



# NEWSLETTER

December 2014 - February 2015 Issue 169



*30 second exposure showing the Mount Wilson Observatory*

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# Editorial

**John Richards**

Well, here we are, the last newsletter of 2012. A time for reflection? Well, we've had some brilliant talks during the year, upgraded the facilities at the observatory at Dyffryn, which the committee recommends you visit, and our outreach sessions are going 'great guns'. A big thanks to all members of the committee for their sterling work during 2014.

And what does 2015 have in store? Well, next year promises to offer more excitement than you can shake a 'celestron at'. More great talks, continued outreach, and of course our 40<sup>th</sup> anniversary. In space, the NASA New Horizons probe will give us the first close up view of the (minor) planet Pluto and Cassini, Hubble, Rosetta and other probes will continue to expand our knowledge of the solar system and the Universe. We live in exciting times. Wishing you a fabulous Christmas break (assuming of course you have one), and hope you have all the astronomical gifts you desire from Santa.

Wishing you dark skies - John

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## Contact Details

Have you changed your email address or other contact details recently? If so, you could be missing out on receiving important society information. Please keep us up to date with any changes. Send your revised details to either our Membership Secretary ([membership.secretary@cardiff-astronomical-society.co.uk](mailto:membership.secretary@cardiff-astronomical-society.co.uk)) or Secretary ([secretary@cardiff-astronomical-society.co.uk](mailto:secretary@cardiff-astronomical-society.co.uk)).

## Publication Dates

The CAS newsletter is published at the first society meeting of September, December, March & June. The deadline for submissions is 4 weeks before the publication date, & is the 7<sup>th</sup> February for issue 170.

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## Visit CAS on the web @



<http://www.cardiff-astronomical-society.co.uk>

General enquiries email [info@cardiff-astronomical-society.co.uk](mailto:info@cardiff-astronomical-society.co.uk)

As a CAS member you can use the Members' Area of the web site. You will need your password to access this area. If you don't know your password it is your surname followed by your membership number.

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# Behind the scenes

## Dave Powell

The Telescope Workshop we ran in the National Museum of Wales in October proved a big success. We had over 2,800 visitors on the day. To begin with it rained but then the Sun shone and Bob Sutton brought along his super solar telescope, and boy was it popular. We had lots of interest and answered as many questions as we could regarding the type of scopes available. We gained new members, sold merchandise, and generally had a good rewarding day.

After several years at the helm I regret to inform that Roger Butler has resigned as chairman of the society.

Saturday October 18th we were again at Brecon Mountain Centre for an evening of stargazing. The weather played a part. It rained. The wind howled, the mountaintops were invisible, and the team were in danger of being washed away. Someone (no names no pack drills), went outside at regular intervals and looked up to the sky in the vain hope of seeing a star, any star, really. One person even rushed in and told me he saw one but I put this down to youthful excitement and ignored him. So we turned to Plan B; yes I know you thought we didn't have a Plan B, and to be honest neither did I, until Theresa informed me we did. So Plan B; two talks; with a bowl of soup and a roll in-between. The talks were entertaining, the soup was Leek and Potato, the rolls were hard but we got around that by putting them out in the rain for several minutes. Our merchandise stall was busy all evening. We were given a tour of their new observatory that I best describe as bijoux and compact, but inside has equipment to die for. All in all a good evening.

October's star party went well. Granted we were troubled by high cloud from time to time, and at one point we had to close the observatory because of a rain shower, but we did manage to view the following deep sky objects: Double cluster, M 29,39,45 open clusters, M 31,81 Galaxies 15,56 Globular, and M 57 Planetary Nebula. In addition we saw the planet Neptune. The new telescope

is working and tracking well. It was also pleasing to have some new members attending.

I can only apologise to everyone for the non-arrival of your new super fancy membership cards. Its fair to say we have had problems with them, but Mark is doing his best. I am told we have a bug in the system and my suggestion we hit each card with a lump hammer before sending them out apparently does not work. Mark is also trying hard to get our new website up and running and I was hoping to announce here that it was complete. But to add to his problems he has been unwell so understandably we are behind schedule. I can only ask for your continued patience.

Next year,2015 is our 40th anniversary year, so the problems could not have come at a worse time. I remain hopeful that this time next year, we can look back on something truly memorable. We have plans but every member can help by spreading the word that CAS remains a progressive, friendly society open to all.

Our dedicated committee are doing there best, but as we grow we need more volunteers for our outside events. If you can help, please do so, we really do appreciate it.

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## **A message from the Secretary**

After a year of turmoil we are now beginning to settle down again.

Personnel changes inevitably cause disruption and I am very grateful to the people who stepped up to the plate at short notice to steady the ship. At last the new membership cards are being sent out and the new website is almost ready to go live.

2015 is our 40th year, and who would have thought it? I am really proud of what we have collectively achieved. It has not been a one man band. I have relied on many people to turn us into one of the most dynamic and active societies in the U.K. We will have a special anniversary dinner in September when I hope many of you

attend. Other events are in the pipeline and I hope there will be something for everyone. Please remember to pay your subscription, and I hope SANTA brings you that special telescope you have always wanted. In the meantime, remember the society telescope based at Dyffryn Gardens awaits your visit.

Now I should be telling you all about the BBC Stargazing Live event for 2015, but the BBC, in their wisdom, has yet to decide on a date, or even a month. It was always held in January. Our best guess is it will be sometime in March but as of now we are completely in the dark. Watch out for the announcement.

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## FREE Astronomy Magazine



Our friends at Astro Publishing have provided us a free link to their latest **Free** astronomy magazine. It's 48 pages of 'electronic goodness', and this bi-monthly edition contains **MANY** fascinating articles. The link for the magazine is shown below:

[http://www.astropublishing.com/FreeAstronomyMagazine\\_NovDec2014/index.html#42](http://www.astropublishing.com/FreeAstronomyMagazine_NovDec2014/index.html#42)

**ENJOY!!**

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**FOR SALE: Meade LXD75 10" Schmidt-Newtonian reflector (tube only).** BRAND NEW with all accessories.

It comes with a matching BC&F dew shield and I may be swayed to sell my Meade QX 30mm 2" eyepiece and 2" Orion SkyGlow filter - again, all are as new with all packaging.

Also, a pair of Revelation 25 by 100 astronomy binoculars, once again in new condition, complete with aluminum case and accessories.

