

# SPACEWATCH

the newsletter of the Abingdon Astronomical Society

14<sup>th</sup> March 2011

David Boyd (Newbury AS),  
'Professional / Amateur Astronomy'

In one week's time it will be the Spring Equinox, and after that the nights will be getting shorter, and lighter. So you'll have to stay up later or get up earlier to go out observing. That is, if you're not observing the Sun, which is becoming quite active at the moment (see page 4).

## THE NIGHT SKY THIS MONTH

by Bob Dryden

**Sun:** The Spring equinox is reached at 23.21 UT on 20<sup>th</sup> March. This is the time the Sun moves north of the celestial equator and the days become longer than the nights.

**Mercury:** Currently on view in the evening sky, Mercury reaches greatest eastern elongation on 23rd March when it will be 19° from the Sun. While this is the best evening apparition of the year, Mercury is only on view until the end of March before it goes through inferior conjunction on 9<sup>th</sup> April. In fact, after the 25<sup>th</sup> March the planet will be getting rather faint, and this, combined with a low altitude (only 15° high at sunset on the 25<sup>th</sup>) means you may have difficulty finding it. Mercury has a meeting with Jupiter on the evening of 16<sup>th</sup> March when the fainter (mag. -1.0) Mercury will be 2° north of the brighter (mag. -2.0) Jupiter. They will be about 9° above the western horizon 30 minutes after sunset. Binoculars should enable you to pick them out of the twilight if they are not visible to the naked eye.

**Venus:** Venus continues to shine in the morning sky although it now stays quite close to the horizon. Through this session the planet does get a little bit lower, but it is still 8° high about half an hour before sunrise by April. You should be able to see Venus very easily in the south east as long as you have a fairly clear horizon as it is a very bright magnitude -3.9. The phase is increasing now, reaching 0.8% by April so telescopically, Venus is not at its most attractive. The morning of the 27<sup>th</sup> March finds Venus just 15" south of Neptune. Both planets will fit in the same field of view of a telescope which is always well worth a look. It will not be an easy observation however as they will be only about 5° high around 30 minutes before sunrise. Four days later, on the 31<sup>st</sup>, there will be a crescent Moon approximately 5° above Venus making for a very nice sight.

**Mars:** Mars is too close to the Sun this session.

**Jupiter:** Closing in on the Sun, Jupiter reaches solar conjunction on 6<sup>th</sup> April. You may be able to see Jupiter up to the end of the third week of March, but it will be very low by then.

**Saturn:** This is the best placed planet for observation this session. It reaches opposition on 4<sup>th</sup> April, after which it is on view virtually all night. Currently in Virgo, several degrees from the bright star Spica, Saturn is easy to see as it shines at a bright magnitude +0.4. The rings are at an angle of about 9°, so they are easy to see in any small telescope.

**Uranus & Neptune:** Uranus is in conjunction with the Sun on 21<sup>st</sup> March as so is not visible at the moment. Neptune creeps out from the solar glare into the morning sky by April. It remains low however and will be rather difficult to see.

**Asteroids:** The continuing lack of meteors and comets means asteroids are the target of choice for keen observers. There are 4 asteroids brighter than 10<sup>th</sup> magnitude on show this session.

**3 Juno** continues to fade (from mag. +8.9 to mag. +9.7) as it moves amongst the stars of southern Leo.

**7 Iris** is also fading as it crosses Cancer. Iris goes from mag. +9.3 to mag. +10.0 by April.

**20 Massalia** is currently near to the Leo/Virgo border and, again, is fading, reaching magnitude +9.7 by April.

The one asteroid that is brightening is **4 Vesta**. This goes from mag. +7.7 to mag. +7.5 (and will continue to get brighter until July). Currently in Sagittarius, it crosses into Capricornus at the end of March, where it will stay throughout the summer. At 7<sup>th</sup> magnitude, Vesta will be an easy binocular object as long as you have a good finder chart.

**Occultations:** Just one fairly bright star under goes a lunar occultation this session.

On 7<sup>th</sup> April, the magnitude +4.4 star, 37 Taurus disappears behind the Moon at 19.13 UT, and then reappears at 20.12 UT. The Moon will be a crescent, about 50° high in the west, so a small telescope is all that should be needed to watch this event. In between the disappearance and reappearance, a fainter, mag. +5.9 star (39 Taurus) is occulted at 19.41 UT if you want something to occupy yourself with while you wait.

**Time:** Don't forget that British Summer Time starts on 27<sup>th</sup> March, when you move your clocks forward one hour. This means you need to mentally deduct an hour from your clock to get to Universal Time (UT) which is the time scale used in the astronomy magazines (and all the times I have given here).

## MOON PHASES:

First Qtr: 12th Mar.; Full: 19<sup>th</sup> Mar.; Last Qtr: 26<sup>th</sup> Mar.; New: 3<sup>rd</sup> Apr.; First Qtr: 11<sup>th</sup> Apr.



## GOES-R, ZOMBIE FIGHTER

by Dr Tony Phillips

On April 5, 2010, something eerie happened to the Galaxy 15 telecommunications satellite: It turned into a zombie.

