

Spring 2023 Number 39

Kieller Observatory Newsletter

KIELLER
OBSERVATORY
Infinite Inspiration



NEWS

CEO to depart

NIGHT SKY

Highlights May/June/
July

SPACE

JWST update

SCIENCE

Sky surveys



EDITORIAL

Galaxy season is upon us, and leaving fast as the brighter skies of summer make observing galaxies tricky. We have had some great aurora over the last three months, and a line up of five planets and the moon at the end of March. It also seems to have rained a lot! And the odd rocket has blown up!

The beginning of the year seems to be amateur astronomy show season - there have been a couple in the UK, the European Astrofest in Kensington in February, and the Practical Astronomy Show in Kettering in March. And reputedly the world's largest show, NEAF, has just taken place in the US. You will find plenty of footage on Youtube if you want to see what unlimited amount of money can buy ...

Nigel Metcalfe

Editors: Nigel Metcalfe & Robert Williams

Kielder Observatory Astronomical Society

Registered Charity No: 1153570.

Kielder Observatory Astronomical Society is a Charitable Incorporated Organisation. Its aims are to

- * Promote interest in the science of astronomy to the general public
- * Facilitate education of members of the public in the science of astronomy
- * Maintain an astronomical observatory in Kielder Forest to support the above aims

<https://kielderobservatory.org>

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Front cover: Peek-a-boo ...

Rear cover: Sycamore Gap, credit: Dan Monk.



So the news that broke just after our last newsletter is that, after three-and-a-half years as CEO of the Observatory, Catherine Johns will be moving job to take up the reins in one of the region's leading arts organisations. Catherine will remain with us for the next few months and gradually transition into her new role as Executive Director of Newcastle-based Dance City, while we undertake the search for her successor.

Catherine joined KOAS in September 2019, as we were embarking on an exciting expansion of our educational outreach programme into schools across the North of Tyne area. A year later and we were in the middle of the Covid pandemic! The fact that we've emerged from such a

challenging period in good shape, with a highly capable team that can face the future with confidence is testament to Catherine's leadership and commitment. Our staff team, trustees and volunteers wish her every success in the next phase of her career.

Catherine adds: "While I'm excited for my new role at Dance City, I'm very sad to be leaving Kielder. It's been wonderful to work here and see it bring so many moments of inspiration to more and more people by widening our participation and extending our outreach into schools and beyond. It's been amazing to work with such a fantastic, inspirational team."

Peter Standfield, Chair of Trustees
Catherine Johns, CEO



OBSERVATORY NEWS



Applications for round two of our arts bursary scheme, Frank's Fellowship, closed at the end of April. We reported on the round one winners in the Autumn 2022 newsletter. The Fellowship supports young artists in Northumberland aged 14-18 to develop work inspired by Kielder Observatory. Each artist will receive a bursary of £250 plus access to Kielder Observatory to help with their work. Sarah, one of the 2022 cohort, said: "I was so grateful to receive the fellowship. It allowed me to buy new art materials and

explore new approaches to being creative. I really enjoyed visiting the observatory and exploring its interrelationship with the landscape and the sky, which inspired my mixed media painting."

We have plenty of events lined up for the summer months. Early evening on weekends (7pm on Saturdays and 5:30pm on Sundays) and during weekends in school holidays we are running our ever-popular family "Space Kids" events. We have several different themed events this



OBSERVATORY NEWS

year, so check out our [events calendar](#) to find your favourite (or come to several of them!). And yes, the rocket making is still there!



months in order that the sky gets dark enough to do a decent amount of observing.

Remember that we also take our planetarium show out to schools. So if your school would like a visit just email our admin team at admin@kielderobservatory.org



You may also notice that we have moved the start times of our main events later in the evening, to 9pm, during the summer

Young Explorers – Apr 23

We visited for the first time as a family of four and thoroughly enjoyed it! The session was so interesting and engaging. Dan, Ellie and Liam were brilliant hosts and so knowledgeable!

We will definitely visit again soon.

Danielle, Tyne & Wear



OBSERVATORY NEWS

As usual we have our crop of monthly [podcasts](#). Since our last newsletter we have had a colleague of mine, Dr Victoria Fawcett, talking about

"[Quasars and the evolution of the universe](#)",

Dr Melanie Windridge discussing "[In search for the Aurora](#)" and Dr Olivia Jones looking back at [one year of the James Webb Space telescope](#).

Throughout 2022, a creative team was working to investigate what dark skies meant to the communities of Kielder. This was an R&D project to create a narrative drawn from the stories of the local communities. You can see a little behind the scenes film on our website and YouTube channel, created at PROTO and an AR experience is in development.

<https://www.youtube.com/watch?v=KiPLeOmgT5U&t=2s>

This project received funding from Arts

Council England and we are grateful to Forestry England, Northumbrian Water and the communities of Kielder for their support.



In March, Nick Howes, who worked at the Observatory back in 2014, returned after nearly a decade to give a wonderful talk entitled "Oh my god we're all going to die!" taking us through the perceived threats in space ... and hopefully what we can do about them.

Our Director of Astronomy, Dan Pye,

Secret Lives of Stars - March 23

So enthusiastic and very professional; I have been planning this trip for a long time and I wasn't disappointed! The 8/8 crystal clear visibility also contributed greatly to my enjoyment; thanks to you all! Will cherish my pictures of the moon forever.

Andrea, Northampton



OBSERVATORY NEWS

appeared in an [online BBC item](#) on the alignment of the planets in the night sky at the end of March.



Now here is some fun! Who likes jigsaws? In our shop we now have a circular jigsaw of the moon, with colours which highlight the different mineral composition.