If you're interested in purchasing any of these items, please contact [j.a.wierszylowski@googlemail.com](mailto:j.a.wierszylowski@googlemail.com)

# Night Sky December 2014 to March 2015

## Robert Lang

December starts this episode of the night sky presentation with a number of the more well-known constellations now appearing above the eastern horizon. At dusk Ophiuchus and Serpens Cauda are setting in the west; above Ophiuchus the constellation of Hercules is making its way to the North West where it will set at the end of the month. In the south west, preceding Ophiuchus is Aquila the Eagle with the bright star Altair. Above Altair is placed Cygnus the Swan with its bright star Deneb. Placed between these two constellations is Sagitta the arrow and Vulpecula the fox, two small dim constellations, and been buried in the milky way they are easily missed. Sandwiched between Cygnus and Hercules is Vega, one of the brightest stars in the north sky; located in the constellation of the Lyre. Meandering its way down through the two 'bird' constellations, southward, and if the sky is not too severely light polluted, you should see the faint fuzzy glow of millions of stars that make up our Milky way galaxy.

Following this glowing aura of Milky Way light through Cygnus, up towards the North, this glimmering stream winds its way through Lacerta, Cassiopeia, Perseus, Auriga, and then Gemini, now just risen in the North East. High in the north the well-known circumpolar constellations of Cassiopeia and Cepheus are easily located. Either side of these two are the fainter constellations of Draco and Camelopardalis, Draco to the West side of Cepheus and Camelopardalis on the East side of Cassiopeia. Northwards again and we arrive at Ursa Major, The Great Bear, of which part of this constellation marking out the well-known asterism of the Plough is pointing the way to the Polaris the pole star in the constellation of the Ursa Minor, The little Bear.

Low down in the south west, part of Eridanus, the river a long winding constellation is just seen above a clear horizon, the well-known constellation of Orion is just above the river to its eastern side. Following the river, and below Orion is the constellation of

Lepus. Preceding Eridanus in order, are the water constellations of Cetus, Pisces, Aquarius, and Capricorn the sea goat which is now setting on the south western horizon. Above Capricorn and to the east side of Aquila are the faint constellations of Delphinus and Equuleus.

Placed on the south meridian is the constellation of the winged horse Pegasus and above Andromeda, following Pegasus are the zodiacal constellations of Pisces the fish, Aries the Ram, Taurus the Bull and Gemini the twins. Above Taurus we arrive back at the constellations of Perseus and Auriga.

Over the following three months (Dec-March.) six hours of sidereal time will pass. Now, at twilight, Cygnus will be setting high in the North east; the square of Pegasus will have all but set and Cetus will be low on the south west horizon. Orion will be due south, been followed by his two hunting dogs Canis Major containing the bright star Sirius and Canis Minor located by its bright star Procyon. The two hunting dogs been separated by the constellation of Monoceros the unicorn. Above the dogs is placed the constellation of Gemini with the two conspicuous stars Castor and Pollux. To the Eastern side of Orion trailing its light through Orion's club, Monoceros and Canis Major the Milky Way sinks below the south horizon.

The constellations heralding the approach of spring will now be rising that's Virgo, Leo, and Cancer. Virgo will be overhead at midnight. The circumpolar asterism of the plough will now be in the East still pointing the way to the North Star. The hour angle (RA) between the tail of Leo and the head of Virgo is 12:00:00 and will be due south on the meridian on the 21st of March.

### **In Brief.**

Jan 2<sup>nd</sup>. Aldebaran 1.4°S of Moon. Pluto in conjunction with the Sun.

Jan 3<sup>rd</sup> Quadrantids Meteor Shower.

Jan 4<sup>th</sup> Earth at Perihelion: 0.98328 AU. & FULL MOON.

Jan 8<sup>th</sup> Jupiter 5.1°N of Moon. Regulus 4.1°N of Moon.

Jan 9<sup>th</sup> Moon at Apogee: 405411 km.

Jan 10<sup>th</sup> Mercury 0.6° of Venus.  
Jan 11<sup>th</sup> Vesta in conjunction with the Sun.  
Jan 12<sup>th</sup> Moon at Ascending Node.  
Jan 13<sup>th</sup> Spica 3.1°S of Moon & LAST QUARTER MOON.  
Jan 14<sup>th</sup> Mercury at Greatest Elong: 18.9°E.  
Jan 16<sup>th</sup> Saturn 1.9°S of Moon.  
Jan 19<sup>th</sup> Mars 0.2 deg south of Neptune.  
Jan 20<sup>th</sup> NEW MOON.  
Jan 21<sup>st</sup> Moon at Perigee: 359643 km. Mercury at Perihelion. & Venus 3.6°S of Moon.  
Jan 22<sup>nd</sup> Mars 3.9°S of Moon.  
Jan 25<sup>th</sup> Moon at Descending Node.  
Jan 26<sup>th</sup> FIRST QUARTER MOON.  
Jan 29<sup>th</sup> Aldebaran 1.2°S of Moon.

Feb 3<sup>rd</sup> FULL MOON.  
Feb 4<sup>th</sup> Jupiter 5.2°N of Moon.  
Feb 5<sup>th</sup> Regulus 4.0°N of Moon.  
Feb 6<sup>th</sup> Moon at Apogee: 406155 km  
Feb 11<sup>th</sup> LAST QUARTER MOON & Mercury stationary.  
Feb 13<sup>th</sup> Saturn 2.1°S of Moon.  
Feb 16<sup>th</sup> Mercury 3.5°S of Moon.  
Feb 19<sup>th</sup> NEW MOON. Moon at Perigee: 356992 km.  
Feb 20<sup>th</sup> Venus 2.0°S of Moon. & Mars 1.5°S of Moon.  
Feb 21<sup>st</sup> Moon at Descending Node.  
Feb 24<sup>th</sup> Mercury at Greatest Elong: 26.7°W.  
Feb 25<sup>th</sup> FIRST QUARTER MOON. Aldebaran 1.0°S of Moon.  
Feb 26<sup>th</sup> Neptune in Conjunction with Sun.



