Canterbury Astronomical Society

CASMag

Notable events in this month:

Sept 3rd, 10th, 17th, 24th – Private Group bookings

Sept 5th, 12th, 19th, 26th - Public Open nights

** Please consider volunteering on https://cas.ivolunteer.com/

Sept 8th – Total lunar eclipse (penumbral starting about 3:28am, partial eclipse starting 4:27am)

Sept 16th – CAS May Monthly meeting Rm 225 Level 2 Ernest Rutherford Building, University of Canterbury

Sept 20th – CAS Members Night @ West Melton observatory

Sept 19th – 22nd – Among the Stars @Camp Iona, Herbert

Sept 22nd – Partial Solar eclipse sunrise~6:20am, partial eclipse maximum ~7:20am, partial eclipse ends ~8:20am

Inside September 2025 Issue

Editor's Thoughts for September

September is one of my favorite times of the year. Mostly because it's time for a astronomy camp in Herbert called Among the Stars. Among the Stars is organized and run most excellently by the enthusiastic and energetic Damien McNamara. It is the first star party I attended. That first time, those dark skies smeared so densely with stars it was difficult to pick out even the most easily recognized constellation, stirred such FOMO (fear of missing out), I could hardly drag myself off the observing field! Add on a night when the aurora danced and we could see the glow over the top of the hills - I have been smitten ever since. I attend Among the Stars every chance I get. The theme for Among the Stars has evolved over the years. Last year and this year it will focus on SMART Telescopes with many of the talks centered around how these portable scopes can be used in varied and wonderful ways – apologies as I am much enamored by my SeeStar. Despite this, I still lug my 10" Dob with me to Herbert everytime because, can I exclaim again, THOSE DARK SKIES are some of the best visual observing skies one gets in New Zealand. It is quite a drive to get to Herbert, about 3 and a half hours if you don't make too many stops but it's well worth it. This year the last day is capped by a sun rising in partial eclipse! If you are interested, there is a "Among the Stars 2025" Facebook page where you can find out more about this astronomy camp and how to register for it. September's CASMag is full – and I thank all the contributors for their work and effort to sharing in words their adventures in astronomy. CLEAR SKIES everyone.

19th July CAS Bonfire Night:

August has rolled up! July was great and the CAS bonfire night on Friday 19th of July was wonderful to behold. We had about 20+ members turn up. Thanks to Jason Krueger, a spectacular bonfire was had

Here are some photos from the Bonfire night courtesy of Mandy Heslop, Sasha Green and me.

Book review: Ripples on a Cosmic Sea - The search for Gravitational Waves by David Blair and Geoff McNamara, Published 1997 *by Terry Richardson*

This book, although published before Gravitational waves were detected, gives a great history of the scientific process in building an instrument capable of detecting these phenomena and introduces the development of LIGO (Laser Interferometer Gravitational-Wave Observatory) which ultimately detected these waves after the book was published.

Book review: Ripples on a Cosmic Sea (continued)

It begins with a very good plain English narrative explaining the nature of spacetime and how it is bent and folded by gravity which was relatively (no pun intended) easy to understand. Having described what these waves are, it then goes on to describe the developments to detect them.

The issues are related to the signal to noise ratio. In this case the noise is many orders of magnitude greater that the signal. The development of the instrument had to overcome enormous technical difficulty. The signal was easy. A quartz crystal is very sensitive – enough to detect the signal. The issue of noise was much more difficult to overcome.

The early development of the instrument centered around a large Aluminium rod (measured in tons) which had to be isolated from earth movement, traffic outside, and footfall in the building. The theory was that a gravitational wave would change the shape of the bar enough to be detected. The issue was to reduce noise by isolating the bar, and detecting that miniscule change. This proved to be virtually impossible, and the Aluminium was changed to an artificial pure ruby crystal more than a metre long which was hugely expensive. This was never successful. The process of developing this instrument led to new innovative isolation techniques using lead and rubber which led to the technology in earthquake isolation in buildings along with other technological innovations.

This approach did not really work as it was not possible to get a bar long enough to be an effective detector. Eventually the design changed to using lasers and mirrors over a long distance. This sounds easy, but in fact to get it working it needed a very powerful laser and a light amplification system. Since the movement was less than the wavelength of the light over 4km, detection was by a shift in the interference pattern. This led to the development of new laser technology (YAG Laser) and further refinement of the isolation methods. The whole project was about measuring an incredibly small signal amongst noise that was many orders of magnitude greater. Although this book is a bit old now, it is enough to give a good understanding of what gravitational waves are, and the process of designing an incredibly sensitive instrument to detect them. A good bedtime read - *Terry Richardson*

Note: For those interested in what books we have in our CAS library at West Melton, there is an Excel list named “Library list of book May 2025” available on the CAS Website in the Document Library section. Ray has also loaded a program onto the CAS computer (at the Observatory) where members who are at the observatory can search and/or browse the books available in the library for topics or authors they wish to know more about – Thanks to our CAS librarian Ray Pointon

An Accidental Observatory by John Pickering

Five years ago, I moved to a new suburb which had a very active community Facebook page. A great conjunction of Jupiter and Saturn happened in December 2020, so I put out a call to come up to the end of the road up the hill to view the event. I pulled out my 8’’ dob and greatly enjoyed sharing the view with a couple of dozen people. A few months later, my Unistellar EV scope, which I had backed on kickstarter, arrived. Being a scientist, I got all excited about joining in with the SETI science missions that utilised the scopes from all over the world. I also started to invite people from the suburb up to my place to have a look at the heavens through the scopes.


The viewing platform

Soon I built a viewing platform. Usually, 8 to 12 people come up. An early highlight was a lunar eclipse, where I had three scopes out and about 50 people visiting. A local chap who could no longer use his scope gave it to me for restoration- a 50 year-old 8.5" Fullerscope with a mirror reground and coated by Garry Nankivell who ground the mirror for the McLellan 1m scope at Mt John. It is a bit heavy to pull out often, but it is a joy it still can be used.

I needed a name and noticed on the drive up to my place a sign partly hidden by grasses which read "Westmorland Heights". So, Westmorland Heights Observatory was born. As a result of outreach to the community, I've had the opportunity to speak at the AGM about good dark sky lighting practices, to speak to Thorrington primary School at Matariki, and endured a night out with cubs. For four years now Matariki up at the top of the hill in West Moreland early in the morning has also been an event.

Last summer as I celebrated my – ahem - birthday, I built an equatorial sundial that sits out the front of my property for passers-by to check the solar time. A local chap who was a signwriter offered to design my sign with instructions on how to work the sundial, and his place of work, Adgraphix, made me a sign and put it up for the grand total cost of a box of beers. I am fortunate to be part of a great community who embraced having

Westmorland Heights Observatory in their hood.