Finally, the Culture Recovery Fund Evaluation Report has been published by the Department for Culture Media and Sport. This was the package of funding delivered to enable cultural organisations to reopen after coronavirus. We were very

much grateful for this funding, which allowed us to:

- * invest in the maintenance and upkeep of the Observatory buildings with significant improvements being made to the Gillian Dickinson Astro-Imaging Academy.
- * safely reopen the Observatory with refreshed safety signage and markers, sanitation supplies and PPE for staff.
- * invest time in digital outputs, particularly putting staff time into our podcast and AR app which is now published.
- * complete refresher training events, and health and safety before we opened as the staff had been away from their usual roles for several months.
- * take advantage of some publicity opportunities that we would not have been able to without the grant.
- * maintain regular payments to service providers.

As a result we have been able to come out the other side of the pandemic in great shape. Let's just hope we don't have another one!





SPACE SLOT

James Webb Space Telescope - Mission update

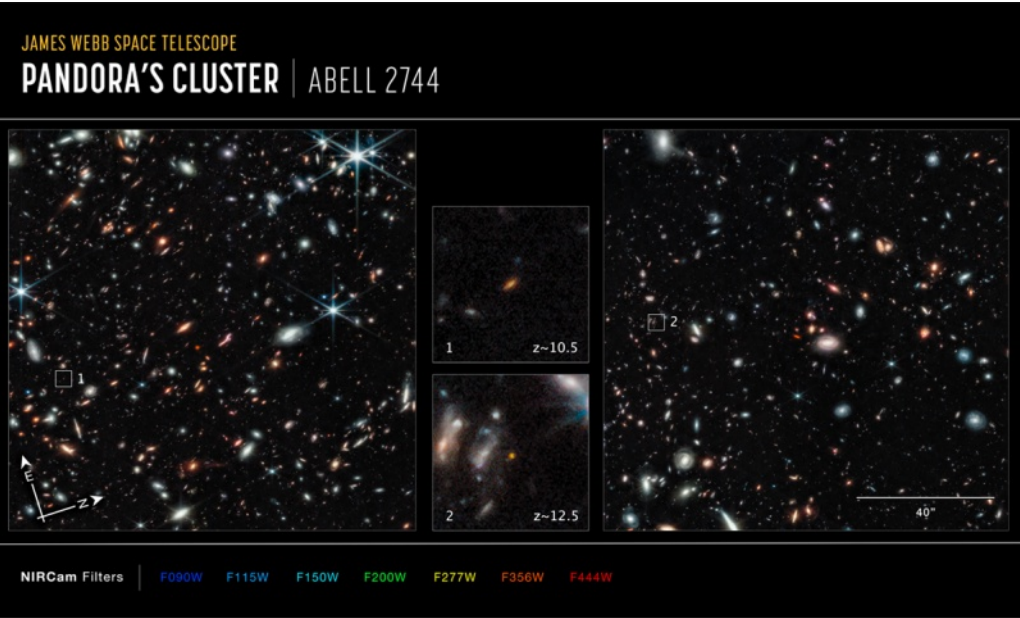
There is now a steady trickle of images being obtained from the JWST. Many of these images are showing some new science or discovery about our Universe. Hopefully that will continue for some time to come in the future.

So lets take a look at some of the recent images and what has been discovered from them.

1) The Pandora Cluster of Galaxies

[Pandora's Cluster](#), pictured below, has approximately 50,000 sources of infrared radiation within it. Abell 2744 is a trio of galaxy clusters that are on a collision course. As such because of their relative

juxtaposition they are collectively acting as a gravitational lens. This allows JWST – and of course Hubble Space Telescope too – to peer farther into the Universe – i.e. to higher redshifts than would normally be possible without the lensing effect of this soon-to-be mega cluster. The central section was originally [imaged by the HST](#), which discovered the tantalising presence of dark matter in 2011. But now with the JWST a whole new level of detail has been revealed. Originally imaged with NIRCAM in a 30 hour exposure there will be a follow up observation using NIRSPEC of some of the high redshift





SPACE SLOT

members of this cluster, sometime in the future. As with most of the JWST data, the raw images from NIRCAM are available if you want to have a more detailed look into this image.



2) PEARLS – otherwise known as the [Prime Extragalactic Areas for Reionization and Lensing Science](#)

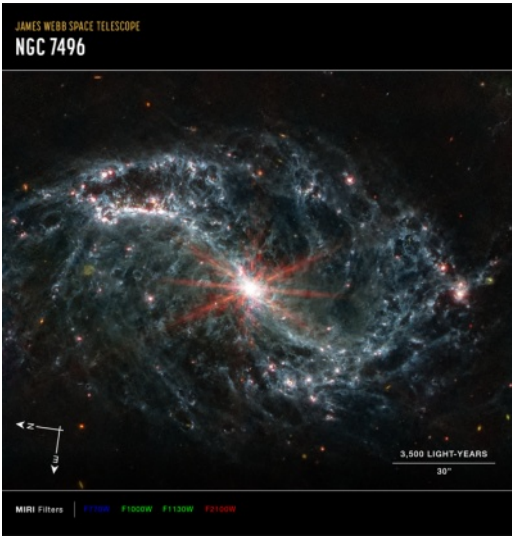
is an ongoing imaging project studying the Universe at mid-range [$\sim 6\text{Gly}$] distances and further. This image covers an area of the sky of about 0.5×0.5 degrees [\sim apparent size of the Full Moon on the sky]. Almost 20 years of planning have gone into this project to be ready for the JWST to start imaging these areas of the Universe. The aim behind PEARLS is to see what the difference in the morphology

of galaxies is compared between the 'near' and 'far' objects. JWST has already shown that there are far more galaxies in the Universe during this epoch suggesting that both there may be more visible matter in the Universe than was originally thought [i.e. less dark matter] and that galaxy formation started 'very early' after the Big Bang. If you would like to know more here is a link to the original scientific paper: [JWST PEARLS. Prime Extragalactic Areas for Reionization and Lensing Science: Project Overview and First Results.](#)

