

Wadhurst Astronomical Society Newsletter February 2018

2018 SUBSCRIPTIONS

Subscriptions to the Wadhurst Astronomical Society became due from the 1st of January 2018. But at the AGM it was reluctantly decided that an increase had become necessary. The subscriptions remain at £18 per adult member and £25 for two family members at the same address until March 1st when they rise by £2 to £20 per adult and £27 for two family members at the same address. Members under 17 years of age and students remain free.

Subscriptions can be paid either by cheque made payable to Wadhurst Astronomical Society or as cash at the meetings or by post to:

John Wayte
Members Secretary
Wadhurst Astronomical Society
27 Pellings Farm Close
Crowborough
East Sussex
TN6 2BF

The Subscriptions can also be paid via electronic banking to:

Wadhurst Astronomical Society
Account Number **35104139**
Sort Code **60-22-15**

Putting your name as the **Reference** so we know who is paying.

WAS SUMMER VISIT 2018

This year we are planning a visit to the Royal Astronomical Society Library at Burlington House in Piccadilly, Central London. The Library holds an enormous and valuable collection of books and manuscripts that are in some cases unique. There is an archive of papers donated by the Herschel family, for example, chronicling observations and correspondence of William, John and Caroline. The visit is planned to take place during either May or June and will be on a weekday, the date of which is to be decided. If you would like to add your name to the list, please e-mail Brian using the address at the end of this Newsletter. Places will be allocated on a first come, first served basis.

MEETINGS

MEETING DATES FOR THE COMING YEAR FROM MARCH

February 21
March 21
April 18
May 16
June 20
July 18
August – No meeting
September 19
October 17
November 21
December 12 (2nd Wednesday)

JANUARY MEETING

Uplands were holding their Parents Evening in our usual venue so we returned for just this meeting to the Drama Studio where we held our meetings for many years.

Following Phil Berry's introduction, our Chairman Brian Mills, opened the Annual General Meeting which began by the report from our Treasurer, John Lutkin.

John said that we had an income over the year of £803, rounding up the general cost of running the Society came to £156, the cost of hiring our venue was £310 and speakers took another £347 leaving an operational deficit of £9. Our account in the bank holds £710 with a reserve of £502. Because of our slight deficit, it is necessary to increase our subscriptions from the first of March. Up until then, anyone renewing his or her subscriptions will be asked for last year's rate. From 1st March, an adult member's subscription will be £20 and for two family members at the same address it will be £27. Members under 17 and students remain free as mentioned above.

Phil Berry gave his report as Secretary and Librarian. He told the meeting that he has already filled this year's list of speakers, which is a considerable achievement. He then ran through the talks which will be announced in the newsletter and also on our website. They will also appear in Astronomy Now magazine. To keep costs low, he relies a lot on talks given by members.

Geoff Rathbone reported as editor of the Society's Newsletter. He thanked Brian for the considerably valuable Sky Notes, which appear each month. He also mentioned the NASA Space Place article that concludes the newsletter. These are excellent and contain up to date subjects. Space Place relies on the number of publications that carry their articles for funding and we receive a certificate each year in recognition.

Brian now gave the Chairman's report. During 2017 he and Phil had carried out a number of Outreach talks and events and since they are often asked back, it seems that they are appreciated. He also added that if enough members are interested, arrangements could be made to hold observing sessions on Ashdown Forest.

Brian also thanked committee members for their work during the year, particularly to Jim Cooper who provides the means of our coffee and biscuits break. Jim also provides the venue for our committee meetings.

Phil then introduced our speaker, Ian King, one of our longstanding members who has spoken to us on many occasions.

Remote Imaging in Spain

Ian King

Astronomical observing from the UK can be very challenging. We don't have that many clear nights and it can be cold and rather uninviting. But Ian said that technology today has advanced so much that the amateur can set up his telescope to be operated from the comfort of his own living room using a laptop and software that is now readily available, with electronic controls on the mount and telescope such as auto-focus and guider.

More and more remotely operated telescopes are becoming popular in locations where most nights are predictably clear. Because of the Internet, these observatories can now be thousands of miles away in places such as Spain and California where the climate is ideal. Ian became interested in such facilities a few years ago so he and his colleague Nik Szymanek, another leading amateur astrophotographer, began to look into what was possible.

Various locations around the world are hosting sites where amateur remotely operated telescopes can be set up, but many of them charge more than £800 a month!

A few years ago, Colin Cooper whom Ian knew approached him. Colin owned a villa in southern Spain just north of Alicante, that was just in-land from the Costa Del Sol near a place surrounded by mountains called Alcalali in the Jalon valley. Ian said that it was easy to get to having flown to Alicante airport and it was a dark site.



The Jalon Valley in Southern Spain



Observatory buildings near Alcalali

Ian said Colin was a very practical man. He had the walls and floors of the observatories built but made the roll-off roof entirely himself.



