Summer 2015 Number 8

Kielder Observatory Newsletter



KIELDER OBSERVATORY COMES TO TOWN!

NEWS

Town meetings a success

SCIENCE

What killed the dinosaurs?

OBSERVING

Highlights for Jul/Aug/Sep

NOCTILUCENT CLOUDS

What are they?



EDITORIAL

Summer is racing by, with its usual mix of extremes of weather, and the observatory is starting to look forward to the darker nights of autumn. Not that we haven't been busy over the summer! As well as running sessions in Newcastle, we have now opened our on-line shop. In this newsletter we have rather an eclectic mix of items for you, ranging from noctilucent clouds to the demise of the dinosaurs! We hope you enjoy it.

Nigel Metcalfe Robert Williams

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Kielder Observatory Astronomical Society

Registered Charity No: 1153570. Patron: Sir Arnold Wolfendale 14th Astronomer Royal

Full Membership £75 per annum Friends of Kielder £25 per annum

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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DIRECTOR'S CUT

Welcome to our latest version of the newsletter!

I have to say the summer months have provided quite a significant challenge to the staff and volunteers at the facility; what was of more significance to me was that we rose to the challenge. From midges to thunderstorms, sweltering humidity, you name it our guests and ourselves have had to endure it. To me this typifies the dedication and hard work that all of our staff and volunteers possess. It's this professionalism that I thank them for and is why both I and the trustees have confidence in the continued success of the observatory.

However, we have dark skies on the horizon; and as the nights draw steadily in we approach the autumn - this is a wonderful season and the Milky Way is undoubtedly the highlight. With a host of new events listed and ticket sales continuing to grow it bodes well for another great observing season. I aim to concentrate efforts on dark sky nights to observing and educating our visitors on our home galaxy. It is often overlooked, as we look instead deeper into space at the most distant specks of light barely discernible from the black cold vacuum of space. Our own Galaxy is far more interesting for observers, with knots of nebulosity twisting and snaking through

the starfields that adorn the Northern Milky Way. Objects like M27, the Dumbell nebula, or the Veil nebula, a supernova remnant snaking around the star 52 Cygni. All of these prove to be the most adorable of sights through our telescopes. I will be holding more training nights at the observatory so that our team can all learn how to find these objects, as well as understand the formation processes and the physics behind them.

To help facilitate this we have some rearranging to do at the facility with the 20" scope top of the list. I am hoping we will have this instrument resurrected and commissioned for late August. With its huge mirror, this telescope will once again prove priceless when we show our guests around our home galaxy.

I have recently appointed Hayden Goodfellow as an astronomer on a temporary contract at the observatory. Over the coming months you will get the chance to meet and congratulate Hayden in his new position. Hopefully he will decide to stay with us and continue the Kielder tradition of home grown astronomers.

So let's have a great autumn season! Thank you for your continued help and support.

Gary Fildes (FRAS MSc Hon.Caus.)



KOAS NEWS TRUSTEE NOTES

The trustees last met on April 15th, in the Newcastle office. The merchandising is moving forward apace. We have now received several samples of clothing ready for the new online shop and for sale at the Observatory (see photos in the news section!). It was also agreed that a series of postcards would also be added to the line of merchandise using photographs taken at the Observatory by staff and volunteers. There will also be a premium line of framed and poster artwork produced from KOAS photography. This will include a 'Limited Edition' series of



Look out for the new range of observatory artwork!

framed artwork. As part of all this we have applied to register the KOAS logo Trademark - hopefully this will be completed by mid-August. STOP PRESS - by the time you read this the new on-line shop will be open at

http://www.kielderobservatory.org/shop/

There has been steady progress on the

expansion plans. Meetings have taken place with various interested parties, and there is a clear desire all round to see the project come to fruition.

The first few months of bookings under the new gift aid scheme have been completed, and there has been an excellent take up rate of ~90%.



Gary signs his new contract in the presence of (most of) the trustees.

Last but not least, the Director finally signed a new contract at the Observatory.

The next meeting will take place in mid-July.



OBSERVATORY NEWS

KIELDER COMES TO TOWN!

