



OASI News

The newsletter of Orwell Astronomical Society (Ipswich)



Image: John Hughes

The image captures Melotte 15 (IC 1795) and IC 1805 aka NGC 896 both small star clusters within the Heart Nebula and Fish Head nebula respectively. These emission nebulae are 7,500 light years away from Earth and contain ionised Hydrogen, Oxygen and Sulphur which leads to the deep blue and orange hues. The structure of the two nebula, of which this is just a part is large, spanning some 2 degrees of the night sky and over four times the diameter of the full Moon.

Data for this image which was acquired over four nights has been presented in the Hubble Palette and includes RGB stars. The acquisition details are as follows:

H-alpha 80 x 300s, OIII 77 x 300s, SII 69 x 300s, Red 18 x 120s, Green 22 x 120s, Blue 18 x 120s
Total integration time 24h 46m

Equipment: William Optics Z103 refractor with reducer, ZWO ASI1600mm Pro Cool camera, 1.25" Chroma Filters.
SkyWatcher EQ6R Pro mount.

Trustees: Mr Roy Adams Mr Neil Morley Mr David Payne
Honorary President: Dr Allan Chapman D.Phil MA FRAS

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Members looking puzzled during the December Festive Christmas Quiz at Newbourne (photo: John Wainwright)

Society Notices

Dear Members,

I hope you had an enjoyable Christmas and New Year.

2024 marks the 150th anniversary of Orwell Park Observatory. To celebrate this significant milestone, the British Astronomical Association, Historical Section, is planning to hold its Section Meeting on Saturday 18 May in Ipswich, with an additional Lecture Meeting, organised by OASI on Friday 17 May. Further details will be announced over the coming weeks, so please check Newsletter, website, emails and Facebook group for updates. We hope to involve Orwell Park School in our celebrations, but have yet to receive confirmation of their willingness to participate.

Thank you and clear skies!

Andy Gibbs, Chairman

Society Contact details

Email queries: info@oasi.org.uk

Facebook: Orwell Astronomical

Twitter: @OASIpswich

YouTube:
<https://www.youtube.com/channel/UCHgxe3QAE RVWf7vkjKkCI2Q>

Members-only message board

<https://groups.io/g/OASI>

Observatory (meeting nights only)

07960 083714

**Please send material for the OASI
web site and newsletter
e.g. observations, notices of events,
general interest articles, to
news@oasi.org.uk**

The CLOSING date is the 15th day of the month



Tuesday 19 December was a wet day in Suffolk, with over 25mm of rain in places. However, the skies cleared in the evening, so this gave me an opportunity to image Jupiter, riding high in the South.

Jupiter was shining at mag -2.7, presenting a 45.7 arcsecond disc. The moon Ganymede is close-by.

Equipment used: ZWO ASI178mc camera, attached to a 200mm Meade LX200 ACF telescope, 2x Barlow lens.

Software used: Sharpcap 4, Autostakkert 3, Registax 6 and Affinity Photo 2.

Andy Gibbs.

Access into the School Grounds and Observatory Tower

Orwell Park School have changed our access route to the observatory.

The new route will be as follows:-

- Enter through gate 2 (gate 1 being the main gate) and park inside as per the attached map.
- Enter the school through the double black doors as indicated on the map. A key fob will be required to open the door.
- Continue straight through the next two sets of double doors.
- Turn left at the end of the short corridor then immediately right.
- Pass through the single door and on your left you will find the staircase leading to the observatory.
- On no account must you deviate from this route.



When leaving the observatory use the same route but in reverse. Please keep noise to a minimum as there are staff quarters nearby.

Articles for OASI News

News, pictures and articles for this newsletter are always welcome. Details above.

Please send tables as separate files in one of the above formats.

If you don't feel up to writing a major article, perhaps you might write a short note for OASI News along the lines of "This month I have mostly been observing/constructing/mending/reading/etc."

The Newsletter archive is at www.oasi.org.uk/NL/NL_form.shtml

Authors, please note that your articles will be publicly available worldwide!