– by John Pickering

September 22nd Partial Solar Eclipse

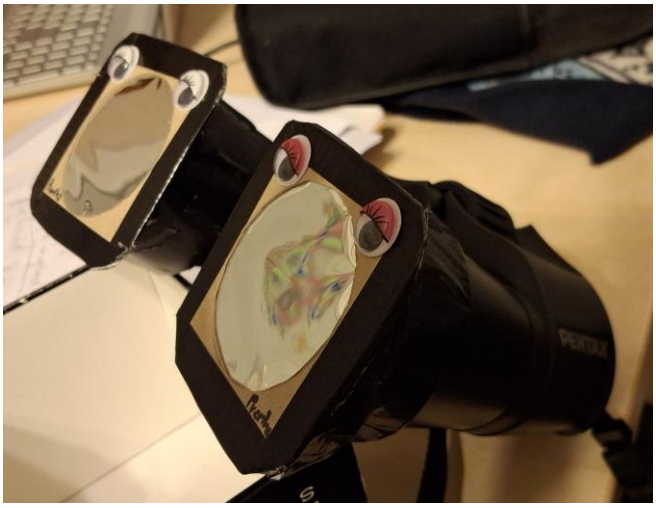
Unfortunately, no members submitted any plans for viewing the partial solar eclipse. Even though it is a partial solar eclipse, everyone who wants to view this natural phenomenon must be prepared as without the right viewing equipment you can end up damaging your vision and/or your equipment. This is an early morning venture. On Monday, September 22nd, the sun will rise around 6:20 am partially eclipsed to some degree. As the sun rises the shadow of the moon on the sun will start to creep over the sun and will reach maximum partial eclipse by around 7.20am (about 65 - 70% of the sun). AS the shadow of the moon moves off the sun, the sun will start to brighten until this partial eclipse ends at 8:20am.

To view this eclipse safely, these are the MUST do's:

- **DO NOT VIEW** the sun, even in partial eclipse, with your naked eye!! You may not realize the damage occurring, but it can and does damage the retinas to the extent where your vision will be impaired and this can be permanent as cells on the retinas do not regenerate
- To view the sun during the partial eclipse, get a pair of eclipse glasses like the one shown below ** CAS has a stash of eclipse glasses for purchase by members at NZ$2.50 a pair** - these lightweight "one-size fits all" glasses which have special filters that filter the light so that you can view the partial eclipse without damaging your retinas.

- If you are using equipment like binoculars or telescopes or cameras to view this partial eclipse, your equipment will need to have solar safety film/filter placed over the top/front of the telescope tube or binocular tubes or the front of your camera lens

I made solar filters for my binoculars from Baader Astrosolar film, and after lots of duct tape, carboard - these are how those filters look and mount onto the binoculars, they must mount on snug so that they don't fall off at crucial times - googly eyes were just too fun not to add!)

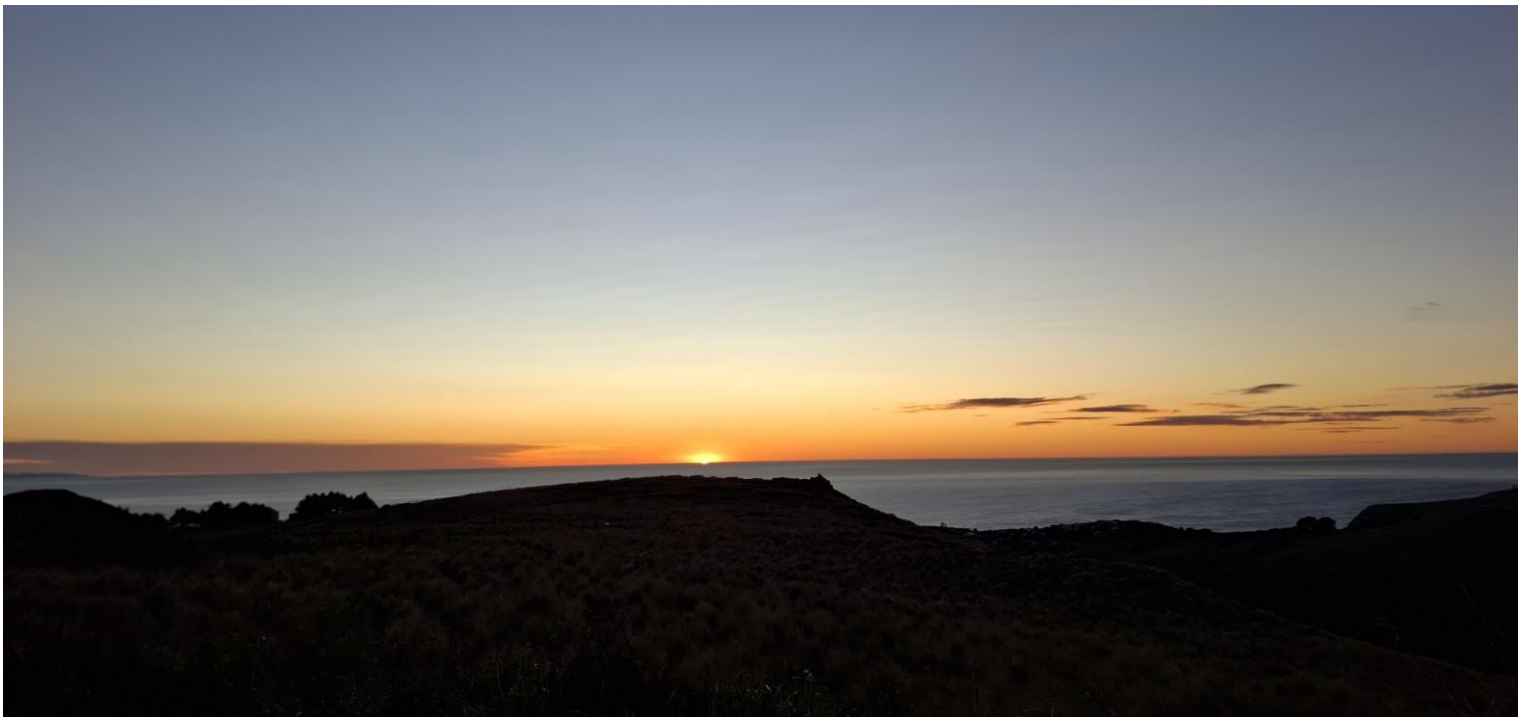


If you have any questions or need help with making your own filters for your equipment, reach out via the CAS forums for help/advice. From my experience, it took about 1-2 weeks for the Baader film to be delivered from an Australian outfit – this was in 2024. Once the film arrived, it then took a lot of nervous measuring and cardboard cutting, advice from others, then quite a lot of duct tape etc to put the filters together. For the upcoming partial solar eclipse in September, I am planning to make a solar filter for my 10 inch Dobsonian from the left-over Baader film.

