

Cover image: NGC5101 & NGC5078, by *Steve Mohr*

SCORPIUS

THE JOURNAL OF THE
MORNINGTON PENINSULA ASTRONOMICAL SOCIETY INC.

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The Mornington 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.



MPAS - <https://www.facebook.com/mpas0/>

MPAS Members - <https://www.facebook.com/groups/MPAS1/>

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Mornington Peninsula Astronomical Society

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SOCIETY NEWS

By Greg Walton



July public night - Although a fairly chilly night, the public night at The Briars went well with 98 in attendance in addition to those members who came. In fact Dave had to close off online booking early and turn away some people due to the popularity level this month, even in winter. Viewing of the sky occurred about a third of the way into Trevor Hand's talk on the Apollo programme part 1, so as to capitalise on breaks in the cloud. Good views of the Moon, Jupiter and Saturn were had by all. Thanks with helping out go to Sky Murphy, Mark Stephens, Heath Lewis, Tony Nightingale, Kevin Rossiter, David Rolfe, Jamie and Jasmine Pole, Peter Lowe, Rohan Baumann, Peter Skilton, Fred Crump, Greg Walton, Simon Hamm and also present were Peter Cracknell, Alan Brygel, Charmaine Compton, and possibly some other members who might have missed signing the observatory log book. Regards, *Peter Skilton*

Tony Nightingale & I arrived at 4:30 to put out the viewing night signs, clean the toilet, mop the floor in the big shed, set up 100 chairs, fill urns, clean the kitchen, sweep out the observatory & set up the telescopes. We also had time to go to the shop to buy sugar, which we saw had run out. We also re-hung the clock & some posters on the wall. Thanks Tony for all the jobs you are doing. *Greg Walton*

A special thanks to Jasmine Pole who very ably operated two telescopes for me, whizzing them to alternative targets as clouds raced about. A Moon favourite for the crowd was finding where Apollo 11 landed. There was the usual sky guide. And telescope parts. We were also able to show starbows, just re-introducing the amazing ancient and very much current technique of spectroscopy that we're trying to catch up on. Any new-ish members please do introduce yourselves to us in the blue vests -sorry it's hard to identify members without a vest. Real great to see visitors from some months back come back for more or are now members. Regards. *Sky Murphy*

July AGM Society Meeting - saw about 24 members in attendance. Peter Lowe (Vice President) chaired the meeting & talked about recent events at MPAS & beyond. A new committee was elected, being Tony Nightingale, Heath Lewis, Mark Stephens, Stewart Gangell & Anders Hamilton also Observatory manager. Fiona Murray staying on as Librarian & Greg Walton staying on as the Scorpius editor. As Dave Rolfe was in Fiji on holiday we thought it best to re-elect him as President & Webmaster, after he addressed us from Fiji via a video link from his mobile phone. Peter Lowe will also stay on as vice President. Jamie Pole will stay on as Treasurer. Peter Skilton will stay on a Secretary. After the proceedings MPAS member Ian Sullivan talked on the history of star charts, then members chatted over coffee. *Greg Walton*

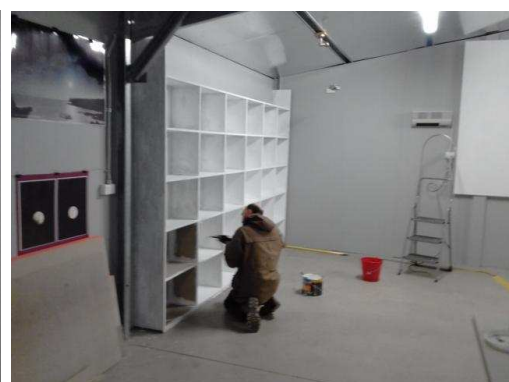


By John Cleverdon

July Members' BBQ & Working Bee on the 22nd - We had a good turnout for the MPAS working bee / members' BBQ. Many members worked to finish insulating & painting the last wall in the big shed, start building the shelving for the library, and box in the roller door. Tony removed that ugly sticky tape on the roof beam. Sky, Ethan & Roland started installing the crank handle for the observatory roof. John Cleverdon extended the drainage pipes for the big shed & with Ethan filled in the large hole so the ride on mower can be used to cut the grass around the garden shed. Ethan & Sky cut tree branches and dragged and carried them to the pile. Pia organized an excellent BBQ & salads. Fiona turned the sausages on the BBQ. Also many other members helped out on other jobs. Thank you to all those who helped out on Saturday. We are almost done & can get back to doing some astronomy.

Thanks again, *MPAS committee*Photos by *John Cleverdon*

Working Bee on the 29th & BBQ - starting at 12 Noon, a small dedicated team SMASHED all the jobs at the working bee. A very big day for the 7 members who attended. The new monster projection screen is ready to wow at the next public night. The new bookcase looks impressive. We boxed in around the roller door & filled in the holes near the switchboard. We almost finished fitting the observatory roof crank handle. After the 6pm BBQ we finished off painting, cleaned up & headed home around 9pm. A very Big thanks to Mark Stephens, Mark Hillen, Tony Nightingale, Sky Murphy, Roland Knabe, John Cleverdon & myself. *Greg Walton*



On Monday 31st July we finally got the crank handle for the observatory operational. We also put another coat of paint on the bookcase. Then on Tuesday, Wednesday & Thursday we returned to finish painting the bookcase, move all the books, magazines & old cupboards. Mark Hillen placed a paver over the end of the drainage pipes for the big shed. Mark also cut & fitted a triangular board in the corner as a display area. Then we washed, vacuumed & swept everything. Then we set up the TV, DVD & VHS player, and all the chairs. Pia washed all the kid's toys. The big shed is looking less like a shed now. Thanks to Mark Hillen, Roland Knabe, Pia Pedersen & myself. *Greg*



August public night - Almost a full house with 80 from the public & 12 members sheltering from the cold in the big shed. After a short introduction the public were sent out to look through the telescopes before Trevor Hand's talk on the Apollo programme part 2. That was a good call, as the sky was clear early on, but clouded over at 9 pm. Everyone got to see Saturn, Jupiter, the Moon & some deep sky objects.

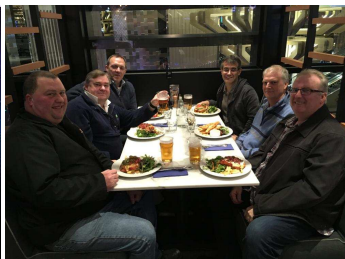
August Society Meeting - It was a great society meeting night at Peninsula Grammar last night for the talk by Oliver James. It was also his first time in the southern hemisphere. There were some things in common with some members, such as Alex Cherney and Oliver both having gone to past Starmus conferences overseas, but been unaware of each other, and Sky Murphy having gone to the same University. After a short chance to see Jupiter, Saturn and some southern objects in Alex's 22 inch Dobsonian (Omega Centauri, Jewel Box, Centaurus A), it was time for the talk inside in the warm out of the wind. Greg Walton had also set up a Dobsonian near the entrance door as well. The ceiling projector was a little fainter than normal, but Plan B using Peter Lowe's backup projector ended up not being necessary. Starting with special effects developed for Star Trek and Quantum of Solace, this was a fast-paced, colourful, multimedia talk for the public, laced with some high-end maths from Kip Thorne for the shown visualisations that were developed of what a black hole and worm hole would really look like (the latter assuming it exists). It was a lucid explanation of why the black hole, Gargantua, in the movie *Interstellar* had the strange appearance that it did due to gravitational lensing of the accretion disc. There were several autographs received on copies of *Interstellar* DVDs and booklets, both those done as part of the raffle on the night and those brought along by keen members and visitors. There were numerous questions after the talk; so much so that they had to be cut short for the tea break before the gates closed. I presented Oliver with an MPAS beanie and a mounted Henbury meteorite - it turned out his 7-year old daughter who didn't come because it was going to be too late a return to Melbourne for her, is an avid collector of rocks and gemstones and didn't yet have a meteorite in the collection, so it was a fortuitous memento of their visit to the deep south of Australia. There was a pleasing number of younger visitors as well in the 60 or so present in total. All the main astronomical societies in Vic were invited to the event, and nearly all passed this onto their members. Attendance was about a third less than expected, probably because of the cold wind outside, but bookings were still coming in 30 minutes before the talk started, and then Monash Uni approached us today, saying they'd just seen the event listing and really wanted all of their astronomy students to see the talk (oops, a tad too late). Oliver is now at Mt. Stromlo for a talk before taking his family to see the Great Barrier Reef before it disappears, then back to the UK. Thankyou to all those members who made the evening possible in practice - whether it was in marshalling the public into the right location in the school grounds, operating the telescopes set up outside, or making the tea/coffee or doing the publicity in the media. Such events don't happen without the unsung efforts of a lot of folk in the background. Just a pity, due to copyright issues with some of the material shown, that we couldn't record the talk for other members who couldn't attend. It was good to see the theatre so full again, and it was a fitting swan song for the impending loss of the venue. Regards, *Peter Skilton*



