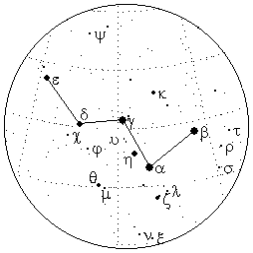


Wadhurst Astronomical Society Newsletter
APRIL 2011 Issue

MEETINGS

COMMITTEE MEETING

Members of the Committee are respectfully reminded that there is a meeting of the Committee at 1930 on Tuesday 12th of April. It will take place at Phil's house.

Any member is welcome to attend if they wish, but please let Phil know first.

MARCH MEETING

The meeting was led by Phil Berry who began by asking members if they had borrowed any of the Society instruments, not to asking for their return but just to keep a tally of where they are.

Phil also mentioned that he and our Chairman, John Vale-Taylor had attended the Wadhurst "Come and Meet Us" event at Uplands College last Saturday. This provided a chance for Businesses and Societies to introduce themselves to the public. A number of people hadn't heard of us and we were able to provide a number of pamphlets explaining our existence and purpose. Also Phil had taken along his Orrery and telescope in demonstration mode; so thank you to them both.

It was announced that Horsham Astronomy Group are hosting this year's SAGAS Summer meeting on Sunday the 3rd of July at Christ's Hospital, Horsham. There is some information on the SAGAS on-line website at:
www.sagasonline.org.uk/
but more details will follow later.

Next, Phil introduced tonight's talk:

DSLR Astro Imaging
by Robin Durant FRAS

Robin is the chairman of the Adur Astronomical Society, covering Hove and Brighton. He said he was impressed with our skies in Wadhurst because at home he has to look over the "Brighton Bonfire", suggesting that the skies there are very light polluted.

He began by saying it is important to keep things simple and basic. He himself enjoys part of his time as a water colour artist and so to him, colour is important.

One of the reasons that Robin became interested in imaging was to show friends that there is a great deal of detail and colour to be seen using a camera instead of the grey blobs they see by eye when looking at gas clouds and galaxies through a telescope.

He mentioned other methods of Astro-imaging before concentrating on The Digital Single Lens Reflex camera. The first consideration being the equipment needed, the cost, mounts and controls.

The advantages of the DSLR are:
Colour – There is no need to use separate images taken through red, green and blue filters.
Uses a big chip; the one Robin uses has a 4,000 x 3,000 pixels.
The camera can achieve a wide angle, useful when imaging objects such as the Great Andromeda Galaxy, and the camera can also be used for terrestrial photography as well.

Some disadvantages:
Can be heavy.
Images can be noisy; the chip is not cooled as it usually is with an Astro CCD camera to reduce electronic noise although Robin did say that if you take a lot of frames and superimpose them, noise can be reduced.
Focussing can be difficult.

We spent some time hearing about different methods of achieving focus such as using the live-view screen and focusing closer and closer until the star gives a little spark at optimum focus. One of the best methods was to use free software available on the Internet and then viewing on a laptop using "Nebulosity" or "DSLR Remote" which both have aids to focus incorporated in the software. It was also suggested that a piece of blue-tack should be at hand to lock the focus in position once achieved, so that when subsequently moving the camera there is less of a possibility of knocking it out of focus.

We then looked at what one needs:
Deep Sky Stacker software to stack the images and it's free on the Internet.
Registax 5 for planetary work and it's also free.
Photoshop software to process images. This can vary very much in price.
A timer.
Light pollution filter; - Robin has found the Neodymium filter good for towns such as Brighton. They cost between £30 and £50.
A small hand mirror; - invaluable to see the screen at the back of the camera when working around the front.
Other important items are warm clothing, a warm drink, a red torch and a pair of binoculars and lots of patience.

Cameras were talked about such as a second hand Canon 350D or 450D with a "B" (bulb) setting so that the shutter can be held open for long exposures. Another need was for a good tripod and it was suggested that they start from around £30 to £40.

Careful setting up is most important to obtain good tracking and if a GOTO mount is used it is worth spending some time getting a really good alignment including setting the level, even if the instructions suggest it isn't necessary. Also, no wind is an advantage, so is the lack of the moonlight and no vibration. Robin mentioned a train passing half a mile away from his house and yet it caused star trails.

