Astronomer

Journal of the Tamworth Regional Astronomy Club Inc

March/April 2017
Vol 2 No 1

Jos Roberts

Master telescope maker

The story of TRAC's 36"

Amazing gift!

The 'Robert Barnett Rigel Telescope'

A piece of space history

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Special Supplement: TRAC Astronomy & Science Education Centre Prospectus

Composite images by Warwick Schofield

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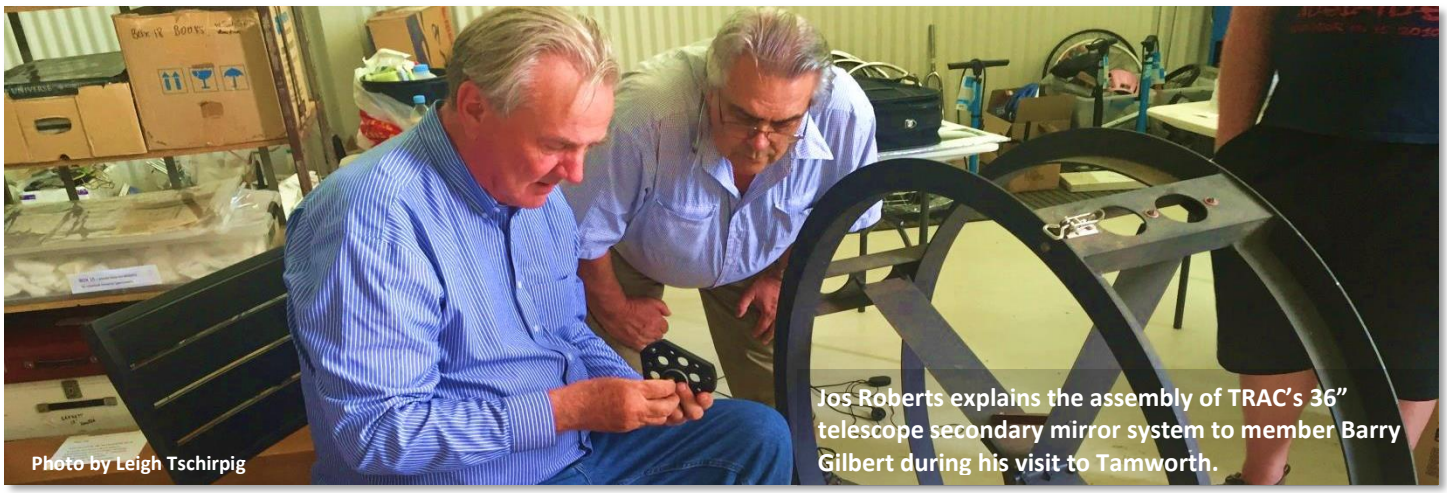

Photo by Leigh Tschirpig

Jos Roberts explains the assembly of TRAC's 36" telescope secondary mirror system to member Barry Gilbert during his visit to Tamworth.

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An inspirational year for TRAC!

It's hard to believe that over a year has passed since TRAC became an incorporated organisation in January 2016.

The past 14 months or so have been a truly amazing time for our Club which has grown in that short space of time to over 60 members with continued interest and new membership applications regularly being received.

Our Club has indeed been extremely fortunate to be a major beneficiary of the generosity of a number of people within the community who have supported our organisation to what has become probably one of the best equipped amateur astronomy clubs outside of the capital cities and possibly within Australia! We have been inspired by a number of people whose dedication and commitment to telescope making and engineering is truly remarkable!

Late last year, we were delighted to host Jos Roberts who provided a wonderful instructional afternoon and evening talk on the construction, maintenance and use of the beautifully built 36" telescope which now bears his name as our Club's primary instrument. Warwick Schofield's article on Jos' visit is this edition's cover story. Thank you Jos and, once again, we are delighted to welcome you as an Honorary Life Member of TRAC.

Following the generous donation of the 36" by Warwick and Margie Schofield, TRAC has received another amazing gift in the form of the beautifully crafted 12.5", equatorially mounted "Robert Barnett Rigel Telescope". This precision engineered instrument was constructed by the late Robert Leigh Barnett of Sydney and his family have generously donated this fantastic telescope to our Club following a chance meeting at the Siding Spring Observatory Open Day. Warwick has written an article about how TRAC came to acquire this remarkable telescope and Robert Barnett's daughter, Anna, has provided a wonderful story about her father's life and work on his telescope. Like Jos' commitment to precision, the story of Robert Barnett's dedication to "doing things right" and his remarkable skills is a wonderful inspiration for our Club. On behalf of the Executive, Committee and members of TRAC we extend a very sincere thank you to the Barnett family for this wonderful donation! Rest assured that the "Robert Barnett Rigel Telescope" will be very well cared for and put to good use to show as many people as possible the wonders of our skies!

Another inspirational story has been the recent restoration of the 34" Hewitt Camera by Raymond McLaren, his Club sub-committee and his team at Andromeda Engineering where our collection of telescopes are currently stored and used.

Raymond's commitment to ensuring the Hewitt Camera restoration was carefully planned and undertaken with the care and precision this historic instrument deserves has been truly outstanding! A sincere thank you to Raymond for his generous donation of an enormous amount of time and energy which now sees this 8½ tonne instrument ready for adaptation to digital imaging when it is installed at our Victoria Park location. Raymond and his team can be truly proud of the role they have played in preserving this historic piece of space history!

Also in this edition of *Astronomer* are reports on the visit by a number of TRAC members to Siding Spring Observatory last October and meetings with inspirational people such as astronomers Fred Watson and Donna Burton as well as an account of Warwick & Margie's visit to the Wollongong Science Centre and Planetarium.

Included with this edition of Astronomer is TRAC's Prospectus for the development of our Roll-Off Roof Observatory and the Astronomy and Science Education Centre and Planetarium which we are sure will inspire a great deal of interest and support across the local community and beyond.

Of course, we need to remember that our Club wouldn't exist without the inspiration of people like Lindsay Lowe and his work to establish the Lowe Observatory and, equally importantly, YOU, our members who make our Club such as fantastic organisation! Without your efforts, dedication and commitment, our Club would cease to be. It's your efforts, your interest, and most importantly, your curiosity about our universe that inspires us all!

Best wishes and clear skies!☆

Leigh Tschirpig
President
Tamworth Regional Astronomy Club Inc

Astronomer

Journal of the Tamworth Regional Astronomy Club Inc

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Cover Story

Jos Roberts
Master telescope maker!

BY WARWICK SCHOFIELD

Photo by Leigh Tschirpig

Jos Roberts during his recent visit to the Tamworth Region with the 36" reflecting telescope he constructed and now proudly owned by TRAC.

ON 12 NOVEMBER, 2016, TRAC members were excited to host a two day visit by telescope constructor, Jos Roberts. Jos was met at Tamworth Regional Airport by Garry Copper and Phil Betts and taken for a brief look around town including a visit to our site at Victoria Park. Jos then ran a technical workshop for the 'Jos Roberts Telescope' technical team at the Andromeda Industries Pty Ltd Advanced Division, Aerospace Workshop.

That evening, Jos gave a presentation to about 30 TRAC members who gathered to meet him and share an informal light supper. His presentation took us back to his early days as a boy at Herstmonceux Castle, Greenwich Observatory in England where his father worked. In an amazingly small world, this is the site where the other Hewitt Camera, the Malvern, is on display!

Jos then gave a detailed presentation showing the unique construction of the original observatory dome he built for the 36" telescope at his property, Mt White House. He constructed the scope in about 2002 with its Dobsonian mount and electrics. The primary mirror is by Intermountain Optics of the USA. The scope won an award for construction at the Southern Star Party soon after its construction (very heavy azimuth base and supports with a very lightweight, carefully engineered and balanced aluminium pipe tubes and sights).

Club President, Leigh Tschirpig, also addressed the meeting and the Committee awarded Jos Honorary Life Membership of TRAC.

The 'Jos Roberts Telescope' has since been reconfigured to its designed, folded format with a three mirror system making the eyepiece more accessible! The scope comes with 10 inch and 3 inch sighting scopes and a Telrad finder.

The next day, Jos was entertained by Club member Kevin Lowe and other members on a visit to the spectacular Lowe Observatory and its 32" scope near Bendemeer.

In spite of the large range of instruments and items now available to Club members of TRAC, the 'Jos Roberts Telescope' continues to draw the attention of members looking at distant, deep sky nebulae and galaxies.

A sincere thank you to Jos for visiting our Club and for giving us a hands-on demonstration of this amazing telescope! We certainly look forward to catching up with Jos from time to time in the future. ☆

Photos on this page by Leigh Tschirpig

What it's all about! As night falls, Club members gather to take in the fantastic views of the universe which the massive optics of the 36" 'Jos Roberts Telescope' offers through the eyepiece.

Amazing gift to TRAC – the Robert Barnett Rigel Telescope!

BY WARWICK SCHOFIELD

Photos on this page by Leigh Tschirpig

WELL, HERE we go again! With an amazing set of alignments of astronomical quality, TRAC recently acquired a magnificent 12½ inch reflecting telescope with a very solid equatorial mount on wheels with locking feet, Unitron sighting scope and probably Grubb Parsons optics!

The alignments…well, a friend of astronomer, PhD candidate, Donna Burton, BSc., MSc., (see separate article) told her of a large, heavy, optical telescope in Sydney looking for a home. Donna had remembered TRAC member Matt Dodds, a science teacher at Farrer Memorial Agricultural High School, Tamworth (now at Tamworth's Calrossy Anglican School) telling her of a newly formed astronomy club in Tamworth and that they may be interested!

Club members Warwick and Margie Schofield and Leigh Tschirpig, whilst attending the Siding Spring Observatory open day in October, 2016, first heard of this from Donna Burton who was operating a demonstration solar scope on the day (see story on page 9).

Well, within a few days, much to the delight of the Barnett family and a strong element of sadness (you see, Robert Barnett had died too early in life, at the age of only 58 - until now, his telescope project had lived on with them, as if a member of the family), the telescope was being dismantled and loaded onto a trailer and into a station wagon by Warwick to make the now familiar Sydney to Tamworth "telescope run" to its new home. The journey was a smooth and uneventful drive up the M1, the new Hunter Expressway and New England Highway to Club member Raymond McLaren's Andromeda Industries Pty Ltd, Advanced Engineering Division, Aerospace manufacturing Workshop at Moonbi, near Tamworth. Here, Club members Garry Copper, Elise Copper and Phil Betts were anxiously awaiting to help with the unloading, unpacking…and to have a first look!☆

People

Donna Burton

DONNA BURTON, PhD candidate, USQ, was the first Australian woman to discover a comet. In fact she discovered two comets (C/2006 R1 Siding Spring and C/2007 Q3 Siding Spring) using the SSO Schmidt facility near Coonabarabran. Donna also worked with the Hewitt Camera project until that project came to an end in 1990. Donna is the National Coordinator for the international group, Astronomers Without Borders. Donna is a commercial pilot, flying instructor and computer technician.☆

People

The story of Robert Leigh Barnett (1931–1989) and his amazing telescope

BY ANNA BARNETT

ROBERT BARNETT'S daughter, Anna writes:

Robert Barnett was born on 15 June, 1931 in Jamaica, the fourth child of Walter Leigh Barnett (Island chemist in Jamaica) and Elma Gwendolyn McDermott. He moved to England in about 1949 as there were limited job opportunities in Jamaica. He joined the RAF in the UK where he learned his trade in electronics. He met my Mum, Joyce Tilbury, at work, in the Royal Aircraft Establishment (RAE) in Sandhurst, Berkshire, England. They wed in 1957 and moved into their first house which they called "RIGEL" located in Medstead, Alton, Hampshire. Dad had a plan to build an observatory there and made a start but the dream was not realized.