Mar 3<sup>rd</sup>. Jupiter 5.5°N of Moon.  
Mar 4<sup>th</sup> Regulus 4.0°N of Moon. Moon at Apogee: 406386 km.  
Mar 5<sup>th</sup> FULL MOON.  
Mar 6<sup>th</sup> Mercury at Aphelion.  
Mar 7<sup>th</sup> Moon at Ascending Node.  
Mar 8<sup>th</sup> Spica 3.4°S of Moon.  
Mar 12<sup>th</sup> Saturn 2.3°S of Moon.  
Mar 13<sup>th</sup> LAST QUARTER MOON.  
Mar 14<sup>th</sup> Saturn stationary.  
Mar 19<sup>th</sup> Mercury 5.2°S of Moon. Moon at Perigee: 357584 km.  
Mar 20<sup>th</sup> NEW MOON. Vernal Equinox. Moon at Descending Node.  
Mar 21<sup>st</sup> Mars 1.0°N of Moon: Occn. Uranus approximately 0.1 degree south of the Moon.  
Mar 22<sup>st</sup> Venus 2.8°N of Moon.  
Mar 24<sup>th</sup> Aldebaran 0.9°S of Moon.  
Mar 26<sup>th</sup> FIRST QUARTER MOON.  
Mar 30<sup>th</sup> Jupiter 5.6°N of Moon.

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## How I got started

Theresa Cooper

Well the how I can remember but not sure about the when – it's a bit like reading, knitting, and gardening, I can't think of a time when I didn't do it and wasn't interested in astronomy.

As I said, the **how** is easy. A geography lesson in junior school (I must have been about 8 years of age) involved a globe of the Earth. The teacher pointed out the UK, spun the globe and there it was again. "Is that all there is?" I asked.

"Yes" came the quite firm answer. I still can remember the strong feeling of disappointment and in the subsequent months I checked out a few other globes and yes, that's all there was.

By chance some time later I was on a shopping trip with my mother to the nearest big town to our mining village, Port Talbot, and looked at all the books on offer in W.H.Smiths.

One colourful book in particular caught my eye – a Whitman World Library book called simply Astronomy. I still have it for sentimental reasons, dog eared and well worn though it is. The illustrations and explanations are of their time - however on the front cover were OTHER GLOBES ! I skimmed through it and discovered a universe. Then the American space programme began in earnest and I was hooked.

At that time it was a bit of an odd interest for a girl. Teachers knew little of the subject and other school children made fun of what they didn't understand. But I subscribed to The Society for Popular Astronomy (then the Junior Astronomical Society) and read articles by someone called Heather Couper, so I ignored the taunts and pressed on. SPA was the equivalent of my local astronomical society and I am still a member today. I have much to thank them for.

I think it is an ancient Chinese saying or possibly Buddhist which states that if you have a passion for something whether it is growing chrysanthemums, breeding rabbits or whatever then you are one of the blessed. And yes, I do feel grateful for having such an interest that I can't ignore. I can't choose whether I look up or not, and can't decide not to be interested in the latest discoveries. It is in my bones.

I would have liked to have been a professional astronomer but coming from a financially insecure background my priority was to get any job and have a secure career. Fortunately I was able to work in a science which took me to all corners of the World which included the bonus of seeing southern hemisphere stars from the Antarctic, stopovers at Puerto Rico so I could visit Arecibo and view aurora near Iceland. And the paid work did enable me to visit most of the NASA centres, watch 2 shuttle launches, and see some of the big observatories such as Mount Palomar, Mount Wilson and Kitt Peak.

Becoming a member of Cardiff Astronomical Society has also benefited my interest to a great extent giving me the opportunity to talk to many astronomers on a one to one basis and to pass on my enthusiasm at outreach events. Doing so I've worked with many interesting people such as Martin Rees the Astronomer Royal, Professor Mike Edmunds and Professor Mike Disney. I've chatted to the late Sir Fred Hoyle and the Head of Astrobiology for NASA. I've served on the FAS Council and represented CAS at many UK wide events. I'm not sure I would have had so many of these opportunities if I had become a professional astronomer.

Usually the more you put in the more you get out. I've worked hard for this Society but it has repaid me many times over. So my interest in astronomy and my commitment to CAS continues and yes, with every discovery of a new exoplanet, or galaxy I'm still finding out – that's not all there is !!

How did **YOU** get interested in astronomy? We'd love to know. Send your ideas to either the Secretary or the Editor (email addresses are on page 2 of this issue) and your story could appear in a future edition of the newsletter.

## **Astronomy? Nothing to do with me...**

**Bob Mizon MBE FRAS**

We have all no doubt heard that the various elements that make up the human body and are vital to its functioning can be reduced to a large puddle of water, an assortment of nails, match-heads and the like. But few of us ask ourselves where these elements came from in the first place. The intriguing answer is that we are made of star-stuff.

The oxygen that makes up over 60% of our bodies; the calcium in our bones; the iron that colours our blood; the nitrogen in our DNA; the various elements that facilitate the electrical activity in our brains and the functioning of our organs: all were cooked up, built from lesser atoms, in the interiors of old, collapsing stars billions of years ago; many of those stars are now white dwarfs, invisible to

the largest telescopes, swept into the distant reaches of our giant Milky Way galaxy by its majestic 200-million-year rotation.

Further back still, at the very beginning of time, all the hydrogen that now makes up most of the Universe - and, as a component of water, a significant proportion of the bodies of living creatures - was formed in the Big Bang, the stupendous explosion which kick-started the cosmos as we know it today. The faint background hiss that is the echo of this event of 15 billion years ago is still detected by sensitive radio telescopes.

Whatever is left of our long-departed bodies in, on or around this planet when it dies, vaporised by the dying, swelling Sun in a few billion years from now, will be redistributed into the clouds which swirl around our Galaxy. Indeed, most of our atoms may already have been recycled through planetary systems more than once, and some may even have been part of other organisms on distant planets in the dim past.

To many people, the stars in the sky remain a symbol of remoteness, and may seem irrelevant to everyday life. How does the cosmos outside the Earth intrude into our everyday existence?

1) The Sun is a star. It keeps us alive every second of the day and night by growing our food, warming and circulating air so that we do not freeze to death at night, and by providing our motive power through energy stored millions of years ago in fossil fuels: coal, oil and gas. It causes all the weather on our planet, regulates our daily biological cycles, and its presence or absence can make or break a holiday!

2) The atoms in our bodies were made either in the Big Bang (hydrogen) or in the interiors of stars. Atoms heavier than iron, for example gold and uranium, are made in the immense "cookers" of supernova explosions, when giant stars explode at the end of their lives. Because these events are rare, the heavy elements they add to the cosmos are rare, and are therefore expensive and sought after. The relative values of the commodities around us are

determined by their stellar origins. People work, struggle, steal, fight and die to possess gold, silver and other precious metals – but they wouldn't give a second glance to the same amounts of iron or carbon – all because of the relative abundances of stars.

