Winter 2017/8 Number 18

Kielder Observatory Newsletter

KIELDER OBSERVATORY
Infinite Inspiration

Welcome to our 10th anniversary year!

EDITORIAL

Another new year is upon us. This one will be special, as it is the Observatory's 10th anniversary, so watch out for some exciting events. In this edition we take a look at the James Webb Space Telescope, and, nearer home, at the telescopes going into our new observatory. There has been a slight delay in issuing this newsletter, as our Operations Director, John Holmes, managed to put himself in hospital after an accident at home. As you can image this has caused some hastily re-arrangement of workloads, but hopefully by the time the next newsletter appears John will be back in the saddle.

Nigel Metcalfe

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Kielder Observatory Astronomical Society

Registered Charity No: 1153570.

Patron: Sir Arnold Wolfendale 14th Astronomer Royal

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

http://www.kielderobservatory.org

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A WORD FROM THE CEO

2018 is well upon us now and we celebrated the end of 2017 in style with our annual Christmas bash at the holly bush. Patti had her customary festive chest infection which meant she missed it (again!) the ones who did attend had a great night. Great to finally see 2 trustees turn up also, thanks to Nigel and Tom.

He looks pleased!

2018 of course marks ten years since the observatory opened, I can tell you things have certainly grown since then…from the heady days of non stop observing to the now structured systems we use which have seen the organisation flourish. As you have already read I am about to start interviewing for our Education Development Manager's vacancy. This position will catapult the organisation into a new direction with education firmly set in our sights. I am hoping for the position to be filled by the summer time, more on this as it happens.

The new observatory is continuing its progress and I expect it to be up and running in Mid March 2018. With a smashing array of new telescopes and systems all aimed at delivering a better experience to our guests as well as propping up the new education initiative. Training with my staff has begun and we are forming a lot of exciting ideas. I will be talking to our PR people around how we celebrate the 10th anniversary so watch this space!

So all very exciting news to look forward to. Built of course on the loyalty and hard work of our staff and volunteers we continue to excel, visitor numbers are continuing to grow and we are just about maxed out! Well…except for one absentee; John Holmes, our operations director decided to go climbing up the front of his house and then tested the laws of gravity once at the top! Ouch…9 broken ribs later and thankfully John is making a recovery, we wish him well!

Gary

Gary Fildes (FRAS MSc Hon.Caus.)

KOAS NEWS

TRUSTEE NOTES

The trustees met in October and again in December. There have been extensive developments over the educational programme - Tom Grieveson would be meeting with the Tees Valley Local

Winter has arrived at the new observatory, but there has clearly been excellent progress!

Authorities, who are keen to be involved. It was noted that next year would be the observatory's 10th Anniversary.

Stuart Kitching has given notice that he intends to stand down as treasurer, but will continue as a trustee. In future the accounts will be prepared and presented by an external company.

We have a new trustee, Trevor Robinson, who was appointed at our December trustees meeting. Trevor is a retired public sector finance director, and has a wide range of experience of working with organisations and helping them to achieve their goals. However, and unusually for an accountant, he also has a scientific background. Trevor has a BSc in Physics from Leicester University and last year he achieved a BSc in Astrophysics with the Open University. He is now studying for a distance learning MSC in Astrophysics with Liverpool John Moores University, and he hopes that this scientific background will help him in his work with Kielder Observatory.

The AGM was held on January 27th, at the Doubletree Inn, Newcastle Airport.

In February, the trustees will be having an Away Day, to help plan the future strategy for the observatory. The next normal trustee meeting will be in April.

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OBSERVATORY NEWS

This shot was taken at the end of January - the outside of the new observatory building is now beginning to look like the finished article.

As you can see above, work on the new observatory building is nearing completion, and it really does look like a new observatory now! The bad weather has affected progress, but the work should be completed by the middle of March. Some of the new equipment for the observatory has already arrived - you can read trustee Jurgen Schmoll's report about it later in the newsletter.

Following on from Dan Pye's appointment at the end of last year, we welcomed another new Science Presenter, Wayne Barber, to the staff in January. We have also recently taken on a temporary member of staff in the admin office, to help cover for our Operations Director, John Holmes, who, as already mentioned, is in hospital after quite a serious accident. We are glad to say he is now

on the mend, and we wish him a speedy recovery.

In December, the staff and volunteers descended en mass upon the Holly Bush Inn in Greenhaugh for their annual Christmas Party, and we thank them for their hospitality.

Party Time! The team celebrated Christmas in style at the Holly Bush Inn.

In November the Observatory featured on the BBC's Inside Out programme.

Gary on the BBC.

In April this year the observatory will be 10 years old, and this year also sees the 5th anniversary of the Kielder Dark Skies Park award. We can't reveal anything yet, but watch out for some very special events to mark the occasion!

Our education programme is gathering pace. Apart from the grant funded work with Tees Valley (which will have a dedicated website), we now have interest from academy trusts in Sunderland and elsewhere in the North East. We have already held a teacher training event at the observatory, and various school visits to the observatory are in the pipeline. As part of this programme we are recruiting an Education Development Manager. By the time you read this, applications will be in and interviewing for the post should be well underway.