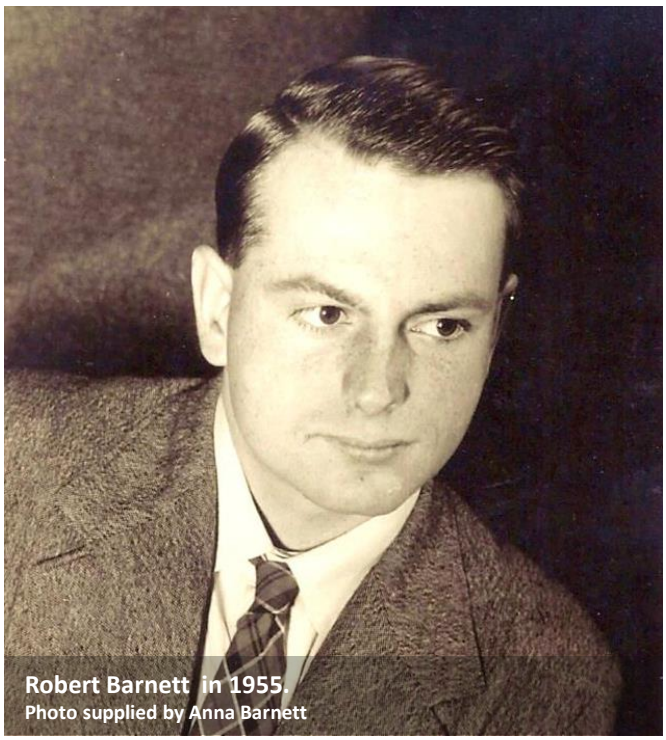
They soon had two daughters Linda and myself, Anna,… and a telescope mirror for a telescope which he was planning to build in about 1962-3, much to Mum's disgust as the money was meant to go towards a pram ! Let's be practical, "a pram only lasts a short time, you can have a telescope for a lifetime!

"If you did a job, always use all of your skills and abilities to make the best it could be and ensure you did the job well the first time"…

In 1968 our family moved to Australia (Dad was working for RACAL at the time) and chose to live in Sydney near his brother (they had always been close). We sailed for Sydney in July 1968, arriving in August 1968 on the "Fairsky". The precious mirror travelled in a specially made box which I have given to the Club…you can see he never did anything by half ! *"If you did a job, always use all of your skills and abilities to make the best it could be and ensure you did the job well the first time"…* (Note by Warwick: The quality of manufacturing of the telescope and mounts bears testimony to his principles…the family believes that the mirror was purchased from Grubb Parsons, of Newcastle, England - only the best will do!)

In the home garage at Carlingford, he would work most evenings, tinkering away, plotting and planning. He bought a lathe in the late 1970's and was assisted by his brother Eric in the construction of the telescope. Dad worked for RACAL then EMI then AWA. During that time he took out a patent for a "radio receiver protection arrangement". Most of his professional work was associated with the military and wireless and communications equipment. He retrained and graduated in Electronics Engineering at UTS in 1978. Some of his lecturers at UTS were the same people he had worked with in the UK !

I recall many evenings during my childhood of Dad pulling out the telescope onto the driveway for an evening of viewing. When "special events" were due to occur, this often meant getting us out of bed, which we never appreciated of course!



Robert Barnett in 1955.
Photo supplied by Anna Barnett

In the last few years of his short life, whilst he often didn't have the physical energy to do the work, he continued drawing and designing improvements. His plan was to make the telescope track and take photos. Whilst he didn't quite get to achieve this, your group may have the skills and technical expertise to see has dream realized. Of course the technology in 1989 when he died was prehistoric, compared to what can be achieved today….he would have loved it.

Anna Barnett, October, 2016

The precision engineered 12.5 inch 'Robert Barnett Rigel Telescope'
Photo by Leigh Tschirpig

Footnote:

We are not certain whether Robert Barnett ever had a clear look at the seventh brightest star, Rigel, but we assume so. Rigel is a quadruple star, a blue/white supergiant , about one hundred times larger than our sun. Its largest companion star is five hundred times fainter but still about four times larger than our sun and a double star itself. It takes a telescope of at least 6 inches diameter mirror to see the two largest elements. Anna assumes, as a conscientious engineer, that her father doubled that 6 inch specification to make sure his project worked! We also cannot locate a receipt for the purchase of the 12½ inch mirror, but we can safely assume it is a Grubb Parsons as it was expensive and was purchased from a company in Northern England!☆

TRAC acquires the Hewitt Camera – a piece of space history

BY WARWICK SCHOFIELD

TRAC RECENTLY acquired the historic 'Hewitt Camera'!

Like many of TRAC'S amazing telescopes and heritage/ historic collectibles, the 'Hewitt Camera' is no exception! Put simply, the 'Hewitt Camera' is a 34 inch reflecting telescope..PLUS…only two of these telescopes were ever made. These were built in England in 1962.

Whilst the basic design was by Joseph Hewitt (1912-1975), the optics and construction was by Grubb Parsons of Newcastle in England under contract to the British Royal Radar Establishment.

The format is of Schmidt optic design with a 25 inch correcting lens installed above the primary mirror. The 34 inch primary mirror is cut in a spherical shape, hence the need for the corrector. The optics are cut such that the focal length of the mirror is only 27 inches. The correcting lens is 42 inches above the mirror, giving a focal ratio of approximately f/1! Hence, the Hewitt has the ability to collect a large volume of light and a very large field of view.

TRAC members Warwick Schofield and Barry Gilbert inspect the restored Hewitt Camera.
Photo by Margie Schofield

At the focus, a slide in module exists to hold a photographic plate.

Because of the spherical nature of the mirror and its interaction with the correcting lens, the final image at the photographic plate is curved. To counteract this, a flattening lens is fitted immediately above the photographic plate. Three large, gold plated focussing vernier collimators are fitted to the photo plate module and the mirror is surrounded by finely balanced, spring loaded counterweights.

Above this is a shutter and aperture control which makes the whole unit into a 'space camera'. The shutter can be activated as still shots or multiple openings per photographic plate.

The purpose for this design was to photograph 'blue streak rockets' but it was eventually built for the purpose of photographing the trajectories of artificial earth satellites and therefore assist in calculating the gravity and the shape of the Earth (geodesy). The sensitivity allowed the original print plate photos to record stars with magnitude less than 10. The research work was finally completed in 1990 and the camera/telescopes were decommissioned.

Some years later, the 'Hewitt Camera' was acquired by Lindsay Lowe with assistance from Stuart Goff and Leigh Tschirpig, with a view to the instrument being restored as a side project of the Lowe Observatory. The 'Hewitt Camera' lay in storage for a number of years until it was acquired in late 2016 by TRAC. The field of view is very wide for a telescope at about 10 degrees (roughly 20 times the apparent width of the full Moon) and the directional controls are manually adjusted by steering wheels along the azimuth and altitude with pointers, locking latches and engraved setting circles.

A TRAC telescope sub-committee, under the guidance of member Raymond McLaren, have recently completed a restoration and reassembly of the 'Hewitt Camera'/Schmidt telescope. This was a massive task and was completed with the generous support of Andromeda Industries P/L Advanced Engineering Division's Aerospace Workshop. The Hewitt stands 3.5 metres tall on its pallet and weighs 8.5 tonnes!☆

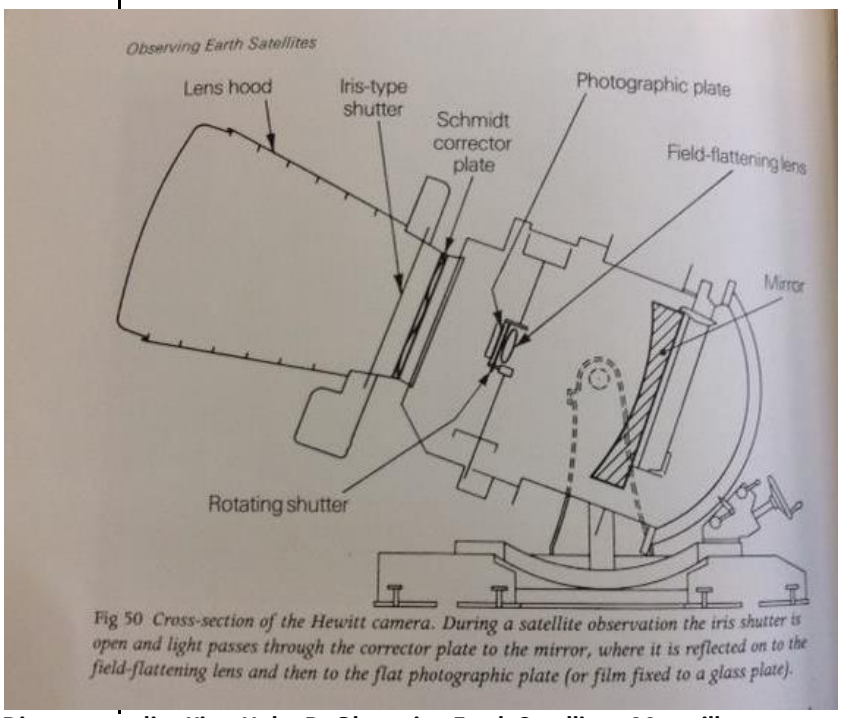


Fig 50 Cross-section of the Hewitt camera. During a satellite observation the iris shutter is open and light passes through the corrector plate to the mirror, where it is reflected on to the field-flattening lens and then to the flat photographic plate (or film fixed to a glass plate).

Diagram credit: King-Hele. D, Observing Earth Satellites, Macmillan, London, 1983.

Member's Report

Siding Spring Observatory Open Day

BY LEIGH TSCHIRPIG

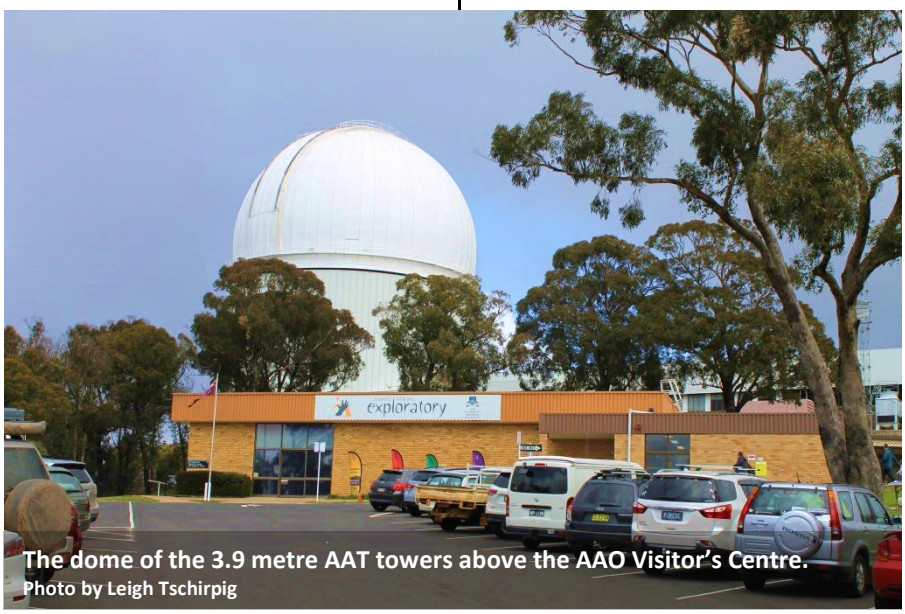
President of the Astronomical Society of Coonabarabran, Donna Burton, shows the Sun through a solar telescope to TRAC members Margie & Warwick Schofield, Leigh Tschirpig, Ashley Anderson and two budding astronomers!