Interior of one of the buildings



Setting up the telescopes. From left to right, John Mills, Nik Szymanek and Colin Cooper

The picture above right shows Ian and Nik's earlier telescope being set-up. On the left is John Mills, who was once the technician at the Isaac Newton telescope at The Royal Greenwich Observatory and other telescopes. It was John that fixed all the computer problems. In the middle is Nik Szymanek and on the right is Colin Cooper who jointly runs the observatory.

We were told what is required to run a remote telescope from a laptop, such as a fully robotic mount, a telescope with auto-focussing, a CCD camera, automatic-imaging software and an observatory with Remote Imaging Facilities. One of the pre-requisites for the mount Ian stressed was that it should have the ability to "Home" and re-synchronise the telescope following any loss of control for any reason. Another essential is something to close the roof if the sky clouds over.

It was explained to us that Colin Cooper, as the man on site, spends a lot of time keeping all the telescopes working and solving the occasional problem that might occur.

Ian now turned to controlling the telescope remotely and told us that there are a number of automated imaging software packages available. They control the software that controls the mount, the camera, the guider and the focuser, permitting an imaging session to be previously set up.

We were also told about 'Plate Solve' where an image of an area of sky is taken by a CCD and this is compared with a known database, which very precisely determines the centre of the image. This is used as a reference so that in the future, the telescope mount returns the telescope exactly to that point, provided the mount is 'homed' before each session begins. This is necessary when imaging the same target night after night.

Ian intended to demonstrate a live session with his telescope in Spain during his talk, but having found that our venue for tonight had changed from our usual classroom, he had to quickly search for a signal with his mobile. He found the only place was a spot on the window ledge of the Drama Studio. This he found worked perfectly.

First, he connected to his remote laptop in Spain. This woke up the mount, which was now driven to the 'home' position to synchronise the telescope for the session. Having achieved this, Ian selected IC 454, the Horse Head Nebula as the target. We could now watch the telescope slewing across the night sky, which in doing so had to perform a meridian flip to prevent the cables becoming taugt.

Having arrived at the target it took only a few minutes before the remarkable image of the nebula appeared on the screen.



Live image taken from the screen of the Horse Head Nebula seen from Spain

The above image took just 30 seconds with Ian's 6-inch refractor in Spain.

We were then shown how an imaging session is set up using "CCD Autopilot" to control the CCD, the mount and the focuser. The programme also took dark and flat fields to enable the image from the CCD to be calibrated.

A number of short exposures were taken and used to find exactly where the telescope was pointing in the night sky and then compared this with the database. A suitable star was then found and used to finely adjust the focus.

Once this was complete, a guide star was found and the session could begin with a number of checks to make sure the best possible focus had been achieved. Having slewed back to the target, a 'plate solve' image was taken, but at this point, the image was lost and Ian believed that the roof-sensor had detected a change in the weather and closed the observatory roof.

This, at least had allowed Ian to demonstrate how a session was prepared and conducted. We had been fortunate to see as much as we had.

Ian concluded by showing some of the remarkable images he had taken from Spain. He explained that some of the data had taken as long as 80 hours to achieve the images. Many were taken with narrow band filters, a system he said that was developed by the Hubble team, using hydrogen, oxygen and sulphur filters.



The Propeller Nebula in Cygnus



The Pacman Nebula in Cassiopeia



The Pelican Nebula in Cygnus



The Veil Nebula in Cygnus



The Horse Head Nebula in Orion
previously imaged by Ian

It is astonishing to think that images like this could be taken overnight whilst Ian was in the comfort of his own home with just the processing to be done during the day. That is the way Ian describes it, but I think a tremendous amount of effort and original care and preparation work was involved to achieve anything like the above.

Following the coffee break our Treasurer gave the following fascinating talk.

Solar Wind

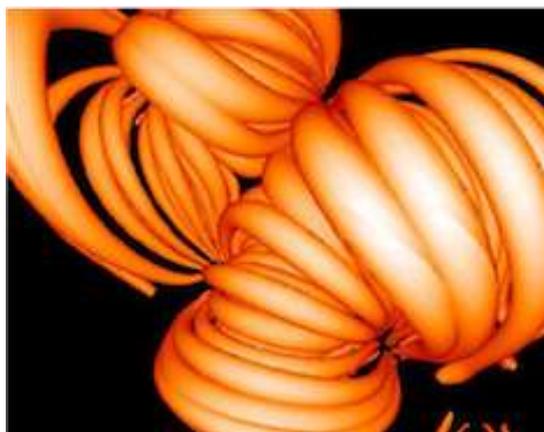
John Lutkin

Later this year, the Society is having a talk about magnetism and ionisation in the sun and John said his short talk should be regarded as a trailer.

