

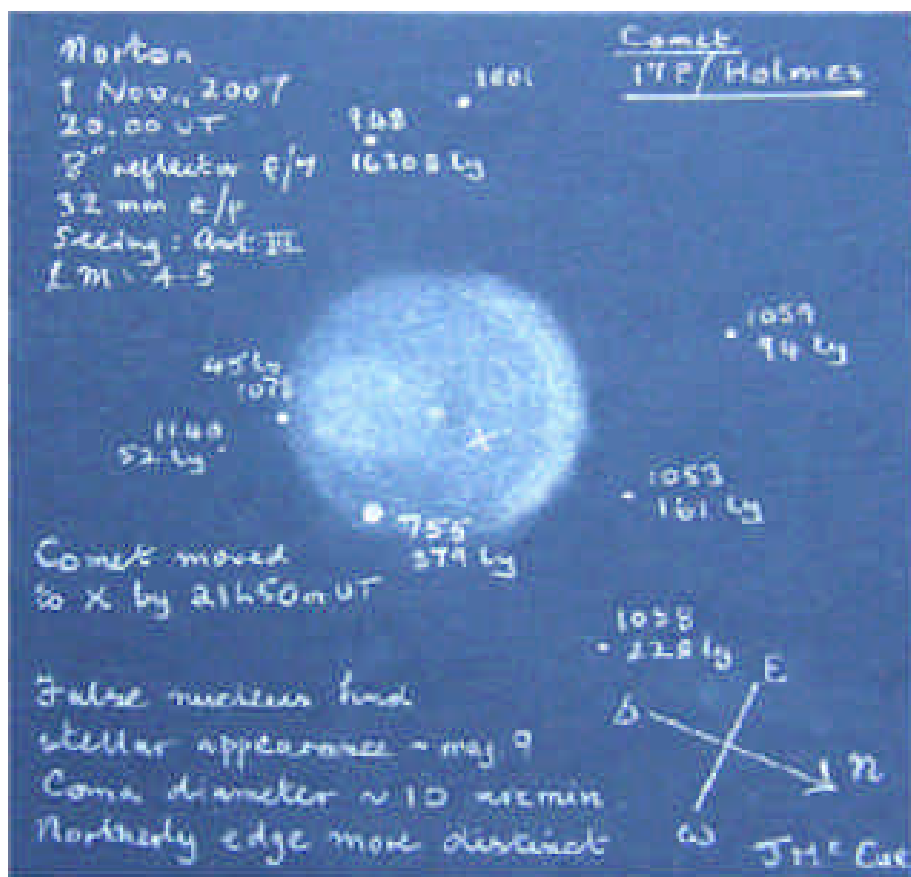


TRANSIT

The Newsletter of



05 December 2007



Doing it the old fashioned way – Comet 17/P Holmes – Dr John McCue

Editorial

Last meeting : 09, November, 2007. "Extrasolar Planets and Extraterrestrial Life" by Prof. Christine Done of Durham University

Next meeting : 14 December 2007. "Ancient Astronomy and Modern Science" by Prof. Richard Stephenson of Durham University

Don't forget : 11 January 2008. Members' Night – Volunteers needed! Let Neil know as soon as possible to grab a slot

Editorial Comment : Aliens, aliens, aliens! Everyone has recently been asking us about aliens. Adults ask as if one might have appeared on the BBC news and they missed it. When children who visit our Planetarium ask this question it's a whole new ball game. We always ask back – "Well, what do you think?" Children appear to have both the curiosity to want to know everything and also a vivid imagination to think outside the circle.

This was highlighted today when I handed out a Solar System Passport to 31 Year 5 pupils. This is a recently devised document that pupils carry with them as we take them along the WWP Solar Walk, a scaled-down walk through the Solar System, where we tell them about each planet as we come to its location relative to its scaled distance from the Sun. A printed placard on a post is filled with information about the planet and we pin a scaled down planet on the post, with the Sun being a small plastic football, the Earth a small painted pearl and all other planets represented by suitable sized realistically painted pearls - (I raided my wife's jewellery box).

The children take all this information in their stride, they duly note answers to questions in the Passport, with each page dedicated to a planet and they also ask their own incredibly intelligent questions as we progress towards Neptune. And this where the hair raises on the back of my neck, on the last page we have asked them to sketch their idea of what an alien looks like.

As mentioned, today was the first time we have used the Passport. We also say they can take them home after their visit. That's a shame! Because today I had 31 totally different drawings of the aliens they dreamed up. They were fantastic! I must admit I had focused their minds on Europa and the proposed space mission to penetrate the ice into the presumed waters beneath, so most aliens had an aquatic theme. Such creatures they had drawn and presumably straight from their imagination, I had never seen anything like them before (except for Damien's drawing where the beast had quite a big waist, a pair of glasses and a small beard!)

Aren't kids wonderful and aren't we lucky to be able to tap into their imagination?

I am going to request their teacher to have them make some more drawings in the classroom and then send them to the Planetarium for everyone to see.

Sometimes when we ask adults to imagine aliens it can be quite boring. We end up with stereotyped Roswell bods and even Daleks! TV is definitely the destroyer of adult imagination. Try drawing your own alien and see if you can think outside the circle (and then ask your kids to do the same). *Editor.*

Letters to the Editor :

Dear Editor,

Dr. David Weldrake, of the Max Planck Institute for Astronomy in Germany, and an Honorary Life Member of CaDAS, recently led an international team which discovered a transiting "hot Jupiter" exoplanet, orbiting the 17th magnitude star Lupus-TR-3.

The star is slightly smaller than the Sun, and its planet, imaginatively named Lupus-TR-3b, is remarkably similar in size and density to Jupiter - yet it orbits the star in only 3.91 days, at a distance of only 0.046 AU, or 12% of the distance of Mercury from the Sun.

Dave comes from Coulby Newham, and was a member of CaDAS during his student days. He studied for his Ph.D. at Mt. Stromlo Observatory in Australia - he was there when the observatory was destroyed by a bush fire in 2003 - and is now based at the Max Planck Institute. He was the second member of our society to enter a career in professional astronomy, and was elected an Honorary Life Member in recognition of his achievement.

Neil Haggath

Dear All,

Can anyone please advise on how to strip and successfully(!) re-assemble a Canon FD 400mm f/2.8L lens, or who could lend me (a copy of) the factory repair manual?

Marc Dubbledam (DAS)

Dear Editor,

An article in the November *Transit* considers the meaning of the word “amateur”, which is often incorrectly used with derogatory connotations.

While the word is primarily used today – such as in sport - to mean someone who is not paid for what they do, the word actually comes from the Latin for “to love”. Its true meaning is one who does something for the love of it – and nowhere is that meaning more appropriate than in the field of amateur astronomy.