Photo supplied by Leigh Tschirpig.

ON SATURDAY, 1 October, 2016, a number of TRAC members took the opportunity to travel to Coonabarabran for the annual Siding Spring Observatory (SSO) Open Day. Whilst not an 'official' TRAC event, it was great to have the opportunity to meet up with several members who were circulating among the crowds.

It had been a number of years since I had visited the Observatory and, having missed the Club's visit to the iTelescope facility earlier in the year, I was keen to see the amazing array of instruments in the iTelescope building as well as the roll-off roof structure which will be similar to the observatory TRAC is planning for the 'Jos Roberts Telescope' at our Victoria Park site.

The morning dawned sunny and mostly clear and after a pleasant drive over to Coonabarabran, I was soon winding my way up towards Siding Spring. The result of the fires a few years ago was evident with the bush landscape clearly still in 'recovery' mode. The massive dome of the 3.9 metre Australian Astronomical Observatory (AAO) was visible much sooner from the road than my previous visits and it was apparent how perilously close the fires had come to the Observatory.



The dome of the 3.9 metre AAT towers above the AAO Visitor's Centre.
Photo by Leigh Tschirpig

Upon arrival I was directed by a friendly volunteer to a parking space almost directly opposite the iTelescope. I was completely blown away by the number and quality of telescopes in this amazing facility and it was fantastic to have the opportunity to meet the facility's Manager, Peter Poulos, and to be invited into what Peter described as the 'VIP' area behind the roped off areas!

A short stroll over to the Exploratory Visitors Centre and I soon met up with Warwick and Margie Schofield who had travelled from Lighting Ridge for the day. The sun was breaking out from behind low clouds which had moved in over the mountain so we took the opportunity to wander across to a solar telescope which was being operated by the President of the Astronomical Society of Coonabarabran, Donna Burton. Donna noticed our TRAC attire and we were soon in conversation about all things astronomical! It was at this point that Donna mentioned a 12.5" telescope in Sydney that was being offered as a possible donation. This turned out to be the 'Robert Barnett Rigel Telescope' now proudly part of TRAC's collection of telescopes! Warwick takes up the story on page 6 about the Barnett family's wonderful donation of this beautifully engineered instrument to our Club and Anna Barnett, daughter of the late Robert Barnett, has shared the story of her father and his dedication to building this high quality instrument (see page 7). A sincere thank you to Donna once again for putting us in touch with the Barnett family. Donna, who has discovered two comets, and is studying towards her PhD, also generously offered to attend a future meeting of TRAC as a guest speaker, an offer we should definitely take up!

The spectacular scenery of the Warrumbungle National Park. The impact of the 2013 fires is clearly evident.
Photo by Leigh Tschirpig

The view through the solar telescope was quite amazing, with solar prominences and surface detail on the sun clearly visible. A solar telescope is something that TRAC should seriously consider adding to our collection of instruments in the future!

A number of presentations by SSO astronomers were scheduled throughout the day and we were particularly keen to attend Dr Fred Watson's talk on the recent detection of gravity waves which confirmed Einstein's theory about their existence almost a century ago. More information is available online at https://www.ligo.caltech.edu/news/ligo20160211 Fred's talk was extremely entertaining (complete with visuals of an animated elephant bouncing on a trampoline to illustrate the concepts at hand!) and really drove home how much we are still learning about our amazing universe. Fred's presentation was held in the aluminising room in the AAO dome and it was quite surreal to have the opportunity to hear one of Australia's most eminent astronomers providing a talk about cutting edge science in this amazing room with its massive vacuum chamber as the backdrop! Following Fred's talk, Warwick ventured into a space where no 'ordinary' man has gone before, the glassed off aluminising control room to introduce ourselves to Fred and provide an overview of what TRAC is doing in Tamworth. Fred was very gracious with his time and interested to hear about the donation of the 'Jos Roberts Telescope' and our plans for an observatory and Astronomy and Science Education Centre and Planetarium. We obtained Fred's contact details and undertook to keep in touch.

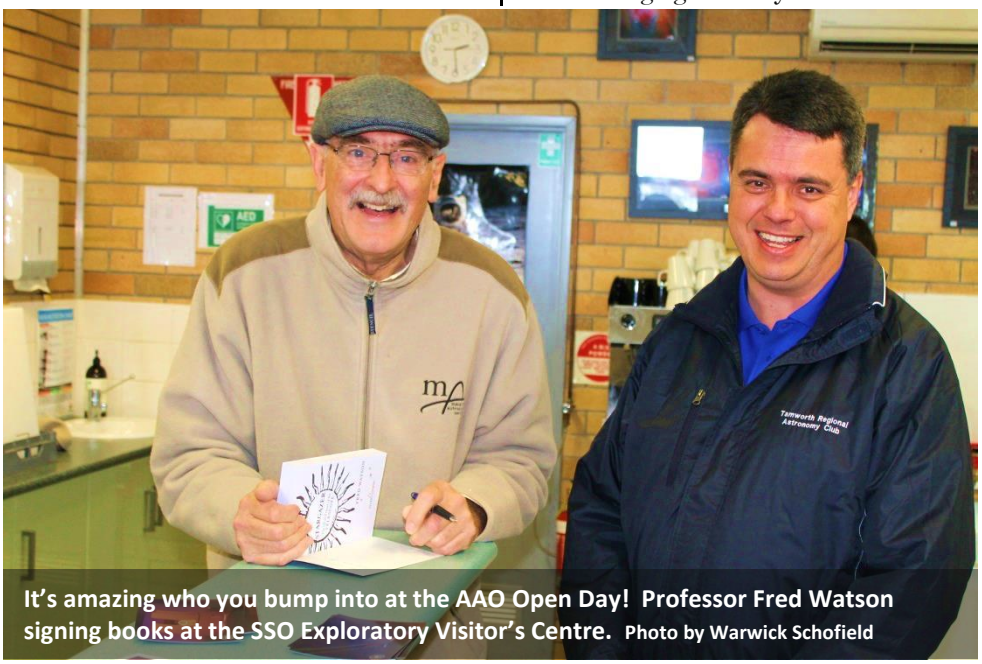
Professor Fred Watson uses an animated trampolining elephant to eloquently explain the recent detection of gravity waves theorised by Albert Einstein a century ago.
Photo by Leigh Tschirpig

Warwick Schofield taking careful measurements, photos and notes about the inflatable planetarium at the SSO Open Day. Warwick is currently investigating similar projection technology used in the Planetarium for use in TRAC's planned AASEC facility in Tamworth. Photo by Leigh Tschirpig

Another highlight of the visit was the opportunity to attend a show in a large inflatable planetarium set up on the ground floor of the AAO. Warwick and I squeezed into the 'structure' with a queue of around 50 people and soon found ourselves seated on the concrete floor for the next 20 minutes or so, looking up at the spectacular astronomical projections above us. The quality of the planetarium was very good – more comfortable seating would have helped a bit, but it was fantastic to see the planetarium in operation. Certainly some great ideas gained for our own planetarium plans at the AASEC!

We headed back across to the Exploratory Visitors Centre and did the tour of the public displays. Soon after, we noticed that Fred Watson was doing some book signings and Warwick was quickly in negotiations about securing a supply of Fred's books for sale to TRAC members – well done Warwick!

Soon enough it was time to think about heading home and it would have been good to have had some extra time to visit a few more of the observatories which were open for public inspection – maybe next time! In all, it was a thoroughly enjoyable day and is an event the Club should consider attending again this year.☆



It's amazing who you bump into at the AAO Open Day! Professor Fred Watson signing books at the SSO Exploratory Visitor's Centre. Photo by Warwick Schofield

Member's Report

Wollongong Science Centre and Planetarium

BY WARWICK SCHOFIELD

Margie Schofield at the Wollongong Science Centre and Planetarium.
Photo by Warwick Schofield

MARGIE AND I recently visited the Wollongong Science Centre and Planetarium. About 30 km to the South we also visited the Albion Park Historic Aircraft Restoration Society (HARS) museum and facility. TRAC Member Barry Gilbert also visited HARS.

The Science Centre was of great interest to us and had many interactive basic physics demonstrations including AC/DC electric generators, lissajous figures, sound waves, foucault pendulum, radioactive materials, radiometer, whisper dishes and moebius strip. These displays are from or similar to the Questacon museum.

It was disappointing to find that the telescope and dome were closed and are not currently active. Also, the planetarium is only open during school holidays and has the older style Zeiss, star projector. We thoroughly enjoyed the HARS experience and saw and learnt some amazing things. Tours were individually guided by volunteers and the display cabinets static but very informative. Warwick even got to sit at the controls of an F111! We also had an inside look around a DC 3 and Boeing 747 - 400.

Just some of the many interesting items on display at the Wollongong Science Centre and Planetarium. Photo by Warwick Schofield

Book Review

Emu Dreaming by Ray & Cilla Norris

BY WARWICK SCHOFIELD

EMU DREAMING – An Introduction to Australian Aboriginal Astronomy by Ray and Cilla Norris, A5, soft cover, 30 pages, 25 colour pictures. Published by Emu Dreaming, Sydney, 2009, $15.00 retail.

THE CULTURE of Indigenous Australians and its relationship to the science of astronomy had evaded me until I took the time to read this book. Co-Author, Ray Norris is an astrophysicist at CSIRO, PhD and post Doc. in radio astronomy. He studied ancient standing stones and now researches the formation of the first galaxies in the Universe! He was appointed Adjunct Professor of Indigenous Studies at Macquarie University in 2008.

Little did I realise that my studies of rock engravings on the Basin track as a small boy on a pushbike in Kuringai National Park many years ago could have revealed the "emu in the sky"! So, my interest in ASTRONOMY and ARCHAEOLOGY have now come into conjunction.

Many of the constellations, described of course from the Northern Hemisphere – are upside down to us - but the indigenous people had their own picture stories to describe them. Orion, the Pleiades, the Magellanic Clouds all had stories of significance.

Astronomic measurements, seasons, the planets, the Moon, the tides all had a place in indigenous culture.

It's a small, glossy book and very easy to read. Give it a go…..Soon to be available from the TRAC bookshop at $15…retail margin proceeds go to TRAC.

