

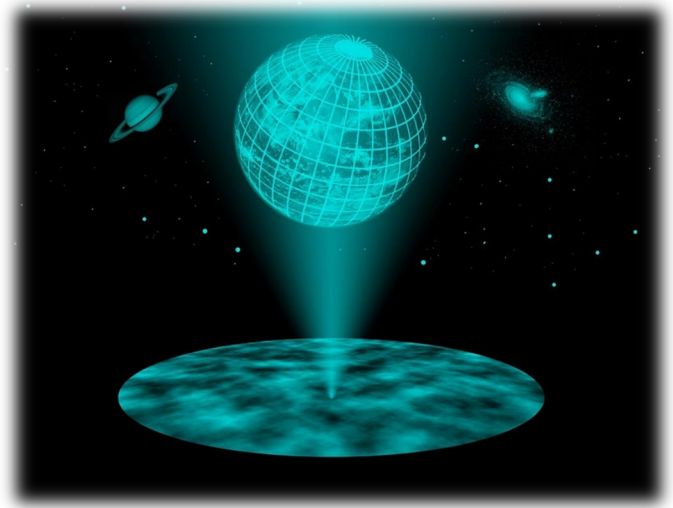
The next WAS meeting will be held on Wednesday 7th of June 2017 at 7:30 pm at Space Place, Carter Observatory, Upland Rd, Kelburn, Wellington

So, our Universe is a Hologram??

Antony Gomez

Two corner stones of modern physics are the theories of quantum mechanics and general relativity. Both theories are extremely good at predicting results in their own realms - quantum mechanics in the realm of the microscopic world; and general relativity in the realm of space and time. However, both theories are incompatible with each other which leaves theorists searching for the holy grail of physics, a theory of quantum gravity. This presentation will take a glimpse into some of the more recent developments in this field. Our world where gravity, space and time are considered fundamental properties of our Universe seems to be no longer true, and a new fascinating picture of our Universe is beginning to emerge, one that stretches beyond our imagination.

Antony is the current president of the Wellington Astronomical Society. As a child he looked up at the stars but it wasn't till 2000 that he had his first look through a telescope. Now he is passionate about showing others the wonders of the night sky. He has a keen interest in the physical sciences, especially in quantum physics and cosmology. As a past scientist working in climate change, he has spent a short time in Antarctica, been sea-sick on a research vessel in the middle of the Southern Ocean and suffered altitude sickness while visiting the Keck and other Telescopes on the top of Mauna Kea, Hawaii.



Inside this issue:

Wellington Astronomical Society June 2017 Events	3
WAS May Meeting Talk "The Analemma, Dials and Digits: Some Unusual Combinations or Clocks of the Really Long Now" by Duncan Hall	4
RASNZ 2017 Conference Report	4
The Fizzy seas of Titan	7
Occultations for June 2017	7
June Night Sky Chart	15
The Night Sky in June	16

2016 — 2017 SUBSCRIPTIONS DUE

The new subscription year began 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 2016-2017

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 quite a few members from last year have not yet renewed their subscriptions. If this is an oversight, can you please remedy it as soon as possible.

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
editor@was.org.nz

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/1684738758511214/> 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 June 2017 Events

WAS June Meeting

So, our Universe is a Hologram?? by Antony Gomez

Two corner stones of modern physics are the theories of quantum mechanics and general relativity. Both theories are extremely good at predicting results in their own realms - quantum mechanics in the realm of the microscopic world; and general relativity in the realm of space and time. However, both theories are incompatible with each other which leaves theorists searching for the holy grail of physics, a theory of quantum gravity. This presentation will take a glimpse into some of the more recent develop-

ments in this field. Our world where gravity, space and time are considered to fundamental properties of our Universe seem to be no longer true, and a new fascinating picture of our Universe is beginning to emerge, one that stretches beyond our imagination.

Antony is the current president of the Wellington Astronomical Society. As a child he looked up at the stars but it wasn't till 2000 that he had his first look through a telescope. Now he is passionate about showing others the wonders of the night sky. He has a keen interest in the physical sciences, especially in quantum physics and cos-

mology. As a past scientist working in climate change, he has spent a short time in Antarctica, been sea-sick on a research vessel in the

middle of the Southern Ocean and suffered altitude sickness while visiting the Keck and other Telescopes on the top of Mauna Kea, Hawaii.

Date: Wednesday 7th June

Time: 7:30pm,

Venue: Space Place at Carter Observatory

Society Observing Evening:

The new WAS observatory is operational at Tawa College. See the many wonderful objects, star clusters, galaxies, dying stars and nebulae around and near the Southern Cross, the spectacular globular cluster 47 Tucanae and the Tarantula Nebula in the Large Magellanic Cloud (LMC). Both

Jupiter and Saturn will be visible from early evening. We are keen to train up more people to use the Dobsonian telescopes and also to learn how to star-hop through the night sky to find astronomical objects. 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.

Date: Saturday 17th June

Time: 7:00pm,

Venue: Tawa College

WAS Astrophotography group / Dark Sky Observing

We will get special access to trial this site both for astrophotography and dark sky observing. Please be at the gates by 6:45pm. The gates will be opened for cars to drive in and closed again at 7pm. 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 24th June

Time: 7:00pm,

Venue: Brooklyn Hill Turbine

Astronomy Night

Maramataka – the lunar calendar by Ockie Simmons

Hear Ockie Simmonds talk about maramataka, the role of Matariki, and

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

Date: Friday 30th June

Time: 6:30pm,

Venue: Lower Hutt War Memorial

WAS May Meeting Talk “The Analemma, Dials and Digits: Some Unusual Combinations or Clocks of the Really Long Now” by Duncan Hall

The May meeting talk was given by Duncan Hall on the subject of the Analemma and how it used in the design of sundials.

The Analemma is the path created when the position of the sun is taken at the same time of the day over the period of one year. It closely resembles a figure eight with one of the loops considerably smaller than the other.

Duncan touched on the main reasons for the shape of the Analemma

(basically, the earth's orbit around the sun is not a perfect circle, and this affects the position of the sun in the sky as seen from any point on the earth's surface), but his main topic was how it is used to create digital sundials.

Unlike the traditional type of sundial, which shows time by the position of a shadow cast by the sun, digital sundials use the light from the sun to illuminate a digital display. The basic principle is that the light is collected, then depending on the current position of the sun in the sky, is channelled by the sundial

to illuminate particular panels in the display. By arranging the channels so that specific parts of the display are only illuminated when the sun is in a particular position in the sky, the display can be made to show the local time in a digital format.

To conclude his talk, Duncan demonstrated some examples of digital sundials, allowing the members to see how they operated.

Gerard Coyle

RASNZ 2017 Conference Report

We (John and Aline Homes) flew down to Dunedin a few days before the Conference, so that Aline could meet up with a colleague, and we could have a look round Dunedin before the Conference started. On the Thursday night, we picked a restaurant near the Otago Museum, called Ombrello's, for dinner. When we arrived, we were led through the bar, and the casual dining courtyard, towards the restaurant, only to be interrupted by glad cries of “Aline!” A group of graduate students, several known to Aline, were celebrating the graduation as Masters of some of their number, and we could offer our congratulations.

The Conference started on Friday, with a trip on the Monarch out to Taiaroa Heads, to see seabirds, including the magnificent Royal Albatrosses, seals, and a solitary sea lion. On the return trip we were delayed a little by being stuck behind a timber carrier coming into the port (no overtaking in the channel), but were still in good time for

dinner before the opening ceremony, unlike in 2010.