Today, we have amateur astronomers who carry out research programmes which could be regarded as “professional” in every sense, except for that of not being paid. Indeed, there are many who supply data and observations which are invaluable to the real professionals, i.e. the university researchers.

Historically, the true meaning of “amateur” was epitomised by the group of men whom Allan Chapman calls the “Grand Amateurs” of Victorian astronomy. These were wealthy British and Irish individuals – some, such as the Third Earl of Rosse, were born into wealthy families; others, such as William Lassell and James Nasmyth, made their own fortunes in business – who devoted their spare time and considerable amounts of money to their hobby. Both the size and quality of their telescopes, and the quality of their work, were more than a match for the professionals of the era.

Professional astronomy at that time was concerned mainly with cataloguing and astrometry; it was these “Grand Amateurs” who carried out original research and made new discoveries. Lord Rosse, whose telescope was the biggest in the world in his day, discovered the spiral structure of galaxies. Norman Lockyer discovered the element helium in the Sun, before it was known to exist on Earth. Others included Sir William Huggins, the pioneer of stellar spectroscopy, and Rev. William Rutter Dawes, of “Dawes Limit” fame.

With just a handful of exceptions – Sir George Airy being the most obvious – it was these “Grand Amateurs”, rather than the paid professionals, who were the “big names” of astronomy in that era.

Neil Haggath

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Christmas in the Dome

from Ray Worthy

It was Christmas in the planetarium.....

No it was not quite that. Actually, it was a couple of days before the schools broke up for their Christmas holidays and I had been asked to do my stuff in a special school somewhere on Tees Side in the north of England. This was just about the last of my school visits with the inflatable dome before I allowed the insurance to lapse and then devote my time to the manufacture of the domes for use by others.

My programme was that I was engaged to do two shows in the morning but only one in the afternoon. This would give me an hour and a half to do the last show and I was surprised that the staff had allowed that much time for one class, but when I queried this, they said that I would understand when I saw the class.

Although the school was designated as " Special", this did not mean necessarily that the children were not teachable. Many of the pupils had some physical disability which prohibited them from being in the education mainstream . The morning sessions went very well indeed and the pupils appreciated the presentations and showed their interest.

The morning's sessions inside the dome prevented me from seeing round the school. I could not move around and see the general picture but at lunch time I was taken on a tour of the establishment by a friendly member of the staff.

The building was specially adapted to help the movement of the handicapped around the school. There were no steps anywhere and if the pupils had to negotiate going up or down to another level, then there were shallow gradient slopes provided.

Even so, having seen all this background and obtained some general appreciation of the place, when at last I was invited to go into the classroom of the pupils for the last session of the day, I was totally unprepared for the experience. In the "Special " school, this class was a degree more "Special" than the others.

Each of the pupils was, in some way dependent upon some form of apparatus ranging from wheelchairs to other specially designed constructions. I do not wish to go into the details, which might be described as harrowing, but I want to mention two boys.

One boy, let's call him Simon, had a deformity which prevented him from walking properly. His left leg was bent around in a semi-circle and as he walked his torso had to move in an orbit of it's own. Simon used a special walking stick as an aid.

The point I wish to make is that Simon busied himself in helping those other pupils who were less mobile than he was. The star of the show was a thin boy, let's call him Tommy. Tommy lived in a frame like a newly planted tree. This frame was a metal cylinder which reached up to his hips. It held him upright with his legs and hips well and truly clamped. This frame was fixed upright on a wooden board and underneath this board were attached four castors which allowed Tommy to be moved around. Above this frame, Tommy bent his upper body and waved his arms, and laughed and shouted with all the rest. When Tommy wanted to move from A to B, it was Simon who pulled the rope on Tommy's board.

I now appreciated why this class had been allocated extra time.

The problem was how to get them into the inflated dome. The teacher, a young lady (I considered her to be some species of saint) was worried. She had never seen an inflatable dome before that very morning and could anticipate all sorts of difficulties facing her charges in this special situation. I told her that we would take it slowly and gently and I would give it my best shot.

The children were excited as all young children are at the thought of going into the planetarium and we made our way slowly along the corridors to the hall, each by his or her special means of perambulation and bringing up in the rear were Tommy with Simon doing his self imposed duty.

When they finally reached the dome and appreciated exactly what it was, I could see that, although they were all fascinated, each child had a certain reservation based upon the particular disability that he or she had.

I had to tread very carefully to dispel any worries. The children were shown how the fan worked and that the dome was like a balloon, except that it was sitting on the floor, so that it was more like a hovercraft. In case you do not already know let me explain that my domes do not have a tunnel and entrance is made through a zip door. The fan pressure can be varied and the pressure is turned up high when someone is entering or leaving by the door, but is turned low down when the door is closed and the show is in progress. I mention this because I could see that only a few of this class would gain entrance through the zip door.

First though, I would have to show the class that the dome was not solid and that the walls were flexible. I selected one boy called James who, although disabled, could roll on the floor. I opened the door to show him that the inside was illuminated and that there was a young lady helper already inside the dome. We could all hear that there was music playing inside as well. Then I asked James to lie down on the floor alongside the wall of the dome. I followed this up by asking him to imagine that he was lying on a bed and that he was going to pull a blanket over himself. I said to him " Roll over and pull the blanket

over your body and you will find yourself inside the dome". James did so and yelled with excitement when he found himself inside. " Now roll back through ", I told him. When he reappeared, the class cheered.

So far so good. Now to allay the fears of the wheelchair users. I explained to the class what I was about to do. " I am going inside and cross to the part opposite the door. Then, I am going to reach underneath the fabric with one hand and pull it down. At the same moment, with my other hand, I am going to push the fabric away from me."

This I did and in two seconds the whole dome had shot over in an arc over my head and landed on the floor in a crescent shaped bundle. This is always spectacular when seen for the first time. Once again they all cheered, but the point was made, they knew that they need not be worried about being trapped inside.

When I first began using this design of dome, the local fire brigade people were worried about the same problem of escape in an emergency and I had to give them a demonstration, to substantiate my claim. The top brass from the regional brigade were all assembled and they had brought along three video recorders on tripods to record the event. When I was prepared I shouted from inside , " Are you ready?". They shouted back " Yes."

I performed the trick which took exactly two seconds. The fire people with all their gold braid, were astonished. The speed was entirely unsuspected, so much so, that they had not even switched on the recorders.

So, back to this special class. The dome took about five minutes to inflate again and we were ready for the wheelchair demonstration. I showed them the "No door" technique. I and the teacher took a wheel each and had arranged for the assistant inside to be ready to receive the chair as it came through. We moved the back of the chair to the fabric wall and shouted " One Two Three!" And at the count of "Three", we had lifted the fabric, pushed the chair in and replaced the fabric on the floor, all in a couple of seconds. The air in the dome seems slow to react, as though it does not realise it can escape and by the time it has got it's act together, the fabric is back down on the floor.

