

Nightscape

Photography



10/10/2019

Alex Cherney
2019
MPAS, ASV, TWAN
www.terrastro.com

What you need is...

- Appropriate clothing
- Sturdy tripod
- DSLR with Live View or Mirrorless camera (Canon, Nikon, Olympus, Panasonic, Pentax, Sony)
- Wide-angle lens – 18mm or less
- Remote trigger
- Torch or headlamp



For time-lapse

- External Power (batteries)
- Large (32GB) CF or SD Card
- Dew heater controller and dew straps or chemical hand warmers
- Bubble level

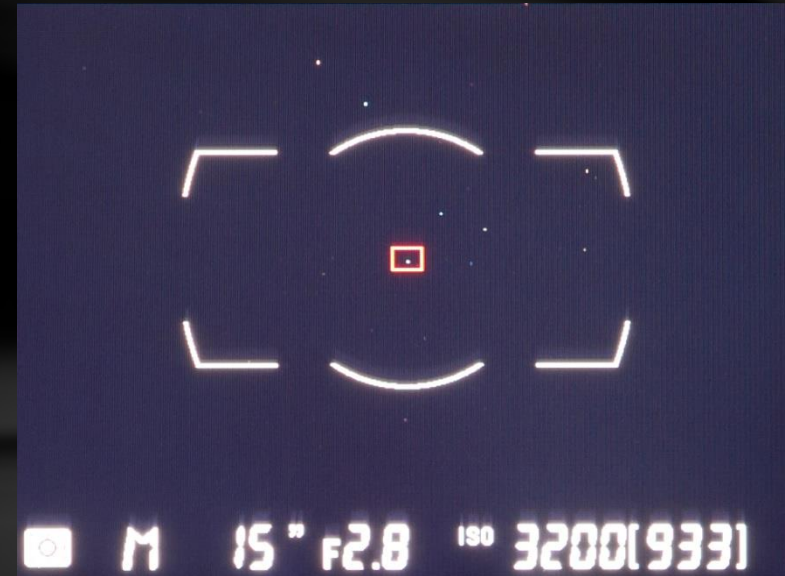


Camera settings

- Manual Exposure Mode
- Manual Focusing Mode
- Manual White Balance at around 4000 K (Sunny WB if N/A)
- ISO 3200 or 1600 and 15 to 30 seconds exposures (Moon less than 15% illuminated)
- Widest possible lens setting (18mm with the kit zoom lens)
- Largest possible aperture (smallest f/stop) – f/3.5 with the kit lens. If the stars in the corners look like seagulls then stop the lens down to f/4

Focusing with Live View

- Set the camera to **Manual Focus**
- Set the focusing ring to the infinity mark
- Centre the camera on a bright star
- Turn on "Live View" mode
- Magnify the Live View mode as far as it goes (100%)
- Turn the focusing ring back and forth until the smallest possible star image is achieved. It may help to pay attention to dimmer stars around.



Maximum Exposure length before the stars start trailing

The 600 rule

$$T_{\max} = 600 / \text{Effective Focal Length (seconds)}$$

i.e. 18mm lens on Nikon D5100 (1.5 crop factor):

$$T_{\max} = 600 / (18 * 1.5) = 600 / 27 = 22 \text{ seconds}$$

The direction is also important and the values can be increased x1.5 times when pointing towards a Celestial Pole

30 sec
14mm
Octans
near SCP



30 sec
14mm
Scorpius
near
Celestial
Equator



Dark frames and LENR

With LENR on the camera does the following:

- Takes the image (30 seconds)
- Closes the shutter takes the dark frame (30 seconds)
- Subtracts the dark frame from the image removing all hot pixels and amplification glow

Some cameras (Pentax) monitor the CMOS temperature and re-use the dark frames thus reducing the gaps.

LENR is undesirable for Time Lapse Animations or Star Trails

Alternative – take a number of dark frames at the end of the imaging run and subtract using batch processing in Photoshop or simply use RAW image format and open in Adobe Photoshop, Lightroom or Nikon Capture NX2.

RAW Image capture vs JPEG

In-camera computers are getting better and better however they are still long way away from full image processing software (Aperture, Photoshop).

