NEWBURY ASTRONOMICAL SOCIETY
MONTHLY MAGAZINE - FEBRUARY 2015

COMET LOVEJOY 2014 Q2

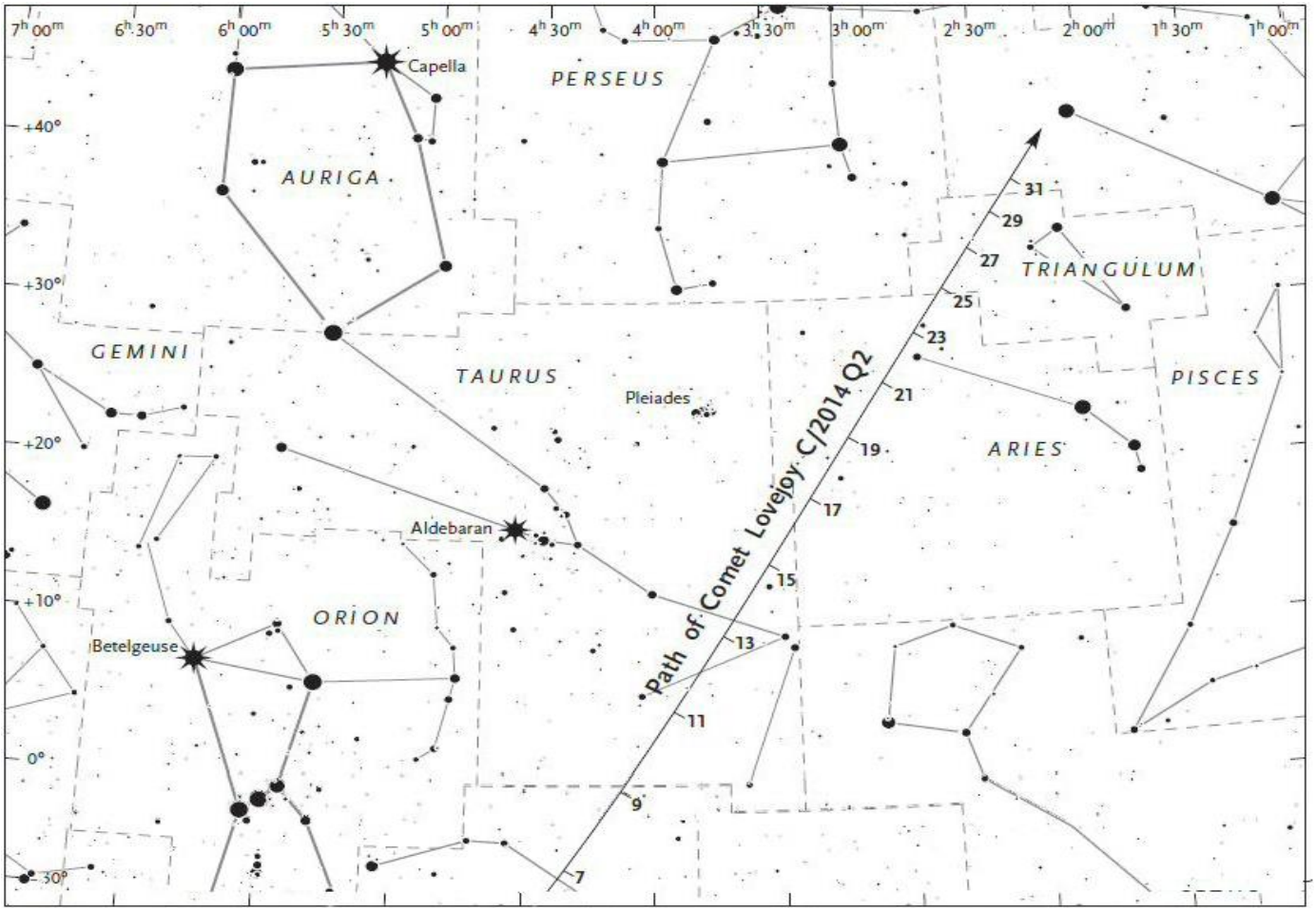


Chart showing position of Comet Lovejoy during January

Comet Lovejoy has been steadily moving north from its starting point in the constellation of Lupus below the familiar shape of Orion. The chart above shows the path that the comet took through January to where it will be located at the beginning of February. The comet has been bright enough to see easily using 9 x 50 binoculars and from a dark location could even be seen with the naked eye.

An image of Comet Lovejoy 2014 Q2

The comet was at its closest to Earth on 7th January, at a distance of 70 million km. Since then it has been receding night by night through the constellations of Taurus and Airies. Although it was moving away from us it was getting closer to the Sun so its brightness remained about the same.

On 9th January the comet crossed into Taurus then on 16th January the comet left Taurus and moved across into Aries. It passed just 8° to the west (right) of the Pleiades on the evenings of 19th and 20th January giving a great imaging opportunity. Lovejoy moved to its closest point to the Sun on 17th January when it was just 194 million km from the Sun.

During February it will move upwards through Andromeda and Perseus. The comet will begin to fade steadily it makes its way towards and passing very close to Polaris next May when it will have faded to just 12th magnitude. See page 6.

NEXT NEWBURY ASTRONOMICAL SOCIETY MEETING

6th February 21st Century Space Flight

Website: **www.newburyas.org.uk**

NEXT NEWBURY BEGINNERS MEETING

18th February Jupiter - King of the Planets

Website: **www.naasbeginners.co.uk**

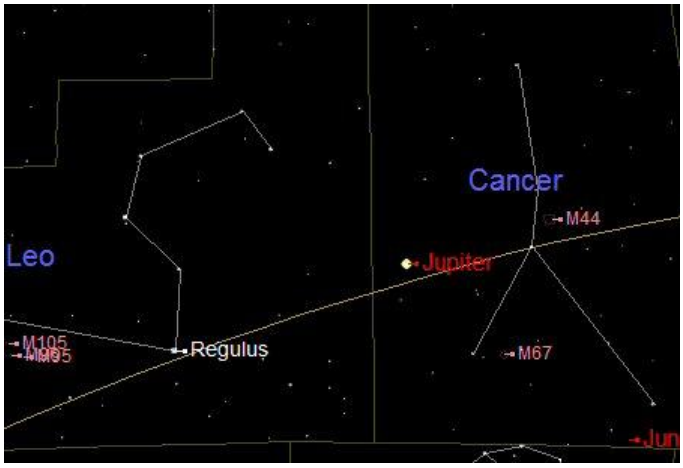
OBSERVING JUPITER

Jupiter will be reaching Opposition on 6th March 2015 and will be in perfect position for observing. Opposition is the exact time that Earth will be overtaking Jupiter on the respective orbits of the two planets. Earth travels much faster along its smaller orbit around the Sun so catches up and overtakes Jupiter about every 13 months. At opposition the two planets will be at their closest at about 628 million kilometres.

