

les rencontres du ciel et de l'espace

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PixInsight

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PixInsight : Qu'es aquò ?

Réponse rapide :

un logiciel de traitement d'images du ciel profond (et aussi planétaire)

Mais ce n'est pas que ça !

Historique

- Créé par Juan Conejero (Espagne), programmeur professionnel et astrophotographe.
- Prédécesseur: SGBNR (réduction de bruit) en 2001.
- Le projet PixInsight a démarré en 2003.
- PixInsight LE (freeware limited edition) a été réalisé en 2004/2005.
- PixInsight Standard (Edition commerciale, architecture modulaire) a démarré en 2008 et toujours en évolution constante.

Pourquoi PixInsight ?

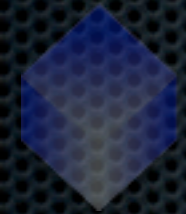
- Logiciel de traitement puissant
- Algorithmes mathématiques innovants et optimisés
- Contrôle total de tous les processus
- Environnement graphique évolué
- Plateforme de traitement d'image réalisé par des astrophotographes pour des astrophotographes

Inside PixInsight ?

- Architecture modulaire et ouverte
- Développement : PixInsight Class Library
- Portabilité multi OS
- Données 8, 16, 32, 64 bits
- Interface graphique avec visu temps réel
- Gestion multi-processeur et RAM
- Gestion des profils de couleur ICC
- Scripts (Javascript), command line, PCL C++

Portabilité multi OS

- Microsoft Windows XP/Vista/7 : 32 et 64 bits
- Mac OS X 10.6/10.7/10.8 : 32 et 64 bits
- Linux 32 et 64 bits
- Core application based on PCL and Trolltech's Qt framework
- PCL : librairie indépendante de l'OS et du hardware
- Parallel processing : gestion avancée des processeurs multi-coeurs et hyperthreading



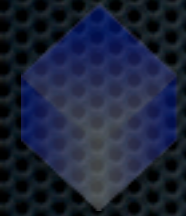
Dynamique réelle de 64 bits

- Unsigned Integers : 8-bit, 16-bit, 32-bit
- IEEE 754 Floating Point : 32-bit et 64-bit
- PCL support for complex-valued floating-point images
- Tous les processus peuvent travailler avec tous les types de données sans aucune distinction

12bit =	4 196
14bit =	16 384
16bit =	65 536
32bit =	4 294 967 296
64bit =	18 446 744 073 709 551 616

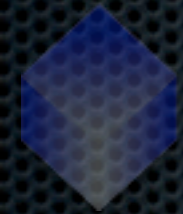
Formats d'images supportés

- FITS : 8, 16, 32, 64 bits
- TIF : 8, 16, 32, 64 bits
- APN (RAW : librairie DC-RAW)
- formats graphiques 8 bits (BMP, JPEG, PNG, GIF,...)



Principe mathématique

- **Traitement multi-échelle (multi-résolution)**
 - Décomposition du signal de départ en séparant à chaque niveau de résolution les basses fréquences (approximation) et les hautes fréquences (détails) du signal.
- **Traitement par ondelettes (algorithme à trous)**
- **Transformée de Fourier**
- **Déconvolution**
- **Masques**
- **Opérations linéaires (mathématiques)**



Principe mathématique

- Alignement stellaire précis (jusqu'à 20% meilleur que les autres logiciels dédiés)
- Empilement optimisé selon différents algorithmes
- Algorithmes évolués de composition de mosaïques
- Fonction magique : HDR Multiscale Transform




















Principe mathématique

- Outils paramétrables (répétables pour plusieurs images)
- Outils dynamiques (uniques à l'image sélectionnée)

Gestion des couleurs

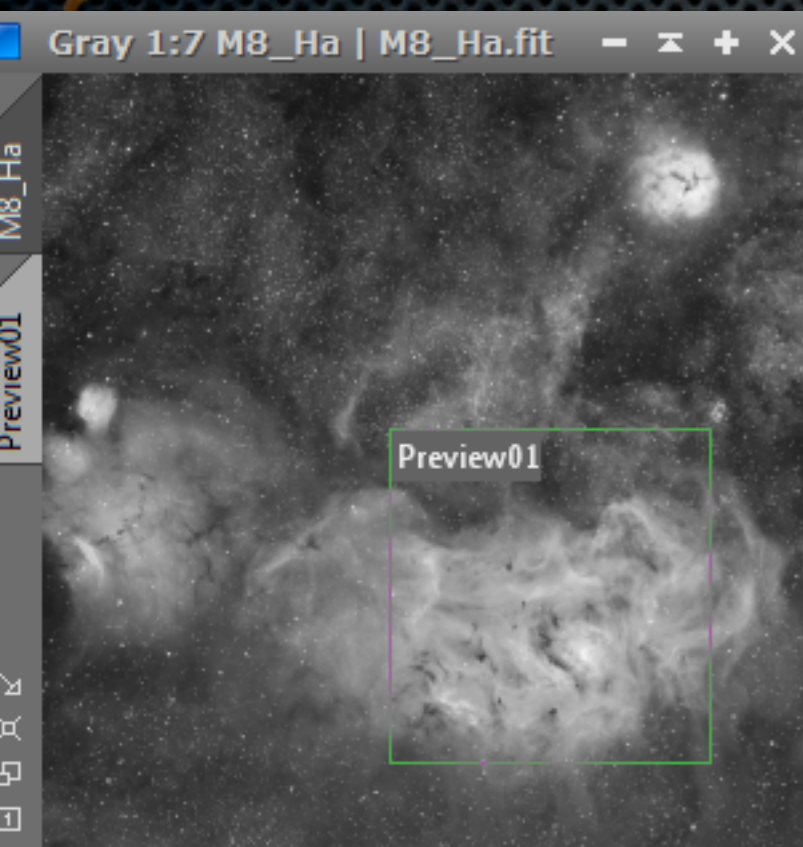
● Affichage

● Profils colorimétriques

	RGB
	Red
	Green
	Blue
	Lightness (CIE L*)
	CIE a*=R b*=G
	CIE L*=0.5
	CIE a*
	CIE b*
	CIE c*
	CIE h*
	CIE X
	Luminance (CIE Y)
	CIE Z
	Hue
	HSV Saturation
	HSI Saturation
	HSV Value
	HSI Intensity

Sauvegarde des Process

- Process Icons
- Historique d'un traitement : icône
- Projets (incluant historique de chaque image)



	#	Proc Id	Mask
▲ ✓	0	<Root>	
✓	1	HistogramTransformation	
✓	2	HDRMultiscaleTransform	
✓	3	CurvesTransformation	
✓	4	MultiscaleMedianTransform	M8_Ha_clone
▲ ✓	5	ProcessContainer	
✓	5.1	HistogramTransformation	Mask <*broke
✓	6	CurvesTransformation	M8_Ha_clone
✓	7	ACDNR	~M8_Ha_clor
✓	8	CurvesTransformation	

```
/*  
 * Start time: 2012/09/21 06:32:56  
 * Execution time: 66.519 s  
 */  
var P = new HDRMultiscaleTransform;  
P.numberOfLayers = 8;  
P.numberOfIterations = 2;  
P.invertedIterations = false;  
P.overdrive = 0.000;  
P.medianTransform = true;  
P.scalingFunctionData = [  
  0.003906,0.015625,0.023438,0.015  
  0.015625,0.0625,0.09375,0.0625,0  
  0.023438,0.09375,0.140625,0.0937  
  0.015625,0.0625,0.00375,0.0625,0
```

Ce qu'on n'y trouvera pas

- Fonctions artistiques
- Outils «clone» évolués
- Retouches locales
- Et plusieurs petites choses pourtant bien utiles...

L'interface

L'interface...

Process

The screenshot shows the PixInsight interface. On the left is the 'Process Explorer' with a list of processing tools. The 'HistogramTransformation' tool is selected. The main window displays the 'HistogramTransformation' documentation page, which includes a table of contents and an introduction section.

Process Explorer:

- ATrousWaveletTransform
- BackgroundNeutralization
- ColorCalibration
- CurvesTransformation
- Deconvolution
- DynamicBackgroundExtraction
- DynamicCrop
- FastRotation
- HDRMultiscaleTransform
- HistogramTransformation**
- MorphologicalTransformation
- MultiscaleMedianTransform
- PixelMath
- ProcessContainer
- RGBWorkingSpace
- Resample
- SampleFormatConversion
- ScreenTransferFunction
- StarMask
- Statistics

Reference Documentation: HistogramTransformation

Implements pixel intensity transformations defined by histogram clipping and expansion points. [\[more\]](#)

Categories: IntensityTransformations

Keywords: histogram, histogram transformation, intensity transform

Contents:

- Introduction
 - Histogram Generation
 - Histogram Transformations
 - Identity Histogram Transformations
- Description
- Usage
 - Input and Output Histograms
 - Understanding Independence on Selected Views
 - Histogram Editing Modes
 - Information Panel
 - Display Options
 - View Selection List
 - Channel Selection
 - Histogram Transformation Parameters
 - Clipped Pixel Counts
 - AutoClip Functions
 - Histogram Readout Modes
 - Interoperability with ScreenTransferFunction
 - Working with the Real-Time Preview Virtual View
- References
- Related Tools

Introduction

A **histogram** is a discrete representation of the distribution of values in the whole set of data points into a number of intervals and counts the Histograms are discrete functions usually represented in the form of

Applied to digital images, histograms are generated by remapping all range of discrete values, for example 256 values in an 8-bit histogram counter initialized to zero. Then for each pixel in the image, its value corresponding counter is incremented by one unit. The result of this is a list of integers representing the total number of existing pixels for

A histogram provides a wealth of information about an image and how available numeric range. Histograms are powerful tools for statistical image analysis, and the basis for many essential

Console

The screenshot shows the 'Process Console' window with execution logs for the HistogramTransformation process. The logs include file paths, FITS reading status, MRS noise evaluation, scale factors, zero offsets, noise estimates, and weight values. It also shows integration parameters and pixel rejection counts for 11 files.

```
Process Console
/Volumes/HD2/AIP/concours 4559/Bias -35C bin 22 11 fichiers bruts/calib_Mar25-010bm.fit
Reading FITS: 16-bit integers, 1 channel(s), 2048x2048 pixels: 100%
MRS noise evaluation: done.
Scale factors : 0.99971
Zero offset : +3.051758e-05
Noise estimates : 3.238e-04
Weight : 1.00000
/Volumes/HD2/AIP/concours 4559/Bias -35C bin 22 11 fichiers bruts/calib_Mar25-011bm.fit
Reading FITS: 16-bit integers, 1 channel(s), 2048x2048 pixels: 100%
MRS noise evaluation: done.
Scale factors : 1.00140
Zero offset : +3.051758e-05
Noise estimates : 3.238e-04
Weight : 1.00000

Integration of 11 images:
Pixel combination ..... average
Output normalization ..... none
Pixel rejection ..... Winsorized sigma clipping
Rejection normalization ... none
Rejection clippings ..... low=yes high=yes
Rejection parameters ..... sigma_low=4.000 sigma_high=4.000

* Using 2048 concurrent pixel stack(s) = 544.00 MB
Integrating pixel rows: 0 -> 2047: 100%

Pixel rejection counts:
/Volumes/HD2/AIP/concours 4559/Bias -35C bin 22 11 fichiers bruts/calib_Mar25-001bm.fit
1 : 4482 0.107% ( 1476 + 3006 = 0.035% + 0.072%)
/Volumes/HD2/AIP/concours 4559/Bias -35C bin 22 11 fichiers bruts/calib_Mar25-002bm.fit
2 : 4541 0.108% ( 1659 + 2882 = 0.040% + 0.069%)
/Volumes/HD2/AIP/concours 4559/Bias -35C bin 22 11 fichiers bruts/calib_Mar25-003bm.fit
3 : 4479 0.107% ( 1663 + 2816 = 0.040% + 0.067%)
/Volumes/HD2/AIP/concours 4559/Bias -35C bin 22 11 fichiers bruts/calib_Mar25-004bm.fit
4 : 4308 0.103% ( 1720 + 2588 = 0.041% + 0.062%)
/Volumes/HD2/AIP/concours 4559/Bias -35C bin 22 11 fichiers bruts/calib_Mar25-005bm.fit
5 : 4201 0.100% ( 1697 + 2504 = 0.040% + 0.060%)
/Volumes/HD2/AIP/concours 4559/Bias -35C bin 22 11 fichiers bruts/calib_Mar25-006bm.fit
6 : 4158 0.099% ( 1715 + 2443 = 0.041% + 0.058%)
/Volumes/HD2/AIP/concours 4559/Bias -35C bin 22 11 fichiers bruts/calib_Mar25-007bm.fit
7 : 4389 0.105% ( 1831 + 2558 = 0.044% + 0.061%)
/Volumes/HD2/AIP/concours 4559/Bias -35C bin 22 11 fichiers bruts/calib_Mar25-008bm.fit
8 : 4279 0.102% ( 1824 + 2455 = 0.043% + 0.059%)
/Volumes/HD2/AIP/concours 4559/Bias -35C bin 22 11 fichiers bruts/calib_Mar25-009bm.fit
9 : 4274 0.102% ( 1776 + 2498 = 0.042% + 0.060%)
/Volumes/HD2/AIP/concours 4559/Bias -35C bin 22 11 fichiers bruts/calib_Mar25-010bm.fit
10 : 4367 0.104% ( 1876 + 2491 = 0.045% + 0.059%)
/Volumes/HD2/AIP/concours 4559/Bias -35C bin 22 11 fichiers bruts/calib_Mar25-011bm.fit
11 : 4313 0.103% ( 1879 + 2434 = 0.045% + 0.058%)

Total : 47791 0.104% ( 19116 + 28675 = 0.041% + 0.062%)

MRS noise evaluation: done.
Computing noise scaling factors: done.

Gaussian noise estimates:
σs = 9.939e-05

Reference SNR increments:
Δσs0 = 1.6791

Average SNR increments:

Ready [Pause/Abort]
```


L'interface...

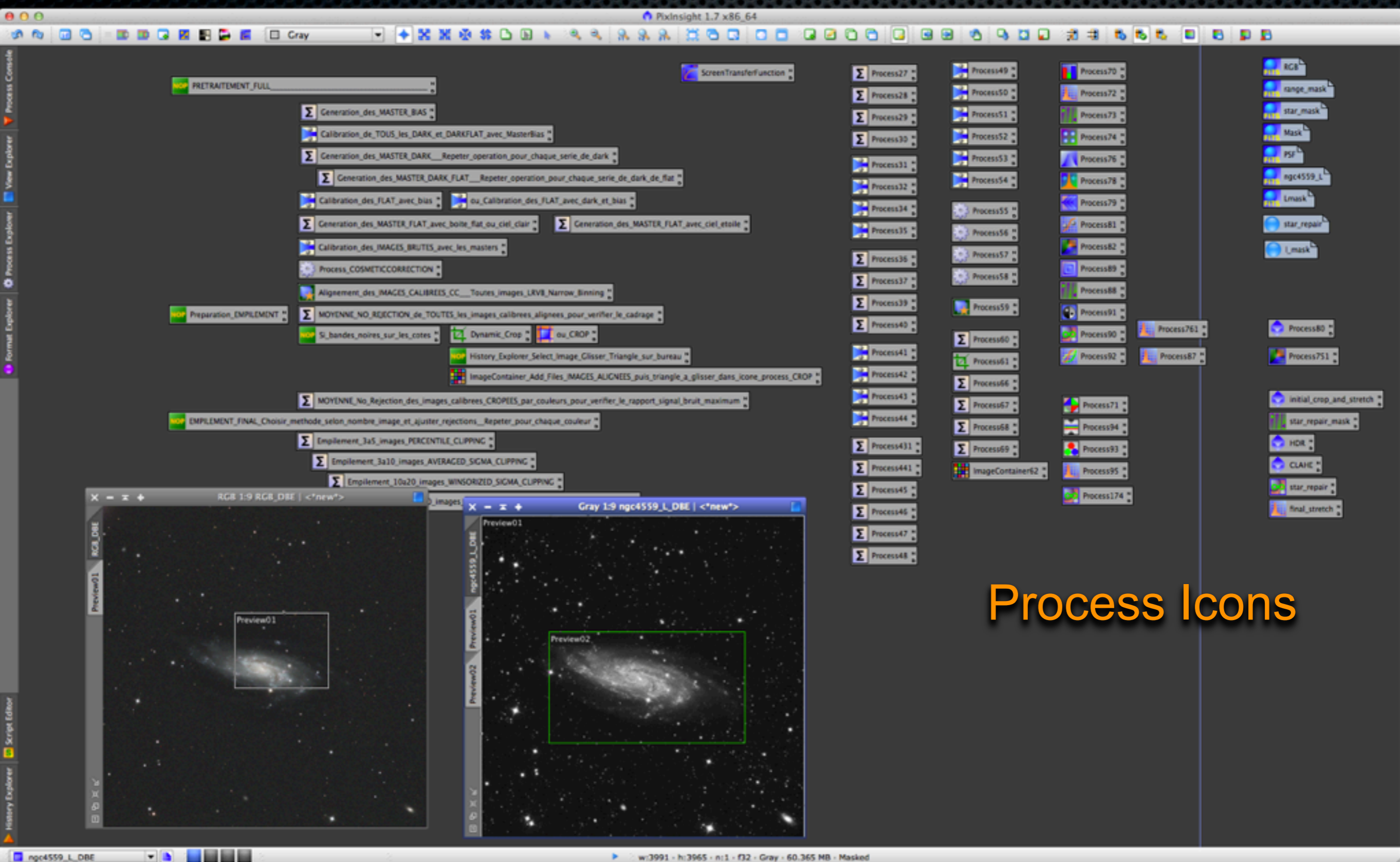
The screenshot displays the PixInsight 1.7 x86_64 interface with several windows and panels:

- Main Viewport:** Shows a large image of a nebula (IC 1848) in RGB 1:3 HAR_RHAVB_AIP format.
- Process Explorer:** A vertical panel on the left showing the processing workflow.
- Process Container:** A window showing a table of processing steps and their masks.
- CurvesTransformation:** A window showing a graph with multiple curves for color adjustment.
- ScreenTransferFunction:** A window showing color calibration curves for R, G, B, and L channels.
- Script Editor:** A window at the bottom right showing JavaScript code for a MultiscaleMedianTransform process.
- Process Explorer (Right):** A vertical panel on the right showing a detailed view of the processing steps.

#	Proc Id	Mask
0	<Root>	
1	CurvesTransformation	
2	ACDNR	
3	Deconvolution	star_mask
4	BackgroundNeutralization	
5	MultiscaleMedianTransform	~MASK
6	ICCPProfileTransformation	

```
/* Start time: 2012/10/18 10:25:46 UTC
 * Execution time: 17.735 s
 */
var P = new MultiscaleMedianTransform;
P.layers = [ // enabled, biasEnabled, bias, noise
  [true, true, 0.000, false, 1.000, 1.00, 0.000],
  [true, true, 0.050, false, 1.000, 1.00, 0.000],
  [true, true, 0.050, false, 1.000, 1.00, 0.000],
  [true, true, 0.000, false, 1.000, 1.00, 0.000],
  [true, true, 0.000, false, 1.000, 1.00, 0.000]
];
P.scaleDelta = 0;
P.lowRange = 0.0000;
P.highRange = 0.0000;
```

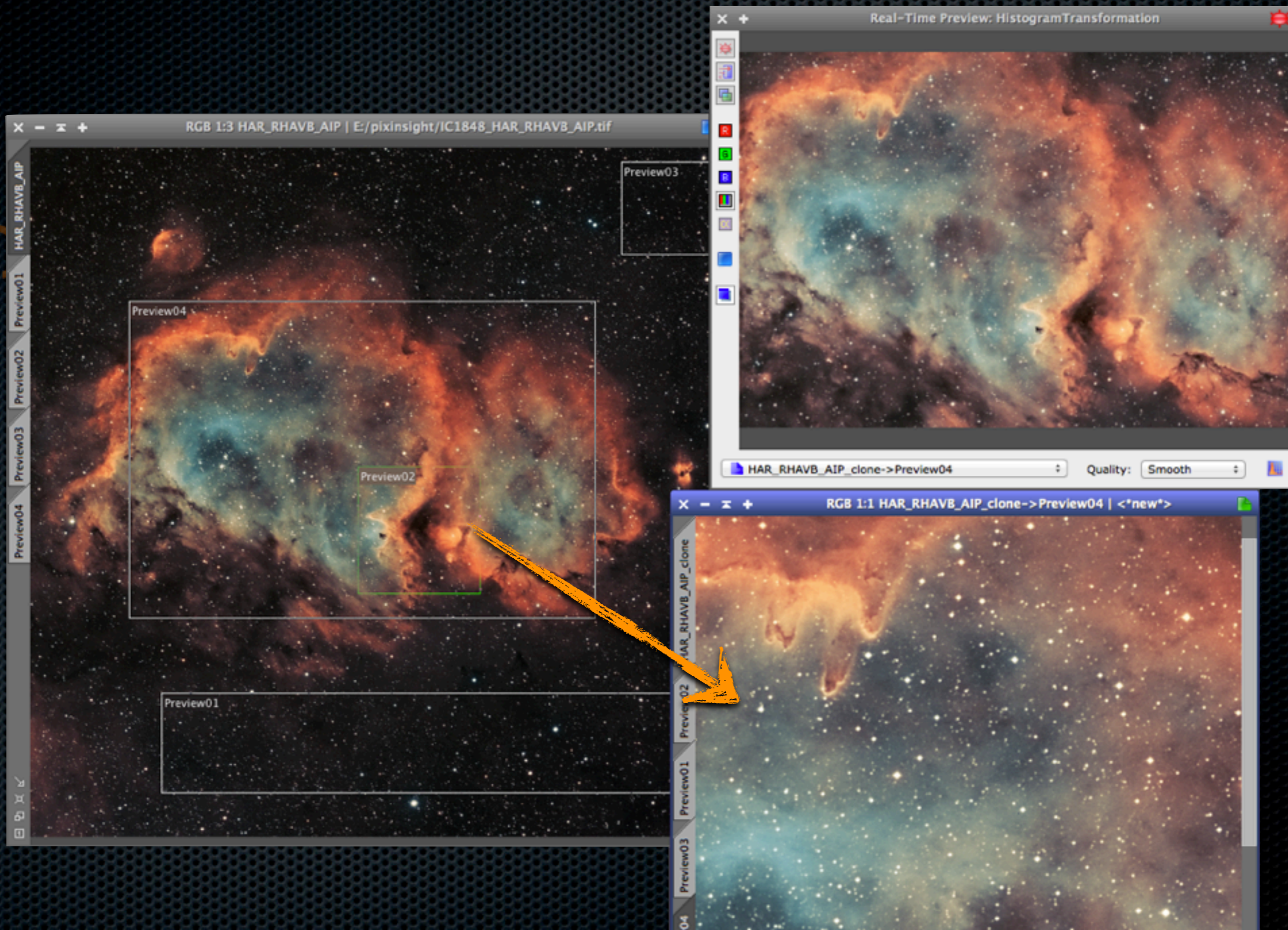
L'interface...