Alien Image Maker Lands on Peninsula - On Wednesday, 16th August, Oliver James from Double Negative in the UK delivered the National Science Week lecture to members of the Mornington Peninsula Astronomical Society. Oliver leads a team of movie special effects staff in an international company called Double Negative, and specialises in scientifically accurate animations and graphic effects for the screen for Hollywood and European film producers. His team produced the special effects such as the black hole, in the movie "Interstellar" in 2014, starring Matthew McConaughey and Ann Hathaway, which ended up winning awards. For Interstellar, the black hole effects were developed in partnership with physicist Kip Thorne, and this work then led on to peer reviewed publications in the scientific literature for its accuracy and unexpected depictions. Oliver screened stunning excerpts from movies that he had worked on, demonstrating how 3-D images were created and how applied physics enabled cinema graphic problems to be resolved. Oliver James did his masters in Physics at The University of Oxford, then moved into the movie business in special effects and animations. He has a list of dozens of blockbuster and well-known movies to his credit over the last 20 years - a subset being Interstellar, Les Misérables, John Carter, Inception, Prince of Persia, Iron Man, Harry Potter, Quantum of Solace, The Dark Knight, Bourne Ultimatum, Batman, The Matrix, The Mummy Returns, Chicken Run, Mission Impossible II, Sleepy Hollow and Event Horizon. We were very fortunate that while in Victoria he had only two engagements; one being to provide our MPAS science week evening lecture and the other to speak at Kyneton. *Tony Nightingale*

National Science Week public viewing night 18th August - Approximately 50 in attendance - 10 members and 40 members of the public. A smaller turnout of the public than expected meant they got more time at the telescopes. Peter Lowe did the talk in the big shed, while other members manned the telescopes. The sky was clear early on, so we did the viewing before the talk. In the observatory the public saw Saturn, Jupiter, Jewel Box, NGC5139. Outside Jasmine & Ethan operated a scope and helped Sky show the spectra of stars. *Greg Walton*

August members BBQ & Working Bee on the 19th - Many thanks to all who helped out, with most jobs being completed with a few extra jobs done as well. Some of the many jobs were: John, Anthony & myself moved the fence near the toilet to make room for a new toilet that is to be built some time soon. Heath & Dave fitted a red LED light on the fence to the toilet. Sky fitted the newly coated mirror in the 12 inch Dobsonian. Phil and Katrina moved magazines from the observatory to the new library, also hung some posters & cleaned sticky tape of the floor. John also cut the tree back that were rubbing the big shed. Anders made a hinged light cover for the electronic lock & cleaned the observatory. We also did some viewing in the observatory till about 10pm. *Greg Walton*



Six MPAS member went to listen to Dr Neil deGrasse Tyson in July. We first had dinner in one of the quieter Port Melbourne restaurants. We were all excited to hear Neil & arrived early to find 4,000 people waiting to be seated. There were longer queues for Neil's books on sale; if you paid double the price you got it signed by Neil. The talk was called **A COSMIC PERSPECTIVE** but I think it could have been called a **comic perspective**, because it was a bit of a comedy - everybody wants to be a comedian, including Neil. The one thing I learnt was that there is nothing bigger than 10^{81} (that's a one with 82 zero's behind) and that there are fewer atoms than 10^{81} in the whole universe. Also Bill Gate is 11,000 times richer than Neil; maybe we are to take pity on Neil after he charged us \$95.00 a ticket. Anyhow I had never seen this building before & was impressed, it holds up to 10,000 people & on the inside it felt like a larger Sydney Opera House. I was also surprised to see so many young people there. 70% could have been uni students, with many families there as well, eager for their children to ask Neil a question at the end of his talk. Very few older astronomers present; we did not recognize anyone from the ASV. They may have stayed home & watched Neil on YouTube, as Neil has many videos online. Still, an interesting night out. *Greg Walton*

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.

MPAS SUBSCRIPTIONS 2017

The ticking over of the New Year has long past, which means that any unpaid society fees are long overdue. The committee has worked hard to ensure that 2017 fees are still the same as the previous year's prices. So to assist the society in maintaining the facilities and service we share, we appreciate your prompt payment for each and every year ahead. As a reminder, the following structure of the 2017 fees is:

SOCIETY FEES

Subscriptions can be paid in a number of ways:

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

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

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 farther information - https://drive.google.com/file/d/0ByvkvzZGI9g_NXZ4cWxHbERTdEE/view?usp=sharing

New Members Welcome

- Peter Cracknell family
- Peter Webb and family
- Frank Xia and family
- David Griesmith
- Anthony Augustine
- Kevin Cass and family

CALENDAR		September / 2017					Red Days indicate School Holidays	
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday		
<p>★ Please - Note that the September Society Meeting ★ ★ ★ ★ will be at the Briars 8pm ★ ★ ★</p>						1 Public Night 8pm	2 MPAS Observatory open to member	
3 Father's Day	4	5 Neptune at opposition 8th magnitude	6 Full Moon Neptune 0.8 degrees N of the Moon	7	8	9	9 Astrophotography Workshop 12:30pm	
10	11	12	13 Last Quarter ASV Meeting	14 AC Astronomy class	15	16	16 MPAS Observatory open to member	
17	18 Venus below a thin crescent Moon in the east at dawn	19 Mars & Mercury with a thin crescent Moon in the east at dawn	20 New Moon Society Meeting @ Briars 8pm	21	22 Jupiter left of a thin crescent evening Moon	23	23 Spring Equinox Members Night BBQ 6pm	
24	25	26 Saturn above the evening Moon	27 Committee 8pm	28 First Quarter	29 Grand Final Day Holiday	30	30 Grand Final Day MPAS Observatory open to member	

Monthly Events September Southern Comets website - <http://members.westnet.com.au/mmatti/sc.htm>
Public nights - 8pm start on the 1st @ the Briars
Astrophotography Workshop - 12:30pm start on the 9th @ the Briars
Astronomy class (AC) - 8pm to 10pm on the 14th @ the Briars (Peter Lowe's winter classes)
Society Meeting - 8pm to 10pm on the 20th @ the Briars
Members Night BBQ - 6pm on the 23rd @ the Briars also 8pm Telescope & observatory training

CALENDAR		October / 2017					Red Days indicate School Holidays	
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday		
1 Daylight Saving begins	2	3 Neptune will slip behind the Moon at 11:18pm Briars	4	5 Mars & Venus 0.5 degrees apart dawn	6 Full Moon Public Night 8pm	7	7 MPAS Observatory open to member	
8	9 Moon 366,855km	10	11 ASV Meeting	12 AC Astronomy class Last Quarter	13	14	14 MPAS Observatory open to member	
15	16	17 Mars & Venus in line with the dawn Moon	18 Society Meeting 8pm	19	20 New Moon VicSouth @ Nhill Uranus opposition	21	21 Members Night Society Dinner 6pm	
22 VicSouth @ Nhill	23 VicSouth @ Nhill	24 Saturn above the Moon	25 Committee 8pm Scorpius Deadline Moon 405,154km	26	27 Scouts?	28	28 First Quarter MPAS Observatory open to member	
29	30	31 Halloween	<p align="center">Scorpius editing team. Members please write a story about your astronomy experiences and add some pictures. Send them to: Greg Walton gwmpas@gmail.com Peter Lowe & Bruce Renowden</p>					

Monthly Events October Southern Comets website - <http://members.westnet.com.au/mmatti/sc.htm>
Public nights - 8pm start on the 6th @ the Briars
Astronomy class (AC) - 8pm to 10pm on the 12th @ the Briars (Meteor Showers - Peter Skilton & Comets - Sky Murphy)
Society Meeting - 8pm to 10pm on the 18th @ the Peninsula School
Members Night Society Dinner - 6pm on the 21st @ the Briars also 7:30pm **President's Speech!!!**

**Please... we need helpers to keep the MPAS Observatory open to members on all Saturday nights.
 If you can help, contact Greg Walton on 0415172503 or email - gwmpas@gmail.com**

