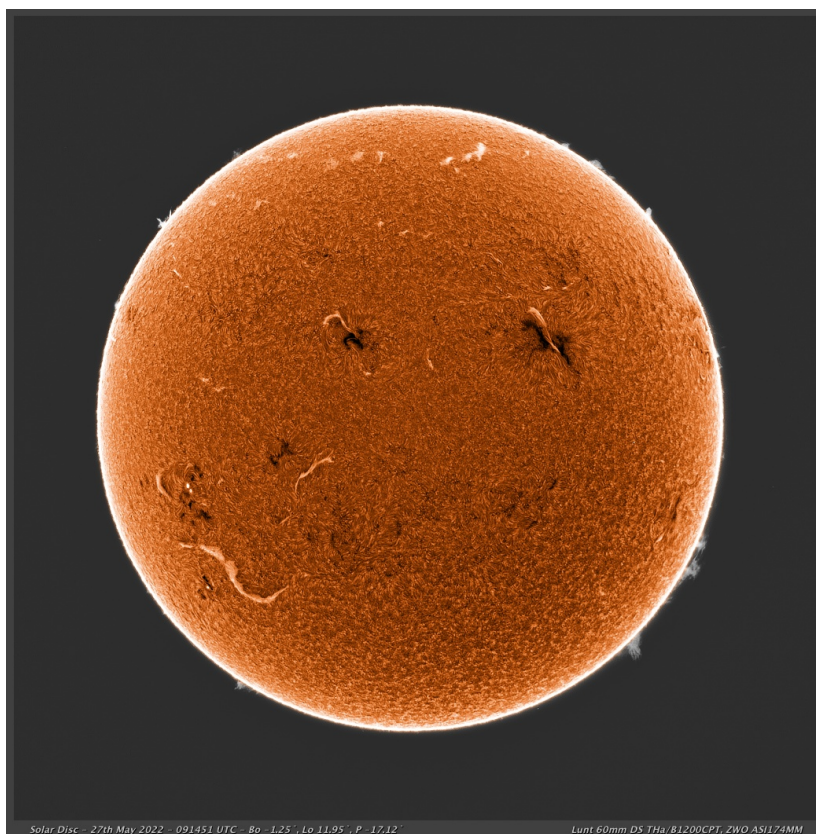




OASI News

The newsletter of Orwell Astronomical Society (Ipswich)



The Sun on Friday morning (27th May) in H α

Photo by John Hughes

Trustees:

Mr Roy Adams

Mr Neil Morley

Mr David Payne

Honorary President:

Dr Allan Chapman D.Phil MA FRAS

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Society Notices

Dear Members,

We use a Zoom Pro account for online meetings. If you would like to join in, please email Paul Whiting, treasurer@oasi.org.uk

In the coming months, we will be guided by advice from the Government and Public Health England, as to when we can resume some of our activities. These are likely to be very limited at first, the Committee will decide what could be done, with the health and safety of everybody being the highest priority.

I would like to wish everybody clear skies, stay safe and I hope to see you soon.

Andy Gibbs, Chairman

Society Contact details

Email queries: info@oasi.org.uk

Facebook: Orwell Astronomical

Twitter: @OASIpswich

YouTube:
<https://www.youtube.com/channel/UCHgxe3QAeRVWf7vkjKkCI2Q>

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

Access into the School Grounds and Observatory Tower

Please use the third gate into the school grounds by the gym.

Areas out of Bounds

Access to the Observatory is only via the black door at the foot of the Observatory tower, which leads to the staircase and thence to the spiral staircase up to the Observatory. If the black door is locked, please phone the observatory mobile during meeting hours. Kindly check/amend the number shown on your 2021 membership card.

Please do NOT explore other routes. When in doubt, ask or call the Observatory mobile.

Remember this is a school and straying into the main part of the school where the pupils reside would cause the society big problems and could see us losing the use of the observatory. Any member found to be anywhere other than the approved access route or the observatory area will face serious sanctions up to and including expulsion from OASI.

Please note that access time for all observatory member nights is after 20:15

Articles for OASI News

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

Please submit your articles in any of the following formats:–

Text: txt, rtf, rtf, doc, docx, odt, Pages, pdf

Spreadsheets: xls, xlsx, OpenOffice/LibreOffice, Numbers

Images: tiff, png, jpg

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."?

Newsletter archive www.oasi.org.uk/NL/NL_form.shtml

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

Reproducing articles from OASI News

If you plan to reproduce an article exactly as per OASI News then please contact the Editor – otherwise, as a matter of courtesy, please seek permission from and credit the original source/author. You may not reproduce articles for profit or other commercial purpose.

Committee 2022

Chairman	Andy Gibbs	Set overall agenda for OASI, Chair committee meetings, Press and publicity,
Secretary	Roy Gooding	Outreach meetings (jointly with Chairman), observatory decoration.
Treasurer	Paul Whiting FRAS	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
	Martin Cook	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 Wilshere	Librarian
	Avtar Nagra	OASI @ Newbourne
Assistants	Martin Richmond-Hardy	Newsletter, OASI @ Newbourne

Committee Meeting

The next Committee Meeting will be on Friday 2 September at 8:00pm via Zoom.

Welcome to new members

Michael Howlett

OASI and BAA Events

Please note that the listed events may change depending on the progress of the pandemic. For the latest event details, please see www.oasi.org.uk/Events/Events.php

There's a Google Calendar on the OASI web site with the latest dates (and corrections!). If you want to easily add OASI Events to your own computer/phone/tablet calendar application click this button on the website Events page (bottom right of the calendar) or use this address to access this calendar from other calendar applications.



<https://calendar.google.com/calendar/ical/1jhs9db7lncki4sojo7092vfv%40group.calendar.google.com/public/basic.ics>

For other astronomy news and astro pictures try our

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 20:15	Martin Cook, Roy Gooding	Observatory open
Friday 3 June 19:30 Zoom	https://britastro.org/event/lofar-how-high-resolution-radio-observations-can-help-us-understand-supermassive-black-holes	LOFAR: how high-resolution radio observations can help us understand supermassive black holes. By Dr. Leah Morabito, UKRI Future Leaders Fellow and Asst Prof Durham University BAA Radio Astronomy Section Zoom
Friday 10 June 20:00 Zoom	Paul Whiting treasurer@oasi.org.uk	Zoom talk (recorded) "Fast Gamma Ray Bursts" with Prof Carole Mundell
Monday 13 June 19:30 Newbourne Village Hall	Martin R-H newbourne@oasi.org.uk	OASI @ Newbourne
Thursday 16 June 20:00 Zoom	Martin Cook membership@oasi.org.uk	Monthly OASI-on-Zoom meeting If you a member of OASI and wish to join in our in-isolation chats, please contact Martin Cook.
Saturday 18 June Institute of Astronomy in Cambridge CB3 0HA	https://www.webbdeepsky.com/annual-meeting/year/2022	The Webb Deep-Sky Society Annual Meeting.
Sunday 19 June 09:30–15:30 Kirton Recreation Ground Back Road, Kirton IP10 0PW	Paul Whiting treasurer@oasi.org.uk	OASI @ East Suffolk Wireless Revival Doors open at 9.30am and the entry fee for visitors is £2. The venue has free car parking.. There will be trade stands, a car boot sale, a Bring & Buy, special interests groups, GB4SWR HF station and an RSGB bookstall. Catering is available on site.
Saturday 25 June 10:00–17:30 Nottingham University	https://britastro.org/event/one-day-summer-meeting-nottingham	BAA Summer Meeting 'Cosmology, Galaxies & Exo-planets'
Monday 27 June 19:30 Newbourne Village Hall	Martin R-H newbourne@oasi.org.uk	OASI @ Newbourne

		Sky Notes by Bill Barton FRAS
Friday 15th July 20:00 Zoom	Martin Cook membership@oasi.org.uk	"Exploring the Solar System in X-rays" with Professor Graziella Branduardi-Raymont
Thursday 21st July Zoom	Martin Cook membership@oasi.org.uk	Monthly OASI-on-Zoom meeting.
Saturday 23 July 12:00–18:00 Newbourne Village Hall	Pete Richards lectures@oasi.org.uk	OASI Picnic (members & their families)
Saturday 30 July 10– 16:00 (TBC) Christchurch Mansion Soane St, Ipswich, IP4 2BE,	Roy Gooding secretary@oasi.org.uk	Public Solar Event

Meetings via Zoom

Paul Whiting has set up an OASI account on Zoom Pro which allows us to accommodate more participants..To join, please first contact Paul, treasurer@oasi.org.uk – OASI members only. Be sure to install/update to the latest version of Zoom – there's no need to set up an account. Go to <https://zoom.us/join> and enter the meeting ID or personal link name. You will have received a link from the meeting organiser.