Process Icons

Preview, Real-Time Preview

PixInsight



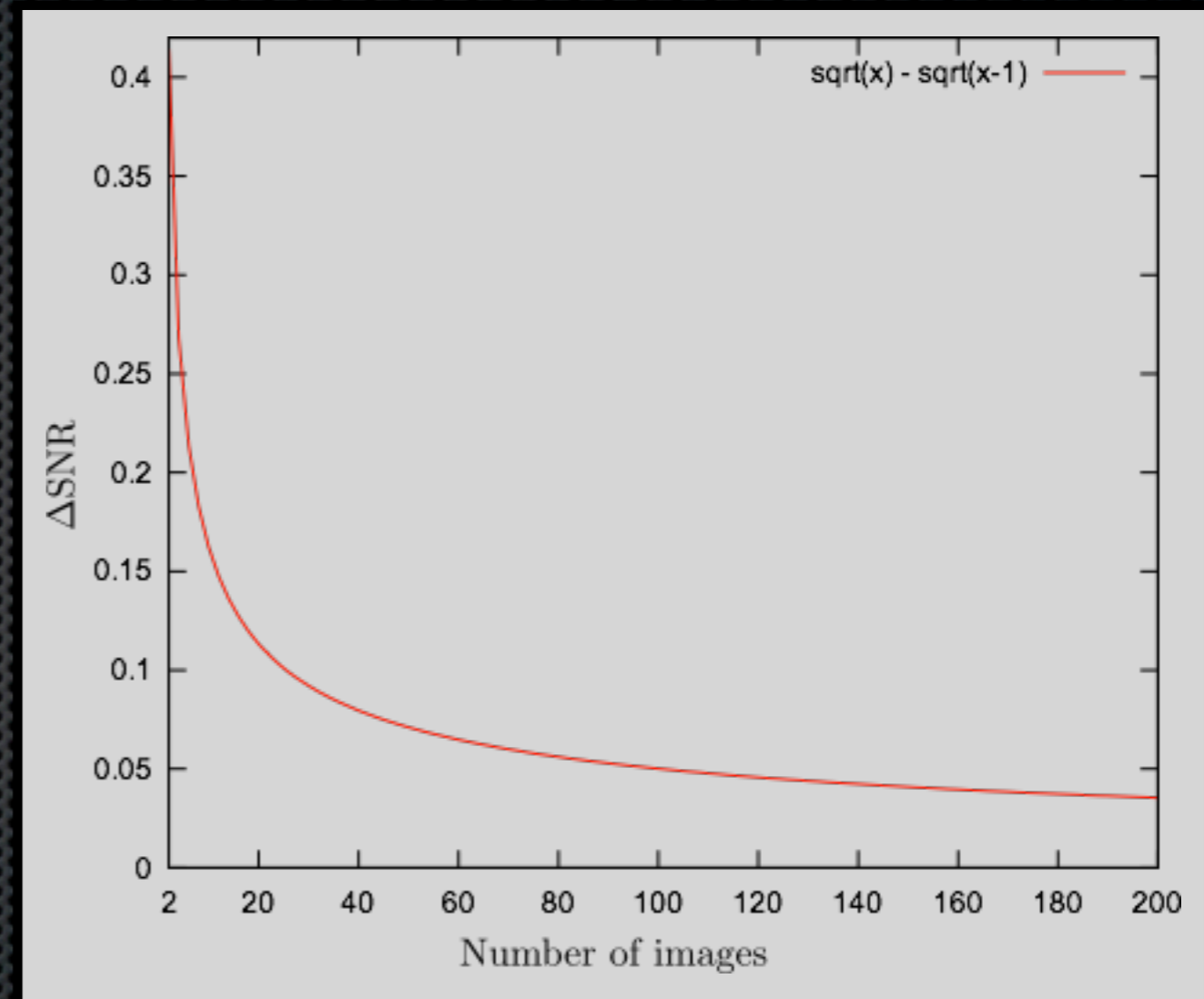
Le prétraitement

Optimisation prétraitement

Combien d'images ?

Bias, dark, flat :

- 10 images ?
- 25 images ?
- 50 images ?
- 100 images ?
- 200 images ?



$$\Delta\text{SNR}(N) = \sqrt{N} - \sqrt{N-1}$$

Process icons :

Création d'un Prétraitement CCD complet


- Suite d'icônes représentant des fonctions préprogrammées (*création perso*)
- Adapté aux images CCD monochromes L, R, V, B, Ha, OIII, SII, NII..., objets du ciel profond
- Adaptable facilement aux CCD couleurs ou APN (matrice de Bayer)
- Optimisation des paramètres à chaque étape par analyse des cartes de réjection
- Sauvegarde de chaque MASTER ou images en 32bits


Process icons : prétraitement «full»


NOP PRETRAITEMENT_FULL _____ ^N_D



NOP PRETRAITEMENT_MASTER_BiasDarkFlat _____ ^N_D


 Generation_des_MASTER_BIAS ^N_D **MasterBIAS optimisé(s)**

 Calibration_de_TOUS_les_DARK_et_DARKFLAT_avec_MasterBias ^N_D **Calibration des DARK**

 Generation_des_MASTER_DARK__Repetier_operation_pour_chaque_serie_de_dark ^N_D **MasterDARK optimisé(s)**

 Generation_des_MASTER_DARK_FLAT__Repetier_operation_pour_chaque_serie_de_dark_de_flat ^N_D


 Calibration_des_FLAT_avec_bias ^N_D  ou_Calibration_des_FLAT_avec_dark_et_bias ^N_D **Calibration des FLATS**

 Generation_des_MASTER_FLAT_avec_boite_flat_ou_ciel_clair ^N_D **MasterFLAT optimisé(s)**


NOP PRETRAITEMENT_FULL _____ ^N_D


 Calibration_des_IMAGES_BRUTES_avec_les_masters ^N_D **Calibration des IMAGES avec les MASTERS**

 Process_COSMETICCORRECTION ^N_D **Elimination des défauts cosmétiques résiduels**


 Alignement_des_IMAGES_CALIBREES_CC__Toutes_images_LRVB_Narrow_Binning ^N_D **Alignement de toutes les IMAGES**

NOP Preparation_EMPILEMENT _____ ^N_D


 MOYENNE_NO_REJECTION_de_TOUTES_les_images_calibrees_alignees_pour_verifier_le_cadrage ^N_D **Retrait des bandes noires pour optimisation du calcul du S/B**


NOP Si_bandes_noires_sur_les_cotes ^N_D  Dynamic_Crop ^N_D


NOP History_Explorer_Select_Image_Glisser_Triangle_sur_bureau ^N_D


 ImageContainer_Add_Files_IMAGES_ALIGNEES_puis_triangle_a_glisser_dans_icone_process_CROP ^N_D


NOP EMPILEMENT_FINAL_Choisir_methode_selon_nombre_image_et_ajuster_rejections__Repetier_pour_chaque_couleur ^N_D

NOP VERIF_S_B ^N_D  MOYENNE_No_Rejection_des_images_calibrees_CROPEES_par_couleurs_pour_verifier_le_rapport_signal_bruit ^N_D **calcul du S/B max**

 Empilement_3a5_images_PERCENTILE_CLIPPING ^N_D

 Empilement_3a10_images_AVERAGED_SIGMA_CLIPPING ^N_D

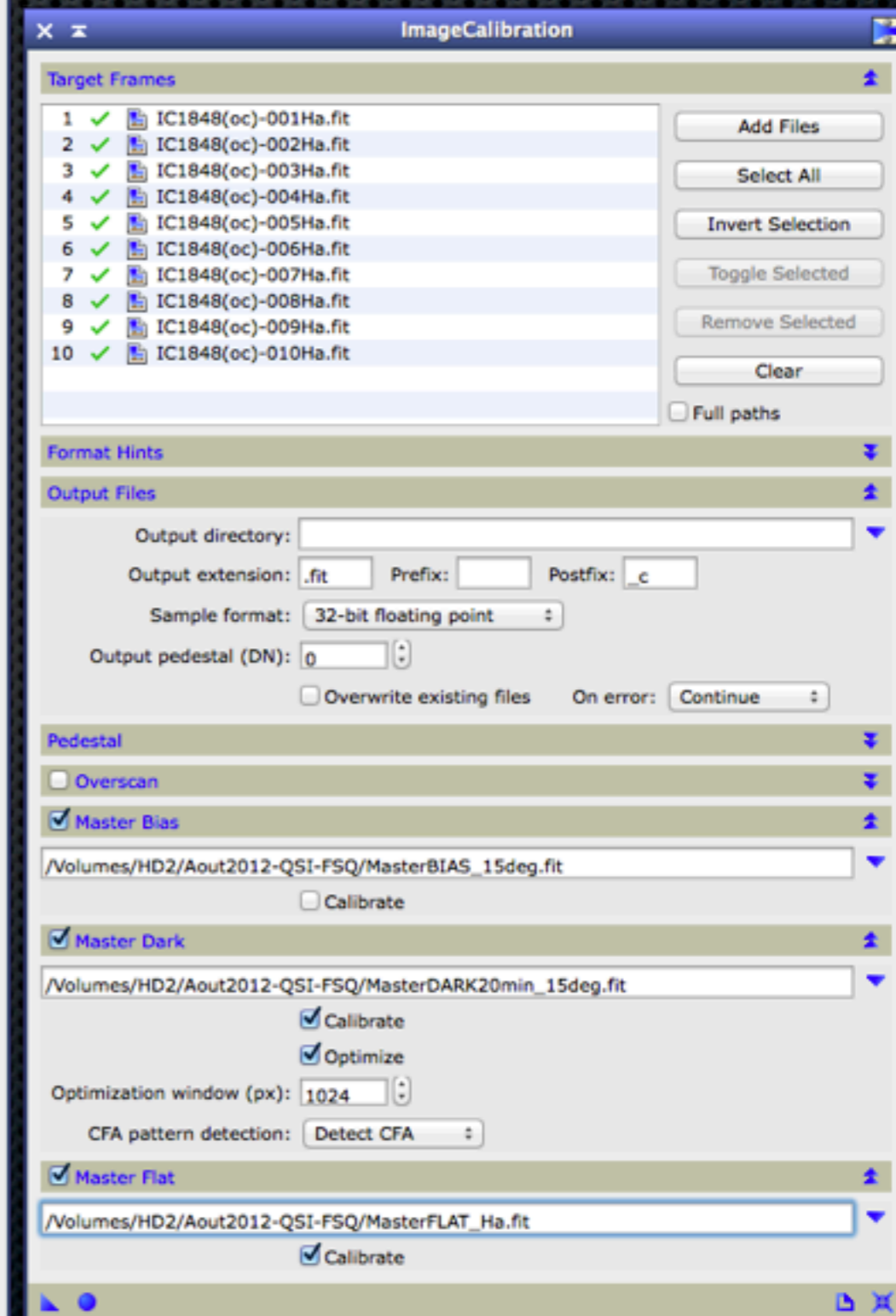
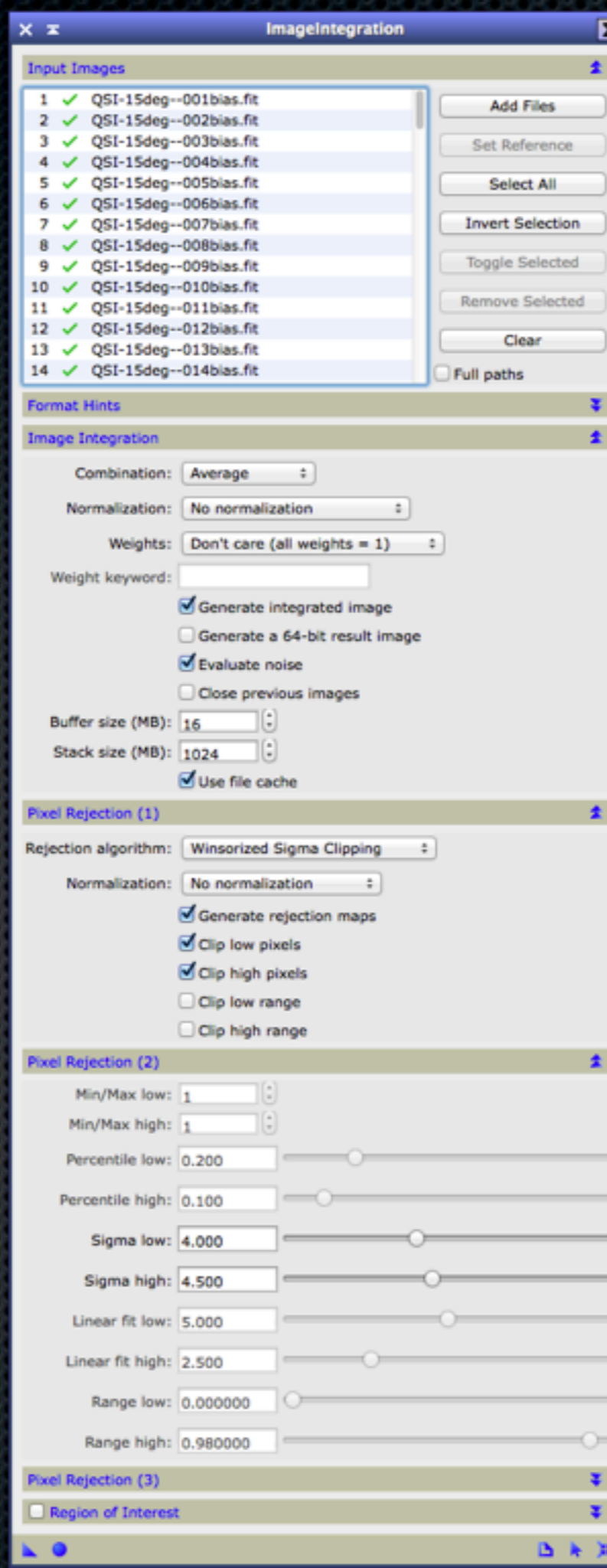
 Empilement_10a20_images_WINSORIZED_SIGMA_CLIPPING ^N_D

 Empilement_20_et_plus__images_avec_gradients_pollution_LINEAR_FIT_CLIPPING ^N_D

Empilement(s) optimisé(s) des différentes images ou couches couleur

intégration, calibration

PixInsight



cosmetique, alignement...

PixInsight

CosmeticCorrection

Target Frames

1	✓	NGC6888-001Ha_c.fit
2	✓	68cyg-001Ha_c.fit
3	✓	68cyg-002Ha_c.fit
4	✓	68cyg-003Ha_c.fit
5	✓	68cyg-004Ha_c.fit
6	✓	68cyg-005Ha_c.fit
7	✓	68cyg-006Ha_c.fit
8	✓	68cyg-007Ha_c.fit
9	✓	68cyg-008Ha_c.fit
10	✓	68cyg-009Ha_c.fit
11	✓	68cyg-010Ha_c.fit
12	✓	68cyg-011Ha_c.fit

Output

Amount: 1.00

Use Master Dark

Master Dark: James/HD2/Aout2012-QSI-FSQ/MasterDARK20min_15deg.fit

Hot Pixels Threshold

Enable

Level: 0.1233997121

Sigma: 34.3740

Qty: 385

Real: Qty: 385, Level: 0.1233997121, Sigma: 34.373997

Cold Pixels Threshold

Enable

Level: 0.0000152590

Sigma: 0.02260

Qty: 38

Real: Qty: 9293, Level: 0.0000152590, Sigma: 0.022597

Use Auto detect

Hot Sigma: 3.0

Cold Sigma: 3.0

Use Defect List

Real Time Preview

	Hot	Cold
Dark	0	0
Auto	0	0

Show map Snapshot

StarAlignment

Reference image: 68_Cyg_002Ha_c_cc

Working mode: Register/Match Images

Generate masks
 Frame adaptation

Target Images

1	✓	68cyg-001Ha_c_cc.fit
2	✓	68cyg-002Ha_c_cc.fit
3	✓	68cyg-003Ha_c_cc.fit
4	✓	68cyg-004Ha_c_cc.fit
5	✓	68cyg-005Ha_c_cc.fit
6	✓	68cyg-006Ha_c_cc.fit
7	✓	68cyg-007Ha_c_cc.fit
8	✓	68cyg-008Ha_c_cc.fit
9	✓	68cyg-009Ha_c_cc.fit
10	✓	68cyg-010Ha_c_cc.fit
11	✓	68cyg-011Ha_c_cc.fit
12	✓	68cyg-012Ha_c_cc.fit
13	✓	68_Cyg-001Ha_c_cc.fit
14	✓	68_Cyg-002Ha_c_cc.fit

Format Hints

Output Images

Star Detection

Detection scales: 4

Noise scales: 1

Hot pixel removal: 1

Log(sensitivity): -1.00

Peak response: 0.80

Maximum distortion: 0.500

Inverted image

Star Matching

RANSAC tolerance: 2.00

RANSAC iterations: 2000

Maximize inliers: 1.00

Maximize overlapping: 1.00

Maximize regularity: 1.00

Minimize RMS error: 1.00

Maximum stars: <Auto>

Triangles per star: 40

Compute intersections: Mosaic modes only

Restrict to previews
 Use brightness relations
 Use scale differences

Scale tolerance: 0.010

Interpolation

Registration model: Projective Transformation

Pixel interpolation: Auto

Clamping threshold: 0.30

Optimisation de l'intégration : réjection

Integration of 11 images:
Pixel combination average
Output normalization additive
Pixel rejection none
Integrating pixel rows: 0 -> 2047: 100%

MRS noise evaluation: done.

Gaussian noise estimates:
 $\sigma_z = 5.728e-05$

Reference SNR increments:
 $\Delta\sigma_{z0} = 4.6897$

Average SNR increments:
 $\Delta\sigma_z = 3.3180$

5.574 s

Moyenne simple

moyenne avec réjection

Total : 345387 0.749% (45 + 345342 = 0.000% + 0.749%)

MRS noise evaluation: done.