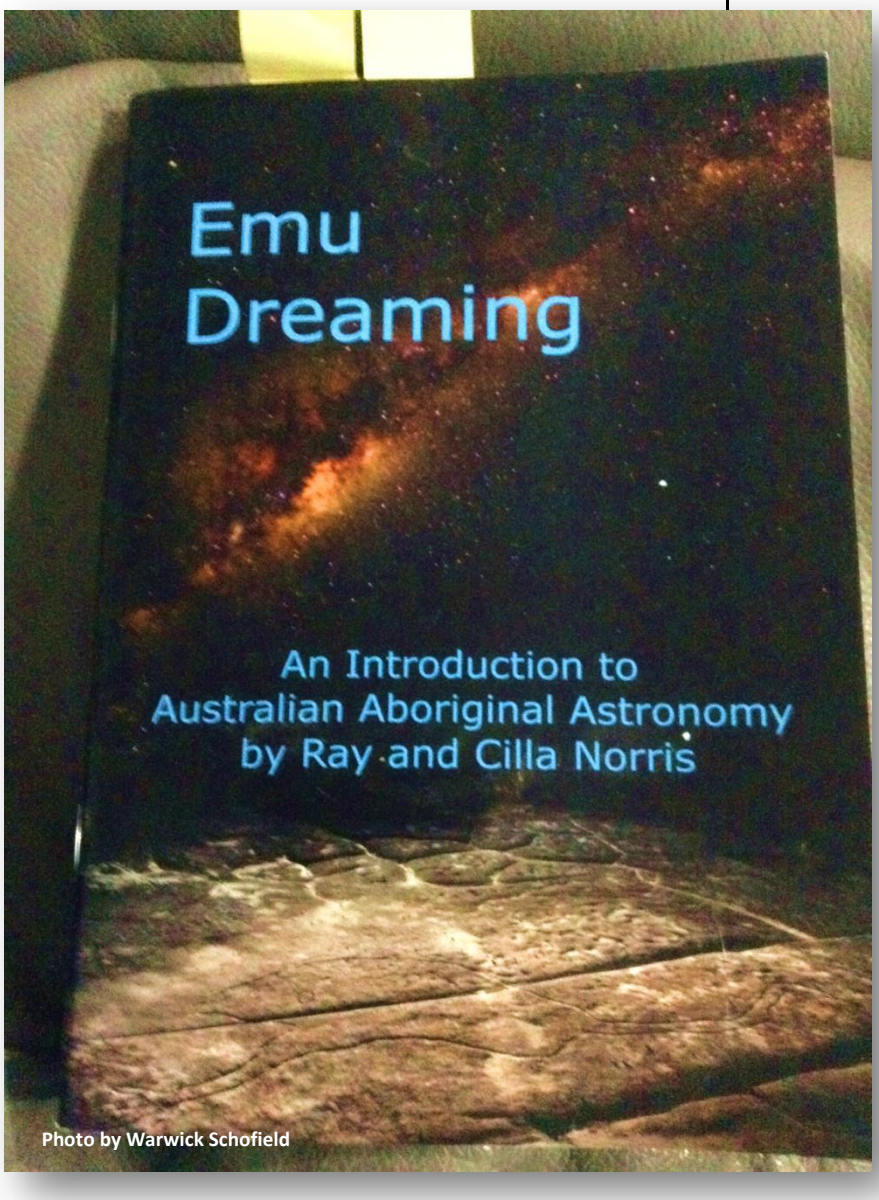


Photo by Warwick Schofield

Also suggested: *DARK SPARKLERS*, Hugh Cairns and Bill Yidumduma Harney, A5, 226 pages, soft cover, many colour plates, published H C Cairns, Merimbula, Australia, May, 2003.

Autumn sky riches

BY LEIGH TSCHIRPIG

M42, the Orion Nebula
Credit: NASA, ESA, M. Robberto (STScI/ESA) and The Hubble Space Telescope Orion Treasury Project

FROM A dark location, the evening sky of early Autumn is a wonderful sight to behold.

Dominating the North Western sky is the constellation Orion, the Hunter, with the familiar asterism of "The Saucepan", or perhaps "The Shopping Trolley" as one TRAC Member describes this famous grouping of stars! The bottom of the saucepan is formed by the three bright stars of Orion's Belt, Mintaka, Alnilam and Alnitak, inverted of course to us in the Southern Hemisphere. The handle of the saucepan is formed by what appears to be three fainter stars. The centre "star" of the handle clearly looks "fuzzy" to the naked eye. Investigating this object through a telescope reveals the Great Nebula of Orion or M42. In smaller telescopes M42 appears as a greyish patch of light with tendrils and layers of cloud extending away from the heart of the nebula. Through larger telescopes, much more structure is revealed with even some hints of subtle reds and blues visible in big telescopes such as the 36 inch "Jos Roberts Telescope". In the centre of M42, a tight cluster of four stars known as the Trapezium can been seen. These are new stars which have been formed from the Orion Nebula.

Just above the Belt Star Alnitak towards the handle of The Saucepan is the magnitude 3.66 star Sigma Orionis. Sigma is a quintuple star system and amateur sized telescope reveal a beautiful quartet of the brightest components of the system.

Close to Alnitak is a small, faint patch of light visible in larger telescopes known as the Flame Nebula. Much fainter and challenging to see, even in larger sized telescopes, is the nebula IC 434 which contains the famous Horsehead Nebula (see finder chart on Page 19).

Above The Saucepan is the seventh brightest star in the sky, Rigel which means "foot" in Arabic, being located near one of the "feet" of the Hunter. This bluish-white star is located 890 light years away and has a diameter of about 75.9 Suns.

Below the saucepan is the well-known star Betelgeuse. In contrast to Rigel, Betelgeuse is a red supergiant located at a distance of 500 light years with a diameter equivalent to 560 Suns. It has a distinct orange colour with a relatively low surface temperature of around 3,100 K. If our Sun was replaced with Betelgeuse, it would extend more than half the distance to the planet Jupiter and would completely engulf Mercury, Venus, Earth and Mars! Betelgeuse is a variable star with its brightness changing from 0.4 to 1.3over a period of approximately 5.7 years.

To the North-West of Orion is the constellation of Taurus the Bull. The head of the bull is marked by the inverted "V" shape of a group of stars known as the Hyades. The brightest star in this group is Aldeberan shining at magnitude 0.87. With a similar colour to Betelgeuse, Aldeberan is an orange giant with a surface temperature of around 4,000 K. Although not as large as Betelgeuse, it shines with a luminosity of 425 times that of the Sun with a diameter of 44 Solar equivalents. In Arabic, Aldeberan means "follower" because it 'follows' our next object of interest in the North-Western sky, the Pleiades.

The Pleiades, also commonly known as the Seven Sisters, is a beautiful group of stars of similar brightness within the constellation of Taurus. Listed in Charles Messier's catalogue as M45, the Pleiades have been known in many cultures since ancient times. In Japan the cluster is known as 'Subaru' and is used by the car company of the same name on its logo. The Pleiades is a good test of your eyesight, with many observers being able to count seven stars in the group from a dark sky location, although people with very good vision can count many more. The astronomer Kepler claimed to have observed as many as 14 stars before the invention of the telescope. How many can you see? When photographed, the stars in the Pleiades are surrounded by blue nebulosity. This is a wonderful object to view through binoculars and at low powers through a telescope.

Drawing an imaginary line up through the Belt Stars of Orion leads to the brightest star in the sky, Sirius, Alpha Canis Majoris, also known as the Dog Star, being located in the constellation of Canis Major, the Great Dog. Shining at magnitude -1.46, Sirius is located in our stellar 'backyard' at a distance of only 8.58 light years. Sirius is a double star with its tiny companion Sirius B, the first white dwarf to be discovered, visible through larger telescopes. Sirius B can be a difficult to detect because of the bright glare from its neighbour.

Below Orion towards the North East are two bright stars located close together, Pollux and Castor, the twins of the constellation Gemini. Pollux, the higher of the two stars, is a wonderful double star with the two components visible in medium sized amateur telescopes. Whereas Pollux is an orange star, it's 'twin' Castor is white. Pollux and Castor are not linked and are simply close together in the sky due to our perspective.

Almost directly below Orion, low above the Northern horizon is the 6th brightest star in the sky, Capella or Alpha Aurigae. Capella is a double star but its two components are too close together to separate in amateur sized telescopes being located only around two-thirds of the distance between the Sun and the Earth.

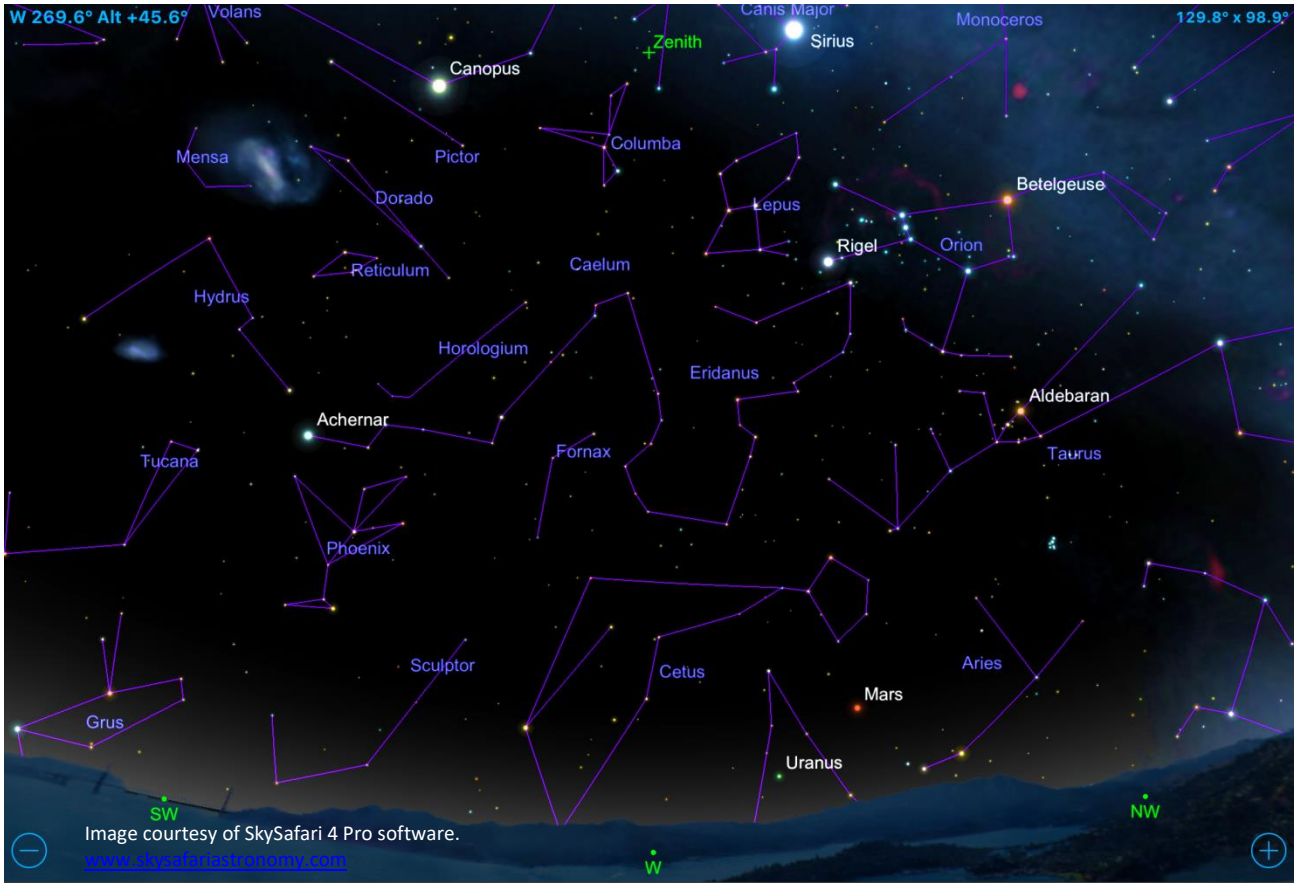
Low in the East at around 8.00pm during mid-March and rising higher each evening as we head into April is the planet Jupiter. Jupiter reaches opposition on 8 April 2017 when it is directly opposite the Sun in our sky with an apparent size of 44.3 arc seconds through a telescope and shining at magnitude -2.5. Through a small telescope the two equatorial cloud belts are easily visible as are its four Galilean satellites. Make sure to observe this fascinating gas giant, the size of 1,000 Earths, in the coming months!

