



# Wellington Astronomical Society

December 2017 Volume 47 Issue 11

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*The December meeting will be held on Wednesday 6th of December at 6:30 pm at Wellington Collegians Cricket Club, Anderson Park, Botanical Gardens.*

## 2017 Christmas Party



NGC 2264: The Christmas Tree Cluster and inverted Cone Nebula at the top of the tree. The very bright star in the middle of the image (S Monocerotis) marks the center of the tree trunk. NGC 2264 is located in the constellation of Monoceros at a distance 2600 light-years from Earth. Credit ESO

**Wishing you all a safe and relaxing Christmas break and a Happy New Year**

**Join us for our Christmas Party, our last gathering for 2017 at the Wellington Collegians Cricket Club, Anderson Park, Botanical Gardens.**

B.Y.O.T. (Bring Your Own Telescope - if you have one)

B.Y.O.B. (Bring Your Own Booze)

B.Y.O.D. (Bring Your Own Dish - potluck dinner / something to bbq)

There will be a BBQ available and we will be providing some sausages and bread. Bring a salad or dessert to share.

Be prepared to have a fun time!

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## 2017 — 2018 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 2017-2018

Adult/Waged: \$ 50.00

Student/Unwaged: \$ 30.00

Family: \$ 70.00

**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.**

### 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 we know who is making the payment

Cash - please bring exact amount to meeting

## WAS COUNCIL MEMBERS AND CONTACTS

The following members were elected to Council at the Nov 2017 AGM

**President:** Antony Gomez  
[president@was.org.nz](mailto:president@was.org.nz) / 021\_253\_4979

**Vice President:** Duncan Hall  
[vice-president@was.org.nz](mailto:vice-president@was.org.nz)

**Secretary:** Becky Bateman  
[secretary@was.org.nz](mailto:secretary@was.org.nz)

**Treasurer:** John Homes

### Council

Andrew Fuller  
Chris Monigatti  
Frank Andrews  
Janine Bidmead  
Murray Forbes  
Peter Woods  
Roland Idaczyk  
Susie Keel

**Membership Secretary:** Janine Bidmead  
[membership@was.org.nz](mailto:membership@was.org.nz)

**Website:** Peter Woods  
[webmaster@was.org.nz](mailto:webmaster@was.org.nz)

**Telescope custodian:** Chris Monigatti

**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.



Join us for the  
**Wellington Astronomical Society**  
**2017 Christmas Party**

**Wednesday 6 December**  
**6:30pm - 9:30pm**  
Wellington Collegians Cricket Club, Anderson Park, Botanical Gardens

**B.Y.O.T.** (Bring Your Own Telescope - if you have one)  
**B.Y.O.B.** (Bring Your Own Booze)  
**B.Y.O.D.** (Bring Your Own Dish - potluck dinner)

**We hope to see you there!**

 **Wellington  
Astronomical  
Society**  
[www.was.org.nz](http://www.was.org.nz)

# Minutes of the 2017 Annual General Meeting

Held at Space Place, Carter Observatory, 7:30pm, Wednesday 1 November

The meeting was opened by President Antony Gomez.

## **Attendees:**

22 financial members and two Life Members, exceeding the quorum of '25% of financial members'.

## **Apologies:**

Apologies were received from: Warwick Kissling, Becky Bateman, Ed Budding, Jim McAloon, Vicki Irons, Roger Butland, Susie Keel,

**Motion:** That the apologies be accepted.

**Moved:** Antony Gomez; **Seconded:** Chris Monigatti; Carried

## **Minutes:**

The 2016 AGM minutes had been copied in the November newsletter and were taken as read.

**Motion:** That the 2016 minutes are a true and accurate record of the previous meeting:

**Moved:** Frank Andrews; **Seconded:** Duncan Hall; Carried

## **President's Report:**

- The President's report PowerPoint was shown.
- Noted that over 60 outreach events had been held, leading to many facebook 'likes' and several new members. Thanks to members who have helped at these events.
- The Astrophotography Group meetings have been significantly weather affected.
- WAS is involved with the prospect of attaining Dark Sky Reserve status for the South Wairarapa. Member Lee Mauger is driving this. South Wairarapa is looking to become the first 3000K area in New Zealand.
- Space and Science Festival is now held over three consecutive Saturdays. WAS are part of the organising committee. Lee Mauger is main organiser.
- Hutt City STEM
- Social events – Christmas BBQ, mid-winter dinner, Cassini 'this is your life' functions were all successful thanks to Janine.
- The new website is more dynamic, taking facebook feed, and is mobile-accessible. Thanks to Peter for his efforts
- WAS tee shirts are available and images of members wearing them around the world are increasing
- The new WAS logo will be unveiled to members later in this AGM for approval. Thanks to Janine for these two initiatives.
- Contact with the Skopje Astronomical Society was made by Antony whilst in Macedonia. With a similar membership to WAS, the Skopje AS run outreach every clear night, hold weekly meetings and also run astronomy courses.
- Expressed thanks to the incoming and former council members, and to Lesley and Bill for suppers at meetings.

## **Future plans:**

- Develop more training for members
- Apply for grants to purchase a Solar telescope for outreach
- Recording of presentations leading possibly to live-streaming has been trialled and will be further investigated



## Minutes of the 2017 Annual General Meeting *(continued)*

- Encourage former members to re-join the society.
- Develop programs for younger kids and students.
- Donate a prize to the NIWA Science Fair.
- Prepare for the 2020 RASNZ Conference in Wellington
- Prepare for the 2023 WAS 50th Anniversary
- Review and update the WAS constitution

**Motion:** That the President's report be received.

**Moved:** Antony Gomez; **Seconded:** Frank Andrews; Carried.

### **Treasurer's Report:**

The summary of the treasurer's report had been published in the November newsletter.

There is \$17,000 in the bank, and total assets of \$23,000.

A modest loss (~\$200) was generated for the financial year, due to expenditure on:

- 10" Dobsonian telescope
- Mid winter dinner
- Late subscriptions
- Tee shirts for outreach

New subscriptions were up significantly, due to outreach and better follow-up.

The Reviewer's report was available for members perusal.

Noted that the Reviewer looks at the accounts only, not the minutes

**Motion:** That the Treasurer's report be accepted.

**Moved:** John Homes; **Seconded:** Frank Andrews. Carried.

### **Appointment of Honorary Assessor / Reviewer:**

**Motion:** That Mr Robert Toothill be appointed as the Honorary Assessor.

**Moved:** John Homes; **Seconded:** Duncan Hall. Carried.

### **Election of Officers:**

There were nominees sufficient to fill the positions of;

**President:** Antony Gomez,

**Vice-President:** Duncan Hall,

**General Secretary:** Gerard Coyle,

**Treasurer:** John Homes.

For positions on council, there were nominations received for;

Murray Forbes, Peter Woods, Janine Bidmead, Andrew Fuller, Chris Monigatti, Becky Bateman

Co-opted: Frank Andrews, Roland Idaczyk, Susie Keel

## Minutes of the 2017 Annual General Meeting *(continued)*

There being no other nominations, President Antony Gomez announced that those named above were elected to council.

Former councillors Edward Wilcock and Sarah Taylor were thanked for their service.

**Motion:** That the above Council be elected.

**Moved:** Peter Graham; **Seconded:** Kara Lipski. Carried by acclamation.

### **Additional Roles:**

Murray Forbes will post newsletters on the website.

Peter Woods will be Web-Master

Chris Monigatti will manage Observing nights.

Duncan Hall will chair the Cretney Bequest Sub-committee.

Lesley and Bill are willing to continue arranging supper after meetings.

Margaret Gordon thanked Antony Gomez for his sterling work especially in attracting new members.

