



TUTORIAL Visual Enhancement V1.2b eng

I. Presentation

It is always disappointing to look through a telescope without being able to see an image similar to those seen in astronomy magazines.

That gave us the idea to develop a new concept between observing and deepsky imaging: the “**Visual enhancement**” new feature.

The **principle of Visual Enhancement** is as follows: each captured frame by the camera is pre-processed and stacked in real time on the master frame being displayed on the screen. This allows to increase the S/N ratio and lets us discover the faint object with more and more details as the stacking is being processed.

To improve the *Visual Enhancement* mode, we have included an autoguiding solution working together with the *Visual Enhancement* feature: **no need of another autoguiding camera anymore!**

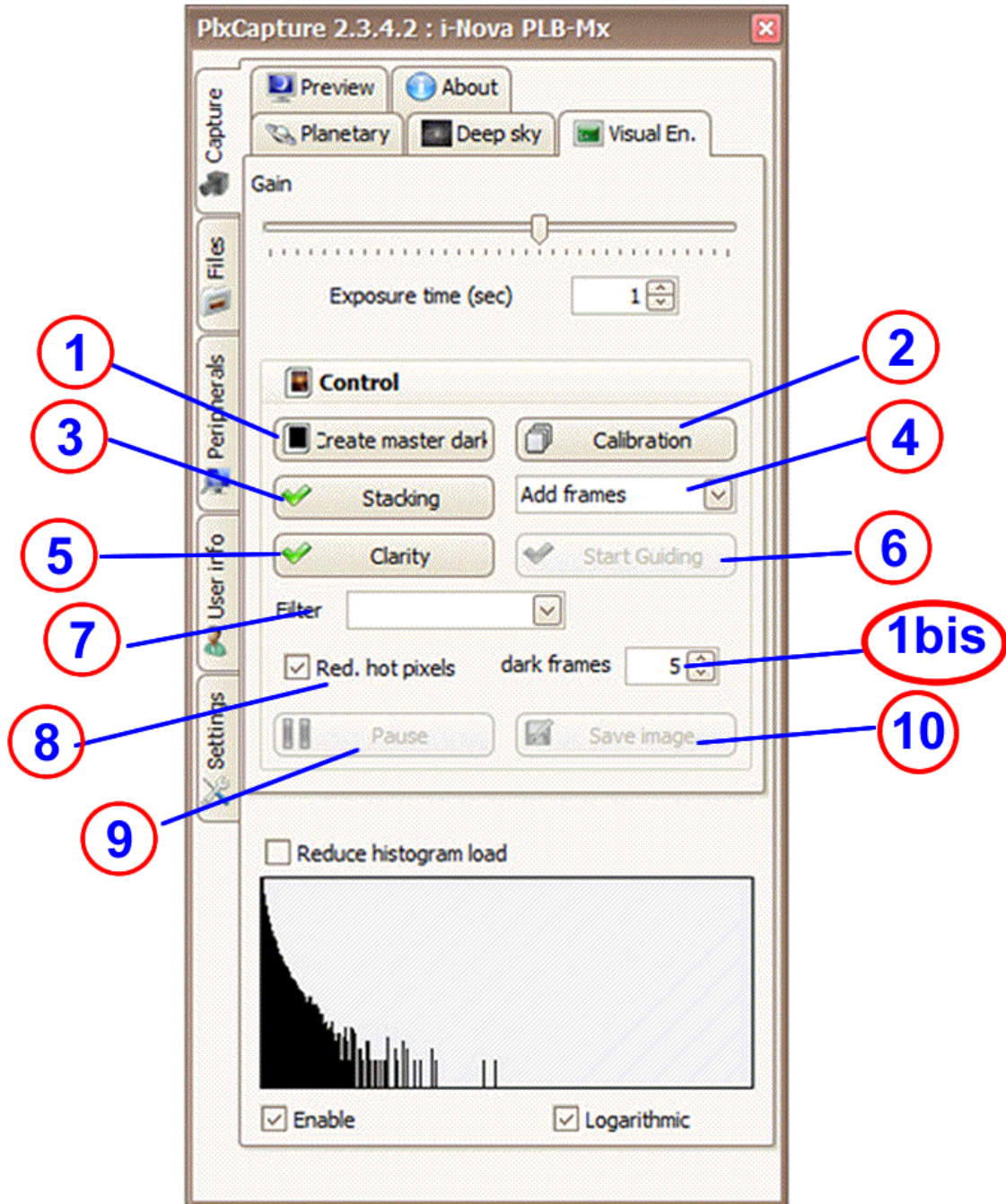
Image quality depends on CCD/CMOS sensor model and the ambient temperature. Regarding temperature regulation, a cooling system (temperature lowered by 30°C/54°F* with the standard model CS-L – single stage Peltier) is available for all *iNova* cameras – PLxCam Series.

