Wadhurst Astronomical Society Newsletter July 2018

MEETINGS

COMMITTEE MEETING

Members of the Committee are respectfully reminded that there will be a Committee Meeting on Tuesday 17th of July beginning at 1930. Jim has kindly offered to have the meeting at his house again.

JUNE MEETING

The June meeting was introduced by Phil Berry who outlined the evening then and introduced the main talk to be given by our own Chairman, Brian Mills.

SOFIA
Brian Mills FRAS

SOFIA, **S**tratospheric **O**bservatory **F**or **I**nfrared **A**stronomy is an airborne observatory and is a joint venture between NASA and DLR, the German Aerospace Centre with NASA contributing 80% of the running costs and DLR, 20%, which is reflected in the time allocated to observing.

To begin his talk, Brian explained a bit about infrared. He described which part of the infrared spectrum SOFIA uses, in the near and mid infrared band and showed the comparison of images of the Horse Head Nebula taken in visible light, then in near infrared and finally in mid-infrared.

NASA

It was William Herschel who in 1800, realised that there was something in the electromagnetic spectrum in the wavelengths just longer than red light and just outside the visible spectrum. He was measuring the temperatures of the various visible colours when split from white light through a glass prism, when he left a thermometer just outside the red band and was surprised to find that the temperature was higher. He realised that there must be something there. He had detected infrared.

We were told that the main purpose of SOFIA is to collect data about star formation, the physics of interstellar medium and the structure of comets, planetary atmospheres and rings.

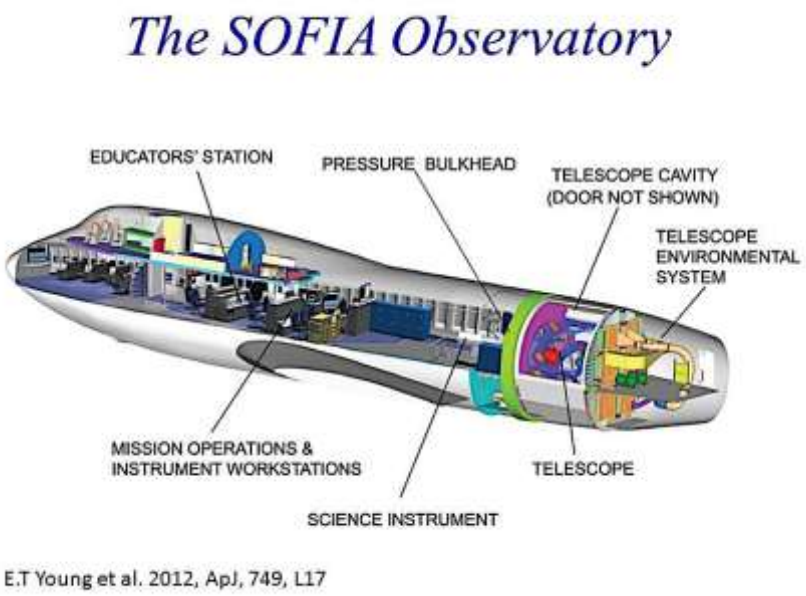
Some of the observations use occultations to obtain data. One example Brian mentioned was to research the atmosphere of Pluto by using the occultation of a distant star by the dwarf planet, which as he said was a pretty rare occurrence. The shadow passed close to New Zealand in 2015 and data was gained by the flying observatory when crossing the path at precisely the right point.

Data from the atmosphere of Neptune's largest moon, Triton, was obtained last year through another occultation and whose path was over the Atlantic Ocean. Scientists were looking for the temperature and structure of Triton's atmosphere, which could be compared with data obtained by Voyager 2 on its way past in 1989. They are looking for any signs of global warming there.

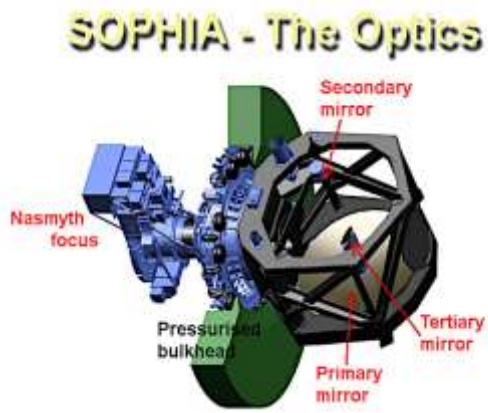
Observations are also being made of the effects of the black hole at the centre of our galaxy. Since SOFIA is able to fly at between 39 and 45 thousand feet, so is above 99% of the Earth's atmospheric water vapour and can see 85% of infrared radiation, meaning that observations can be made through any galactic dust.

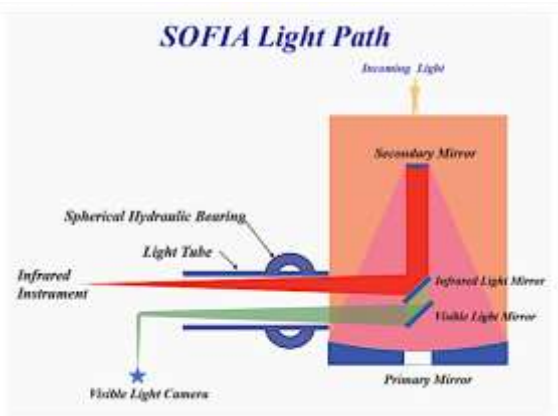
Brian talked about the aircraft used. It is a Boeing 747 SP (Special Performance). It can fly at Mach 0.8 with a range of 6,635 nautical miles. It was named Clipper Lindbergh after the pilot who first flew the Atlantic. Brian then told the fascinating story of the Lindberghs, who incidentally lived for a short time at Weald near Sevenoaks.

The aircraft is pressurised with a pressure-bulkhead separating the operations area from the telescope itself.



