



**BERGEN  
ASTRONOMISKE  
FORENING**



# Introduksjon til Astrofotografering

## Del 2: Bildebehandling



Foredrag i Bergen Astronomiske Forening

Mars/Mai 2009

Workshop Februar 2013

September 2014

September 2019

**Odd Høydalsvik**



# Agenda

## Huskeliste og grunnleggende om lagring

Behandling av enkeltbilder (tatt med kameralinser)

Stacking av flere bilder (tatt med kameralinser)

Stacking av bilder tatt gjennom teleskop

Stacking med Astro Pixel Processor

Stacking med Deep Sky Stacker

# Huskeliste

- Fotografer alltid i RAW-format dersom kameraet støtter det, eventuelt JPG+RAW
- Bruk manuell hvitbalanse
  - Dagslys (solsymbolet) eller 5600K er et godt utgangspunkt. Kan uansett justeres i etterbehandlingen.
- Med DSLR og lange brennvidder: Bruk speillås (kan gå bra uten dersom monteringen er stødig og eksponeringstiden er fra ett minutt og oppover)
- Autofokus: **NEI!**
- Eksponering: Manuell. Eksponer så lenge at himmelbakgrunnen ikke blir helt svart. Sjekk histogrammet.
- Fargerom: Adobe RGB (men konverter til sRGB for visning på web)
- ISO: 800 eller 1600 (helt nye DSLR kanskje opp til 3200)
- Image Review: Kan lønne seg å slå av for å spare batteri
- Lukkertid: bulb for lange tider. Snorutløseren styrer da tiden.
- Støyreduksjon: **På** for enkeltbilder. **Av** dersom du tar mange bilder som skal stackes.
- Max eksponeringstid (sekund) uten tracking: 200/brennvidden (for små bildeformat på web kan man gå opp til 500/brennvidde – kjent som «500-regelen»)
- Med foto-objektiv: Så stor blenderåpning som mulig (dvs. laveste f-tall til objektivet). Du må kanskje blende ned litt for å få skarpe stjerner helt ut til hjørnene.

# Lagring av bildene på PC

- Første bud: Husk backup!
- Lag en katalogstruktur som gjør det enkelt å finne fram.
- Råfilene/originalopptakene skal aldri endres!
  - Unntak:
    - endring av filnavn for enklere identifisering
    - Slette mislykkede bilder
- Endringer gjøres på kopier.



# Eksempel på katalogstruktur

- Astrofoto
  - Deepsky
    - M31
      - 2019-01-10
        - » Originaler
          - Light
          - Dark
          - Flat
          - Bias
        - » Behandlet
  - Planeter
    - Jupiter
      - 2019-02-12
        - » Originaler
        - » Behandlet
  - Sol
  - Måne
- OSV.
- Dark, Bias og Flat er bilder vi tar for å korrigere for «støy» og optiske feil.
- Dersom man har astrokamera med kjøling kan man med fordel lage et bibliotek med Darks og Bias for foretrukne eksponeringstider og temperatur.
- Disse lagres da i en egen mappe rett under mappa «Astrofoto».

# Eksempel på arbeidsflyt fra kamera til PC

- Overfør råfilene til ønsket katalog
  - F. eks. Adobe Bridge:
    - Se over bildene og slett mislykkede
    - Batch rename (motiv\_dato\_løpnummer)
      - NGC7000\_20120213\_001.raw
      - Darks\_20120213\_001.raw
      - Flats\_20120213\_001.raw

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Huskeliste og grunnleggende om lagring

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# Enkeltbilder behandlet i Lightroom



Utgangspunktet:

Canon EOS 6D, 60s, f2.8, 1600 ISO



# Resultatet – kraftig «strukket» (og litt beskåret)



# Lightroom – kraftig strekking

**Lens Corrections**

Basic | **Profile** | Color | Manual

Enable Profile Corrections

Setup Default

Lens Profile

Make: Canon

Model: Samyang 14mm f2.8

Profile: 5Dii + Samyang 14m...

Amount

Distortion: 100

Vignetting: 100

**Histogram**

ISO 1600 - - 60,0 sec

Original Photo

**Basic**

Treatment: Color | Black & White

Profile: Adobe Standard

WB: As Shot

Temp: 5150

Tint: +7

Tone: Auto

Exposure: +0,90

Contrast: +15

Highlights: +25

Shadows: 0

Whites: 0

Blacks: 0

Presence

Texture: 0

Clarity: +45

Dehaze: +75

Vibrance: 0

Saturation: +20

**Tone Curve**

Region

Highlights: 0

Lights: +35

Darks: -5

Shadows: 0

Point Curve: Linear

**Detail**

Sharpening

Amount: 25

Radius: 1,0

Detail: 25

Masking: 0

Noise Reduction

Luminance: 80

Detail: 50

Contrast: 0

Color

Detail: 50

Smoothness: 50

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# Stacking av flere eksponeringer

## Bilder tatt med vanlige objektiver

- Adobe Camera Raw inneholder «profiler» for de fleste objektiver på markedet
- Disse korrigerer for svakhetene i optikken (langt på vei)
  - Feil i fargebrytning
  - Vignettering
  - Fortegning
  - Etc.
- Dette kan brukes for å korrigere bildene i enda større grad enn ved å ta «flats»
- I eksempelet brukes det ikke darks, flats og bias

# Arbeidsflyt i ACR

- Merk alle RAW-filene i utforsker og åpne dem i ACR
- Jobb med det første bildet som følger:
  - Slå på *Lens profile corrections*
  - *Remove Chromatic Aberration*
  - *Noise reduction and sharpening* (forsiktig – vi gjør mer av det i det stackede bildet helt til sist)
  - Ikke gjør endringer i tonekurven (det gjør vi i det stackede bildet)
  - Generelle innstillinger
    - Reduser eksponeringen 0,5 – 1 trinn for å hindre utbrente stjerner
    - Kontrast 0
    - Highlights: -70 - -80 for å hindre utbrente stjerner
    - Kanskje redusere svartnivået noe for å redusere lysforurensning, men la det være igjen en del rom til venstre i histogrammet

# Eksempel på arbeidsflyt i ACR

The screenshot displays the Adobe Camera Raw (ACR) interface with the following panels and settings:

- Top Row (Histograms):** Five histograms showing color channels (R, G, B) for different stages of the workflow.
- Metadata:** f/2 61.00 s, ISO 1600 100 mm.
- Toolbars:**
  - Section 1: Magnifying glass icon highlighted.
  - Section 2: Magnifying glass icon highlighted.
  - Section 3: Triangle icon highlighted.
  - Section 4: Square icon highlighted.
  - Section 5: Globe icon highlighted.
- Left Panel (Lens Corrections):**
  - Enable Lens Profile Corrections:
  - Setup: Custom
  - Lens Profile: Canon EF 100mm f/2 USM
  - Correction Amount: Distortion 100, Vignetting 100
- Second Panel (Lens Corrections):**
  - Remove Chromatic Aberration:
  - Defringe: Purple Amount 20, Purple Hue 26 / 88, Green Amount 18, Green Hue 37 / 63
- Third Panel (Detail):**
  - Sharpening: Amount 30, Radius 1.0, Detail 25, Masking 0
  - Noise Reduction: Luminance 33, Luminance Detail 50, Luminance Contrast 0, Color 25, Color Detail 50
- Fourth Panel (Tone Curve):** Parametric and Point sliders for Highlights, Lights, Darks, and Shadows.
- Right Panel (Basic):**
  - White Balance: Daylight
  - Temperature: 5500, Tint: +10
  - Exposure: -0.65, Contrast: 0, Highlights: -78, Shadows: 0, Whites: 0, Blacks: -83
  - Clarity: 0, Vibrance: 0, Saturation: +11

# Eksempel på arbeidsflyt i ACR (forts)

- Merk så alle bildene i filmstripen
- Synkroniser
- Lagre alle som 16 bits tiff filer
- Disse bildene stackes så i f.eks. Deep Sky Stacker
- Ingen Darks, Flats eller Bias



# Enkeltekspønering fra ACR



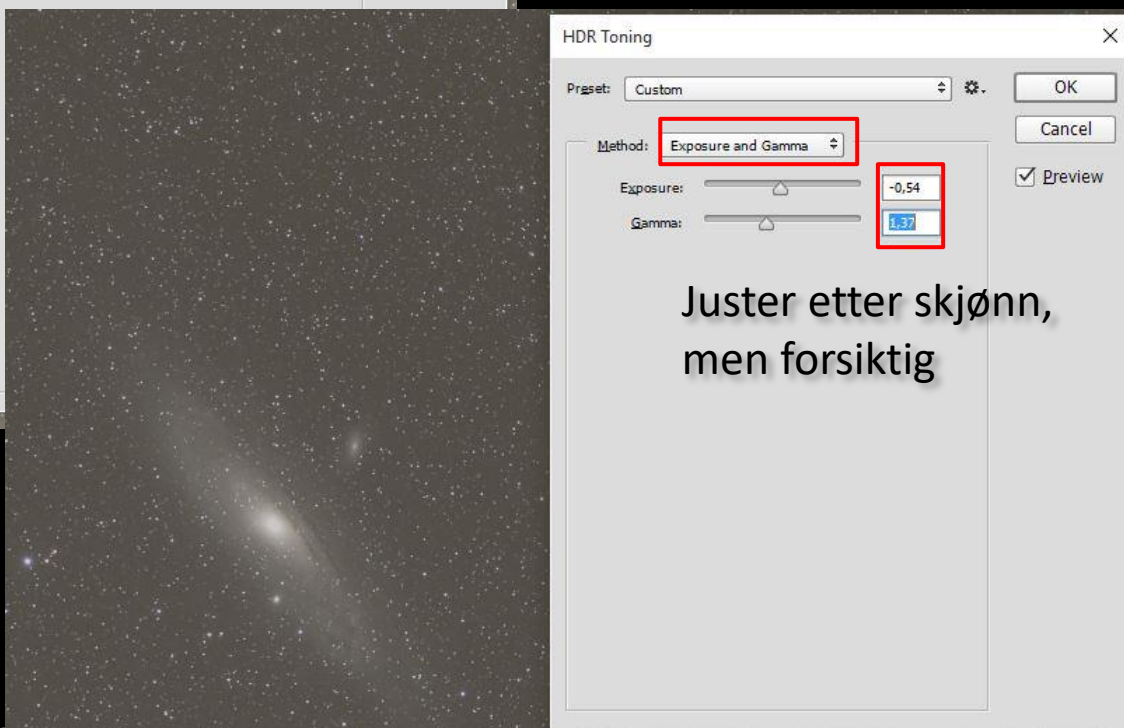
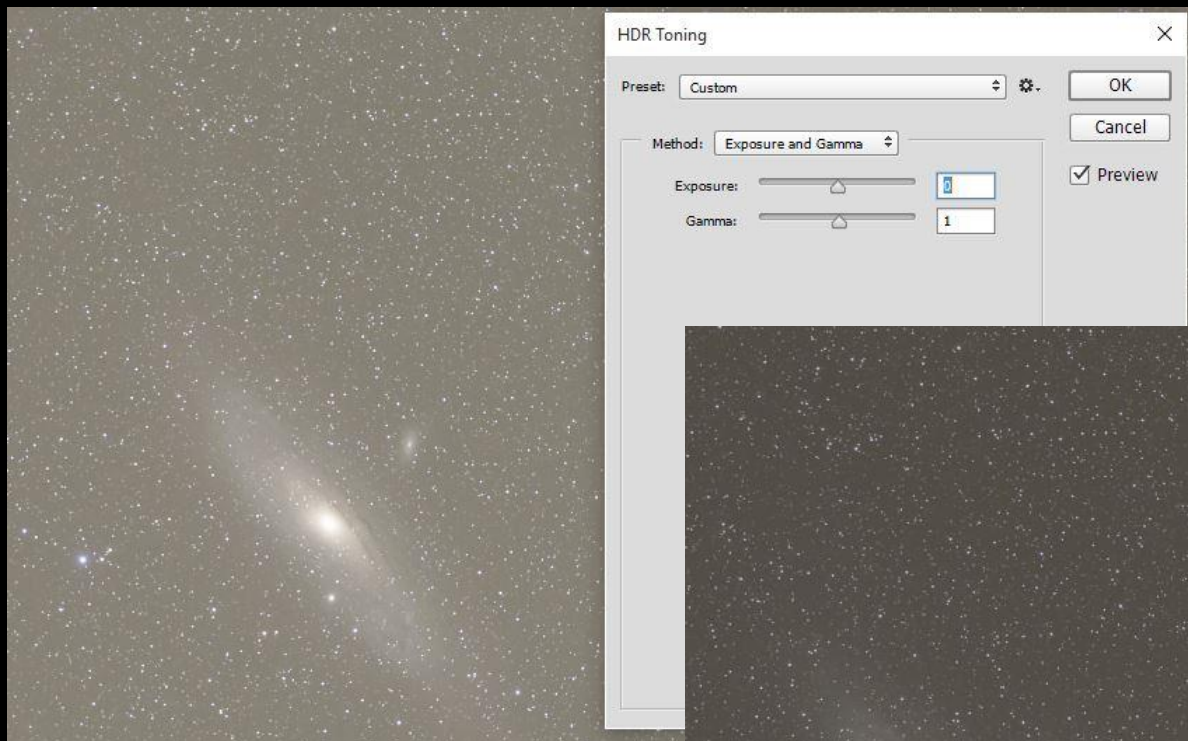
# Stacket i DSS

