

Cover image - MPAS 2016 Xmas Party Group Photo, by Greg Walton



# SCORPIUS

THE JOURNAL OF THE  
MORNINGSIDE PENINSULA ASTRONOMICAL SOCIETY INC.

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The Morningside Peninsula Astronomical Society (formerly the Astronomical Society of Frankston) was founded in 1969 with the aim of fostering the study and understanding of astronomy by amateurs and promoting the hobby of amateur astronomy to the general community at all levels.

The Society holds a focused general meeting each month for the exchange of ideas and information. Regular public and private observing nights are arranged to observe currently available celestial objects and phenomena. In addition, the Society encourages the service of its members for on-site or off-site educational presentations and observing nights for schools and community groups.

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**December 10th Xmas Members' BBQ** - About 40 members in attendance. The day started at 1:30 pm with some members turning up early to do some last minute jobs. Tony set up & washed the tables & also removed cobwebs in the big shed, while I mowed the grass & did some jobs in the observatory. Heinz Rummel whipper snipped around the trees. Dave Rolfe & Jamie Pole installed a new radio antenna mast. Mark Hillen removed the dead tree from behind the tool shed. Inge Marcinkowski dusted the telescopes, bino-chairs & swept out the observatory. Pia Pedersen set up the Xmas decorations while the other ladies put out the food. Jamie manned the BBQ & collected membership fees. Fred showed the Moon through his telescope. Then it was time for the group photo (*see above*). Dave Rolfe (President) made a speech & wished everyone at MPAS a **Merry Christmas & Happy New Year!!! ... and** also thanked all members for their help throughout the year. We did open the MPAS observatory & got some views of the Moon through the 5 inch refractor, but the clouds did not clear with most members leaving around 10pm. *Greg Walton*

# SOCIETY NEWS

By Greg Walton

**November public night** - Approximately 60 in attendance: 15 MPAS members and 45 members of the public. Clouds & strong winds stopped us from viewing most of the night. Trevor Hand did one of his marvellous talks, while members battled with wind & telescopes on the field. Most got to see the Moon, Venus & Mars. Saturn stubbornly hid in the clouds. We opened the observatory briefly & found Venus with the 14 inch Meade, but strong gusts of wind made it unsafe so we closed the roof. As always the sky cleared once the public had left!

**Super Moon** - On the 14th November about 12 people (mostly members) attended the MPAS Briars site, to watch the Moon rising in the east. It was at its closest since 1948 at a distance of a mere 356,509 km, about 14% larger than normal & 30% brighter. But honestly we could not see any difference from normal -probably because the Moon hid in the clouds on the horizon for the first 1/2 hour. By the time it appeared it was well above the horizon, losing the illusion effect. We opened the observatory just in case. We were besieged by members of the public and the sky stayed clear. But in time it was not long before we had to close the roof as rain was starting to fall around 10 pm when we all headed home. We all got some photos as you can see below. I actually thought the Moon looked bigger the following night ... *by Greg Walton*



**November Society Meeting** - saw about 30 members in attendance. We almost had to do the meeting in the car park for the second time as our key card did not work because the codes had been changed. Dave Rolfe (President) was able to get somebody to open the door for us. The meeting got under way 15 minutes late. Dave chaired the meeting and talked about upcoming events at MPAS. Then our guest speaker, Dr Nick Lomb, did an excellent talk on the history of the Solar Eclipse Expedition of 1871. Nick worked at the Sydney Observatory for 30 years and has written many books. Greg Walton did "Sky for the Month" then showed videos from the VicSouth Star Party and members' photos of the Super Moon, after which members chatted over coffee. Photo at right: Dr Nick Lomb & Ian Sullivan.

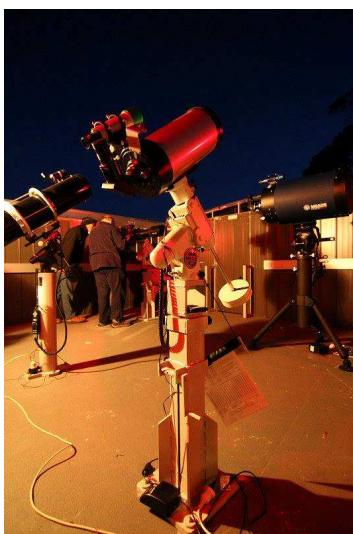
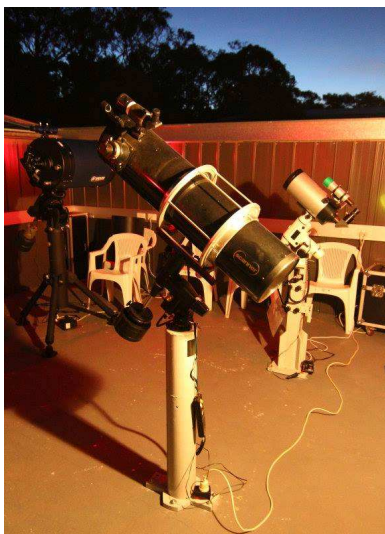


Photo - Greg Walton

**November Members' BBQ & Working Bee** - The working bee started at 3 pm. Dave Rolfe & I cleared dead trees and branches that were rubbing the big shed, to also reduce the fire risk. Then Dave mowed the grass while I whipper snipped. I then fixed the fence behind the observatory and the leaking pipe behind the sink, while Dave set up an antenna for listening to meteor scatter. Ian Sullivan poisoned weeds on the path to the car park & the gravel road, while John Cleverdon loaded branches in the ute ready for dumping. Then it was time for Jamie Pole to fire up the BBQ. After that, it was all hands on deck to install 3 new piers in the observatory. Unfortunately we first had to remove the Springfield telescope due to safety concerns. We then stripped down 3 telescopes, bolted down the piers, and fitted the telescopes to their piers. By then it was dark enough to do the polar alignment and hit the start button. About 6 members stayed on till moonrise at 12:20 am. It was good to get these jobs done before the Xmas BBQ, but we could have done with a few more members helping out. *Greg Walton*



All photos by Rohan Baumann



**Right** - As Greg takes to one of the new observatory piers for some "minor adjustments" with the angle grinder, Jamie selflessly acts as a human shield to protect a nearby scope from flying sparks. *Rohan Baumann*



**December Public Night** - Approximately 70 in attendance: 20 MPAS members and 50 members of the public. Trevor Hand did one of his marvellous talks, while members on the field manned the telescopes. It was one of those rare perfectly clear skies with many staying till 1 am. The observatory was open with all telescopes running. John Cleverdon found M31 Andromeda galaxy in an 8 inch Dobsonian telescope that a member of the public had brought along. Alois also showed the spectra of some stars in his telescope.

**This year we have had two 8 inch Dobsonian telescopes donated to the Society.**

The first telescope (white, below) was donated early in the year at one of the public nights, when a family brought it along and said, it was their father who built it at the ASV's Instrument Making Section. The telescope works very well but the mirror had corroded. Kindly, ASV member Ken Beard cleaned & re-aluminized the mirror at no cost to the Society. I also added wheels.

The second donated telescope (blue) belonged to an ASV member, Geoff Dudley, who suddenly passed away earlier this year. Geoff spent much time making this telescope and I found it a pleasure to use, with a high quality focuser & a large Telrad finder. The telescope also has provision for digital setting circles. Hopefully members will use and appreciate these two excellent telescopes. *Greg Walton*



**MPAS SUBSCRIPTIONS 2017**

The ticking over of the New Year also means that society fees are now due to be paid. The Society has worked hard to ensure that 2017 fees are still the same as last year's prices. So to assist the Society in maintaining the facilities and service we provide, we appreciate your prompt payment for the 2017-year.

As a reminder, the following structure of the fees are:

- \$50 – Full Member
- \$45 – Pensioner Member
- \$65 – Family Membership
- \$60 – Family Pensioner

**SOCIETY FEES**

Subscriptions can be paid in a number of ways:  
Membership

- Direct Cash payment to a committee member
- Send a cheque to the Society mail box: MPAS, P O Box 596, Frankston 3199
- Make a direct electronic payment into the Society working bank account.

The account details are BSB 033-272 Account 162207. Remember to add your name and details to the transfer so we can identify the payment in the bank records. If you have any concerns please talk to a committee member. Click on the link for further information:

[https://drive.google.com/file/d/0ByvkxzZG19g\\_NXZ4cWxHbERTdEE/view?usp=sharing](https://drive.google.com/file/d/0ByvkxzZG19g_NXZ4cWxHbERTdEE/view?usp=sharing)

CALENDAR		January / 2017				
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
<b>1</b> New Years Day Neptune close to Mars	<b>2</b> New Years Holiday Venus 2degs left of Moon	<b>3</b> Mars & Neptune close to the Moon	<b>4</b>	<b>5</b>	<b>6</b> First Quarter Public Night 8pm Mercury 1.2degs M23	<b>7</b> MPAS Observatory open to members till midnight
<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b> Full Moon	<b>13</b> Public Night 8pm Neptune 0.4degs Venus	<b>14</b> ASV Meeting MPAS Observatory open to members till midnight
<b>15</b> Regulus 0.8degs north of Moon	<b>16</b>	<b>17</b>	<b>18</b> NO Meeting	<b>19</b> Jupiter above the Moon	<b>20</b> Last Quarter Public Night 8pm	<b>21</b> Training Day Members Night BBQ 6pm
<b>22</b>	<b>23</b>	<b>24</b> Saturn right of the Moon Dawn	<b>25</b> Saturn above the Moon Dawn	<b>26</b> Australia Day Mercury right the Moon Dawn	<b>27</b>	<b>28</b> New Moon MPAS Observatory open to members till midnight Mars 0.7degs NGC524
<b>29</b> Comet Panstarrs close to M80	<b>30</b> Neptune 0.2degs of the Moon	<b>31</b> Mars & Venus right of the Moon	<b>Please remember we run 3 Public Nights in January - 6th, 13th &amp; the 20th</b>			

**Monthly Events & Highlights.** Red Days indicate School Holidays  
**Public Nights** 6th, 13th, 20th, 8pm start at the Briars  
**Members Night BBQ** 6pm at the Briars on 21<sup>st</sup>; also **Observatory & Telescope Training Day after BBQ Evening** - Jupiter above the Moon 19th - Mars & Venus right of the Moon on the 31st  
**Please note: There will be NO meeting in January this year !!!! due to work at the Peninsula School !!!!**