After the ceremony, we had the Fellow's address from Jennie McCormick, who gave us a brief history of her journey to become one of New Zealand's most notable astronomers. Highlights have included her work with MicroFUN following up reported microlensing events to look for exoplanets, her discovery of an asteroid 386622 New Zealand (so named by her), and the time a media celebrity, actress Gates McFadden of Star Trek: The Next Generation, asked Jennie for her autograph.

Then we had two days of presentations. As usual, these ranged from personal stories of “how we did this” to highly technical results. I will not attempt to go through them all, but just mention a few.

Grant Christie from Auckland described how, inspired by the efforts of Steve Butler, a group from Auckland

arranged a Dark Sky Survey, and it was surprising how close to the city some really dark areas were.

Maria Pozza gave us an update on progress in getting New Zealand law up to scratch for activities in space.

John Drummond described his MSc. project to measure the distance to a quasar, using the sort of off the shelf equipment readily available to amateurs.

At the beginning of the month Duncan Hall had given WAS a presentation on the Analemma, and digital sundials. At the Conference he presented a few excerpts, which was all he had time for.

Invited guest speaker Joss Bland-Hawthorn spoke on the change in astronomical instruments from Optics to Photonics.

Ian Griffen of Otago Museum recounted how a flight on the SOFIA airborne telescope led him to charter a plane to fly south and into the Aurora Australis.

Oana Jones, one of the Otago Museum staff helping run the Conference, also told us of a project to provide rural schools with gear for meteor tracking, based on an all-sky camera mounted on a Raspberry Pi.

The Conference was followed by a public lecture by Joss Bland-Hawthorn on the Black Hole at the centre of our galaxy, which is at the moment unusually quiet.

Present for part of the Conference was Norman Dickie, who turned 100 a few months ago, although a health issue a

few days before meant he could not attend the whole Conference.

After the Conference we stayed on for the 11th Trans-Tasman Symposium on Occultations, organised by our own Murray Forbes. This time, as well as the presentations, there were some hands-on exercises on analyzing and reporting events. In spite of some hiccups, these were largely successful and it was agreed that more such exercises would be a good idea for future Symposia.

The 2018 RASNZ Conference will be in Christchurch, at the Arts Centre. It

will be from Friday 4th May to Sunday 6th May. Registrations and a call for presentations will open early next year.

The 12th Trans-Tasman Symposium on Occultations will be held in Ballarat, Victoria, Australia, in conjunction with the 2018 National Australian Convention of Amateur Astronomers, which will be over Easter 2018 (30th March to 2nd April). More details will be available later.

John Homes

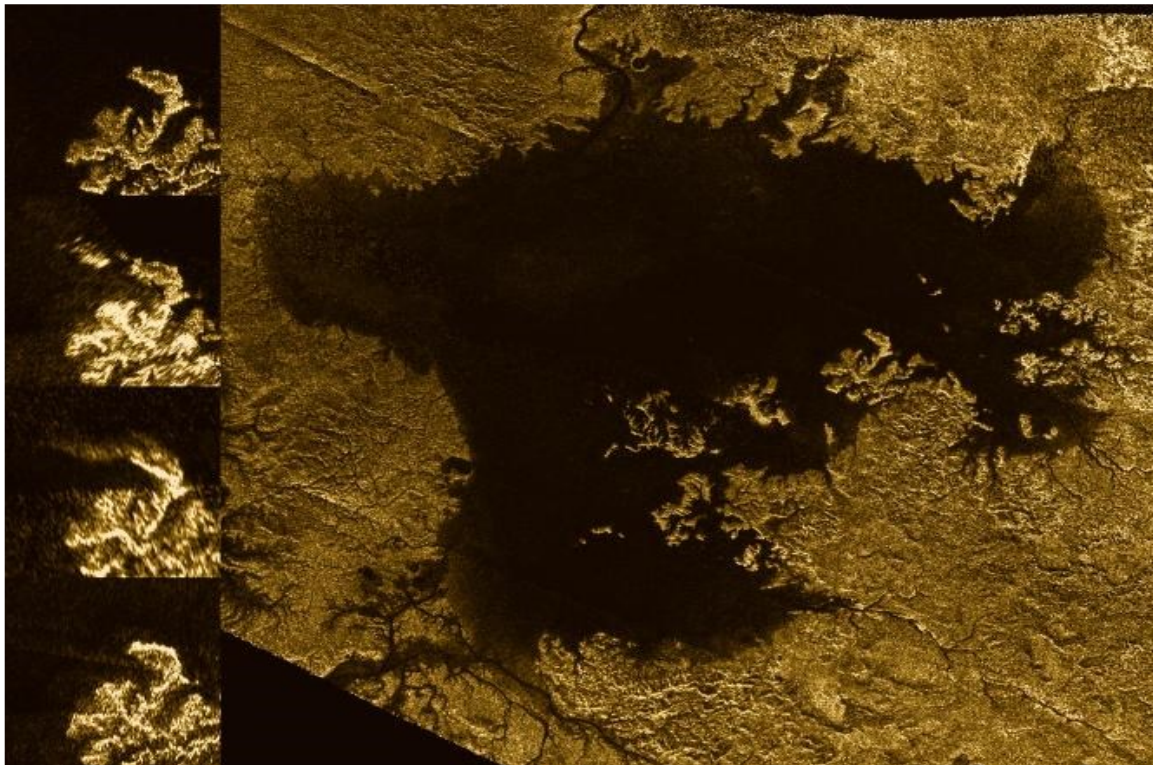
The Fizzy Seas of Titan



This article is provided by NASA Space Place.

With articles, activities, crafts, games, and lesson plans, NASA Space Place encourages everyone to get excited about science and technology.

Visit spaceplace.nasa.gov to explore space and Earth science!



Radar images from Cassini showed a strange island-like feature in one of Titan's hydrocarbon seas that appeared to change over time. One possible explanation for this "magic island" is bubbles. Image credits: NASA/JPL-Caltech/ASI/Cornell

With clouds, rain, seas, lakes and a nitrogen-filled atmosphere, Saturn's moon Titan appears to be one of the worlds most similar to Earth in the solar system. But it's still alien; its seas and lakes are full not of water but liquid methane and ethane.

At the temperatures and pressures found on Titan's surface, methane can evaporate and fall back down as rain, just like water on Earth. The methane rain flows into rivers and channels, filling lakes and seas.

Nitrogen makes up a larger portion of the atmosphere on Titan than on Earth. The gas also dissolves in methane, just like carbon dioxide in soda. And similar to when you shake an open soda bottle, disturbing a Titan lake can make the nitrogen bubble out.

But now it turns out the seas and lakes might be fizzier than previously thought. Researchers at NASA's Jet Propulsion Laboratory recently experimented with dissolved nitrogen in mixtures of liquid methane and ethane under a variety of temperatures and pressures that would exist on Titan. They measured how different conditions would trigger nitrogen bubbles. A fizzy lake, they found, would be a common sight.

On Titan, the liquid methane always contains dissolved nitrogen. So when it

rains, a methane-nitrogen solution pours into the seas and lakes, either directly from rain or via stream runoff. But if the lake also contains some ethane—which doesn't dissolve nitrogen as well as methane does—mixing the liquids will force some of the nitrogen out of solution, and the lake will effervesce.

It will be a big frothy mess," says Michael Malaska of JPL. "It's neat because it makes Earth look really boring by comparison."