Reproducing articles from OASI News

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Committee 2024

Chairman	AndyGibbs	Set overall agenda for OASI, Chair committee meetings, Press and publicity
Secretary	RoyGooding	Outreach meetings (jointly with Chairman), observatory decoration
Treasurer	PaulWhiting	Finance, Supervision of applications for grants. Visits by outside groups, Observatory tours, Public appreciation of astronomy, Outreach activities
Committee	James Appleton	Committee meeting minutes, Web site
	MartinCook	Membership, Tomline refractor maintenance & user testing
	Matt Leeks	Safety & security
	Peter Richards	Lecture meetings, Email distribution lists
	John Wainwright	Equipment curator
	Mike Whybray	Astronomy Workshops, Child protection officer, Orwell Park School Astronomy Club
	Andy Willshere	Librarian
	Adam Honeybell	Newsletter
	Paul Whiting	OASI @ Newbourne

Committee Meeting

The next Committee Meeting will be on Friday 9th February at 8:00pm via Zoom. All members welcome.

Welcome to new members

Christopher Bunyan, Phil Batten, Louisa Mower, David Schultz

OASI and BAA Events

For the latest event details, please see www.oasi.org.uk/Events/Events.php

For other astronomy news and astro pictures try our

X (formerly twitter) feed <https://twitter.com/OASlpswich>

Facebook page <https://www.facebook.com/pages/Orwell-Astronomical/158256464287623>

Date, Time & Location	Contact	Event
Weekly, every Wednesday, from 20:00 Orwell Park Observatory, Nacton	Martin Cook, Roy Gooding	Observatory open
Monday 12 th Feb from 19:30 Newbourne Village Hall	Paul Whiting	OASI@Newbourne Beginners and new members welcome
Thursday 18 th Feb 20:00 Zoom	Paul Whiting	Monthly Zoom Meeting
Monday 26 th Feb from 19:30 Newbourne Village Hall	Paul Whiting	OASI@Newbourne Beginners and new members welcome Sky Notes & talk

OASI @ Newbourne

newbourne@oasi.org.uk

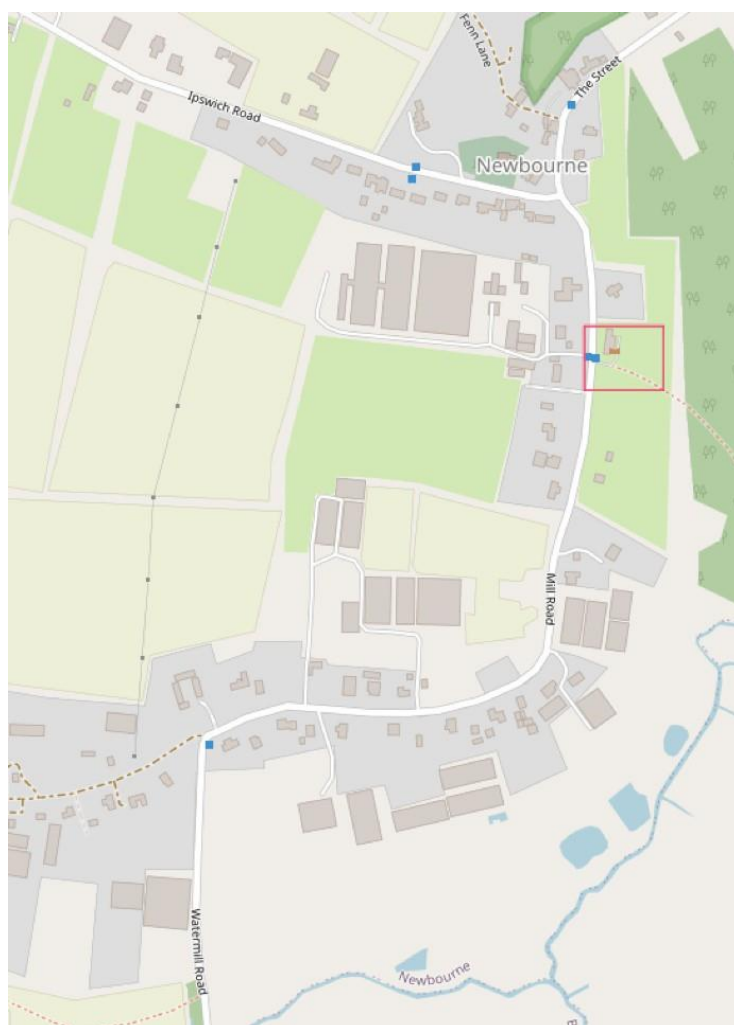
We meet at Newbourne Village Hall,
Mill Lane, IP12 4NP on the 2nd and 4th
Mondays from 19:30.