The telescope has a 2.5 metre mirror and in the diagram below can be seen the secondary mirror and then the tertiary mirror that sends the light through the Nasmyth Focus to either the infrared instruments or the visible camera.





We were told that the telescope is a folded Cassegrain with a Nasmyth focus so that the path from the telescope is from a fixed axis point as the telescope rotates. The 2.5 metre mirror has a focal ratio of f19.6 and the total weight of the telescope is 17 tons. Elevation can be between 23^{o} and 58^{o} with an azimuth range of 3^{o}. The telescope is stabilised by gyroscopes and guide cameras with other devices to overcome vibration.

Looking to the rear of the cabin and the pressurised bulkhead
NASA

The main cabin with the technicians in place
NASA

Brian said the advantages of the airborne observatory included cheapness compared with a space launch, it can go anywhere, different instruments can be used, repairs and adjustments can be made and new instruments can be added.

We were given a brief look at the history of airborne observing which stretches back to the 1920s. In 1923, the US Navy used sixteen planes to observed a solar eclipse but sadly none of the photographs came out. In 1930 the US Naval Observatory organised planes to observe the eclipse shadow in an attempt to check the accuracy of the predicted track position.

In 1932 three cameras were used to record the Sun's corona and shadow. They flew at 27,000 feet with the crew using oxygen masks in an open cockpit.

The crew of the unpressurised aircraft with their camera equipment

A jet aircraft was first used for eclipse observing in 1963 and was a DC8. This enabled the duration of totality to be observed for 142 seconds instead of 100 seconds on the ground. It also carried out infrared measurements of the Sun's upper atmosphere.

NASA used Convair CV 990 aircraft from the late 1960s to make airborne observations. The aircraft had one-inch thick quartz glass windows of optical quality placed in the top of the fuselage, although as Brian said, infrared was limited through the glass. These flights were used to observe eclipses, comets, meteors, Mars at opposition and found that the clouds of Venus were not water vapour.

Between 1967 and 1997 NASA used a Learjet. Because it was open to the atmosphere, the crew had to wear oxygen masks but the big advantage for the 12-inch Cassegrain was that there was no glass in the telescope's way to affect the light path. Jupiter and Saturn were found to radiate more energy than they absorbed and the clouds of Venus were found to consist of sulphuric acid.

Concorde was used in 1973 to observe an eclipse that lasted just over 7 minutes but because the plane could fly at Mach 2 at 50,000 feet the eclipse could be observed for 74 minutes!

Between 1974 and 1995 a C-141 Starlifter transport plane was used. It carried a 36" telescope and was able to fly for 7½ hours. Pluto's atmosphere was discovered as were rings around Uranus and water molecules were detected on comets. Supernova 1987A in the Magellanic Cloud was also studied.

Finally Brian looked at what SOFIA is doing now and what is planned for it in the near future.

It is currently in New Zealand covering a number of planned missions.

One of the missions is to look at two massive stars in close orbits that have erupted twice recently, shedding ionised gas which is racing away from them at an estimated one million miles an hour! This system is Eta Carinae and the stars become close to each other every 5.5 years. They are expected to go supernova soon. As they come closer in their orbits, the smaller star is believed to be making a tunnel through the gas created by the larger star and this is one of the things SOFIA will be looking at.

Another mission is to look towards the black hole at the centre of our galaxy and investigate the strength of any magnetic fields and what effect it this having on material close by.

Yet another mission that Brian mentioned was to look at a star formation area in the direction of the Tarantula Nebula. The stars are all forming at the same time and it will be interesting to see the affect of solar wind and whether stars formation has halted or not.

The atmosphere of Titan will be looked at and a study of the debris around supernova 1987A is also included.

SOFIA is now expected to continue flying until at least 2030.

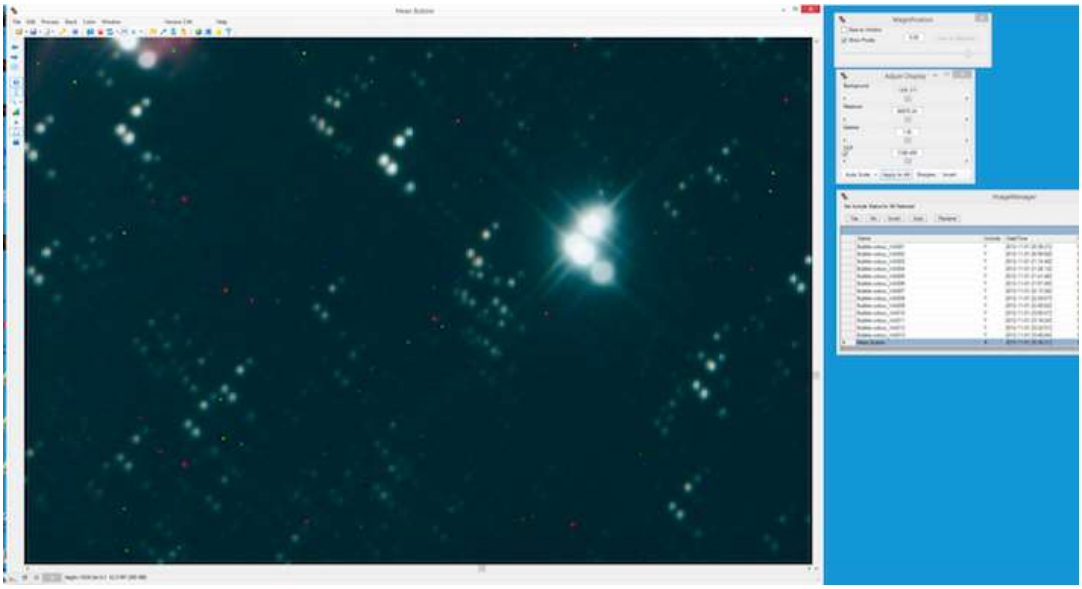
Stacking astronomy images
John Lutkin

John asked, "What is stacking and why stack?"