Ser ikke bedre ut på dette stadiet – men det er mye mindre støy i bildet



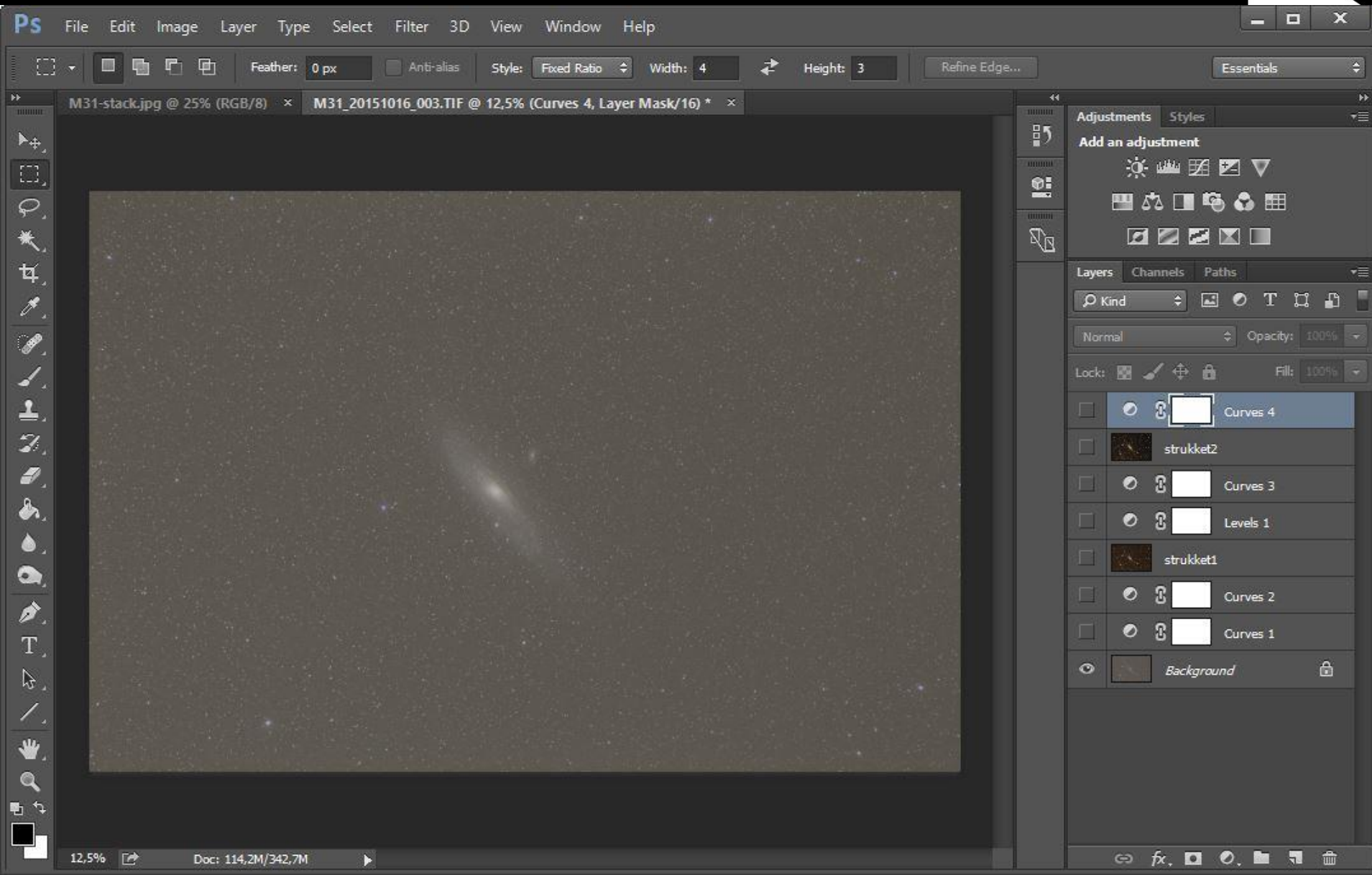
# Fra 32 bits format til 16 bits

Photoshop: Image → Mode → 16 bits/channel

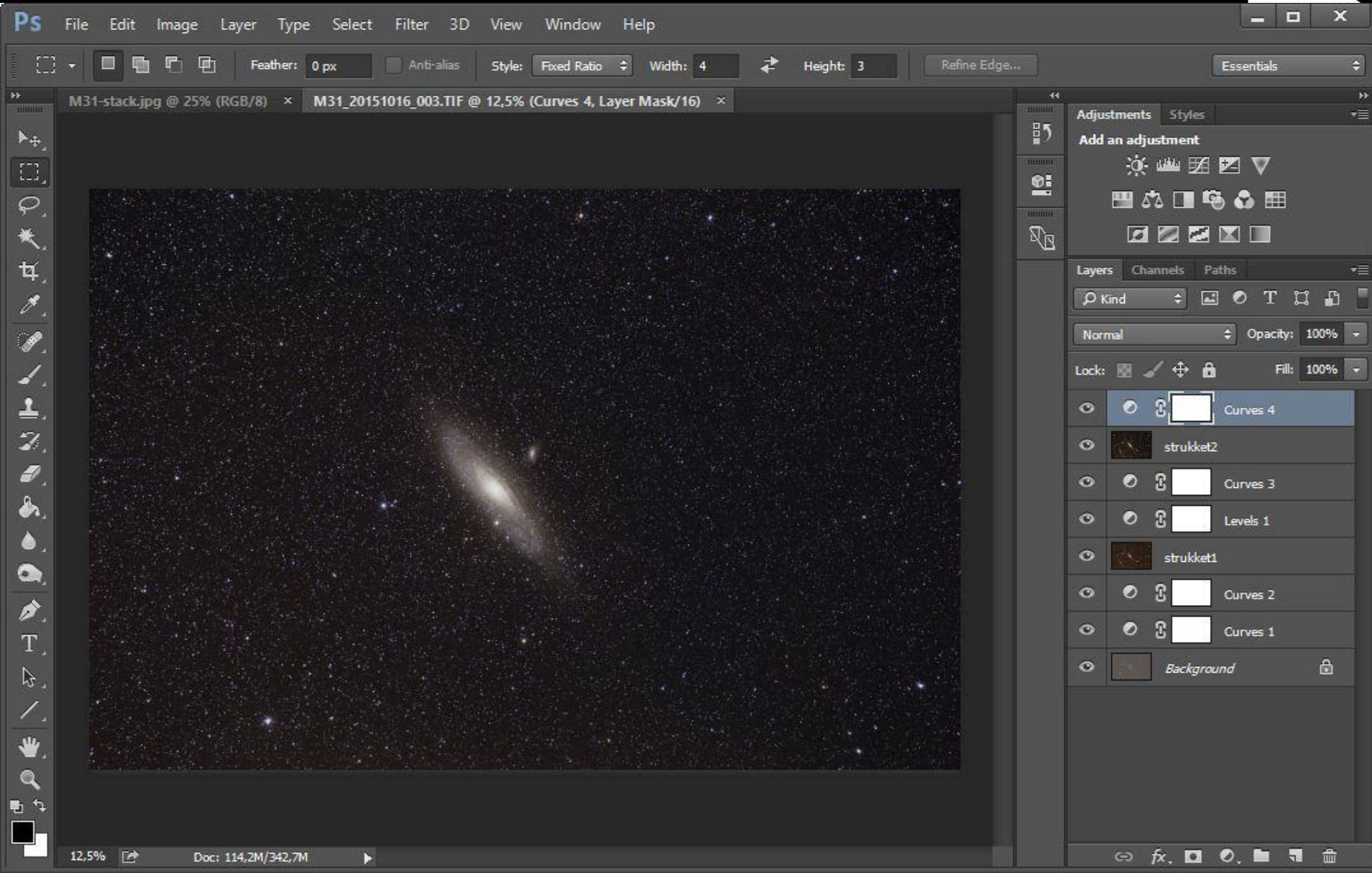


Juster etter skjønn,  
men forsiktig

# Utgangspunktet



# Sluttresultatet: justering («strekking») med Curves og Levels



# Stacking av bilder med landskap

## Sequator – Stacket 11 bilder 20s, ISO 6400



# Stacking av bilder med landskap

## Sequator – Stacket 11 bilder 20s, ISO 6400

Kamera fast oppstilt på stativ – ingen tracking. 11 x 20s = 220s total eksponering.  
Litt mer diffust, men mye mindre støy, og bedre farger.



Utsnitt av enkeltbilde



Utsnitt av stackede bilder

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# Bilder tatt gjennom teleskop eller objektiver uten profildata

# Kalibrering

- Å fjerne uønskede effekter introdusert av optikken eller elektronikken i kameraet kaller vi å kalibrere bildet.
- For å fjerne uønskede effekter brukes ofte:
  - Biasbilder (bias frames)
  - Mørkebilder (dark frames)
  - Flatfeltbilder (flat frames)
- Vi bruker mange av hver for å få et så statistisk godt resultat som mulig.

# Biasbilder

- Registrerer initialtilstanden til pikslene.
- Tas med objektivdeksel på.
- Tas på korteste mulige lukkertid.
- Tas ved samme temperatur som bildene.
  
- Bruk minst 8, gjerne flere.
  
- Bidraget fra bias er som regel lite i forhold til andre effekter.
- Man kan derfor få gode resultater uten biasbilder.

# Mørkebilder (Darks)

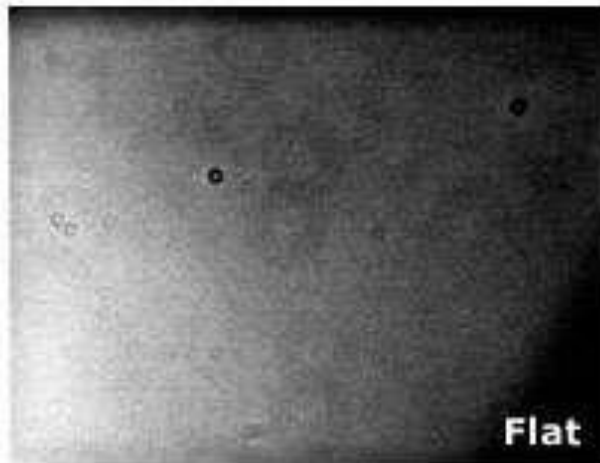
- Registrerer sluttstanden til pikslene.
- Tas med objektivdeksel på.
- Tas med samme eksponeringstid som bildene.
- Tas ved samme temperatur som bildene.
- Bruk helst 8, gjerne flere.
- Ta alltid minst 3 mørkebilder.



# Flatfeltbilder

- Kompenserer for vignettering, støv på sensoren og eventuell ujevn følsomhet i bildebrikka.
- Ta bilde av en jevnt opplyst flate med samme fokus som bildene forøvrig.
- Jeg bruker en jevnt belyst hvit akrylplate rett foran objektivåpningen.
- Kan også benytte et nettbrett som viser et helt hvitt bilde.