### **Resolutions:**

I. That the society:

- i. Cease to produce the monthly newsletter in the current format, and
- ii. Make use of online means to communicate to and between its members

**Moved:** Duncan Hall; **Seconded:** Antony Gomez. Carried.

2. That the society reduce the membership fee for associate members from \$30 to \$20.

**Moved:** John Homes; **Seconded:** Antony Gomez. Carried.

### **Life Membership Nomination:**

**Motion** from Gordon Hudson: "That the Society nominate **John Talbot** for **Life Membership** of the Wellington Astronomical Society".

John joined WAS in 2004 after getting a Telescope for his 60<sup>th</sup> birthday in 2003. A talk by Graham Blow in 2005 led John into Occultation observation and research.

John had spells as Treasurer, Vice President & President of the society.

In 2017 John was awarded the prestigious Homer F. Daboll award for his occultation work, becoming only the third New Zealander to receive this (Brian Loader and Graham Blow being the others).

**Moved:** Gordon Hudson; **Seconded:** Antony Gomez. Carried by acclamation.

# Minutes of the 2017 Annual General Meeting *(continued)*

## General Business:

1. **Telescope Hire:** Noted that the Auckland Astronomical Society hire out scopes to members at \$50 per month. Suggested that \$50 could be a reasonable deposit, or three months free, then \$50 per month. A check pre and post hiring is needed, as is training on safety and use. Scopes should be labelled with warnings re pointing at the Sun. Tawa nights could be used for training.

2. **WAS New Logo:** The proposed new logo was presented to members – outline of Wellington landmark buildings with Corona Australis. Thanks to Janine for driving this development.

**Motion:** “That WAS adopt the new logo as displayed”.

**Moved:** Duncan Hall; **Seconded:** Peter Graham. Carried by acclamation.

3. **2020 RASNZ conference:** a Local Organising Committee (LOC) has been formed and is beginning investigating possible venues. LOC = Janine Bidmead, Duncan Hall, Marilyn Head, Roland Idaczyk.

4. **2023 WAS 50<sup>th</sup> Jubilee:** Jim McAloon and Duncan Hall have agreed to research the history of our society, and any earlier organisations. Noted that 2023 will be the Auckland Astronomical Society’s 100<sup>th</sup> anniversary, so our celebration should be later in the year (WAS was formed in August).

5. **Seat arrangement:** suggested that setting out chairs in a curve would allow members to sit closer to the screen.

6. Bill and Lesley were thanked for the **suppers** after meetings and presented with framed space travel posters by Janine.

Paul Higgin was thanked for his huge involvement in the outreach events held by the society and was also presented with a framed poster.

A short presentation followed on the progress of the Cretney Bequest Sub-committee.

The meeting was declared closed at 8:52pm.

Minutes recorded by General Secretary, Chris Monigatti

## **New General Secretary**

Unfortunately Gerard Coyle has since resigned as the General Secretary. Becky Bateman volunteered to take on the position of General Secretary and was duly elected by the rest of the Council.

The Council thanks Gerard for his two years of service on the WAS Council and as the newsletter editor.

## **The New WAS Logo**



Our new WAS logo depicts some well known structures in Wellington including Carter Observatory, the Beehive and Cenotaph. The clear night sky shows the constellation of Corona Australis, the Southern Crown, which at the right times can be seen directly over Wellington.

Quite an appropriate constellation for our beautiful city



# Central Star Party 2018

Central Star Party has been established to hold annual star parties in the central North Island for the benefit of the astronomical community of the North Island of New Zealand. The goal of the organisers is to provide a fun social astronomical gathering laced with talks and activities.

The second Central Star Party is Thursday 18th to Tuesday 23rd January 2018 and will be held at the Tuki Tuki Camp site in the Hawkes Bay. This is the site of many previous star parties.



The site is complete now, and there is a brand new hall, with two additional meeting rooms for alternate meetings, a new kitchen and three new dormitories. Accommodation is tenting, staying in the dormitories or using one of the six powered caravan sites.



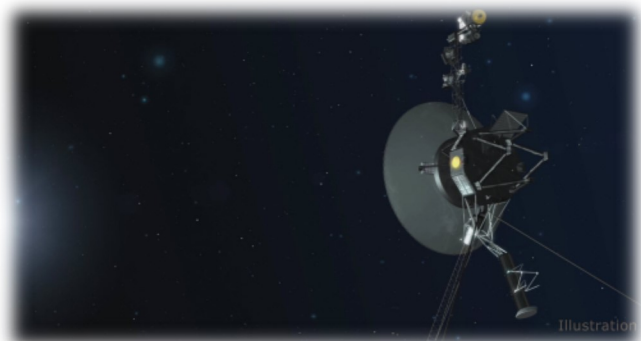
Last years Central Star Party was a huge success with over 70 people attending and enjoying a great programme of presentations as well as a trip to the local observatory, sausage sizzles, entertainment as well as fish and chip dinners delivered to the camp.

We also had sponsorship from a number of organisations including **ASTRONZ** who donated a pair of binoculars (amongst other things) for a raffle.

This year is shaping up to be even better, registrations are open now.

[www.censtar.party](http://www.censtar.party)

## Voyager I Fires Up Thrusters After 37 Years



If you tried to start a car that's been sitting in a garage for decades, you might not expect the engine to respond. But a set of thrusters aboard the Voyager 1 spacecraft successful-

ly fired up Wednesday after 37 years without use.

Voyager 1, NASA's farthest and fastest spacecraft, is the only human-made object in interstellar space, the environment between the stars. The spacecraft, which has been flying for 40 years, relies on small devices called thrusters to orient itself so it can communicate with Earth. These thrusters fire in tiny pulses, or "puffs," lasting mere milliseconds, to subtly rotate the spacecraft so that its antenna points at our planet. Now, the Voyager team is able to use a set of four backup thrusters, dormant since 1980.

[\(More\)](#)



## Results from the 9th November Carina Occultation

You may remember the prediction I gave for this event in the October newsletter. Six New Zealand observers attempted to measure this occultation, with four being club members. I asked our observers for a summary of their results;

Gordon Hudson:

*"No observation - Technical failure/Blowing a gale/Clear but very unsteady."*

Murray Forbes:

*"I was completely clouded out – not a star to be seen. Very windy as well."*

Roland Idaczyk:

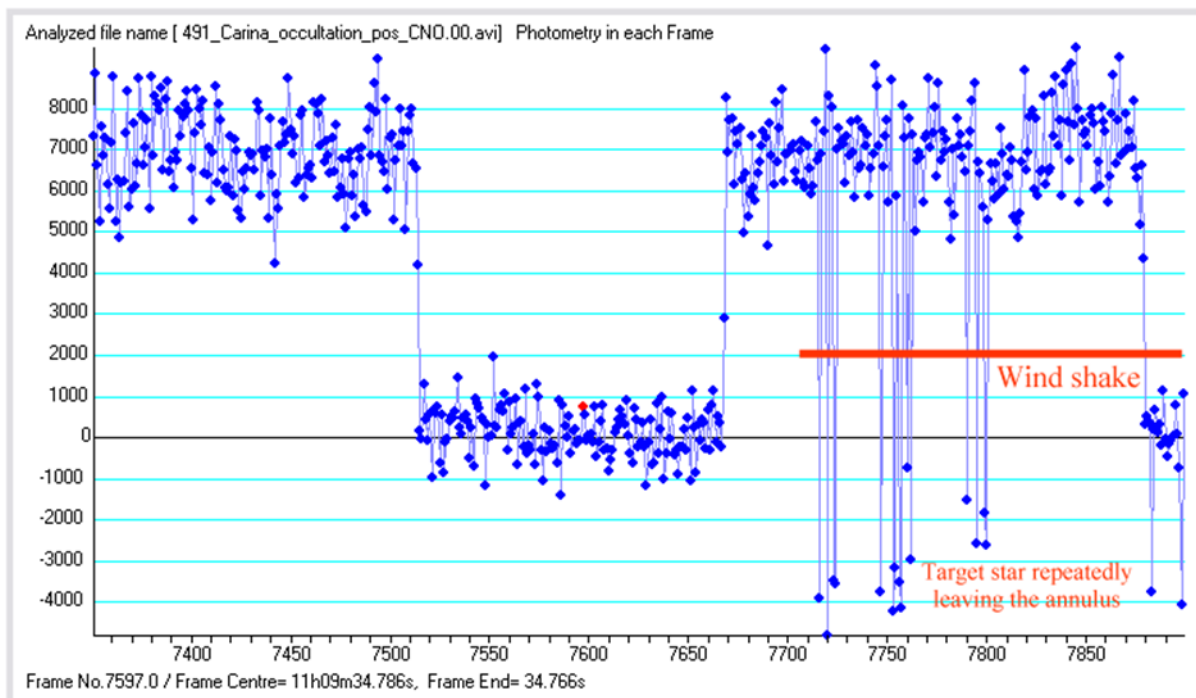
*"This occultation turned out to be quite an adventure. To begin with, I almost missed it, because I got the hour wrong. Somehow I had got it into my head that the event would happen an hour later than it actually did. But luckily, I started early to identify the star field. When I then started my test recording and saw the timestamp, I thought 'hang on!' I quickly checked the published data for the event and found that it was actually only five minutes away. How lucky!*