So as we indicated in the last newsletter, we have been trialling taking the observatory to the people. We have now night of it! Book as usual through http://www.kielderobservatory.org/ If you can't make August, there will be another session on Sunday September 20th.



Gary holds the audience spell-bound at the Vermont hotel in April.

held two phenomenally successful evening events at the Vermont hotel in Newcastle, one in April and one in June. We have another evening booked for Sunday August 2nd, "Jewels of the Universe", so why not come along and see Gary and his team in action, exploring images of some of the most fascinating objects in the Universe. The bar will be open, and the Vermont are offering a special room rate if you want to make a Also in Newcastle, we took part in the Great North East Space Expo held at the Discovery Museum on June 22nd. This STEM event, sponsored by Think Physics and Northumbria University, and run by the Ashington Learning Partnership, aimed to attract young people in to careers in the space sector. Over 390 students attended and feedback for the event from pupils, teachers and exhibitors has been incredibly positive.



OBSERVATORY NEWS

It's also been a phenomenal time at the observatory, with record numbers still flocking to see the Universe in all its glory - but, also, in the solar system, something quite magical is happening. By the time



Staff and volunteers pose during a training day held on May 22nd.

you read this, the New Horizons spacecraft will have flown by the last of the classical "Planets". Now demoted to dwarf planet status, Pluto, discovered by Clyde Tombaugh in 1930, was always just a tiny speck of light, even in some of the largest telescopes on Earth and in orbit. But now, after a mammoth journey to the very edge of our solar system, a feat not achieved since the monumental Voyager missions of the 70s and 80s, humanity is about to get its first close up glimpse not only of Pluto itself, but its plethora of moons, some only discovered after the spacecraft launched, on what was, at the time, a deep space 'planetary' mission.

Whilst the demotion still causes anguish in some quarters, it really doesn't matter what Pluto is, it's still a stunning achievement by the engineers, scientists and mission controllers, who have guided the spacecraft on this epic journey. Pluto is currently sitting in a very dense region of sky in the constellation of Sagittarius, so whilst it may be tricky observing from Kielder at best, through the magic of robotic telescopes, and our former Deputy Director, Nick Howes, who has regular access to robotic scopes all over the



Gary models the new short-sleeved Tshirts. Long sleeved versions are also available.



OBSERVATORY NEWS

world, we'll be aiming to bring you images of Pluto over the coming weeks, as New Horizons zooms onwards, and outwards in to the unknown regions of the Trans Neptunian Zone (TNO).

The TNO is peppered with thousands and maybe even millions of comets, and it's on that theme, with the Rosetta mission still in the news, that this October, we'll be bringing you a comet themed week, when Nick returns to Kielder. Bringing with him his personal collection of not only some of the world's most famous meteorites, but also a range of Apollo and Gemini mission hardware and items, to show our wonderful guests. Keep an eye out on the website for these events, scheduled for the week of the 12th October onwards.

On the subject of meteorites, Kielder is now proudly able to sell meteorites to our guests, and we have a range of the famous Nantan meteorite fall, offered at great prices for anyone who comes to the obsy.

As noted already, our on-line shop is now live. Items for sale include our 'Limited Edition' series of artwork, a range of mounted prints and a series of 16 postcards, all produced from photography taken at the observatory by either Gary or his team. As well as the this we have added a range of long and short sleeve tshirts, in black or white, emblazoned with the original concept sketch of the Observatory by the winning architect Charles Barclay. And of course our famous 'Kielder Mugs'!



Josh and Charlotte model the new childrens T-shirts.

We look forward to seeing you soon, and hope you revel and enjoy the excitement of the Pluto flyby as much as we all will here at Kielder.



SCIENCE SPOT

What Killed the Dinosaurs? – Part 1 – Terrestrial Causes

When we are discussing our collection of meteorites during events at Kielder Observatory, visitors, as well as staff, often make reference to 'the impact that killed the dinosaurs', particularly after they've seen the Chelyabinsk films. It seems people quite firmly accept as fact that an asteroid or comet impacted the earth 65 million years ago, creating the environmental havoc that resulted in the guick demise of all species of dinosaurs after their 135 million years of existence on the planet. This may be due to the media coverage surrounding the locating of an impact crater in the early 1990's and Hollywood films about the issue. However, as with a lot of things in life, this explanation isn't as cut and dry as people may think.