At this time of year the 'Ecliptic' (the imaginary line along which the Sun, Moon and planets appear to move across the sky) is high in the sky during the night due to the 23º tilt of Earth's axis. The ecliptic is low during the day which makes the Sun appear very low in the winter sky. With the ecliptic high at night Jupiter appears high in the sky and in relatively clean and stable air away from the murky and turbulent air closer to the horizon.

Jupiter is visible most of the night, rising in the east at about 16:50. It will be observable in the east as soon as it is dark and will set over the western horizon at about 07:30. Jupiter is easy to find as it is very bright, in fact it is the brightest object in the night sky except for the Moon.

By 8 o'clock in the evening (20:00) Jupiter will be rising high enough in the south east to be in a good position for observing in the constellation of Cancer (the Crab). Jupiter is located just inside the constellation of Cancer near the border with Leo.

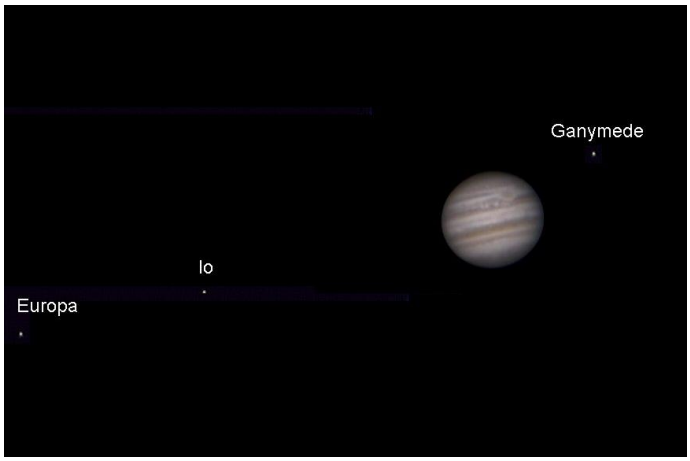


Jupiter located in the constellation of Cancer

A good pair of 9 x 50 binoculars will just about show the four bright moons known as the Galilean Moons. These four bright moons are called the 'Galilean Moons' after Galileo who first recorded seeing them. The surface of the planet has many bands or 'belts' of different colours two of which can be seen even using a small telescope. A larger telescope is required to see the detailed markings on the surface. The North and South Equatorial Belts are located, as the names suggest, above and below the white Equatorial Zone.

These belts are mainly different shades of browns with variations from yellow through orange to chocolate brown. There are even reds especially in the famous Great Red Spot although it is in fact more pink than red. The Great Red Spot is a massive storm much larger than the size of the Earth. It has been raging since before the invention of telescopes and was observed by early astronomers using primitive telescopes 350 years ago.

Jupiter is the best of all the planets to observe with a small telescope of 100mm aperture or less. It is even possible to make interesting observations of the positions of the moons using a reasonably good pair of 9 x 50 binoculars. A telescope is however required to see the coloured cloud belts. A small to medium sized telescope (100mm to 150mm aperture) could give a view something like the image shown below (but not quite as clear).



Jupiter and three Moons imaged in 2010 by Steve Harris

The Galilean Moons can be seen changing position to either side of Jupiter so it is good fun to track them from night to night or even through the night. Sometimes there may be only three or even two moons visible when one or two are passing in front or behind the planet. They can be distributed in any pattern and may even be all gathered to one side at times.

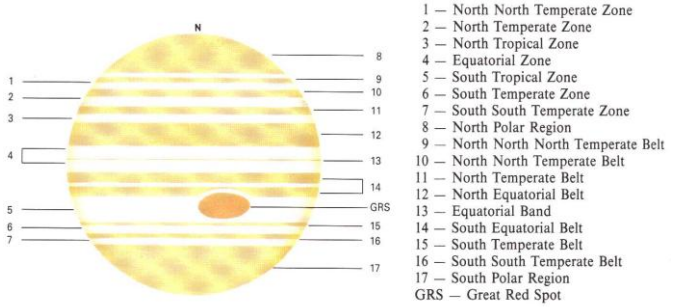
A small telescope (100mm aperture) will be able to show details of some of the interesting events concerning the movements of the moons around Jupiter. Jupiter has a small tilt angle 3.07° compared to many of the other planets including Earth at 23.45°. Consequently its moons regularly appear to pass in front and behind the planet. This can make observing Jupiter very interesting.

When a moon passes in front of a planet it is said to 'transit' the planet. Most computer planetarium applications will be able to predict these events very accurately. Using an accurate clock the event can be observed and the predicted timings checked. Using a high magnification (100x or more) the moon can be followed as it approaches the edge of Jupiter. As the gap between the moon and Jupiter closes the moon will eventually appear as a 'pimple' on the edge of the planet. The time that the 'pimple' finally disappears can be recorded. The time when the moon reappears on the opposite side of the planet can also be predicted and the timing checked in a similar way. It is very difficult to see the moon as it transits the bright surface of Jupiter but the shadow of the moon is quite easy to see. The [eclipse] shadow can also be predicted using a computer planetarium application. The shadow looks very black against the bright surface of Jupiter so the passage of the shadow can be tracked and timed quite easily.

When a moon passes behind a planet it is said to be 'occulted' by the planet. Occultations can be followed in a similar way to transits. See Page 4.

Jupiter will appear high in the night sky this year so it will be a good year for observing it. On the 6th February 2015 Jupiter will be at opposition. This means it will be directly opposite the Sun in our sky and therefore due south at midnight Greenwich Mean Time (GMT). When at opposition Jupiter will be about 50° above the horizon and 45.4 arc-seconds in diameter therefore looking very bright. Jupiter always displays an almost full disc but can lose a tiny amount from the edge when it is at greatest elongation (at about 90° from the Sun as we view it from Earth). However Jupiter will appear absolutely full to the untrained eye. For these reasons Jupiter will be as good as it gets subject to clear skies.

For those who are lucky enough to have a larger telescope a closer study of the features in Jupiter's cloud system can be achieved. The darker bands on the clouds are known as 'Belts' and the lighter ones known as 'Zones'. The belts are numbered 9 to 16 in the diagram below and the most prominent (North and South Equatorial Belts) 12 and 14 can be seen using a small telescope. A larger telescope is required to make out the details of the other less prominent belts.