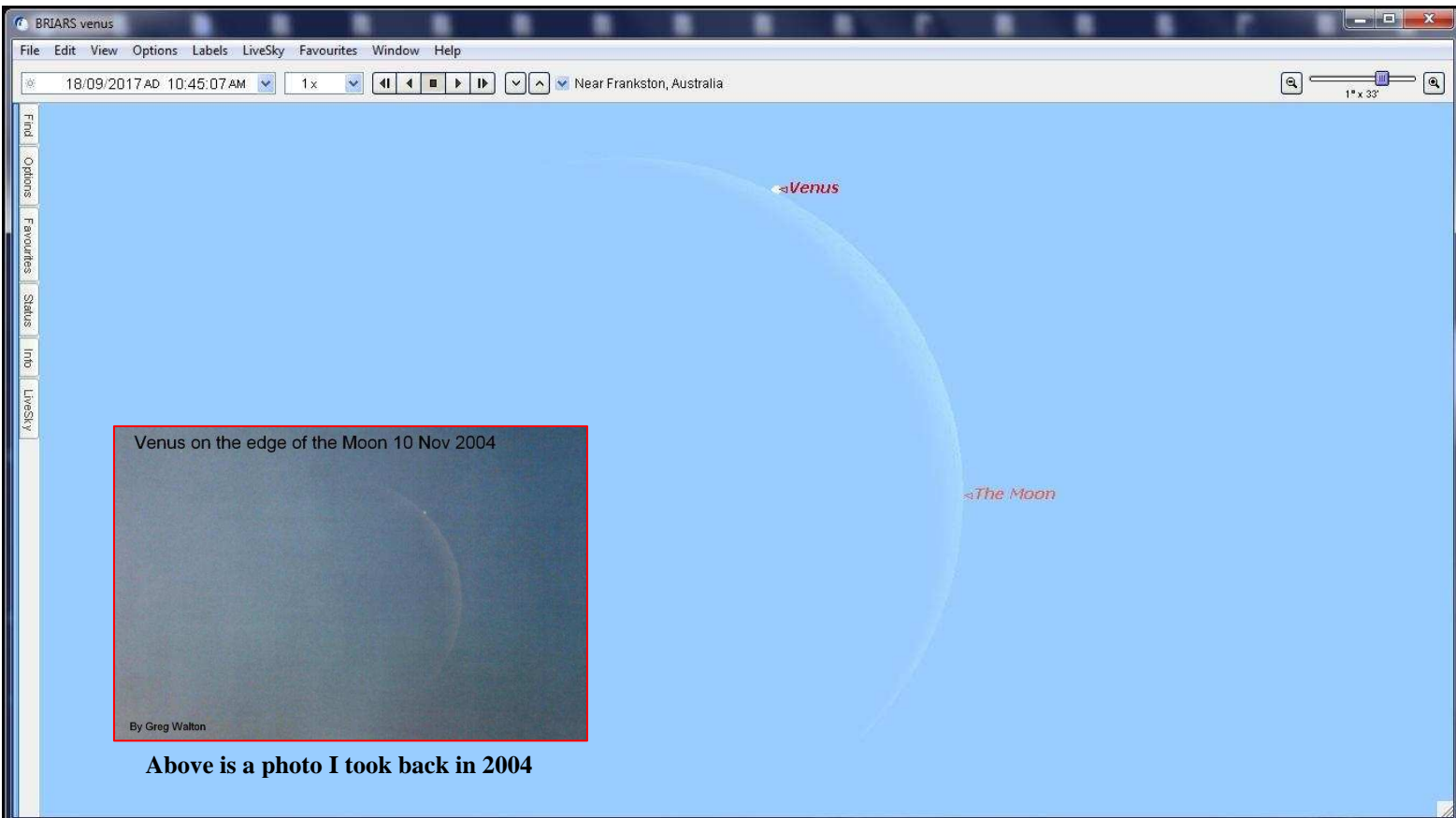
September Event: We will look at Venus disappearing behind the Moon in the daylight.

From the Briars on the morning of the 18th of September precisely at 10:46 hrs Venus will slip behind the Moon. With a little practice you can see Venus in the daytime with the unaided eye. The problem is knowing where to look. But on this day the Moon will be there to guide us. Face north & just look 27 degrees to the left of the sun.

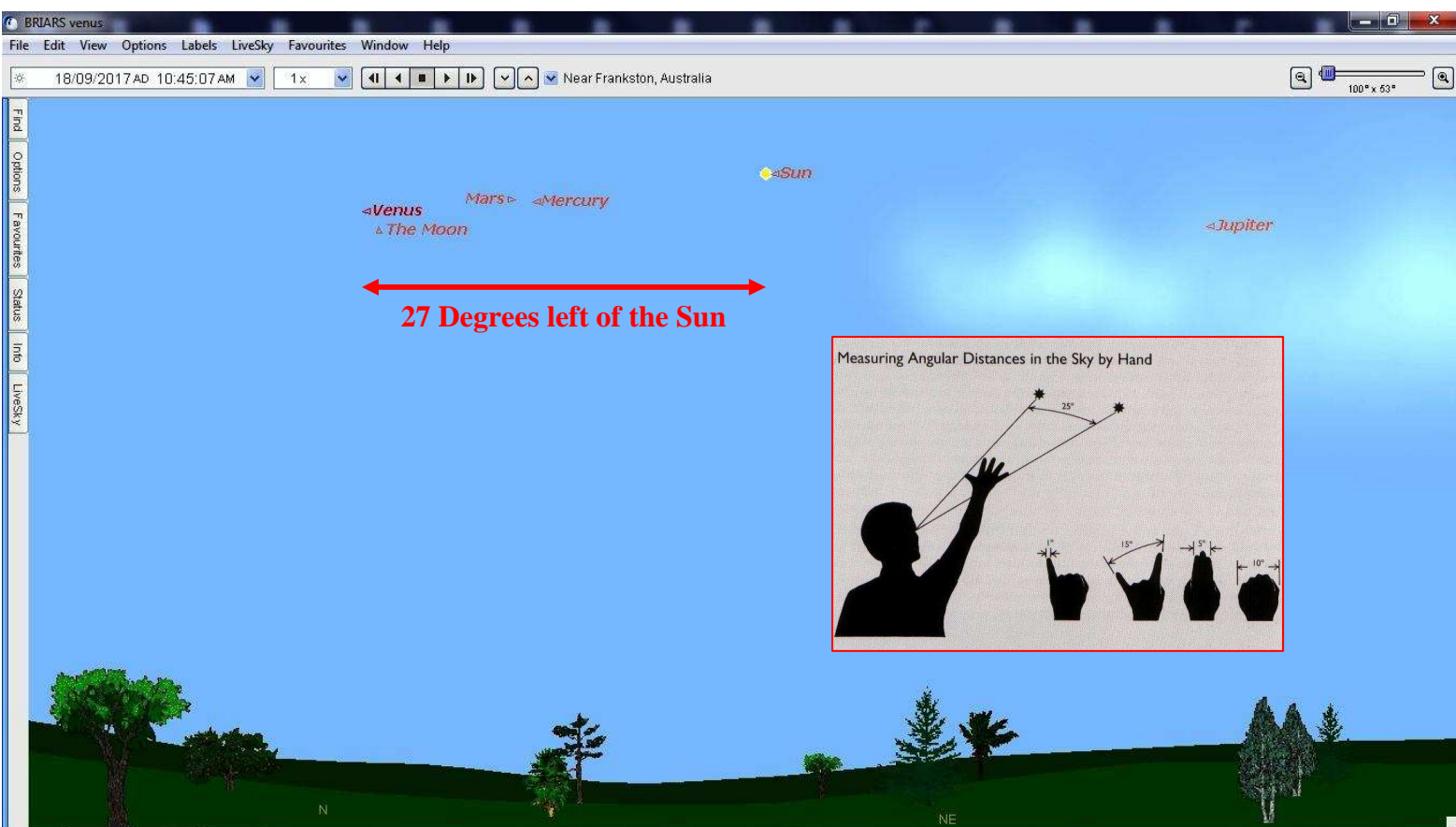
Warning: Observing planets near the sun is dangerous!!!

Do not point any telescope, binoculars, camera or any optical device at the sun.

Please ask an experienced member in the society for help. One trick is to keep the sun hidden behind a building. Venus will re-emerge from behind the Moon 1 hour & 14 minutes later at 12:00 hrs.