As well as for some lectures & talks, we meet via Zoom on the 3rd Thursday of every month at 8pm.

OASI @ Newbourne

Martin Richmond-Hardy newbourne@oasi.org.uk

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

In view of the ongoing Covid situation, we kindly request that attenders wear masks in the village hall to protect others and themselves. Hand gel is available.

Newbourne dates for 2022

June	13	27 (A)
July	11	25 (A)
August	8	22 (A)
September	12	26 (A)
October	10	24 (A)
November	14	28 (A)
December	12	26 (may omit as it's Boxing Day)

We open up for all meetings at 7:30pm. Astro News/Star Guide (A) at 7:45pm followed by any Talks (T), Workshops (W) and the occasional Quiz (Q).

Stargazer's Guide

On the last meeting each month, at 19:45, Bill Barton FRAS will give a short presentation of what can be viewed in the following 4 weeks plus a reminder of OASI events. These will be available on our website.

Paul Whiting FRAS will give occasional Astro News briefings.

Astronomy Workshops/Informal talks

Contact Mike Whybray Monday meetings start at 7:30pm. Workshops / Talks start at 8pm

If you are a new OASI member, or haven't been to one of these informal workshops before, they are a mixture of events of different characters including beginners talks, interactive workshops, films, etc., suitable for all.

Do you have a subject you could workshop/talk? You could do a short one, or share the effort with a partner. Drop Mike Whybray a line! workshops@oasi.org.uk

Lectures – via Zoom

Contact: Peter Richards lectures@oasi.org.uk

The start time for all talks will be 8pm and, as usual, the talks will usually be held on a Friday evening.

All meetings are currently via Zoom. Contact Paul Whiting if you can't find the details.

Athaneum Astro Society

www.3a.org.uk/index.htm

Meetings (<http://www.3a.org.uk/programme.htm>) have resumed at Whepstead Community Centre, Bury Road, Whepstead, Bury St Edmunds, IP29 4TA <http://www.3a.org.uk/contact.htm> .

LYRA Lowestoft & Yarmouth Regional Astronomers

www.lyra-astro.co.uk

For events please see <http://www.lyra-astro.co.uk/events/>

DASH Astro

Darsham And Surrounding Hamlets <http://dash-astro.co.uk>

Meetings are normally held at New Darsham Village Hall and all DASH Astro observing sessions will take place at Westleton Common. ASOG observing sessions and locations may be arranged at the time of observation. Unless stated all group meetings will take place from 7:30 pm. on Sundays.

Meetings <https://www.dash-astro.co.uk/Events>

BAA news & webinars

For full details of all meetings or cancellations, please go to <https://britastro.org/meetings/2022>.

The BAA Radio Astronomy Section

Thanks to an initiative by Paul Hearn, the BAA Radio Astronomy Section have been enjoying talks, seminars and tutorials via Zoom.

These are/will be available on the BAA YouTube channel.

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

BAA RA Section Autumn programme 2022

Sep. 2nd. 19:30 BST (18:30 UTC)	Dr Helen Russell School of Physics & Astronomy Nottingham University	x-ray astronomy ‘An X-ray view of the Universe’
Oct. 7th. 19:30 BST (18:30 UTC)	Dr Samuel Lander Theoretical astrophysicist. Univ. East Anglia. The main focus of research is neutron stars: the collapsed remnants of a normal star's core following a supernova.	All about Magnetars A magnetar is a type of neutron star with a particularly strong magnetic field. This field powers a range of outburst activity, from X-ray and gamma-ray bursts and flares, to the recently discovered fast radio bursts. This talk will survey the observations and give a picture of how a magnetar releases all this energy.
Nov. 4th. 19:30 GMT (18:30 UTC)	Prof. John Richer The Cavendish Laboratory Cambridge Univ. John Richer is an astrophysicist with expertise in the field of star formation, with a particular interest in radio and submillimetre observations of young stars and protostellar systems.	‘On ALMA’ Atacama Large Millimetre/submillimetre Array ALMA is a submillimetre interferometer at the Chajnantor site in the Atacama Desert at 5100 metres above sea level. The principle research areas are millimetre and submillimetre imaging and spectroscopic observations of star-forming regions in our own Galaxy, in nearby galaxies, and in the very distant universe. These observations provide an unobscured view of the cold universe.
Dec. 2nd. 19:30 GMT (18:30 UTC)	Dr. Emma Chapman Guest star: JWST Royal Society Dorothy Hodgkin fellow based at the University of Nottingham.	Christmas Lecture ‘Exploring the Dark Ages of the Universe by Radio’ The first stars ever! 400 million years after the big bang. This era has never been observed and constitutes over a billion-year gap in our knowledge.

The Night Sky in June 2022

Martin RH

All event times (BST) are for the location of Orwell Park Observatory 52.0096°N, 1.2305°E.

Times are BST unless otherwise stated.

Sun, Moon and planets

Sources:

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

Object	Date	Rise	Set	Mag.	Notes
Sun	1	04:41	21:05		Summer Solstice Jun 21, 10:13 Sunrise 04:35, Sunset 04:39
	30	04:39	21:19		
Moon	1	05:35	23:32		1 st Quarter 07 June 15:49 Full Moon 14 June 12:52 Last Quarter 21 June 04:11 New Moon 29 June 03:52
	30	05:15	22:53		
Mercury	1	04:30	19:16	2.8	Max. western elongation 16 June
	30	03:37	19:48	-0.6	
Venus	1	03:29	17:24	-3.9	
	30	02:56	18:44	-3.8	
Mars	1	02:36	14:40	0.7	Perihelion 21 June
	30	01:19	14:45	0.5	
Jupiter	1	02:30	14:31	-2.1	
	30	00:43	12:58	-2.3	
Saturn	1	01:24	10:50	0.8	
	30	23:25	08:53	0.6	
Uranus	1	03:44	18:37	5.9	
	30	01:53	16:51	5.8	
Neptune	1	02:16	13:43	7.9	
	30	00:22	11:50	7.9	

In the second half of June, skywatchers will be treated to a beautiful alignment of the planets in the same order as they are from the Sun in our solar system — Mercury, Venus, Mars, Jupiter and Saturn. They will be visible during the twilight hours spanning in the eastern and southeastern sky in the latter half of June. Apart from the planets, the Moon will get close to each planet during this period — Saturn on June 18; Jupiter on June 21; Mars on June 22; Venus on June 26 and Mercury on June 27.

Occultations during June 2022

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 June 2022

Source: BAA Handbook 2021 p26-27 and <https://in-the-sky.org/newsindex.php?feed=meteors>

Shower	Normal limits	Maximum	Max RA/Dec.°	ZHR at Max	Notes
Daytime Arietids	May 22 – July 2	June 8	02:56 (44°) +24°	30?	Most active of the daytime showers. Good for radio observers. ZHR and radiant location uncertain.
Daytime ζ-Perseids	May 20 – July 5	June 10	04:16 (64°) +27°	20?	Peak overlaps with the Daytime Arietids. Good for radio observers. ZHR and radiant location uncertain.
June Boötids	June 22 – July 2	June 27	14:52 (223°) +48°	?	Unexpected outburst with ZHR~100 m/h on 1998 June 27 after a quiescent period of several decades. Very favourable.

For radio observation, use reflections from Graves radar on 143.050MHz or the Brams transmitter in Belgium on 49.97MHz and now UK GB3MBA on 50.408MHz. See also https://www.popastro.com/main_spal/meteor/radio-meteor-observing-2020/.

New meteor radio beacon

For detecting meteors over the UK there is now a beacon on 50.408MHz.

From Brian Coleman G4NNS

The Meteor Beacon on 50.408MHz was installed at the Sherwood Observatory and switched on at 13:00 Saturday 14th May. Its status can be found at ukmeteorbeacon.org/status.

Thanks to all those who have helped with this project. Andy G4JNT (PA), Heather M0HMO (software), Chris G3WIE (Hybrid phase shift / splitter), Nigel G7NJC (H/W installation), Paul 2E1GSC (Network connection and software), Peter G3PHO (Beacon keeper), John G4TSN (nearest close down op). Having arrived home I saw my first meteor "ping" within about 15 seconds of turning on the SDR RX.

Reports with waterfall displays showing head echoes will be very welcome. Expect to see aircraft if you are within 3-400km of the beacon plus the direct signal by the propagation mode of the day. Reports showing Head echoes (the ones with the rapidly changing Doppler shift) are most valuable, especially if these have been captured from 400km or more from the beacon. These are what we will need in order to calculate location, velocity and trajectory.

*All the best
Brian G4NNS*

<https://www.ukmeteorbeacon.org/Home>

Visible ISS passes $\geq 15^\circ$ max altitude

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

Times are BST. Predictions are approximate (24 May) 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.
30 Jun	-1.4	03:00:45	10°	SSE	03:02:14	12°	SE	03:03:44	10°	ESE

A quiet month!