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OBSERVATORY NEWS

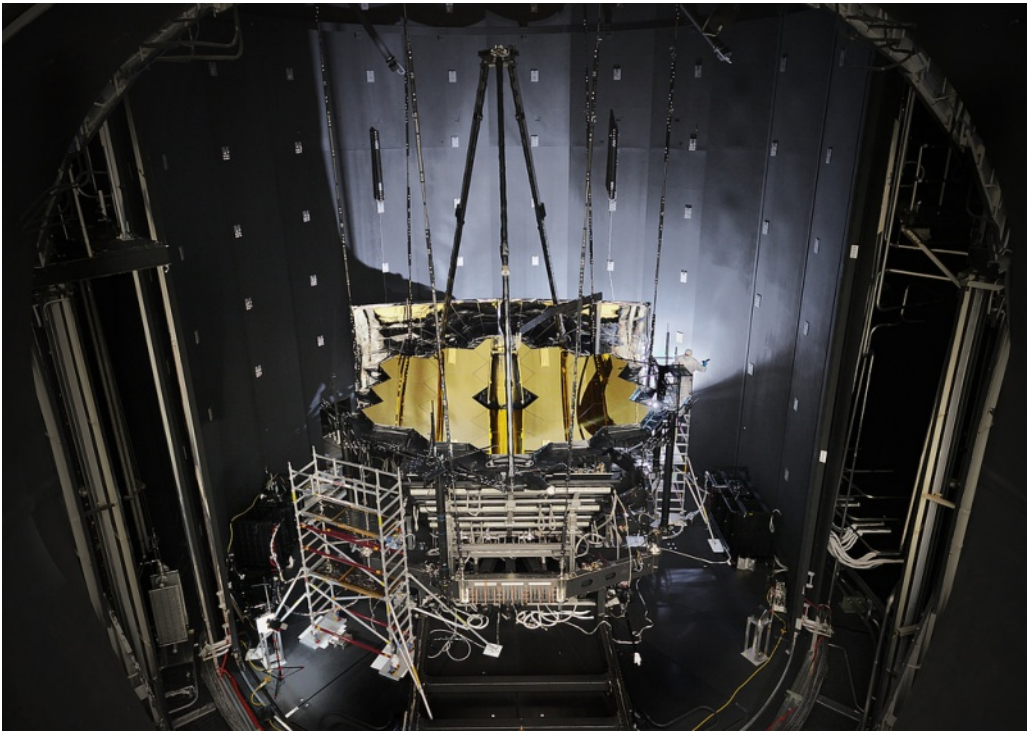
The view from inside the new observatory, complete with roof!

"Had an amazing time on the new years eve star gazing event. We were really lucky with the weather and got some clear shots on the telescopes. Team are really friendly and knowledgeable, so pleased we went and recommend it to any one thinking of going or wanting to know more"

Ruth, Huntingdon

SCIENCE SLOT

The James Webb Space Telescope (JWST)



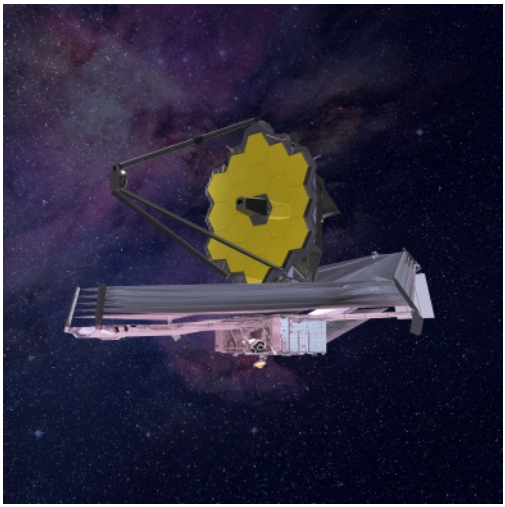
The James Webb telescope undergoing cryogenic testing at the Johnson Space Centre in Summer 2017.

Credit: NASA

Countdown has begun to the launch of the replacement for Hubble Space Telescope, the James Webb Space Telescope. With its 6.5m mirror, this promises to be as big a leap for astronomy as was the Hubble when it was launched.

Due to go up in an Ariane 5 rocket from French Guiana in Spring 2019, JWST will be the most ambitious space telescope every launched. Its primary mirror is made up of 18 beryllium petals, which will unfold to make the shape of the mirror. It also has a giant sun-shield which will also unfold to protect the telescope from the heat of the sun. This is critical, as JWST is designed as an infra-red telescope, not optical - i.e. it detects tiny amounts of heat

from objects far out in the Universe. To do this the telescope has to be kept at a chilly -225 deg C!

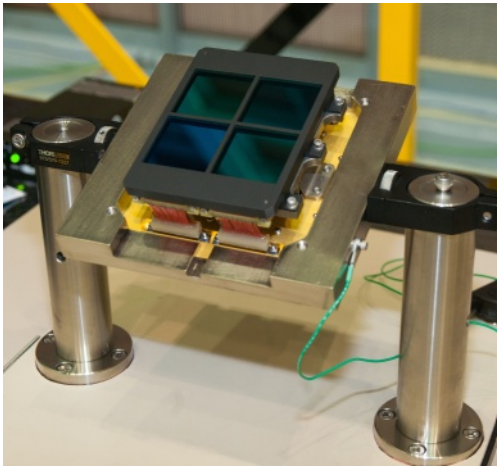


An artist's impression of what the JWST will look like in orbit.

The telescope itself will orbit the Sun not the Earth, at something called the L2 Lagrange point, about 1.5 million km from Earth on the opposite side from the Sun (remember the moon is only about 400,000 km away). This is where the combined gravity of Earth and Sun contrive to enable the spacecraft to orbit in step with the Earth (i.e. taking 1 year to go round the Sun). Normally, the further you go from the Sun the longer your 'year' becomes.