CALENDAR		February / 2017				
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			<b>1</b> Venus, Mars & the Moon all in a line. West, evening	<b>2</b>	<b>3</b> Public Night 8pm	<b>4</b> First Quarter MPAS Observatory open to members till midnight Comet 45P star Delta Aquilae
<b>5</b>	<b>6</b> Comet 45P/Honda near NGC6755	<b>7</b> Jupiter stationary	<b>8</b> ASV Meeting	<b>9</b>	<b>10</b>	<b>11</b> Full Moon MPAS Observatory open to members till midnight
<b>12</b> Occultation of Regulus by Moon 12.27am from Briars	<b>13</b>	<b>14</b> Valentine's Day	<b>15</b> Society Meeting 8pm Spica, Jupiter & Moon	<b>16</b>	<b>17</b> Comet Panstarrs near NGC6325	<b>18</b> TLD 1pm Members Night BBQ 6pm
<b>19</b> Last Quarter Moon 404,376km	<b>20</b>	<b>21</b> Saturn right of the Moon Dawn Comet 45P/Honda near NGC4314	<b>22</b> Planning Committee Meeting 8pm Comet Panstarrs near NGC6401	<b>23</b>	<b>24</b>	<b>25</b> MPAS Observatory open to members till midnight
<b>26</b>	<b>27</b> New Moon Uranus 0.6degs of Mars Annular eclipse of the Sun not visible from Australia. Chile, Angola, Zambia	<b>28</b>	<b>MPAS Observatory is open to members till midnight on all Saturdays in January &amp; February.</b>			

**Monthly Events & Highlights.** \*\*\*Many Comets in the Sky this month; one may brighten\*\*\*  
**Public Nights** 3rd, 8pm start. **Society Meeting** at 8pm on 15th @ the Peninsula School  
**Members Night BBQ** 6pm at the Briars on 18th  
**TLD - Telescope Learning Day Workshop 18th February @ the Briars from 1:00 pm (Open to the public)**  
**Evening** - Venus, Mars & the Moon all in a line on the 1st. Occultation of Regulus by the Moon on 11th after midnight  
**Evening** - Spica, Jupiter & the Moon all in a line on the 15th

Please, we need helpers to keep the MPAS Observatory open to members on all Saturday nights.



# Mornington Peninsula Astronomical Society - 2017 Calendar

Date	January	February	March	April	May	June	July	August	September	October	November	December	Date
1	<u>Su</u> New Year's Day	W	W	<u>S</u>	M	Th	<u>S</u>	T	F 8pm Public Night	<u>Su</u> Daylight Saving begins	W	F 8pm Public Night	1
2	<u>M</u> New Years Holiday	Th	Th	<u>Su</u> Daylight Saving ends	T	F 8pm Public Night	<u>Su</u>	W	S	<u>M</u>	Th	S	2
3	<u>T</u>	F 8pm Public Night	F 8pm Public Night	<u>M</u>	W	S	<u>M</u>	Th	Su Father's Day	<u>T</u>	F 8pm Public Night	Su	3
4	<u>W</u>	S	S	<u>T</u>	Th	Su	<u>T</u>	F 8pm Public Night	M	<u>W</u>	S	M	4
5	<u>Th</u>	Su	Su	<u>W</u>	F 8pm Public Night	M	<u>W</u>	S	T	<u>Th</u>	Su	T	5
6	F 8pm Public Night	M	M	<u>Th</u>	S VASTROC	T	<u>Th</u>	Su	W	F 8pm Public Night	M	W	6
7	<u>S</u>	T	T	F 8pm Public Night	Su VASTROC	W	F 8pm Public Night	M	Th	<u>S</u>	T Melbourne Cup Day	Th	7
8	<u>Su</u>	W ASV	W ASV	<u>S</u>	M	Th	<u>S</u>	T	F	<u>Su</u>	W ASV	F	8
9	<u>M</u>	Th	Th	<u>Su</u>	T	F	<u>Su</u>	W ASV	S APW 1pm	M	Th	S	9
10	<u>T</u>	F	F	<u>M</u>	W ASV	S	<u>M</u>	Th AC	Su	T	F	Su	10
11	<u>W</u>	S	S	<u>T</u>	Th AC	Su	<u>T</u>	F	M	W ASV	S Remembrance Day	M	11
12	<u>Th</u>	Su	Su	W ASV	F	M Queen's Birthday	W ASV	S NSW	T	Th AC	Su	T	12
13	F 8pm Public Night	M	M Labour Day	<u>Th</u>	S	T	<u>Th AC</u>	Su NSW	W ASV	F	M	W ASV	13
14	<u>S</u>	T Valentine's Day	T	F Good Friday	Su Mother's Day	W ASV	<u>F</u>	M NSW	Th AC	S	T	Th	14
15	<u>Su</u>	W MPAS Meeting 8pm	W MPAS Meeting 8pm	<u>S</u> Easter	M	Th AC	<u>S</u>	T NSW	F	Su	W MPAS Meeting 8pm	F	15
16	<u>M</u>	Th	Th	<u>Su</u> Easter	T	F	<u>Su</u>	W MPAS Meeting 8pm	S	M	Th	S Members Xmas Party	16
17	<u>T</u>	F	F St Patrick's Day	<u>M</u> Easter	W MPAS Meeting 8pm	S	M	Th NSW	Su	T	F	Su	17
18	<u>W</u>	S TLD 2pm Members 6pm	S SD 1pm Members 6pm	T	Th	Su	T	F NSW	M	W MPAS Meeting 8pm	S AC Members	M	18
19	<u>Th</u>	Su	Su	W MPAS Meeting 8pm	F	M	W MPAS AGM 8pm	S 6pm Members	T	Th	Su	T	19
20	F 8pm Public Night	M	M	Th	S 6pm Members	T	Th	Su NSW	W MPAS Meeting 8pm	F VicSouth	M	W	20
21	<u>S</u> 6pm Members	T	T	F	Su	W MPAS Meeting 8pm	F	M	Th	S 6pm Society Dinner	T	Th	21
22	<u>Su</u>	W Committee	W	S SA 6pm Members	M	Th	S 6pm Members	T	F	Su VicSouth	W Committee	F	22
23	<u>M</u>	Th	Th	Su	T	F	Su	W	S 6pm Members	M VicSouth	Th	<u>S</u>	23
24	<u>T</u>	F	F	M	W	S 6pm Members	M	Th	<u>Su</u>	T	F	<u>Su</u>	24
25	<u>W</u>	S	S	T ANZAC Day	Th SPSP	Su	T	F	<u>M</u>	W	S	<u>M</u> Xmas Day	25
26	<u>Th</u> Australia Day	Su	Su	W Committee	F SPSP	M	W Committee	S	<u>T</u>	Th	Su	<u>T</u> Boxing Day	26
27	<u>F</u>	M	M	Th	S SPSP	T	Th	Su	W Committee	F	M	<u>W</u>	27
28	<u>S</u>	T	T	F	Su SPSP	W Committee	F	M	<u>Th</u>	S	T	<u>Th</u>	28
29	<u>Su</u>		W	S	M	Th	S	T	F Pub. Hol. Grand Final	Su	W	<u>F</u>	29
30	M		Th	Su	T	F	Su	W	<u>S</u> Grand Final	M	T	<u>S</u>	30
31	T		F		W		M	Th		T Halloween		<u>Su</u> New Years Eve	31

Yellow Boxes - MPAS Society Meetings @ the Peninsula School 8pm  
 Green Boxes - Public Nights @ the Briars 8pm  
 Blue Boxes - Members-Only Nights @ the Briars 6pm  
 Pink Boxes - 6 Committee Meetings @ the Briars 8pm  
 Orange Boxes - ASV Monthly Meetings @ the Herbarium Melbourne 8pm

TLD - Telescope Learning Day 18th February @ the Briars 2pm  
 SD - Solar Day 18th March @ the Briars 1pm  
 SA - Sky Atlas - How to Use a Sky Atlas 22nd April @ the Briars 6pm  
 APW - Astrophotography Workshop 9th September @ the Briars 1pm  
 Society Dinner - 21st October @ the Briars 6pm

Autumn Equinox - March 20  
 Winter Solstice - June 21  
 Spring Equinox - September 23  
 Summer Solstice - December 22

Full Moon  New Moon 

**Bold underlined days** - School Holidays  
**Grey Boxes** - Weekends & Public Holidays

Working Bees will be noted in the calendar in Scorpius Newsletters  
**AC** - Night Time Astronomy Classes - Thursdays @ the Briars 8pm to 10pm  
 11th May, 15th June, 13th July, 10th August,  
 14th September, 12th October & 18th November

**VASTROC 2017** Mt Burnett Astronomical Society <http://vastroc.net/> 6-7th May  
**SPSP 2017** - South Pacific Star Party- Ilford NSW 25th - 28th May  
**VicSouth 2017** - Nhill Victoria 20th to 23rd October  
**NSW - National Science Week** - 12th to 20th August

MPAS Calendar 2017 - by Greg Walton

# 2017 Astronomy Classes

## Sat 21st January, 8PM - Observatory & Telescope Training Day

Starts after the Members' BBQ - Places are limited. email : [Greg Walton gwmpas@gmail.com](mailto:Greg.Walton.gwmpas@gmail.com)

## Sat 18th February, 2PM - Telescope Learning Day (Bring Your Telescopes)

Day starts at 2PM followed by a BBQ. This is a Public event.

### Night Talk : Mark Stephens / Kevin Rossiter

What are Stars / Planets / Clusters / Galaxies & Nebulae

Telescopes & Mounts - How they work

Binocular Basics

What you will see through the eyepiece (field of views)

## Sat 18th March, 1PM - Solar Day (Bring Your Telescopes)

Day starts at 1PM followed by a BBQ. This is a Public event.

### Afternoon Talk : Ian Sullivan

Sun Dials, Solar Viewing

## Sat 22nd April, 8PM (Bring Your Telescopes)

### Night Talk : Ian Barry / Rohan Baumann

Naming Conventions (Messier / NGC)

What is the Sky Coordinate System

How Sky Atlas / Planispheres work

Winter Southern Hemisphere Objects

## Thu 11th May, 8PM (Bring Your Telescopes)

### Night Talk : Paul Albers / Fred Crump

Astronomy Software & Photography

Details on the Moon (Full Moon)

## Thu 15th June, 8PM

Peter Lowe's famous Winter Series, Part 1

## Thu 13th July, 8PM

Peter Lowe's famous Winter Series, Part 2

## Thu 10th August, 8PM

Peter Lowe's famous Winter Series, Part 3

## Sat 9th September, Astrophotography Workshop, 1PM

Day starts at 1PM followed by a BBQ. This is a Public event.