Exposure time is important; with a 17 mm wide angle lens, one minute is possible without getting star trails. With a 24 mm lens, 30 seconds is possible. With an Alt-Azimuth mount and an 80 mm scope, a maximum of one minute is recommended and with an Equatorial mount, this can be as long as 3 minutes.

A minimum of one hour total exposure is usually needed, but this could be made up of 60 one-minute exposures and one dark frame exposure which is used to help eliminate hot pixels on the chip.

Robin showed a number of images he has taken, showing examples of different techniques. Firstly he showed a number of images using a DSLR on a simple tripod using a wide angle lens. He used the "Bulb" time setting on his camera to obtain the long exposures and also remotely operated the camera. He also mentioned that he had found a really dark sky at a place called Beer in Devon. The first he showed was of the North American Nebula in the Milky Way. It was made from 50

frames each exposed for 45 seconds. The colour and the detail were surprisingly good.

Two long exposures taken during the Perseid meteor shower showed three meteor trails, although on a previous night he had captured nothing.

An image of the moon made from 20 exposures using a Canon 450D DSLR revealed considerable detail having used Registax to combine the images and then cropping the result.

A really clear image of Orion's Horse Head Nebula amazed members and at this point Robin said that the 450D Canon DSLR has a red filter in it to balance the camera's colour response and prevent faces becoming too red, but he had had this professionally removed because as he said, there is an awful lot of Hydrogen Alpha radiation in the night sky and this would be lost to a large degree.

Still using the DSLR camera we were shown a number of images stacked from frames but using an 80 mm telescope lens. We now saw M32, the Andromeda Nebula great detail. Also we were shown the Rosette nebula and the Veil nebula.

Finally Robin showed images also taken with his DSLR camera of Sun Spots using a Baader solar filter and also the transit of Venus in 2004 followed by many more of his successes, leaving members with a challenge to see what they themselves might achieve.

During the last few minutes Robin went through equipment he has acquired over time to help with DSLR imaging and also showed his converted garden shed observatory in which we could see his mount with a Skywatcher guide scope that he thoroughly recommended.

Robin Durant suggested that if any member had any query in the future on the use of a DSLR camera for Astro-imaging then he would be pleased to help by email, contacting him on: robindurant@btconnect.com

During questions afterwards Robin was asked what format he used from his cameras and he said that he always used RAW which although memory hungry, provided the best data for subsequent processing.

Robin said that he supports the "Teardrop Charity" for terminally ill children and he donates his fee to this fund.

UNUSUAL NOTES FROM THE SCIENTIFIC WORLD

After the coffee break, John Wayte gave an interesting short talk about odd things he had noted from the scientific world. He talked about the hottest temperatures to be found.

The surface of the Sun is about 5,000 Kelvin; a Supergiant can be as hot as 50,000 K; a white dwarf may reach 200,000 K, but a black hole is thought to possibly reach 1 trillion K!

Yet the hottest temperature reached was in the Large Haydron Collider in Switzerland in December 2010 when a particle collision resulted in a temperature of 7 trillion K!

John mentioned that In an earlier failure of the Collider in the 1990s was the result of two beer bottles, subsequently found in one of the sections of the ring.

FROM OUR DIRECTOR OF OBSERVATIONS

Brian Mills gave his monthly notes on the night sky with useful tips on how to find objects that he referred to, either from sky maps or by star hopping.

He also continued his trip through the astronomical alphabet. This time he looked at "B" and talked first about Friedrich Bessel.

Friedrich Wilhelm Bessel - was born in Germany on July 22nd 1784 and began his working life as an accountant in an import/export business where the positional importance of ships began his interest in longitude which led him into astronomy. It wasn't long before he was offered the position of assistant at Lilienthal Observatory near Bremen in Germany.

He had come to the attention of a well known doctor and part time astronomer called Heinrich Olbers after making adjustments to the orbital calculations for Halley's Comet. Incidentally Olbers, amongst other things, was responsible for the discovery of asteroids Vesta and Pallas. Bessel also carried out work to refine James Bradley's measurements of stellar positions. At the age of just 26 he was appointed Director of the Konigsberg Observatory where he continued his work to pinpoint the positions of some 50,000 stars. He also published tables on atmospheric refraction, again using Bradley's observations and was able to show how light was bent due to variations in the density of the atmosphere relative to altitude. However, he is best remembered as being the first person (and there was some stiff competition at the time) to calculate the distance of a star other than the Sun. He did it using the parallax method.

