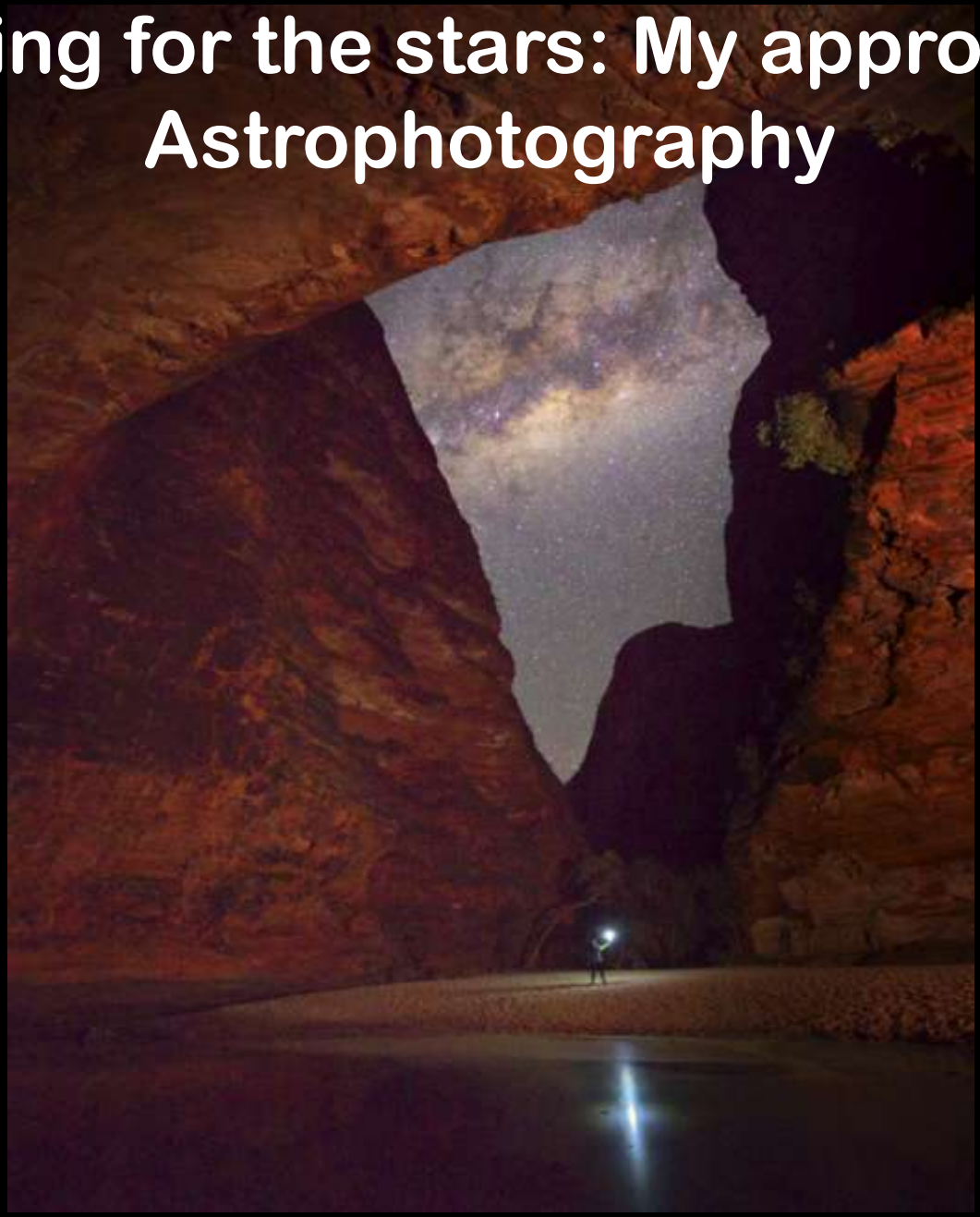
Shooting for the stars: My approach to Astrophotography