*It was quite windy that night and therefore I got a bit of shaking in the video, but there was still enough good data to get a nice baseline of the star's magnitude. The occultation is very clearly defined and I measured it to be 8.7 seconds at my site. A screenshot from Limovie showing the light-curve is attached.*

*I was using the old KT&C 350BH occultation camera with the KiwiOSD on my 14-inch LX200R installed in my roll-off-roof observatory in Ngaio.*

*The crowning highlight for me was the fact that this was my very first positive minor planet occultation. I had been trying, on and off, for about ten years, but only had misses, technical problems and bad weather so far.*

*So, anyone waiting for their first, don't give up! It won't happen overnight, but it will happen!*



Peter Graham:

*"Conditions were reasonable with some clouds and upper atmosphere turbulence. The image would fade quite deeply during set up so I set the camera with a somewhat saturated image to cover possible fades during the event.*

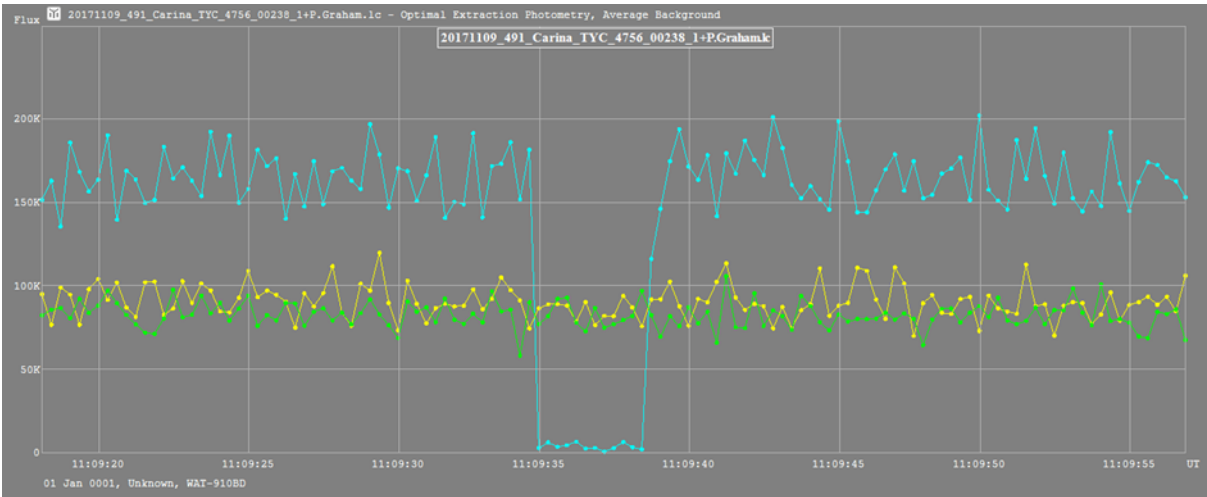
*This was a dramatic event because of the extinction of the star – always fun to watch!*

*I have discovered that doing upgrades of the mount controller hardware, firmware and software can be time consuming and disruptive to your observing program.*

Getting the system working as before and aligned has been a challenge.

Equipment and software:-

- Telescope - Meade LX5 SCT 250mm f 1575mm
- Mount - Astrophysics GTO900
- Camera - Watec-910BD
- Recorder - Occurec
- Light curve - Tangra 3
- Timing analysis - AOTA via Occult4



Murray Forbes

Total lunar occultations for December 2017 - January 2018

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	Dec	01	08	55	23.8	D	0362		F5	6.5	6.2		93+	148		36	022
17	Dec	28	10	35	07.7	D	0308		M4	6.3	5.4	v	71+	115		29	314
18	Jan	22	08	32	01.9	D	0012		B8	6.4	6.5	s	24+	059	-08	22	287
18	Jan	22	08	49	34.4	D	0013	c	K2	6.2	5.5	v	24+	059	-10	19	284
Double 6.5 8.5 0.002" 350.0, dT = 0.00s																	
18	Jan	25	08	59	02.4	D	0393	c	K0	6.7	6.1		55+	095		29	320
Double 7.6 7.6 0.10" 090.0, dT = +0.31s																	
18	Jan	27	09	32	22.9	D	0684	p	B9	6.2			76+	122		29	342
Double 6.97 7.02 3.10" 276.0, dT = -7s,																	
18	Jan	30	09	56	14.9	D	1171		A1	6.5	6.5		98+	164		25	024

