DATA REDUCTION

USING THE

AstroImageJ
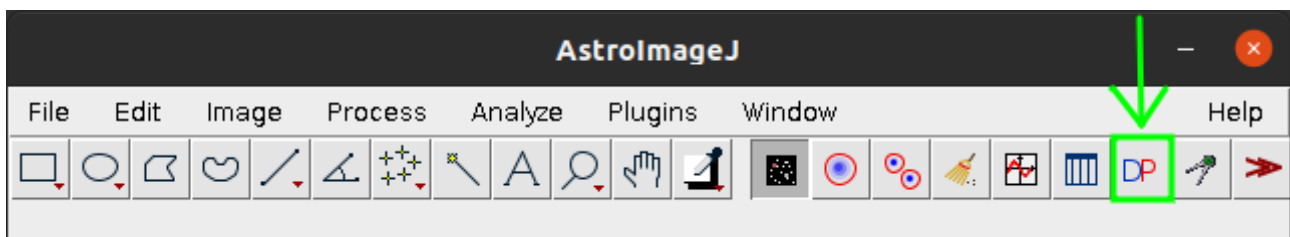
SOFTWARE

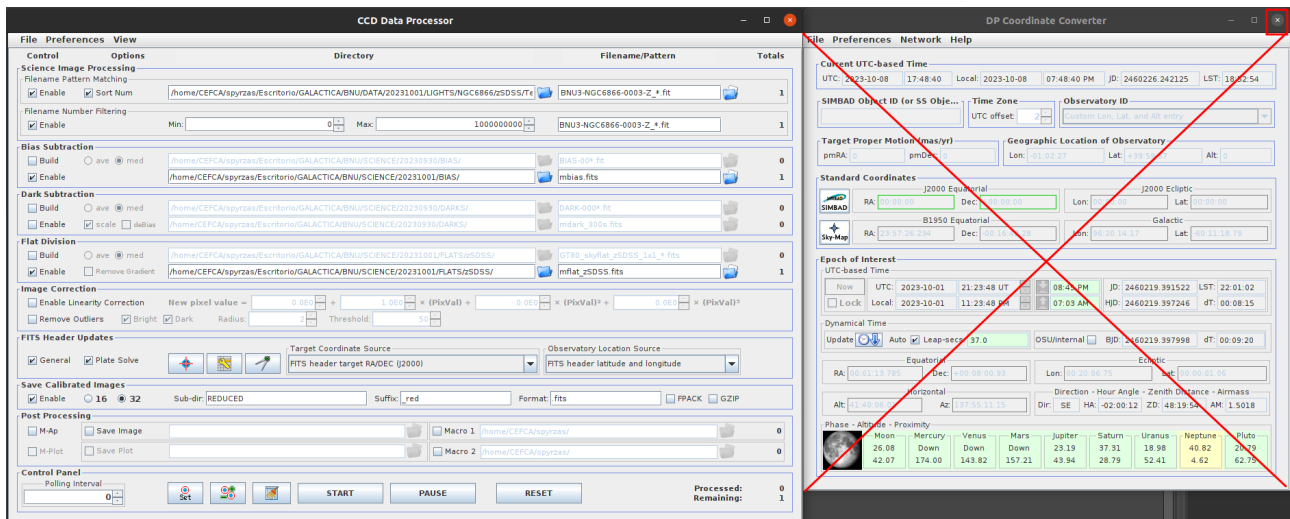**Stelios Pyrzas**