There are four main themes to JWSTs science: (1) to look back around 13.5 billion years to detect the era when the very first stars and galaxies were born (due to the expansion of the Universe and the consequent redshifting of light, such objects are only visible in the infra-red; (2) to follow the assembly of galaxies from then until the present; (3) to study the birth of stars and planetary systems by looking deep into nearby dust clouds (infra-red light penetrates through the dust); (4) to study the atmospheres of exoplanets in more detail than is possible from the ground.

To achieve these aims there are four main instruments mounted on JWST:

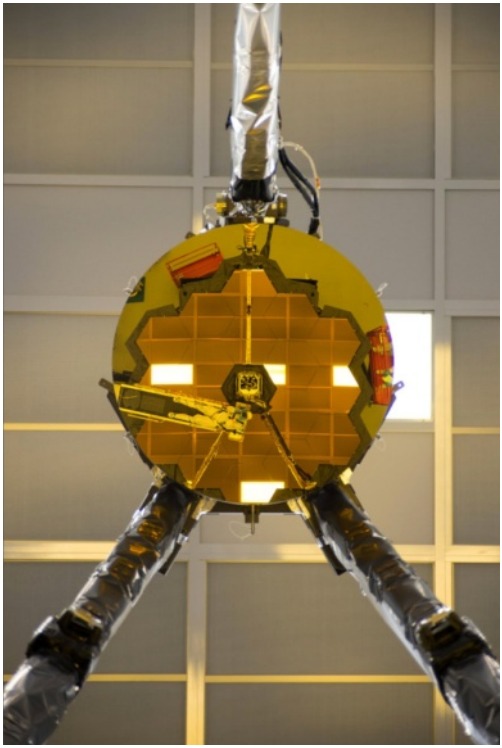


The rather unassuming-looking NIRCam, but this camera will be capturing photons from some of the most distance objects in the Universe.

Credit: NASA

SCIENCE SLOT

NIRCam, the near-infrared camera, which can view two side-by-side 2.2 arcminute square fields (that is not very big - remember the moon is around 30 arcminutes across on the sky!), at both short and long (out to about 5 microns) near infra-red wavelengths simultaneously.



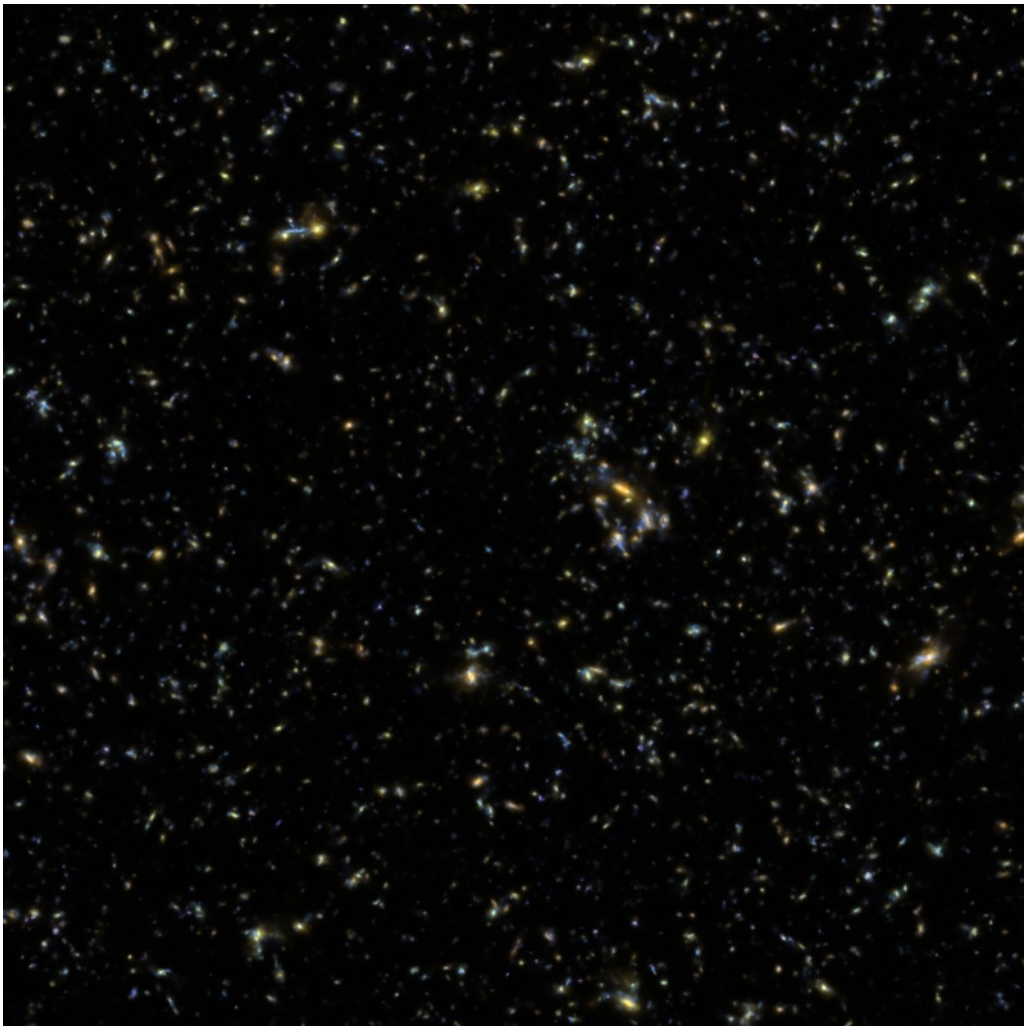
An unusual view, looking up at the reflection of the primary mirror in the secondary.