Bubbles could also arise from a lake that contains more ethane than methane. The two will normally mix, but a less-dense layer of methane with dissolved nitrogen—from a gentle rain, for example—could settle on top of an ethane layer.

In this case, any disturbance—even a breeze—could mix the methane with dissolved nitrogen and the ethane below. The nitrogen would become less soluble and bubbles of gas would fizz out.

Heat, the researchers found, can also cause nitrogen to bubble out of solution while cold will coax more nitrogen to dissolve. As the seasons and climate change on Titan, the seas and lakes will inhale and exhale nitrogen.

But such warmth-induced bubbles could pose a challenge for future seafaring spacecraft, which will have an

energy source, and thus heat. "You may have this spacecraft sitting there, and it's just going to be fizzing the whole time," Malaska says. "That may actually be a problem for stability control or sampling."

Bubbles might also explain the so-called magic islands discovered by NASA's Cassini spacecraft in the last few years. Radar images revealed island-like features that appear and disappear over time. Scientists still aren't sure what the islands are, but nitrogen bubbles seem increasingly likely.

To know for sure, though, there will have to be a new mission. Cassini is entering its final phase, having finished its last flyby of Titan on April 21. Scientists are already sketching out potential spacecraft—maybe a buoy or even a submarine—to explore Titan's seas, bubbles and all.

Marcus Woo

Want to teach kids about exoplanets? Go to the NASA Space Place and see our video called, "Searching for other planets like ours": <https://spaceplace.nasa.gov/exoplanet-snap/>

Occultations for June 2017

Total Lunar Occultations

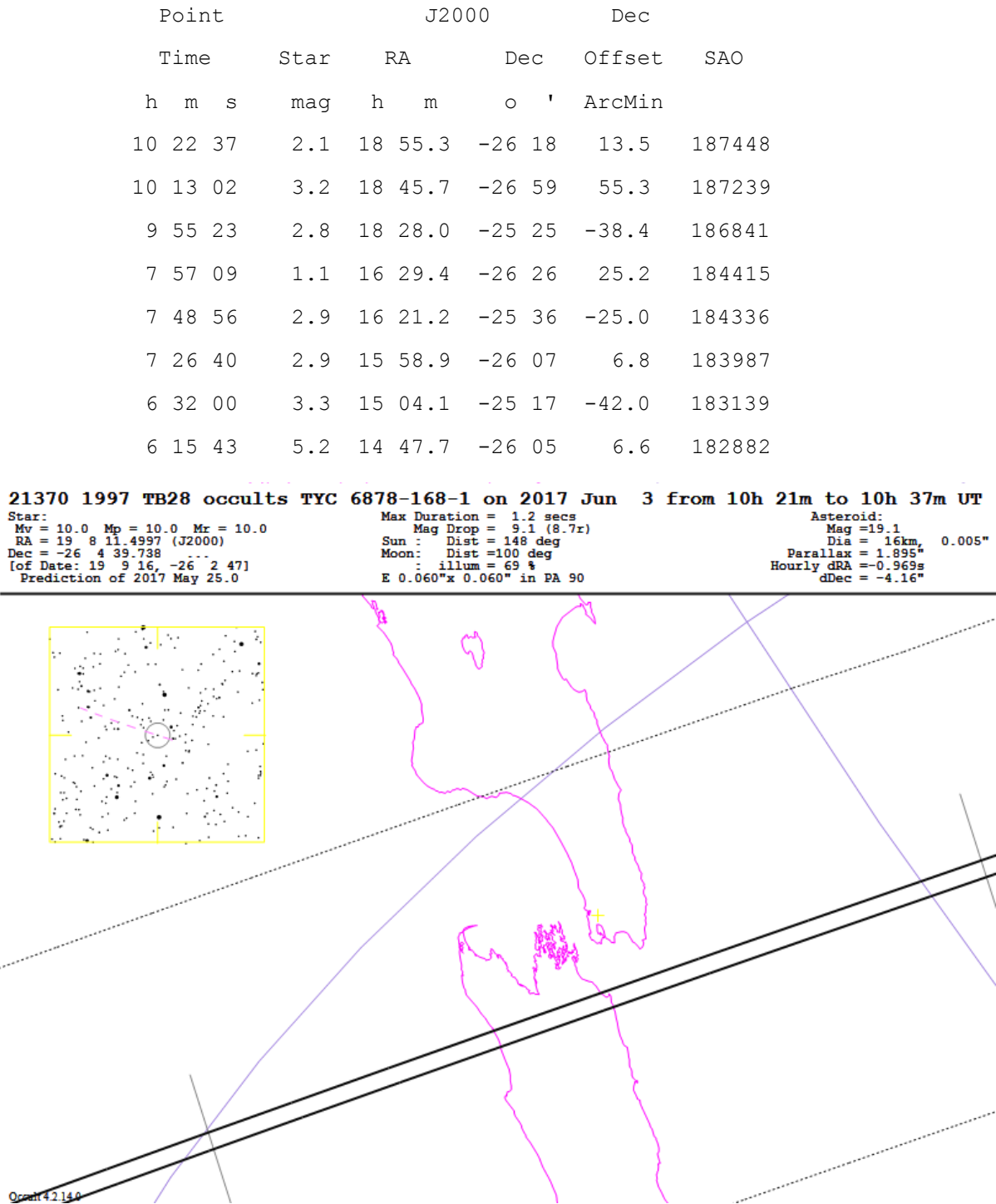
There are only two worthwhile lunar occultations during June:

- The first event for the month is on Monday 26 June at 05:31pm, which is during twilight. Fortunately the star is reasonably bright (magnitude 5.9) and is disappearing behind the dark limb on a nearly new moon (only 6% illumination). The moon is quite low in the sky, being only 17° above the NW horizon – which may be difficult if you live in a valley.
- The next event is at the beginning of July but before our next meeting so I have included it in this newsletter. It is the disappearance of a suspected double star on Sunday 2nd July, at 10:36pm. The brightness of each component is given as the same value, which indicates these values aren't actually known and is calculated from the stars combined brightness. The time between disappearances of each component is given as -0.05 seconds, so the step will only last 1-2 frames on the video camera. Nevertheless, the star is part of the Kepler2 program and so is worth attempting.

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	Jun	26	05	31	18.8	D	1259		A9	5.9	5.9		06+	029	-6	17	314
17	Jul	02	10	36	03.7	D	1965	P	A1	6.5	6.5		63+	105		34	296
Double: ** 7.3 7.3 0.050" 350.0, dT = -0.05sec :																	
1965 is in the Kepler2 program {ID = 212801410}																	

Minor Planet Occultations

The first minor planet occultation for June is on Saturday 3rd at the civilised hour of 10h 35m 30s UT. It's a fairly short event (at most 1.2 seconds) with a narrow (16 km) shadow predicted to travel just south of Nelson and Blenheim. At magnitude 10, the star should be within the reach of an 8" scope, and will seem to completely disappear during the occultation. Although the moon is moderately bright (being 69% illuminated), it will be on the other side of the sky from the star (100° away). The large width of the 1-sigma (dotted) lines reflect the large uncertainty about the predicted path of the shadow. There are a surprising number of bright pre-point stars between sunset and the event, with the pick of the bunch probably SAO183987.