However, back in 1804 it was the Sicilian mathematician and astronomer Giuseppe Piazzi who had nicknamed 61 Cygni "The Flying Star" because of its large apparent motion as seen from Earth. It wasn't until 34 years later in 1838 that Bessel succeeded with the parallax method when he calculated that 61 Cygni was in fact 10.4 light years from Earth - although modern estimates put this at 11.4.

Bessel didn't win the parallax race by much because later in the same year the Russian astronomer Struve measured the parallax of Vega and the Scottish astronomer Henderson calculated the distance to Alpha Centauri. The probability is that it was in fact Henderson who should have taken the honours but he delayed publishing his results until 1839. This was because he had been working for the Royal Observatory at the Cape of Good Hope and returned to the UK due to illness and arrived home before he began the reduction of his observations.

The instrument that Bessel used to make his measurements was the Fraunhaufer Heliometer at Konigsberg Observatory and this worked by having an object glass that was spilt in two with one half being moved by a micrometer.

Bessel received many honours including having a lunar crater and an asteroid named after him. He died on 17 March 1846.

Beehive The Beehive is another name for the open cluster known as The Praesepe or M44 in the constellation of Cancer. It is magnitude 3.7 and has an apparent diameter of 95 arc minutes.

It is 600 light years from Earth and has an estimated age of 600 million years although there is some debate about the accuracy of this. It was first noted by Galileo in 1609 when, with his small telescope, he resolved it into 40 stars. A recent survey counted 1,010 members, some of which are red giants and white dwarfs - stars towards the end of their life cycle. Like other clusters the bright and more massive stars make up the core whilst the least massive stars have migrated to form an outer halo.

Betelgeuse This is the eighth brightest star in the night sky and because it is a semi regular variable (varies from +0.2 to +1.2) it sometimes outshines Rigel (beta Orionis) whilst at other times it can drop to 19th brightest. This variability was first commented on by Sir John Herschel in 1836. In 1920 it was the first star (apart from the Sun) to have its angular diameter measured. It is a red supergiant - the largest stars by volume that we know about - although not necessarily the largest by mass. These are stars that have gone through the "hydrogen burning" phase but still have a mass of around 10 solar masses. Although their temperatures are relatively cool (around 4000K) they are huge - possibly 1000 or 1500 times the size of the Sun.

The age of Betelgeuse is put at only 10 million years but the most likely outcome for it is that it will become a type 2 supernova within around 1 million years and leave behind a neutron star that may be as small as 20km in diameter. In fact there is a suggestion that it has already gone supernova but because it is 600 light years away, the light from that event

hasn't reached us yet. If this were to happen brightness estimates suggest it would outshine a full Moon at night and be easily visible during the day.

APRIL MEETING

Wednesday 20th April 2011 – Dr. John Lawrence will be giving a talk called "The Life and Times of Galileo". John is a retired scientist who once worked for ICI. He specialised mainly in metals and mining but his greatest love is the history of science.

Meetings begin at 1930 although members are invited to arrive anytime after 1900 as this is a good time to exchange ideas and discuss problems and relax before the meeting.

The venue as always is held in the Upper Room of the Methodist Church at the east end of Wadhurst Lower High Street, opposite the entrance to Uplands College. (For those with SatNav – the post code is TN5 6AT)

FUTURE MEETINGS

Wednesday 18th May 2011 – Details to follow

Wednesday 15th June 2011 – Details to follow

OTHER NOTES AND INFORMATION

SUBSCRIPTIONS FOR 2011

We have now entered the Society's new session, and again, the subscriptions remain the same as in recent years. Membership for the year is still £15.00 and £20 for two members within the same family at the same address. Children and students are free and always welcome.

Subscriptions can be made at the meetings, preferably by cheque payable to "Wadhurst Astronomical Society" or can be posted to our Treasurer, Michael Wyles at:
31 Rowan Tree Road
Tunbridge Wells
Kent
TN2 5PZ

Visitors are asked for a £2 donation to any meeting to cover costs.