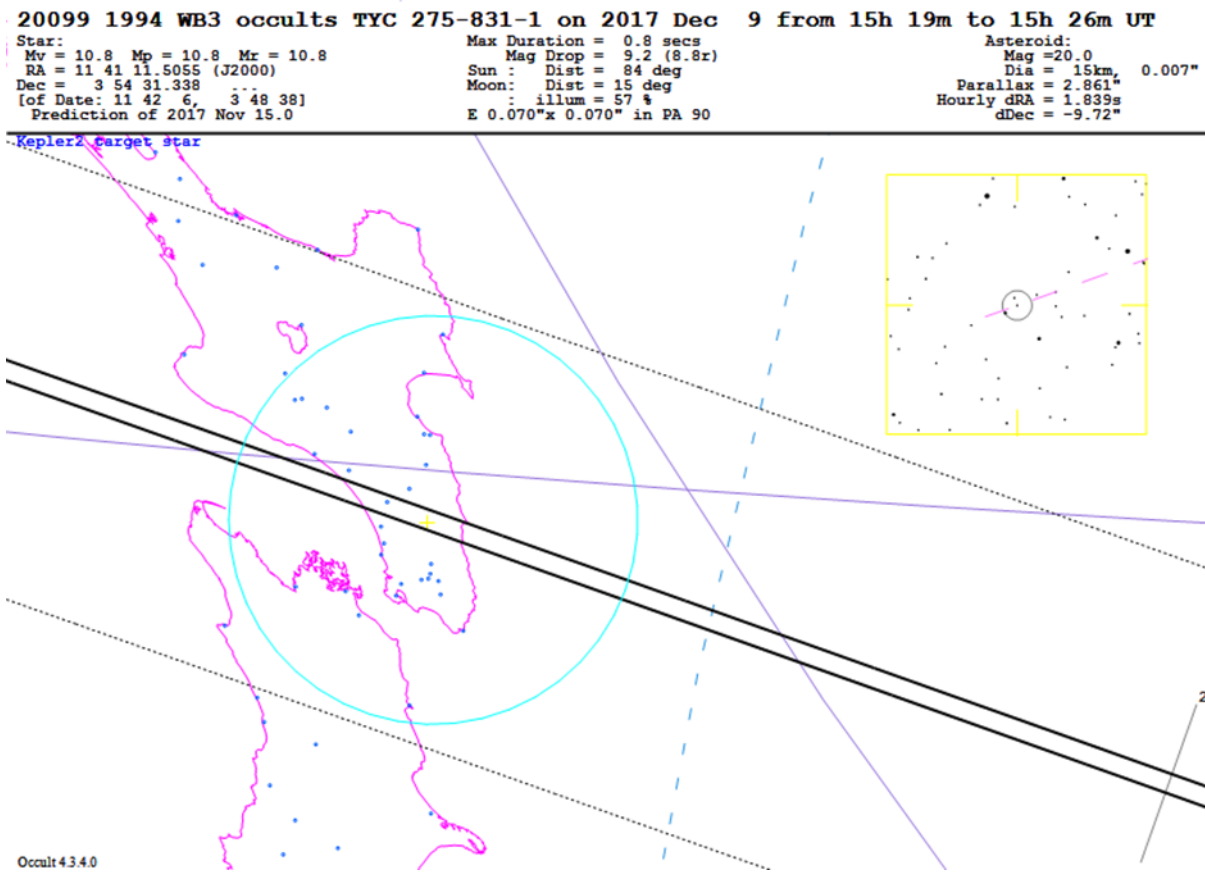
- As we don't have a meeting in January, I have two months' worth of predictions for this newsletter. The first lunar occultation occurs on Friday 1st December at 9:55 pm. The star is fairly bright (magnitude 6.5), so the event should still be measureable even though the moon is nearly full (93% illuminated) – provided there aren't any nearby clouds (as these are brightly lit by the moon and cause a lot of glare). The moon (and star) are high enough above the horizon ( $36^\circ$  altitude) that it should be above any hills that surround your observatory.
- The next lunar occultation is not until near the end of December, on Thursday 28th at 11:35pm. The star is again fairly bright (magnitude 6.3) and very red in colour (spectral type M4) so you may want to use a red filter to increase the contrast between the star and (71% illuminated) moon. Although the star is listed as a variable star, the variation is only over a small range in brightness (magnitude 6.2 to 6.38) so this should cause any problems. Again, the event takes place at a convenient altitude ( $29^\circ$ ) above the horizon.
- There is a gap of about three weeks before the next lunar occultation, occurring on Monday 22nd January (Wellington Anniversary) at 9:32pm. Unlike the previous events, here the moon is only 24% illuminated. However this event takes place during twilight, with the sun only  $8^\circ$  below the horizon. Unfortunately this star is a B8 spectral type, i.e. blue/white in colour, and so you can't use a red filter to increase the contrast between the star and the blue twilight sky. The moon is also fairly low in the sky with an altitude of  $22^\circ$ , and is near the sun.
- The next event occurs only 17 minutes later. It is a red star (spectral type K2) so quickly adding in a red filter to your system will increase the contrast between the star and blue twilight sky. The star is a double star, with the components being magnitudes 6.5 and 8.5 respectively. Carefully adjusting the gain on your video camera so that the star is nearly saturated may allow you to also see the fainter component. However in this case, the separation between the components is so small (0.002 arc-seconds) that a video camera recording at 25 frames per second will miss it.
- We should have more luck with the next occultation as this is also a double star but now the separation is larger (0.1 arc-seconds) and the gap between disappearances is 0.31 seconds. This occurs a few days later, on Thursday 25th January at 9:59pm. The two components are listed as having the same magnitude (7.6), which actually means that the magnitudes of the individual components are not known. To get an accurate measurement of the two stars, carefully adjust the gain on your video camera so that the combined brightness isn't saturated, i.e. still in the linear response region of your camera.
- We're been spoilt with doubles, as the next occultation is another double star. This event occurs on Saturday 27th January at 10:32pm. The combined brightness of the stars is 6.2, with each component star being similar intensities, at magnitudes 6.97 and 7.02 respectively. If the seeing is good that evening you may be able to resolve the individual component stars as the separation is 3.1 arc-seconds. This also means there is a long gap (7 seconds) between the disappearances of each component, with the first star being occulted before the predicted time listed in the table above – take care to start your video recorder early enough to get both disappearances. This star is also listed in the Kepler2 program, so please make a special effort to measure this lunar occultation.
- The final occultation is near the end of the month, on Tuesday 30th January at 10:56pm. We're back to observing at a full moon (the illumination is 98%), so any nearby clouds may cause problems with glare. Otherwise this should be a straight forward event, with a brightest (magnitude 6.5) star at a convenient altitude ( $25^\circ$ ) above the horizon.

## Minor Planet occultations for December 2017 - January 2018

There are three minor planet occultations over the next two months, with all of them being early morning events about 4am. The first is on Thursday 9th December, at 15h 20m 24s UT (Friday 4:20am). This is a fairly faint star (magnitude 10.8) so you may need to use an integrating camera to see the star. The asteroid is much fainter (magnitude 20) so the 'star' (actually the combined light from the star and asteroid) will completely disappear during the event. The maximum duration of the disappearance is 0.8 seconds, so don't increase the camera's integration time so much that you miss the occultation. The star is in the Kepler2 program so please make an effort to observe this, even though the shadow's path is predicted to travel north of Wellington – the uncertainty in the prediction is large enough that there's still a chance we could see it. The moon is near the last quarter (with 57% illumination) and is nearby in the sky to the star ( $15^\circ$  elongation), so you'll probably need to use a pre-point star to locate the target star. There are no particularly bright pre-point stars for this event but all the declination offsets are small enough that the pre-point star should still be within your field-of-view after doing the declination offset.

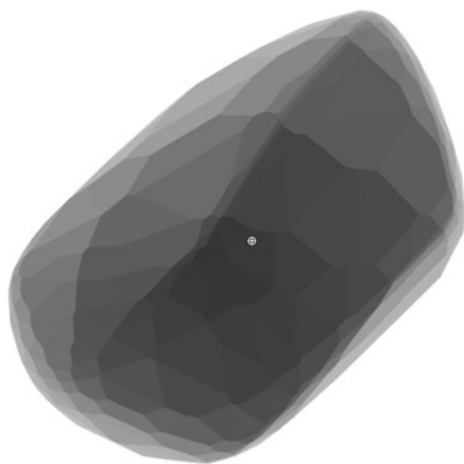
I'd recommend attempting to pre-point early in the evening, for example using SAO 112904, and then getting some sleep until just before the event. If this doesn't work (perhaps due to cloud) then try the two pre-point stars just before the event (SAO 118299 or SAO 118851).