Two main theories attempt to explain the cause(s) of the last global mass extinction on Earth, 65 million years ago. In the first two of this series of three articles, I will summarise the main facts and points of these theories; was it a gradual environmental decline due to changes on and within the earth or an extra-terrestrial impact causing sudden, catastrophic environmental change?

In the final article, I will give a brief, 8 | Kielder Newsletter | Summer 2015 objective comparison between those two theories. So, for the first article, let us examine what terrestrial events could have led to such a catastrophic loss of life.

HOW DO WE KNOW THERE WAS A MASS EXTINCTION?

Fossils found in rocks that are slightly younger than 65 million years old appear to show a massive decline in the number of species present when compared to fossils found in rocks that are older. This drop is around 65%. The occurrence of this mass extinction (also called the K-T boundary or K-T extinction) is not disputed, however the cause(s) are, as there have been many mass extinctions in Earth's history without corresponding meteorite impacts. It is important to keep in mind that there is a margin of error in the methods for determining how old rocks are and therefore any fossils contained within them. For example, geologists cannot say that a rock is 65 million years, 5 months and 4 days old. The margin of error (depending on the dating method and the rock involved) can be quite high, e.g. plus or minus several 100,000's or even millions of years. When we talk about 65 million years ago, we are actually talking about more of a range of time rather than a specific one.



SCIENCE SPOT

WHAT WAS GOING ON AROUND 65 MILLION YEARS AGO?

Well, obviously like today, many things were going on but by far the most globally

between half a million and 2 million years. This 'super volcanism' deposited over 1 million km³ of lava over western India. Today, near Bombay, the thickness of this lava layer is around 2.4 km (and that's



Earth at the end of the Cretaceous (65 million years ago). Red point is the location of the Chicxulub impact site; Purple areas are the approximate extent of the Deccan Traps (India). *Credit: (Basemap) Getech Group plc from its Global Palaeogeographies product.*

significant was widespread volcanic activity sending lots of ash and chemicals into the atmosphere. 66 million years ago (+/- 2 million years), India was a large island in the Indian Ocean with a huge amount of volcanic activity going on (see inset figure). The area where this was taking place is referred to as the Deccan Traps or Deccan Flats. This activity lasted after millions of years of erosion too). This prolonged event is by far the most significant volcanic event in Earth's history (in terms of lava deposited) with some publications stating a factor of 1000x bigger than the next most significant event.



SCIENCE SPOT CONSEQUENCES OF 'SUPER VOLCANISM'

The eruption would have had many major effects on the environment and we will only discuss some here. Huge amounts of sulphur dioxide would have been released into the atmosphere by the eruption. In turn this would have caused acid rain that would have fallen onto plant and animal life, soil and into lakes, rivers and oceans thereby altering their chemistry. This would have led to detrimental effects on life whether living on land or in the sea. Huge amounts of carbon dioxide would also have been released and would have created a greenhouse effect much greater than we are experiencing today.

With global temperatures increasing, less oxygen would be soluble in water causing respiratory issues with marine organisms. This increase in temperature would have also adversely affected the fertility of organisms. As temperatures rise, blood in animals/reptiles is redirected from deep inside to the skin to carry the heat away from the core of the animals body. In the present day, it is known that in cows a 1-1.5°C increase in core temperature can kill their embryos.

With higher temperatures, more water

would be able to be held within the atmosphere giving rise to increased cloud cover. The net, longer term, effect of this would have been global cooling as eventually more sunlight is reflected back out into space than penetrates the Earth's atmosphere (a fact that is still true in today's debate around climate change). Suffice it to say, Earth's environment 65 million years ago was far more hostile than it is today, not just for surviving but for reproducing! This would not have been the first time in Earth's history that volcanism had caused extinctions; 'Super Volcanism' in Siberia around 250 million years ago is known to be the cause of the biggest ever mass extinction on Earth; then, around 95% of all species disappeared from the fossil record after that period.