This was a great game and slowly but surely all of the class was assembled inside talking to the young assistant, all that was except Tommy with his faithful friend Simon. I gave Tommy the option of going in like a wheelchair, or being lifted out of his frame and rolling in like James had done. He chose the wheelchair option, so after a " One, two , three," Simon and I had worked the magic and Tommy was inside the dome looking around with wonder in his eyes.

After all that the actual programme might have been described as an anti climax but they were all so excited at overcoming the obstacle that nothing could dampen their enthusiastic responses. It was a marvellous show.

Getting out was a cinch, so easy with my two second method. Of course this was an amazing experience especially when seen from the inside. One second you are inside the dome and the next second you are in the school hall. They cheered so loudly, the Head came running to see what the fuss was about .

The progress back to the classroom can only be described as triumphant, with the kids shouting and singing . The teacher's eyes were brimming over. She said that she had never seen the class so excited and motivated. Just before they assembled for their going home buses and taxis, I could see that the teacher had arranged a vote of thanks. Tommy called over to me and beckoned me to come closer. When I got there, he asked everyone to be quiet.

Tommy became quite formal as he delivered his prepared speech. When this was done and the class had once again lifted the roof off with their noise Tommy leaned over as close to my ear as he could and he grabbed my shirt to pull me closer. He said in a confidential manner.

" This year, I am going to have a REALLY SMASHING CHRISTMAS".

My visit to the Royal Observatory, Greenwich (ROG)

From Pat Duggan

I don't know what I was expecting of this visit. I thought it would be an old building with a few exhibits under 1-2 hundred years of dust? After all, the question of Longitude had been settled in Georgian times so I hadn't thought much had gone on there since? I was very wrong. It took a walk from the tube station, through a sort of 'builder's heaven' of new and still-being-built luxury flats to a beautiful park and there, perched attractively on the top of a hill I had never noticed before, was the Greenwich Royal Observatory. It looked bright and colourful in red brick trimmed with white edges and it had a clock outside in the wall. It was a huge clockface and had been the first to show Greenwich Mean Time to the general public.

The air was filled with the chatter of school parties and the whizzing of Japanese cameras. The view was splendid, stately buildings edged The Thames below with only green grass spanning the gap. This was what it was all about, or so I learned when I was entering the courtyard. The weird black ball, balanced on a vicious looking vertical spike which topped off the ROG building, was intended to be seen clearly against the bright sky from the river. Ships would move off on their long journeys passing this point at one o'clock and set their chronometers exactly to that time, when the huge black ball would drop down to the base of its

spike, a sort of visual clock chime. It had fallen off completely once, apparently, and looked a bit dented by the experience.

Moving inside from the cobbled courtyard the rooms occupied by past Astronomers Royal seemed a bit bare and basic. Obviously they managed to sit still for hours at these desks and to do complex mathematical calculations, think imaginatively and read up on European astronomical papers for long periods in the cold. The pay was apparently just as bad as the conditions too. However the octagonal observation room had a grand outlook - in the days before Light Pollution. It was panelled and contained some remarkable clocks. It was built on the order of Charles II, to be an observatory for "*the finding out of the longitude of places by perfecting navigation by astronomy*".

The next gallery I went into was set with 'hands-on' devices which I had a go at when the children let me. Most were explaining the basic Solar System and how it was mapped as an extension of Earth's Lat and Long. The most striking thing about this room was a picture gallery showing shipwrecks. Beneath them were lists of crew members who were lost. I found similar names to those in my own family tree and in that way the importance of Longitude was brought home to me personally.

At the end of the exhibition room was the most enormous Quadrant. It was made of brass and minutely engraved. I was aghast at the eyesight that must have been needed to read it accurately – and in the semi-dark! There was a side room containing all the clocks and devices that were submitted in the search for an accurate device to record Longitude. John Harrison, born in Yorkshire, was eventually awarded most of the £20,000 prize but it was almost at the end of his life, he died at the age of 83.

Two telescopes were separately housed and their dates and uses recorded as important to the setting of Greenwich as the zero line for 72% of the world's navigation charts, a factor that also decided the acceptance of Greenwich as hour zero for world time zones.

The Peter Harrison Planetarium was a high-light of the visit too, a state-of-the-art building with a high steel cone roof. Inside it was designed as one would expect after an extremely large financial grant. The show, "Star Life" was brilliant and stunning. It was introduced by one of the observatory astronomers who was there to answer questions and point out the emergency exits. The reason for the latter became obvious as it started – I found myself reaching for a safety belt! It was a top-notch recorded film played out in an almost terrifying reality across the dome above your head with 'surround sound' for the sudden emphasis of explosions etc – the audience loved it!

The Meridian building in the courtyard was next. All the explanations were there and of course children were putting one foot in each of the eastern and western halves of the globe across what is now, necessarily, a steel-clad line. It is slightly flood-lit at night. The top of the building opens, I had not realised that from inside,

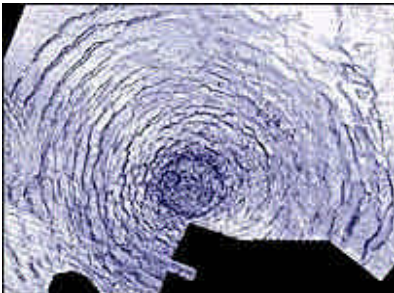
and star positions lined up exactly on that meridian for the calculation of Greenwich Mean Time for the world.

All in all I thought it was a thoroughly good place to visit when in London. The trip back to Waterloo was on the "Driver- Free" Docklands Light Railway, which also was new to me and an experience in itself. It takes you below the Thames and past canal boats docked in quiet side quays and then through the impressive and new Canary Wharf complex, but as an overhead, off the ground railway so that you can look down and feel rather strange, especially with the Star Life film still ringing in your ears.

UK impact crater debate heats up

By Jonathan Fildes

A deep scar under the North Sea thought to be the UK's only impact crater is no such thing, claims a leading geologist. Professor John Underhill, from the University of Edinburgh, says the Silverpit structure, as it is known, has a far more mundane explanation.



Seismic surveys show a trough surrounded by concentric fractures

Detailed surveys reveal nine similar vast chasms in the area, he says.

This suggests it was part of a more widespread process, probably the movement of salt rocks at depth, not a one-off meteorite impact, he believes.

"I feel like I'm spoiling a party," said Professor Underhill. "It's a less glamorous explanation, but that's what the scientific data is saying."

Professor Underhill first put forward his theory in 2004. New evidence, he says, now backs it up.

However, the group that discovered the structure in 2002 stands by its original theory of a cataclysmic asteroid or comet impact about 60-65 million years ago.

"I can't understand why John keeps banging away at an alternative model," said team member Dr Simon Stewart, a geologist with BP.