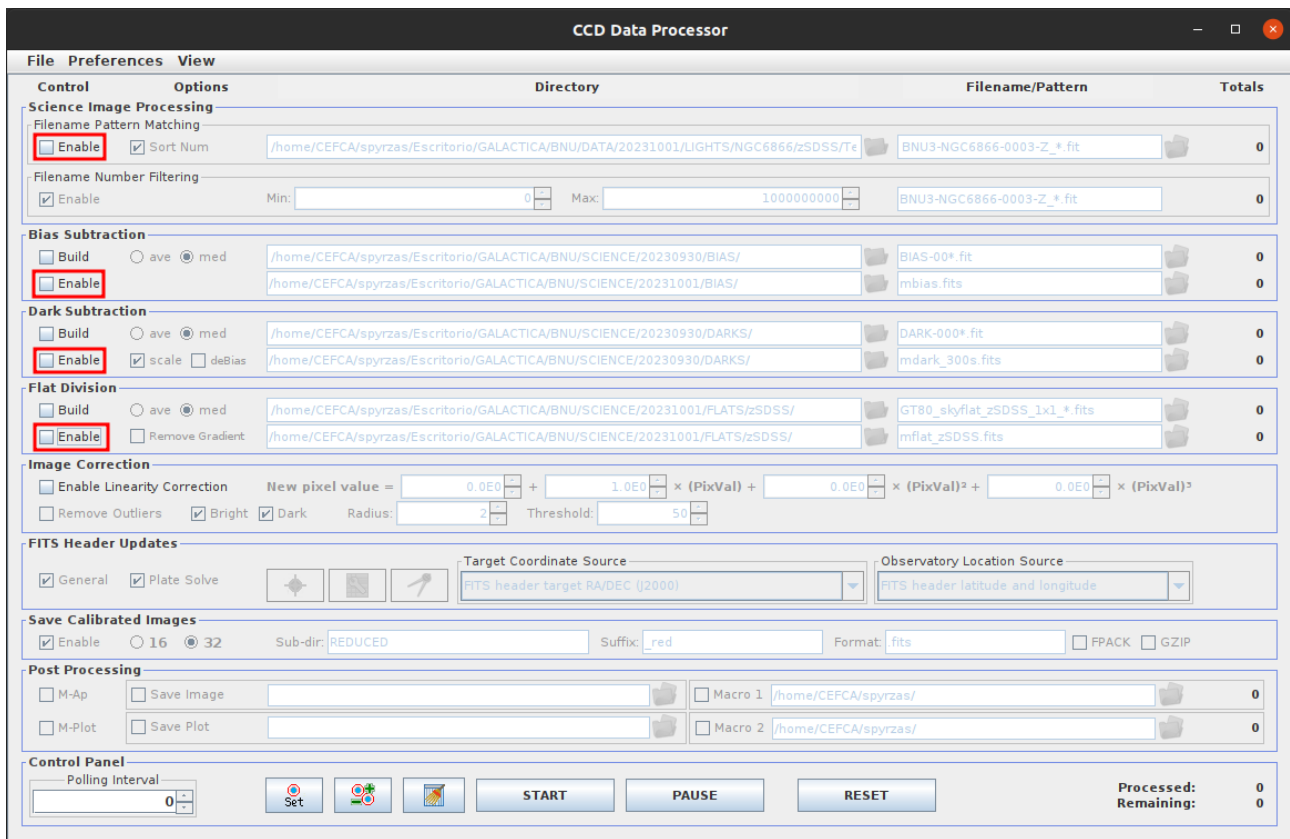
CEFCA, 2025

(1) Launch AstroImageJ.
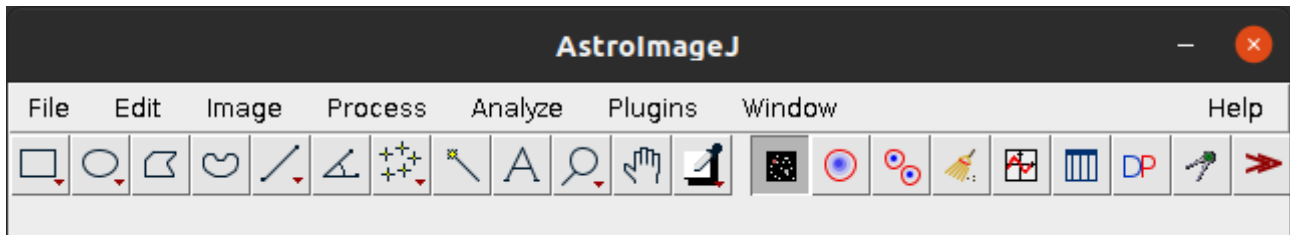
(2) Select the Data Processor button DP.

