My journey and experiences in Night & Astro Photography

These are my personal experiences and random thoughts only – and yes, Google will likely disagree. All images take by me.

Night photography (for me) is shot when it is truly dark, well past the Blue Hour when city buildings and real estate are often shot. Night photography can record a world that is less seen, a magical and often surreal world, including lighting, fireworks, festivals, night events, buskers and critters – natural or artificial light.

Astro (to me) means trying to capture sky objects themselves, and the challenges of overcoming the competing requirements of long exposures and sharp stars.

Nightscapes are usually a widefield shot that combines a landscape foreground object with an astro background element, eg the Milkyway or the Moon. Meteor showers are good fun also.

What motivates me to sometimes drive >100kms from the city, then sit in the cold late at night? Many times, I have then driven 100kms+ to home just before dawn. Tip – best to stay overnight somewhere.

- Several years in the NT, often camping in the desert in a sway, looking up @ the stars. One night on the phone, I watched shooting stars every 20 seconds. I can never forget those magical moments.
- One night some mates joined me @ Palmer lookout @ midnight – they drove for more than an hour to be there, so I then put my camera on wide angle time lapse of the milky way, and let it run until the battery when flat. We sat around a fire brazier, chewed the fat and watched the sun rise – a magical night.
- The reward is jagging that shot is great, but even of the shots didn't work, just being out in the clear night air, under a brilliant sparkling night sky is just marvel in the awesome size of the universe is reward enough for me. I love witnessing the awesomeness and power of nature.
- Because it is hard – a challenge – to try new things
- Things that are normally not seen, eg, critters that only come out @ night.

CANON 5D4 + Canon EF 100-400mm f/4.5-5.6L (@360mm F5.6) + focussing torch, 1/60th sec, ISO 12800, handheld @ 30m away

Back in 2010 I bought a DSLR and promptly wanted to know what astro objects I could photograph with my new equipment. I visited an astro club, and my questions were answered with puzzled faces; '… ask us about telescopes…' I then went out and tried my luck, armed with Google. I shot the Eta Carinae nebula with a 60D + 50mm F1.4 + a clip in light pollution filter, @ a public lookout on a very flimsy tripod in the centre of Alice Springs, and I didn't process this stack of images until I learnt how to do this several years later. I have been trying all sorts of things ever since. My post processing also improved over 5years. Note, no tracking was used – all regular camera gear.

First successful astro pic - Eta Carinae 2011
CANON 60D + EF 50mm F1.4 ISO 6400, 20 shots + 20 darks,
in the middle of Alice Springs on a wobbly travel tripod
7502 light years away, stacked in **DeepSkyStacker**

Eta Carinae 2016
CANON 5D3 + EF 100-400mm f/4.5-5.6L (@400mm F5.6),
ISO 6400, 30 shots + 30 darks, @ Teal Flat
on the very sturdy tripod, stacked in **DeepSkyStacker**

It helps a lot to have an interested partner or friend. Although she wasn't so thrilled when we were accidently shot at by fox hunters near Snow Town one night – perhaps all lights off is not the best policy.

Gear:

This really is the elephant in the room for night and astrophotography. Dark conditions really do stretch the capabilities of the tech, even for the latest and greatest gear, but great shots can still be taken with older camera bodies, and, lenses that gather less light. Eg, use a tripod and shoot long exposures / timelapses / star trails.

