TRANSIT

The September 2012 Newsletter of

Cleveland & Darlington Astronomical Society

NEXT TWO MEETINGS at Wynyard Planetarium

Friday 14 September 2012, *7.15 for 7.30 pm*

Life in a cluster of galaxies

Prof. Richard Bower, *Durham University*

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Friday 12 October 2012, *7.15 for 7.30 pm*

Transit of Venus Special

Neil Haggath and other CaDAS members

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Editorial *by Andy Fleming*

Welcome along to September's *Transit* for which I'm guest editor for just this month while Rod has been away being married and enjoying his honeymoon. So I'm sure you'll all join me in sending congratulations and very best wishes to both him and his new bride!

An exciting new age of exploration of the Red Planet, Mars has just started since the last issue of *Transit*, and of course you'll all be aware of the highly successful landing on the surface of Curiosity, NASA's Mars Science Laboratory, already sending fabulous photographs and data back as it looks for the building blocks of life. I for one held my breath while watching NASA-TV live on the internet on Monday 6 August whilst the SUV-sized rover went through its "seven minutes of terror" descent to the Martian surface and then used its sky crane (technology never used before), to descend to the planet's surface. Whatever Curiosity finds, and it has a full battery scientific experiments and laboratories including a rock-zapping laser and non-solar dependent mini nuclear power plant to help it in its tasks, it's going to be a fascinating two year mission. Congratulations to some of humankind's very best minds at NASA and JPL for this superb success.

Unfortunately elsewhere in the astronomical and space community either locally, nationally or internationally, it hasn't been such a good summer. Ray Stapleton (Hauxwell) (left), an active and well-liked member of CaDAS and a long-standing donor of equipment to the society, passed away on Friday 10 August. Our sincerest thoughts are with his wife Mandy and children Abi, Jack and Jed.

The summer has also seen the sad loss of Sir Bernard Lovell who in 1957 constructed the then-largest steerable radio telescope in the world at Jodrell Bank, which now bears his name - the Lovell Telescope. Over 50 years later, it remains a productive radio telescope, now operated mostly as part of the MERLIN and European VLBI Network interferometric arrays of radio telescopes.

The sad news has continued regarding space exploration with the passing away of Sally Ride at just 61 years of age, who in 1983 became America's first woman in space on board space shuttle Challenger mission STS-7.

Finally of course, the death of Neil Armstrong aged 82, the first human to set foot on the Moon brings to an end a torrid UK summer both meteorologically and astronomically. I feel totally humbled to comment on the passing away of such a true giant, an extraordinary member of mankind and in an era of so-called 'reality TV' a true celebrity and international hero. He, like the other Apollo astronauts went to the Moon in the full knowledge that there was a very good chance they wouldn't be coming back (and Apollo 13 nearly didn't), but they were prepared to take massive risks in the pursuit of knowledge and if necessary pay the ultimate price like many famous explorers before them . As NASA called, it they had "the right stuff", and to this day they remain the only humans to have ever left low earth orbit. Despite my, and I'm sure yours, overwhelming sense of sadness at his death, Neil will forever possess the unique accolade in being the first person in human history to have set foot on another world.

Neil Haggath has written a wonderful tribute to Neil on page 9 of this issue of Transit.

Many thanks to this month's contributors especially once more to Brian Blakeley, Rob Peeling, Keith Johnston, Neil Haggath, Pat Duggan and John McCue. The deadline for *Transit*'s October edition, when Rod will be back in this seat (contact details are below), is **Wednesday 26 September**.

Please send items for October's issue to Rod Cuff: **info@cadas-astro.org.uk** *;1 Farndale Drive, Guisborough TS14 8JD (01287 638154, mobile 07775 527530)*

Letters

A Real Blue Moon *from Brian Blakeley*

Rob Peeling's article in Skylights July 2012 and the definition of a Blue Moon reminds me of a real Blue Moon!

For a few days in 1948 (I think) when I was working in Glasgow, the Moon was really blue and the Sun a beautiful electric blue through the Glasgow smog.

The cause was high altitude smoke from a forest fire in Canada.

Best wishes – Brian Blakeley

OBSERVATION REPORTS AND PLANNING
Skylights – September 2012 *with Rob Peeling*

Hours of Darkness

BST	Sunset	Astronomical Twilight	Sunrise
1st September	18:59	21:10 to 03:06	05:20
30th September	17:48	19:45 to 04:12	06:10

Darkness is back and the observing session resumes in earnest.

The Moon

	8 Sept	16 Sept	22 Sept	30 Sept
	Last Quarter	New Moon	First Quarter	Full Moon
Rise	22:11	06:21	13:54	17:31
Set	14:53 (9th)	18:02	22:05	06:08 (1st)

On 8th September the Moon will rise close to the Hyades. Closely following the moon into the sky will be Jupiter. On 26th September at between 10:25 to 10:30 the moon will occult the star 46 Capricorni. You will see it blink out under the dark limb.

The planets

Jupiter is in the vicinity of the Hyades when it rises in the late evening. There are conveniently timed transits of the Great Red Spot on 10th (22:09), 22nd (23:03) and 27th (22:11).

Venus is in its guise as the morning star in September. The moon is nearby and also the Beehive open cluster (M44) in the pre-dawn sky of 12th September.

Neptune is in Aquarius. Use a star chart to find the star 38 Aquari (NE of iota Aquari) and centre it in a low power field about 2 degrees field of view. To the southeast of 38 Aqr you should be able to see two stars similar (but a bit fainter) than 38. Neptune is the one nearer to 38 Aqr. Use a high power lens to see the disk and confirm your observation. Once you've found it, try and see it in the finder or with binoculars. Once you know where it is it can be seen with really small instruments – no surprise in this since Galileo unknowingly recorded the position of Neptune among his observations of Jupiter's moons and his telescope was very basic by our modern standards.