"The crater interpretation of Silverpit still stands, in my opinion."

Regional view

The 3km-wide (1.8 miles) wide bowl was discovered in 2002 by Dr Stewart and his colleague Phil Allen, of geoscience firm PGL, about 130km (80 miles) east of the Yorkshire coast.

The structure, which comprises concentric, closely-spaced rings, is punched through a band of chalk. Today, it is covered by shales and sandstones almost one kilometre deep.

It can only be seen on seismic data, collected by petroleum companies hunting for new oil and gas fields.

Two studies by Dr Stewart and Mr Allen, the latest of which mapped the structure in 3D, concluded that it was the result of a space impact. But Professor Underhill has never been convinced.



"I just felt that there was a bit more to the story than met the eye," he told BBC News.

To establish whether the feature was unique, he examined a 3,750-sq-km-area around the structure.

"I decided to throw a more regional view at it, and ended up finding a whole load of these features with very similar cross sections," he said.

He says he has identified at least nine major bowl-shaped depressions, known as synclines, and over 15 subsidiary structures including Silverpit itself. More have also been identified elsewhere, he claims.

Salt push

He says that the swarm of structures is the result of movement of a thick layer of salt of Upper Permian (248-256 million years ago) age that lies below the whole area.

The salt is highly mobile and flows between areas of high and low pressure.

In some regions, huge blisters of salt force the overlying rocks up into domes, known as anticlines; elsewhere the salt flows entirely away and the overlying layers buckle and subside.

This is what caused the crater-like Silverpit structure, argues Professor Underhill.

"The key observation is that every single syncline is exactly coincident with where the salt has thinned or withdrawn," he said.

"There is an absolute one-to-one correlation between these two levels."

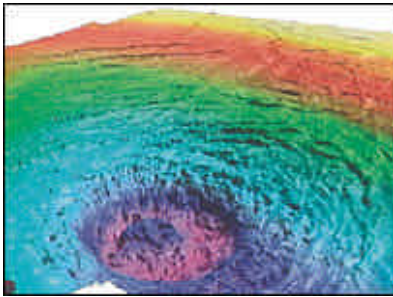
Professor Underhill also points out that there have been no tsunami deposits of the right age found flanking the North Sea.

If a space object did crash into the shallow basin, the argument goes, it would have caused great waves to dash the coastlines of surrounding countries.

"There is a lack of any independent evidence for a meteorite impact for the time that they say in the place that they advocate," said Professor Underhill.

Missing links

Dr Stewart is un-moved. He points to a 300m-high central peak, or nipple, in the centre of the inner bowl, typical of impact craters. In addition, he argues the seismic surveys show areas of undeformed rock underlying the crater.



The Silverpit structure has been mapped in 3D

In addition, he argues the seismic surveys show areas of undeformed rock underlying the crater. He explained it was like finding a hole in the roof of your house at the same time as you were digging in the basement.

"With only this information, one might conclude your roof collapsed because of subsidence into the hole you made in the basement," he says.

"But if you then point out that the first floor is intact, undeformed, we would conclude the roof hole was unrelated to the basement hole and indeed was most likely to be caused by something dropping through it."

Professor Underhill is unconcerned by this argument. He says that different rocks are mechanically stronger than others and will react in different ways when the salt withdraws.

Conclusive proof

The debate has drawn in other researchers from the geological community.

Impact expert Dr Gareth Collins from Imperial College London has also examined the evidence and says the circular structure is geometrically similar to other craters, particularly those found on other planets.



Similarities exist with impact structures on Jovian ice moons

"On balance an impact origin is the simplest and most likely explanation," he says. "But to qualify that - it has absolutely not been proven to have an impact origin."

To unequivocally show Silverpit is a crater, he says, geologists would have to drill through its centre and look for evidence of minerals, such as shocked quartz, catastrophically altered by the crushing forces of the impact.

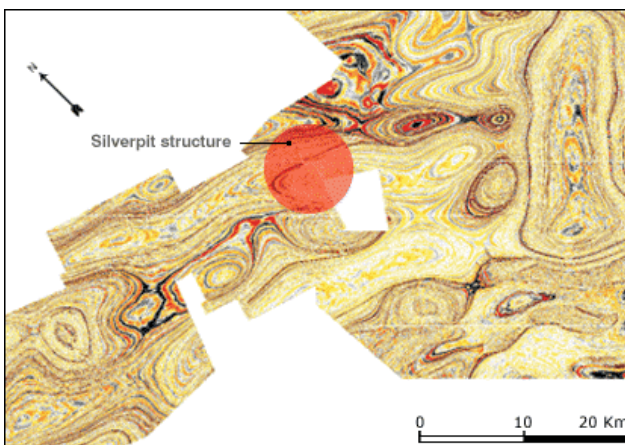
"The rocks and minerals affected by the impact would have been changed in a way which is absolutely diagnostic of high pressures that happen over a very short period of time," he said.

Other geologists with experience of the North Sea say that the large number of similar structures found by Professor Underhill strongly favours salt withdrawal.

"Given the abundance of these features and their distribution, it looks more like a salt withdrawal phenomenon than an impact, unfortunately," said Professor John Gluyas, of Durham University and co-founder of North Sea oil firm Fairfield Energy.

"On balance, I think John has it at the moment; but I think I'd like to see more evidence before I side with one camp."

The new work will be presented at the annual American Association of Petroleum Geologists meeting in Long Beach, California, in early April.



Peeling away the complex geology around Silverpit reveals a series of basins thought to have been created by salt withdrawal

(Seismic data courtesy of PGS, WesternGeco, British Gas and Shell)

UK Plan to Track Asteroid Threat

UK space scientists and engineers have designed a mission to investigate a potentially hazardous asteroid.

The 300m-wide (984ft) rock, known as Apophis, will fly past Earth in April 2029 at a distance that is closer than many communications satellites.

Astrium, based in Stevenage, Herts, wants a probe to track the asteroid so its orbit can be better understood.

The concept will compete for a \$50,000 (£25,000) Planetary Society prize, but a full mission would cost millions.

The British design calls for a small, remote-sensing spacecraft, dubbed Apex, which could rendezvous with Apophis in January 2014.

It would spend three years tracking the rock, sending data back to Earth about the object's size, spin, composition and temperature.

From this information, orbit modelling would enable a more accurate prediction of the risk of any future collision.

Early warning

Astrium says that if its concept won the prize, it would donate the money to charity.

"The real prize for us would be if the European or US space agencies thought there was merit in our proposal and asked us to carry the feasibility study forward," said Dr Mike Healy, the company's space science director.

A full mission would be expected to cost several hundred million dollars to develop and launch.

Apophis caused some consternation in 2004 when initial observations suggested it might hit Earth in 2029.