3) The Moon was instrumental in bringing life out of the sea, and onto the land. Creatures evolved to live on the land *via* an amphibian stage, and the tides caused by the Moon provided a wet-dry-wet area where they could live in this mode. If the Earth had had no Moon, would we all be clever fish? The vast tides created by the Moon (which was much closer millions of years ago) drew minerals into the oceans, facilitating the onset of life. Our only natural satellite, especially when full, does seem to have an effect upon certain susceptible people (hence "lunacy"), although the causes are little understood. Many creatures regulate their behaviour, especially in breeding and egg-laying, according to the full Moon, and the human menstrual cycle's mimicking of the Moon's cycle may be no coincidence.

4) The genetic mutations upon which evolution is based are in part caused by the impacts of high-energy cosmic rays from space. These originate in supernova explosions, so the progress of life on Earth is driven partly by the deaths of distant, supermassive stars.

5) On a more everyday note, our clocks and calendars are set by the motions of heavenly bodies. A day is one rotation of the Earth, and the position of the Sun sets the time: when the Sun is at its highest over your time zone, it is midday. Months are "moonths", time periods based on the changing phases of the Moon. Why are there 24 hours in a day, 60 seconds in a minute? The ancient Babylonians had a base-12 counting system, and divided the sky, time and angular surfaces accordingly - hence the twelve houses of the Zodiac. Why are there seven days in a week? They are the days of the seven naked-eye bodies (gods and goddesses) which move around in the sky against the starry background: Sun (Sunday), Moon (Monday), Mercury (French: mercredi), Venus (French: vendredi), Mars (French: mardi), Jupiter (French: jeudi) and Saturn

(Saturday). When is Easter Sunday? It's the first Sunday after the first full Moon following the vernal equinox (the moment in spring when the Sun crosses the equator of the sky in its apparent annual journey through the stars).

6) Last, but by no means least, is the part the starry night sky has played in human culture, science and religion. Astronomy, developed from astrology, was already 2 000 years old when physics and mathematics flowered; in its modern form, it embraces most other scientific disciplines, and overflows into philosophy and theology. The apparently unchanging cosmos was long ago compared with the corruptible and ever-changing Earth below, and appropriate conclusions were drawn about the perfection of the Gods and the fallibility of humankind.

One of the saddest manifestations of the damage which human technical progress can do to the environment, and indirectly to the human spirit, is the slow eradication of the visibility of the night sky to modern people because of light pollution\*. Poorly aimed lighting schemes in urban areas, and unregulated lights in rural areas, throw light into the night sky and take away the stars. The current and completely unproven belief that very bright lights deter criminals, and the lack of regulation of light spill and intensity, mean that most people nowadays see little of the rest of the Universe. The night sky is the only part of our environment with no protection in law.

Michael Crichton, author of *Jurassic Park* and many other works of fiction and non-fiction, wrote in his autobiographical work *Travels*:

*"The natural world, our traditional source of direct insights, is rapidly disappearing. Modern city-dwellers cannot even see the stars at night. This humbling reminder of Man's place in the scheme of things, which human beings once saw every twenty-four hours, is denied them. It's no wonder that people lose their bearings, that they lose track of who they really are, and what their lives are really about".*

# Spaceflight roundup

A lot to report in this issue. It seems science and space in particular are 'in' at the moment. There are even reports of the UK launching a mission to the Moon. Alas, amongst all the activity, tragedy and loss of life reminds us that space is an inherently dangerous place to be.

## Lunar Mission

Are you looking for an unusual Christmas present this year? Fed up of giving someone socks or 'smellies'? Well, for around £3 you could get involved in an innovative 'crowd funded' British science project to send a probe to the Moon and dig into it the Lunar crust. The plan is a kickstarter project where willing participants provide funding and in return, dependent on their level of funding, get 'rewards' in return. The plan is to launch the probe towards the South Pole of the Moon in 2024, but the initial £600,000 funding request concludes on 17th December at 23:59. So far, they've had almost 5,000 investors, and raised more than 75% of their initial funding requirements. More details can be found at:

<https://www.kickstarter.com/projects/lunarmissionone/lunar-mission-one-a-new-lunar-mission-for-everyone>

## China is over (or around) the Moon

China became the first nation in almost 40 years to launch a probe around the Moon and successfully retrieve it back on Earth. The probe, called Xiaofei, was launched on its 8 day, 520,000 mile mission on 23<sup>rd</sup> October and landed in the Mongolian desert after hurtling into the Earth's atmosphere at more than 25,000 mph. This mission forms part of a plan by the Chinese to have a sample of Moon rock returned to Earth within 5 years.

## 'Risky Business'

Within the space of 3 days, we were reminded that the 'routine' operation of sending things into space is 'anything but'. On October 28<sup>th</sup>, the Orbital Science Antares ORB3 unmanned rocket carrying more than 2 tons of supplies to the International Space station

exploded just seconds after launch from NASA's Wallops Flight facility in Virginia.



*Antares explosion and images of Virgin Galactic craft breaking up*

Just as the world was digesting this sobering news, and just 3 days later, a Virgin Galactic Spaceship 2 disintegrated and crashed, seconds after separating from its mother ship, WhiteKnightTwo. The co-pilot Michael Alsbury was killed in the crash, but miraculously, the other pilot, Peter Siebold managed to survive (albeit with serious injuries) after being thrown free from the craft while it flew at around 50,000 feet in altitude. After initial suspicion fell on the new fuel that was being tested for the first time, subsequent evidence suggested the feathering system, which slows the craft down was deployed too early. In fact it was deployed while the rockets were still firing. NTSB (National Transportation Safety Board) is currently investigating the crash.



## ISS

Expedition 42 crew successfully launched from the Baikonur cosmodrome on 24<sup>th</sup> November on their 5 ½ month trip to the International Space Station. After the failure of the recent Cygnus flight, tension was high, but the ever reliable Soyuz TMA-15M rocket failed to disappoint, and lofted the crew of 3 (including Italian astronaut and Flight engineer Samantha Cristoforetti, Soyuz Commander Anton Shkaplerov



and NASA flight engineer Terry Virts), docking safely to the ISS a few hours later. All of expedition 42 crew are on twitter and you can follow their progress by following @astroSamantha, @AstroTerry and @AntonAstrey. Their mission poster had the crew posing as characters from Douglas Adams' 'Hitchhikers guide to the galaxy' where the answer to life, the universe and everything was '42'.