The cloud markings on Jupiter

The Belts and zones are regions of higher and lower atmospheric pressure. The lighter coloured 'Zones' are regions of rising gas caused by convection of heat from the core of Jupiter. The darker 'Belts' are regions of falling gas and are approximately 20 kilometres lower in altitude than the zones. In the regions where the belts and zones meet huge storms are created as the belts and zones move at different speeds and directions. A larger telescope will allow some of detail of the storm patterns to be seen.

The most famous feature in the cloud system is the 'Great Red Spot' (GRS). This huge storm has been raging for at least 350 years. We know this because it was recorded by astronomers in 1664 using some of the earliest telescopes. The GRS does change colour and shape but it is always there. Its colour may fade from its pink to nearly white when it may almost disappear. The colour is thought to be caused by Phosphorus welling up from deep in Jupiter's atmosphere.

The GRS is not the only storm feature to be seen. There are white spots and even mini red spots. These tend to be transient and last from just a few days or weeks but others may persist for up to fifty years. Spots can combine with other spots as they move along the boundaries between the belts and zones. Some larger spots have even been swallowed up by the GRS. Over the last couple of years there was a lot of turbulence around the GRS with eddies running along the South Tropical Zone and around the GRS.

As Jupiter is so large (for a planet) it is the easiest planet to image through a telescope. The cheapest way to do this is to use a computer web camera. By removing the lens of the webcam and replacing it with a special adaptor (available from astronomy shops for about £20) the webcam can be mounted in place of the eyepiece. With the webcam connected to a computer via a USB port a short video of Jupiter (1 to 2 minutes) can be recorded on to the hard drive.

It is then necessary to download a free piece of software from the internet called 'registax'. This application can automatically align each frame of the video then stack all the images from each frame on top of each other. The result is all the features on the surface of the planet that are in the same place on the images are added and the features become clearer on the finished single image. The image can even be enhanced using the built in processing screen in registax. The image below was taken using a webcam on 14th November 2012 and shows some of the turbulence around the Great Red Spot in the South Tropical Belt. The Tropical Belts are mentioned on the previous page (South is at the top of the image). The moon Ganymede can also be seen to the right of Jupiter.

Jupiter imaged on 14th November 2012 by Steve Harris

Another computer application that can be downloaded free from the internet is a computer planetarium application. The events happening around Jupiter can be predicted using these applications and then followed using a telescope. One of the best and most popular computer planetarium applications to download is 'Stellarium'. This and other applications can be used to predict what is going to happen around Jupiter during any clear night before observing is started.

Jupiter is now appearing 'side on' as we look at it from Earth. This means we see the orbits of the moons on a flat plane which is almost aligned to the equator of Jupiter. As a consequence the moons pass in front or behind Jupiter on every orbit and not above or below as they do most of the time. This makes observing Jupiter very interesting. We can watch the moons approach the planet to disappear behind or in front of Jupiter and then watch them reappear an hour or two later. We can also see their shadows as they pass in front and project their shadow on to the planet. Because all the moons are in the same plane for the next few months they also pass behind or in front of other moons which makes things even more interesting. These events are called: 'Mutual Events' and also involve 'Transits' and 'Occultations'.

EVENTS ENVOLVING JUPITER's MOONS

With the help of a computer planetarium application the events happening around Jupiter can be predicted and followed using a telescope. There are computer planetarium applications such as 'Stellarium' that can be downloaded free from the internet. These applications can be used to predict what is going to happen around Jupiter and the other planets before starting an observing session on a clear night.

Eclipses occur when a moon casts its shadow on to Jupiter. It is quite easy to see because the eclipse shadow looks like a black full stop on the planet. Moons can also be eclipsed as they pass through the shadow cast by Jupiter.

Transits occur when a moon passes in front of Jupiter. The moon is actually very difficult to see while it is in front of the planet as it is lost in the glare from the surface.

Occultations occur when a moon passes behind the planet. Occultations and Transits are easy to follow with a telescope as the moon approaches Jupiter.

For telescopic observers, the table on page 5 contains the complete list of events involving Jupiter's four bright moons and the planet's disk or shadow.

The left hand column gives the date.

In the data columns, the midpoint time of the event in Universal Time (GMT) is given first.

Then the moon involved (Roman numerals I to IV):
I for Io II Europa III Ganymede IV Callisto

This is followed by the type of event:
Oc for an occultation of the moon behind Jupiter's limb
Ec for an eclipse of a moon as it passes through Jupiter's shadow
Tr for a transit of the moon across the planet's face
Sh for the moon casting its eclipse shadow on to Jupiter

An occultation or eclipse begins when the moon disappears (D) and ends when it reappears (R).
A transit or shadow passage begins at ingress (I) and ends at egress (E).

MUTUAL EVENTS OF JUPITER's MOONS

Mutual Events are the interactions of Jupiter's moons with the other moons. These may be Eclipses, Occultations and Transits that can be followed with the help of computer planetarium applications. An eclipse occurs when one moon casts its shadow on to another moon. Occultations occur when one moon passes behind another moon and is hidden from view. A Transit is where one moon passes across the disc of another moon. Eclipses are one moon's shadow on another.

The following chart shows details of the 'Eclipse Mutual Events' that will occur during February. Column 3 (headed Moons) identifies the moons as: '1' Io, '2' Europa, '3' Ganymede, '4' Callisto. 'e' indicates that the first moon will produce an eclipse shadow on the second moon.

As an example the first event on 2nd February '3e4' predicts an eclipse shadow from Ganymede appearing on Callisto starting at 01:37 and ending at 01:41.

Date		Moons	Start	End
Feb	2	3e4	01 37 18	01 41 46
	2	3e1	18 19 10	18 22 17
	4	2e1	08 45 39	08 51 34
	5	1e3	18 57 37	19 00 50
	7	2e1	21 58 10	22 03 55
	9	3e1	21 07 42	21 11 24
	11	2e1	11 09 39	11 15 15
	11	4e3	13 31 22	13 45 27
	12	1e3	21 45 33	21 49 43
	15	2e1	00 21 08	00 26 34
	16	3e1	23 54 05	23 58 02
	18	2e1	13 31 48	13 37 04
	20	1e3	00 36 45	00 41 43
	22	2e1	02 42 32	02 47 36
	23	3e2	17 12 08	17 13 42
	24	3e1	02 39 15	02 43 11
	25	2e1	15 52 33	15 57 26
	27	1e3	03 33 06	03 38 54

The chart below shows details of the 'Occultation Mutual Events' that will occur during February. In column 3 (headed Moons) the moons are identified as: '1' Io, '2' Europa, '3' Ganymede, '4' Callisto. 'o' indicates that the first moon Occults (passes in front of) the second moon. As an example the first event on 2nd February '3o2' predicts an Ganymede will occult (pass in front of) Europa starting at 07:53 and ending at 07:59.