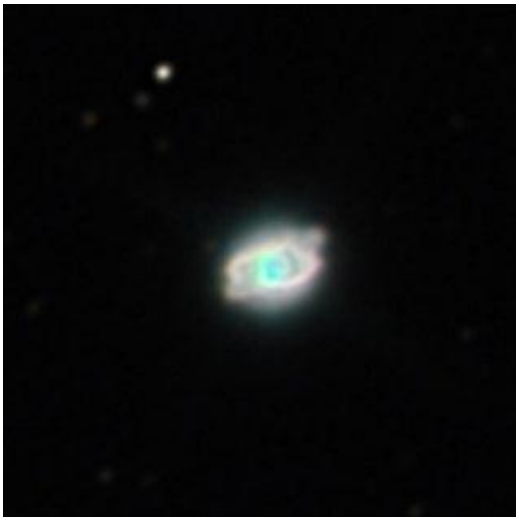
Uranus is right on the boundary between Pisces and Cetus. Despite being much brighter than Neptune, I think you'll find it harder to locate being far from any bright marker stars. It is close to 44 Piscium and very similar in brightness. If you can find 44 Psc then in the telescope you ought to see a wide double of similar brightness. Uranus is preceding i.e. west of 44, so if you stop the telescope drive then the planet is the one that disappears out of the field first. It should look bluish and will become a disk if you increase eyepiece power.

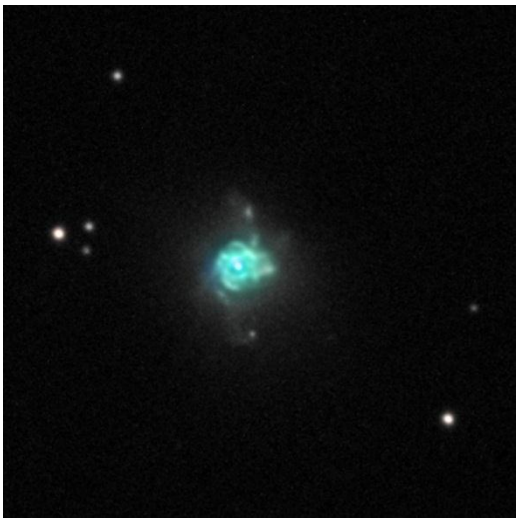
Deep sky

I thought some planetary nebulae would be good suggestions for this month.

The first is NGC 6572, the Emerald Eye which lies south of 71 Oph and I mentioned it in the last issue of Transit (and no apology for using it again). Look for it with low power, sweeping south east from 71 Oph. It is very bright for a planetary nebula and at first difficult to spot because it is very star like in appearance. However its colour is what gives it away. Suddenly you realise that you are looking at a bright green star and that can't be right! There are no actually green stars – any you might encounter looking at double stars are tricks of contrast. This planetary is bright enough to detect in my 10x50 finder. Higher power or an OIII or UHC filter shows nebulosity to confirm that it really is a planetary nebula. With q really high power 4.9mm lens with my 12" telescope, I see a brighter spot in the middle. The nebula is slightly elongated rather than round and seems to be slightly brighter in the other direction across the narrower part.

Now try NGC 6210 which lies slightly north of a line between beta Herculis and delta Herculis. A pair of 6th and 7th mag stars marks the spot. The planetary nebula forms the last corner of an isosceles triangle with the 7th magnitude star at the sharp point and the planetary and a similar bright 9th mag star making the other end. NGC 6210 is like our previous target in that it looks like a green star at first sight.





NGC 6572 (top) & NGC 6219 (bottom)

Now try the Blinking Planetary, NGC 6826 in Cygnus. First find the wide yellow double star, 16 Cygni. This makes one corner of an equilateral triangle with the brighter stars, delta Cygni (one arm of the Northern Cross) and the naked eye multiple star, omicron Cygni. In a low power field you should find the Blinking planetary to the southeast of 16 Cygni. The blinking effect can be seen by looking directly at the nebula and then slightly away. The central star blinks in and out of view.

NGC 6826

Finally for this month, let's visit those old favourites, M27, the Dumbbell Nebula and M57, the Ring Nebula. M57 should be visible as a tiny smoke ring in a low power view if you point you telescope midway between beta and gamma Lyrae. M27 will show up as a hazy patch in a finder if you sweep north from gamma Sagittae at the tip of the Arrow.

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GENERAL ARTICLES

Paris *by Pat Duggan*

I took a 2 hour 20 minute train, Northallerton to Kings Cross, and walked about admiring the restoration work done there. I treated myself to a very fine lunch at a salad bar near the platform. It was a short walk into the St Pancras part of the station and I found there was not a queue for Eurostar so went onto the platform. Tickets were printed from the internet at home with a bar code square for the automated barrier and passport was no problem at all. The train was only 70% full so although I had booked a seat it didn't seem to matter and Paris was the next stop.

It was getting dark as I arrived and I headed for the Rue Magenta outside the station. The internet had been useful as I had used "street view" on the map to familiarise myself with the way I wanted to walk to the hotel in the non-touristy area called Republic. I recognised all the shops and turnings immediately and found the hotel without any trouble. I had booked a 2*on the internet and didn't find any problem as they spoke English. The room was quiet, clean, bright, high up and smelled strongly of vegetables – how French, I thought. Fortunately the smell disappeared as soon as I had had a shower!!!!!

The morning was bright but drizzling. I walked to the Sorbonne area to visit the Pantheon. I was very pleased to find an English pamphlet about the famous Foucault pendulum that had caused such a stir in March 1851 when the general populous were shown how the 2.5mm gyration happened, and widened, and took the 28 kg bob gradually and repeatedly in a circle swinging from 67 metres above on a steel wire. Nineteenth century physicists and mathematicians had been firmly convinced, by astronomical evidence that the Copernican concept of the planetary system was correct, that the Earth revolved around the Sun. The importance of the pendulum leaving a visible trace of that rotation across a ring of sand convinced non-scientific people of Earth's 24 hour motion on its own axis causing night and day as well as its yearly passage around the Sun. Apparently the Parisian public flocked to see the experiment in large numbers then. Later when the experiment was re-established Flammarion took the opportunity to agitate how the result settled "the contest between those who believe they speak in the name of God and those who declare that the Supreme Cause is unknowable – this demonstration also had a political and ideological role!

