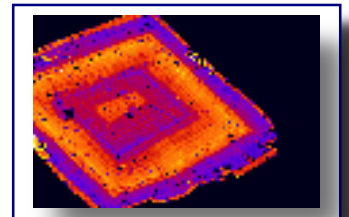


JEOLMapExporter[©]

Exporting JEOL map files on the JXA-8230
and JXA-8530F.



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1.0 - Introduction

On the JEOL JXA-8230 and JXA-8530F electron microprobes, the map data is stored in a 64-bit binary format. Most image processing programs are unable to read this file formats. This program (Fig. 1) allows the user to convert the raw JEOL binary maps files into a format that can be easily read by other programs, and still maintain the original image's exact resolution.

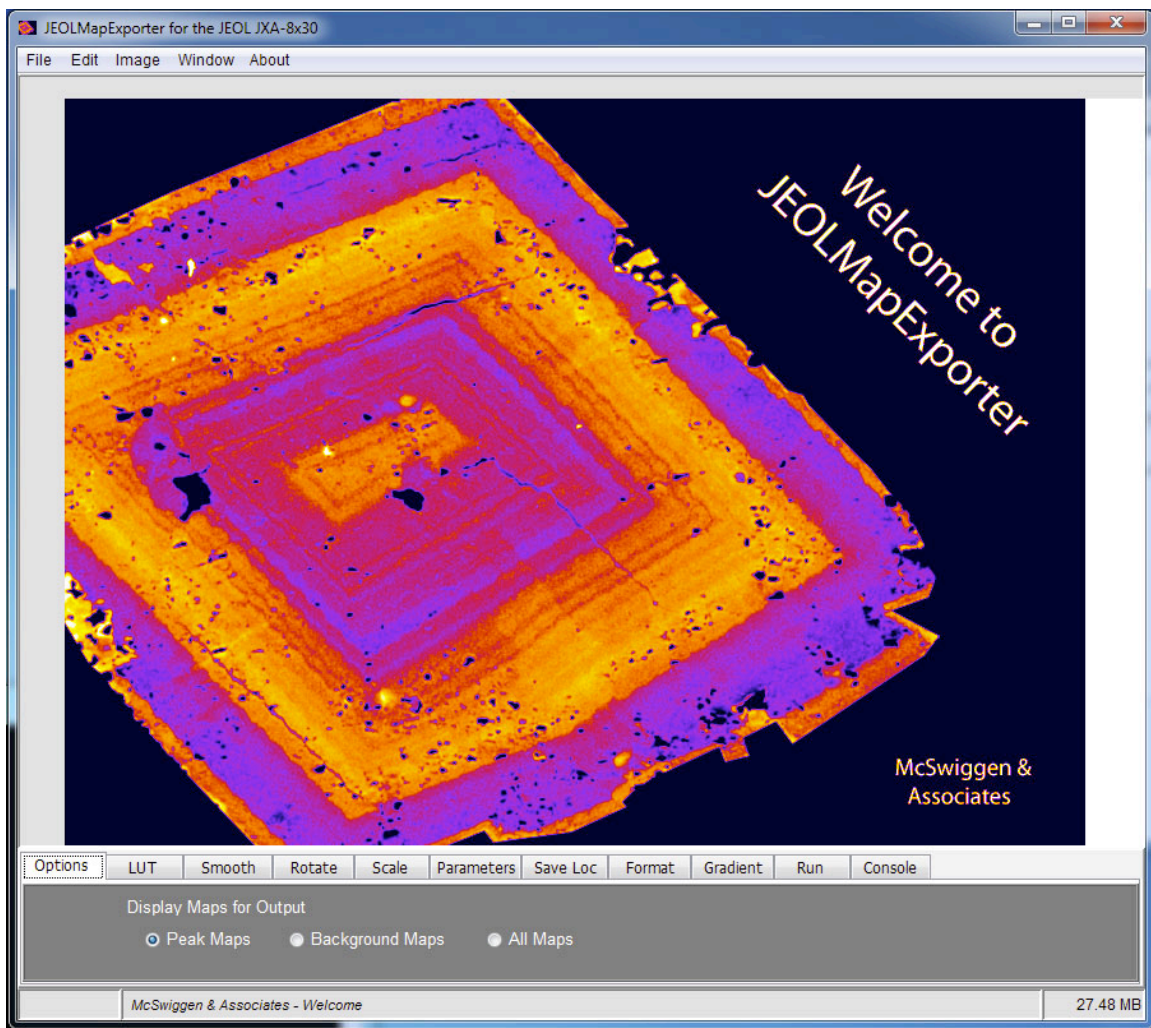


Figure 1. Welcome to JEOLMapExporter. The JEOLMapExporter can convert single maps or large groups of maps into JPEG, BMP, PNG, EPS or TXT files. The maps can be converted singularly or in a batch

process. In addition, while the maps are open, the user can be smooth, rotate, change the color LUT, and add or remove the scale bar.