Further study by ground-based telescopes indicated there was virtually no chance of this happening, and the expectation is that the object will whiz past the Earth at a close but comfortable distance of just under 36,000km (22,370 miles).

Talk of a possible strike on the next visit in 2036 has also been dampened by astronomers who have kept a careful watch over the rock's progress through space.

Nonetheless, Apophis is considered a good target on which to practise Earth-protection measures.

Were such an object to hit the Earth, it could cause devastation on a country scale, leading possibly to the deaths of many millions of people.

Scientists say, however, that given sufficient warning, a potential impactor could be deflected out of Earth's path.

Some have suggested such a rock might be nudged on to a safe trajectory by hitting it with a small mass. Others have proposed flying a spacecraft next to the object, to use gravity to tug the asteroid clear of the planet.

Political support

The issue of asteroid or comet strikes is a topical one as researchers continue to gather more information about their frequency during Earth history.

At least one of the planet's mass extinction events - which included the demise of the dinosaurs 65 million years ago - has been attributed to the impact of a large space object.

Liberal Democrat MP Lembit Opik has campaigned for the research area to be given more funding. His grandfather, renowned Estonian astronomer Ernst Opik, did much to raise science's understanding of Earth-crossing comets and asteroids.

The politician told the BBC News website: "The question isn't whether Earth is hit by an asteroid - it is when.

"Good luck to Astrium; they are showing that if we have the political will, we certainly have the technical know-how to do something about threatening objects."

The US-based Planetary Society has organised its competition in co-operation with the European Space Agency (Esa), the US space agency (Nasa), the Association of Space Explorers (ASE), the American Institute of Aeronautics and Astronautics (AIAA), and the Universities Space Research Association (USRA).

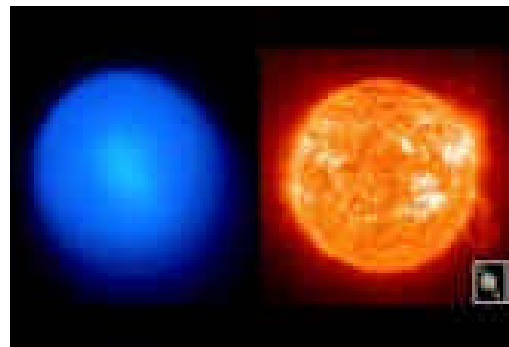
The winning entry will be submitted to space agencies to see if they want to carry the ideas through.

Incredible Comet Bigger than the Sun

By Robert Roy Britt

A comet that has delighted backyard astronomers in recent weeks after an unexpected eruption has now grown larger than the sun.

The sun remains by far the most massive object in the solar system, with an extended influence of particles that reaches all the planets. But the comparatively tiny Comet Holmes has released so much gas and dust that its extended atmosphere, or coma, is larger than the diameter of the sun. The comparison is clear in a new image.

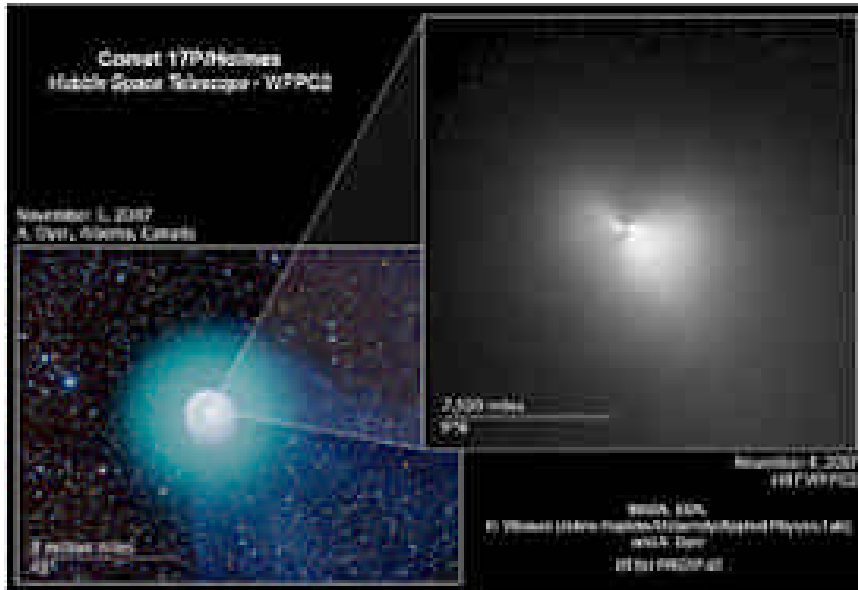


Above - Comet on left with Sun and Earth for size comparison

"It continues to expand and is now the largest single object in the solar system," according to astronomers at the University of Hawaii.

The coma's diameter on Nov. 9 was 869,900 miles (1.4 million kilometers), based on measurements by Rachel Stevenson, Jan Kleyna and Pedro Lacerda of the University of Hawaii Institute for Astronomy. They used observations from the Canada-France-Hawaii Telescope. The sun's diameter, stated differently by various sources and usually rounded to the nearest 100, is about 864,900 miles (1.392 million kilometers).

A new Hubble Space Telescope photo of the comet reveals an intriguing bow-tie structure around its nucleus.



Above -The comet's coma—mostly microscopic particles—shines by reflecting sunlight.

Holmes is still visible to the naked eye as a fuzzy star anytime after dark, high in the northeast sky. You can find it by using the above sky map. It is faintly visible from cities, and from dark country locations is truly remarkable.

Over the next few weeks and months, the coma and tail are expected to expand even more while the comet will fade as the dust disperses,

A small telescope will reveal the fuzzy coma. Lacking a long tail characteristic of some great comets, however, Holmes is not the most dramatic object in the sky for casual observers.

Mystery outburst

Nobody knows why Holmes erupted, but it underwent a similar explosive brightening in 1892. The recent display, which began Oct. 24, brought the comet from visual obscurity to being one of the brighter objects in the night sky. It has since dimmed somewhat as the material races outward from the nucleus at roughly 1,100 mph (0.5 km/sec).

The Hawaiian astronomy team writes in a press statement: "This amazing eruption of the comet is produced by dust ejected from a tiny solid nucleus made of ice and rock, only 3.6 kilometers (roughly 2.2 miles) in diameter."

The new image from the Hawaiian observatory also shows a modest tail forming to one side, now just a fuzzy region to the lower-right. That's caused by the pressure of sunlight pushing on the gas and dust of the coma.

