Wellington Astronomical Society August 2017 Volume 47 Issue 7
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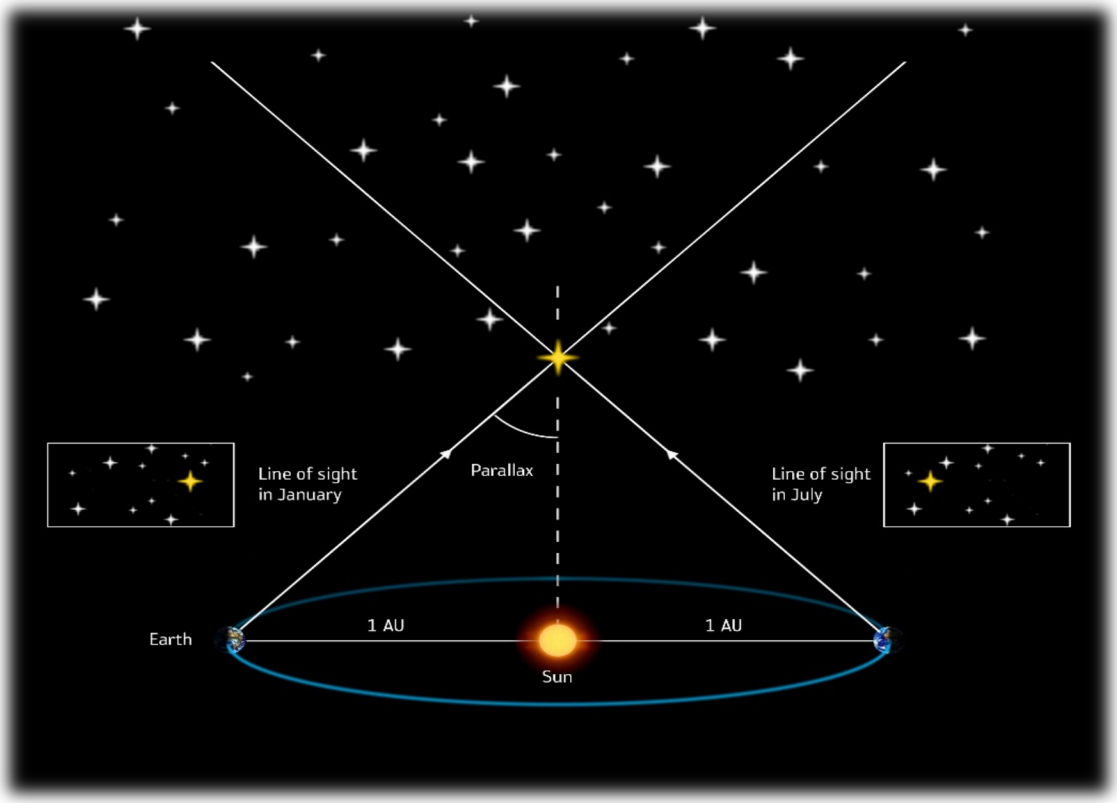
The next WAS meeting will be held on Wednesday 2nd of August 2017 at 7:30pm at Carter Observatory, Upland Rd, Kelburn, Wellington

From the Greeks to Gaia: the History and Science of High-resolution Astronomy - Warwick Kissling



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Warwick Kissling has been member of WAS since 1980. He has a PhD in Engineering Science (mathematical modelling) from Auckland University, and works for GNS Science modelling how water and heat flow underground in geothermal areas. His main interest in astronomy is celestial mechanics (the science of orbital motion) but is interested in anything where mathematics and computer modelling can be used - which is in fact most of astronomy!!

Inside this issue:

2017 — 2018 SUBSCRIPTIONS DUE

The new subscription year begins in September, so WAS looks forward to receiving your subscription renewal.

Renewal forms can be found on the website, but a summary follows:

Subscription for Newsletter by Email 2017-2018

Adult/Waged:	$ 50.00
Student/Unwaged:	$ 30.00
Family:	$ 70.00

Payment methods:

Cheque - make out to Wellington Astronomical Society Inc, and mail to PO Box 3181, Wellington 6140

Direct Deposit or Internet Banking - use Acc No: 03-0502-0508656-00, please include reference so WAS knows who is making the payment

Cash - please bring exact amount to meeting

It appears that a few members have not yet renewed their 2016-2017 subscriptions. If this is an oversight, can you please remedy it as soon as possible or include it as part of this year's subscription. Thanks.

WAS COUNCIL MEMBERS AND CONTACTS

Council Members

The following members were elected to Council at the Nov 2016 AGM

President: Antony Gomez
president@was.org.nz / 021_253_4979

Vice President: Duncan Hall
vice-president@was.org.nz

Secretary/Telescope custodian: Chris Monigatti
secretary@was.org.nz / 021_890_222

Treasurer: John Homes

Newsletter Editor: Gerard Coyle
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Membership Secretary: Janine Bidmead
membership@was.org.nz

Website : John Homes & Peter Woods
webmaster@was.org.nz

Council

Andrew Fuller

Edward Wilcock

Frank Andrews

Janine Bidmead

Murray Forbes

Peter Woods

Sarah Taylor

Postal Address: Wellington Astronomical Society, PO Box 3181, Wellington 6140, New Zealand

WAS ON FACEBOOK

Our Facebook page "Wellington Astronomical Society" is now operational. You can search for it on Facebook or click on this link https://www.facebook.com/WellingtonAstronomicalSociety/.

If you are a Facebook user, please use the page to receive up-to-date notifications of our Society's events and news. This is the easiest way to keep informed as to what is going on in the Society, as well as keeping up with astronomical news.

