

SPACEWATCH

the newsletter of the Abingdon Astronomical Society

14th January 2008

**Chris Hooker (Newbury AS) –
'Solar System Imaging with a Webcam'**

Happy New Year to you all. I hope you all had a pleasant Christmas holiday. Maybe one or two of you got a webcam for Christmas? Well tonight Chris Hooker is here from our neighbouring society to tell us all how to image the planets with one.

THE NIGHT SKY THIS MONTH

by Bob Dryden

Mercury: While this evening apparition of Mercury will not be the best of the year, it is still a chance to catch the planet in the evening sky. It will be crossing Capricornus, low in the south-east immediately after sunset. Greatest eastern elongation of 19 degrees will be on 22nd January so probably the best period in which to hunt for Mercury will be between January 21st and 26th. Scan the horizon with binoculars and the lone 'star' will be Mercury.

Venus: As Venus is a very bright magnitude -3.9 you will be able to see it quite easily even though it will be very low in the south-east. However, you will have to be looking just before dawn as it will not rise until 06.00 UT in mid-January, and 06.30 UT by mid-February. The planet is slowly approaching the Sun and it will not be long before it disappears from view for a few weeks so take this opportunity to see it. It now has a fat gibbous phase, resembling a $\frac{3}{4}$ Moon shape. At the end of January/first week of February, Venus has a close encounter with Jupiter. They will be closest around 31st January/2nd February. As Jupiter is also bright (-1.8 mag) the pair should make a very nice sight in the morning twilight sky.

Mars: Mars is now well past opposition and fades from -1.1 mag to -0.2 mag by mid-February. Its apparent size is also decreasing fast and by mid February is just 10 arc seconds across which means it is going to be increasing difficult to see any surface markings by then. The planet remains in Taurus throughout this period so it will be very well placed for observations.

Jupiter: Apart from the meeting with Venus (see above) Jupiter is either too close to the Sun or too near the horizon for serious observations this session.

Saturn: In Leo and approaching opposition, Saturn is visible for the best part of the night as it rises about 21.00 UT in January and by 19.00 UT in February. The rings are at an angle of about 7.5 degrees now so are getting

harder to see. You will have to use a telescope to see them and it is best to let the planet rise well above the horizon before attempting the observation.

Uranus + Neptune: It is too late really to see Neptune now, as it is too close to the Sun. You still have a short time in which to look for Uranus though. Still in Aquarius at magnitude +5.8, you can find it as long as you look soon after dark otherwise it will have set.

Comets: Comet 17P/Holmes is still there, still in Perseus. While having faded somewhat, it is still an easy binocular object. Keep your eye on it over the next few weeks. The last time comet Holmes brightened unexpectedly (in the 1800's) it faded slightly and then re-brightened about 70 days later. Obviously, we have no way of knowing if it will do that again this time, but if it does, then it should be around now.

The only other comet visible of any brightness is comet 46P/Wirtanen. This one is also in the evening sky, crossing Pisces, low in the south-west. You will need a telescope for Wirtanen as it is about mag. 9.5 in January, brightening to probably its maximum of 9.2 by mid-February.

Algol: If you fancy watching a star actually change brightness during one evening, then beta Perseus, better known as Algol, is a good one to watch. It changes from magnitude 2.1 to mag 3.4 in about 4.5 hours, and then regains its former brightness over the next 4.5 hours. Compare how bright it is to the stars around it every half hour or so when it is undergoing a fade and you will be able to watch it change. Of course, you need to know when to look as it does not undergo fading and brightening permanently. Well, it reaches minimum brightness on Jan 15th at 23.9UT, Jan 18th at 20.7UT, Feb 2nd at 4.8UT, Feb 5th at 1.6UT, Feb 7th at 22.4UT, and Feb 10th at 19.2UT. For the previous 4.5 hours of each of these dates and times it will be fading, and for the 4.5 hours after each of these dates and times it will be brightening.