Starlink passes

<https://heavens-above.com/AllPassesFromLaunch.aspx>

For a dynamic 3-D display, see <https://heavens-above.com/StarLink.aspx>

Astronomy on the radio

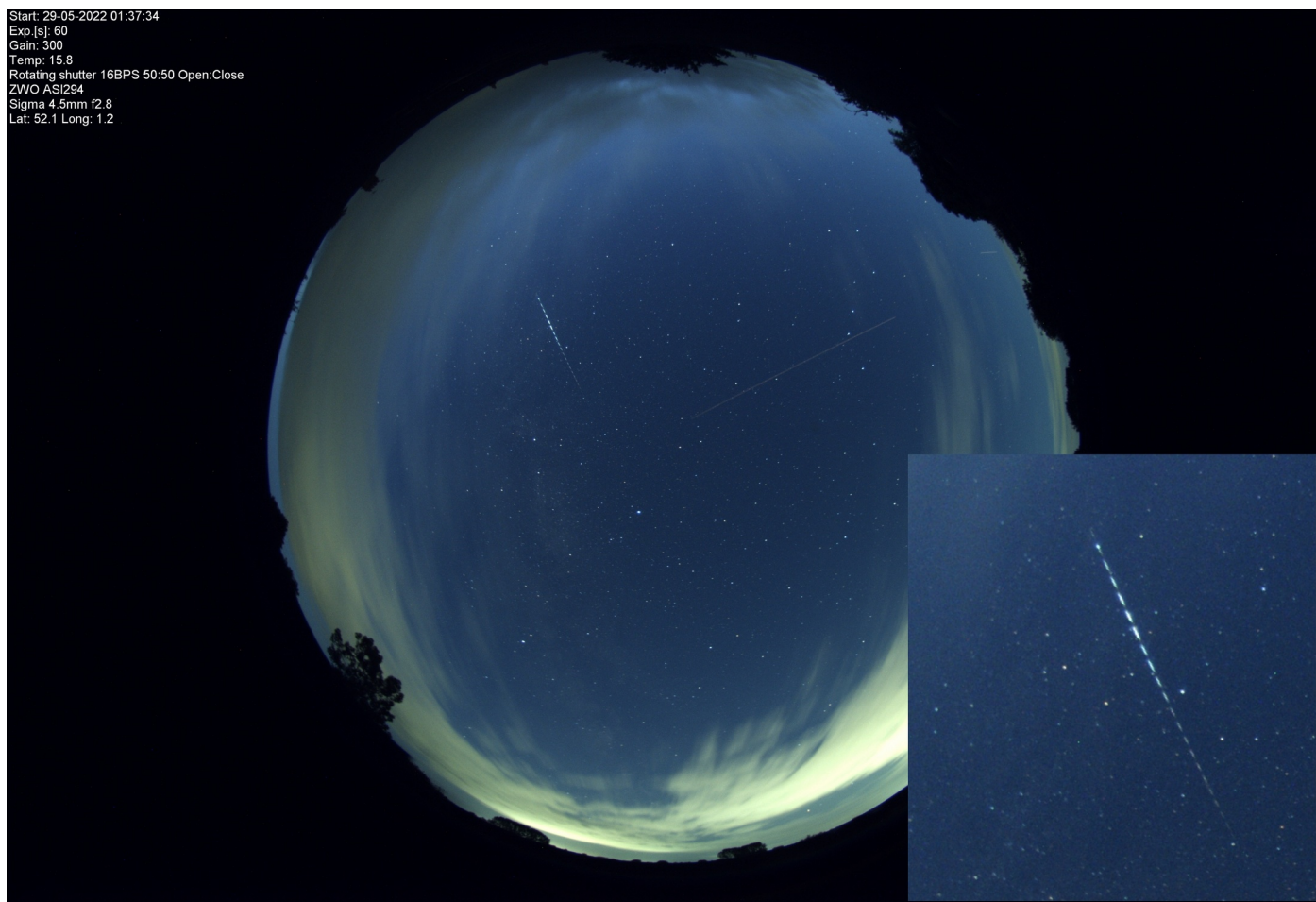
Bill Barton's Radio Broadcast

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>

Meteor Reports

Alan Smith

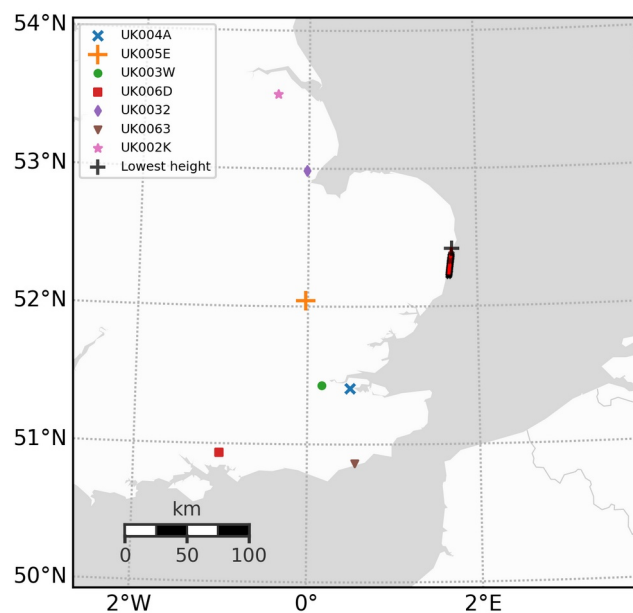
Fireball 29/5/22 013823hrs UT. Pattern is caused by the rotating shutter at 16bps.



Chris Albins also captured this on two of his video cameras.

UKMON plotted the path as shown here →

Credit: © UK Meteor Observation Network 2021.
This work is licensed under a [Creative Commons BY 4.0 International License](https://creativecommons.org/licenses/by/4.0/).

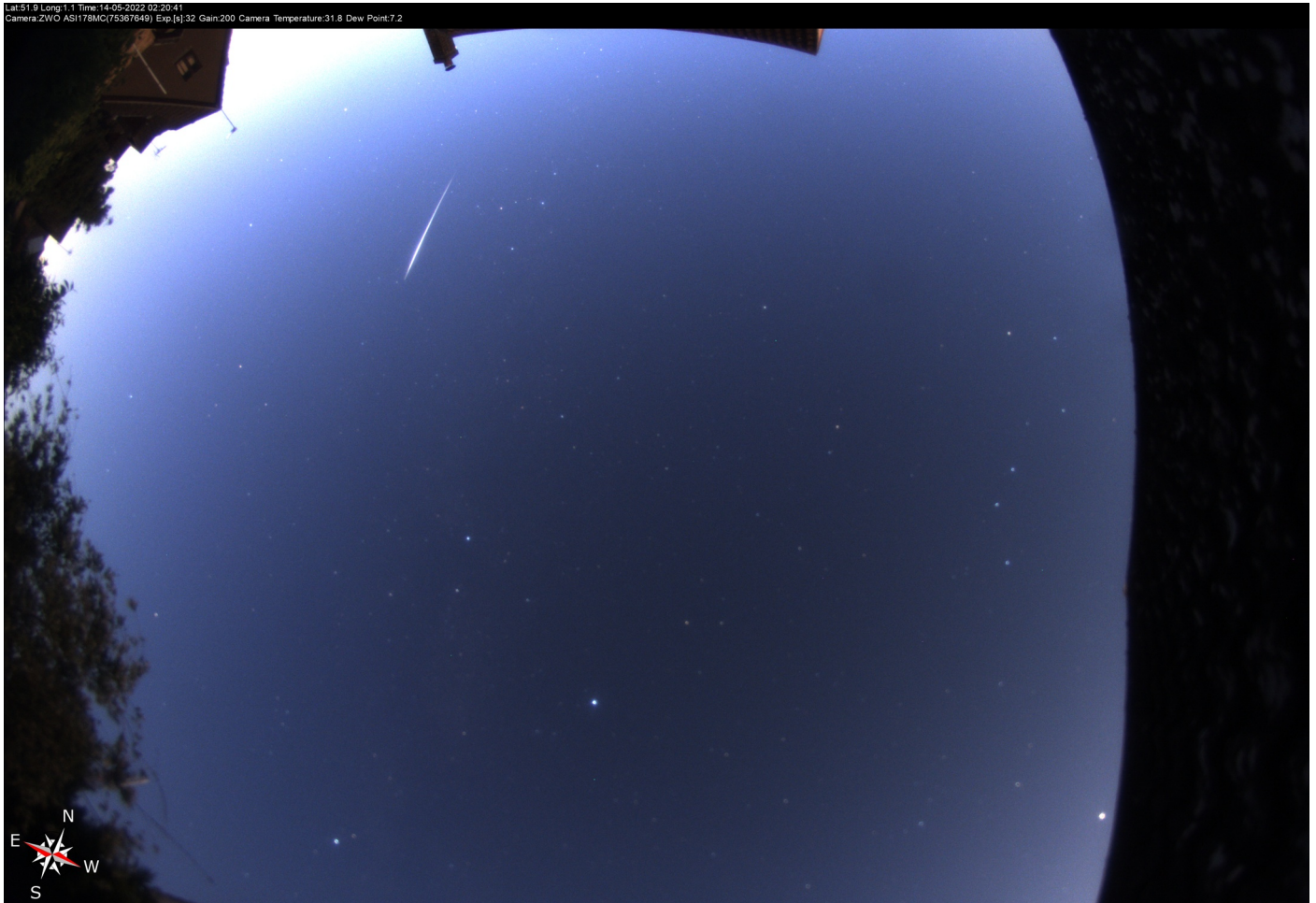


Details can be found at at

https://archive.ukmeteornetwork.co.uk/reports/2022/orbits/202205/20220529/20220529_013825.885_UK/index.html