Point			J2000				Dec		
Time			Star	RA		Dec		Offset	SAO
h	m	s	mag	h	m	o	'	ArcMin	
15	05	05	6.4	11	25.8	03	52	2.9	118851
14	05	35	6.7	10	26.2	03	56	-1.9	118299
12	51	51	6.1	09	12.2	03	52	1.0	117492
11	59	37	6.0	08	19.8	03	57	-4.9	116630
10	23	41	5.9	06	43.6	03	56	-6.3	114324
10	03	24	6.4	06	23.3	03	46	3.3	113801
09	21	40	6.8	05	41.4	03	47	1.4	113040
09	14	31	5.3	05	34.3	03	46	1.9	112904
09	07	24	6.7	05	27.1	03	51	-3.6	112781
07	42	58	6.9	04	02.5	03	51	-5.2	111573



The next minor planet occultation is not until the end of January, specifically on Wednesday 31<sup>st</sup> January at 15h 47m 30s UT (Thursday 4:47am). The star is again fairly faint at magnitude 9.8, while the asteroid is magnitude 13.5 – which is beyond the reach of my 8” scope and video camera, so the star will seem to completely disappear during the occultation. The asteroid has an approximate diameter of 29 km, so the maximum duration of the disappearance will be quite long (3.6 seconds). The shadow is predicted to pass north of Wellington, across our Kapiti Coast and Wairarapa observers. Even so, I encourage Wellington observers to also attempt the observation as the uncertainties in the prediction mean that my observatory, for instance, has a 23% chance of seeing an occultation. There are 3D shape models available for the minor planet in the DAMIT and ISAM databases (see the images below), so successful measurements by at least two observers could scale these models and improve our knowledge of the minor planet’s size. The full moon is only 29° away from the star, so I’d recommend using a pre-point star earlier that night to locate the target star. The best early evening pre-point star is arguably SAO149158 (as it’s the brightest and only needs a 1.9 arc-minute offset in Declination – for my camera, the pre-point star will still be in the field-of-view after doing the offset). There is also a bright (magnitude 4.8) pre-point star (SAO155096) just five minutes ‘before’ the occultation, again with a small (2.3 arc-minute) Declination offset.

Point			J2000				Dec		
Time			Star	RA		Dec		Offset	SAO
h	m	s	mag	h	m	o	'	ArcMin	
15	42	47	4.8	09	19.8	-11	58	2.3	155096
15	05	16	6.5	08	42.2	-11	58	1.0	154558
13	40	26	6.7	07	17.1	-12	02	3.2	152660
13	31	24	6.7	07	08.1	-11	55	-3.7	152427
13	17	34	4.1	06	54.2	-12	02	2.9	152071
12	54	00	6.6	06	30.6	-12	05	4.8	151582
12	40	11	6.8	06	16.7	-12	03	2.4	151303
12	38	53	6.6	06	15.4	-11	54	-6.2	151272
12	30	26	7.0	06	06.9	-12	04	3.2	151127
11	50	42	6.3	05	27.1	-11	54	-7.7	150461
11	02	39	5.0	04	38.9	-12	07	4.4	149789
10	19	09	6.0	03	55.3	-12	06	2.0	149251
10	10	03	4.4	03	46.1	-12	06	1.9	149158
09	22	16	6.5	02	58.2	-12	00	-4.8	148690

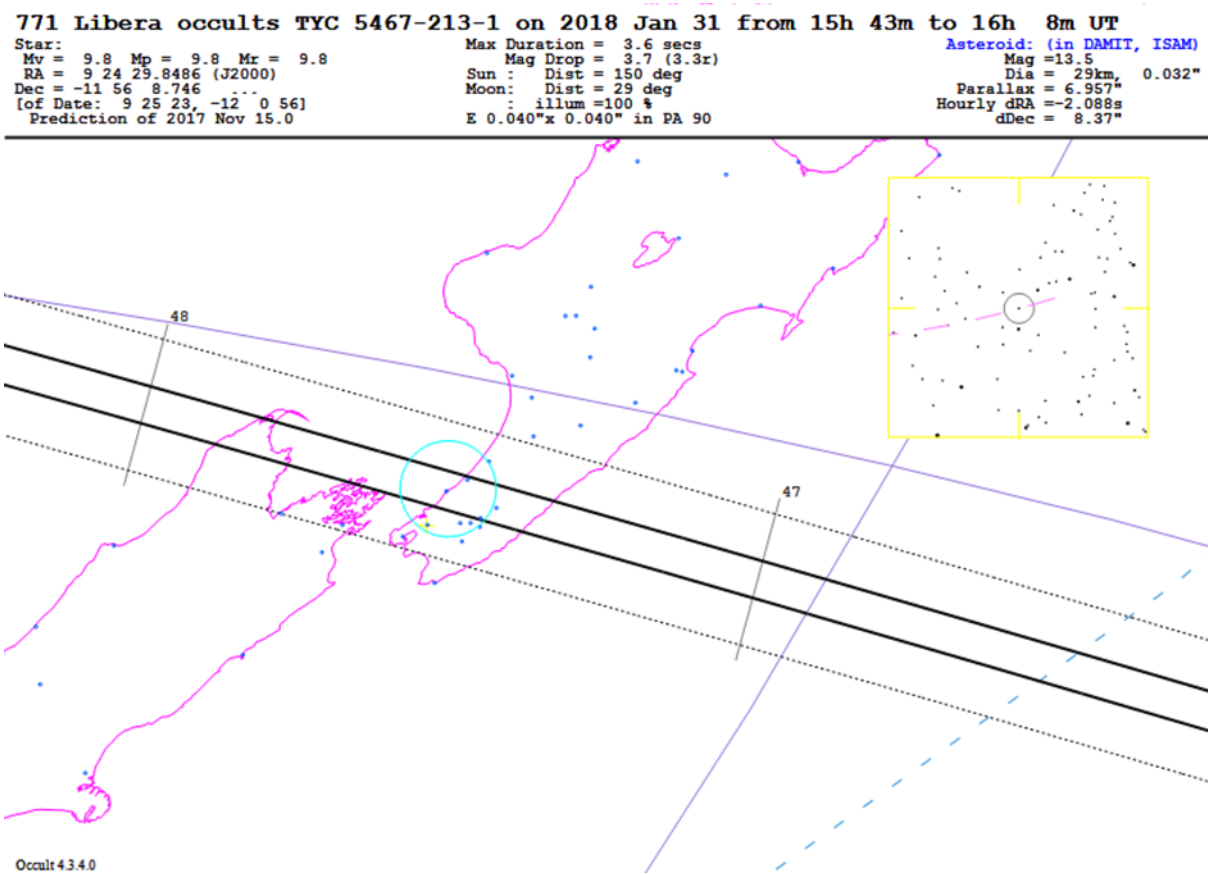


DAMIT 250



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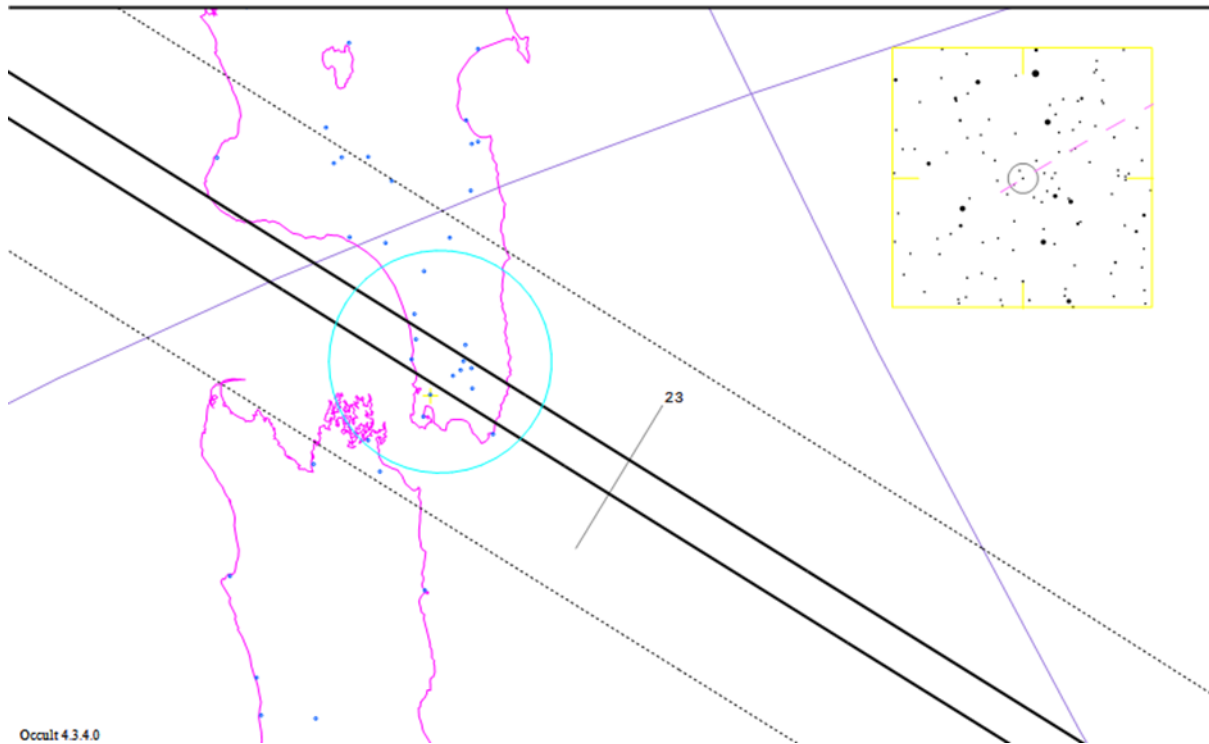