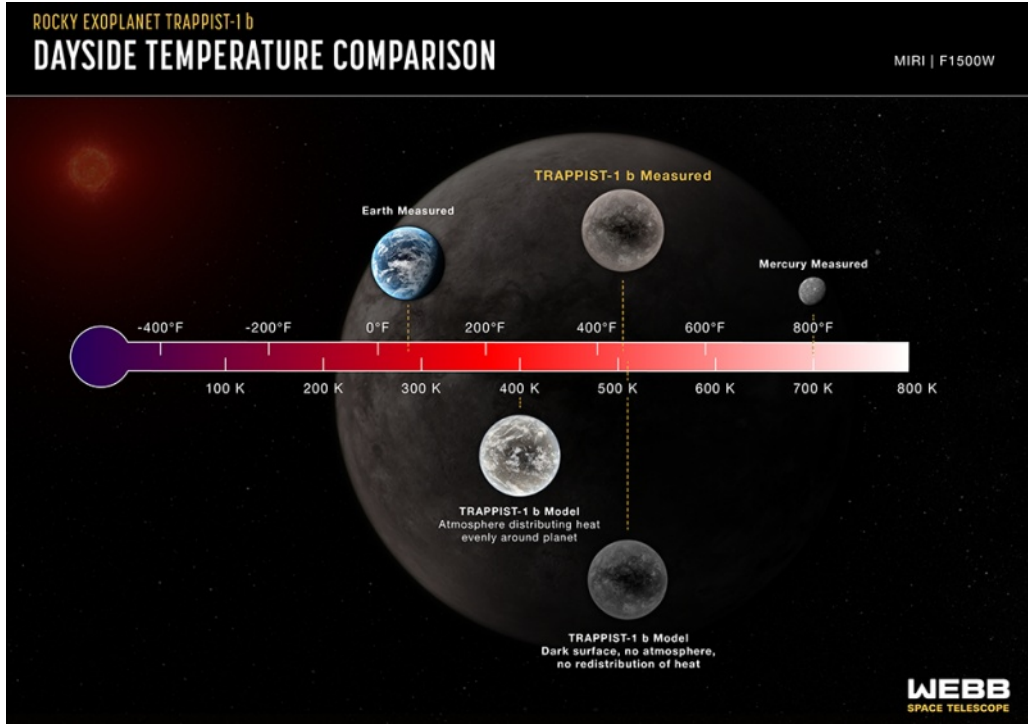
3) **NGC7496 – NGC 7469** is a galaxy in the constellation of Pegasus and is ~ 200 million Ly distant. It is a type 1 [Seyfert Galaxy](#) having broad emission lines in its spectra, due to an actively feeding central supermassive black hole (SMBH) and a significant rate of new star formation taking place. In NGC7496 the SMBH has a mass of around 12 million M_{sun} [cf our Milky Way's SMBH which is $\sim 1.8M_{\text{sun}}$]. In the spiral arms there are a number of massive star clusters [Mass $\sim 500,000$ to 10 million M_{sun}] which may be only 1.5 to 10 million years old. There are no similar structures in the Milky Way. It is also possible/likely that NGC7496 has been or currently is [interacting with a near neighbour.](#)



SPACE SLOT



4) **TRAPPIST-1b** The **TRAPPIST-1** system was discovered by an automated planet hunting telescope located at the La Silla Observatory in Chile in 1999. Since then, further observations have discovered a number of planets around the parent star, which is a red dwarf. Up to 4 of these planets may be habitable to life, though being near a star of this nature is not without some hazards as red dwarf stars are somewhat unpredictable and prone to violent outbursts. At 40 Ly away TRAPPIST-1 is in our Sun's back garden.





SPACE SLOT

Each of the planets in the 7-object system has a mass of around 1 Earth mass but all of the planets orbit inside 1AU from the parent star. Being a red dwarf star system, this possibly permits water to exist in mostly liquid form on the innermost 4 planets. Unusually, though, the planets orbit at a right angle to the plane of this system. Now JWST has now crucially measured the – apparent – surface temperature of some of the planets in this system. TRAPPIST-1b is a tad warm – at ~450F [~230°C]. It may seem that life cannot exist at this extreme temperature – but [extremophile bacteria](#) have been found in many environments on Earth where previously they were not thought possible to exist. There is certainly more details to come from the observation of the TRAPPIST-1 star system ...

5) The Cosmic Seahorse – [this pan](#) of the cosmic seahorse shows the effect of a foreground galaxy cluster magnifying the apparent view of objects much further

away. Because the foreground cluster - SDSS J1226+2149 - is not a perfect lens, the image of the background objects are distorted, creating both 'arcs' and other



strange shapes – hence the "seahorse". In general, the red objects in this image are much further away than the blue/white objects, which are in the foreground.

Robert Williams

Aurora Night March 23

Unfortunately, due to the weather we didn't get to see anything. However, the team were absolutely fantastic. They were all very approachable and so enthusiastic, it was very infectious. I would highly recommend!

Laura, Newcastle upon Tyne



NIGHT SKY

MAY 2023 (times in BST)

Lunar phases

Full moon	05/05/2023	18:34
Last quarter	12/05/2023	15:38
New moon	19/05/2023	16:53
First quarter	27/05/2023	16:22

PLANET SUMMARY

Mercury is in conjunction with the Sun.

Venus will be visible from 22:30 until after midnight. Mars will be visible from 22:30 until midnight. Jupiter is in conjunction with the Sun. Saturn will be visible in the morning twilight. Uranus is in conjunction with the Sun.

THE STARS AT 10PM

North – Perseus, Cassiopeia and Cepheus are nicely placed. Andromeda, Cygnus and Lacerta are near the horizon.

East – Bootes, Hercules and Lyra are nicely placed, with Ophiuchus and Serpens near the horizon along with Libra.

South – Coma Berenices, Leo and Cancer are high up, Virgo is nicely placed. The southerly constellations of Crater – the Cup, Corvus the Crow, Sextans and Hydra

the Water Snake hug the horizon.