Above is a photo I took back in 2004





Embroidered MPAS merchandise

All Items will have the MPAS Moon phase logo on the left hand side.
Colours have been selected to minimize clash with logo.
(by The Uniform guys)



(A) Men's Micro Waffle Polo

- BIZ COOL™ 100% Breathable Polyester
- Micro waffle knit textured fabric
- Self fabric collar with concealed 2 button placket
- Matching self fabric cuff on sleeve
- Side splits
- Loose pocket included
- 170 GSM
- Modern Fit

Sizes : S,M,L,XL,2XL,3XL,5XL
Colours : Black, Navy, White
Price : \$36



(B) Ladies Micro Waffle Polo

- BIZ COOL™ 100% Breathable Polyester
- Micro waffle knit textured fabric
- Self fabric collar with Zip
- Matching self fabric cuff on sleeve
- Side splits
- 170 GSM
- Modern Fit

Sizes : 8,10,12,14,16,18,20,22,24
Colours : Black, Navy, White
Price : \$36



(D) Adults Auto Winter Jacket

- Polyester/Polyamide (Nylon) shell
- Quilted satin lining
- Zip-through collar with snap closure wind panel
- Internal pockets
- Up to Size 3XL
- Black Only

Sizes : S,M,L,XL,2XL,3XL
Price : \$70



(C) Kids Botany Polo

- 160gm 100% Drivewear polyester moisture removal
- DriWear Mini-waffle knit easy care fabric
- Self fabric collar
- 3 button placket
- 2 button placket on sizes 4, 6 & 8

Sizes : 4,6,8,10,12,14,16
Colours : Black, Navy, White
Price : \$25



(E) Hotham Hoodie

- 310gm blended 80% cotton/20% polyester
- Jersey knit fleece knit, low pill
- Grey marle hood liner and flat tie cord
- Sizes Small to 3XL

Sizes - Men : S,M,L,XL,2XL,3XL
Ladies : 8,10,12,14,16
Colours : Black, Navy, Charcoal
Price : \$48



(F) Kids Full Zip Fleece Jacket

- 100% Polyester
 - Black Only
- Sizes : 4,6,8,10,12,14
Price : \$30



(L) Adults Scarf

- 300g Anti-Pill Polar Fleece Scarf
- Colours : Navy, Black, Bottle Green, Royal, Maroon
Price : \$18



(G) Woolmix Corporate Pull Over Knit

- 50% Wool 50% Acrylic
- 'V' neck long sleeve plover
- Easy Fit

Sizes : XS,S,M,L,XL,2XL,3XL,5XL
Colours : Black, Navy, Charcoal
Price : \$75



(M) Spirit Pole

- 100% Breathable Polyester
- Colours : Black, Navy, White, Green
Sizes - Men : S,M,L,XL,2XL,3XL,5XL
Ladies : 6,8,10,12,14,16,18,20,24
Price : \$25



(J) Adults Acrylic Fleece Beanie

- One Size Fits All
 - Stretch Beanie
- Colours : Black, Charcoal, Navy, Pink, Royal, Purple
Price : \$15



(N) PVN Field Vest

- 100% Polyester
 - Light Blue only
- Sizes : S,M,L,XL,2XL,3XL,5XL
Price : \$15



(K) Microfibre Structured Brim Hat

- Adjustable Band and Toggle
- Sizes : Small / Large
Colours : Bottle Green, Royal Blue, Navy Blue
Price : \$20



ORDER FORM

ITEM (letter)	NAME	SIZE	COLOUR	AMOUNT \$
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As this is a batch order, all orders need to be received and paid by end of **November 2017** TOTAL \$:
Orders can also be emailed to d.rolfe@mpas.asn.au and payment to MPAS BSB:033272 A/C:162207

Orders are also taken on-line at <https://www.trybooking.com/MFEJ>

Down load this form https://drive.google.com/file/d/0BYvkxzZGI9g_RkJ0bVE0SWxQeUE/view?usp=sharing



ASTROPHOTOGRAPHY WORKSHOP

SYMPOSIUM

The Mornington Peninsula Astronomical Society is proud to announce an Astrophotography Workshop.

We will be canvassing and introducing concepts which will assist both the amateur and the professional photographer.

The day will have an array of lectures given by experienced and acknowledged astro-photographers.

A practical hands-on session will also be held during the evening at our observatory.

We will be providing tea, coffee and biscuits during the day.

A BBQ and refreshments will be supplied to gear you up for the night ahead.

TOPICS

Introduction to Astrophotography.

Imaging the Southern Lights (Aurora).

Wide-field Astrophotography with a DSLR.

Deep sky Astrophotography.

Photoshop for astrophotography
(If weather is overcast)

Practical application and consolidation of concepts acquired.

When: The 9th of September 2017
Where: The Briars MPAS society rooms Mt Martha
Time: 12:30 pm till late

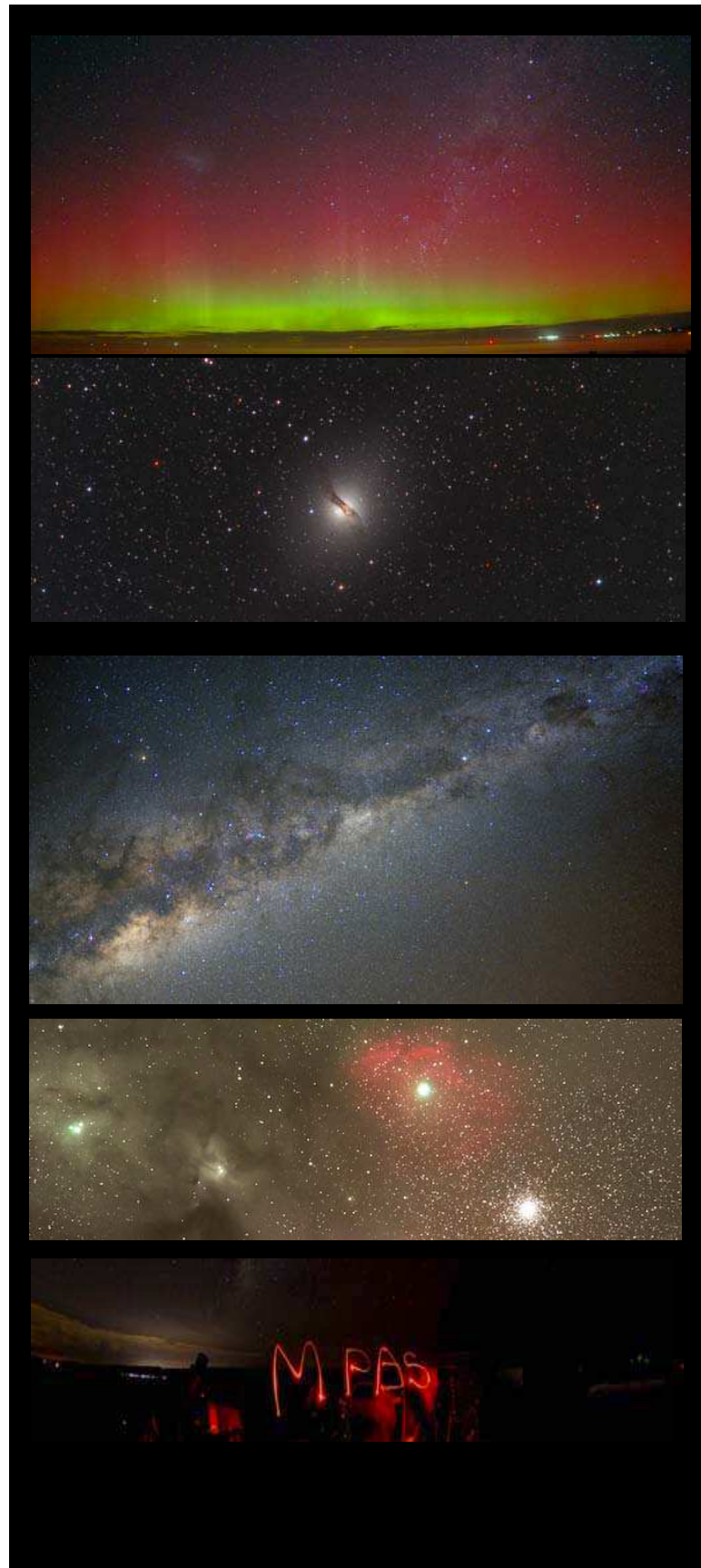
Places are limited to 80 people so bookings are essential.

