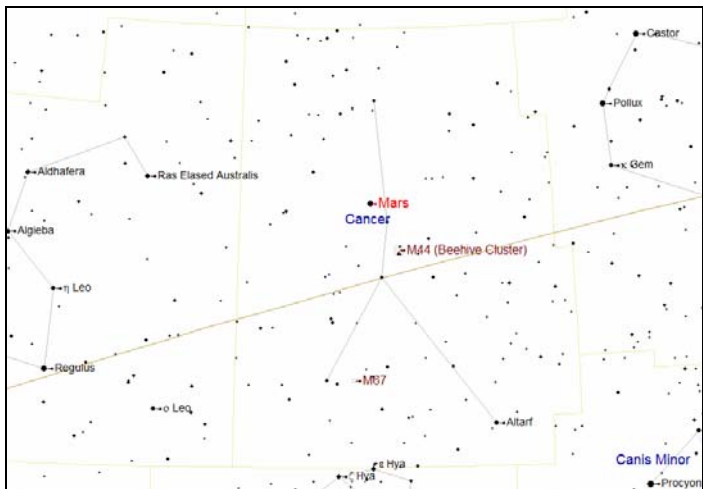


NEWBURY ASTRONOMICAL SOCIETY

BEGINNERS SECTION MAGAZINE – FEBRUARY 2010

THE CONSTELLATION OF CANCER



Cancer is a rather faint zodiacal constellation lodged in between Gemini to the west and Leo to the East. There are no bright stars but there are two interesting Messier objects, M44 and M67. M44 is a large, bright open cluster that is second only to M45 The Pleiades (The Seven Sisters) in Taurus. M44 is known as Praesepe or 'The Beehive'. The Beehive is best seen using binoculars as it is too big, (about twice the size of the full Moon) for all but the smallest telescopes. The brightest half dozen or so stars in M44 form the shape of a pyramid or as its name suggests, the shape of an old fashioned straw beehive. In the picture below the Beehive is shown lying on its side. The fainter stars surrounding the Beehive, add to the effect, looking rather like a swarm of bees buzzing around the hive. There are about a hundred stars in the cluster which is around 700 million years old and is about 525 light years from us.



M44 Praesepe (The Beehive Cluster)

M67 is rather less impressive than M44 because it appears much smaller at about the same size as the full Moon. It is composed of about 100 stars that are too faint and close together to be resolved using binoculars however the cluster can be seen using a small telescope. This cluster is much older than M44 at around 10 billion years and is 2500 light years away.

The star known as iota 1 (shown at the top of the vertical line on the chart above) is a beautiful double star. When observed in a telescope, one star is golden coloured the other is blue/green. Cancer is of special interest this year because the planet Mars is within its boundaries. See pages 3 and 4.

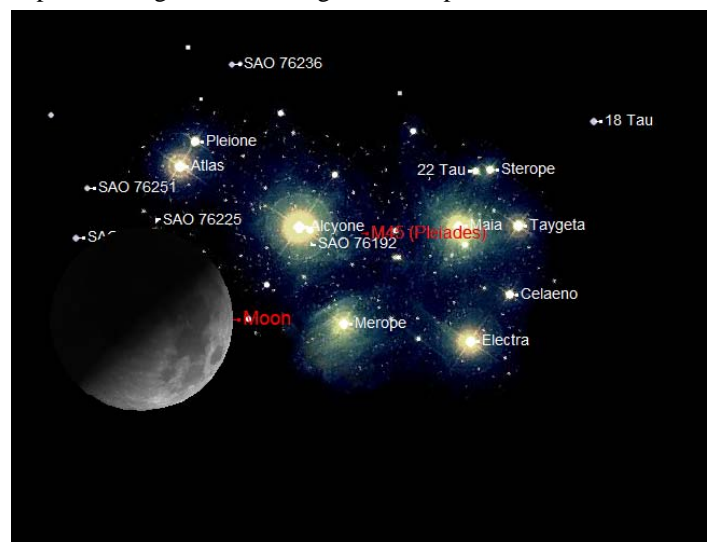
MOON PASSES THROUGH SEVEN SISTERS



Position of the Moon at 7:00 on 21st February

On 21st February the Moon will pass through the open star cluster M45 The Pleiades (Seven Sisters) in the constellation of Taurus. The Moon will be entering the cluster as the sky darkens but will be seen at its best by about 6:30 to 7:00.

