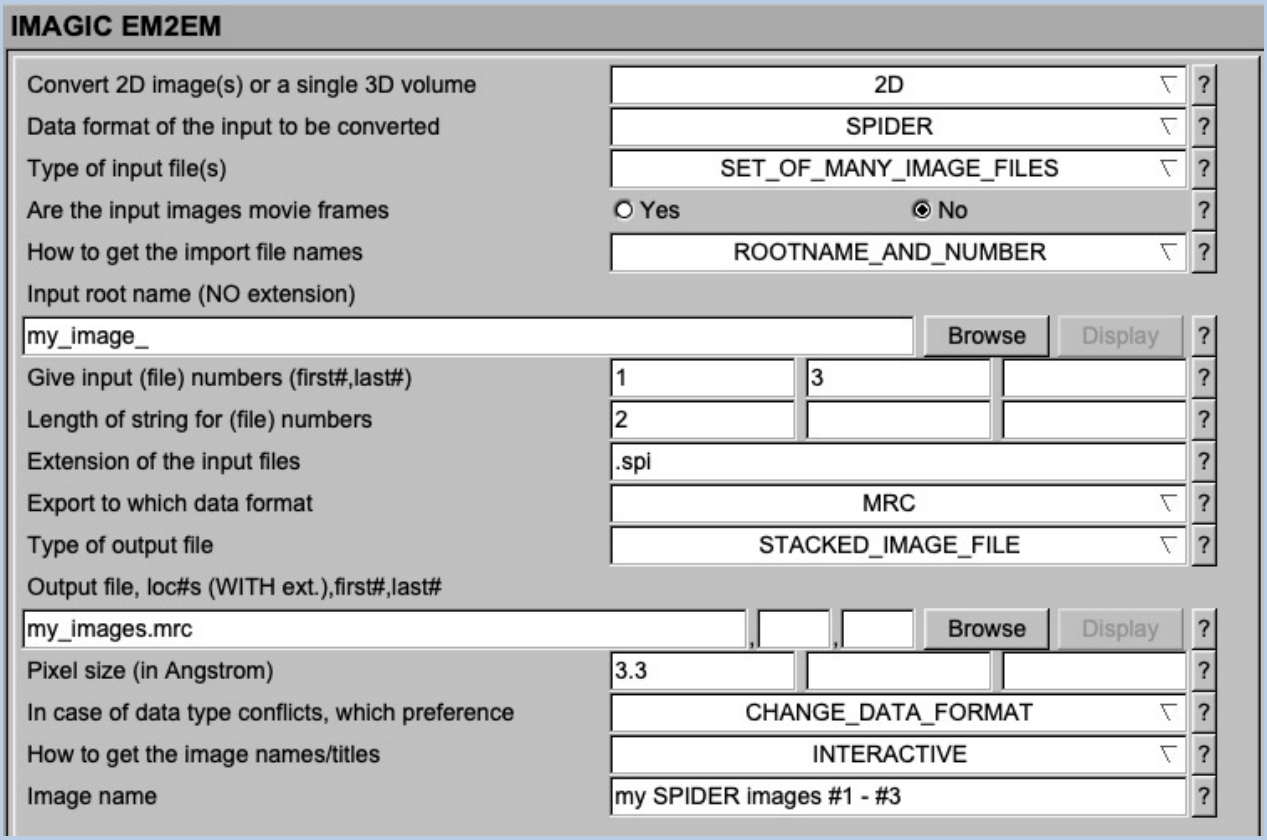
Some formats allow to store a text/comment in the headers of the images