RAW Capture	In-camera JPEG
Contain *mostly unaltered* data recorded by CMOS detect	Have all camera settings "burnt-in" to the JPEG file
Have 12-14 bits of data per pixel and more headroom for shadow detail recovery	Converted to 8 bit per pixel lossy compressed file with reduced dynamic range
Have *almost* no Noise Reduction applied allowing for more efficient noise reduction in computer software (Neat Video)	Noise reduction and sharpening are applied by an in-camera processor (some manufacturers are worse than others at obliterating detail)
Larger file size require larger SD Cards	Each file occupies considerably less (in excess of 50%) space than RAW files

Digital Cameras for Low Light Photography



- Digital cameras make low light photography easy
- Even entry level DSLRs/Mirrorless cameras have clean ISO 3200
- Kit lenses (18-55mm f/3.5) provide a usable starting point
- If you don't have very fast f/1.4 lens then use the Moonlight or twilight

Image data:

23 July 2012, Lake Tekapo, NZ.

Sony NEX5N, kit 18-55mm lens at 18mm and f/4, ISO 3200, 15 sec, RAW file capture.

Simple Processing: RAW conversion, Noise Reduction, Colour Balance and Brightness/Contrast adjustments in Photoshop CS5

Note: The church is illuminated by 18.5% crescent Moon

Working with light

- Use crescent Moon or twilight to naturally illuminate the foreground
- Use nearby light pollution
- **Gently** light up the foreground objects with a flashlight