Gaussian noise estimates:
 $\sigma_z = 5.813e-05$

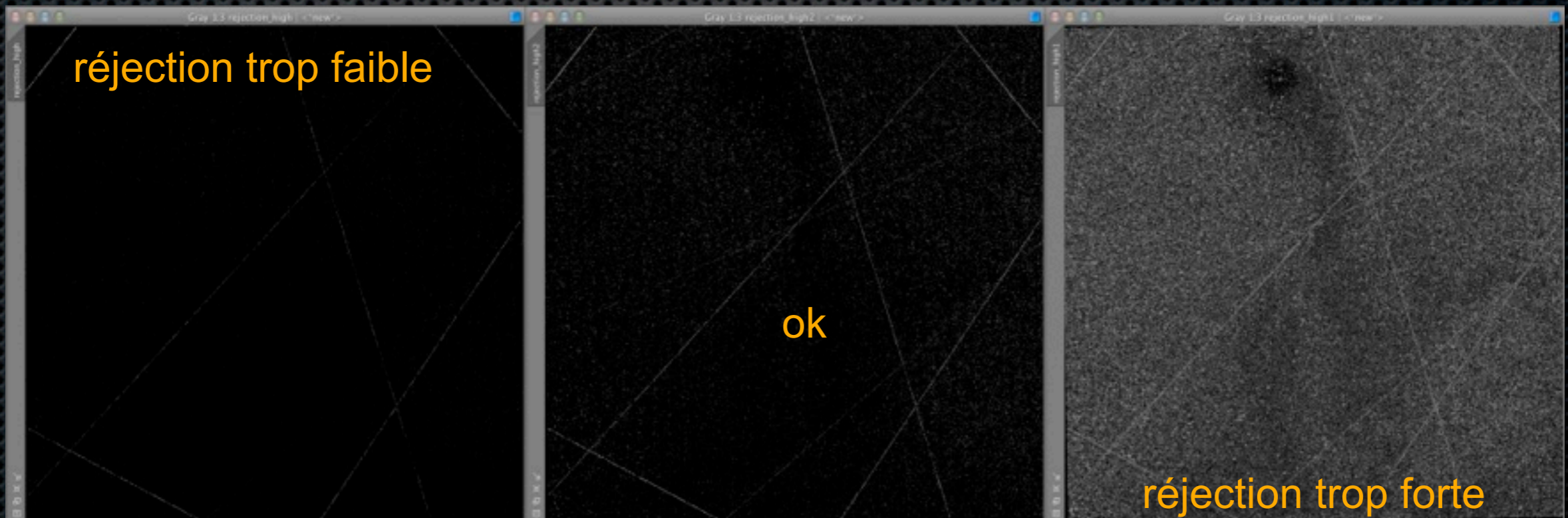
Reference SNR increments:
 $\Delta\sigma_{z0} = 4.6185$

Average SNR increments:
 $\Delta\sigma_z = 3.2676$

réjection trop faible

ok


réjection trop forte




Process icons : prétraitement «simplifié»

NOP PRETRAITEMENT_SIMPLIFIE ^N_D


NOP PRETRAITEMENT_MASTER_BiasDarkFlat ^N_D


 Generation_des_MASTER_BIAS ^N_D


MasterBIAS optimisé(s)

 Generation_des_MASTER_DARK__Repetier_operation_pour_chaque_serie_de_dark ^N_D


MasterDARK optimisé(s)

 Generation_des_MASTER_DARK_FLAT__Repetier_operation_pour_chaque_serie_de_dark_de_flat ^N_D

 Calibration_des_FLAT_avec_bias ^N_D


 ou_Calibration_des_FLAT_avec_dark_et_bias ^N_D

Calibration des FLATS


 Generation_des_MASTER_FLAT_avec_boite_flat_ou_ciel_clair ^N_D


MasterFLAT optimisé(s)

NOP PRETRAITEMENT ^N_D


 Calibration_des_IMAGES_BRUTES_avec_les_masters ^N_D

Calibration des IMAGES


 Process_COSMETICCORRECTION ^N_D

 Alignement_des_IMAGES_CALIBREES_CC__Toutes_images_LRVB_Narrow_Binning ^N_D


NOP Preparation_EMPILEMENT ^N_D

 MOYENNE_NO_REJECTION_de_TOUTES_les_images_calibrees_alignees_pour_verifier_le_cadrage ^N_D

NOP Si_bandes_noires_sur_les_cotes ^N_D


 Dynamic_Crop ^N_D


NOP History_Explorer_Select_Image_Glisser_Triangle_sur_bureau ^N_D


 ImageContainer_Add_Files_IMAGES_ALIGNEES_puis_triangle_a_glisser_dans_icone_process_CROP ^N_D


NOP EMPILEMENT_FINAL_Choisir_methode_selon_nombre_image_et_ajuster_rejections__Repetier_pour_chaque_couleur ^N_D


NOP VERIF_S_B ^N_D

 MOYENNE_No_Rejection_des_images_calibrees_CROPEES_par_couleurs_pour_verifier_le_rapport_signal_bruit_maximum ^N_D

 Empilement_3a5_images_PERCENTILE_CLIPPING ^N_D

 Empilement_3a10_images_AVERAGED_SIGMA_CLIPPING ^N_D

 Empilement_10a20_images_WINSORIZED_SIGMA_CLIPPING ^N_D

 Empilement_20_et_plus__images_avec_gradients_pollution_LINEAR_FIT_CLIPPING ^N_D

Process icons : prétraitement «minimum»

Pixinsight

NOP PRETRAITEMENT_MINIMUM N
 D

NOP PRETRAITEMENT_MASTER_BiasDarkFlat N
 D


Σ Generation_des_MASTER_BIAS N **MasterBIAS optimisé(s)**
 D


Σ Generation_des_MASTER_DARK__Repetier_operation_pour_chaque_serie_de_dark N **MasterDARK optimisé(s)**
 D


Σ Generation_des_MASTER_DARK_FLAT__Repetier_operation_pour_chaque_serie_de_dark_de_flat N
 D

Σ Generation_des_MASTER_FLAT_avec_boite_flat_ou_ciel_clair N **MasterFLAT optimisé(s)**
 D

NOP PRETRAITEMENT_SIMPLE N
 D

 Calibration_des_IMAGES_BRUTES_avec_TOUS_les_masters N **Calibration des IMAGES**
 D

 Process_COSMETICCORRECTION N
 D

 Alignement_des_IMAGES_CALIBREES_CC__Toutes_images_LRVB_Narrow_Binning N
 D

NOP EMPILEMENT_FINAL_Choisir_methode_selon_nombre_image_et_ajuster_rejections__Repetier_pour_chaque_couleur N
 D


Σ Empilement_3a5_images_PERCENTILE_CLIPPING N
 D

Σ Empilement_3a10_images_AVERAGED_SIGMA_CLIPPING N
 D

Σ Empilement_10a20_images_WINSORIZED_SIGMA_CLIPPING N
 D

Σ Empilement_20_et_plus__images_avec_gradients_pollution_LINEAR_FIT_CLIPPING N
 D

NOP Si_bandes_noires_sur_les_cotes N
 D

 Dynamic_Crop N
 D

BATCH

pixinsight

Batch Preprocessing Script v1.22

Bias | **Darks** | **Flats** | **Lights**

- ▲ Binning 1
 - ▲ 900.00s
 - Dark-900s - 20deg - 01...
 - Dark-900s - 20deg - 02...
 - Dark-900s - 20deg - 03...
 - Dark-900s - 20deg - 04...
 - Dark-900s - 20deg - 05...
 - Dark-900s - 20deg - 06...
 - Dark-900s - 20deg - 07...
 - Dark-900s - 20deg - 08...
 - Dark-900s - 20deg - 09...
 - ▲ Binning 2
 - ▲ 300.00s
 - Dark2x2 - 300s - 20deg...
 - Dark2x2 - 300s - 20deg...
 - Dark2x2 - 300s - 20deg...
 - Dark2x2 - 300s - 20deg...
 - Dark2x2 - 300s - 20deg...
 - Dark2x2 - 300s - 20deg...
 - Dark2x2 - 300s - 20deg...
 - Dark2x2 - 300s - 20deg...
 - Dark2x2 - 300s - 20deg...
 - Dark2x2 - 300s - 20deg...
 - Dark2x2 - 300s - 20deg...

Exposure tolerance: 10

Image Integration

Combination: Average

Rejection algorithm: Winsorized Sigma Clipping

Min/Max low: 1

Min/Max high: 1

Percentile low: 0.20

Percentile high: 0.10

Sigma low: 4.00

Sigma high: 3.50

Linear fit low: 5.00

Linear fit high: 3.50

A script for calibration and alignment of light frames
Copyright (c) 2012 Kai Wiechen.
Copyright (c) 2012 Pleiades Astrophoto.

Options

 - CFA images
 - Optimize dark frames
 - Generate rejection maps
 - Export calibration files
 - Up-bottom FITS
 - Use master bias
 - Use master dark
 - Use master flat

Registration Reference Image

Output Directory

Batch Preprocessing Script v1.22

Bias | **Darks** | **Flats** | **Lights**

- ▲ Binning 1
 - ▲ Luminance
 - ▲ 900.00s
 - Trio-L-02.fit
 - Trio-L-03.fit
 - Trio-L-04.fit
 - Trio-L-05.fit
 - Trio-L-06.fit
 - Trio-L-07.fit
 - Trio-L-08.fit
 - Trio-L-11.fit
 - Trio-L-12.fit
 - ▲ Binning 2
 - ▲ Bleu
 - ▲ 300.00s
 - Trio-B-01.fit
 - Trio-B-02.fit
 - Trio-B-03.fit
 - Trio-B-04.fit
 - Trio-B-05.fit
 - ▲ Binning 2
 - ▲ Rouge
 - Trio-R-01.fit
 - Trio-R-02.fit
 - Trio-R-03.fit
 - Trio-R-04.fit
 - Trio-R-05.fit

Calibrate only

Cosmetic Correction

Apply

Template icon: <none>

DeBayer

Bayer/mosaic pattern: RGGB

DeBayer method: VNG

Image Registration

Pixel interpolation: Auto

Clamping threshold: 0.30

Image Integration

Apply

Options

- CFA images
- Optimize dark frames
- Generate rejection maps
- Export calibration files
- Up-bottom FITS
- Use master bias
- Use master dark
- Use master flat

Registration Reference Image

E:/pixinsight/TRIO/IMAGES/Trio-L-05.fit

Output Directory

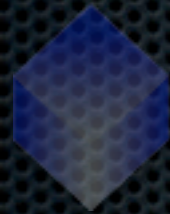
E:/pixinsight

Le traitement

Traitement

Avant tout traitement, il faut s'assurer que l'on a utilisé toutes les techniques possibles afin d'optimiser l'image brute d'empilement :

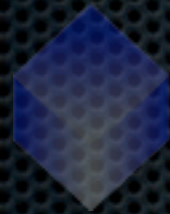
- Utilisation de toutes les techniques permettant d'augmenter le rapport signal sur bruit lors de l'acquisition
- Calibration précise des images brutes
- Intégration optimale des images



Traitement

Le traitement est avant tout une perception personnelle (artistique ou mathématique) de l'image finale tout en essayant de préserver les structures qui la composent. Il faut avoir à l'esprit que :

- Le traitement n'est pas une chose triviale (cela demande des essais et donc du temps)
- Chaque image est unique : pas de formules universelles (ou de «workflow»)
- Et... une bonne dose de subjectivité



Traitement

PIXINSIGHT offre une panoplie de fonctions pour traiter toute sorte d'images. Beaucoup de fonctions sont inédites et uniques au logiciel. Il ne faut pas hésiter à les utiliser pour optimiser chaque étape du traitement
Citons par exemple :

- Pas moins de 6 fonctions de réduction de bruit.
- Outil mathématique très puissant (PIXELMATH)
- Gestion des masques très précise. Bon nombre de traitements plus ou moins complexes nécessitent un masque optimisé

Images linéaires
Images non-linéaires
Screen Transfer Function

Image linéaire

PixInsight

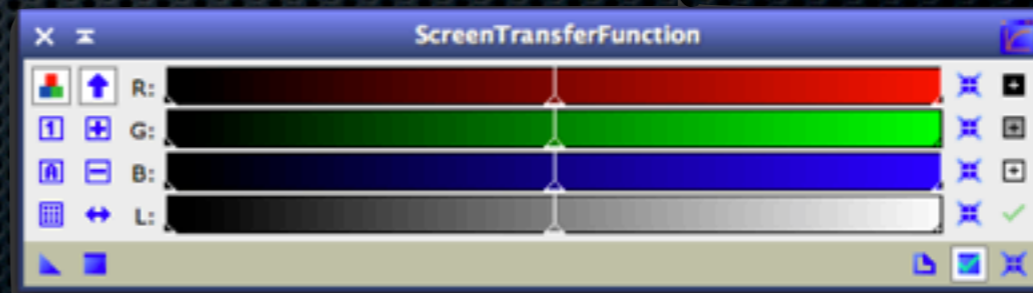
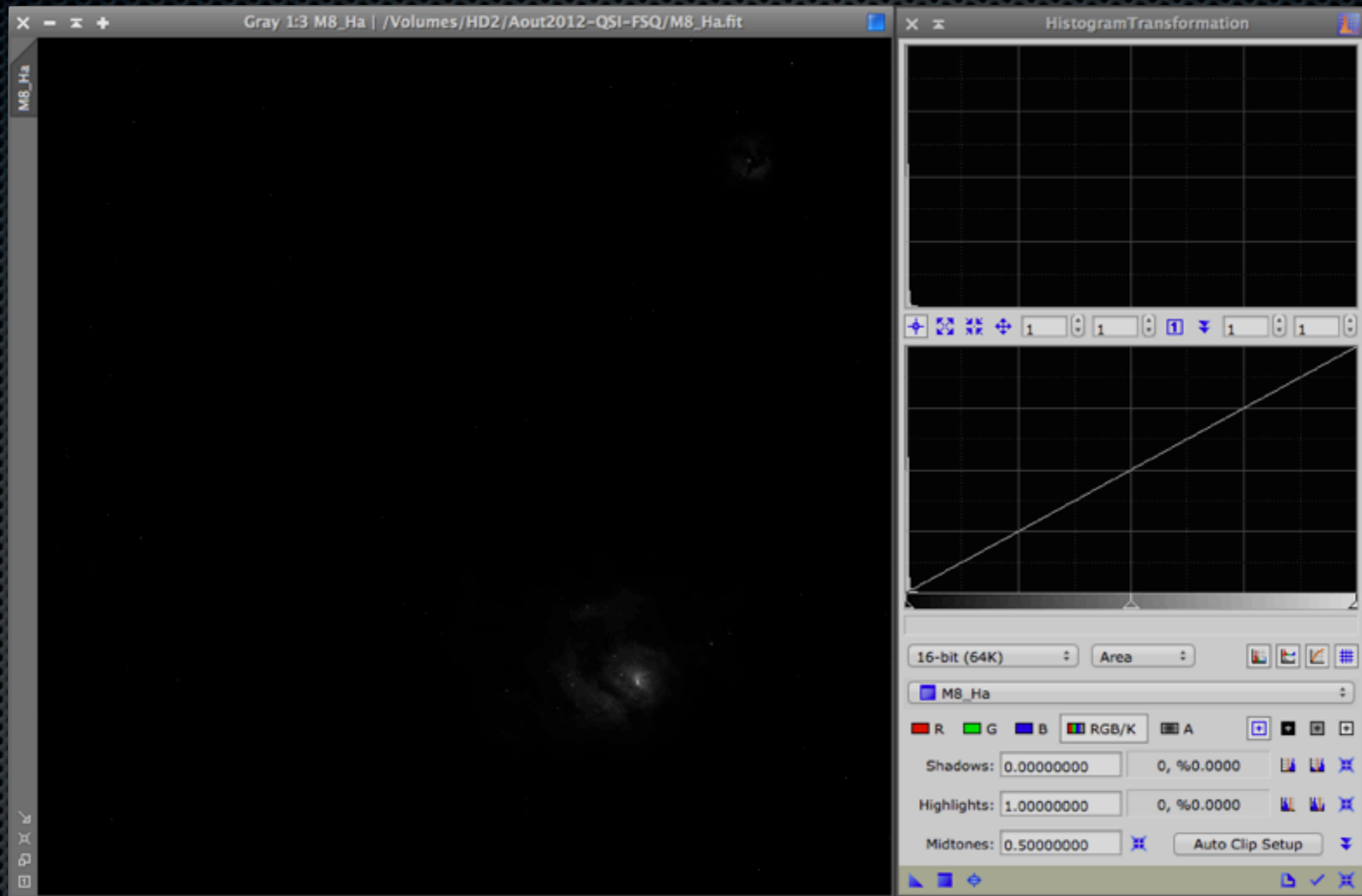