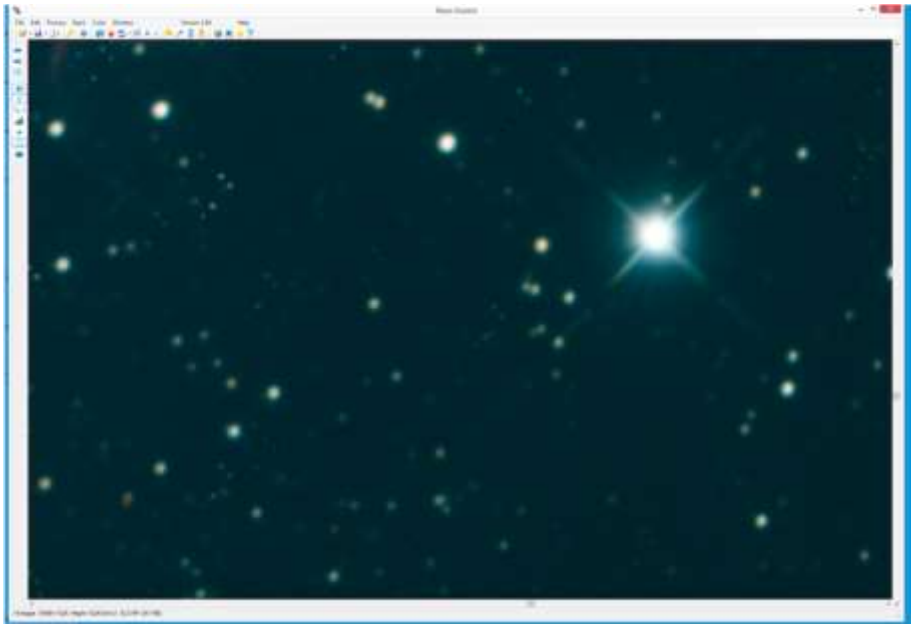
He explained that making a number of images reduces the effect of trying to track an object over a long period of time. He also said that an individual image would not always be perfect. By stacking, many of these problems are reduced.

By taking a large number of images with exposures no more than 30 seconds, when stacked will show very little star movement.

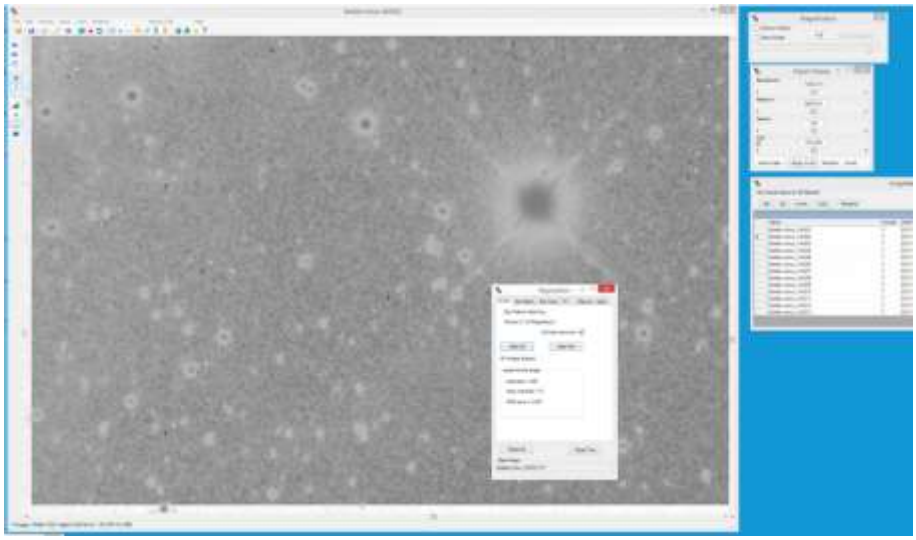
By using a programme called **CCDStack** John showed a series of shots to illustrate its use.



Stars from individual frames are seen unregistered



Following registration, the resultant combined stack is seen



The registered images aligned

When looking at the wider picture, John's image shows colour in the Bubble Nebula

John now looked at the various software programmes available for stacking and processing images.

The first he mentioned was **Deep Sky Stacker**. He said the images are entered and the parameters set and it then combines the images to produce an acceptable result. The software is free but John sometimes felt that it couldn't always do some of the things he would like to have done but added that it is a good programme to start with.

Another free programme is **Registax**, which is very good at combining selected images particularly of the planets or the moon. John said it works extremely well and is another good programme for the beginner.

Maxim DL is a more serious programme, which will also run your observatory for you. John rates it very highly but the downside is that it is very expensive at between $199 and $599!

Pixinsight John says is the current favourite. He said that this programme gives you the result as it is and doesn't go into processing to give 'pretty' pictures. This programme costs around £200 and comes with free updates.

Registar costs about £151 and has the advantage that it will accept images of different sizes and combine them as if they had been one size. It will also rotate images over a large angle and then register them.

Nebulosity is a good programme that does most of what the amateur wants, accepting images from different sources such as digital camers and costs around £75 with upgrades that cost £20 every three years.

Snippets from the World of Science
John Wayte

Visby Lenses

The Vikings were known to be great seafarers and probably navigated using Sunstone Crystals, which polarizes light, enabling the Sun to be detected on a cloudy day and aid navigation. They could also have been using telescopes about 500 years before the earliest recorded working telescope was invented in the Netherlands in 1608.

The late Dr Karl-Heinz Wilms from Germany first heard of the so-called "Visby" lens in 1990 when he was searching for exhibits to display in a Munich museum. It was named after the major town in the Swedish island of Gotland. He found a picture of the lens in a book and planned to examine the original.

But it was not until 1997 that a team of three German scientists and specialists in the field went to the island to examine what turned out to be 13 lens-shaped rock crystals.