He said normally positive particles repulse each other, but within the Sun they are forced together by the tremendous mass and gravitational pull. These particles encounter something John explained was called Quantum Tunnelling where at any time it is not certain where the particles are and sometimes they can cross the barrier. A lot of energy is released within the Sun and this is known as fusion; then we have helium-forming hydrogen.

John said that in larger stars with their greater forces, it is far more complicated and the result is bigger atoms.

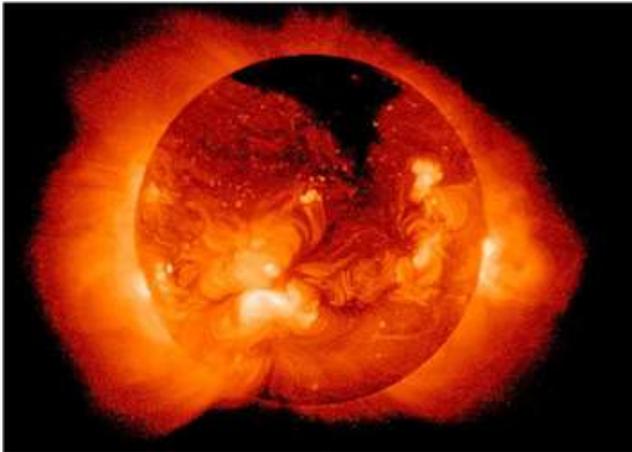
The flow of electrically charged particles creates enormous magnetic fields. As these increase it gives rise to what John called Loops. He likened this to twisting cotton until it coils up.



An idea of how the magnetic fields form loops

He described the Solar Wind as having its source in the outer atmosphere of the Sun, called the Corona. It has been found that the gases in the Corona reach 1,000,000°C. He said that emission lines show hydrogen and helium as being the main components, although many have their electrons stripped away.

We were shown an image of the corona in x-ray, which revealed what John called Coronal Holes, associated with magnetic fields, often near the poles and this is where the high speed solar wind mainly originates.

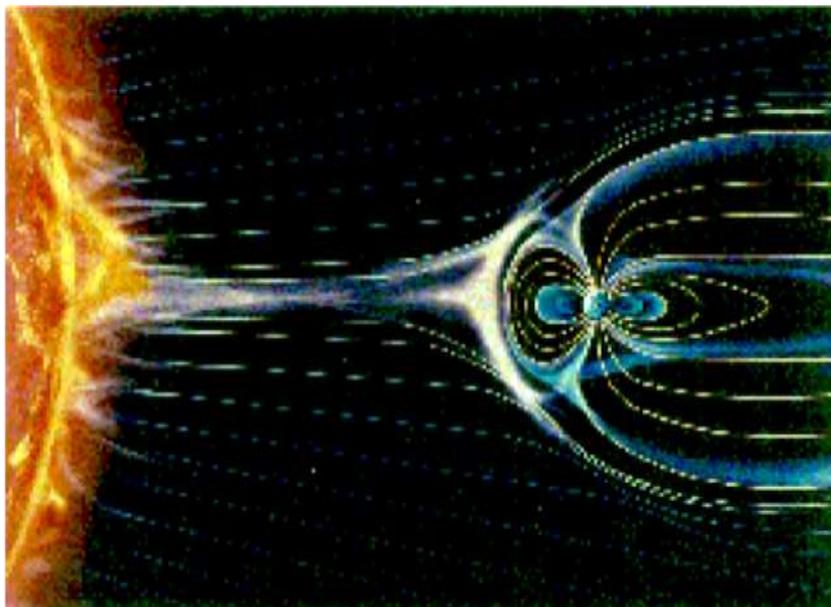


The Sun's Corona in x-ray showing the coronal holes particularly near the poles

The solar wind is a stream of highly ionised magnetised plasma consisting predominantly of hydrogen and helium and leaves the Sun at different speeds. The high-speed solar wind reaches speeds of nearly 2 million miles an hour consisting of something like 4 atoms per cubic centimetre.

We were told that it is not understood why the Sun's atmosphere can reach a million degrees when the surface is about 5,800 K. There is some thought that components of the Sun might be acting like a particle accelerator but this is not certain.

On the first of September 1859 Richard Carrington, a British amateur astronomer recorded two white spots on the Sun, brighter than anything else on the rest of it. He believed this to be a magnetic explosion. The following day, it was reported that operators at a USA telegraph office were getting electric shocks from their equipment and the sky had taken on a very unusual colour over a wide area. Through ice cores it has been found that this was the most powerful aurora, the result of solar wind, for over 500 years.



John showed a diagram of the Earth's 'deflector shields' that provides our protection.

He finished by saying he fears for what might happen today following a "Carrington Event"!

FEBRUARY MEETING

21 February 2018 – Dr Graham Appleby tells us about “Monitoring Sea Levels from Space – The Role of Geodesy”

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. 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 if they wouldn't mind contributing £3 towards costs.