NICE TO HAVES when viewing the partial Solar eclipse:

- A good vantage point that has clear views of the Eastern horizon where the sun rises
- **Really warm clothing!!** Being so early in the morning and we won't get the benefit of a full sunrise so it will be some time before the temperature inches up.
- Hot drinks and a comfortable chair, hot water bottle
- People to share the experience with (making sure they all have solar eclipse glasses please)

This spot in Christchurch would be a perfect place to watch the sunrise on Sept 22nd. I leave it to you to figure out where this photo was taken – clue: I bluff you not about this lovely spot, see CASMag July



My plan to view the Partial Solar Eclipse

- Make the solar filter for my 10-inch Dobsonian telescope
- Lug my 10-inch telescope, my binoculars (and googly eye solar filters) & SeeStar S50 (which also has its own googly eyes Baader solar filter) to Among the Stars astronomy camp at Camp Iona in Herbert
- Pray to the universe for clear skies – every night and for the morning of September 22nd
- On September 22nd, wake about 5:15 – 5:30 am and head out to the Herbert cemetery which has one of the best views of the Eastern horizon, be setup by 6am, have lots of hot drinks & dress very warmly
- Marvel as this natural phenomenon unfolds

By Preetha Sreedharan

A Blast from the past – The following two articles are courtesy of Alan Teague. Alan was editor of CASMag in 1977 and he has kindly shared these two articles written by Clive Rowe and Rod Austin respectively on the 1976 Full Solar Eclipse. This is a scanned copy of the original so it's a bit wonky though I think quite in keeping with the spirit of the articles. Enjoy

TOTAL SOLAR ECLIPSE
1976 OCTOBER 23

My wife Faye, and I took the rare opportunity of combining a visit to my brother's family in Adelaide, friends in Melbourne and the October total solar eclipse, on a peep now, pay later basis.

• A combination of Austin-equatorial, Andrews-achromat and precision plastic poo-pipe was assembled for the occasion and smuggled past unsuspecting Customs officers, en route for Kangaroo land. High winds, stormy seas, hostile coasts, unfriendly natives and parched waterless deserts; nothing could stop us as we cruised along at 10 000 metres in an Air New Zealand DC-10, quaffing our champagne and chicken noodles, hell-bent on our appointment with Umbra.

• Well, to cut a long and interesting story short before the Editor does, we arrived by bus, train and bicycle at the wondrous city of Mount Gambier, set up in our spacious caravan, pre-hired for the occasion, and set out on a Hertz camel to survey the optimum site from which to view the forthcoming spectacle. An excellent site, previously surveyed with a magnifying glass held over an issue of Sky and telescope, was discovered by Faye as we cruised along the high ridge road overlooking Valley Lake. As this site was equipped with the exact size and height of pipe required for the equatorial, was paved with concrete and surrounded with a pipe railing, we immediately claimed it in the name of our venerated Prime Minister, secured the blessing (by appointment) of the local town clerk, and punched anyone who came too close.

• On the days before the eclipse we were plagued with inclement weather which precluded precise alignment with Alpha and Beta Centauri and so were forced to resort to the method of dampened digit held aloft in the prevailing wind which yielded an r.m.s. or standard deviation from the meridional horizontal projection, of 3.14159265 arc minutes.

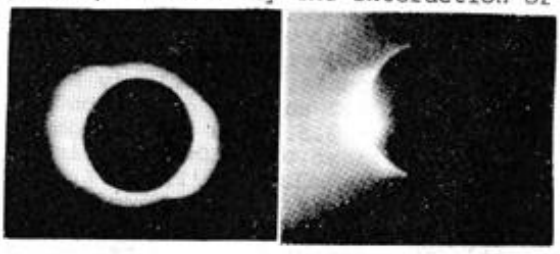
• Rod Austin arrived on Friday night loaded with camera equipment, filters and a tummy bug which helped him maintain a pre-dawn vigil to establish the weather situation on eclipse morning.

• At midday, computed on an HP-45, we confirmed the alignment of the equatorial mount, switched on the 230 volt inverter (field test for Peter Gordon's unit) and verified the tracking rate. The sky was generally cloudy with patches of blue. The 35mm Pentax was loaded with Kodak 64 colour film and carefully focused on a young lady in the nurses' home of the hospital across the crater lake. The camera was then aligned on the Sun for photographs of the partial phases of the eclipse.

• At this stage the trickle of people moving up past us to the high point of the mountain swelled to a torrent, and the car park rapidly filled to overflowing. We answered as many questions as time allowed and handed out some of Rod Austin's film filters, appealed to people to keep clear of the equipment and punched those that strayed too close. About half an hour before totality I pointed out to a fellow ham from Colorado that his Celestron 5 (f6) which he had carefully aligned in the plane of the meridian, had its polar axis pointing north instead of south which might complicate tracking. He conceded this point and so we quickly shifted his mount into our railed sanctuary where we could offer the additional advantage of a precision 230 volt drive system which he gratefully accepted.

• Rod moved his gear further up the hill so that he could watch the eclipse shadow, by this time racing across the Indian Ocean towards the South Australia coast. He took with him a diffraction grating and secured some quite interesting flash spectra at the beginning of the eclipse. Meanwhile, our Japanese friends at Mount Gambier airport (on the centre line), after six weeks of on-site preparation and years of instrument preparation at Kyoto University, dismally watched a heavily overcast sky while running through the fruitless exercise of operating their high speed flash spectrum recorder.

• At our site the temperature dropped a very noticeable 6° C some time before totality and there was an audible gasp from some hundreds of people as the magnificent whitish corona and red prominences blazed out with dramatic suddenness through light, scudding clouds. I began a short, systematically increasing series of exposures through my f5.6 camera (500mm focal length), but after one minute the clouds closed in and prevented a full recording of the extent of the corona. In visual appearance, this eclipse was remarkably similar to the 1965 May one which many of us viewed from near Kaitaia. This was expected as the two events occurred almost exactly one eleven year solar cycle apart. Of note were the solar plumes, defined by the interaction of



the coronal plasma and the polar magnetic field, and the bright red hydrogen prominences. By the time we had photographed the remaining partial phases, most people had moved off the mountain.