The following day I walked from the hotel in Republic to the bus stands outside Gare du Nord and caught a number 350 bus to Le Bourget Airport. The bus stops right outside the Musée of Air and Space. So I can say "yes – I've been on Concord", but it didn't take off. This really is a "must see" as everything from early aeroplanes to Arianne Rockets are there. There is a large section on satellites and space exploration and it is all attractively displayed. There is so much to see I was pleased to find a restaurant there too which was packed with French people seemingly part of a conference centre also established there.

There are other astronomical interest places to visit in Paris but I had such a short time there. I had wanted to see the Picasso "Starry Night" series of paintings but the gallery was "Closed for Refurbishment" and the paintings distributed around other Parisian galleries, which was a shame. I failed to talk my way into the Paris Observatoire but that was a bit ambitious! Hot mulled wine was being sold on the street and my visit coincided with the New Beaujolais tasting in the markets. Snacks were best bought from larger supermarkets. The canal sides east of Republic, the Senat gardens near the Pantheon and many smaller parks were still full of colourful flowers which made pleasant places to stop and eat sandwiches…with a hot mulled wine. I can recommend a trip to Paris, even in December.

Dalby Starfest 2012 – Imaging Results So Far *by Keith Johnson*

Keith Johnson has attended the 12th Annual Summer Star Festival organised once again by the Scarborough and Ryedale Astronomical Society between Friday August 17th and Monday August 20th 2012. Once again, he's coming up with some great images despite the poor weather.

Keith states that prior to Starfest he already had in mind which objects he wanted to image. However, cloud and rain hampered any observing and imaging until Sunday evening when the skies cleared from around 7pm and the skies remained clear until dawn. After checking that all of his imaging equipment was working correctly he slewed the telescope to M27 the Dumbbell Nebula in Vulpecula, as the skies were not dark enough at that time. He decided to use M27as a "test" to make sure the telescope mount, camera, guiding equipment was working correctly and that the focus good.

M27 the Dumbbell Nebula in Vulpecula

The M27 test image displayed pin point stars after 5 minute exposures and after almost an hour of further tweaking he decided to go to M31The Andromeda Galaxy and commence his imaging session.

Using his modified Canon 1000D DSLR @ ISO 1600, capturing 19 x 3 minute exposures were all that was required to obtain detail of this beautiful object.

As M33 the Pinwheel Galaxy was in the same region of sky he decided that it would be his next target, this time capturing 17 frames again at ISO 1600.

He's also included the M27 Dumbbell Nebula test result which has been included above, cropped by 50 per cent.

Keith's Equipment:

HEQ5 Pro. mount.
Moonfish 80mm doublet refractor (acting as the guide scope).
William Optics ZS66 doublet refractor (Imaging O.T.A.)
Astro engineering dual dovetail mounting bar.
Skywatcher Guidescope mount.
William Optics III field flattener.
LVI standalone auto guider.
Canon 1000D (modified).

Well done Keith and here are more of his superb images:

M31, the stunning Andromeda Galaxy.

M33 Triangulum Galaxy.

The Reluctant Hero: Neil Armstrong 1930-2012 *by Neil Haggath*

The world has lost one of its true heroes. Neil Armstrong, the first human being to set foot on another world, died on 25 August, at the age of 82.

Neil Alden Armstrong was born in Wapakoneta, Ohio on 5 August 1930. As a child, he was fascinated by flying; his father took him for his first flight in a light aircraft when he was only six years old. He gained a pilot's licence before he was old enough to drive!

In 1947, he went to Purdue University in Indiana, to study aeronautical engineering. This was under a scholarship from the US Navy, where he would study for two years, then serve three years in the Navy as a junior officer, before completing the last two years of his degree. His naval service coincided with the Korean War; after qualifying as a naval pilot at the age of 20, he flew 78 combat missions, and once had to eject after his plane was hit by anti-aircraft fire. After leaving the Navy in 1952, he completed his degree in 1955. 15 years later, after the end of his astronaut career, he also gained a master's degree from the University of Southern California, and was also awarded several honorary doctorates.

In 1956, he married his first wife Janet, whom he had met at university. They had three children, but one tragically died at just two years old.

After graduating, Armstrong became a civilian test pilot, based at the High-Speed Flight Station at Edwards Air Force Base. He made seven flights in the famous X-15 rocket plane, to altitudes of over 60 km.

In 1958, he was selected for the US Air Force's independent manned spaceflight programme, but four years later, he was selected by NASA as one of its second group of astronauts, which became known as the "Next Nine". (The first group, selected in 1959 for Project Mercury, were always referred to as the "Original Seven"). While NASA is a civilian agency, most of the early astronauts were serving military officers, on long-term secondment to the Astronaut Corps. Armstrong was one of only two, at that time, who joined the Corps as civilians; the other, Elliott See, never flew in space, as he was killed in an aircraft accident. So when Armstrong made his first flight in 1966, he became the first American civilian to go into space – but not the first overall. That distinction belonged to the USSR's Valentina Tereshkova, though she was given an "honorary" Air Force rank.

Armstrong's first spaceflight was a historic one. As Commander of Gemini 8, launched on 16 March 1966, he achieved the first ever docking of two spacecraft. His co-pilot was Dave Scott, who would also later land on the Moon. The purpose of the ten two-man Gemini missions, in 1965-66, was to develop and test the technology and techniques which would be required to go to the Moon; one of the most important was rendezvous and docking – the joining together of two spacecraft in orbit.

