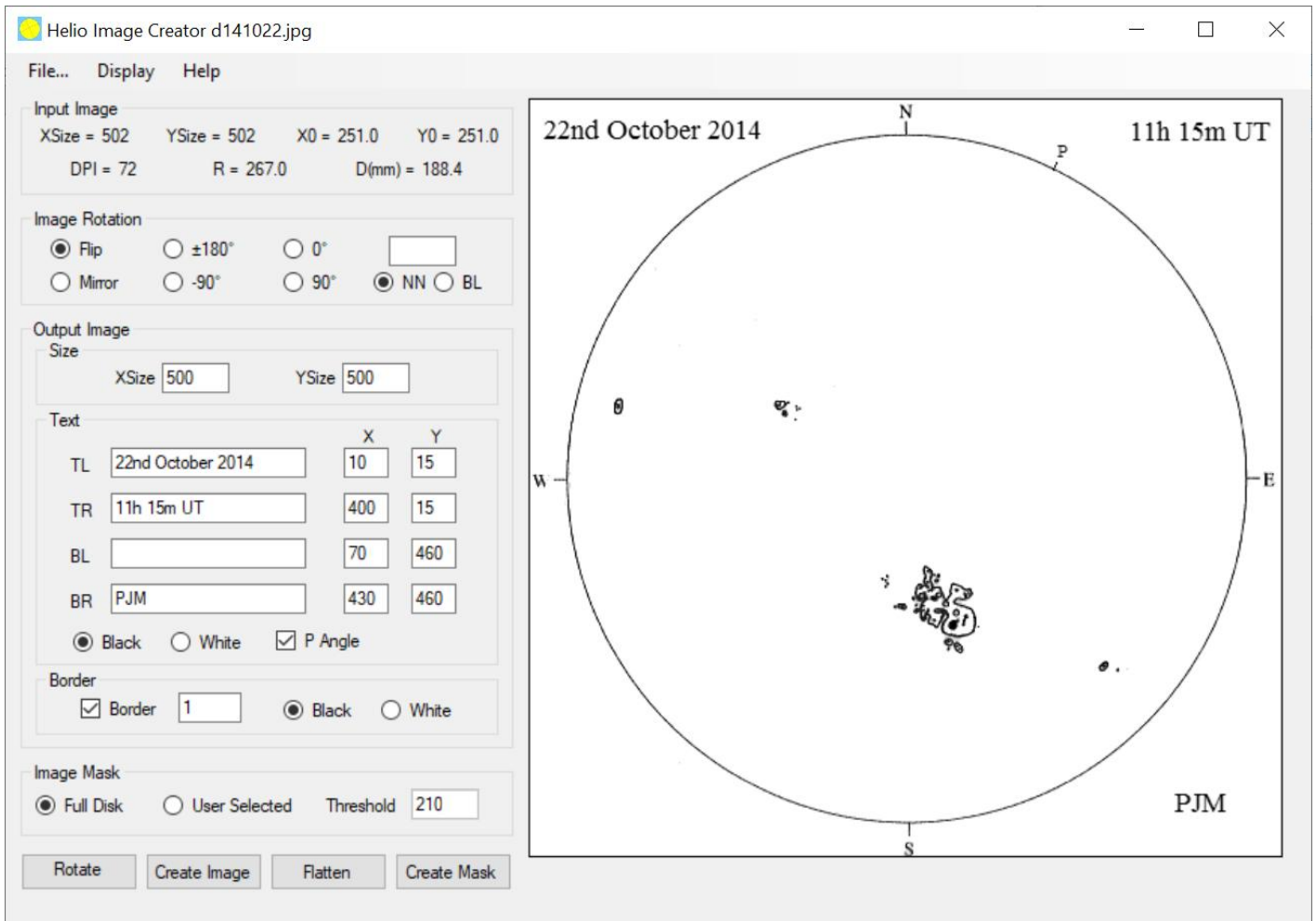


Helio Image Creator v2.1 User Guide



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December 2024

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1. Introduction

As a solar observer who makes full disk drawings and who creates electronic copies of these for display on a web site, I wanted an easy way of centering the images, adding annotation such as date & time, cropping to a given size and adding a border. In addition, I also want to create a mask image for the calculation of sunspot area for either the whole disk or individual sunspot groups. The area calculation itself is performed using Helio Viewer (after the mask image has been manipulated to, for example, fill in sunspot penumbra). Helio Creator performs these functions.

Thus, Helio Image Creator has the following features:

- Inputs a user full disk solar image (in bitmap format).
- Determines the center of the solar image.
- Changes the orientation of the image via a flip/mirror or rotation by any angle.
- Creates a solar image of a specified size, adds annotation to top left, top right, bottom left and/or bottom right of the image and/or adds border.
- Outputs the created image.
- Flattens the brightness variation from the middle to the edge of the disk.
- Creates and outputs a mask (red pixels) for either the whole disk or individual sunspot groups.

