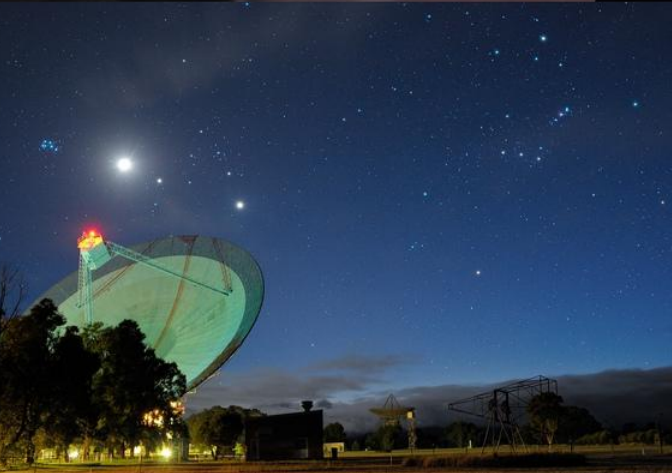
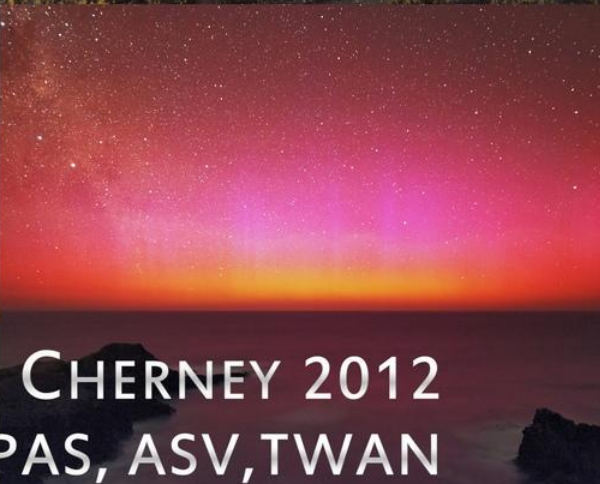
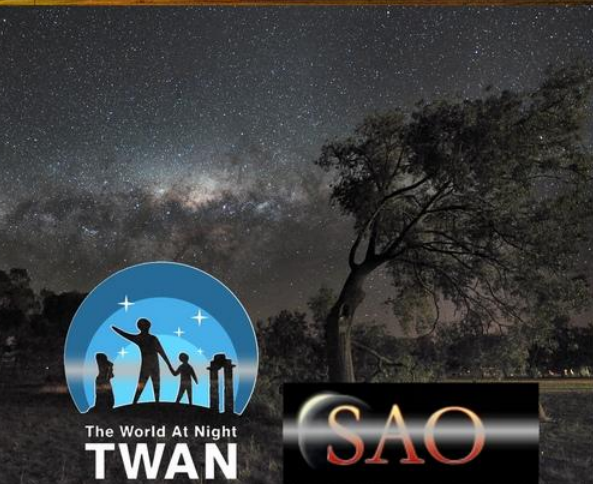




THE BEAUTIFUL



AT NIGHT



ALEX CHERNEY 2012  
SAO, MPAS, ASV, TWAN



# Digital Cameras shine in Low Light



- Digital cameras make previously unthinkable possible
- 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, light pollution or both to your advantage

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

- Lighting is critical in any photograph
- Use crescent Moon or twilight to naturally illuminate the foreground
- Make light pollution your friend
- Gently light up the foreground objects with a flashlight (I use coloured cellophane to make the light warmer, matte pink seems to work best)



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



# Galactic View from Planet Earth

Note: The tree is illuminated by the car park lights nearby





# Captivating foregrounds

- Stars and the Milky Way look similar from most dark sky locations
- Often an interesting foreground can make the image much more appealing
- Ocean, mountain ridges, interesting silhouettes, people (used creatively)
- Landscape elements complementing the sky work best



Note: The foreground is illuminated by a roving lighthouse beam



# Loch Ard Gorge, Great Ocean Road

Note: Stack of seven images (average) for the foreground noise reduction. Natural light only.