The Moon quite regularly passes through M45 because the cluster is located just above the ecliptic (the imaginary path along which the planets, Sun and Moon appear to move across the sky). The computer generated image below also shows the glowing gas that surrounds the stars in M45 as seen in longer exposure images taken through a telescope.



Position of the Moon at 8:00 on 21st February

NEWBURY ASTRONOMICAL SOCIETY BEGINNERS

17th February Using Computer Planetarium Programmes

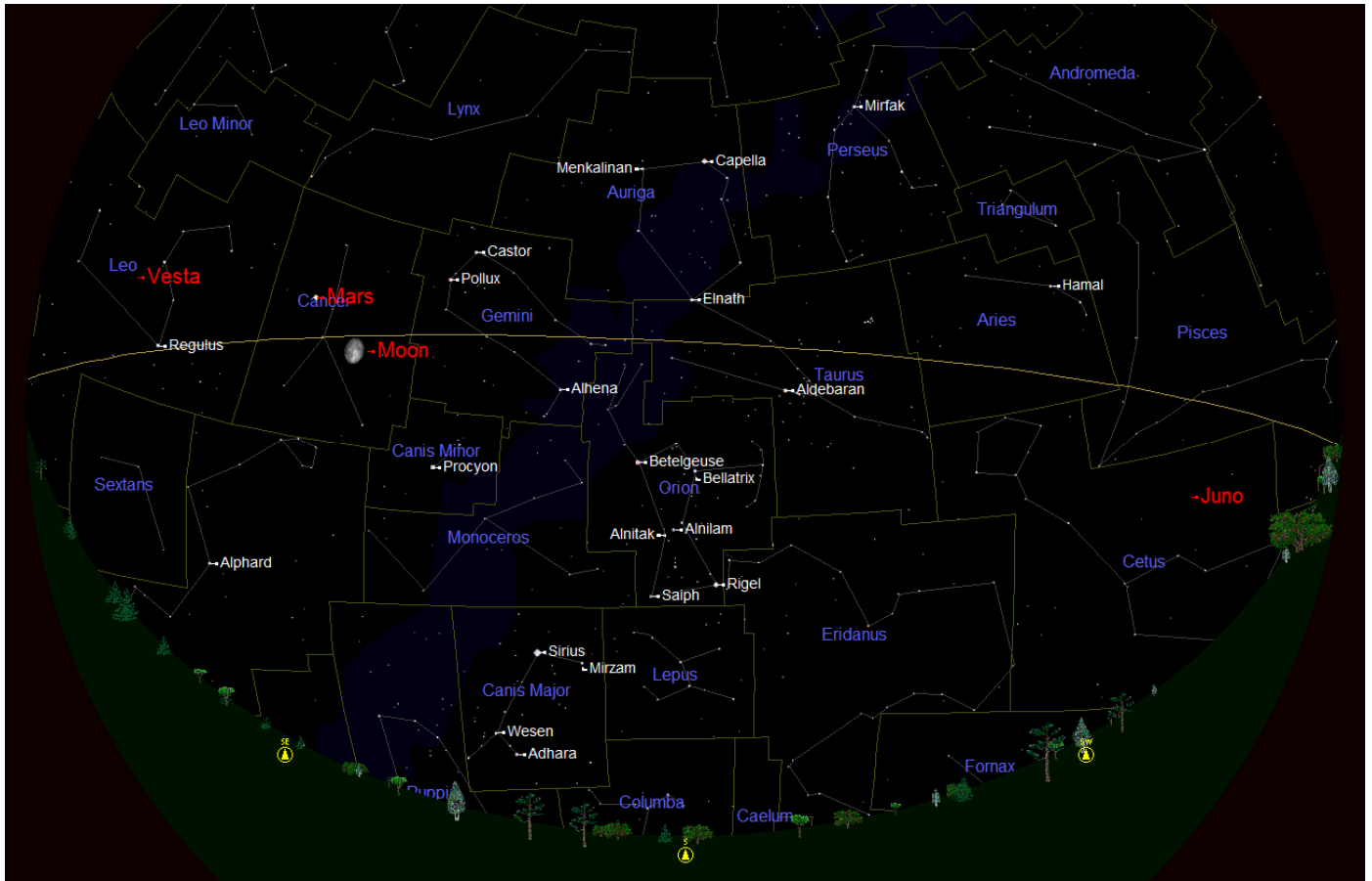
NEWBURY ASTRONOMICAL SOCIETY MEETING

5th March An Introduction to Stellar Spectroscopy

For all the latest news, don't forget to visit the website on:

www.naasbeginners.co.uk

MARS AT ITS BEST THIS APPROACH



Mars at opposition on 29th January 2010

Mars was in its best position for observing on 29th January when it was at 'opposition'. This means it was in direct alignment with Earth and the Sun as Earth overtook Mars along the paths of their orbits. The orbit of Mars is on average 78 million kilometres further out from the Sun than the orbit of Earth.