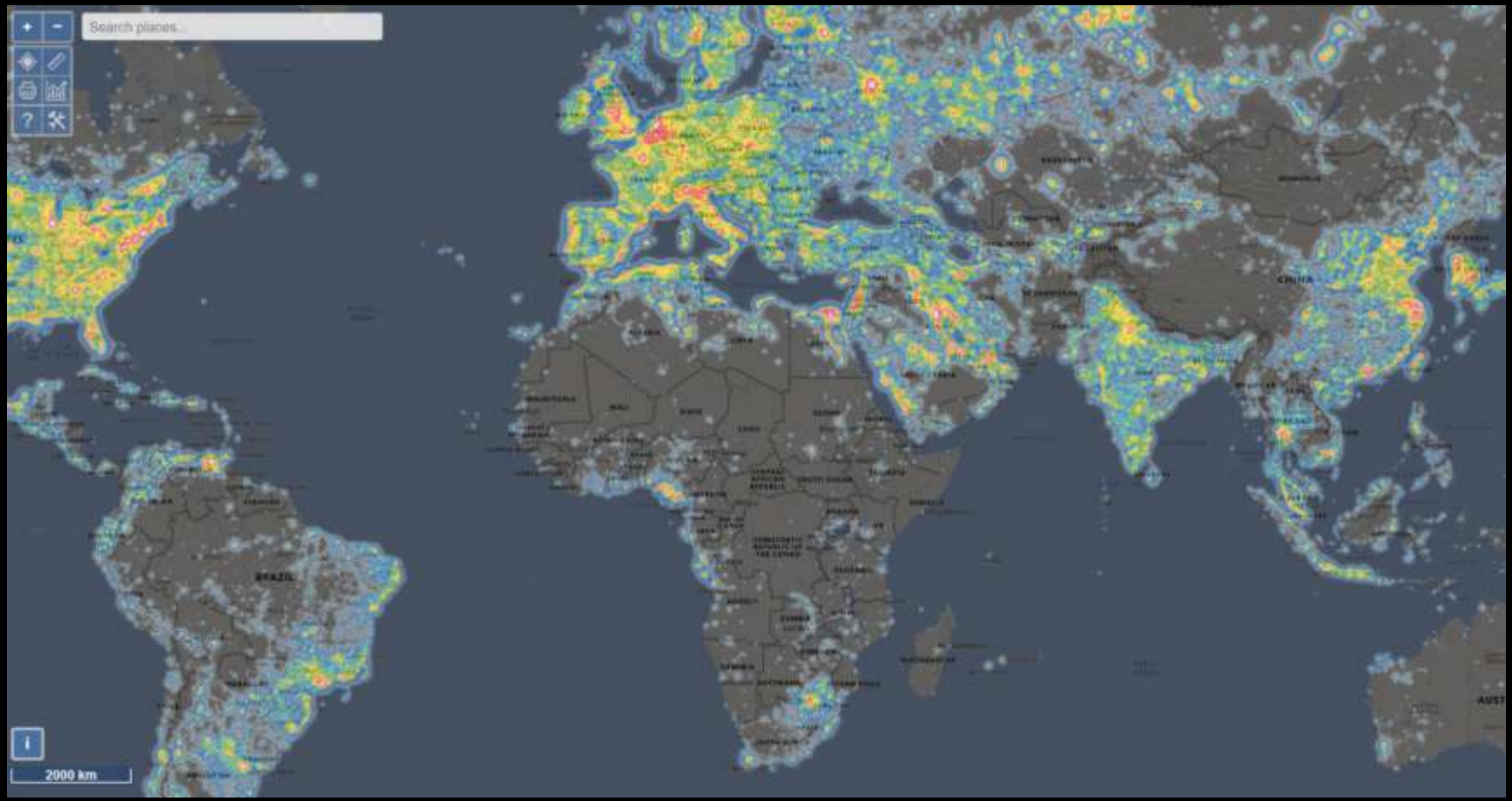


About me…..