• To me, a disturbing feature of the publicity given prior to the eclipse was the emphasis given to the dangers of the eclipse by various "authorities". The result was that some millions of people huddled about their television sets rather than risk watching the real spectacle where that was possible. The underlying assumption seemed to be that people were stupid. Perhaps this is a reasonable assumption. No comparable publicity is given in the United States, where I understand there are few casualties attributable to careless viewing of the partial phases. See you at Port Moresby. Clive Rowe

Chasing SHADOWS

Contrary to my statement at the 1976 September meeting I did not have to sell my car to get to the eclipse of October 23. Effectively my trip lasted only three days, leaving Christchurch for Melbourne on Friday October 22 and coming back to Christchurch on Monday October 25 in time for an astronomical meeting.

• By coincidence, the trip over was shared by at least four other eclipse chasers. Jocelyn Russell and Alan Teague, also of CAS of course, and an American couple, Marty and Ann McGovern Scheiner, whom I met on board (partly by tipping a glass of champagne over them). She writes children's books and they arrange business trips to coincide with eclipses, although neither are interested in astronomy as such. So far she has seen five and he six, including the big one of 1973 and the latest.

• The arrival at Melbourne was interesting with such highlights as: the man who dropped all his duty-free booze at the immigration desk, and the fact that my name almost caused their computer to go on strike. I was informed that I have a common name, and that my notoriety had not spread quite that far yet. After Customs, I bludged a trip into town with the Scheiners to the Town Hall where an exhibition was being held in conjunction with the solar/lunar conjunction. It was most interesting. While there, I ran into several local amateurs including Jim Trainor, who asked to be remembered to Frank Andrews, and also a New Zealander I know from Gisborne who went up on the 727 for an aerial view of proceedings.

• Then it was back to the airport for the flight to Mount Gambier and I ran into a bunch of Americans who had visited Mount John just the week before. The flight departure forestalled the beginnings of an eclipse party. The arrival at Mount Gambier was after dark, but not so dark as to make me miss the distinctive figure of Clive Rowe, who had arrived with Faye three days before. Then it was into town for a meal at a restaurant, also patronized by the Japanese party, and eventually to the caravan park.

• 3 a.m. eclipse morning; the meal has disagreed with me and I wanna go home! The heck with eclipses. However, by mid-morning I am feeling much better and with gear set up and some souvenir shopping under my belt things are looking good. Good that is, except the weather which is heavy, patchy low cloud with some cirrus behind. About this time the crowds were drifting up the mountain and we were visited by Ralph Dakin and Arthur Page. The former is chief optician with Bausch and Lomb, and the latter is one of the most successful of Australian amateurs (he discovered the star 66 Ophiuchi to be a flare star, the earliest spectral type known to flare).

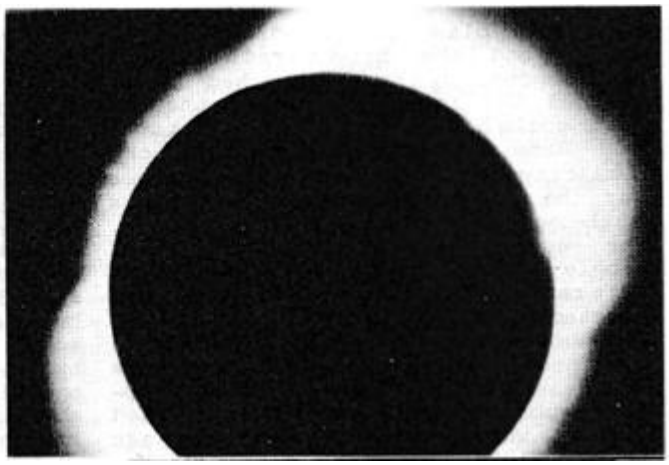
• The day rolled on and so did the cloud. One hour before first contact the high cloud was so thick that we could not make out the Sun's shape. However, it thinned and the Moon was first seen only 40 seconds after contact. Surprisingly quickly the Moon slid across the Sun and within 40 minutes the daisies were starting to close. The sky started to turn dark and gloomy. Within two minutes of totality the low cloud went patchy leaving us with just a thin veil of high cloud. The sky got darker and then someone shouted that he could see the umbral shadow approaching. A real shiver went down my spine. Here it came, ever so silently streaking across the ground and through the cloud at over two kilometres per second. The light went down and the corona grew around the Sun. Time stopped; after the last hectic seconds the three minutes of totality seemed as if they would be with us forever.

• Venus shone high in the sky, but the cloud hid other objects. Along the northern and southern horizons the sky appeared orange with the atmosphere still in direct sunlight. Slowly, then ever faster, the western horizon turned orange, getting brighter, BRIGHTER! WHAM! Sunlight! The overpowering flash of the first direct light was turning rapidly into a fiery crescent, and getting steadily brighter.

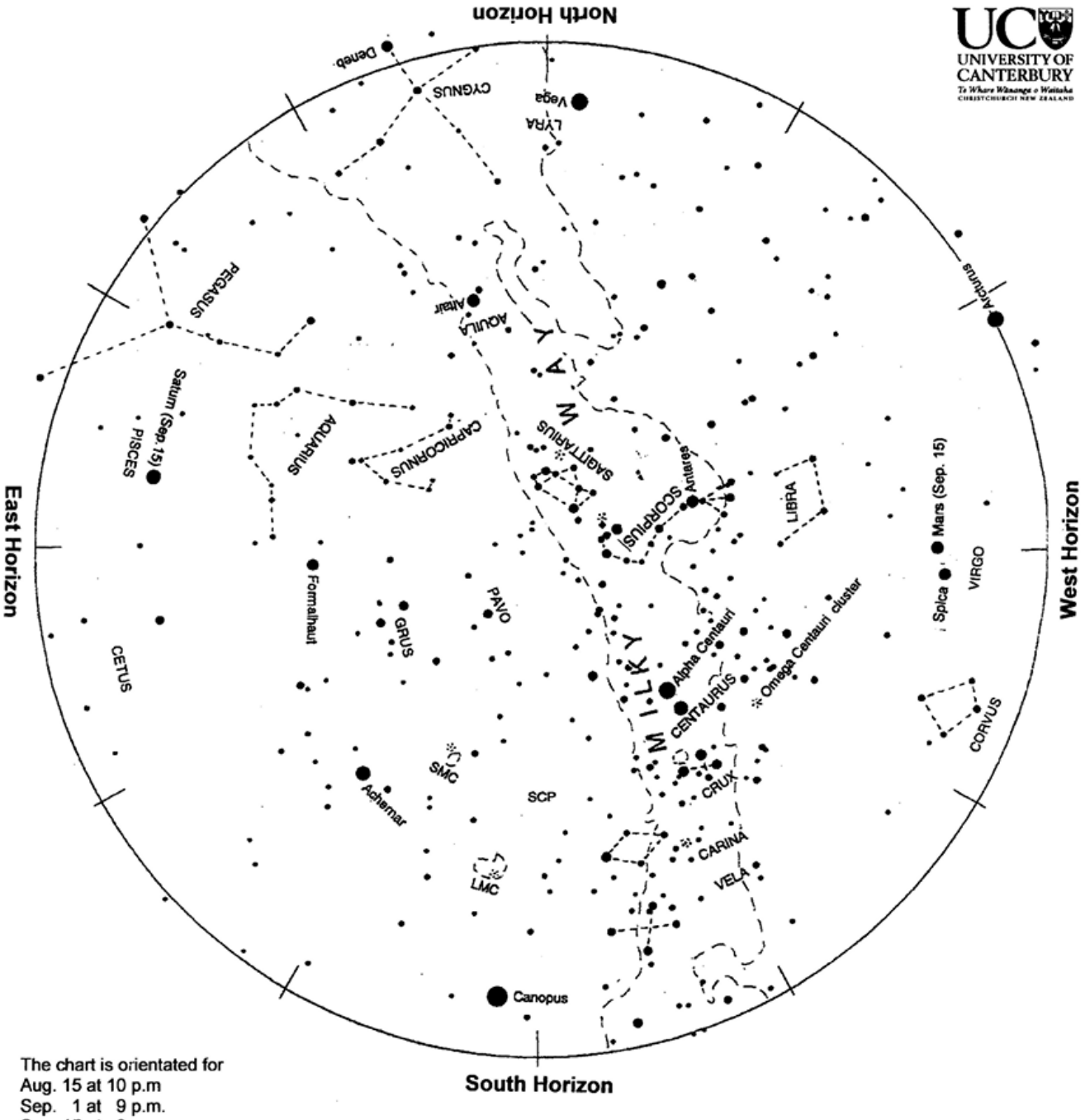
• The gloom retreated eastwards towards our friends at Ballarat, still waiting for totality only seconds away. Within five minutes the top of the mountain was deserted. An hour later, after →