FUTURE MEETINGS

21 March 2018 – A welcome return from William Joyce whose subject this time is “Asteroids & Comets”

18 April 2018 – Barry Soden returns to enlighten us on “Daylight Skies”

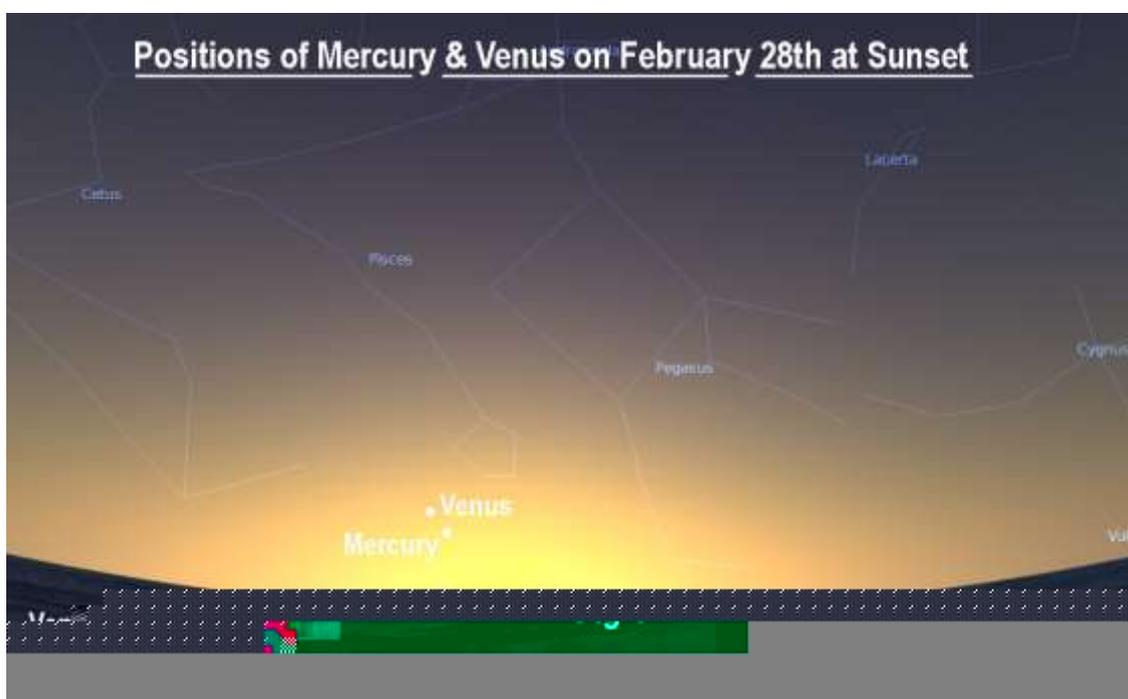
16 May 2018 – Colin Stuart tells us “ How to Weigh the Universe”

SKY NOTES FOR FEBRUARY 2018

Planets

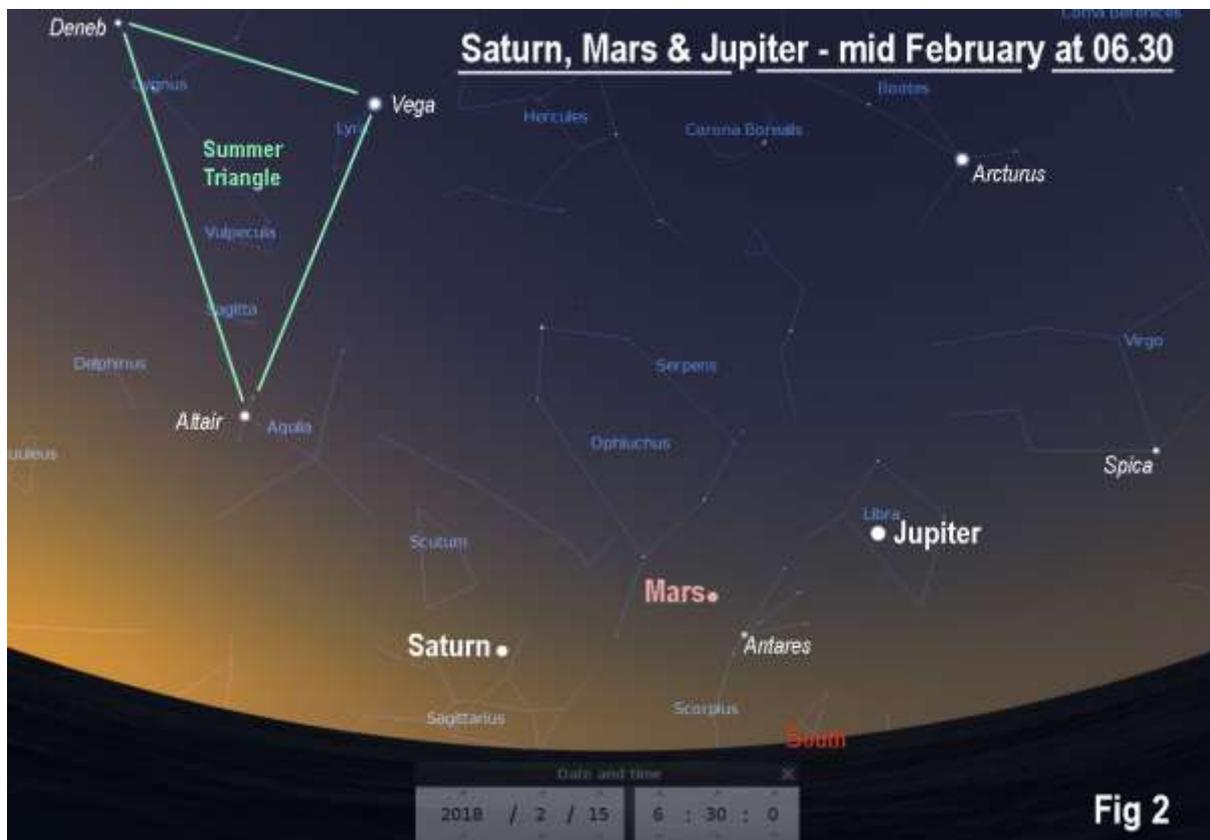
Mercury is a morning object at the start of the month although its declination is almost the same as the Sun so that the two rise together meaning there is no realistic chance of observation. However, following superior conjunction on February 17th the planet moves into the evening skies and heads towards greatest elongation, which will occur on March 15th. This will be one of the best evening opportunities to see Mercury during 2018. By the end of February it may just be possible to glimpse Mercury, a little south and west of the brighter Venus, with binoculars although **do not sweep for them until after the Sun has set**. Fig 1 shows the positions of both planets on the last day of the month at sunset.