**Visitors are welcome but we do ask you to
join the Society after two visits.**

<http://www.oasi.org.uk/OASI/Membership.php>

Newbourne dates for 2024

February	12	26 (T/S)
March	11	25 (A/S)
April	01 [#]	22 (S)
May	06 [#]	27 (A/S)
June	10	24 (S)
July	08	22 (A/S)
August	12	26 (S)
September	09	23 (A/S)
October	14	28 (S)
November	11	25 (A/S)
December	09 (Q)	



We open up for all meetings at 7:30pm. Astro News (A) / Star Guide (S) at 7:45pm followed by any Talks (T), Workshops (W) and occasional Quiz (Q). # indicates a change to the normal monthly pattern.

Newbourne Talk – Monday February 26th : “The Future of Astronomy”, Paul Whiting

BAA news & webinars

For full details of all meetings or cancellations, please go to <https://britastro.org/events/future-events>

Wednesday 27th Mar 2024 17:30-20:00 BAA Meeting
Venue: *INSTITUTE OF PHYSICS, 37 Caledonian Road, London, N1 9BU*

Friday-Sunday 12-14th Apr BAA Winchester Weekend
Venue: *Sparsholt College, Winchester*

Saturday 11th 2024 May BAA Spring Meeting, Greenock

Saturday 18th May 2024 10:00-17:00 Historic Section Meeting, Ipswich
Venue: *Museum Street Methodist Church, Ipswich (tbc)*

Wednesday 5th June 2024 17:30-20:00 BAA Meeting & George Alcock Lecture
Venue: *INSTITUTE OF PHYSICS, 37 Caledonian Road, London, N1 9BU*

September (dates tba) BAA Autumn Meeting
Venue: *Rutherford Appleton Laboratory*

Wednesday 30th October 2024 17:30-20:00 BAA Meeting & AGM
Venue: *INSTITUTE OF PHYSICS, 37 Caledonian Road, London, N1 9BU*

The BAA Radio Astronomy Section

The BAA Radio Astronomy Section have been enjoying talks, seminars and tutorials via Zoom and these are available on the BAA YouTube channel

<https://www.youtube.com/user/britishastronomical/playlists>.

February 2 nd 19:30 GMT (19:30 UTC)	Marcus Leech President. Canadian Centre for Experimental Radio Astronomy	Amateur SDR based interferometry, hardware and software. (Getting started)
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Answer to December/January maths teaser:

$$18+16 = 114$$

$$14+11 = 74$$

$$12 + 9 = 60$$

$$20 + 15 = 118.$$

The first two numbers are the position of Prime numbers in a sequential list. e.g. the 11th prime number in sequential list is 31. So taking the 20th and adding it to the 15th in sequence gives $71+47 = 118$.

Here is another little teaser:

O	18	14	K	16	12
8	T	12	8	8	U
1260		1664			?

The Night Sky in February 2024

All event times are for the location of Orwell Park Observatory 52.0096°N, 1.2305°E.
Times are **GMT** unless otherwise stated.

Sun, Moon and planets

Sources: <http://heavens-above.com/PlanetSummary.aspx> <http://heavens-above.com/moon.aspx>

February 2024

Object	Date	Rise	Set	Mag.	Notes
Sun	1	07:36	16:42		
	29	06:42	17:34		
Moon	1	-	09:48		Last Quarter 02 February 23:18 New Moon 09 February 22:59 Perigee 10 February 18:54
	29	23:18	08:06		First Quarter 16 February 15:01 Full Moon 24 February 12:31 Apogee 25 February 15:00
Mercury	1	07:02	14:48	-0.2	
	29	07:00	17:27	-1.6	
Venus	1	06:05	13:50	-3.9	
	29	06:04	15:02	-3.8	
Mars	1	06:50	14:31	1.3	
	29	06:00	14:41	1.3	
Jupiter	1	10:22	00:40	-2.2	
	29	08:40	23:09	-2.0	
Saturn	1	08:41	18:47	1.0	
	29	06:57	17:17	1.0	
Uranus	1	11:43	01:50	5.7	
	29	08:54	23:59	5.8	
Neptune	1	09:11	20:39	7.9	
	29	07:22	18:54	8.0	

Occultations during February 2024

https://iota-es.de/moon/grazing_descrx101.html and <http://www.lunar-occultations.com/iota/bstar/bstar.htm>

Observers are encouraged to download and install the [Occult](#) software program [Windows only] to generate predictions for their own particular site coordinates.

Meteor showers during February 2024

Shower	Normal limits	Maximum	ZHR at Max	Notes
Alpha Centaurids	28/01/24 – 21/02/24	08/02/24	6	Quite fast meteors

See also <https://www.rmg.co.uk/stories/topics/meteor-shower-guide>

For radio observation, use reflections from Graves Radar on 143.049MHz or the Brams transmitter in Belgium on 49.97MHz and UK GB3MBA on 50.408MHz <https://www.ukmeteorbeacon.org/Home>

See also https://www.popastro.com/main_spa1/meteor/radio-meteor-observing-2020/.