# Kalibrering



$$\text{Calibrated} = (\text{Raw} - \text{Bias} - \text{Thermal}) / \text{Flat} = (\text{Raw} - \text{Dark}) / \text{Flat}$$

# Programmer for kalibrering

- Det fins mange spesialiserte programmer for dette formålet.
- Et godt og brukervennlig gratisprogram er "Deep Sky Stacker" (DSS)
- Jeg bruker nå helst Astro Pixel Processor (koster 125 euro)
- De mest avanserte bruker gjerne PixInsight

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# Astro Pixel processor



Råfil fra kamera



Stacket i APP

9 Lights  
4 Darks  
15 Flats



Etterbehandlet i  
Photoshop og Lightroom

# Brukergransnittet

Astro Pixel Processor version 1.070 by Aries Productions

LICENSE CFG HDD 30GB OpenGL

#CPU 4 using 03 threads APP 2%

OS 37%

RAM APP 41/2048 OS 6032/16344

set work directory

- 5) NORMALIZE 6) INTEGRATE 9) TOOLS
- 3) ANALYSE STARS 4) REGISTER
- 0) RAW/FITS 1) LOAD 2) CALIBRATE

**Kontrollpanel for stacking**

Multi-Channel/Filter processing

auto-detect Masters & Integrations

Light all clean

Flat all clean

Dark all clean

DarkFlat all clean

Bias all clean

MasterFlat all clean

MasterDark all clean

MasterDarkFlat all clean

**Forhåndsvisningsfelt**

Please select your working directory

Look In: M45

20090101

Folder Name: N:\Astrokurs\DeepSky\M45

Files of Type:

Open Cancel

**Kontrollpanel for etterbehandling**

log colors

neutralize-BG invert data

1 000 B: 000 016 3

1 239 W: 255 255 3

reset 10.0 C: 01.00 0.1

15% BG, 3 sigma, 2.5% base

1 239 ST: 255 255 3

1 000 BA: 000 016 3

0 HL: 000 250

0.00 SAT: 0.15 0.50

0.00 SAT: TH: 0.25 1.00

1 000 CON: 000 016 3

0.0 SHARP: 00.0 20.0

select	frame	file name	ISO/gain	exposure (s)	tine shot	#stars & star density	background & dispersion	SNR & noise	FWHM min, max (abs & rel)	quality score	Registration RMS - #stars	Instrument	color space	dimensions	CFA	type	size(MB)
--------	-------	-----------	----------	--------------	-----------	-----------------------	-------------------------	-------------	---------------------------	---------------	---------------------------	------------	-------------	------------	-----	------	----------

**Liste over innlastede filer, med tilhørende informasjon**

# Parametre for råfiler



- For DSLR trenger man ikke endre noe her.
- Bruker man astrokamera (farge) må man sette riktig Bayer-mønster, og sannsynligvis hake av på «force Bayer CFA»

# Innlegging av bildefiler

Astro Pixel Processor version 1.070 by Aries Productions

orientation  scale to fit  rectilinearProjection  linear()   
no image in image viewer

License CFG HDD 707GB OpenGL  
#CPU 4 using 03 threads APP 2%  
OS 30%  
RAM APP 50/2048 OS 6048/16344

N:\Astrokurs\DeepSky\M45

5) NORMALIZE 6) INTEGRATE 9) TOOLS  
3) ANALYSE STARS 4) REGISTER  
0) RAW/FITS 1) LOAD 2) CALIBRATE

Other/Processed all clean 0

Multi-Channel/Filter processing  
 Multi-Session processing  
 auto-detect Masters & Integrations

Light all clean 0  
Flat all clean 0  
Dark all clean 0  
DarkFlat all clean 0  
Bias all clean 0  
MasterFlat all clean 0  
MasterDark all clean 0  
MasterDarkFlat all clean 0

Please select the light frames for your project

Look In: Light

- M45\_20090101\_009.CR2
- M45\_20090101\_010.CR2
- M45\_20090101\_011.CR2
- M45\_20090101\_012.CR2
- M45\_20090101\_013.CR2
- M45\_20090101\_014.CR2
- M45\_20090101\_015.CR2
- M45\_20090101\_016.CR2
- M45\_20090101\_017.CR2

File Name: J1\_013.CR2\*M45\_20090101\_014.CR2\*M45\_20090101\_015.CR2\*M45\_20090101\_016.CR2\*M45\_20090101\_017.CR2

Files of Type: FITS, CR2, NEF, TIFF, JPEG

Open Cancel

log  colors

stretch save

neutralize-BG  invert data

1 000 B: 000 016 3  
1 239 W: 255 255 3  
reset 10.0 C: 01,00 0.1

DDP  auto  saturation

15% BG, 3 sigma, 2.5% base  
1 239 ST: 255 255 3  
1 000 BA: 000 016 3  
0 HL: 000 250  
0,00 SAT: 0,15 0,50  
0,00 SAT: TH: 0,25 1,00  
1 000 CON: 000 016 3  
0,0 SHARP: 00,0 20,0

select	frame	file name	ISO/gain	exposure (s)	tine shot	#stars & star density	background & dispersion	SNR & noise	FWHM min, max (abs & rel)	quality score	Registration RMS - #stars	Instrument	color space	dimenstons	CFA	type	size(MB)
--------	-------	-----------	----------	--------------	-----------	-----------------------	-------------------------	-------------	---------------------------	---------------	---------------------------	------------	-------------	------------	-----	------	----------

# Alle bildefiler innlest

Bilder kan vises ved å dobbeltklikke på filen i nederste del

Astro Pixel Processor version 1.070 by Aries Productions

orientation scale to fit rectilinearProjection linear(1)

#CPU 4 using 03 threads APP 2% OS 49%

RAM APP 50/2048 OS 6063/16344

N:\Astrokurs\DeepSky\M45

5) NORMALIZE 6) INTEGRATE 9) TOOLS  
3) ANALYSE STARS 4) REGISTER  
0) RAW/FITS 1) LOAD 2) CALIBRATE

Other/Processed all clean 0

Multi-Channel/Filter processing  
Multi-Session processing  
 auto-detect Masters & Integrations

Light all clean 9  
Flat all clean 15  
Dark all clean 4  
DarkFlat all clean 0  
Bias all clean 0  
MasterFlat all clean 0  
MasterDark all clean 0  
MasterDarkFlat all clean 0

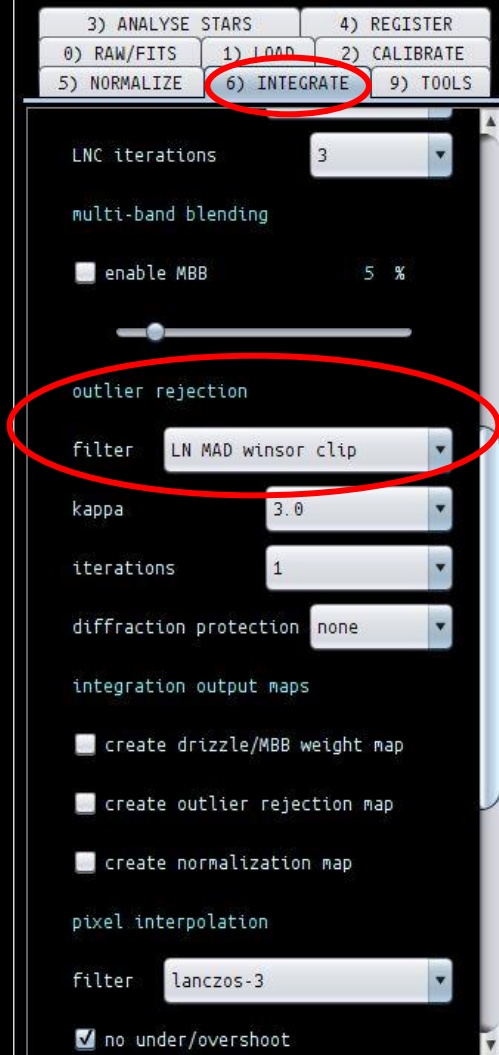
no image in image viewer

log colors stretch save  
neutralize-BG invert data

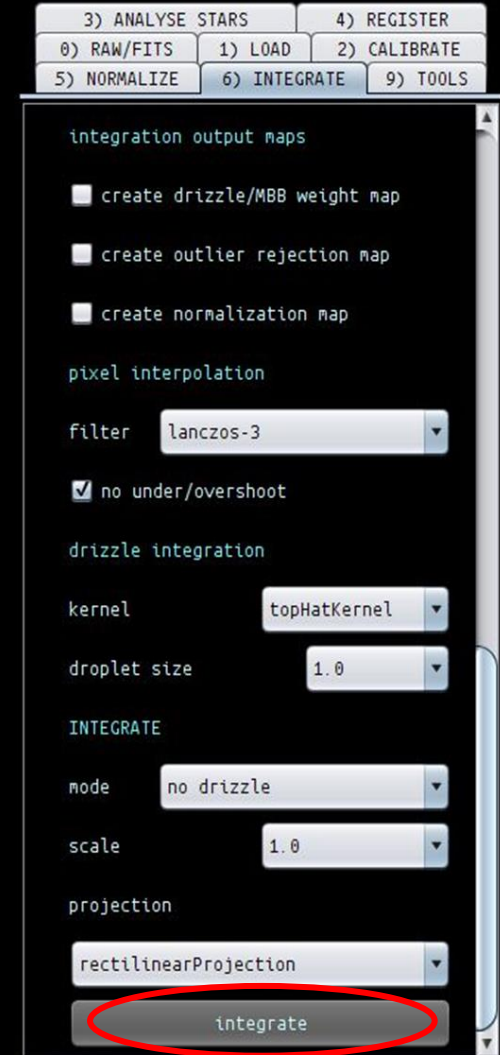
1 000 B:000 016 3  
1 239 W:255 255 3  
reset 10.0 G:01.00 0.1  
 DDP  auto  saturation  
15% BG, 3 sigma, 2,5% base  
1 239 ST:255 255 3  
1 000 BA:000 016 3  
HL:000 250  
SAT:0.15  
SAT.TH:0.25  
1 000 CON:000 016 3  
SHARP:00.0 20.0

select	frame	file name	ISO/gain	exposure (s)	time shot	#stars & star density	background & dispersion	SNR & noise	FWHM min, max (abs & rel)	quality score	Registration RMS - #stars	Instrument	color space
<input checked="" type="checkbox"/>	Light 1	N:\Astrokurs\DeepSky\M45\20090101\Light\M45_20090101_009.CR2	800	100	2009:01:01 21:40:04	-	-	-	-	-	-	CANON EOS 40D	14b sRGB
<input checked="" type="checkbox"/>	Light 2	N:\Astrokurs\DeepSky\M45\20090101\Light\M45_20090101_010.CR2	800	100	2009:01:01 21:51:19	-	-	-	-	-	-	CANON EOS 40D	14b sRGB
<input checked="" type="checkbox"/>	Light 3	N:\Astrokurs\DeepSky\M45\20090101\Light\M45_20090101_011.CR2	800	100	2009:01:01 21:54:34	-	-	-	-	-	-	CANON EOS 40D	14b sRGB
<input checked="" type="checkbox"/>	Light 4	N:\Astrokurs\DeepSky\M45\20090101\Light\M45_20090101_012.CR2	800	100	2009:01:01 21:57:49	-	-	-	-	-	-	CANON EOS 40D	14b sRGB
<input checked="" type="checkbox"/>	Light 5	N:\Astrokurs\DeepSky\M45\20090101\Light\M45_20090101_013.CR2	800	100	2009:01:01 22:01:04	-	-	-	-	-	-	CANON EOS 40D	14b sRGB
<input checked="" type="checkbox"/>	Light 6	N:\Astrokurs\DeepSky\M45\20090101\Light\M45_20090101_014.CR2	800	100	2009:01:01 22:04:19	-	-	-	-	-	-	CANON EOS 40D	14b sRGB
<input checked="" type="checkbox"/>	Light 7	N:\Astrokurs\DeepSky\M45\20090101\Light\M45_20090101_015.CR2	800	100	2009:01:01 22:07:34	-	-	-	-	-	-	CANON EOS 40D	14b sRGB
<input checked="" type="checkbox"/>	Light 8	N:\Astrokurs\DeepSky\M45\20090101\Light\M45_20090101_016.CR2	800	100	2009:01:01 22:10:49	-	-	-	-	-	-	CANON EOS 40D	14b sRGB
<input checked="" type="checkbox"/>	Light 9	N:\Astrokurs\DeepSky\M45\20090101\Light\M45_20090101_017.CR2	800	100	2009:01:01 22:14:04	-	-	-	-	-	-	CANON EOS 40D	14b sRGB
<input checked="" type="checkbox"/>	Flat 01	N:\Astrokurs\DeepSky\M45\20090101\Flat\Flats_Borg101_20090101_001.CR2	800	0,067	2009:01:02 01:54:51	-	-	-	-	-	-	CANON EOS 40D	14b sRGB
<input checked="" type="checkbox"/>	Flat 02	N:\Astrokurs\DeepSky\M45\20090101\Flat\Flats_Borg101_20090101_002.CR2	800	0,077	2009:01:02 01:54:51	-	-	-	-	-	-	CANON EOS 40D	14b sRGB

# Integrasjon



- Med bilder fra DSLR kan man stort sett fint klare seg med standardinnstillingene.
- Det er mange ting man kan skru på om man vil, og ønsker å eksperimentere.
- Anbefaler at man kjører med en form for «Outlier rejection». Denne funksjonen fjerner satelittspor o.l.
- Trykk «Integrate» for å starte jobben. Da kjører trinn 2, 3, 4, 5 og 6.