Bookings Required. (See event page for more details)

Afternoon Talk : David Rolfe, Greg Walton, Jamie Pole, Alex Cherney, Steve Mohr

## Thu 14th September, 8PM

Peter Lowe's famous Winter Series, Part 4

## Thu 12th October, 8PM

Meteor Showers – Peter Skilton

Comets – Sky Murphy

## Sat 18th November, 8PM after BBQ (Bring Your Telescopes)

Summer Southern Hemisphere Objects (New Moon)

Night Talk : Helmuth Schultes / John Cleverdon



Above image of NGC253 taken at the Briars.

I put my Canon 5Dmk3 on the 14" and had a crack at imaging. I had all sorts of fun, limited to 30sec's at best due to some polar alignment issues and some other movement, possibly the mirror's? A learning experience as to be expected, but I am impressed at the performance towards the edges of the image. Just a little vignetting at the corners on the full frame DSLR. 3 December 2016

Andrew Nilsson <https://flic.kr/p/PFo2rp>

### A word from the Scorpius editing team.

Members please write a story about your astronomy experiences and add some pictures.

Send them to:

Greg Walton

[gwmpas@gmail.com](mailto:gwmpas@gmail.com)

Brett Bajada, Peter Lowe & Bruce Renowden








## PUBLIC NIGHT THANK-YOU

Recent public viewing nights and school viewing nights have continued to be very well received by the attendees. It is no coincidence that this is due to the efforts put in by the members that help out at these events. To everyone that has helped out over the past months, a very big thank-you goes to you all. Your efforts are very much appreciated, and are being very well received.

## Request form - for MPAS observatory & telescope training.

I wish to be trained to use the following telescopes. (Please add your name to either one of the yellow right hand boxes of each telescope ( Visual or Astrophotography ); please select as many as you like.)

Link to all telescope manuals [https://drive.google.com/drive/folders/0ByvkxzZGI9g\\_dnV0SXdKTVdVaUk?usp=sharing](https://drive.google.com/drive/folders/0ByvkxzZGI9g_dnV0SXdKTVdVaUk?usp=sharing)

Telescope	Photo	Visual	Astrophotography
<b>MPAS Observatory opening &amp; closing procedure.</b> See Link below - <a href="https://drive.google.com/drive/folders/0BvkkxzZGI9g_NGw4U3dNRWp6fUWc?usp=sharing">https://drive.google.com/drive/folders/0BvkkxzZGI9g_NGw4U3dNRWp6fUWc?usp=sharing</a>			
<b>150mm Maksutov FL 1900mm F12 EQ5H Go-to mount</b> See Link below - <a href="https://drive.google.com/drive/folders/0BvkkxzZGI9g_MFavaYl0NHBDams?usp=sharing">https://drive.google.com/drive/folders/0BvkkxzZGI9g_MFavaYl0NHBDams?usp=sharing</a>			
<b>125mm Refractor FL 1000mm F8 EQ6 Go-to mount</b> See Link below - <a href="https://drive.google.com/drive/folders/0BvkkxzZGI9g_MF2UsNmJNmd0b1k?usp=sharing">https://drive.google.com/drive/folders/0BvkkxzZGI9g_MF2UsNmJNmd0b1k?usp=sharing</a>			
<b>200mm Newtonian FL 1000mm F 5 EQ5 manual mount</b> See Link below - <a href="https://drive.google.com/drive/folders/0BvkkxzZGI9g_aFHekYRKTJOMFE?usp=sharing">https://drive.google.com/drive/folders/0BvkkxzZGI9g_aFHekYRKTJOMFE?usp=sharing</a>			
<b>350mm Cassegrain FL 3500mm F10 EQ8 Go-to mount</b> See Link below - <a href="https://drive.google.com/drive/folders/0BvkkxzZGI9g_a1UzC7wCfD2a3c?usp=sharing">https://drive.google.com/drive/folders/0BvkkxzZGI9g_a1UzC7wCfD2a3c?usp=sharing</a>			
<b>253mm Springfield FL 1400mm F 5.5</b> See Link below - <a href="https://drive.google.com/drive/folders/0BvkkxzZGI9g_OHd3TEoydTl5N007?usp=sharing">https://drive.google.com/drive/folders/0BvkkxzZGI9g_OHd3TEoydTl5N007?usp=sharing</a>			
<b>450mm Newtonian FL 2000mm F 4.5 EQ manual mount</b> See Link below - <a href="https://drive.google.com/drive/folders/0BvkkxzZGI9g_NGdmZ2NES1A2S0k?usp=sharing">https://drive.google.com/drive/folders/0BvkkxzZGI9g_NGdmZ2NES1A2S0k?usp=sharing</a>			
MPAS also has many other telescopes that you can get trained on.	Add telescopes you wish to be trained on.		

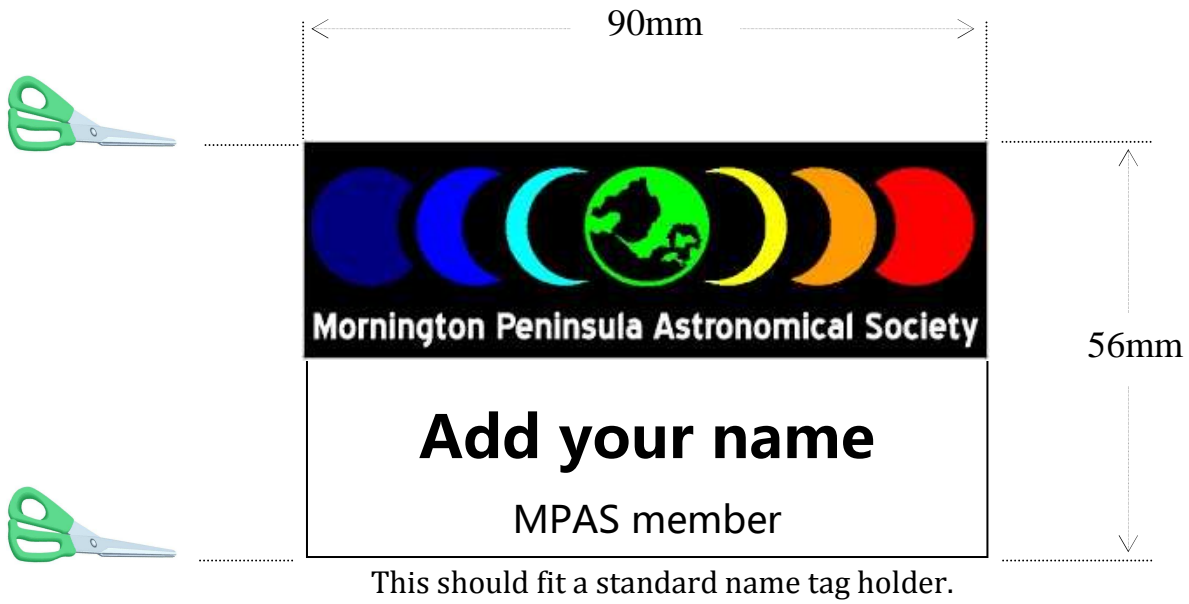
Upon completion you will be certified & given an electronic key to open the observatory.

Once your session is over, you will be responsible for shutting down the telescopes & closing the observatory.

**Restrictions** - Members need to be an MPAS member for more than one year, before they can get an observatory key; also must be 18 or more years of age. New members can still get training on the telescopes, but will need to be in the presence of a certified member, when using the observatory.

Contact - Greg Walton on 0415172503 or Dave Rolfe, Paul Albers & Jamie Pole for training.

Make your own MPAS name tag. Just print & cut using template below.



Download link to word doc - Name tags [https://drive.google.com/file/d/0ByvkxzZGI9g\\_V1RWOWFGVIZJRIk/view?usp=sharing](https://drive.google.com/file/d/0ByvkxzZGI9g_V1RWOWFGVIZJRIk/view?usp=sharing)

## Making lift piers for the MPAS observatory, *by Greg Walton*

The problem with most observatories is that you cannot see objects close to the horizon. The answer is: buy a lift pier. But they're around \$2,500 - a little more than the Society can afford at this time. So I made them - mostly from left-over bits of steel. I added a crank handle to lift the telescope with a cable & 8 thumb-screws to lock it in place. **Caution - Please ask me to demonstrate how they work.**







Time Lapse video Link  
<https://vimeo.com/193798891>



Time Lapse video Link <https://vimeo.com/194211312>  
Photos [https://drive.google.com/drive/folders/0BvYkxzZGI9g\\_NHNhRiQwZzdSWkU](https://drive.google.com/drive/folders/0BvYkxzZGI9g_NHNhRiQwZzdSWkU)

**Below are test images taken with the MPAS Meade 14 inch & 125mm refractor, by Greg Walton**



M42 Briars 14inch cass EQ8 30sec iso12800 By Greg Walton 3 Nov 2016



NGC104 Briars 14inch cass EQ8 15sec iso12800 By Greg Walton 3 Nov 2016



M42 Briars 125mm F8 Refractor EQ6 Pentax K30 16x30sec iso12800 By Greg Walton MPAS 29Nov2016



NGC3372 Briars 125mm F8 Refractor EQ6 Pentax K30 16x30sec iso12800 By Greg Walton MPAS 29Nov2016



NGC104 Briars 125mm F8 Refractor EQ6 Pentax K30 16x30sec iso12800 By Greg Walton MPAS 29Nov2016