\$40 entry, which includes a BBQ Dinner and light refreshments.

Bring your Tripod, Camera, warm clothes and an enquiring mind.

Further information can be found at www.mpas.asn.au

Book online at <http://www.trybooking.com/198793>



Steve Mohr's Story

Remote Autonomous Imaging



So how does it go? Well, you get up in the morning, turn on the PC, go warm up the kettle, and make a big fresh cup of coffee. By the time you get back to the PC, all the new astro data from the previous nights imaging is now on your PC, waiting for you to review. Well, that's what fundamentally happens *now*; but of course, this is the good part of the story, like skipping the content of a good book and jumping to the happy ending. I have to admit that this end result was only made possible through excellent tag-teamwork with Terry Robinson (ASV member) that spanned about 2 years of introductory learning on automated imaging in the field, and approximately 9 months of rigorous design and testing of our current imaging systems, all inclusive of the successes, failures and detailed trouble shooting.

Anyone trying this game (astrophotography) will know that there are few easy wins. My path to this current situation was really tough, but equally rewarding through the challenges. During the development period, nearly every night we reviewed our previous night's successes and failures. Our stories are probably not much different to anyone else's, where one minute things are working, the next, well...it's not! So now I know astrophotography is basically a contest of who's got the most patience, and who has lots of determination. There is no quick path to excellence, so we just have to keep trying, hoping to get there in the end.

When I think back, there were so many things that were a challenge, and when you first experience some faults, your first thoughts are immediately: "How the hell can I fix that!" ☺ Hopefully it's not boring to mention, but I thought to share some of the faults that I can recollect:

Camera-Associated Errors:

- Cooling kept shutting down on start up. Ended up that my original 12V DC power supplies (not the OEM AC power supply) couldn't supply enough current, and the camera's cooling program kept aborting at 55% of the max power it needed to work.
- AOX failed intermittently on camera start up, resulting in very poor guiding. I still haven't found a fix for this, and have resigned myself to the fact that this will be a continuing problem.
- Driver and firmware errors. Many new drivers come and go, so fixing one thing could create a new fault with the revised version. The moral of the story, do not upgrade the driver/ firmware unless you read that the update is for your camera, and that you saved the old driver in the camera driver directory before your update – just so you can revert to the old version if you have to.
- And more faults for the camera... just my impeccable memory can't remember them.

Mount Errors:

This was the least troublesome part of the system, but there were some driver faults with the release of the Astro Physics control system that affected my older version controller. The active AP user group sorted these out promptly, to near zero faults from the AP mount.

Dome errors:

The one recurring fault was that the shutter wasn't shutting when it was supposed to – *BIG PROBLEMO*. Following some correspondence with the driver writer, a new driver was achieved, and now all good – whew! Clearly the equation of rain plus an open shutter equals a possible disaster.

Telescope Issues:

- Power control and remote switching – OMG, turning power hungry items on and off reliably simply requires everything to be over the top in specification; that's cables, relays, IP switches, plugs, etc.
- Rotator - keeping it powered: As the telescope sways about with various pointing angles to the sky, the effect of gravity on cables can be significant over time. One moment they are plugged in, the next they are unplugged. Nothing like long cable ties to fasten the cables to the body of the OTA.
- Serial to USB: I realise now that there are few really reliable Serial to USB adaptors on the market. Many of them are no good for serious applications. I purchased several recommend types, and they ended up causing faults such as the incorrect handling of the data flow, or poor holding of the assigned com port number (meaning, over time the USB device would change the com port number upon power up of the PC). In the end, I found the right solution that now works every day with no problems (StarTech USB to 4-Port Straight-Through RS232 Serial Adapter – highly recommended).
- Closed loop heating/cooling system, with set point temperature control of secondary mirror and primary mirror: This took some time to work out, but now works really well. The primary mirror uses the Planewave focuser controller, where it maintains the primary mirror temperature control, either heating up or increasing fan speed to heat or cool the mirror to 1.8 degrees C over ambient temperature. For the secondary, using a Seletek Armadillo controller with dual temperature probe and a homemade circular dew heater made from resistors, the secondary mirror can maintain a temperature of 2 degrees C above ambient. This heating/cooling system is switched on from late in the afternoon to 10am in the morning during the cooler months to keep mirrors free of moisture.
- Focuser control has always been very reliable, with the OEM Planewave control system and Focusmax control software.

Weather Station:

The first problem was the selection of the right weather station, and then... How many weather devices did we need? In the end, we decided to have a master weather station, with an infrared rain sensor on the dome as a backup (connected directly to the dome shutter controller, and independent of any other function). One thing we found out was that these weather stations are not accurate out of the box! If you really monitor these, you'll soon see they do not correctly report the weather when weather conditions grossly change (specifically when the sky temperature vastly changes, that is a cool versus hot night). Even the more expensive Boltwood systems have the same issues.

We selected the AAG weather station. This unit can be tuned for better accuracy, but this is a very complicated/hard to understand process. Now we modify the settings of the AAG quarterly to suit the sky temperature changes, as without these adjustments, the weather station would not report correctly. The backup is a rain sensor (Hydreon Optical Rain Sensor) which is mounted on the dome, and connected directly to the dome controller. The dome controller can handle two weather station inputs. The Hydreon Optical Rain Sensor works like the rain sensor in a car, and has proven to be very reliable.

PC Issues:

Now that everyone has a PC, just think about relying 100% on your PC to protect your equipment? The units we picked are mini industrial, fanless units like this one:



Lots of real serial ports (x6) and lots of USB ports (4x USB3 and 4x USB2), and a reasonable processor (i7, 4510U). The operating system is Windows 7 Pro, all updated to the latest patches, no virus software, and these are never used for internet browsing. This PC reboots daily, and has a master control software switching system that governs its operation for the next night's operation. Here we can tell the PC to do one of three things:

- Partial- hibernation: PC On, weather station on, all other devices switched off. This is a good power saving mode allowing our off grid systems to catch up if we run low on power. Also, if the weather is forecast to be poor for a period, we select this option.
- *Thunderbirds Are Go!* The PC is set in the autonomous imaging configuration where all devices are powered, and the main operating programs are loaded.
- Full hibernation: nothing on, the PC is totally off. This is handy for those extremely hot days, or for when the off grid power supply is running extremely low. The PC can be restarted by a SMS text message.

All the above controls are with thanks to Terry's perseverance and scripting! Amazing work, Terry!

In regard to the PC's performance and the many programs running at once, the overall demand on the system is only about 1/8th of the systems memory (RAM = 8GB), and perhaps only 10% to 30% of the PC's processing resources.

The Scripting Challenge:

Many of the current executive programs, like Sequence Generator Pro and CCDAutopilot, have nice check box inputs that turn on or off those features on how the system will do things for you (like: Tick = Auto focus every XX hours of operation). They also have the ability to run scripts at certain moments of the operation (like: Tick = run script after sunset...). These scripts turn out to be very important to the best results in performance.

Achieving Goals:

These efforts also turn out to be very hard to write for people with little or no experience in JAVA or Visual Basic. Thank goodness for Terry again! He got stuck into learning this part of the project, and did a sterling effort! Maybe an experienced JAVA/ VB writer could have done a better job, but in the end, Terry's scripting achieved our goals, from switching on/off IP relays, controlling cool down/ warm up of the camera, turning on/off programs, and more, all done within these scripts. He did a wonderful job – *thank you, Terry*. He worked out some crazy stuff that we now benefit from, and all being remotely controllable.

Software Issues:

Over the initial test period of 9 months, it was simply scary how many times we discovered driver or software faults originated from the installation of the latest driver or software version. Now, with every software/driver release, we've learnt to review the release's information for what the update was meant to fix or what new features were added. Now we do not install updates unless they tackle issues we are experiencing, or have new features we can use.

New driver and software faults ended up being one of the biggest issues experienced, because with these errors the remedy is totally out of your control. All you can do is provide your fault information to the software developer and then wait until the issue is found and resolved. Here you have to participate in the forums to ensure the issue is correctly and completely reported. Unfortunately, you end up fighting against the armchair experts, and although they mean well they end up being one of the biggest hindrances to getting a problem resolved!