Credit: NASA

NIRSpec, the near-infrared spectrograph, which will split the light into its component wavelengths for chemical analysis. NIRSpec has a North-East connection, as part of it was built at Durham University!
MIRI, the mid-infrared instrument; this has both a camera and a spectrograph which will work at much longer wavelengths than the other instruments (out to 30 microns).
FGS/NIRISS, the fine guidance sensor/near infra-red imager and slitless spectrograph, which can take low resolution spectra of objects.

Finally, why James Webb? Originally the telescope was to be called the NGST (Next Generation Space Telescope - shades of Star Trek anyone?). Well it turns out that Mr Webb was not a famous scientist, but in fact the NASA administrator from 1961-1968, who oversaw the first of the US manned space missions.

Will it all work? We can only hope so. One thing that is for sure is that there is no spacecraft in existence which can take astronauts out for a repair mission!



A simulation of a deep patch of sky as seen by the JWST NIRCam camera. This was formed by simulating the sky as it would appear through three different coloured filters, then combining them to make a colour image.

Credit: G.F.Snyder

NIGHT SKY

FEBRUARY 2018 (times in GMT)

Lunar phases

Last quarter	07/02/2018	15:53
New moon	15/02/2018	21:05
First quarter	23/02/2018	08:08

PLANET SUMMARY

Mercury and Venus are too close to the Sun to observe this month. Mars is a morning object visible in twilight for about 2 hours. Jupiter is also a morning object but visible for about 4 hours. Saturn is a challenging object only visible for about 1 hour in morning twilight. Uranus is an evening object visible for about 3 hours after sunset.

THE STARS AT 9PM (GMT)

North – Cassiopeia and Cepheus are nicely placed with the two Bears. Cygnus and Hercules are low down

East – Gemini is high up with Leo and Cancer nicely placed. Virgo is just beginning to rise

South – Auriga is high up. Orion and Monoceros are nicely placed. Canis major and Lepus are low down

West – Taurus and Perseus are high up. Andromeda is nicely placed. Pisces and Pegasus are low down.

METEOR SHOWERS

There are no bright meteor showers this month.

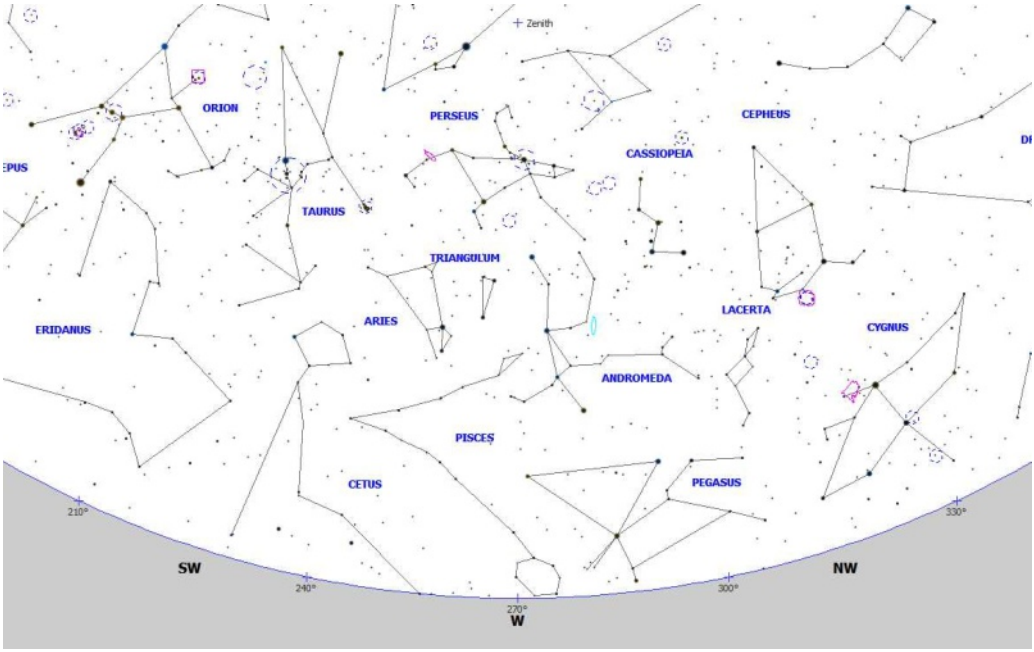
COMETS

There are no bright comets in the sky expected in February.

The Planets 15/02/2018

	Sun	Mercury	Venus	Moon	Mars	Jupiter	Saturn	Uranus
Rise	07:26	07:39	07:54	07:24	03:15	01:24	05:04	09:06
Transit	12:21	12:18	12:58	12:06	07:09	05:48	08:53	16:00
Set	17:17	16:58	18:03	16:55	11:03	10:12	12:42	22:54

February night sky looking west.



The Rosette Nebula, NGC2244, in Monoceros, is a spectacular targer at this time of year.