Remember you will need to interact occasionally with the page by liking or commenting on postings, or indicating whether you are coming to an event. Otherwise Facebook will, after a time, stop sending you new postings. So keep visiting the page as there are a number of Society events coming up in the next few months.

We also have Facebook group "WAS – Wellington Astronomical Society" https://www.facebook.com/groups/96304353012/ which is open for anyone to join by request. The public group is open for discussion or postings on astronomical news. The WAS Astrophotography Group https://www.facebook.com/groups/168473875811214/ is for those interested in astrophotography. It serves as a place to notify others of astrophotography gatherings at short notice and to display images captured by members.

Wellington Astronomical Society August 2017 Events

WAS August Meeting

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Date: Wednesday 2nd August

Time: 7:30pm,

Venue: Space Place at Carter Observatory

Lower Hutt War Memorial Library Astronomy Night:

Digital Sundials: What are they? How do they work? What can we learn from them? – Duncan Hall

Duncan Hall is a Chartered Professional Engineer. He is also Vice President of the Wellington Astronomical Society. He's had a long-term interest in solar-powered, low-powered, and no-powered timepieces.

We will head outside afterwards to look through telescopes provided by the Wellington Astronomical Society.

Date: Friday 4th August

Time: 6:30pm,

Venue: Lower Hutt War Memorial Library

WAS Astrophotography group / Dark Sky Observing

We are hoping to get special access to this site again both for astrophotography and dark sky observing. Please be at the gates by 7:15pm. The gates will be opened for cars to drive in and closed again at 7:30pm. There won't be anyone there to let you in if you are late. Any updates will be posted on the WAS Astrophotography Group Facebook page closer to the time. For further details or cancellations contact Edward 021_08304802 or Chris 021_ 890222.

Date: Saturday 19th August

Time: 7:30pm,

Venue (to be confirmed): Brooklyn Hill Turbine

Royal Society of New Zealand Hudson Lecture

The Hawking evaporation of black holes - Matt Visser

In 1973 Stephen Hawking proved that black holes slowly evaporate due to subtle quantum effects, leading to 44 years of confusion in the particle physics and general relativity communities.

While there is little doubt that Hawking's prediction is correct, and we even have some indirect experimental evidence, the devil is in the details — Matt will give a general non-specialist talk touching on black hole entropy, quantum information theory, and the foundations of both general relativity and quantum physics.

Dates: Wednesday 23rd August

Time: 6:00pm,

Venue: Te Whare Aparangi, Royal Society of New Zealand

WAS Observing Evening

See many wonderful objects, star clusters, galaxies, dying stars and nebulae. We will be focusing on objects around the galactic centre like the Lagoon, Trifid, Swan, and Eagle nebulae as well as a number of other Messier objects prominent in this part of the night sky.

Both Jupiter and Saturn will be visible from early evening. Come and learn how to star-hop through the night sky to find many of the various astronomical objects using the Society's Dobsonian telescopes.

Chris is often there on Friday evenings too so feel free to come along though it would be best to give him a ring on 021_ 890222 to check on conditions.

Dates: Saturday 26th August

Time: 7:00pm,

Venue: Tawa College

Total Eclipse of the Sun - 22nd August 2017

The total eclipse on August 22 (NZST) starts at sunrise in the north Pacific Ocean about half way between Hawaii and the eastern most part of Siberia. The total eclipse moves eastwards to enter the U.S.A. in Oregon a little south of Portland with Salem in the path. After crossing the U.S.A. the eclipse leaves the country from South Carolina with Charleston in the path. It heads across the Atlantic Ocean towards Africa, but ends at sunset still west of the continent and to the south of the Cape Verdi Islands.

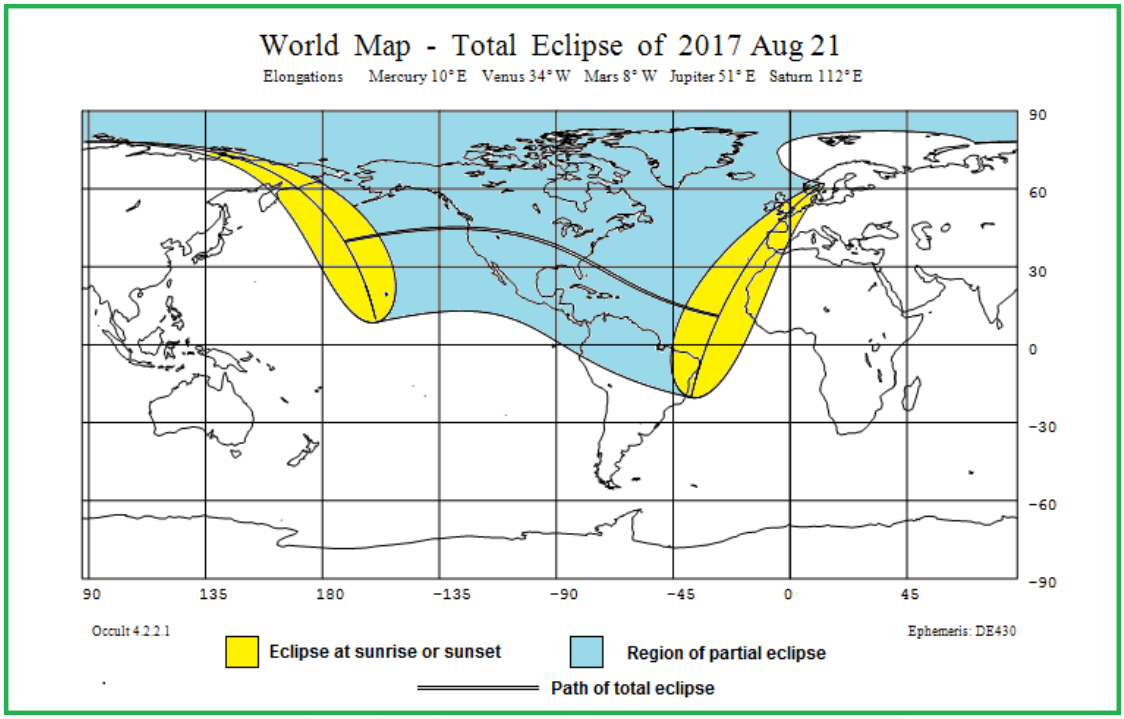
The greatest duration of totality is just over 160 seconds and occurs along a belt from south of St Louis, Missouri, to north of Nashville in Tennessee. The maximum path width of totality is 155 km.