The final minor planet occultation for this newsletter is actually in February, but it occurs before our February meeting and so has been included now. The event is on Saturday 3<sup>rd</sup> February at 15h 22m 54s UT (Sunday 4:22am). The star is magnitude 10.1, while the minor planet is magnitude 18.0 and so the star will completely disappear during the occultation. As the asteroid has an estimated 30 km diameter, the maximum duration of the occultation is predicted to be 1.7 seconds. The shadow is predicted to pass north of Wellington, across our Kapiti Coast and Wairarapa observers. Even so, I encourage Wellington observers to also attempt the observation as the uncertainties in the prediction mean that my observatory, for instance, has a 14% chance of seeing an occultation. The moon will be fairly bright (with an illumination of 87%) and close-by (with an elongation of 55°), so again using a pre-point star to locate the target star is recommended. I'd recommend using the pre-points earlier in the night, and keep the bright pre-point star (SAO181543, 1¼ hours before the event) as a backup in case the earlier pre-points fail (for instance, due to cloud).

Point			J2000				Dec		
Time			Star	RA		Dec		Offset	SAO
h	m	s	mag	h	m	o	'	ArcMin	
13	35	11	3.0	13	18.9	-23	10	21.7	181543
13	13	51	6.3	12	57.6	-22	45	-3.2	181265
12	50	44	2.7	12	34.4	-23	24	35.5	180915
12	26	31	3.0	12	10.1	-22	37	-11.1	180531
11	28	10	4.5	11	11.7	-22	50	1.2	179624
10	01	18	6.8	09	44.6	-22	45	-4.2	177914
09	50	09	5.9	09	33.4	-22	52	2.4	177649
08	37	20	6.1	08	20.5	-22	55	4.7	175634

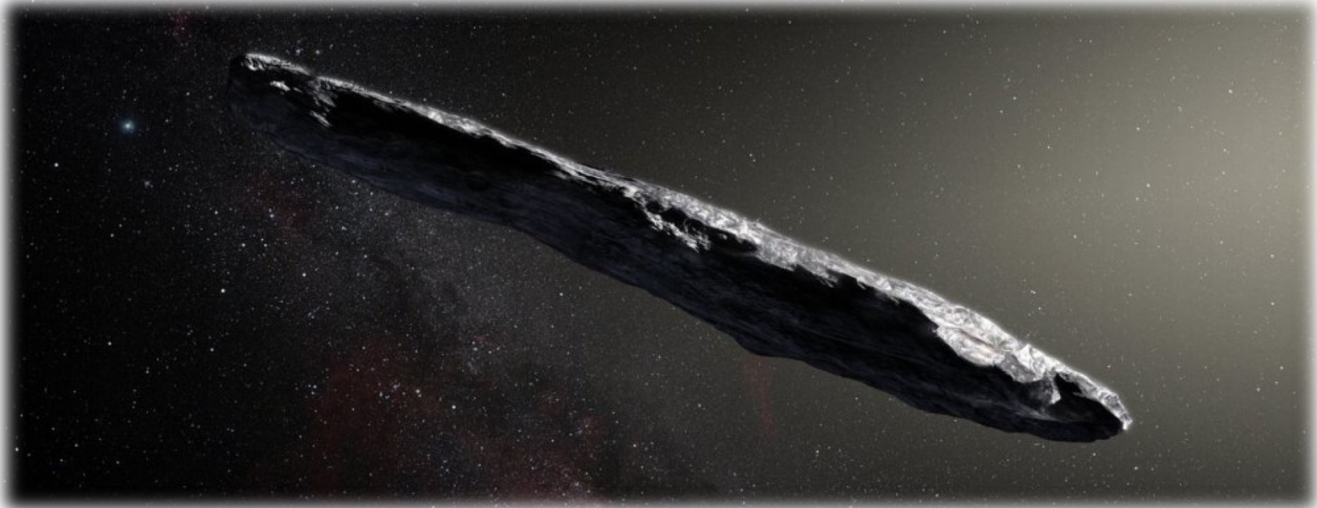
3092 Herodotus occults TYC 6761-197-1 on 2018 Feb 3 from 15h 20m to 15h 29m UT

Star:	Max Duration = 1.7 secs	Asteroid:
Mv = 10.1 Mp = 10.1 Mr = 10.1	Mag Drop = 7.9 (7.5r)	Mag = 18.0
RA = 15 6 51.9945 (J2000)	Sun : Dist = 84 deg	Dia = 30km, 0.011"
Dec = -22 50 10.269	Moon: Dist = 55 deg	Parallax = 2.251"
[of Date: 15 7 54, -22 54 8]	: illum = 87 %	Hourly dRA = 1.407s
Prediction of 2017 Nov 15.0	E 0.030"x 0.030" in PA 90	dDec = -11.80"