Image linéaire : STF

PixInsight

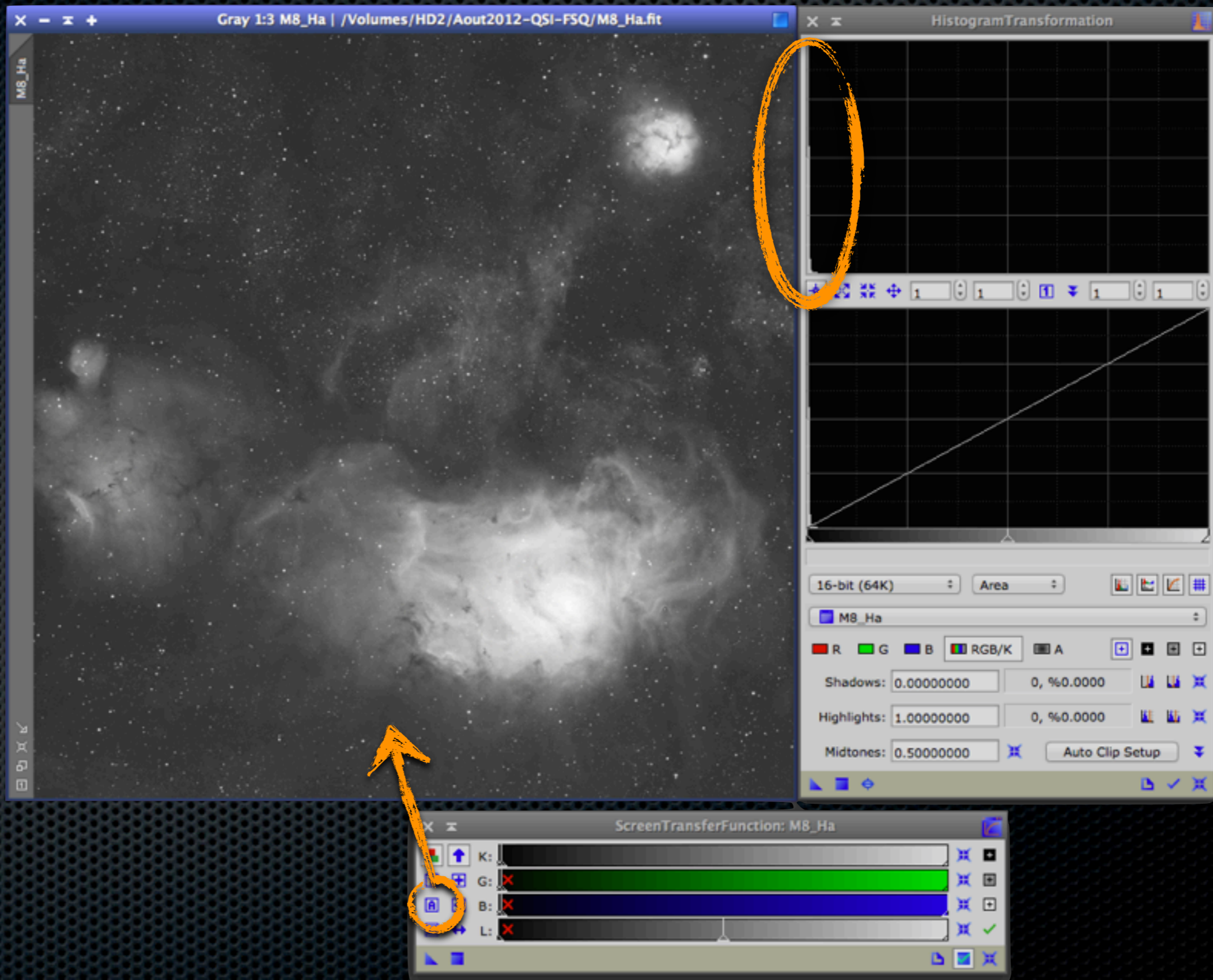


Image linéaire --> non linéaire

PixInsight

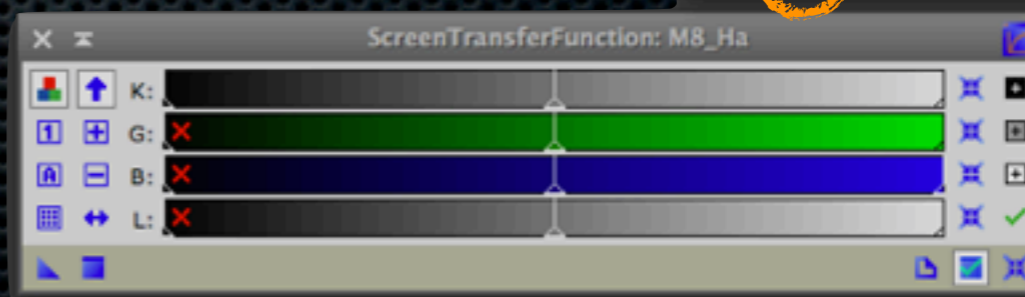
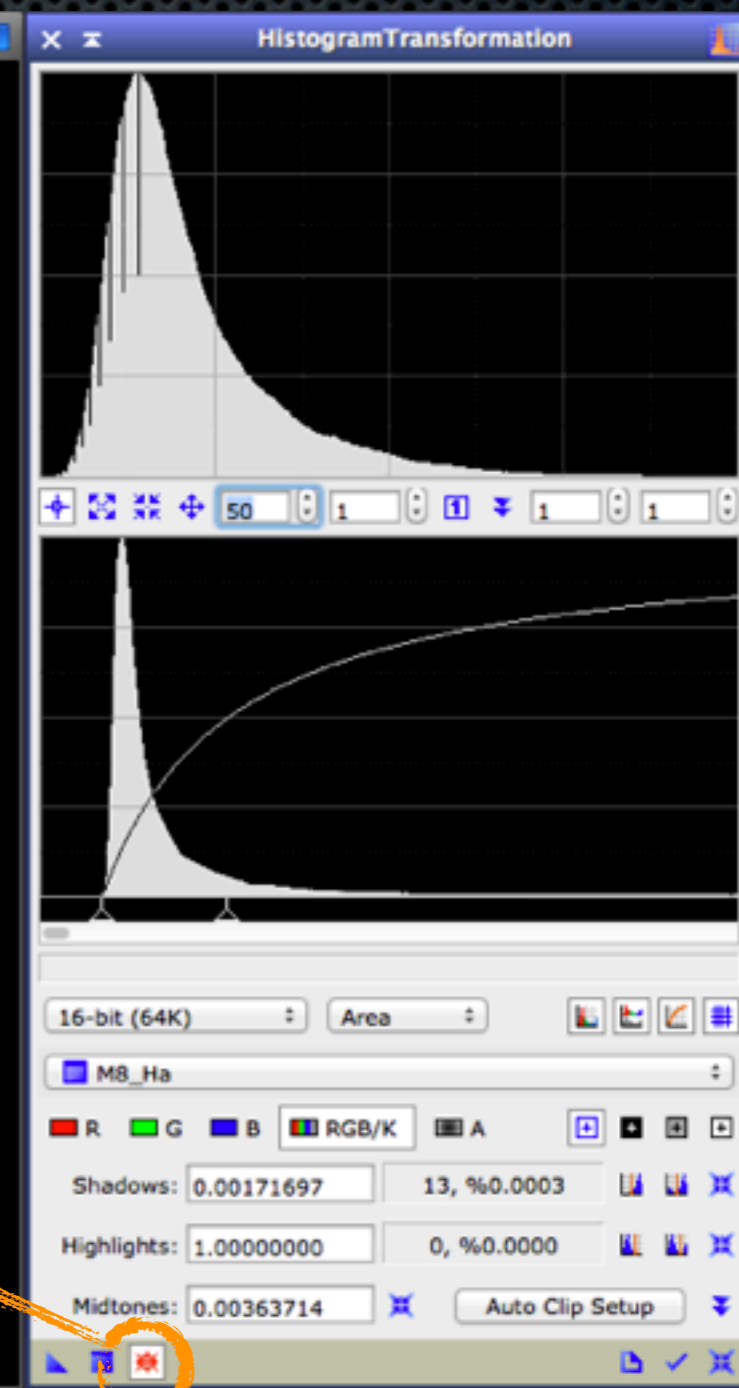
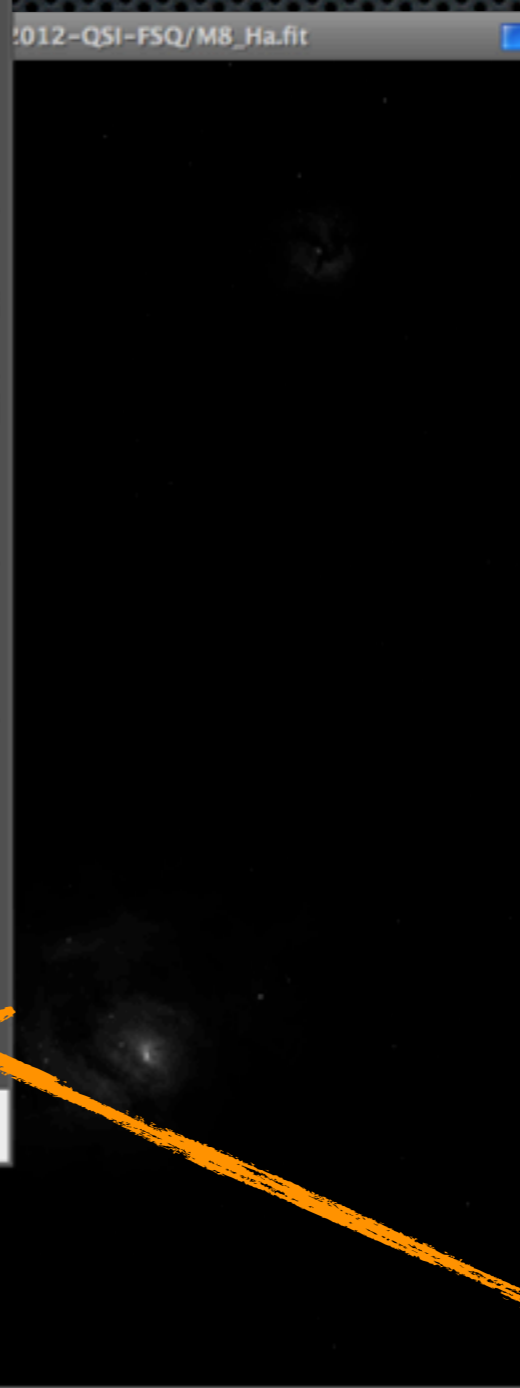
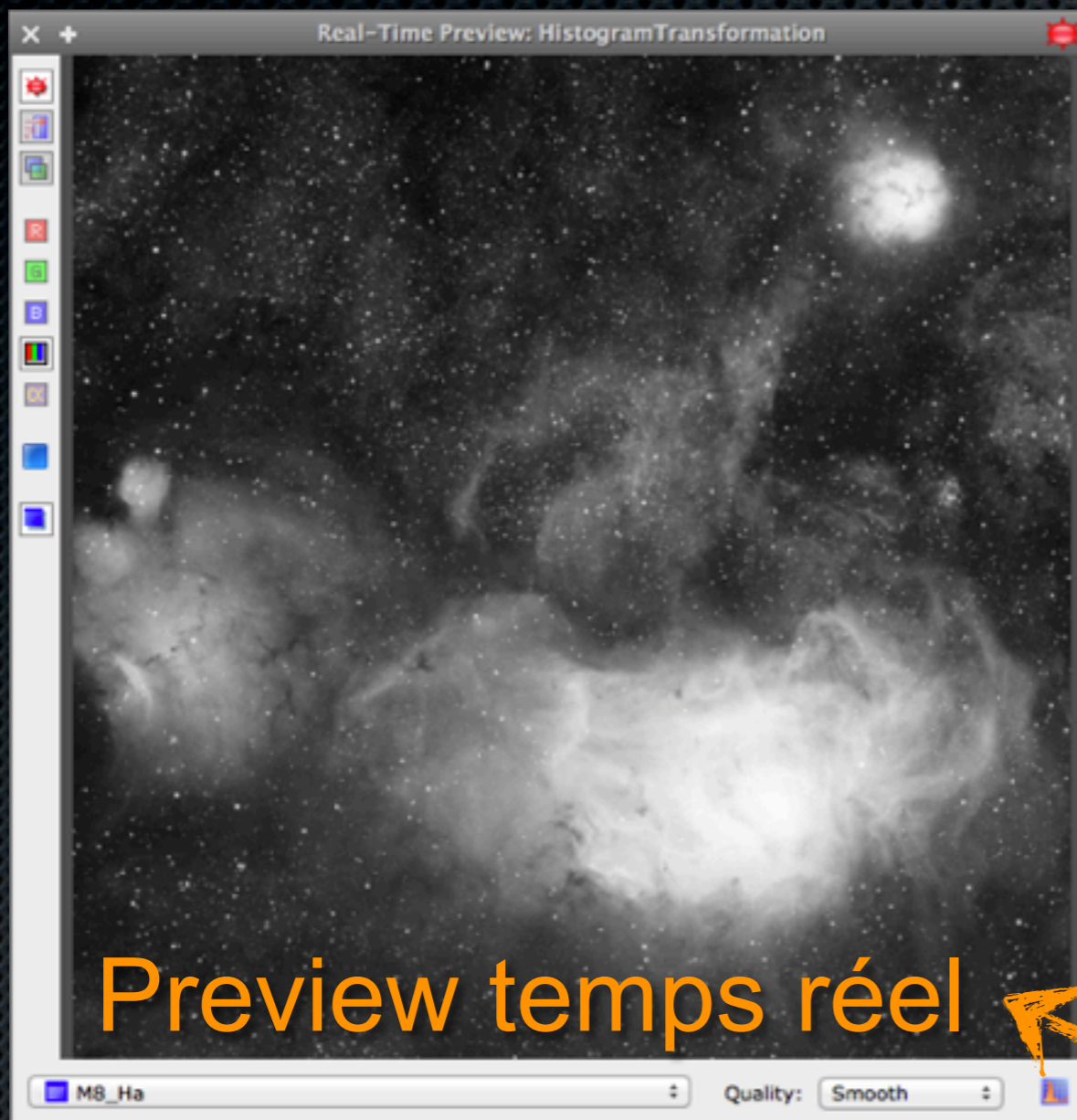
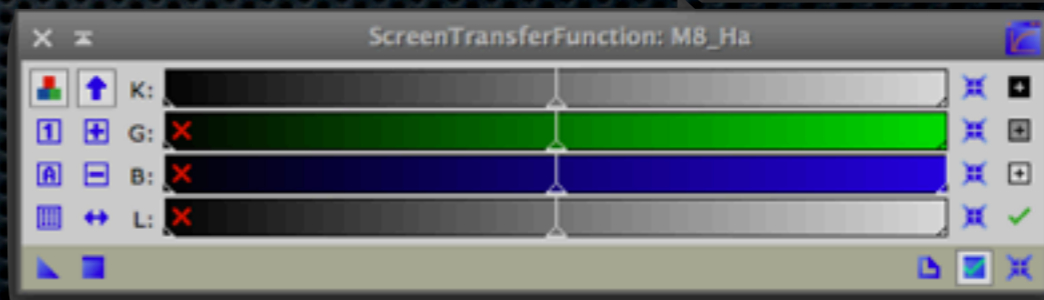
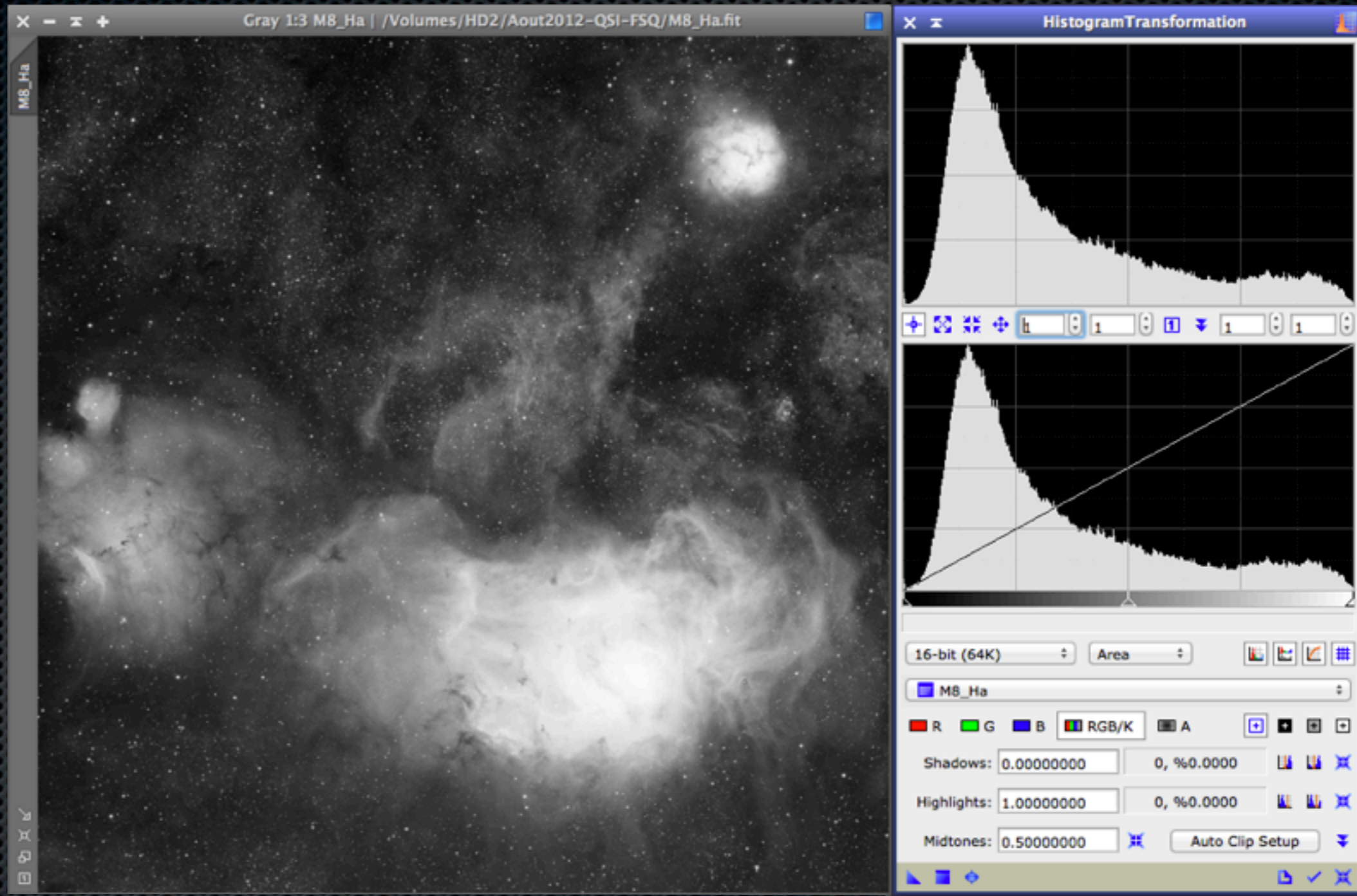


Image non linéaire

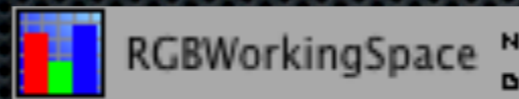


Des exemples de processus de traitement

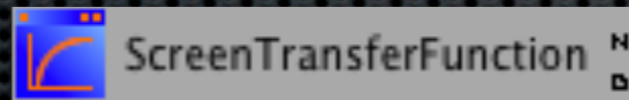
Traitement : image monochrome

image
linéaire

image
non linéaire



RGBWorkingSpace ^N_D



ScreenTransferFunction ^N_D

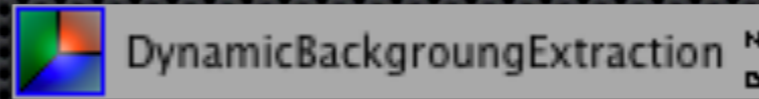


Masque de protection des hautes lumières



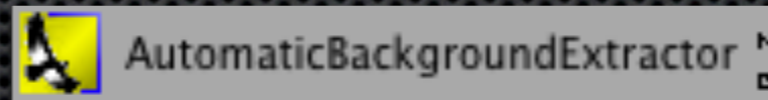
ATrousWevletTransform ^N_D

Réduction du bruit

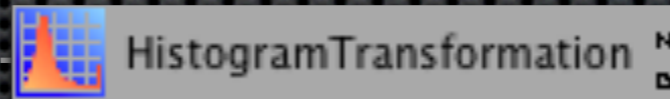


DynamicBackgroundExtraction ^N_D

Retrait des gradients

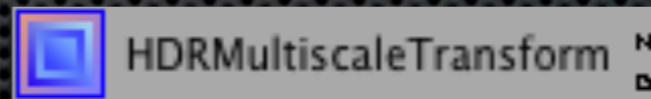


AutomaticBackgroundExtractor ^N_D



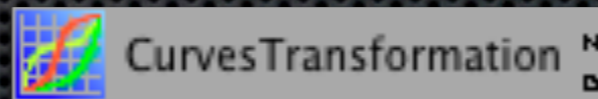
HistogramTransformation ^N_D

Compression de la dynamique



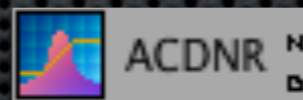
HDRMultiscaleTransform ^N_D

un peu de magie !



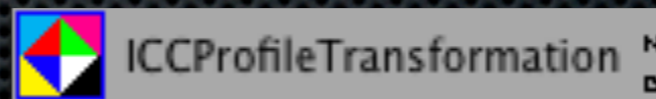
CurvesTransformation ^N_D

Rehaussement des niveaux



ACDNR ^N_D

2nde réduction du bruit (éventuellement)



ICCProfileTransformation ^N_D

Profil de couleurs (sRGB ou AdobeRGB ou GREY)



IntegerResample ^N_D

Réduction format (éventuellement)

Traitement : image monochrome

image
linéaire

image
non linéaire



Déconvolution

Traitement LRVB

PixInsight

images
linéaires

images
non linéaires

Luminance

ScreenTransferFunction_Luminance

DynamicPSF

StarMask

Deconvolution

ATrousWevletTransform

DynamicBackgroundExtraction

AutomaticBackgroundExtractor

HistogramTransformation

HDRMultiscaleTransform

CurvesTransformation

ACDNR

RGBWorkingSpace

Rouge

SII

Vert

ou Ha

Bleu

OIII

ChannelCombination_images_R_V_B

STF_RVB

DynamicBackground_RVB

AutomaticBackground_RVB

BackgroundNeutralization

ColorCalibration

HistogramTransformation_RVB

SNR

ACDNR_LRGB

StarMaskL

MorphologicalTransformation

CurvesTransform_RVB_Sat

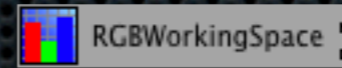
LRGBCombination

CurvesTransform_Final

ICCProfileTransformation

IntegerResample

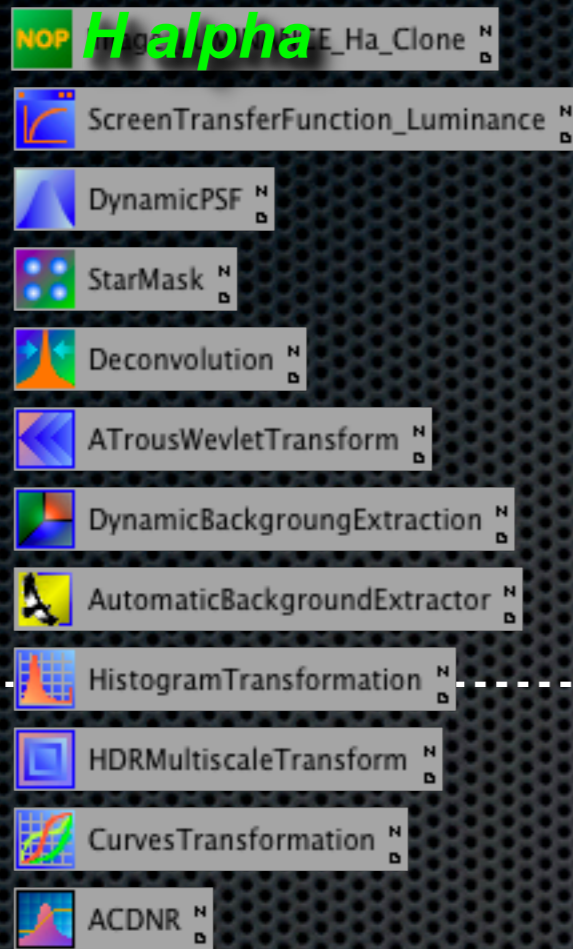
Traitement canaux mixés



PixInsight

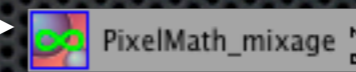
images linéaires

images non linéaires



images linéaires

images non linéaires



Des fonctions clés !

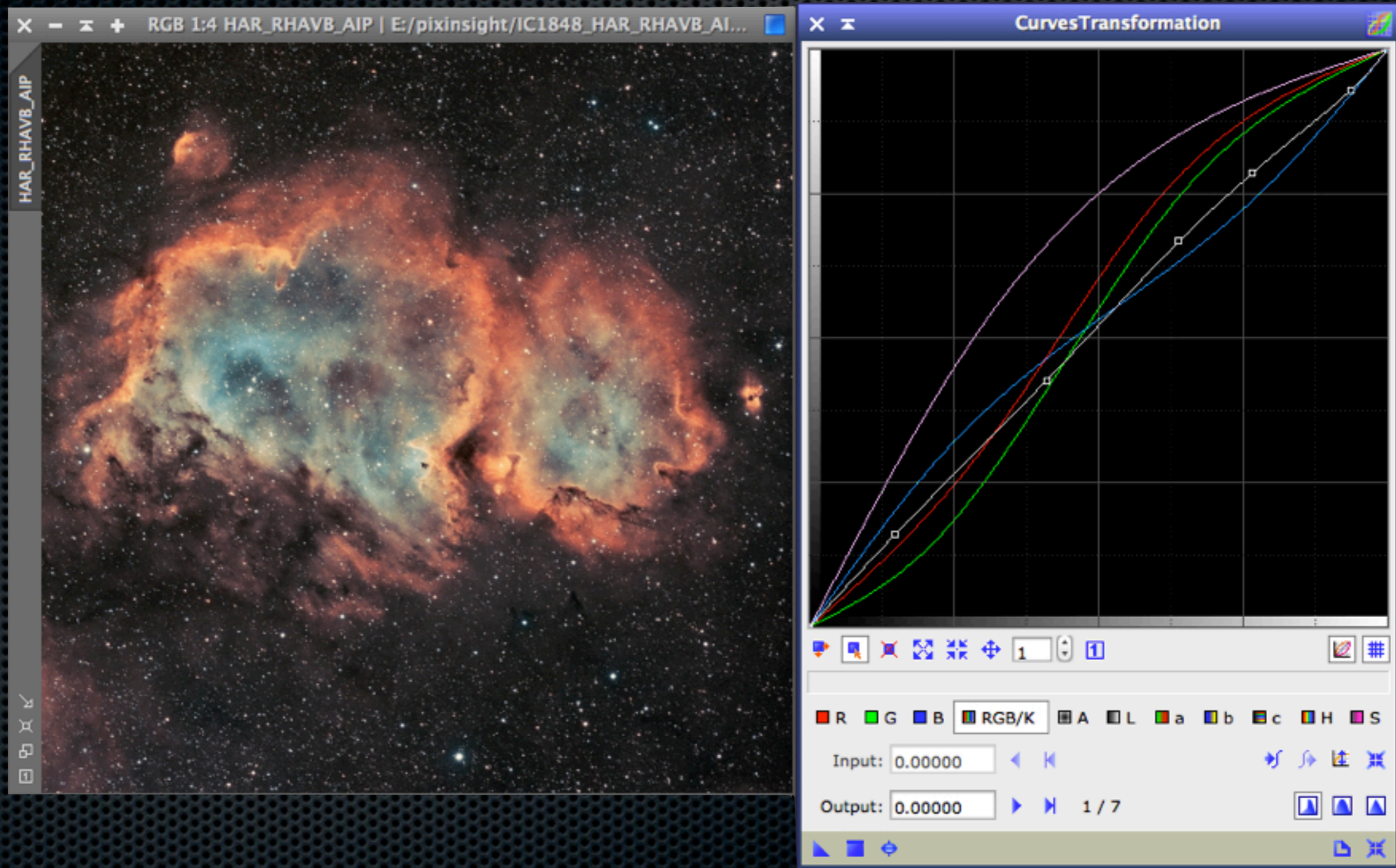
Histogram Transformation

PixInsight

The screenshot displays the PixInsight interface. On the left, a window titled "HAR_RHAVB_AIP" shows a colorful nebula image. On the right, a "HistogramTransformation" window is open, showing two histograms for the image. The top histogram shows the original image's color channels (Red, Green, Blue) and a white diagonal line representing the identity function. The bottom histogram shows the transformed image's color channels, where the curves are shifted and stretched. Below the histograms, the software's histogram settings are visible, including "8-bit (256)", "Lines", and "HAR_RHAVB_AIP". The color channels are set to "RGB/K", and the "Midtones" are set to 0.31741573. The "Shadows" and "Highlights" are both set to 0.00000000.