Which Executive Program:

Luckily today, there are many executive programs to help us with our imaging routine, where each program has its merit and purpose. For us, we didn't want to become a slave to managing these observatories, so the executive program had to do a lot for us. More importantly, my dear wife would have divorced me if I selected a program that needed nightly babysitting to work. Definitely she would have killed me, if I had to reset the night's observations as a result of these becoming invalid after a weather event that shut down the session for an hour and then the weather cleared. Most executive programs need assistance to restart and to reset the observations according to the object's rise and set times. Depending on how long the weather event lasts, some objects may have to be deleted from the session as they are no longer in a viewable area of the sky. No, I certainly did not want this slave relationship either. So which executive program was the right one?

Looking around the market, there are many existing solutions, and on the horizon, there are some new, very feature rich options emerging, but these just need more time to develop. So which one will be the right one? When selecting an executive program, you need to look at your hardware and controlling software (are these compatible with the program?) and, importantly, the situation you run them under (whether as a mobile platform, or a fixed platform?). Taking all of these into consideration, you then need to look around the market what are available.

After only a quick look on the net, you can see there are many programs and many levels of executive control. Importantly, you should notice there is a difference between automated operation and autonomous operation. I note some examples below:

- Sequence Generator Pro (SGP) – an evolving product, huge potential, but still, a basic but effective entry level automation system. Requires nightly session configuration, and is not autonomous.
- CCDAutoPilot – more reliable, more comprehensive, but only an automation solution requiring significant user interaction.
- CCD Commander – no experience with this one. It's supposed to be good too but, like CCDAutoPilot, it's not “autonomous” in operation.

What do I mean by “autonomous”? Well, I can use CCDAutoPilot (CCDAP) as an example to explain. Using CCDAP as the executive program, it manages all your systems functions; it will by itself do many functions without user intervention, all set in its starting and closing parameters. It will monitor the weather, close the dome if there is an unsafe weather event, focus your telescope as specified, and sequentially image all targets you set for that night. If a weather event occurs, say the clouds come in, CCDAP will close down the operation. When the weather becomes “safe”, it can resume, but it will continue with the same observations. CCDAP handles the observations sequentially, needing to finish one observation before continuing to the next. This will obviously be a problem if the weather delay was a few hours. Suddenly your object is not where it was expected to be in the sky; it may be low in the night's sky or, worse, below the horizon. Now, if we were out in the field and we were monitoring the system this would be fine. We could reset the observations and restart the imaging session.

This does still sound good as an “automated” system. An “autonomous” system does part of the managing quite differently. The autonomous system is totally in charge of all tasks, including that of selecting appropriate targets for the night. It will be adaptive in re-selecting targets following an unsafe weather event, and will schedule targets in accordance to the moon phase and time of year. This is what I am calling the marriage-saving device. Yes, something my wife won't divorce me over because I spend every day sitting at the PC programming the night's targets, inclusive of resetting observations following weather events.

Now, there is this program called ACP Expert Observatory Control software (Hot Product 2017: S&T). This guy is different; regarded as “professional-class automation”, and is used by many professional level observatories. Here we are talking the real deal. In the end, all you do is program in your targets. ACP's interface is not the nice Windows look of CCDAutoPilot; in fact it looks a little old school, but the inputs structure is mostly logical. After a lot of reading of the help files, you can see this has been an evolutionary product over many years. I wouldn't be surprised if it's about 10 to 15 years of progress in there. To start your operational inputs, there are a load of details to input, all describing your location, equipment, and style of operation you want. To input your target, you must input the objects coordinates, camera rotation, overall how much time to spend on the target per filter, inclusive of the sub-exposure lengths, whether you want moon-down imaging or it is okay to image with the moon up (including how far away from the moon in degrees is allowable -this value is adaptable in accordance to the phase of the moon too!).

See below the input screen for a target:

Schedule Astro-Imaging

[Help](#)

1. Object and Coordinates

Target Name: [Get Coordinates or Ephemeris](#)
 Right Asc. (hrs): [Deep Sky Catalog Search](#)
 Declination (deg): *(coordinates in J2000)*
 Pos. Angle (deg): *(true/sky PA, required)*

2. Images (request each color separately)

Total time: *(hours, may extend over multiple nights)*
 Exposure time: *(seconds, for each individual exposure)*
 Filter:
 Binning:
 Dithering: *(pixels rms ⓘ -1.0 for auto)*
 Auto Calibrate: Perform full calibration after acquiring
 Hot Pixels: Remove hot pixels after calibration

3. Priority and Constraints

Priority: *(each observer has own priority scale)*
 Horizon: *(degrees, must be above this altitude)*
 Hour Angle: *(Hours E, W, -east, must be within HA range)*
 Moon Avoid: *(distance degrees, width days ⓘ [Moon Avoid Help](#))*
 Moon Down: *(Moon must be below horizon, ignore Moon Avoid)*
 Sky Condition: *(Sky must be at least this good)*

4. Timing Controls

Block Time: *(hours, ⚠ divide images into blocks of time up to this long, default 1 hour, 0.5 - 4 hrs)*
 Monitor Interval: *(days, requeue every 'n' days forever or until "Must Run Before")*
 Must Run After: *(UTC, ex: 2011/03/30 03:12:44)*
 Must Run Before: *(UTC, ex: 2011/03/30 03:12:44)*
 Fixed Time: *(override dispatcher, ⚠ use with caution!)*

Enable requests immediately

The target list is maintained in the program section known as the Scheduler, and you can see it in summary below (web interface):

ACP Expert at Starview Farm Observatory

Current Observing Projects

Click a Project name below to see its Plans
Hovering the mouse will reveal info in many places

PROJECT	OBSERVER	PLNS	IMGS	TIME	RUN	CMPL	PEND	DEFD	FAIL	DIS
Abell 36 planetary nebula	Steve	18	76	16.50h	0.0%	44.4%	0.0%	55.6%	0.0%	0.0%
B33 - HHead Neb	Steve	14	71	14.50h	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%
Blue Horse - Scorp	Steve	10	20	5.00h	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
Cone - Fox Fur	Steve	16	81	13.75h	0.0%	81.3%	0.0%	18.8%	0.0%	0.0%
Dark Nebula - O2	Steve	3	13	3.00h	---	---	---	---	---	---
GG31	Steve	12	54	10.50h	---	---	---	---	---	---
GUM10 - Nebula	Steve	9	63	7.50h	0.0%	33.3%	0.0%	66.7%	0.0%	0.0%
HMSTG84 - Hand of God	Steve	24	80	13.75h	---	---	---	---	---	---
IC2531 Galaxy	Steve	12	59	10.50h	0.0%	83.3%	0.0%	0.0%	0.0%	16.7%
IC2944 - Running Chicken	Steve	20	89	14.83h	0.0%	60.0%	0.0%	40.0%	0.0%	0.0%
IC428 - Orion Dark Neb	Steve	22	81	10.00h	0.0%	9.1%	0.0%	90.9%	0.0%	0.0%
IC4628 - Prawn Nebula	Steve	33	95	22.50h	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%
IC5332 Galaxy	Steve	13	68	11.00h	0.0%	7.7%	53.8%	38.5%	0.0%	0.0%
LDN 1622 - Boogie Man Neb	Steve	11	74	9.50h	---	---	---	---	---	---
ldn1622 - Dark Neb	Steve	29	85	13.75h	0.0%	3.4%	0.0%	96.6%	0.0%	0.0%
M17 - Swan Nebula	Steve	21	71	14.50h	0.0%	4.8%	0.0%	95.2%	0.0%	0.0%
M20 - Triford Neb	Steve	11	51	11.00h	0.0%	45.5%	0.0%	54.5%	0.0%	0.0%
M42 - Orion Dark Neb	Steve	19	67	9.25h	0.0%	15.8%	0.0%	84.2%	0.0%	0.0%
M8 - Lagoon Neb	Steve	11	51	11.00h	0.0%	9.1%	0.0%	90.9%	0.0%	0.0%

The main summary is shown to the right hand side of the table, where the target status is shown across the line. Traffic light status of Red - Orange - Green indicates either fault, nearly finished, or finished targets (the percentage number changes colour in accordance with the state of completion from Black to Orange to Green, and FAILs are highlighted in Red). To the left side you can scroll down the left frame to a particular target and expand the targets details. In these detail lines you can edit the imaging schedule per filter.

Outside of the web interface, is an ACP program just for editing your target list; this is called the Expert Schedule Browser. I've never really used this, but one important feature here is that you can back up and export your table. In the case of a hard disk failure, this is one area you don't want to lose the information. It represents many hours of target data entry, with each target taking perhaps 5-10 mins to correctly input, and that includes setting the FOV to the correct rotation so your off axis guider has a guide star centrally located on the guide chip. Below is a screenshot to show you some of the information in there per entry:

A feature included is the over-the-WEB monitoring for checking the nightly status of the system by visiting your ACP WEB address.