Gemini 8's primary objective was to rendezvous and dock with an unmanned "target" vehicle, called an Agena, which was launched a few hours ahead of it. The Agena was in fact a modified upper rocket stage, fitted with the "female" part of the docking mechanism. Gemini 6, three months earlier, had been scheduled to perform this test, but their Agena exploded during launch – so it fell to Armstrong and Scott to make history.

They successfully docked with the Agena – but then things went badly wrong. A faulty attitude thruster stuck on, and caused the combined spacecraft to go into a dangerous spin. After separating them, Armstrong managed to correct the spin and stabilise the Gemini – but

in doing so, he used up most of the spacecraft's manoeuvring fuel. So they had to cut the mission short, and make an emergency return to Earth. Instead of its scheduled three days, the flight lasted less than 11 hours – but they landed safely. As well as achieving a vital "first", Armstrong and Scott had survived the first space emergency.

Armstrong's second and last spaceflight was, of course, as Commander of Apollo 11, which would attempt the first landing on the Moon. Before this, he served as Commander of the backup crew for Apollo 8, the first manned mission to orbit the Moon; each backup crew became the prime crew for three missions later. (The first four manned Apollo missions were "workups", testing the spacecraft and various aspects of the lunar landing procedure.)
Even by the demanding standards of the Astronaut Corps, Armstrong had acquired a reputation for being completely unflappable, and keeping his head in a crisis – and never was this more apparent than when he survived a near-fatal accident during his Apollo training. Each mission commander had to fly the infamous Lunar Landing Training Vehicle (LLTV), informally known as the "Flying Bedstead". This was intended to simulate flying the Apollo Lunar Module in lunar gravity; it did so by using one engine to provide an upward thrust equal to five sixths of its weight, while another engine was used for manoeuvring. The LLTVs were notoriously difficult to fly, and on 6 May 1968, the one which Armstrong was flying malfunctioned and crashed. He was forced to eject at an altitude of only 100 feet; he landed safely, but a later analysis showed that had he ejected just one second later, he would have been too low for his parachute to open in time, and would have been killed! Yet he calmly dusted himself off and walked away, and within half an hour, was back in his office, writing up his report.

Armstrong's colleagues on Apollo 11 were Edwin "Buzz" Aldrin, the Lunar Module Pilot, and Michael Collins, the Command Module Pilot. In common with Apollo 10, the "dress rehearsal" mission – which had done everything except actually land on the Moon - all three were veterans of Gemini flights. All the Apollo commanders had made at least one previous spaceflight, but many of the crew members on the earlier and later missions were first-timers. The Apollo 10 and 11 crews were the only two which consisted entirely of Gemini veterans; not surprisingly, the two riskiest missions were given the most experienced crews.

Apollo 11 was launched on 16 July 1969, thereby fulfilling President Kennedy's challenge to achieve the landing before the end of the decade. Four days later, Armstrong and Aldrin descended to the lunar surface in their Lunar Module, Eagle, while Collins remained in orbit aboard the Command Module, which had the equally patriotic name Columbia. As they made their final approach to the Sea of Tranquillity, it became apparent that their intended landing area was strewn with large rocks, which would have made it dangerous. With characteristic calm, Armstrong took over manual control, and guided Eagle four miles further downrange, in search of a safer spot to set it down. When he finally touched down, at 2017 GMT on 20 July, the LM's descent engine had less than a minute's worth of fuel remaining.

Armstrong's report, as Eagle touched down safely, has passed into history: "Houston, Tranquillity Base here. The Eagle has landed."

A few hours later, at 0256 GMT on 21 July (which was still the evening of 20th in the USA), Armstrong became the first man to step onto the surface of the Moon. As he did so, he spoke perhaps the most famous words in history: "That's one small step for (a) man; one giant leap for mankind." (As he later admitted, he did indeed "fluff his lines", and omitted the word "a". Strictly speaking, what he actually said was consequently nonsensical – but no-one who heard it failed to appreciate his meaning. He always preferred the quote to be written with the "a" in brackets, to indicate the intended meaning.)

Aldrin followed him onto the surface 20 minutes later. It was not only protocol which dictated that the Commander went first; it was also necessitated by the design of the Lunar Module. The cramped confines of the cabin, and the position of the hatch, dictated that the Commander always had to leave the LM first and return to it last.

While much more ambitious missions would follow later, the objective of Apollo 11 was simply to land two men on the Moon and return them safely, to prove that it could be done, and to fulfil Kennedy's challenge. Armstrong and Aldrin spent only 21 hours on the Moon, and their single moonwalk lasted only two and a half hours. They performed some ceremonial duties, such as planting the American flag and talking to President Nixon, set up a few experiments, and of course collected some rock samples. Apollo 11 returned to Earth after a total flight time of just over eight days.

Armstrong resigned from NASA in 1971, and took up a teaching position, becoming a Professor of Engineering at the University of Cincinnati, Ohio. He later accepted directorships with a number of American companies.

Given the degree of his fame, and the magnitude of his achievement, one of the most remarkable aspects of Armstrong's personality was his modesty. After Apollo 11, despite his worldwide fame, he never wanted to be regarded as a "hero" or a "celebrity", saying that he had simply done his job. He rightly pointed out that, while he was the individual who had made the historic "first step", it had taken the combined efforts of 400,000 people, across the country, to get him there.

Nor did he ever wish to cash in on his fame, as many of his colleagues did. In the immediate post-Apollo years, while all of the astronauts were still household names, many of them made fortunes from advertising and product endorsements, but Armstrong refused all such offers.

When a greeting card company used his name and the “one small step” quote without his permission, he sued them – but this was done as a point of principle, rather than for personal gain; he donated the settlement to his old university.

Despite all this, however, his fame put a strain on his marriage; he and Janet separated during the 1980’s, and were divorced in 1994. He married his second wife, Carol, soon afterwards.