Curves Transformation

PixInsight

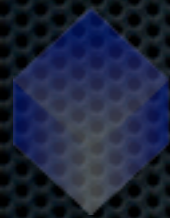


Les masques

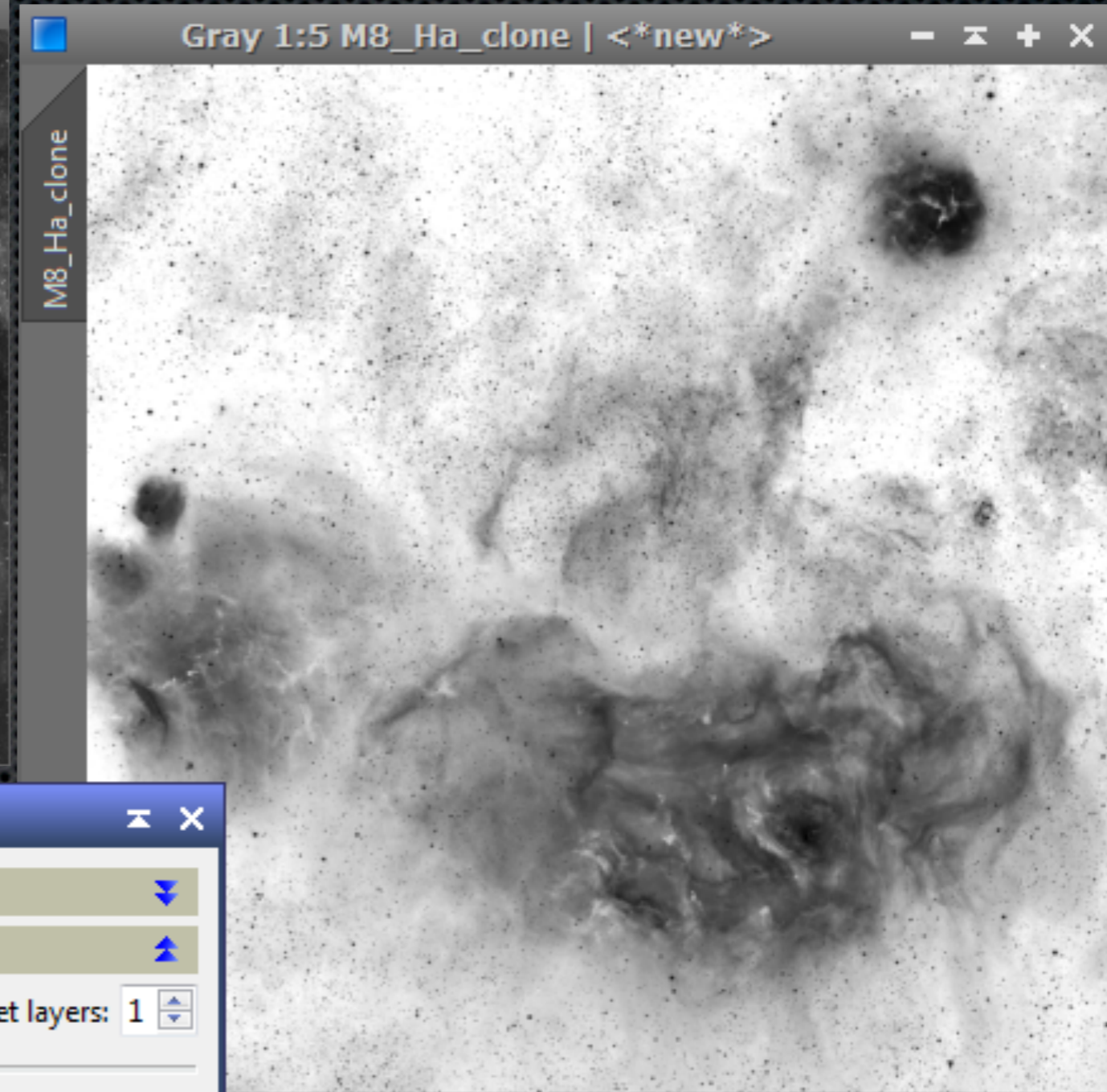
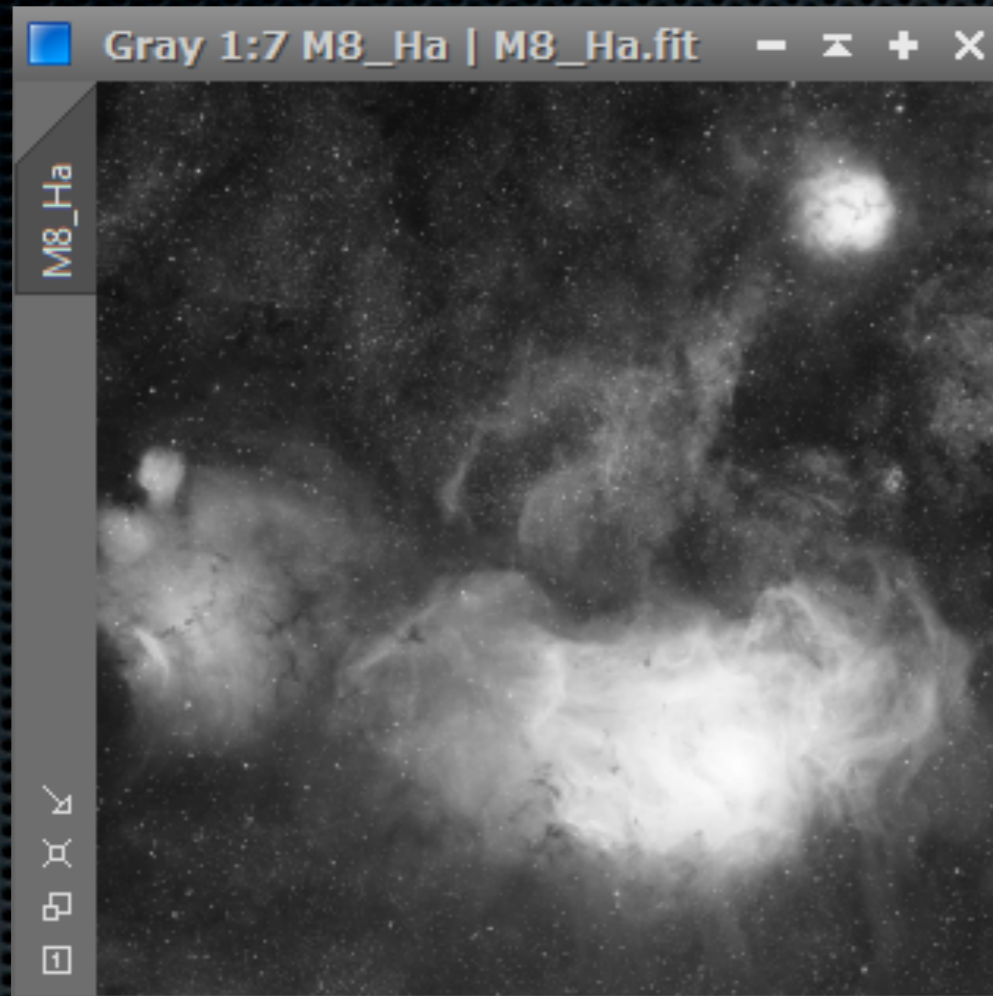
Indispensables à une majorité de fonctions

Les processus de traitement utilisent des masques d'intensité pour limiter leur effets sur certaines zones de l'image. Leur choix et leur utilisation est primordiale dans la réussite d'un traitement spécifique

Plusieurs fonctions permettent de créer facilement ces masques.



Les masques



ACDNR

ACDNR Filters

Lightness Mask

Preview Removed wavelet layers: 1

Midtones: 0.41000

Shadows: 0.18000

Highlights: 0.98000

This panel shows the ACDNR (Advanced Contrast Detail Noise Reduction) settings. It includes a "Preview" checkbox, a "Removed wavelet layers" dropdown set to 1, and three sliders for "Midtones", "Shadows", and "Highlights" with numerical values of 0.41000, 0.18000, and 0.98000 respectively.

Les masques

The image displays a software interface for image processing, showing the creation of a mask for an astronomical image. The main window shows the original image, a mask, and a cloned image. A control panel for the RangeSelection tool is also visible.

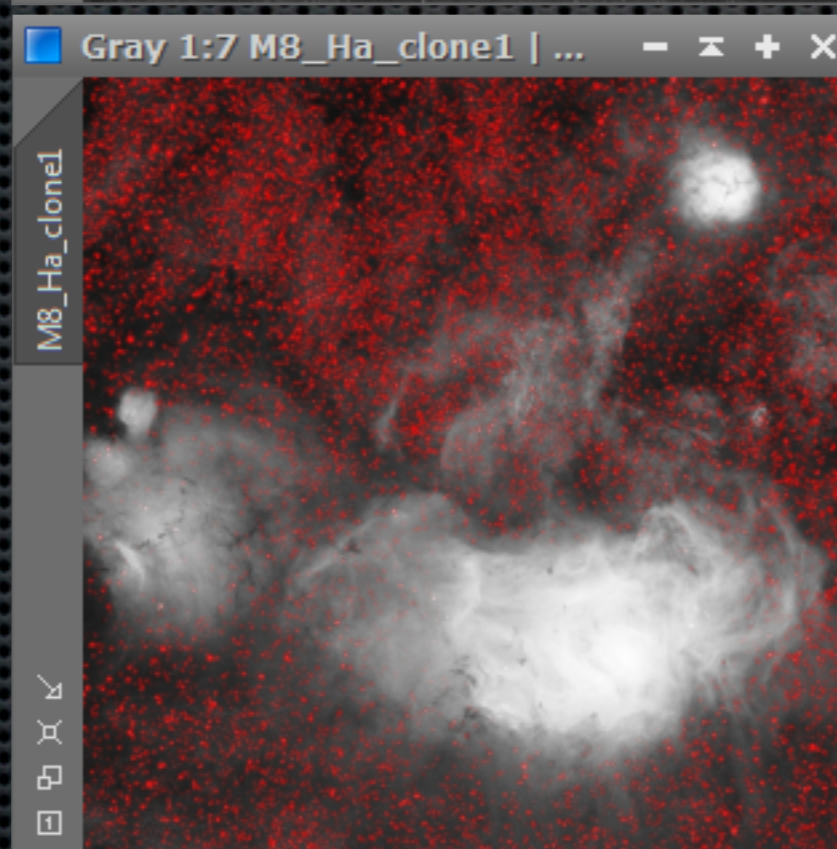
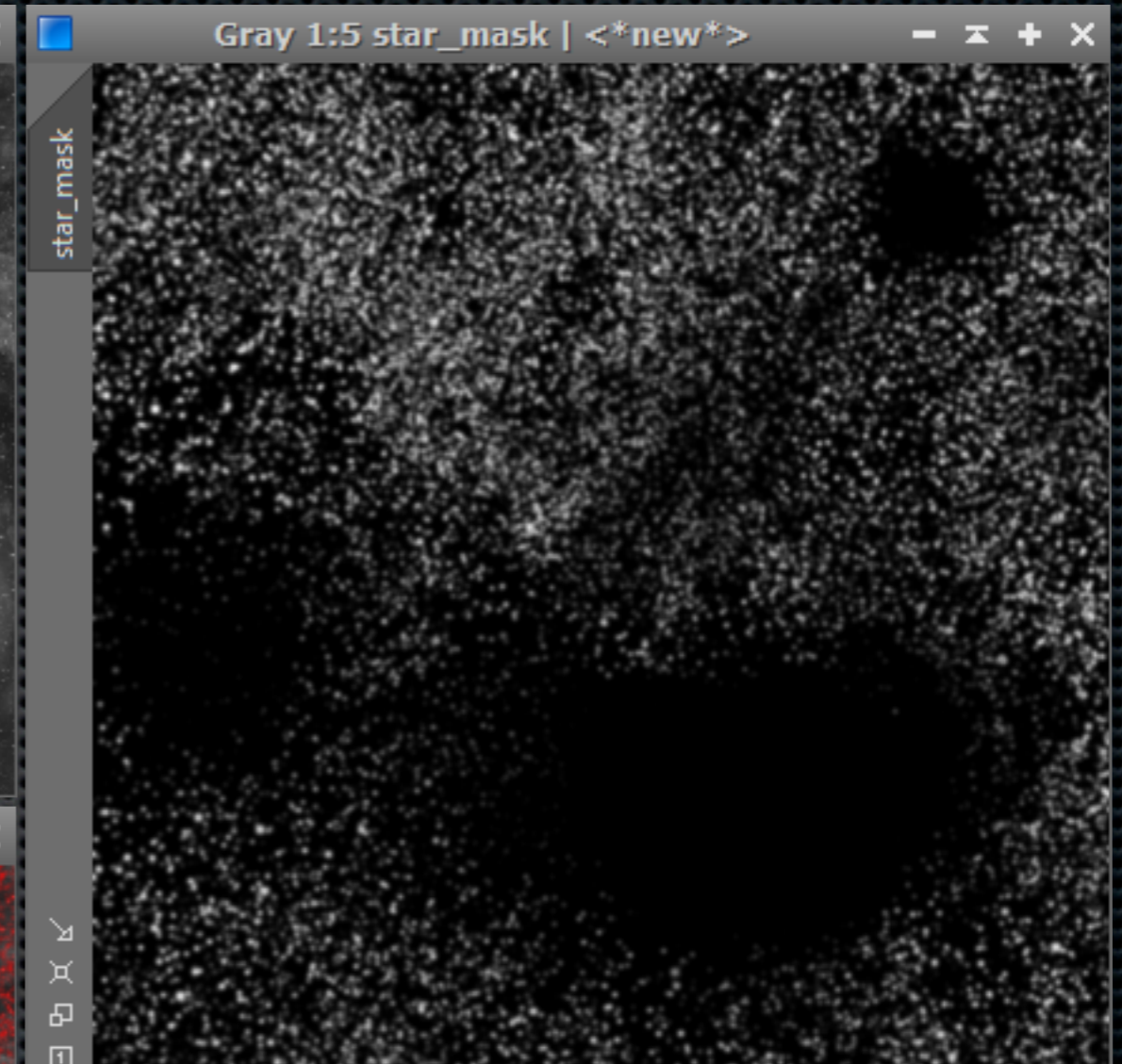
The main window shows the original image (Gray 1:7 M8_Ha | M8_Ha.fit) and the resulting mask (Gray 1:5 range_mask | <*new*>). The mask is a binary image where the object is white and the background is black.

The cloned image (Gray 1:7 M8_Ha_clone1 | ...) shows the original image with the mask applied, resulting in a red image (M8_Ha_clone2).

The RangeSelection control panel shows the following settings:

- Lower limit: 0.340000
- Upper limit: 0.830000
- Link range limits
- Fuzziness: 0.10
- Smoothness: 23.0
- Screening
- Lightness
- Invert

Les masques



StarMask

Threshold: 0.30000 Mode: Star Mask

Scale: 5 Growth: 2 Comp.: 2 Small: 1

Smoothness: 12 Aggregate Binarize Contours Invert

Shadows: 0.00000

Midtones: 0.50000

Highlights: 1.00000

Truncation: 1.00000

Limit: 1.00000

This panel shows the StarMask dialog box with various settings. The Threshold is set to 0.30000. The Mode is Star Mask. Other settings include Scale (5), Growth (2), Comp. (2), and Small (1). There are also checkboxes for Aggregate, Binarize, Contours, and Invert. Sliders are provided for Shadows, Midtones, Highlights, Truncation, and Limit, all set to their default values.

HDRMultiscaleTransform



image Nicolas Outters

HDRMultiscaleTransform



HDRMultiscaleTransform

Number of layers: Number of iterations: Inverted

Overdrive:

Median transform

Scaling function:

To lightness Preserve hue

Lightness mask

Deringing

Midtones Balance

HDRMultiscaleTransform



Tout est possible !

Du plus soft au plus hard !

xinsight



Yeux de merlan...

PixInsight



Deconvolution

PSF

Algorithm

Deringing

Global dark: 0.1300

Global bright: 0.0000

Local deringing

Local support: star_mask

Local amount: 0.70

Wavelet Regularization

Dynamic Range Extension



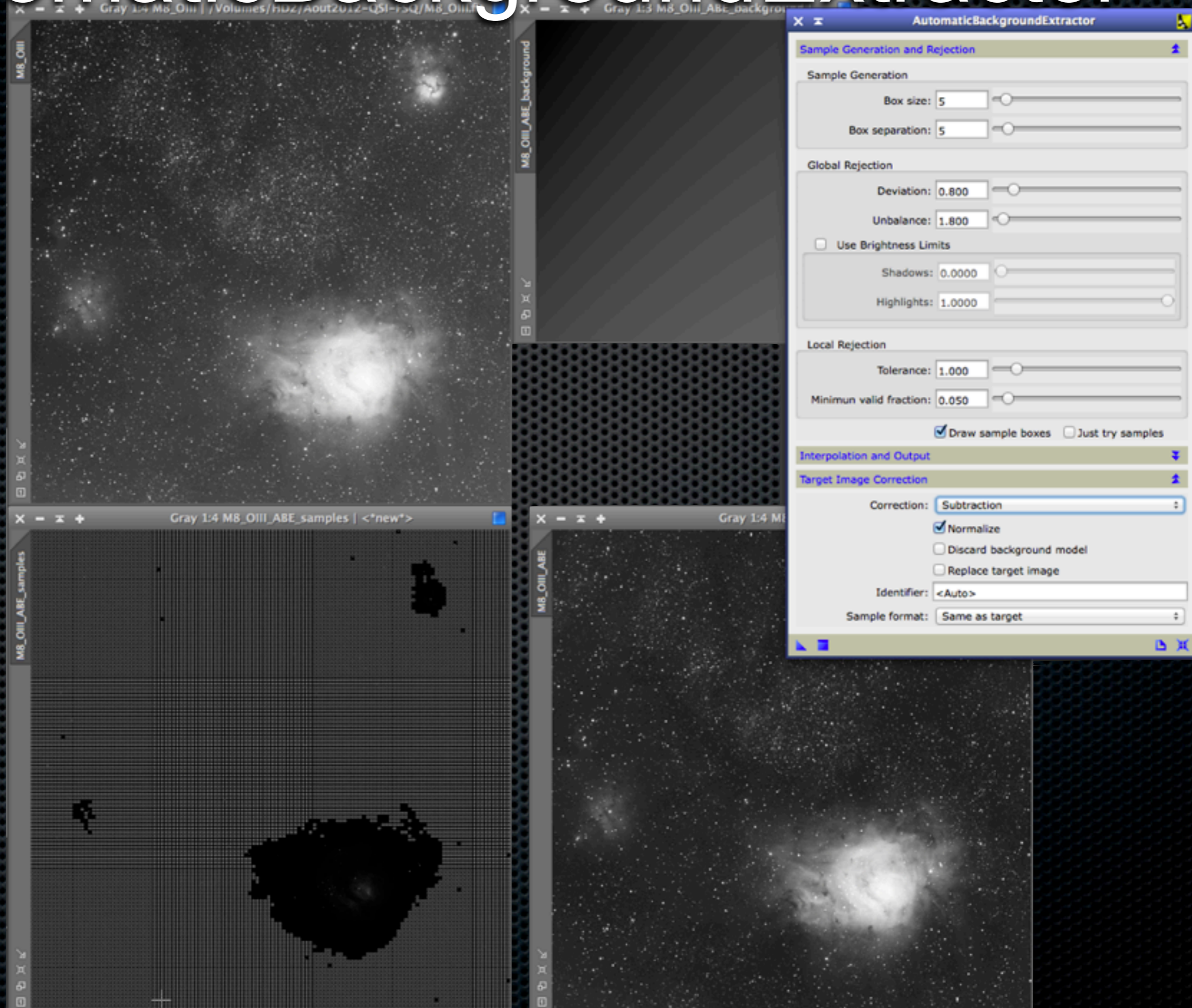
DERINGING !