- Paul Harrison
- Geophysicist & Professional Photographer
- Interested in astro, macro, landscapes and travel photography

2015 Light Pollution Map

80% of US and 30% of ROTW cannot see the Milky Way



2015


MORE GEAR
LEARNING TO USE EXISTING GEAR

2019

Safety

- Look before you move
- Take basic first aid kit
- Take water / flask
- Tell somewhere where you are going and likely return time

- Head torch (+spare), warm clothing, wet weather gear for longer trips

Ross River Virus and Barmah Forest Virus

- avoid outdoor exposure particularly around dawn and dusk when mosquitoes are most active
- wear long, loose-fitting and light-coloured clothing when outdoors
- apply a personal repellent containing diethyltoluamide (DEET) or picaridin evenly to any exposed skin (always follow instructions on the label).
- use mosquito nets or mosquito-proof tents when camping or sleeping outdoors.


Maratus gemmifer

Camera

- Any modern camera will allow you to photograph the night sky
- Larger pixels will collect more light
- Battery life also important

- Learn to operate your camera in the dark

Lens

- Possibly more important than the camera body used
- Ideally a fast, wide angle prime lens
- Check reviews for astro capabilities

Kit

- Sony A7III (24 mp) x2
- Sony 14mm f/1.8
- Sony 24mm f/1.4*
- Tamron 35mm f/1.4
- Tamron 15-30mm f/2.8

- Consider second hand market

Shoot in RAW format

- Shoot RAW & JPG if camera allows
- Allows maximum flexibility for later
- Learn some basic Post Processing
- Most cameras come with a RAW editor
- I use and recommend Affinity Photo 2 software

Shooting Technique

- A composition….the Milky Way should be the “icing on the cake”
- Tripod – the sturdier the better
- Focus manually on a bright star
- Mirror-lock or use 2 sec timer / intervalometer
- Take at least 5 images + 1 dark frame

Shooting Considerations

- Around New Moon or before / after moonset
- Clear skies – Windy App / Skippy Sky
- Astro planning spreadsheet

Date	Day	Sunrise	Sunset	Moon Set	Moon Rise	Moon luminosity	core start	start elevation	core end	end elevation
24/07/2024	Wednesday	7:12:00 AM	17:40:00	09-18	19-47	93.0%	14-22	53.00	04-41	0.00
25/07/2024	Thursday	7:12:00 AM	17:41:00	09-50	20-56	86.0%	14-18	54.00	04-37	0.00
26/07/2024	Friday	7:11:00 AM	17:42:00	10-22	22-03	77.0%	14-14	55.00	04-33	0.00
27/07/2024	Saturday	7:11:00 AM	17:42:00	10-53	23-09	66.0%	14-10	56.00	04-39	0.00
28/07/2024	Sunday	7:10:00	17:43:00	11-26	00-16	55.0%	14-06	57.00	04-25	0.00
29/07/2024	Monday	7:09:00	17:43:00		01-23	44.0%	14-02	58.00	04-21	0.00
30/07/2024	Tuesday	7:09:00	17:44:00	12-03	02-30	33.0%	13-58	59.00	04-17	0.00
31/07/2024	Wednesday	7:08:00	17:45:00	12-46	03-37	23.0%	13-54	60.00	04-13	0.00
1/08/2024	Thursday	7:07:00	17:45:00	13-35	04-40	15.0%	13-50	61.00	04-09	0.00
2/08/2024	Friday	7:06:00	17:46:00	14-30	05-37	8.0%	13-46	62.00	04-05	0.00
3/08/2024	Saturday	7:06:00	17:46:00	15-30	06-26	4.0%	13-42	63.00	04-01	0.00
4/08/2024	Sunday	7:05:00	17:47:00	16-32	07-07	1.0%	13-38	63.00	03-57	0.00
5/08/2024	Monday	7:04:00	17:48:00	17-33	07-42	0.0%	13-34	64.00	03-53	0.00
6/08/2024	Tuesday	7:03:00	17:48:00	18-33	08-13	1.0%	13-30	65.00	03-49	0.00
7/08/2024	Wednesday	7:02:00	17:49:00	19-29	08-40	5.0%	13-26	66.00	03-45	0.00
8/08/2024	Thursday	7:01:00	17:50:00	20-24	09-05	9.0%	13-22	67.00	03-41	0.00
9/08/2024	Friday	7:01:00	17:50:00	21-18	09-30	16.0%	13-18	68.00	03-37	0.00
10/08/2024	Saturday	7:00:00	17:51:00	22-11	09-55	23.0%	13-14	69.00	03-33	0.00