Note: Pebble beach and rocks are gently illuminated with a flashlight



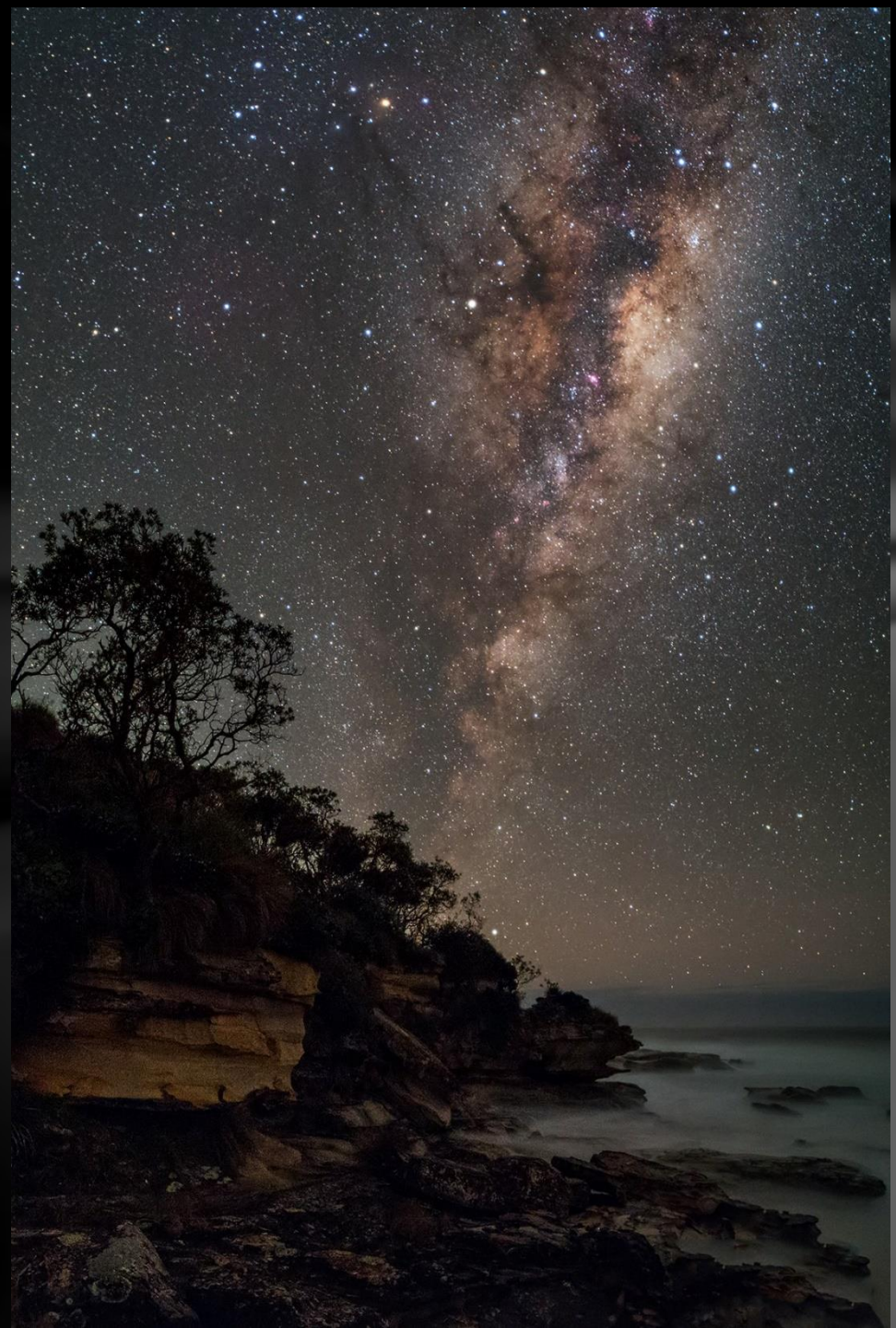
Great Ocean Road, July 2017

- Light-painting with a smartphone screen (slightly red-coloured)



NSW Coast, July 2017

- No artificial lights



Moonlight (thin crescent Moon)



Using Light Pollution

Scouting at night, light pollution map: <http://www.lightpollutionmap.info/>



Context

- Stars and the Milky Way look similar from most dark sky locations
- An interesting foreground adds to the night sky image
- Ocean, mountains, silhouettes, people, etc...
- Landscape elements which work with what is in the sky work best

Note: The foreground is illuminated by a lighthouse beam



Australian Landscape

Cape Schanck, Mornington Peninsula, Victoria

Note: The signs and road are illuminated by flashlight



Aurora and clouds, Flinders, Victoria, June 18th 2012



12 Apostles, Great Ocean Road



Star Trails



- Take multiple images (30sec-10 min) with as little gap as possible
- Set lower exposure to preserve star colours
- Stack in StarStaX (www.starstax.net)

Lake Tyrrel, Victoria



MAGIC telescope, La Palma, Canary Islands



Location and Framing

- Google Maps and Satellite images

- FoV calculator

Lens focal length (mm)	"Digital multiplier" Factor	Distance to Subject (any units)
35	1	100
Horizontal Angular FOV	Vertical Angular FOV	Diagonal Angular FOV
54.4 degrees	37.8 degrees	63.4 degrees
Horizontal FOV (same units as distance)	Vertical FOV (same units as distance):	Diagonal FOV (same units as distance)
102.86	68.57	123.62