John Hughes

John captured this one on his all-sky ZWO ASI178MC on 2022-05-14T02:20:41Z



Martin Richmond-Hardy

May Report for my UKMON station UK0056 is at

<https://archive.ukmeteornetwork.co.uk/reports/2022/stations/Kirton/05/index.html>

I also picked up this one on 22 May at 35. Mag -1.4 May psi Scorpiid, from the outer asteroid belt.

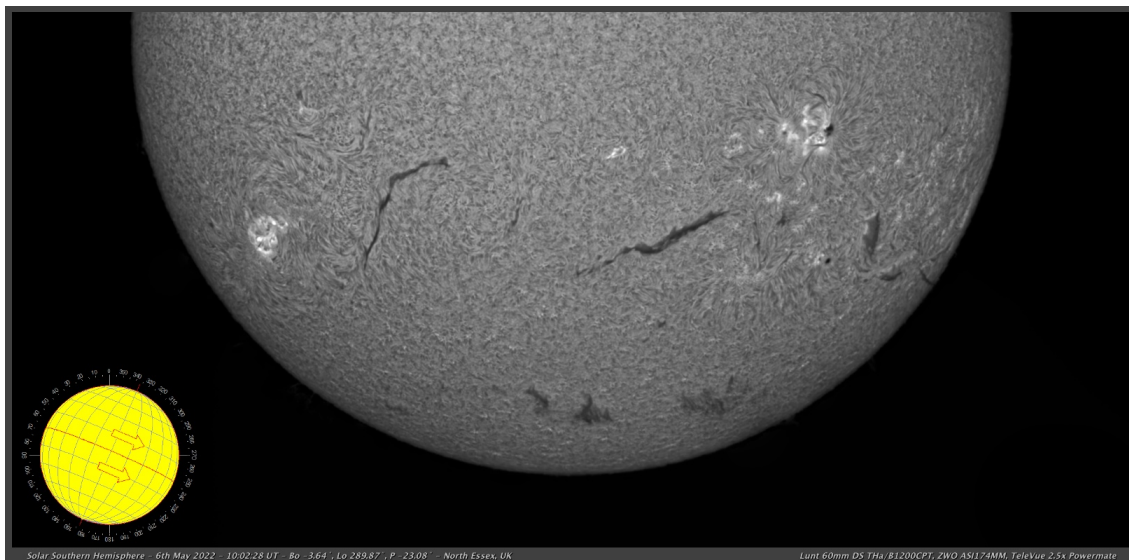
Details:-

https://archive.ukmeteornetwork.co.uk/reports/2022/orbits/202205/20220522/20220522_233539.813_UK/index.html

Solar images

John Hughes

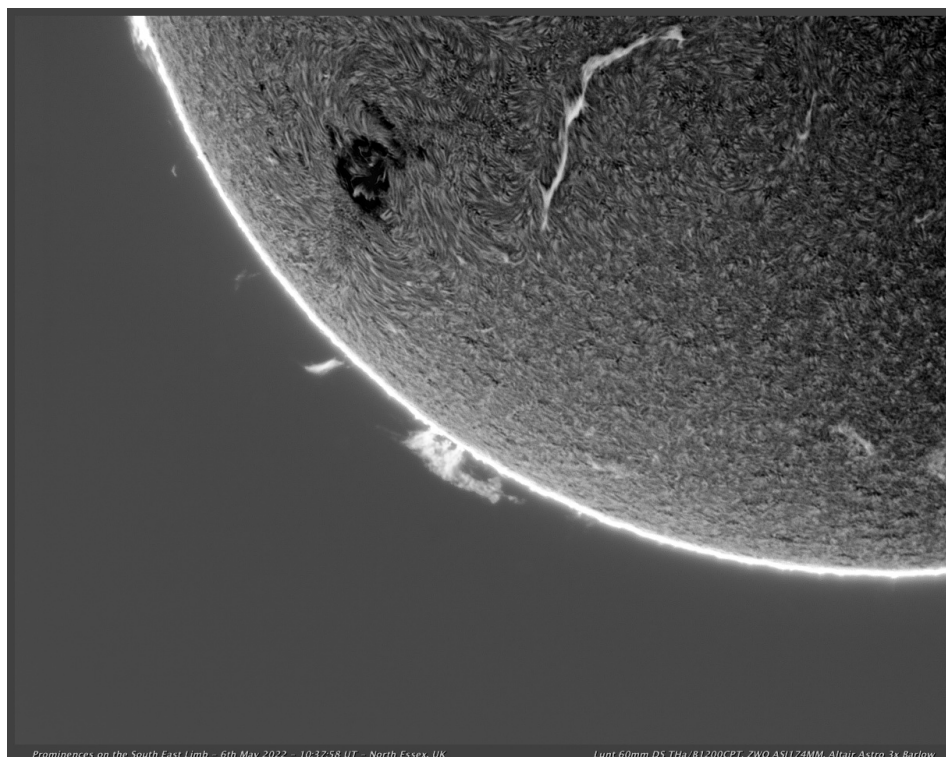
Below are some images from my solar observation session of 6th May



Solar Southern Hemisphere - 6th May 2022 – 10:02:28 UT – Bo – 3.64, Lo 289.87, P -23.08 – North Essex

I) Most of the activity today was located on the southern hemisphere with only a few filaments and a filaprom visible in the north. Here we can see active regions (L-R) AR13006, AR13004 & AR13001 plus some fine filaments.

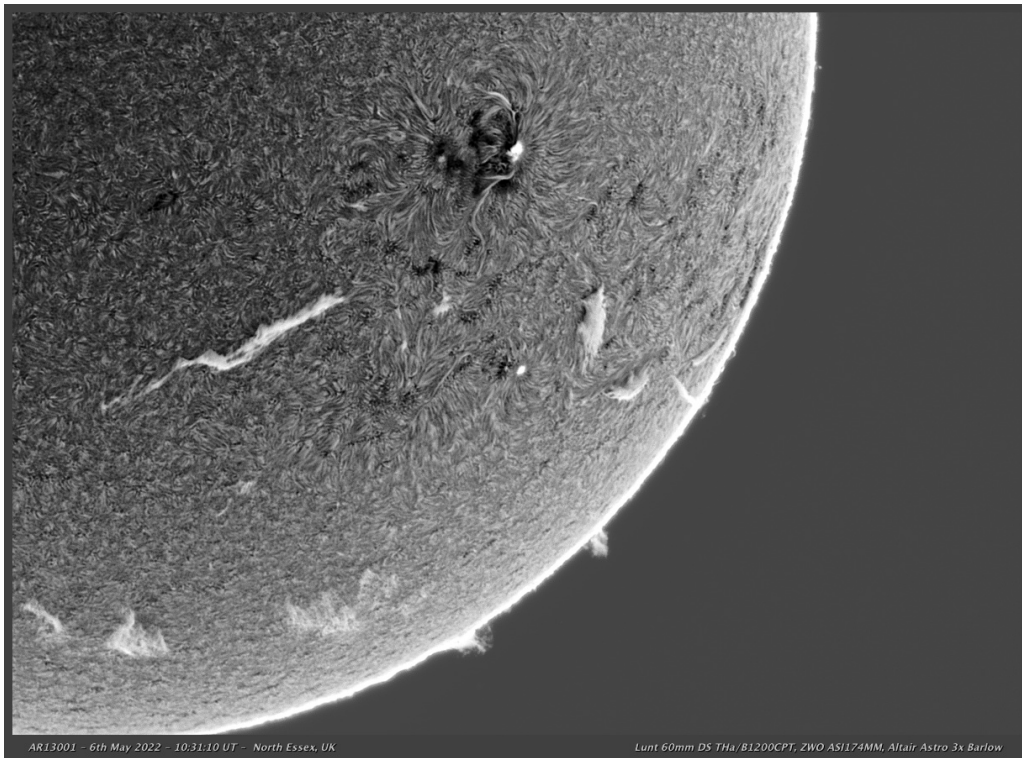
Equipment: Lunt 60mm DS Tha/BI200CPT, ZWO ASI174MM, TeleVue 2.5x Powermate