Credit: Nigel Metcalfe

NIGHT SKY

MARCH 2018 (times in GMT)

Lunar phases

Full moon	02/03/2018	00:51
Last quarter	09/03/2018	11:19
New moon	17/03/2018	13:11
First quarter	24/03/2018	15:35

PLANET SUMMARY

Mercury and Venus are still too close to the Sun to safely observe. Mars is a morning object visible for about 1 hour in twilight. Jupiter is a morning object and will be well placed at around 0300. Saturn is a challenging object visible in twilight from around 0500. Uranus will be visible low in the west after sunset.

THE STARS AT 10PM (GMT)

North – The two bears are high up. Cepheus and Draco are nicely placed. Cygnus, Lyra and Hercules are low down.
East – Leo and Coma Berenices are nicely placed. Virgo is low down. You can also find Hydra, Crater and there is Corvus near the horizon.
South – Virgo, Leo, Cancer and Gemini are nicely placed. Orion, Canis major, Monoceros and Lepus are low down.
West – Gemini, Auriga, Perseus, Orion and Canis Major are nicely placed. Pisces is near the horizon.

METEOR SHOWERS

There are no major meteor showers in March.

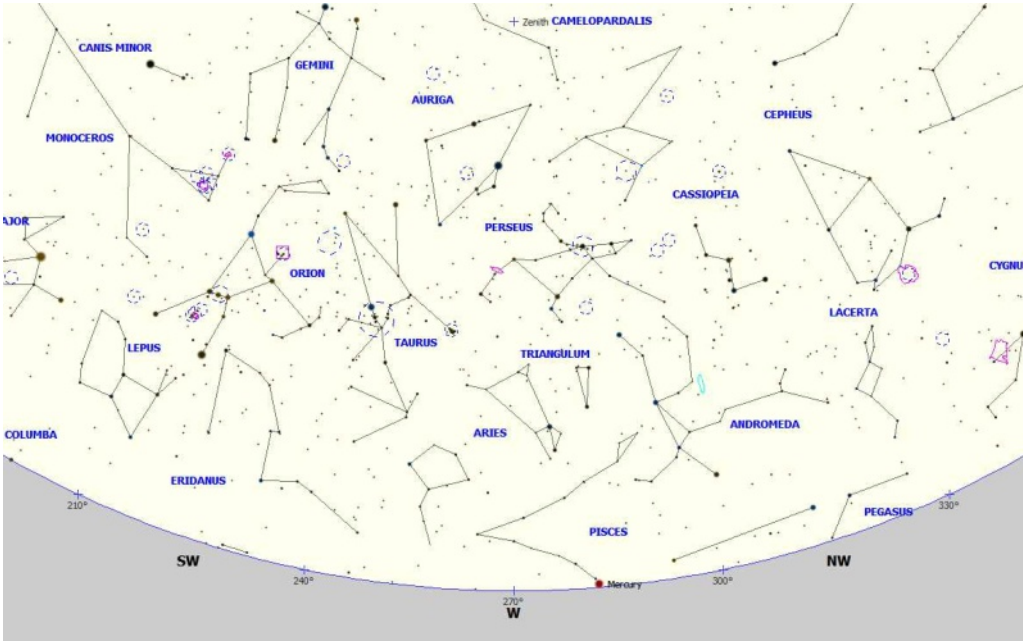
COMETS

There are no bright comets visible in March 2018.

The Planets 15/03/2018

	Sun	Mercury	Venus	Moon	Mars	Jupiter	Saturn	Uranus
Rise	06:22	06:38	06:55	05:53	02:48	23:33	03:22	07:18
Transit	12:16	13:20	13:16	10:47	06:30	04:01	07:01	14:14
Set	18:11	20:04	19:38	15:49	10:12	08:24	11:01	21:11

March night sky looking west.



By March we are getting well into galaxy season, and this fine pair, Messier 81 and Messier 82, are high in the sky.

NIGHT SKY

APRIL 2018 (times in BST)

Lunar phases

Last quarter	08/04/2018	08:17
New moon	16/04/2018	02:56
First quarter	22/04/2018	22:45
Full moon	30/04/2018	01:58

PLANET SUMMARY

Mercury is still too close to the Sun. Venus will be visible low in the west in the evening twilight for about 1 hour. Mars is a morning object visible in twilight. Jupiter will be visible from around midnight until just after 4am. Saturn is a morning object visible from around 0400 until dawn. Uranus is in conjunction with the Sun and not visible this month.

THE STARS AT 10PM (BST)

North – Perseus, Cephues and Cassiopeia are nicely placed with the two Bears high up

East – Draco, Bootes and Virgo are nicely placed. Lyra, Hercules and Serpens Caput are near the horizon.

South – Virgo, Leo, Cancer and Gemini are all nicely placed. Corvus, Crater, Sextans and Hydra are near the horizon.

West – Monoceros, Canis Minor, Gemini, Auriga, Perseus and Cassiopeia are all nicely placed. Canis Major, Orion and Taurus are all near the horizon with Venus in Aries just setting.

METEOR SHOWERS

There are the April Lyrids – active between the 16th and 25th of April – The Moon will be new on the 16th and waxing thereafter, so may interfere with the maximum of this shower for a while during the night – Lyra is visible all night but early morning is best for this shower. On the 20th the Moon will set at 0030 so there is a window of about 3h30m to see the shooting stars before dawn starts to show its hand.