# Integrasjonsjobben kjører

Astro Pixel Processor version 1.070 by Aries Productions

LICENSE CFG HDD 707GB OpenGL orientation scale to fit rectilinearProjection linear(L)

#CPU 4 using 03 threads APP 13% 0S 58% Stack task requires 0.1 GBs of Free harddisk space

RAM APP 450/2048 0S 6481/16344

N:\Astrokurs\DeepSky\M45

3) ANALYSE STARS 4) REGISTER  
8) RAW/FITS 1) LOAD 2) CALIBRATE  
5) NORMALIZE 6) INTEGRATE 9) TOOLS

integration output maps

- create drizzle/MBB weight map
- create outlier rejection map
- create normalization map

pixel interpolation

filter lanczos-3

no under/overshoot

drizzle integration

kernel topHatKernel

droplet size 1.0

INTEGRATE

node no drizzle

scale 1.0

projection rectilinearProjection

Integrate

2) CALIBRATE: creating MasterDark, ISO/gain: 800.0 DIM: 3944x2622

```

18:49:44 - 2) CALIBRATE: will create 1 MasterDark frames...
18:49:44 - 2) CALIBRATE: creating MasterDark, ISO/gain: 800.0 DIM: 3944x2622
18:49:44 - 2) CALIBRATE: integrate dark frames: starting integration task...
18:49:44 - 2) CALIBRATE: integrate dark frames: integration mode: average
18:49:44 - 2) CALIBRATE: integrate dark frames: regular integration/no Drizzle: data resampling filter: not applicable
18:49:44 - 2) CALIBRATE: integrate dark frames: Force CFA disabled: only Bayer CFA processing of frames if frames contain relevant metadata
18:49:44 - 2) CALIBRATE: integrate dark frames: NOT demosaicing (calibration on CFA pixels)
18:49:44 - 2) CALIBRATE: integrate dark frames: demosaic algorithm: Adaptive Airy Disc
18:49:44 - 2) CALIBRATE: integrate dark frames: demosaic pattern: supported
18:49:44 - 2) CALIBRATE: integrate dark frames: number of frames: 4
18:49:44 - 2) CALIBRATE: integrate dark frames: frame type: Dark
18:49:44 - 2) CALIBRATE: integrate dark frames: outlier rejection filter: no rejection
18:49:44 -
18:49:44 - 2) CALIBRATE: integrate dark frames: loading 1st frame
18:49:45 - 2) CALIBRATE: integrate dark frames: got frame details, setting up integration task...
18:49:45 - 2) CALIBRATE: integrate dark frames: got size of 1 frame: 20 MegaBytes
18:49:45 - 2) CALIBRATE: integrate dark frames: using read buffer of 4080 KiloBytes
18:49:45 - 2) CALIBRATE: integrate dark frames: integration buffer consumes 131072 KiloBytes of RAM memory
18:49:45 - 2) CALIBRATE: integrate dark frames: created memory to file mapper for main integration task
18:49:46 - 2) CALIBRATE: integrate dark frames: wrote frame: 1 to file mapper
18:49:47 - 2) CALIBRATE: integrate dark frames: loaded frame 2 of 4 frames
18:49:47 - 2) CALIBRATE: integrate dark frames: wrote frame: 2 to file mapper
18:49:48 - 2) CALIBRATE: integrate dark frames: loaded frame 3 of 4 frames
18:49:49 - 2) CALIBRATE: integrate dark frames: wrote frame: 3 to file mapper
18:49:49 - 2) CALIBRATE: integrate dark frames: loaded frame 4 of 4 frames
18:49:52 - 2) CALIBRATE: integrate dark frames: integrating pixels 8355841 to 10341168
18:49:52 - 2) CALIBRATE: integrate dark frames: constructing integration result
  
```

Completed 39%

cancel 2) CALIBRATE

log colors

stretch save

neutralize-BG invert data

1 000 B:000 016 3

1 239 W:255 255 3

reset 10.0 G:01.00 0.1

DDP  auto  saturation

15% BG, 3 sigma, 2,5% base

1 239 ST:255 255 3

1 000 BA:000 016 3

0 HL:000 250

0.00 SAT:0.15 0.50

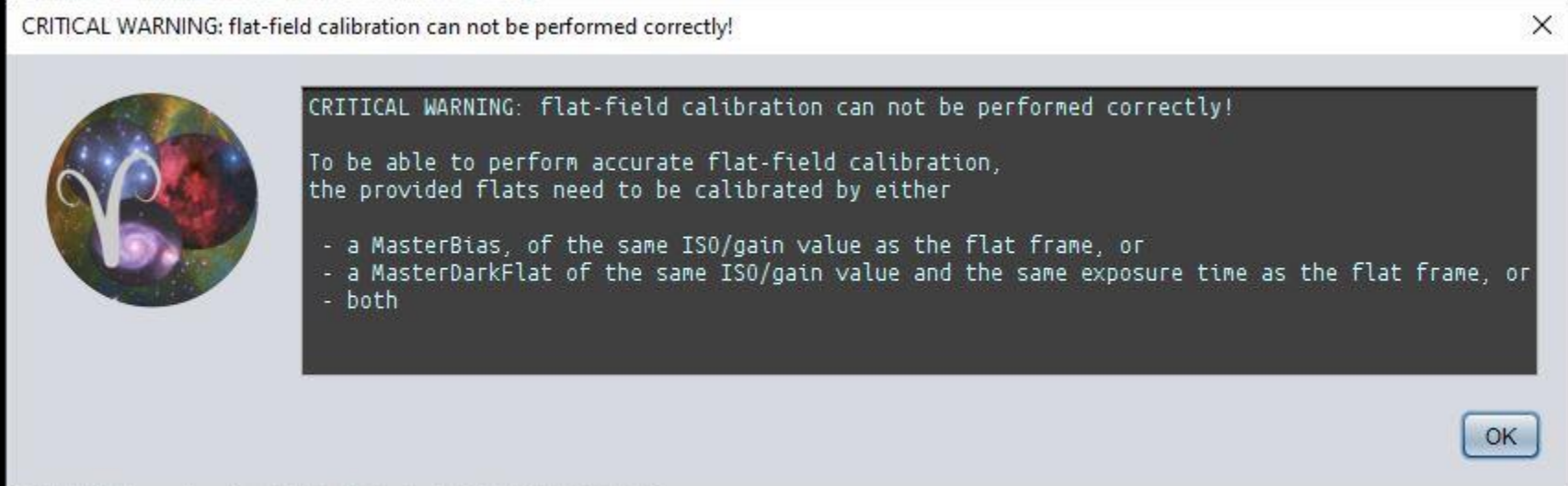
0.00 SAT.TH:0.25 1.00

1 000 CON:000 016 3

0.0 SHARP:00.0 20.0

select	frame	file name	ISO/gain	exposure (s)	time shot	#stars & star density	background & dispersion	SNR & noise	FWHM min, max (abs & rel)	quality score	Registration RMS - #stars	Instrument	color space
<input checked="" type="checkbox"/>	Light 1	N:\Astrokurs\DeepSky\M45\20090101\Light\M45_20090101_009.CR2	800	100	2009:01:01 21:48:04	-	-	-	-	-	-	CANON EOS 400	14b sRGB
<input checked="" type="checkbox"/>	Light 2	N:\Astrokurs\DeepSky\M45\20090101\Light\M45_20090101_010.CR2	800	100	2009:01:01 21:51:19	-	-	-	-	-	-	CANON EOS 400	14b sRGB
<input checked="" type="checkbox"/>	Light 3	N:\Astrokurs\DeepSky\M45\20090101\Light\M45_20090101_011.CR2	800	100	2009:01:01 21:54:34	-	-	-	-	-	-	CANON EOS 400	14b sRGB
<input checked="" type="checkbox"/>	Light 4	N:\Astrokurs\DeepSky\M45\20090101\Light\M45_20090101_012.CR2	800	100	2009:01:01 21:57:49	-	-	-	-	-	-	CANON EOS 400	14b sRGB
<input checked="" type="checkbox"/>	Light 5	N:\Astrokurs\DeepSky\M45\20090101\Light\M45_20090101_013.CR2	800	100	2009:01:01 22:01:04	-	-	-	-	-	-	CANON EOS 400	14b sRGB
<input checked="" type="checkbox"/>	Light 6	N:\Astrokurs\DeepSky\M45\20090101\Light\M45_20090101_014.CR2	800	100	2009:01:01 22:04:19	-	-	-	-	-	-	CANON EOS 400	14b sRGB
<input checked="" type="checkbox"/>	Light 7	N:\Astrokurs\DeepSky\M45\20090101\Light\M45_20090101_015.CR2	800	100	2009:01:01 22:07:34	-	-	-	-	-	-	CANON EOS 400	14b sRGB
<input checked="" type="checkbox"/>	Light 8	N:\Astrokurs\DeepSky\M45\20090101\Light\M45_20090101_016.CR2	800	100	2009:01:01 22:10:49	-	-	-	-	-	-	CANON EOS 400	14b sRGB
<input checked="" type="checkbox"/>	Light 9	N:\Astrokurs\DeepSky\M45\20090101\Light\M45_20090101_017.CR2	800	100	2009:01:01 22:14:04	-	-	-	-	-	-	CANON EOS 400	14b sRGB
<input checked="" type="checkbox"/>	Flat 01	N:\Astrokurs\DeepSky\M45\20090101\Flat\Flats_Borg101_20090101_001.CR2	800	0.067	2009:01:02 01:54:51	-	-	-	-	-	-	CANON EOS 400	14b sRGB
<input checked="" type="checkbox"/>	Flat 02	N:\Astrokurs\DeepSky\M45\20090101\Flat\Flats_Borg101_20090101_002.CR2	800	0.077	2009:01:02 01:54:51	-	-	-	-	-	-	CANON EOS 400	14b sRGB

# Feilmeldinger



- Programmet kan i noen tilfeller stoppe opp og be om input fra brukeren.
- Denne feilmeldingen kom fordi jeg ikke har Bias-bilder.
- Flat-bildene blir derfor ikke optimalt korrigert. Men dette er neppe så kritisk som det kan virke i advarselen.
- Trykk OK, og programmet kjører videre.



# APP fyller ut fil-lista nederst med info om bildene



Astro Pixel Processor version 1.070 by Aries Productions

LICENSE CFG HDD 706GB OpenGL

#CPU 4 using 03 threads APP 60%

RAM APP 1008/2048 OS 7083/16344

orientation scale to fit **rectilinearProjection** linear()

Integration task requires 1,0 GBs of Free harddisk space

6) INTEGRATE: integrate light frames: loading frames of integration ...

```
18:54:54 - 6) INTEGRATE: integrating light frames...
18:54:54 - 6) INTEGRATE: found: 9 light frames to integrate...
18:54:54 - 6) INTEGRATE: created 9 image loaders, starting integration...
18:54:54 - 6) INTEGRATE: integrate light frames: starting integration task...
18:54:54 - 6) INTEGRATE: integrate light frames: composition: full
18:54:54 - 6) INTEGRATE: integrate light frames: integration weights: equal
18:54:54 - 6) INTEGRATE: integrate light frames: projection of data: rectilinearProjection
18:54:54 - 6) INTEGRATE: integrate light frames: integration mode: average
18:54:54 - 6) INTEGRATE: integrate light frames: regular integration/no Drizzle: data resampling filter: lanczos-3-NUOS
18:54:54 - 6) INTEGRATE: integrate light frames: scaling integration/increasing resolution: 1.0x
18:54:54 - 6) INTEGRATE: integrate light frames: Force CFA disabled: only demosaicing frames if frames contain relevant metadata
18:54:54 - 6) INTEGRATE: integrate light frames: demosaic algorithm: Adaptive Airy Disc
18:54:54 - 6) INTEGRATE: integrate light frames: demosaic pattern: supported
18:54:54 - 6) INTEGRATE: integrate light frames: normalization mode: regular
18:54:54 - 6) INTEGRATE: integrate light frames: normalization method: add-scale
18:54:54 - 6) INTEGRATE: integrate light frames: applying background neutralization in normalization
18:54:54 - 6) INTEGRATE: integrate light frames: number of frames: 9
18:54:54 - 6) INTEGRATE: integrate light frames: frame type: Light
18:54:54 - 6) INTEGRATE: integrate light frames: outlier rejection filter: LN MAD winsor clip
18:54:54 - 6) INTEGRATE: integrate light frames: outlier rejection iterations: 1
18:54:54 - 6) INTEGRATE: integrate light frames: outlier rejection kappa: 3.0
18:54:54 - 6) INTEGRATE: integrate light frames: outlier rejection diffraction protection: none
18:54:54 - 6) INTEGRATE: integrate light frames: create rejection map: false
18:54:54 - 6) INTEGRATE: integrate light frames: create weight map (MBB and/or Drizzle): false
18:54:54 - 6) INTEGRATE: integrate light frames: create normalization map: false
18:54:54 - 6) INTEGRATE: integrate light frames: use Local Normalization Correction: false
18:54:54 -
18:54:54 - 6) INTEGRATE: integrate light frames: loading 1st frame
18:55:04 - 6) INTEGRATE: integrate light frames: got frame details, setting up integration task...
18:55:04 - 6) INTEGRATE: integrate light frames: got size of 1 frame: 115 MegaBytes
18:55:04 - 6) INTEGRATE: integrate light frames: using read buffer of 4080 KiloBytes
18:55:04 - 6) INTEGRATE: integrate light frames: integration buffer consumes 442368 KiloBytes of RAM memory
18:55:04 - 6) INTEGRATE: integrate light frames: created memory to file mapper for main integration task
18:55:07 - 6) INTEGRATE: integrate light frames: wrote frame: 1 to file mapper
18:55:12 - 6) INTEGRATE: integrate light frames: loaded frame 2 of 9 frames
18:55:16 - 6) INTEGRATE: integrate light frames: wrote frame: 2 to file mapper
18:55:21 - 6) INTEGRATE: integrate light frames: loaded frame 3 of 9 frames
18:55:24 - 6) INTEGRATE: integrate light frames: wrote frame: 3 to file mapper
18:55:28 - 6) INTEGRATE: integrate light frames: loaded frame 4 of 9 frames
18:55:31 - 6) INTEGRATE: integrate light frames: wrote frame: 4 to file mapper
18:55:35 - 6) INTEGRATE: integrate light frames: loaded frame 5 of 9 frames
```