Murray Forbes

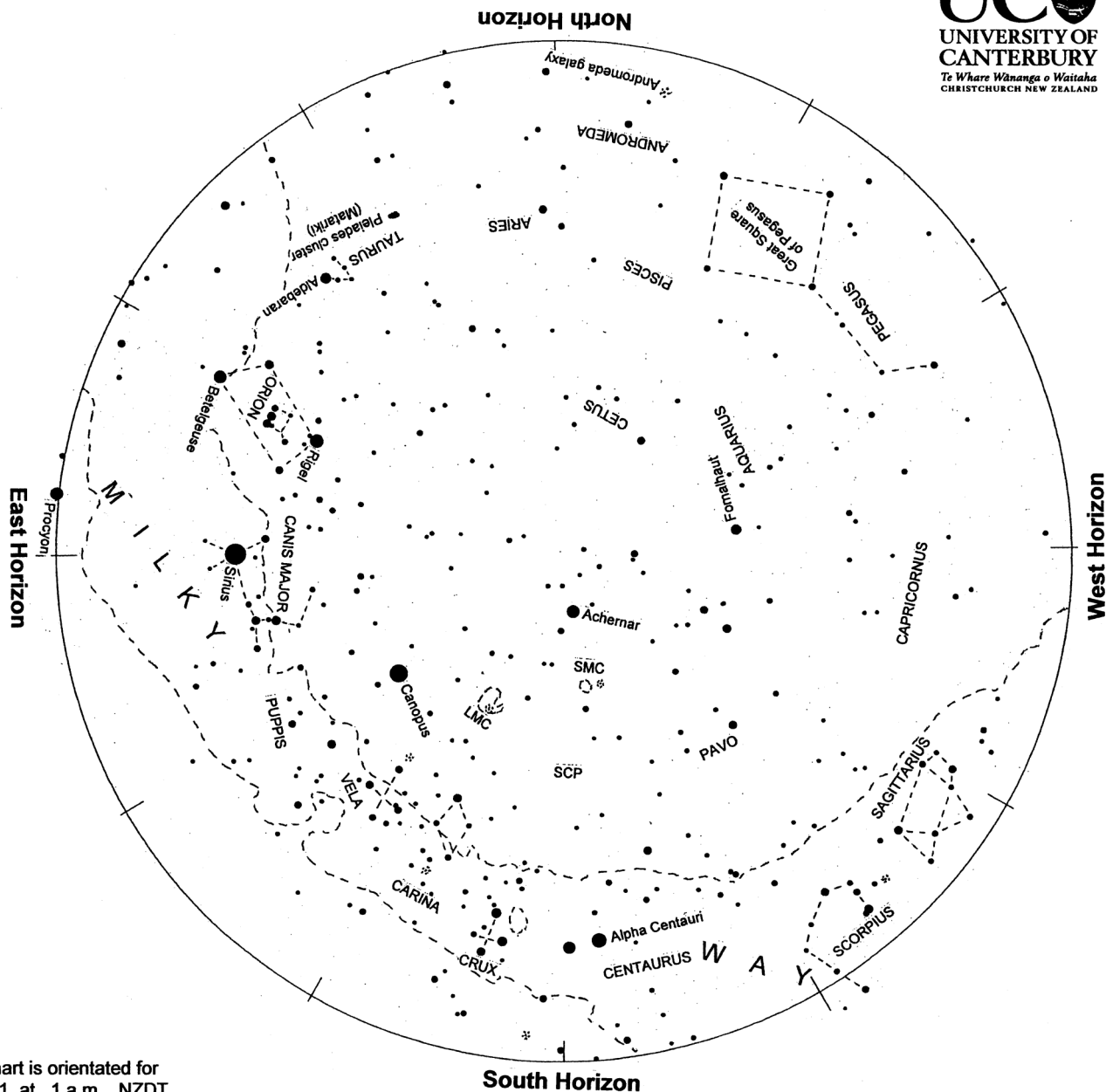
## The First Interstellar Object to Visit Us Is More Incredible Than We Ever Expected



Artist impression of 'Oumuamua (European Southern Observatory/M. Kornmesser)

The first asteroid observed visiting our Solar System from elsewhere isn't just unusual in its interstellar origin. It's also unlike any other asteroid we've seen before. Astronomers have trained a flurry of telescopes on the object discovered last month, and now we're being rewarded with super-exciting details. Newly named 'Oumuamua, the asteroid is up to 400 metres (0.25 miles) long, and is distinctly cigar-shaped. It could be up to 10 times as long as it is wide - a shape never before seen in an asteroid.

'Oumuamua (official designation 1I/2017 UI - the "I" is for "interstellar") was first spotted by the Pan-STARRS 1 telescope in Hawaii in late October, and it didn't take long for astrophysicists to figure out that its trajectory and velocity both indicated that it was an extrasolar stranger, perhaps flung out by a neighbouring star. [\(More\)](#)



The chart is orientated for  
 Nov. 1 at 1 a.m. NZDT  
 Nov. 15 at midnight "  
 Dec. 1 at 11 p.m. "  
 Dec. 15 at 10 p.m. "

### Evening sky in December 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 also shows a small extra clockwise rotation each night as we orbit the sun.

Sirius, the brightest star, is due east, twinkling like a diamond. Left of it is Orion, with 'The Pot' at its centre. Bright Rigel is above the Pot and reddish Betelgeuse below. Left of Orion is orange Aldebaran with a V-shaped cluster making the face of Taurus the Bull. Further left is the Pleiades/Matariki/Seven Sisters star cluster. The Pointers and Crux, the Southern Cross, are low in the south. Right of Canopus, the second brightest star, are the Clouds of Magellan (LMC and SMC on the chart), two small nearby galaxies. The Great Square of Pegasus spans the lower northern sky with the Andromeda Galaxy below and right of it.

# The Night Sky in December 2017

The brightest stars are in the east and south. **Sirius**, the brightest of all the stars, is due east at dusk, often twinkling like a diamond. Left of it is the bright constellation of **Orion**. The line of three stars makes Orion's belt in the classical constellation. To southern hemisphere skywatchers they make the bottom of 'The Pot'. The faint line of stars above the bright three is the Pot's handle or Orion's sword. At its centre is the Orion Nebula, a glowing gas cloud nicely seen in binoculars. **Rigel**, directly above the line of three stars, is a hot blue-giant star 770 light years\* away. Orange **Betelgeuse**, below the line of three, is a cooler red-giant star 430 light years away.

Mercury and Saturn (not on the chart) are low in the southwest twilight at the beginning of the month, right of the Scorpion's tail, setting 80 minutes after the Sun. Mercury is above Saturn and slightly brighter at first, but fades and sinks toward Saturn. The two appear close together on the 7th. After that Mercury quickly disappears into the twilight with Saturn slowly following.

Left of Orion is a triangular group making the upside down face of **Taurus** the bull. Orange **Aldebaran**, at one tip of the V shape, is one eye of Taurus. The stars on and around the V, except for Aldebaran, are the Hyades cluster. It is 150 light years away. Aldebaran is not a member of the cluster. It just happens to be on the line-of-sight at about half the cluster's distance. Further left is the **Pleiades/Matariki/Subaru** cluster, a tight grouping of six naked-eye stars impressive in binoculars. It is 440 light years away.

**Canopus**, the second brightest star, is high in the southeast. Low in the south are the Pointers, Beta and **Alpha Centauri**, and **Crux** the Southern Cross upside down at this time of the year. In some Maori star lore the bright southern Milky Way makes the canoe of Maui with Crux being the canoe's anchor hanging off the side. In this picture the Scorpion's tail, just setting, can be the canoe's prow and the

Clouds of Magellan are the sails.

The **Milky Way** is wrapped around the horizon. The broadest part is in **Sagittarius** low in the west at dusk. It narrows toward Crux in the south and becomes faint in the east below Orion. 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 or central bulge of the galaxy, 30 000 light years away, is in Sagittarius. The nearby outer edge is the faint part of the Milky Way below Orion. A scan along the Milky Way with binoculars finds many clusters of stars and a few glowing gas clouds.

The Clouds of Magellan, **LMC** and **SMC**, high in the southern sky, are two small galaxies about 160 000 and 200 000 light years away, respectively. They are easily seen by eye on a dark moonless night. The larger cloud is about 1/20th the mass of the Milky Way galaxy, the smaller cloud 1/30th but that is still many billions of stars in each.