In the next newsletter we will look at: What Killed the Dinosaurs? – Part 2 – Extra-Terrestrial Causes

Lee Moorhead



JULY 2015

(times in BST)

Lunar phases

02/07/2015	03:20
08/07/2015	21:24
16/07/2015	02:24
24/07/2015	05:04
31/07/2015	11:43
	02/07/2015 08/07/2015 16/07/2015 24/07/2015 31/07/2015

PLANET SUMMARY

Mercury and Mars are too close to the Sun this month. Venus will be visible low in the west at Sunset. Jupiter is lost in the evening twilight. Saturn is visible for the first half of the night. Uranus is a morning object. During July Venus and Jupiter move away from their conjunction on the 30th June, getting more difficult to see as the month progresses. Saturn sits in Libra just above the Scorpion's claws.

THE STARS AT 11PM (BST)

North – The two Bears will be around along with Cepheus and Cygnus in the north east and Perseus near the northern horizon

East - Draco is high up with Cygnus lying

The Planets 15/07/2015

nicely placed for viewing – this will be a good time to view the late Summer Milky Way. Pegasus is near the horizon South – Hercules is overhead with Ophiuchus nicely placed. Scorpio is near the southern horizon West – Coronal Borealis is high up with Virgo low down and Leo about to set neat midnight.

METEOR SHOWERS

There are no major meteor showers in July.

COMETS

There are no bright comets in July.

OTHER EVENTS

Watch out for Noctilucent clouds – these are very high [70km+] ice clouds and are best seen during the Summer months (see the article later in this newsletter).

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

	Sun	Mercury	Venus	Moon	Mars	Jupiter	Saturn	Uranus
Rise	04:57	04:02	08:37	04:42	04:07	07:59	17:00	00:09
Transit	13:13	12:32	15:37	12:42	12:36	15:23	21:21	06:53
Set	21:29	21:02	22:36	20:36	21:05	22:46	01:45	13:36

Kielder Newsletter | Summer 2015 | 11



AUGUST 2015

(times in BST)

Lunar phases

Last quarter	07/08/2015	03:03
New Moon	14/08/2015	15:54
First quarter	22/08/2015	20:31
Full Moon	29/08/2015	19:35

PLANET SUMMARY

Mercury and Venus are too close to the Sun during August. Mars is visible low in the east before sunrise – in twilight. Jupiter is near solar conjunction and so is not visible this month. Saturn is visible for about 1 hour in the west after sunset.

THE STARS AT 11PM (BST)

North –Perseus, Andromeda and Cassiopeia are nicely placed for viewing all night East – Pegasus and Cygnus are well placed for viewing South – Lyra is high up with Sagitta the Arrow just below. Hercules and Ophiuchus are well placed with Sagittarius and Scorpio on the southern horizon West – Bootes is nicely placed with Virgo

The Planets 15/08/2015

near the horizon

METEOR SHOWERS

The major focus for August is the Perseid Meteor Shower of the 12th and 13th August. In 2015 the Moon will be almost New so this could be a good year to view the Perseids as the Moon will have set by the time Perseus rises. Expect about 50 to 75 shooting stars every hour after darkness. For more details check this link out ... https://in-thesky.org/news.php?id=20150813 11 100

COMETS

There are no bright comets in August.

	Sun	Mercury	Venus	Moon	Mars	Jupiter	Saturn	Uranus
Rise	05:46	07:46	06:26	06:44	03:56	06:36	14:58	22:04
Transit	13:12	14:31	13:03	13:47	12:00	13:46	19:18	04:50
Set	20:36	21:13	19:41	20:38	20:04	20:55	23:38	11:33

12 | Kielder Newsletter | Summer 2015



SEPTEMBER 2015

(times in BST) Lunar phases

Last quarter	05/09/2015	10:54
New moon	13/09/2015	07:41
First quarter	21/09/2015	09:59
Full moon	28/09/2015	03:50

PLANET SUMMARY

Mercury is in close conjunction with the Sun. Venus is a morning object rising some 3 hours before the Sun. It is close to Mars but Mars will be about 25x fainter. Jupiter is too close to the Sun to be seen this month. Saturn sets about 2 hours after the Sun so will be visible in twilight.

THE STARS AT 10PM (BST)

North – Draco, Bootes and Cygnus are high overhead, with Ursa Minor nicely placed [upside down]. Cassiopeia and Perseus are on the NE horizon. At a dark site, scan Cygnus with binoculars to find the North America nebula, a misty patch near the star Deneb.