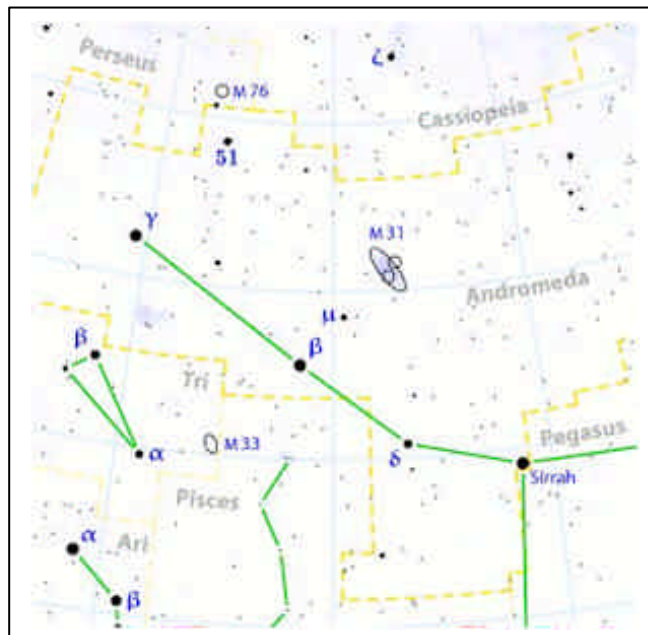
But the comet is so far away—149 million miles (240 million kilometers), or about 1.6 times the distance from Earth to the sun—that even Hubble can't resolve its nucleus.

The offset nature of the coma, seen in ground-based images, suggests "a large fragment broke off and subsequently disintegrated into tiny dust particles.

The Beauty of the Princess

Andromeda reveals her secrets

From Andy Fleming



Okay, so I'll admit it. I share the typical mammalian trait of laziness, including when it comes to observing the night sky. I also exhibit a modicum of tightness when it comes to spending money on equipment in our damp and cloudy climate. So I'll use the excuse straight away of two eyes being better than one, and say that my enjoyment of the night sky comes primarily from a pair of 10 x 50 Super Zenith binoculars that I purchased for a fiver at a local car boot sale.

These binoculars have, over the past year allowed access to some stunning celestial sights, often when the use of a telescope would have been impractical, such as when I've been out walking the dogs, or during those all-too-brief clear spells. They are also nicely portable for a quick to get away from the worst of the Teesside light pollution.

One of my favourite constellations is Andromeda, possibly because it is in an interesting part of the sky, being flanked celestially by the constellations of Cassiopeia, Pegasus, and Perseus. Perhaps it's because Princess Andromeda

was involved in one of the most famous of all the Greek legends. Or perhaps it's because within the constellation is the spectacular great spiral galaxy M32, the other giant spiral galaxy along with the Milky Way in our local cluster, and is the most visible galactic deep sky object seen from the UK.

Greek legend has it that Perseus, killer of the Gorgon, Medusa, had a glance that could turn anyone to stone. He also possessed an unfair advantage, as the gods had provided him with a pair of winged sandals and a shield that he could use to locate Medusa (thus looking only at her reflection, and not the Gorgon herself). After neatly slaying Medusa, Perseus was returning home when he saw the beautiful Princess Andromeda, inexplicably tied to a post on the seashore.

It turned out that Andromeda's mother, Queen Cassiopeia, had fallen foul of the sea god Poseidon, and as a punishment, Cetus, a monster had been sent to ravage the country. King Cepheus, after consulting an Oracle was told that the only way to placate Neptune was to sacrifice his daughter to the monster. However, a timely appearance was made by Perseus who turned the beast to stone and then married Andromeda.

All the major players in this fairly unique happy-ending were thus cast into the sky by the Greeks, and all can be seen around Andromeda. Even the sea monster, Cetus, is on view, although he was relegated to the status of a harmless whale!

[A Life under the Stars 4](#)

[A night at the Planetarium](#)

from David Blenkinsop

Its Friday evening so I set up my telescope outside the Planetarium. My friends are here, John Fadian, Mike Gregory, Colin and Rob Peeling. Rob and John have set up their telescopes. We get some members of the public too.

I point the telescope at Albireo. The public hang back. I say have a look. I say can you see the colours – some say “white”, some say “wow!”, I say to Colin “we got a wow!”. Then someone grabs my finder (*ouch*), Colin says how about M13, so swing to it. I explain what it is and how far away it is - do I have to explain light years again. We get another “wow!”

We then turn to the Ring Nebula and let the public look at it and someone grabs my finder again (*ouch, ouch*). The Moon is in the sky and try to avoid it. I say to Colin, how about the Blue Snowball, so we find it and then tell the public what a planetary nebula is. I have to go for a galaxy and point the telescope at M81 and M82. We all have a look and, yes, someone again grabs my finder.

John comes to borrow my stepladder to show some people the Owl Cluster. I point the telescope to the Double Cluster. When people see it we hear yet another “wow”.

Colin says we should look at M31, so we do. Do I say how far away it is - yes. I say the light we see tonight left the galaxy when Australopithecus was walking about in Africa. I turn the telescope to eta Cassiopeia then ask if they can see the colours, saying the bright one is a sun-like star and the companion is a red dwarf. I hope that everyone knows what a red dwarf is.

Next is gamma Andromeda, I ask do you see the colours? Mars is high by now, so we have a look, I fiddle with the eyepiece, that’s the best I can get it.

I have to do the Moon now. We start with the 40mm eyepiece. We get another “wow!”. I change eyepieces so that the public can see just what a 10” telescope can do. Some people tell me that was good but the Moon looked better at with the low power. Some shake my hand, yes, the public have gone home now feeling the cold.

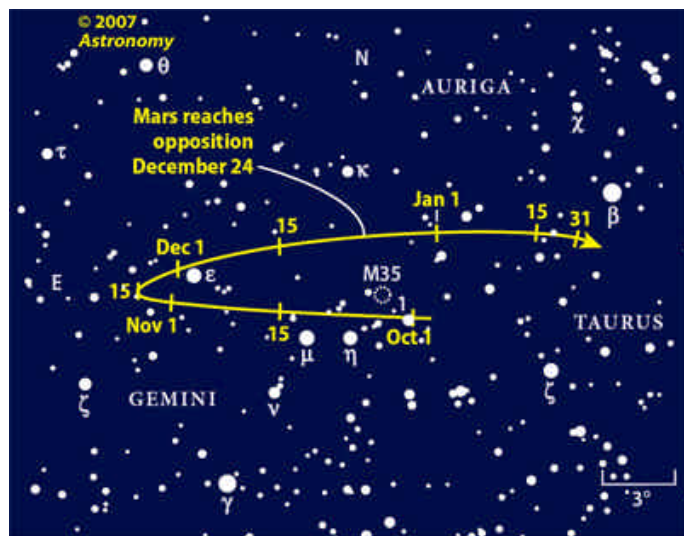
Rob comes over to us and says “come and have a look at this”. Colin and me say “whats this, a planetary or a red star we have not seen before”. John, Colin, Mike, Rob and me get in some more deep sky viewing.