fourth contact, it was as if it had never been and certainly will not be again at Mount Gambier until 2220 when again the Moon's umbral shadow will thrill the crowds along an almost identical line. An expensive trip for me, for just three days, of which only three minutes were really important. I would do it again tomorrow. It was only my second eclipse, but I am planning already for New Guinea in 1983 and 1984. See you there? - Rod Austin

Photo: Solar corona (from a colour slide, 1/8 sec at f10, Celestron 8 - A Teague.



Thank you again Alan Teague for sharing these articles. I always appreciate the bells and whistles I have now in terms of equipment but also salute the passion and ingenuity of these legends of CAS, who most of us have heard in name but never had a chance to meet in person.



The chart is orientated for
Aug. 15 at 10 p.m
Sep. 1 at 9 p.m.
Sep. 15 at 8 p.m.

Evening sky in September 2025

To use the chart, hold it up to the sky. Turn the chart so the direction you are looking is at the bottom of the chart. If you are looking to the south then have 'South horizon' at the lower edge. As the earth turns the sky appears to rotate clockwise around the south celestial pole (SCP on the chart). Stars rise in the east and set in the west, just like the sun. The sky makes a small extra clockwise rotation each night as we orbit the sun.

Canopus twinkles like a diamond near the southern horizon. Vega shines on the northern horizon. Orange Arcturus twinkles red and green as it sets in the northwest. The Milky Way spans the sky from north to south. Mars is a medium-bright red 'star' low in the west. Saturn is a cream-coloured 'star' low in the east. West of overhead is orange Antares marking the Scorpion's body. The Scorpion's tail curls above it like a back-to-front question mark. Crux, the Southern Cross, and the Pointers are in the south-west. There are eclipses of both the Moon and the Sun this month.

Chart produced by Guide 8 software; www.projectpluto.com. Labels and text added by Alan Gilmore, Mt John Observatory of the University of Canterbury, P.O. Box 56, Lake Tekapo 7945, New Zealand. www.canterbury.ac.nz

The Evening Sky in September 2025

Bright stars shine around the skyline. Orange **Arcturus** is in the northwest, often twinkling red and green as it sets. **Canopus**, the brightest star in the evening sky, skims along the southern skyline, twinkling all colours. **Vega** is low in the north. It is the second-brightest northern star after Arcturus. From northern Aotearoa the star **Deneb** can be seen near the north skyline. It is the brightest star in Cygnus the Swan.

Mars is low in the west. It looks like a medium-bright red star. In mid-September it will be near **Spica**, the brightest star in Virgo. **Saturn** is in the eastern sky, a medium-bright 'star' all on its own. Late in the month Mercury appears below Mars in the west, setting an hour after the Sun (so isn't on the chart.)

Orange **Antares**, northwest of the zenith, marks the body of the Scorpion. The Scorpion's tail hooks toward the zenith like a back-to-front question mark. It is the 'fishhook of Maui' in Māori star lore. Below or right of the Scorpion's tail is 'the teapot' made by the brightest stars of **Sagittarius**. It is upside down in our southern hemisphere view.

Midway down the southwest sky are 'The Pointers ', Beta and **Alpha Centauri**. They point down to **Crux** the Southern Cross. Alpha Centauri is the third brightest star. It is also the closest of the naked-eye stars, 4.3 light-years* away. Beta Centauri, along with most of the stars in Crux, is a blue-giant star hundreds of light-years away.

The **Milky Way** spans the sky from north to south. It is brightest and broadest overhead in Scorpius and Sagittarius. In a dark sky it can be traced down past the Pointers and Crux into the southwest. To the northeast it passes **Altair**, meeting the skyline right of **Vega**. The Milky Way is our edgewise view of the galaxy, the pancake of billions of stars of which the sun is just one. The thick hub of the galaxy, 27 000 light years away, is in Sagittarius. Dust clouds near us appear as gaps and slots in the Milky Way. Binoculars show many clusters of stars and some glowing gas clouds in the Milky Way.

The Large and Small Clouds of Magellan, **LMC** and **SMC**, look like two misty patches of light in the south sky. They are easily seen by eye on a dark moonless night. They are galaxies like our Milky Way but much smaller. The LMC is about 160 000 light years away; the SMC about 200 000 light years away.

On moonless evenings in a dark sky the Zodiacal Light is visible in the west. It appears as a faint broad column of light extending up past Mars and Spica, toward Antares. It is sunlight reflecting off meteoric dust in the plane of the solar system.

There are two 'morning stars'. Golden Jupiter appears in the northeast around 4:20 a.m. at the beginning of the month and 3 a.m. at the end. Silver Venus, brighter than Jupiter, rises around 5:30 at the beginning of September and soon after 5 a.m. at the end. The Moon will be near Jupiter on the 14th, and close to Venus on the 20th.