This new feature is suitable for small optical instruments like an ED80 refractor.

Most of deepsky objects in the Messier catalog can be seen with this *Visual enhancement* feature.

*Without cooling, the temperature of the sensor can be 10 to 20°C (20 to 35°F) above the ambient temperature.

II. Visual Enhancement screen description





1. **Create master dark:** This function creates the master dark frame from a set of dark frames (number of frames in field **1bis**). This master frame **needs to be re-created each time gain and/or exposure time values are changed**. This master dark frame is saved with the current displayed picture (see “**Pause**” button **(9)** and “**Save image**” button **(10)**).

2. **Calibration:** This function allows PLxCapture to enable the autoguiding feature via the ST4 port of the camera or via an ASCOM connection (EQMod for example).

3. **Stacking:** This button starts stacking the frames being captured. Increasing the S/N ratio, this functionality lets us discover the faint object with more and more details as the stacking is being processed.
Note: monitor the histogram to stop the process before the curve reaches the right side of the graph (in this case, the image is “over-exposed”).

4. **Stacking mode:** This combo box selects the method used by PLxCapture to stack frames, there are two modes: « **Add** » and « **Mix** »:
 - « **Add** » will increase sensitivity adding stacked frames,
 - « **Mix** » will increase signal/noise ratio of each frame.

5. **Clarity:** This function allows to improve the image visualization: the outline of the object being captured appears quicker on display than in standard display mode.

6. **Guiding:** This button will be enabled only after a successful calibration. It will activate autoguiding (an ST4 autoguiding cable has to be connected to the *i-Nova* camera and to the mount via its ST4 autoguiding port).

7. **Filter:** If an automatized filterwheel is connected (through ASCOM V6 protocol), it could be used to make dark frames (using « blind » filter); otherwise, a cap needs to be put at the front of the instrument objective during the procedure.

8. **Red. hot pixel:** Reduces significantly the number of hot pixels on the image currently being captured.

9. **Pause:** This button will temporarily stop the current stacking process.

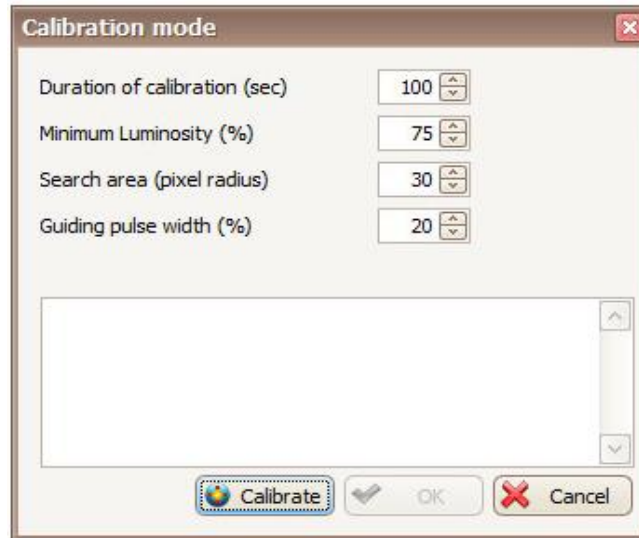


10. **Save image:** This button is active only when the stacking process is paused. The two available file formats are TIFF and FITS (12bit). **The master dark frame and the master offset files are saved in the same folder as the stacked image of the deepsky object.** This image can be processed with an image-processing software.

In addition to easing deepsky objects observation, this ***Visual Enhancement*** feature allows to quickly take nice shots of faint objects with no specific needed skill in astrophotography.

III. The calibration window

When clicking on the "**Calibration**" button, this window appears:



Parameters and explanations

A. Duration of calibration:

The calibration process done in 2 steps:

1. Detect camera's tilt compared to the equatorial grid,
2. Measure backlash/movement in all axis RA +/- and DEC+/-, (each part takes the same time).

B. Minimum brightness: When clicking on an area of the image, the closest star will be selected as reference/guide star. To be detected as "reference star", an object have to be brighter than this percent value.

C. Search area: This is the area around the clicked position where PLxCapture search for « reference star » will be done; it's defined in pixels.