The next event is a few days later, on Monday 5th June (Queens Birthday) at 13:15 UT (1:15am Tuesday morning). This is a fairly large asteroid (with an estimated diameter of 60 km) and so will have a long occultation (up to 5.9 seconds). The star is magnitude 9.9 and the asteroid is a couple of magnitudes fainter so the star will again seem to completely disappear during the event. The path of the shadow is predicted to travel over Wellington, so this event is well worth attempting. There will be a nearly full moon (86% illuminated) only 54° away, which will make finding the star difficult unless you use a pre-point star;

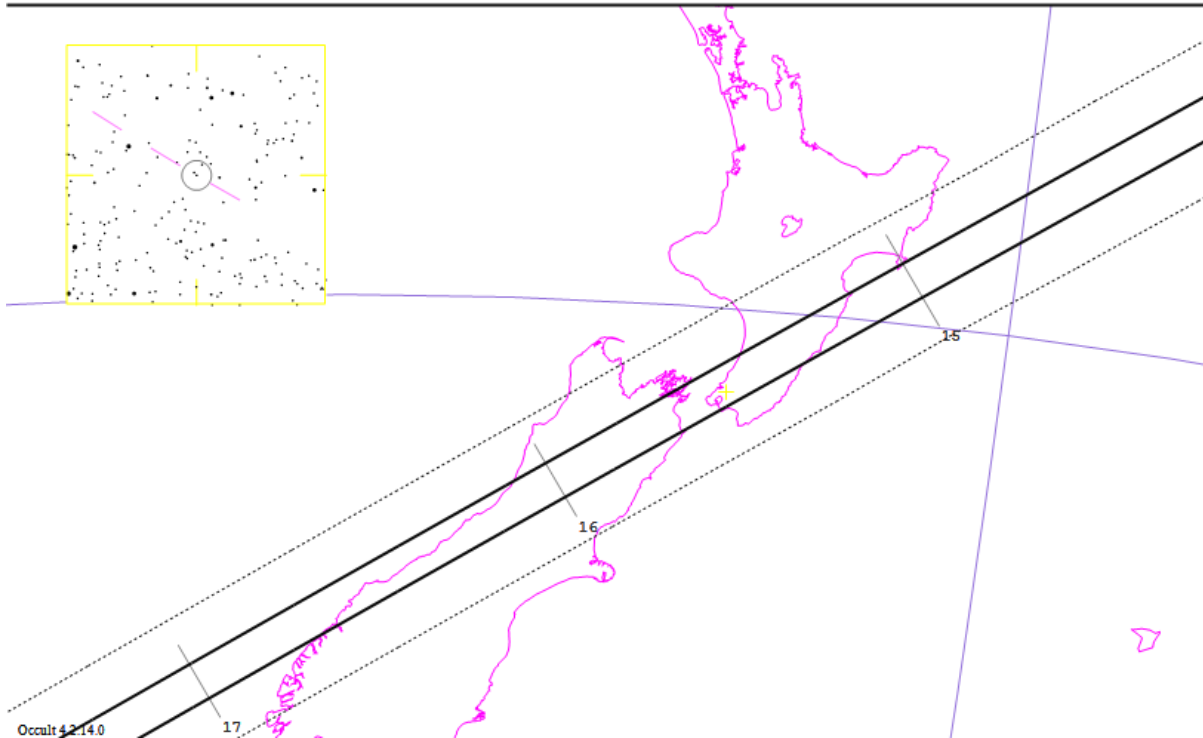
Point			J2000			Dec	
Time	Star		RA	Dec	Offset	SAO	
h m s	mag		h m	o '	ArcMin		
13 15 01	6.4		17 22.6	-35 55	-4.1	208741	
12 53 03	6.0		17 0.6	-35 56	-2.2	208293	
12 29 11	6.9		16 36.7	-35 55	-2.7	207820	
11 49 40	6.9		15 57.1	-35 56	-1.1	207146	
11 17 20	6.8		15 24.7	-35 55	-1.0	206599	
11 14 27	3.6		15 21.8	-36 16	19.7	206552	
11 02 21	7.0		15 9.7	-35 52	-3.8	206345	
10 56 16	6.7		15 3.6	-35 57	0.9	206247	
10 52 42	6.9		15 0.0	-36 02	6.2	206185	
10 41 15	6.7		14 48.5	-35 50	-4.9	205964	
09 59 28	2.1		14 6.7	-36 22	27.4		
09 13 27	2.8		13 20.6	-36 43	48.5		
08 59 47	5.6		13 6.9	-35 52	-2.4	204132	
07 40 07	6.2		11 47.1	-35 54	0.5	202805	

1048 Feodosia occults TYC 7374-731-1 on 2017 Jun 5 from 13h 5m to 13h 26m UT

Star:
 Mv = 10.0 Mp = 10.0 Mr = 10.0
 RA = 17 23 7.4313 (J2000)
 Dec = -35 58 47.192
 [of Date: 17 24 19, -35 59 34]
 Prediction of 2017 May 25.0

Max Duration = 5.9 secs
 Mag Drop = 2.6 (2.2r)
 Sun : Dist = 165 deg
 Moon: Dist = 54 deg
 : illum = 86 %
 E 0.080"x 0.080" in PA 90

Asteroid:
 Mag =12.5
 Dia = 60km, 0.065"
 Parallax = 6.919"
 Hourly dRA =-2.825s
 dDec =-20.02"



The third occultation for the month is on Saturday 10th June, at a civilised hour of 10:04 UT. The asteroid is quite small (approximately 15 km diameter) so the event will be short (at most 1.2 seconds). There is a near-by (19° elongation) full moon, so you'll probably need to use a pre-point star to find the target star. The shadow's track is north of Wellington but the prediction has a fairly large uncertainty so it is still worth attempting.

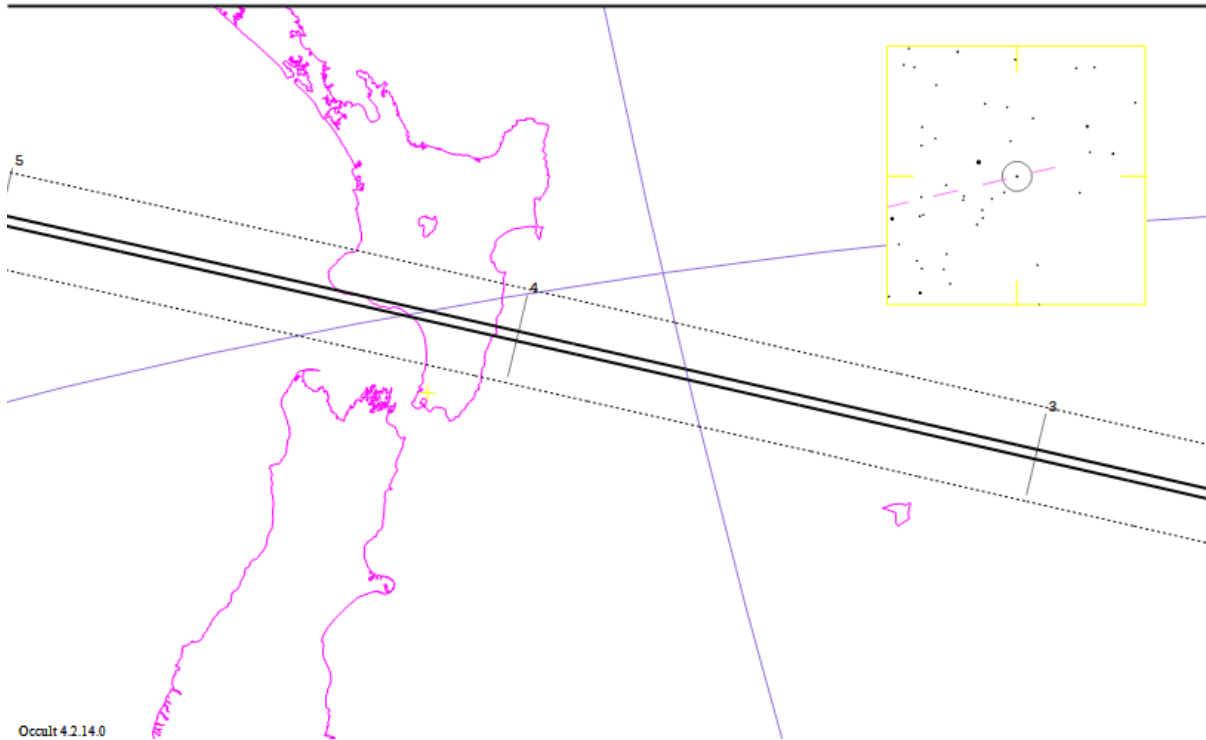
Point			J2000			Dec	
Time	Star		RA	Dec	Offset	SAO	
h m s	mag		h m	o '	ArcMin		
09 27 29	2.3		16 00.3	-22 37	-22.0	184014	
07 24 53	6.1		13 57.5	-23 01	4.2	182123	
06 46 26	3.0		13 18.9	-23 10	13.6	181543	
06 25 43	7.0		12 58.2	-23 03	6.8	181274	