Examples

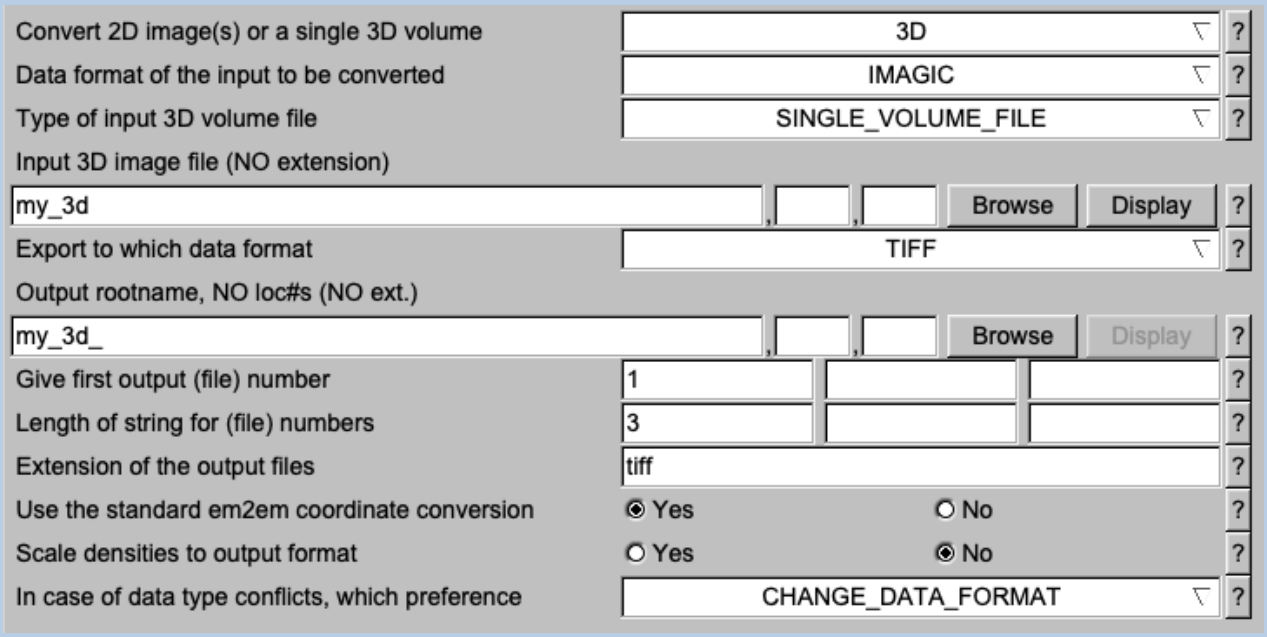
>> Convert a single MEDIPIX image into a SUPRIM image



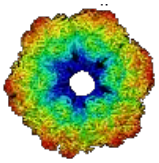
>> Convert SPIDER image files named my_image_01.spi, my_image_02.spi and my_image_03.spi into MRC format and store the image in a single MRC file



>> Convert a 200x200x200 3-D volume in IMAGIC to TIFF files:



Note that the output will be a series of 200 TIFF 2-D image files named my_3d_001.tiff, my_3d_002.tiff … my_3d_200.tiff.



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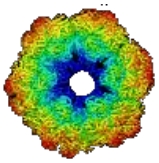
guiEM2EM

Not (yet) possible

The following options are not (yet) possible:

- Run in batch mode



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guiEM2EM

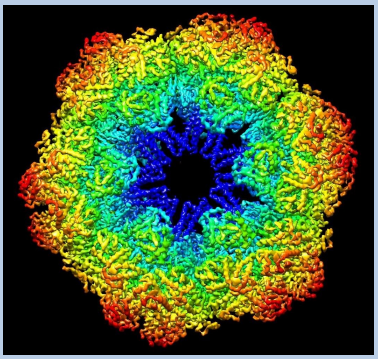
Feedback / Error hints

We intensively tested the **guiEM2EM** program and tried to find all possible errors and inconsistencies. But the current program is very complex and still in progress. So you may still find some problems.

We are happy to get feed-back. Please send your comments, error hints etc. to

imagic@ImageScience.de

THANK YOU VERY MUCH.

Image Science

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imagic@ImageScience.de