Comets

Source : <https://heavens-above.com/Comets.aspx> on 23/01/24.

Comet	Brightness	Date of last reported observation	Angular separation from Sun	Constellation
62P Tsuchinshan	8.9	2024-Jan-21	121°	Virgo
12P Pons-Brooks	9.0	2024-Jan-23	58°	Cygnus

Visible ISS passes >30° max altitude for February 2024

Source: <http://heavens-above.com/PassSummary.aspx?satid=25544>

Times are **GMT**.

Predictions are approximate (23/1/24) due to craft adjustments. Check the day before.

Date	Bright-ness (mag)	Start			Highest point			End		
		Time	Alt.	Az.	Time	Alt.	Az.	Time	Alt.	Az.
19-Feb	-2.7	06:19:55	10°	SW	06:23:06	43°	SSE	06:26:18	10°	E
20-Feb	-2.2	05:31:14	13°	SSW	05:33:42	32°	SSE	05:36:43	10°	E
21-Feb	-3.5	06:17:17	10°	WSW	06:20:36	67°	SSE	06:23:54	10°	E
22-Feb	-3.2	05:29:10	22°	SW	05:31:01	53°	SSE	05:34:17	10°	E
23-Feb	-2.8	04:41:32	39°	SSE	04:41:32	39°	SSE	04:44:36	10°	E
23-Feb	-3.7	06:14:37	10°	W	06:17:57	84°	S	06:21:17	10°	E
24-Feb	-3.8	05:26:37	27°	WSW	05:28:15	75°	S	05:31:35	10°	E
25-Feb	-3.4	04:38:47	59°	SE	04:38:47	59°	SE	04:41:49	10°	E

25-Feb	-3.8	06:11:48	10°	W	06:15:08	85°	S	06:18:28	10°	E
26-Feb	-3.9	05:23:42	28°	W	05:25:19	86°	S	05:28:39	10°	E
27-Feb	-3.7	04:35:45	71°	ESE	04:35:45	71°	ESE	04:38:48	10°	E
27-Feb	-3.7	06:08:47	10°	W	06:12:06	70°	SSW	06:15:24	10°	ESE
28-Feb	-3.8	05:20:33	27°	W	05:22:12	81°	S	05:25:32	10°	E
29-Feb	-3.7	04:32:31	74°	ESE	04:32:31	74°	ESE	04:35:35	10°	E
29-Feb	-3.2	06:05:35	10°	W	06:08:47	46°	SSW	06:11:59	10°	SE

Bill Barton's Radio Broadcast

ICRFM (Ipswich Community Radio) 105.7 MHz at about 08:25 in the morning of the first Wednesday of each month. I aim to cover what there is to see in the sky and then a little bit on something topical. ICRFM is also available to listen to over the Internet and there is a listen again option on their website. <http://www.icrfm.com>

Forthcoming Outreach Programmes

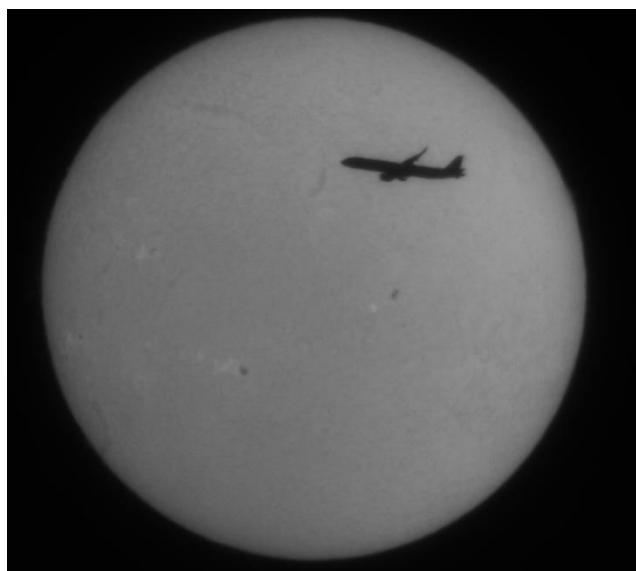
All members are welcome to come along and help out at these events – you don't need to be an expert in the subject. Just respond to the email call for help prior to the event.

Please note that not all events are open to the public.