Starview Farm Observatory

Welcome Steve

Scheduled

My Documents

Shared Files



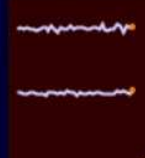
Observatory Info

Help Resources

Toolbox

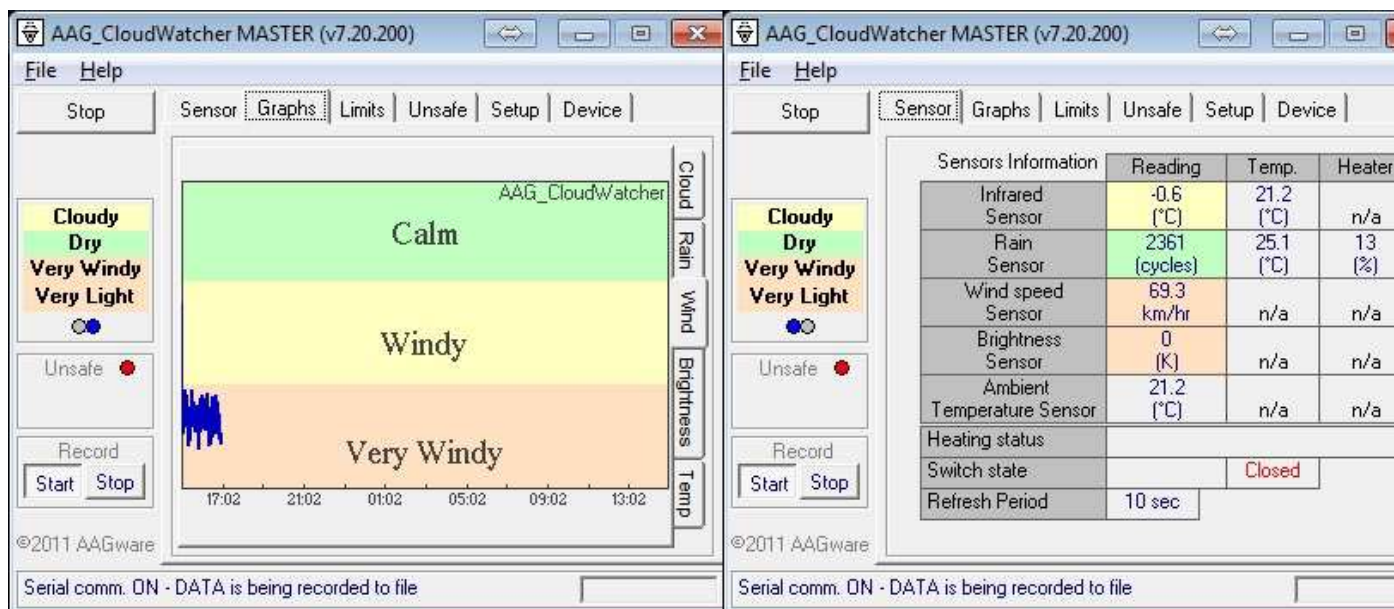
System Status

[Help](#) Hover the mouse over the links to see what they do

Observatory	Telescope	Imager	Activity	Scheduled Plan	
In use	Sidereal Track	Exp: 11.79 sec	Observing	Plan NGC6744 - Ga	
Local: 06:19:11	HA: 03:31.0	Filter Blue	FWHM 4.0	Obs NGC6744 - (1/1)	
UTC: 20:19:10	RA: 19:11:15.80	Binning 2:1		Repeat 1/1	
LST: 22:42:17	Dec: -63°47'04.0"	Cooler -30°C/24%		ImgSet Blue filte(1/1)	
Owner ScopeDomeOZ	PA: 340°	Guider		Count 5/6	
Weather Clear Calm	Az: 212.78°	Interval (sec) 0.11		Tracking Errors	
Shutter Open	Alt: 49.50°	Error Ex: 0.05			
Dome Slave	GEM: West	Error Ey: 0.14			
Scheduler		Air: 1.314			
Status Observing					

The above interface provides you a real time view of what is happening at a glance. From this page you can link to the imaging schedule, to see and edit your target list.

ACP relies on the weather feed. It looks for the position of the sun below the horizon to determine when to start up and whether to open the dome to start the dome equalisation process. Now this is the good part, it looks at your list, scans all target objects, checks if the moon will be present, then schedules targets in blocks only for meridian imaging – here telescope is always looking directly up, imaging through the thinnest of atmosphere. If the weather becomes unsafe, it first closes the dome and parks the mount. If the weather becomes clear, it will open the dome and start imaging again with a revised target list. It will open and close the shutter, reschedule targets as often as needed, until twilight when it then shuts down the observatory.



Sensors Information	Reading	Temp.	Heater
Infrared Sensor	-0.6 (°C)	21.2 (°C)	n/a
Rain Sensor	2361 (cycles)	25.1 (°C)	13 (%)
Wind speed Sensor	69.3 km/hr	n/a	n/a
Brightness Sensor	0 (K)	n/a	n/a
Ambient Temperature Sensor	21.2 (°C)	n/a	n/a

The program also nicely handles the collection of flat files, you just need to run the ACP script and it will turn on the flats panel, rotate the dome to the correct orientation such that the flats panel is in front of the OTA, and run the flats routine on all filters. Within this script you just specify the target ADU for filters; ACP does the rest.

Now, ACP has complicated scripting which is a positive and a negative (if you are not fluent with scripting it's a negative for certain). These scripts do the important stuff, like how you want to turn equipment on and in what sequence, what order to turn software on, how to chill your camera (such as a slow cool down taking 20 minutes to reach target temperature) – this saves your CCD's life, you know.

Then, at the end of the night, turning off the system, doing a very careful and orderly shutdown, and warming the camera up slowly until it hits ambient. ACP has faults too, but you learn what these are, and build more scripts to help it through these faults (for example, the main fault is that there is no watch dog).

Observatory Power issues:

When is enough power enough? Simply, you need to throw at it as much power as you can afford, and more than you think. Unfortunately in my case, the dome site is off grid. It took months to understand what a solar system is, how to configure one, how many panels would be needed, what controller to go with, can I remotely view performance, how to get emails from the system for any warnings, what type of batteries and how many and how big a capacity. This was a major challenge, as most people on the web talk about 12v solar systems which are not suitable for larger demands. Based on our calculations, the dome and equipment needed enough power to supply what's classified as a small to medium sized home. So far this winter, the power supply has fully recharged every day and continues without issue.