Présent sur de nombreuses fonctions

DynamicBackgroundExtraction

The screenshot displays the DynamicBackgroundExtraction software interface. It features two main image windows on the left: 'Image05' (left) and 'Image05_DBE' (right). The 'Image05' window shows a galaxy image with a grid of small square markers overlaid, representing the sampling process. The 'Image05_DBE' window shows the same galaxy image with the background extracted, leaving the galaxy and stars visible. Below these windows is a 'ScreenTransferFunction: Image05' window with sliders for R (Red), G (Green), B (Blue), and L (Luminance) channels. On the right side, there is a 'DynamicBackgroundExtraction' control panel. This panel includes a 'Selected Sample: 55 of 126' indicator, a 'Sample #' field (55), and navigation buttons. It also has 'Anchor X' (1857) and 'Anchor Y' (1197) fields, a 'Radius' field (20), and a 'Symmetries' section with checkboxes for H, V, D, and Axial. Below these are color and weight parameters: R/K (0.002537), G (0.003620), B (0.003985), Wr (0.969), Wg (0.966), and Wb (0.959). There is a 'Model Parameters (1)' section with 'Tolerance' (1.000), 'Shadows relaxation' (3.000), and 'Smoothing factor' (0.250). A 'Sample Generation' section includes 'Default sample radius' (20), 'Samples per row' (10), and 'Minimum sample weight' (0.750). The 'Model Image' and 'Target Image Correction' sections are also visible, with 'Correction' set to 'Subtraction' and 'Normalize' checked. The 'Identifier' is set to '<Auto>' and 'Sample format' is 'Same as target'.

AutomaticBackgroundExtractor



PixelMath

PixelMath

Expressions

R/K: $0.7*s2 + 0.3*ha$

G: $0.3*ha + 0.6*o3 + 0.1*s2$

B: $0.8*o3 + 0.2*ha$

A:

Symbols:

Use a single RGB/K expression Use 64-bit working images

Rescale result: Lower bound: Upper bound:

PixelMath

Expressions

RGB/K: $\sim(\sim MIXSHO_AIP * \sim(MIXSHO_AIP1_DBE / k))$

G:

B:

A:

Symbols: $k=1.5$

Use a single RGB/K expression Use 64-bit working images

Rescale result: Lower bound: Upper bound:

Destination

Replace target image Create new image

Image Id:

Image width: Image height:

Color space: Same as target RGB Color Grayscale Alpha channel

Sample format:

PixelMath

Destination

Replace target image Create new image

Image Id:

Image width: Image height:

Color space: Same as target RGB Color Grayscale Alpha channel

Sample format:

PixelMath Expression Editor: Channel #1

$0.3*ha + 0.6*o3 + 0.1*s2$

- a([xc, yc])
- abs(x)
- acos(x)
- acosh(x)
- adev(a, b, c[, ...]) | adev(img)
- asin(x)
- asinh(x)
- atan(y[, x=1])
- atanh(x)
- avg(a, b[, ...]) | avg(img)
- avgDev(a, b, c[, ...] | avgDev(img)
- ceil(x)

--> 3 Images Available <--

<* No Symbols Defined *>

Parse

OK Cancel

* Select a PixelMath function or operator on the list above.

INDISPENSABLE !

La déconvolution : la PSF

The screenshot displays the Pixinsight 1.7 x86 software interface. The main window shows a grayscale image of a galaxy field with 63 stars marked by green crosses. The 'DynamicPSF' panel on the right provides a table of star parameters and PSF model settings. The 'Average Star Data' dialog box in the foreground shows the calculated average Moffat PSF parameters, with the FWHMx and FWHMy values circled in orange.

	Ch	B	A	cx	cy	sx	sy	FWHMx	FWHMy	r	theta
M106PI											
1	0										
Moffat		0.013667	0.033037	792.40	438.50	2.18	2.01	1.91px	1.76px	0.920	171.79
2	0										
Moffat		0.013732	0.159002	701.96	527.80	2.10	2.01	1.92px	1.83px	0.954	162.46
3	0										
Moffat		0.013715	0.006480	595.36	1307.25	2.01	1.92	1.90px	1.81px	0.955	153.63
4	0										
Moffat		0.013745	0.030206	853.95	1191.43	2.32	2.19	1.92px	1.81px	0.945	170.81
5	0										
Moffat		0.013713	0.012010	1383.55	1182.55	2.41	2.26	1.95px	1.82px	0.935	165.99
6	0										
Moffat		0.013697	0.011685	1156.41	1864.49	2.04	1.93	1.91px	1.81px	0.945	4.12
7	0										
Moffat		0.013736	0.026384	859.51	1659.82	2.17	2.10	1.90px	1.84px	0.969	163.58
8	0										
Moffat		0.013721	0.015735	885.71	1696.92	2.45	2.32	1.92px	1.82px	0.945	165.49

Average Star Data

Average Moffat PSF

N 63 stars

B 0.013778

A 0.044840

sx 2.17 px

sy 2.04 px

FWHMx ... 1.92 px

FWHMy ... 1.80 px

r 0.938

theta 164.53 deg

beta 3.89

MAD 5.226e-003

La déconvolution

PixInsight

Gray 1:4 M106PI | M106PI.fit

Deconvolution

PSF

Parametric PSF Motion Blur PSF External PSF

View Identifier

PSF2

PSF2

11 x 11

Algorithm

Algorithm: Regularized Richardson-Lucy

Iterations: 50

Target: Luminance (CIE Y)

Deringing

Global dark: 0.0600

Global bright: 0.0000

Local deringing

Local support: star_mask

Local amount: 0.25

Wavelet Regularization

Noise model: Gaussian Wavelet layers: 3 B3 Spline (5)

Noise threshold Noise reduction

1: 4.00 1.00

2: 3.20 1.00

3: 2.20 0.70

4: 1.00 0.70

5: 1.00 0.70

Convergence: 0.0000 Disabled

Dynamic Range Extension

ScreenTransferFunction: PSF2

M106PI

Gray 14:1 ...

PSF2

Average Star Data

Average Moffat PSF

N 62 stars

B 0.013612

A 0.145635

sx 0.73 px

FWHMx ... 1.04 px

FWHMy ... 0.96 px

theta ... 118.96 deg

beta 1.71

MAD 2.056e-003

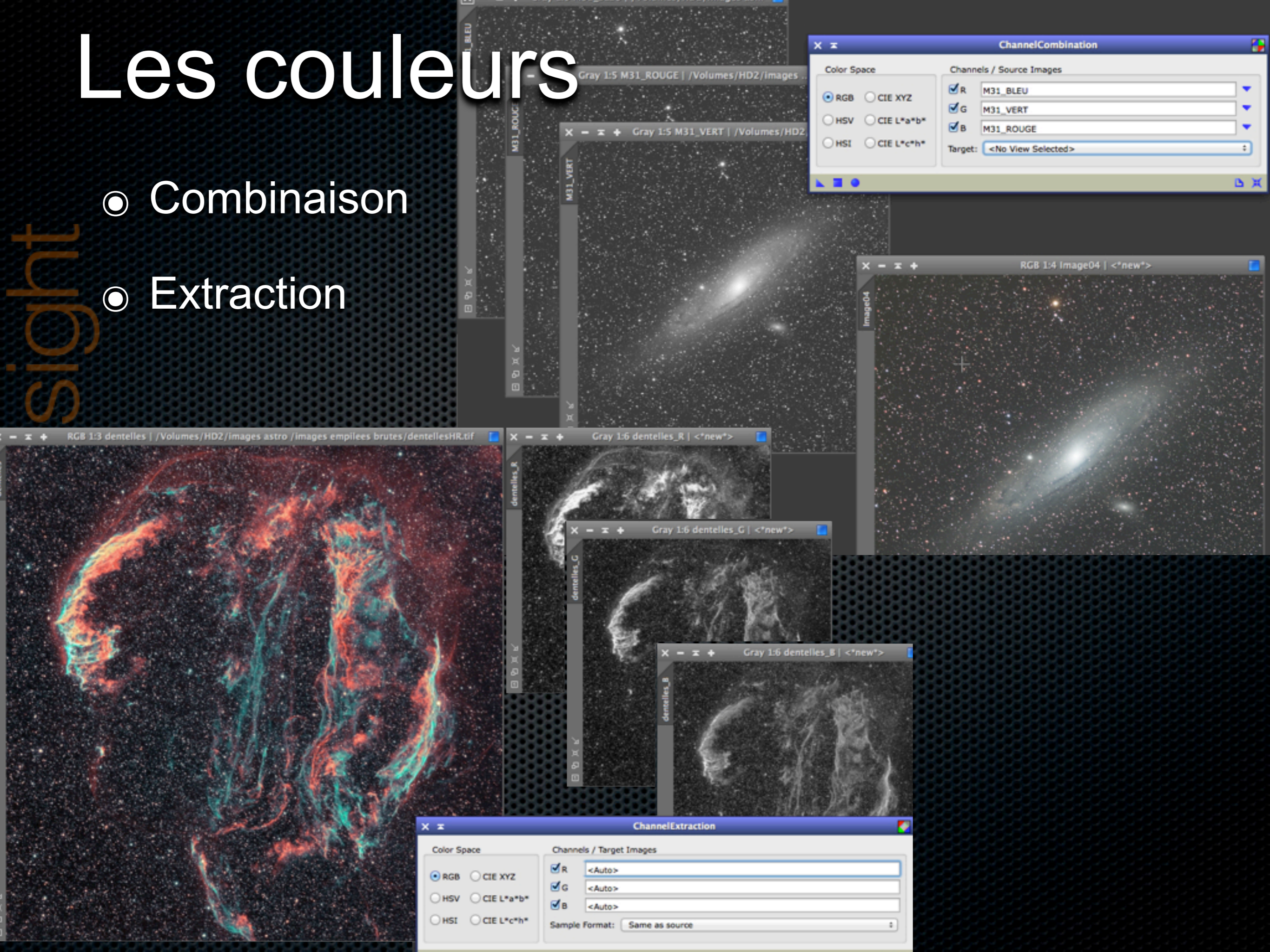
ScreenTransferFunction: PSF2

K: G: B:

Les couleurs

- Combinaison
- Extraction

sight



La calibration des couleurs

PixInsight

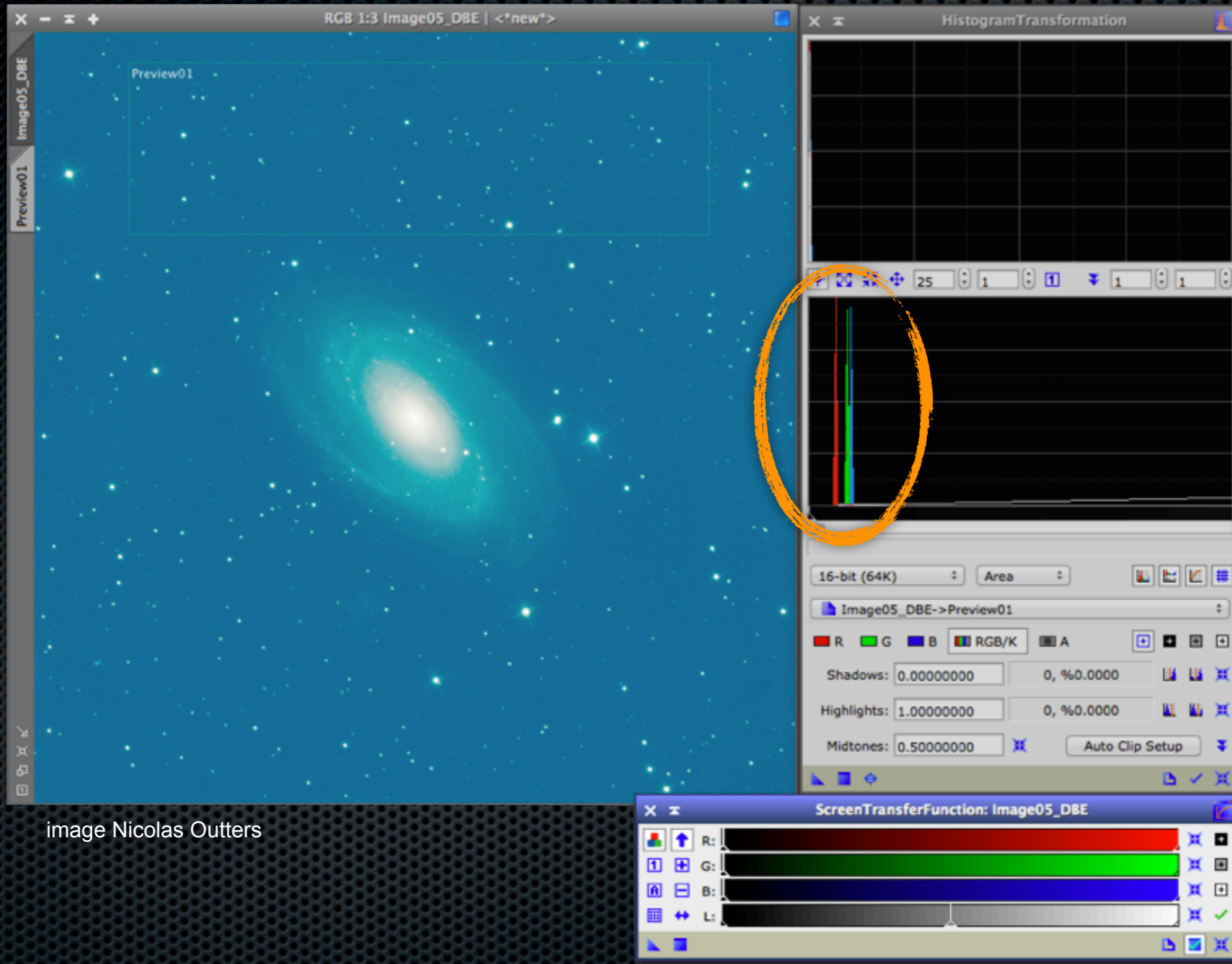


image Nicolas Outters

La calibration des couleurs

PixInsight

The screenshot displays the PixInsight software interface with several key components:

- Main Image Window:** Shows a star field with a galaxy. Two preview windows are visible: 'Preview01' (top left) and 'Preview02' (center), both showing the same scene.
- HistogramTransformation Panel:** Located on the right, it features a histogram plot with a single peak. Below the plot are controls for bit depth (16-bit (64K)), color mode (Lines), and various sliders for Shadows (0.0000000), Highlights (1.0000000), and Midtones (0.5000000). There is also an 'Auto Clip Setup' button.
- BackgroundNeutralization Panel:** Located at the bottom left, it includes a 'Reference image' dropdown set to 'Image05_DBE->Preview01'. It has sliders for 'Lower limit' (0.000000) and 'Upper limit' (0.100000), a 'Working mode' dropdown set to 'Rescale as needed', and a 'Target background' slider set to 0.010000. There is also a 'Region of Interest' section with input fields for Left, Top, Width, and Height, and a 'From Preview' button.
- ScreenTransferFunction Panel:** Located at the bottom right, it shows color calibration curves for Red (R), Green (G), Blue (B), and Luminance (L).

Background Neutralization

La calibration des couleurs

PixInsight

The screenshot displays the PixInsight interface with the 'Color Calibration' dialog box open. The main window shows a galaxy image with two preview windows: 'Preview01' (top left) and 'Preview02' (center). The 'Color Calibration' dialog has two sections: 'White Reference' and 'Background Reference'. The 'White Reference' section is active, with 'Reference image' set to 'Image05_DBE->Preview02', 'Lower limit' at 0.00000, and 'Upper limit' at 0.90000. The 'Background Reference' section has 'Reference image' set to 'Image05_DBE->Preview01', 'Lower limit' at 0.000000, and 'Upper limit' at 0.100000. A color calibration bar is visible at the bottom of the dialog, showing sliders for Red, Green, Blue, and Luminance.

Color Calibration

La calibration des couleurs

PixInsight

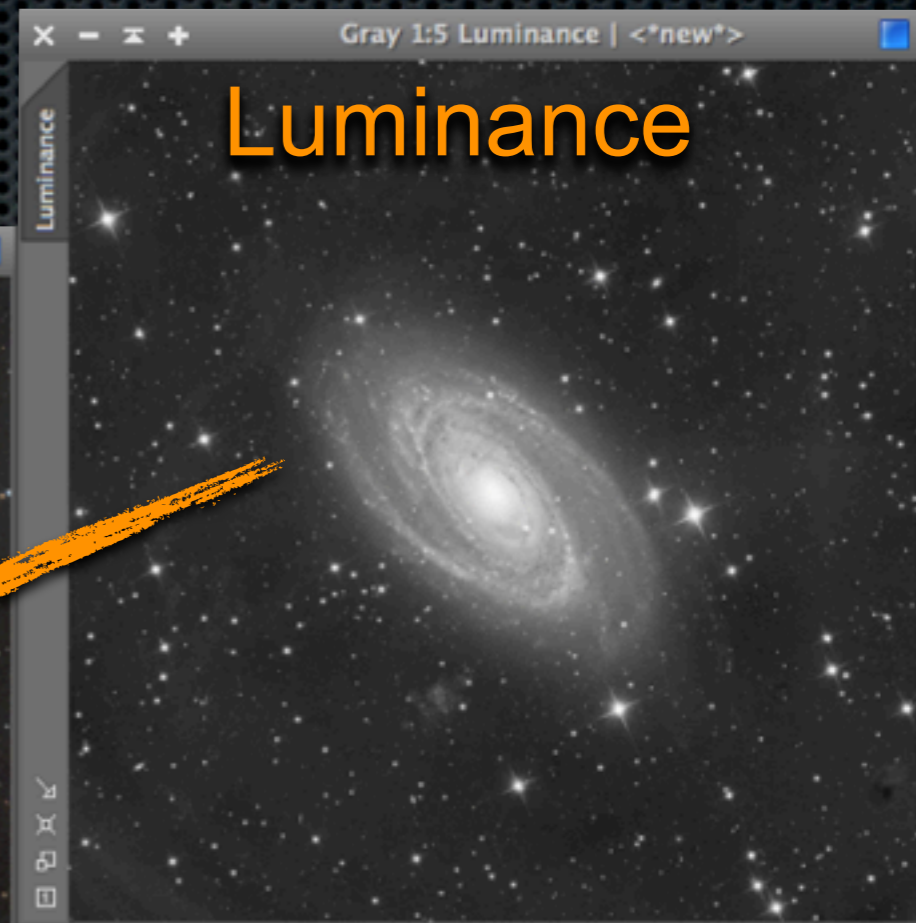
The screenshot displays the PixInsight interface with the following components:

- Main Window:** Shows the original image 'Image05_DBE' with two preview windows: 'Preview01' (top) and 'Preview02' (bottom).
- Top HistogramTransformation Panel:** A histogram window titled 'HistogramTransformation' for 'Image05_DBE->Preview01'. It shows a narrow, sharp peak in the histogram, indicating a lack of detail in the original image. The histogram is plotted on a grid with a diagonal line representing the identity function.
- Bottom HistogramTransformation Panel:** A histogram window titled 'HistogramTransformation' for 'Image05_DBE->Preview02'. It shows a much wider and more detailed histogram with multiple peaks, indicating that the image has been processed to reveal more detail. The histogram is plotted on a grid with a diagonal line.
- Color Calibration Controls:** Below the histograms, there are controls for color calibration, including 'Shadows', 'Highlights', and 'Midtones' sliders. The 'Midtones' slider is currently set to 0.50000000.

Two orange arrows point from the main image area to the respective histogram windows, illustrating the relationship between the image and its histogram.