No part of the eclipse is visible from New Zealand or Australia apart from the western coast of the latter where the eclipse starts as the Sun sets.

For a detailed map showing the path across the U.S.A. Eclipse path (Adapted from RASNZ website - https://www.rasnz.org.nz/in-the-sky/eclipses)

The eclipse will be livestreamed from https://eclipse2017.nasa.gov/eclipse-live-stream. Totality starts at 3:46am (NZST) and ends at 8:01am with the greatest eclipse at 6:26:40am.

Adapted from the RASNZ website



The total solar eclipse, which will extend across parts of the U.S., takes place on Aug. 22 (NZST). In this image solar prominences can be seen along the limb (in red) as well as extensive coronal filament

Image by Luc Viatour / www.Lucnix.be

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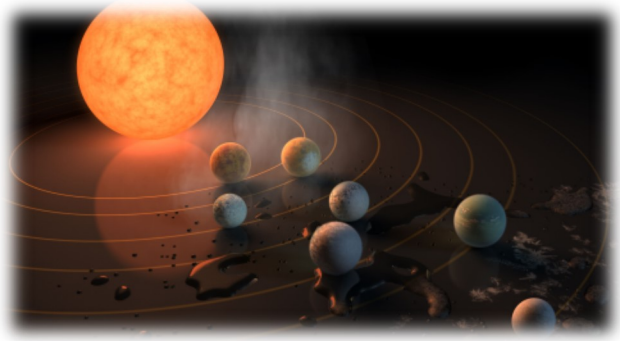
There's A Compelling Reason Scientists Think We've Never Found Aliens, And It Suggests Humans Are Already Going Extinct

Unchecked climate change would eventually lead to widespread devastation on Earth. Rising seas would inundate coastal cities like Miami, searing heat would increase human mortality, and acidic oceans would become inhospitable to fish and coral, leaving behind little but rubbery masses of jellyfish.

These consequences of human activity could be the thing that prevents our civilization from advancing much further. In a particularly extreme scenario, it could even wind up wiping us from the face of the Earth.

That may sound unlikely, but it's the answer some scientists are giving to a perplexing question: Why haven't we encountered intelligent alien life? *Read more (IFL Science)*

Bad News for Life: TRAPPIST-1 Planets' Atmospheres May Have Been Destroyed



The potentially Earth-like planets in the TRAPPIST-1 system may not be so conducive to life after all, two new studies report.

Intense radiation and particles streaming from their host star have likely taken a huge toll on all seven of these worlds, even the three that apparently lie within the "habitable zone," where liquid water could theoretically exist on a planet's surface, according to the new research.

"Because of the onslaught by the star's radiation, our results suggest the atmosphere on planets in the TRAPPIST-1 system would largely be destroyed," Avi Loeb, co-author of one of the studies, said in a statement. *Read more (Space.com)*

New Research suggest Andromeda and Milky Way galaxies are already touching, might collide sooner than we think

The Milky Way and Andromeda galaxy won't collide for the next 4 billion years. But a recent discovery of a massive halo of hot gas close to Andromeda Galaxy may mean that our galaxies are already touching. Astrophysicist Nicholas Lehnerfrom University of Notre Dame, led a group of scientists using the Hubble Space Telescope to detect an enormous halo of hot, ionized gas about 2 million light years in diameter around the galaxy. *Read more (Physics-Astronomy)*

Occultations for August 2017

Total Lunar Occultations

- The first lunar occultation for the month is on Thursday 24th August about an hour after sunset. The moon is not far off being new but is only 15° above the horizon, which may cause problems if you live in a valley.
- The next lunar occultation is at the end of the month, on Wednesday 30th August. The event takes place 1.5 hours after sunset, so there won't be any problems with a twilight sky. The star is a K0 spectral type, i.e. it is quite red and so a red filter may be useful to reduce any glare that may be present from the 59% illuminated moon. The star & moon are 65° above the horizon, so living in a valley won't cause any problems for this event.
- The last two occultations take place on the same night, Friday 1st September. These events have been included in this newsletter as they take place before our September meeting. The first occultation takes place during twilight. As the star is a K4 spectral type, it is again a very red star and a red filter will be useful to increase the contrast between the blue, twilight sky and the red star. The next event is just 50 minutes later, after the end of twilight. This is believed to be a double star, but the exact brightness of the individual components is unknown. The components are predicted to disappear 0.6 seconds apart, corresponding to 15 frames on a PAL video camera – which should produce a long step in the light-curve.