There is a **total eclipse of the Moon** around dawn on Monday 8th. The Moon starts to enter the dark part of Earth's shadow, the umbra, at 4:27 a.m. It is fully in the umbra at 5:31 and closest to the shadow centre at 6:13. It starts moving out of the umbra at 6:53, around moonset from N.Z.

A **partial eclipse of the Sun** happens at sunrise on Monday 22nd. There will be a big bite out of the Sun when it rises. This will get bigger till 7:10 a.m., then slowly shrink. The Moon moves off the Sun around 8:15, depending on your location. **Never look at the Sun without eye protection!** Doing so can cause permanent damage. Eclipse glasses are the best protection. If they aren't available then make pinhole in a sheet of paper or cardboard and project an image of the sun onto a wall. Eclipse glasses can be bought from Astronz, Auckland, www.astronz.nz; Carter Observatory = Space Place, Wellington https://shopwellington.nz/products/0a6f6e36-8b23-11eb-f3d6-6a8b0d828055; the Dark Sky Project, Lake Tekapo, www.darkskyproject.co.nz, and Otago Museum, Samanta.Luzzi@tuhura.nz .

*A **light-year** (**l.y**.) is the distance that light travels in one year: nearly 10 million million km or 10^13 km. Sunlight takes eight minutes to get here; moonlight about one second. Sunlight reaches Neptune, the outermost major planet, in four hours. It takes sunlight four years to reach the nearest star, Alpha Centauri.

Notes by Alan Gilmore, University of Canterbury's Mt John Observatory, P.O. Box 56, Lake Tekapo 7945, New Zealand.
www.canterbury.ac.nz
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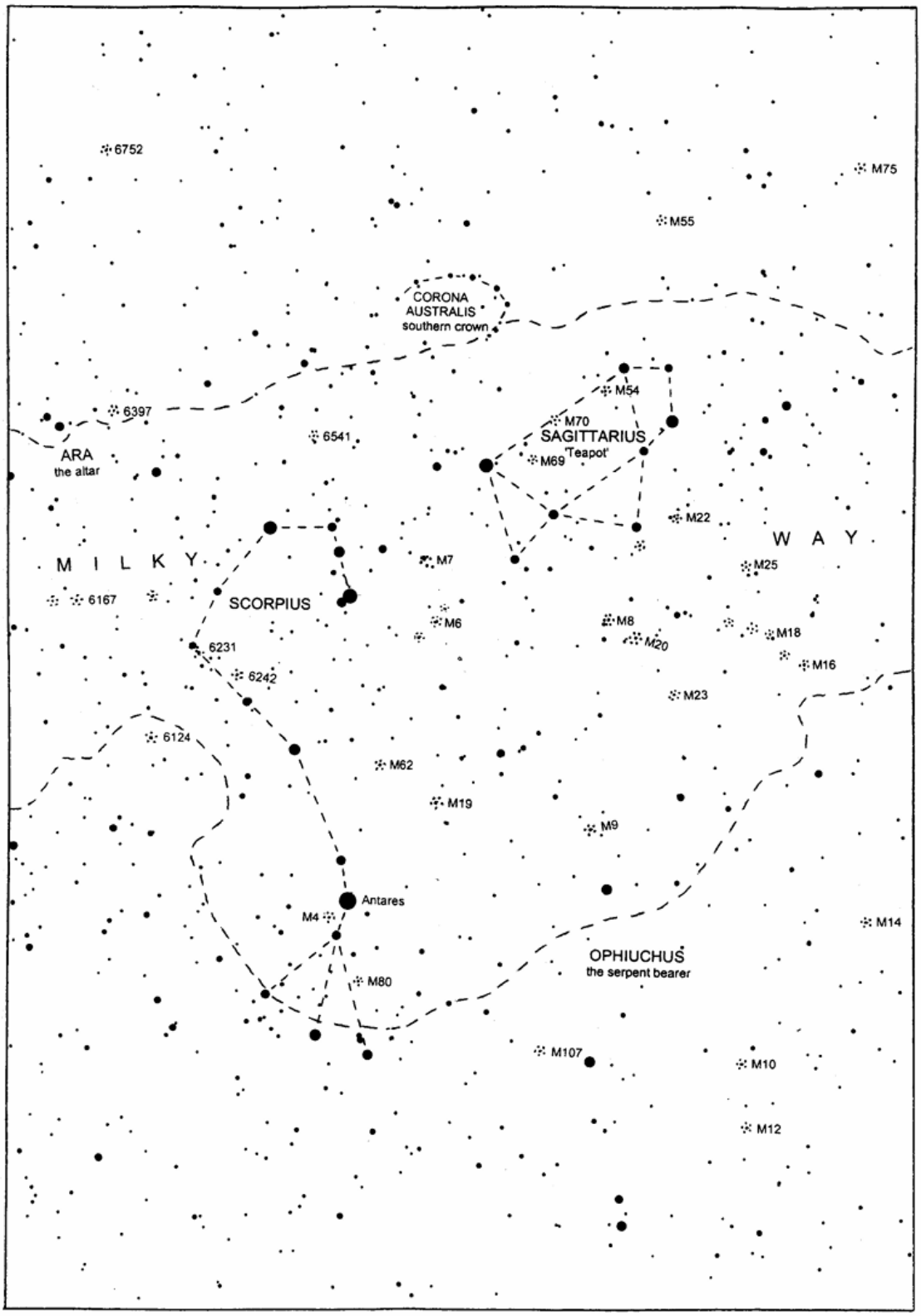


The Sky West of Overhead at Evening in September

The chart shows the sky west of the zenith at nightfall. The Milky Way is here bright and broad as we look toward the centre of the galaxy. Many star clusters and a few nebulae are seen, some obvious to the naked eye. Those visible in binoculars or small telescopes are indicated with asterisks. They are described on the other side of this page.

Chart produced by Guide 8 software; www.projectpluto.com. Labels added by Alan Gilmore, University of Canterbury's Mt John Observatory, P.O. Box 56, Lake Tekapo 7945, New Zealand. www.canterbury.ac.nz

UC UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

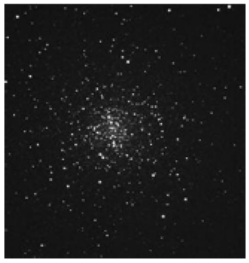
Interesting Objects West of Overhead in September

Antares is the brightest star in the region. It is orange coloured; being a 'red giant' star. (The 'red' of red giants is usually more an orange tint.) It is around 600 light years* away, 19 000 times brighter than the sun, and three times bigger than Earth's orbit. Its mass or weight is about 12 times that of the sun, so most of the star is very thin gas spread around a hot dense core. Red giants are the last stage in the evolution of stars. The dense core of the star has shrunk and heated. The outer regions of the star have expanded to a very spread-out gas. The core is wringing the last of the thermo-nuclear energy out of elements like helium, carbon, oxygen and neon. Relatively soon the core of Antares will run out of energy and collapse, triggering a spectacular supernova explosion. (The sun will become a red-giant in about seven billion years time but it ends up as a white dwarf star, not a supernova.)