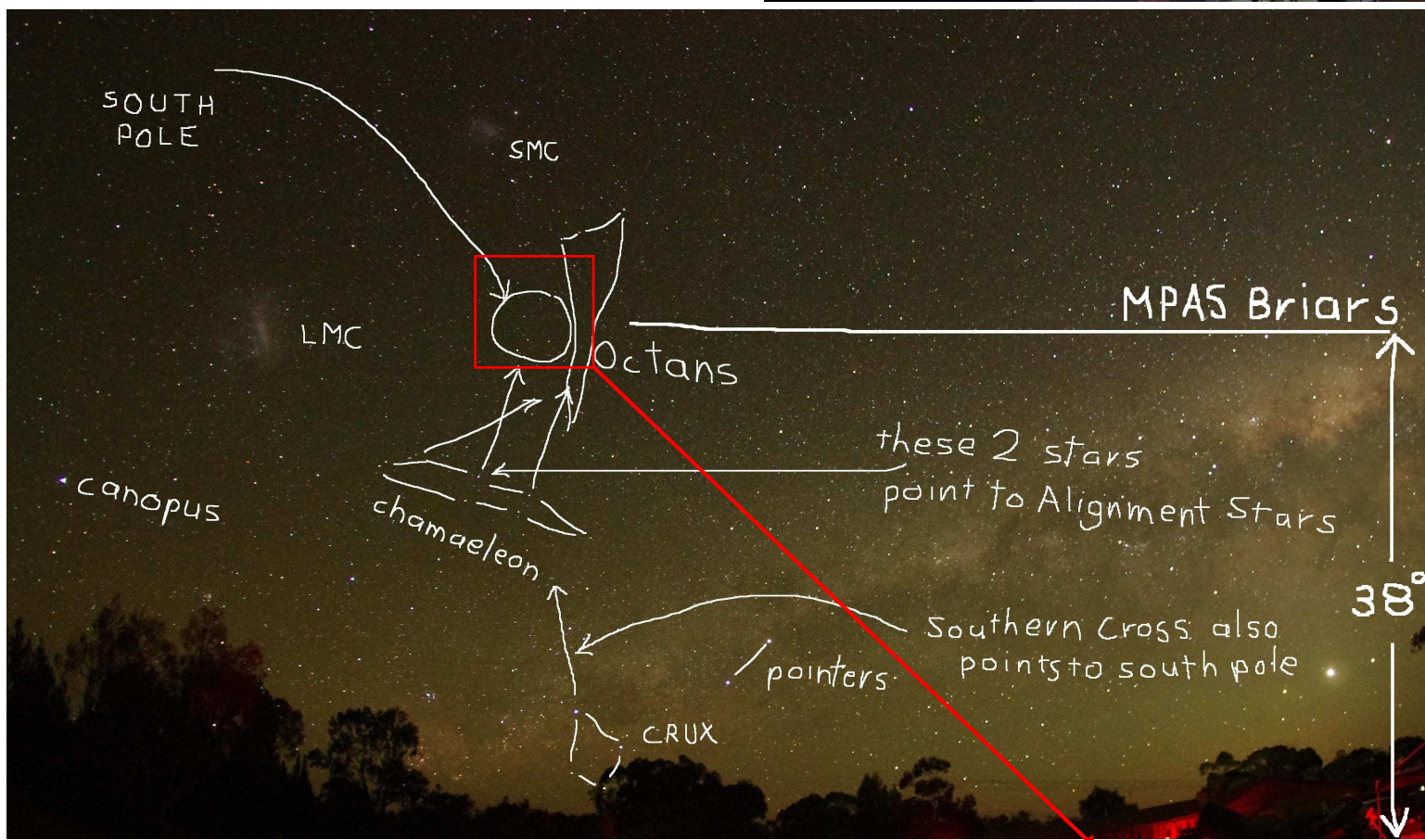
NGC253 Briars 125mm F8 Refractor EQ6 Pentax K30 15x30sec iso12800 By Greg Walton MPAS 29Nov2016

**Sky for the Month: we will look at finding the south celestial pole, by Greg Walton**

I can't find Octans!!! I have heard this too many times. We need to be able to find the south celestial pole, when using a telescope on an equatorial mount. Once the mount is aligned with the south celestial pole, an object should stay in the eyepiece once the tracking motor is switched on. Good polar alignment is needed if you wish to do astrophotography with any telescope or camera lens with a focal length more than 200mm. For this you will need accurate alignment with the south celestial pole & if we do not find the southern celestial pole, the stars will trace lines across our image. This is called star trails. See in the image below, how all the stars in the sky rotate around the south celestial pole (SCP).

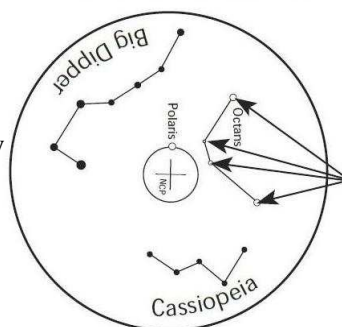
The easiest way to find the south celestial pole is to use the Southern Cross. If you draw an imaginary line through the length of the Southern Cross, the SCP is at 4 times the length of the Cross, or about 2/3 of the way to the Small Magellanic Cloud (SMC) ....This should get you close.

The other way is to set your mount pointing 38 degrees (our latitude) above the horizon & use a compass to find south, but remember magnetic south is 11 degrees right of true south, when facing south. So true south is 11 degrees to the left of magnetic south. The magnetic pole drifts over time & at the moment it sits below Perth in WA. That would be handy if you live there. Also remember a compass can give a false reading if you are standing near anything made of steel.

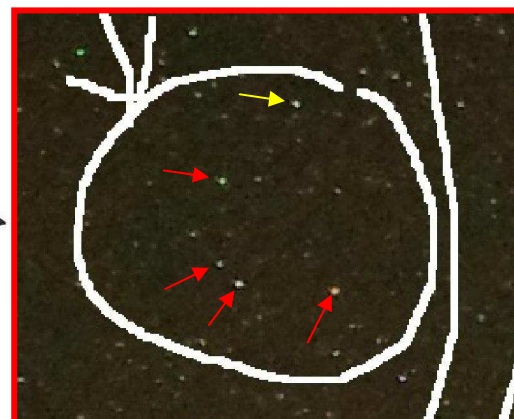


To get the most accurate polar alignment you will need to use a polar scope & align a pattern of stars in the polar scope against a group of stars in the night sky. This pattern of stars can be easily seen with a pair of binoculars. I like to use 2 stars in the middle of the Chamaeleon constellation as they point more accurately to the south celestial pole, see diagram above.

Place the four stars in the Asterism here



Southern Hemisphere



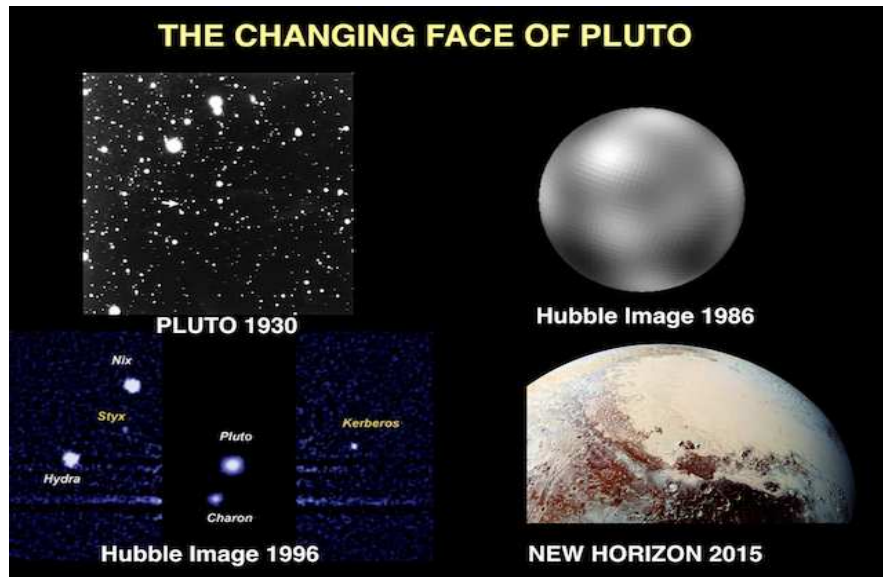
**At right** - The red arrows point to the star used in the Saxon type polar scope found in most EQ5 & EQ6 mounts. The yellow arrow is used in the Vixen type polar scopes. You will need to rotate the polar scope to fit the star pattern, then adjust sideways & elevation.

# ASTRO NEWS

By Peter Lowe

## New Horizon Mission Phase-1 Complete

Some 15 months after its historic July 2015 flyby through Plutoian planetary system, the final New Horizon mission data has been received back here on Earth. While the flyby data has now been completely downloaded, the study of Plutoian system will continue for many more years to come revealing the systems structure, planetary processes and history. The New Horizons probe operates on just a few watts of electricity, and because the craft is so far from Earth, data transmission is necessarily gradual. This is the first close up examination of the distant Kuiper Belt region of the solar system Whereas scientists expected to find interesting but essential frozen worlds they have found fascinating, highly dynamic worlds with active cryo-geology and a rich history going back to the solar system formation era. The overall mission is not yet complete as the spacecraft heads deeper into the Kuiper Belt towards a small object called 2014 MU69, located about billion miles away from Pluto. Very little is known about 2014 MU69 other than aside its small size (about 50km across) and its reddish hue. The probe is expected to fly-by in 2019. Pluto has been transformed from a faint starlike object barely visible in 1930 telescopes to a recognised place in the solar system with towering ice mountains and icebergs floating in lakes of frozen nitrogen.



Pluto has been transformed from a faint starlike object barely visible in 1930 telescopes to a recognised place in the solar system with towering ice mountains and icebergs floating in lakes of frozen nitrogen.

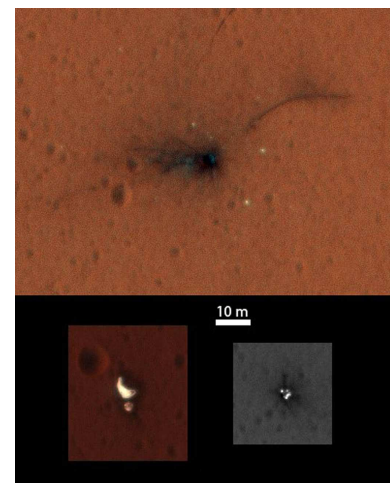
## The Roundest Star Ever Observed

“Roundest” if that’s even a word, attests to how close an object’s shape conforms to a perfect sphere. Gravitationally an isolated, non-rotating star will form a perfect sphere. It is expected non-rotating neutron stars will closely conform to a spherical shape to within a few centimetres but this has yet to be confirmed by measurement. Just how close to a perfect sphere can a star get? All stars rotate and therefore flatten at the poles by the centrifugal force. The faster the rotation, the more oblate the star becomes. Our Sun rotates with a period of 27 days and has a radius at the equator 10 km larger than at the poles; for the Earth this difference is 21 km. Asteroseismology is a spectral technique allowing astronomers to study how stars vibrate. This enables astronomers to infer the stars internal structure and shape by measuring the time it takes for seismic disturbances to propagate across the body. Using this technique astronomers from the Max Planck Institute for Solar System Research (MPS) and the University of Gottingen have succeeded in measuring the oblateness of a slowly rotating star. The stellar oscillations imply a difference in radius between the equator and the poles of only 3 km making the star the roundest natural object ever measured in the universe.