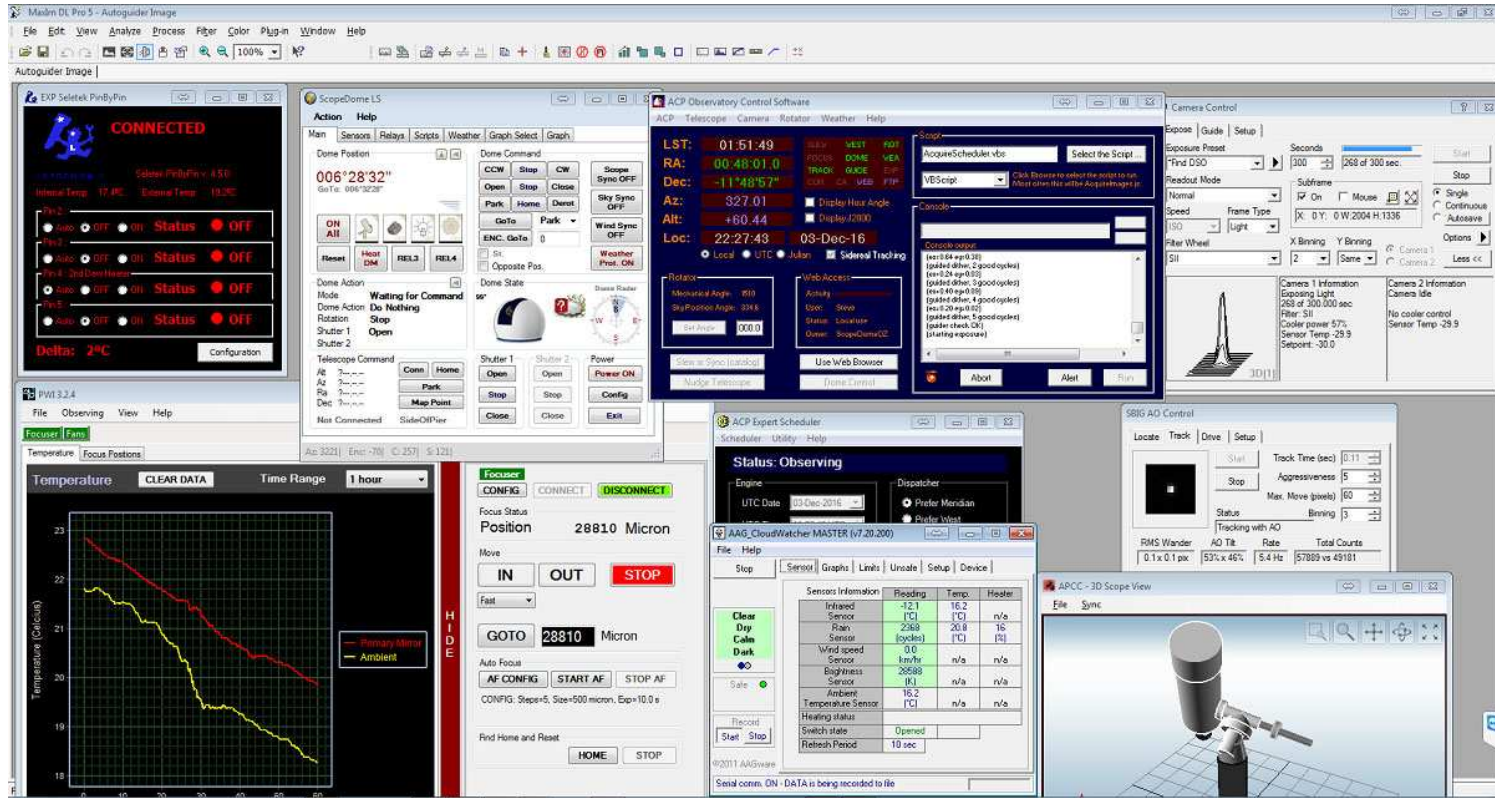
Above: Big celebration after drilling all the holes and mounting the panels! This was a two day job just drilling 8mm and 10mm holes. Unfortunately, I screwed up the spacing calculation between the panel rows! Front row had to be tilted to a lower angle not to shade the back row during winter. Thankfully I realised this before mounting the panels. It is very interesting that the front row still produces basically the same power volume as the back row on a winter day...! We didn't expect that.

Below is the snapshot page showing the power harvesting results (taken from late July). Following a winter night, about 12-14 hours of operation, the power consumption is around 3,400 to 3,800watts to replenish the battery pack.

Data Log View												
Days 0 to -83												
Day	Today	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	-11
Events	1	1	1	1	1	1	1	1	1	1	1	1
Hour Meter	258d0h	257d14h	256d14h	255d14h	254d14h	253d14h	252d14h	251d14h	250d14h	249d14h	248d14h	247d1
Max. Battery Voltage	57.77	58.03	58.39	58.28	57.80	58.01	58.07	58.02	58.35	58.39	58.56	57.9
Min. Battery Voltage	49.93	49.74	49.67	49.67	49.64	49.75	49.78	49.63	49.83	49.36	49.28	49.4
Max. Array Voltage	114.50	113.72	113.22	114.95	114.09							
Max. Output Power Watts	1643	1398	1301	1315	1721							
Amp Hours	61.8	60.1	63.1	61.1	61.5							
Watt Hours	3480	3390	3560	3450	3470							
Max. Battery Temp °C	16	15	14	14	16							
Min. Battery Temp °C	12	9	8	8	8							
Charging Durations Min:												
Equalize	0	0	0	0	0							
Float	255	173	279	242	267							
Absorption	179	179	179	179	179							
Faults	-	-	-	-	-							
Alarms	-	-	-	-	-							

In the above table, we look at “Max. Battery Voltage”, “Min. Battery Voltage”, “Watt Hours”, and “Float”. During summer, we also note the “Max. Battery Temp” to be sure the batteries remain within operating tolerance, otherwise we hibernate the systems. The Watts line indicates the Watts generated by the power system to replenish the batteries. It is inclusive of a smaller value that accounts for the devices operating continuously, like the modem, the PC, the internal network (LAN), weather station, dome electronics, monitoring system, surveillance system, etc. Mount, camera, telescope, and other high consumption items are mostly off from 7am to 5pm.

So, in the end it’s a lovely thing; but make no mistake, it has been exceptionally hard to get to this level of safe operation. In summary, about 9 months of backyard testing with nightly reviews of operation, then 4 months of testing in the field. I now still observe the system for faults daily by email, but mostly the system handles issues itself. I’d get a SMS text message if a serious fault occurs, I then remotely connect to the PC to see the systems status. For the last four weeks the system has worked really well, but as usual with some minor glitches, all being self recoverable. Otherwise, since December 2016 I have collected 3,771 images, 49.9 GB of data (to 6th August 2017).



So that’s my story for the previous two + years now. The images coming from the system are the highest quality I have ever achieved, due to the meridian imaging zone used. Every now and then you will see my latest processed image coming through the MPAS Facebook page. So now you know some of the story behind each one of these as they come through. Thanks for reading, and I hope the above wasn’t too sleep inducing! Clear skies and good imaging to you all!



MPAS Gallery by Steve Mohr



NGC2736 - Pencil Nebula - LHaOIIIIRGB by Steve Mohr



M20 Trifid Nebula by Steve Mohr

MPAS Gallery by Steve Mohr



NGC 2170 *Steve Mohr* (Short listed - Royal Observatory Greenwich: Insight Astronomy Photographer of the Year 2017)



M83 by *Steve Mohr*

SOCIETY INFORMATION



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Peter Skilton



Jamie Pole



Tony Nightingale



Stewart Gangell



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Heath Lewis



Mark Stephens



Greg Walton

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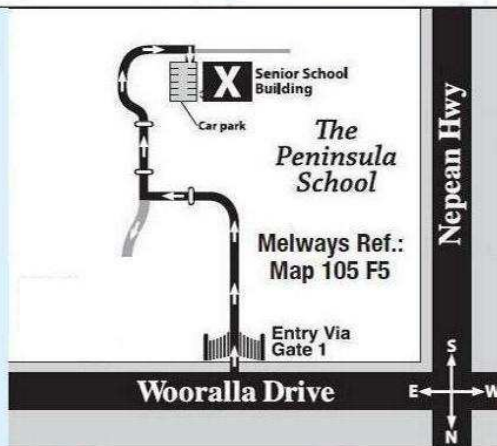
SOCIETY MEETINGS

Meeting Venue: The Peninsula School, Wooralla Drive, Mt Eliza, (Melways ref. 105/F5) in the Senior School 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
 email: welcome@mpas.asn.au

Phone: 0419 253 252

Mail: PO Box 596, Frankston 3199, Victoria, Australia



facebook MPAS members - <https://www.facebook.com/groups/MPAS1/>

LIBRARY



Fiona Murray



Fred Crump

The Society also has books & videos for loan from it's library, made available on most public & members nights at The Briars site, contact Fiona Murray or Fred Crump

E-SCORPIUS NEWSGROUP

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

To join, to go: 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 say that you want to join E-Scorpius & you will be added to the E-Scorpius list. Member forum : http://www.mpas.asn.au/members_forum.html

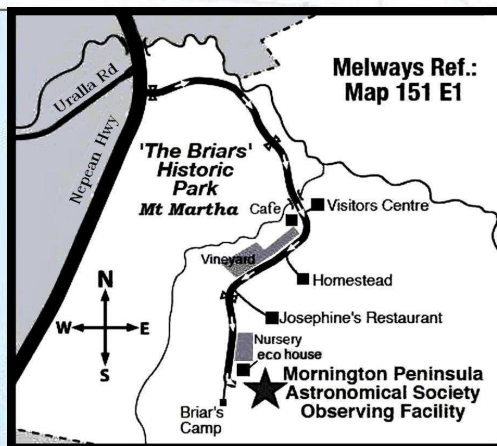
VIEWING NIGHTS - MEMBERS ONLY

Viewing Night - Members only
 Any night, at The Briars, Nepean Hwy, Mt Martha, starting at dusk. Members visiting The Briars for the first time must contact Greg Walton on 9776 2074 or 0415172503 if they need help getting to The Briars site. Upon arrival at the site, remember to sign the attendance book in the observatory building.

For addition details:
 Internet: www.mpas.asn.au
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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 gwpas@gmail.com

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