The day began as usual, with industry-owned Galaxy 15 relaying TV signals to millions of viewers in North America, when suddenly the geosynchronous satellite stopped taking commands from Earth. It was brain dead! Like any good zombie, however, its body continued to function. Within days, Galaxy 15 began to meander among other satellites in geosynchronous orbit, transmitting its own signal on top of the others'. Satellite operators scrambled to deal with the interference, all the while wondering *what happened?*

In horror movies, zombies are usually produced by viruses.

"In this case, the culprit was probably the sun," says Bill Denig of the National Geophysical Data Center in Boulder, Colorado. He and colleague Janet Green of NOAA's Space Weather Prediction Center recently led a study of the Galaxy 15 anomaly, and here are their conclusions:

On April 3<sup>rd</sup>, a relatively minor solar flare launched a cloud of plasma toward Earth. Galaxy 15 had experienced many such events before, but this time there was a difference.

"Galaxy 15 was just emerging from the shadow of Earth when the cloud arrived and triggered a geomagnetic storm," explains Denig. Suddenly exposed to sunlight and the ongoing storm, "the spacecraft began to heat up and charge [up]."

Electrons swirling around Galaxy 15 stuck to and penetrated the spacecraft's surface. As more and more charged particles accumulated, voltages began to rise, and—zap!—an electrostatic discharge occurred. A zombie was born.

"At least, this is what we suspect happened based on data collected by GOES satellites in the vicinity," he says. "We'll be able to diagnose events like this much better, however, after GOES-R is launched by NASA in 2015."

GOES-R is NOAA's next-generation Geostationary Operational Environmental Satellite. One of the instruments it will carry, a low-energy electron counter, is crucial to "zombie fighting." Low energy-electrons are the ones most likely to stick to a spacecraft's surface and cause brain-frying discharges. By monitoring these particles in Earth orbit, GOES-R will provide better post-mortems for future zombie outbreaks. This could help satellite designers figure out how to build spacecraft less susceptible to discharges. Also, GOES-R will be able to issue alerts when dangerous electrons appear. Satellite operators could then take protective action—for example, putting their birds in "safe mode"—to keep the zombie population at bay.

Meanwhile, Galaxy 15 is a zombie no more. In late December 2010, after 9 months of terrorizing nearby spacecraft, the comsat was re-booted, and began responding to commands from Earth again.

All's well that ends well? True zombie fighters know better than to relax. Says Denig, "we're looking forward to GOES-R."

You and the kids in your life can learn about space weather at <http://scijinks.gov/space-weather-and-us>.

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

## LAST MONTH'S TALK

by Gwyneth Hueter

February's talk was given by Dr John Hardwick, and was about atmospheric phenomena on Earth: rainbows, glories, etc.)

He started off with visual effects caused by shadows, such as the long triangular shadows caused by mountains, and the blue shadow caused by the Earth itself when the Sun is setting behind you.

Moisture on the ground will reflect light back at you (opposition effect): Buzz Aldrin saw a halo around his shadow when he stood on the Moon with his back to the Sun due to the Sun's reflection on the lunar dust.

The best known effect of sunlight shining through water droplets is the prism effect you see in a rainbow, but did you know that you can get an interference pattern caused by the sunbeams going through the raindrops? These are extra narrow lines inside the rainbow's lower edge. These are called 'supernumeraries' and the smaller the raindrops the bigger they are.

More complicated are the effects caused by ice crystals prisms, which are basically hexagons which can be in cylinders like pencils or in thin hexagonal plates. Sunlight can cause all kinds of reflections through and across these, and the best views can be got near the polar regions because it's colder so you'll get more of the crystals. The most common phenomenon is the 44 degree diameter halo around the Sun or Moon seen through high icy cloud.

Dr Hardwick finished with the refraction effects of the Earth's atmosphere near the horizon, most notably when you see mirages or the green flash. The green flash is sunlight refracted up from behind the horizon. It looks green because the blue part of the spectrum is scattered in the atmosphere and the orange and red parts are obscured by moisture and solid particles in the atmosphere. You get the best views from a point at altitude because there is less atmosphere to scatter the light, but it looks more blue then.

Dr Hardwick recommends [www.atoptics.co.uk](http://www.atoptics.co.uk) which has a lot of examples of these phenomena, but don't forget we have an excellent book on the subject in the Society library, by Robert Greenler – Apologies, but I've borrowed it!



*The Galaxy 15 communication satellite was “brainless” for several months in 2010 after being exposed to a geomagnetic storm. The new GOES-R satellite will warn of such dangers.*

### 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 abingdonas 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](mailto: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 main meetings. You are most welcome to join us.