Kepler 11145123 is more than twice the size of the Sun and rotates three times more slowly. It supports purely sinusoidal oscillations rather than the more turbulent modes we observe on the Sun. Periodic expansions and contractions of the star can be detected as the fluctuations in brightness. NASA’s Kepler mission observed the star’s oscillations continuously for more than four years. Different modes of oscillation are sensitive to different stellar latitudes. By comparing the frequencies of the modes of oscillation that are more sensitive to the low-latitude regions and the frequencies of the modes that are more sensitive to higher latitudes the difference in radius between the equator and the poles was found to be only 3 km with a precision of 1 km.

## Schiaparelli Mars Lander Destroyed on Impact

The Russian-European ExoMars two-part mission consists of an orbiter called TGO (Trace Gas Orbiter) and surface probe called Schiaparelli. The surface probe was due to land in October this year however communications were lost during the atmosphere entry phase. The TGO successfully entered orbit and is monitoring the Martian atmosphere through its annual climate cycle. It will orbit closer to Mars over the next few years when close-orbit science operations will begin in March 2018. NASA’s Mars Reconnaissance Orbiter photographed the impact site of the Schiaparelli lander, gaining the first color view of the site since its loss. The pictures at right cover three locations where parts of the spacecraft reached the ground: the lander module itself in the upper portion, the parachute and back shell at lower left, and the heat shield at lower right. The landing plan was a parachute descent after which the probe is dropped and thrusters slow it further to make a soft landing. It appears all was well until the thruster phase, which only lasted 3 seconds leaving the lander to fall and hit the surface at high speed.



## Chinese Tiangong-2 Space Station

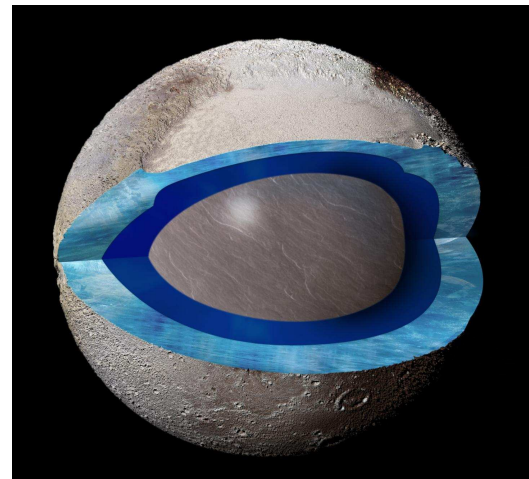
The Chinese space program has taken its next step forward with the launching of two Chinese astronauts Jing Haipeng (R) and Chen Dong to the orbiting Tiangong-2 space station. They are on a 33-day space mission to test various onboard systems and perform experiments in anticipation of longer future missions. Vegetables grown in space and the silkworm cocoons will also be brought back together with urine and saliva samples, as well as other orbited microorganisms.

The Tiangong-2 space station is a staging phase for an anticipated larger and permanently manned station expected to be constructed in orbit. For the time being the Tiangong-2 station is acting as a test/training laboratory



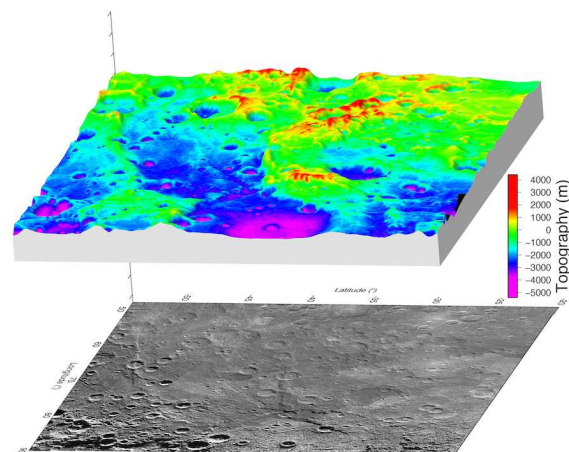
## Subsurface Ocean on Pluto

A new analysis suggests a liquid ocean lying deep beneath Pluto's frozen surface is the best explanation for large features revealed by NASA's New Horizons probe. The idea of sub-surface oceans is not new and several outer solar system objects are known to have them. That Pluto has a subsurface ocean is not new, but the new study provides the most detailed investigation yet of its likely role in the evolution of key features such as the vast, low-lying plain known as Sputnik Planitia. Forming one side of the famous heart-shaped feature Sputnik Planitia is suspiciously well aligned with Pluto's tidal axis, an unlikely arrangement suggesting there is extra mass in that location interacted with the tidal forces between Pluto and its moon Charon to reorient Pluto, putting Sputnik Planitia directly opposite the side facing Charon. There is a similar arrangement between the Earth and the Moon where the heavy side of the Moon faces the Earth. However a deep basin on Pluto seems unlikely to provide the extra mass needed to cause that kind of reorientation. Sputnik Planitia is a big, elliptical hole in the ground, so the extra weight must be hiding somewhere beneath the surface and it is postulated that an ocean is a natural way to get that. Like other large basins in the solar system, Sputnik Planitia was most likely created by the impact of a giant meteorite, which would have blasted away a huge amount of Pluto's icy crust. With a subsurface ocean, the response to this would be an upwelling of water pushing up against the thinned and weakened crust of ice. Because water is denser than ice, that would still leave a fairly deep basin with a thin crust of ice over the upwelling mass of water. The water freezes over as an ice shell and the basin fills with nitrogen ice. The nitrogen provides the excess mass. Calculations suggest a nitrogen layer about 7 km thick above a subsurface ocean provides enough mass to create a "positive gravity anomaly" consistent with the observations. The nitrogen either snowed directly out of the atmosphere or settled on the surrounding mountain peaks and flowed down as glaciers into the basin. Images from New Horizons do show what appear to be nitrogen glaciers flowing out of mountainous terrain around Sputnik Planitia.



## Great Valley found on Mercury

A high-resolution digital elevation model derived from stereo images obtained by NASA's MESSENGER spacecraft has revealed Mercury's great valley shown here in this 3D perspective view. Scientists discovered the new large valley on Mercury which may be the first evidence of buckling of the planet's outer silicate shell in response to global contraction. The researchers discovered the valley using a new high-resolution topographic map of part of Mercury's southern hemisphere created by stereo images from NASA's MESSENGER space probe. The most likely explanation for Mercury's Great Valley is buckling of the planet's lithosphere - its crust and upper mantle - in response to global contraction. The Earth's lithosphere is broken up into many tectonic plates, but Mercury's lithosphere consists of just one plate. Cooling of Mercury's interior caused the planet's single plate to contract and bend. Where contractional forces are greatest, crustal rocks are thrust upward while an emerging valley floor sags downward. There are examples of lithospheric buckling on Earth involving both oceanic and continental plates, but this may be the first evidence of lithospheric buckling on Mercury. The valley is about 400 kilometers wide with its floor as much as 3 kilometers below the surrounding terrain. The valley is more than 1,000 kilometers long and extends into the Rembrandt basin, one of the largest and youngest impact basins on Mercury. The valley is bound by two large fault scarps - steps on the planet's surface where one side of a fault has moved vertically with respect to the other resulting in massively high cliffs.



## Cherenkov Radiation Prototype Telescope

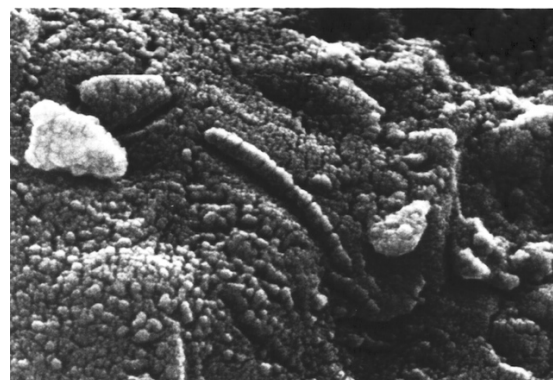
At the highest energies cosmic gamma rays tunnel down into the Earth's atmosphere as light speed bullets. Traveling faster than the speed of light in the atmosphere they emit an outburst of radiation known as Cherenkov radiation. To observe these extremely high energy photons astronomer need to find very dark skies (hard these days!) and extremely sensitive light detectors. By using arrays of detectors across a region it is possible to determine the direction and energy of these rare photons. Last October, the ASTRI telescope prototype, a novel dual-mirror Schwarzschild-Coudé telescope design proposed for the Cherenkov Telescope Array (CTA), passed its biggest test yet by demonstrating a resolution of a few arc minutes over a large field of view of 10 degrees. Three telescope types are required to cover the full CTA very-high energy range (20 GeV to 300 TeV): Medium-Size Telescopes energy range (100 GeV to 10 TeV) while the larger and smaller sized instruments extend the energy range below 100 GeV and above a few TeV, respectively. Since the very high-energy gamma ray showers (between a few TeV and 300 TeV) produce a large amount of Cherenkov light, it is sufficient to build telescopes with small mirrors to catch that light and an array allows astronomers to determine the potential sources.



## The Case for Martian Life Strengthened

The planets Earth and Mars formed at the same time 4.6 billion years ago and experienced the same early solar system events such as the great meteor bombardment which ended about 4 billion years ago. In many respects they were identical twin planets that followed identical timelines before going their separate ways. On Earth life formed and has flourished ever since while we don't know if life ever formed on Mars even though it appears conditions on both planets were essentially identical. They both generated surface water oceans and both went through an early volcanic phase creating rich atmospheres. The young Sun was some 30% less bright at that time and both planets succumbed to global ice ages. Eventually the more massive Earth broke free of that giant freeze while the less massive Mars remained frozen. The question is did life spawn on Mars before the great freeze during that overlap time when conditions on both planets were conducive to life formation. Our only evidence is here on Earth, which is why going to Mars is such a major scientific space priority. The discovery of evidence for life on Mars (past or present) will be a Rosetta stone event in astrobiology and would help fill in the early chapters in both planets' histories. Fossils are the only direct evidence we have of early terrestrial life however the earliest organisms on Earth were microscopic and did not fossilize well. The oldest fossil evidence formed from bacterial blankets resting on the bottom in shallow waters or as goeey masses known today as stromatolites. The oldest stromatolite fossils were found in Australia and dated to 3.48 billion years ago however recent discoveries of apparent stromatolite formations laying on an ancient seabed in Greenland have been dated to 3.7 billion years ago, just 300 million years after the sterilizing meteor bombardment event. Now in geological terms 300 million years is a blink of an eye and serves to show the Earth was a pleasant, life-sustaining place for a good part of that period. This happened before the great freeze events on both planets and the question is "Did the same thing happen on Mars?" Did the solar system's twin planets Earth and Mars spawn twin life and how differently did those twins evolve? The next generation of Mars probes will contain equipment designed to look for biological activity, past and present and might yet add another piece to that biological jigsaw.