- **My Camera**: CANON 5D4.
- **My usual lenses**:
  - For widefield night skies and general night handheld walk around: CANON 16-35mm III F2.8, and Samyang XP 14mm f/2.4. For night walk around short exposure work, all the bigger aperture lenses will work better with less noise in your shot for the same exposure duration. For longer exposure tripod work, smaller apertures work just fine, and often are preferable to give a deeper depth of field (ie, more objects in focus).
  - For individual astro objects I use a Canon EF 100-400mm f/4.5-5.6L field of view (fov) of 6° and sometimes with a 1.4x teleconverter making an effective field of view of 560mm (FF) (fov 4.3°). The moon is 0.5° wide.
  - For critters @ night, a good torch (I use a zooming one), Canon EF 100-400mm f/4.5-5.6L + 1.4x (ref possum pic above)
- Long exposures will require a sturdy Tripod or a Gorilla pod or no wind. You can also weigh your tripod down with a heavy bag.
- **Sky-Watcher Star Adventurer Tracker** (optional) https://www.bhphotovideo.com/c/product/1452448-REG/sky_watcher_s20512_star_adventurer_pro_pack.html is used to eliminate star trails and allow for long exposures. I am yet to confirm if my gear is too heavy for this tracker- may need a heavier counterweight. None of my shots shown have used a tracker.
- **Dew** is a risk. When the air temperature falls much below the dew point, you will not be able to keep the lens dew free. I use cheap chemical (iron oxide) hand warmer sachets, and have a cut sock over my lens with the heater slid in between the sock and lens. Yes, there are also USB powered lens heaters for sale online.
- **Red head light** or red bike tail-light for gear & site illumination – white light really destroys your night vision.
- **Light painting** torch & Light trails lights etc for light painting.
- Most cameras have a built in 2 or 10sec shutter delay, so for single exposures a remote shutter control isn't necessary to eliminate shake. For 20 shot multiple exposures, or for lightning, an intervalometer will make this task much easier.

Where to go for dark skies:

- **Palmer Lookout** – reasonably close and plenty of parking, but no facilities. Sky above and to the East is dark. Sky to the West towards light polluted Adelaide looks like sunset when your eyes adjust. https://goo.gl/maps/sv8ww8Cmppv65XC19
- **Clifftop @ Teal Flat** - plenty of parking, but no facilities https://goo.gl/maps/uUhVRmModgSifPsdA
- **Cobdogla Caravan Park** https://goo.gl/maps/TDYgJxwdQWZNSswP6 (see my Fire Tree pic) – 5km away from Barmera, but is a lot darker than Barmera.
- **Barunga Gap** (12kms W of Snowtown) - plenty of parking, but no facilities https://goo.gl/maps/ydxWDiJyqLvWaTzm8
- **The River Murray Dark Sky Reserve** https://assa.org.au/facilities/river-murray-dark-sky-reserve/
- **Marion Bay** on the edge of the Innes National Park worked for me
- **Reflections in still bodies of wat**er, eg Murray backwaters or dams. There must be no wind for nice sharp reflected stars. The Joyner Lagoon at the back of the Cobdogla Caravan Park had a magical reflected milky way one night. Even **puddles of water** in a potholed road look interesting with the Milkyway reflected in them.

Holiday rental @ Marion Bay on the edge of the Innes National Park

Other places near Adelaide I have visited @ Night:

- Old Port Willunga Jetty ('The Sticks') – no much in the way of stars being close to Adelaide, but long exposures here are fun anyhow – stay for an hour or two after sunset. You can try and 'light paint' the Sticks with a torch as I did here + bonus sparks. 4mins

- The old Myponga Jetty – the milky way is just visible here as it is a bit further from Adelaide's lights

When:

- **For stars,** 2hrs after sunset to 2hours before sunrise is best. This means wintertime gives a longer dark window to choose from.
- Moonlight = no stars. The Lunar Phase app for your phone is another must have tool to plan your astro shoot.
- The Milkyway is best in the middle of the year. In summer the milky way sets with the sun. Use Stellarium (free) https://stellarium.org/ planetarium or the $10 Android app version to work the best time of year.
- The Meteor Shower Calendar app can give you notifications.

How to reduce noise:

- Shoot **RAW** & stay in RAW or uncompressed **TIFF** until the very end – jpeg blows up a single a noise pixel to a minimum of 4 pixels, and then can then be nigh impossible to denoise.
- I use **NOISEWAR**E for all my non-astro shots – as it is fast. Eg. 15secs per image. I have spoken to others who love **Topaz Denoise ai**, but it is vastly slower, but probably better.
- Normal denoising tools, eg, NOISEWARE, destroy stars, thus stacking is the usual denoising method for star photography. Topaz Denoise ai may work for you for single shot starry sky denoising but I haven't found a good example of this yet.
- What is noise? Thermal (sensor noise), so cooler is better. Lack of photon noise – the lawn sprinkler analogy.
- **Stacking** - shoot 20 images @ shorter shutter and with high iso, to avoid star trails. Effectively results in one long exposure, but without star trails. **DeepSkyStacker** (free) - is the standard for astro stacking auto stacks and aligns the multiple images above & removes hot pixels. DSS is a very powerful free tool. Also take another 20 images with lens cap on to allow DSS to map out a sensors' individual characteristic noise. http://deepskystacker.free.fr/english/index.html
- I don't use my camera's in-camera noise reduction personally as this doubles the exposure time, and only denoises the jpeg – and I want to use the RAW files instead for further processing.