In his later years, Armstrong shunned publicity, made very few public appearances, and became almost reclusive. Since the 1990’s, he refused all requests for autographs, for the very valid reason that he objected to others making money from his name. It had become common for people to obtain autographed items, for the sole purpose of selling them on eBay for profit, and some were even selling forgeries. (Buzz Aldrin, consequently, became much in demand as “the next best thing”, and has long made a career of being the public figure which Armstrong never wanted to be.)

Bizarrely, some of the proponents of the ludicrous “Apollo was faked” conspiracy theory have pointed to Armstrong’s “reticence” as “proof” of their idiotic claims – their argument being that he refused to talk about it, because he didn’t really do it! It doesn’t occur to these morons to consider the obvious explanation – that he was simply a shy and unassuming man, who wanted to be left alone to get on with his life!

I’ll end on a personal note. I’m one of the generation who “grew up with the Space Age”; I was born just a few months after Gagarin’s flight. I was seven years old at the time of Apollo 11, and already fascinated by spaceflight; the earliest mission which I can remember knowing about was Apollo 8 in December 1968. My resultant passion for space and astronomy remains to this day. In recent years, I’ve had the great honour and privilege of meeting four of the Apollo astronauts – events which I count among the Great Moments of my life.

Finally, as a fitting tribute to this remarkable man, I can do no better than to quote from the press statement issued by his family:

“For those who may ask what they can do to honour Neil, we have a simple request. Honour his example of service, accomplishment and modesty, and the next time you walk outside on a clear night and see the moon smiling down at you, think of Neil Armstrong and give him a wink.”

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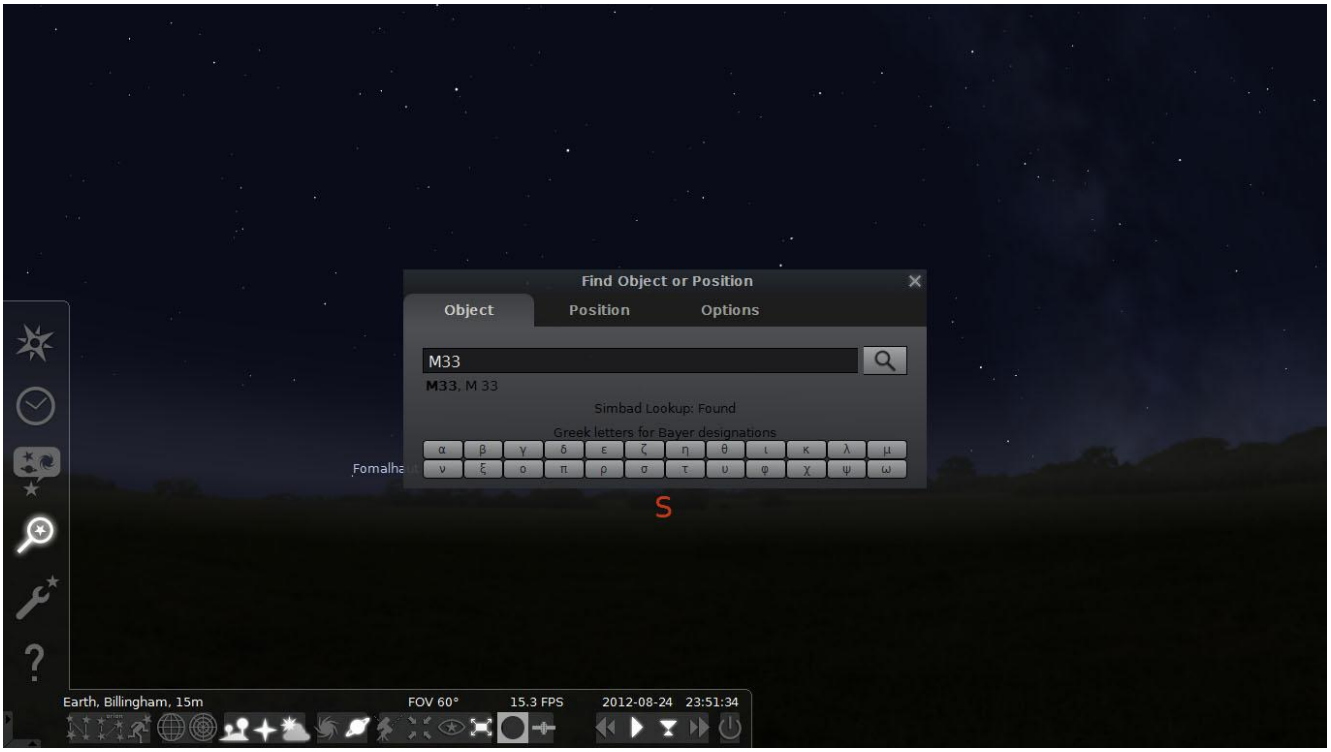
Stellarium: A Star amongst Planetarium Software *by Andy Fleming*

Many people with 3G mobile phones and portable media devices such as Apple’s iPod have been amazed at the quality of applications, especially those relating to astronomy and navigating your way around the night sky. Most of my colleagues who are not amateur astronomers have hours of fun with these planetarium ‘apps’ for their devices.

However, the software for computers pre-dates that for mobile devices by many years and it is much more substantial, effective and interesting. The astronomy planetarium software genre for use by the general public dates back to the early 1990s with the release of ground-breaking programs such as Redshift. Excellent though such early software was, the

applications available were limited by the technology of the era, and pale into insignificance by the plethora and quality of the substantial applications available today.