## Rosetta

On 12<sup>th</sup> November the world held its breath as the tiny probe Philae, launched from the European probe Rosetta landed successfully on comet 67P/Churyumov–Gerasimenko, becoming the first nation EVER to land a probe on a comet. It was watched by an estimated 1 **BILLION** people!!! After 'landing', the probe bounced around the surface of the comet twice, and unfortunately landed in a ravine where sunlight was scarce. The probe eventually ran out of power around 72 hours later, but not before sending some spectacular results, including a detection of organic molecules on the surface. For more information about the amazing mission of Rosetta and Philae see the great article written by Kayleigh Churchill on page 27.

## Hayabusa 2



Getting in on the act as well are the Japanese. On 3<sup>rd</sup> December, they launched the Hayabusa 2 probe, on a six-year expedition to bring a piece of asteroid 1999 JU3 back to Earth. Asteroid 1999 JU3 , a carbon-rich world just 900 meters long, is currently orbiting between Earth and Mars and Hayabusa 2 will arrive there in June 2018.

## ExoMars 2018

In the autumn statement, Chancellor George Osborne announced that Britain would provide £55m for the European ExoMars project and a similar amount for funding towards the ISS.

## GO Orion !!

On December 5<sup>th</sup> and after a delay of 24 hours, mainly due to faulty oxygen values and the weather, America began the latest step on its journey back into space, when the unmanned Orion capsule completed its maiden flight on top of a Delta 4 heavy rocket. The launch occurred at 12:05 UTC/GMT and the Orion capsule performed flawlessly. After reaching an altitude of 3,600 miles, completing 2 orbits and flying through the Van Allen belts for long periods, the Orion capsule re-entered the atmosphere at 20,000 mph, testing the heat shield to limits not witnessed since the Apollo



program 40 years ago, it splashed down in the Pacific Ocean just over 4 hours later.

## New Horizons prepares for 'wake up' call

New Horizons, the first probe ever to visit the (dwarf) planet Pluto and hurtling towards the planet at almost 10 miles a second, will wake itself up after more than 9 years in space. The scheduled



wake up date is set for Monday December 6<sup>th</sup> at around 20:00 (8pm) GMT. After conducting some internal tests, it will send a signal to Earth that, due to its distance from us, will take over 4 hours to arrive. The highly hazardous closest approach to Pluto and Charon (its largest moon) is scheduled for the middle of July 2015,

though scheduled imaging will start soon after 'New Year headaches' have subsided in January 2015 when it passes Kuiper belt object VNH004.

# 75 years of Astronomy

## Margaret Morris

When I was a little girl of about six, my grandfather took me into the garden one winter evening and pointed out the constellations. I was hooked on Astronomy! Also, in common with most youngsters at that time, I collected stamps. I read all I could about Astronomy and at the same time was forming a pretty average stamp collection of whatever came my way including sixpenny packets from Woolworths. Following a severe illness with a long recovery, I started to look more seriously at my twin interests and wondered if they might be combined.

In 1945, skimming through the World Catalogue published by Stanley Gibbons, there did not seem to be too many stamps relating to Astronomy. About the only interesting ones were the superb set of six issued by Mexico for the inauguration of the Astrophysical Observatory at Tonanzintla. Even today, these remain valued



elements of the collection; in fact, one of them, the 1 peso value, depicts the Hertzsprung-Russell diagram which has not so far appeared on any other stamp issue. (see left)

Because I was not very advanced as a collector, I was unable to identify all the other interesting items that can be added in – for example, the Southern Cross constellation as a watermark on

the paper used for printing Brazilian stamps, or a postmark from a town in Rhodesia named Arcturus. However, knowledge of the theme and its philatelic implications continued to grow.

The collection grew also – especially during the International Geophysical Year 1958-9 when interesting stamp designs featured

the Earth as a planet and such phenomena as auroræ. Then came the International Quiet Sun Year with stamp designs depicting dramatic events such as solar flares. The Space Age dawned and the floodgates opened! Unfortunately, many countries more or less saw this as a licence to print money. I did soak up most of these issues to begin with but then had to have a hard think about where the collection was going. I disposed of some of the more speculative items and decided to confine my future purchases to purely Astronomy issues, and Space flights which had a mainly astronomical purpose. During International Year of Astronomy 2009 there was another flood, but on this occasion most of the issues were of great astronomical interest and could be included.



It has proved necessary over the years to develop some sort of system in order to cope with the stream of new material (and older material which came to be identified as my knowledge of philately grew). The

collection is now very large and is loosely organised into three main sections which I describe as: The Observables, The Observers and The Observations. Of course, it is a lot more complicated than that, and there is considerable overlap between these main sections. Also, I have branched out into other aspects – including collecting letters written by important astronomers.

Perhaps we could look at each of these main sections in turn.

1. The Observables: As you might imagine, this is a very large field and can be subdivided in several ways. My own subdivision consists of The Solar System (Sun, Moon, Planets, Solar System Phenomena, e.g. Eclipses, Auroræ, etc., Comets), Stars and Constellations, Galaxies.

2. The Observers: This starts with some stamps depicting a single human being looking up at the sky, then continues with

astronomers of the early civilisations (Greek, Egyptian, Islamic, etc.) as they tried to interpret what they saw. Copernicus occupies



several albums on his own – consisting mainly of material issued in 1973 to commemorate the quincentenary of his birth. Kepler and Newton are well represented and of course the issues for Halley intermingle with

those in the Comets part of the collection. Most well known astronomers and physicists have been depicted on stamps but one curious omission is Messier; I do hope that some day France will honour her illustrious son.

3. The Observations: All the tools of astronomy are included – from the very simple to the most modern sophisticated instruments. An important sub-section deals with Timekeeping. Famous observatories such as Greenwich, Mount Palomar and Pulkovo have been depicted.



I hope that this brief outline of my collecting interests may tempt you to see the fascination in these little bits of paper. The beautiful book "Stamping through Astronomy" by Renato Dicati (published by Springer, English edition 2013) provides many more illustrations than I can show here. You may also be interested to know that there is a club for enthusiasts – the Astro Space Stamp Society based in the UK, but with contributions from keen collectors all over the world.