MOON PHASES:

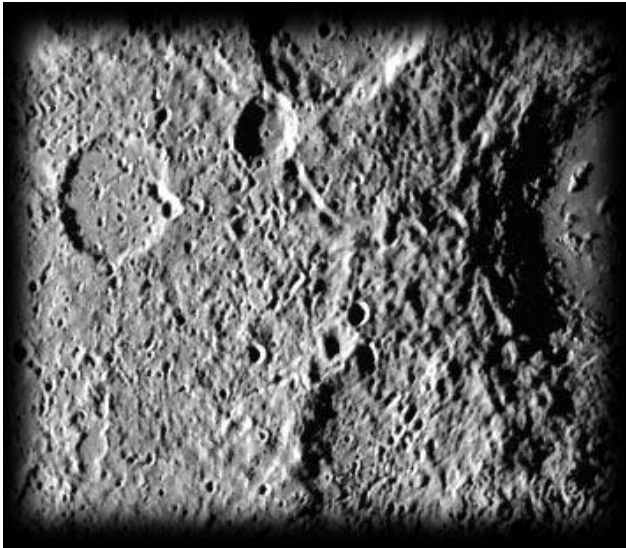
New: 8th Jan.; 1st Qtr: 15th Jan.; Full: 22nd Jan.; Last Qtr: 30th Jan.; New: 7th Feb '08.

MERCURY FLY-BY

by Andrew Ramsey

NASA's Messenger spacecraft arrives at Mercury today. After its launch on 3rd March 2004, it orbited the Sun and flew past Earth once more on 2nd August 2005 using Earth's gravity to swing in towards Venus, which it passed twice on 24th October 2006 and 5th June last year. The last pass of Venus enabled Messenger to swing in

again towards Mercury which it will finally reach today. However, this time at least, it will not stop! It is travelling far too quickly for this. Instead it will orbit the Sun and pass Mercury twice more (on 6th October this year and 29th September next year) before finally approaching Mercury slowly enough enabling it to go into orbit on 18th March 2011.

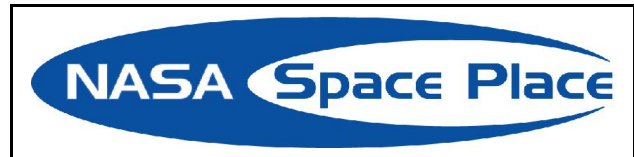


Messenger will be the first probe to orbit Mercury, the closest planet to the Sun. Until Mariner 10's fly-bys in 1975 Mercury was a bit of an enigma. Being always so close to the Sun in the sky, it is very difficult to observe. But even Mariner 10 only saw half of Mercury's surface. The timing of its orbits, and the planet's rotation meant that Mercury always presented the same face to the Sun as it passed, leaving the rest in darkness. The surface of Mercury was found to be heavily cratered (as in the above NASA photo) like the Moon, but unlike the Moon, a magnetic field was found, which caused scientists some headaches – how could such a small planet – too small for a molten core – create a magnetic field?

Messenger will pass Mercury only 200km away from the surface. As it does so, it is hoped that it can probe the distribution of mass in the planet, thus giving the extent of any molten core. Its cameras will map half of the hidden hemisphere on this first pass, and complete the mapping at the next fly-by.

Although Mercury is close enough to the Sun that lead will melt at the equator during the day, there are craters near the poles where it is thought that ice may lurk. Temperatures may fall sufficiently for water or sulphur to condense in the craters. As the crater walls heat up, gases may be given off again. Messenger's cameras will look for these.

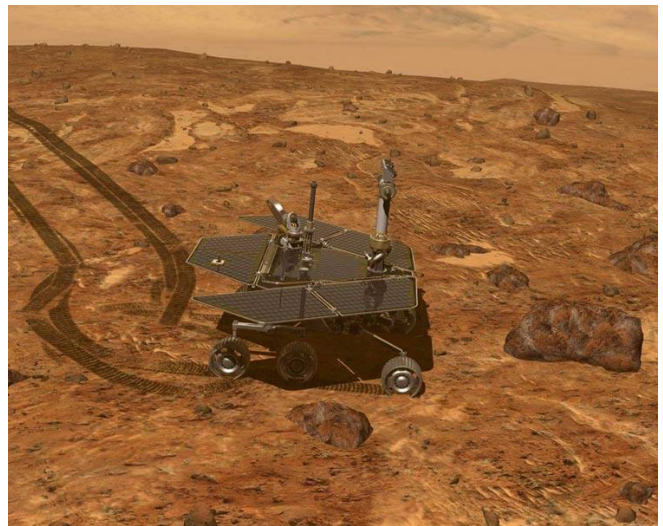
Messenger is not the only spacecraft destined for Mercury. A joint European-Japanese craft called BepiColumbo will be launched in 2013. Once in orbit round Mercury, the timing of its radio signals will give accurate range-finding distances of the planet. The extra delay due to the radio signals dipping in and out of the Sun's gravitational well as Mercury goes behind the Sun will also test Einstein's General Theory of Relativity to a very high accuracy.