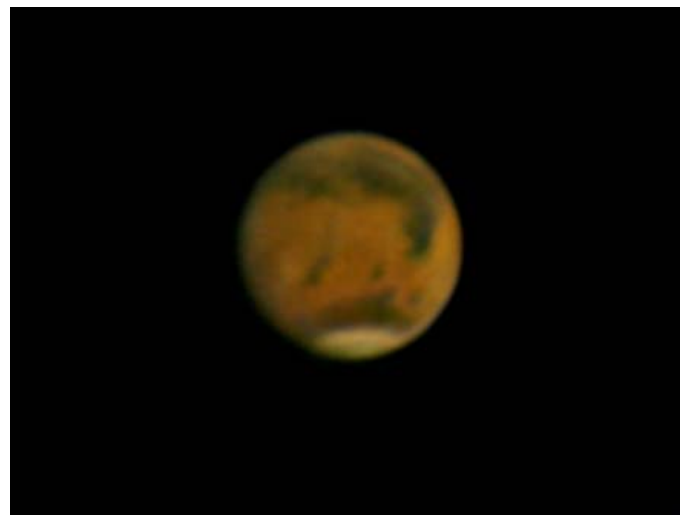
We all know that Earth moves around the Sun once a year which is 365¼ days. Mars takes the equivalent of 687 Earth days or 1.88 Earth years. However, judged from a notional point in space, when the two planets are at opposition, as Mars completes one orbit of the Sun Earth will have passed that point 322 days before. Earth therefore will need to complete almost another orbit before it can catch up with Mars. So Earth actually takes about two years to meet Mars at opposition.

Mars has an eccentric orbit compared to Earth which in comparison has an orbit that is almost circular. The Earth / Mars separation can vary between 50 million to 100 million kilometres see page 3. At opposition this year Mars is about 98 million kilometres away from Earth which is almost as far as it can be. Therefore Mars will appear comparatively small when viewed through a telescope.

It is not all bad news for the amateur astronomer because Mars is positioned high in the sky during this approach. This means it can be observed through clearer sky far from the thick murky and contaminated air closer to the horizon. With opposition occurring in mid winter the clear frosty nights and dark sky should make for reasonably good views despite the small apparent size of Mars.

Observing Mars can be very rewarding despite being a quite difficult target in a small telescope (100mm aperture). Some dark areas and the ice cap may be seen on a good night.

With Mars appearing so small we must take advantage of everything that can assist us to improving the view. All the advice given in previous articles in this magazine will help. Amongst the most important are to make sure that Mars is not observed in a position above close by buildings where heat from the building can cause disturbance in the air and distort the image. Waiting for the telescope to cool and stabilise will greatly improve the image. Similar improvement will be achieved by waiting for Mars to reach a higher position in the sky where it can be viewed through less of Earth's atmosphere. Finally take time to allow your eye and brain to adapt to registering and analysing the fine detail then more and more will be seen.