East – Cygnus and Lyra are high up, with Andromeda and Pegasus nicely placed

and Pisces near the horizon South – Cygnus and Lyra are high up, with Sagitta and Aquila nicely placed and Sagittarius near the southern horizon West – Hercules and Corona Borealis are nicely placed. Virgo skirts the Horizon.

METEOR SHOWERS

There are no major meteor showers.

COMETS

Comet C/2013 US10 Catalina appears during late August and early September. It is very low down in the south for most of September but is heading northwards to reach the Great Bear by early Jan 2016 when it may be visible to the naked eye. http://www.aerith.net/comet/catalog/2013 US10/2013US10.html

OTHER EVENTS

On September 28th there will be a Total Lunar Eclipse at around 0200 UT. If the sky is clear then the whole of the event will be visible from the UK :

http://www.timeanddate.com/eclipse/lunar/ 2015-september-28

	Sun	Mercury	Venus	Moon	Mars	Jupiter	Saturn	Uranus
Rise	06:40	09:12	03:35	08:51	03:50	05:13	13:05	20:00
Transit	13:03	14:22	10:38	14:36	11:18	12:09	17:22	02:46
Set	19:24	19:32	17:40	20:11	18:44	19:05	21:39	09:27

The Planets 15/09/2015

Kielder Newsletter | Summer 2015 | 13



The Planets are coming - part two

In our last newsletter we looked at some interesting interactions – scientifically known as conjunctions - with other Planets and with the Moon, up until July. So, here is part two of our guide, which is a run down of the events from August until the end of October. As with any conjunction event it is best to start observing a few days before the actual date described so you can see the dance of the Planets.

Event 1: 10th September Moon and Venus

This event begins a few days previously when in the pre-dawn sky, and looking East on the 5th September, you can find Venus low in the east at around 0500 BST. Venus is in Cancer – near Acubens, Alpha Cancri; and the red Planet Mars is nearby – close to Pi Cancri on the border with Leo. The Last quarter Moon is in the Hyades in Taurus. Over the next few days the Moon glides across the constellations of Taurus, northern Orion, through Gemini and into Cancer. On the 10th Venus is only about 2 degrees away from the Moon. On the 11th of September the Moon, Venus and Mars make up an almost equilateral triangle.





Event 2: 28th September Total Lunar Eclipse

At 02:11 (UT) in the morning, so this event is for the early risers! Full details can be found at http://eclipse.gsfc.nasa.gov/LEplot/LEplot2001/LE2015Sep28T.pdf There have been a few Lunar Eclipses over the past few years but not all were visible from the UK:

15th June 2011 – only a penumbra eclipse – difficult time of year anyway

10th December 2011 - again not fully eclipsed as seen from the UK

28th November 2012 / 25th April 2013 / 25th May 2013 - no full eclipse

18th October 2013 - was a full eclipse visible from the UK

5th April 2014 - not visible from UK

8th October 2014 - not visible from the UK

4th April 2015 - not visible from the UK

So the next event on 28th September which will be visible from the UK – weather permitting – is a good opportunity to see the Moon turn a weird shade of blood red. You should see something like this

http://www.timeanddate.com/eclipse/lunar/2015-september-28. The prenumbral phase will start just after 0000 UTC, depending on your actual location, with totality from 0211 until 0323 UTC. So get your cameras at the ready to record this – somewhat spectacular – event. And if you miss that one then the next visible from the UK will be on 7th September 2025!





Event 3: 9th October, Venus, Mars and Jupiter

Moving onto October, with the darker nights drawing us closer to our telescopes: in the pre-dawn skies, and looking East and starting from the 1st October you will see the two brightest Planets, Venus and Jupiter with a much fainter and redder 'star' between them – this is Mars. Between Mars and Venus lies Regulus in Leo. Now moving on day-by-day you will see that by the 6th October, Mars has moved slightly closer to Jupiter and the crescent Moon is moving into view in the neighbouring constellation of Cancer. By the 8th October the crescent Moon is now in Leo as well. By the 9th the Moon is between Venus and Mars and passes Jupiter by the 10th.