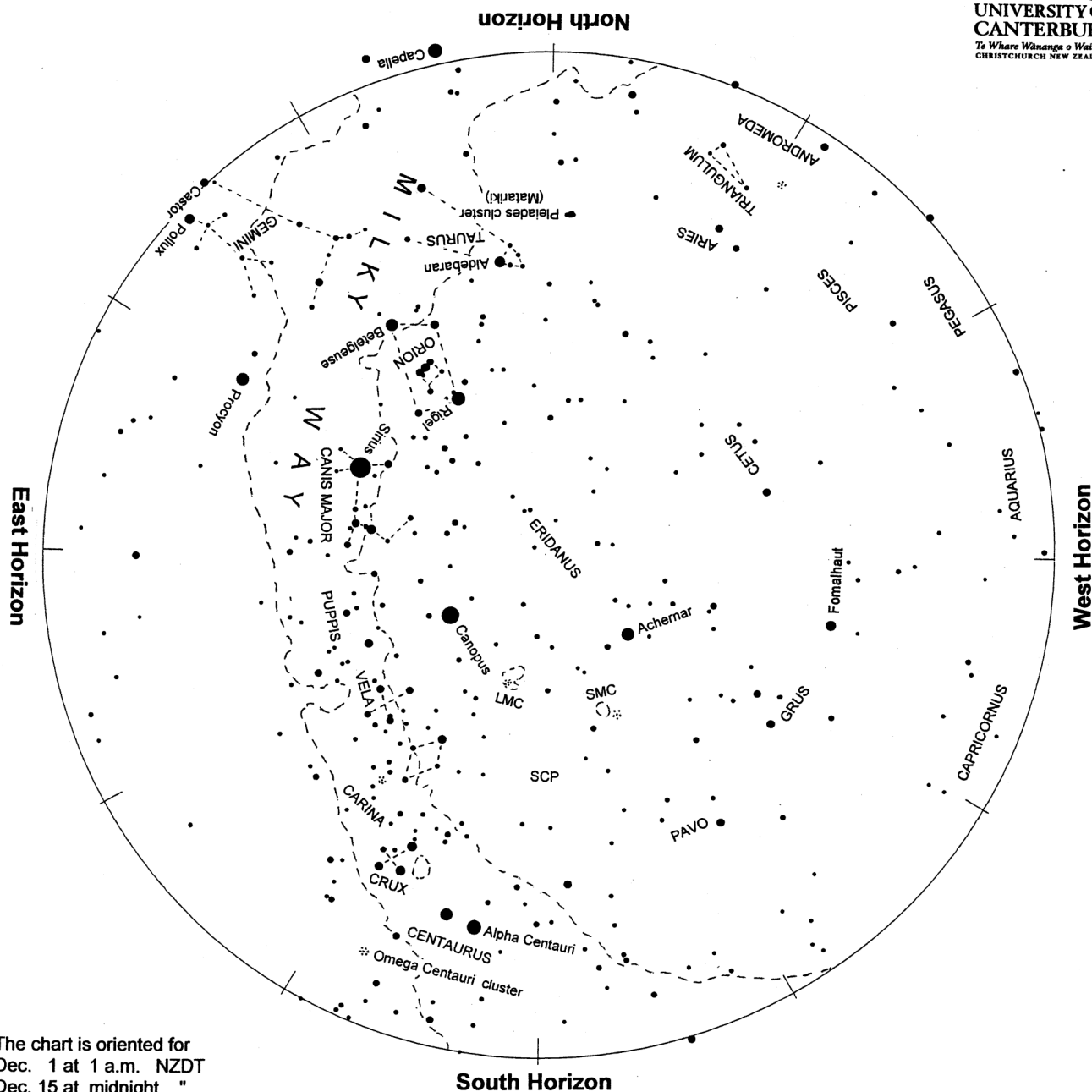
Very low in the north is the **Andromeda Galaxy** seen in binoculars in a dark sky as a spindle of light. It is a bit bigger than our Milky Way galaxy and nearly three million light years away.

Mars, Jupiter and later Mercury appear in the eastern dawn sky. On the 1st reddish Mars rises due east after 3:30, appearing below the blue-white star Spica. Golden Jupiter is the brightest 'star' in the morning sky, rising around 4:30. By mid-month Spica, Mars and Jupiter appear equally spaced along a diagonal line. By the 31st Jupiter is low in the east at 3 a.m. with Mars, much fainter, above and left of it. Mercury begins a rapid ascent of the dawn sky in the last third of December after passing between us and Sun. By the 23rd it will be rising an hour before the Sun, appearing directly below orange Antares, a position it holds till the end of the month.

\*A light year (l.y.) is the distance that light travels in one year: nearly 10 million million km or 10<sup>13</sup> 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](http://www.canterbury.ac.nz)



The chart is oriented for  
Dec. 1 at 1 a.m. NZDT  
Dec. 15 at midnight "  
Jan. 1 at 11 p.m. "  
Jan. 15 at 10 p.m. "

### Evening sky in January 2018

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 or westward rotation from night to night as we orbit the sun.

Sirius, the brightest star, is high in the east at dusk. Left of it is Orion, containing 'The Pot', with Taurus and the Pleiades/Matariki star cluster further left toward the north. Canopus, the second brightest star after Sirius, is southeast of the zenith. Crux, the Southern Cross, and the Pointers are low in the south. From northern New Zealand the bright star Capella is near the north skyline. There are no bright planets in the evening sky until the end of the month when Venus appears low in the twilight. The other planets are in the morning sky.



# The Night Sky in January 2018

Bright stars appear in the eastern half of the evening sky in January. Sirius is the brightest. Left of Sirius are bluish Rigel and orange Betelgeuse, the brightest stars in Orion the hunter. Between them, but fainter, is a line of three stars making Orion's belt. To southern hemisphere star watchers, Orion's belt makes the bottom of 'The Pot' or 'The Saucepan'. A faint line of stars above and right of the belt is the pot's handle or Orion's sword. The sword has a glowing cloud at its centre: the Orion Nebula. There are no bright planets in the evening sky except at the end of the month when Venus might be seen setting 20 minutes after the sun.

Left of Orion is the V-shaped pattern of stars making the face of Taurus the Bull. The V-shaped group is called the Hyades cluster. It is 150 light years away. Orange Aldebaran, making one eye of the bull, is not a member of the cluster but on the line of sight, half the cluster's distance.

Left again, toward the north and lower, is the Pleiades/Matariki/Seven Sisters/Subaru star cluster. Pretty to the eye and impressive in binoculars, it is 440 light years\* from us. From northern NZ the bright star Capella is on the north skyline. It is 90,000 times brighter than the sun and 3300 light years away.

Low in the south are Crux, the Southern Cross, and Beta and Alpha Centauri, often called 'The Pointers'. Alpha Centauri is the closest naked-eye star, 4.3 light years away. Beta Centauri, like most of the stars in Crux, is a blue-giant star hundreds of light years away. Canopus is also very luminous and distant: 13 000 times brighter than the sun and 300 light years away.

The Milky Way is in the eastern sky, brightest in the southeast toward Crux. It can be traced towards the north but becomes faint below Orion. The Milky Way is our edgewise view of the Galaxy, the pancake of billions of stars of which the sun is just one. Binoculars show many star clusters and a few glowing gas clouds in the Milky Way, particularly in the Carina region. The Milky Way is faint left, or north, of

Orion because we are looking toward its thin outer edge. The centre region of the Galaxy, in Sagittarius, is hidden by the sun at this time of year.

The Clouds of Magellan, LMC and SMC, are high in the southern sky and easily seen by eye on a dark moonless night. They are two small galaxies about 160 000 and 200 000 light years away.

A total eclipse of the Moon begins on the 31st just before midnight NZDT but isn't immediately obvious. The Moon will be moving through the outer part of Earth's shadow till 12:48 a.m. on February 1, when it begins to move into the darker part. By 1:51 it will be totally in the dark central part of the shadow, the umbra. It should be darkest around 2:30. It begins to exit the umbra at 3:08 and is fully out of it by 4:11. It leaves the outer part of the shadow, the penumbra, at 5:08.

All the bright planets are in the morning sky except Venus which is behind the Sun most of the month. At the beginning of the month golden Jupiter rises after 2:30 and is the brightest 'star' in the morning sky. Above and left of it, and much fainter, is reddish Mars. Jupiter and the background stars rise earlier each morning but Mars moves more slowly. This causes Jupiter to overtake Mars, the two will be close around the 7th. Their apparent closeness is a line-of-sight effect: Mars is 285 million km from us and Jupiter is 880 million km away.

Mercury is bright in the morning sky for most of the month. In early January it is rising 90 minutes before the Sun, toward the southeast. Saturn rises slowly out of the dawn twilight in the first fortnight. On the 14th it is beside Mercury and the fainter of the two. At that date Mercury is 182 million km away and Saturn 1640 million from us. Mars, Jupiter and Saturn continue to rise earlier each day as we catch up on them. Mercury, much faster than us, slips lower in the dawn as it moves to the far side of the Sun.

\*A **light year** 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.

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