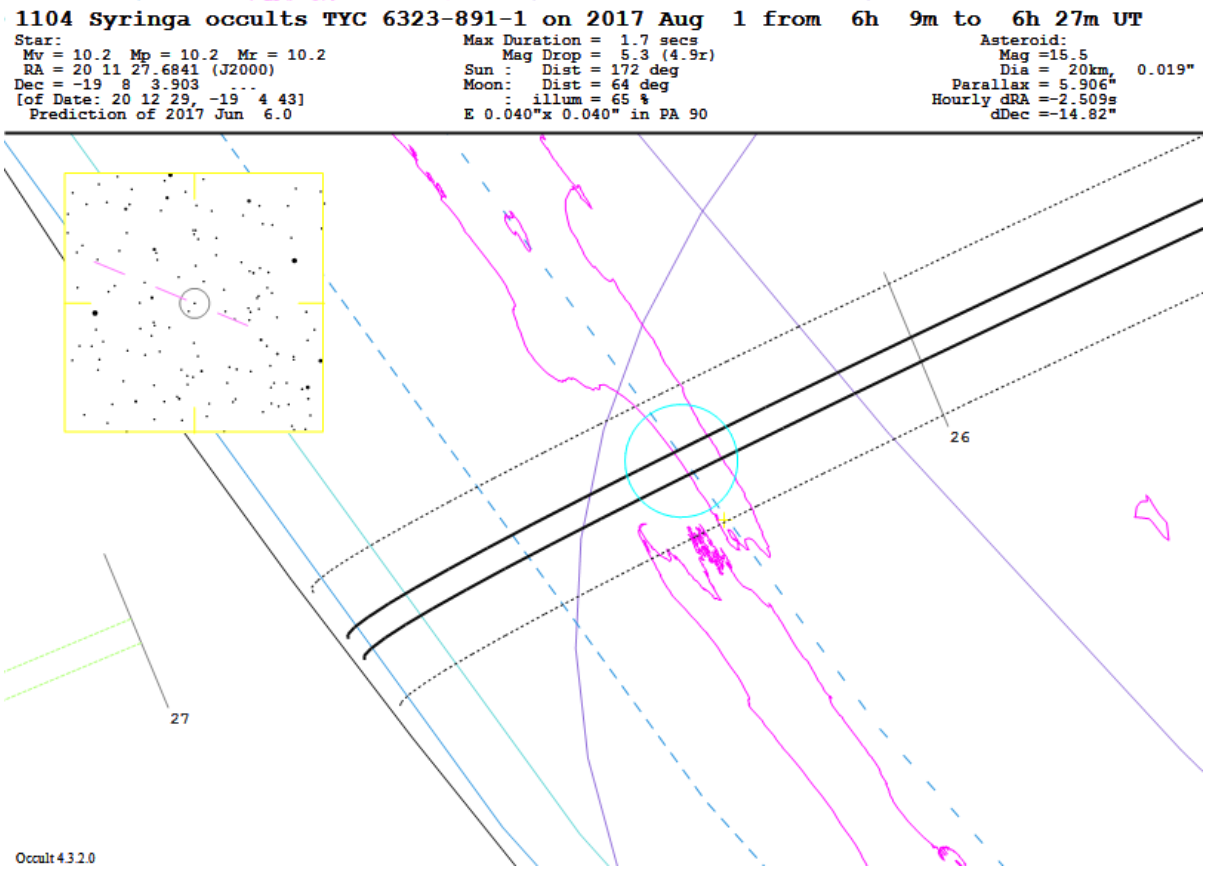
day			Time			P	Star		Sp	Mag	Mag		%	Elon	Sun	Moon	
y	m	d	h	m	s		No	D		v	r	V	ill		Alt	Alt	Az
17	Aug	24	06	53	58.3	D	1758		G5	6.9	6.4		7+	031		15	287
17	Aug	30	07	39	35.7	D	2460		K0	6.0	5.5		59+	100		65	334
17	Sep	01	06	42	59.6	D	161842		K4	6.9	6.0	s	77+	122	-10	59	053
17	Sep	01	07	33	36.9	D	2733	C	A1	6.8	6.7	s	77+	123		65	032
double 7.2 7.2 0.20" 90.0, dT = +0.6sec																	

Minor Planet Occultations

The first minor planet occultation for August is on Tuesday 1st at 06:26:18UT. This is only an hour after sunset, so it's not surprising that there is only one pre-point star before the event. I'd recommend instead doing the pre-point during the previous evening. Even then, there are only a few bright pre-point stars. The star being occulted is quite faint (magnitude 10.2) but is still much brighter than the minor planet, so the star will seem to completely disappear during the occultation. The diameter of the minor planet is estimated to be 20 km, so the duration of the disappearance will be at most 1.7 seconds. The path of the shadow is predicted to be north of Wellington, but the uncertainty in this prediction is such that there is a 9% that it could actually be seen from Wellington.