LRGB

PixInsight



LRGBCombination

Channels / Source Images

- L Luminance
- R <Auto>
- G <Auto>
- B <Auto>

Target: <No View Selected>

Channel Weights

Transfer Functions

Lightness: 0.500

Saturation: 0.200

Chrominance Noise Reduction

Smoothed wavelet layers: 4

Protected wavelet layers: 2

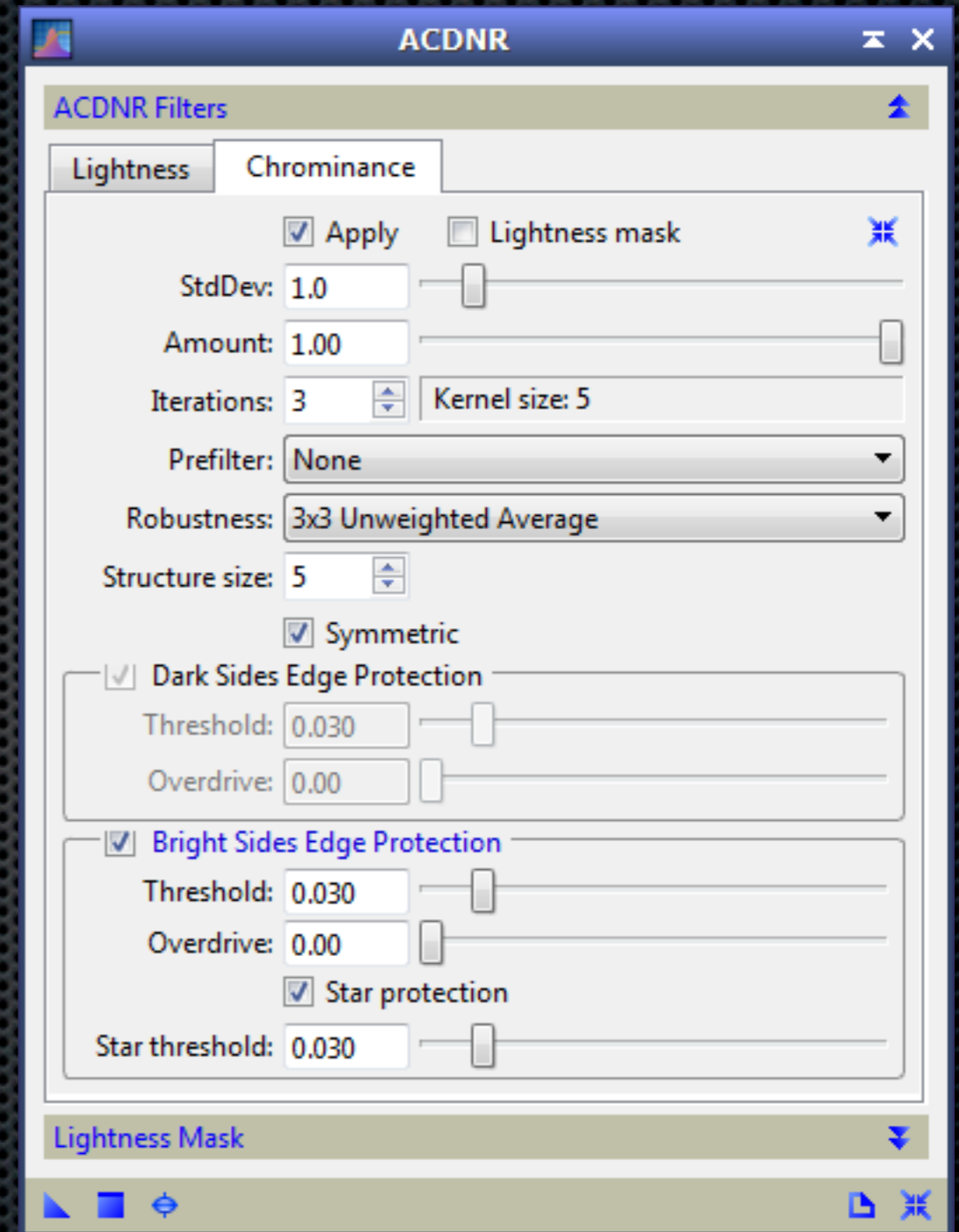
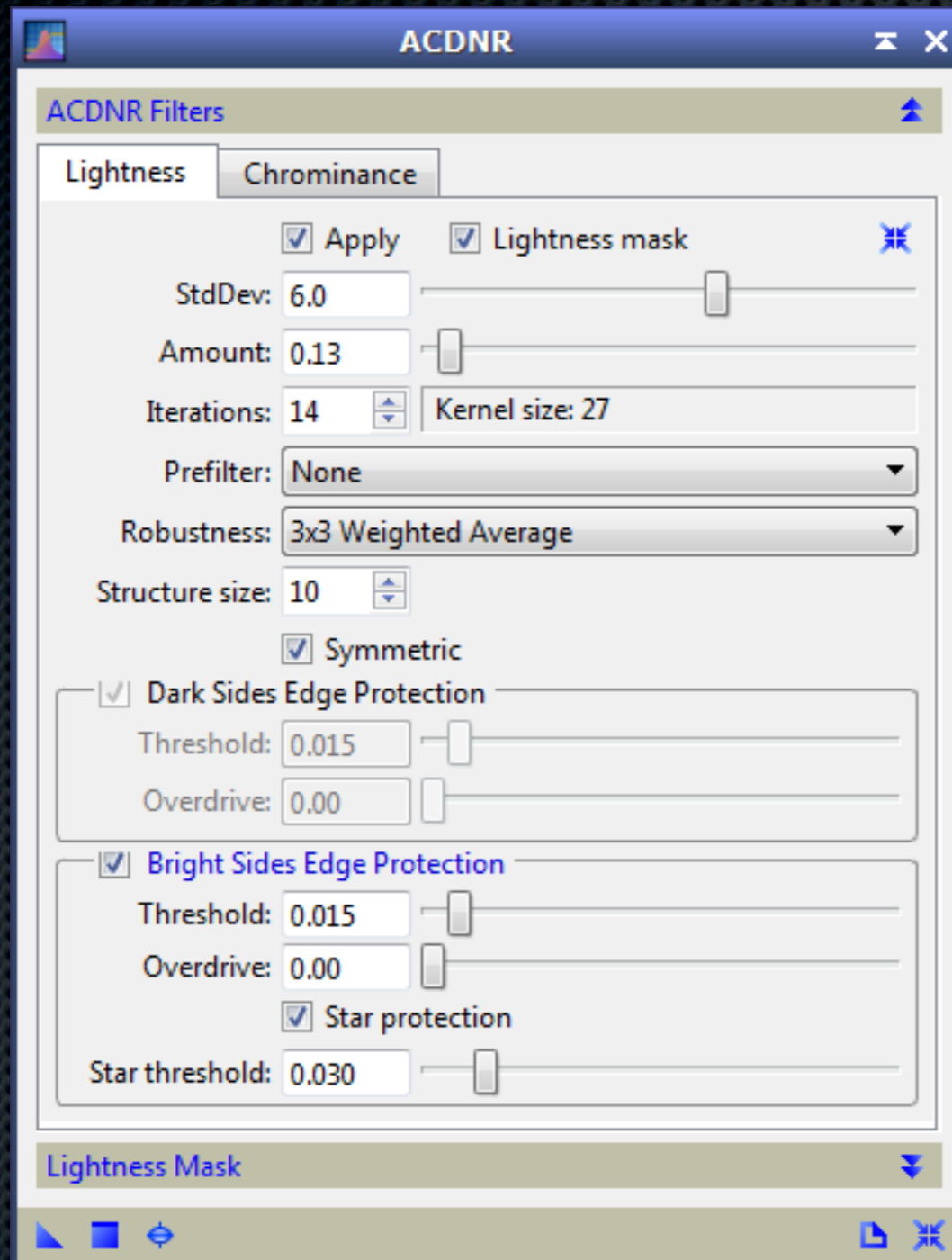
Le bruit... pas moins de 6 fonctions

La réduction du bruit est souvent une étape clé du traitement mais c'est aussi une décision puisqu'il y a toujours un risque que l'algorithme détruise des données essentielles en plus du bruit.

- **ACDNR** *Adaptive contrast-driven noise reduction* (Lum+Chroma / non-linéaire)
- **SCNR** *Subtractive Chromatic Noise Reduction* (Chroma / non-linéaire)
- **GREYCstoration** (Lum / non-linéaire)
- **ATrouWaveletTransform** (Lum+Chroma / linéaire, non-lin.)
- **MultiscaleMedianTransform** (Lum+Chr / lin., non-lin)
- **LRGB Combination** (Chroma / non-linéaire)

ACDNR

PixInsight



Luminance

Chroma

MultiscaleMedianTransform

ATrouWaveletTransform

PixInsight

Luminance
et/ou
Chroma

MultiscaleMedianTransform

Wavelet Layers

Dyadic Linear: 0 Layers: 8

Scaling Function: B3 Spline (5)

Layer	Scale	Parameters
✓ 1	1	S(t=1.0000, s=0.10, a=1.5000)
✓ 2	2	S(t=1.0000, s=0.10, a=1.0000)
✓ 3	4	S(t=1.0000, s=0.10, a=0.5000)
✓ 4	8	S(t=1.0000, s=0.10, a=0.3000)
✓ 5	16	S(t=1.0000, s=0.10, a=0.1000)
✓ 6	32	S(t=0.5000, s=0.10, a=0.0000)
✓ 7	64	S(t=0.3000, s=0.10, a=0.0000)
✓ 8	128	
✓ R	256	

Multiscale Layer 1/8

Bias: 0.000

Noise Reduction

Threshold: 1.0000

Amount: 0.10

Adaptive: 1.5000

Dynamic Range Extension

Target: RGB/K components Layer Preview: No layer preview

ATrouWaveletTransform

Wavelet Layers

Dyadic Linear: 0 Layers: 8

Scaling Function: B3 Spline (5)

Layer	Scale	Parameters
✓ 1	1	
✓ 2	2	
✓ 3	4	
✓ 4	8	
✓ 5	16	
✓ 6	32	
✓ 7	64	
✓ 8	128	
✓ R	256	

Detail Layer 1/8

Bias: 0.000

Noise Reduction

Threshold: 3.000

Amount: 1.00

Iterations: 1

k-Sigma Noise Thresholding

Threshold: 3.00

Amount: 0.50

Soft thresholding

Use multiresolution support


Deringing

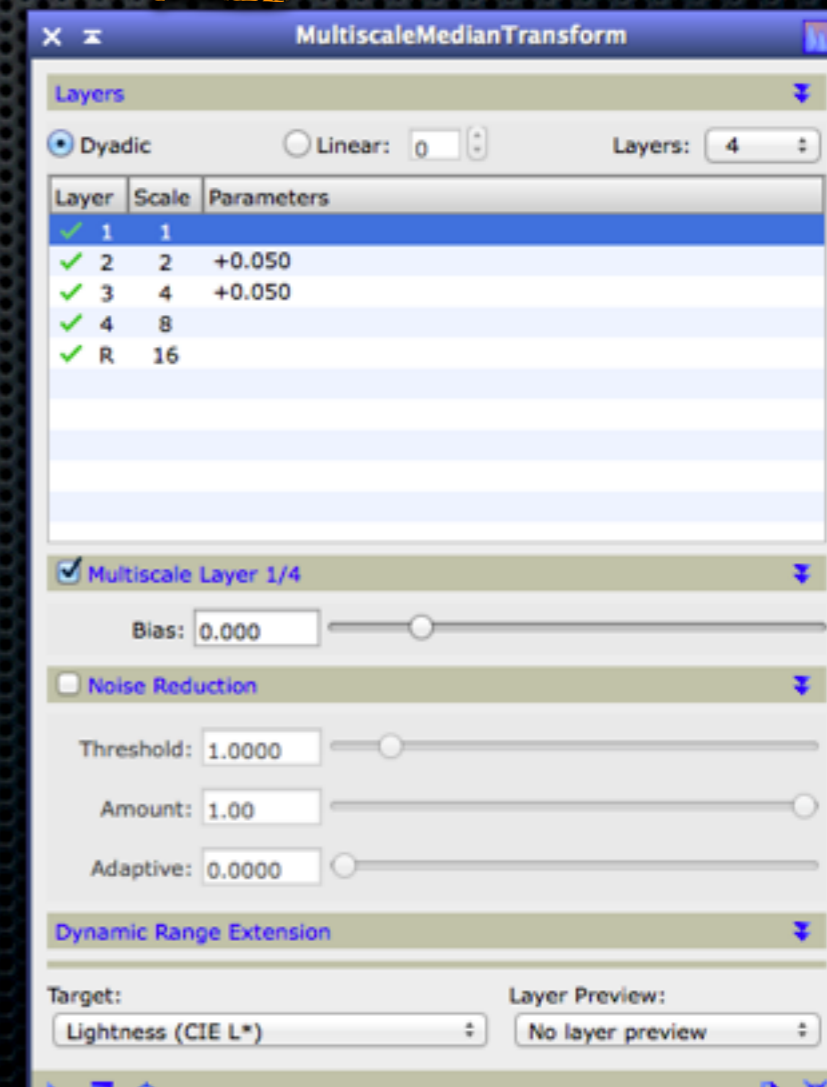
Large-Scale Transfer Function

Dynamic Range Extension

Target: RGB/K components Layer Preview: No layer preview

L'accentuation... 5 fonctions

- UnsharpMask
- MultiscaleMedianTransform 
- ATrouWaveletTransform
- RestorationFilter
- Deconvolution

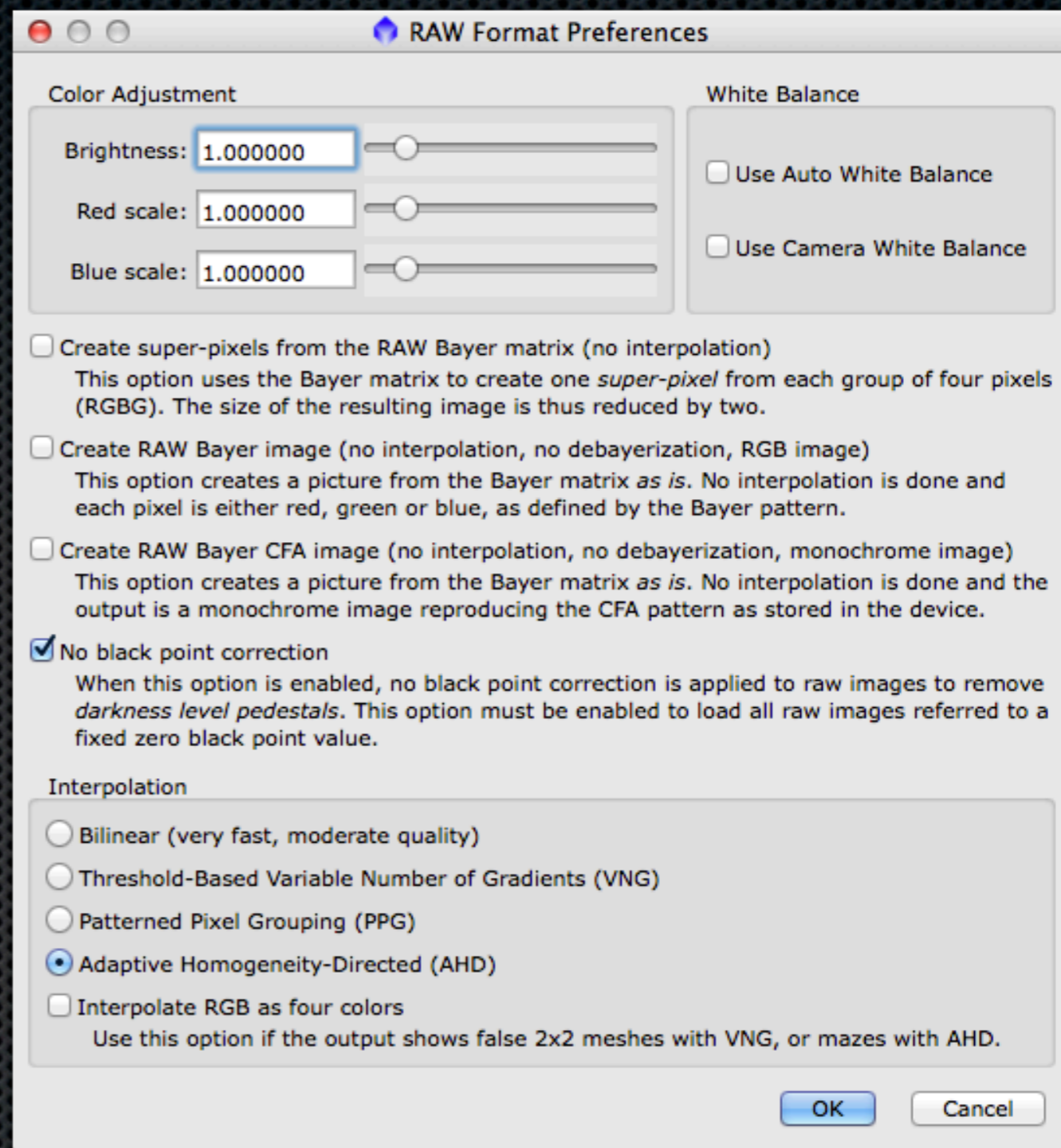
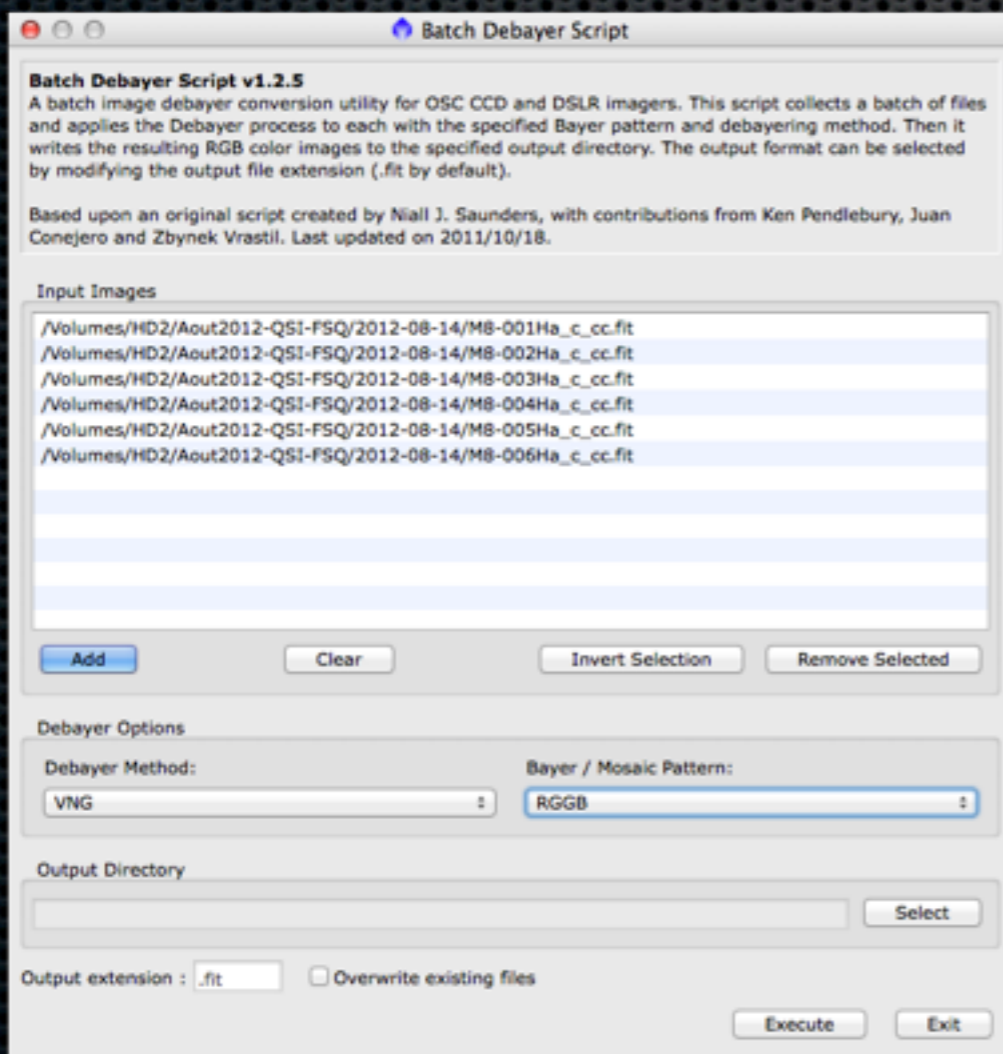


Les APN

● RAW

● Debayer

PixInsight

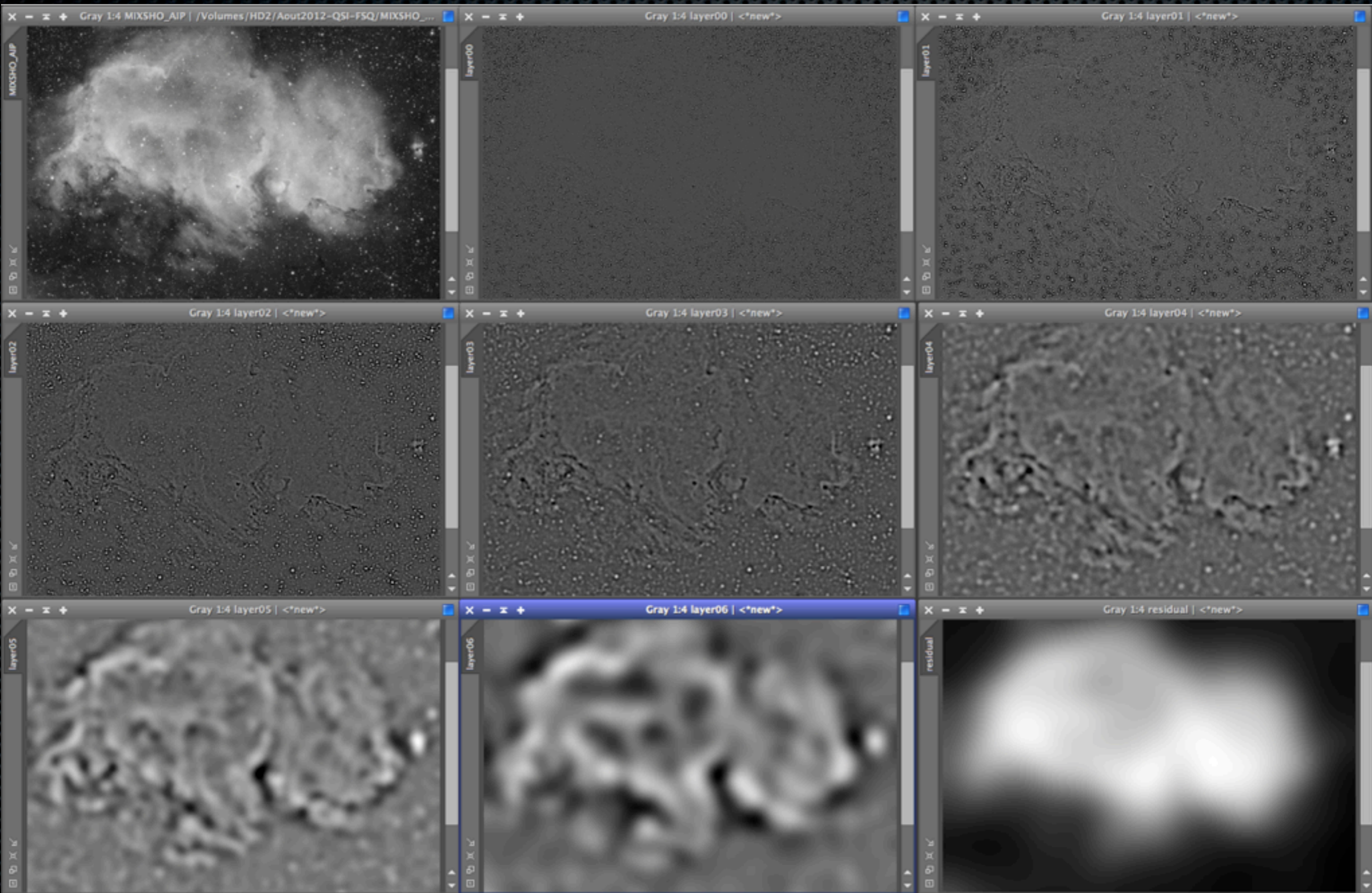


Et les autres...