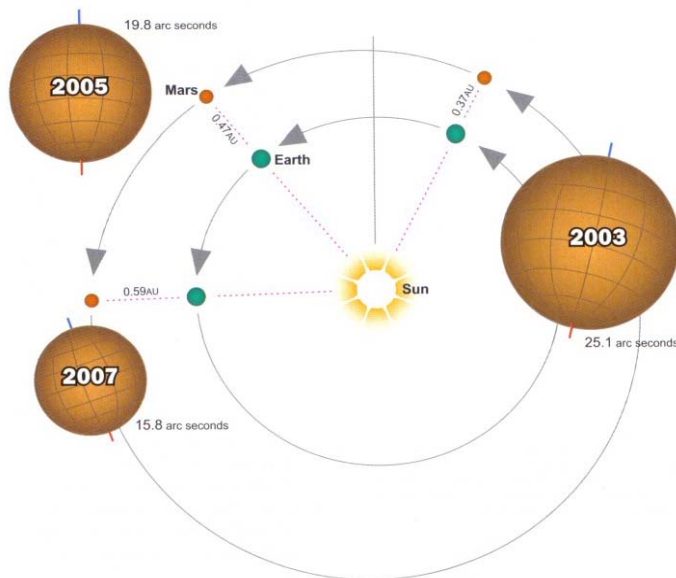


Mars imaged by Chris Hooker on 10th January 2010

MARS THE RED PLANET

Mars has just past its best viewing position for 2¼ years. On 29th January it was at its closest approach to Earth in this opposition. Every two and a quarter years (approximately) Earth overtakes Mars as the two planets move around their respective orbits. As Mars occupies the next orbit out beyond Earth it takes longer to orbit the Sun. A year on Mars is equivalent to 1.88 Earth years. Therefore Earth catches up and overtakes Mars just a little over every two years.

On 22nd August 2003 Mars was as close to Earth as it can ever get. This was due to the positions that the planets were in on the elliptical orbits. Mars was at its minor axis (closest to the Sun) and Earth was at its major axis (furthest from the Sun).



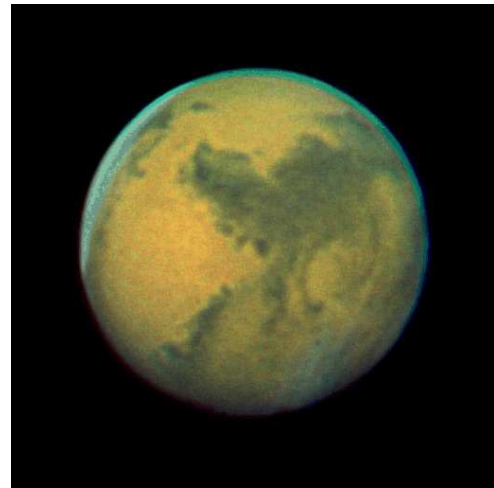
The relative positions of Mars and Earth

The diagram above shows that in 2003 Mars was 0.35 AU from Earth. (1 Astronomical Unit AU is the average Earth Sun distance: 150 million kilometres). This means Earth and Mars were 55.5 million kilometres apart. In 2005 this distance was 70.5 million kilometres and in 2007 88.5 million kilometres. This year Mars was 99 million kilometres away. In 2003 Mars therefore appeared larger in the sky, actually 25.1 arc seconds. This is a measure of the diameter as an angle where one arc second is $1^\circ \div 3,600$. (60 arc seconds = 1 arc minute and 60 arc minutes = 1°). In 2005 the diameter of Mars was 19.9 arc seconds, 2007 was 15.8 arc seconds and this year it was only 14.1 arc seconds.

Despite Mars being so close in 2003 it was not a good year for observing the Red Planet. Unfortunately Mars was very low in the sky, in fact it was very close to the southern horizon. This meant that we had to peer through about 200 kilometres of dirty turbulent atmosphere to see it. This year Mars will be high in the sky and we will see it through only about 20 kilometres of comparatively clear and steady atmosphere. Although Mars is smaller this year the view should be much clearer.

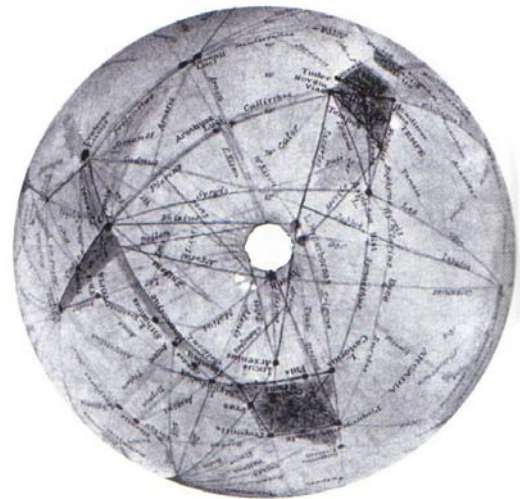
There is a lot to see on the surface of Mars although a larger telescope will be needed to see the details. Unlike Venus and the gas giants Jupiter and Saturn it is the hard surface of the planet that we can see and not the cloud tops. Mars is actually the only planet other than our Earth that we can see surface detail on. Using a telescope with an aperture of 120mm to 150mm it is possible to see distinctive light and dark markings. It is also possible to see ice caps as they grow and shrink with the seasons. With larger telescopes it is possible to make out

some of the main features. These features are quite difficult to define and mainly appear as large orange tinted areas and darker grey or even greenish coloured areas.



