

SPACEWATCH

the newsletter of the Abingdon Astronomical Society

12th November 2007

**Stan Cocking Memorial Lecture:
Gordon Rogers –
'Imaging Deep Space from
Long Crendon'**

Hello, it's me again. First of all, thank you to Chris for putting the newsletter together last month. I had just got back from a three week holiday in Namibia where there is so little light pollution that you can see that the sky is in fact not black, but a pale grey from the light of thousands of stars. You can actually see what you're doing with no light, once your eyes are adapted. The Moon, when it is up casts such strong shadows you could swear it was daylight. It was nice to see the southern stars again, and those two permanent clouds of Magellan, satellite galaxies of our Milky Way.

Meanwhile, back to Oxfordshire...

We have a comet – and quite a bright one at that. If you haven't seen it yet, then you obviously haven't looked up on a clear night as it is right above you mid-evening. With the naked eye it is obviously not point-like and any pair of binoculars of small telescope will reveal is fuzzy ball shape. The comet is hardly moving, and is getting larger – does that mean it is heading straight for us? On the contrary, it is moving directly away from us but is still growing in size from its sudden surprise outburst last month in which is brightened by an unprecedented one million times!

THE NIGHT SKY THIS MONTH

by Bob Dryden

Mercury - You just have time to have a final glimpse of Mercury before it disappears back behind the Sun on 17th December. It is crossing Virgo and Libra so it will be very low down in the south east just before sunrise. By the end of November it will be too close to the Sun to be visible.

Venus - Now it is past its greatest elongation, Venus is starting to move back towards the Sun but it is still very easy to see before dawn in the south east. Shining at a very bright -4.2 mag it is hard to miss this beacon. Now crossing Virgo, the planets phase is increasing slowly and it will now present a gibbous shape to telescope users.

Mars - This is the planet that will be attracting all the attention this season as it approaches its superb opposition on Christmas Eve. It is now very well placed in Gemini which means it passes virtually overhead later in the night. In mid November the planet rises about 19.00 UT,

culminating around 03.00 UT in the morning. By mid December however it rises about 17.00 UT and reaches its highest point of the night by about midnight. The planet increases in brightness throughout the session reaching a bright -1.5 mag by December. The apparent size also increases to 15" as Earth moves towards Mars and the telescopic views, hopefully, will be excellent. I say hopefully because earlier this year there were massive dust storms on Mars that obscured the detail on the disc but at the moment it looks like those storms are dissipating which means that by opposition the disc might be clear again. Only time will tell.

Jupiter – If you have a low south-west horizon, then Jupiter is quite bright, just above the horizon around sunset but quickly sets.

Saturn - For early risers (or those who like to stay up all night!) Saturn is on view in Leo. While the planet rises about midnight, it takes a couple of hours or so for it to gain enough height for worthwhile telescopic views. The rings are closing quite dramatically now, reaching a tilt angle of just -6.6 degrees this month, so ring detail is now very hard to see.

Uranus + Neptune - Both these planets are very well placed for observation in the evening sky as it goes dark. Uranus occupies Aquarius while Neptune resides in Capricornus. Binoculars and a finder chart are all you need to see them.

Occultations - On the evening of 28th/29th November the waning gibbous Moon skims across the northern part of the open cluster M44, the Beehive, in Cancer. The event takes place from about midnight to 02.00 UT. The Moon will be about 30 degrees high in the east at the start of this event. As no very bright stars are occulted, you will probably need a small telescope to watch the action as the Moon passes over several fainter members of the cluster.

Meteors - The Leonid meteor shower is active from 15th to 20th November with the maximum occurring on 18th November at 05.00 UT. This is very favourable indeed for the UK this year as the Moon sets about midnight giving you a dark sky for the rest of the night. You always see more meteors after midnight anyway, and as the maximum is around dawn, everything is in the meteor watchers favour that morning. The high Leonid meteor counts of a few years ago are gone now but you could still see about 20 Leonids an hour if it is clear.

The best meteor shower of the year, the Geminids, are also active this session. You will see them between 7th and 16th December, but the best night, the night of maximum, is the night of 14th/15th when you might see up to 100 meteors an hour. The actual maximum time is around 16.00 UT on the 14th but high meteor rates continue for several hours either side of that time. The

Moon is just a crescent on the 14th and sets at about 20.00 UT anyway, so this shower is very favourable as well. Geminid meteors are often very bright and spectacular so I would urge you to spend an hour or two (or even more) watching for them if it is clear on the 14th.