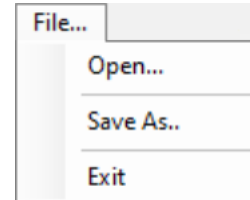
Warning: never look at the Sun with the naked eye or with any optical instrument unless you are familiar with safe solar observing methods.

2. Menus

Here the various menu items shown along the top of the Helio Image Creator program are explained. Changes to users selectable parameters are stored in the Helio Image Creator Settings file (see Appendix A) for subsequent executions of the Helio Image Creator program (i.e. changes from initial setting only need to be performed once).

File

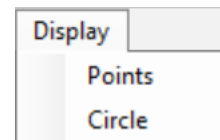
The 'Open...' menu item opens a user solar image and displays this image. 'Save As...' saves the current image after any of the bottom buttons has been pressed. Note that the 'Rotate Image' button can be pressed prior to the use of the 'Create Image' button. The 'Create Mask' button will automatically save the mask with a file name of the image name plus an extension of '_Mask'.



Using the 'Exit' menu item exits the program.

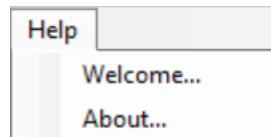
Display

For each input image, Helio Image Creator detects the edge of the solar disk and then fits a circle to these points. These points and the fitted circle can be displayed via the 'Points' and 'Circle' menu items.



Help

The help menu gives the welcome window and the about box. The welcome window appears when Helio Image Creator is started for the first time and at every successive start if the tick box in the lower left is not ticked. The about box includes the web address where additional information about solar observing can be found.



3. Display

Here the various parts of the Helio Image Creator display (as shown in the cover page of this document) are explained:-

Menus

These are described in section 2.

Input Image Panel

Here the properties of the input image are displayed - the image size, the center of the image, the number of dots per inch (DPI), the radius of the fitted circle all in pixels and its diameter in mm. Note that once the 'Create Image' button has been pressed, the parameters in this panel refer to the created image and not the input image.

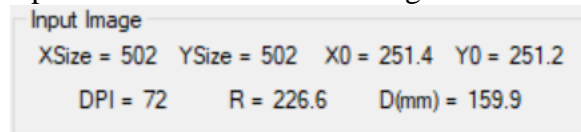
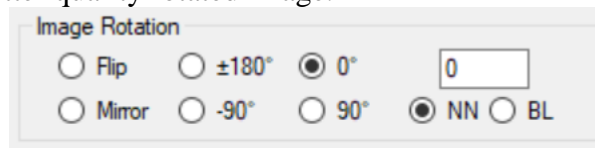


Image Rotation Panel

The orientation of the input image can be changed, if required, using this panel and by then pressing the 'Rotate Image' button. The changes in orientation are 'Flip' (i.e. top to bottom), 'Mirror' (i.e. left to right), rotating by various predefined angles and by a user input angle. For this user input rotation angle, there are two interpolation methods available - nearest neighbour and bi-linear, the former is the quickest while the latter gives a better quality rotated image.



Output Image Panel

The output image will be centered at the middle of the solar image (at the X0 and Y0 pixel position). This panel defines the output image size (excluding any border), the text that can appear at top left, top right, bottom left or bottom right of the image including the positions of the text, whether the text is to appear black or white plus any border. To add a border, the 'Border' check box need to be ticked, the size of the border specified and whether this to be black or white. The information shown below produced the image shown on the cover page of this document.