PhotoPills

- “Swiss Army knife” for photography
- Allows planning for astrophotography

Plan the shot

Plan the shot

14mm lens at f/2, 25sec, ISO 1600, 677 stacked images

Shooting Settings

- Wide angle lens at f/2 or widest f-stop
- ISO 3200 (to start)
- White Balance to 3900K
- In camera noise reduction - OFF

- For quick composition setup use ISO12800 and 4 secs exposure

Sharp Stars

500/focal length rule aims to deliver stars as a sharp point

Actually more complex

PhotoPills for detailed approach

Shooting Settings

- Shutter speed using 500 / 300 / 250 rule

	Full Frame	Crop Sensor	Micro 4/3
– 14mm	36secs	21secs	18secs
– 24mm	21secs	13secs	10secs
– 35mm	14secs	9secs	7secs

Review your shots

Composition – Leading Lines

Use lines / curves to draw the eye to the subject

Eye is also drawn to brightest part of the photo

Use lines / curves to draw the eye to the subject

Eye is also drawn to brightest part of the photo

With / without person

Composition – Leading Lines

Use lines / curves to draw the eye to the subject

Scout the location

Composition – Selective Focus

Use the shallow depth of field to draw the eye to the main subject

35mm lens at f/1.6

Torch used to lightpaint the foreground

24mm lens at f/1.4
20 secs
10 stacked images + 1 dark frame and foreground shot

8 panel horizontal panorama shot
15mm lens at f/2.8, 20sec, ISO 5000
Lighting is from a 26% moon close to setting – Foreground first

Flash used to lightpaint the foreground (0.5 CTO gel)

15mm lens at f/2.8
20 secs
ISO 4000
Single Image

3 panel vertical panorama

11 stacked images in each panel

24mm lens at f/1.6, 13sec, ISO 3200

Foreground lighting Nanlite Pavo 6C II at 3900K 3%

Vertical pano of 3 panels

5 stacked images + 1 dark frame in each panel

24mm lens at f/2, 15sec, ISO 1600

Foreground lighting and interior light with Nanlite Pavo 6C II

Vertical pano of 3 panels (focus stacked)