Happy star-gazing!☆

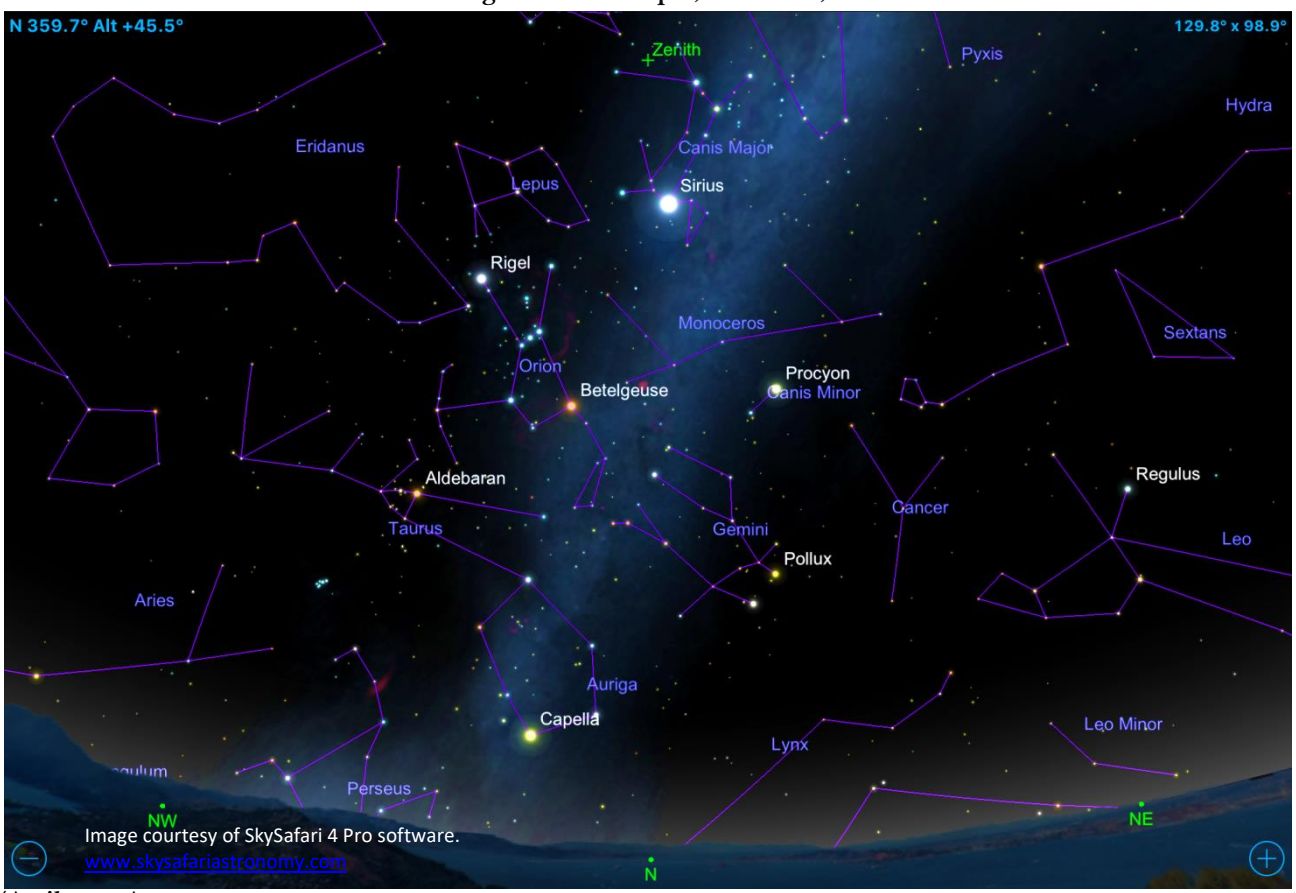
Evening Sky Maps

The following set of maps show the evening sky views to the West, North, East and South at 8.00 pm on 15 March and 15 April, 2017 from the Tamworth region. The images have been provided by SkySafari 4 Pro software - www.skysafariastronomy.com An all-sky map, together with a list of forthcoming astronomical events (free for personal printing), is available online at www.skymaps.com/downloads.html - scroll down to the latest Southern Edition and download the pdf file.