Saturday February 10th 2024 - Cedarwood Primary School, Kesgrave

Thursday February 22nd 2024 - Norwich Science Festival, The Forum, Norwich

Sat 24th and Sun 25th February - Star Parties at Foxhall Aviation Museum, Foxhall Road.



Never easy imaging the Sun when it's low down and close to a flight path.

Good old Ryanair FR169 had to get into the shot!

Lunt LS60THa/B1200 telescope and Zwo 178MM camera.

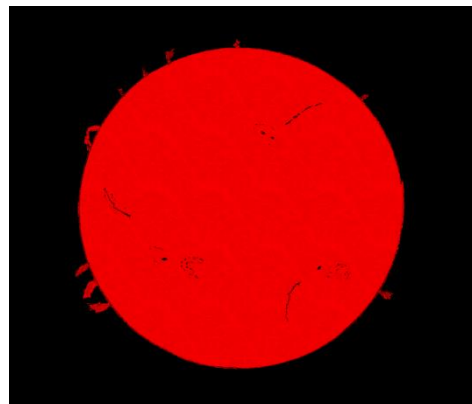
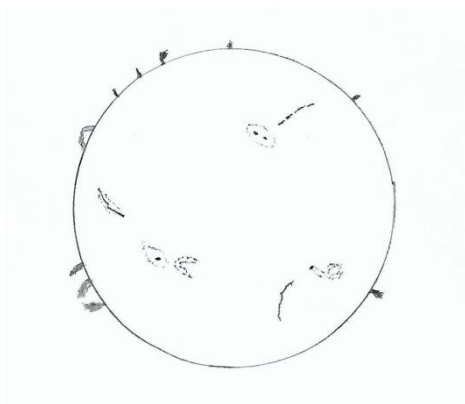
Martin Cook

Member's Observations

Neil Morley

We haven't seem much of the Sun recently, so here's something I prepared earlier. It's a pencil sketch observed in H α light on 17/8/23 at 15:00-15:20 UT using OASI's Coronado PST. A 20mm Kellner eyepiece provided a magnification of 20x. The sketch was scanned and post-processed using GIMP 2.6, and shows prominences, filaments and active regions.

I attach the original and post-processed images. The post-processed image aims to provide a more realistic view of what was seen through the eyepiece.



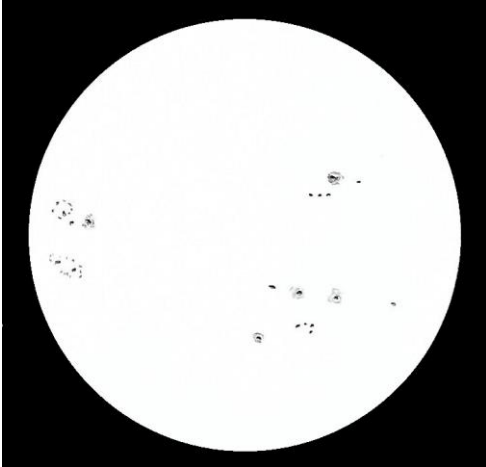
Here are a couple of white light pencil sketches showing sunspots spaced a couple of days apart (6/12/23 11:45-11:50 UT and 8/12/23 10:55-11:00 UT). Changes were noted within the sunspots groupings and their relative positioning demonstrates the solar disk's rotational direction (left to right).

As it was close to freezing outside, I set up the equipment in my conservatory. The equipment was a Celestron C4R 102mm F9.8 refractor on a manually driven alt-az mount. The telescope was fitted with a Lunt 1.25" Herschel Wedge (diagonal) to provide safe views of the solar disk in white light. A 25mm Star Plossl eyepiece provided a magnification of 40x. An additional 1.25" single polarizing filter was fitted to the eyepiece in accordance with Lunt's instructions. Image brightness was adjusted to a comfortable level by rotating the eyepiece/filter combination.

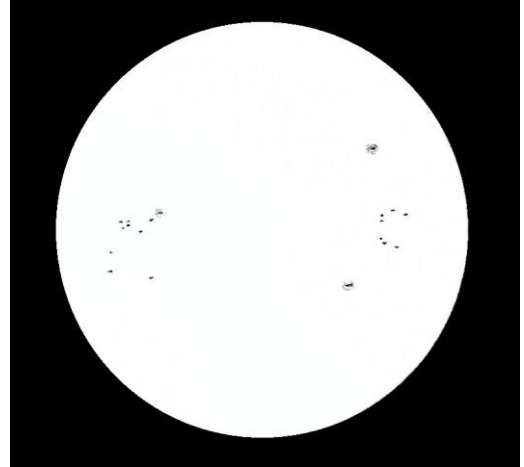
Post processing steps:

1. Scan image to PDF (HP Envy 5646 printer).
2. Copy/paste image into Paint.
3. Flip image L-R horizontally to correct the effects of the diagonal.
4. Add black oval/circle to mask the edge of the solar disk.
5. Save image then copy/paste into GIMP 2.6 (1024 pixel square).
6. Bucket fill the sky background black. Touch up remaining spots around the solar disk (paintbrush tool).
7. Save final image.