5 stacked images + 1 dark frame in each panel

24mm lens at f/2, 15sec, ISO 1600

Foreground lighting with Nanlite Pavo 6C II placed close to subject

7 stacked images + 1 dark frame

24mm lens at f/2, 15sec, ISO 1600

Foreground lighting with Nanlite Pavo 6C II - placed far away and flagged

5 stacked images +
1 dark frame for
foreground and sky

Focus stacked

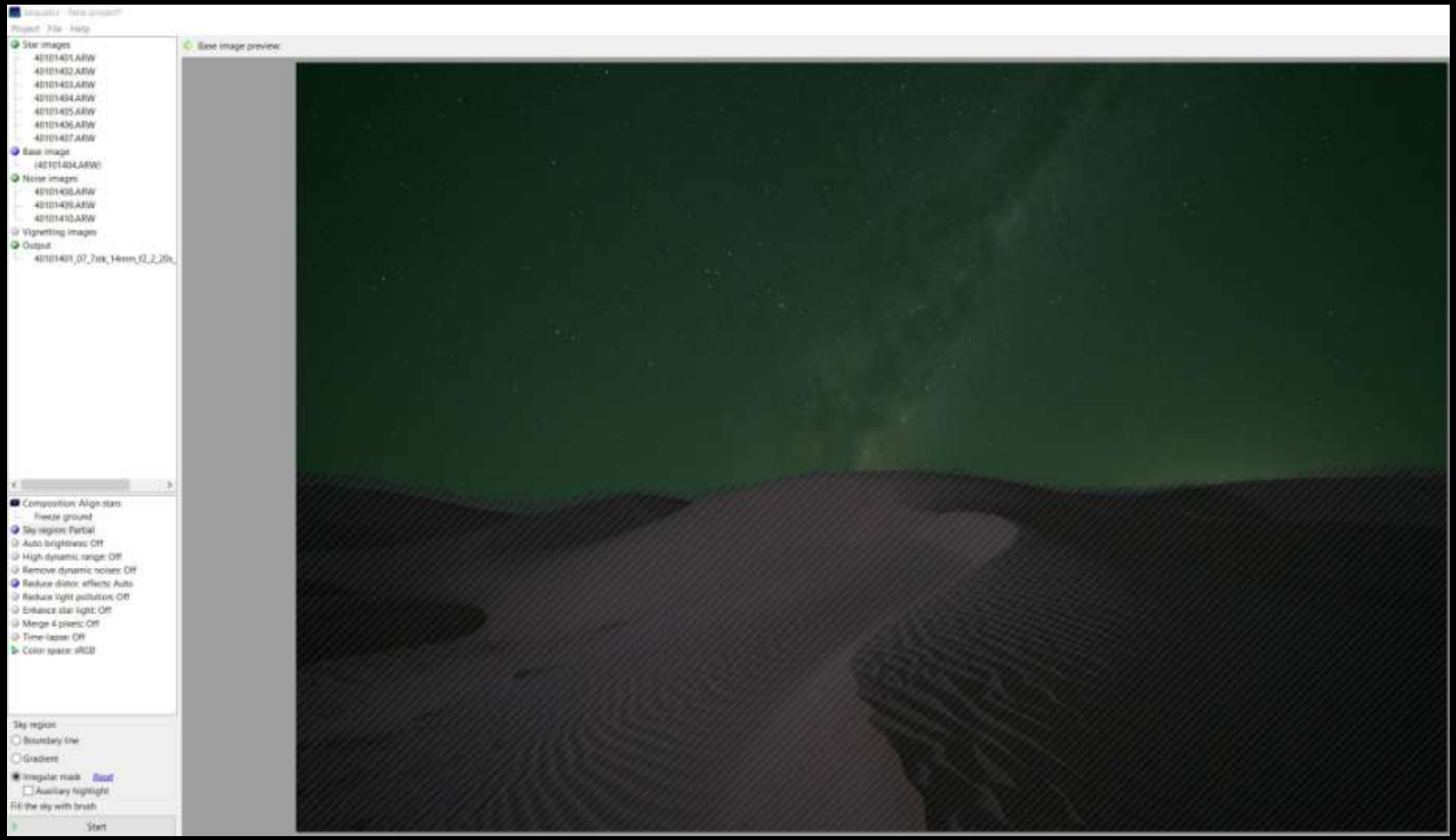
15mm lens at f/2.8,
20sec, ISO 5000

Foreground lighting
Nanlite Pavo 6C II
at 3900K 2%
low down position

Editing

- Start with RAW files
- Stack images using Sequator (Free) / Starry Sky Stacker ($25)
- Stacking increases Signal / Noise
- Removes hot pixels & satellites

Stacking – increases S/N



Stacking – Pre Processing

Single shot

Stack of 10 shots

Stacking – Post Processing

Single shot

Stack of 10 shots

Basic Editing

- Boost exposure
- Apply a colour defringe to stars
- Adjust Levels, White Balance, Contrast and Saturation to taste
- Run some form(s) of denoise