Many thanks to those members who have already renewed their subscription.

ASTRO-IMAGING EVENING

Ian King has booked the Wadhurst Methodist Church hall for Thursday 12th May - 1900 to 2200.

Ian wants to bill it as "An Evening with Don Goldman" in association with Wadhurst Astronomy Club and IanKingImaging Ltd

Don Goldman is going to give two 1 hour talks on Image Processing for beginner to intermediate Astro-imagers and Narrow Band Filters and Narrow Band Image Processing

Don Goldman is the CEO and designer of Astrodon Filters: www.astrodon.com

He is also a very experienced and world renowned Astro-imager.

Full details of the talks can be found at: www.iankingimaging.com

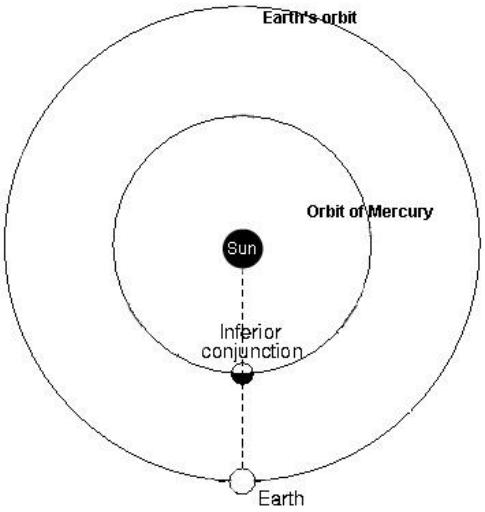
To book just email Ian with your name at: info@iankingimaging.com
with a subject of "An Evening with Don Goldman".

There will only be about 50 seats available but Ian wants to make sure there are enough people for them as this guy is coming all the way from the states.

SKY NOTES FOR APRIL

Planets

Mercury passes through inferior conjunction (see diagram) on April 9th and then because it lies to the west of the Sun it becomes a morning object. Sadly this is a very poor apparition for observers in the UK because at this time of year the ecliptic makes an acute angle with, and is quite close to, the horizon.

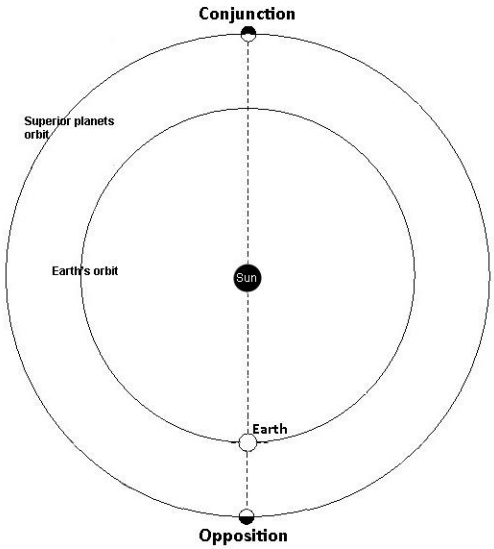


Venus is still a morning object (at magnitude -4.0 in the east-north-east) but becoming more difficult by the day to see as it sinks lower in the sky and into the twilight.

Mars passed through conjunction (see diagram under Saturn) during February and although it is gradually becoming a morning object, it will sadly not be visible from the UK yet.

Jupiter will pass through conjunction on 6th April and so is not visible this month. When it emerges from behind the Sun it too will be a morning object although from the UK it is likely to be the end of May/beginning of June before we can catch a glimpse of it.

Saturn at magnitude +0.4 rises before sunset by the end of the month and reaches opposition on 3rd April - the time when it is opposite the Sun in the sky. It is moving retrograde in Virgo (it is in this constellation all year) and will do so until it reaches its second stationary in June when it returns to a direct motion of west to east.



Lunar Occultations

In the table below I've only listed events for stars down to magnitude 7.0 that occur before midnight although there are others that are either of fainter stars or occur at more unsociable hours. DD = **d**isappearance at the **d**ark limb. **Times are in BST.** I have shown a graphic for the brightest occultation (37 tauri) so that you can see where the star will disappear.