2.0 – Selecting Files

To begin, the user selects which maps are going to be exported. Select the maps by going to the menu item **File > Select Images**. The window show in Figure 2 will open. If the path is set to point at the directory containing the projects of interest, those projects will be displayed in the first sub-window. If the path is not set correctly, click on the **Change Path** button and a file manager window will open. Use this window to navigate though the file structure until the appropriate directory is found and can be selected.

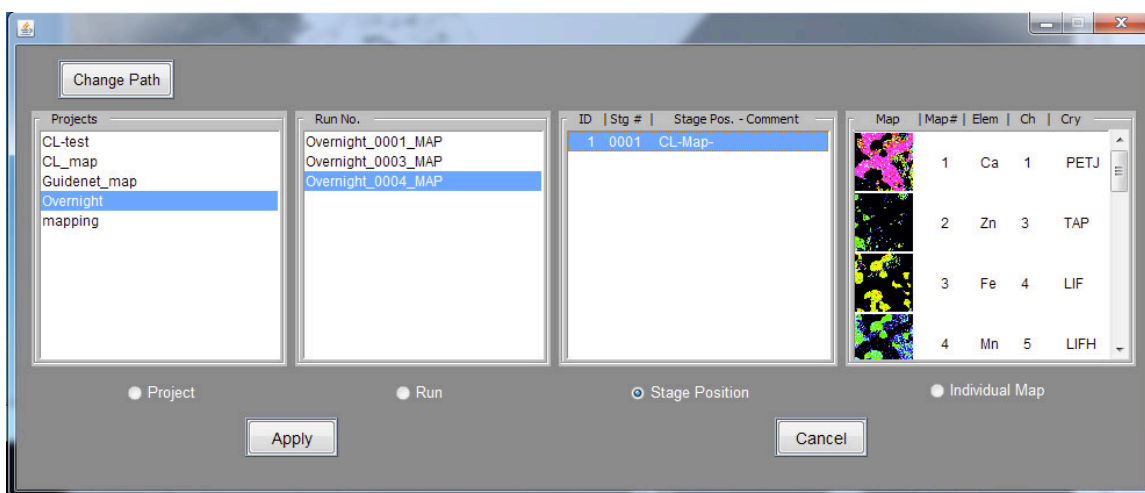


Figure 2. **Select Images ...** window.

By selecting the desired project in the first sub-window, all of the Run directories in that project will be displayed in the second window. This will also highlight the **Project** radio button until the first window. If the **Apply** button were selected at this point, all of the images in the selected project would be loaded into the JEOLMapExporter program. If the user wants to load the maps only from a single stage position, then the appropriate project, run, and stage number must be selected. At that point the **Stage Position** radio button would be highlighted. Clicking on the **Apply** button will load all the maps collected at the single stage position. The first map in the list will be displayed (Fig. 3). The user can then step through each successive map by clicking on the **Run** tab and then by clicking on the **Next >>** button (Fig. 4).

Figure 3.
JEOLMapExporter
displaying one of the
maps.