Example of a good image obtained from Earth

Now we have close-up images of the surface, taken by space probes, we know what these features are. In the past however people had to speculate as to what they might have been. This led to some ideas that we now consider bizarre but at the time were quite real. In the 1890's the famous astronomer Percival Lowell declared to the world that he had seen canals on the surface of Mars.



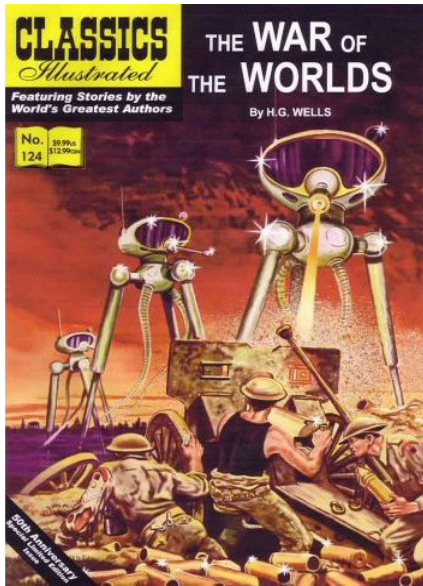
Percival Lowell's drawing of canals on Mars

Lowell believed that Mars was a barren planet that was losing all its water. He thought intelligent beings had dug canals to transport water from the poles to the deserts that covered the rest of the planet. The darker areas that he saw he suggested were vegetation, perhaps crops that were irrigated from the canals.

This belief persisted right up to the 1950's and even into the 1960's and was not fully discounted until the first images were returned from probes sent to Mars. Even then there were interpretations, generally from cranks and 'dodgy' writers who claimed that features that appeared in images were the work of intelligent life. There were mountains that looked like faces and giant pyramids. All turned out to be natural features and tricks of the light.

Before the 1960's it was still accepted that there might be intelligent life on Mars and that there might still be a threat of invasion by little green men. Many stories were written

about invasions from Mars, including 'The War of the Worlds' by HG Wells. This and thousands of other stories were featured in 'Comic' magazines and were even made into films.



A 1950's comic front cover

On 30th October 1938 the famous actor Orson Welles caused panic when he broadcast the introduction to a new radio drama based on the War of the Worlds by HG Wells.



Orson Welles broadcasting in 1938

The first words of the play were scripted as a radio news bulletin about an invasion from Mars. Welles described how spaceships were landing in the major cities around the world. He said people were being killed by terrible death rays from the invading spacecraft. People hearing the news bulletin from the play were seized with panic and rushed into the streets all over the United States. Some took to their cars and drove to the hills for safety.

We are still searching for life on Mars today with probes orbiting the planet and rovers on the surface with many more to come in the future. Interest in life on Mars was rekindled in the 1990's when scientists thought they had found evidence of life in a meteorite believed to have originated on Mars. The meteorite (known as Meteorite ALH84001) was thought to have been blasted from the surface of Mars by a massive asteroid impact millions of years ago. The impact was so great that some rocks and debris were blasted at high enough speed to escape from Mars and thrown into space. Meteorite ALH84001 after going into orbit around the Sun eventually collided with Earth, landing in Antarctica where it was buried in the ice for about 13,000 years.

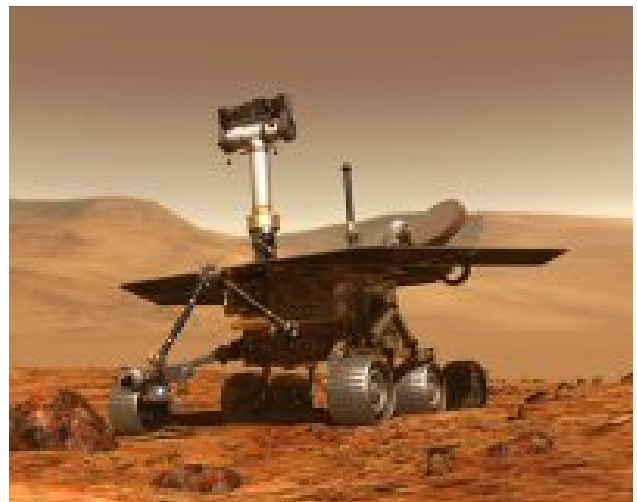
When this rocky meteorite was cut open and examined under a very powerful microscope, minute segmented formations were seen. These resembled tiny fossils of ancient bacteria found on Earth but much smaller.