### Proposed Martian Fossil found in meteorite (Unconfirmed)



### Greenland Stromatolite Lump Formations



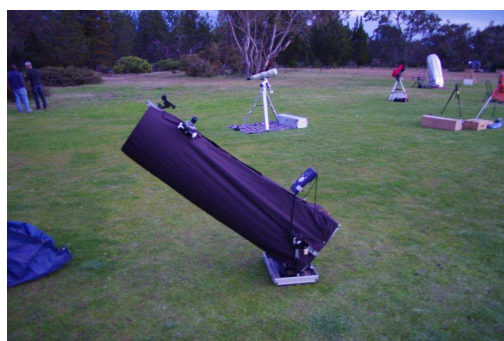
## MPAS at Vic-South 2016 Star Party in the Little Desert National Park, *by Greg Walton*

This event is run jointly by the Astronomical Society of Victoria and the Astronomical Society of South Australia. Normally it takes about 5 hours to drive to the Little Desert from the Mornington Peninsula, but due to the many junk shops along the way, it took us much longer. The sky was sunny approaching Nhill, so looked like we were in for a clear night. We signed in and set up camp, then set up the telescopes & time lapse cameras on the viewing field. I had not used my 12-inch briefcase telescope for a long while, so I set it up in front of my time lapse camera, so I could add this to my time lapse video. This year there was a larger than normal turn out, with about 30 campsites out the back & all other accommodation booked out. The night started out well with many meteors racing across the sky. Venus was shining brightly sitting between Saturn & Antares. But as usual the clouds rolled in at 3am & pretty much stayed that way for the rest of the event. Other members from MPAS were Frank Hunniken, Rod Brackenridge & his family.

Saturday - everyone had a slow start, so the talks did not start till after lunch. Russel Cockman talked on The End of the World & Paul Haese talked on his remote imaging observatory. Then the door prizes were drawn (First prize was an 8 inch Dobsonian) & also this year for the first time was an auction of astronomy equipment, after which everyone lined up for a group photo. A bad weather warning was announced for strong winds & rain at 3am. So after dinner, Pia & I made the decision to slowly pack up all my cameras & telescopes, then we sat around talking to fellow astronomers. As it darkened it was very hard to see what we were doing, as the clouds had blocked out all the starlight. It was amazing how dark this viewing site was. Then on cue the rain fell at 3am & then came the strong wind.

Sunday - was another slow start. The wind was still blowing strongly with many packing up camps & heading home. Pia & I also packed up. We headed north to investigate some small towns & maybe find some more junk shops, which we did. The sun came out & we thought we would head back to the Little Desert Lodge, for some more astronomy. But it was not to be, as a rain front passed though around 3pm & we made the decision to head home. Still we did not leave empty handed.

You can see the time lapse video I made @ - VS 2016 <https://vimeo.com/189575780>

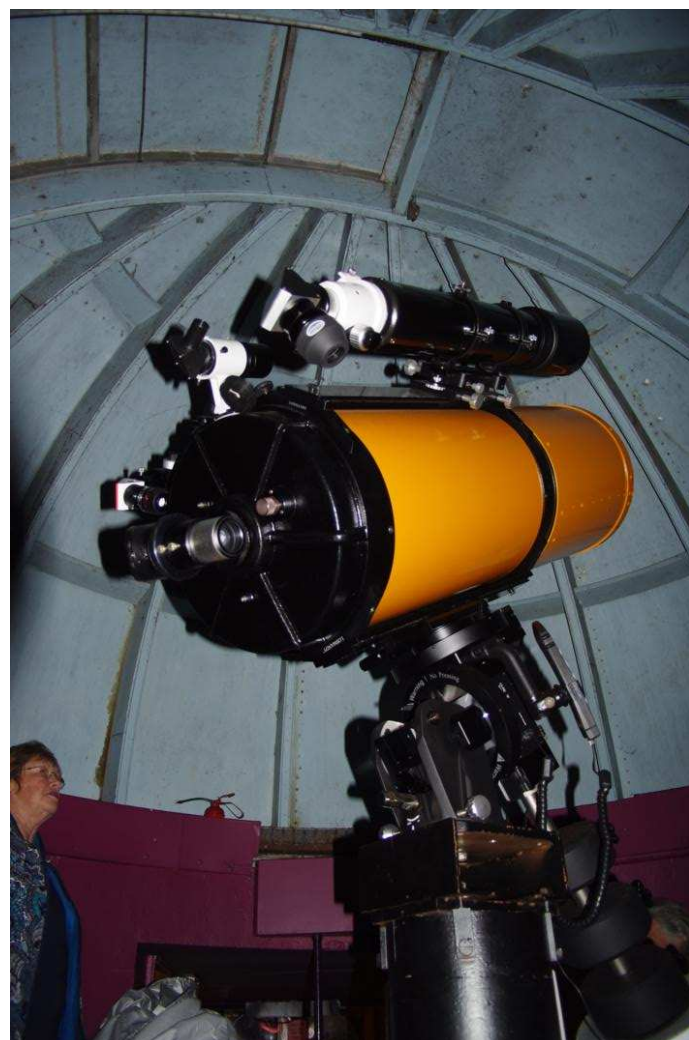


## Port Macquarie Observatory

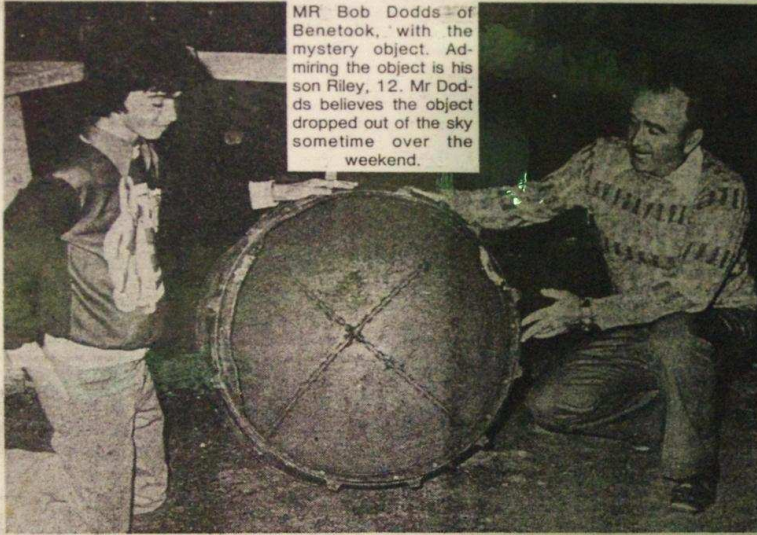
About 400 kilometres north of Sydney is the seaside town of Port Macquarie. I must say a very nice city with beautiful beaches & harbour, lots of restaurants, modern shopping centre & even a well equipped Astronomical Society. It just happened that we were in town the night the Astronomical Observatory was having one of their public viewing nights. The observatory is in a park in the centre of town, surrounded by towering motels, 3 having astronomical names (The Observatory, The Orion & The Sirius - under construction) but we were told none have contributed to the Port Macquarie Observatory. Pia & I were the only public that showed up, as the sky was cloudy. There was a small shop just inside the front entrance, where we talked to the 2 members on duty & they told us the observatory was built in 1962 with the help from the local Rotary Club doing much of the construction work. The meeting hall only seats about 60 but has a cosy feel. Also, there is no need to go outside to view through the telescope, as the observatory dome is attached to the meeting hall. The Dome is about 3.5 metres in diameter & houses a 14 inch Celestron Cassegrain which has been refurbished in the last 12 months. It sits on a new EQ8 mount the same as the new MPAS mount. Mike Smith from Bintel has been a regular visitor helping out with the telescope & new mount. It also has 2 telescopes piggy-backed on the tube, one 4inch refractor with white light filter & a 60mm Lunt hydrogen alpha solar telescope. Local schools visit the observatory on a regular basis. There are around 80 members but as with most clubs only about 6 members do most of the work. The local council has drawn up plans to build a new 8 million dollar observatory on the site of the old observatory, but the council is broke so it most likely will not happen! You can read more about the history of the observatory with the link below.

*By Greg Walton*

[www.p mobs.org.au](http://www.p mobs.org.au)



# OBJECT FALLS FROM SKY



MR Bob Dodds of Benetook, with the mystery object. Admiring the object is his son Riley, 12. Mr Dodds believes the object dropped out of the sky sometime over the weekend.

**Mystery surrounds a metal object which fell on a Millewa wheat property sometime over the weekend.**

The unidentified object was found by Mr Don Dodds of Bentook, 35 kilometres west of Mildura at 9 a.m. Monday in a fallowed wheat paddock.

Mr Dodds had fallowed the same section of 600 acre paddock on Friday and knocked off work at 4 p.m. that day.

He noticed the object on Monday when he returned to complete fallowing of the paddock.

"I know it wasn't there on Friday," Mr Dodds said. "There were no footprints about and no tyre marks."

"The only place it could have come from was out of the sky," Mr Dodds said.

"I don't know whether

it's part of a rocket or spacecraft of some kind."

Mr Dodds said the object was about a third of the size of a 44-gallon drum.

"At first I thought it had been cut by a welder, but on closer examination it appears to have just melted," Mr Dodds said.

The mystery object landed on a soft, sandy section of paddock which

had been heavily fallowed.

"It just sank into the earth," Mr Dodds said. "I haven't reported it to authorities because I simply can't explain how it got there."

"I would certainly like to know how it did get there and where from."

The object landed about 500 metres from the nearest farmhouse.

# MYSTERY OBJECT NO LONGER A MYSTERY

The mystery of a metal object that landed in a fallowed paddock of Merbein South wheat farmer, Mr Bob Dodds, has been solved.

The piece of metal has been identified as being part of an Agena-D orbital satellite.

The identification was made after extensive tests were carried on the metal object by scientists from the Department of Science in Canberra.

## Mystery

Since the object fell from the sky on August 22 there has been a ring of mystery surrounding it.

Mr Dodds discovered the object at 9 a.m. on Monday, August 25, buried in a patch of heavily fallowed soil in a 600-acre paddock on his property.

"I know it wasn't there on the Friday," Mr Dodds said. "There were no footprints about and no tyre marks."

"The only place it could have come from was out of the sky," he said.

The positive identification ends many weeks of speculation.