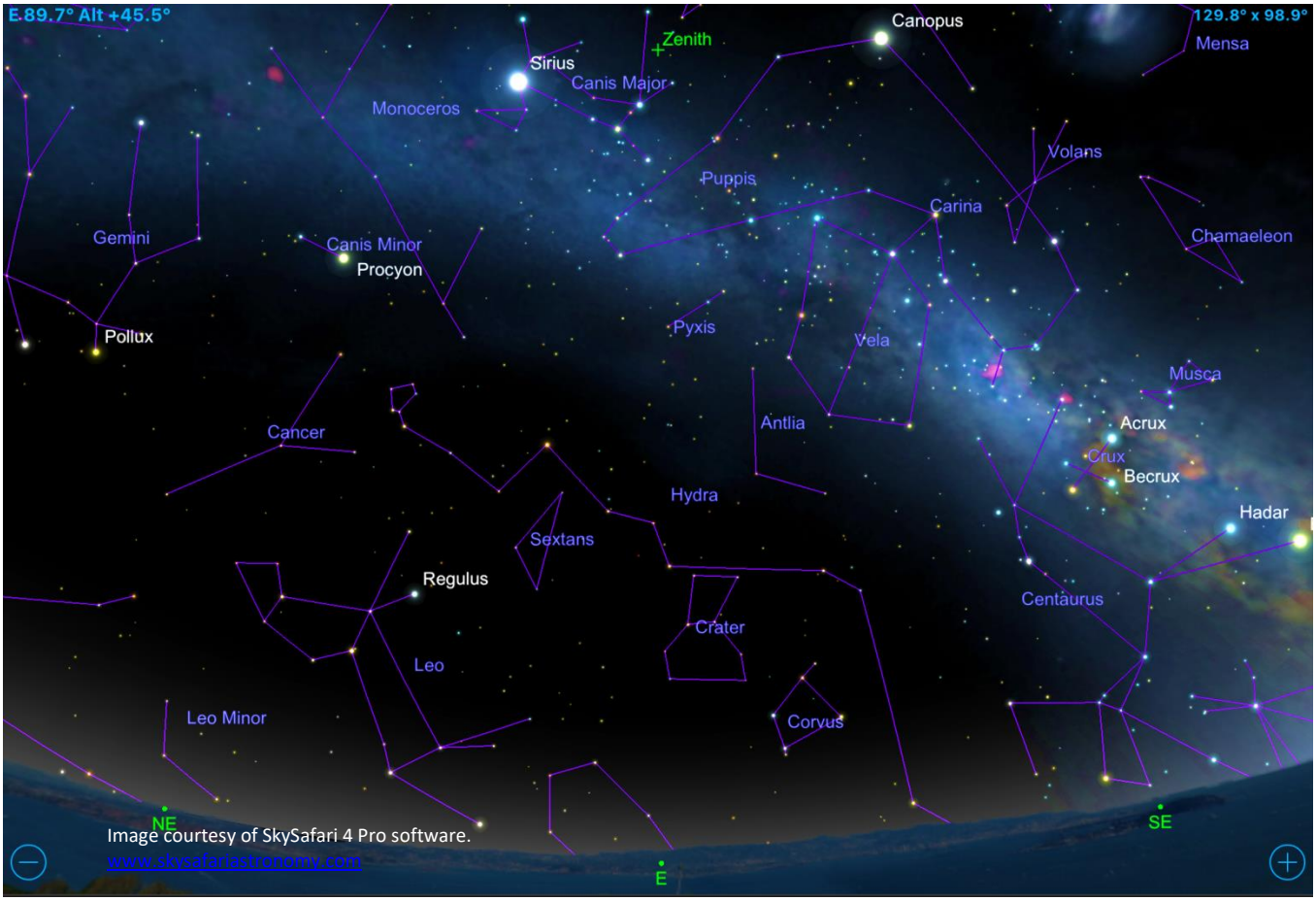
Looking West – 8.00 pm, 15 March, 2017



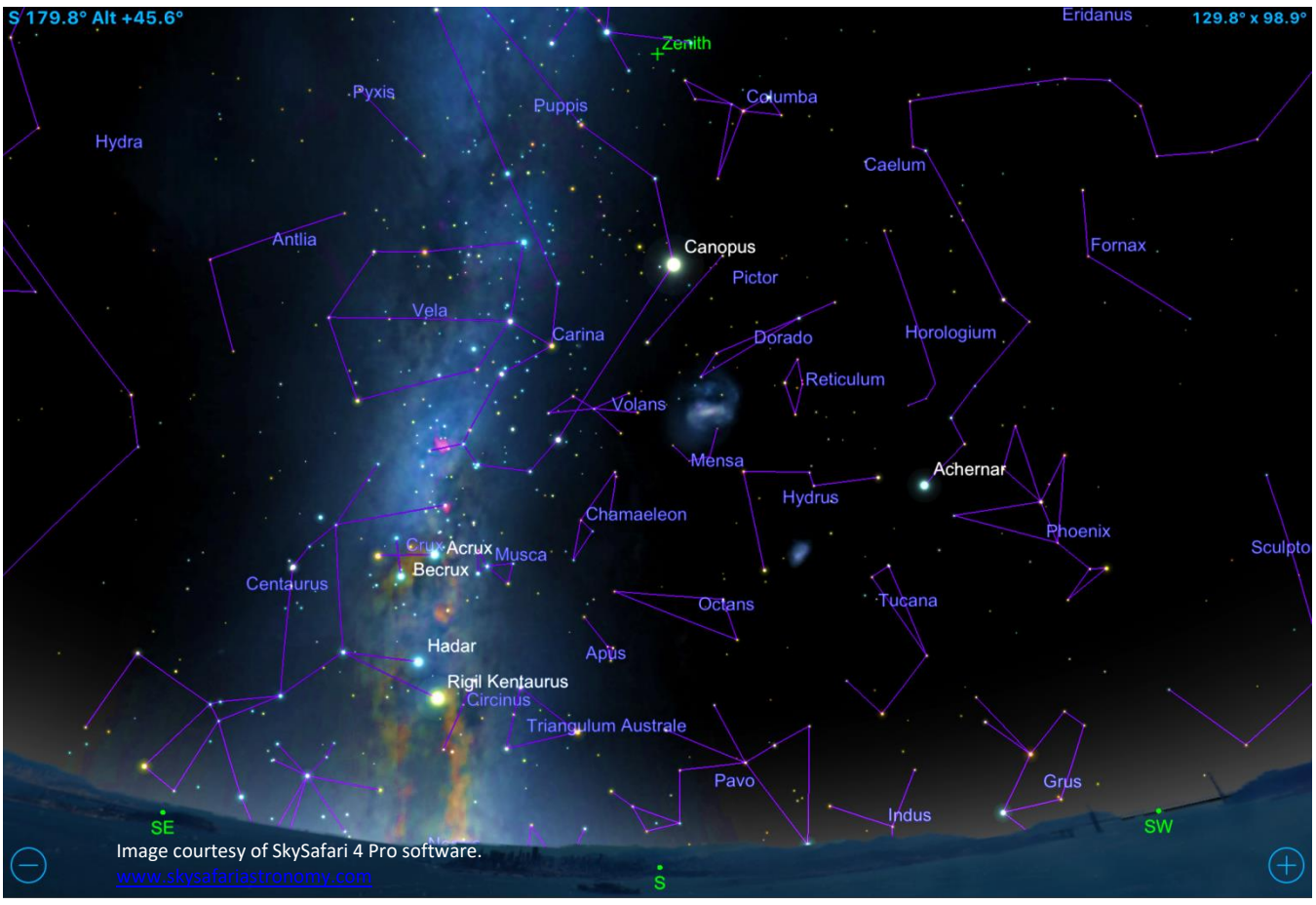
Looking North – 8.00 pm, 15 March, 2017



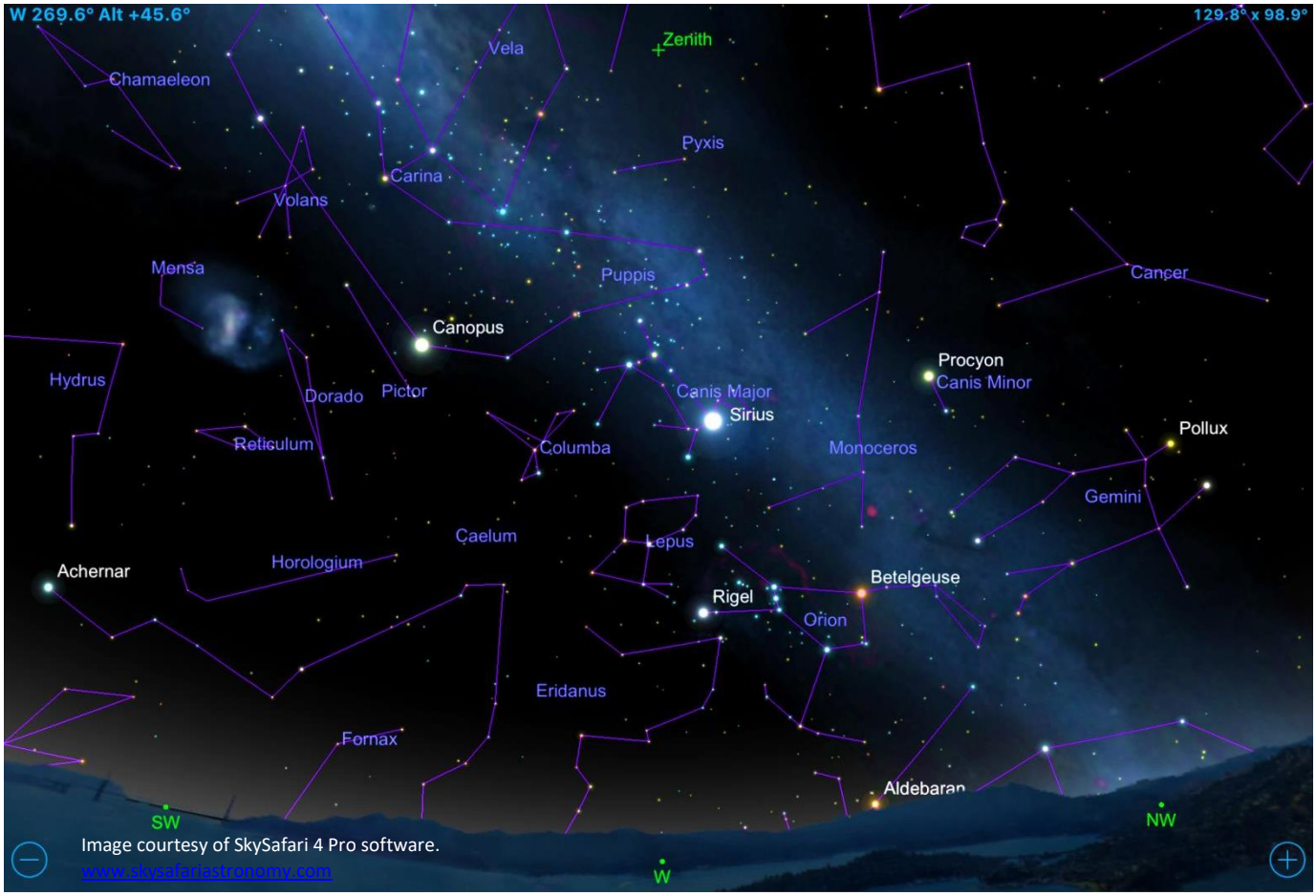
Looking East - 8.00 pm, 15 March, 2017



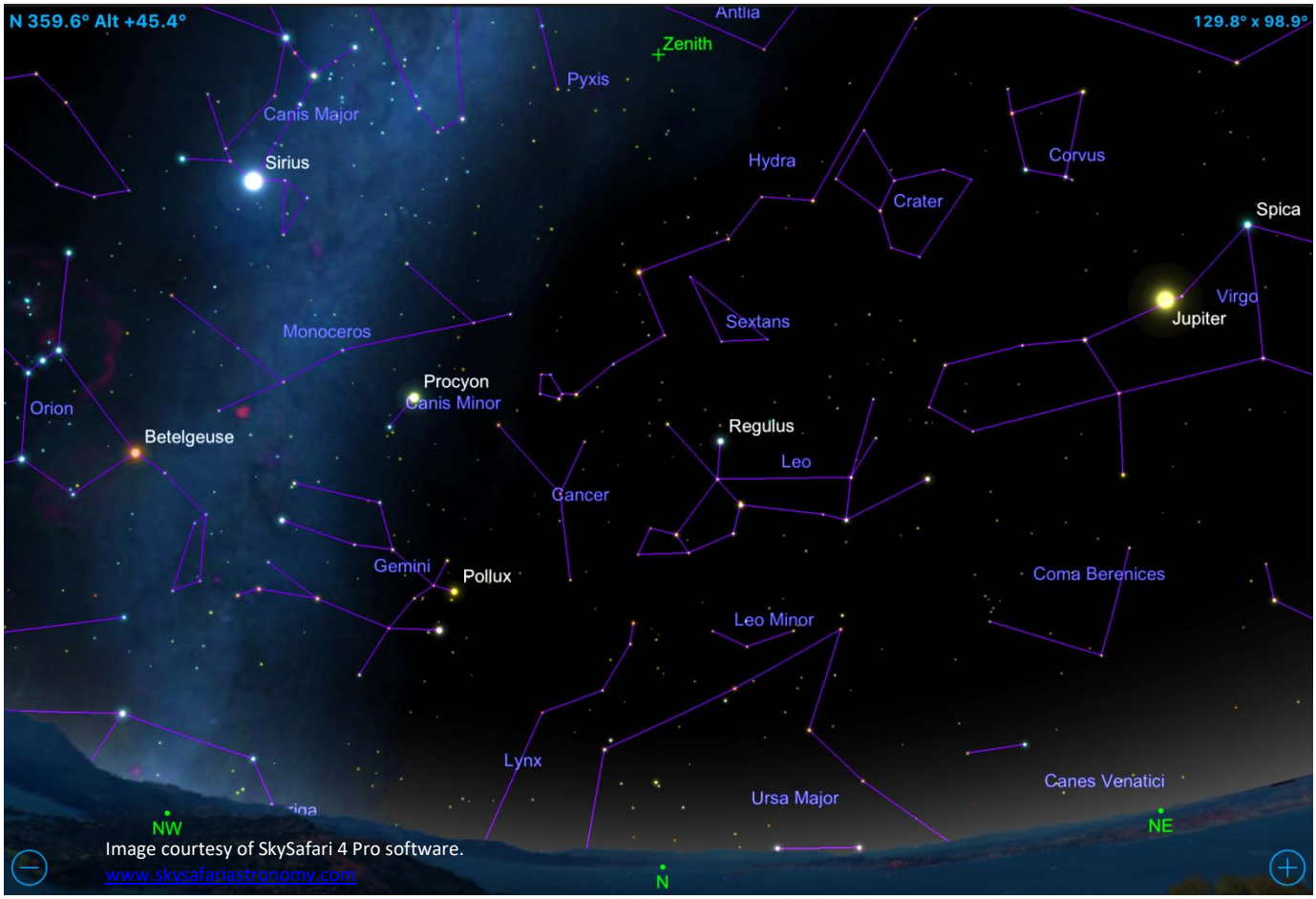
Looking South – 8.00 pm, 15 March, 2017



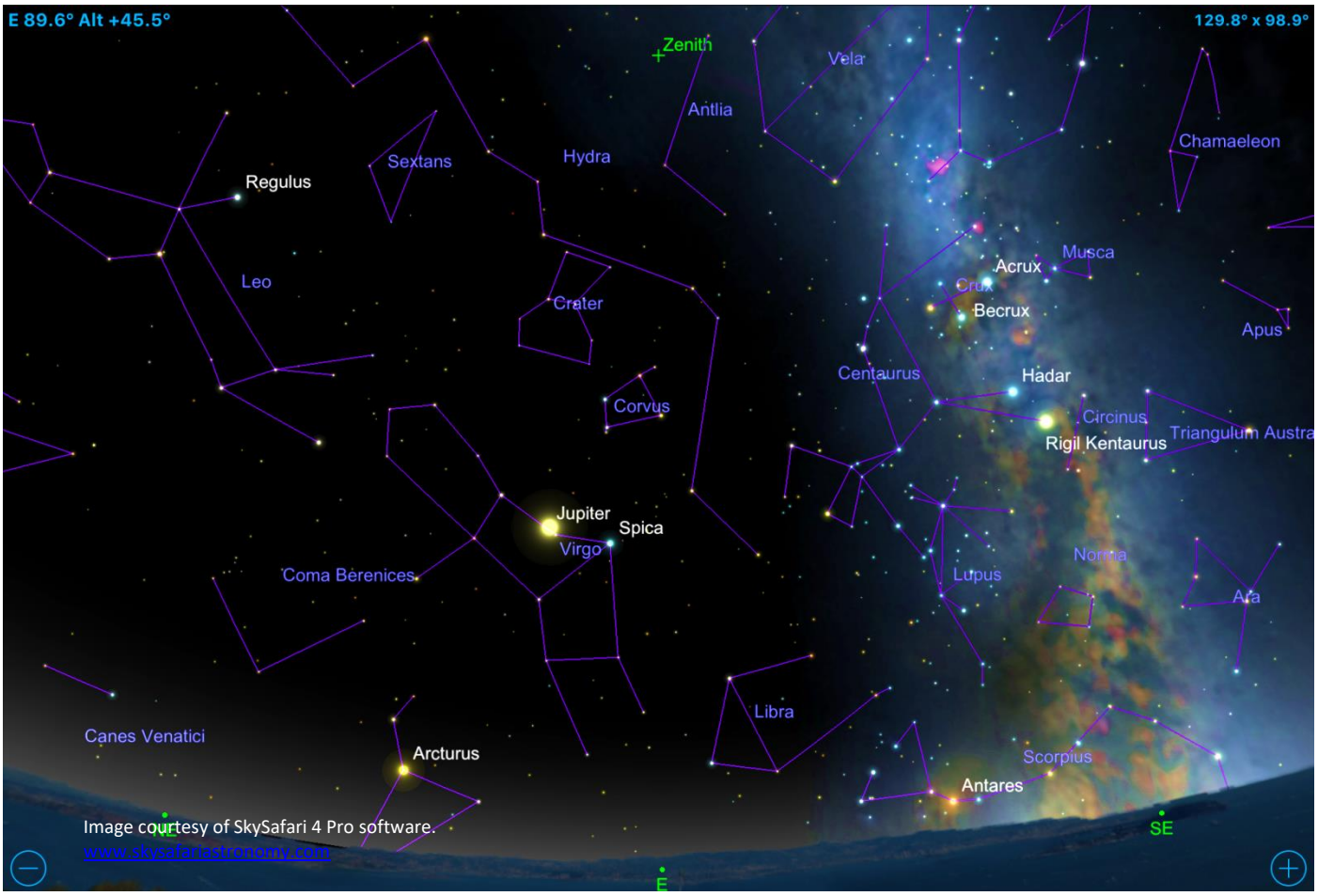
Looking West – 8.00 pm, 15 April, 2017



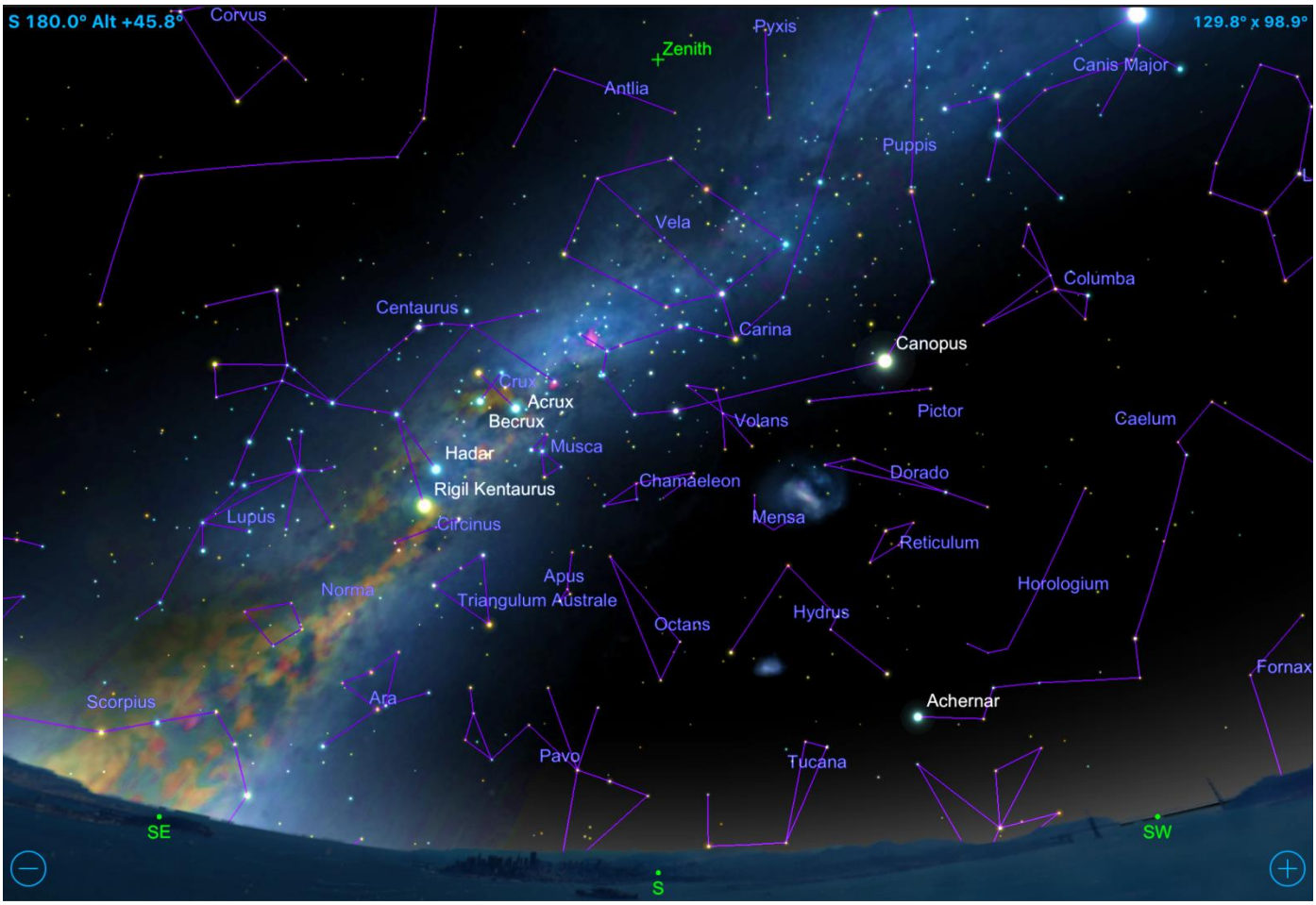
Looking North – 8.00 pm, 15 April, 2017



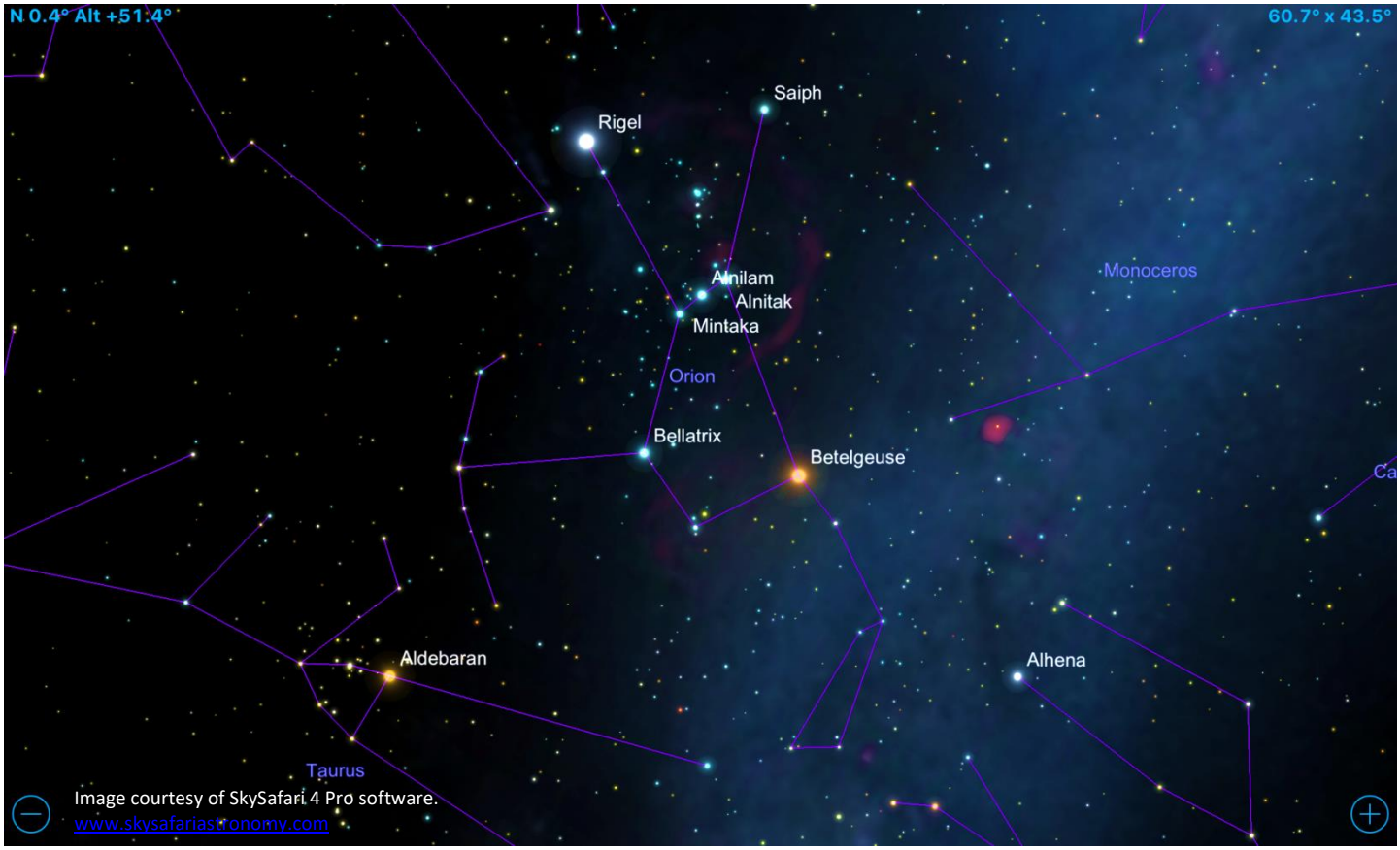
Looking East – 8.00 pm, 15 April, 2017



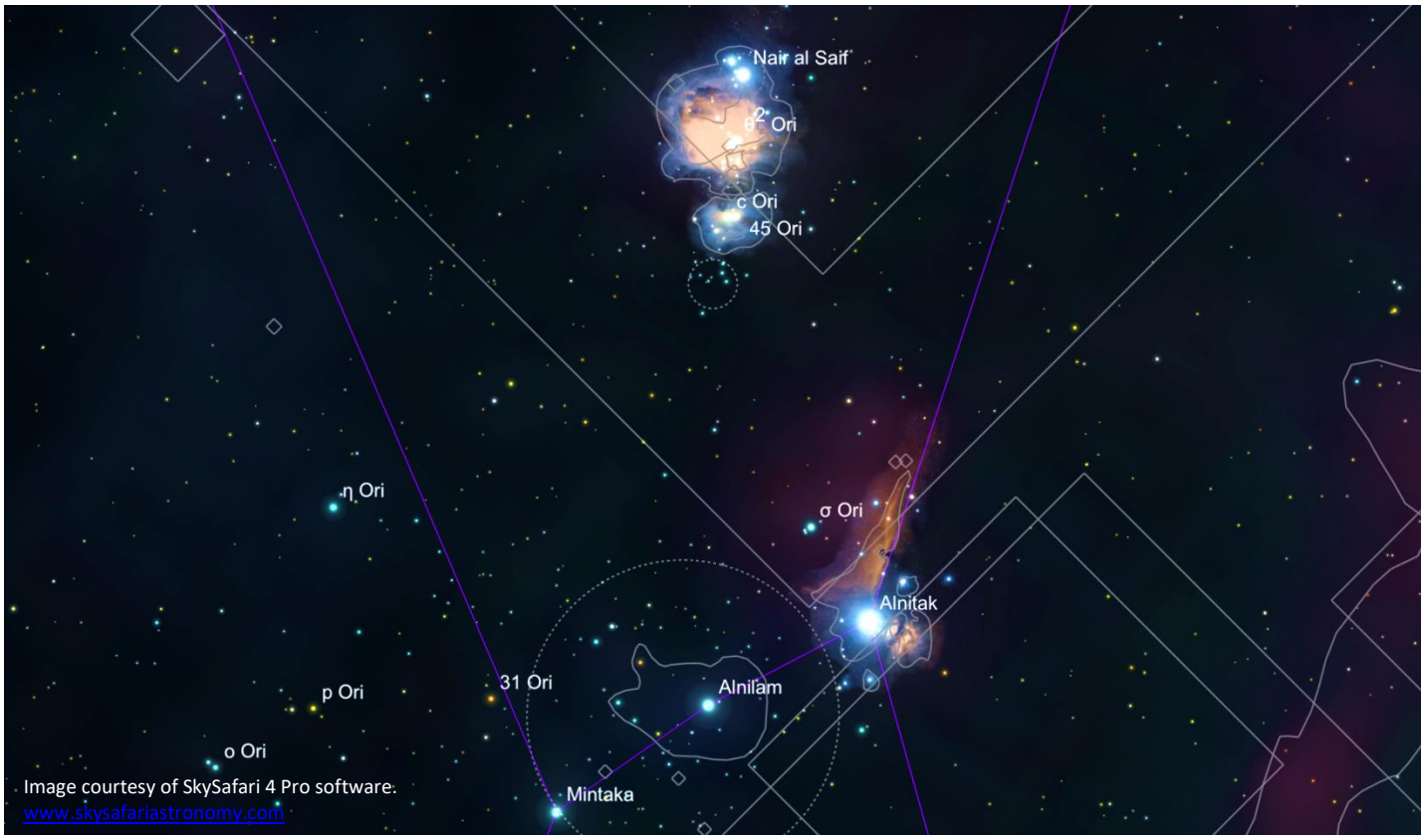
Looking South – 8.00 pm, 15 April, 2017



Orion finder chart



The "Belt and Sword of Orion" finder chart



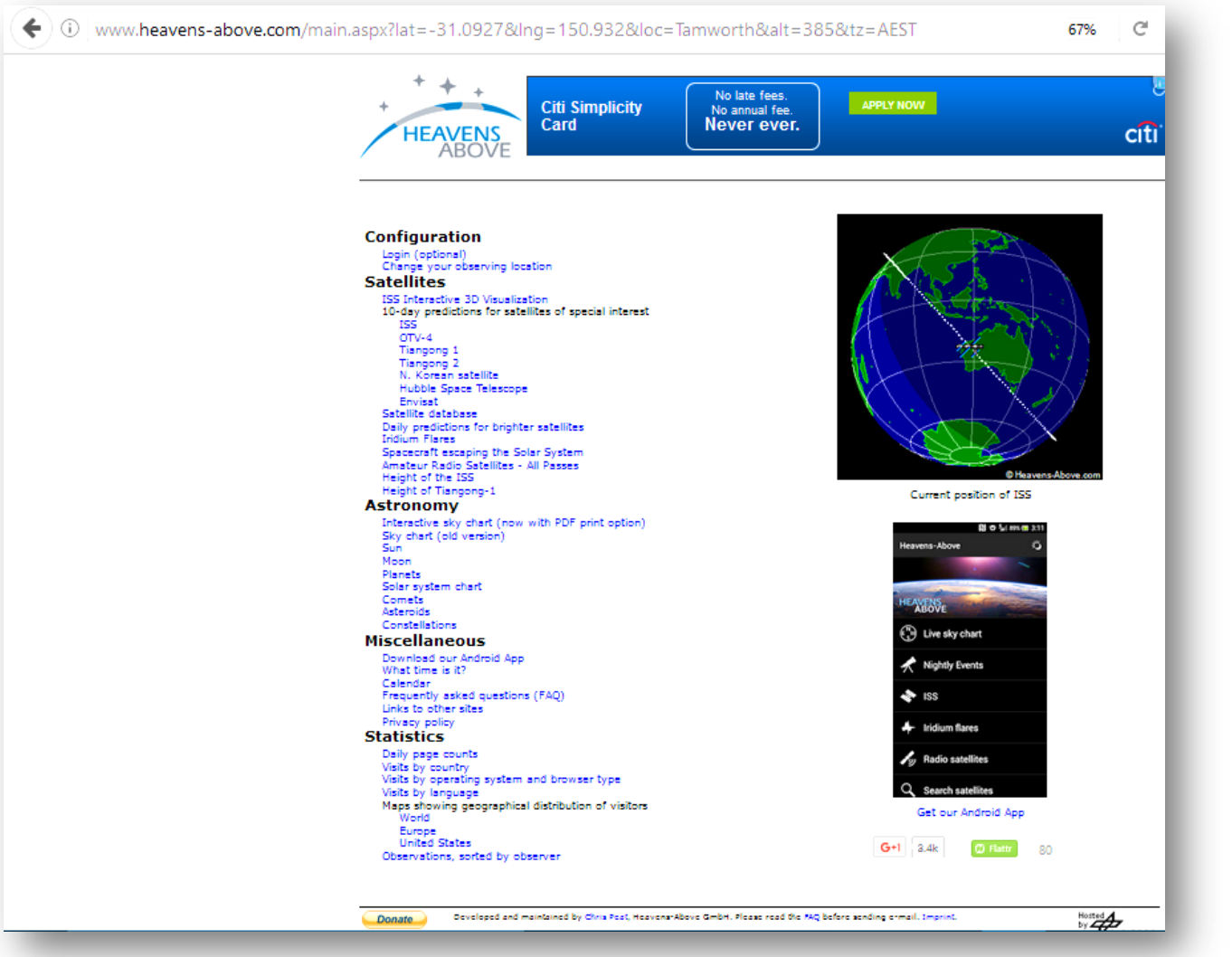
Free printable finder charts for many other astronomical objects are available online at http://freestarcharts.com. Remember to turn them upside down for our view in the Southern Hemisphere!

Website Review

BY LEIGH TSCHIRPIG

A VERY useful website for amateur astronomers is the Heavens Above site at: www.heavens-above.com. The site, which provides detailed information about artificial satellites, was created by Chris Peat, German Space Operations Centre, Munich and is based in the United States, however the information provided can be configured to any observing location on Earth by either searching for a city or town or by moving a pin locator on a map.

Once you have set your observing location, the site provides localised information such as 10 day predictions for satellites of special interest, for example the ISS and the Hubble Space Telescope and Iridium Flairs. The site can also generate an interactive star chart and detailed information about the sun, moon, planets, comets, asteroids and constellations. There are other useful features including a clock displaying local, universal and sidereal time and an Android app is also available. This is a highly recommended site with a great deal of useful information. The site is supported by advertising and, being voluntarily operated, has the opportunity for users to make a donation. In all, a great site. Five stars! ☆☆☆☆☆



Screenshot of the excellent Heavens Above website. Users have the opportunity to make a donation to this voluntarily run service.