COMETS

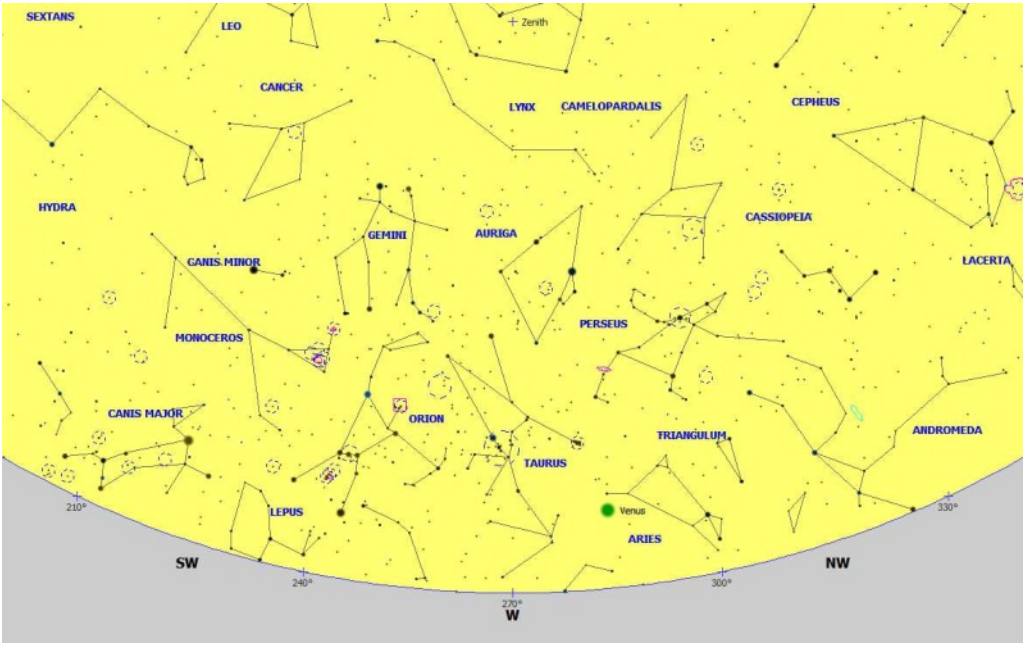
There are no bright comets visible in April 2018.

Night Sky credits: Lunar and planetary data sourced from Cybersky 5

The Planets 15/04/2018

	Sun	Mercury	Venus	Moon	Mars	Jupiter	Saturn	Uranus
Rise	06:08	05:41	06:53	06:26	03:00	22:19	02:23	06:19
Transit	13:07	11:51	14:38	12:46	06:42	02:51	06:13	13:19
Set	20:08	18:01	22:25	19:20	10:25	07:18	10:04	20:19

April night sky looking west.



Messier 104, the Sombrero Galaxy, is spectacular galaxy with a central dust lane. Sadly it is always rather low in the sky from Kielder, but April is the best time to see it.

Credit: Nigel Metcalfe

ASTRONOMERS' TALES

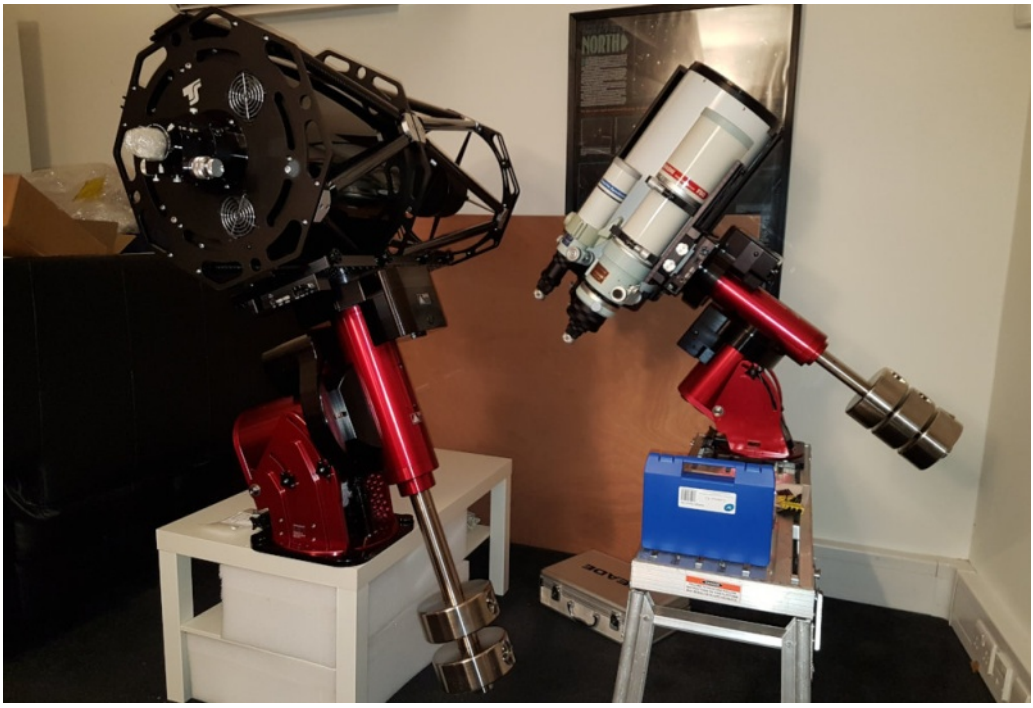
Instrumentation for the new observatory

Visitors at Kielder will have noticed the ongoing building activity for our new observatory. Unlike the existing one, it will consist of a room with a sliding roof. This design allows access to the full sky at any time, and it allows to use more than one telescope setup in it. So now you may wonder what we will use in there and why.