Output Image

Size

XSize

500

YSize

500

Text

TL

22nd October 2014

X

10

Y

15

TR

11h 15m UT

400

15

BL

70

460

BR

PJM

430

460

☒ Black

☐ White

☒ P Angle

Border

☒ Border

1

☒ Black

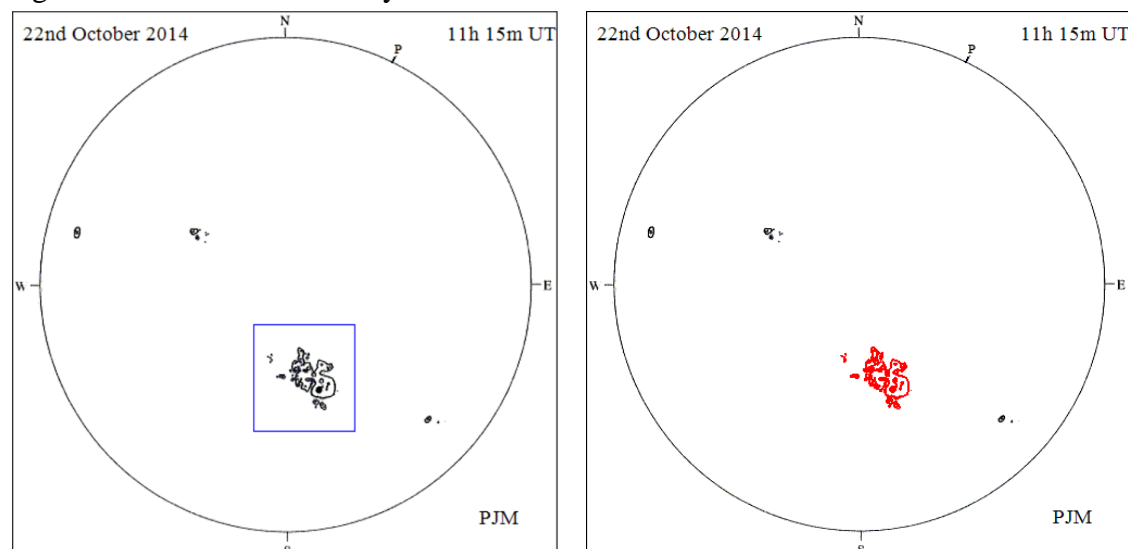
☐ White

Image Mask Panel

A mask will be created when the ‘Create Mask’ button pressed. If the ‘Full Disk’ radio button is selected, then all the pixels with a value below the threshold box value within the solar disk will be converted to the mask colour (red). The mask file will automatically output once the ‘Create Mask’ button is pressed with the same file name as the saved disk drawing plus an addition of _Mask at the end of the filename.

Image Mask ☒ Full Disk ☐ User Selected Threshold

If the ‘User Selected’ radio button is selected, the user can selection one or more groups to create the mask (rather than all the groups within the disk). The right mouse is used to select individual groups by pressing down, dragging and lifting up the right mouse to generate a blue box as shown below left for AR 12192. The generated mask image is shown below right. A group can be de-selected by pressing shift and the right mouse button within any blue box.



4. Operation

The use of Helio Image Creator is outlined below:-

Image Input

A full disk solar image in bitmap format (.bmp) is input using the 'Open...' item in the 'File' menu. The size of the Image Creator window adjusts to display the whole image. If the new window size is larger than that of the computer display, scroll bars appear. The size of the computer screen can be adjusted using the 'Screen Resolution' item in the 'Display' menu. The user can check that circle has been fitted in the solar image by using the 'Points' and/or 'Circle' items of the 'Display' menu.

Image Rotation

The orientation of the input image can be changed using the buttons on the 'Image Rotation' panel or by inputting a user defined rotation angle (a positive angle rotates the image clockwise). There are two interpolation methods available - nearest neighbour and bi-linear, the former is the quickest while the latter gives a better quality rotated image. To change the orientation or make a rotation, the 'Rotate Image' button at the bottom left of the Helio Image Creator window needs to be pressed. Note that it is not necessary to press this button if no orientation change or rotation is required.

Create Image

After the user has input all the information in the 'Output Image' panel, pressing the 'Create Image' button creates the final image. The information required in this panel is the output image size (excluding any border), the text that can appear at top left, top right, bottom left or bottom right of the image including the positions of the text, whether the text is to appear black or white plus any border. To add a border, the 'Border' check box need to be ticked, the size of the border specified and whether this to be black or white.

Flatten

Solar images will have a reduction in brightness between the middle of the disk to the edge. For such images, the Flatten button will remove this brightness variation so that a mask can be successfully created.

Create Mask

The user needs to select whether the mask will include all the sunspots on the disk (by selecting the 'Full Disk' radio button) or just specific groups. For the latter option, the 'User Selected' radio button needs to be selected and the right hand mouse used to select each group (as explained in Section 3). Pressing the Create Mask button creates the mask.

Output Image

After the output image has been created, it can be output (in bitmap format) using the 'Save As' items of the 'File' menu.

Appendix A: Helio Image Creator Settings File

This file contains the user selected parameters. The contents of the file should not be changed via a text editor - they are altered by selecting the user parameters from within the Helio Image Creator program itself. Below, the default parameters are given together with a brief explanation.

<u>Parameter</u>	<u>Explanation</u>
false	Welcome window ticked (true or false)
500	Output image X size
500	Output image Y size
1st January 2020	Top left text
10	Top left X position
15	Top left Y position
08h 00m UT	Top right text
400	Top right X position
15	Top right Y position
	Bottom left text
70	Bottom left X position
460	Bottom left Y position
PJM	Bottom right text
430	Bottom right X position
460	Bottom right Y position
Black	Output text colour (black or white)
true	Output border (true or false)
1	Output border size
Black	Output border colour (black or white)
false	Points on user solar disk edge shown (true or false)
false	Fitted circle to user solar disk shown (true or false)
false	Image rotation set to flip (true or false)
false	Image rotation set to mirror (true or false)
0	Image rotation angle
1	Interpolation method - nearest neighbour (1) or bi-linear (2)
true	Include P angle label (true or false)
2	Mask option - Full Disk (1) or User Selected (2)
210	Mask threshold
1	Load image file type

Appendix B: Mouse Controls and Tab Order

The following mouse controls are used within Helio Image Creator Viewer:

<u>Mouse Control</u>	<u>Function</u>
Right Click & Drag	Selects a box to create mask pixels
Shift Right Click	De-selects a mask box

The date and time in the Output Image Panel are in ascending tab order. Thus, pressing tab moves the cursor between these boxes and in this order (shift tab moves the cursor between these boxes in the reverse order).