Focussing:

- Autofocus can work if there is enough light around, but most cameras cannot focus on stars (yet). Just focus on a bright star or distant light in live view, with full screen magnification, and then focus on a smaller dimmer star. You can shine a torch towards a distant road reflector to give you something to focus on. Smaller and dimmer objects are best to focus on.

Fireworks:

- My tip: use a wide lens, set your intervalometer to 1 to 2 seconds and let the intervalometer run for the entire fireworks show.
- Try stacking the clearest best 3 shots, eg, the few shots without smoke for a composite.
- Very long exposures risk killing the money shot. Eg, If you have the money shot in the can in the first 3 seconds, but there is still 7 seconds of exposure to go, but @ the 5 second mark there is an unusually bright firework that lights up smoke, and then your money shot will be wiped out.
- Shoot with the smoke blowing away.

Lightning:

- Similar advice to fireworks. Use a wide lens, and as the lightning storm approaches, set your intervalometer to 2 seconds and let the intervalometer run until the storm has passed. You may find you have 20-50 pics of lightning strikes shooting this way.
- Very long exposures risk killing the money shot. Eg, If you have the money shot in the can in the first few seconds, but there are still 10 seconds of exposure to go, but @ the 6 second mark there could be sheet lightning (lightning behind a cloud) that lights up the entire frame, and then wipes out your money shot. Or, use a spare black t-shirt to cover the lens after the money shot.
- I use the **Weatherzone** radar https://www.weatherzone.com.au/radar/sa to track the lightning, or **Blitzortung Lightning app** for your phone – you can set alerts when the lightning is, eg, 50kms away.

Moon:

- Sunlight reflected from the moon to earth is very nearly the same colour balance as the sun, but very strong moonlight can look a little bluish. This is because the proteins in our colour receptors (Cones) stop working @ low light, but the blue cones continue to (just) work in lower light when the other cones have stopped. The blue cones do also stop when it is darker, and then our vision then becomes fully monochrome.
- Shoot closeups of the moon, or lunar eclipse (blood moon), of planes and satellites transiting the moon, Time lapse or a multiple images composite of a blood moon event. Moon and terrestrial object composites.
- Best detail is found around the 'terminator' – the division between the light and dark hemispheres.

Lunar eclipse (Bood Moon)

partial eclipse 2 shot HDR stack

Star Trails:

- Stars will appear to ‘trail’ with longer exposures due to the Earth’s rotation.
- You can try (Exposure time = 500/[crop-factor × focal length]) to start with. Just take some test shots to determine much trailing you can tolerate and adjust you shutter speed to match. Stars will trail much less near the celestial poles.

CANON 5D4 + 16mm F2.8, 80x 2minute exposures, in suburban Redwood Park, tripod, stacked in **Startrails.de** (free)

Meteor showers

- also require dark skies. Use an intervalometer set to 2 second exposures. Meteors are mostly faint and are a very short duration thus long exposures will make the background too prominent and make the meteors disappear in the shot.

White Balance:

- The night sky is usually a dirty brown colour once a way from the city. The **Fire Tree** @ Cobdogla image had the white balance changed to 4000k in post to give the blue look most people expect to see.

Lens Whacking: – simply rotate the zoom ring during the exposure

Nightscapes:

I highly recommend Richard Tatti ‘s **Youtube** channel, **Nightscape Images**: https://www.youtube.com/channel/UC-KNiVo4X76cJIMphH1lEdA/videos for nightscape instructional and inspirational videos. These are all shot in rural Victoria.

Richard recommends **Sequator** (free for Windows) to assist in easy stacking and aligning of multiple background images (to reduce noise) and then to add your separate foreground image.

Apple users could try **Starry Landscape Stacker** (Apple Os only).