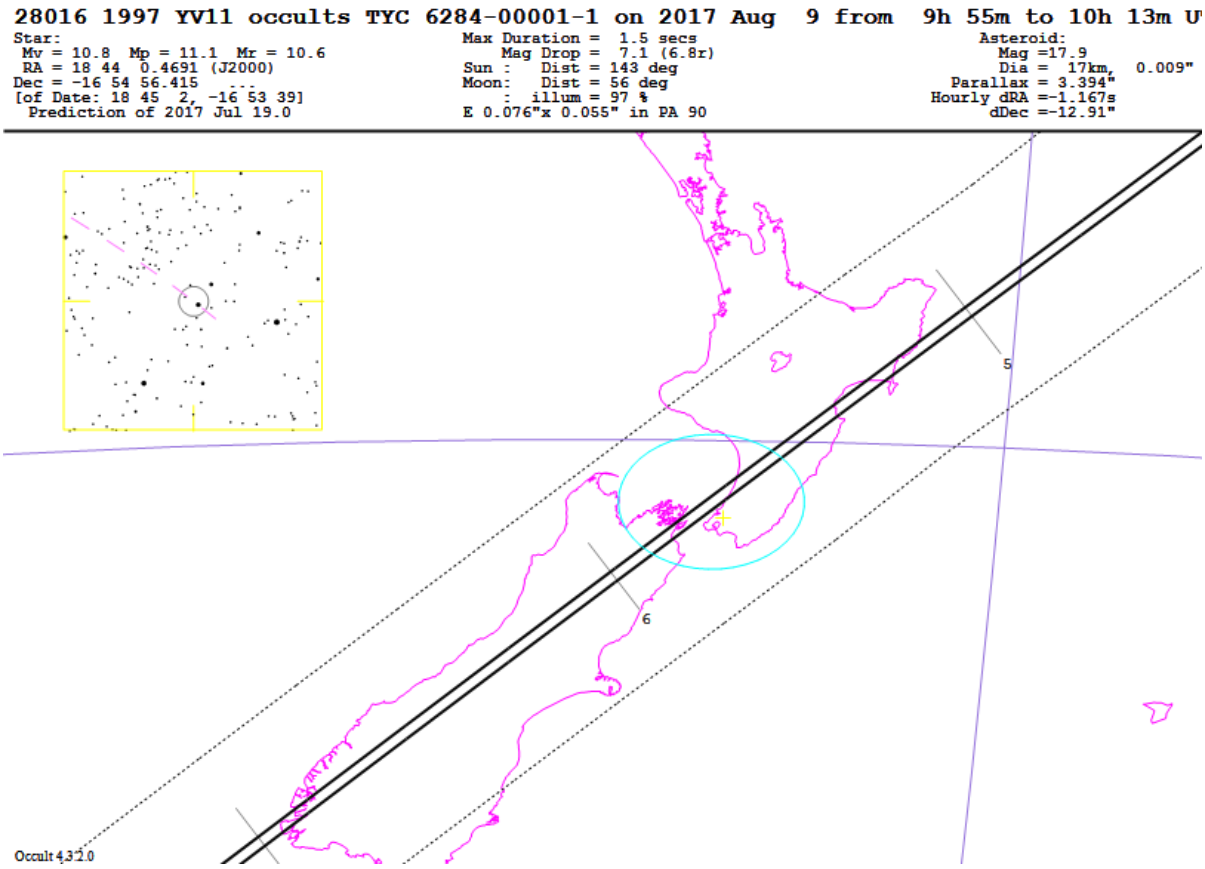
Point Time			Star	J2000 RA		Dec		Dec Offset	SAO
h	m	s	mag	h	m	o	'	ArcMin	
06	07	06	5.9	19	52.2	-19	3	-4.9	163060
Previous evening									
11	40	16	6.4	01	22.5	-19	5	-5.5	147767
10	35	31	6.5	00	17.5	-19	3	-7.7	147205
09	12	21	6.4	22	54.1	-19	11	0.0	165365

Point Time			Star	J2000 RA		Dec		Dec Offset	SAO
h	m	s	mag	h	m	o	'	ArcMin	
07	48	31	6.6	21	30.0	-19	9	-0.7	164433
07	26	06	6.7	21	07.5	-19	5	-3.9	164152
07	21	22	7.0	21	02.8	-19	15	5.8	164087
07	18	13	6.3	20	59.6	-19	2	-6.9	164043
07	12	11	6.8	20	53.5	-19	7	-2.1	163954
07	06	53	6.8	20	48.2	-19	16	6.8	163887



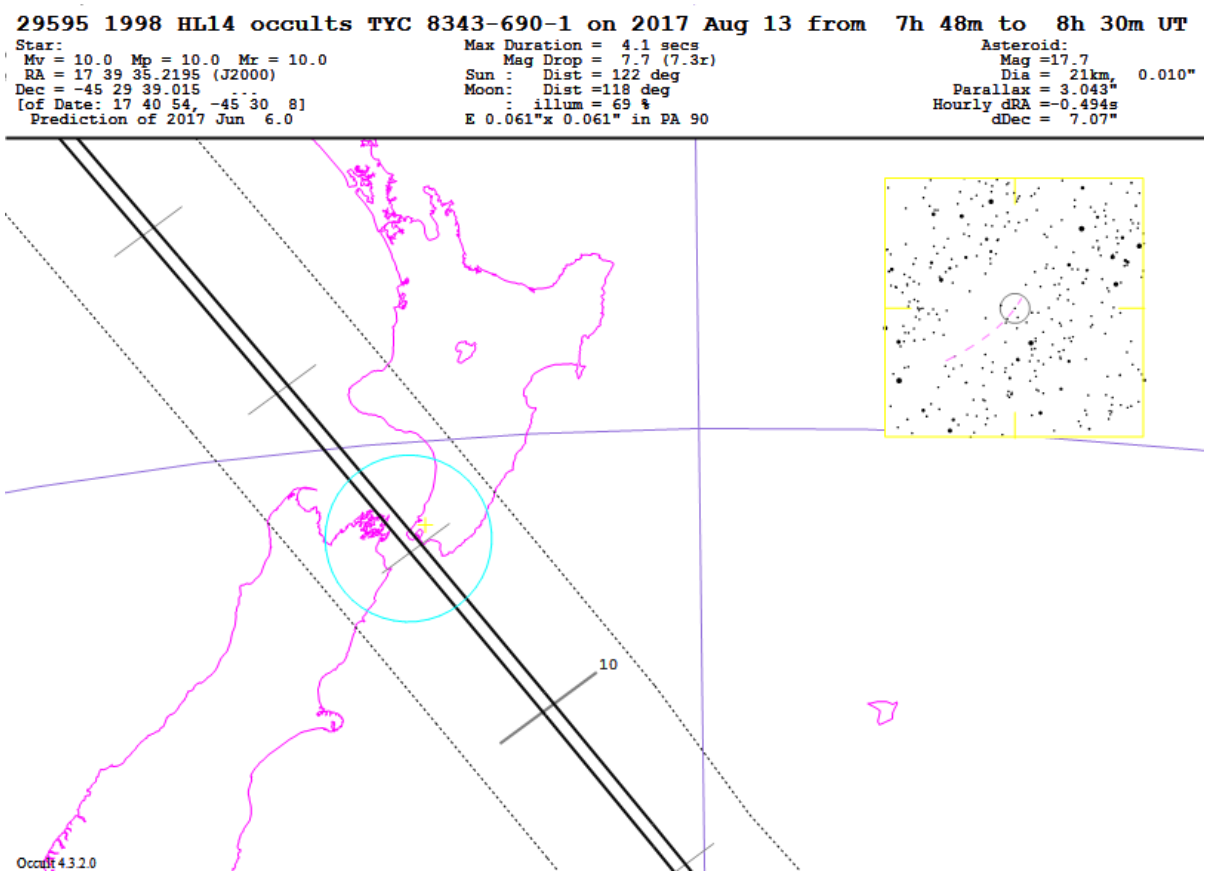
The next occultation is a week later, on Wednesday 9th at 10:05:42 UT. The moon is nearly full (97% illuminated) and fairly close in the sky (56° away) so you'll probably need to use a pre-point star to find the target star. The shadow is predicted to track out at sea to the west of Wellington, but there is still a 5% chance that the path could actually pass over Wellington. Again, this is a small minor planet and so the occultation will be brief (at most 1.5 seconds) – so a video camera/recorder system will be needed to reliably measure the event. SAO 158840 looks to be a good pre-point star, while SAO 159563 could be used to confirm you've done the pre-point right.