In fact there are a whole series of conjunctions between the three planets during the rest of October:

* Mars and Jupiter are in conjunction on the 17th October with the Moon now set and Venus is closing in on the pair too.

* Onto the 23rd October and Venus, Mars and Jupiter make up a tight group, near Sigma Leonis, with only a about 4 degrees separating the trio.

* On the 25th October Venus and Jupiter are now in conjunction.





OBSERVERS' SLOT

NOCTILUCENT CLOUDS

During the summer months when the sky isn't dark enough for deep sky observing you might be tempted to put up your astronomical feet and turn your attention to other pursuits. However, there are plenty of projects you can still get involved in and one of these is observing Noctilucent Clouds (NLC's). Literally meaning "night shining clouds", these wispy formations start appearing in the summer months from about mid-May to mid-August and can be seen above the northern horizon from most parts of the UK. They tend to appear about an hour and half to two hours after sunset (or before sunrise) and look like bands or whirls of silvery blue coloured clouds (see Figure 1). The British Astronomical



Figure 1. Noctilucent clouds seen over Durham cathedral in June this year. Credit: Dr John Lucey, Durham University.



OBSERVERS' SLOT



Figure 2. Noctilucent clouds over the North Pole on 27/6/15 as seen by the AIM satellite. Credit: LASP/University of Colorado.

Association gives a guide to observing and recording these phenomena (http://www.britastro.org/aurora/nlc.htm) and classifies the different types of cloud that you can see into four categories: -

1. Veil (a simple structureless sheet)

2. Bands (lines or streaks)

3. Waves or Billows (fine herring-bone structure like the sand ripples on a beach at low tide)

4. Whirls (large-scale looped or twisted structures).



OBSERVERS' SLOT

So how do these clouds come about? The first point to make is that they are formed at very high altitudes of 80 to 85km and appear to shine at night because they are lit by the sun which during the summer lies not far below the horizon at UK latitudes. At this point in the upper Mesosphere the temperature is -180C and, by mechanisms that are yet not fully understood, the clouds form when water vapour freezes around tiny dust particles. So where does the water vapour and the dust particles come from? Interestingly, this is the altitude at which some meteors entering our atmosphere burn up through the intense heat of friction with the air. It has been suggested that this may be a source of the fine particles of dust. But what about the water vapour? Here some of our bovine friends may be helping as it suggested that methane may be reaching this height where, by some chemistry involving free radicals, its hydrogen is being converted into water.

So why are NLC's of interest to scientists and why are amateurs needed to observe them? Firstly, NLC's are observed to be a recent phenomenon. The first reports of their observation came in 1885. This is two years after the massive eruption of Krakatoa when large amounts of ash, dust and gas were ejected into the upper atmosphere. Secondly, they are being observed more frequently and at increasing lower earth latitudes. The accepted view is that NLC's can be seen from latitudes of 50 to 65 degrees (north or south; they are seen in the southern hemisphere in summer too) but more recently they have been seen as far south as 40 degrees. So this is where amateurs can play a part. In 2007 NASA launched the AIM satellite

(http://lasp.colorado.edu/aim/index.html) to observe these clouds (see Figure 2) but observations from amateurs are encouraged to supplement our understanding of their range and frequency. What's more they may be an indicator of climate change, perhaps because, as the earth warms up more methane is released from frozen Arctic bogs and this is contributing to the overall methane content of our air. In any case, it all makes it a good reason

to stay up late on summer evenings and look out for these enigmatic clouds.

> Duncan Hale-Sutton Astronomical Society of Edinburgh





THE NATIONAL ASTRONOMY MEETING

Just for something a bit different, we report from the National Astronomy Meeting, which took place in LLandudno during the first week of July.

Held under the auspices of the Royal Astronomical Society (of which our own Gary Fildes is a Fellow), the National Astronomy Meeting is an annual chance for professional astronomers to get together and celebrate the best of UK science. However, the event is not just about research - school teachers and other educators are represented, and there is a strong emphasis on outreach. Held over four days, there are a couple of plenary talks each day, which everyone attends, around which are scheduled many parallel sessions, covering just about any topic you care to name, ranging from Archeoastronomy to Space Weather!