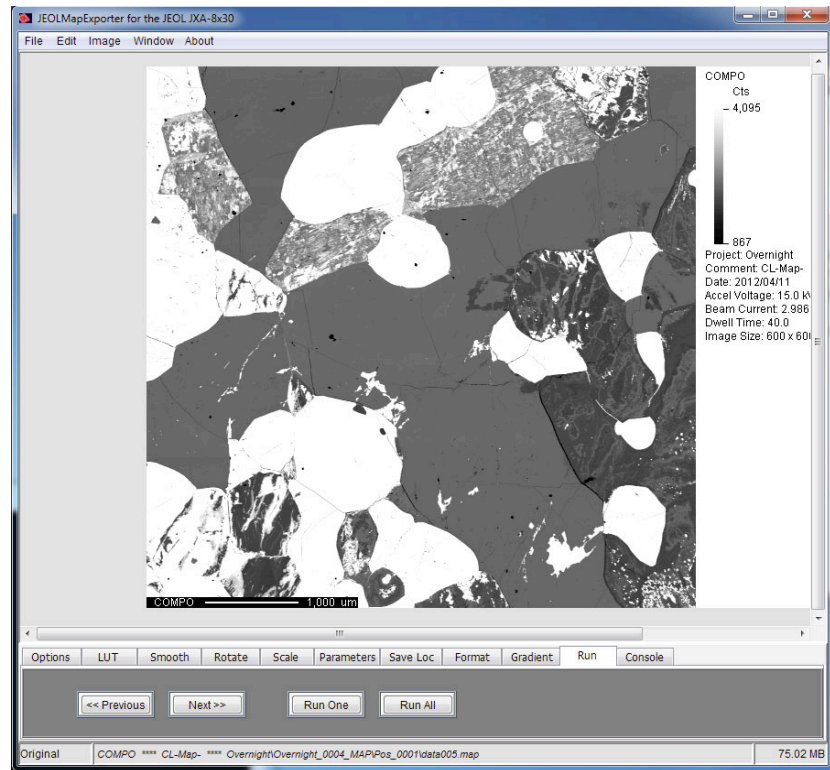
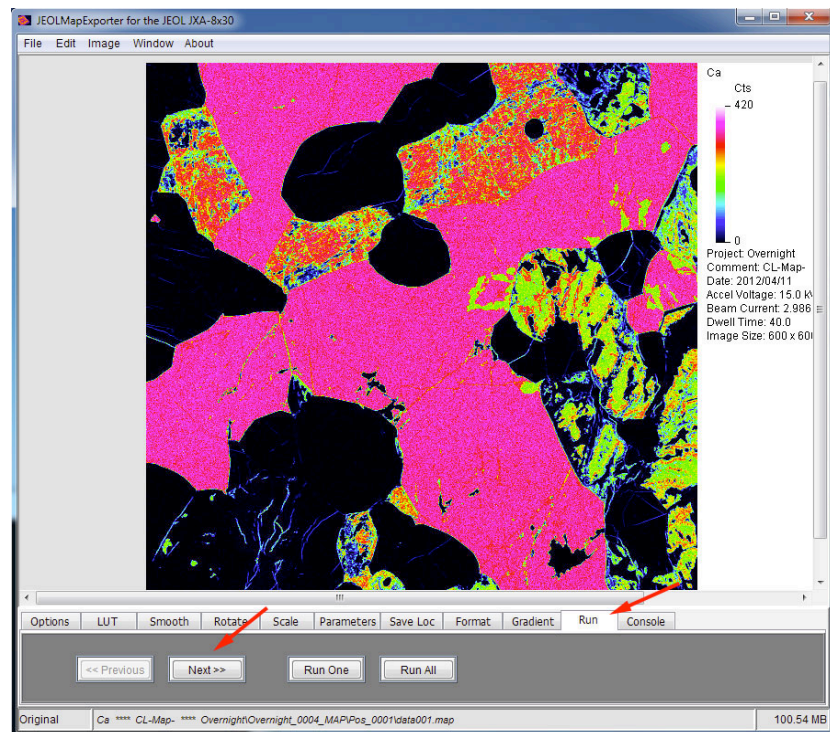


Figure 4.
JEOLMapExporter
displaying successive maps.
The user can step through
each loaded map by
clicking on the **Run** tab and
then by clicking on the
Next>> button.



3.0 – Modifying Images

Users can perform a number of modifications to the images before they are saved.

3.1 LUT Tab

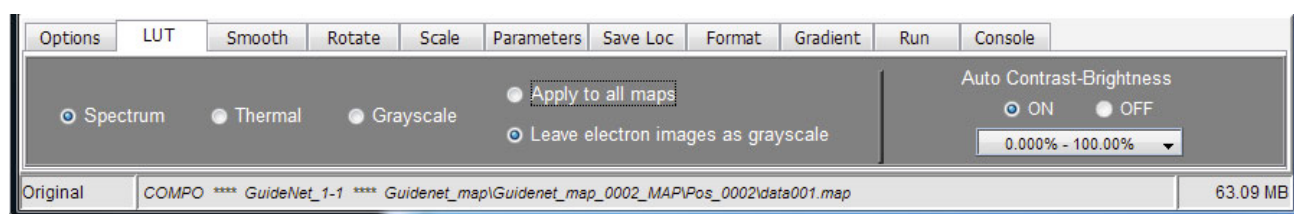


Figure 5. LUT Tab.

The **LUT** tab allows the user to perform a number of functions. First, the user can select between three look-up tables (Spectrum, Thermal and Grayscale). The selected LUT will be applied to the loaded images. Secondly, the user can select between having electron images stay as a grayscale image regardless of the look-up-table selected, or whether all maps should have the same LUT applied. Lastly the user can use an auto brightness and contrast to apply to all of their images.

3.2 Manual Brightness and Contrast

If the user wants to manually adjust the brightness and contrast, they can go to the menu item **Image >> Brightness/Contrast**. This will open the window shown in Figure 6.