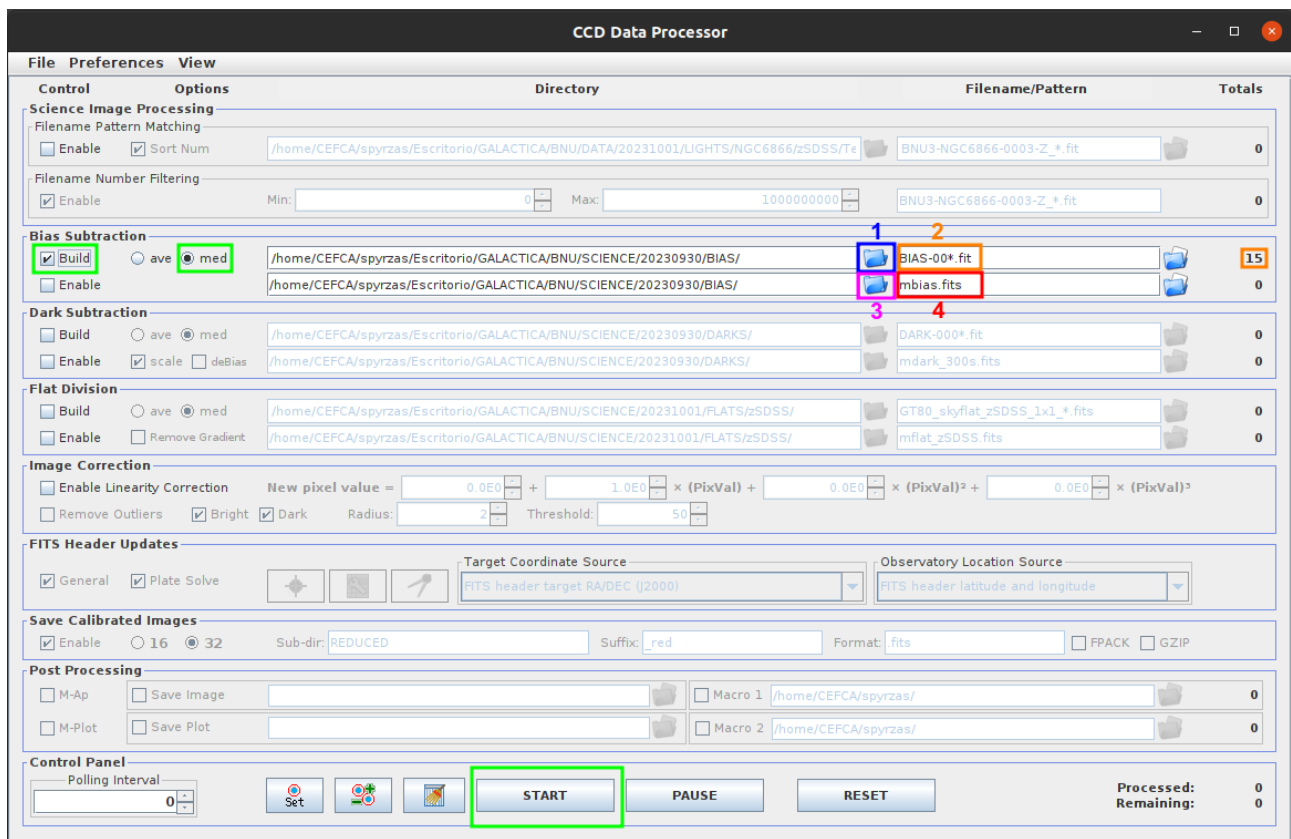**(3)** Two windows will open. You can close the Coordinate Converter.