"It seems that the elliptical lens design was invented much earlier than we thought and then the knowledge was lost" Dr Olaf Schmidt told BBC News back in the year 2000.

When the lenses were tested, the team was amazed. They passed a series of tests almost as well as modern optics.

Examples of Visby lenses
Thor News

Made from rock crystal, they have an accurate shape that betrays the work of a master craftsman. The best example measures 50mm (2-inches) in diameter and 30mm (1.2-inches) thick at the centre.

"The surface of some of the lenses has an almost perfect elliptical shape," Dr Schmidt said. "They were obviously made on a turning lathe."

They have a flattened central area that makes them excellent magnifiers.

"They could have been used as magnifiers, allowing fine carvings to be carried out, or they could have been used to start fires or to burn wounds and cuts so that they did not get infected."

What intrigued the researches was that the lenses were of such high quality that they could have been used to make a telescope centuries before the first known crude telescopes were constructed.

Manufactured in Byzantium

The Gotland crystals provide the first evidence that sophisticated lens-making techniques were used by craftsmen over a 1,000 years ago; at a time when researchers had only just begun to explore the laws of refraction.

According to the researchers, it is clear that the craftsmen who figured the lenses knew more about applied optics than the scientists of the time. They must have worked by trial and error because the mathematics to calculate the best shape – as far as we know – did not become available for several hundred years.

The researchers speculate that the knowledge to make such an accurate lens was known to only a few craftsmen; perhaps even just one person.

But it seems clear that the Vikings did not make lenses themselves. There are hints that they may have been manufactured in the ancient empire of Byzantium (modern Istanbul) or in the region of Eastern Europe where Scandinavian Vikings are know to have participated in trade networks.

While it's a little early to say that the Vikings did actually make a telescope, what is certain is that these were very high quality lenses.

The Sextant

An unusually low-tech item will also be aboard a spacecraft being readied for the next cargo delivery to the International Space Station: - a hand held sextant. This instrument, which measures the angular distance between two visible objects, is a time-honoured staple of navigation. Sailors out at sea and beyond any visible landmarks have traditionally used the sextant to pinpoint their location using the angle of the Sun.

A modern sextant

Astronaut Alexander Gerst learns to use a sextant aboard the ISS
NASA

The sextant navigation investigation will test the use of handheld sextants for emergency navigation on future deep-space missions, according to the NASA statement. As crewed missions travel further and further from Earth, the risks will increase. If a crew found itself without communications or sufficient computing capabilities, it could theoretically use a sextant to find its was using the angles among the Moon, planets and stars.

This is not the first time that sextants have been used in space. The Gemini missions in 1965-66 were the first and James Lovell in 1968 demonstrated its practical use on Apollo 8. Further experiments were conducted on Skylab in the 1970s.

Because the instruments require no power or external support to operate, it could be a simple but life-saving tool, NASA officials said.

JULY MEETING

18 July 2018 – The highly entertaining Dr David Mannion tells us about "Astronomical Numbers".

Meetings will take place at Uplands College, Lower High Street, Wadhurst and are held in classrooms IL5 and IL6 which are in the blue walled classroom block at the far end of the drive from the main gate and up by the tennis courts. Signs will direct you. There is car parking near the block although this needs to be cleared before 2230 when the gates close. The postcode is TN5 6AZ.

Meetings begin at 1930 prompt although members are invited to arrive anytime after 1900, as this is a good time to exchange ideas and discuss problems and also help set things up before the meeting starts.

Anyone is welcome but non-members are asked to pay £3 towards costs.

FUTURE MEETINGS

There is no meeting in August

19 September 2018 – WAS member Will O'Brien talks on "Dynamics of Charged Particles in Planetary Magnetic Fields".

17 October 2018 – Dr Stephen Wilkins gives us the latest information about "Exploring the Universe with the James Webb Space Telescope"

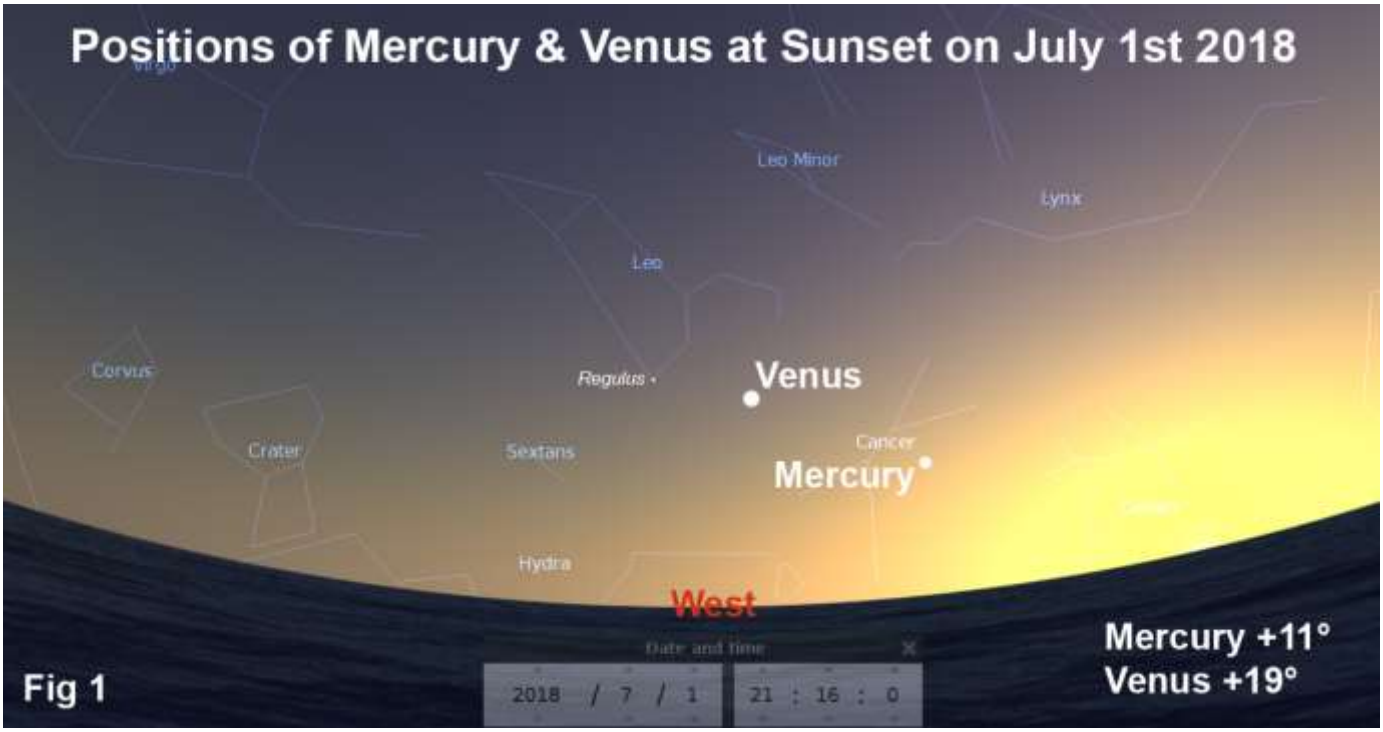
21 November 2018 – Jan Drozd explains about "A Pale Blue Dot – Earth - from an Aliens Perspective".