8409 Valentaugustus occults TYC 6796-621-1 on 2017 Jun 10 from 9h 55m to 10h 10m

Star:
Mv = 9.1 Mp = 9.1 Mr = 9.1
RA = 16 37 2.3059 (J2000)
Dec = -23 0 8.671
[of Date: 16 38 6, -23 2 5]
Prediction of 2017 May 25.0

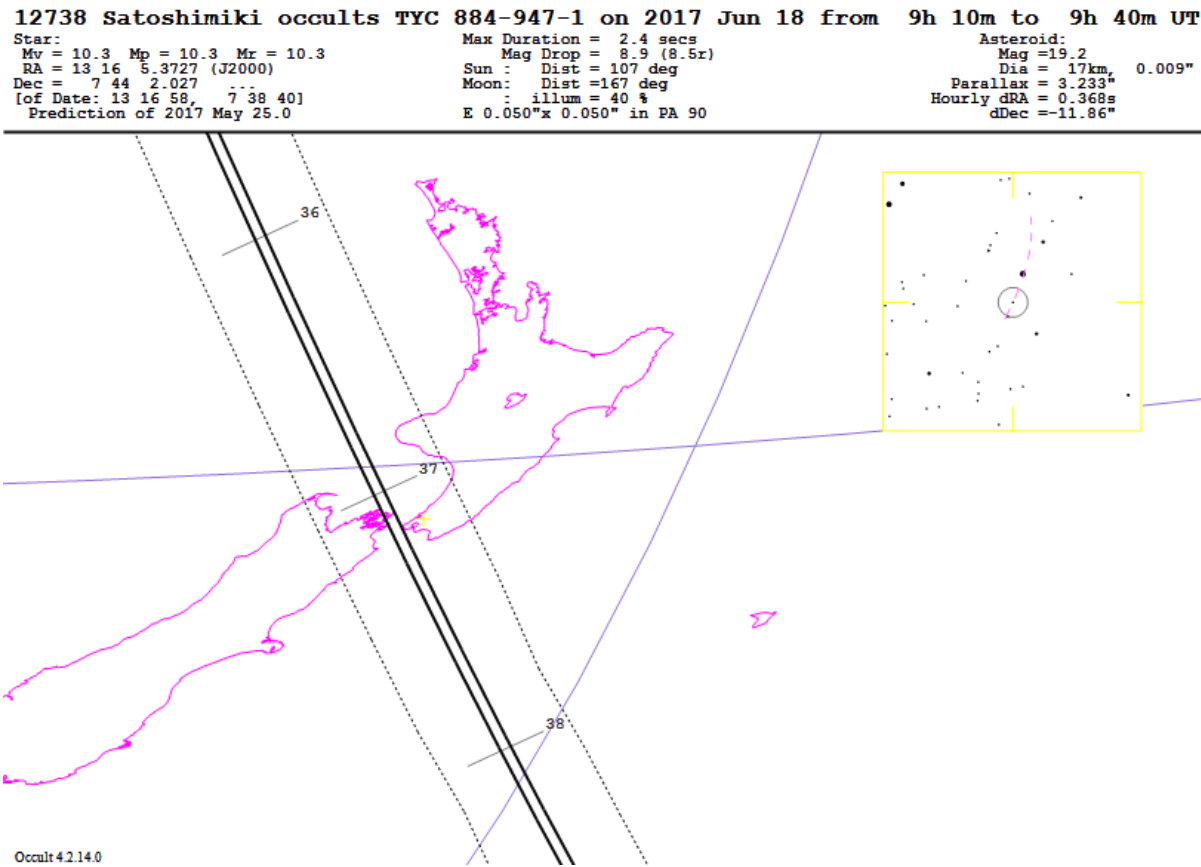
Max Duration = 1.2 secs
Mag Drop = 8.2 (7.8r)
Sun : Dist = 171 deg
Moon: Dist = 19 deg
illum = 99 %
E 0.040"x 0.040" in PA 90

Asteroid:
Mag =17.3
Dia = 15km, 0.009"
Parallax = 3.834"
Hourly dRA =-2.027s
dDec = 6.68"



The fourth event is near the middle of the month, on Sunday 18th June in the evening at 9:37 UT. Again it is a small (17 km diameter) asteroid with a short occultation (at most 2.4 seconds). The shadow is predicted to pass through Cook Strait, but there is still a reasonable chance that it could pass over Wellington or Blenheim. There should be any problems due to the moon for this occultation, as the moon is only 40% illuminated and 167° away. There aren't any bright pre-point stars between sunset and the event (nor are there any later in the evening of the previous night);

Point			J2000		Dec		SAO
Time	Star	RA	Dec	Offset			
h m s	mag	h m	o '	ArcMin			
09 06 43	5.2	12 45.6	7 40	3.8	119574		
08 55 39	6.8	12 34.5	7 44	0.2	119479		
08 54 41	7.0	12 33.5	7 41	3.5	119466		
06 17 31	6.8	09 55.9	7 41	2.9	117997		
05 45 11	6.8	09 23.5	7 43	0.2	117646		



Our run of small asteroids continues on Tuesday 20th June, at 15:52 UT (3:52 am Wednesday morning) with another 17 km diameter minor planet. The shadow is predicted to travel north of Wellington but the uncertainty in the prediction means there is still a chance we could see the occultation here. The moon won't pose any problems, being only 17% illuminated and 125° away. There are plenty of pre-point stars to choose from – with arguably the best being at 8:17pm, allowing you to pre-point in the early evening and then get some sleep until just before the event the next morning;