West – Cancer, Gemini and Auriga are nicely placed, along with Perseus. Orion skirts the horizon.

METEOR SHOWERS

There are no bright meteor showers this month.

COMETS

There are no bright comets expected this month.

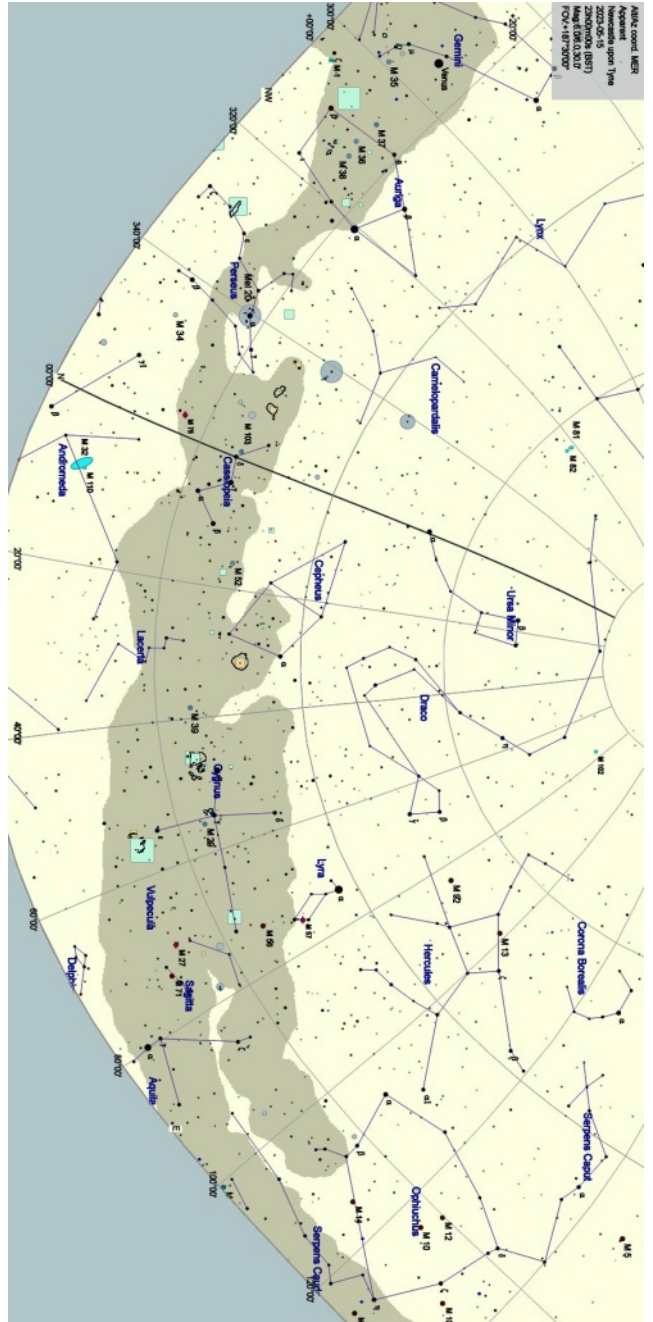
The Planets 15/05/2023

	Sun	Moon	Mercury	Venus	Mars	Jupiter	Saturn	Uranus
Rise	04:57	03:53	04:43	07:08	09:00	04:21	03:06	04:51
Set	21:06	15:45	18:58	01:12	01:59	18:59	18:10	20:30



NIGHT SKY

The sky chart for Newcastle looking NNE at 11pm on 15/05/2023.





NIGHT SKY

JUNE 2023 (times in BST)

Lunar phases

Full moon	04/06/2023	04:41
Last quarter	10/06/2023	20:31
New moon	18/06/2023	05:37
First quarter	26/06/2023	08:49

PLANET SUMMARY

Mercury is too close to the Sun this month. Venus will be an evening object visible after 2300, low in the East. Mars is an evening object visible from 2300 low down in the west. Jupiter is a morning object visible in the eastern twilight. Saturn is a morning object visible low in the east before sunrise. Uranus is close to Jupiter this month.

THE STARS AT 11PM

North – Cepheus is nicely placed with the two Bears high up. Near Cepheus are the not-well known constellations of Lynx and Camelopardalis. Auriga, Perseus and Andromeda skirt the horizon.

East – Hercules, Lyra and Cygnus are nicely placed. Ophiuchus along with both parts of the Serpent are nicely placed in the south-eastern sky.

The Planets 15/06/2023

	Sun	Moon	Mercury	Venus	Mars	Jupiter	Saturn	Uranus
Rise	04:24	02:38	03:42	08:08	08:48	02:31	01:07	02:53
Set	21:46	19:16	20:02	00:28	00:35	17:07	11:13	18:38

South – Hercules, Bootes and Coma Berenices are nicely placed along with Ophiuchus, Libra and Virgo. To the lower LHS of Libra can be found the claws of the Scorpion.

West – Virgo, Leo, Cancer and Gemini cut a swathe across this view. Auriga is low in the NW.

METEOR SHOWERS

There are no major meteor showers in June.

COMETS

Comet C/2021 T4 Lemmon may reach binocular visibility around mid-month. It will only be visible from the southern Mediterranean though.