12 December 2018 (note – second Wednesday of the month) – Brian Mills FRAS reveals more secrets about "Local Astronomers"

SKY NOTES FOR JULY 2018

Planets

Mercury is an evening object reaching greatest eastern elongation on July 12th. On that date it will be 26° from the Sun, and will shine at magnitude +0.5, at an altitude of 9° in the west-north-west. However, a better option would be to look before elongation when the planet will be brighter and higher in the sky. On the first of the month, at sunset, Mercury will be 11° high in the WNW (see fig 1) at will be half a magnitude brighter at 0.0. If you wait until the Sun is 6° below the horizon, the end of civil twilight, mercury will be 5° in altitude. If you sweep for Mercury with optical aid please remember it is perilous to your eyesight to do so before the Sun has set. It only takes a moment for your retina to be damaged by unexpected sunlight. Following elongation the planet swiftly losses altitude thanks mostly to the shrinking angle that the ecliptic makes with the horizon. The fact that Mercury is almost 5° below the ecliptic by the end of the month also has a negative effect on visibility.

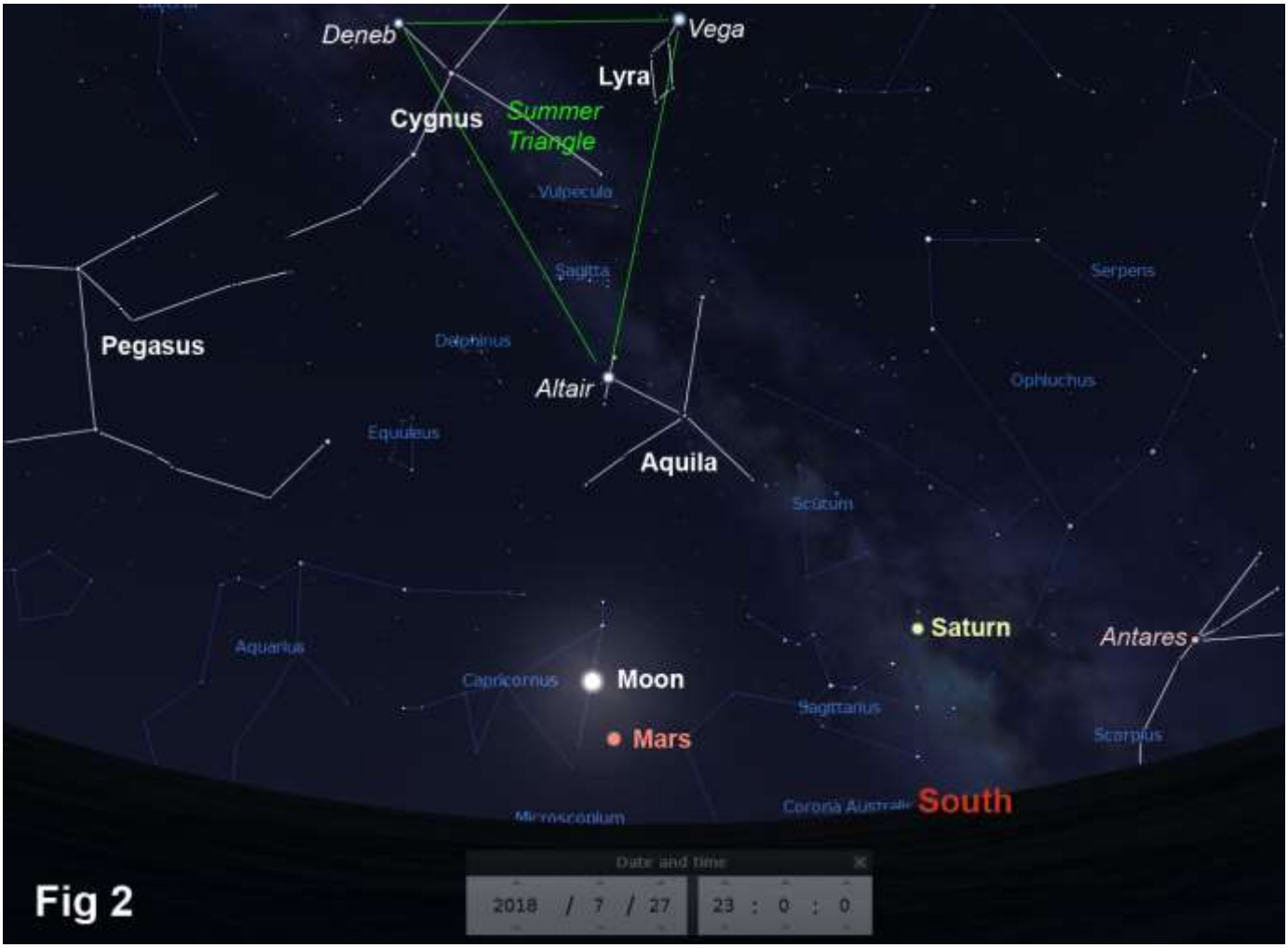


Venus is still a brilliant object low down in the west as soon as the Sun has set (see fig 1). It also suffers in the same way as Mercury because of the position of the ecliptic relative to the horizon and gradually loses altitude as the month progresses. On the last day of July, Venus is just 13° high at sunset although its brightness will have increased to magnitude -4.2 by then making it easier to locate in twilight skies. The phase of the planet continues to decrease from 70% to 57% during the month whilst its apparent size grows from 15" to 20" (15 to 20 arc seconds). On July 10th Venus passes just over a degree north of magnitude +1.5 Regulus, the brightest star in Leo whilst on July 15th a 10% illuminated Moon is 5° to the west of the planet.