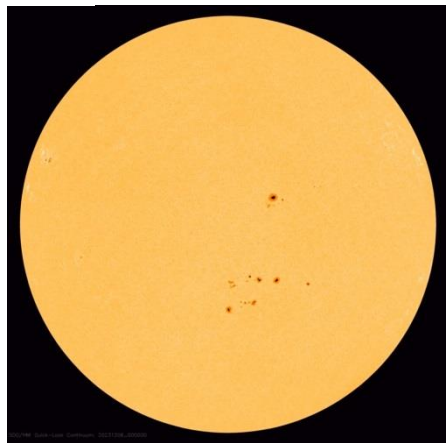
Finally, and this goes without saying.... Never look at the Sun without the use of correct solar filters or dedicated solar telescopes. Let me know if you would find a suitably themed workshop useful e.g. Newbourne and I'll arrange something in the new year.



Neil Morley sketch: 6/12/23



Neil Morley sketch: 8/12/23



NASA image: 6/12/23

Carl Baldwin

Back to normal this evening, but last night was actually clear so I attempted some imaging of Jupiter. I have more to work through, but from the first images the one attached is probably the best.

Equipment: Skywatcher Skymax 180 Pro (Maksutov-Cassegrain) on EQ6-R Pro mount, ZWO ASI294MC camera connected through a 2.5x barlow.

Software: SharpCap, PIPP, AutoStakkert, Registax, Sharpen AI

Equipment as above, Software SharpCap and Affinity Photo (and yes, I do have to learn how to better use masking)

The right-hand image was taken a few days later, showing Io's shadow.



VIPER

Volatiles Investigating Polar Exploration Rover.

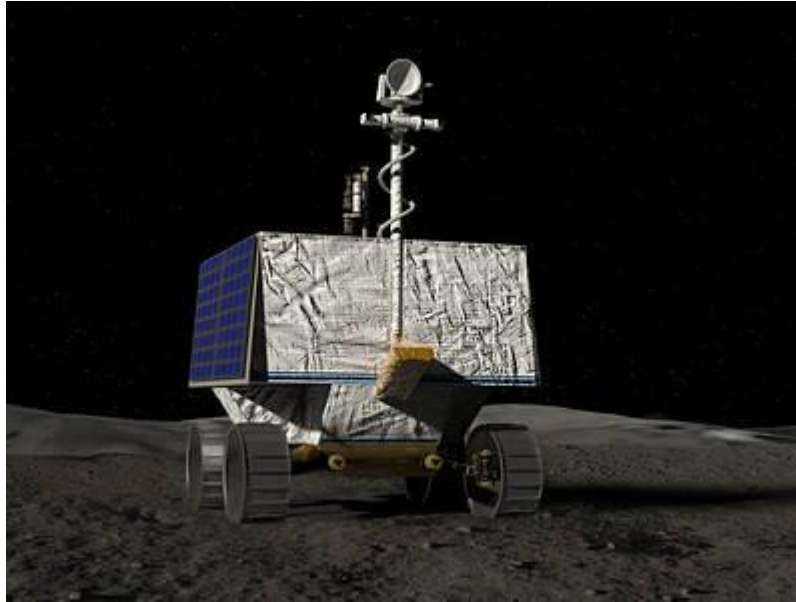
a short article from the library.

This NASA mission is scheduled to land at the lunar impact crater, Nobile, situated in the area of the Moon's South Pole, towards the end of 2024. Launch vehicle and lander are to be supplied by a commercial enterprise partner of NASA. The mission period will be 3 cycles of lunar day and night, which is approximately 100 of our Earth days. In size, the Rover is similar to a large golf buggy, the prototype of which has been comprehensively tested on Earth. It has been built to manoeuvre Moon's crust and combat all the changes that the Moon can throw at it, such as lunar dust, rapid temperature changes and cosmic rays. The maximum travelling distance by Rover will be 20kms.