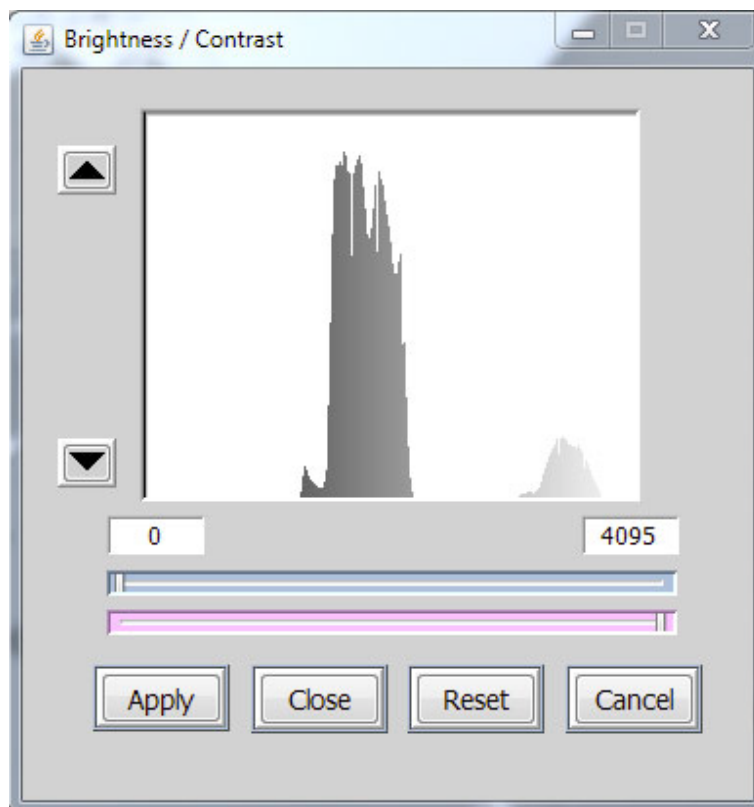


Figure 6. Manual Brightness and Contrast Window.

3.3 Smooth Tab

The displayed image can be smoothed by going to the Smooth tab and then by selecting the desired window size (Fig. 7). This function only applies to the individual displayed image.

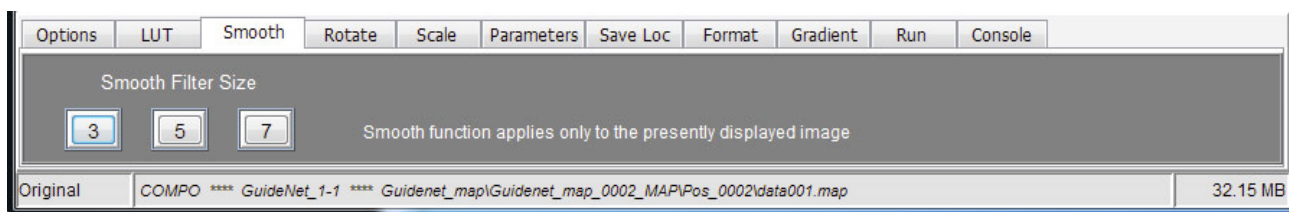


Figure 7. **Smooth** Tab.

3.4 Rotate Tab

The JEOL software stores stage-scanned maps differently from beam scanned maps. The stage-scanned maps will be displayed rotated 90° from the original orientation. The rotate functions allows the user to rotate the image in 90° intervals either clockwise or counterclockwise (Fig. 8). This function only applies to the individual displayed image.

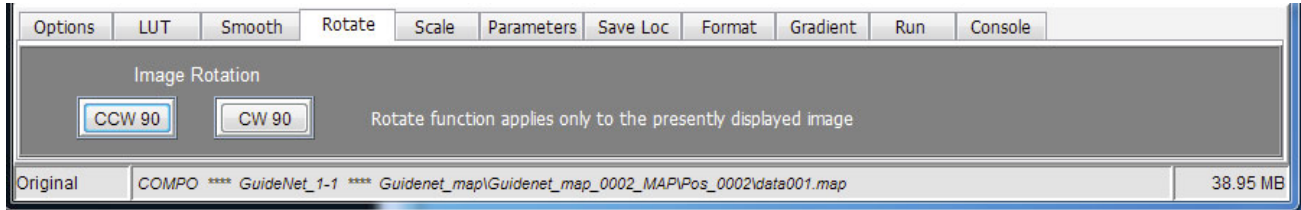


Figure 8. **Rotate** Tab.

3.5 Scale Tab

The user can select to either display the scale bar on the image or not. If it is to be display, the user can select at which corner of the map to display it, and what size it should be displayed. All of these options are selected in the **Scale** tab.

