

SPACEWATCH

the newsletter of the Abingdon Astronomical Society

12th September 2005

Andrew Coates - MSSL:

“Cassini-Huygens to Saturn and Titan”

Welcome back to another season of astronomy with this, the largest astronomical society in Oxfordshire.

This year the observing evenings will be led by Ian Smith – his phone number is given on the back page. We also have a new observing site at Frilford Heath Golf Course. Once again Bob Dryden has come up trumps with a varied programme of external speaker meetings, and as always there will be Beginners' Meetings every month led by society members.

If you have any comments on how our society is run, or have any ideas for meetings, talks or observations, then please let any of the committee members know. Their names are listed on your new programme card.

THE NIGHT SKY THIS MONTH

by Bob Dryden

The Sun crosses the celestial equator on 22nd September at 22hr 23 mins UT. What does this mean? Well that is the time of the autumn equinox, and it means the nights are longer than the days and the Sun will be in the southern celestial hemisphere.

The Planets:

Mercury is just finishing a good morning apparition but it means the planet will be as good as unviewable this session.

Venus is heading towards greatest eastern elongation (Nov 3rd) and crosses Virgo, Libra, and Scorpius. Although it is very bright at -4.0 mag, it remains low in the south west. It is very easy to see with the naked eye as long as you look shortly after sunset otherwise the planet has set. On the evening of 7th October the crescent Moon will be one degree south of Venus but the pair will be very low in the south west.

Mars is the planet that is grabbing our attention at the moment. In September it is a very bright

-1.1mag and by October it will have increased to -1.8 mag as it crosses Aries and Taurus. Its diameter also increases from 14 arc seconds to 19 arc seconds so details on the disc will be visible in a telescope. Things continue to improve right through until November, but you can easily start following the action now.

Uranus and **Neptune** are the only other two planets on view at the moment. You will need binoculars and a finder chart (see page 6), but they are not hard to see once you know where to look. Uranus is the brighter of the two at magnitude +5.7 and it is in Aquarius. Neptune is slightly harder to see at magnitude +7.8 in Capricorn. Neptune is visible once it goes dark, and Uranus rises shortly after.

Comets, meteors, and asteroids:

We have a shortage of bright comets at the moment. In fact, the only 'bright' comet visible is 101P/Chernykh and that is only 10th magnitude but if you fancy having a try for it then you need to look towards the border of Pisces and Cetus.

There is an even bigger shortage of meteors and asteroids – there are none about this session.

Eclipse:

While we are short on some objects to look at, we are blessed with a partial eclipse of the Sun on 3rd October. This will be an annular eclipse (that's when the Moon passes directly in front of the Sun, but is at a point in its orbit where it is just too small to completely cover the Sun's disk). Annularity will only be visible along a track starting in the North Atlantic Ocean, crossing central Spain from north-west to east and ending in Africa. Here in Abingdon, about 0.66 % of the solar disc will be covered by the Moon. The eclipse starts at 07hr 48min UT and finishes at 10hr 18min UT. Remember, **DO NOT LOOK DIRECTLY AT THE SUN UNLESS YOU ARE USING AN ADEQUATE FILTER.** You do not need any optical aid to see the eclipse, just a filter to hold in front of your eyes.

Occultations:

There are two lunar occultations of brighter stars worth having a go for if it is clear. The first is on 15th September at 20.06 UT involving kappa

Capricorn which is a magnitude 4.8 star. This could be an interesting one to see as the occultation could be a grazing one, and instead of the star going directly behind the Moon, it could pass along the lunar limb instead. You will need a fairly clear south-eastern horizon as the Moon will be only 10 degrees high at the time. The second is a proper occultation, this time of a magnitude 4.5 star, 136 Taurus. However, instead of disappearing behind the Moon, it is reappearing at 22.39 UT. The Moon will be very low in the north east which could make the observation difficult.

MOON PHASES:

New: 3rd Sept.; First Qtr: 11th Sept.; Full: 18th Sept.;
Last Qtr: 25th Sept.; New (eclipse) 3rd Oct.



IMPROBABLE BULL'S-EYE

by Tony Phillips

Picture this: Eighty-eight million miles from Earth, a robot spacecraft plunges into a billowing cloud almost as wide as the planet Jupiter. It looks around. Somewhere in there, among jets of gas and dust, is an icy nugget invisible to telescopes on Earth—a 23,000 mph moving target.

The ship glides deeper into the cloud and jettisons its cargo, the “impactor.” Bulls-eye! A blinding flash, a perfect strike.