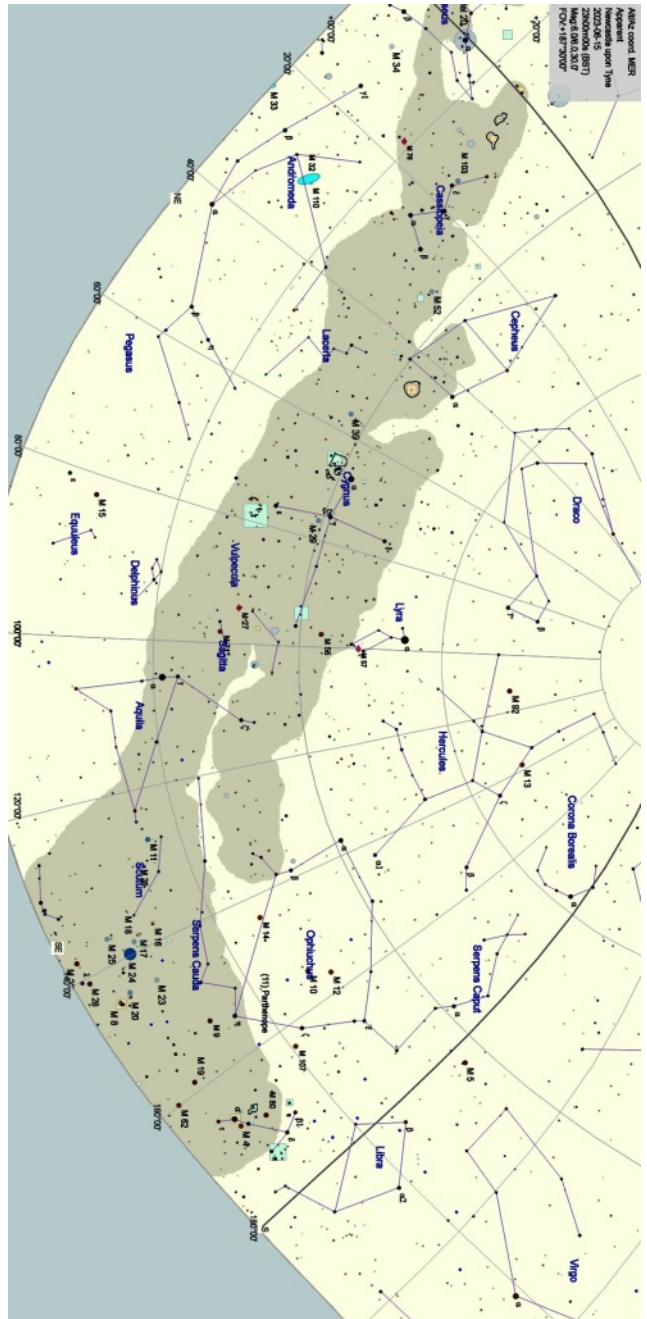


NIGHT SKY

The sky map looking E from Newcastle at 11pm on 15/06/2023.

During the Summer months, on clear nights and only if the conditions are right, Noctilucent Clouds may become visible.

They are created by a combination of extreme cold in the Earth's high atmosphere – in the Mesosphere at altitudes of about 50Km to 100Km, trapped water vapour and – it is suggested – the influence of other factors such as shooting stars and dust from – for example the Sahara Desert. They appear as bright blue streaks, nets and flows and look nothing like any other type of cloud. They tend to appear just after sunset and before sunrise though can also be seen late at night too.





NIGHT SKY

JULY 2023 (times in BST)

Lunar phases

Full moon	03/07/2023	20:38
Last quarter	10/07/2023	20:31
New moon	17/07/2023	19:31
First quarter	25/07/2023	23:06

PLANET SUMMARY

Mercury is too close to the Sun this month.
Venus will be a challenging object visible low in the west in the evening twilight.
Mars is in a similar location to Venus.
Jupiter is a morning object visible from around 0200 low in the eastern twilight.
Saturn is also visible low in the eastern twilight before dawn. Uranus lies close to Jupiter this month.

THE STARS AT 10PM

North – Corona Borealis and Bootes are high up, with Coma Berenices and Canes Venatici nicely placed. Virgo and Leo are close to the horizon.
East – The Milky Way cuts a swathe across the sky at this time. From Perseus in the east, through Cassiopeia, Cepheus, Cygnus – in the south - into Sagitta and

Vulpecula, towards Aquila, Scutum and Sagittarius in the west. Low down are Andromeda and Pegasus.
South – Cygnus, Lyra, Hercules and Bootes are nicely placed with Aquila, Ophiuchus and Virgo still worth a look. You may see the body of Sagittarius and the head of the Scorpion near the horizon.
West – The two Bears, Corona Borealis and Hercules are well placed. Libra, Virgo and Leo are still visible with Cancer setting.

METEOR SHOWERS

There are no major meteor showers in July.

COMETS

There are no comets brighter than 10th magnitude visible this month.

The Planets 15/07/2023

	Sun	Moon	Mercury	Venus	Mars	Jupiter	Saturn	Uranus
Rise	04:44	01:49	06:06	08:22	08:42	00:43	23:09	00:58
Set	21:36	20:52	22:26	23:35	23:05	15:40	09:11	16:48