Scientists believe that

the object was part of an orbital satellite that was launched by NASA, in Texas, in 1966.

The object had been orbiting the earth for the past 14 years and only recently decayed enough to lose force and re-enter the earth's atmosphere.

The Dodds' neighbour, Mrs Bennett said she saw a bright glow in the sky about 7.30 p.m., on the Sunday night, which scientists have put down to the final explosion of the satellite before the part landed in the paddock.

## Inspected

"Experts" from most parts of Australia have inspected the object over the past month, and had totally abandoned any thought of it belonging to a satellite or any space object," Mrs Dodds said.

The proper authorities will be contacted about the finding of the NASA space satellite, and it will not be known for a few days if the metal will be taken back to the USA.

"Plans are underway, if NASA don't require the object, to have it displayed in the Wentworth Folk Museum," Mrs Dodds said.



MRS DODDS reads the letter of confirmation from the Department of Science in Canberra stating that the metal object is the final stage of a NASA orbital satellite.

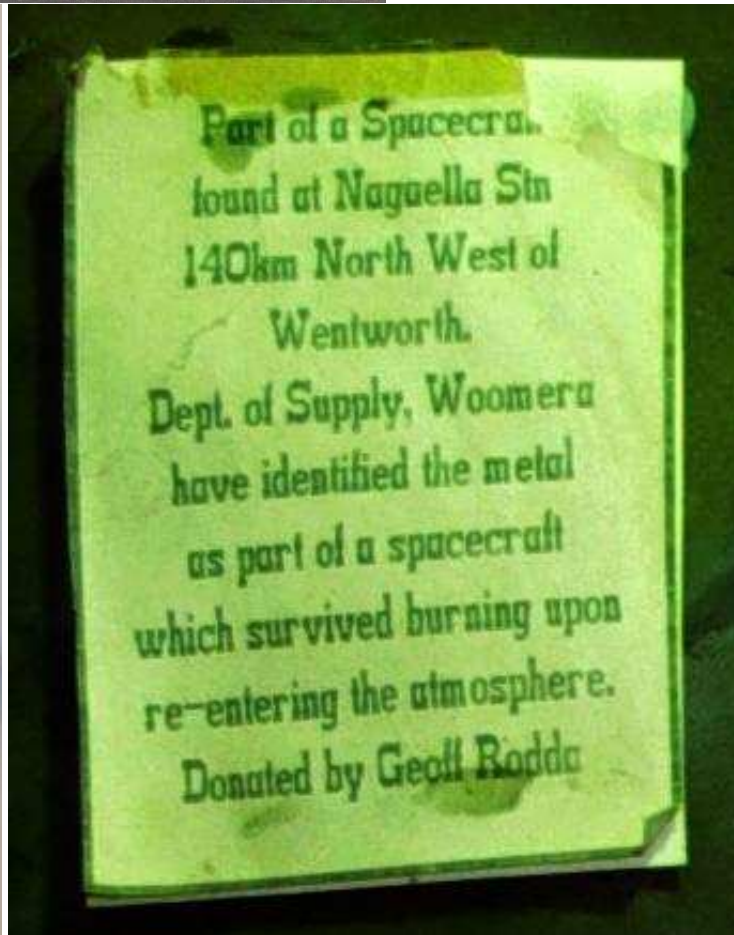
SUNSHINE 28-8-80

22-10-80

**Wentworth Museum** - We saw a piece of space junk & a newspaper article dated 28-8-1980 about another piece of space junk that fell in the Wentworth area. In our travels in outback Australia we always visit the local museums & most of them have pieces of space junk. It's a wonder that somebody has not been injured by falling space junk.



By Greg Walton





## Colour Codes from the Stars, Part 3 Basic Equipment

This article introduces some basic principles and considerations regarding the choosing and using of equipment by field astronomers in exploring spectroscopy, initially *at low spectral resolution*. Please research for more details and for other viewpoints. To maximise text information here, please look up images and illustrations from the series articles or use the links shown or search the Internet.

**Starlight through a grating creates a vivid, observable spectrum.**

Image it, if desired.

Then explore with spectroscopy software.

With these 3 main steps, getting started is probably *simpler tried out than explained*. See in reality at the eyepiece. Later, concepts and techniques will assist in the fine-tuning.

### See 'light' as a spectrum

Thread a transmission grating such as the SA100 to the bottom end of the eyepiece, as with a filter, i.e. in the converging cone of light. (Note the one-piece visual version of the Rainbow Optics is designed for mounting on top of the eyepiece). Firstly, view a bright star.

Caution: Do not touch the grating surface.

On either side of the star we will see brighter and fainter spectra that are *off-centre* and *spread out* sideways, or 'dispersed'. The pair closest to the target star are its '1<sup>st</sup> order' spectra, the next are '2<sup>nd</sup> order', and so on. The star is 'zero order'.

We shall observe and image the brighter of the 1<sup>st</sup> order pair, sometimes together with the zero order. The blazing design in a grating causes one to be brighter than the other.

This article addresses the slit-less, blazed, diffracted transmission grating. For a prism, there's no zero order -only one refracted spectrum with red nearest to the centre line.

What are we seeing? Beautiful colours arrayed out with violet nearest to the zero order, absorption lines (depending on the telescope used), directional changes with grating orientation, and the overlapping if several objects are in the same direction as grating dispersion. Do blue stars' spectra look that different from red stars'? What can be seen of the moon? How about Saturn or Jupiter with their moons? A cluster? A nebula? Any SN? A carbon star? A comet!? How faint is an object, to still be spectrally observable given a setup?

### Image the spectrum

1. You can experiment with afocal imaging at the eyepiece, with a snapshot or a digital camera. Assess the quality of data obtained this way.
2. Put the grating in a DSLR camera nosepiece, or a CCD camera, and place the combination in the drawtube. *Generally, focus at about the midpoint of the spectrum.*  
Experiment with imaging with tracking. If no tracking, have the spectrum lie perpendicularly to the direction of drift, so the spectrum height will spread crosswise.
3. If without a telescope, use the grating with a DSLR, with or without tracking -as in 2.
4. Experiments will show that aligning the spectrum with the pixel axis give better results.
5. In place of a still camera, an astronomical videocam can also be used.
6. A flip mirror, or alternative, allows convenient switching between visual and imaging. Example <http://julianh72.blogspot.com.au/2016/09/methane-in-neptunes-atmosphere-from-my.html> , with permission by Julian Hardy

### Process the image

*Even without having taken an image yourself  
you can process any spectral image you can get hold of.*

*Without any grating or camera you can download  
some freeware or free-trial software and explore!*

Forums have discussions on features and preferences: e.g. BASS, RSpec, Vspec, ISIS. As an illustrative introduction, below we shall use the free-trial RSpec that's easy to get started on.

Example stars (From the top-left File > Open Main Profile, or by two other means) access the reference library of spectral data files of various star types. Each profile graph shows on the right side screen as intensity (arbitrary scale) against *wavelength in angstrom*.

(Near the bottom right) the 'Synthesise' button will generate a band of *synthesised* spectrum in colour or monochrome, below the profile. Next, see what the 'Fill' button does.

Look at what first?

Is the red part or the blue more dominant, or the middle? Is it *always* more blue for bluish stars, more red for reddish stars, orangey for the sun type? What characterise star classes?

What basic 'features' are we looking for, in a profile graph?

What are the dips (absorption in the spectrum)? Are there spikes (emission in the spectrum)? Are they sharp or gradual? Explore the buttons above the graph and when overlaying lines of chemical elements or a profile of the same star type do they coincide?

Your star (From the bottom left menu) open a spectral image file that you have placed in the default 'Capture' folder. Play with cropping and rotating the image. Its profile graph appears on the right side screen, with the horizontal axis being pixel number.

To know *what the wavelength values are, that the pixel numbers represent*, we ‘calibrate’.

Some basic methods for calibration, instrument response compensation, background subtraction, and intensity normalisation will be covered in the next article.

### Further notes. What is being imaged?

The following will help in understanding about a) the adjustment of distance from the grating to the camera sensor, b) where the spectrum lies on the sensor pixels, c) considerations for which grating to buy, and d) what setup parameters affect data quality.

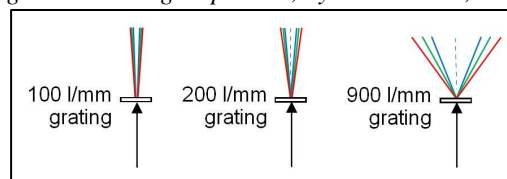
As seen in the eyepiece, the dispersed spectrum is deviated off-centre and spread out. By how much? The number of lines in a grating determines the deviation angles of the components of the spectrum. Too far off-centre and the spectrum, or the range of interest, will be off the field of view while more spread-out means the available pixels capture a smaller part of the spectrum and the image resolution can be higher -but not necessarily!

Here’s a [useful visualisation](#) (or experiment or calculation). If a laser pen light: red, green, blue, in turn, is directed through a grating a distance  $y$ , e.g. 20 cm, away, to shine at point  $z$  on a wall, each additional colour spot lands a different distance away from  $z$ . Geometry or compass measurement will show respective deviation angles for each colour (wavelength).

A 100 lines/mm grating shows the angle for blue, green, red as 2, 3, 4 deg. respectively. For a 200 l/mm grating these are: 5, 6, 8 deg. For a 900 l/mm grating these are 22, 29, 36 deg.

*Relate these to a star with its colour components appearing off-centre and spreading out in your optical equipment.*

Figure 1. Grating dispersion, by Lesa Moore, ASNSW.



Exploring further, a strip of cardboard bent as part of a circle in the path of the diffracted spectrum would show that the colour dots are closer together than their projections on the flat wall. This will relate later to *nonlinearity* when calibrating. Also see ‘field curvature’.

This visualisation is useful in appreciating that in transmission-grating field use,

- Higher-number lines/mm directs the spectrum further away, sideways, from the centre line of the optical train.
- Higher-number lines/mm gives a longer strip of spectrum, so a smaller section falls on the pixels, possibly yielding a higher resolution. But the spectrum is also fainter!
- As the colour components are dispersed radially, their projections on a flat surface, such as the wall or an image sensor, stretch out *non-linearly* in ‘plate scale’ of angstrom/pixel, and also become *relatively* out-of-focus (field curvature). Figure 2.

Figure 2. Deviation angle and field curvature. Resource [3] page 189, with permission.

### FAQs

Colour or monochrome camera? In general, colour for visuals such as at group viewing, mono to achieve a higher image-resolution (then synthesise colours as required).