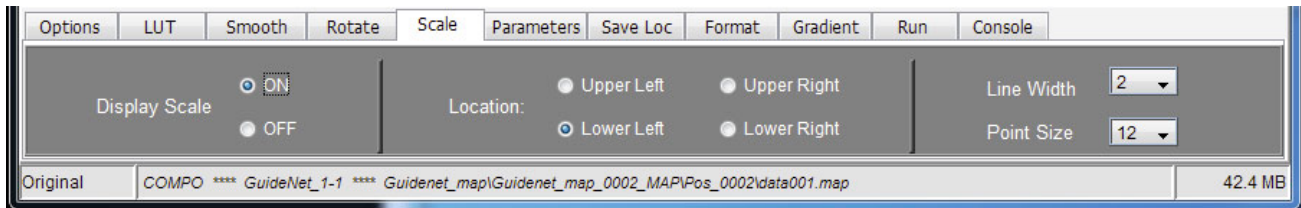
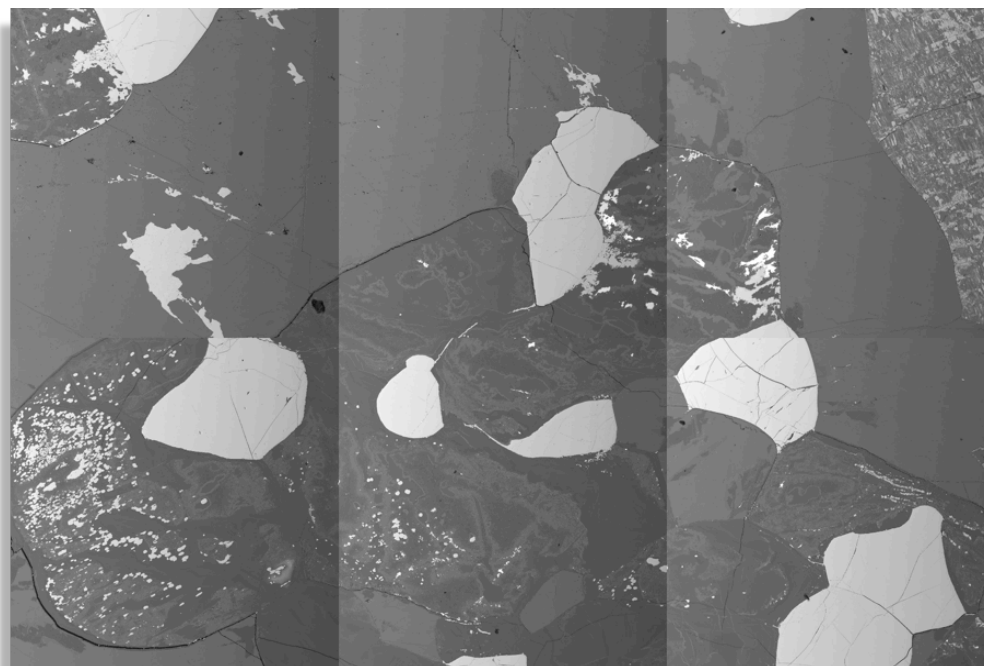
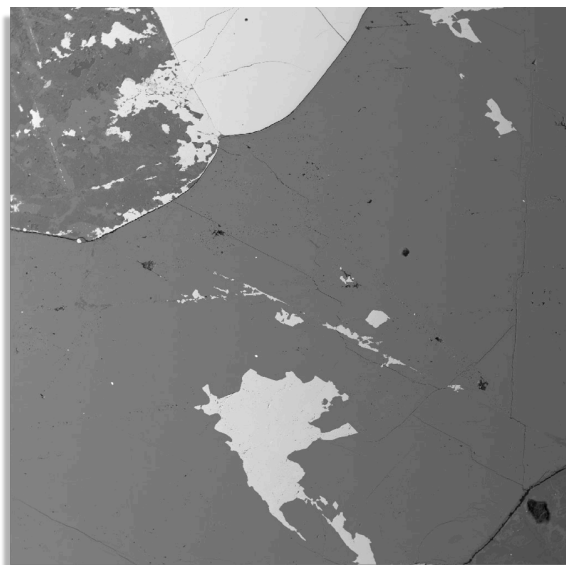


Figure 9. **Scale** Tab.

3.6 Gradient Tab

The Gradient tab allows the user to correct for gradients in the backscattered electron image. Typically these gradients result from samples that are not exactly level, thereby causing a gradient in the intensity. Typically these gradients are not noticeable when only looking at the individual map. However, when the maps are compiled into a mosaic map, these gradients can be distracting at best. Figure 10 shows a comparison of an individual BSI with a modest intensity gradient, with the same image after combining into a mosaic map.

Figure 10. Right is a backscattered electron image with a moderate intensity gradient that is not too noticeable when viewed individually. However when combined into a mosaic image (bottom), the boundaries between the images become distinct because of the sharp jump in intensity.



In situations such as this, the gradient can be corrected for using the functions in the Gradient tab before the images are exported. Figure 11 shows the same mosaic image compiled from the same individual images, but with the intensity gradient removed before the images were compiled.