(4) Focus on the "CCD Data Processor" window and make sure all options are disabled. The window should look all grey like this:


(5) First we will create all master calibration frames, step by step and then we will proceed to reduce our science images.
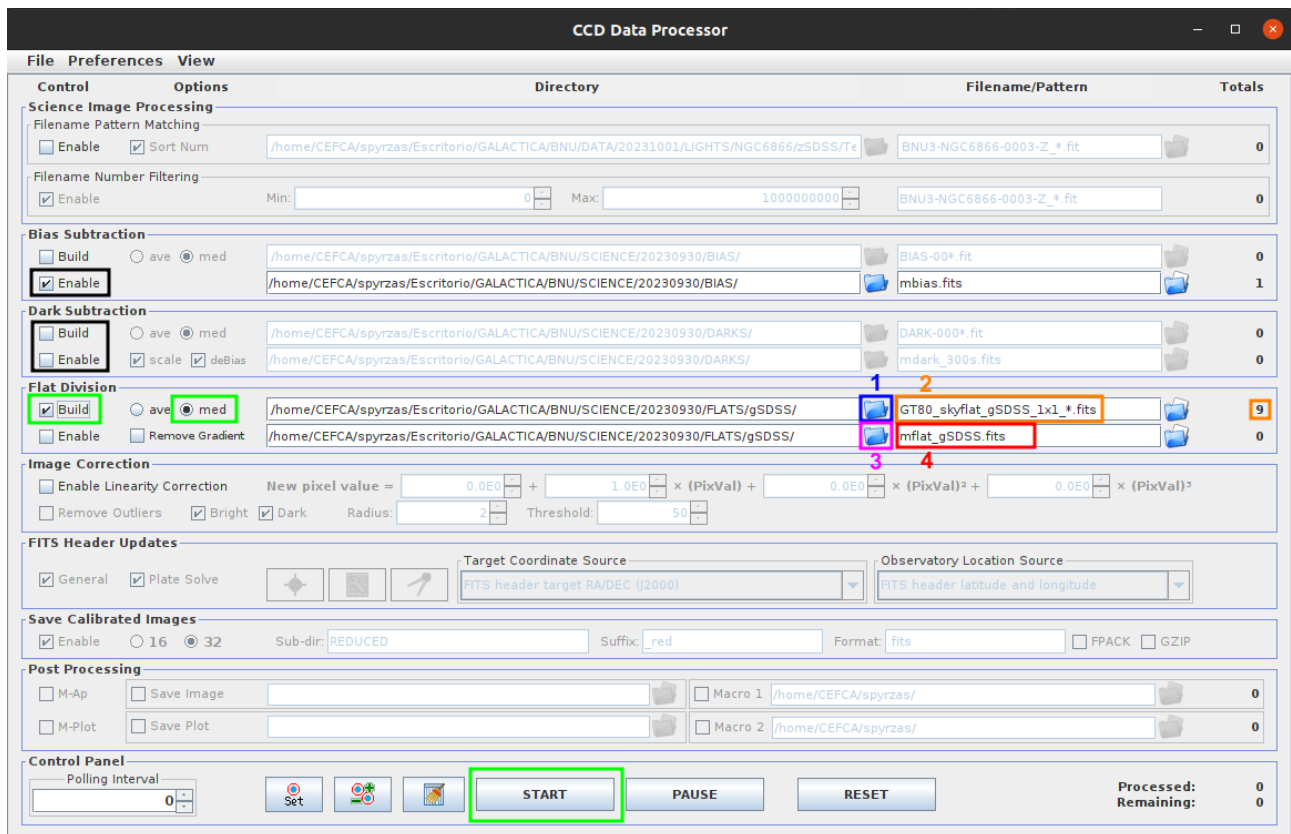
CREATING THE MASTER BIAS

(a) Select the **"Build"** option under the "Bias Subtraction" section.

(b) Make sure that the **"med"** (for median) option is selected.