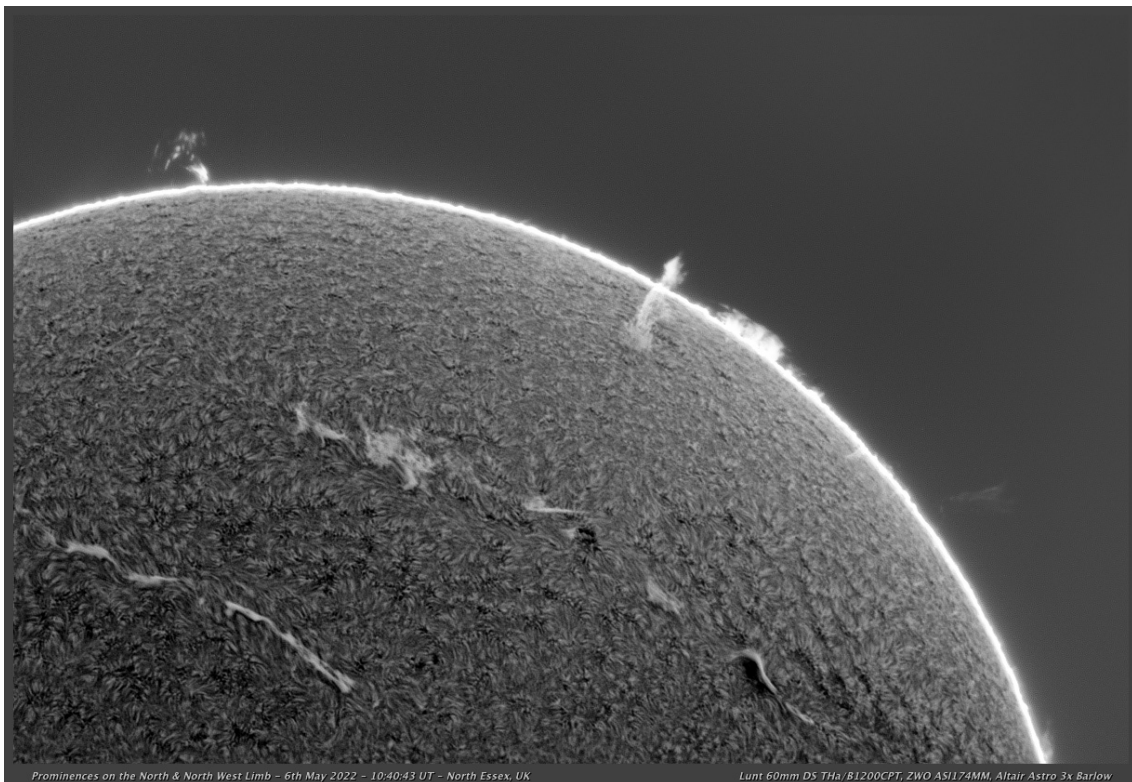
Prominence on the south-east limb. 6 May 2022 – 10:37:58 UT

Equipment: Lunt 60mm DS Tha/BI200CPT, ZWO ASI174MM, Taltair Astro 3x Barlow.

Centred in the image is AR13001 with some lovely filaments surrounding this single sun spot. This region of activity is classified Hsx.



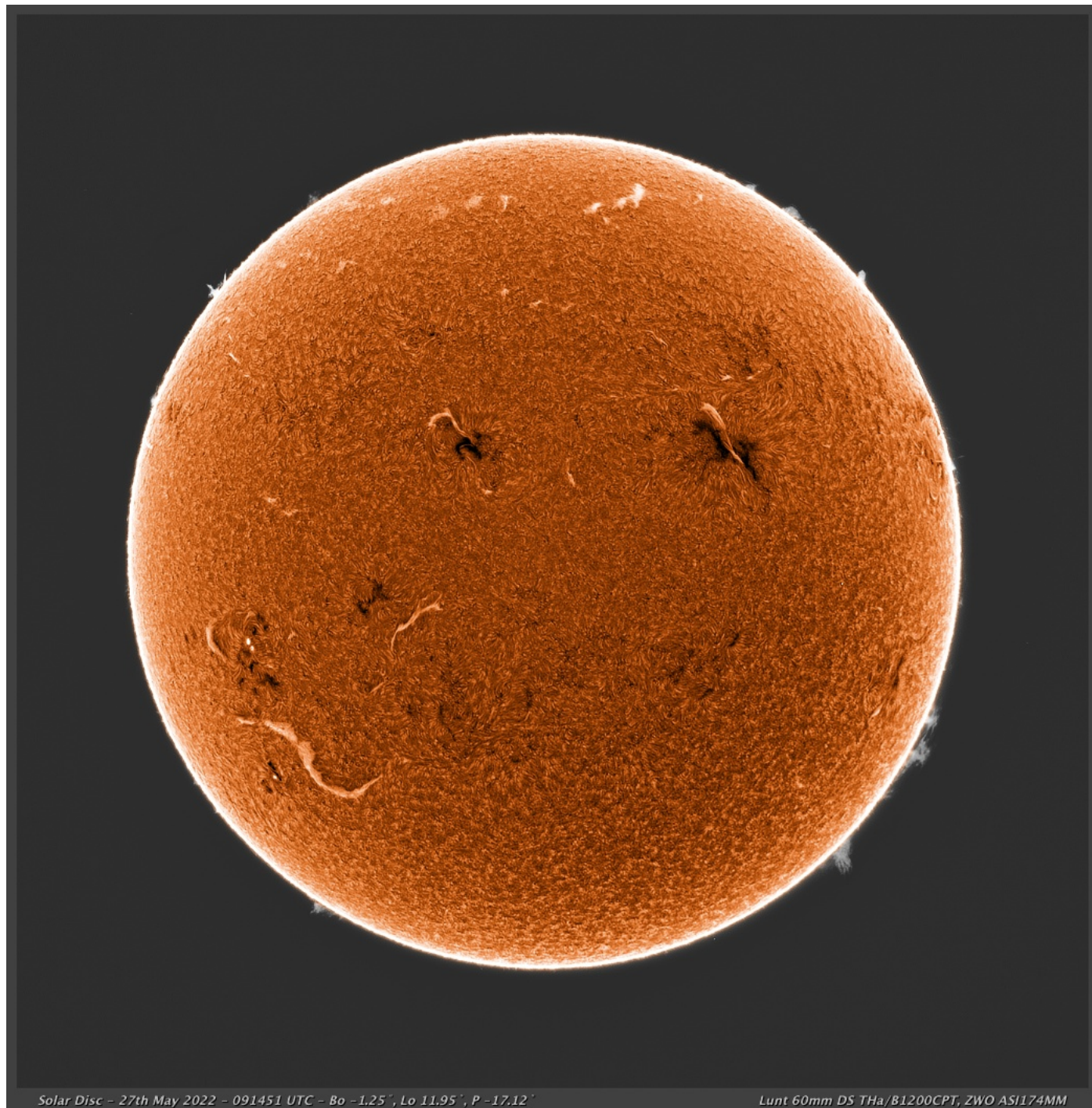
AR13006 coming off the south eastern limb with some nice prominences on the limb and a long filament on the solar disc.



On the northern hemisphere we have two nice prominences on the north and north west limb plus a filaprom. The equipment used is listed on the images.

Attached is a collection of images I captured on Friday morning (27th May). It was a challenging session with strong gusts of wind blowing off the sheet covering my head and laptop (making it difficult to observe the laptop screen) and passing clouds adding to the interruptions.