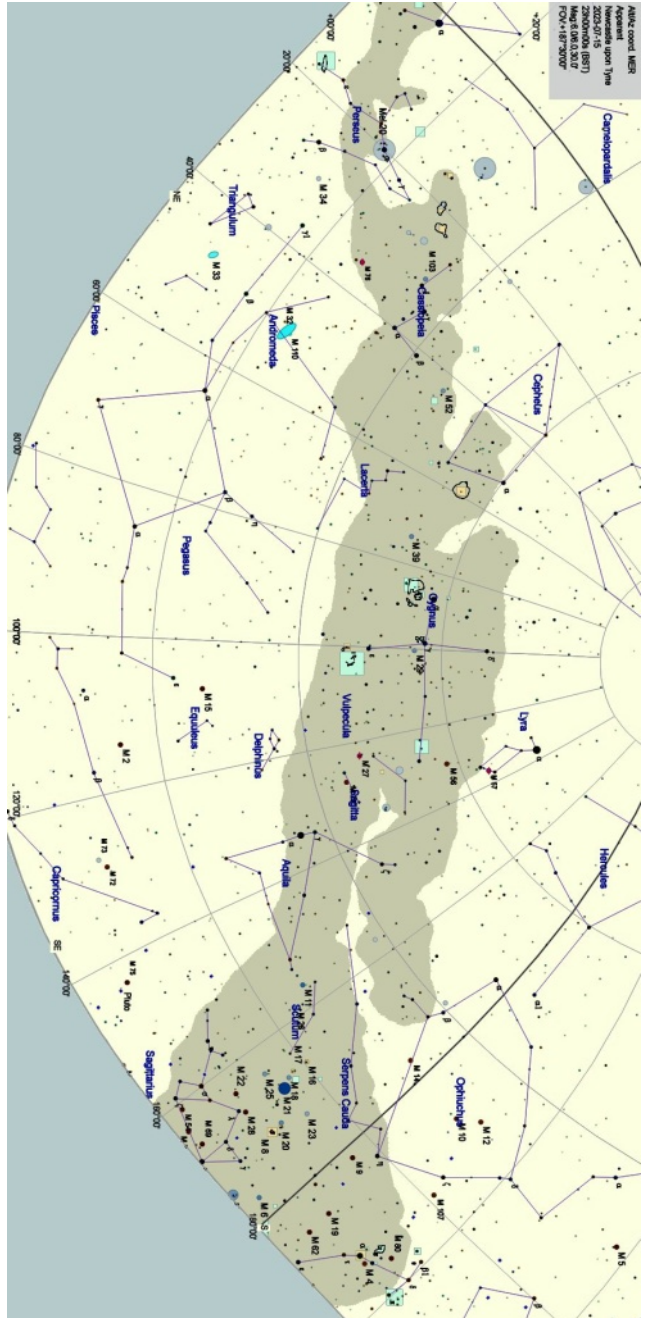


NIGHT SKY

**The sky map looking SE from
Newcastle at 11pm on
15/6/2023.**

Night Sky credits:

Data sourced from [Cartes du Ciel](https://www.timeanddate.com/moon/phases/),
[https://www.timeanddate.com/moon/](https://www.timeanddate.com/moon/phases/)
[phases/](https://www.timeanddate.com/moon/phases/)
and <https://in-the-sky.org/>





SCIENCE SLOT

Automated Sky Surveys

Going back almost 2 millennia, many famous astronomers have catalogued their observations of particular objects. Some of these, such as the Almagest, are of historical interest. More recently – in the Telescope Era - reputable astronomers, such as Halley, Messier, Struve and many others have all made significant contributions by compiling catalogues of objects such as comets, galaxies, nebulae, double and variable stars etc., which have become the sources of much research by professional astronomers and enjoyment for amateur astronomers too. Since the advent of computers in use in astronomy in the late 1960's it has become possible to automate the search and investigation of a very wide range of objects. Some of these automated surveys have been running for more than 50 years, whereas others are essentially new kids on the block.

The following is a not-very-exhaustive list of automated sky surveys, the instrument[s] that they use, the objects/ types that they are searching for and some important results arising from them:

1) Sloan Digital Sky Survey (SDSS)

[SDSS](#) is a northern hemisphere survey which began in the year 2000 and initially ran for 8 years. As well as images at

visual wavelengths, SDSS has also been compiling near infrared images and spectroscopic data. There have been several 'phases' of SDSS (and no less than 18 data releases!): phases I and II were completed in the first 8 years - in this time it created a detailed 3-dimensional view of the large scale structure of around 25% of the Universe. It observed more than 900,000 Galaxies and investigated over 120,000 [Quasars](#). Since phase II SDSS has continued with a phase III, which was completed in 2014, phase IV, which just finished in 2022, and now a



The SDSS 2.5m telescope at Apache Point Observatory.

Credit: SDSS



SCIENCE SLOT

phase VI! The current statistics are impressive - around 1 million spectra of stars, 1 million spectra of QSOs and 3 million spectra of galaxies, and a total of 469 million objects identified over 14,555 square degrees of sky.

SDSS uses a single 2.5m (not large by today's standards) survey telescope situated on Apache Point Observatory, New Mexico. It has two main instruments : 1) a 120Mp camera with a field of view of 1.5 degrees. 2) Two feeds from this camera relay information to spectrographs to obtain red shift data of each object[s] surveyed allowing up to 600 galaxies to be investigated in each frame. The design of the hardware that generates observations from this system were of such magnitude that the team who ran this survey were awarded the [2009 Noble Prize in Physics](#).

During each night of operation SDSS generates many 100's of Gb of data. Most of the objects observed lie in a range from a redshift of $z=0.1$ [$\sim 1.4\text{GLy}$] to $z=0.7$ [$\sim 9\text{GLy}$] for galaxies and up to $z=5$ [69GLy] for quasars. The distance record for SDSS is $z\sim 6$.

2) Catalina Sky Survey (CSS)

CSS is a project to investigate and catalogue Near Earth Objects (NEOs). One of the main goals is to identify and

characterise Potentially Hazardous Asteroids (PHAs). Based at the University of Arizona, CSS is designed to track down every NEO with a diameter of $>140\text{m}$ which could – if one was to hit Earth – cause an [extinction level event](#) (ELE).



The Catalina Sky Survey, located at Mount Lemmon Observatory in the Santa Catalina Mountains near Tucson, Arizona. CC BY-SA 4.0

Located at the Catalina Mountain Observatory near Tucson, Arizona, three telescope/camera systems [1.5m Cassegrain reflector, 1.0m Cassegrain and a 0.7m Schmidt], are used separately and in tandem to track and catalogue asteroids.

The 1.5m telescope is $f1.6$ and equipped with an 111-megapixel CCD array, and a FOV of 5sq. degrees . It surveys 1000sq. degrees per night and can detect objects as faint as 22nd magnitude in a 30s exposure.