Cosmic Illusion: Mars to Move Backward

We're now coming into the home stretch of the last good apparition of Mars until 2016. Now blazing in the late-evening east-northeast sky like an eye-catching yellowish-orange "star," Mars is less than six weeks away from its closest approach to Earth during this apparition.

At the beginning of 2007, the red planet was 221 million miles (356 million kilometers) from Earth. This month, it will be 63 million miles (102 million kilometers) away and it now shines some 10 times brighter than it did on New Year's Day.

Since 01 Jan 2007 Mars has progressed more than halfway around our sky and now is on an easterly course through the background stars of the Zodiac.



It currently resides smack in the middle of the constellation of Gemini, the Twins.



But on Thursday, Nov. 15, that steady eastward course came to a stop.

Actually, for the past few weeks, Mars has appeared to slow in its eastward trajectory as seen from Earth. It seems to waver, as if it had become uncertain. Finally, on Nov. 15, it paused and came to a halt.

Then, for about the next 11 weeks, the "wandering star," as ancients called it, will reverse its course in the heavens and move backward against the star background – toward the West.

Then, on Jan. 30, 2008, it will pause again, before resuming its normal eastward direction.

All the planets exhibit this "retrograde motion" at one time or another. But for the longest time, the ancient astronomers were unable to come up with a satisfactory explanation for it. For one thing, while behaving in this strange manner, Mars will also appear to deviate somewhat from its normal course; the retrograde motion will appear to bring it a little above its regular orbital track. In other words, for those of us watching from Earth, Mars will appear to travel in a loop.

Yet, the Greeks staunchly believed that the sun, moon and planets all moved around the Earth in perfect circles. They had a great difficulty in representing and calculating this mysterious loop and for a long time they had no adequate explanation for it.

The Greeks finally explained away this anomaly by assuming that the planets moved around the Earth in smaller "epicycles" – that is, a small circle whose center moves along its main orbital circle around Earth, resulting in complex, almost coil-like curves. Unfortunately, the actual observations of the planets never seemed to fit this strange orbital mechanism, ultimately making the Greeks explanation quite useless.

The truth emerges

It was not until the year 1543 when the great Polish astronomer Nicolaus Copernicus (1473-1543) had his lifelong work "De revolutionibus" published, that the secret of the odd retrograde loops were finally revealed. By demoting the Earth from its hallowed position at the center of the solar system and replacing it with the Sun, he was able to triumphantly explain the riddle of the apparent "backwards motion effect" of the planets.

In fact, it's the same effect obtained when passing another car on a highway: Both cars are going in the same direction, but one is moving more slowly. As

they pass, the slower car will appear to be moving backward in relation to the faster one.

Copernicus simply applied the same effect to the planets. In the present situation, both Earth and Mars are moving in the same direction around the Sun, but the slower one, Mars, appears to move backwards compared to the faster one, Earth.

Just an illusion

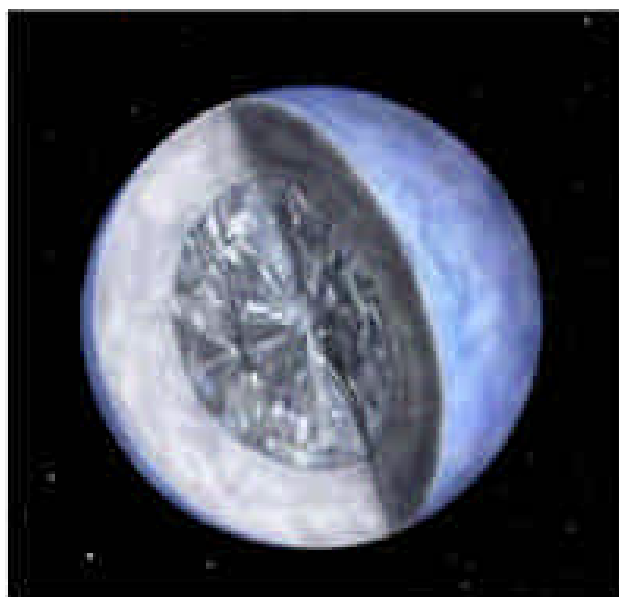
The retrograde motion of Mars – like the apparent motion of the slower car on the highway – is nothing more than an illusion. The last two times Mars underwent retrograde motion (in 2003 and 2005), I received numerous inquiries asking if the sun, as seen from Mars, would also appear to stop and move backwards across the sky.

The answer is most definitely "no."

The apparent backward motion will manifest itself after Mars arrives at its first stationary point on Nov. 15. Mars will then begin to loop back toward the west. Earth will overtake Mars on Christmas Eve. Finally, on Jan. 30, 2008, the combined movements of Earth and Mars will cancel-out the apparent backward motion, with Mars reaching a second stationary point. From then on, Mars will loop back to the east, resuming its normal eastward path among the stars.

A Diamond Bigger than Earth Discovered in Centaurus

from Casey Kazan



Like an episode out of the *Hitchhiker's Guide to the Galaxy*, The Harvard-Smithsonian Center for Astrophysics has announced the discovery of a mass of crystallized carbon formerly known as star BPM 37093, now known as the biggest diamond in the galaxy, fifty light years away from Earth in the constellation Centaurus.

The star, named "Lucy" after the Beatles song, "Lucy in the Sky with Diamonds," is estimated to be 2,500 miles across and weighs approximately 10 billion-trillion-trillion-carats – a one, followed by 34 zeros. Travis Metcalfe, an astronomer from the Harvard-Smithsonian Center for Astrophysics and leader of the team who discovered the gem, says "You would need a jeweler's loupe the size of the sun to grade this diamond. Bill Gates and Donald Trump together couldn't begin to afford it."

The diamond is actually the crystallized interior of a white dwarf – or the hot core of a star that is left over after the star uses up its nuclear fuel and dies. It is made mostly of carbon and is coated by a thin layer of hydrogen and helium gases.

Five billion years from now, our sun will die and become a white dwarf. Approximately two billion years after that, its ember core will crystallize as well, leaving a giant diamond in the center of our solar system. A paper announcing this discovery has been submitted to *The Astrophysical Journal Letters* for publication. The Harvard-Smithsonian Center for Astrophysics is a joint collaboration between the Smithsonian Astrophysical Observatory and the Harvard College Observatory. Scientists within the organization are classified into six research divisions where they study the origin, evolution and ultimate fate of the universe.

Careful where you point that big thing of yours

The ultimate speeding ticket

Two British traffic patrol officers from North Berwick were involved in an unusual incident, whilst checking for speeding motorists on the A-1 Great North Road. One of the officers, used a hand-held radar device to check the speed of a vehicle approaching over the crest of a hill, and was surprised when the speed was recorded at over 300mph.