Apr.	Time	Star	Mag.	Ph	PA °
7th	20.14	37 tauri	4.3	DD	116
7th	20.41	39 tauri	5.9	DD	138
8th	23.32	V1154 tauri	6.7	DD	36
9th	23.43	141 tauri	6.3	DD	66
13th	17.15	6 Leonis	5.0	DD	99
15th	22.12	87 leonis	4.7	DD	98

Phases of the Moon for April

New	First ¼	Full	Last ¼
3rd	11th	18th	25th

ISS

Below are details of passes of the ISS as seen from Wadhurst that are magnitude -2.0 or brighter. The details of all passes including those visible from other areas can be found at: www.heavens-above.com

Please remember that the times and directions shown below are for when the ISS is at it's ***maximum*** elevation, so you should go and look a few minutes before. **Times are in BST.**

Apr.	Mag	Time	Alt°	Az.
19th	-2.2	22.18	27	WSW
20th	-3.0	21.03	32	SSE
20th	-2.0	22.37	29	W
21st	-3.8	21.22	60	SSE
22nd	-3.8	21.41	89	N
23rd	-3.6	20.25	52	SSE
23rd	-3.7	21.59	76	N
24th	-3.8	20.43	85	S
24th	-3.8	22.18	82	NNE
25th	-3.7	21.01	77	N
25th	-3.2	22.35	52	W
26th	-3.7	21.18	79	N
27th	-3.9	21.36	80	SSW
28th	-3.4	21.53	49	SSW
29th	-3.8	20.35	88	SW
29th	-2.4	22.10	26	SSW
30th	-3.5	20.52	57	SSW

Iridium Flares

The flares that I've listed are magnitude -3 or brighter although there are a lot more that are fainter or occur after midnight. If you wish to see a complete list, or obtain timings for somewhere other than Wadhurst, go to: www.heavens-above.com

Remember that when one of these events is due it is sometimes possible to see the satellite in advance of the "flare", although of course it will be much fainter at that time. **Times are in BST.**

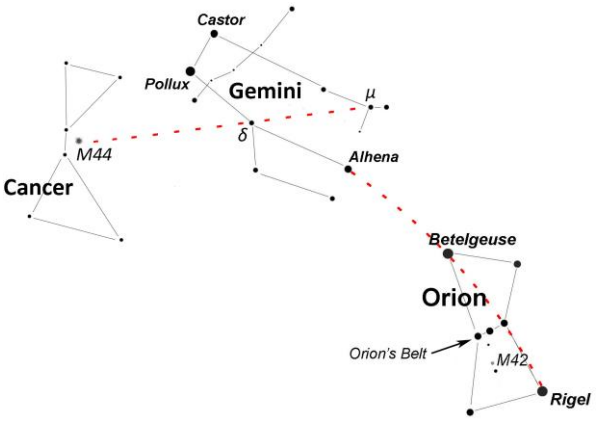
Apr.	Time	Mag	Alt°	Az.
7th	20.30	-6	35	N
8th	20.24	-7	37	N
22nd	23.48	-3	29	WSW
23rd	21.17	-5	22	N
23rd	21.26	-6	19	N
24th	21.19	-4	21	N
25th	23.39	-5	27	WSW
26th	23.33	-4	28	WSW
26th	23.37	-3	26	WSW
29th	23.26	-3	25	WSW

The Night Sky in April (Written for 2200 BST mid month)

Looking north the Great Bear is virtually overhead which means Cassiopeia is sinking towards the horizon. Two of the three stars of the Summer Triangle are visible a little to the east of north whilst the Great Andromeda Galaxy is a little to the west.

In the east, some of the summer constellations are coming into view. Bootes, Corona Borealis and Hercules are all clear of the horizon.

In the south, Leo is high up on the meridian, whilst Cancer is just to the west of it. Now is a good time to look for the Beehive cluster (M44) and at magnitude 3.1 is a relatively easy naked eye object. See the map for directions on how to locate it. Below Leo is the long and generally faint Hydra, along with the small constellations of Crater and Corvus.



Looking west the winter constellations of Orion, Taurus and Canis Major are all on the horizon, although Gemini and Auriga are still on view.