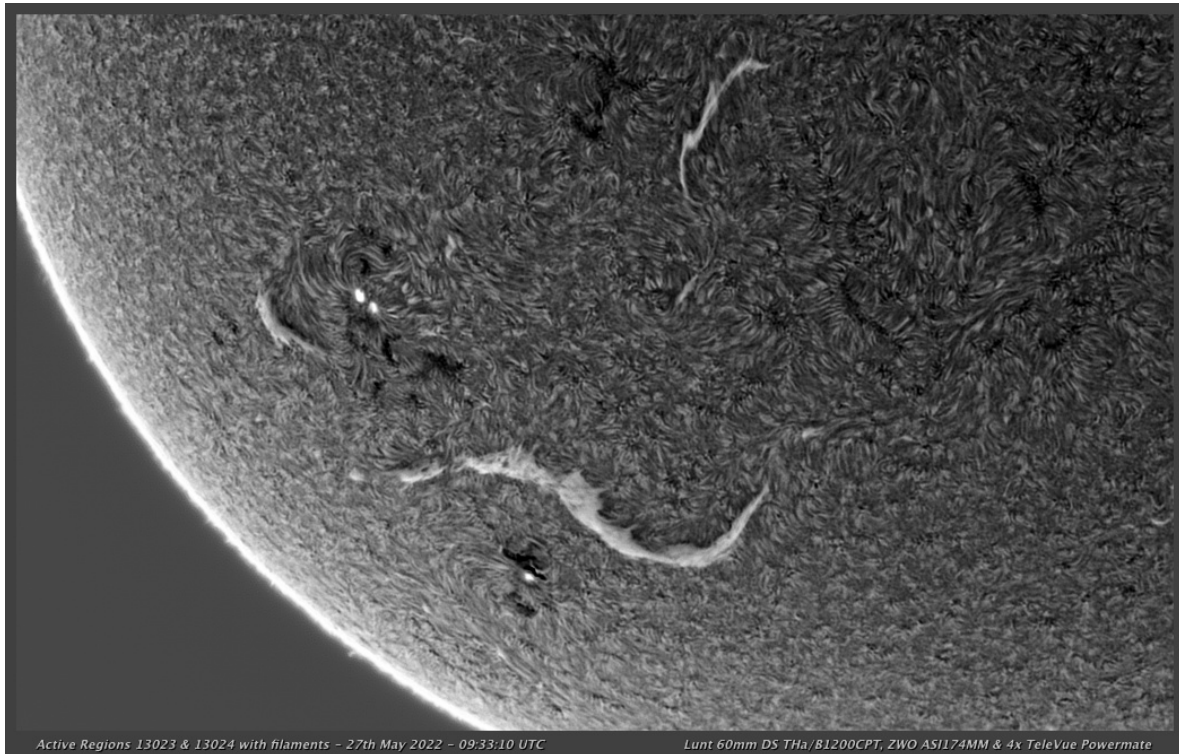
The first image is of the solar disc. Captured with the Lunt 60mm DS THa/B1200CPT and ZWO ASI174MM camera. There were not many sizeable proms other than on the south west limb, however, there was a long s-shaped filament passing between AR13023 and 13024.



Solar Disc - 27th May 2022 - 091451 UTC - Bo -1.25°, Lo 11.95°, P -17.12°

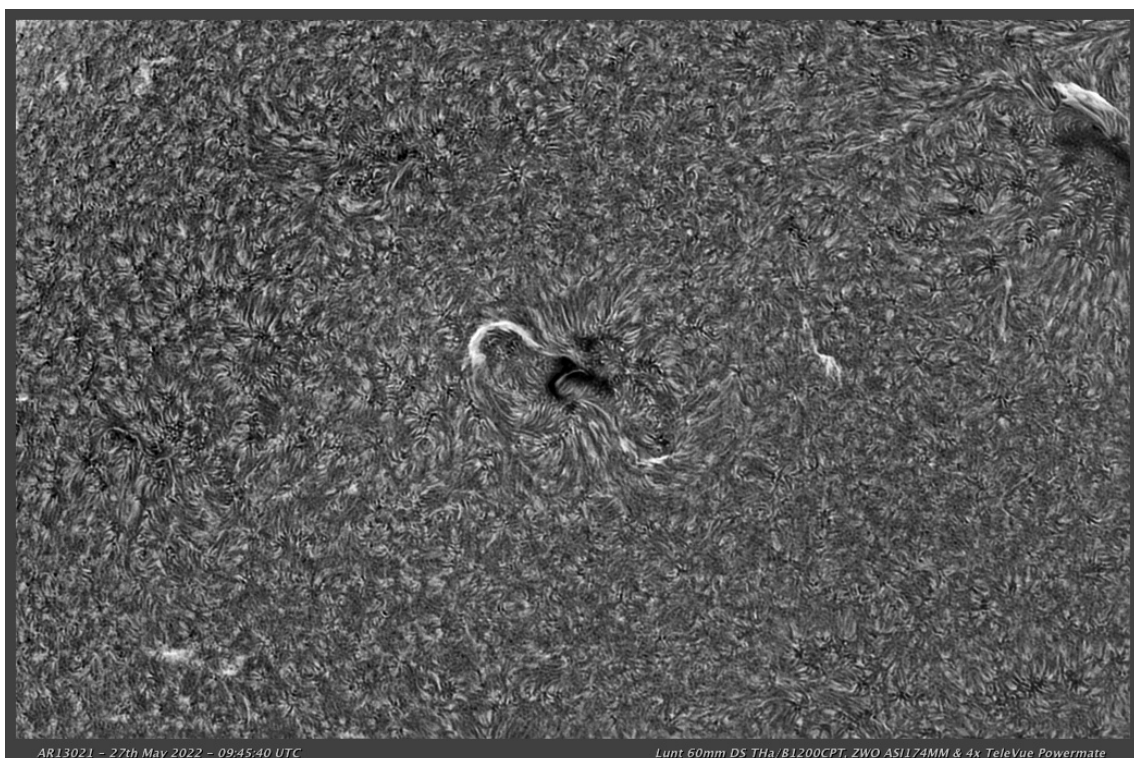
Lunt 60mm DS THa/B1200CPT, ZWO ASI174MM

The next images were captured with the same scope and camera, however, I also introduced a 4x TeleVue Powermate into the image train.

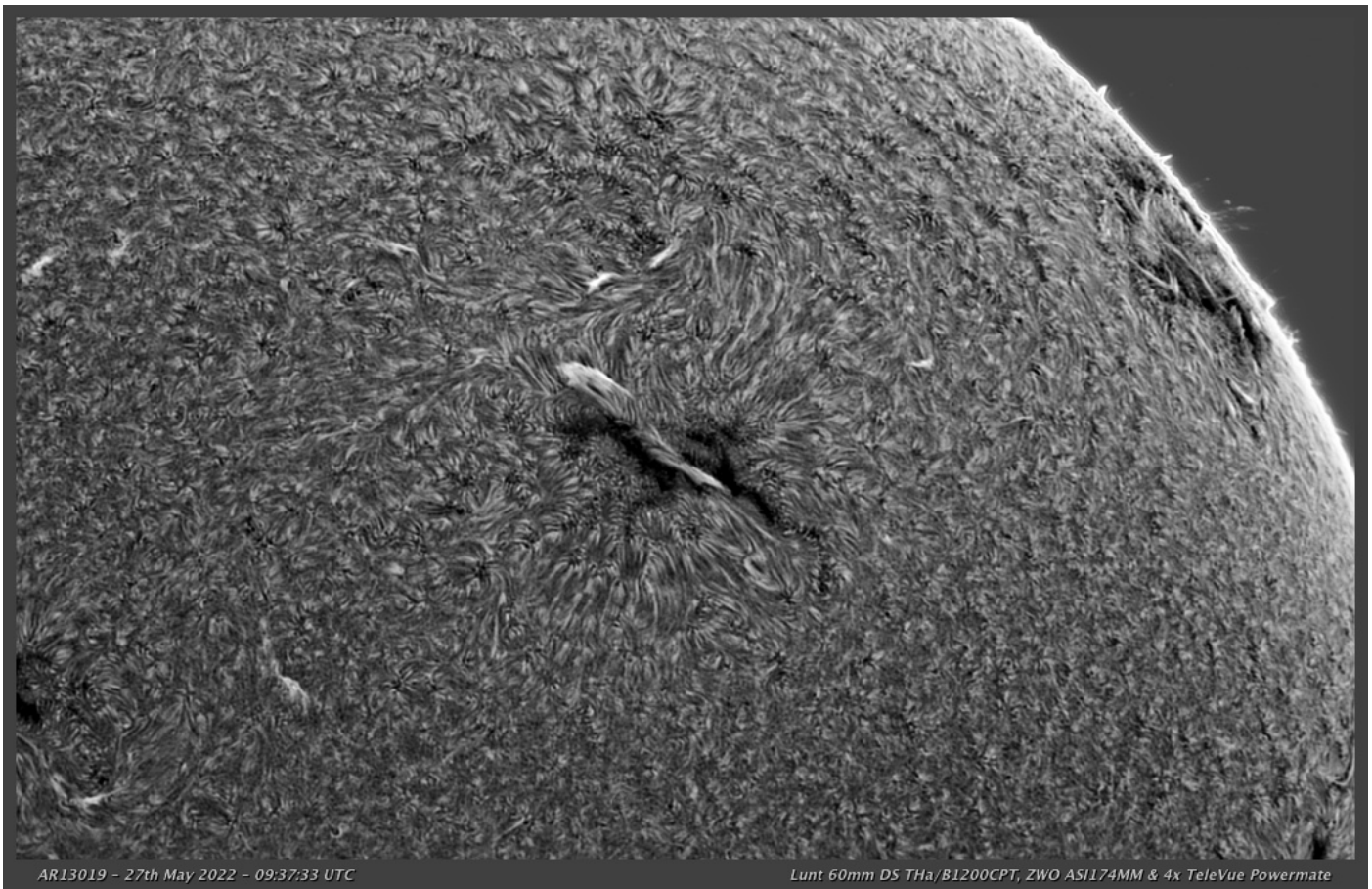


Active Regions 13023 and 13024. AR13023 is classified HAX and composed of two sunspots which are clearly visible. Later on during the day it produced a C1.3 class flare. AR13024 is half the size of AR13023 and has only a single spot. Classified HSX it produced two flares on this day; Class C1.0 and C1.4.