# Up-coming CAS Public Events

Date	Time	Event	Venue
10 <sup>th</sup> Jan	10:00am to 4:00pm	Astronomy Day	National Museum of Wales Cardiff

## CAS Lectures December To February

Date	Title	Lecturer
11 <sup>th</sup> Dec.	What Astronomy can I do from a city?	David Arditti, Middlesex
8 <sup>th</sup> Jan.	The Debate: "Two Adventures in the History of Astronomy"	Prof Jon Davies, and Prof Mike Edmunds,
22 <sup>nd</sup> Jan.	Secrets of Celestial Light	Will Gater, Bristol
5 <sup>th</sup> Feb.	The Birth of our Solar System	Emma Wride, University of South Wales
19 <sup>th</sup> Feb.	Time and the Stars	Bob Mizon, Dorset

## Observing Sessions

Date	Day	Time	Venue
12 <sup>th</sup> or 13 <sup>th</sup> Dec.	Fri or Sat	20:00 - 24:00 GMT	Dyffryn Gardens
19 <sup>th</sup> or 20 <sup>th</sup> Dec.	Fri or Sat	20:00 - 24:00 GMT	Mountain View Ranch
23 <sup>rd</sup> Dec.	Tue	20:00 - 24:00 GMT	Dyffryn Gardens
9 <sup>th</sup> or 10 <sup>th</sup> Jan.	Fri or Sat	20:00 - 24:00 GMT	Dyffryn Gardens
23 <sup>rd</sup> or 24 <sup>th</sup> Jan.	Fri or Sat	20:00 - 24:00 GMT	Mountain View Ranch
13 <sup>th</sup> or 14 <sup>th</sup> Feb.	Fri or Sat	20:00 - 24:00 GMT	Dyffryn Gardens
20 <sup>th</sup> or 21 <sup>st</sup> Feb.	Fri or Sat	20:00 - 24:00 GMT	Mountain View Ranch

**NOTE:-** Where two dates are given we will attempt to hold the session on the first date, weather permitting, otherwise we will try again on the subsequent date. All dates are subject to weather conditions. For confirmation of any session please check on the CAS Web site or the CAS Observing line. 07817 723 883 for more information.

Mountain View Ranch was formerly Castle Heights Golf Club.

# Almanac

Compiled by John Richards

## Sun Rise/Set & Twilight

Date	Astronomical Twilight Begins	Sun Rise	Sun Set	Astronomical Twilight Ends
01 <sup>st</sup> December	05:53	07:55	16:07	18:09
08 <sup>th</sup> December	06:01	08:04	16:04	18:07
15 <sup>th</sup> December	06:07	08:11	16:03	18:07
22 <sup>nd</sup> December	06:11	08:16	16:05	18:10
29 <sup>th</sup> December	06:14	08:18	16:10	18:14
1 <sup>st</sup> January	06:14	08:18	16:13	18:16
8 <sup>th</sup> January	06:14	08:16	16:21	18:23
15 <sup>th</sup> January	06:11	08:12	16:31	18:31
22 <sup>nd</sup> January	06:06	08:05	16:42	18:41
29 <sup>th</sup> January	05:59	07:56	16:54	18:51
1 <sup>st</sup> February	05:56	07:51	17:00	18:55
8 <sup>th</sup> February	05:46	07:40	17:13	19:06
15 <sup>th</sup> February	05:35	07:27	17:25	19:18
22 <sup>nd</sup> February	05:22	07:13	17:38	19:29

## Meteor Showers

Date	Meteor Shower	RA	DEC	ZHR
9 <sup>th</sup> December	Puppids-Velids	9h00m	-48°	15
14 <sup>th</sup> December	Geminids	7h28m	32°	75
23 <sup>rd</sup> December	Ursids	14h28m	78°	5
26 <sup>th</sup> December	Puppids-Velids	09h20m	-65°	15
04 <sup>th</sup> January	Quadrantids	15h28m	50°	80

## Observers Club Meetings

Date	Day	Time	Venue
30 <sup>th</sup> January	Fri	20:00 - 22:00 GMT	Black Cock Inn
27 <sup>th</sup> February	Fri	20:00 - 22:00 GMT	Black Cock Inn

## Dave's Star Parties

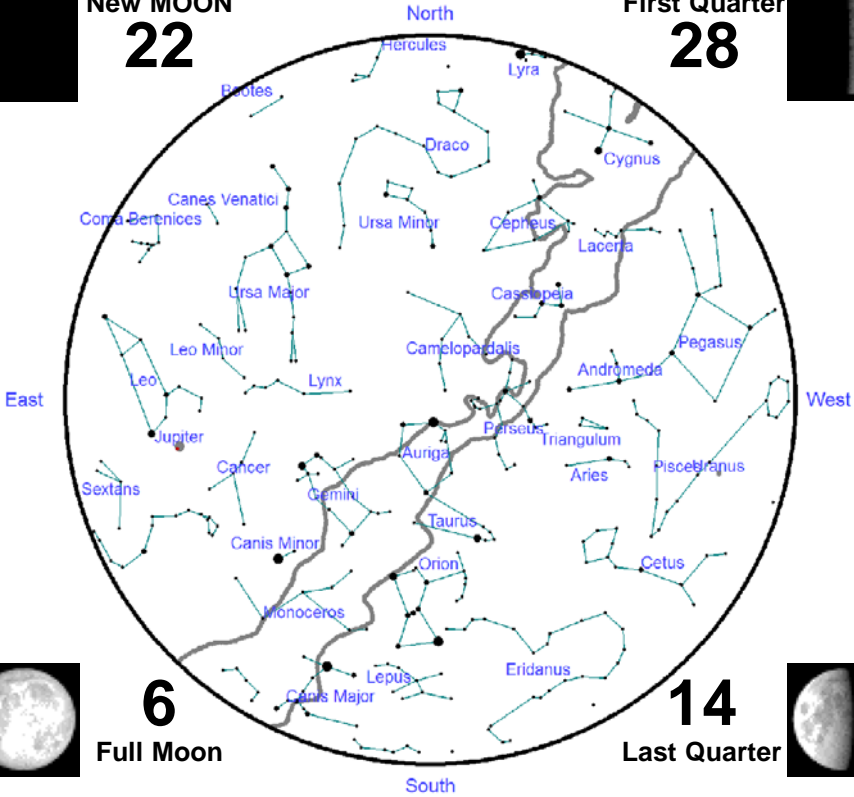
Date	Day	Time	Venue
20 <sup>th</sup> January	Tuesday	20:00 to 22:00	Dyffryn Gardens/Observatory
17 <sup>th</sup> February	Tuesday	20:00 to 22:00	Dyffryn Gardens/Observatory