Meteorite ALH84001 and fossil

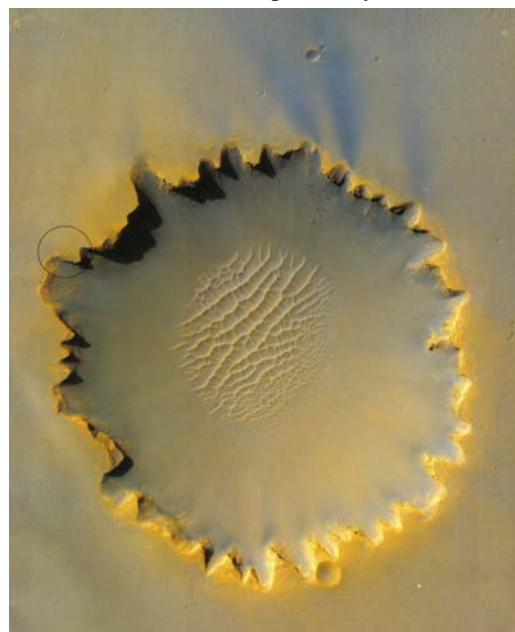
The features found in Meteorite ALH84001 have now almost universally been accepted as not being evidence of life but the theory has not been completely ruled out.

The search for water and evidence of life on Mars continues with rovers on the surface. Spirit and Opportunity landed on the surface and were expected to last a few months but are now entering their sixth year exploring Mars.