All the data that is collected will be utilised to show the most probable position where ice can be found and how to acquire it, making VIPER unique in its approach on the moon. Investigating where caches of ice are situated will provide beneficial information for human habitation at a later date. All gathered data will be analysed with results extrapolated for other areas of the solar system for further in-depth analysis.

Firstly a little background information. During the 1960's there were five lunar orbiters launched. These photographed 99% of the moon's surface. All five were crashed into the moon to stop the systems from adding to the electronic detritus already floating in space. The first orbiter was launched on 10 August 1966 and was crashed on 29 October 1966, with the last launching on 1 August 1967 and crashing on 31 January 1968. In the late 1990's, Lunar Prospector spacecraft detected hydrogen at the Moon's poles. This stimulated NASA's Ames Research Centre into initiating a mission named 'LCROSS', (Lunar Crater Observation and Sensing Satellite). This satellite was designed to have two parts, one a missile that would crash into a crater generating a substantial plume of dust and detritus into which the second part, the spacecraft, would manoeuvre through, identifying its contents. This procedure was executed within four minutes. The data obtained showed the availability of hydrogen gas that originated as water ice

crystals, ammonia, methane as well as mercury, silver and sodium. This was the Holy Grail of Moon exploration; there was some form of water at the poles. LCROSS had been exceedingly successful. The ice found corresponds to air, fuel and water, all of which could be manufactured by humans in situ on the Moon. This would offset some of the mission costs by having these products available in location.



Picture credit: [VIPER Image Gallery | NASA](#)

What will VIPER do while on its journey across part of our Moon. Its main task is to seek out ice found mainly on the surface and to generate informative maps which as previously stated would be very useful for future expeditions. VIPER has several science plans of action:

- i. To seek out polar water in its various states and vaporous substances found within the regolith and to investigate their origins.
- ii. All data obtained to be formatted for further use by later mission crews.

Finding enough water is the main objective, and therefore the saying '*leaving no rock unturned* ', would be a good yardstick. The axis of the moon is at a minor tilt and therefore the sun doesn't rise to a specific height to the horizon which leaves the bottom of craters very cold. During the day, the surface of the moon can attain 140 degrees C. and reach - 250 degrees C. at night. Because of heat from our Sun, some of the ice crystals will undergo sublimation. However ice below the ground will be relatively safe, some of which may be difficult to find. These are called cold traps and if found would be a very useful stockpile. In order to survey these areas, VIPER will survey four different sections of soil depth. These are:

- i. Surface component.
- ii. Shallow, within 50cm of the surface.
- iii. Deep, 50cm to 100cm down.
- iv. Dry area where ice is not expected. 100cm down.

The VIPER rover is specifically designed to negotiate the surface of the Moon's South Pole. It is 2.5m tall and 1.5m long as well as wide, and is designed to meander around crater floors. The engineers have designed a new type of wheel action that, it is hoped will not stop them from driving through different types of soil - dense and firm to soft and feathery. If VIPER comes across soft and feathery types of soil, it is capable of lifting each of its wheels separately and in a revolving motion is able to pull the rover out of the boggy soil. Its four- wheel elements can also rotate to drive the craft sideways with independent steering. It has a cruising speed for regular use of 0.72 kph,

slowing to 0.4 kph for scientific observation, as well as being able to trundle up a 15° incline. Lights have also been fitted to enable the cameras to record, even in poor luminosity. A definite advantage to having an expedition on the Moon is that navigational commands will be sent in close to real time. It takes 1.282 sec for a signal to leave earth and arrive at the Moon. VIPER's computer is its brain which has been designed for it to act on transmitted signals, which in view of the Earth signal to Moon time will be close to real time as well as acting autonomously when reacting to sensor data.

When in its water hunting mode, VIPER will utilise its on-board Neutron Spectrometer System (NSS). If water is found, then so will hydrogen. Having established water, the on-board drill will be operated, down to a depth of a metre. The drill has the acronym TRIDENT (The Regolith and Ice Drill for Exploring New Terrains) and is designed to splinter solid material using a hammer process as well as for the carbide drill bit to spin and cut into the ground. All drill samples are conveyed upward to the surface via channels called flutes where a spinning brush head will sweep the samples into a neat pile for analysis by VIPER's Near Infrared Volatiles Spectrometer System (NIRVSS), colloquially called '*nervous*'. The last time that drilling was performed on the Moon was during the Apollo missions.