The highlight of the week is the public lecture, which this year was given by the Astronomer Royal, Sir Martin Rees. His talk, entitled "From Mars to the Multiverse", took us on a fantastic journey out from our own Solar System to the



most distant reaches of the Universe (in both space and time!).



Sir Martin Rees gave the public lecture

We were also treated to a summary of the Rosetta space mission by Dr Matt Taylor, he of the colourful (and sometimes controversial) shirts. At the time of the talk there had been no contact with the Philae lander for a week or so, but I am happy to report that a couple of days later communications were re-established. The main problem seems to be that the orbiting mothership has had to move away from the comet as its star-trackers are being confused by material ejected from the comet's surface (so it's not just my telescope that can't autoguide!).

Perhaps of more interest to Kielder was the demonstration of a Virtual Reality version of the open source planetarium software Stellarium. Wearing a VR headset, the stars light up around you in a real-time display of what the sky would look like if it wasn't day time! Even more spectacularly, Stellarium has the ability to "switch off" the ground, leaving you immersed inside a 360 degree sphere of

Want to help Kielder Observatory become one of the top astronomy attractions in the UK ?

For just £25 per year you can join the Friends of Kielder Observatory. For £75 per year you can have voting rights at our AGM and access to two free events of your choice.

Contact membership@kielderobservatory.org for further details.





As well as a talk on Rosetta, there was an attractive display describing the mission.

stars (looking down and seeing stars where your feet ought to be is something of a challenging experience!).

Coming to an observatory near you some time soon I wonder?

Nigel Metcalfe



VR anyone? I wonder what they are looking at ...



ASTRONOMICAL DARKNESS

It may not surprise you to know that, even at a dark site like Kielder, during the summer months there are periods where the sky never gets dark enough for serious astronomy, or, to put it more formally, the sun never gets more than 18 degrees below the horizon. Astronomical twilight, as it is known, which covers the time when the sun is between 12 and 18 degrees below the horizon, seems to have been first formalised in 1928. Why 18 degrees is the magic figure is not entirely obvious - HM Nautical Almanac Office state a couple of definitions: twilight starts when "Sixth magnitude stars are no longer visible to the naked eye under good conditions" or twilight ends when "The illumination due to scattered light from the Sun is rather less than that from starlight and other minor natural sources.". I am not sure either is a very rigorous definition!

Whatever the reason for the definition, astronomical darkness, which left us in the North East in the first week on May, does not return until the first week in August. Three whole months - bring on those dark skies!

Not been to Kielder yet?

Then why not book one of our events for you or your family?

Summer Space Kids is running every Monday, Wednesday and Friday throughout August, starting Monday 3rd August, ending on Friday 28th August, 4pm - 6pm.

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

SPECIAL EVENTS:

* On August 2nd and Sept 20th we will be running special evening shows at the Vermont Hotel in Newcastle.

* On Sept 25th, Oct 3rd and Dec 4th there will be a series of stargazing events in Dilston Physic Garden.



We would love to display your images here! All the better if they are taken up at Kielder, but it is not essential. Please send them to

newsletter@kielderobservatory.org

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



A beautiful aurora over Kielder - Gary Fildes



Venus and Jupiter setting over the Great Orme, LLandudno - Nigel Metcalfe.





Reader Jane Dolan took this rather nice shot on a walk up to the observatory - just to prove we do get clear skies!



But not all the time! Lightning storm on July 1st - Gary Fildes.





Yet another aurora - it has been a good year!



The conjunction of Venus and Jupiter on June 30th. Canon 1000D at prime focus of a Nexstar SLT 102mm refractor - Nigel Metcalfe.





A rather stunning sunset cloud formation over Kielder - Gary Fildes.



Editor Robert Williams has been 'down-under', and sends this 20 sec exposure of the southern Milky-Way taken with a Vivitar 8mm f3.5 fisheye lens and a Canon 60Da.

'Amazing night with really informative demos and talks. Really chilled friendly evening. A must-do for visitors to the area and worth travelling a distance for. '

Ben Brewis

'Love this place. Both the staff & volunteers are amazing. Can't wait to return!' Katie Molloy

KOAS: Your Window to the Universe

http://www.kielderobservatory.org