http://www.bobatkings.com/photography/technical/field_of_view.html



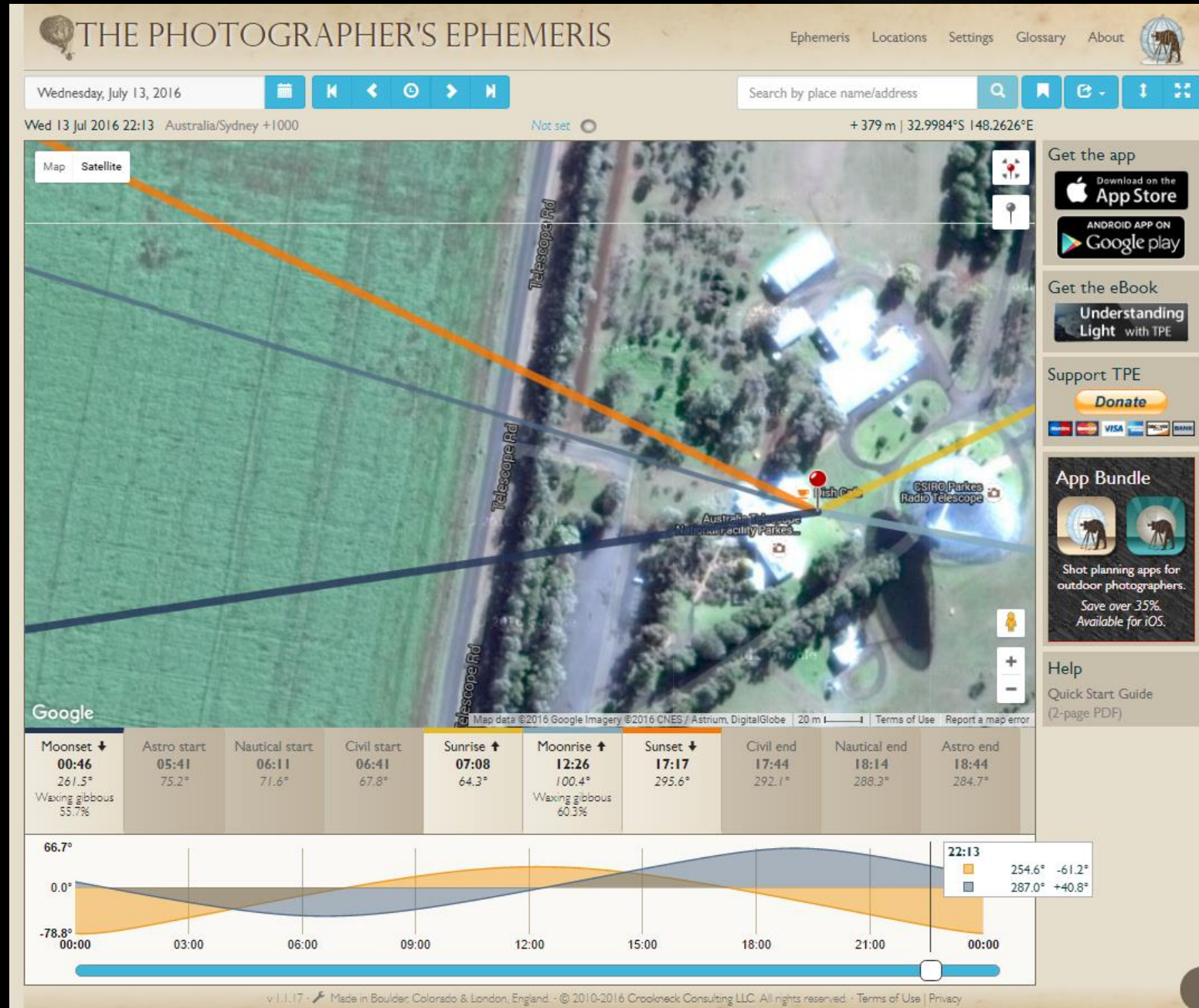
- Stellarium (FoV, Perspective projection, azimuthal grid)
<http://www.stellarium.org>