I haven’t tried either of these desktop apps

.

Fire Tree @ Cobdogla, 16mm, F2.8, single shot @ ISO 12800, June 2019, 1am and 1°C

2am @ Teal Flat, moon rising in the fog – yes, this is a nightscape !

Ghost Mushrooms @ Glencoe - 4 min exposure. These appear white to the naked eye both day and night.

Midnight, laying on a rug on the forest floor and 1°C, in pitch black, hearing the roos thump their tails in the dark just behind us. The thrill of the chase and the promise of a nice warm fire later, helps combat the cold.

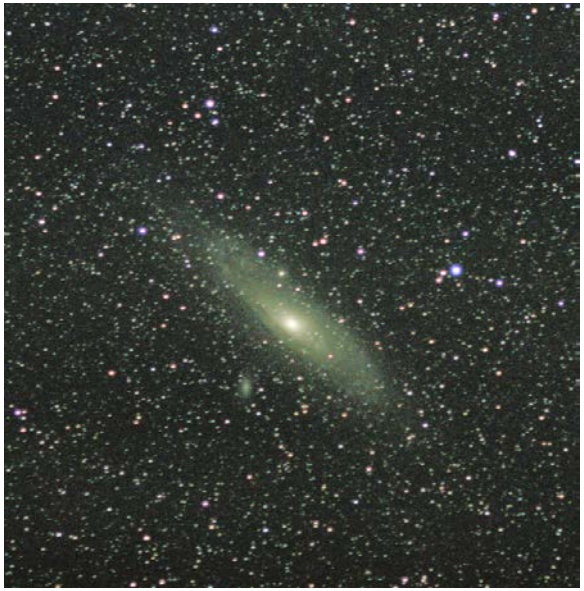
Last Stars Before Dawn – 4:30 am on the opposite side of lake Bonney from Barmera and already losing the contrast from the 7am sunrise

Perched on some rocks @ Midnight @ Franz Josef Glacier New Zealand, in a t-shirt… 0° on a compact point n shoot. 30seconds.

Large Magellanic cloud - CANON 5D3 + Canon EF 100-400mm, 2014 ish, taken @ Palmer lookout, stacked in DeepSkyStacker

Large Magellanic cloud - CANON 5D4 + Canon EF 100-400mm, taken @ Teal Flat, stacked in DeepSkyStacker

Andromeda Galaxy is huge, 3°across vs the moon @ 0.5° & Is very low in the horizon.



Tarantula Nebula – 400mm and heavy crop.

Dragon Under The Bridge – a Fire Twirling Festival shot. Several seconds

Other useful tools and websites:

- **Startrails.de** (free) https://startrails.de/ can also easily make nifty animations of your star trails.
- **DSLR controller app** – can control your camera via usb cable or wifi. The app can display the live view on your phone or tablet. You can also micro adjust the focus of you lens – I needed to use this on one lens. Also has an intervalometer function.
- **SkippySky** http://www.skippysky.com.au/Compact/Australia/Compact_Oz_Stockport.html the best resource in Adelaide to determine if the sky is clear enough to shoot the stars.
- **Stellarium (free)** https://stellarium.org/ planetarium. I use the $10 Android app version – this is also the standard – great to have in the field. This is a must have tool to plan your astro shoot.
- **Lunar Phase app**. – another must have tool to plan your astro shoot. Moonlight = no stars.
- **DeepSkyStacker** (free) - is the standard for astro stacking auto stacks and aligns the multiple images above & removes hot pixels. A very powerful free tool. Also stack 20 images with lens cap on to map out sensor noise. http://deepskystacker.free.fr/english/index.html
- **Intervalometer**: either built into camera or external device or phone app via cable or wifi allows hands free continuous shooting.
- **Sequator** (free for Windows) to assist in easy stacking and aligning of multiple background images (to reduce noise) and then to add your separate foreground image. Not tried by myself.
- Apple users could try **Starry Landscape Stacker** (Apple Os only). Not tried by myself.
- **NOISEWARE** was the only commercially paid for software used in these imaged. All the other image stacking and processing software used in these images is free.

Summary:

- **Get out there and try things**
- **Shoot RAW**
- **Have fun**