Venus is now an evening object although it begins February too close to the Sun for observation, and as the month moves on its elongation (from the Sun) only increases gradually. Its position at the end of February is shown in fig 1 and as you can see it is only 10° high at sunset on the 28th when it shines at magnitude -3.9. Its observability improves as the months pass with greatest elongation occurring in mid August although by that time the change in position of the ecliptic will have a seriously negative impact on the planets altitude.



Mars, in an effort to confound the astrologers, moves from Scorpio into the non-zodiacal Ophiuchus on February 8th. It then travels briskly eastwards, covering the majority of the southern part of that constellation although it is mid March before it reaches the border with Sagittarius. The red planet is currently in the morning skies, rising at 03.00 at the start of the month. By mid-month it is close to culminating by the time the Sun has reached 6° below the horizon (the end of nautical twilight and the beginning of civil twilight). The planets size and brightness both continue to grow as it heads towards opposition at the end of July. On the morning of the 8th Mars lies between the red star Antares (whose name means “Rival of Mars”) and a waning crescent Moon. Fig 2 shows the position of Mars in the middle of the month.

Jupiter is also a morning object although by the end of the month it rises only just after midnight meaning that before long it will be a welcome addition to the evening skies once more. It spends the month within the confines of Libra (see fig 2) despite moving gradually eastwards. By the end of February the planets diameter has grown to 39" (39 arc seconds) and its brightness has risen to a striking magnitude -2.2. Sadly its altitude, even at opposition in early May, is going to be a rather disappointing 23°.



Saturn is the third of the trio of planets currently in the pre-dawn skies. At the beginning of February it rises at around 05.30 GMT but by the end this has become 04.00 GMT. On the last day of the month Saturn is 13° in altitude in the south-south-east, amongst the star fields of the Milky Way, when the Sun is 6° below the horizon. As with Mars and Jupiter, Saturn is also approaching opposition, which, in the case of the ringed planet, will occur in late June. Its current brightness is +0.6 whilst its angular size is 15.7" (15.7 arc seconds) if you ignore the rings but 35.6" if you include the rings. The mid-month position of Saturn at 06.30 is shown in fig 2.

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 = disappearance at the dark limb, RD = reappearance at the dark limb and RB = reappearance at the bright limb. The column headed "mm" (millimetres) shows the minimum aperture telescope required for each event.