# Almanac December



New MOON  
**22**

First Quarter  
**28**

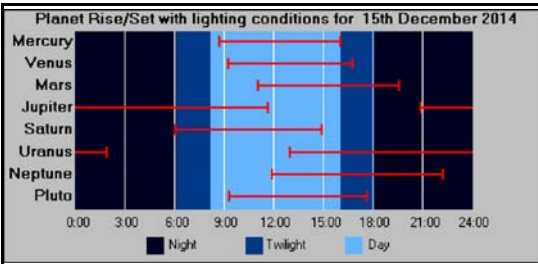


**6**  
Full Moon

**14**  
Last Quarter



	Constellation	R.A	Dec	Rises	Sets	Mag.
Mercury	Sagittarius	17h44m56s	-25°00'28"	08:40	16:01	-1.0
Venus	Sagittarius	18h23m41s	-24°11'34"	09:12	16:45	-3.9
Mars	Capricornus	20h42m07s	-19°33'46"	10:59	19:34	+1.0
Jupiter	Leo	09h40m44s	+14°44'08"	20:53	11:37	-2.3
Saturn	Libra	15h48m59s	-18°04'04"	05:58	14:51	+0.6
Uranus	Pisces	00h47m23s	+04°21'16"	12:57	01:50	+5.8
Neptune	Aquarius	22h39m15s	-09°18'03"	11:58	22:29	+8.0
Pluto (Dwarf)	Sagittarius	19h03m42s	20°31'03"	09:27	17:50	+14.2



## Planet Events

- 8th Mercury at Superior Conjunction.
- 12th Mars at Perihelion.
- 27th Venus at Aphelion.

The data presented here is for the 15<sup>th</sup> December, positional data is at 00:00 GMT/UT



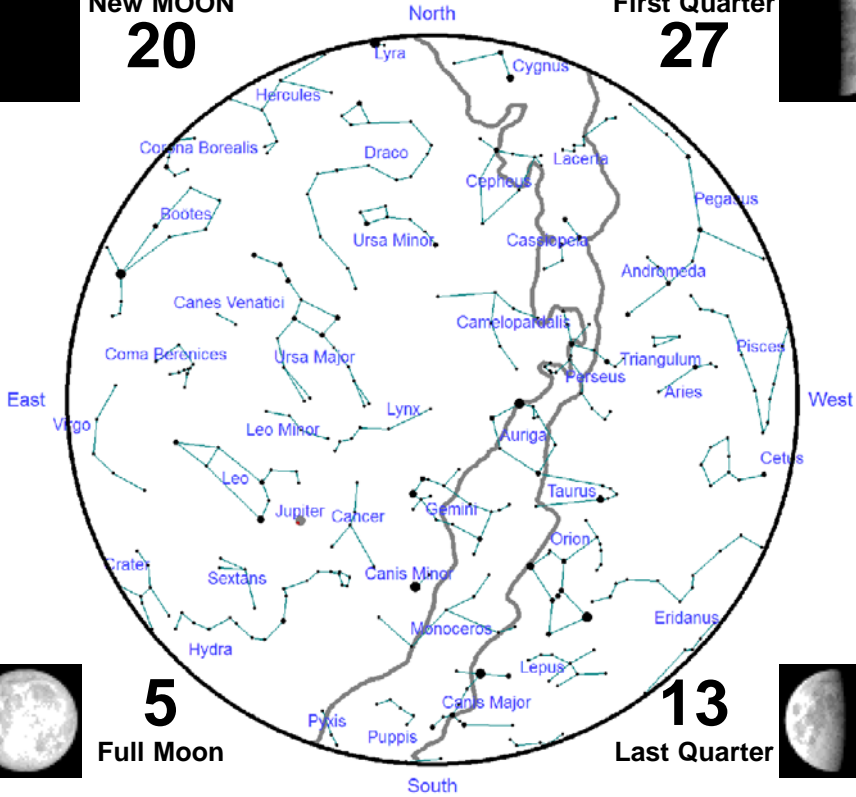
# Almanac January

New MOON

20

First Quarter

27



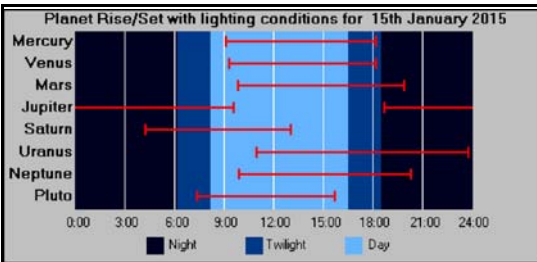
5

Full Moon

13

Last Quarter

	Constellation	R.A	Dec	Rises	Sets	Mag.
<b>Mercury</b>	Capricornus	21h04m04s	-17°17'47"	09:06	18:08	-0.6
<b>Venus</b>	Capricornus	21h08m44s	-18°02'59"	09:15	18:08	-3.9
<b>Mars</b>	Aquarius	22h17m28s	-11°41'19"	09:47	19:53	+1.1
<b>Jupiter</b>	Leo	09h32m40s	15°31'11"	18:39	09:32	-2.5
<b>Saturn</b>	Libra	16h01m59s	-18°40'42"	04:13	12:58	+0.5
<b>Uranus</b>	Pisces	00h48m11s	+04°27'41"	10:55	23:45	+5.8
<b>Neptune</b>	Aquarius	22h45m46s	-08°42'35"	10:00	20:37	+8.0
<b>Pluto (Dwarf)</b>	Sagittarius	19h11m04s	-20°53'48"	07:35	15:53	+14.2



## Planet Events

- 3rd Earth at Perihelion(0.98 A.U.).
- 21st Mercury at Perihelion (0.31 A.U.).
- 30th Mercury at Inferior Conjunction.