MSolo is the other mass spectrometer housed on-board VIPER which will evaluate natural atmospheric gases on the surface of the Moon upon touchdown. This is to differentiate between gasses from the Moon from those clinging to the lander originating from elsewhere.

One problem of situating VIPER at a pole is that for two weeks out of every four, due to libration, Earth disappears from view. This means that the VIPER team on Earth have had to plan ahead by scrutinising prior satellite images to identify safe areas for the two week break of the rover. Any place considered must allow for at least minimal sunlight to reach the solar panels as the rover has only 50 hours of power in reserve.

Mission control will be at NASA's Ames research Centre in Silicon Valley, California, with support NASA units in Houston and Florida. The mission is scheduled to run 24/7, with three shifts of 8 hours per day on Earth. Between shifts there is an hour handover /takeover period, to keep all staff apprised.

References:

- <https://www.nasa.gov/viper/lunar-operations>
- [VIPER Image Gallery | NASA](#)
- <https://www.americanscientist.org/article/volatiles-investigating-polar-exploration-rov>
- <https://www.hou.usra.edu/meetings/lpsc2020/pdf/2898.pdf> (usra.edu)

Andy Willshere

Peregrine - Nigel Evans

It looks like Astrobiotic's lunar lander Peregrine will not be landing on the Moon, after a failure in its propulsion system. Peregrine was launched on Jan 8 on the inaugural flight ULA's Vulcan rocket with a Centaur 5 upper stage. The upper stage successfully pushed Peregrine towards the Moon, before being discarded into heliocentric orbit.

The weather cleared on 9 Jan, giving me an opportunity of imaging Peregrine. I did not expect it to be bright - and it wasn't. It was moving around 7 arcseconds a minute, so initially I settled on 30 second exposures. 240109 Peregrine1 NSE.jpg shows a composite image of its motion in the sky. In my system Peregrine is just about detectable in a single frame, but you need to know where to look and have a good imagination. After it crossed the meridian the motion was slowing down to less than 3 arcseconds per minute, so I increased the exposure to 60 seconds 240109 Peregrine2 NSE.jpg shows a similar trail in the sky. The Magnitude was around 17.2 -17.4 at a range of ~250k km

JPL Horizons provide a set of predictions beforehand of where Peregrine would be - they got retrospectively updated after the propellant leak as this would act as a small engine. These predictions enable me to align the images of Peregrine and stack them to produce a still 240109 Peregrine3 NSE.jpg and a video 240109 Peregrine NSE.mp4. The image of Peregrine is now much more evident

As for the Centaur upper stage, I didn't know anything other than it was outside my field of view

The following evening also produced clear skies. By now I had got predictions of where the Centaur stage was, from ProjectPluto. The Centaur stage is much brighter, at around 15.2, even though it is 600k km away. Much easier to make a still and a video of its motion. 240110 Centaur NSE.jpg and 240110 Centaur NSE.mp4.

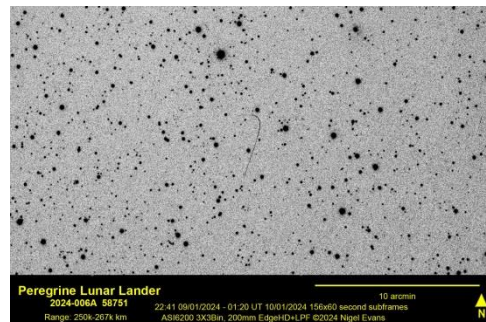
As the Centaur is much brighter, I had a go at seeing if it was tumbling by taking a heap of 10second exposures - 240110 Centaur2 NSE.mp4. As far as I could tell, the answer is No.

The Centaur will disappear into heliocentric orbit. Peregrine will loop up to about 400k km on 13 Jan then fall back towards the Earth, passing on the 18 Jan then looping back out towards the Moon.

[Please note: the .mp4 files are available on the OASI website. Ed.]



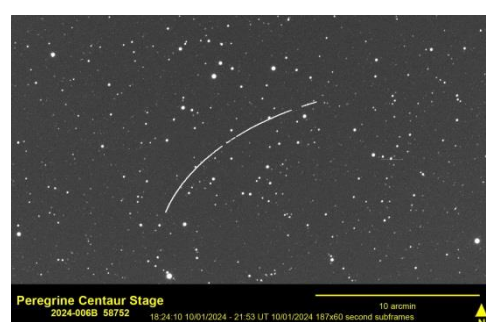
240109 Peregrine1 NSE.jpg



240109 Peregrine2 NSE.jpg



240109 Peregrine3 NSE.jpg



240110 Centaur NSE.jpg