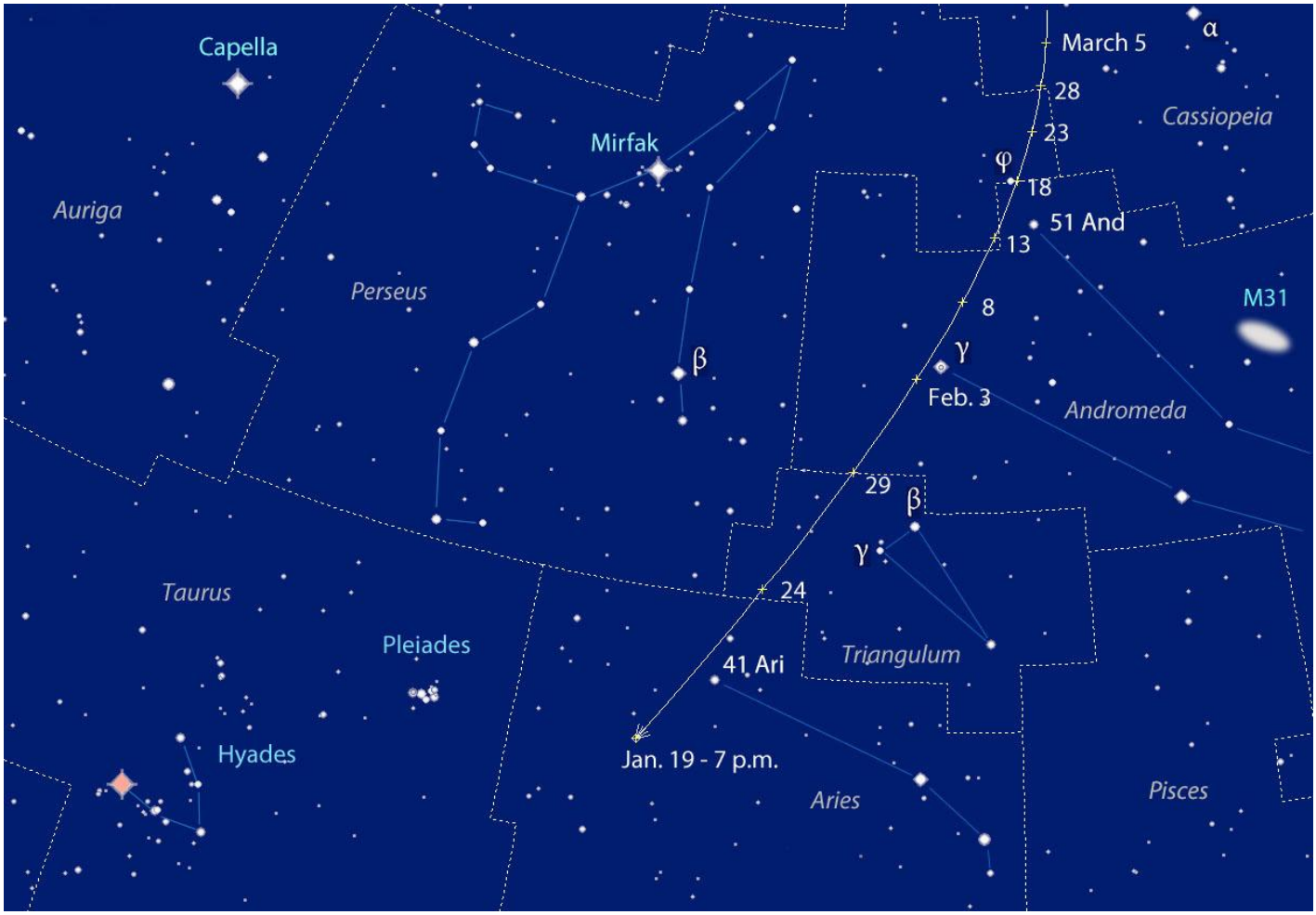
Date 2015		Moons	Start	End
Feb	2	3o2	07 53 31	07 59 15
	2	3o1	18 31 56	18 37 14
	4	2o1	08 51 08	08 58 07
	5	1o2	16 27 44	16 31 19
	5	1o3	18 59 45	19 04 47
	6	2o3	18 58 28	19 05 50
	7	2o1	21 54 23	22 01 14
	9	1o2	05 26 04	05 29 36
	9	3o2	10 34 07	10 39 52
	9	3o1	20 55 51	21 01 13
	11	2o1	10 56 51	11 03 36
	11	4o3	12 29 06	12 43 50
	12	1o2	18 24 29	18 27 55
	12	1o3	21 22 55	21 28 39
	13	2o3	21 57 45	22 02 51
	14-15	2o1	23 59 37	00 06 15
	16	1o2	07 23 03	07 26 21
	16	3o2	13 15 18	13 20 58
	16	3o1	23 18 45	23 24 12
	18	2o1	13 01 50	13 08 22
	19	1o2	20 21 47	20 24 55
	19	1o3	23 48 07	23 54 30
	22	2o1	02 04 27	02 10 52
	23	1o2	09 20 46	09 23 41
	23	3o2	15 58 02	16 03 28
	24	3o1	01 41 46	01 47 16
	25	2o1	15 06 41	15 12 58
	26	4o2	20 25 55	20 29 55
	26	1o2	22 20 02	22 22 40
	27	1o3	02 16 53	02 23 53