The data presented here is for the 15<sup>th</sup> January, positional data is at 00:00 GMT/UT

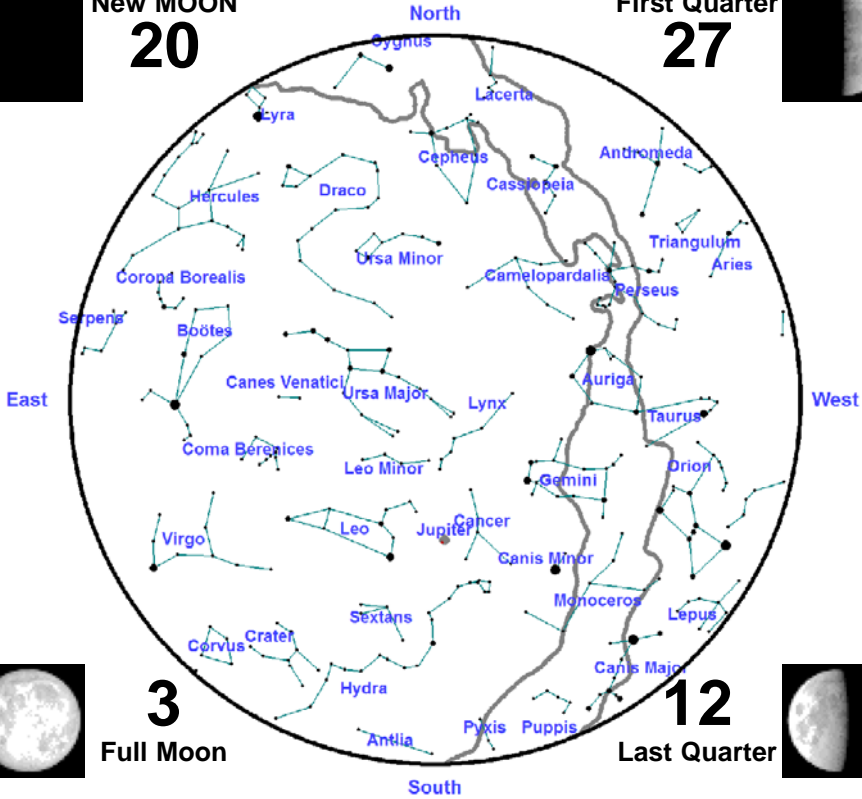
# Almanac February

New MOON

20

First Quarter

27



3

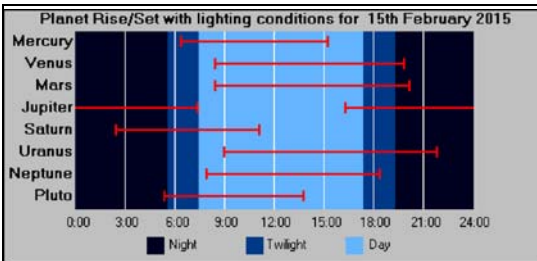
Full Moon



12

Last Quarter

	Constellation	R.A	Dec	Rises	Sets	Mag.
Mercury	Capricornus	20h15m06s	-17°57'56"	06:19	15:13	+0.4
Venus	Pisces	23h35m29s	-03°58'38"	08:23	19:49	-3.9
Mars	Pisces	23h46m52s	-02°08'01"	08:25	20:09	+1.2
Jupiter	Cancer	09h17m14s	+16°48'12"	16:14	07:22	-2.6
Saturn	Scorpius	16h10m45s	-19°00'29"	02:22	11:03	+0.4
Uranus	Pisces	00h51m50s	+04°51'48"	08:55	21:49	+5.9
Neptune	Aquarius	22h45m55s	-08°41'44"	07:58	18:35	+8.0
Pluto (Dwarf)	Sagittarius	19h11m09s	-20°53'41"	05:33	13:51	+14.2



## Planet Events

6th Jupiter at Opposition.

26th Neptune at Conjunction.

The data presented here is for the 15<sup>th</sup> February, positional data is at 00:00 GMT/UT



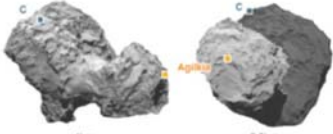
On 12 November, after 10 years, and travelling more than six billion kilometres across the solar system, the Rosetta spacecraft and Philae lander is set to land on the Comet 67P/Churyumov-Gerasimenko.

Back on Earth, the flight team operating Rosetta will be faced with the challenge of landing Philae on a rotating, duck-shaped comet travelling through space at 40,000mph. The landing site, known as "Agilkia", is on the smaller "head" of the lobe and is one square kilometre in size. Agilkia contains cliffs and crevices and has huge boulders – any of which could ruin a landing. However, it has good lighting conditions which means Philae will have opportunities to recharge its solar-powered batteries and periods of darkness will allow its systems to cool.

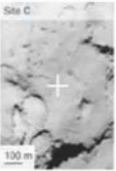
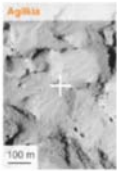
Rosetta will release Philae from a distance of 22.5km from the centre of the comet. An inaccuracy of a few millimetres per second in Rosetta's orbit could result in Philae completely missing the comet. The decent is expected to last about seven hours and as the event is taking place 510 million km from Earth, communication between Rosetta and the controllers will take 28 minutes and 20 seconds each way. There will be no steering of the lander down to the comet's surface - once released, it is on a path of its own.



The landing site



Agilkia Primary landing site  
C Backup landing site



## 1: Release from Rosetta

Rosetta will push the Philae lander away when the spacecraft is about 22.5km from the comet's centre. Rosetta needs to release Philae at exactly the right place in time and space to be sure of putting the little robot on the correct path to the comet

## 2: Descent

The descent to the comet's surface is expected to take about seven hours. On the way down, Philae will take pictures of the comet and start taking measurements of the environment around the comet

## 3: Comet activity

The comet activity on the day - throwing out gas and dust or even the splitting up of the comet itself - cannot be predicted. The descending robot will just have to cope with whatever is chucked at it



## 4: Landing zone

The chosen landing area is not perfectly flat, but most slopes are at an angle of less than 30 degrees. There are some boulders that could pose a problem if Philae hits them.

## 5: Touchdown

When the lander hits the surface - at walking pace - foot screws will drill into the surface and harpoons will be used as anchors. A thruster on top of Philae will also gently push the robot into the surface to stop it bouncing off into space. If the surface is very soft, the screws may not secure the lander. If it is very hard, they may not penetrate it at all.

After the initial experiments, longer-term studies are planned. However, this could be affected by dust gathering on its battery recharge, solar panels. As the comet journeys closer to the Sun, temperatures inside the lander will get so hot that its equipment will stop working. After Philae's mission ends, Rosetta will continue its escort and remote analysis of the comet for a few more months.

**Philae and Rosetta could be key to unlocking answers about the formation of the Solar System, the origins of water on Earth and perhaps even life itself.**