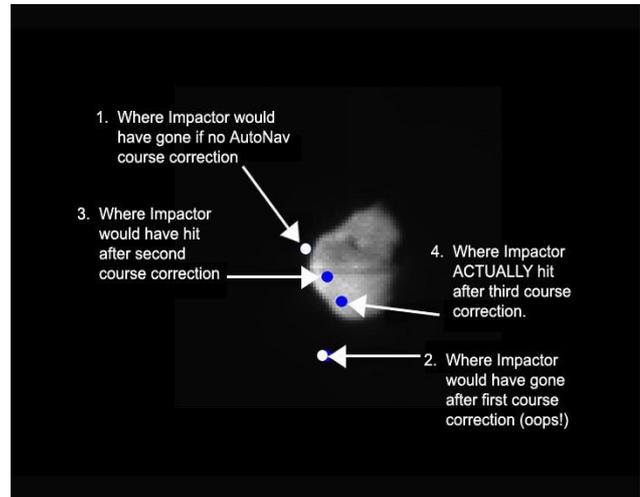
As incredible as it sounds, this really happened on the 4th of July, 2005. Gliding through the vast atmosphere of Comet Tempel 1, NASA’s Deep Impact spacecraft pinpointed the comet’s 3x7-mile wide nucleus and hit it with an 820-lb copper impactor. The resulting explosion gave scientists their first look beneath the crust of a comet.

That’s navigation.

Credit the JPL navigation team. By sending commands from Earth, they guided Deep Impact within sight of the comet’s core. But even greater precision would be needed to strike the comet’s spinning, oddly-shaped nucleus.

On July 3rd, a day before the strike, Deep Impact released the impactor. No dumb hunk of metal, the

impactor was a spaceship in its own right, with its own camera, thrusters and computer brain. Most important of all, it had “AutoNav.”



Comet Tempel 1, as seen by the Deep Impact impactor’s camera. Three last-minute AutoNav-controlled impact correction manoeuvres enabled the Impactor to hit the bulls-eye.

AutoNav, short for *Autonomous Navigation*, is a computer program full of artificial intelligence. It uses a camera to see and thrusters to steer—no humans required. Keeping its “eye” on the target, AutoNav guided the impactor directly into the nucleus.

The system was developed and tested on another “Deep” spacecraft: Deep Space 1, which flew to asteroid Braille in 1999 and Comet Borrelly in 2001. The mission of Deep Space 1 was to try out a dozen new technologies, among them an ion propulsion drive, advanced solar panels and AutoNav. AutoNav worked so well it was eventually installed on Deep Impact.

“Without AutoNav, the impactor would have completely missed the nucleus,” says JPL’s Ed Riedel, who led the development of AutoNav on Deep Space 1 and helped colleague Dan Kubitschek implement it on Deep Impact.

En route to the nucleus, AutoNav “executed three maneuvers to keep the impactor on course: 90, 35, and 12.5 minutes before impact,” says Riedel. The nearest human navigators were 14 light-minutes away (round trip) on Earth, too far and too slow to make those critical last-minute changes.

Having proved itself with comets, AutoNav is ready for new challenges: moons, planets, asteroids ... wherever NASA needs an improbable bulls-eye.

Dr. Marc Rayman, project manager for Deep Space 1, describes the validation performance of AutoNav in his mission log at:

<http://nmp.nasa.gov/ds1/arch/mrlog13.html>

(also check mrlog24.html and the two following). Also, for junior astronomers, the Deep Impact mission is described at:

<http://spaceplace.nasa.gov/en/kids/deepimpact/deepimpact.shtml>

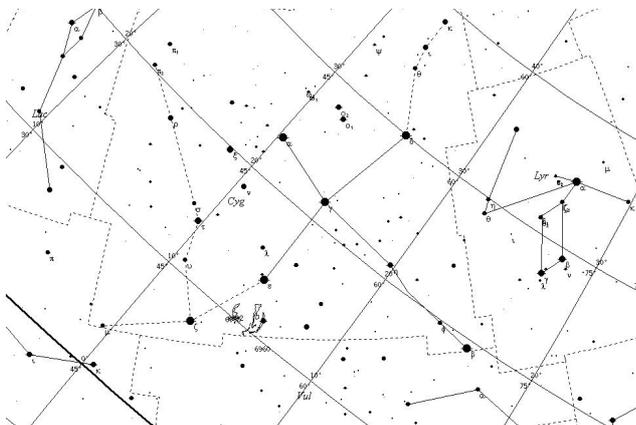
This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

THIS MONTH'S DEEP SKY OBJECT

I'm going to start the new season with a **bang** and a **challenge!** The object comprises two different NGC numbers, namely NGC 6960 and NGC 6992, and is more commonly known as "The Veil Nebula".