Completed 17%

cancel 6) INTEGRATE

3) ANALYSE STARS 4) REGISTER  
8) RAW/FITS 1) LOAD 2) CALIBRATE  
5) NORMALIZE 6) INTEGRATE 9) TOOLS

integration output maps

- create drizzle/MBB weight map
- create outlier rejection map
- create normalization map

pixel interpolation

filter **lanczos-3**

no under/overshoot

drizzle integration

kernel **topHatKernel**

droplet size **1.0**

INTEGRATE

node **no drizzle**

scale **1.0**

projection **rectilinearProjection**

log colors

stretch save

neutralize-BC invert data

1 000 B: 000 016 3

1 239 M: 255 255 3

reset 10.0 G: 01.00 0.1

DDP  auto  saturation

15% BG, 3 sigma, 2,5% base

1 239 ST: 255 255 3

1 000 BA: 000 016 3

0 HL: 000 250

0,00 SAT: 0,15 0,50

0,00 SAT: TH: 0,25 1,00

1 000 CON: 000 016 3

0,0 SHARP: 0,0 20,0

select	frame	file name	iso/gain	exposure (s)	time shot	#stars & star density	background & dispersion
<input checked="" type="checkbox"/>	Light 1 MD-1 MF-1 CA STAR REC NORM	N:\Astrokurs\DeepSky\M45\20090101\Light\M45_20090101_009.CR2	800	100	2009-01-01 21:48:04	766 766	1,1362E-02 - 1,7258E-03 1,6589E-02 - 1,9195E-03 1,1919E-02 - 1,8688E-03
<input checked="" type="checkbox"/>	Light 2 MD-1 MF-1 CA STAR REC NORM	N:\Astrokurs\DeepSky\M45\20090101\Light\M45_20090101_010.CR2	800	100	2009-01-01 21:51:19	820 820	1,1237E-02 - 1,6944E-03 1,6366E-02 - 1,9123E-03 1,1727E-02 - 1,8546E-03
<input checked="" type="checkbox"/>	Light 3 MD-1 MF-1 CA STAR REC NORM	N:\Astrokurs\DeepSky\M45\20090101\Light\M45_20090101_011.CR2	800	100	2009-01-01 21:54:34	856 856	1,1291E-02 - 1,7019E-03 1,6101E-02 - 1,9112E-03 1,1545E-02 - 1,8456E-03
<input checked="" type="checkbox"/>	Light 4 MD-1 MF-1 CA STAR REC NORM	N:\Astrokurs\DeepSky\M45\20090101\Light\M45_20090101_012.CR2	800	100	2009-01-01 21:57:49	795 795	1,1186E-02 - 1,7017E-03 1,5994E-02 - 1,8978E-03 1,1373E-02 - 1,8396E-03
<input checked="" type="checkbox"/>	Light 5 MD-1 MF-1 CA STAR REC NORM	N:\Astrokurs\DeepSky\M45\20090101\Light\M45_20090101_013.CR2	800	100	2009-01-01 22:01:04	798 798	1,1097E-02 - 1,7059E-03 1,5815E-02 - 1,8993E-03 1,1192E-02 - 1,8200E-03
<input checked="" type="checkbox"/>	Light 6 MD-1 MF-1 CA STAR REC NORM	N:\Astrokurs\DeepSky\M45\20090101\Light\M45_20090101_014.CR2	800	100	2009-01-01 22:04:19	841 841	1,0999E-02 - 1,6984E-03 1,5724E-02 - 1,8780E-03 1,1056E-02 - 1,7992E-03
<input checked="" type="checkbox"/>	Light 7 MD-1 MF-1 CA STAR REC NORM	N:\Astrokurs\DeepSky\M45\20090101\Light\M45_20090101_015.CR2	800	100	2009-01-01 22:07:34	886 886	1,0996E-02 - 1,7084E-03 1,5695E-02 - 1,9007E-03 1,0998E-02 - 1,8076E-03
<input checked="" type="checkbox"/>	Light 8 MD-1 MF-1 CA STAR REC NORM	N:\Astrokurs\DeepSky\M45\20090101\Light\M45_20090101_016.CR2	800	100	2009-01-01 22:10:49	937 937	1,1072E-02 - 1,7096E-03 1,5428E-02 - 1,8774E-03 1,0653E-02 - 1,7617E-03
<input checked="" type="checkbox"/>	Light 9 MD-1 MF-1 CA STAR REC NORM	N:\Astrokurs\DeepSky\M45\20090101\Light\M45_20090101_017.CR2	800	100	2009-01-01 22:14:04	880 880	1,1066E-02 - 1,7014E-03 1,5359E-02 - 1,8924E-03 1,0602E-02 - 1,7625E-03
<input checked="" type="checkbox"/>	Flat #1	N:\Astrokurs\DeepSky\M45\20090101\Flat\Flats_Borg101_20090101_001.CR2	800	0,067	2009-01-02 01:54:51	-	-
<input checked="" type="checkbox"/>	Flat #2	N:\Astrokurs\DeepSky\M45\20090101\Flat\Flats_Borg101_20090101_002.CR2	800	0,077	2009-01-02 01:54:51	-	-

# Info om bildene



select	frame	file name	ISO/gain	exposure (s)	time shot	#stars & star density	background & dispersion
<input checked="" type="checkbox"/>	Light 1	MD-1 MF-1 CA STAR REG NORM N:\Astrokurs\DeepSky\M45\20090101\Light\M45_20090101_009.CR2	800	180	2009:01:01 21:48:04	766 766	1,1362E-02 - 1,7258E-03 1,6580E-02 - 1,9195E-03
<input checked="" type="checkbox"/>	Light 2	MD-1 MF-1 CA STAR REG NORM N:\Astrokurs\DeepSky\M45\20090101\Light\M45_20090101_010.CR2	800	180	2009:01:01 21:51:19	820 820	1,1237E-02 - 1,6944E-03 1,6366E-02 - 1,9123E-03
<input checked="" type="checkbox"/>	Light 3	MD-1 MF-1 CA STAR REG NORM N:\Astrokurs\DeepSky\M45\20090101\Light\M45_20090101_011.CR2	800	180	2009:01:01 21:54:34	856 856	1,1291E-02 - 1,7019E-03 1,6101E-02 - 1,9112E-03
<input checked="" type="checkbox"/>	Light 4	MD-1 MF-1 CA STAR REG NORM N:\Astrokurs\DeepSky\M45\20090101\Light\M45_20090101_012.CR2	800	180	2009:01:01 21:57:49	795 795	1,1186E-02 - 1,7017E-03 1,5994E-02 - 1,9078E-03
<input checked="" type="checkbox"/>	Light 5	MD-1 MF-1 CA STAR REG NORM N:\Astrokurs\DeepSky\M45\20090101\Light\M45_20090101_013.CR2	800	180	2009:01:01 22:01:04	798 798	1,1097E-02 - 1,7059E-03 1,5815E-02 - 1,9093E-03
<input checked="" type="checkbox"/>	Light 6	MD-1 MF-1 CA STAR REG NORM N:\Astrokurs\DeepSky\M45\20090101\Light\M45_20090101_014.CR2	800	180	2009:01:01 22:04:19	841 841	1,0999E-02 - 1,6904E-03 1,5724E-02 - 1,8700E-03
<input checked="" type="checkbox"/>	Light 7	MD-1 MF-1 CA STAR REG NORM N:\Astrokurs\DeepSky\M45\20090101\Light\M45_20090101_015.CR2	800	180	2009:01:01 22:07:34	886 886	1,0996E-02 - 1,7084E-03 1,5695E-02 - 1,9007E-03
<input checked="" type="checkbox"/>	Light 8	MD-1 MF-1 CA STAR REG NORM N:\Astrokurs\DeepSky\M45\20090101\Light\M45_20090101_016.CR2	800	180	2009:01:01 22:10:49	937 937	1,1072E-02 - 1,7096E-03 1,5428E-02 - 1,8774E-03
<input checked="" type="checkbox"/>	Light 9	MD-1 MF-1 CA STAR REG NORM N:\Astrokurs\DeepSky\M45\20090101\Light\M45_20090101_017.CR2	800	180	2009:01:01 22:14:04	888 888	1,1060E-02 - 1,7014E-03 1,5359E-02 - 1,8924E-03
<input checked="" type="checkbox"/>	Flat 01	N:\Astrokurs\DeepSky\M45\20090101\Flat\Flats_Borg101_20090101_001.CR2	800	0,067	2009:01:02 01:54:51	-	-
<input checked="" type="checkbox"/>	Flat 02	N:\Astrokurs\DeepSky\M45\20090101\Flat\Flats_Borg101_20090101_002.CR2	800	0,077	2009:01:02 01:54:51	-	-
<input checked="" type="checkbox"/>	Flat 03	N:\Astrokurs\DeepSky\M45\20090101\Flat\Flats_Borg101_20090101_003.CR2	800	0,077	2009:01:02 01:54:52	-	-
<input checked="" type="checkbox"/>	Flat 04	N:\Astrokurs\DeepSky\M45\20090101\Flat\Flats_Borg101_20090101_004.CR2	800	0,077	2009:01:02 01:54:52	-	-
<input checked="" type="checkbox"/>	Flat 05	N:\Astrokurs\DeepSky\M45\20090101\Flat\Flats_Borg101_20090101_005.CR2	800	0,100	2009:01:02 01:54:53	-	-
<input checked="" type="checkbox"/>	Flat 06	N:\Astrokurs\DeepSky\M45\20090101\Flat\Flats_Borg101_20090101_006.CR2	800	0,100	2009:01:02 01:54:54	-	-
<input checked="" type="checkbox"/>	Flat 07	N:\Astrokurs\DeepSky\M45\20090101\Flat\Flats_Borg101_20090101_007.CR2	800	0,100	2009:01:02 01:54:54	-	-
<input checked="" type="checkbox"/>	Flat 08	N:\Astrokurs\DeepSky\M45\20090101\Flat\Flats_Borg101_20090101_008.CR2	800	0,077	2009:01:02 01:54:55	-	-
<input checked="" type="checkbox"/>	Flat 09	N:\Astrokurs\DeepSky\M45\20090101\Flat\Flats_Borg101_20090101_009.CR2	800	0,077	2009:01:02 01:54:55	-	-
<input checked="" type="checkbox"/>	Flat 10	N:\Astrokurs\DeepSky\M45\20090101\Flat\Flats_Borg101_20090101_010.CR2	800	0,100	2009:01:02 01:54:56	-	-
<input checked="" type="checkbox"/>	Flat 11	N:\Astrokurs\DeepSky\M45\20090101\Flat\Flats_Borg101_20090101_011.CR2	800	0,077	2009:01:02 01:54:57	-	-
<input checked="" type="checkbox"/>	Flat 12	N:\Astrokurs\DeepSky\M45\20090101\Flat\Flats_Borg101_20090101_012.CR2	800	0,077	2009:01:02 01:54:57	-	-
<input checked="" type="checkbox"/>	Flat 13	N:\Astrokurs\DeepSky\M45\20090101\Flat\Flats_Borg101_20090101_013.CR2	800	0,100	2009:01:02 01:54:58	-	-
<input checked="" type="checkbox"/>	Flat 14	N:\Astrokurs\DeepSky\M45\20090101\Flat\Flats_Borg101_20090101_014.CR2	800	0,100	2009:01:02 01:54:59	-	-
<input checked="" type="checkbox"/>	Flat 15	N:\Astrokurs\DeepSky\M45\20090101\Flat\Flats_Borg101_20090101_015.CR2	800	0,100	2009:01:02 01:54:59	-	-
<input checked="" type="checkbox"/>	Dark 1	N:\Astrokurs\DeepSky\M45\20090101\Dark\Darks_3min_20090101_001.CR2	800	180	2009:01:02 01:05:06	-	-
<input checked="" type="checkbox"/>	Dark 2	N:\Astrokurs\DeepSky\M45\20090101\Dark\Darks_3min_20090101_002.CR2	800	180	2009:01:02 01:08:21	-	-
<input checked="" type="checkbox"/>	Dark 3	N:\Astrokurs\DeepSky\M45\20090101\Dark\Darks_3min_20090101_003.CR2	800	180	2009:01:02 01:11:36	-	-
<input checked="" type="checkbox"/>	Dark 4	N:\Astrokurs\DeepSky\M45\20090101\Dark\Darks_3min_20090101_004.CR2	800	180	2009:01:02 01:14:51	-	-
<input checked="" type="checkbox"/>	MasterFlat MF-1	N:\Astrokurs\DeepSky\M45\MF-ISO_gain_000_0-exp_0_1s-15subs-CANON_EOS_40D-3944x2622...	800	0,100	N/A	-	-
<input checked="" type="checkbox"/>	MasterDark MD-1	N:\Astrokurs\DeepSky\M45\MD-ISO_gain_000_0-exp_180_0s-4subs-CANON_EOS_40D-3944x2622...	800	180	N/A	-	-
<input checked="" type="checkbox"/>	Integration 1	N:\Astrokurs\DeepSky\M45\St-avg-1620_0s-LNMHC_1_3_0_none-x_1_0_LZ3-NS-Full-eq-add-...	0,000	1620	N/A	-	-