Point Time	Star	J2000 RA	Dec	Dec Offset	SAO
h m s	mag	h m	o '	ArcMin	
08 18 01	6.3	16 56.0	-16 48	-3.8	160171
07 15 58	4.1	15 53.8	-16 44	-7.0	159563
06 55 07	5.5	15 32.9	-16 51	0.9	159335
06 50 28	5.6	15 28.3	-16 43	-7.2	159280
06 13 10	2.8	14 50.9	-16 3	-47.0	158840



The third planet occultation for August is on Sunday 13th at 08:11:06. We continue the run of small minor planets, with this one being about 21 km in diameter, and the disappearance being at most 4.1 seconds long. The shadow is predicted to travel across the south of Wellington, but the uncertainty in the prediction means I have a 6% chance is seeing it from my observatory in the Hutt Valley. Another way if gauging this is to look at the cyan ellipse drawn on the map below. The size of the ellipse along the track indicates the uncertainty about the predicted time of the occultation while the size of the ellipse at right angles to the track indicates the uncertainty about the predicted location of the shadow's path. The brightest of the pre-point stars, SAO 225712, requires you to find that star immediately after sunset.

Point Time			Star	J2000 RA		Dec		Offset	SAO
h	m	s	mag	h	m	o	'	ArcMin	
07	54	20	6.7	17	22.8	-45	37	7.6	227880
07	36	41	6.3	17	05.1	-45	30	1.4	227601
07	32	09	6.6	17	00.5	-45	27	-1.6	227547
06	56	35	6.3	16	24.9	-45	21	-6.8	226730
06	43	01	6.7	16	11.3	-45	20	-7.5	226562
06	22	01	6.1	15	50.3	-45	24	-2.9	226263
05	54	28	3.4	15	22.7	-44	41	-45.1	225712