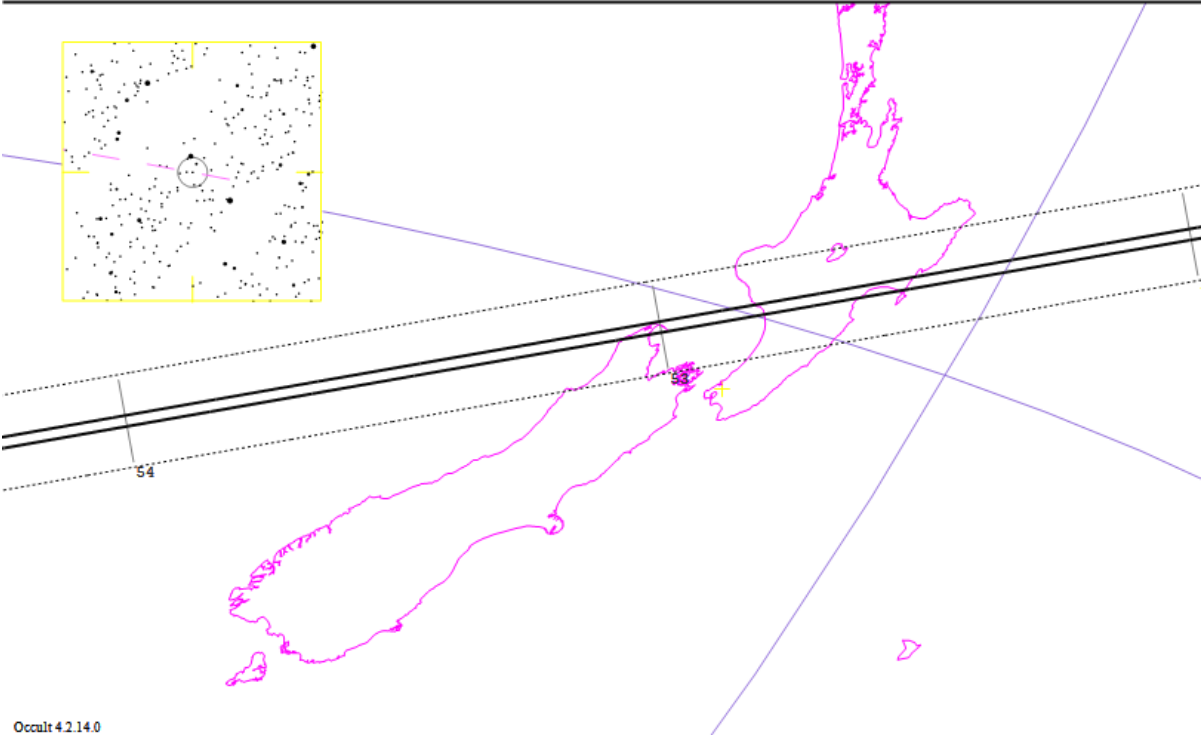
Point			J2000			Dec	
Time	Star	RA	Dec	Offset	SAO		
h m s	mag	h m	o '	ArcMin			
15 04 32	3.5	17 37.6	-15 24	-38.4	160700		
14 50 36	6.7	17 23.6	-16 2	0.3	160515		
14 37 24	2.4	17 10.4	-15 43	-18.2	160332		
13 24 18	6.5	15 57.1	-16 2	2.1	159598		
12 18 15	2.8	14 50.9	-16 3	3.9	158840		
12 18 04	5.2	14 50.7	-16 0	1.2	158836		
11 51 24	6.7	14 24.0	-16 6	7.9	158539		
10 55 01	4.8	13 27.5	-15 58	0.9	157946		
10 17 25	6.6	12 49.8	-15 53	-4.2	157535		
09 57 34	2.9	12 29.9	-16 31	33.8			
09 18 07	6.1	11 50.3	-15 52	-5.3	156926		
09 01 53	7.0	11 34.1	-16 3	5.6	156754		
08 17 33	3.1	10 49.6	-16 12	14.3			
07 54 04	3.8	10 26.1	-16 50	52.6	155980		
06 55 08	7.0	09 27.0	-16 1	2.5	155196		

20607 Vernazza occults TYC 6266-874-1 on 2017 Jun 20 from 15h 50m to 16h 3m UT

Star:
Mv = 9.9 Mp = 9.9 Mr = 9.9
RA = 18 26 4.8262 (J2000)
Dec = -16 3 35.650
[of Date: 18 27 6, -16 2 47]
Prediction of 2017 May 25.0

Max Duration = 1.2 secs
Mag Drop = 7.5 (7.1r)
Sun : Dist = 170 deg
Moon: Dist = 125 deg
: illum = 17 %
E 0.041"x 0.041" in PA 90

Asteroid:
Mag = 17.4
Dia = 17km, 0.011"
Parallax = 4.204"
Hourly dRA = -2.218s
dDec = -5.95"



The last occultation in June is on Friday 30th June at 7:13 UT (which is still two hours after sunset). The minor planet is approximately 15 km in diameter and so the occultation will be brief (at most 2.3 seconds). One tricky aspect for this event is the low altitude of the star (only 13° above the horizon) – as I live in the Hutt Valley it will probably be below a hill for me. The other difficulty will be finding a suitable pre-point star, as the event is only a few hours after sunset. I'd suggest using a pre-point star on the previous evening, with SAO164132 arguably the best of the bunch.

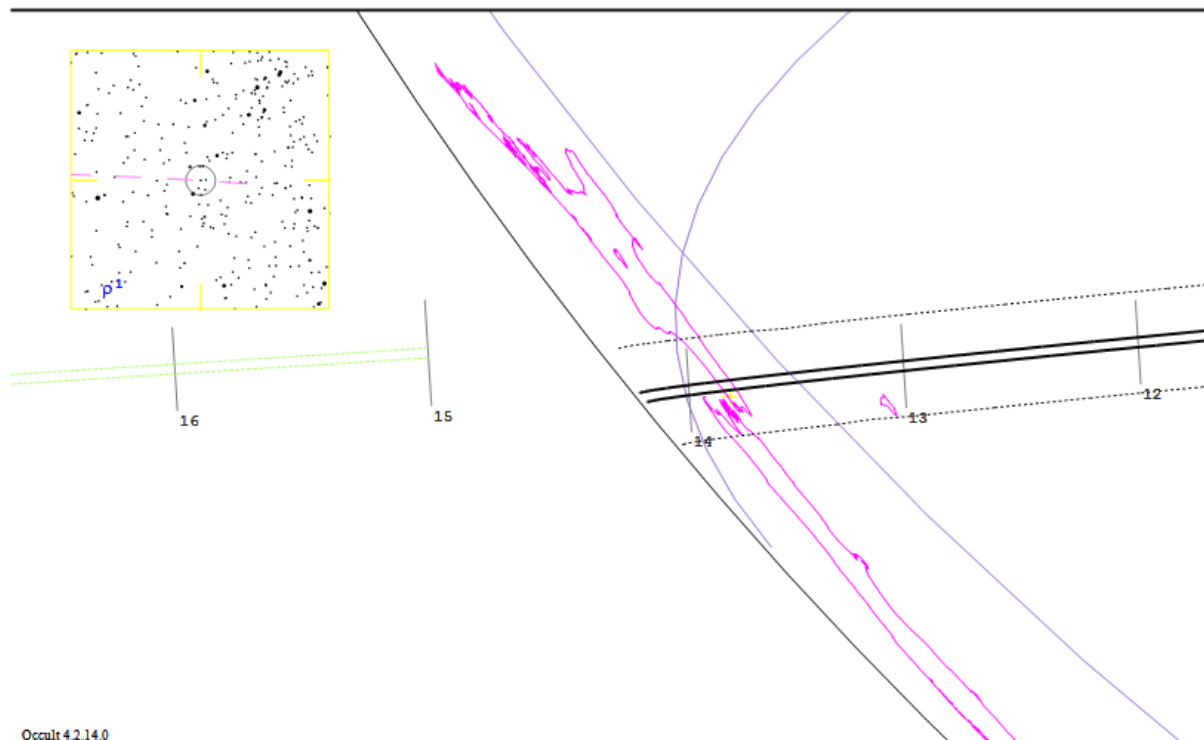
Point			J2000		Dec		
Time	Star	RA	Dec	Offset	SAO		
h m s	mag	h m	o '	ArcMin			
06 46 50	6.9	18 51.3	-17 9	3.2	161909		
06 03 26	5.5	18 7.8	-17 9	4.3	161093		
05 57 02	6.3	18 1.4	-17 9	4.6	160998		
Previous evening;							
12 41 55	2.0	00 43.6	-17 59	48.7			
11 03 52	6.2	23 5.2	-17 5	-5.7	165481		
09 39 01	3.7	21 40.1	-16 40	-29.8			
09 04 59	4.1	21 5.9	-17 14	5.0	164132		
07 46 25	6.9	19 47.2	-17 5	-2.7	162980		