(c) Click on the folder in the top row (**1**) and navigate to the directory where your bias frames are: e.g. [path_to_bias]/20230930/BIAS/

(d) On the box to the right (**2**), write "BIAS-00*.fit" and you should see a number appear (in our example, 15) as indicated on the image above. This number should match the number of your bias frames!

(e) Click on the folder in the bottom row (**3**) and navigate to the ***same*** directory where your bias frames are: [path_to_bias]/20230930/BIAS/

(f) On the box to the right (**4**), write "mbias.fits", the name that will be given to the master bias frame.

(g) When you are ready, press the "Start" button.

CREATING THE MASTER DARK
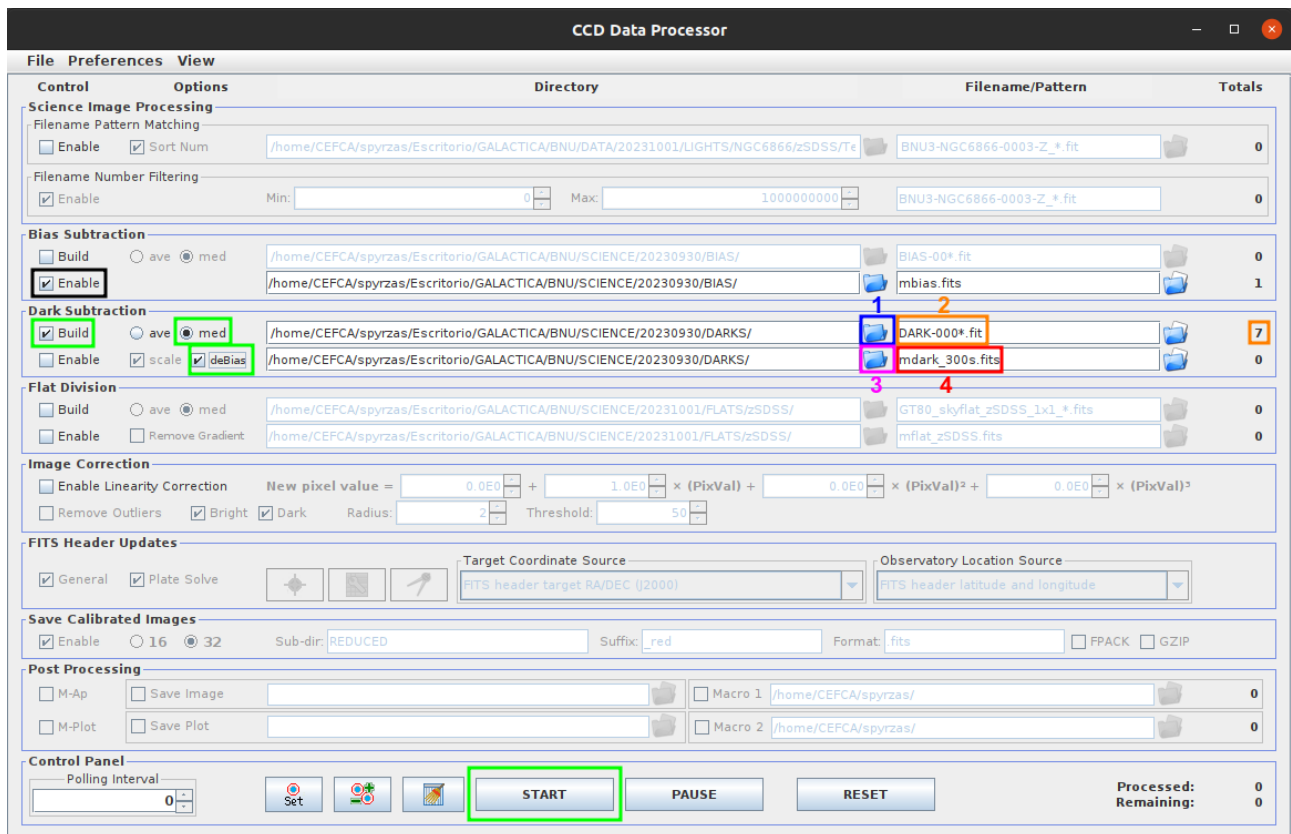
(a) Under the "Bias subtraction" section, click on enable.