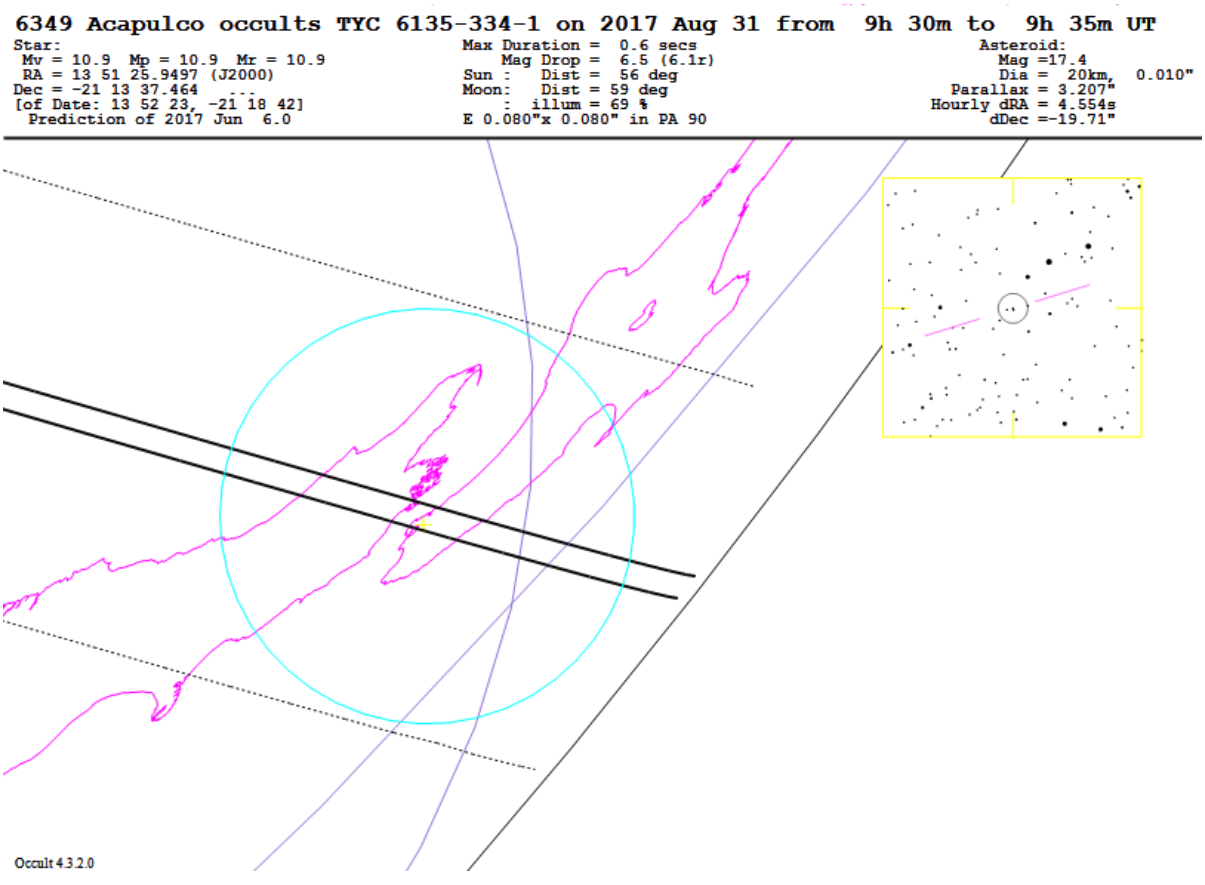


The last occultation is on the final day of August, being on Thursday 31st at 09:35:12 UT. The shadow's path is predicted to be a bit north of Wellington travelling across the Kapiti Coast and Hutt Valley. There may be some difficulties due to the low altitude (13°) of the star above the western horizon. There aren't any bright pre-point stars on the same night so I've also listed some for the previous evening;

Point Time			Star	J2000 RA		Dec		Offset	SAO
h	m	s	mag	h	m	o	'	ArcMin	
08	16	29	6.4	12	32.5	-21	13	-0.3	180879
06	35	46	7.0	10	51.6	-21	15	1.8	179278
05	51	22	6.7	10	07.1	-21	15	1.7	178431

Previous evening

16 03 49	7.0	20 17.1	-21 19	-3.1		
15 17 45	6.1	19 30.9	-21 19	-2.4	188219	
14 56 40	2.9	19 09.8	-21 1	-19.2	187756	
14 51 36	3.8	19 04.7	-21 44	24.0	187643	
14 44 40	3.5	18 57.7	-21 6	-13.9	187504	
14 40 57	5.7	18 54.0	-21 22	1.4	187422	
14 24 54	5.9	18 37.9	-21 24	4.0	187071	
14 00 50	3.8	18 13.8	-21 4	-15.7	186497	
13 55 43	6.4	18 08.6	-21 27	7.9	186343	
13 54 16	6.2	18 07.2	-21 27	7.6	186302	
12 04 21	6.6	16 17.0	-21 18	2.0	184285	
12 01 03	6.7	16 13.7	-21 24	7.8	184240	
11 54 12	3.9	16 06.8	-20 40	-35.9	184123	
11 13 35	7.0	15 26.1	-21 23	7.6	183466	
10 34 48	6.1	14 47.2	-21 19	5.0	182873	
10 33 46	6.4	14 46.2	-21 11	-3.9	182858	



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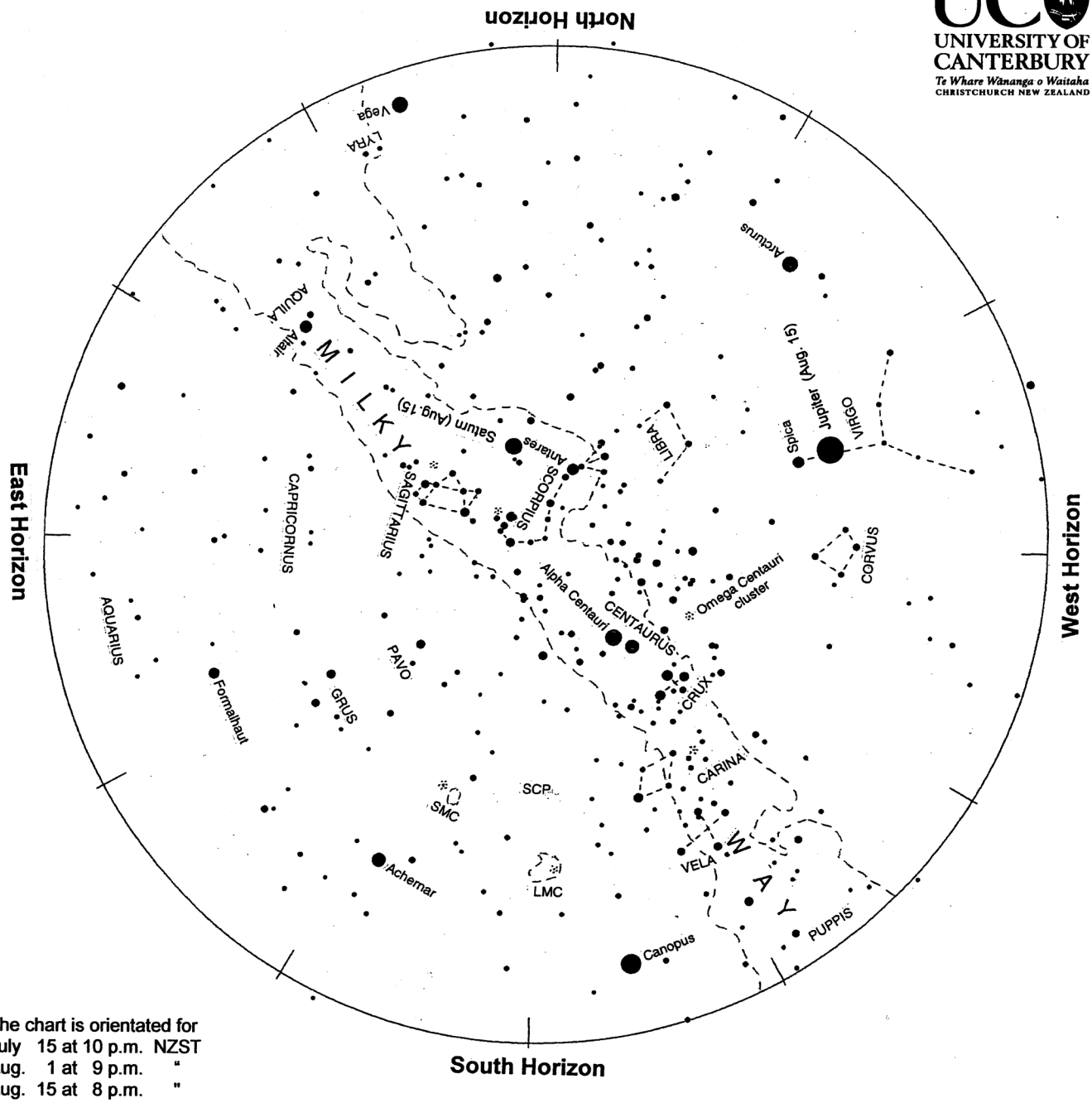
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND