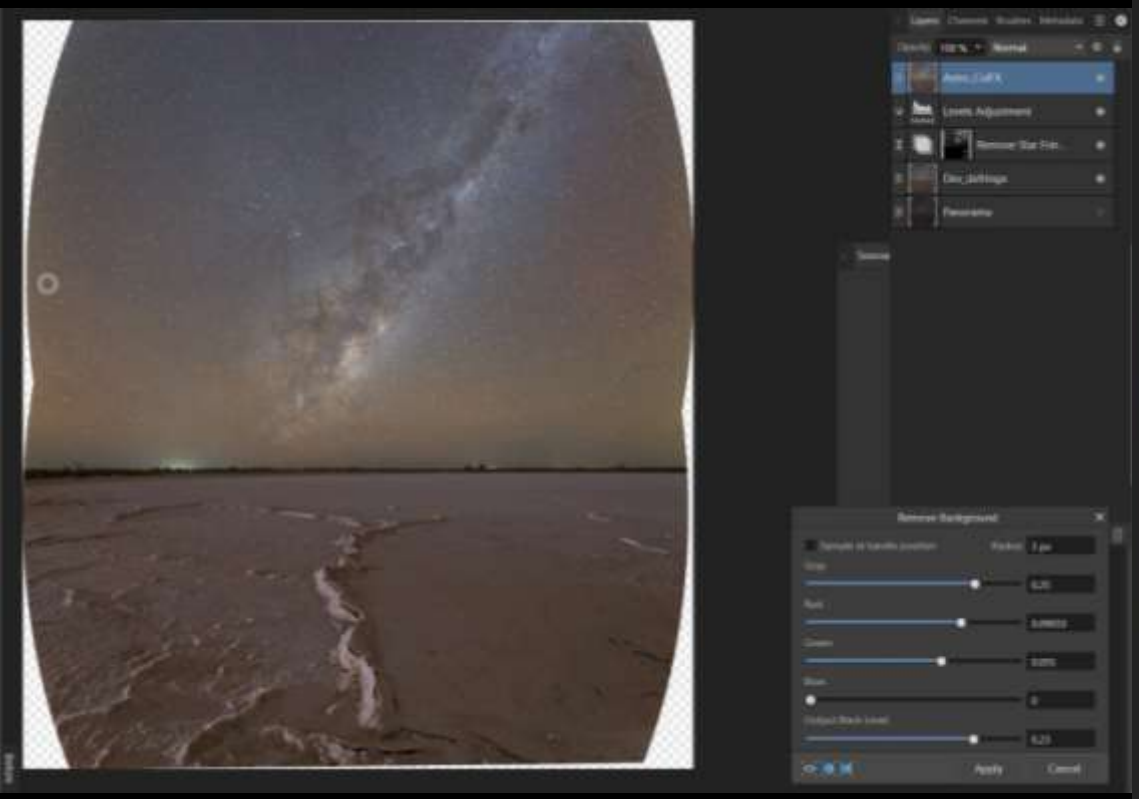
Affinity Photo 2

- One-off licence fee (AU$60 until 15th Aug)
- Regular free software updates
- Uses layers approach
- Will read PSD / PSB files
- Extensive astro photography support