- Scouting during the day with the camera and compass

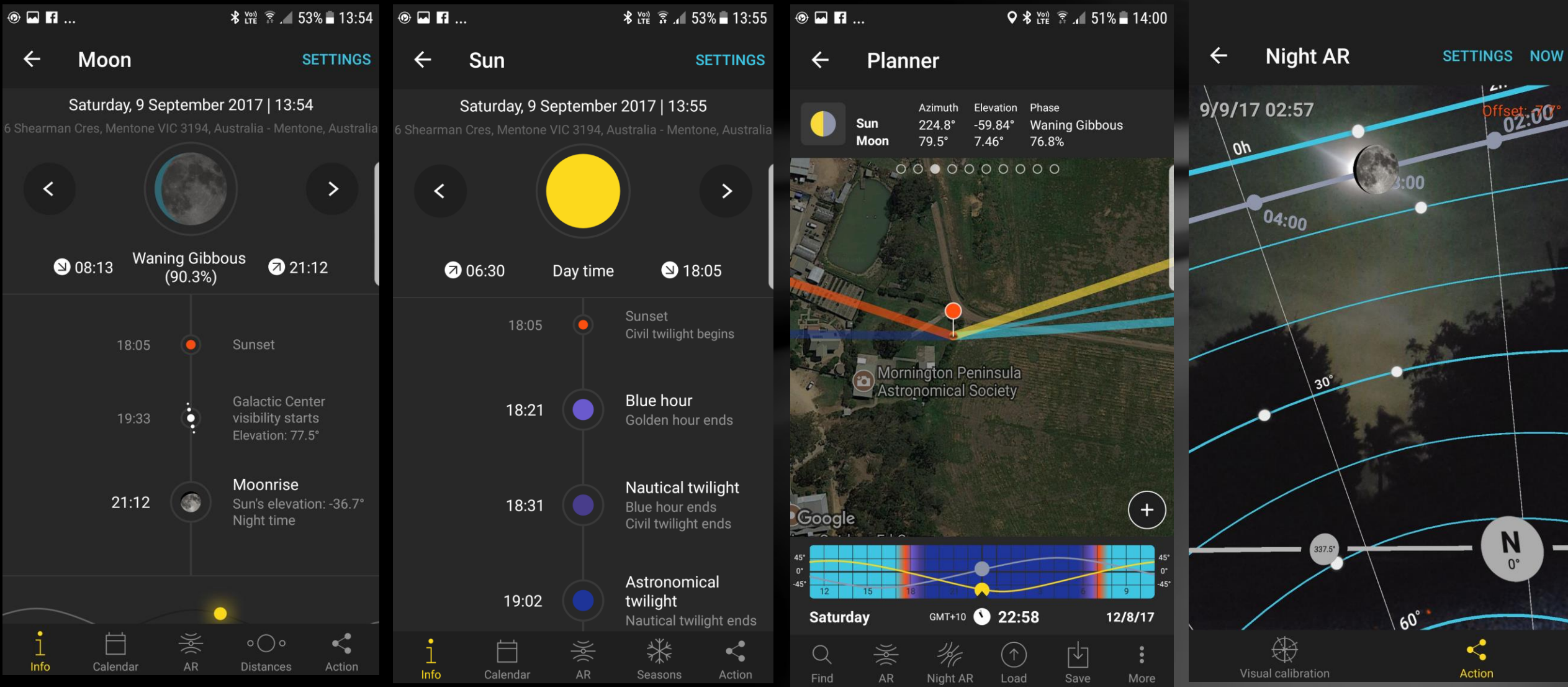
- Save locations in Google Maps for future use



<https://app.photoephemeris.com/>



Mobile App – PhotoPills (Android, iOS)



Other Mobile Apps

- Sky Map (Free - Android)
- Star Chart (Free – iOS)
- Stellarium Mobile Sky Map (\$3 - Android, iOS)
- Sky Safari 5 (\$4 - Android, iOS)
- Redshift (\$15 - Android, iOS)
- Star Walk 2 (\$3 - Android, iOS)

Predicting Clear Skies

Computer Cloud Models & Maps Satellite Images

- www.cloudfreenight.com
- www.yr.no
- satview.bom.gov.au
- www.skippysky.com.au
- www.weatherzone.com.au
(mobile app available)

The most accurate weather forecast method is to be there and check!