### DATES FOR YOUR DIARY

**21<sup>st</sup> Mar.** 8pm Beginners' Meeting in the Perry Room.

**11<sup>th</sup> Apr.** 8pm Talk by Prof. Richard Harrison (RAL) 'A Golden Age of UK Space-based Solar Observing'

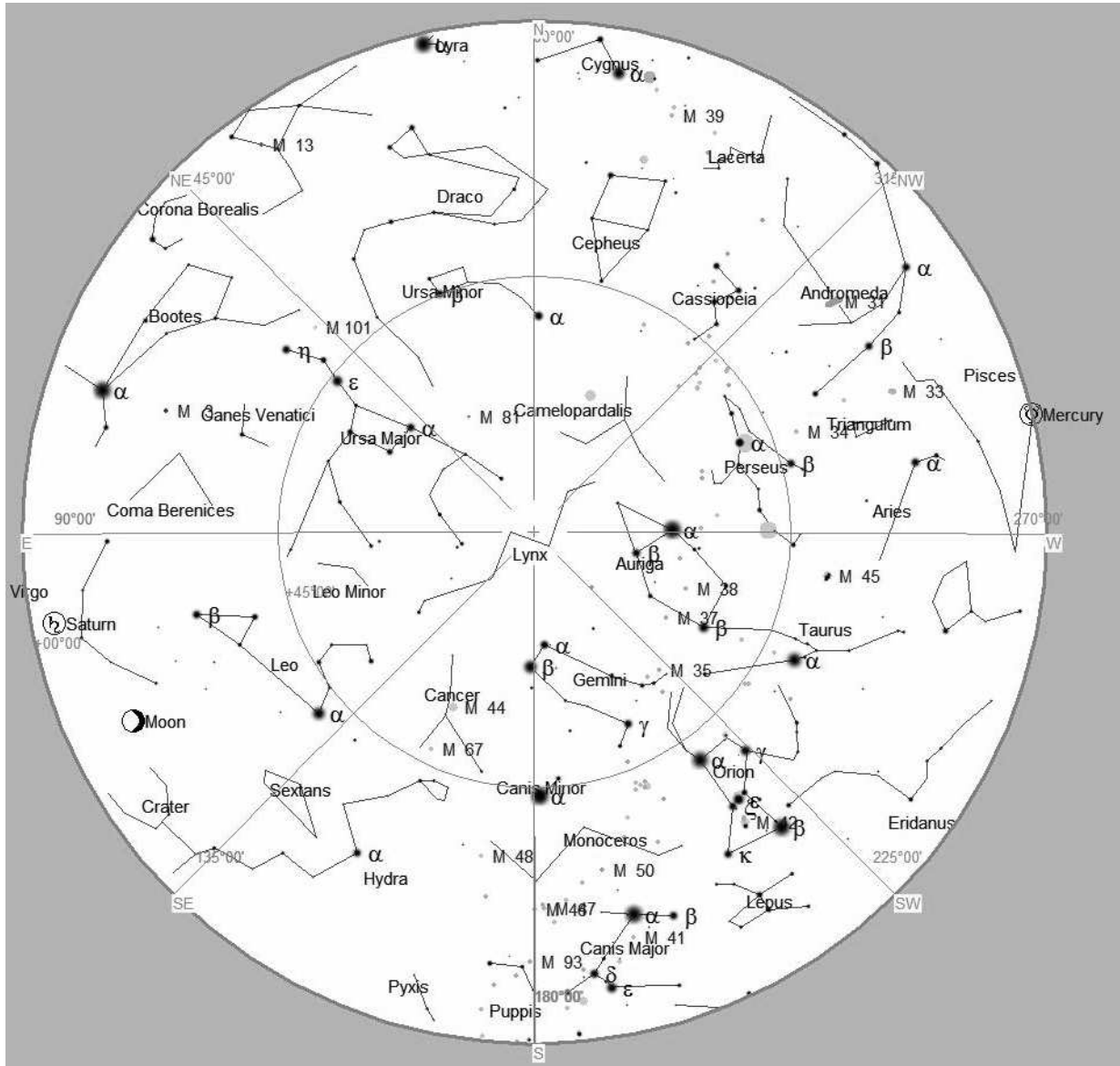
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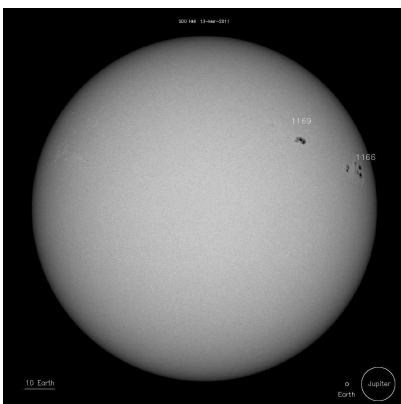
## STAR CHART



**The Night Sky at 21:00pm (GMT) next Saturday (19<sup>th</sup> March)**

Orion is now over in the south-west. Gemini, the Twins, are high in the south, with Auriga, the Charioteer to the right, and Perseus beyond. In the south-east is Leo, the Lion. The Plough is standing on its handle in the north-east.

## THE SUN



The Sun – yesterday at 13.00 UT by SOHO, the Solar and Heliospheric Observatory, left in white light, and right in X-rays, showing two large sunspot groups disappearing over the eastern limb. Be sure to use a solar filter over the large end of your telescope, not at the eyepiece, and be sure to fasten it securely.