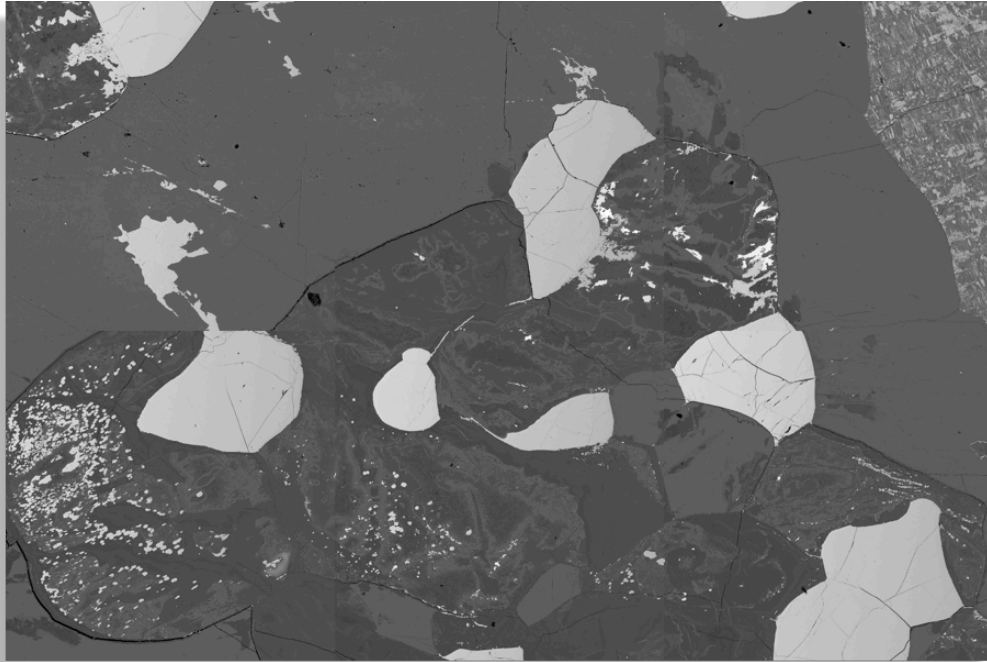


Figure 11. Mosaic image with the gradients removed from the individual images prior to combining into a single image.

To perform a gradient correction, apply the following steps.

- 1) Turn the gradient correction on (Fig. 12, left side of tab frame).
- 2) Edit the list of maps to be worked with using the "Edit" button.

The gradient function can be used to work on an individual map or a set of maps. If working with a set of maps the same correction will be applied to all of the maps. Therefore entire set must be of one type (i.e. COMPO) and must have the same gradient. When the maps were originally loaded, it is possible that maps of different types were included in the set. For example, in Figure 13 all the maps in a particular Run are displayed. However, we are only interested in those that are selected. The other are either calculated maps or mosaic maps that were constructed from individual maps with the intensity gradients still present.
- 3) Select regions on the map using the mouse that should represent equal backscattered electron intensity (i.e. the same phase). Use the mouse to click on a spot and then drag and release to select a small rectangular area. After the area is selected, click on the "Set" button to record that location. The average intensity of each area will be used to calculate the parameters for a function that defines the gradient.