(b) Select the **"Build"** option under the "Dark Subtraction" section.

(c) Make sure that the **"med"** (for median) option and the **"deBias"** option is selected.

(d) Click on the folder in the top row (**1**) and navigate to the directory where your dark frames are: e.g. [path_to_dark]/20230930/DARKS/

(e) On the box to the right (**2**), write "DARK-000*.fit" and you should see a number appear (in our example, 7) as indicated on the image above. This number should match the number of your dark frames!

(f) Click on the folder in the bottom row (**3**) and navigate to the ***same*** directory where your dark frames are: [path_to_dark]/20230930/DARKS/

(g) On the box to the right (**4**), write "mdark_300s.fits", the name that will be given to the master dark frame.

(h) When you are ready, press the "Start" button.

CREATING THE MASTER FLAT

(a) Under the "Bias subtraction" section, click on enable. Also, disable the options under the "Dark subtraction" section.

(b) Select the **"Build"** option under the "Flat Division" section and make sure that the **"med"** (for median) option is selected.

(c) Click on the folder in the top row (**1**) and navigate to the directory where your flat frames are: e.g. [path_to_flat]/20230930/FLATS/gSDSS/

(d) On the box to the right (**2**), write "GT80_skyflat_gSDSS_1x1_*.fits" and you should see a number appear (in our example, 9) as indicated on the image above. This number should match the number of your flat frames in the gSDSS filter!

(e) Click on the folder in the bottom row (**3**) and navigate to the ***same*** directory like before: [path_to_flat]/20230930/FLATS/gSDSS

(f) On the box to the right (**4**), write "mflat_gSDSS.fits", the name that will be given to the master flat frame for the gSDSS filter.

(g) When you are ready, press the "Start" button. Remember to repeat the process for all other filters (rSDSS, iSDSS, zSDSS) if applicable!

PREPARING FOR THE REDUCTION OF SCIENCE IMAGES
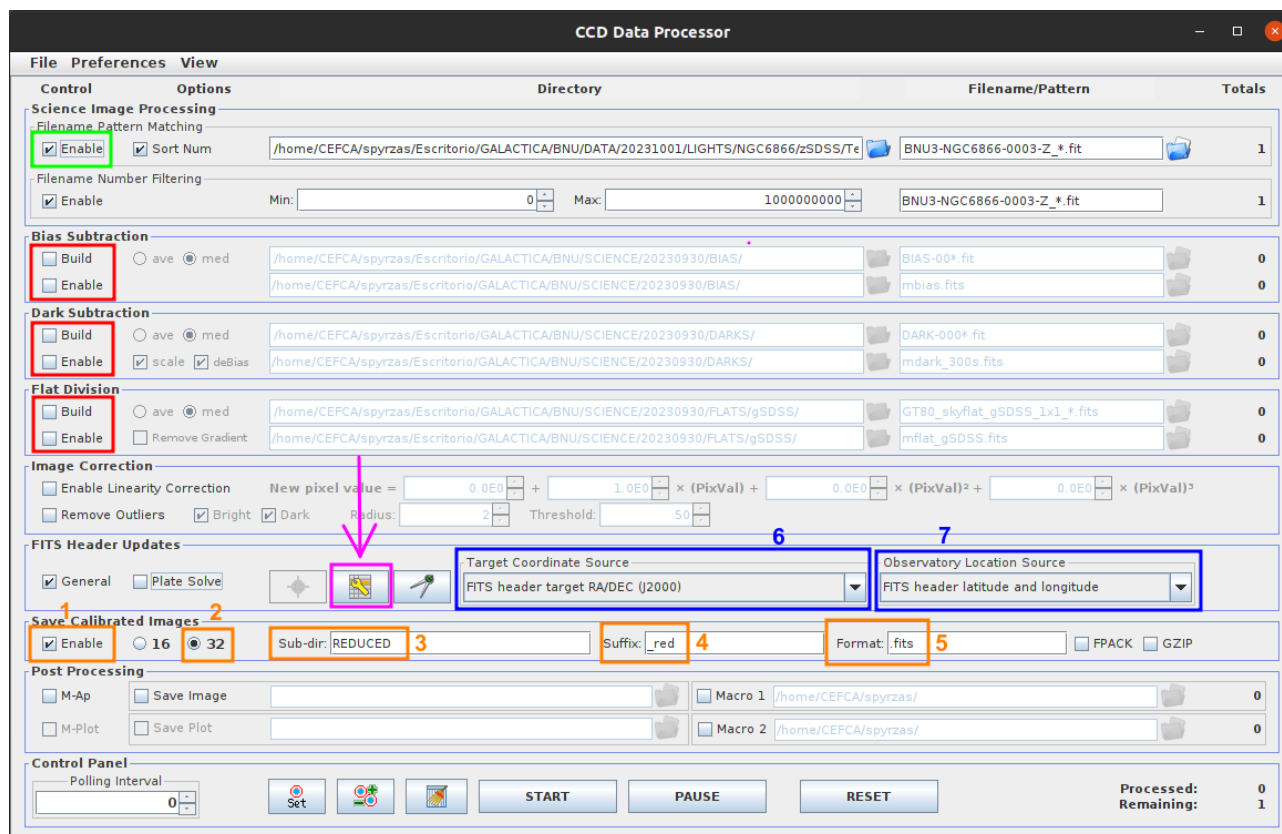
(a) First, enable the option under "Science Image Processing"