- Does not have a Photo library / DAM

Astro Background filter

Before



After

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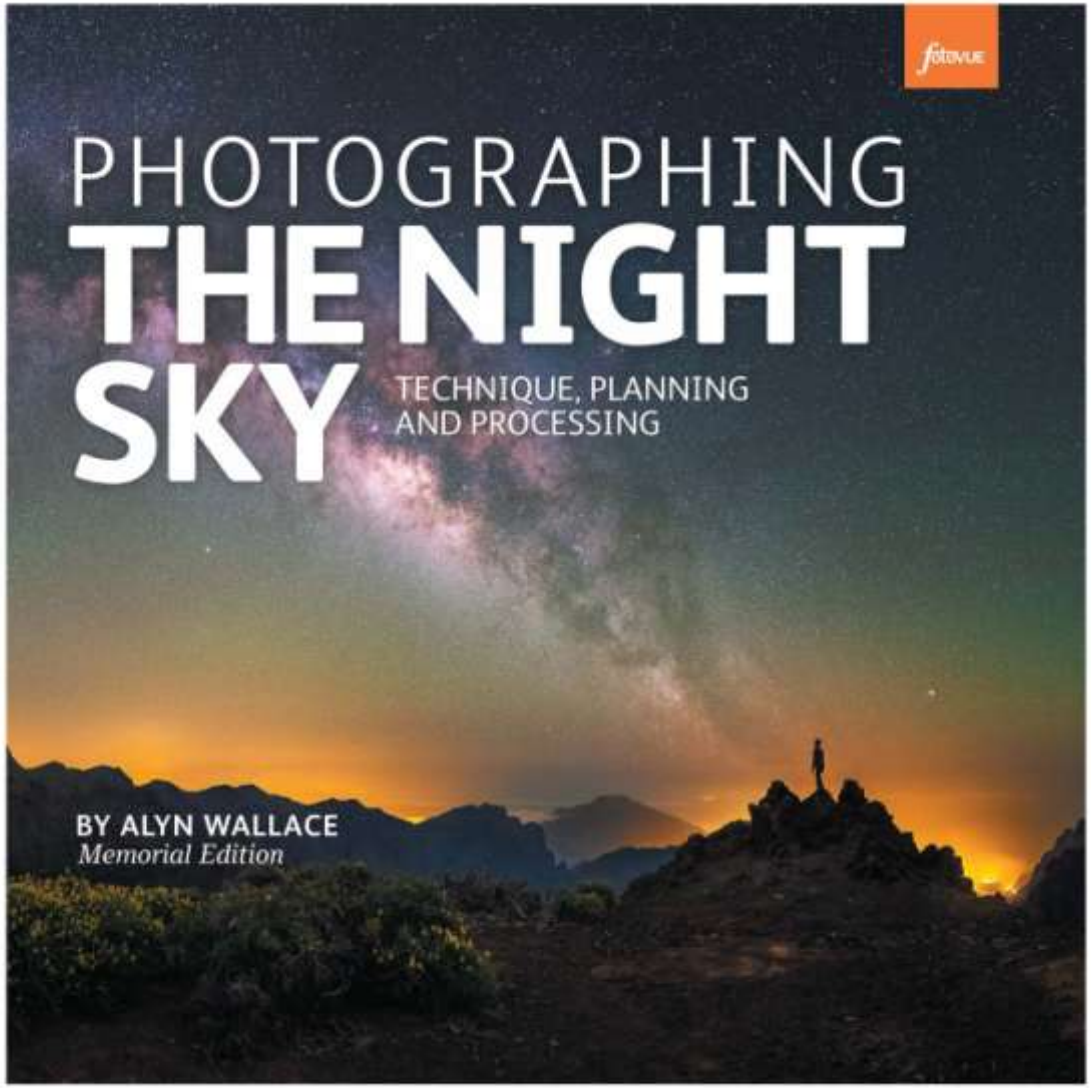
Focuseddiffractions.com