NO MARS ROCK UNTURNED

by Patrick L. Barry

Not many endeavours require that you plan the mode of Imagine someday taking a driving tour of the surface of Mars. You trail-blaze across a dusty valley floor, looking in amazement at the rocky, orange-brown hillsides and mountains all around. With each passing meter, you spy bizarre-looking rocks that no human has ever seen, and may never see again. Are they meteorites or bits of Martian crust? They beg to be photographed.



Are these rocks of any scientific interest? With the new AEGIS software, the Mars Rovers, Spirit and Opportunity, will be able to judge for themselves whether a scene is worth a high-resolution image. (Artist's rendering.)

But on this tour, you can't whip out your camera and take on-the-spot close-ups of an especially interesting-looking rock. You have to wait for orders from headquarters back on Earth, and those orders won't arrive until tomorrow. By then, you probably will have passed the rock by. How frustrating!

That's essentially the predicament of the Spirit and Opportunity rovers, which are currently in their fourth year of exploring Mars. Mission scientists must wait overnight for the day's data to download from the rovers, and the rovers can't take high-res pictures of interesting rocks without explicit instructions to do so.

However, artificial intelligence software developed at JPL could soon turn the rovers into more-autonomous shutterbugs.

This software, called Autonomous Exploration for Gathering Increased Science (AEGIS), would search for

interesting or unusual rocks using the rovers' low-resolution, black-and-white navigational cameras. Then, without waiting for instructions from Earth, AEGIS could direct the rovers' high-resolution cameras, spectrometers, and thermal imagers to gather data about the rocks of interest.

"Using AEGIS, the rovers could get science data that they would otherwise miss," says Rebecca Castaño, leader of the AEGIS project at JPL. The software builds on artificial intelligence technologies pioneered by NASA's Earth Observing-1 satellite (EO-1), one of a series of technology-testbed satellites developed by NASA's New Millennium Program.

AEGIS identifies a rock as being interesting in one of two ways. Mission scientists can program AEGIS to look for rocks with certain traits, such as smoothness or roughness, bright or dark surfaces, or shapes that are rounded or flat.

In addition, AEGIS can single out rocks simply because they look unusual, which often means the rocks could tell scientists something new about Mars's present and past.

The software has been thoroughly tested, Castaño says, and now it must be integrated and tested with other flight software, then uploaded to the rovers on Mars. Once installed, she hopes, Spirit and Opportunity will leave no good Mars rock unturned.

Check out other ways that the Mars Rovers have been upgraded with artificial intelligence software at <http://nmp/TECHNOLOGY/infusion.html#sciencecraft>.

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

LAST MEETING'S TALK

by Gwyneth Hueter

Sorry if this is not up to its usual standard but how do you describe colours to a blind person or sound to a deaf person?

Basically, Nik Szymanek's talk was mostly information about astrophotography, starting with simple undriven snapshots, and ending with professional standard stuff. And with fantastic shots all the way.

You can't beat a clear sky, and Nik's favourite spot is on the La Palma Observatory car park in the Canaries. Anyone can go there, so what's stopping us? Some of the best telescopes are on that mountain, namely the Isaac Newton and the William Herschel Telescopes.

If you want better observing conditions then you have to go to somewhere like the Mauna Kea Observatory. And yes, Nik's quite familiar with the car park there too.

I think we were all pretty stunned by the quality of the shots, but mainly because the sky quality was so good.

Nik finished off with a video of some of the best views, accompanied by some pretty ethereal music. I think we were all in a good mood after that, judging by the way his merchandise was bought up afterwards.

FURTHER DISCUSSION

If you are not already on our internet mailing list, then why not log on to YahooGroups. The list is called 'abingdonas'. Members use the list to alert each other about celestial events and to chat about amateur astronomy. The list is quite active, with several messages most weeks. To read through previous messages click on <http://groups.yahoo.com/group/abingdonas/>.

To join the abastro list, please go to <http://www.yahogroups.com>. You can also unsubscribe from the list here. To post messages to the list, please send them to abingdonas@yahogroups.com.

Please note that you will need to sign up with a YahooID if you do not already have one. You can do this on the above page.

Further information about the mailing list can be found on the abingdonas webpage at : <http://groups.yahoo.com/group/abingdonas/>.

Further discussion on astronomy and many other topics takes place at the Spread Eagle pub in Northcourt Road after the meeting. You are most welcome to join us.

DATES FOR YOUR DIARY

21st Jan. 8pm. Beginners' Meeting in the Perry Room.

4th – 6th Feb. (First clear night) Observing Evening at Abbey Meadow. Phone Ian on 01491 824266 for details. And wrap up warm!