The 1.0m instrument is $f2.6$, with a 4-megapixel CCD. It has a FOV of 0.3deg



SCIENCE SLOT

and typically observes around 50 targets per night down to 22nd magnitude. The 0.7m instrument is f1.3, with a 111-megapixel CCD array, and an impressive FOV of ~20 sq. deg. It surveys an area of the sky of ~4000 sq. degrees per night. Its limiting magnitude is ~20 in a 30s exposure.

The CSS has made some important discoveries:

- a) **NEO 2008TC3** – discovered only 20 hours before it impacted Earth, this asteroid entered Earth's atmosphere somewhere over Africa and pieces of it were recovered from the Sahara Desert in Sudan.
- b) **NEO 2014AA** a small asteroid which fell into the Atlantic Ocean 21 hours after discovery.
- c) **NEO WT1190F** possibly a piece of space junk which was filmed burning up in the Earth's atmosphere.
- d) **NEO 2006RH120** This object is an ephemeral Earth orbiting natural satellite - essentially a roaming space rock that occasionally intersects Earth's orbit, is captured and then later flung out again.

3) Pan-STARRS

Pan-STARRS operates from its base on Hawaii at Haleakala Observatory. Using two 1.8m Ritchey-Chretien telescopes

Pan-STARRS is designed to observe transient astronomical occurrences, including new comets, asteroids, variable stars, supernovae and basically anything else that changes in brightness. As with similar surveys it is searching for NEOs that could pose a risk of an ELE. Since Hawaii is close to the equator this system has one of the widest sky views of all similar systems.

Beginning in 2010, the main instrument –



The Pan-STARRS telescopes at Haleakala Observatory on the island of Maui, Hawaii.

Credit: N. Metcalfe

PS1 – a 1.8m f4.4 RC wide-field telescope imaged wide fields [3 degrees] of sky in each exposure using a 1.4 billion megapixel CCD image array of 60 separate CCDs. Each image generated is 2Gb in size. Typical exposures are 30 to 60 seconds and it can record objects as faint as magnitude 22 [~ 100 million fainter than



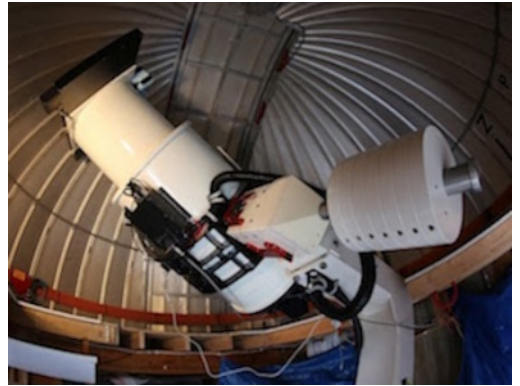
SCIENCE SLOT

Sirius].

In the mid 2010s a second, identical telescope, PS2, was commissioned. Over a period of one night of observation typically 1 Tb of data is collected by each telescope. Typically 6000 sq. degrees of sky is imaged each night [a square ~80 degrees on each side]. This allows the whole visible sky from Hawaii to be imaged every 40 hours. In PS1's first 4 years of operation the whole visible sky had been imaged in 5 separate filter bands.

Discoveries:

a) The PANSTARRS survey of comets and NEOs discovered 100,000 Jupiter Trojans, compared to 2900 known before the survey started, 20,000 Kuiper Belt Objects, compared to 800 known before 2005, thousands of Saturn, Uranus and Neptune Trojans and many Centaurs. In amongst these was **Oumuamua** – a visitor from another solar system.



The ATLAS-2 telescope on Mauna Loa, Hawaii.

Credit: ATLAS

4) Asteroid Terrestrial-impact Last Alert System (ATLAS)

ATLAS is another survey of PHAs – it uses 4 x 0.5m class telescopes, 2 situated on Hawaii, one at Sutherland South Africa and one at El Sauce Observatory in Chile. Started in 2015, this system is designed so that all four telescopes each survey 25% of the visible night sky four times every night. This system is also looking for NEOs with Earth intersecting/crossing

Not been to Kielder Observatory yet?

Then why not book one of our events for yourself and/or your family?

Advanced booking is essential. Weekend events can fill up several weeks in advance. Please book online at <https://www.kielderobservatory.org/our-events/>.

We can also be contacted at admin@kielderobservatory.org



SCIENCE SLOT

orbits and can provide up to 7 days early warning of a potentially hazardous asteroid. Using 0.5m Schmidt Cameras operating at f/2, each of which is fitted with a 110Mp CCD array, the each telescope has a central FOV of 5.4 degrees on a side and can spot objects as faint as magnitude 19.

Discoveries:

- a) [Supernova SN2018cow](#) – an unusually powerful supernova.
- b) [Asteroid 2018AH](#) – the largest Earth crossing Asteroid so far discovered
- c) A number of 10m class Asteroids that were spotted within 24 hours of perigee (nearest approach to the Earth).
- d) [Comet C/2019 Y4 \(ATLAS\)](#) – a comet which was anticipated to reach naked eye visibility in 2020, but which sadly disintegrated.
- e) The system also imaged the ejecta from the [DART mission to an NEO, which impacted on Asteroid Dimorphus](#).

5) Zwicky Transient Facility (ZTF)

The [Zwicky Transient Facility](#) is a relatively recent new system for identifying and study optical transients – essentially anything that is visible in the night sky that either moves, changes in brightness – or both. Capable of surveying the whole northern hemisphere of the night sky every



The Zwicky Transient Facility uses a wide-field camera mounted on the Samuel Oschin telescope at the Palomar Observatory in Southern California.