(b) Also, disable all options for Bias, Dark and Flat

(c) Make sure that options **1** to **5** as well as **6** and **7** are like you see on the image above. Option 4 is "**_red**" and Option 5 is "**.fits**"

(d) Finally, press on the wrench icon (indicated by an **arrow**).

On the new window that will pop up, make sure that your options match the ones on the image on the next page of this document.

Be careful, words are case sensitive: writing "object" is *not the same* as writing "OBJECT"!

General FITS Header Settings   —   ☐   ✕

FITS Header Input Settings

Target Name Keyword: `OBJECT`

Target RA Keyword: `OBJCTRA` ☐ Degr...

Target DEC Keyword: `OBJCTDEC`

Observatory Name Keyword: `TELESCOP`

Observatory Latitude Keyword: `SITELAT` ☐ negate

Observatory Longitude Keyword: `SITELONG` ☐ negate

FITS Header Output Settings

Target J2000 RA Keyword: `RAOBJ2K` ☑ enable

Target J2000 DEC Keyword: `DECOBJ2K` ☑ enable

Target RA Keyword: `RA  OBJ` ☑ enable

Target DEC Keyword: `DEC  OBJ` ☑ enable

Target Altitude Keyword: `ALT  OBJ` ☑ enable

Target Azimuth Keyword: `AZ  OBJ` ☑ enable

Target Hour Angle Keyword: `HA  OBJ` ☑ enable