Image credit: www.heavens-above.com

TRAC 2016 Christmas Party

THE TAMWORTH Regional Astronomy Club's Christmas Party was held on 5 December at Victoria Park. Thunderstorms on the evening failed to dampen the enthusiasm and the evening was very well attended with a great night enjoyed by all!

The storms had caused an electricity blackout in much of East Tamworth, however our Club's Publicity Officer, Phil Betts came to the rescue with a generator to power some spotlights and, most importantly, the strings of Christmas lights which had been set up for the evening.

Our Catering Coordinator, Di Case, put together a wonderful spread of food and nibbles, supplemented by a range of festive treats and snacks provided by those in attendance.

A highlight of the evening was the surprise arrival of TRAC Members and Tamworth Pipe Band Members, Steve Rogers and Felix Peake in full attire who played a selection

of traditional Scottish tunes and Christmas carols. Thanks Steve and Felix! As the storms persisted, our Treasurer and photography specialist, Stuart Goff captured the fantastic image below to cap off an enjoyable and memorable evening.☆

TRAC's Treasurer and Photography Group Leader, Stuart Goff, captured this spectacular image of a lightning strike during a series of storms in the Tamworth area on the evening of our Club's 2016 Christmas Party from our Victoria Park site.

TRAC Info

Club shirts and jackets available

A REMINDER that TRAC members can order polo shirts, jackets and hoodies with our Club logo from Monogram It/Hip Pocket at 123 Bridge Street, Tamworth. If you would like to place an order, contact our Executive (see page 3 for contacts) to obtain an authorisation slip, then call into the store with the signed slip to check your size, place your order and confirm pricing. It usually takes around two weeks for items to be printed. The polo shirts are slightly different to the sample pictured (the collar is blue), and all clothing items are available in male and female styles. Thank you once again to Sandy McIntosh at Monogram/Hip Pocket for assisting with the supply of these items.☆

Diary

Forthcoming meetings and events

Saturday, 22 April, 2017