The Veil occupies quite a large area, spanning nearly 3 degrees across, but has a bit of a reputation of being a difficult object to see. I challenged myself to find it several years ago, and was pleasantly surprised to discover that it was quite easy to both find and to see.

You will need fairly dark skies to see this (by dark, I mean away from big towns and away from the orange skyglow). You will also need a clear sky without any haze whatsoever. I don't know what the minimum aperture size is, but I have seen it clearly with a 5 inch scope (without the aid of a nebula filter). Robert Burnham (author of Burnham's Celestial Handbook) reports that the brightest part of the nebula can be seen using 7X50 binoculars, but I haven't been able to do this.



The easiest way to find The Veil is to locate epsilon (ϵ) Cyg in your finderscope. Now drop your view

due south in declination and you will run into 52-Cyg. One part of The Veil can be seen north and south of this star, but this is the fainter part of the veil (NGC 6960). Move the scope so that it is say half a degree north of 52-Cyg, and then pan over to the left of this star. You should run into the brightest part of The Veil (NGC 6992) in 2 to 3 degrees.

With my 5 inch scope I only saw the brightest part of the nebula. However, on a society observing session several years ago I was observing this with a C5 scope and an UHC filter. The detail that I saw was quite staggering. Two of us observed filamentary structure in the nebula. The Veil nebula is one object which works very well with a good nebula filter (say an O III or a UHC), and I have only seen filamentary structure using such a filter, with the O III filter being the best filter I've yet used on this DSO.

On good nights, I can stay with this one object for ages – it really does captivate me, and it is certainly one of my favourite deep sky objects. It possesses a delicate appearance, which can sometimes exhibit glorious filamentary structure.

So what is The Veil? It is believed to be a supernova remnant, which exploded some 25,000 years ago (I told you I was starting off with a bang!). Charles Messier only recorded one such object in his famous catalogue, and that was his first entry, namely M1 (the Crab Nebula). The Veil is thought to be about 1500 light years away, which would give it a diameter of 70 light years.



So is The Veil a "challenge"? From my usual observing location (my back garden) I have to admit that it is fairly easy to see this object. For me, the challenge is to observe the filamentary structure. For other locations, it may be challenging to see it at all, especially in the absence of a nebula filter.

LET THERE BE DARKNESS!

by David Birkett, your local CfDS rep.

For “Lighten our darkness” read “Darken our lightness”.

Despite all the doom and gloom over light polluted skies there is a glimmer of recoil in a slow re-darkening of the skies.

Since taking on the job of the Campaign for Dark Skies (CfDS) representative for Oxfordshire two things have happened. Firstly my available time has reduced due to an increase in work and secondly my awareness of the amount and source of artificial light at night has become more acute.

The workload, which I am assuming is shortish term, just prevents me from being more active at present. I have ideas but putting them into action takes time. I am a great believer in differentiating between work and pleasure and I try to balance the two.

My increased awareness is a realisation that most light scatter is from highways, backed up by commercial and leisure sites augmented by house security systems. There are others, but too numerous to list.

On the road lights front I see that there is a steady improvement, new installations and relamping are gradually reducing the amount of sky lighting but very slowly. Highway engineers are gradually introducing better lamp design, i.e. shining down. When flying at night now often one sees only a ribbon of reflected light off a road without the pin points of light that do most of the damage. Reflected light however, is still a problem but I believe somewhere a compromise should be reached. The next stage is perhaps the reduction of lux levels expected on our highways.

Commercial and leisure sites are now covered by the recently introduced light pollution act that brings light pollution into the realms of a reportable offence as it is now subject to the criminal law of statutory nuisance. Any individual can through the prescribed channels bring the offender to heel. It still seems a cumbersome track to follow.

Building regulations are helping further in as much as only low energy lights are permitted externally but it is still not an offence to sell high-powered lights. This is similar to the motorbike silencer problems of the past, but gradually the message will get home. I hope.

The railways, docks, airports and the like will remain outside this new legislation but anyone living near either must both do it by choice and also have accepted the noise and air pollution that goes with it.

On the question of pollution this is also part of the problem as dust in the air reflects light, often at dusk it is evident that the air we live in is a pretty thick cocktail of pollutants. Often after rain when the clouds part we can still get that sparkly view of the sky. A colleague recently took his kids to Dorset on holiday, with almost no lighting, they could not believe the sky.

Further on the positive side I have had approaches, under the flag of the Campaign, from the Hydraulic Research Centre at Wallingford wanting guidance on re-lighting their car park and Radio Oxford seeking an interview on light pollution. With the former I put them in touch with the OCC Highway lighting Engineer, who is very sympathetic to the cause and the latter as they asked at short notice like 4pm on the day before an early morning slot could not be helped. I did my best to get others involved but holidays I guess made it impossible.