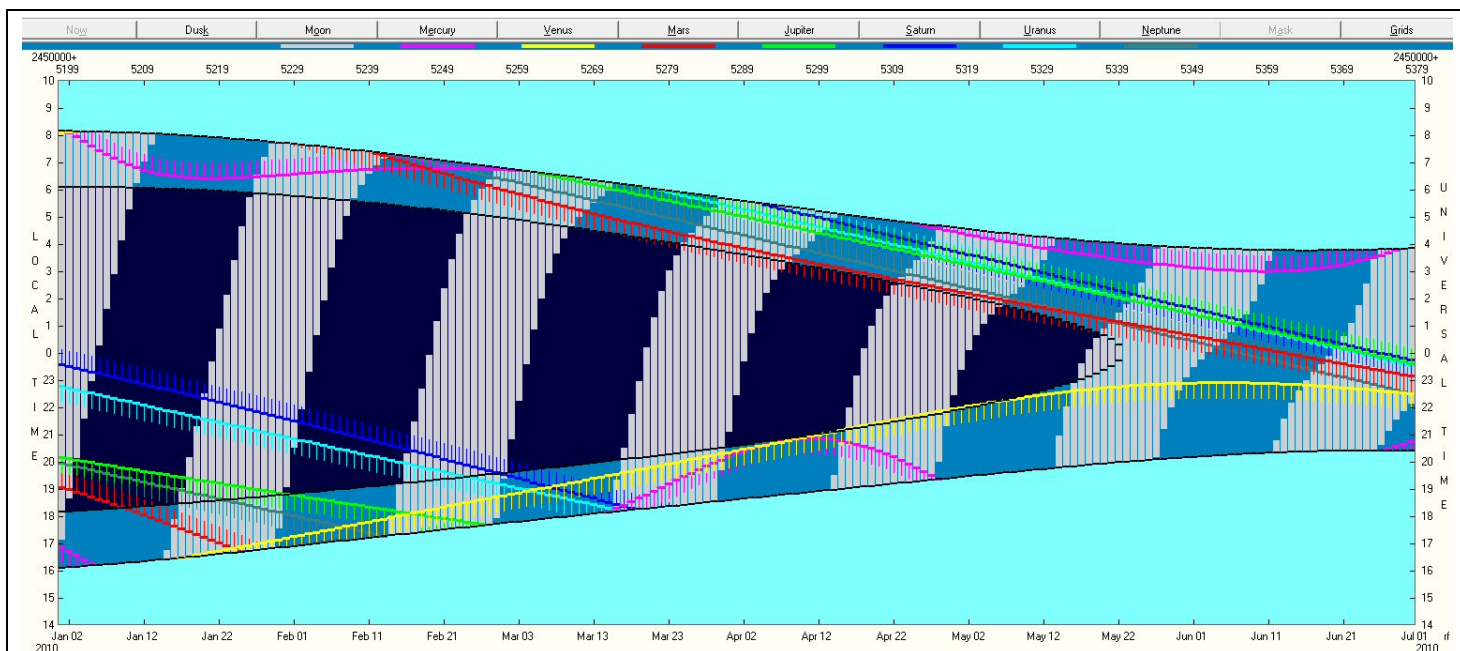


Mars Rover Spirit

Probes have been in orbit around Mars for a number of years and their images are getting more and more detailed. The latest orbiting probe is the Mars Reconnaissance Orbiter that has taken some of the most detailed pictures yet.



Circled in this image is the Rover Opportunity



THE SOLAR SYSTEM JANUARY 2010

The chart above is from Richard Fleet's GRAPHDARK application that can be downloaded free from his website at: www.rfleet.clara.net.

The dates for the next 6 months are shown along the bottom of the chart and the time up the sides. The areas shown light blue at the top and bottom indicate daylight. The lower thick curved line shows the start of dusk and the upper shows the end of dawn (full daylight). The conical curved black line shows full darkness. The thinner curved black lines show the legal 'lighting up' times. The curved vertical bands show the Moon phases (white the moon is in the sky, black it is not). The coloured lines show the times when the planets are visible. The vertical bars on the lines indicate when the planet is visible. Bars below the line show the planet is visible from sunset up until the time indicated by the line. Above the line indicates it is visible from the time indicated up until dawn.

MERCURY moved out from conjunction with the Sun at the end of last month. It will be visible low on the eastern horizon in the morning before sunrise at the beginning of this month.

VENUS moves out from conjunction with the Sun this month and may be seen very low in the west after sunset.

MARS rises in the east at 15:30 at the beginning of the month and by 13:30 at the end of the month. It still appears small but will be in a good position in the south east at sunset. By 19:00 it will appear like a bright reddish star high in the east. A telescope will be required to see its small 13 arc second reddish coloured disc. A larger telescope will show some of the more distinctive surface markings and the white polar ice cap. See Page 2. Mars has two moons that are too small to be seen.

JUPITER will be too close to the western horizon for any useful observations to be carried out. By the end of February it will have disappeared completely as it moves into conjunction with the Sun on 28th February. Jupiter will be out of view for a few weeks only to reappear in the east before sunrise as it emerges from behind the Sun.

SATURN rises at 21:10 at the beginning of the month and will be high enough for viewing by 23:00 and very well placed in the south by midnight. It will rise almost 1½ hours earlier by the end of the month. The ring system is just starting to open out again after appearing edge on for most of last year. It will still be a couple of years before it returns to its full glory.

URANUS is now a difficult object to observe in the south west at sunset in the constellation of Pisces.

NEPTUNE is now in conjunction with the Sun and will not be observable this month.

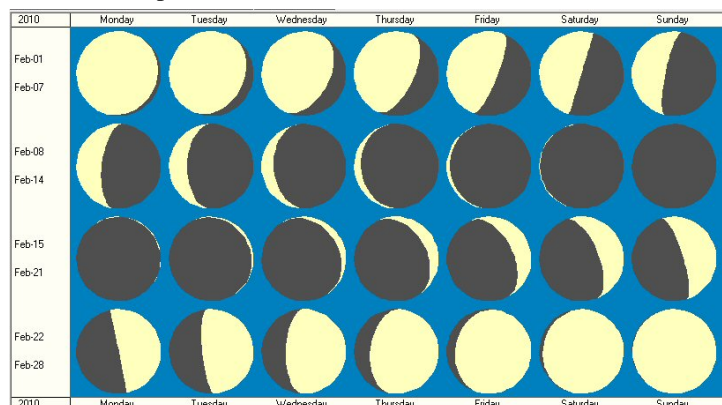
THE SUN There has been some Sunspots recently to enlighten the hitherto bland views of the Sun. The Sun has an eleven year cycle of increasing sunspot activity. We should now be well into the period of maximum activity but the activity has been very sparse until the last few months with almost no activity at all.