DSLR or CCD or CMOS? To start with, use any existing camera then research well on sensor size, response curve, and other specifications. Suggest use a [mono CCD](#) to compare others with. Note the effect of the camera’s IR filter.

If there are many objects in the field of view, orientate the grating to avoid overlapping of spectra. Later, one might explore the slit spectrograph for individual or team use.

If you cannot fit the zero order in the same frame as the spectrum, adjust the spacing between the grating and the sensor, or use a camera with a larger sensor, or just work with the spectrum and calibrate by other means.

Note the relationship between the deviation angle, spectral spread, sensor size, and the grating-to-sensor distance. Sometimes a spacer is useful to set a desired distance. This relates also to filter wheel usage.

Test this: Generally, spectra appear about 5<sup>th</sup> magnitude fainter than the target object.

An added prism, in a ‘grism’, may be useful to redirect the spectrum towards the centre.

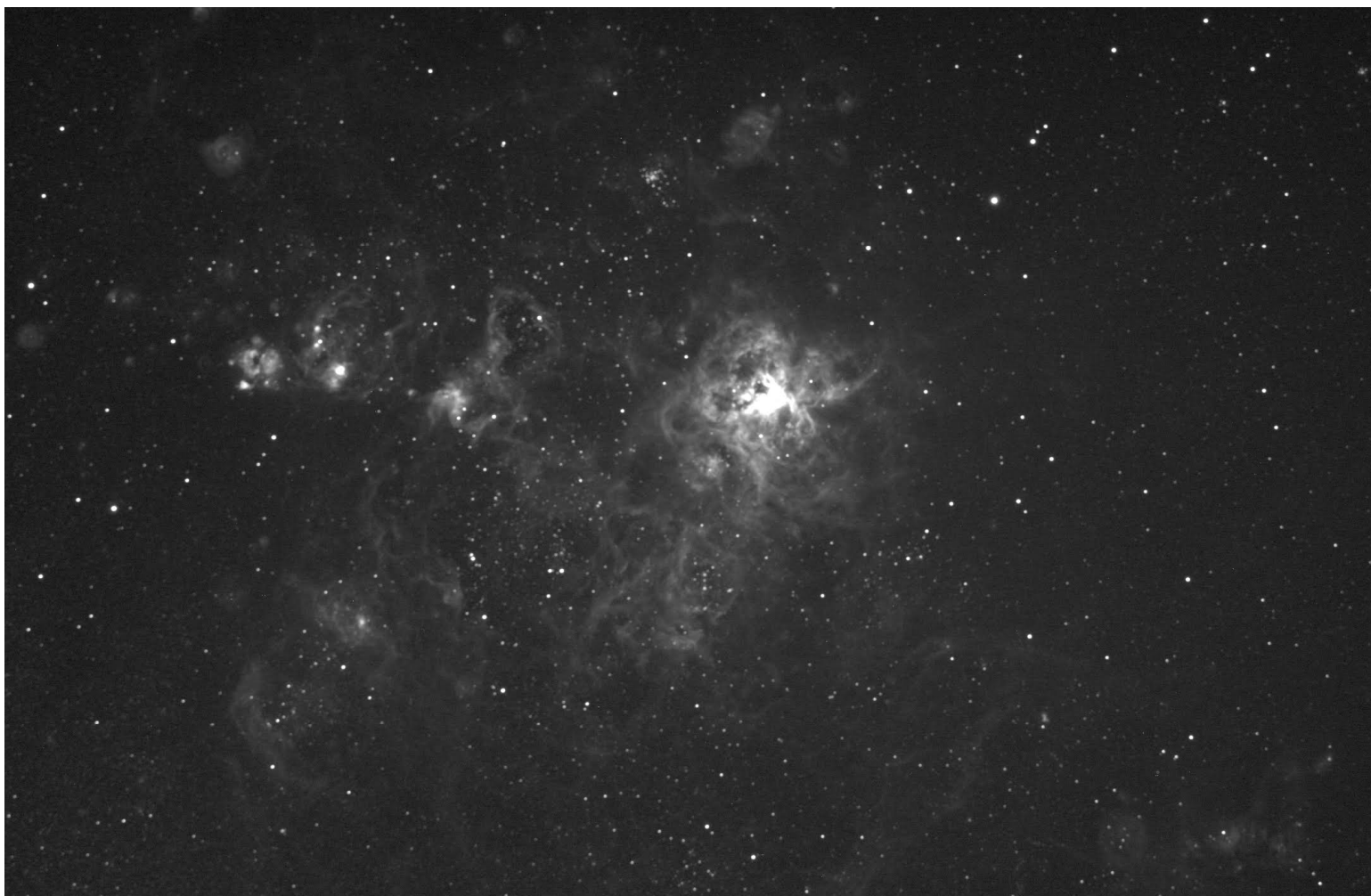
**Medium- and High-Resolution Equipment.** Research on these is recommended.

**‘Low-Res’ Contributions to science:** Scouting, surveys, campaigns. See later in the series.

**Resources** (See also Parts 1 & 2 lists)

1. Christian Buil web pages [www.astrosurf.com/buil/](http://www.astrosurf.com/buil/)
2. Spectroscopy workshop AAO, [https://www.aao.gov.au/files/science/basics\\_of\\_spectroscopy\\_3\\_May\\_2016Creduced.pptx.pdf](https://www.aao.gov.au/files/science/basics_of_spectroscopy_3_May_2016Creduced.pptx.pdf) and <https://youtu.be/kv8leQWYpWM>
3. Astronomical Spectroscopy for Amateurs, Ken M Harrison, Springer, 2011.

*By Sky C Murphy and the Team at Southskyscience  
A version of this article has been submitted  
to Astronomical Societies in Australia and New Zealand*



NGC2070 (The Tarantula Nebula) taken during a full moon with a Ha filter from Cranbourne. Exposure time was a total of 20 minutes (4x 5 minute stacked frames). This nebula is located on the edge of the Large Magellanic Cloud. By Dave Rolfe



While everybody was at Vic South or Snake Valley - I spent a little time imaging over the Cup Day long weekend from my parents farm near Charlton. Nice clear skies, with some passing clouds. Due to some equipment issues only captured some Luminance data, Blue and Red (no green) for M45 - as a result - the image is mono only - and a heavy crop. I hope to add some colour data once I get a chance to get out under dark clear skies again. Messier 45 or Pleiades <https://en.wikipedia.org/wiki/Pleiades> is a star cluster otherwise known as the 'Seven Sisters', also pictured on the Subaru badge! Jamie

SOCIETY INFORMATION



Dave Rolfe



Paul Albers



Peter Skilton



Jamie Pole



Trevor Hand



Peter Lowe



Fred Crump



Greg Walton

OFFICE BEARERS OF THE MORNINGTON PENINSULA ASTRONOMICAL SOCIETY

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**Phone Contact:** Peter Skilton

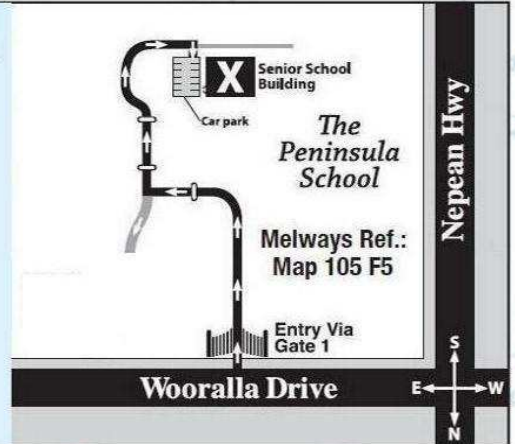
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**Treasurer:** Jamie Pole  
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**Library:** Fiona Murray

SOCIETY MEETINGS

**Meeting Venue:** The Peninsula School, Wooralla Drive, Mt Eliza, (Melway ref. 105/F5) in the Senior School Building at 8pm on the third Wednesday of the month (except December).  
 Entry is via the main gate, off Wooralla Drive. (See map).

**For addition details:**  
 Internet: [www.mpas.asn.au](http://www.mpas.asn.au)  
 email: [welcome@mpas.asn.au](mailto:welcome@mpas.asn.au)

**Phone:** 0419 253 252  
**Mail:** PO Box 596, Frankston 3199, Victoria, Australia



Fiona Murray

The Society also has books & videos for loan from its library, made available on most public & members' nights at The Briars site, contact Fiona Murray.

LIBRARY

E-SCORPIUS NEWSGROUP

MPAS' main line of communication is the online newsgroup called E-Scorpius. Here you will be kept up to date with the latest MPAS news & events information as well as being able to ask questions and join in discussions with other members.

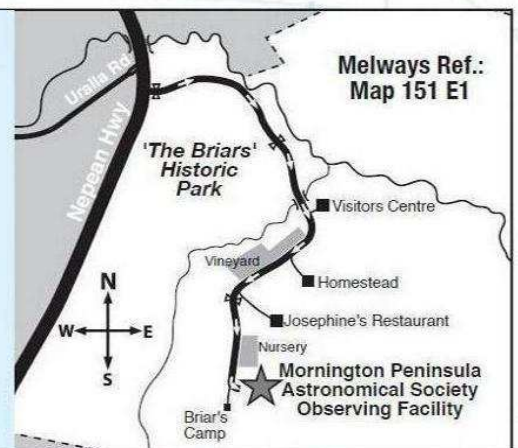
To join, go to: [www.groups.yahoo.com/e-scorpius](http://www.groups.yahoo.com/e-scorpius) and sign up to Yahoo Groups - you are required to sign up to Yahoo Groups to join E-Scorpius. Once you have signed up at Yahoo Groups, email [welcome@mpas.asn.au](mailto:welcome@mpas.asn.au) to say you want to join E-Scorpius & you will be added to the E-Scorpius list.

VIEWING NIGHTS - MEMBERS ONLY

Any night, MPAS members may observe from The Briars observing facility, Mt Martha. Members visiting for the first time must contact Greg Walton on 9776 2074 or 0415172503 if they need help getting to the Observatory site. Upon arrival, remember to sign the attendance book in the observatory building.

**For additional details:**  
 Internet: [www.mpas.asn.au](http://www.mpas.asn.au)  
 email: [welcome@mpas.asn.au](mailto:welcome@mpas.asn.au)

**Phone:** 0419 253 252  
**Mail:** PO Box 596, Frankston 3199, Victoria, Australia



Members please write a story about your astronomy experiences and add some pictures. Send them to: Greg Walton [gwmipas@gmail.com](mailto:gwmipas@gmail.com)

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