The machine then stopped working and the officers were not able to reset it. The radar had in fact latched on to a NATO Tornado fighter jet over the North Sea, which was engaged in a low-flying exercise over the Border district.

Back at police headquarters the Chief Constable fired off a stiff complaint to the RAF Liaison office. The reply came back in true laconic RAF style. "Thank you for your message, which allows us to complete the file on this incident.

You may be interested to know that the tactical computer in the Tornado had automatically locked on to your 'hostile radar equipment' and sent a jamming signal back to it. Furthermore, the Air-to-ground missiles aboard this fully-armed aircraft had also locked on to the target. Fortunately, the Dutch pilot flying the Tornado responded to the missile status alert intelligently, and was able to override the automatic protection system before a missile was launched!

Phoenix due for arrival on Mars next year.



Left : The Phoenix lander, due on the roads of Mars in May 2008

Since the launch of the Mars Phoenix Lander is just around the corner, I thought I'd give you a quick explainer on the mission.

Meet NASA's Mars Phoenix Lander. Scheduled for launch on August 3rd, this mission will blast off from Cape Canaveral atop a Delta II rocket. It'll take almost 10 months to reach Mars, entering the atmosphere in May, 2008.

The spacecraft is equipped with a pulsed thrust system to slow its descent through the atmosphere. Its landing system is pared down to the bare essentials to maximize the amount of scientific equipment it can land with. It doesn't have an airbag system like the rovers, and instead will use parachutes and thrusters to land gently on the surface on its three landing legs.

Unlike the Mars rovers currently crawling around the surface of the Red Planet, Mars Phoenix Lander will be stationary. Once it touches down in the Martian polar regions, it'll live out the rest of its days searching from that position.

Its purpose is to determine if life ever arose on the surface of Mars, or even there's life there today. Although the surface of Mars is cold, dry, scoured by wind and dust, and blasted by radiation from the Sun and space, just underneath the topsoil, there could water ice and even life, protected from the harsh elements.

The Phoenix Lander will use its 2.3 metre (7.7 feet) folding arm to dig down into the Martian soil around its landing site. NASA's Mars Odyssey spacecraft revealed that there are large deposits of water ice just a few centimetres beneath

the surface of Mars. The Phoenix Lander should be able to break through into this crust, and see if there's anything alive down there.

The robotic arm will lift the soil samples up onto the main spacecraft deck so that a suite of scientific instruments can examine it for evidence of life. One will heat the samples, and measure the kinds of gases given off. Another will analyze the chemistry of the soil itself.

In addition to its search for evidence of past and present life, Mars Phoenix Lander will serve as a Martian weather station, following changes in the polar regions to help scientists predict weather patterns on the Red Planet

Darran Summerfield's magnificent half-marathon

Sponsored by a number of the Cleveland and Darlington Astronomical Society members, Darran successfully finished his very first half marathon and in a very respectable time. Well done to Darran on finishing the run and for his magnificent £600 for Cancer Research. Editor

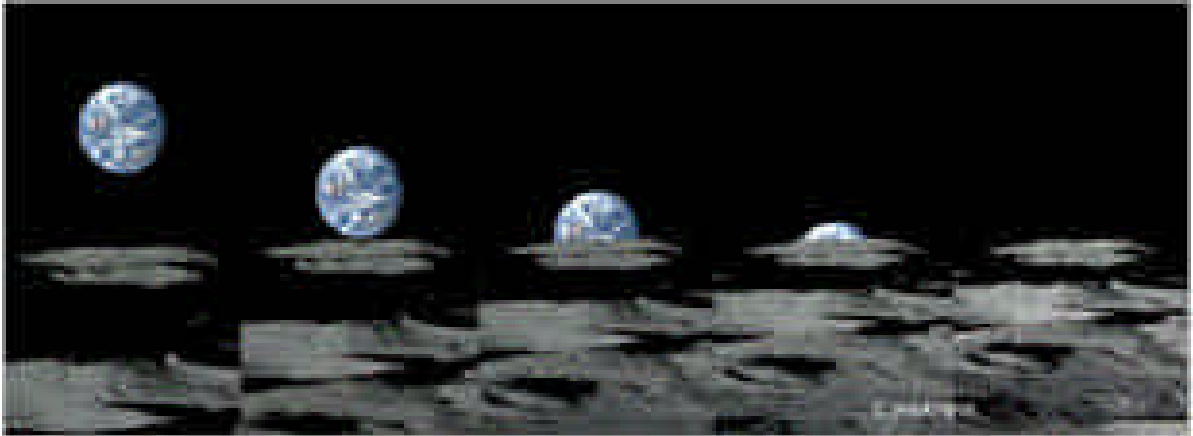
I did complete the Great North Run (my first half marathon) without walking, in 2h 17m which was spot on. All told I managed to raise about £600 for Cancer research UK. The last 3 miles were awful... Darran

Look at that smile, it tells you everything!



Earthrise, Earthset

The Japanese Kaguya Moon probe just took a stunning set of images of the Earth over the limb of the Moon. Drink this in:



But take a good look at the images. See how dark the Moon looks? That's real: the Moon is, on average, about 1/2 to 1/4 as reflective as the Earth is, so the Earth looks bright while the Moon looks dark. For an even more striking example of this, check out the lunar dust on Buzz Aldrin's knees in the famous Man on the Moon picture. The surface looks bright, but the dust is charcoal gray.

Transit Tailpieces

Many thanks to Moonfish :

CaDAS wish to offer their many thanks to Ray Stapleton and Danny at Moonfish for providing the two recent raffles prizes. The first prize was a 15mm Plossl eyepiece won last month by lucky-as-always Pat Duggan. The second prize is a corker 1.25" binoviewer (they are so popular Moonfish have completely sold out). This prize will be raffled at the next CaDAS meeting 14 Dec 2007.

For Sale : Tal reflector 2M 150mm with motorised equatorial mount, 1200mm focal length, misc eyepieces and filters, with wooden boxes for telescope and motor. Offers. Contact Wynyard Planetarium 01740 630544 or e-mail b2mullen@hotmail.com (seller has lots of astro bits and pieces including Mamiya and Vivitar 35mm SLR film cameras).

Articles : Please send contributions for the newsletter to Bob Mullen,

18 Chandlers Ridge, Nunthorpe, Middlesbrough, TS7 0JL, 01642 324939 (b2mullen@hotmail.com) Copy deadline date is the 20th of each month.

2007 Geminid Meteor Shower : Activity is expected to peak around Dec 14d 11h UT - during UK daylight. The maximum is broad, however, and observations on the Thursday night to Friday morning of Dec 13-14 should be productive even ahead of peak, especially late on in the night when the radiant (just north of Castor) is high in the sky - see table below. The evening of Dec 14-15 is also likely to be graced with high Geminid activity, with the added bonus of an increased proportional abundance of bright events (from the BAA Journal).

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