# 12 Apostles, Great Ocean Road





# Australian Landscape

Cape Schanck, Mornington Peninsula, Victoria

Note: The signs and road are illuminated by flashlight





# Flinders, Mornington Peninsula, Victoria





# Aurora and clouds, Flinders, Victoria, June 18<sup>th</sup> 2012





# Lake Tyrrel, Victoria





# MAGIC telescope, La Palma, Canary Islands





# Sky Photography – Parkes Radio Telescope





# Location, Location, Location!

- 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



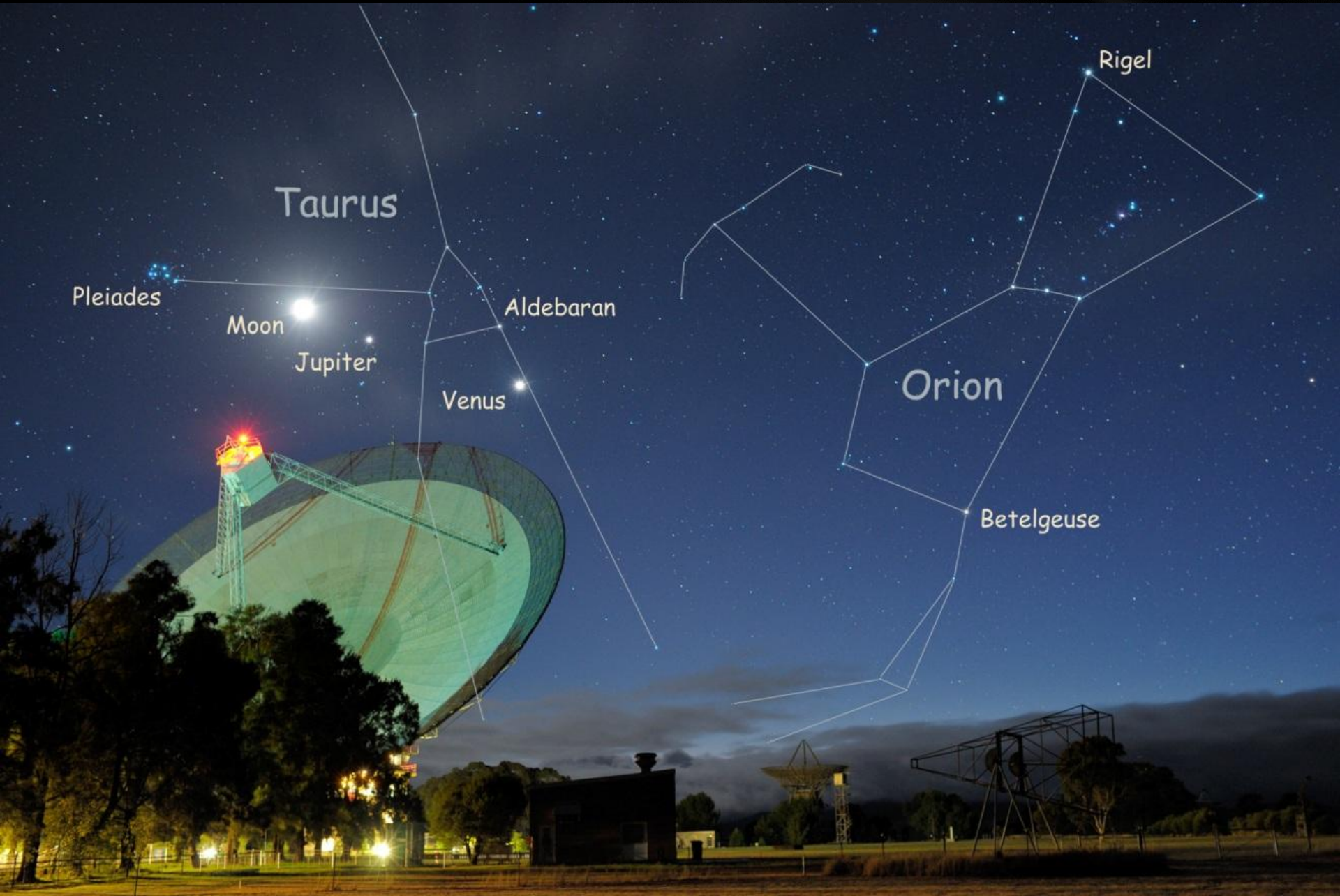
[http://www.bobatkins.com/photography/technical/field\\_of\\_view.html](http://www.bobatkins.com/photography/technical/field_of_view.html)