- Fonctions géométriques
- Fonctions d'interpolation
- Couleurs
- Transformée de Fourier
- HDR sur plusieurs images
- Mosaïques
- *j'en oublie...*



Multiscale : analysez vos images



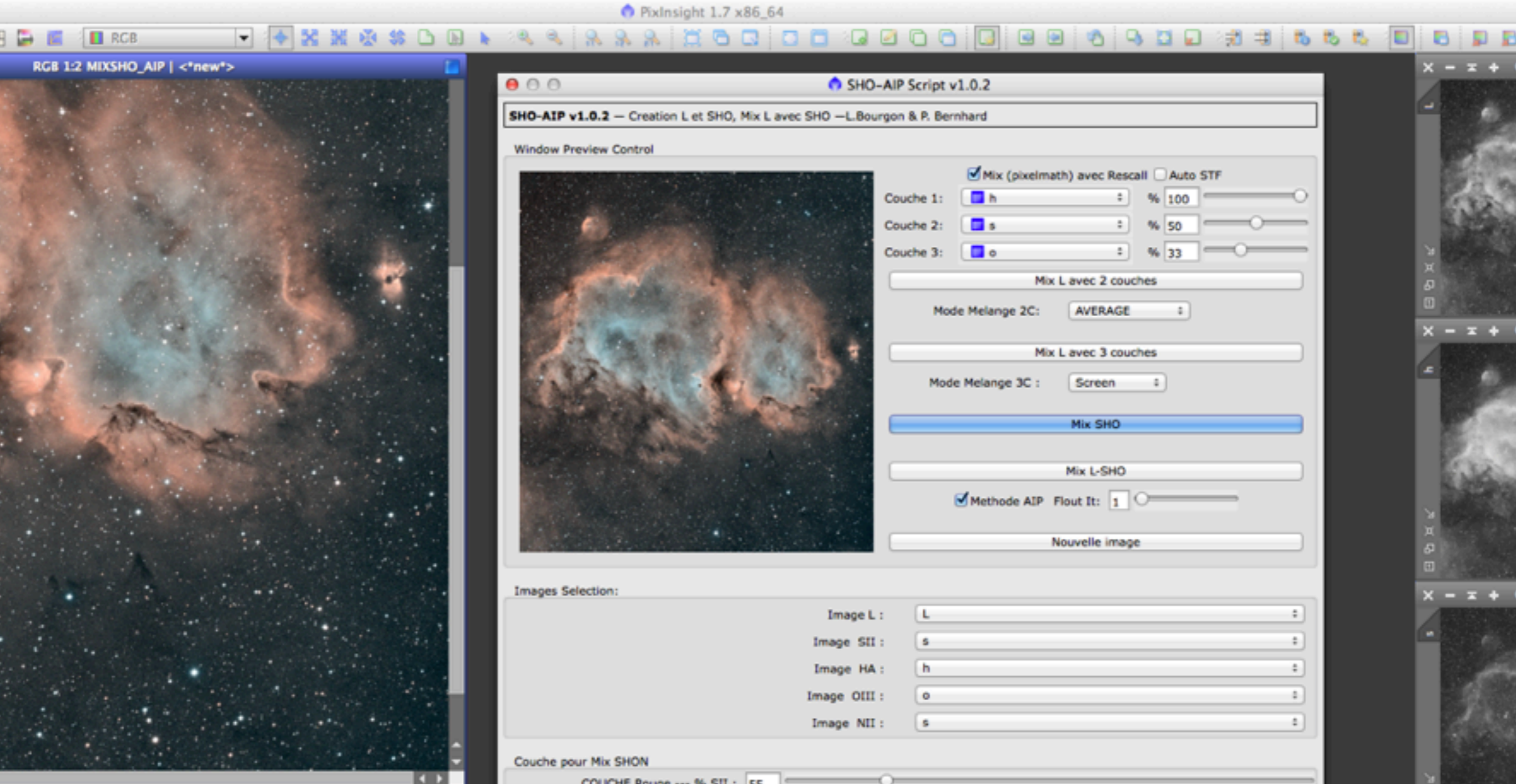
Les scripts

The screenshot displays the PixInsight Script Editor interface. On the left, a 'View Explorer' pane lists various 'External Objects' under the 'Core JavaScript Objects' category, including ACDNR, ATrousWaveletTransf..., AdaptiveStretch, Annotation, AssignICCProfile, AssistedColorCalibra..., AutoHistogram, AutomaticBackgrou..., B3Estimator, BackgroundNeutraliz..., Binarize, Blink, ChannelCombination, ChannelExtraction, ChannelMatch, CloneStamp, ColorCalibration, ColorManagementSet..., ColorSaturation, ConvertToGrayscale, ConvertToRGBColor, Convolution, CosmeticCorrection, CreateAlphaChannels, Crop, CurvesTransformation, Debayer, Deconvolution, DefectMap, DigitalDevelopment, Divide, DynamicAlignment, DynamicBackgroundE..., and DynamicCrop.

The main editor window, titled 'SHO-AIP.js', contains the following JavaScript code:

```
334 }
335
336 var engine = new Inset;
337
338 function ii_dialog() {
339
340 this. base = Dialog;
341 this. base ();
342 var labelWidth1 = this.font.width( "-----" + 'T' );
343
344 this.ApplyAutoSTF = function( view, shadowsClipping, targetBackground)
345 {
346     var stf = new ScreenTransferFunction;
347
348     var n = view.image.isColor ? 3 : 1;
349
350     var A = [ // c0, c1, m, r0, r1
351             [0, 1, 0.5, 0, 1],
352             [0, 1, 0.5, 0, 1],
353             [0, 1, 0.5, 0, 1],
354             [0, 1, 0.5, 0, 1] ];
355
356     for ( var c = 0; c < n; ++c ) {
357         view.image.selectedChannel = c;
358         var median = view.image.median();
359         var avgDev = view.image.avgDev();
360
361         if ( median < 0.5 ) { // Noninverted channel
362             var c0 = Math.range( median + shadowsClipping*avgDev, 0.0, 1.0 );
363             var m = findMidtonesBalance( targetBackground, median - c0 );
364             A[c] = [c0, 1, m, 0, 1];
365         } else { // Inverted channel
366             var c1 = Math.range( median - shadowsClipping*avgDev, 0.0, 1.0 );
367             var m = 1 - findMidtonesBalance( targetBackground, c1 - median );
368             A[c] = [0, c1, m, 0, 1];
369         }
370     }
371
372     stf.STF = A;
373     view.image.resetSelections();
374     stf.executeOn( view );
375 }
376
377 this.Calculate_L = function(c)
378 {
379     if(Dejala==0)
380     {
381         Dejala=1;
382         this.cursor = new Cursor( StdCursor_ArrowWait);
383         console.show();
384         var scale L1 = opacityL1/100;
385         var scale L2 = opacityL2/100;
386         var FL1 = format("%.2f", scale L1);
387         var FL2 = format("%.2f", scale_L2);
388
389         var FL = "";
390
391         if(c==3)
392         {
393             var scale L3 = opacityL3/100;
394             var FL3 = format("%.2f", scale_L3);
395
396
```

The status bar at the bottom shows the file path: /Volumes/HD2/scripts Pixinsight/SHO/SHO-AIP.js, the page number 128, and the version 1. The system tray on the right shows 'INS'.



Les scripts

SHO-AIP Script v1.0.2

SHO-AIP v1.0.2 — Creation L et SHO, Mix L avec SHO — L. Bourgon & P. Bernhard

Window Preview Control

Mix (pixelmath) avec Rescale Auto STF

Couche 1: % 100

Couche 2: % 50

Couche 3: % 33

Mix L avec 2 couches

Mode Melange 2C: AVERAGE

Mix L avec 3 couches

Mode Melange 3C: Screen

Mix SHO

Mix L-SHO

Methode AIP Flout It: 1

Nouvelle image

Images Selection:

Image L : L

Image SII : s

Image HA : h

Image OIII : o

Image NII : s

Couche pour Mix SHON

Couche	% SII	% HA	% OIII	% NII
COUCHE Rouge	55	45	0	0
COUCHE Vert	10	20	70	0
COUCHE Bleu	0	10	90	0

OK

```
putative star pair matches.
forming RANSAC ...
star pair matches in 130 RANSAC iterations.
ary of model properties:
ers : 0.762
lapping : 0.978
arity : 0.964
ity : 0.883
ean square error:
: 0.345 px
age RMS error deviation:
: 0.204 px
errors:
: 1.381 px
: 1.236 px
sformation matrix:
-0.9997 -0.8255 +2064.7347
+0.0257 -1.0081 +2012.4393
+0.0000 +0.0000 +1.0000
e : 0.999
tion : -181.45°
: +2064.73 px
: +2012.44 px
3 s
ation 2, delta = 0.197 arcsec (0.1 pixels)
e center ..... RA: 02 55 00.279 Dec: +60 31 01.72
lution ..... 3.93 arcsec/pix
e Plate Solver script version 1.51
entiation Matrix (Gnomonic projection = Matrix * Coords[x,y]):
+0.001091148462 -0.000027856936 -1.004035520758
+0.000020000633 +0.001090779784 -1.140105925929
+0.000000000000 +0.000000000000 +1.000000000000
lution ..... 3.929 arcsec/pix
tion ..... 178.543 deg
l ..... 388.51 mm
l size ..... 7.40 um
d of view ..... 2d 13' 30.7" x 2d 13' 26.8"
e center ..... RA: 02 55 00.279 Dec: +60 31 01.72
e bounds:
op-left ..... RA: 02 46 37.861 Dec: +59 21 35.76
op-right ..... RA: 03 04 06.317 Dec: +59 24 54.37
ottom-left .... RA: 02 45 33.064 Dec: +61 34 44.36
ottom-right ... RA: 03 04 15.897 Dec: +61 38 16.98
--execute-mode=auto
lications/PixInsight64.app/Contents/src/scripts/ImageSolver+AnnotateImage/ImageSolver.js"
essing script file:
lications/PixInsight64.app/Contents/src/scripts/ImageSolver+AnnotateImage/ImageSolver.js
Pause/Abort
```



Image Plate Solver Script
Image Plate Solver v1.51 — A script for plate-solving astronomical images.
The values are initialized from existing WCS coordinates or the keywords OBJECTRA, OBJECTDEC, FOCALLEN, XPIXSZ and DATE_OBS if present.
Copyright © 2012 Andrés del Pozo

Image parameters

Right Ascension (hms): 2 : 55 : 7.747 Search

Declination (dms): 60 : 31 : 1.62 S

Epoch (ymd): 2012 : 8 : 20

Image scale: Focal distance (mm): 388.509
 Resolution (arcsec/px): 3.92876

Pixel size (um): 7.4

Model Parameters

Local star catalog: /Users/Macbookpro/Documents/PPMXL.bin

VizieR star catalog: PPMXL CDS (vizier.u-strasbg.fr) Strasbourg, France

Limit magnitude: 12

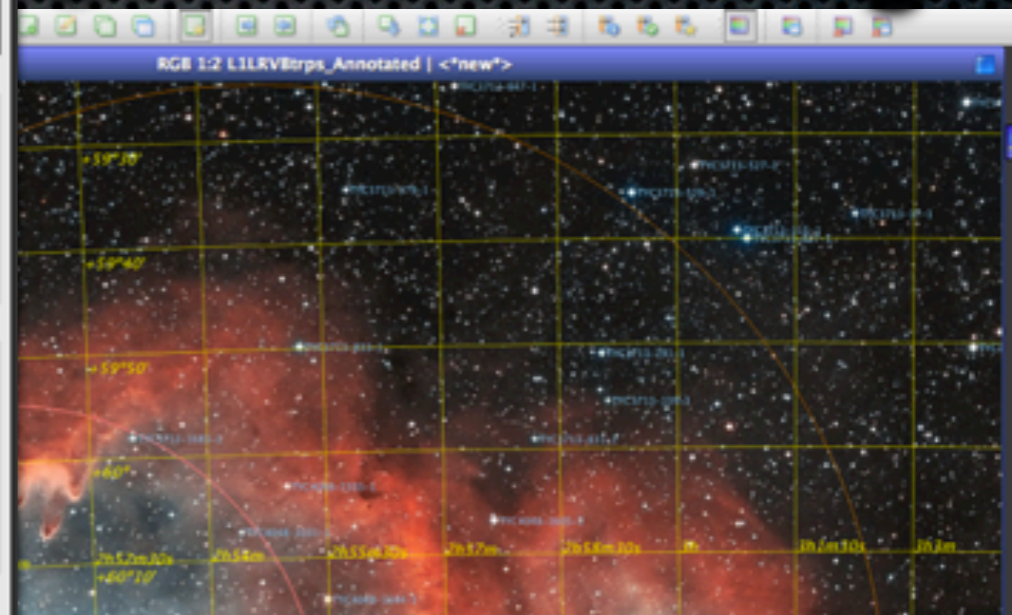
Star sensitivity: -1.00 Show stars

Maximum iterations: 4

Update FITS keywords
 Add WCS keywords

Reset OK Cancel

Le fun...
● ImageSolver
● AnnotateImage



10772 bytes transferred in 0.042 s @ 00.40 MB/s
Catalog TYCHO-2 size: 210 objects

Image Annotation Script
Image Annotation v1.11 — A script for annotating astronomical images.
This script draws on the image coordinate grids and symbols of objects extracted from different astronomical catalogs. The script requires the image to have coordinates stored in FITS header keywords following the WCS convention. The Image Plate Solver script can be used to generate these coordinates and keywords.
Copyright © 2012 Andrés del Pozo

Layers

Layer	Description
<input checked="" type="checkbox"/> Grid	Grid in equatorial coordinates
<input checked="" type="checkbox"/> NamedSt...	HD-DM-GC-HR-HIP-Bayer-Flamsteed Cross Index(36...
<input checked="" type="checkbox"/> NGC-IC	NGC and IC catalogs (9900 objects)
<input checked="" type="checkbox"/> TYCHO-2	Tycho-2 catalog (2,539,913 stars)
<input type="checkbox"/> PGC	PGC HYPERLEDA I catalog of galaxies (983,261 galax...
<input type="checkbox"/> PPMXL	PPMXL catalog (910,469,430 objects)
<input checked="" type="checkbox"/> Sharpless	Catalog of HII Regions - Sharpless (313 nebulaes)
<input checked="" type="checkbox"/> VdB	Catalog of Reflection Nebulae - Van den Bergh (159 ...)

Grid Parameters

Show markers

Color: Custom (255,255, 0) 255

Width: 1

Show labels

Font: SansSerif 22 Bold Italic

Color: Custom (255,255, 0) 255

Grid density: 10

General Properties

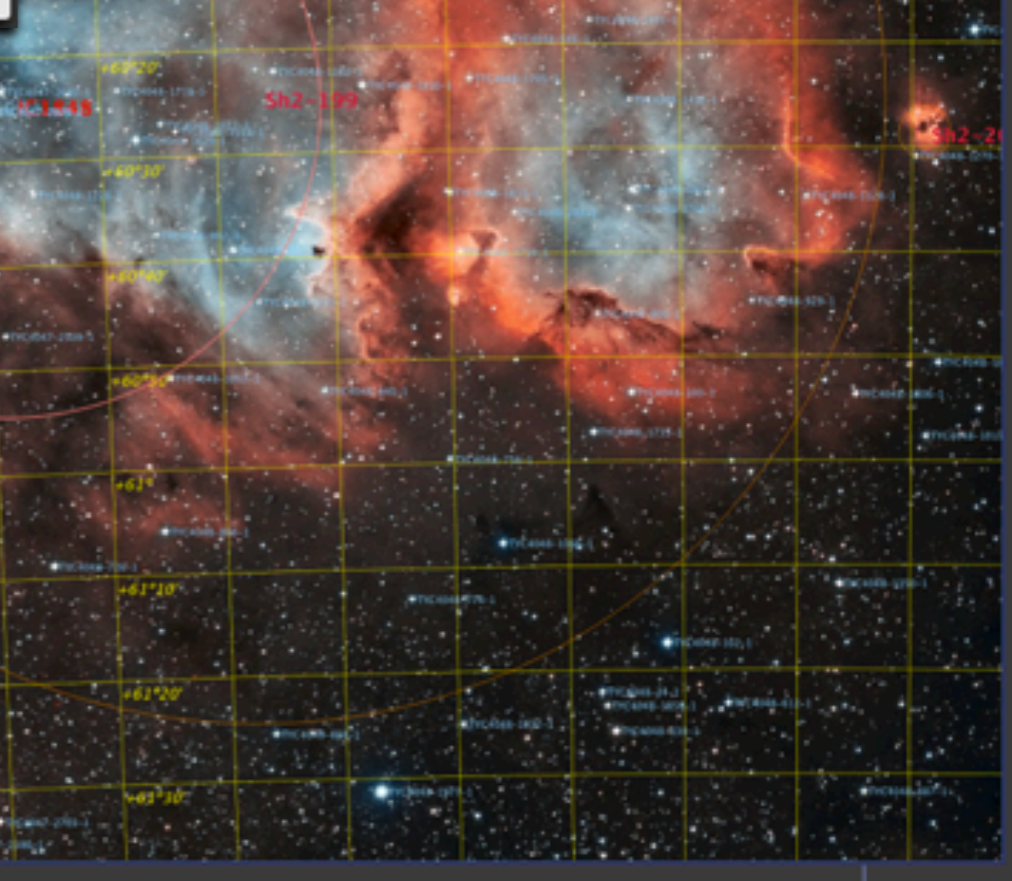
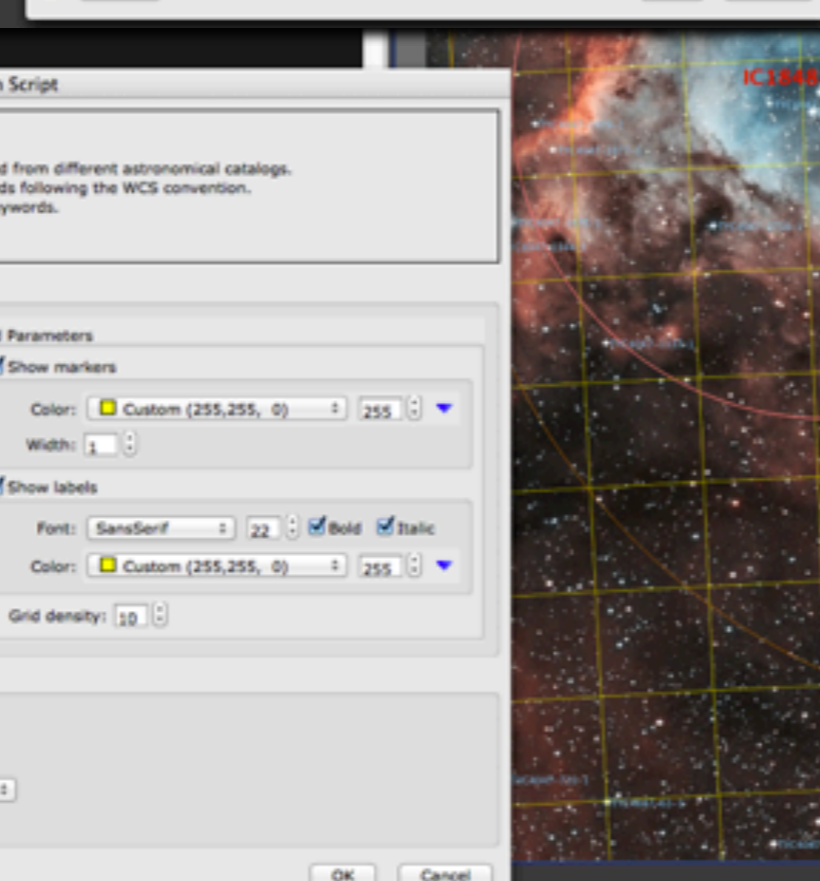
Output mode: Annotate image Apply STF before annotation

Epoch (ymd): 2000 1 1

Vizier server: CDS (vizier.u-strasbg.fr) Strasbourg, France

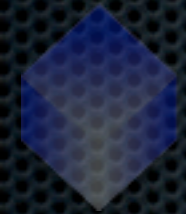
Remove duplicate objects

Reset OK Cancel



Une communauté active...

- site web : <http://pixinsight.com/>
- forum actif et riche en informations :
<http://pixinsight.com/forum/index.php>
- AIP organise régulièrement des stages de formation à Pixinsight
<http://www.astro-images-processing.fr/>
- Nombreux scripts et process développés par des utilisateurs
- tutoriels divers sur différents sites web



Merci...