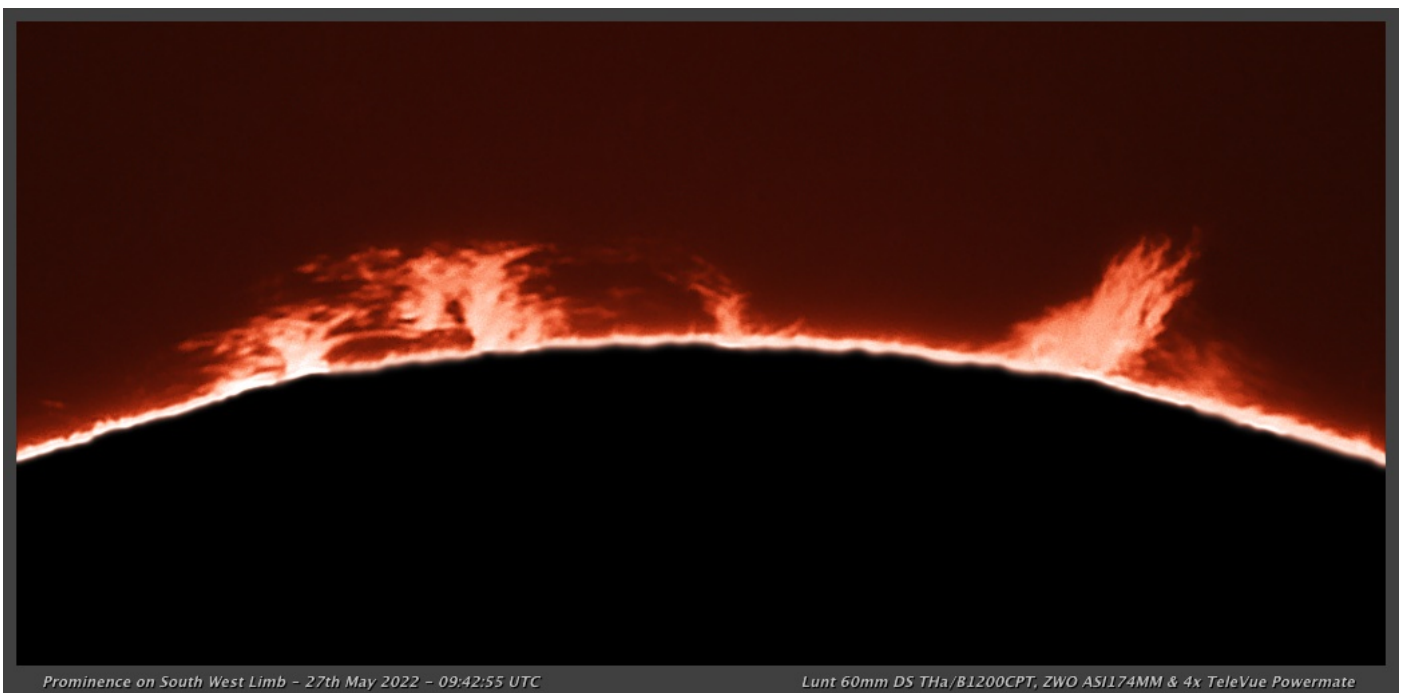
Moving north and slightly west, we have the small active region AR13021. This region is composed of three sunspots and is classified BXO. It too produced flares later on in the morning; class C1.6 and C2.3.



Then we have AR13019 heading towards the north west limb. Made up on a single sunspot, this region is classified AXX.



Finally heading south west we come to the series of prominences visible on the limb on 27 May.



Searching for Habitable Worlds around Jupiter

A short article from the Library

Andy Willshire

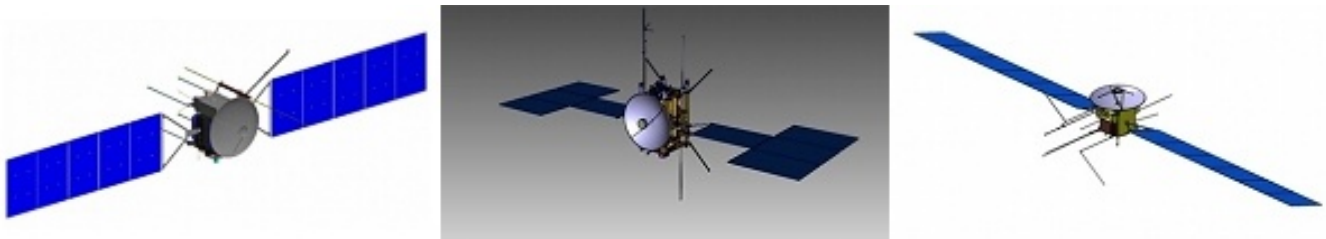
When we look through our telescopes at the planet Jupiter, we can see very easily the four Galilean moons. These were discovered independently by Galileo and Simon Marius around 1610, and are some of the largest in the solar system. There are about 80 moons of Jupiter known collectively as the Jovian system. Since 1892, many smaller moons have been detected, all being named after daughters and/or lovers of the Roman god Jupiter.

Since Galileo spotted these moons, scientific knowledge of the gas giants within our Solar System has grown steadily, with both ground and space-based observations adding to the knowledge. Flybys by Pioneer and Voyager as well as information obtained from Galileo and Cassini spacecraft being of major importance. The Galileo discoveries provided verification that there were oceans situated under the icy surface layers of three of the four large moons, Europa, Ganymede and Callisto.

It is because of these results that the European Space Agency (ESA) has decided to send a space-craft to investigate. It was decided to call this project J.U.I.C.E. (Jupiter Icy moon Explorer). This has taken the place of the Europa Jupiter System Mission (JAXA), which was to be an uncrewed Joint NASA/ESA space mission. JUICE will primarily centre on Ganymede as a primary scientific task, but will also investigate the Jupiter system, including Europa, to check out its surface and sub-surface composition. JUICE has been designated as an essential step for future research into our Solar System.

The key science goals are therefore to investigate Ganymede, Europa and Callisto, to consider their possibilities of providing habitats and having investigated the Jupiter system, use all methodology acquired to provide a mainstay for all future gas giant research. Habitability is considered to be the possibility of a location to underpin any type of life. It is envisaged to launch JUICE when satisfactory opportunity arises between 2022 and 2023, using an Ariane +5 ECA (Evolution Cryotechnique type A) rocket, with an estimation of Jupiter orbital insertion in January of 2030.

The Ariane5 space rocket is capable of lifting into space 10 metric tons into geostationary transfer orbit, or 20 metric tons into low earth orbit. It is 50.5 m tall, 5.4 m in width and has a mass of 780t. The launch system consists of the main cryogenic stage, two solid boosters and an upper cryogenic stage. By the end of 2023, the Ariane 6 rocket will come into operation. All preparations culminating in the final launch will take place at Guiana Space Centre (GSG).



Picture credit: ESA

The basic JUICE mission scenario will be continuous scanning of the atmosphere and magnetosphere of Jupiter. Two flybys of Europa and one flyby of Callisto, and then on to Jupiter at approximately latitude 30°, at which point another orbital phase will take place. If all goes well, JUICE's final act is to head into Jupiter in a final act of self-destruction. The propulsion systems for these tasks will be bi-propellant. Getting to Jupiter will be by using standard chemical propulsion and several gravity assists, Earth-Venus-Earth-Earth. This will take about 8 years, and obtain power from its solar arrays. On arrival its trajectory will be on the exterior side of Jupiter's inner radiation belt. The spacecraft will carry approximately 3000kg of chemical propellant in order for it to orbit Jupiter and Ganymede and fulfil its mission combining at least 25 flybys. The signal time from Earth to Jupiter and back can be as long as 1hr 46 m, so all instructions must be succinct.

Comprehensive Mission Profile

2022/2023 Launch by Ariane_5 ECA.

01/2030 Arrive at Jupiter for orbit insertion.

11 months to fly to Callisto.

Europa stage: 2 Europa and 3 Callisto flybys taking 36 days.

Jupiter High latitude phase including 9 Callisto flybys taking 260 days.

Onward flight to Ganymede taking 11 months.