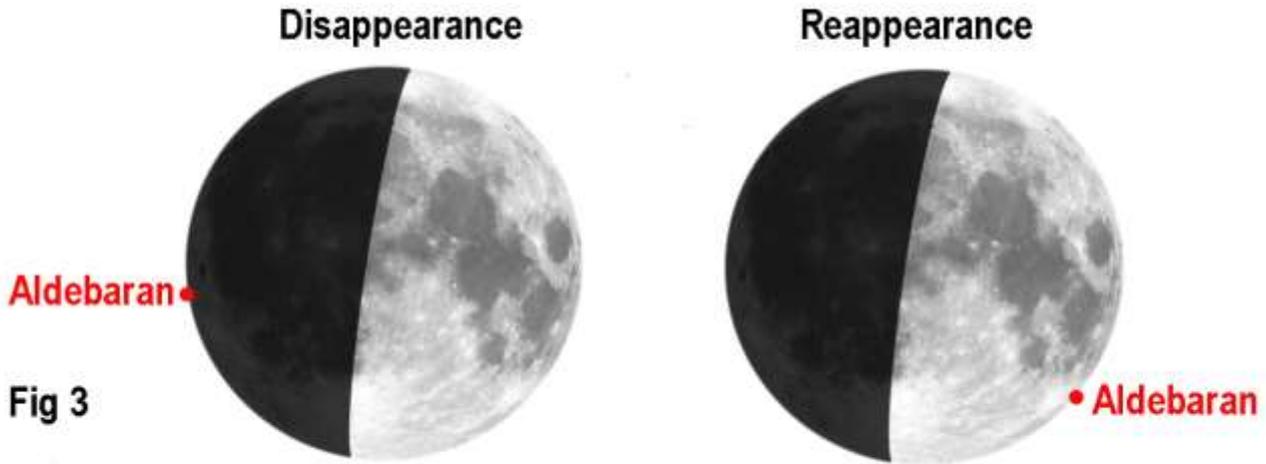
The Moon visits the Hyades cluster once again with an occultation of Aldebaran occurring in the late afternoon when the Sun is still above the horizon. However, the prediction software suggests that a very moderate aperture is required to see the brightest star in Taurus disappear behind the dark limb of the Moon which, at that time, will be at a very respectable altitude. Fig 3 shows the position of the star at disappearance and reappearance.

Times are in GMT.

Feb.	Time	Star	Mag	Phase	Altitude °	% illumination	mm
Feb 18	17.39	SAO 128661	6.6	DD	21	8	80
Feb 19	17.28	ZC 150	6.1	DD	32	14	80
Feb 20	20.52	ZC 291	6.8	DD	15	24	50
Feb 21	17.26	ZC 405	4.3	DD	48	32	40
Feb 21	17.44	ZC 405	4.3	RB	47	32	130
Feb 23	16.37	Aldebaran	0.9	DD	50 (Sun +7°)	54	40

Feb 23	17.44	Aldebaran	0.9	RB	55 (Sun -3°)	55	40
Feb 24	20.39	ZC 863	6.7	DD	54	67	70
Feb 24	22.02	ZC 871	6.7	DD	45	67	70
Feb 28	17.52	ZC 1434	5.4	DD	18	98	70

Aldebaran Occultation – February 23rd



Phases of the Moon for February

Last ¼	New	First ¼	Full
7 th	15 th	23 rd	

ISS

Below are details for passes of the International Space Station (ISS) this month where its brightness is in excess of -2.0. 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 its *maximum* elevation, so you should go out and look at least five minutes beforehand. **Times are in GMT.**

Feb.	Time	Mag.	Alt°	Az.	Feb.	Time	Mag.	Alt°	Az.
1 st	17:30:29	-3.3	50°	SSE	6 th	19:33:02	-2.0	31°	WSW
1 st	19:06:25	-3.4	60°	WNW	7 th	18:41:40	-3.5	61°	SSW
2 nd	18:14:29	-3.9	88°	N	8 th	17:49:12	-3.8	81°	SSW
3 rd	18:58:31	-3.9	79°	NNW	8 th	19:25:23	-2.0	25°	SSW
4 th	18:06:07	-3.9	78°	N	9 th	18:33:02	-2.6	38°	SSW
5 th	18:50:10	-3.9	86°	S	10 th	17:40:36	-3.1	55°	SSW
6 th	17:57:42	-3.9	82°	N					

Iridium Flares

The flares that I've listed are magnitude -2.5 or brighter although there are a lot 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. **Times are in GMT.**