As well as any Leonids or Geminids, it is very possible you might see a Taurid meteor or two while out observing. While this shower is past its maximum, it goes on until 30th November. Taurids are few in number, but make up for that by often being bright and fairly slow moving so keep an eye for them.

Asteroids - 1 Ceres is still on view in Cetus. It is fading slightly now, reaching 7.8 mag by mid December, but a pair of binoculars will show it to you easily.

Equally easy to see in binoculars will be the asteroid 8 Flora which is approaching opposition on 20th November in Taurus. Actually, it is the far west of Taurus, close to the border with Cetus, and as a result is quite close to Ceres in the sky.

Comets - After the surprise performance of comet 17P/Holmes in October and November, no one knows what it will be like this session. It reached about 2.5 mag, but seems to be fading slightly now so it is impossible to say how bright it will be in the coming weeks. It might just gradually fade away, or it might stay as it is now, so you will have to just watch it to find out. It will stay in Perseus however. The comet is physically a long way away (for a comet) so it does not appear to move much in the sky from night to night.

Another comet, Comet 8P/Tuttle, is brightening now, going from about 9.5 mag to 6th mag through this session. Not only is it getting easier to see, but it is very well placed in Ursa Minor, not too far from Polaris. Later in December it crosses into Cepheus.

MOON PHASES:

Last Qtr: 1st Nov...; New: 9th Nov.; 1st Qtr: 17th Nov.; Full: 24th Oct.; Last Qtr: 1st Dec.; New: 9th Dec.

LAST MEETING'S TALK

by Gwyneth Hueter

Last month's talk was entitled 'Exoplanets and how to find them' given by Andrew Norton of the Open University.

The talk began with the amusing observation that had it been given in 1995, there would have been only one extrasolar planet to talk about, namely the planet around 51 Pegasi. Since then, we have found over 200 (254 according to the extrasolar planet encyclopedia found on <http://exoplanet.eu>.)

Mr Norton then explained the five recognised ways of planet hunting:

- Direct imaging: the contrast is better if you use infra red for faint planets.
- Astrometry: how a planet's gravity changes a parent star's orbit over time. A big planet will have the most effect on the star's orbit.
- Radial velocity (Doppler shift) measurements: this is how most of the planets have been discovered.
- Microlensing (gravitational lensing): four planets have been discovered in this way – a small star in the foreground concentrates the light from a background star directly behind and its accompanying planet shows as a blip in the star's light curve.
- Eclipses (transits): so far only seen in edge on solar systems with 'hot Jupiter' planets.

'Hot Jupiters' seem to be most enigmatic. These are planets which are gas giants like Jupiter (sometimes much bigger). Why are so many so close to their parent star? Well over half of them are less than one astronomical from their star.

Although Mr Norton could not explain how these hot Jupiters can survive so close to a star, they are easier to detect than the relatively small rocky Earth or Venus sized planets. He described the UK's planet search, (WASP = Wide Angle Search for Planets) using transits and the international (SuperWASP) planetary search using telescopes in Europe, Canary Islands and South Africa. These searches involve observatories with very wide angled cameras which are constantly photographing the sky.



THE RED (HOT?) PLANET

by Patrick L. Barry

Don't let Mars's cold, quiet demeanour fool you. For much of its history, the Red Planet has been a fiery world.