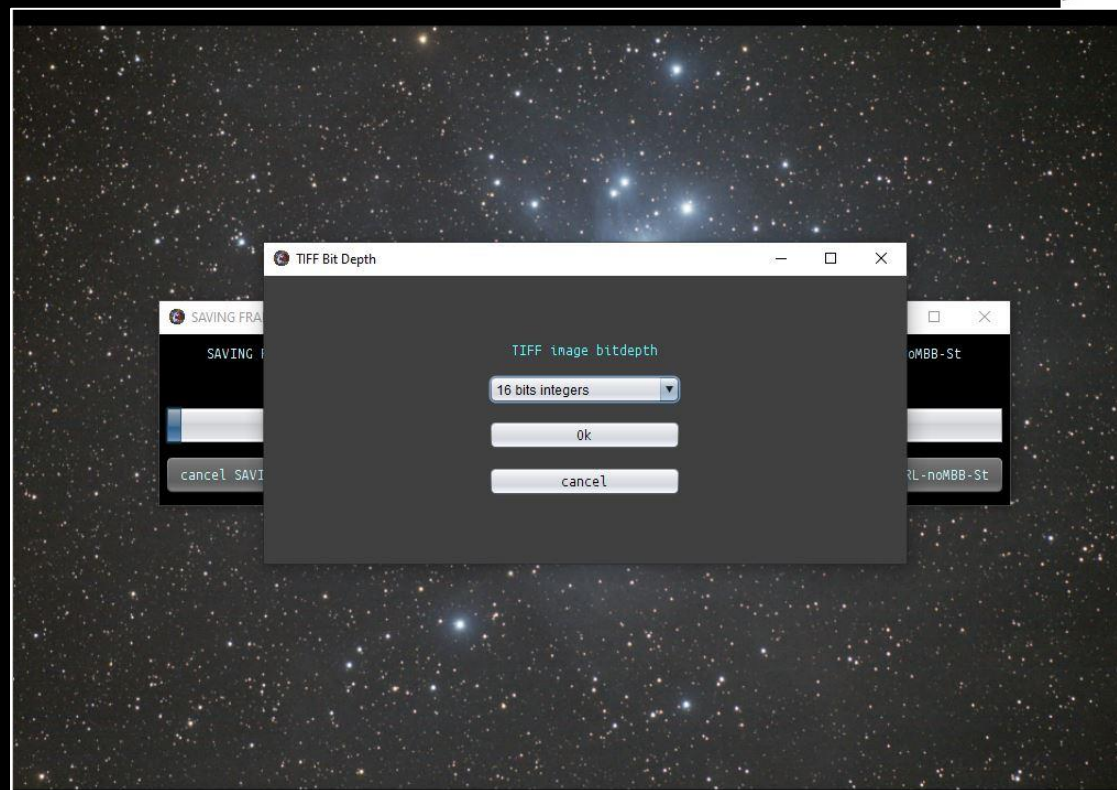
# Stackingen er ferdig og bildet vises

Ikke hak av for *neutralize-BG*

The screenshot displays the Astro Pixel Processor (APP) interface. The main window shows a processed star field image. On the left, there are control panels for system status (CPU, RAM, OS), file location (N: \Astrokurs\DeepSky\M45), and processing options (ANALYSE STARS, REGISTER, RAW/FITS, LOAD, CALIBRATE, NORMALIZE, INTEGRATE, TOOLS). Below these are settings for integration output maps, pixel interpolation (filter: lanczos-3, no under/overshoot), drizzle integration (kernel: topHatKernel, droplet size: 1.0), and projection (rectilinearProjection). A central panel shows FITS header information for HDU1, including parameters like SIMPLE, BITPIX, NAXIS, DATE, SOFTWARE, VERSION, INTEGRATION, CFIMAGE, GAIN, EXPTIME, LOK, SCALE, NOISE, SNR, medNR, medENR, reFNR, and END. On the right, there is a histogram plot with 'stretch' and 'save' buttons, and a 'neutralize-BG' checkbox which is unchecked. Below the histogram are various sliders for background and saturation control, including '15% BG, 3 sigma, 2,5% base' and 'SAT: 0,15'. At the bottom, a table lists the processed frames and their metadata.

select	frame	file name	ISO/gain	exposure (s)	time shot	#stars & star density	background & dispersion	SNR & noise
<input checked="" type="checkbox"/>	Flat 11	N:\Astrokurs\DeepSky\M45\20090101\Flat\Plats_Borg101_20090101_011.CR2	800	0,077	2009-01-02 01:54:57	-	-	-
<input checked="" type="checkbox"/>	Flat 12	N:\Astrokurs\DeepSky\M45\20090101\Flat\Plats_Borg101_20090101_012.CR2	800	0,077	2009-01-02 01:54:57	-	-	-
<input checked="" type="checkbox"/>	Flat 13	N:\Astrokurs\DeepSky\M45\20090101\Flat\Plats_Borg101_20090101_013.CR2	800	0,100	2009-01-02 01:54:58	-	-	-
<input checked="" type="checkbox"/>	Flat 14	N:\Astrokurs\DeepSky\M45\20090101\Flat\Plats_Borg101_20090101_014.CR2	800	0,100	2009-01-02 01:54:59	-	-	-
<input checked="" type="checkbox"/>	Flat 15	N:\Astrokurs\DeepSky\M45\20090101\Flat\Plats_Borg101_20090101_015.CR2	800	0,100	2009-01-02 01:54:59	-	-	-
<input checked="" type="checkbox"/>	Dark 1	N:\Astrokurs\DeepSky\M45\20090101\Dark\Dark_3min_20090101_001.CR2	800	180	2009-01-02 01:05:06	-	-	-
<input checked="" type="checkbox"/>	Dark 2	N:\Astrokurs\DeepSky\M45\20090101\Dark\Dark_3min_20090101_002.CR2	800	180	2009-01-02 01:08:21	-	-	-
<input checked="" type="checkbox"/>	Dark 3	N:\Astrokurs\DeepSky\M45\20090101\Dark\Dark_3min_20090101_003.CR2	800	180	2009-01-02 01:11:36	-	-	-
<input checked="" type="checkbox"/>	Dark 4	N:\Astrokurs\DeepSky\M45\20090101\Dark\Dark_3min_20090101_004.CR2	800	180	2009-01-02 01:14:51	-	-	-
<input checked="" type="checkbox"/>	MasterFlat MF-1	N:\Astrokurs\DeepSky\M45\MF-ISO_gain_800_0_exp_0_15-15subs-CANON_EOS_400-3944x2622...	800	0,100	N/A	-	-	-
<input checked="" type="checkbox"/>	MasterDark MD-1	N:\Astrokurs\DeepSky\M45\MD-ISO_gain_800_0_exp_180_05-4subs-CANON_EOS_400-3944x2622...	800	180	N/A	-	-	-
<input checked="" type="checkbox"/>	Integration 1	N:\Astrokurs\DeepSky\M45\St-avg-1620_05-LMMWC_1_3_0_none-x_1_0_L23-NS-Full-eg-add-...	0,000	1620	N/A	-	-	-

# Lagring av bildet



- Oppgi filnavn
- Velg fargerom (sRGB eller Adobe)
- Velg filtype: Tiff 16 bits

# Finjustering i Lightroom: Utgangspunktet etter stacking i APP



# Finjustering i Lightroom: Ferdig etterbehandlet



# Justeringene som er gjort

Treatment: **Color** | Black & White

Profile: **Color** ▾

WB: **Custom** ▾

Temp  + 5

Tint  + 30

Tone **Auto**

Exposure  0,00

Contrast  0

Highlights  - 40

Shadows  0

Whites  0

Blacks  - 20

Presence

Texture  0

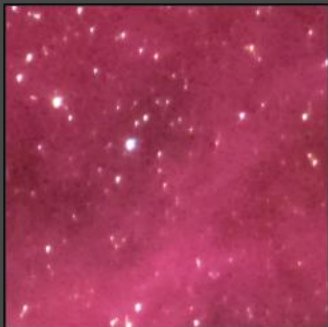
Clarity  + 50

Dehaze  + 75

Vibrance  0

Saturation  + 40

**Detail** ▾



Sharpening

Amount  0

Radius  1,0

Detail  25

Masking  0

Noise Reduction

Luminance  25

Detail  50

Contrast  0

Color  25

Detail  50

Smoothness  50

**Effects** ▾

Post-Crop Vignetting

Style **Color Priority** ▾

Amount  + 13

Midpoint  36

Roundness  0

Feather  68

Highlights  0

Grain

Amount  0

Size  25

Roughness  50

# Agenda

Huskeliste og grunnleggende om lagring

Behandling av enkeltbilder (tatt med kameralinser)

Stacking av flere bilder (tatt med kameralinser)

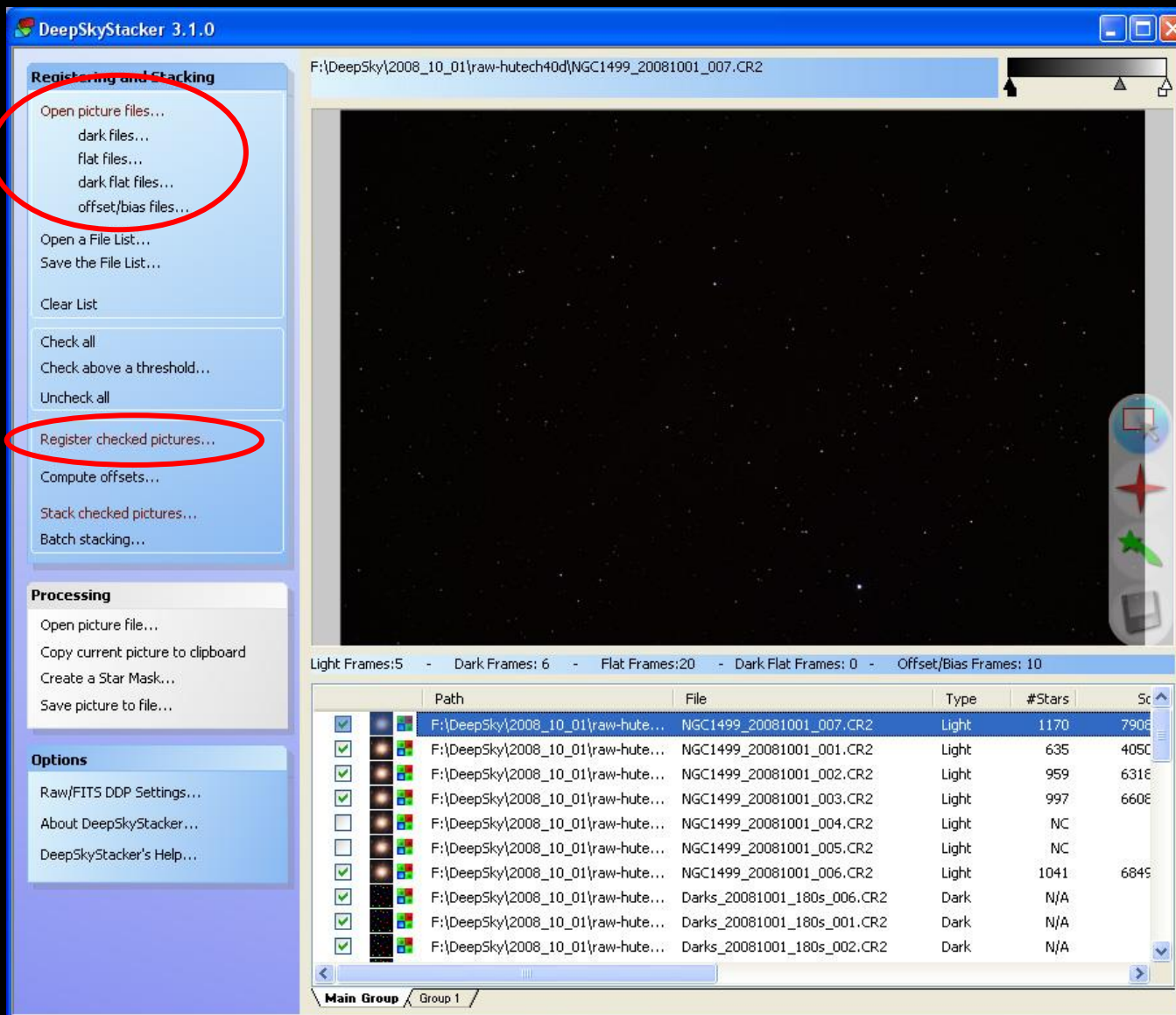
**Stacking av bilder tatt gjennom teleskop**

**Stacking med Astro Pixel Processor**

**Stacking med Deep Sky Stacker**



# Stacking med DSS



**DeepSkyStacker 3.1.0**

F:\DeepSky\2008\_10\_01\raw-hutech40d\NGC1499\_20081001\_007.CR2

**Registering and Stacking**

- Open picture files...
  - dark files...
  - flat files...
  - dark flat files...
  - offset/bias files...
- Open a File List...
- Save the File List...
- Clear List
- Check all
- Check above a threshold...
- Uncheck all
- Register checked pictures...
- Compute offsets...
- Stack checked pictures...
- Batch stacking...

**Processing**

- Open picture file...
- Copy current picture to clipboard
- Create a Star Mask...
- Save picture to file...