EVENTS ENVOLVING JUPITER AND ITS MOONS THIS MONTH

See the key to the information contained in this table on page 4

Date	Events (time, moon, type, event)							
1st February	3:45	I.Ec.D	6:12	I.Oc.R	10:49	IV.Ec.D	16:53	IV.Oc.R
2nd February	0:57	I.Sh.I	1:04	I.Tr.I	3:14	I.Sh.E	3:21	I.Tr.E
	3:31	II.Ec.D	6:37	II.Oc.R	9:11	III.Sh.I	9:37	III.Tr.I
	12:50	III.Sh.E	13:15	III.Tr.E	22:13	I.Ec.D		
3rd February	0:38	I.Oc.R	19:25	I.Sh.I	19:30	I.Tr.I	21:43	I.Sh.E
	21:47	I.Tr.E	22:22	II.Sh.I	22:30	II.Tr.I		
4th February	1:17	II.Sh.E	1:25	II.Tr.E	16:42	I.Ec.D	19:04	I.Oc.R
5th February	13:54	I.Sh.I	13:55	I.Tr.I	16:11	I.Sh.E	16:13	I.Tr.E
	16:48	II.Ec.D	19:43	II.Oc.R	23:11	III.Ec.D		
6th February	2:55	III.Oc.R	11:10	I.Ec.D	13:30	I.Oc.R		
7th February	8:21	I.Tr.I	8:22	I.Sh.I	10:39	I.Tr.E	10:40	I.Sh.E
	11:38	II.Tr.I	11:41	II.Sh.I	14:33	II.Tr.E	14:35	II.Sh.E
8th February	5:37	I.Oc.D	7:58	I.Ec.R				
9th February	2:47	I.Tr.I	2:51	I.Sh.I	5:05	I.Tr.E	5:08	I.Sh.E
	5:57	II.Oc.D	8:57	II.Ec.R	12:52	III.Tr.I	13:09	III.Sh.I
	16:30	III.Tr.E	16:48	III.Sh.E	20:28	IV.Tr.I	21:11	IV.Sh.I
10th February	0:03	I.Oc.D	1:12	IV.Tr.E	2:00	IV.Sh.E	2:26	I.Ec.R
	21:13	I.Tr.I	21:19	I.Sh.I	23:30	I.Tr.E	23:37	I.Sh.E
11th February	0:45	II.Tr.I	0:59	II.Sh.I	3:40	II.Tr.E	3:53	II.Sh.E
	18:29	I.Oc.D	20:55	I.Ec.R				
12th February	15:39	I.Tr.I	15:48	I.Sh.I	17:56	I.Tr.E	18:05	I.Sh.E
	19:04	II.Oc.D	22:14	II.Ec.R				
13th February	2:32	III.Oc.D	6:51	III.Ec.R	12:55	I.Oc.D	15:24	I.Ec.R
14th February	10:05	I.Tr.I	10:16	I.Sh.I	12:22	I.Tr.E	12:34	I.Sh.E
	13:53	II.Tr.I	14:17	II.Sh.I	16:48	II.Tr.E	17:12	II.Sh.E
15th February	7:21	I.Oc.D	9:52	I.Ec.R				
16th February	4:31	I.Tr.I	4:45	I.Sh.I	6:48	I.Tr.E	7:02	I.Sh.E
	8:11	II.Oc.D	11:31	II.Ec.R	16:08	III.Tr.I	17:08	III.Sh.I
	19:46	III.Tr.E	20:46	III.Sh.E				
17th February	1:47	I.Oc.D	4:21	I.Ec.R	22:57	I.Tr.I	23:13	I.Sh.I
18th February	1:14	I.Tr.E	1:31	I.Sh.E	2:10	IV.Oc.D	3:01	II.Tr.I
	3:35	II.Sh.I	5:55	II.Tr.E	6:30	II.Sh.E	9:43	IV.Ec.R
	20:13	I.Oc.D	22:50	I.Ec.R				
19th February	17:23	I.Tr.I	17:42	I.Sh.I	19:40	I.Tr.E	19:59	I.Sh.E
	21:18	II.Oc.D						
20th February	0:49	II.Ec.R	5:49	III.Oc.D	10:50	III.Ec.R	14:39	I.Oc.D
	17:18	I.Ec.R						
21st February	11:49	I.Tr.I	12:10	I.Sh.I	14:06	I.Tr.E	14:28	I.Sh.E
	16:09	II.Tr.I	16:54	II.Sh.I	19:04	II.Tr.E	19:49	II.Sh.E
22nd February	9:05	I.Oc.D	11:47	I.Ec.R				
23rd February	6:15	I.Tr.I	6:39	I.Sh.I	8:32	I.Tr.E	8:56	I.Sh.E
	10:25	II.Oc.D	14:06	II.Ec.R	19:26	III.Tr.I	21:07	III.Sh.I
	23:03	III.Tr.E						
24th February	0:45	III.Sh.E	3:31	I.Oc.D	6:16	I.Ec.R		
25th February	0:41	I.Tr.I	1:07	I.Sh.I	2:58	I.Tr.E	3:25	I.Sh.E
	5:17	II.Tr.I	6:12	II.Sh.I	8:11	II.Tr.E	9:07	II.Sh.E
	21:58	I.Oc.D						
26th February	0:44	I.Ec.R	10:43	IV.Tr.I	15:11	IV.Sh.I	15:28	IV.Tr.E
	19:07	I.Tr.I	19:36	I.Sh.I	19:59	IV.Sh.E	21:24	I.Tr.E
	21:53	I.Sh.E	23:32	II.Oc.D				
27th February	3:23	II.Ec.R	9:07	III.Oc.D	14:49	III.Ec.R	16:24	I.Oc.D
	19:13	I.Ec.R						
28th February	13:33	I.Tr.I	14:05	I.Sh.I	15:51	I.Tr.E	16:22	I.Sh.E
	18:26	II.Tr.I	19:31	II.Sh.I	21:20	II.Tr.E	22:25	II.Sh.E

FAREWELL TO COMET LOVEJOY



The path that Comet Lovejoy will take through February

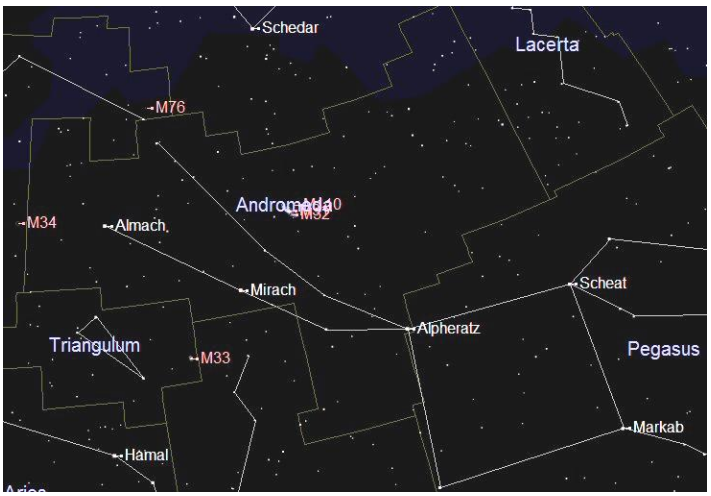
Comet Lovejoy C2014 Q2 has been the focus of much excitement to amateur astronomers since the beginning of January. It first became an easy target for anyone with a pair of binoculars just after Christmas when it appeared in the constellation of Lepus. The constellation of Lepus is located just below the very striking constellation of Orion the Hunter.

