

SD Jovian Raw Image Processor [SDJ RIP]

ImageJ Macro

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October 1, 2022

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This manual and ImageJ Macro is the result of the collective work of R. Youker and A. Youker. The work was completed during the NASA International Space Apps Challenge October 1, 2022 at Rosman, NC.

The Authors would like to thank Randi Neff, Matt Cass, and Alex Lewis (Southwest Community College) for organizing and running the event. Tim DeLisle and Melanie Crowson from the Pisgah Astronomical Research Institute (PARI) for hosting the event and providing tours of the facilities.

Chapter 1

Purpose of SDJ RIP ImageJ Macro?

The SD Jovian Raw Image Processor (SDJ RIP) ImageJ macro was created in response to the NASA Space International Apps Challenge 2022 competition. The “Visualizing Jovian System Like Never Before” problem tasked competitors with creating an open-source image editing program that uses innovative methods to process raw JunoCam raw images for scientific, artistic, or other fun purposes. The authors chose to tackle the problem by using the freeware program ImageJ and specifically the “batteries included” version of ImageJ called FIJI (Its just ImageJ).

A macro was created that runs in FIJI and allows the user to process raw JunoCam images. The Macro performs the following operations on the JunoCam images: 1) converts image to 16-bit greyscale, 2) duplicates image, 3) duplicate image is blurred using Gaussian filter, 4) the blurred image is subtracted from original, 5) a fire lookup table (LUT) is applied, 6) the brightness and contrast is adjusted, and 7) the view is magnified 2xfold to see detail (**Figure 1**). The final image is an artistic rendering of the original and enhances details of the swirling clouds of Jupiter, due to loss pass effect of Gaussian filter, with loss of some information and blurring of the image.

The loss of information and slight blurring is okay given the purpose of the macro is to create “pretty artistic” pictures. The macro can be used on the raw framelets, RGB image, or individual RGB channels. Future planned features for the macro are discussed in Chapter 5.

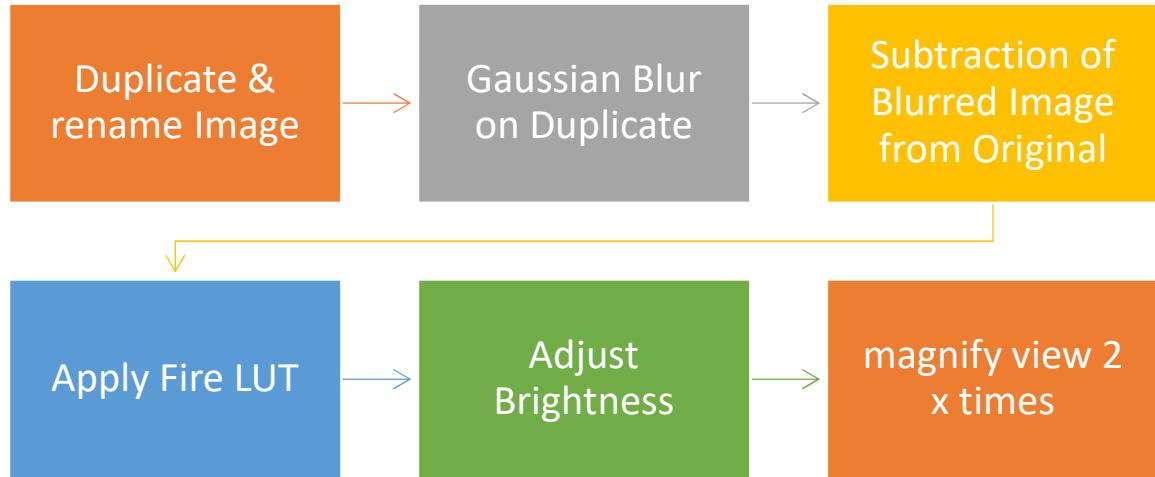


Figure 1: Schematic of SDJRIP macro workflow

Chapter 2

How to install Fiji [its just imageJ]?

First, install FIJI if not already running on your computer. The FIJI program can be downloaded from the following site <https://imagej.net/software/fiji/>. The FIJI software can be run on Windows, MacOS, and Linux computer systems (32 or 64-bit). Download and install the appropriate version for your computer system. The files will be downloaded as a zipped folder. Extract the folder (Fiji.app) containing the software files, open folder, and start the program by double-clicking on the ImageJ application file. All files needed to run the program are contained in this downloaded folder.

Chapter 3

How to install SDJ RIP Macro in FIJI?

Download the SD Jovian Raw Image Processor (SDJ RIP) *ijm* file to your computer (). Open FIJI and navigate to *plugins > install plugins* (Crtl + Shift + M). Select location of the SDJ RIP.ijm and press open button on window. Restart the FIJI program and the SDJ RIP macro should be visible in the *plugins > utilities menu*. Please make sure you have permission to save to the *plugins > utilities menu* for your computer. Sometimes you need administrator permission to make changes to certain folders on windows computers. Can also run macro by selecting *plugins > macros > run* and selecting the SDJ RIP.ijm file.

Chapter 4

Generate “Super Cool Jovian Image”

To generate a “super cool Jovian image”, download an image from NASA’s

<https://www.missionjuno.swri.edu/junocam/processing>, open FIJI, and run the SDJRIPT macro.

The macro will open a window and you must select an image to process. The macro will perform all the task described in Chapter 1 and listed in Figure 1. The final processed image can then be saved in any image format supported by FIJI by using the *file > save as* command. Examples of before and processed images are shown below (**Figure 2 & 3**).

Before SDJRIPT processing



After SDJRIPT processing

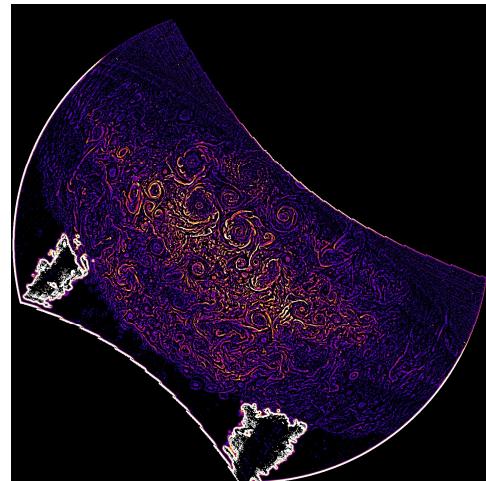


Figure 2: Example processing result using SDJRIPT macro in FIJI. The file

JNCE_2022272_45C00053_V01-red was downloaded from the

<https://www.missionjuno.swri.edu/junocam/processing> website and processed in

SDJRIPT macro in FIJI.

Before SDJRIPT processing



After SDJRIPT processing



Figure 3: Example processing result using SDJRIPT macro in FIJI. The file JNCE_2022272_45C00053_V01-raw was downloaded from the <https://www.missionjuno.swri.edu/junocam/processing> website and processed in SDJRIPT macro in FIJI.

Chapter 5

Future Planned SDJRIPT Features

The current SDJRIPT macro allows the processing of individual images in FIJI. This 1.0 version is an initial macro created due to the time constraints of the NASA competition. The authors plan to add additional features in the feature for subsequent versions of the macro. For example, the ability to batch process multiple images at once. Other potential features that could be added include an more expansive GUI interface and the ability to separate and process individual channels from RGB image files.