Resources


fotovue
PHOTOGRAPHING
THE NIGHT
SKY
TECHNIQUE, PLANNING
AND PROCESSING
BY ALYN WALLACE
Memorial Edition

Some people to follow

- Perth Astrophotographers (FB Group)
- Aurora Australis Western Australia (FB)
- Michael Goh / IG @astrophotobear
- Trevor Dobson @trevordobson_astro
- Greg Rowney @gregrowney

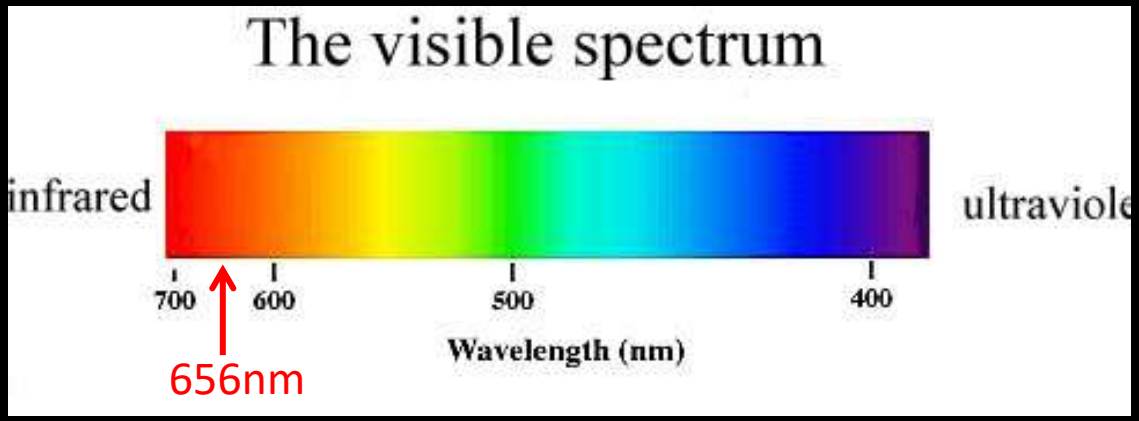
YouTube - Some people to follow

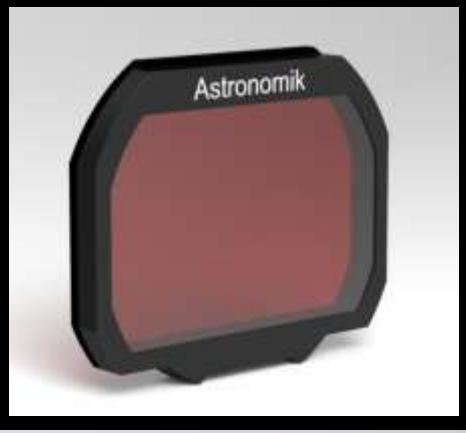
- Lonely Speck – great editing advice
- Alyn Wallace (Astrophotography)
- Greg Rowney – Grow Photography
- Richard Tatti – Nightscape Images
- Sean Tucker

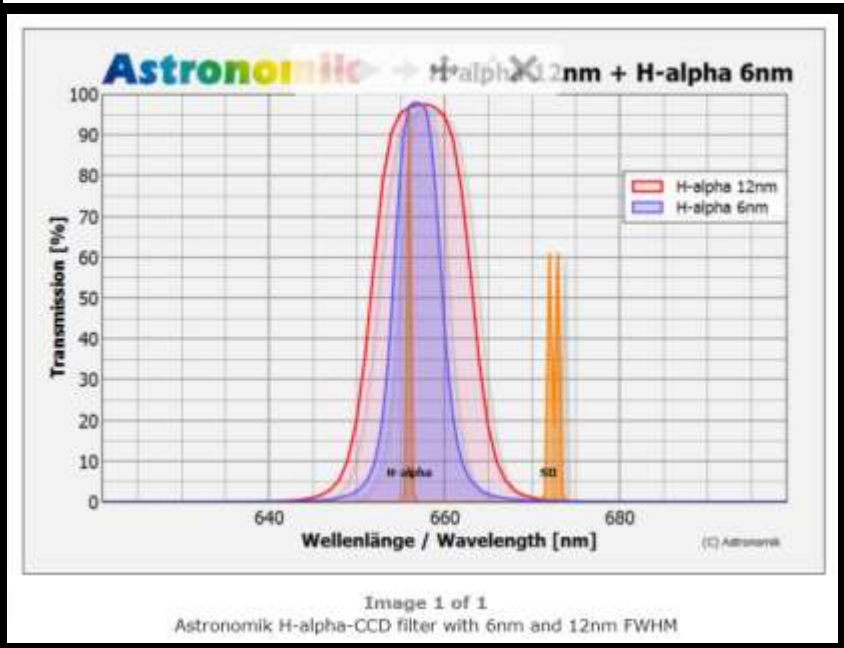
Astro-modified cameras

- Hydrogen-alpha (Ha-mod)
  - Most common
  - Camera can still be used for “normal” photography with a custom WB
  - Clip in or screw on Ha narrowband filters allows just Ha light to be collected
- Full spectrum mod
  - Dedicated for astrophotography

Astro-modified cameras







24mm f/1.4 15 sec ISO 6400 12nm Ha filter Stack of 30 images

24mm f/2 13 sec ISO 3200 Stack of 10 images
24mm f/1.4 15 sec ISO 6400 12nm Ha filter Stack of 30 images

35mm f/2 8 sec ISO 2000 Stack of 10 images

35mm f/2 8 sec ISO 2000 Stack of 10 images
35mm f/1.4 10 sec ISO 6400 12nm Ha filter Stack of 30 images

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Focuseddiffractions.com

15mm lens at f/2.8, 20sec, ISO 2000, 578 images.

5 panel horizontal panorama shot – leave space
5 stacked images in each panel
24mm lens at f/2, 13sec, ISO 3200.


8 stacked images
14mm lens at f/2, 20sec, ISO 2000.

Zodiacal light

Moonset

Long lens

420mm
f/8
1/6 sec
ISO 200

Use PhotoPills to plan the alignment

Moonrise

560mm f/13 4 sec ISO 400

Aurora borealis

15mm f/2.8 3.2 sec ISO 3200

Aurora Australis

35mm f/2 3.2 sec ISO 1600


Thank You