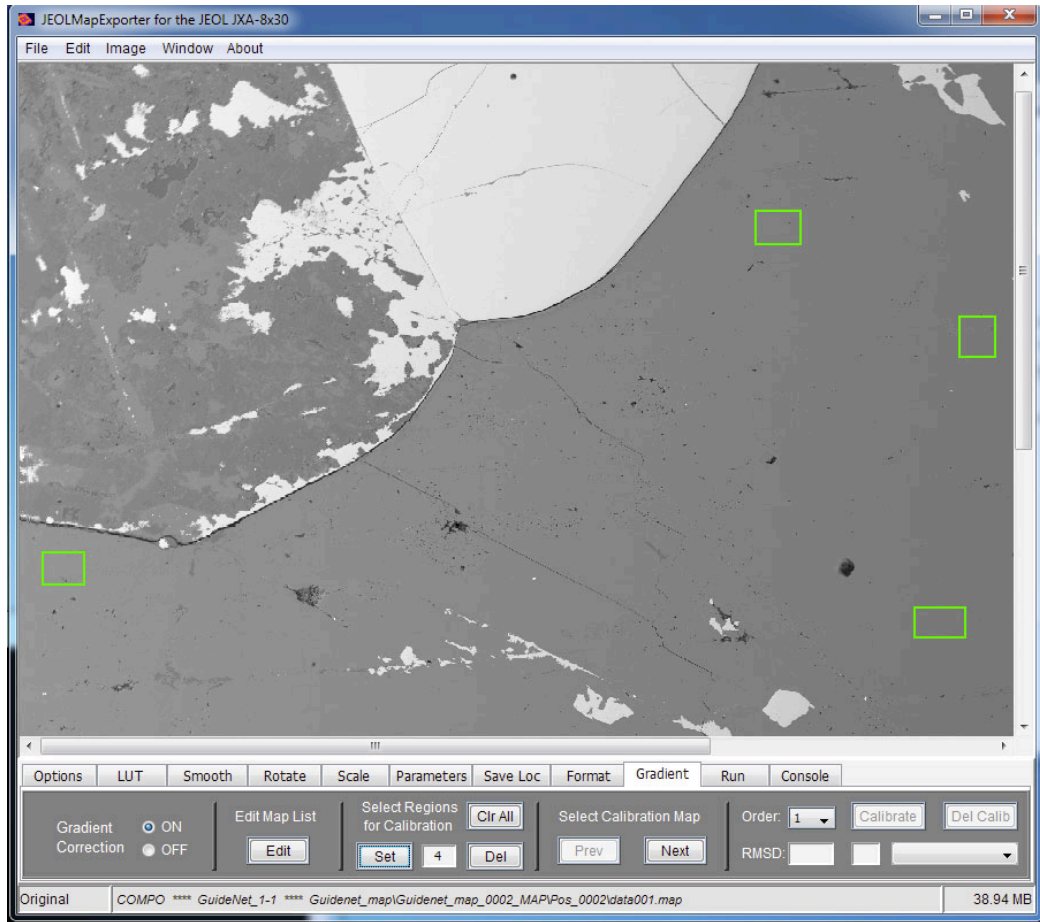


Figure 12. Gradient Tab.

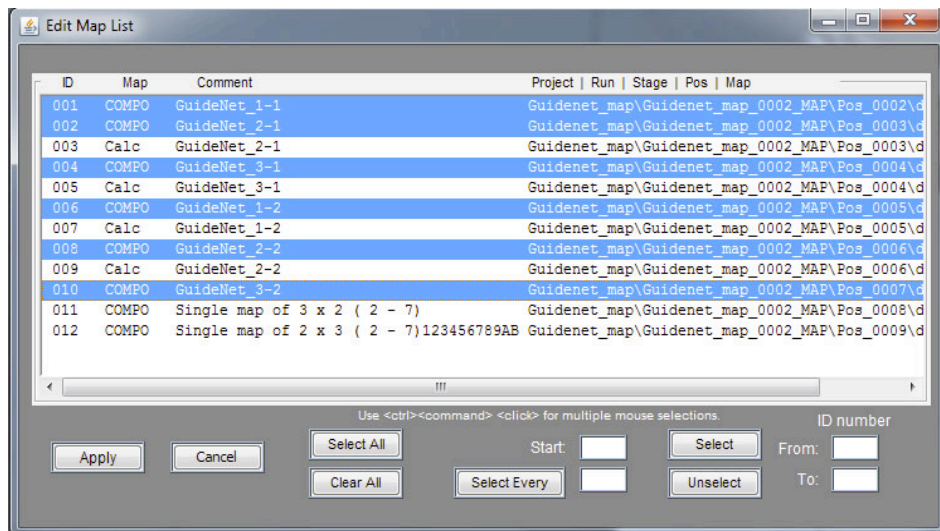


Figure 13. Editing list of maps to be corrected with the gradient function.

If an undesirable location was selected, click on the "Del" button to delete it. Successive clicks on the "Del" button will continue to remove selected area sequentially. The "Clr All" button will remove all of the selected areas.

- 4) Continue to select areas across the map area that best define the intensity gradient. More than one map can be used to select areas. Use the "Next" and "Prev" buttons to step through the map set while selecting areas.
- 5) Select the order of the polynomial will be used to fit the gradient using the "Order" drop down menu.
- 6) As soon as enough areas have been selected for the order of the polynomial to be use, then "Calibrate" function will become enabled. Clicking on that button will calculate the coefficients for the polynomial. These can be displayed in the drop down menu list just below the "Calibrate" button. As long as there are calibration parameters displayed, and the gradient correction function is turned on, all of the displayed maps will be corrected accordingly. To remove the correction, click on the "Del Calib" button.
- 7) The "RMSD" field will display the root-mean-square deviation. This allows the user to evaluate the goodness of fit between the different polynomial options.

4.0 – Outputting Maps

4.1 Location Tab

Before the maps can be output, the location at which they are to be stored must be specified. This is done in the **Location** tab (Fig. 14). To set the desired location, click on the Change button and select the appropriate directory.

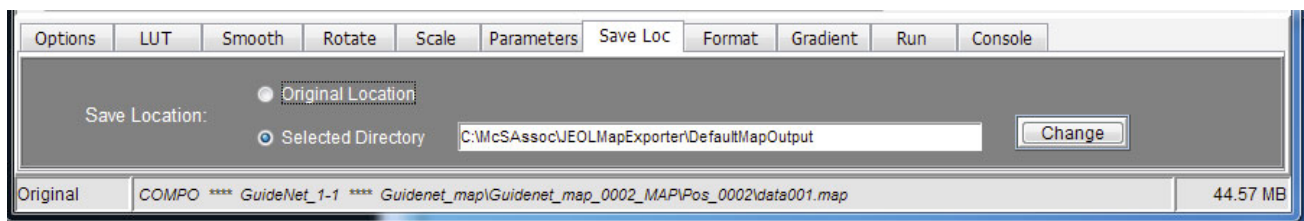


Figure 14. **Location** Tab.