Earth arrives at aphelion, its greatest distance from the Sun, on July 6 at 17:48 BST when the two bodies will be 152.1 million kilometres apart.

In the UK, during late spring and early summer, we experience twilight throughout the night because the Sun is never as much as 18° below the horizon which is what is needed for "astronomical darkness". Around May 25th this period begins and lasts until roughly July 19th when, for a brief period at 01.00 (midnight GMT), the centre of the Sun reaches that required negative altitude.

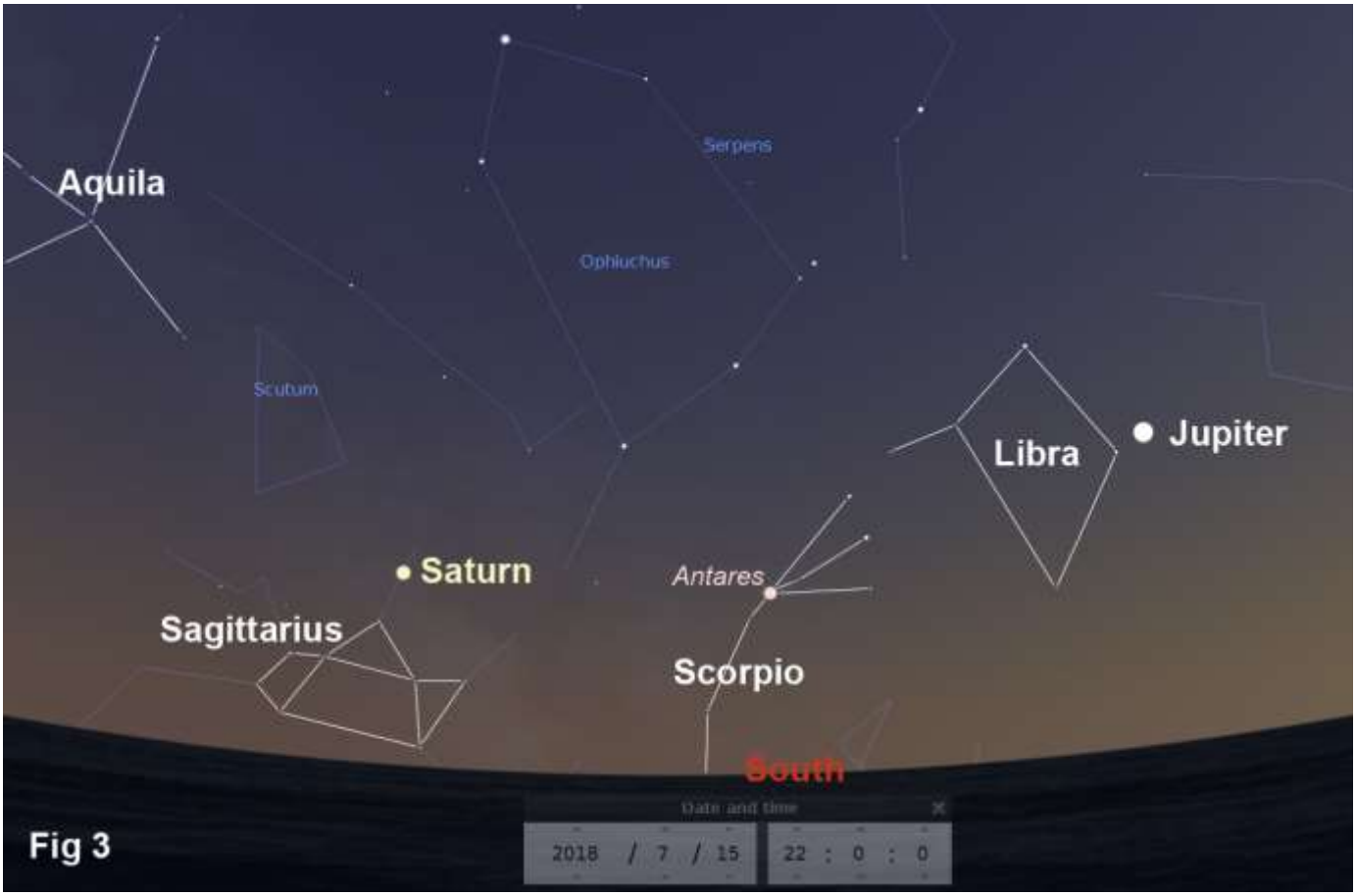
Mars rises at 23:15 at the start of the month but this has moved on to 21:15 by the end. The planet comes to opposition on July 27th (as shown in fig 2) when it will be 57.6 million kilometres from Earth. At that time its brightness will have increased to magnitude -2.8 (brighter than Jupiter at opposition this year) and its apparent size will have grown to a respectable 24.3" (24.3 arc seconds). A modest telescope will give a hint of surface markings although there has very recently been a dust storm, which covered parts of the planet. Mars is currently moving retrograde, east to west in Capricorn, a direction it will continue until late August. The planet's negative declination, -25° at the time of opposition, means that visibility is considerably limited with Mars just over 13° above the southern horizon on the night of opposition. Not only is the red planet a long way below the celestial equator, it is also 6° below the ecliptic, all of which means it is visible for 7 hours at best and reaches the meridian due south at 01:15 BST on the 27th.