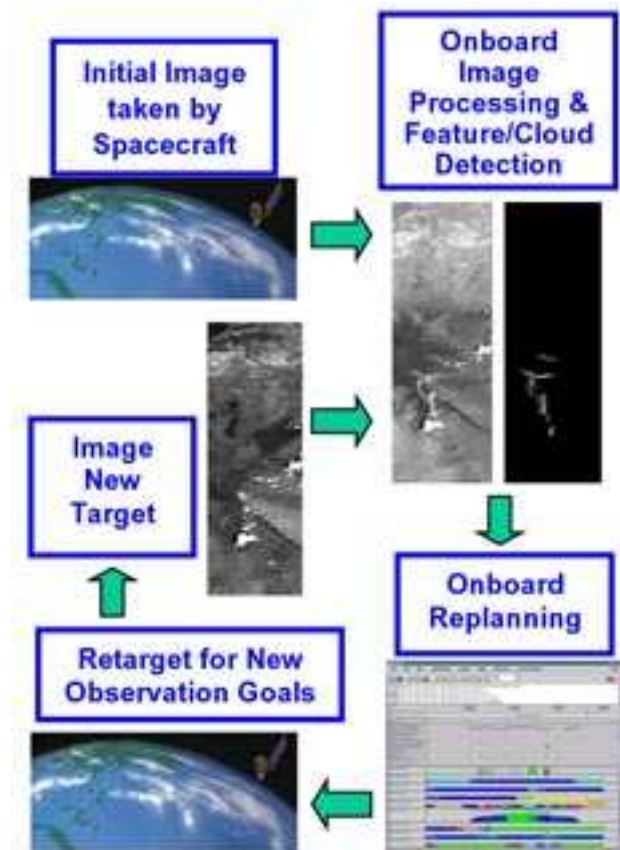
Dozens of volcanoes that dot the planet's surface stand as monuments to the eruptions that once reddened Mars's skies with plumes of glowing lava. But the planet has settled down in its old age, and these volcanoes have been dormant for hundreds of millions of years.

Or have they? Some evidence indicates that lava may have flowed on Mars much more recently. Images of the Martian surface taken by orbiting probes show regions of solidified lava with surprisingly few impact craters, suggesting that the volcanic rock is perhaps only a million years old.

If so, could molten lava still occasionally flow on the surface of Mars today?

With the help of some artificial intelligence software, a heat-sensing instrument currently orbiting Mars aboard NASA's Mars Odyssey spacecraft could be just the tool for finding active lava flows.

"Discovering such flows would be a phenomenally exciting scientific finding," says Steve Chien, supervisor of the Artificial Intelligence Group at JPL. For example, volcanic activity could provide a source of heat, thus making it more likely that Martian microbes might be living in the frosty soil.



Just as changing cloud patterns on Earth were identified using Earth Observing-1's Advanced Land Imager along with ScienceCraft software, the THEMIS instrument with ScienceCraft on the Mars Odyssey spacecraft can avoid transmitting useless images.

The instrument, called THEMIS (for Thermal Emission Imaging System), can "see" the heat emissions of the Martian surface in high resolution—each pixel in a THEMIS image represents only 100 meters on the ground. But THEMIS produces about five times more data than it can transmit back to Earth.

Scientists usually know ahead of time which THEMIS data they want to keep, but they can't plan ahead for

unexpected events like lava flows. So Chien and his colleagues are customizing artificial intelligence software called ScienceCraft to empower THEMIS to identify important data on its own.

This decision-making ability of the ScienceCraft software was first tested in Earth orbit aboard a satellite called Earth Observing-1 by NASA's New Millennium Program. Earth Observing-1 had already completed its primary mission, and the ScienceCraft experiment was part of the New Millennium Program's Space Technology 6 mission.

On Odyssey, ScienceCraft will look for anomalous hotspots on the cold, night side of Mars and flag that data as important. "Then the satellite can look at it more closely on the next orbit," Chien explains.

Finding lava is considered a long shot, but since THEMIS is on all the time, "it makes sense to look," Chien says. Or better yet, have ScienceCraft look for you—it's the intelligent thing to do.

To learn more about the Autonomous ScienceCraft software and see an animation of how it works, visit <http://ase.jpl.nasa.gov>.

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

DATES FOR YOUR DIARY

23rd Nov. 7pm at (and organised by) Science Oxford, 1-5 London Place, St Clements, Oxford: Prof. Colin Pillinger – "Space is a Funny Place". Entrance £5. Advanced booking is essential on 01865 728953 or e-mail: events@oxtrust.org.uk