09/2032 Ganymede stage.

Elliptical #1. Global geological mapping. 30days.

Elliptical and high altitude circular section taking 120 days and medium altitude orbit (500km) 102 days.

Low altitude circular orbit (200km) 30 days.

06/2033 proposed end of mission.

Housed onboard the JUICE spacecraft are up to twelve instruments that were considered as essential by the ESA science study team. The craft will have spectro-imaging potential running from the ultraviolet to the near infra-red. It also has narrow and wide angle cameras as well as submillimetre wave devices. The on board geophysical unit will include radar and laser altimetry in order to survey moon surfaces, as well as gravity field estimations.

Some of the main science objectives

Investigate whether Ganymede can be considered a planetary object and that it has a feasible habitat	Investigate the range of the ocean and its depth. Investigate its ice shell. Investigate allocation of surface materials. Look for past and present movement. Investigate the Jovian magnetosphere
Investigate Europa especially some of the latest more active zones.	Explore the composition of non-ice material. Seek liquid water. Investigate recent activity processes.
Investigate Callisto	Investigate the atmosphere dynamics and how it circulates. Investigate non ice material Investigate past commotion
Survey the Jupiter System	Investigate the atmospheric potential Investigate the chemical composition Investigate the magnetosphere Study the moons sources of magnetospheric plasma. Study Io. Explore the activity of this moon

Initial data : ESA

JUICE will investigate the icy worlds of the moons of Ganymede, Europa and Callisto, with Ganymede as its primary target. This moon has a diameter of approximately 5260km and is larger than Mercury. It orbits Jupiter at about a distance of 1×10^6 km. There is belief that there is some form of tidal heating on the moon, but much less than on Io and Europa. This heat could be a marker to provide conditions for life to materialise and produce mild

tectonic activity. Obtaining as much data as possible will be essential to verify if there are any conditions conducive for any form of life.

During the Galileo mission, it was noted that Ganymede has its own magnetic field, which is a fact that is not held by any other moon in the Solar system. It generates a magnetic dipole field. This magnetic field is tiny when compared to Jupiter's, but together the two perform complex programmes. JUICE will investigate how Ganymede's magnetic interactions will affect the auroras on Jupiter, as well as how it generates and maintains this effect. More recently, observations point to a probability of there being an ocean under the ice. Its depth and dimensions will be one of the JUICE objectives, as well as calculating its rotation rate, gravity field, effects on the surface from Jupiter's tidal influences and elucidate how the various layers of the moon are composed.

Callisto is the outermost and second in size of the moons, but is the least dense. Similar to the other two moons, it is thought that a large ocean rests below its surface, but up to now, this theory is not as convincing as for the other moons. Because of where Callisto exists, orbiting past Jupiter's main radiation belt, it has lower radiation levels and less interaction with the Jovian magnetosphere than its compatriots. It exists 1.88 * 10⁶ km distance from Jupiter and is geologically more stable due to minimal tidal heating than the inner moons. The JUICE project will investigate the cratered surface, with its lack of resurfacing to try to understand its past history. This surface will also be studied both chemically and compositionally. Instrumentation, which includes ice –penetrating radar, will also be able to explore the internal structure.

Europa is the smallest of the Galilean moons and is tidally locked. It takes about 3.5 days to rotate around its parent body. Europa's orbit is elliptical, and therefore experiences different gravitational stresses especially on its surface, as well as providing some degree of heating. Of the three moons, Europa is considered to be the most likely to provide data that could support habitability. There is specific data to suggest that a sub-surface lake of water exists beneath its crust; some think twice as much water volume as on Earth. Hubble when recently scanning this area spotted water-vapour plumes exiting from the icy crust and rising to 160km. JUICE when performing a flyby may be able to acquire a sample, which would give information about the ocean, without having to drill into the ice layer. Cracks have been noted on the crustal region, which may be due to some form of tectonics, or even subduction faults. In these areas, JUICE will be able to provide chemical analysis, searching for evidence of life. The spacecraft will flyby twice around the areas of Europa's hemispheres.

The scientific world will be hoping that JUICE will provide many answers to all of these relevant questions about this specific astronomical area.

References:

[ESA Science & Technology - JUICE's secondary target: Callisto](#)

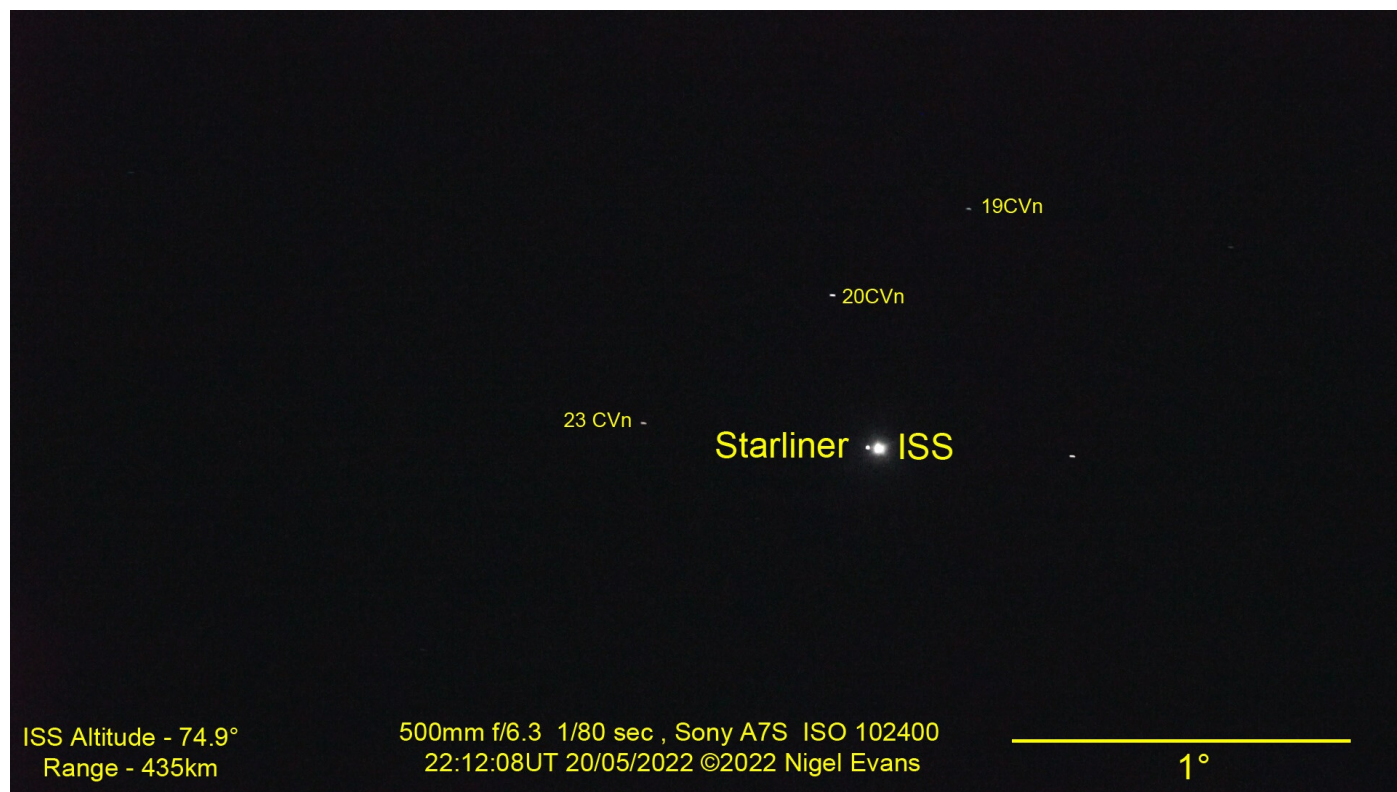
[ESA Science & Technology - JUICE's primary target: Ganymede](#)

[Jupiter Icy Moons Explorer - Wikipedia](#)

Starliner

Nigel Evans

A still from my earlier video. At a range of 435km, 1 degree is about 7.6km. The supposed separation of 200m corresponds to about 1.6 arcminutes. In this still I crudely estimate that Starliner is about 1.8 arcminutes in front of the ISS.



On the BAA site are some better images by: Martin Lewis, Steve Knight and Chris Hooker. And no doubt more to come...

<https://britastro.org/observations/>

The OASI Summer Picnic



Date: 23rd July 2022
Time: 1pm to 6pm
Venue: Newbourne Village Hall

Mill Road
Newbourne
WOODBIDGE
Suffolk
IP12 4NP

OASI members and their family and friends are all invited.

If skies are clear the club's telescopes will be available for anyone who is interested or bring your own.

Bring your own picnic food and drink and chairs and mats etc. Important note: there will be no barbecue this year so bring your own ready to eat food.

Input for the July magazine by Friday 17 June, please.