Jupiter, despite reaching opposition in early May, is now better placed for observation being due south on the meridian at 21:00 at the beginning of July. The gas giant has lost a few tenths in magnitude since its closest approach to Earth but its apparent size is just a fraction below 40" (40 arc seconds) so it is nearly twice the angular size of Mars.

The planet spends the first part of the month moving retrograde in Libra but on the 11th it reaches its second stationary point after which it moves direct (west to east) once more. A waxing gibbous Moon is a little over 4° north of Jupiter on the evening of the 20th. Fig 3 shows the position of Jupiter in the middle of the month at 22:00 BST.

Saturn was at opposition at the end of June so it is still moderately well placed for observation. However, thanks to its location in Sagittarius, and the previously mentioned issues with the ecliptic at this time of day and year, it is around 01:00 by the time it culminates in the early part of the month. By mid July it rises in daylight (around 19:15) and reaches the meridian due south at 23:45 with an altitude of just 16°. The ringed planet's brightness and apparent size have only shrunk marginally since opposition although at magnitude +0.1 it is easily mistaken for a star. The ring angle continues to increase slightly enhancing the view we are presented with of the upper surface of the rings, though this is nothing to do with Saturn but rather the positions and axial tilts of our two planets as they move in their orbits. Fig 3 shows the planets location mid month at 22:00 BST.



Lunar Occultations

In the table below I've listed events for stars down to magnitude 7.0 that mostly occur before midnight although there are many others that are either of fainter stars or occur at more unsociable hours. DD = **d**isappearance at the **d**ark limb, RD = **r**eappearance at the **d**ark limb and RB = **r**eappearance at the **b**right limb. The column headed "mm" (millimetres) shows the minimum aperture telescope required for each event. **Times are in BST.**

July	Time	Star	Mag	Phase	Altitude °	% illumination	mm
July 03	01:08	ZC 3288	5.8	RD	11	81	60
July 04	03:52	ZC 3419	4.2	RD	26	72	40

Phases of the Moon for July

Last ¼	New	First ¼	Full
6th	13th	19th	27th

ISS

Below are details for passes of the International Space Station (ISS) this month where its brightness is in excess of -1.5. The details of other passes, including those visible between midnight and dawn, can be found at www.heavens-above.com. Please remember that the times and directions shown below are for when the ISS is at it's ***maximum*** elevation, so you should go out and look at least five minutes beforehand. **Times are in BST.**

July	Time	Mag.	Alt°	Az.		July	Time	Mag.	Alt°	Az.
17th	23:47:45	-2.0	19°	E		25th	21:35:59	-3.8	66°	SSE
18th	22:55:28	-1.9	15°	ESE		25th	23:12:29	-3.7	78°	N
19th	22:01:40	-2.0	14°	SE		26th	22:19:59	-3.7	80°	N
19th	23:37:36	-3.8	53°	SSE		26th	23:56:31	-4.0	78°	SSW
20th	22:45:18	-3.3	36°	SSE		27th	23:04:02	-3.9	87°	N
21st	21:53:03	-2.7	24°	SSE		28th	22:11:32	-3.7	79°	N
21st	23:29:13	-4.0	79°	SSE		28th	23:47:46	-3.6	51°	SW
22nd	22:36:50	-3.8	59°	SSE		29th	22:55:30	-3.9	71°	SSW
23rd	21:44:30	-3.4	41°	SSE		30th	22:03:01	-3.9	89°	S
23rd	23:20:52	-3.8	83°	N		30th	23:38:42	-2.6	29°	SW
24th	22:28:25	-3.9	85°	S		31st	22:46:51	-3.4	46°	SSW

Iridium Flares

The flares that I've listed are magnitude -1.5 or brighter although there are many more that are fainter or occur after midnight. If you wish to see a complete list, or obtain timings for somewhere other than Wadhurst, go to www.heavens-above.com. When one of these events is due, it is sometimes possible to see the satellite before and after the "flare" although, of course, it will be much fainter then. The event of July 6th is particularly bright with magnitude -8.2 being close to maximum brightness for these satellites. **Times are in BST.**

July	Time	Mag	Alt°	Az.°		July	Time	Mag	Alt°	Az.°
2nd	22:41	-6.3	23°	282° (WNW)		8th	22:50	-3.8	11°	300° (WNW)
3rd	22:37	-3.0	22°	284° (WNW)		8th	22:52	-2.8	11°	300° (WNW)
5th	22:42	-5.9	18°	290° (WNW)		25th	23:19	-1.9	20°	27° (NNE)
6th	21:36	-8.2	60°	51° (NE)		26th	23:13	-3.3	20°	28° (NNE)
7th	21:47	-5.6	18°	343° (NNW)						

The Night Sky in July (Written for 22.00hrs BST mid month)

If we look east we can see that all three members of the Summer Triangle have risen along with a group of small and faint constellations that fill the void between Cygnus and Aquila. Equuleus is the nearest to the horizon and closest to the head of the mythological winged horse which is as expected given that its name means "little horse". Then, moving north, we pass through Delphinus, Sagitta and Vulpecula, the latter of which has more interesting objects than you would expect given its diminutive size. It contains a number of open clusters, the brightest being NGC 6940 at magnitude 6.3. It is also home to the "dumbbell" nebula, otherwise known as M27 somewhat fainter at magnitude 8.1.