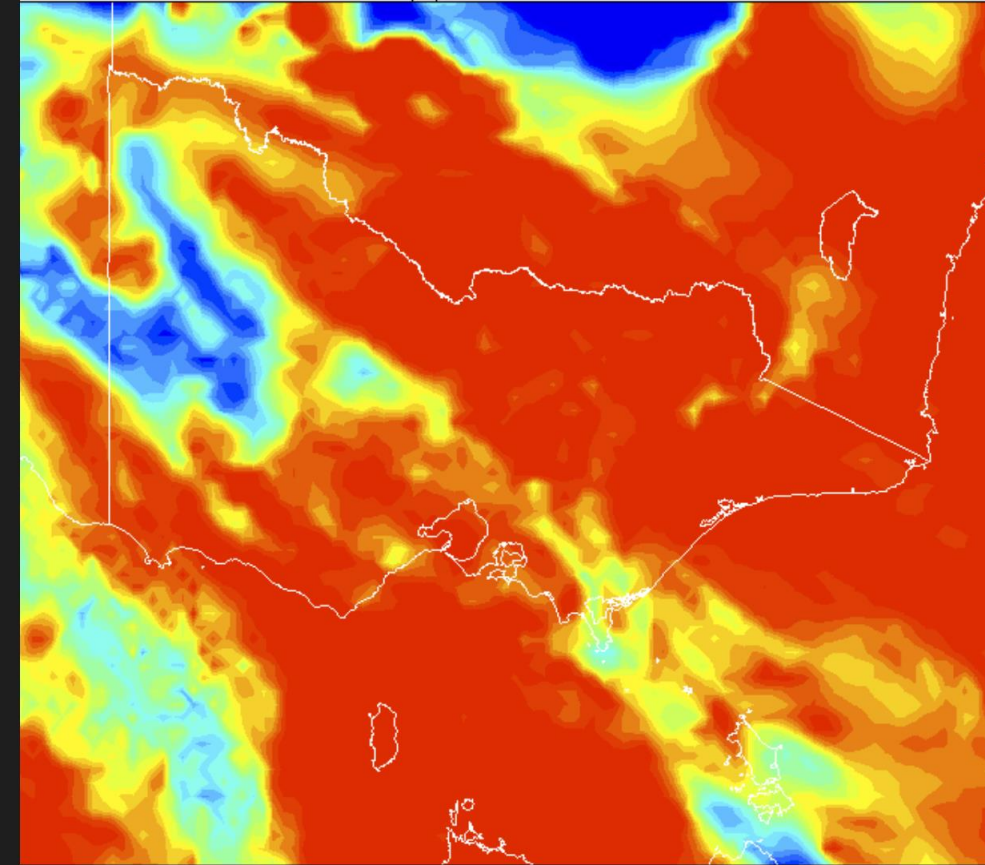
Cloud Free Night

Cloud Forecasts for Australia & New Zealand



Home **Map** Meteogram Satellite Radar Chart Help

ACCESS-R 07 Oct 2019 06 UTC Victoria +003 hr
Total Cloud Cover (%) at 2000 EDT Mon 07 Oct 2019



MODEL
[ACCESS-C](#)
[ACCESS](#)
[GFS](#)

REGION
[Australia](#)
[SE Australia](#)
[VIC Melbourne](#)
[NSW Sydney](#)
[ACT Canberra](#)
[SE QLD Brisbane](#)
[N QLD FNQ](#)
[NT Darwin](#)
[Central Australia](#)
[NW WA](#)
[SW WA Perth](#)
[SA Adelaide](#)
[TAS Hobart](#)
[New Zealand](#)

TYPE
[Total Cloud](#)
[Fog](#)
[Low Cloud](#)
[Middle Cloud](#)
[High Cloud](#)
[Wind](#)
[Jetstream](#)
[Pressure/Rainfall](#)
[Pressure/Evaporation](#)
[Temperature](#)
[Humidity](#)
[Precipitable Water](#)
[Solar Irradiance](#)