On the battlefield I am to try and resolve a contretemps between the residents of Radley and the school and its playing field, which is lit after dark. It will be sometime in mid-September when the nights draw in when the full extent of the problem can be measured. Watch this space.

On a final note, I did experience dark skies two years ago in Orkney, it rained, but I did collide with an Orcadian in the Under Milk Wood blackness whilst walking back to my quarters. We just did not see each other. His swearing needed subtitles.

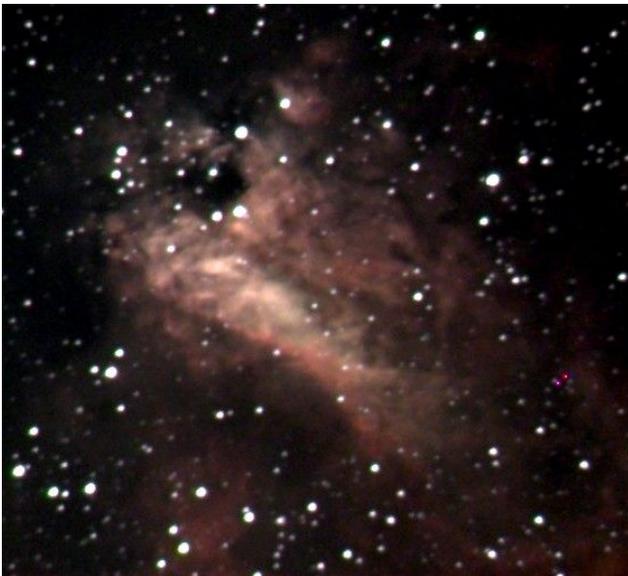
More soon.

[Ed. For more on the Campaign for Dark Skies and the recent ruling reclassifying light pollution as a statutory nuisance go to <http://www.dark-skies.org> .]

SOUTHERN STARGAZING IN SAGITTARIUS – THE SWAN

by former member Deborah Hambly in New Zealand

It has been a wonderful winter here in New Zealand with one of the driest seasons on record for nearly a century. My first priority is to continue to learn the new constellations, and relearn old ones from a new orientation. I had trouble picking out Sagittarius from the background of the bright Milky Way. As my AutoStar telescope controller mysteriously broke, I had to star hop to the many Deep Sky Objects (DSO) that can be found near the centre of our galaxy.



With my trusty “Turn Right at Orion” (one has to turn the book upside down to use from this hemisphere) I tried to identify all the new things I was finding. M17 or “The Swan” was definitely my favourite. According to the book, it is extremely difficult to appreciate from Northern Europe as it never rises high enough to clearly see the nebulosity. The book pictures a checkmark or Nike “Swish” and note that it may take some imagination to pick out the neck, head and beak of the swan. I was able to see all of these in an instant and was completely amazed. I kept coming back for another look at the Swan as it was so impressive. At my second public demonstration I also risked showing this DSO and

the non-experienced observers were also very impressed.

More next month on “The Tarantula” which is just above the Larger Magellanic Cloud.

NOTICES

1st October 2005: FAS Convention in Cambridge. Talks and trade stands.

22nd October 2005: ‘The Astronomer’ AGM in Basingstoke. Day of talks.

FURTHER DISCUSSION

Don’t forget the Society’s web site:
www.abingdonastro.org.uk

Our webmaster, Andrew Ramsey, is always on the look-out for members’ photographs to put on there. Don’t forget you can read back copies of SpaceWatch on the web site too. New on the web site is the item “Space News”, astronomy news which changes every day, brought to you courtesy of “Universe Today”.

You can also find details of our e-mailing list there.

DATES FOR YOUR DIARY

19th September 8pm. Beginners’ Meeting in the Perry Room.

26th – 28th September (FCN*) 8pm. Observing Evening at Abbey Meadow, Abingdon. Contact Ian Smith on 01491 824266 for details.

10th October 8pm. Dr Isobel Hook (Oxford University) “Future Professional Large Telescopes”.

The editor of “SpaceWatch” is Andrew Ramsey, who would very much appreciate your help and contributions. Please send any news, observations, photos, etc. to:

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E-mail: AbAstro@ATRamsey.com Phone: 01865 245339

STAR CHART



Looking south at 11.30pm next Saturday (16th September):

Jupiter and Venus are very low in the west just after sunset, but by this time of night both have set. The Moon is almost full. Uranus (below left) and Neptune (below right) make good objects to search for in binoculars (7x50 field of view shown below) or a small telescope. There are also plenty of deep sky objects in Sagittarius if you have a good clear unpolluted southern horizon.