In the south Hercules is on the meridian with Boötes and Corona Borealis slightly to the west. Hercules is faint and indistinct so it is useful to be able to locate it easily. The simplest way is to imagine a line drawn from Arcturus through Alphekka (α CrB) and continue it generally north eastwards. This will bring you to the faint quadrilateral known as the "Keystone" which forms the lower part of the strong man's body. Incidentally, he is always drawn "upside down" with his head close to the stars of northern Ophiuchus. Below Corona Borealis we find Serpens Caput which forms the head of the Serpent whose dismembered tail, Serpens Cauda, lies on the opposite side of Ophiuchus. Within the head lies the globular cluster, M5, at magnitude 5.8. The tail section contains M16, also known as the Eagle Nebula, which is home to the "Pillars of Creation". Closer still to the horizon is the group of stars that form the head of Scorpio, of which the brightest is Antares also known as the "Rival of Mars".

Towards the west Leo, which currently contains the planet Venus, is preparing to set. Virgo just to the east of the lion will soon follow suit. Several of the area's globular clusters are still well placed like M53 in Coma Berenices at magnitude 7.7 and M3 in Canes Venatici at magnitude 6.4.

In the north the bright star Capella (in Auriga) is close the horizon and approaching the meridian whilst on the opposite side of the north celestial pole Ursa Minor stretches towards the zenith. The head of Draco lies close to the overhead point allowing the twists and turns of the dragon to be more easily followed. Cassiopeia and Cepheus both lie to the east of the meridian and contain a number of objects of interest. Within Cassiopeia we find not only a number of magnitude 6 and 7 open clusters but also the Heart and Soul nebulae. Cepheus contains the Elephant's Trunk nebula which should be visible to the naked eye under good conditions and the Iris nebula which is of the reflection variety.

Meteors

The Capricornids are thought to have three maxima on July 9th, 16th and 26th when ZHR's are expected to be in the order of 5. A nearby Moon in Sagittarius will interfere on the last of these dates.

The Delta Aquarids have two radiants providing maxima on two different dates, but only the first of these occurs during July. The initial maximum takes place on July 29 when ZHR's are expected to be around 20 although the radiant will not rise until 22.30 BST. An almost full Moon in Capricornus will seriously interfere with observations.

Lunar Eclipse

A total lunar eclipse will take place on July 27th with the Moon first entering the penumbral shadow at 18:14. Then first umbral contact occurs at 19:24 with maximum immersion at 21:22. The Moon will have left the Earth's umbra by 23:19 and the penumbra by 00:28. The umbra is the central part of the Earth's shadow whilst the penumbra is the lighter outer area (see fig 4). Whilst the effect of the former is very obvious, the effect of the latter could easily be missed by a casual observer.

Brian Mills FRAS

SPACEPLACE - NASA

This article is provided by NASA Space Place.
With articles, activities, crafts, games, and lesson plans, NASA Space Place encourages everyone to get excited about science and technology.
Visit **spaceplace.nasa.gov** to explore space and Earth science!

A Close-Up View of Mars
By Jane Houston Jones and Jessica Stoller-Conrad

In July 2018, skywatchers can get an up close view of Mars—even without a telescope! In fact, on July 31, Mars will be closer to Earth than it has been in 15 years.

Why is that?

Like all the planets in our solar system, Earth and Mars orbit the Sun. Earth is closer to the Sun, and therefore it races along its orbit more quickly. Earth makes two trips around the Sun in about the same amount of time that Mars takes to make one trip.

Sometimes the two planets are on opposite sides of the Sun and are very far apart. Other times, Earth catches up with its neighbour and passes relatively close to it. This is called Mars's closest approach to Earth, and it's happening this year on July 31. The Moon will be near Mars on that night, too!

Keep in mind that even during its closest approach, Mars is still more than 35 million miles away from Earth. That's really far. So, Mars won't appear as big as the Moon in the sky, but it will appear bigger than it usually does.

July and August will be a great time to check out Mars. Through a telescope, you should normally be able to make out some of the light and dark features of the Red Planet—and sometimes even polar ice. However, a huge Martian dust storm is obscuring these features right now, so less planetary detail is visible.

There is another important Mars date in July: Mars opposition. Mars opposition is when Mars, Earth and the Sun all line up, with Earth directly in the middle. This event is happening on July 27 this year.

Although you may see news focusing on one of these two dates, Mars will be visible for many months. For about three weeks before and three weeks after opposition and closest approach, the planet will appear the same size to a skywatcher.

From July 7 through September 7 Mars will be the third brightest object in the sky (after the Moon and Venus), shining even brighter than Jupiter. The best time to view Mars during this time is several hours after sunset, when Mars will appear higher in the sky.

Mars will still be visible after July and August, but each month it will shrink in size as it travels farther from Earth in its orbit around the Sun.

In other sky news, there will be a partial solar eclipse on July 13, but it will only be visible from Northern Antarctica and southern Australia. On July 27 (beginning at 20:21 UTC), a total lunar eclipse will be visible in Australia, Asia, Africa, Europe and South America. For those viewers, Mars will be right next to the eclipsing Moon!

If you're wanting to look ahead to next month, prepare for August's summer Perseid meteor shower. It's not too early to plan a dark sky getaway for the most popular meteor shower of the year!

You can catch up on NASA's missions to Mars and all of NASA's missions at www.nasa.gov

Caption: In 2018, Mars will appear brightest from July 27 to July 30. Its closest approach to Earth is July 31. That is the point in Mars' orbit when it comes closest to Earth. Mars will be at a distance of 35.8 million miles (57.6 million kilometres). Credit: NASA/JPL-Caltech

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