A special solar filter must be fitted to a telescope to view sunspots or the image can be projected on to a screen. **DO NOT LOOK DIRECTLY AT THE SUN IT WILL CAUSE BLINDNESS**

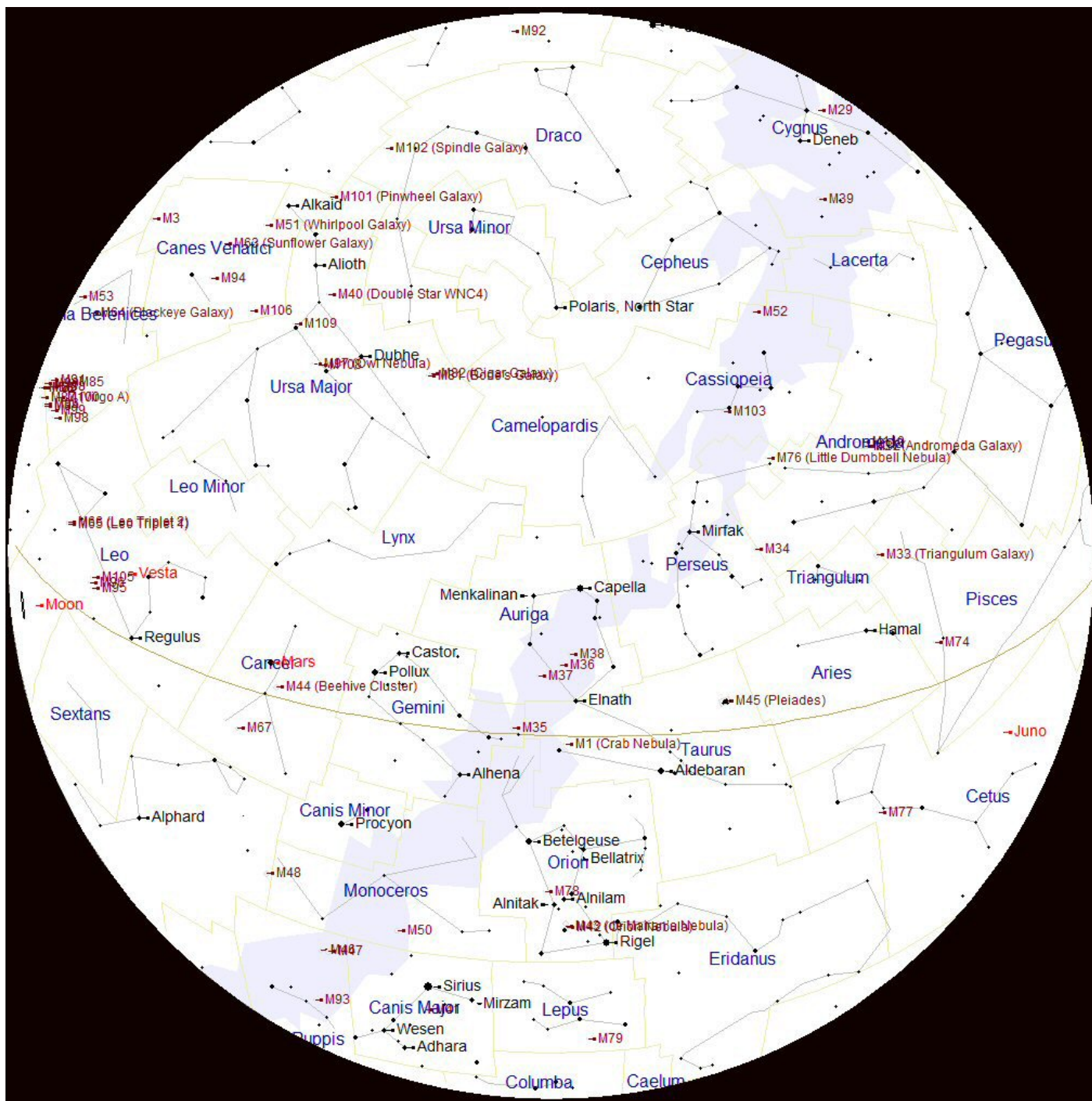


Sunspots imaged using a webcam on 1st January 2010

MOON The phases of the Moon this month:



THE SKY THIS MONTH



The chart above shows the night sky as it appears on 1st February at 9 o'clock 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 8 o'clock GMT at the middle of the month and at 7 o'clock GMT at the end of the month. Due to the Earth rotating once every 24 hours, the stars also appear to move 15° (360° divided by 24) each hour from east to west.

The centre of the chart will be the position in the sky directly overhead. 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 is 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 50° 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.