7 Oct 2019 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 19:33:03

⏏ ◀24 ◀12 ◀6 ◀3 ◀1 || ▶1 ▶3 ▶6 ▶12 ▶24 ▶

Home **Map** Meteogram Satellite Radar Chart Help

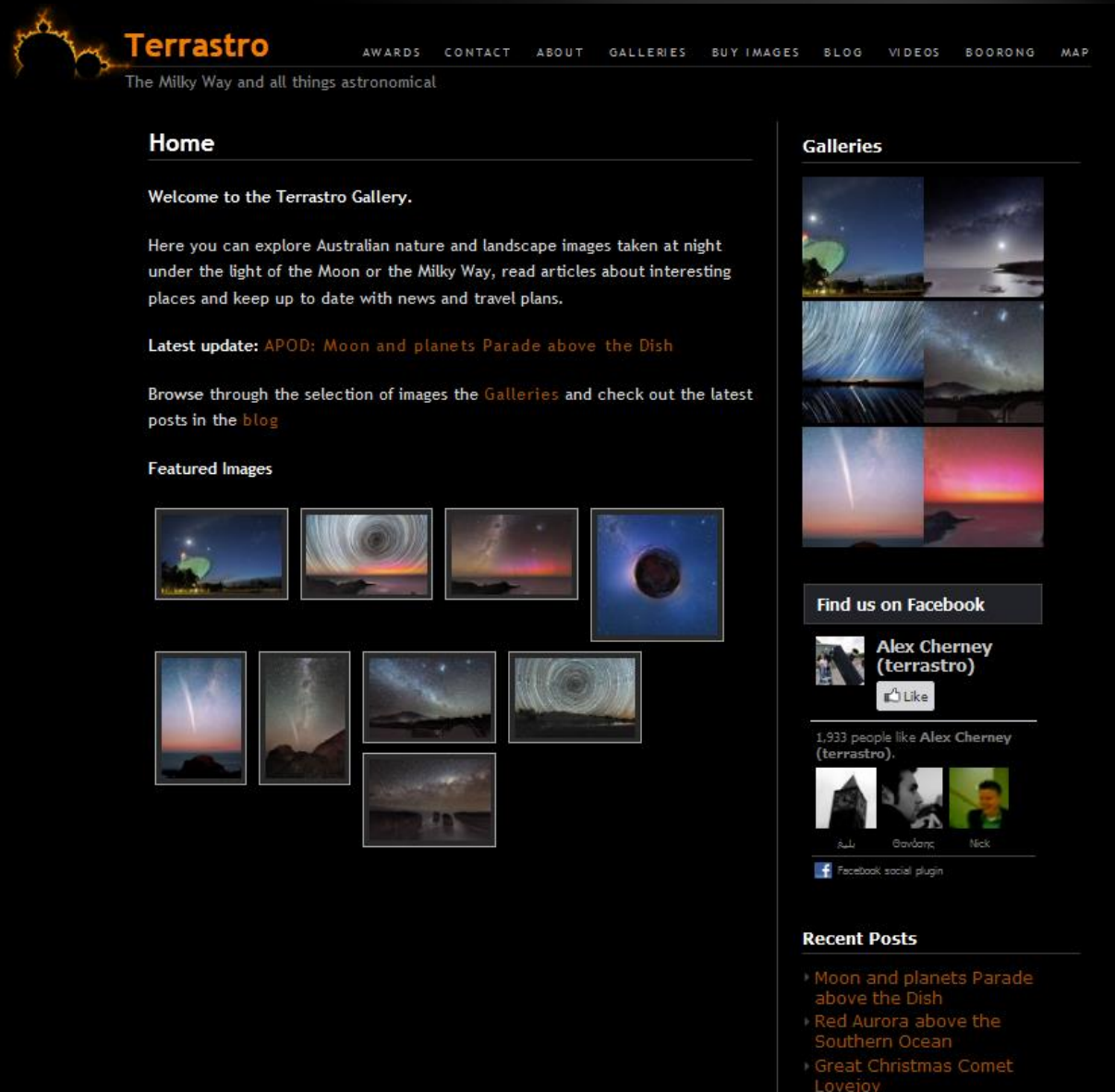
Personal Safety

- Scout the location during daylight –some locations can be quite dangerous or not accessible in the dark
- Some national parks, lighthouses, etc. can be locked at night or have access restrictions
- Let someone know where you're going and when you plan to return
- Go with friend(s)

Thank you!

My latest images, videos
and blog are online at
www.terraastro.com

e: alex@terraastro.com



The screenshot shows the Terraastro website homepage. At the top is a navigation bar with the site logo (a stylized sun) and the name "Terraastro" in orange. Below the name is the tagline "The Milky Way and all things astronomical". The navigation menu includes links for AWARDS, CONTACT, ABOUT, GALLERIES, BUY IMAGES, BLOG, VIDEOS, BOORONG, and MAP.

The main content area is divided into two columns. The left column has a "Home" section with a welcome message, a description of the site's focus on Australian nature and landscape images, and a "Latest update" section mentioning "APOD: Moon and planets Parade above the Dish". Below this is a "Featured Images" section displaying a grid of eight astronomical images, including a green nebula, a spiral galaxy, a red aurora, and a comet.

The right column has a "Galleries" section with a grid of six images, including a green nebula, a spiral galaxy, a red aurora, and a comet. Below the galleries is a "Find us on Facebook" section featuring the profile of Alex Cherney (terraastro) with a "Like" button and a list of three friends: Ali, David, and Nick. At the bottom of the right column is a "Recent Posts" section listing three posts: "Moon and planets Parade above the Dish", "Red Aurora above the Southern Ocean", and "Great Christmas Comet Lovejoy".