**Options**

- Raw/FITS DDP Settings...
- About DeepSkyStacker...
- DeepSkyStacker's Help...

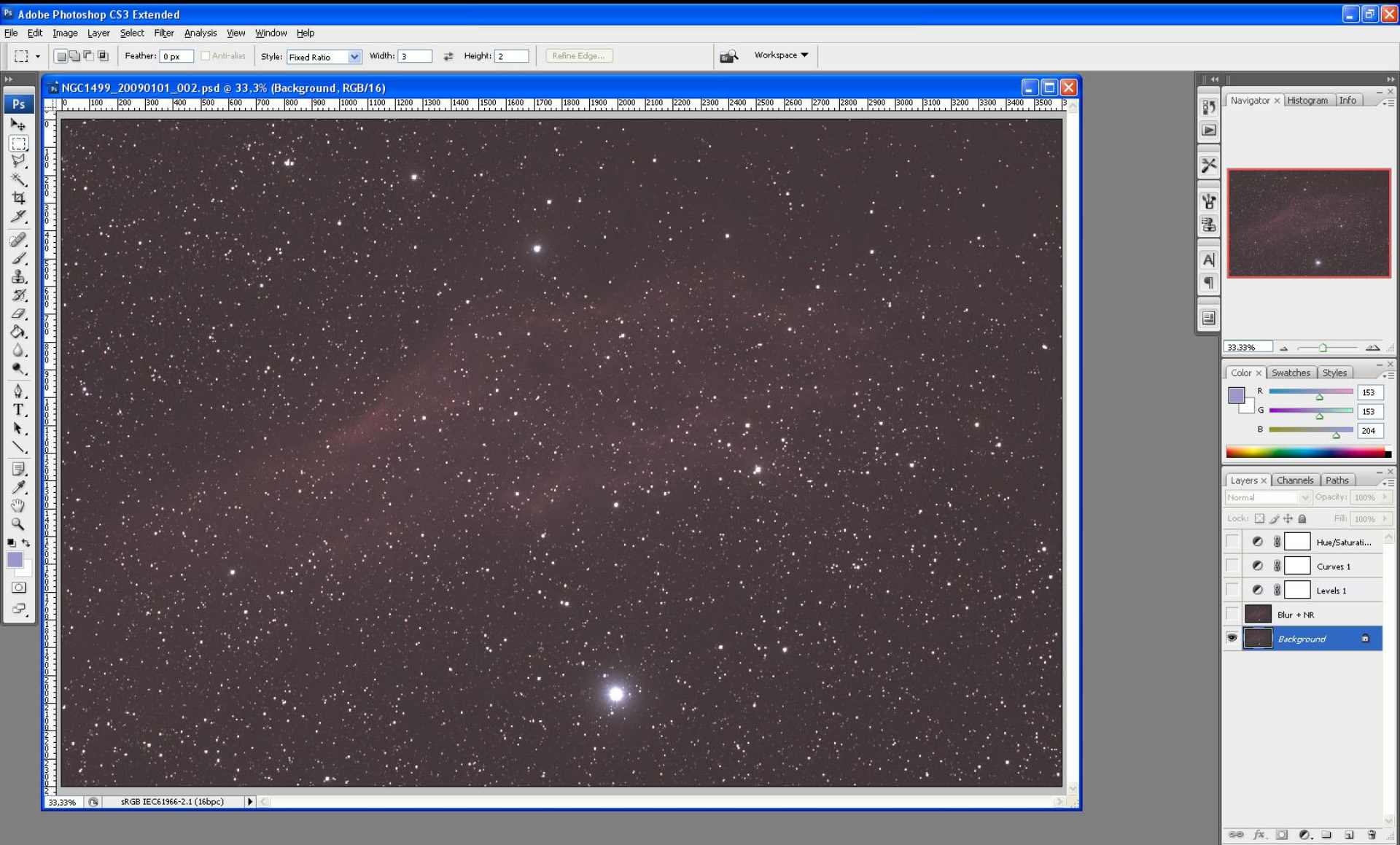
Light Frames:5 - Dark Frames: 6 - Flat Frames:20 - Dark Flat Frames: 0 - Offset/Bias Frames: 10

	Path	File	Type	#Stars	Sc
<input checked="" type="checkbox"/>	F:\DeepSky\2008_10_01\raw-hute...	NGC1499_20081001_007.CR2	Light	1170	7908
<input checked="" type="checkbox"/>	F:\DeepSky\2008_10_01\raw-hute...	NGC1499_20081001_001.CR2	Light	635	4050
<input checked="" type="checkbox"/>	F:\DeepSky\2008_10_01\raw-hute...	NGC1499_20081001_002.CR2	Light	959	6316
<input checked="" type="checkbox"/>	F:\DeepSky\2008_10_01\raw-hute...	NGC1499_20081001_003.CR2	Light	997	6608
<input type="checkbox"/>	F:\DeepSky\2008_10_01\raw-hute...	NGC1499_20081001_004.CR2	Light	NC	
<input type="checkbox"/>	F:\DeepSky\2008_10_01\raw-hute...	NGC1499_20081001_005.CR2	Light	NC	
<input checked="" type="checkbox"/>	F:\DeepSky\2008_10_01\raw-hute...	NGC1499_20081001_006.CR2	Light	1041	6849
<input checked="" type="checkbox"/>	F:\DeepSky\2008_10_01\raw-hute...	Darks_20081001_180s_006.CR2	Dark	N/A	
<input checked="" type="checkbox"/>	F:\DeepSky\2008_10_01\raw-hute...	Darks_20081001_180s_001.CR2	Dark	N/A	
<input checked="" type="checkbox"/>	F:\DeepSky\2008_10_01\raw-hute...	Darks_20081001_180s_002.CR2	Dark	N/A	

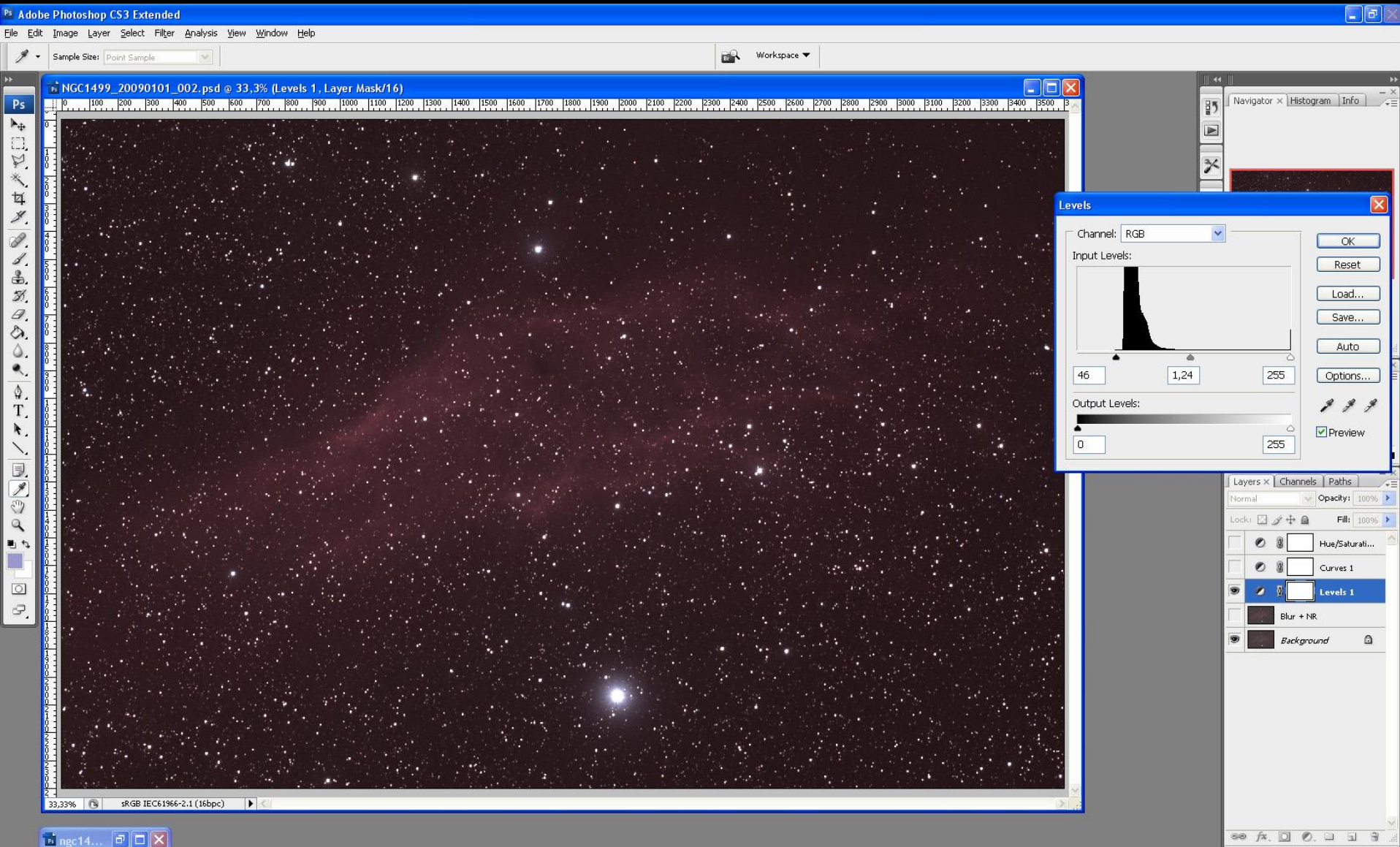
Main Group / Group 1

# Etterbehandling i Photoshop

Bildet slik det ser ut etter stacking i DSS, og før etterbehandling



# Juster histogram



The screenshot displays the Adobe Photoshop CS3 Extended interface. The main canvas shows a star field image titled "NGC1499\_20090101\_002.psd @ 33,3% (Levels 1, Layer Mask/16)". The Levels adjustment panel is open, showing the "Channel: RGB" and "Input Levels" histogram. The histogram shows a distribution of pixel values from 0 to 255, with a peak around 1,24. The "Output Levels" are set from 0 to 255. The Layers panel on the right shows the "Levels 1" layer selected. The status bar at the bottom indicates "33,33%" zoom and "sRGB IEC61966-2.1 (16bpc)" color profile.

Adobe Photoshop CS3 Extended

File Edit Image Layer Select Filter Analysis View Window Help

Sample Size: Point Sample Workspace

NGC1499\_20090101\_002.psd @ 33,3% (Levels 1, Layer Mask/16)

Channel: RGB

Input Levels:

46 1,24 255

Output Levels:

0 255

OK Reset Load... Save... Auto Options... Preview

Layers x Channels Paths

Normal Opacity: 100%

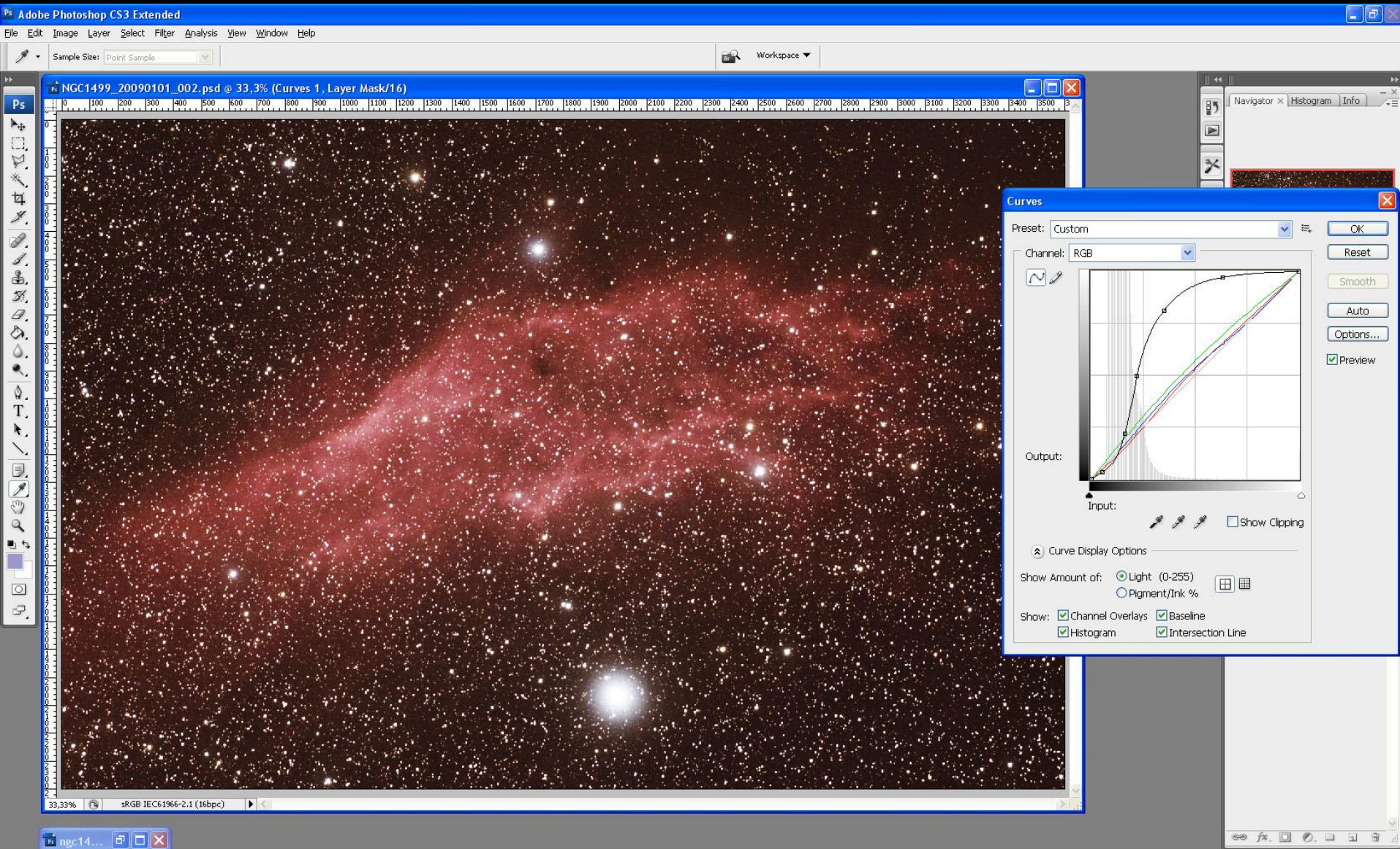
Lock: Fill: 100%

Hue/Saturati...  
Curves 1  
Levels 1  
Blur + NR  
Background

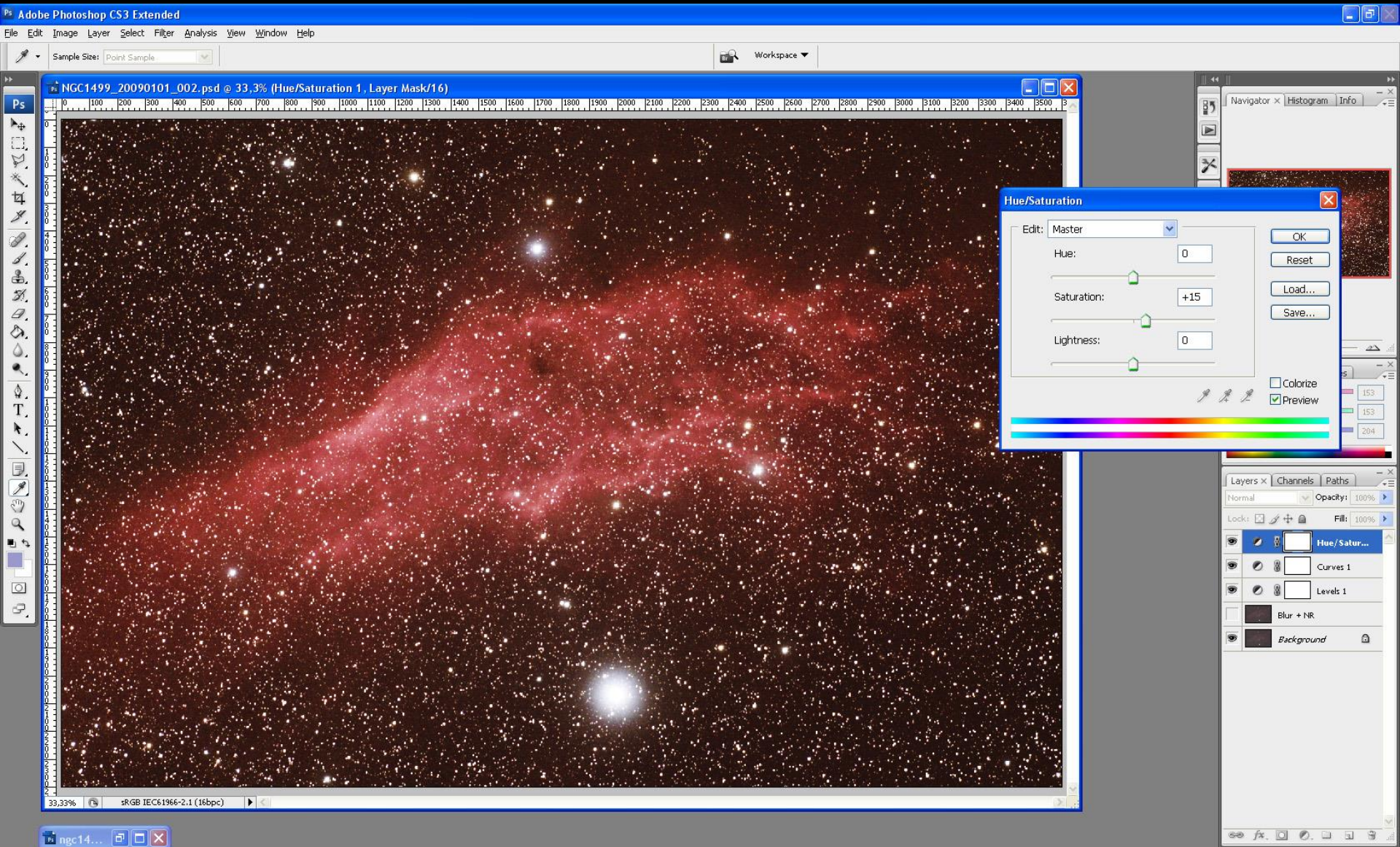
33,33% sRGB IEC61966-2.1 (16bpc)

ngc14...

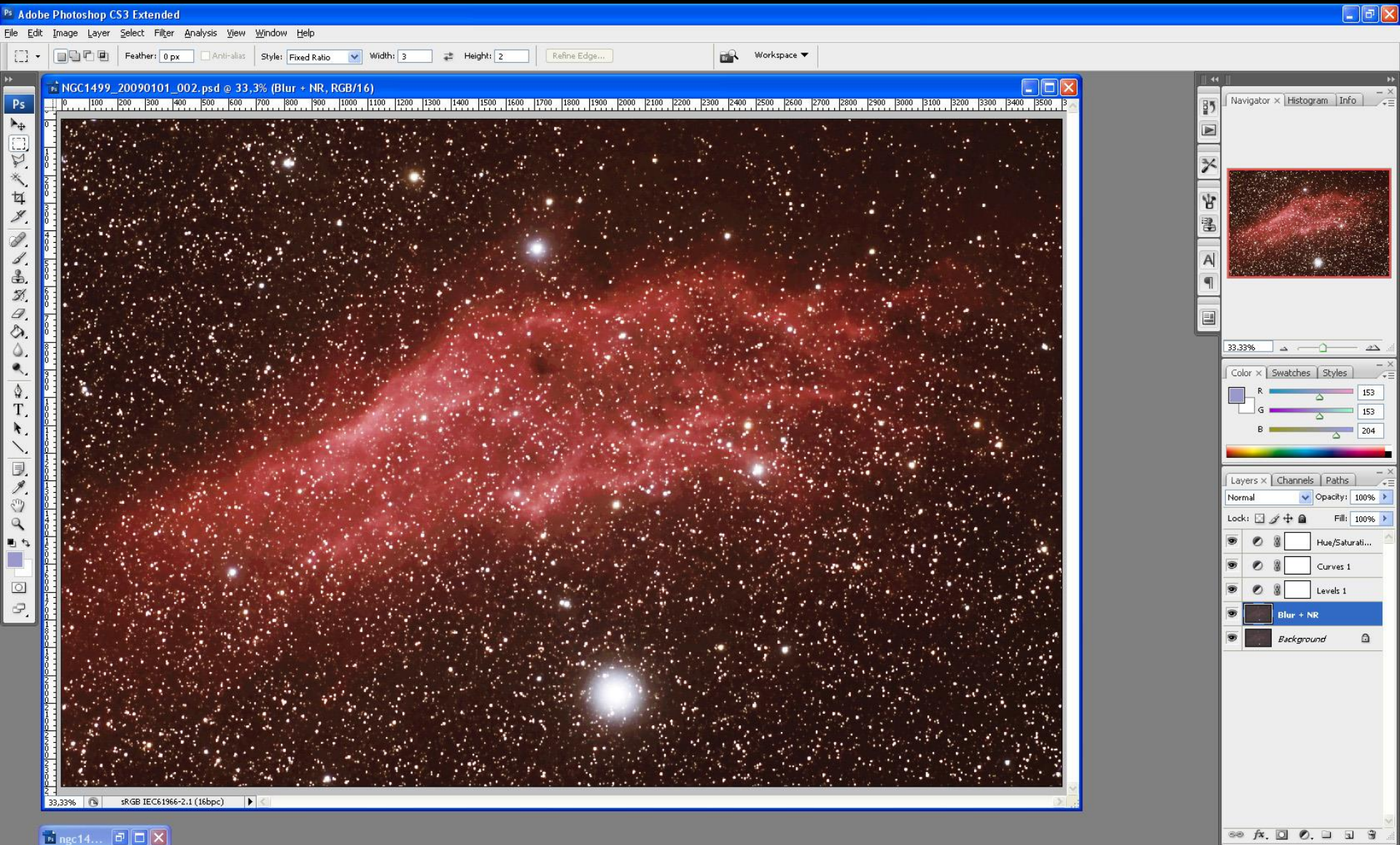
# Justere kurver



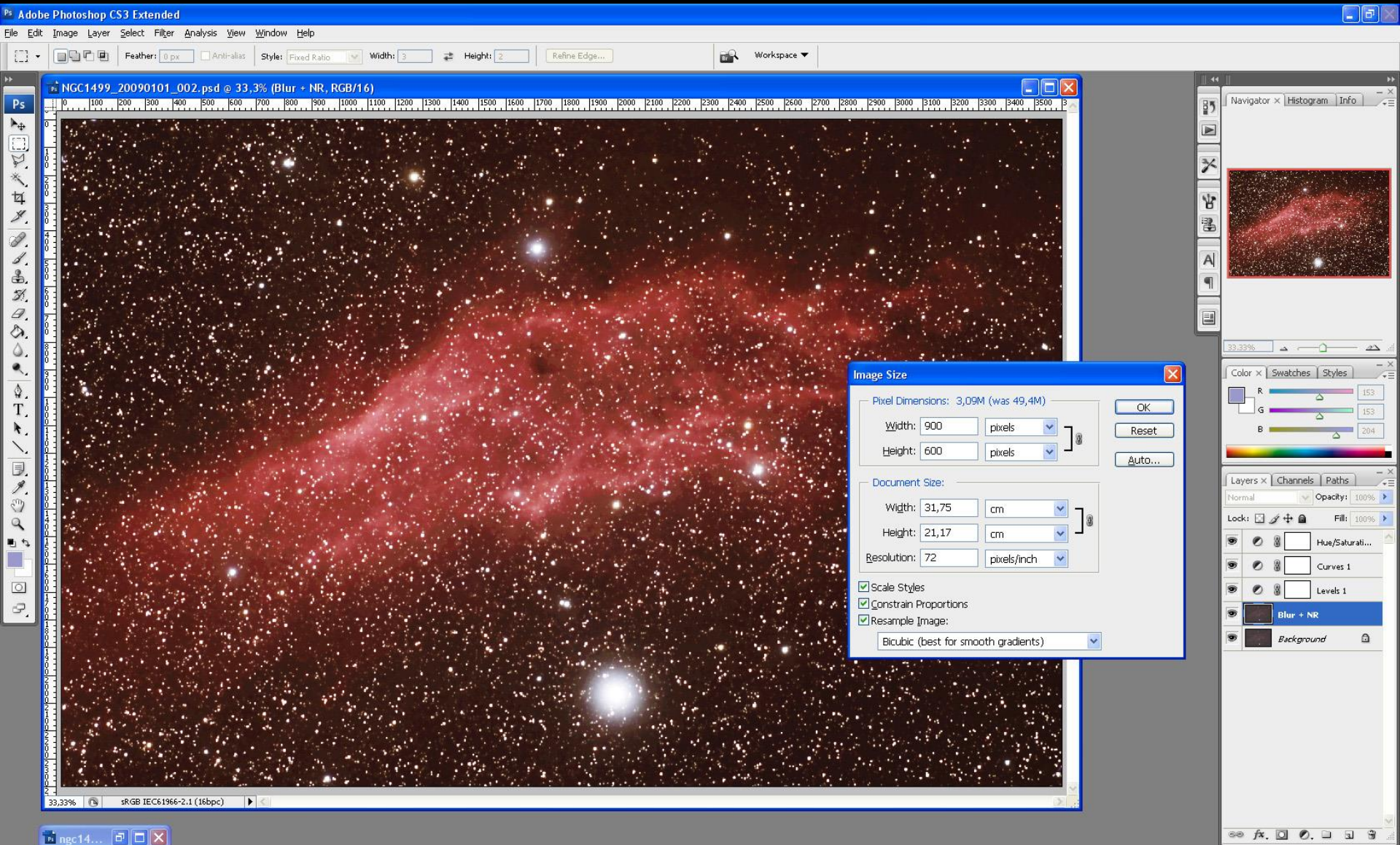
# Justere fargemetning



# Redusere støy



# Tilpasse til web-visning



# Ferdig resultat

Ikke like bra som med APP, men jeg kan ha lært en del siden dette ble laget.