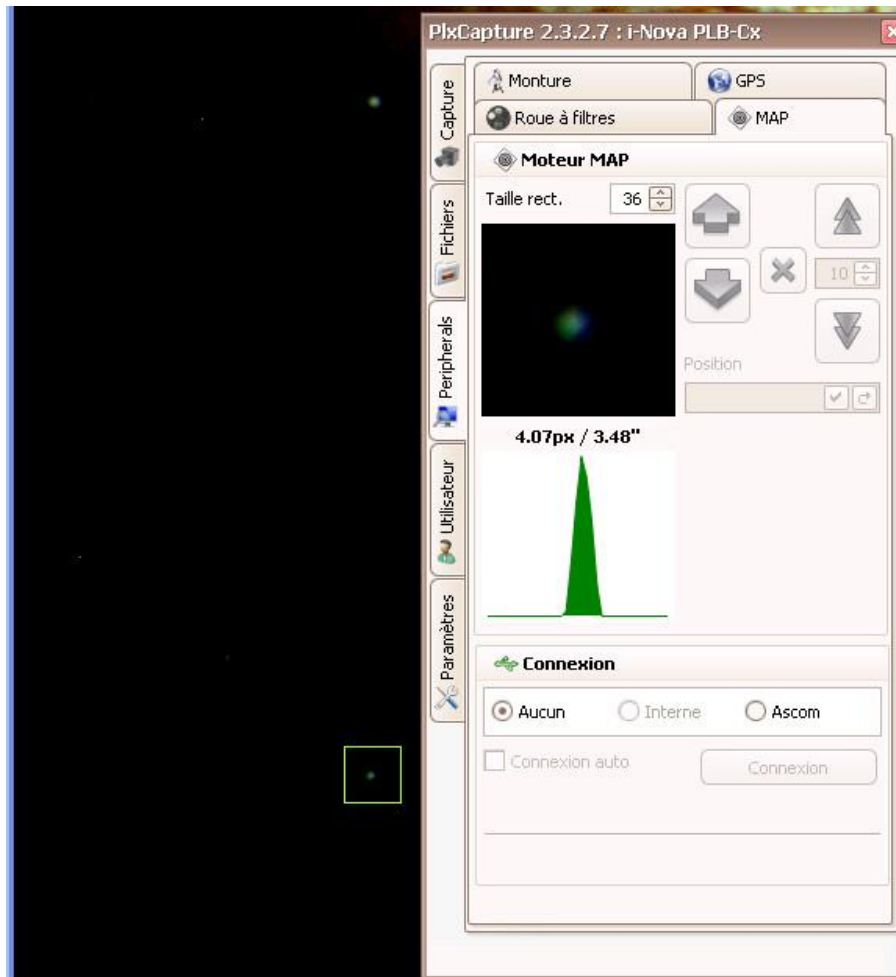
D. Guiding pulse width: During the calibration process, PLxCapture will send guiding pulses in intervals of 100ms. This field will set the pulse duration, in percent, to be used within these intervals - for example: with a 20% value, PLxCapture will send a 25ms pulse and will wait for 75ms (like a PWM modulated signal).

E. Action buttons: With "**Calibrate**", PLxCapture will start calibration; when done, you can choose to save results and use them for autoguiding with "**OK**" or to "**Cancel**" them. "**Cancel**" can be pressed during calibration to cancel the procedure.

IV. Procedure

- A. Polar alignment + star alignment:** Accurate polar alignment of the mount is critical – Best is to use a polar finder to get a good tracking.
- B. Focus:** In PLxCapture software, use the **Focus** function in the vertical “Peripherals” tab on the left hand side:
- Click on a faint star (not saturated) in the Preview window (the star, enlarged significantly, appears in the setting window);
 - Use the manual focuser knob for focusing to get the smallest possible value for FWHM (if an electric focuser - controlled by the PC via ASCOM - is connected, then use the navigation buttons for focusing).