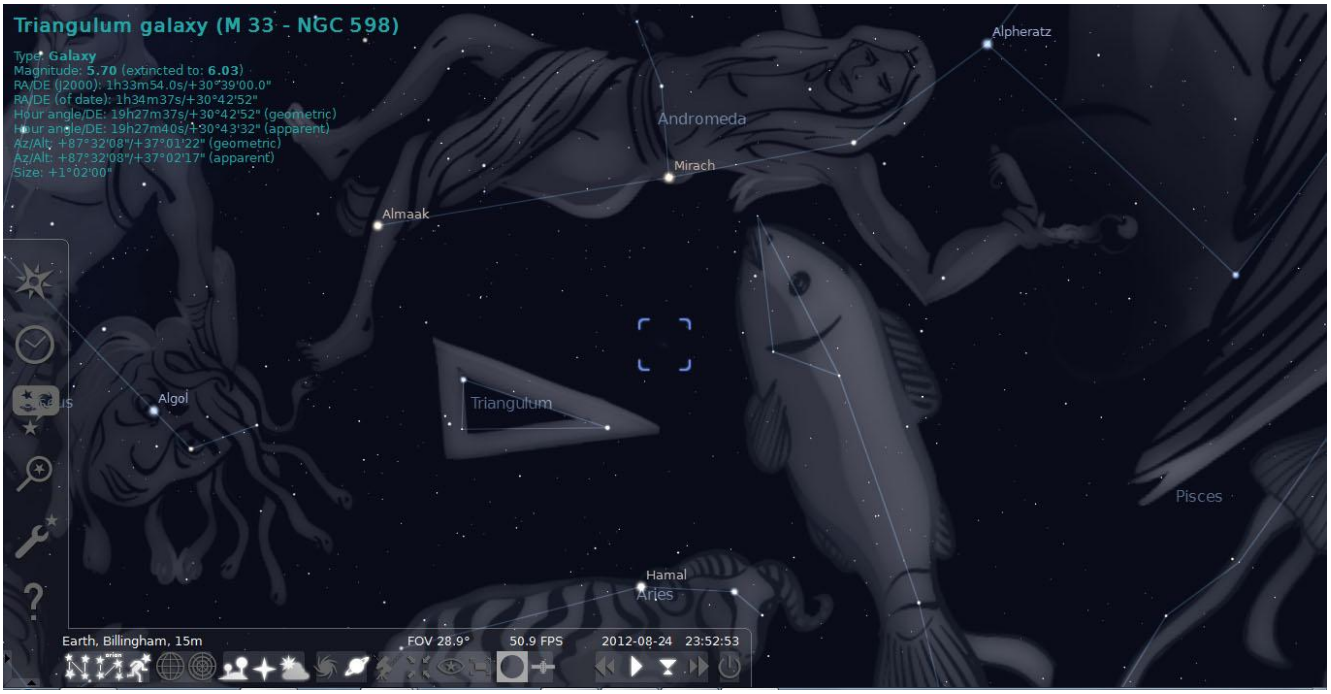


Stellarium's astronomical object search facility.

When it comes to planetarium software for both the PC and the Apple Mac there's a huge choice of capable programmes on offer including Imaginova's Starry Night in all its various incarnations, United Soft Media's Redshift, Sky X, SkyMap and Cartes du Ciel (Star Charts). The bad news is that although these products come complete with bells and whistles and are used by amateur and professional astronomers alike, they're not free, and in their various editions can cost anything from £30 up to £200. In addition these heavyweights have unnecessarily high hardware requirements. Starry Night in its professional editions requires at least 2GB of RAM and a fast dual core processor. It also claims a massive slice of valuable hard drive space real estate.

As usual, the internet comes up trumps yet again with a highly capable free alternative, Stellarium. It is used in professional planetariums worldwide and is GPL desktop software which renders realistic skies in real time with openGL graphics software. The software allows you to see what you can observe with the naked eyes, binoculars or a small telescope.

Downloading Stellarium from its website at stellarium.org is a breeze. The program is available for all main formats i.e. Windows PC, Mac, Ubuntu or Linux. At just 57MB for the Windows version, the program, unlike much commercial 'bloatware' downloads in thirty seconds on a broadband connection, and the easy installation will be complete on even the slowest machines within a few minutes.