The comet steady moved northwards into Taurus where it was at its closest to Earth, at a distance of 70 million km, on January 7th. Since then it has been moving away from us night after night through Taurus where it passed its closest point to the Sun on 17th January. Although it was moving away from us and in theory getting fainter it was moving closer to the Sun and getting intrinsically brighter. Therefore its apparent brightness remained about the same until 17th January. Now it is starting to move away from us and from the Sun and will begin to fade during February.

Fortunately it was easy to find due to the presence of a number of well known objects in sky along its route. From 16th January the comet crossed into Taurus where M45 (the Pleiades star cluster) became a good marker. It passed just 8° west of the Pleiades on the evenings of 17th and 18th January giving a great imaging opportunity. On 16th January the comet left Taurus and moved across into the rather sparse constellation of Aries. It went on to move through Triangulum and into Andromeda and will enter Cassiopeia on 28th February.

Lovejoy will still be with us at least until the end of February but getting fainter all the time. The chart above shows the path that the comet will be taking from the constellation of Andromeda into Cassiopeia after a couple of brief visits to the constellation of Perseus.

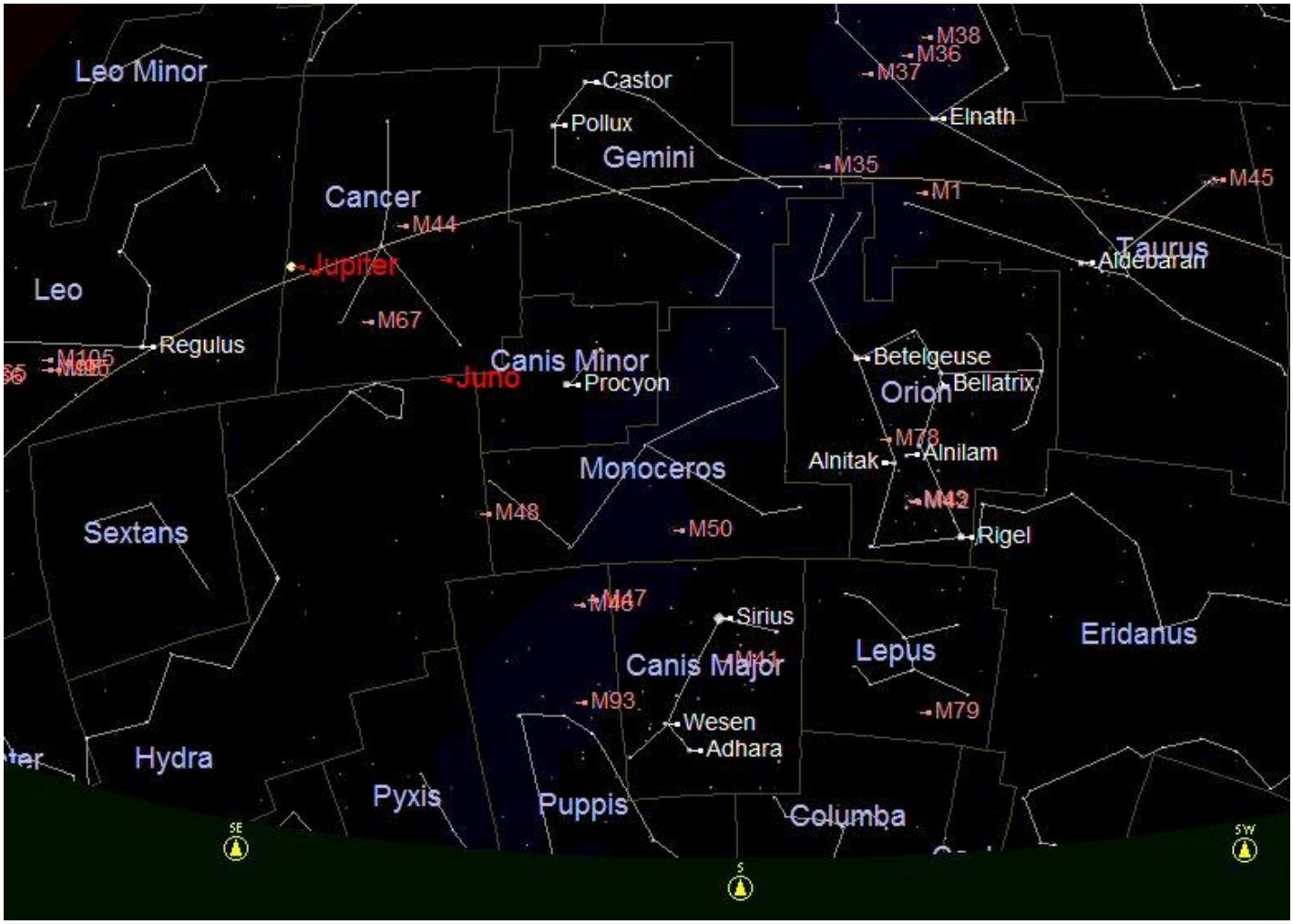
Around the 4th February Lovejoy will be quite easy to locate as it will be very close to the fairly bright and very beautiful double star Almach – Gamma (γ) Andromedae. Almach is a stunning double star with the brighter star a dazzling gold colour and the other almost sky blue.



The constellation of Andromeda

Lovejoy will bid us farewell in the first weeks of March.

EXPLORING THE NIGHT SKY - FEBRUARY 2015



The chart above shows the night sky looking south at about 21:00 on 15th February. West is to the right and east to the left. The curved line across the sky is the ecliptic. This is the imaginary line along which the Sun, Moon and planets appear to move across the sky. The constellations through which the ecliptic passes are known as the constellations of the 'Zodiac'.

The beautiful winter constellation of Orion (the Hunter) is still dominating the southern winter sky. It can be seen appearing over the horizon in the east as soon as it is dark at around 18:00. Orion will be at its best this month as it dominates the southern sky. The most distinctive feature of Orion is the three stars that represent his belt. From his belt there is a line of stars that denote his sword hanging from his belt. Within the sword is the beautiful Orion Nebula M42 which was featured in the December issue of this magazine.

Two stars represent Orion's two hunting dogs. They are Sirius in Canis Major and Procyon in Canis Minor. Sirius can be found by following the line of Orion's belt down and to the east (left). Sirius is always low and close to the horizon where there is a lot of turbulence in the air. This causes Sirius to twinkle very noticeably. It is the brightest star in the night sky and the closest star that we can see from the UK at about 8.6 light years away. Sirius sparkles through the colours of the rainbow due to the turbulent air close to the horizon. It is well worth a look through a pair of binoculars or a telescope.