- Stellarium (FoV, Perspective projection, azimuthal grid, true South)
- Scouting during the day with the camera and compass
- Save locations in Google Maps for future use





# Moon, Jupiter, Venus, Pleiades, Orion July 15<sup>th</sup>, 2012, Parkes Radio Observatory





# What you need (basic)

- 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





# Camera settings to start with

- Manual Exposure Mode
- Manual Focusing Mode
- Manual White Balance at around 4100 - 4300K (Sunny WB)
- 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 Southern Celestial Pole (SCP)

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 unusable 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.



# Star Trails



- Take multiple images (30sec-10 min) with as little gap as possible
- Set lower exposure to preserve star colours
- Stack in Startrails ([www.startrails.de](http://www.startrails.de))



# Timelapse: Red Aurora Australis Flinders, Victoria, Australia



<http://vimeo.com/terrastro/redaurora>



# Making the Timelapse Animation

- Take at least 300 consecutive frames.
- Make sure filenames are sequential
- Use Video Editor to import individual frames as a sequence and define the frame rate
- Crop to 1920x1080 widescreen format
- Add Music
- Render video: MP4 or MOV format, 1920x1080 for large screen TV and 1280x720 for the Internet





# ASKAP Radio Telescope

- Radio-quiet: Murchison Shire – 41,000 sq. km., 140 people
- 36 12-metre antennae working as one, 6km baseline
- 188-element Phased Array Feed (Receiver)
- 5.5x5.5 deg FoV – ideal for sky surveys
- Frequency Range 0.7-1.8 GHz
- Cost \$153 Mln
- \$21 Mln Cray Supercomputer in Perth shared with MWA