4.2 Format Tab

There are five formats that can be used to output the images (BMP, JPEG, TIF, PNG, EPS, and TXT). This is set in the **Format** tab (Fig. 15). It should be remembered that the BMP, JPEG, TIF-RGB, PNG and EPS formats all scale the image to the range of 0 to 255. The format TIF-16bit will record the true intensity range, as long as the values are between 0 and 65535. However, the color information is not recorded. It will only be a greyscale image. In addition, most image processing software (Photoshop, ImageJ, etc.) will display the image with that scaling factor (0 and 65535). If your true intensity range for that image is between 0 and, for example, 2000, then the image will be displayed as all black until you rescale it.

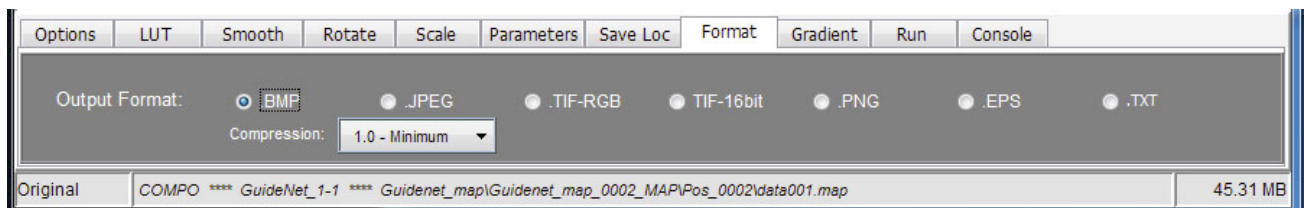


Figure 15. **Format** Tab.

4.4 Run Tab

The **Run** tab contains two functions. The **Previous** and **Next** buttons allow the user to step through all of the loaded images, one image at a time (Fig. 16). The **Run One** button allows the user to store one image at a time, whereas the **Run All** button will output all of the loaded images in one batch process.

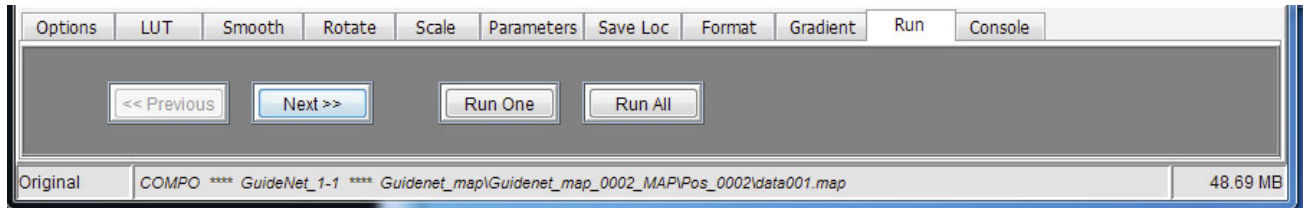


Figure 16. **Run** Tab.

4.5 Console Tab

The **Console** tab allows the user to track what images have been stored, their location, and their new file name (Fig. 17). The contents of the **Console** window can be edited from the **Edit** menu, or it can be saved as a text file by going to **File >> Save Txt**.

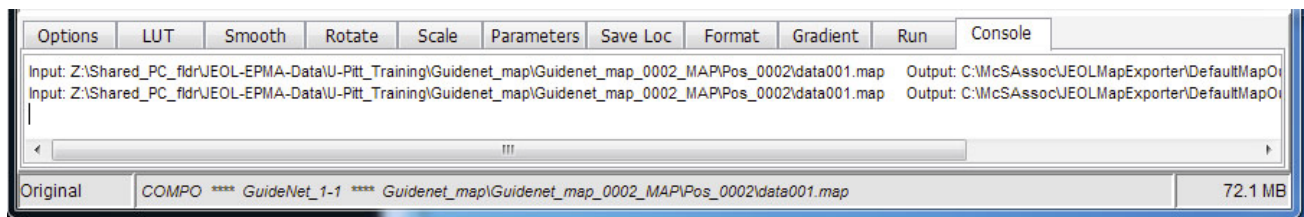


Figure 17. **Console** Window.

5.0 – Installation

To install the JEOLMapExporter program, simply click on the program, "Install-JEOLMapExporter.jar". This will install all of the required files and will create a shortcut for the desktop.

If a shortcut is not on the desktop, then run the program by double-clicking on the file JEOLMapExporter_Run. Its full path should be:
C:\McSAssoc\JEOLMapExporter\JEOLMapExporter_Run.