Technical Meeting of the Tamworth Regional Astronomy Club Inc, commencing at 6.00 pm with a BBQ. Location details and confirmation of the meeting will be e-mailed to TRAC members. In the case of poor weather, the meeting will be held at Victoria Park. For enquiries, please contact Vice-President Garry Copper via e-mail (see page 2 for contact details).

Monday, 1 May 2017

Viewing Night of the Tamworth Regional Astronomy Club Inc at Victoria Park, commencing at 7.00 pm (weather permitting). An alternative indoor program will be held in the case of poor weather.

Saturday, 27 May 2017

Technical Meeting of the Tamworth Regional Astronomy Club Inc, commencing at 6.00 pm with a BBQ. Same details as previous Technical Meetings.

TRAC Prospectus DVD

TRAC Contributions

I wish to contribute

My name _____

My address _____

Phone _____ E-mail _____

1. Cash donation (receipt issued) or Sponsorship (Tax Invoice issued)

   To: Tamworth Regional Astronomy Club Inc (TRAC)
   PO Box 1023, Tamworth, NSW, 2340

   ❑$10 ❑ $50 ❑ $100 ❑Other _____

   Cash, cheque or direct transfer:
   Tamworth Regional Astronomy Club, BSB 802298 a/c No. 73689 Northern Inland Credit Union
   (please put your name in the description for your direct deposit transaction)

2. Cash donation to the TRAC Crowdfunding Site (target $22,000)_____
3. Become a financial member of TRAC
   Life Membership $1,000
   Full Member 3 years $150, 2 years $100, 1 year $50
   Concession Membership: Pensioner $25, Junior $10
4. I wish to donate materials or services to Stage 1 to assist with the Roll Off Roof Observatory.

   My suggested contribution _____
5. My donation of items related to astronomy or science education

   (telescope, books…) _____

Signature of donor_____ **Date**_____

If you wish to contact a Club Committee member to discuss your contribution:

Phil Betts Ph 0447 603 303

Garry Copper Ph 0458 772 747

Stuart Goff Ph 0427 639 444

Warwick Schofield Ph 0427 668 802

TRAC is currently seeking Tax Deductible Gift Recipient status for Stage 2 (The Astronomy and Science Education Centre and Planetarium).

For further information, contact Vice President Garry Copper: Ph 0458 772 747

Web: http://tracthestars.weebly.com

E-mail: tracthestars@gmail.com