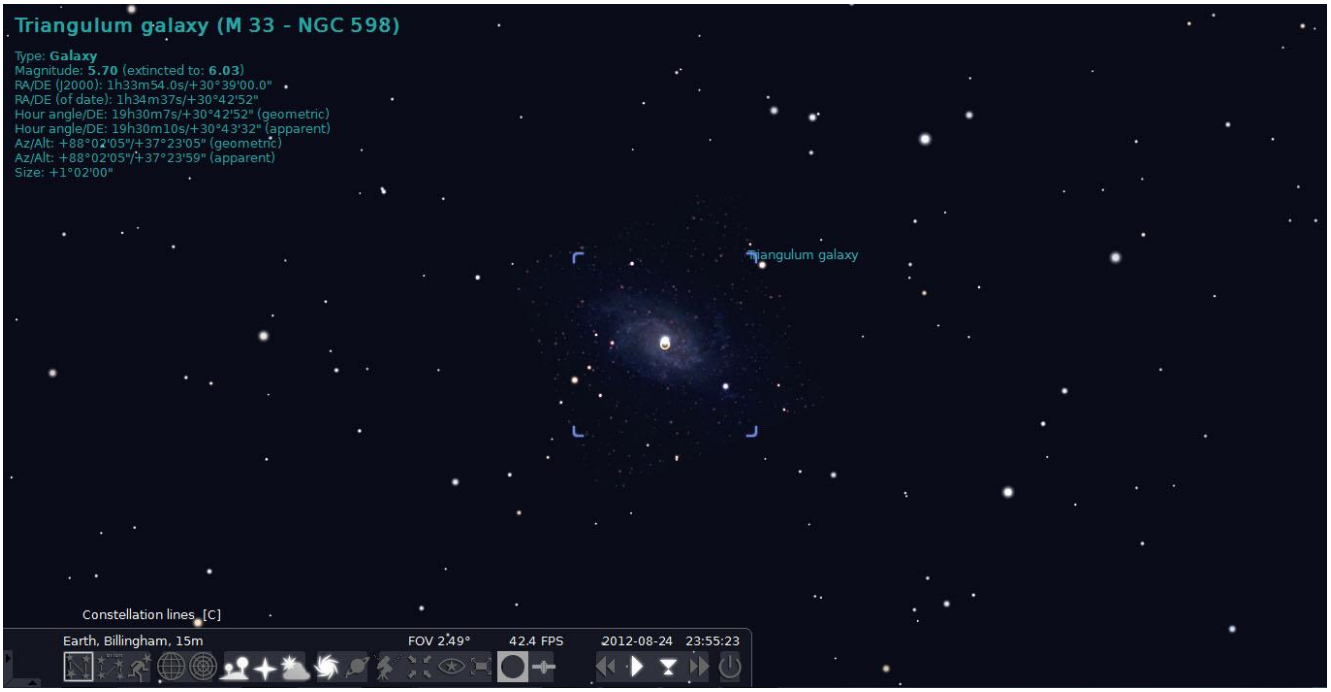


Stellarium displays the astronomical target, in this case M33 in its real time position against the background stars.

The program executes in seconds and you're initially greeted by the opening location scene. At this point it is probably advisable to click the location icon and enter the name of your town or city or grid reference. Remember that this is real time software, and to hide daylight simply toggle the atmosphere icon. And without any more ado, your cosmic voyage begins. Just open the search box and type in M33 (the available predictive text will help), for example. Initially Stellarium will show you a naked eye view and will show you exactly where in the night sky outside the object will be. To put place it in its proper position within the constellations you can toggle constellation art, labels and boundaries. If the object is below the horizon and is not available from your viewing location Stellarium includes a toggle icon to remove the ground and horizon.

Once found it's just a simple task of going out into your backyard and using the accurate depiction of M33 in the night sky in Stellarium to find it in the identical-looking real thing above your head (light pollution permitting) with your telescope. Of course, you will have already seen M33 at much more close quarters; Stellarium allows you to zoom in on an object either by the backslash key on your keyboard or via your mouse. Many of the beautiful images of nebulae, galaxies and planets originate from NASA and further downloads are available after the initial program installation; these include more stars and more and fainter deep sky objects.

Zooming in on the target, maximum magnification regarding M33 reveals this truly beautiful spiral galaxy, not visible from my home even with my 200mm Newtonian reflector due to the Triangulum Galaxy's low surface brightness, and of course Teesside's truly appalling light pollution.



Zooming in on the target. High magnification regarding M33 reveals this truly beautiful view: . Unfortunately this object is not visible from my home location due to light pollution.

The present version of the program is 0.11.3, and its capability if it was commercial software would be amazing enough; it's incredible when you remember its freeware. It possesses a default catalogue of over 600,000 stars, extra downloadable catalogues with more than 210 million stars; asterisms and illustrations of the constellations; constellations for twelve different cultures; images of nebulae (full Messier catalogue); realistic Milky Way; very realistic atmosphere, sunrise and sunset and the planets and their satellites

Its user interface include a powerful zoom, time control, multilingual capability, fisheye projection for planetarium domes, spherical mirror projection for your own low-cost dome, an all new graphical interface and extensive keyboard control and telescope control by which Stellarium and your computer will give a suitably adapted computer 'go to' capability.

In terms of visualisation, Stellarium offers equatorial and azimuth grids, star twinkling, shooting stars, eclipse simulation, skinnable landscapes, and now possesses spherical panorama projection. The program can be customised with a plug-in system adding artificial satellites in real time, ocular simulation, telescope configuration and the ability to add new solar system objects from online resources. You can add your own deep sky objects, landscapes, constellation images and scripts.

I really can't recommend this freeware enough. It is up there with commercial packages such as Starry Night, but has the added bonus of being tightly coded, small and unlike such paid-for packages it can be considered in no way 'bloatware' and has been produced in the best programming traditions. It is constantly updated by a group of academics, professional astronomers and the European Southern Observatory, and access to the internet allows for a database of astronomical objects to keep even the professional astronomer busy for years. And free really does mean free, both Stellarium's website and the program itself are devoid of any adware, unwanted toolbars or any other internet nasties..

In summation then, a fantastic package that anyone with even a passing interest in the night sky should download straight away. The only criticism I can possibly level at the software is

that it is so detailed, so visually real that using it to explore the night sky may prevent you from venturing into your back garden with all the light pollution, freezing temperatures in winter, cloudy skies and dew on your telescope's mirrors and eyepieces.

System Requirements: Pentium III 800Mhz; Apple Mac 667MHz; Linux/Unix; Windows NT/2000/XP/Vista/7; MacOS X 10.3.x or greater; 3D graphics card which supports OpenGL; 256 MB RAM, (1GB or more required for the largest star catalogues).

Overall Verdict: ***** (out of 5)

Pros: Free, comprehensive, capable, better than much commercial software, tightly coded with limited hard disk space required.

Cons: So good, it may prevent you from observing the real night sky!

Seeing Double *with John McCue*

John McCue, who, as well as being CaDAS's founder, is the BAA's Double-star Advisor has started a practical observing project with which you may be able to help.. I'll quote (edited) what he said in an email to Transit:

"I'm attaching the latest project, which is to try to encourage double star observing by having a catalogue of gems. I've taken them from the showpiece list in the Cambridge Double Star Atlas, choosing the ones visible from UK, and funnily enough it leaves me with 101. It reminds me of the Messier and Caldwell caalogues and I hope they'll have the same effect, ticking them off.

Any sketches, descriptions, measurements, even images would be interesting. They could be included in Transit."

They could indeed – we'd be glad to build any such input into an article or articles -- or if you don't want to publish them for some reason, I'm sure John would welcome your output too.

A spreadsheet of John's double star gems is provided as a file attachment to the e-mail containing this copy of Transit.