Taurus (the Bull) is still obvious in the night sky in the south during the early evening. Located at the centre of Taurus is the bright red giant star Aldebaran which is surrounded by the dispersed stars of the large Open Cluster 'the Hyades'. The stars of the Hyades are so scattered that they are not included in the Messier Catalogue. Taurus can be seen at the top right of the chart above, sitting astride the ecliptic. In the north west of Taurus is the beautiful Open Custer Messier 45 (M45) also known as the Pleiades or (the Seven Sisters).

Joined to Taurus at the star Elnath is the constellation of Auriga with its beautiful bright white star Capella. Capella will be directly overhead later in the evening and looks stunning through binoculars or a small telescope. Auriga is host to three lovely 'Messier' open clusters, M36, M37 and M38.

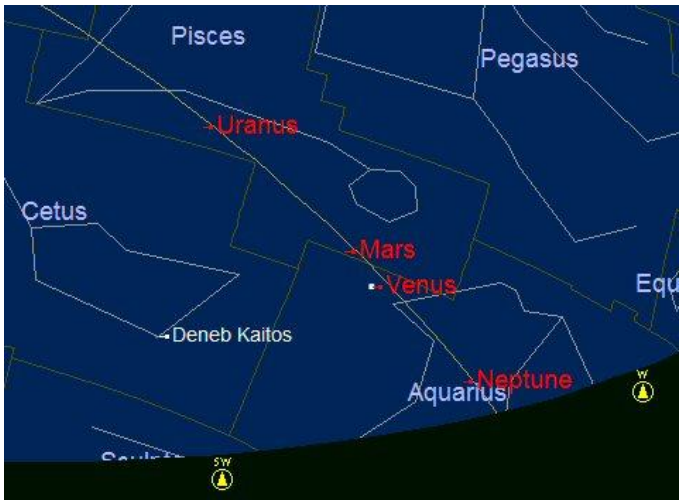
To the east (left) of Taurus is the constellation of Gemini (the Twins) with its lovely open cluster M35 located just off the end of the upper line of stars. Gemini is followed along the ecliptic by the constellation of Cancer. Cancer is quite indistinct but is worth tracking down with binoculars to find the lovely open cluster M44 which is also known as Praesepe or the Beehive Cluster. The giant 'king of the planets' Jupiter is located in Cancer just inside the border with Leo.

Just coming into view now is the distinctive shape of Leo (the Lion) looking rather like the crouching Sphinx in Egypt.

THE SOLAR SYSTEM THIS MONTH

MERCURY will be at its greatest western elongation on 24th February. This will be when it will be at its greatest apparent distance from the Sun. It may just be visible very near to the eastern horizon in the constellation of Capricorus just before sunrise. After 24th February it will start to move back towards the Sun.

VENUS is moving higher above the south western horizon in the evening sky over the next few months. As Venus is currently on the opposite side of the Sun to Earth we see most of the side facing us illuminated by the Sun. Therefore it will appear as a relatively small but nearly full disc. The position of Venus in the sky can be seen close to the Mars on the chart below. Venus will not reach its greatest eastern elongation until 6th June when it will be at its greatest apparent distance from the Sun. It is climbing further above the western horizon and will be observable soon after the Sun sets.



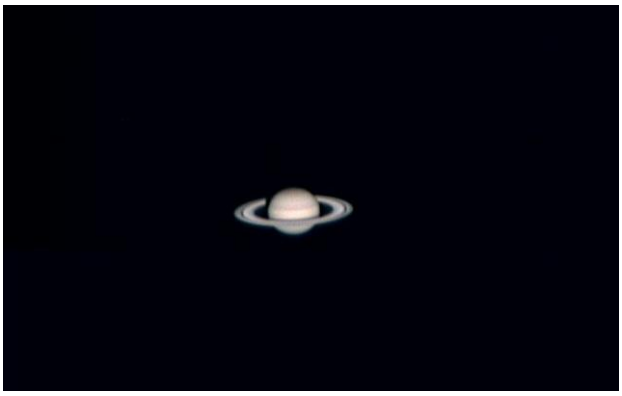
Venus, Mars and Uranus on 12th February

MARS rises in the south east at about 08:15 which is in daylight and will set over the western horizon at around 20:00. It will just about be visible low in the south west in the constellation of Pisces. Mars is a long way from Earth at the moment so will look very small at just 4.3 arc-seconds in diameter. It will just be visible above the south western horizon after the Sun sets at 17:00. Mars will set in the south west at 19:50 at the beginning of the month and 20:10 by the end of the month. It will very difficult to see in the twilight sky but its proximity to Venus may help finding it. See the Venus chart above.

JUPITER is located in Cancer and rises in the east at around 16:40 at the beginning of the month and 15:00 by the end of the month. This means it will be well positioned by about 20:00, certainly by the end of the month. It will normally start to be good for observing about two hours after it rises. See the chart on page 7.

The four biggest and brightest moons (Io, Europa, Ganymede and Callisto) are known as the Galilean moons after Galileo Galilei who first reported seeing them. They can easily be seen using a modest telescope (90mm aperture) or even a good pair of binoculars. The two inner moons Io and Europa appear to move quite quickly especially when they are positioned close to the planet. They can be seen to have moved in periods of about 10 to 15 minutes. See pages 2 through to 5 for this month's special feature.

SATURN rises at about 02:00 and sets at about 11:00. Saturn rises 4½ hours before the Sun in the east and sets at around mid morning in the south west. Saturn can be seen in the south east for two or three hours before dawn. It is possible for the early riser to get out before breakfast for a quick look before the sky begins to brighten. Some observations of the beautiful ringed planet can now be made with the ring system nearly wide open.



Saturn imaged by Steve Harris in 2007

URANUS rises in the east in the constellation of Pisces at about 08:45 and will be observable in the south east as soon as it is dark and until it sets at around 21:40. Uranus will require a medium sized telescope to see it as a 3.4 arc-second blue disc, a 150mm reflector or a 100mm refractor will be needed. See the Venus chart.

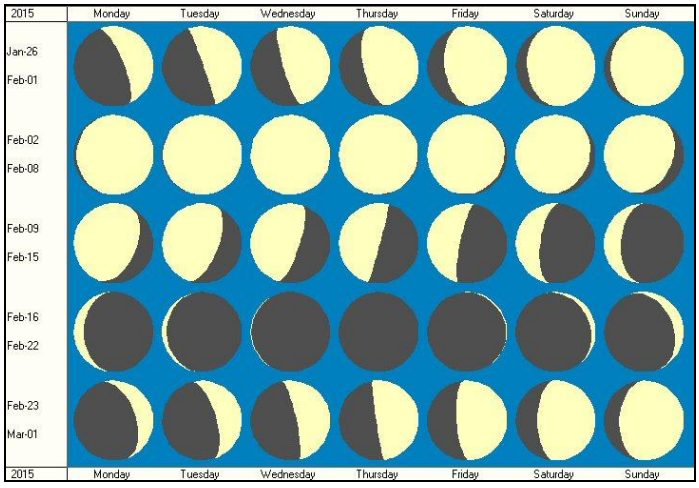
NEPTUNE is moving into conjunction with the Sun on 26th February so will not be visible. See the Venus chart.