The new observatory will be mostly used for imaging of deep sky objects. So sensitive cameras can be used to transfer live images into the classroom, or long time exposures can be made to reveal the beauty of the Kielder skies. The setup can be used for science as well, as monitoring stars to reveal extrasolar planet transits for example.

When planning the setup, several desires had to be met. One desire was a powerful telescope to allow deep imaging of small objects like distant galaxies. Another desire was to have a wide field instrument for more extended objects. We encountered the problem that a wide field instrument piggybacked on a large telescope means that usually only one is used at a given time. Either a faint small object is being imaged, with the wide field optics being idle or an extended nebula is the subject, leaving the big telescope idle. This looked not very satisfying for us and we decided to go for two separately mounted telescopes. So now we have a 350mm Ritchey Chretien telescope (the same type as in the Patrick Moore dome) on a Paramount MEII as the big telescope. This setup is accompanied by a smaller Paramount system carrying three telescopes: another Ritchey Chretien with 250mm aperture in a closed tube, a Takahashi apochromatic refractor with 106mm aperture, and a very small Takahashi 60mm refractor acting either as a very wide field telephoto lens or as a guide scope. So the small setup caters

Not been to Kielder Observatory yet?
Then why not book one of our events for you or your family?
Advanced booking is essential. Weekend events can fill up several weeks in advance. Please book online at http://www.kielderobservatory.org/events/ or call us on 0191 265 5510. We can also be contacted at admin@kielderobservatory.org



The new 350 RC (left) and the trio of 250mm RC plus 106mm and 60mm Takahashi refractors (right), waiting for their home in the new observatory.

for focal lengths up to 2000mm, while the large instrument increases the focal length to 2800mm. This provides enough ports to put cameras on, and a cluster of ball heads on the small mount's counterweight shaft may be procured in future for astrophotography classes, where every participant can attach a camera. Due to the nature of the shed, both telescopes can be used simultaneously on different objects in the sky. The decision for the Paramount system means that all stationary mounts at Kielder Observatory can be operated with the same software, easing training needs for our personnel and volunteers.

A large format CCD system is in the pipeline for this facility as well, allowing high end imaging and science programs in the future. So, from March on when the new observatory will be commissioned, Kielder Observatory is going to be even more exciting!

Jurgen Schmoll

OBSERVERS' SLOT

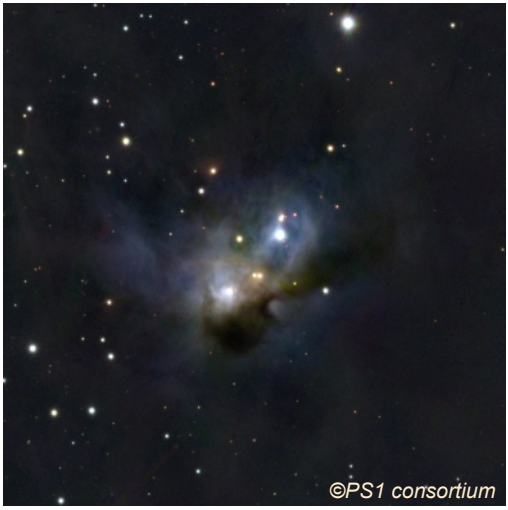
As part of an occasional series, we take a look at some of the less well-known deep sky objects. Orion is high up in the sky at the moment - everyone knows about Messier 42, the Great Nebula, but there are many other jewels in Orion ...

Messier 78

This is another reflection nebula in Orion, about 5 degrees north of M42, but it tends to get overlooked. It is part of the same complex cloud of gas and dust which covers most of Orion, and it is illuminated by two 10th magnitude stars. It was first spotted by Pierre Mechain in 1780.

NGC 1788

Another reflection nebula within the Orion cloud, but considerably fainter than M78. However, it can easily be photographed with a small telescope. It lies a few degrees west of M42.



NGC 1999

A nebula with a hole in it! This remarkable-looking object is just a couple of degrees south of M42. It is quite small

but surprisingly bright. The dark blob really is a hole in the nebula.

NGC 2022

Nothing to do with the Orion complex for

once, this is a planetary nebula, glowing green from ionised oxygen. Nothing to do with planets either, but a shell of gas

blown off by a giant star towards the end of its life.

NGC 2024/IC434

OK, so the Flame Nebula and the Horsehead are not really lesser known, but still worth including. The Flame is

actually an emission nebula, with the gas being ionised by radiation from the easternmost star in Orion's belt. Unlike NGC1999, the Horsehead is dark because of an obscuring cloud of dust.

NGC 2194

This is a really nice, compact star cluster in the north of Orion which photographs well. Its brightest stars are 10th

"We went on Saturday evening. Although it was cloudy, we had an amazing time! The team made us feel so welcome and it was clear from the start, that they are passionate about their subject!

Dan's introduction was great. The tour around the observatory is excellent. The presentation by Adam was superb. Really got the grey matter working! It amazes me how you store all of this information!

We will definitely be coming back. Hopefully get clear skies next time"

Michelle

magnitude, and it has ~150 members brighter than 15th magnitude.

NGC 2169

Close by is another open cluster, which, although not as rich as NGC 2194, is brighter. It has the nickname the '37

cluster' due to its visual appearance.