THE TRANSIT QUIZ

Answers to the summer's quiz

1. The Plough, the Christmas Tree cluster, the Square of Pegasus and the Teapot are examples of what? **Asterisms (a recognisable pattern of stars, not necessarily in the same constellation. For instance, Alpheratz in the Square of Pegasus is actually α Andromedae.)**

2. Perseus, Norma, 3-KPC, Outer, Crux–Scutum – some of the names given to what? **Spiral arms in our Galaxy.**

3. What did NASA's Interstellar Boundary Explorer (IBEX) recently find out about the 'bow shock' where the heliosphere meets the interstellar medium? **It doesn't exist! The speed – about 84,000 km/hr – at which the solar particles move through the interstellar medium turns out not to be fast enough to create a shock wave.**

4. The European Space Agency's next large science mission, due for launch in 2011, is JUICE. What does the acronym stand for? **JUpiter ICy moons Explorer. It will arrive at Jupiter in 2030 and spend several years studying the Galilean satellites.**

5. 'Vega is within half a degree of Birmingham.' What?! **Vega and Birmingham are two craters on the Moon, which subtends half a degree of arc on the sky.**

6. Historically speaking, what's the claim to fame of Kirch's Comet (1680)? **It was the first comet to be discovered telescopically.**

7. What's the connection between these three activities: the Milky Way Project, Planet Hunters and Solar Stormwatch? **They're all 'citizen science' projects where members of the public review images or other data from space telescopes (Spitzer, Kepler and STEREO respectively) to recognise and classify certain types of object (infrared bubbles in the interstellar medium, transiting exoplanets, and 'anything odd' in solar images, respectively). I could have included Galaxy Zoo and Moon Zoo, but that would have been *too* easy!**

8. Which familiar constellation has α and β stars called Shedir and Chaph? **Cassiopeia.**

9. Which first-magnitude star is nearest to the celestial equator? **Procyon (α Canis Minoris), at +05° 13' 30".**

10. Where is this object and what is it? **This is a hole on Mars. Quoting from Astronomy Photo of the Day: *The hole was discovered by chance on images of the dusty slopes of Mars' Pavonis Mons volcano taken by the HiRISE instrument aboard the robotic Mars Reconnaissance Orbiter currently circling Mars. The hole appears to be an opening to an underground cavern, partly illuminated on the image [from the] right. Analysis of this and follow-up images revealed the opening to be about 35 meters across, while the interior shadow angle indicates that the underlying cavern is roughly 20 meters deep. Why there is a circular crater surrounding this hole remains a topic of speculation, as is the full extent of the underlying cavern. Holes such as this are of particular interest because their interior caves are relatively protected from the harsh surface of Mars, making them relatively good candidates to contain Martian life. These pits are therefore prime targets for possible future spacecraft, robots, and even human interplanetary explorers.***

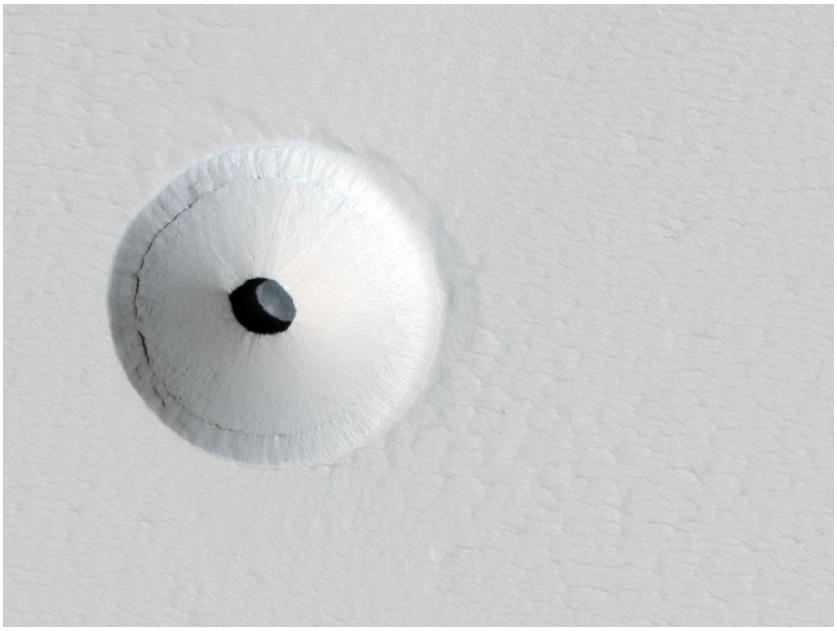


Image credit: NASA, JPL, U. Arizona

September's quiz

1. Name the Martian crater where NASA's latest Mars rover, the Mars Science Laboratory 'Curiosity' successfully landed on August 6, 2012.

2. Where in our solar system would you find a large impact crater called Caloris Basin, also known as Caloris Planitia?

3. In which constellation would you find M57, the Ring Planetary Nebula?

4. Name the European Space Agency's unmanned spacecraft that flew past and studied Halley's Comet in 1986.

5. Name the unit of distance astronomers use that is defined as the average distance between the Sun and the Earth.

6. What is the name of the brightest star in the northern constellation Canes Venatici? It is infact a double star system located approximately 110 light years from the Earth.

7. He was the lead Soviet rocket engineer and spacecraft designer in the Space Race during the 1950s and 1960s and was the anonymous and secret opposite number of NASA's Wernher von Braun. A Member of the Soviet Academy of Sciences, overseeing the early successes of the Sputnik and Vostok projects, his R7 rocket derivatives are still used to this day. What was he called?

8. Name of the NASA spacecraft launched in June 2001 with the aim of providing a detailed all-sky survey of the differences in temperature of the relic radiation of the Big Bang, the Cosmic Microwave Background Radiation (CMBR).

9. What is the name and Messier number of this beautiful Deep Sky Object?

Image credit: NASA

10. Who was the first British Astronomer Royal, who catalogued over 3,000 stars? The catalogue bears his name and he was also honoured with a lunar crater and asteroid named after him.