THE SUN

The Sun rises at 07:40 at the beginning of the month and at 06:50 by the end of the month. Solar activity has been relatively low during this cycle with fewer sunspots. However there have been occasional increases in activity over the past few months. There was a beautiful display of sunspots last month.

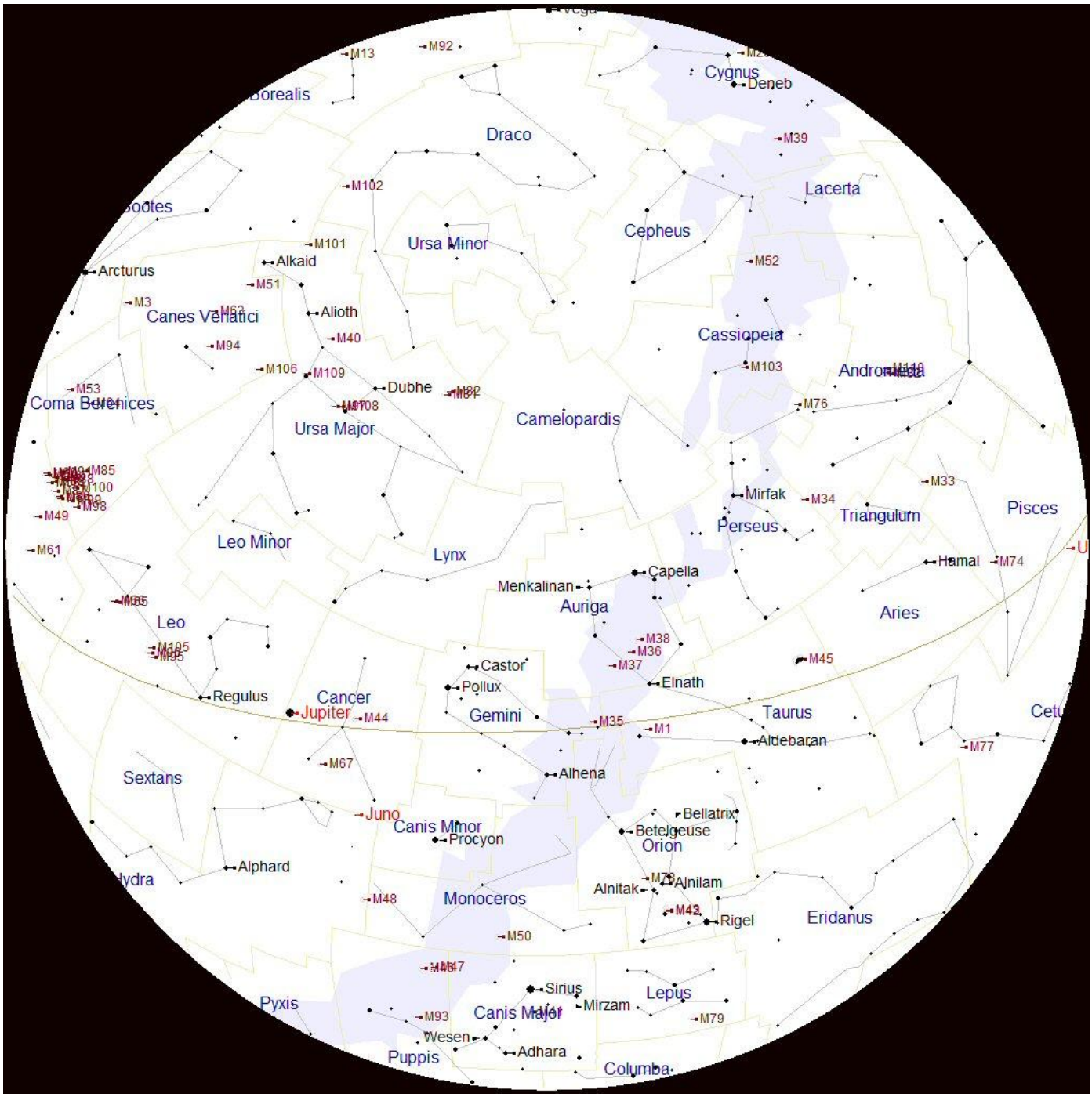
Sunspots and other activity on the Sun can be followed live and day to day by visiting the SOHO website at: http://sohowww.nascom.nasa.gov/ .

THE MOON PHASES IN FEBRUARY 2015



Full Moon will be on 3rd February, Last Quarter will be on 12th February. The thin crescent of the new Moon may be spotted in the west on the evening of the 18th February. First Quarter will be on 25th February.

THE NIGHT SKY THIS MONTH



The chart above shows the night sky as it appears on 15th February at 9 o'clock in the evening Greenwich Mean Time (GMT). As the Earth orbits the Sun and we look out into space each night the stars will appear to have moved across the sky by a small amount. Every month Earth moves one twelfth of its circuit around the Sun, this amounts to 30 degrees each month. There are about 30 days in each month so each night the stars appear to move about 1 degree. The sky will therefore appear the same as shown on the chart above at 10 o'clock GMT at the beginning of the month and at 8 o'clock GMT at the end of the month. The stars also appear to move 15º (360º divided by 24) each hour from east to west, due to the Earth rotating once every 24 hours.

The centre of the chart will be the position in the sky directly overhead, called the Zenith. First we need to find some familiar objects so we can get our bearings. The Pole Star **Polaris** can be easily found by first finding the familiar shape of the Great Bear 'Ursa Major' that is also sometimes called the Plough or even the Big Dipper by the Americans. Ursa Major is visible throughout the year from Britain and is always quite easy to find. This month it high in the north east. Look for the distinctive saucepan shape, four stars forming the bowl and three stars forming the handle. Follow an imaginary line, up from the two stars in the bowl furthest from the handle. These will point the way to Polaris which will be to the north of overhead at about 50º above the northern horizon. Polaris is the only moderately bright star in a fairly empty patch of sky. When you have found Polaris turn completely around and you will be facing south. To use this chart, position yourself looking south and hold the chart above your eyes.

Planets observable in the night sky: Jupiter Uranus, Mars and Venus. Saturn may be seen in the early morning.