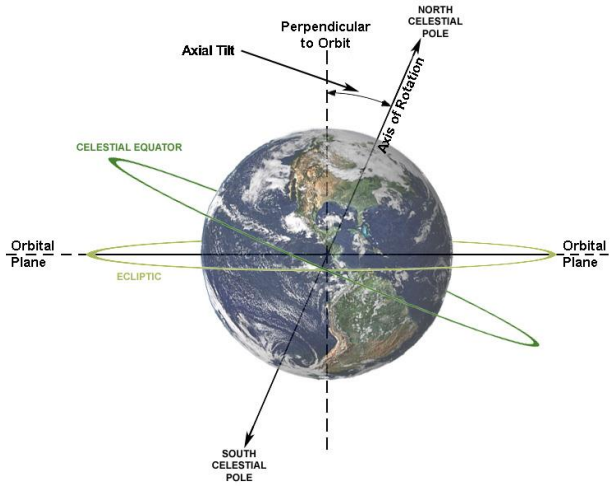
Brian Mills

DEFINITIONS OF TERMS USED IN ASTRONOMY

Equinox

As we know the Earth takes a year to orbit the Sun once. This manifests itself to us by the Sun moving slowly against the background stars along an imaginary line known as the ecliptic. Another way of describing the ecliptic is to say that it is the plane of our planets orbit around the Sun. Because the plane of the Earth's orbit and its axis of rotation are not at right angles to one another, the ecliptic and the celestial equator (the Earth's equator projected out into space) do not coincide apart from twice when they cross each other. These points are called the

Vernal (spring) and Autumnal equinoxes and are the times in the year when day and night are of equal length. Because these two great circles cross twice each year, for six months the Sun is above the celestial equator (northern hemisphere summer) and for six months it is below (northern hemisphere winter).



Solstice

The Solstices refer to the times (summer and winter) when the Sun reaches the points on the ecliptic furthest from the celestial equator. To put it another way it is when the Sun is at its highest or lowest in the sky at the moment it transits the meridian. These are the times when we have the correspondingly longest and shortest days of the year.

At the summer solstice for example, the position on the horizon where sunrise occurs will be the furthest north of east, and where it sets will be the furthest north of west giving us more than 16½ hours of daylight. As I said above, the ecliptic marks the sun's passage across the sky, so in summer the ecliptic is much higher than in winter when it is much closer to the horizon.

Yuri Gagarin

On the 12th April it will be exactly fifty years since Yuri Gagarin blasted off aboard Vostok 1 from the Baikonur Cosmodrome to signal the beginning of manned space exploration. The flight which lasted for 108 minutes entailed just one circuit of the Earth and concluded after re-entry when he ejected from the capsule at a height of seven kilometres and parachuted to the ground. The capsule itself landed on its own parachutes. This final stage was one that was shrouded in secrecy because Russia claimed that Gagarin had stayed inside the capsule, a story that they stuck with until 1971. The reason was that in rules drawn up by the FAI (Fédération Aéronautique Internationale) in 1961, it was required that a pilot must land with his craft for it to be officially classified as a space flight. Sadly, Gagarin had to lie about the final moments of the flight in a subsequent press conference. More sadly still he would never again fly in space - he died during a training flight in a MiG15 jet fighter just seven years later at the age of 34.

Brian Mills

NASA'S SPACE PLACE

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 Centre in Boulder, Colorado. He and colleague Janet Green of NOAA's Space Weather Prediction Centre recently led a study of the Galaxy 15 anomaly, and here are their conclusions:

On April 3rd, 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.

Caption:
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.

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

CONTACTS

Chairman John Vale-Taylor
pjvalet1@btinternet.com

Secretary & Events Phil Berry 01892 783544
phil.berry@tiscali.co.uk

Treasurer Mike Wyles 01892 542863
mike31@madasafish.com

Editor Geoff Rathbone 01959 524727
geoff@rathbone007.fsnet.co.uk

Director of Observations Brian Mills 01732 832691
Brian@wkrcc.co.uk

Wadhurst Astronomical Society website:
www.wadhurst.info/was/

SAGAS web-site www.sagasonline.org.uk

Any material for inclusion in the May 2011 Newsletter should be with the Editor by April 28th 2011