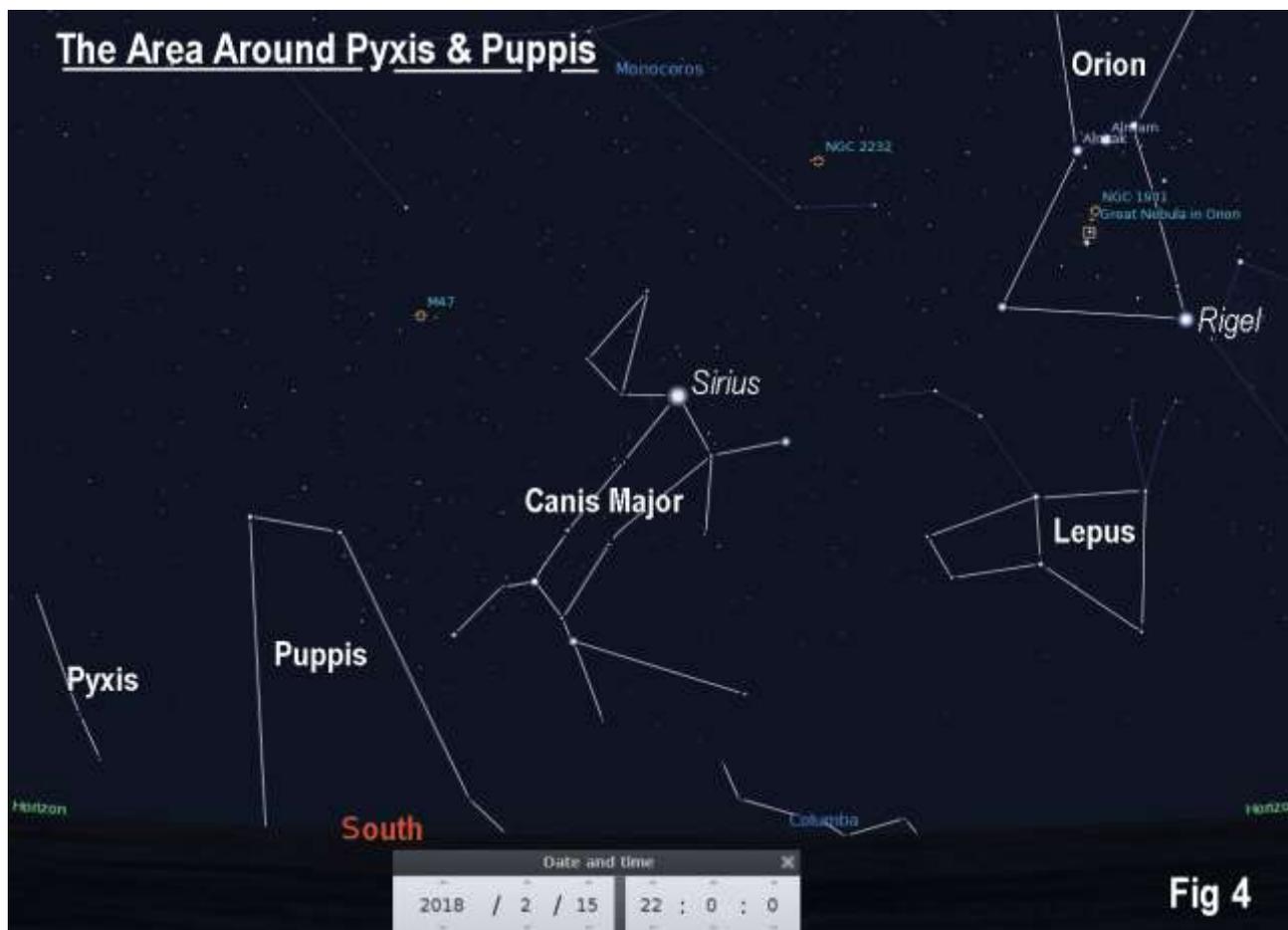
Feb.	Time	Mag	Alt°	Az.°	Feb.	Time	Mag	Alt°	Az.°
3 rd	17:35	-7.5	36°	191° (S)	20 th	17.53	-4.7	11°	279° (W)
7 th	19.00	-5.1	43°	146° (SSE)	20 th	18.06	-3.2	47°	181° (S)
9 th	17.21	-6.3	33°	203° (SSW)	21 st	18.02	-3.4	47°	184° (S)
10 th	17.49	-6.4	10°	279° (W)	22 nd	17.56	-5.5	46°	185° (S)
16 th	18.23	-7.9	47°	169° (S)	25 th	19.23	-8.1	50°	133° (SE)
17 th	18.17	-2.9	47°	171° (S)	27 th	17.55	-5.2	51°	187° (S)

Partial Solar Eclipse

A partial eclipse of the Sun occurs on February 5th though none of the event is visible from the UK. However, there are usually some internet feeds that will allow you to watch the Moon's progress in front of the Sun. The eclipse begins at 18.56 GMT and ends at 22.47 GMT.

The Night Sky in February (Written for 22.00hrs GMT mid month)

In the east Arcturus is ten degrees in altitude with Corona Borealis just a little below it. Both Hercules and Virgo have yet to completely clear the horizon as they prepare to become summer constellations once again. Just over 10° north of Arcturus lies M3 (NGC5272), which is possibly the second finest globular visible from the UK. At magnitude 6.3 it is at the absolute limit of naked eye visibility, although binoculars will easily show it, whilst apertures of around 120mm will resolve it comfortably. Between the stars of Virgo and the tail of the Great Bear lies the faint constellation of Coma Berenices which contains the north galactic pole as well as, on a more temporary basis, the rather faint dwarf planet Makemake at magnitude 16.9.