# ASKAP Science

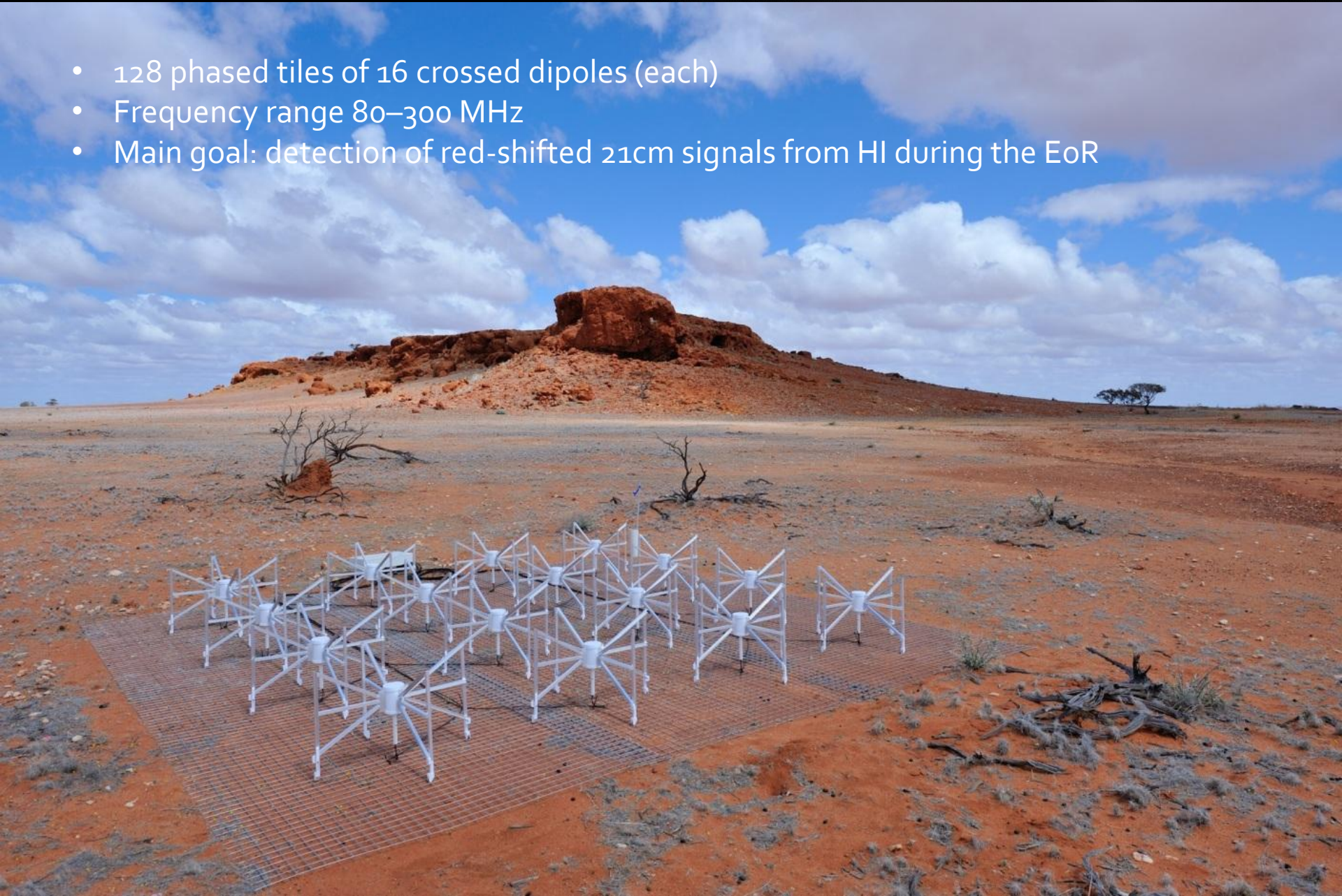
- EMU: Evolutionary Map of the Universe
- WALLABY: Widefield ASKAP L-Band Legacy All-Sky Blind Survey
- POSSUM: Polarization Sky Survey of the Universe's Magnetism
- DINGO: Deep Investigations of Neutral Gas Origins





# Murchison Widefield Array

- 128 phased tiles of 16 crossed dipoles (each)
- Frequency range 80–300 MHz
- Main goal: detection of red-shifted 21cm signals from HI during the EoR





# Photogrammetry at ASKAP





# Timelapse: ASKAP Radio Telescope Murchison WA

A timelapse photograph of three large radio telescope dishes at the Murchison Radio-Astronomy Observatory in Western Australia. The dishes are arranged in a row, and the scene is captured during sunset, with a warm orange and yellow glow in the sky. The sun is visible between the middle and right dishes. The dishes are dark, and the text is overlaid in white.