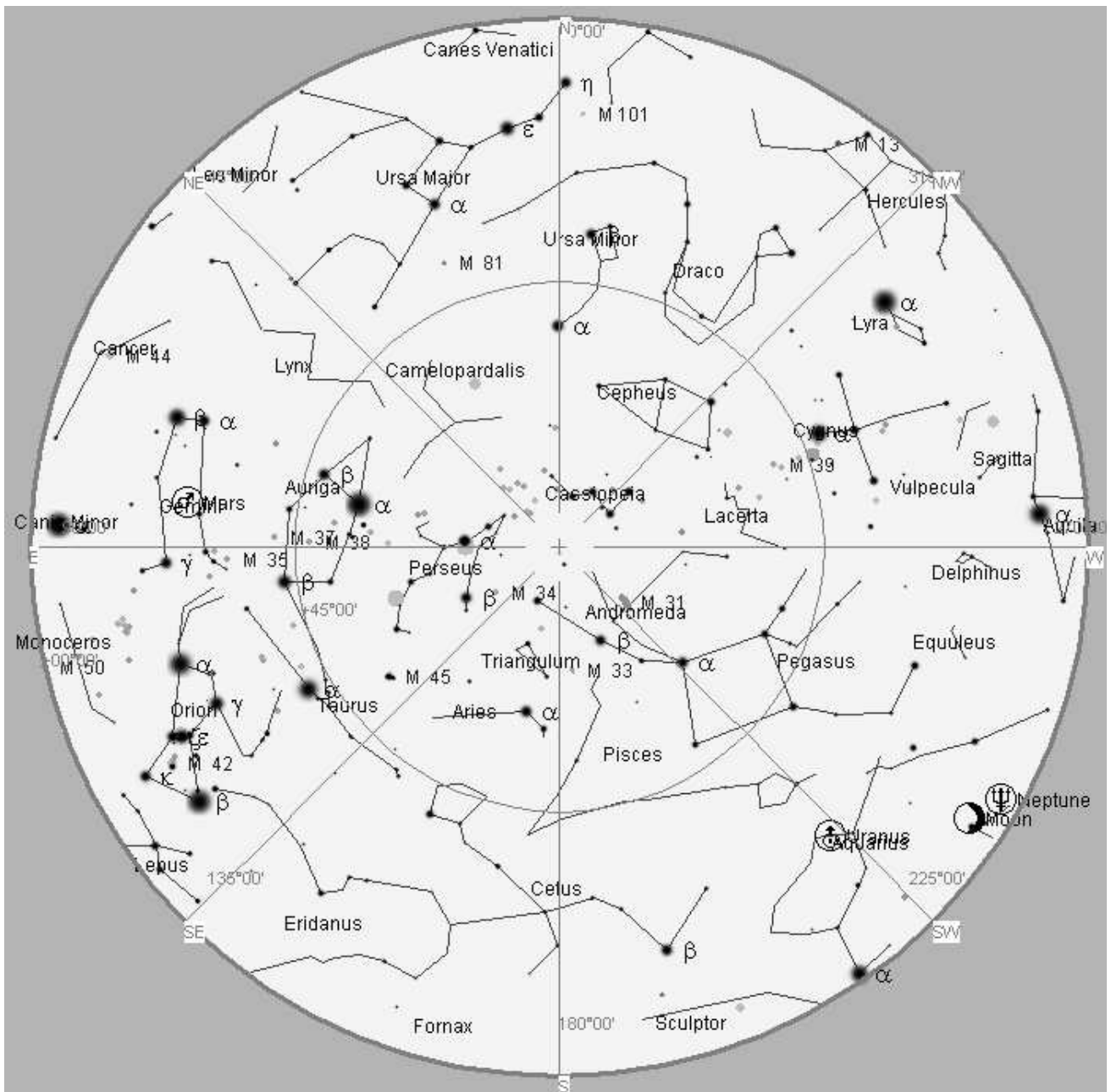
26th Nov. 8pm. Beginners' Meeting in the Perry Room.

3rd – 5th Dec. (First clear night) Observing Evening at Frilford Heath. Phone Ian on 01491 824266 for details.

12th Dec. 8pm Speaker meeting: Nik Szymanek - Astrophotography.

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 (17th November)

Right overhead is Perseus and the 'W' of Cassiopeia. Look out for the extra, rather fuzzy 'star' which is Comet 17P/Holmes. It is not hard to find. Binoculars will show that it is not at all star-like in reality. Nearby is another fuzzy patch – our nearest galaxy, M31, in Andromeda. Orion is now rising earlier to dominate the south-east at 9pm. Follow the belt up and to the right to find the bright reddish star Aldebaran and beyond the Pleiades, or Seven Sisters. Mars is quite bright in the south-west too, in Gemini.