The chart is orientated for
July 15 at 10 p.m. NZST
Aug. 1 at 9 p.m. "
Aug. 15 at 8 p.m. "
Sep. 1 at 7 p.m. "

Evening sky in August 2017

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.

Jupiter is the bright 'evening star', appearing in the northwest of the zenith sky soon after sunset. Saturn is a bright 'star' east of overhead with orange Antares above it. Mercury is low in the west, above the sunset point, for the first half of the month. (It sets before 8 pm, so isn't on the chart.) Orange Arcturus is in the northwest, often twinkling red and green. Vega is on the north skyline. The Pointers and Crux, the Southern Cross, are midway down the southwest sky. Canopus, low in the south, twinkles all colours. The Milky Way spans the sky.

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 Night Sky in August

Three naked-eye planets are visible in the early evening sky for most of the month. Jupiter is northwest of overhead, the brightest 'star' in the sky. Saturn is northeast of overhead, the brightest 'star' in its part of the sky but fainter than Jupiter. Above Saturn is orange Antares. Mercury is low in the west, above the sunset point, for the first half of the month before disappearing in the twilight.

Bright stars are widely scattered over the sky. Vega on the north skyline is balanced by Canopus low in the south. Orange Arcturus is in the northwest, twinkling red and green as it sets. The Southern Cross, Crux, and the Pointers are midway down the southwest sky. The Milky Way spans the sky from northeast to southwest.

Jupiter, high in the west and golden-coloured, sets steadily earlier through the month: at 11 pm at the start of August and after 9 pm at the end. Saturn, cream-coloured, stays in the sky most of the night, setting in the southwest in the morning hours. Jupiter and Saturn are both well placed for evening viewing in a telescope. Any small telescope will show the four 'Galilean' moons of Jupiter, though not every night as the moons can disappear behind Jupiter or hide in its shadow. Saturn's ring is visible in any telescope magnifying 20x or more. Jupiter is 890 million km away and Saturn 1400 million km away mid-month. The Moon appears close to Saturn on the 3rd and passes Jupiter on the 25th and 26th.

Mercury (not shown on the chart) ends its evening sky appearance as it passes between the Earth and the Sun. It sets before 8 pm at the beginning of the month, the brightest 'star' in the lower western sky. By the 20th it is setting before 7 pm, an hour after the Sun, and fading. It disappears soon after.

Midway down the southwest sky are 'The Pointers ', Beta and Alpha Centauri. They point down and rightward to Crux the Southern Cross. Alpha Centauri is the third brightest star and the closest of the naked eye stars, 4.3 light years* away. Beta Centauri, like most of the stars in Crux, is a blue-giant star hundreds of light years away and thousands of times brighter than the sun.

Antares marks the body of the Scorpion. The Scorpion's tail hooks around the zenith like a back-to-front question mark. Antares and the tail make the 'fish-hook of Maui' in Maori star lore. Antares is a red giant star: 600 light years away and 19 000 times brighter than the sun. 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.

The Milky Way 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, 30 000 light years away, is in Sagittarius. The actual centre is hidden by dust clouds in space. The nearer dust clouds 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 low in the south, 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.

Brilliant Venus rises in the northeast after 5 a.m. all month. It is bright enough to cast shadows in dark locations. The Moon is above Venus at dawn on the 19th. By mid-morning the two will be due north and level, with Venus on the right. Once the Moon is found, one can then see the planet in daylight by eye.

The Moon grazes the Earth's shadow on the morning of the 8th. The top of the Moon will begin to darken around 5 a.m. By 6:20 the top quarter of the Moon will be in shadow. Moonset is soon after.

A total solar eclipse crosses the United States on the 22nd NZST. Nothing is seen from New Zealand.

*A light year (l.y.) is the distance that light travels in one year: nearly 10 million million km or 1013 km. Sunlight takes eight minutes to get here; moonlight about one second. Sunlight reaches Neptune, the outermost major planet, in four hours. It takes 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