CSIRO

ASKAP

RADIO  
TELESCOPE

MURCHISON RADIO-ASTRONOMY OBSERVATORY  
WESTERN AUSTRALIA

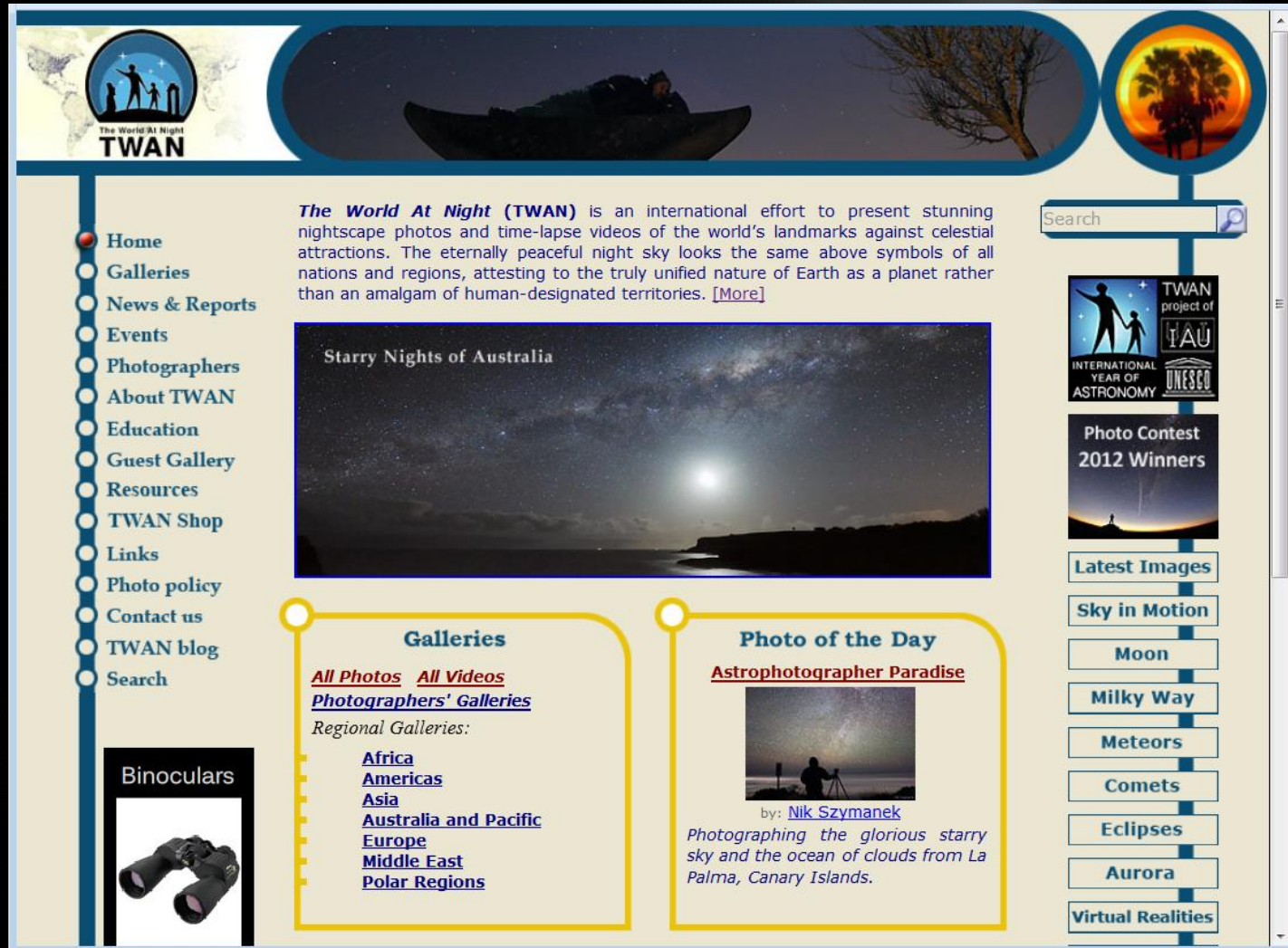
CSIRO ACKNOWLEDGE THE WAJARRI YAMATJI PEOPLE AS THE TRADITIONAL OWNERS OF THE OBSERVATORY SITE

<http://vimeo.com/terrastro/askap>



# The World at Night [WWW.TWANIGHT.ORG](http://WWW.TWANIGHT.ORG)

*The World At Night (TWAN) is a program to create and exhibit a collection of stunning landscape astrophotographs and time-lapse videos of the world's most beautiful and historic sites against a night time backdrop of stars, planets and celestial events. TWAN is a bridge between art, humanity, and science.*



The screenshot shows the TWAN website homepage. At the top left is the TWAN logo, which features silhouettes of people looking at a starry sky. To the right of the logo is a large image of a person in a boat on a dark sea under a starry sky. Further right is a circular image of a sunset over palm trees. Below the logo is a navigation menu with links: Home, Galleries, News & Reports, Events, Photographers, About TWAN, Education, Guest Gallery, Resources, TWAN Shop, Links, Photo policy, Contact us, TWAN blog, and Search. To the right of the navigation menu is a search bar. Below the navigation menu is a section titled "Starry Nights of Australia" with a large image of a starry sky over a coastline. To the right of this section is a vertical sidebar with links: Latest Images, Sky in Motion, Moon, Milky Way, Meteors, Comets, Eclipses, Aurora, and Virtual Realities. Below the "Starry Nights of Australia" section are two yellow-bordered boxes. The first box is titled "Galleries" and contains links for "All Photos", "All Videos", and "Photographers' Galleries". Below these are regional galleries: Africa, Americas, Asia, Australia and Pacific, Europe, Middle East, and Polar Regions. The second box is titled "Photo of the Day" and features a photo of a person on a tripod under a starry sky, with the text "by: Nik Szymanek" and "Photographing the glorious starry sky and the ocean of clouds from La Palma, Canary Islands." At the bottom left of the page is a small image of binoculars with the text "Binoculars" above it.