2728 Yatskiv occults TYC 6300-1079-1 on 2017 Jun 30 from 6h 47m to 7h 14m UT

Star:
 Mv = 9.6 Mp = 9.6 Mr = 9.6
 RA = 19 18 22.4277 (J2000)
 Dec = -17 6 43.622
 [of Date: 19 19 24, -17 4 36]
 Prediction of 2017 May 25.0

Max Duration = 2.3 secs
 Mag Drop = 5.2 (4.8x)
 Sun : Dist = 169 deg
 Moon : Dist = 108 deg
 : illum = 42 %
 E 0.090"x 0.090" in PA 90

Asteroid:
 Mag = 14.8
 Dia = 15km, 0.020"
 Parallax = 8.352"
 Hourly dRA = -2.131s
 dDec = -1.94"



Occult 4.2.14.0

The last occultation is actually in July, but it takes place before our July meeting so has been included in this newsletter instead. It occurs on Saturday 1st July, again in the early evening at 7:27 UT. The shadow is predicted to travel just south of Wellington but the uncertainty in the prediction means it is worth attempting for both Wellington and Blenheim observers. The moon is near-by (67° away) but is only 53% illuminated so shouldn't pose any great problem. There is only one pre-point star that evening (SAO159358), but SAO162512 looks to be a good candidate the previous evening.

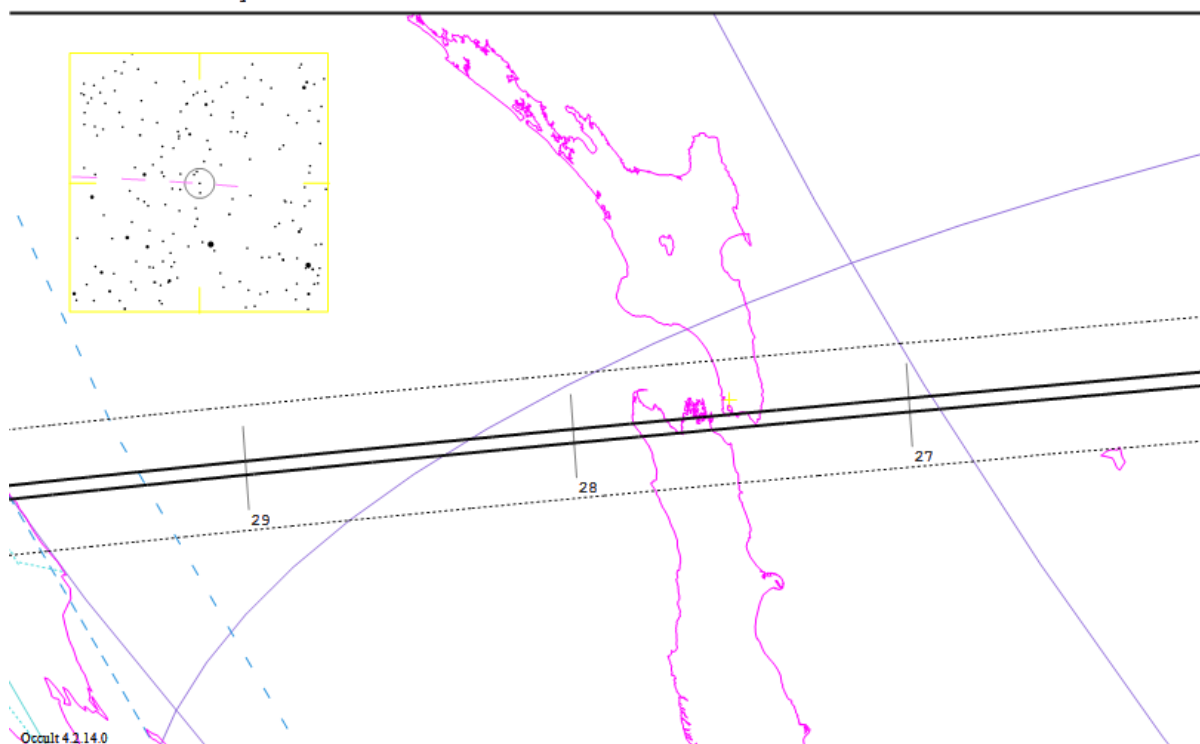
Point			J2000				Dec		
Time			Star	RA		Dec		Offset	SAO
h	m	s	mag	h	m	o	'	ArcMin	
05	40	31	7.0	15	35.0	-17	8	-6.5	159358
Previous evening;									
11	48	31	3.7	21	40.1	-16	40	-43.3	
11	23	37	6.1	21	15.1	-17	21	-2.0	164249
11	16	16	6.2	21	07.7	-17	27	4.8	164156
10	49	56	7.0	20	41.3	-17	23	0.6	163798
10	37	38	6.7	20	29.0	-17	26	4.3	163616
09	30	31	3.9	19	21.7	-17	51	30.5	162512
08	46	50	6.8	18	37.9	-17	14	-5.4	161683
08	26	13	5.8	18	17.2	-17	22	3.7	161260