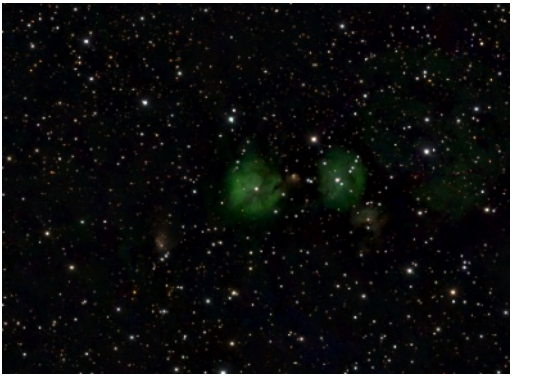
NGC 2141

Further south, near the 4th magnitude star μ Orionis (which is an interesting

quadruple system), is this rich, but faint, open cluster.

IC 2162

Our final pick, almost at the northern tip of Orion, near Gemini, is the surprisingly bright complex of nebulosity around IC2162. Although it looks green in this image from the PanSTARRS survey (due to the combination of filters used), it is actually a cloud of glowing, red hydrogen gas,



GALLERY

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

newsletter@kielderobservatory.org

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

These are anticrepuscular rays captured at sunset in the last week in December. They are simply shafts of sunlight shining through darker cloud-shadowed regions. They appear to emanate from a point directly opposite in the sky to where the Sun is setting, but are actually parallel rays that converge to a vanishing point from our perspective. It is more common to see crepuscular rays, which emanate from the direction of sunset.

GALLERY

On November 6th a 4-hour timelapse movie was taken up at the observatory. You can see it at https://en-gb.facebook.com/KielderObservatory/videos/1541077552642994/ This is what you get if you combine it all together as one shot!

The galaxy Messier 106 in the constellation of Canes Venatici and its fainter companion NGC4217 (top right, with the nice edge-on dust lane).

The moon on December 27th. The prominent crater in the centre at the bottom is Copernicus - the large dark circular feature to its left is the Mare Imbrium.

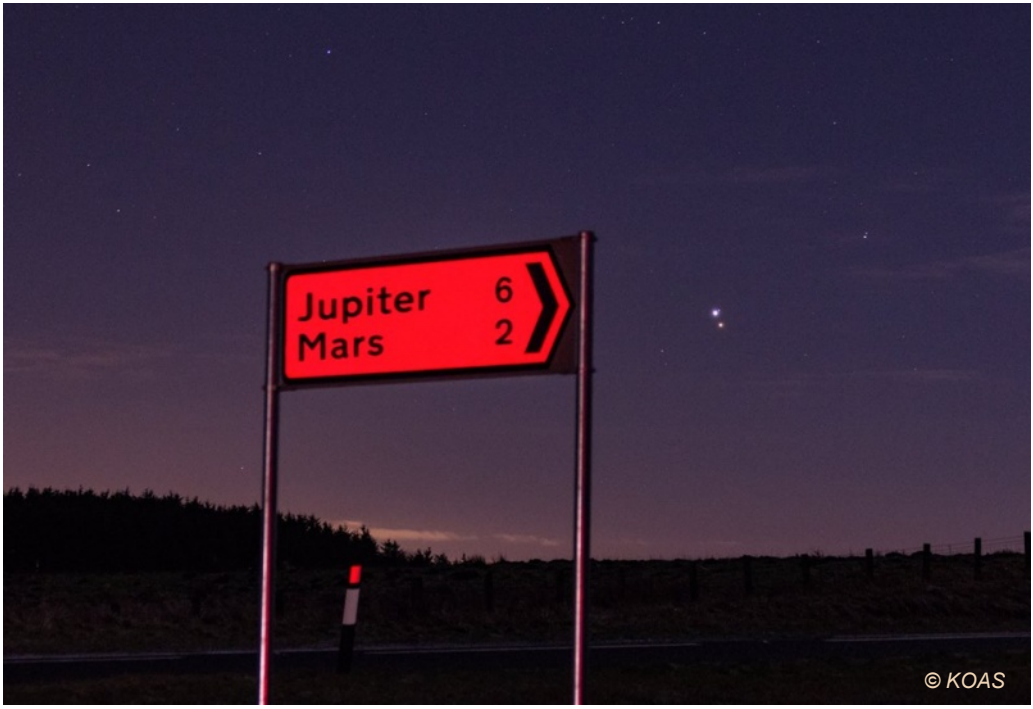
Editor Robert Williams took this image of a Geminid meteor over the Observatory on 14th December. It was taken using a Canon 60Da with 8mm Samyang fish-eye lens at f3.5. Exposure was ~30sec at ISO2000.

GALLERY

The NGC891 is a well-known spiral galaxy in Andromeda. We see it almost exactly edge on, and the dark lane along the middle is dust in the plane of the galaxy obscuring starlight from reaching us.

The road to Orion?

The Owl Cluster (otherwise known as NGC457) lies in the constellation of Cassiopeia, and is a great photographic target for a small telescope. It is actually a star cluster within our galaxy, about 21 million year old and 8000 light years away.



Someone has been busy with Photoshop!

"We attended the late night safari last night Mother Nature was kind to us we had clear skies ! Truly amazing experience I saw not one but 4 shooting stars the Milky Way another galaxy and so many stars ! Breath taking views of the world above and beyond thank you to all the staff who are all very welcoming & knowledgeable . Thanks for the Land Rover drive to and from the observatory I wouldn't of wanted to have driven up there in the snow"

Tanya - Durham

"Absolutely amazing way to spend New Years Eve last night. Can't wait to go back"

Danny - Barnsley

KOAS: Your Window to the Universe

http://www.kielderobservatory.org

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