Target Zenith Distance Keyword: `ZD  OBJ` ☑ enable

Target Airmass Keyword: `AIRMASS` ☑ enable

JD (UTC) start-Obs Keyword: `JD  SOBS` ☑ enable
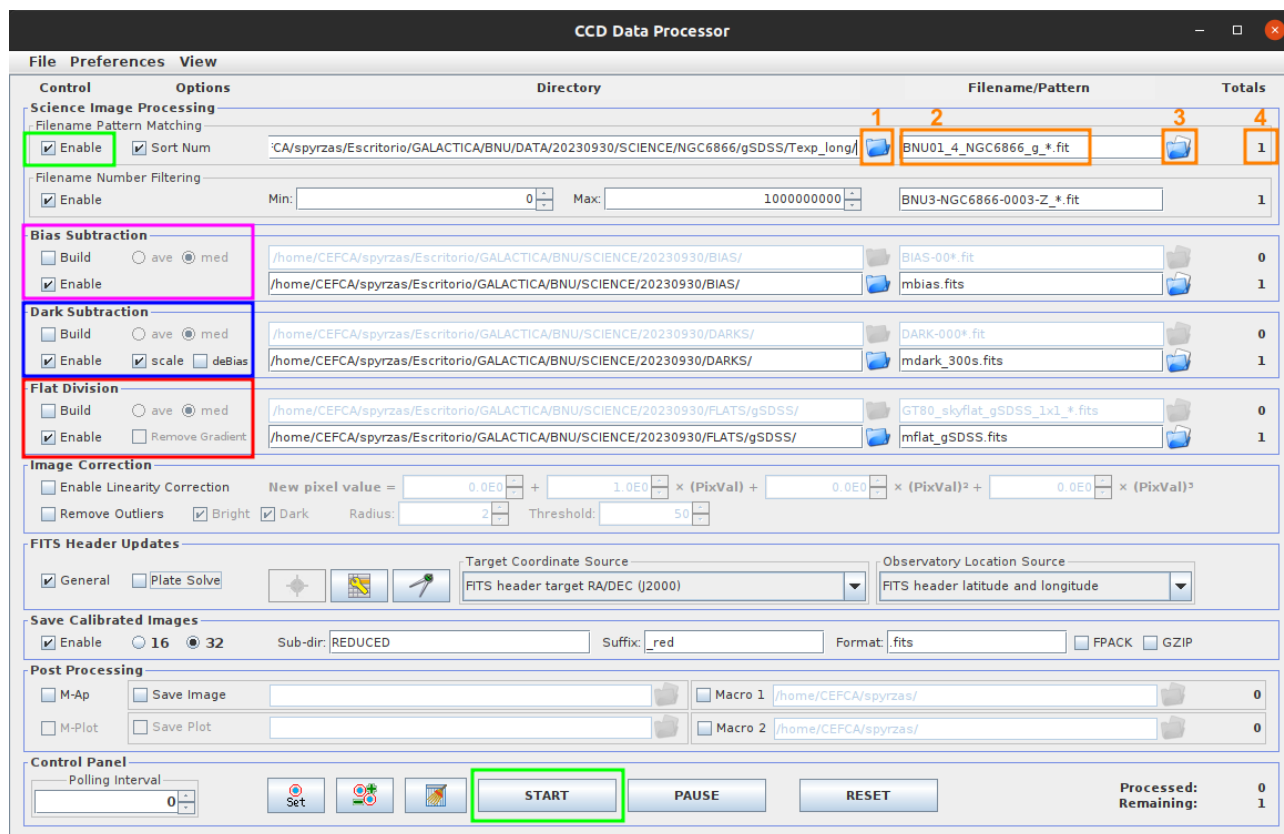
JD (UTC) mid-Obs Keyword: `JD  UTC` ☑ enable

HJD (UTC) mid-Obs Keyword: `HJD  UTC` ☑ enable

BJD (TDB) mid-Obs Keyword: `BJD  TDB` ☑ enable

Observatory Latitude Keyword: `SITELAT` ☑ enable

Observatory Longitude Keyword: `SITELONG` ☑ enable

REDUCING THE SCIENCE IMAGES

(a) Make sure that the **Bias**, **Dark** and **Flat** sections are set up as you see on the image above.

(b) **MAKE SURE** that the selected master flat frame matches the filter of your science image!!!

(c) Enable the option under "Science Image Processing"

(d) Click on the folder in the top row (**1**) and navigate to the directory of your science images.

(e1) On the box to the right (**2**), write part of the name of the image(s) so that AstroImageJ can locate it/them.

(e2) Alternatively, click on the folder icon (**3**), select one image and move the "*****" sign on the name until you see the correct number of science images in the last box (**4**).

(f) When you are ready, press the "Start" button.