**The World At Night (TWAN)** is an international effort to present stunning nightscape photos and time-lapse videos of the world's landmarks against celestial attractions. The eternally peaceful night sky looks the same above symbols of all nations and regions, attesting to the truly unified nature of Earth as a planet rather than an amalgam of human-designated territories. [\[More\]](#)

**Starry Nights of Australia**

**Galleries**  
[All Photos](#) [All Videos](#)  
[Photographers' Galleries](#)  
Regional Galleries:  
[Africa](#)  
[Americas](#)  
[Asia](#)  
[Australia and Pacific](#)  
[Europe](#)  
[Middle East](#)  
[Polar Regions](#)

**Photo of the Day**  
[Astrophotographer Paradise](#)  
by: [Nik Szymanek](#)  
Photographing the glorious starry sky and the ocean of clouds from La Palma, Canary Islands.

Binoculars



# Time-Lapse from La Palma Observatory

starmus  festival

*Discover the Cosmos  
and Change the World!*

# STARMUS

Gran Telescopio CANARIAS

# festival



© 2008 Gran Telescopio Canarias  
Fotografía: Pablo Benet

[www.starmus.com](http://www.starmus.com)



UNESCO

**50 years in Space: Tribute to Gagarin**  
**Discover the Cosmos and Change the World**  
**Astrophotography Now Exhibition**  
**Beyond your Imagination: Space Art & 3D Astronomy Exhibition**  
**SETI Zone**  
**"108 Minutes": Round Table Discussion**  
**Tangerine Dream Starlight Concert: The Gates of Saturn**

<http://vimeo.com/terrastro/outerspace>



# Timelapse: Mystic Sky

Mt John Observatory, Lake Tekapo, South Island, New Zealand



<http://vimeo.com/terraastro/mysticsky>



# Timelapse: Border Stargaze 2011

*5 nights of clear skies*



<http://vimeo.com/terrastro/epicstargaze>



# Timelapse: Total Solar Eclipse, November 2013

## Tropical North Queensland

# TOTAL SOLAR ECLIPSE

## NORTH QUEENSLAND, AUSTRALIA

NOVEMBER 14TH, 2012



The World At Night  
**TWAN**

[WWW.TWANIGHT.ORG](http://WWW.TWANIGHT.ORG)

PHOTOGRAPHY:  
ALEX CHERNEY & JAMES MCHUGH ©2012  
[WWW.TERRASTRO.COM](http://WWW.TERRASTRO.COM)  
MUSIC: 'DAWN OF A NEW ERA' BY ZERO PROJECT

<http://vimeo.com/terrastro/tse2012>



# Thank you!

My latest images, videos  
and blog are online at  
[www.terraastro.com](http://www.terraastro.com)

e: [alex@terraastro.com](mailto:alex@terraastro.com)



**Terraastro**

The Milky Way and all things astronomical

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## Home

Welcome to the Terraastro Gallery.

Here you can explore Australian nature and landscape images taken at night under the light of the Moon or the Milky Way, read articles about interesting places and keep up to date with news and travel plans.

**Latest update:** [APOD: Moon and planets Parade above the Dish](#)

Browse through the selection of images the [Galleries](#) and check out the latest posts in the [blog](#)

## Featured Images



## Galleries



## Find us on Facebook



**Alex Cherney  
(terraastro)**



1,933 people like Alex Cherney (terraastro).



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## Recent Posts

- ▶ [Moon and planets Parade above the Dish](#)
- ▶ [Red Aurora above the Southern Ocean](#)
- ▶ [Great Christmas Comet Lovejoy](#)