At the right-angle bend in the Scorpion's tail is a large and bright cluster of stars, **NGC 6231**, looking like a small comet. It is around 6000 l.y. away. Its brightest stars are 60 000 times brighter than the sun. The cluster is about 8 light years across, similar in size to the Pleiades/Matariki cluster in our summer sky. Were it as close at the Pleiades/Matariki cluster (440 l.y.) then its brightest stars would be as bright as Sirius.

Below and right of the Scorpion's sting is M7, a cluster obvious to the eye and nicely seen in binoculars. M7 is about 800 l.y. away and around 260 million years old. Below the sting and fainter is M6, the 'butterfly cluster'. M6 is around 1300 l.y. away and is half the age of M7. Other clusters worth a look in binoculars are M21, M23, NGC 6167, and NGC 6193. The 'M' objects were listed by the 18th Century French astronomer Charles Messier. He hunted comets, so made a catalogue of fuzzy objects that could be mistaken for comets. The NGC (New General Catalogue) objects shown are bright to enough to have been seen by Messier but are too far south to be seen from Paris.

Below and left of the Sagittarius 'Teapot' is the glowing gas cloud **M8,** the **'Lagoon Nebula'**. It is a star-forming region where gas and dust have recently gathered into new stars. ('Recently' = the past million years or so.) Ultraviolet light from one particularly hot star is lighting up the leftover gas, making it glow. On colour photos it appears pink due to hydrogen atoms fluorescing in the UV light. Below M8 is M20, the Trifid Nebula, small glowing patch in binoculars, also a pink hydrogen region in photos. Other nearby nebulae (gas and dust clouds) are M16 and M17.



Globular clusters, spherical clusters of ancient stars, are found throughout the region. The brightest is **M4** by Antares. It is also one of the closest at 10 000 l.y. away. In binoculars and small telescopes 'globs' appear as round fuzzy spots. Others marked on the chart are M9, M10, M12, M14, M19, M22, M55, M54, M62, M80 and NGC 6541. The concentration of globular clusters in this area was an early clue that the centre of the galaxy lay in this direction.

This part of the Milky Way is broad and bright as we are looking to the centre of the galaxy. The actual centre, 27 000 light years away, is hidden from our view by intervening dust clouds. The nearer dust clouds make gaps and slots along the Milky Way. The hub of the galaxy is a great sphere of stars, called the 'central bulge'. Some of the central bulge is glimpsed in gaps between the dust clouds. At the very centre is a black hole four million times the sun's mass but only the size of our solar system. All big galaxies have a massive black hole at their centre.

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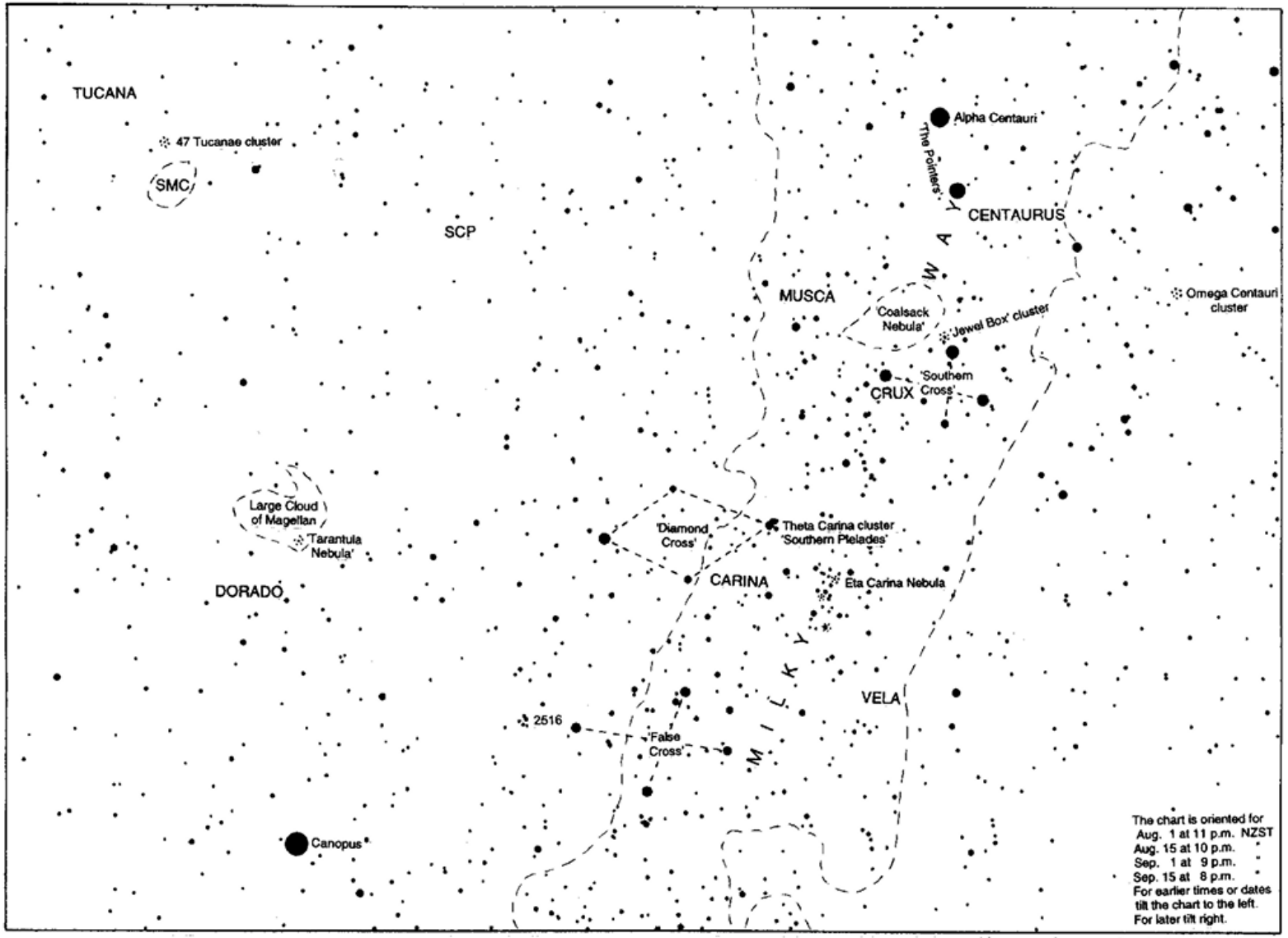

Southern Evening Sky in September

The chart shows the southern and southwest sky. Interesting star clusters and nebulae are indicated with asterisks. They are described on the other side of this page.