To the south we find Cancer close to the meridian with the open cluster, known as either the Beehive or Praesepe preparing to culminate at an altitude of nearly 60°. As with many open clusters it covers a comparatively large area of the sky, and in this particular case it spans some 95 arc minutes. Below Cancer lies the head of Hydra (the Water Snake) whose body winds south eastwards until it disappears below the horizon. If you have a good southerly aspect look to see if you can find the two most northerly of the bright stars in Puppis, which represents the poop deck of the ship Argo Navis. This was, in mythology, the vessel that Jason and the Argonauts used to go in search of the Golden Fleece. The original constellation was so cumbersome that the French astronomer Lacaille subdivided it into three separate entities. To the east of Puppis lies a line of three stars that makes up the only obvious form within the constellation of Pyxis (the compass). The area is shown in fig 4.

Looking to the west we find Orion and his retinue are all still visible with Canis Major's brightest star, Sirius, still twenty degrees in altitude. To the east of Orion lies the faint and shapeless form of Monoceros where there are a number of open clusters and nebulae, NGC 2232 and NGC 2264 being good examples of each, but no bright galaxies. Capella lies due west at this time but is still 65° above the horizon.

Towards the north we find that two members of the Summer Triangle, Deneb and Vega are both visible close to the horizon although Vega, in particular, is very low. Above them Cepheus and Cassiopeia occupy the sky to the west of the meridian whilst to the east of it lie Draco and the two bears. Ursa Major is heading towards the meridian with its front paws almost at the zenith, whilst on the other side of the overhead point lies the faint constellation of Lynx. It has only one star with a Bayer classification, alpha at magnitude 3.1, which explains why it is so inconspicuous. However, now is an ideal time to identify it given its altitude. The famous double cluster, between Perseus and Cassiopeia is still moderately well positioned at an altitude of 45° in the northwest.

SPACEPLACE - NASA

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Sixty Years of Observing Our Earth

By Teagan Wall

Satellites are a part of our everyday life. We use global positioning system (GPS) satellites to help us find directions. Satellite television and telephones bring us entertainment, and they connect people all over the world. Weather satellites help us create forecasts, and if there's a disaster—such as a hurricane or a large fire—they can help track what's happening. Then, communication satellites can help us warn people in harm's way.

There are many different types of satellites. Some are smaller than a shoebox, while others are bigger than a school bus. In all, there are more than 1,000 satellites orbiting Earth. With that many always around, it can be easy to take them for granted. However, we haven't always had these helpful eyes in the sky.

The United States launched its first satellite on Jan. 31, 1958. It was called Explorer 1, and it weighed in at only about 30 pounds. This little satellite carried America's first scientific instruments into space: temperature sensors, a microphone, radiation detectors and more.

Explorer 1 sent back data for four months, but remained in orbit for more than 10 years. This small, relatively simple satellite kicked off the American space age. Now, just 60 years later, we depend on satellites every day. Through these satellites, scientists have learned all sorts of things about our planet.

For example, we can now use satellites to measure the height of the land and sea with instruments called altimeters. Altimeters bounce a microwave or laser pulse off Earth and measure how long it takes to come back. Since the speed of light is known very accurately, scientists can use that measurement to calculate the height of a mountain, for example, or the changing levels of Earth's seas.

Satellites also help us to study Earth's atmosphere. The atmosphere is made up of layers of gases that surround Earth. Before satellites, we had very little information about these layers. However, with satellites' view from space, NASA scientists can study how the atmosphere's layers interact with light. This tells us which gases are in the air and how much of each gas can be found in the atmosphere. Satellites also help us learn about the clouds and small particles in the atmosphere, too.

When there's an earthquake, we can use radar in satellites to figure out how much Earth has moved during a quake. In fact, satellites allow NASA scientists to observe all kinds of changes in Earth over months, years or even decades.

Satellites have also allowed us—for the first time in civilization—to have pictures of our home planet from space. Earth is big, so to take a picture of the whole thing, you need to be far away. Apollo 17 astronauts took the first photo of the whole Earth in 1972. Today, we're able to capture new pictures of our planet many times every day.

Today, many satellites are buzzing around Earth, and each one plays an important part in how we understand our planet and live life here. These satellite explorers are possible because of what we learned from our first voyage into space with Explorer 1—and the decades of hard work and scientific advances since then.

To learn more about satellites, including where they go when they die, check out NASA Space Place:

<https://spaceplace.nasa.gov/spacecraft-graveyard>



This photo shows the launch of Explorer 1 from Cape Canaveral, Fla., on Jan. 31, 1958. Explorer 1 is the small section on top of the large Jupiter-C rocket that blasted it into orbit. With the launch of Explorer 1, the United States officially entered the space age. Image credit: NASA

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Wadhurst Astronomical Society website:
www.wadhurstastro.co.uk

SAGAS website:
www.sagasonline.org.uk

Any material for inclusion in the March 2018 Newsletter should be with the Editor by February 28th 2018