Credit: Palomar Observatory/Caltech

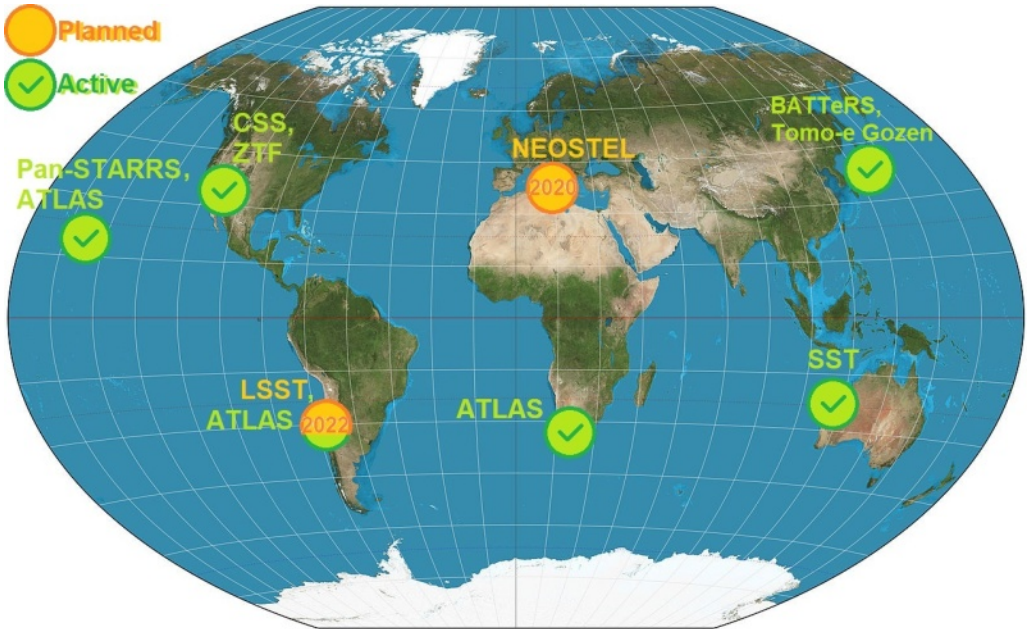
2 days, its remit is to identify NEOs, supernovae and other objects or events that change in brightness/position, and create a data archive for other telescope systems to follow up. Named after the renown Fritz Zwicky, the ZTF utilises two telescopes based at Mount Palomar Observatory:

- a) a wide-field CCD camera mounted on a 48" Schmidt Camera – the Samuel Oschin Telescope – for identification, location and tracking.
- b) The SEDM Spectrograph mounted on a 60" Telescope - for object type, transience and other science

This system has already identified one very key object – [Comet C/2022 E3 \(ZTF\)](#) – which was visible in late January/February 2023. This comet is a long period comet – orbit ~50,000 years – that circles the Sun and then out into the Oort Cloud



SCIENCE SLOT



The locations of the various NEO tracking survey sites around the world. CC BY-SA 4.0

and glowed green because of the presence of Cyanogen. With a size of ~1 km it is average for this type of object. There is still some uncertainty about its orbit as it may return to the inner solar system in around 100,00 years or – like object I/2017/U1 Oumuamua, it may never return to the solar system.

- 3) [BAA Variable Star Observing Section](#)
 - 4) [Double Star Observing](#)
 - 5) [Comet observations](#)
 - 6) Asteroids and Comets at the [IAU Minor Planet Center](#)
- and many others

Robert Williams

These are just a small selection of surveys being run by professional bodies.

However, as an amateur you can get involved in something similar, for example:

- 1) [TASS, the Amateur Sky Survey](#)
- 2) [The Astronomical League](#)



GALLERY

We would love to display your images here, whether they are taken up at Kielder or not. Please send them to

admin@kielderobservatory.org

along with a brief description of how and when they were taken.



It is galaxy season, so here is one of our favourites, Messier 51 in Canes Venatici, otherwise known as the Whirlpool Galaxy. This was taken over two nights in April by our ex-trustee Jurgen Schmoll. He used his 14" SCT and an Altair Astro 26C camera. In total he exposed for 65 x 3 min.



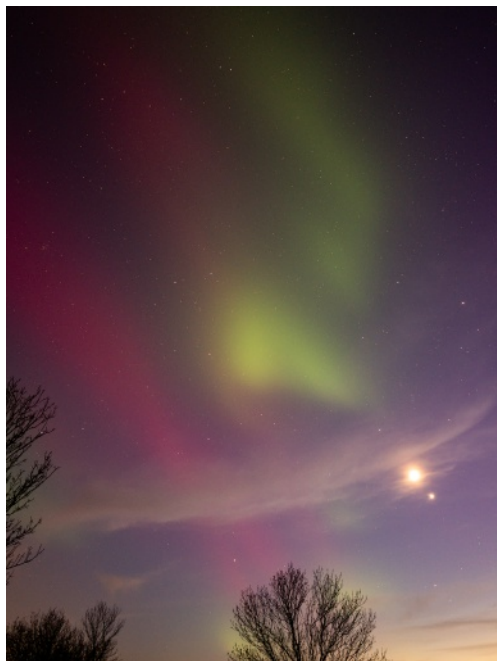
GALLERY



It has been a pretty good year for aurora so far. The lower shot was taken on March 23rd, at only 9pm in the evening, whilst on April 23rd much of the country (or at least the non-cloudy bits!) experienced a spectacular aurora (top image).



GALLERY



Here are some more images of the April 23rd aurora: top left, Villiam from Denmark; top right, Angela from Gournock in Scotland; bottom, Carol from Cornwall.



GALLERY



The full moon of February 6th had a colourful halo around it, due to the atmospheric conditions.



Late Night Explorer -
March 23

What a brilliant team. Despite the disappointment of a cloudy night, the whole team swung into action and delivered a fascinating and engaging evening programme. Their enthusiasm was contagious (especially given that it was the middle of the night!), and I learned so many new things. The talks on rocks, stargazing tips and Sir Patrick telescope were especially interesting. Well done!

Paul, Selby

Kielder Observatory - a beacon for dark skies

<https://kielderobservatory.org>

**KIELDER
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Infinite Inspiration