Chart produced by Guide 8 software; www.projectpluto.com. Labels added by Alan Gilmore, University of Canterbury's Mt John Observatory
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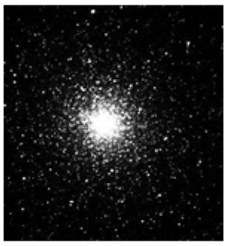
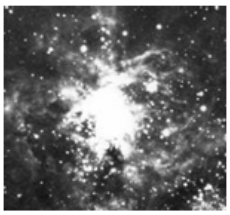
Interesting Objects in the Southern Sky

Large & Small Clouds of Magellan (LMC & SMC) appear as two luminous patches, easily seen by eye in a dark sky. They are two galaxies like the Milky Way but much smaller. Each is made of billions of stars. The Large Cloud contains many clusters of young luminous stars seen as patches of light in binoculars and telescopes. The LMC is about 160 000 light years away and the SMC 200 000 l.y away, both very close for galaxies. (1 light year is about 10 000 billion km, 10^{13} km.)



47 Tucanae, looks like a faint fuzzy star on the edge of the SMC. It is a globular cluster, a ball of millions of stars. A telescope is needed to see a peppering of stars around the edge of the cluster. Though it appears on the edge of the SMC it is one-tenth the distance, 15 000 light years away, and is has no connection to the Small Cloud. Globular clusters are mostly very old, 10 billion years or more; at least twice the age of the sun. **Omega Centauri**, right of the Pointers, is a similar cluster around 17 000 light years away.



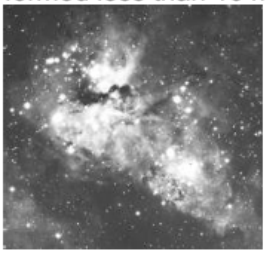
Tarantula nebula is a glowing gas cloud in the LMC. The gas glows in the ultra-violet light from a cluster of very hot stars at centre of the nebula. The cloud is about 800 light years across. It is easily seen in binoculars and can be seen by eye on moonless nights. This nebula is one of the brightest known. If it was as close as the Orion nebula (in The Pot's handle in the summer sky) then it would be as bright as the full moon.

Canopus is the second brightest star. It is 14 000 times brighter than the sun and 300 light years away. Sirius, in the eastern dawn sky, is the brightest star in the sky. The planets Venus and Jupiter are brighter.

Alpha Centauri, the brighter Pointer, is the closest naked-eye star, 4.3 light-years away. Alpha Centauri is a binary star: two stars about the same size as the sun orbiting around each other in 80 years. A telescope that magnifies 50x splits the pair. (A very faint and slightly closer star, Proxima Centauri, orbits a quarter of a light-year, or 15 000 Sun-earth distances, from the Alpha pair.)

Coalsack Nebula is a cloud of dust and gas about 600 light years away, dimming the more distant stars in the Milky Way. Many similar 'dark nebulae' can be seen, appearing as slots and holes in the Milky Way. These clouds of dust and gas eventually coalesce into clusters of stars.

The Jewel Box is a compact cluster of young luminous stars about 7000 light years away. The cluster formed less than 16 million years ago. It is best seen in a telescope. To the eye it looks like a faint star.



Eta Carinae nebula is a glowing gas cloud about 8000 light years away. The golden star in the cloud, visible in binoculars, is Eta Carinae. (Eta is the Greek 'e'.) It is estimated to be to be 80 times heavier than the sun and four million times brighter but is dimmed by dust clouds around it. It is expected to explode as a supernova any time in the next few thousand years. Many star clusters are found in this part of the sky.

The **Southern Pleiades** is a newish name for a cluster of stars at the right-hand point of the 'Diamond Cross'. It is formally the Theta Carinae cluster, after its brightest star but is also known as the 'Five of Diamonds' cluster, the reason obvious when it is seen in a telescope. It is much fainter and smaller than the real Pleiades in Taurus but a nice sight in binoculars. The cluster is about 500 light years away and is around 30 million years old.

NGC **2516,** left of the False Cross, looks to the eye like a tailless comet. It is a nice sight in binoculars. The cluster is about 1200 light years away and 110 million years old.

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Members Interest Section
This section is for members who have as an interest under the umbrella of Astronomy. Your interests could be around Meteors / Comets / Photometry / Solar observing / Photography / Telescope building / Spectroscopy / Aurora's / Occultation's / Variable Stars / Satellite tracking / Lunar observations/ Jupiter impact monitoring / Radio Astronomy / Eclipses. You are welcome to share your thoughts and see who other like minded people would like to join you. You can form your own interest section. Below are a few members who have started their own interests sections. You can also use the CAS forum to discuss other ideas to check out who else would be interested in starting a new members interest section.

Tune into Jupiter or the Sun with Radio Astronomy
Radio astronomy can be done during the day and even cloudy nights. Terry has built a receiver and with his computer can log activity of the Sun and Jupiter.
For more information contact Terry Richardson, email: member1@cas.org.nz Cell: 021 776 458

Bounce Signals off the Moon
Beam a signal at the Moon or at a lunar orbiting satellite
For more information contact Simon Lewis Vice, email: president@cas.org.nz Cell: 022 640 6649

Spectroscopy
CAS has recently purchased a diffraction grating which can be attached to a telescope eyepiece or camera on the telescope. The grating, like a prism, spreads the light from starlight into component colours (distribution of wavelengths). Thus begins the engaging look into the not so private lives of stars, nebulas and galaxies.
For more information contact Ray Pointon, email: rpointon@cyberxpress.co.nz

Other Information

***** IMPORTANT NOTE - UC PARKING ******

There are bollards now installed by the Rehua Building and these will be raised at 6pm daily till 7am. Do not park in the areas by these as you risk getting locked in! Please note its just this one area where the EV chargers are located that has been protected by bollards. All the rest of the campus remains the same. Be wary where you are parking!! The map at this link shows where accessibility parks are >>> https://www.canterbury.ac.nz/about-uc/our-campus-and-environment/maps

CASMag will be published every alternate month and will contain information on CAS activities, articles contributions from CAS members, monthly star charts. I'd like to invite members new and experienced, young and mature to send in your contributions, can be short articles (50 – 100 words) on what your experience has been being a CAS member, what you have learnt, what astronomy projects you're working on etc. Send your contributions to Editor@cas.org.nz by the 3rd week of the month at the latest.