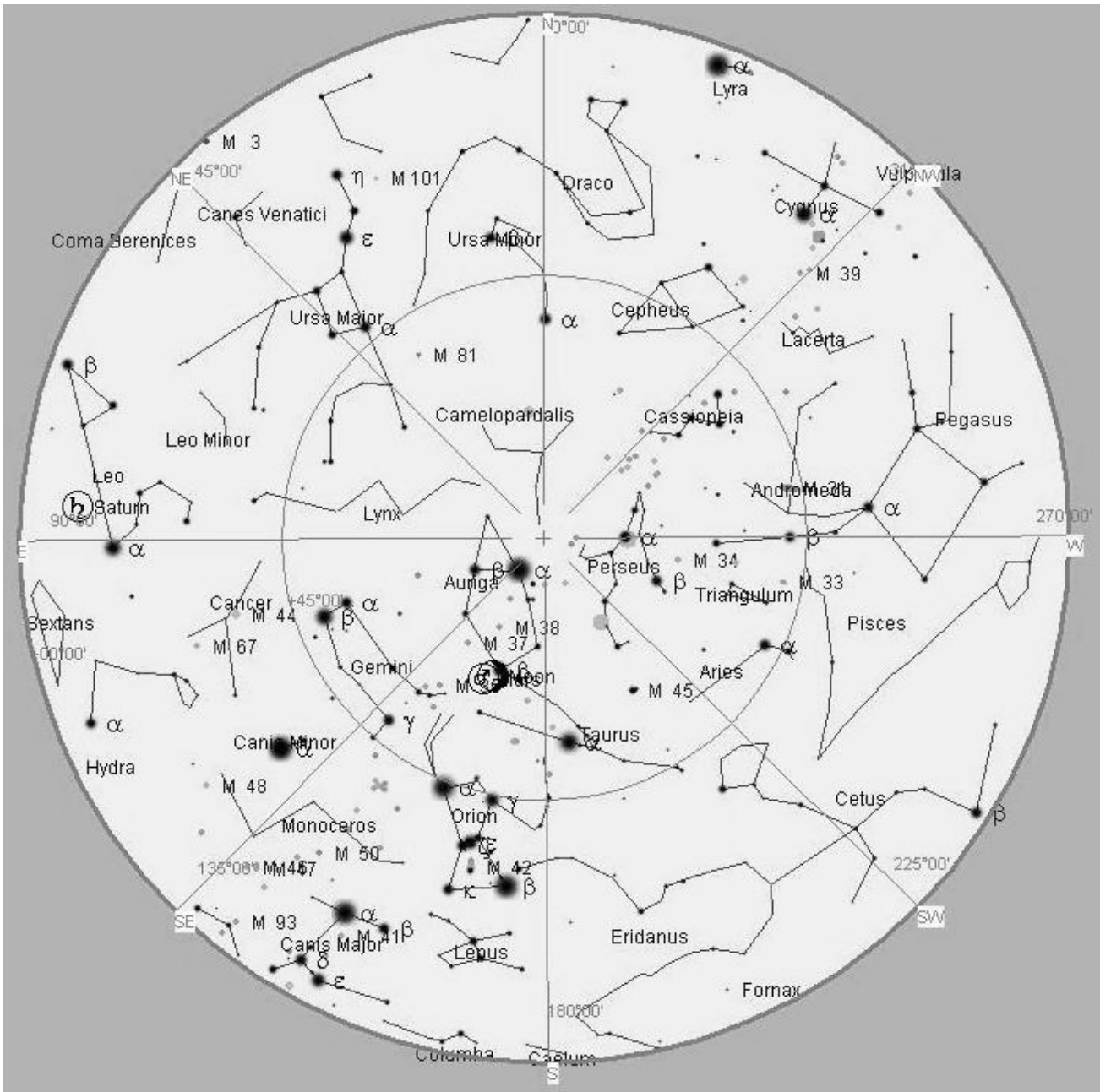
11th Feb. 8pm Speaker meeting: Dr David Whitehouse (BBC) – "The Sun: A Biography".

The editor of "SpaceWatch" is Andrew Ramsey, who would very much appreciate your stories & contributions. Please send any news, observations, photos, etc. to:

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STAR CHART



The Night Sky at 9pm (GMT) next Saturday (19th January)

Orion dominates the southern sky at this time of year. Use Orion as a pointer to find many other constellations. If you haven't seen Mars this season, your time is running out, but it is there above Orion on the Gemini / Taurus border.

Comet Holmes is still visible in Perseus, pretty much overhead. Though it is fading in brightness as it grows ever larger, it might just, as it did those many years ago, brighten a second time. So watch out.