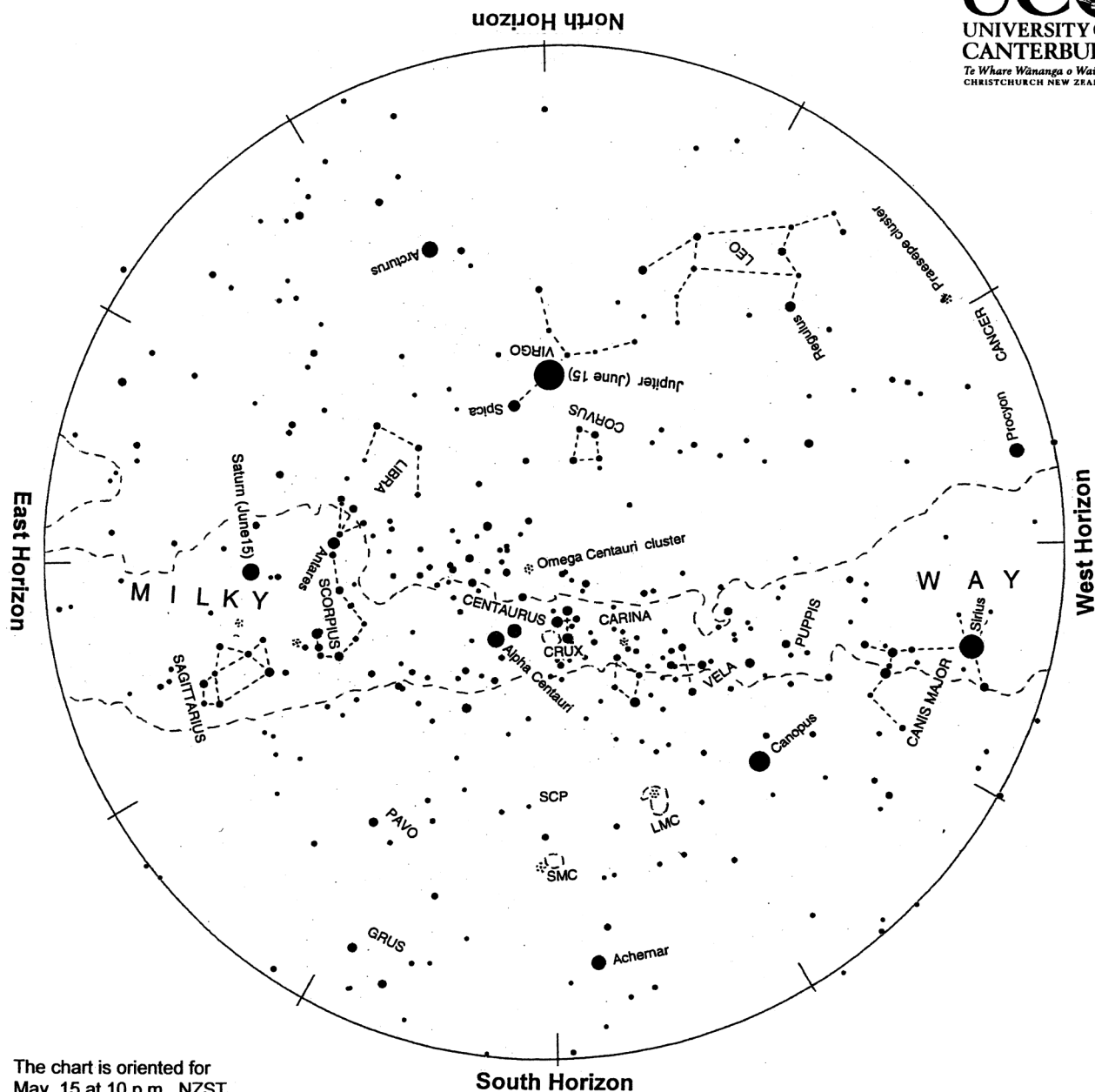
2724 Orlov occults TYC 6238-315-1 on 2017 Jul 1 from 7h 9m to 7h 31m UT

Star:
 Mv = 10.5 Mp = 10.5 Mr = 10.5
 RA = 17 20 14.8393 (J2000)
 Dec = -17 17 16.552
 [of Date: 17 21 17, -17 18 8]
 Prediction of 2017 May 25.0

Max Duration = 2.4 secs
 Mag Drop = 4.7 (4.3r)
 Sun : Dist = 160 deg
 Moon: Dist = 67 deg
 : illum = 53 %
 E 0.070"x 0.070" in PA 90

Asteroid:
 Mag = 15.2
 Dia = 21km, 0.018"
 Parallax = 5.389"
 Hourly dRA = -1.846s
 dDec = -1.90"





The chart is oriented for
 May 15 at 10 p.m. NZST
 June 1 at 9 p.m. "
 June 15 at 8 p.m. "
 July 1 at 7 p.m. "

Evening sky in June 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 westward shift each night as we orbit the sun.

Jupiter is the brightest 'star' in the evening sky, appearing in the northeast soon after sunset. Saturn is midway up the eastern sky, the brightest star in that area. Orange Antares is above it. Sirius twinkles colourfully in the west before setting. Canopus is in the southwest, circling into the south later in the night. South of overhead are the Pointers, Alpha and Beta Centauri, with the Southern Cross (Crux) to their right. Antares marks the body of the Scorpion, on its back, with the Sagittarius 'teapot' below it. Orange Arcturus, low in the north, often twinkles red and green.

The Night Sky in June

Jupiter appears in the northeast sky soon after sunset, the brightest 'star' in the sky. It shines with a steady golden light. Sirius, the brightest true star, appears soon after, low in the west. It sets around 9 pm, mid-month, twinkling like a diamond. Canopus, the second brightest star, is in the southwest. As the sky darkens cream-coloured Saturn appears due east with orange Antares above it. Arcturus, another orange star, appears in the lower north sky, often twinkling red and green when it is low in the sky.

Sirius appears bright both because it is 20 times brighter than the sun, and because it is relatively close at nine light years*. Canopus is a truly bright star, 310 light years away and 13,000 times brighter than the sun. Canopus is a 'circumpolar' star: it circles the South Celestial Pole (SCP on the chart) but never sets.

Jupiter's disk and four 'Galilean' moons can be seen any telescope. We are seeing the moons' orbits nearly edge-on so they appear to move back and forth like beads on a string, swapping places night to night. Io, the closest to Jupiter, orbits in 1 3/4 days. Callisto, the farthest of the four, takes nearly 17 days to complete an orbit. Jupiter is 750 million km away. Saturn is the brightest 'star' in the eastern sky. A small telescope shows its rings and its biggest moon, Titan, orbiting about four ring-diameters from the planet.

Saturn is 1,350 million km away.

Crux, the Southern Cross, is south of the zenith. Beside it and brighter are Beta and Alpha Centauri, often called 'The Pointers' because they point at Crux. Alpha Centauri is the closest naked-eye star, 4.3 light years away. Beta Centauri and many of the stars in Crux are hot, extremely bright blue-giant stars hundreds of light years away. They are members of a group of stars that formed together then scattered. The group is called the Scorpio-Centaurus Association.

Antares, the orange star above Saturn, marks the scorpion's body. It is a red giant star: 600 light years away and 19 000 times brighter than the sun. Red giants are much bigger than the sun but much cooler, hence the orange-red colour. Though hundreds of times bigger than the Sun, Antares is only about 20 times the Sun's mass or weight. Most of the star's mass is in its hot dense core. The rest of the star is thin gas. Red giants are dying stars, wringing the last of the thermo-nuclear energy from their cores. Below Scorpius is Sagittarius, its brighter stars making 'the teapot'.

The Milky Way is brightest and broadest in the southeast toward Scorpius and Sagittarius. It remains bright but narrower through Crux and Carina then fades in the western sky. 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. A scan along the Milky Way with binoculars will find many clusters of stars and some glowing gas clouds. Relatively nearby dark clouds of dust and gas look like holes and slots in the Milky Way. There is a well-known dark cloud called The Coalsack by the Southern Cross. It is around 600 light years away. The dust, more like smoke, comes off old red stars. These clouds eventually coalesce into new stars.

The Clouds of Magellan, LMC and SMC, in the lower southern sky, are luminous patches easily seen by eye in a dark sky. They are two small galaxies about 160 000 and 200 000 light years away. The Large Cloud is about 5% the mass of the Milky Way; the Small Cloud is about 3%.

Brilliant Venus (not shown on the chart) rises in the eastern sky before 4 a.m. at the beginning of the month, later at the end. At the end of June Venus will be directly above the Matariki/Pleiades star cluster. The Moon will be near Venus on the 21st, enabling the planet to be found in the day-

light sky by naked eye. At 11 a.m. that morning the Moon and Venus will be 45 degrees left of the sun and level with it. (45 degrees is roughly two hand-spans at arm's length.) Mercury appears below and right of Venus, the brightest 'star' in the region, at the start of the month. It sinks lower in the dawn twilight, disappearing around the 10th.

*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