Preview
window



Setting
window

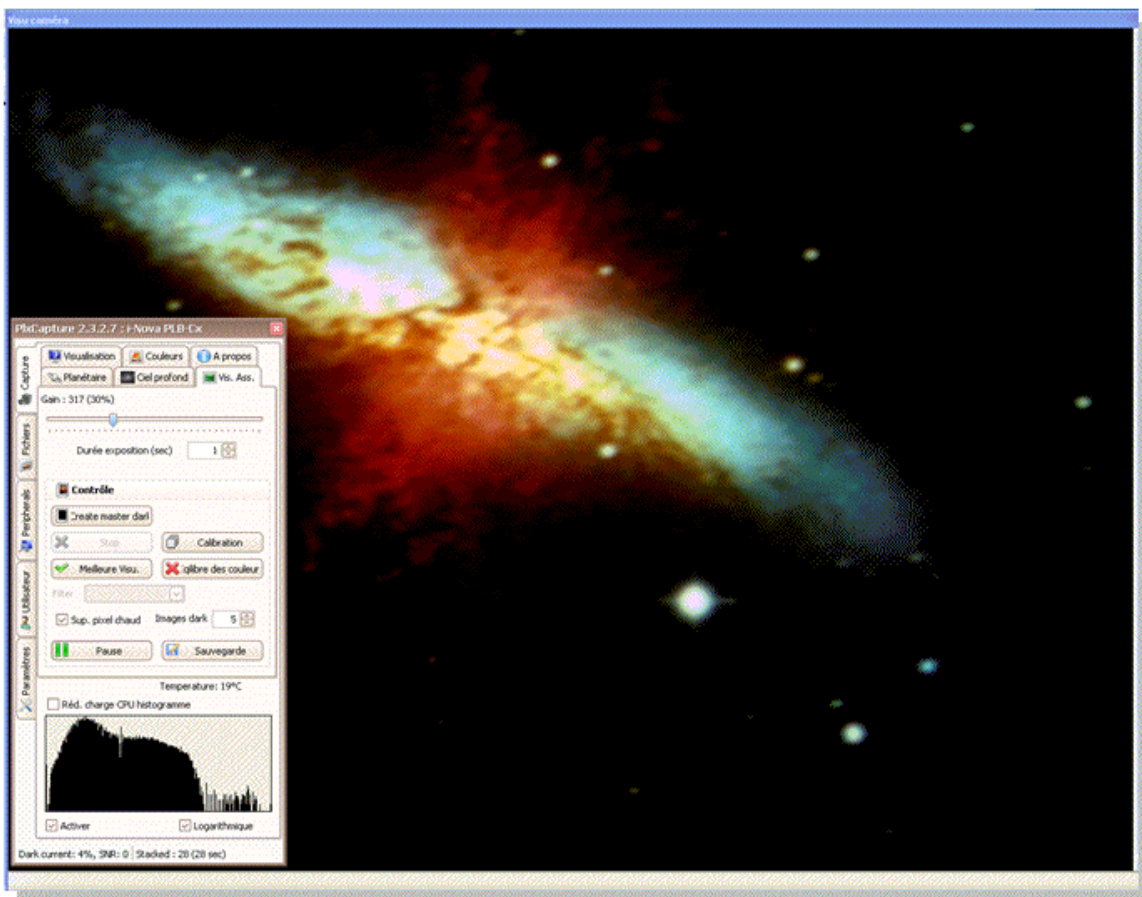


- C. **Slewing (make a Goto) to a deepsky object:** use the Goto controller or a sky map software (like Carte du ciel, Stellarium, Celestia, TheSky, Starry Night, ...) to slew automatically to a deepsky object.
- D. **Visual enhancement:** In main screen of PLxCapture software, click on the “**Visual enhancement**” icon.
- E. **Setting the exposure time and gain values:** these 2 parameters have to be adjusted following the sensor of the camera:
- For *i.Nova* **PLA+**, **PLA-C2**, **PLA-M** and **PLB-C2** cameras, gain value needs to be between 40 and 70%;
 - For *i.Nova* **PLA-Mx**, **PLB-Mx** and **PLC-M** cameras: between 30 and 50%;
 - For *i.Nova* **PLB-Cx** and **PLB-Mx2** cameras: between 50 and 90%.
- These values are for reference only as they have to be adjusted following ambient temperature.
- Time exposure can be set between 1 and 15 seconds following tracking quality of the mount.
- With a cooled camera, gain and time exposure values may be higher (a few minutes).
- F. **Miscellaneous parameters:** click the parameters:
- « **Red. hot pixels** » to minimize the number of hot pixels,
 - « **Clarity** » **button** to get more contrast during the stacking process.
- G. **Create master dark frame:** Enter the number of dark frames in field **1bis** that PLxCapture has to generate (**this number is generally between 5 and 15**).
- Note:** this dark frame is linked to gain and time exposure values: each time these values are changed, it is necessary to re-create the master dark frame for the best possible outcome.
- H. **Calibration:** If tracking precision of the mount is excellent or if the mount is autoguided by an external program, this calibration is not needed. Clicking on this button, PLxCapture opens the calibration window; it is then possible to refine default parameters, otherwise click on **Calibration**, and select a reference star in the Preview window. After the delay between 2 images is over, click again on the reference star. Once calibration is done, click on **OK** to finish the process.
- I. **Stacking process:** Click on the **Stacking** button to start to see the result of the stacked deepsky object appearing in the preview window. Clicking on the **Stop** button clears the current stacking process and displays the

current stacked image.

J. Pause: if PLxCapture is currently stacking images, the « **Pause** » button is active. Clicking on the « **Pause** » button lets pause the stacking process – Press the « **Pause** » button again to resume the stacking process. Clicking on the « **Pause** » button activates the « **Save Image** » button.

K. Save image: The button is only active when « **Pause** » is active. Allows to back up the reference image displayed in the preview window in FITS or TIFF format.



This tutorial document is available here:

http://www.inova-ccd.fr/download/F. Visual_Enhancement/Tutorial_Visual_Enhancement_V1.2b_eng.pdf