

# Sagittarius

The Newsletter of the Astronomy Section of La Société Guernesiaise

April – June 2006

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## Inserts

Star chart

Sunset, sunrise, moonset and moonrise times

In addition, the Section meets at the Observatory every Tuesday evening, and Friday if clear for observing.

# Minutes of the Astronomy Section AGM 2006

(held at the Observatory, Rue de Lorier, St Peters on Tuesday 26<sup>th</sup> January 2006 at 8pm)

**Present** - Jessica Harris,  
Frank Dowding, Geoff Falla,  
David Le Conte, Peter Langford,  
Colin Spicer and Debby Quartier

## 1. Apologies

There were no apologies for absence.

## 2. Election of Officers

The existing officers of the Astronomy Section of La Société Guernesiais were all prepared to stand for reelection and were duly reelected. The position of Light Pollution Officer remains vacant. David Le Conte suggested that we could offer the States advice on light pollution. It was agreed to renew our subscription to Campaign for Dark Skies and put notices in the Observatory Building with guidelines on using lighting sensibly. It was also agreed to obtain a copy of the States guidelines on exemptions in the planning revisions to see if there was anything concerning light pollution.

## 3. Treasurer's Report

The Treasurer presented his report and accounts noting that the Section still held a healthy bank balance although funds were down on 2004 (mainly due expenses to incurred throughout the year) and that we did receive funds from Imperial College marine biologists using our buildings for field studies. The cost of producing and mailing Sagittarius and supplying Astrocalendars annually to members

could still be maintained without the need to increase Section subscriptions.

Expenditure may be required on the Observatory Building roof in the near future as minor leaks were apparent in heavy downpours. It was agreed that this should be monitored.

Debby Quartier advised that she would check with La Société what public liability and damage cover was in force for the observatory.

Thanks were expressed to the Treasurer for his report.

## 4. Equipment

It was agreed that it would be useful to have refresher training sessions for both the Meade telescope and the CCD camera. It was agreed that David Le Conte with give the Meade telescope training on 28<sup>th</sup> February.

New eyepieces were desired for the Meade and it was agreed to contact Nick Hudson of True Technology in the first place.

The purchase of webcam was discussed for the Meade telescope and enquiries would be made with a view to purchase.

## 5. Workers Education Association Course

Preparation was well in hand for this years course and introductory letters had already been posted. Jessica

Harris suggested that we should bind the various course handouts and Debby Quartier agreed to do this.

## **6. Visitors**

The regular open evenings were discussed and would continue as previous years. The £1 'suggested' donation was still appropriate but discretion would be used on cloudy nights.

## **7. Premises**

Apart from the roof (noted under item 3), it was noted that the screen, used for solar projection, needed repainting and the 'rusty' pipe needed to be boxed in.

## **8. Any Other Business**

Colin Spicer suggested that we should look for a suitable research project and

would look on the BAA website for ideas. New moon observing was suggested as a possible project. David Le Conte noted that we should be more conscientious in completing the observing log.

Finally the trees to the south were discussed as their increased growth is now hindering our view southwards. It was agreed that the owner would be approached and that it would be appropriate if the letter were signed by the President of La Société. Jessica Harris agreed to contact Charles David on this matter.

There being no further business, the meeting closed at 9.40pm.

*Debby Quartier*

## **Visit to Greenwich on 18<sup>th</sup> February 2006**

One or two of us at the Observatory receive the Greenwich lecture programme annually. Although the lectures are mainly of a nautical or historical theme, they do include scientific lectures with at least a couple on the subject of astronomy. Jessica and myself attended a couple of years ago when the hot topic was the transit of Venus and we both had such a good day that we resolved to go again when a suitable lecture next arose. In February 2006 there was such an opportunity with a series of lectures on the history of Cosmology which kicked off with a talk by Dr Alan Chapman (several of you may

have read his book 'God's in the Sky' and seen the highly entertaining TV programme that accompanied it).

The cost of the lectures is £29 and includes refreshments but not lunch (and of course getting a reasonably cheap day return flight to Gatwick). There are mid-morning and afternoon tea breaks and you have sufficient time in the lunch break to walk up the hill and stand across the Greenwich Meridian, seeing the great view across to Canary Wharf and the City of London. To do the Observatory and museum any justice you need a good day to explore and see everything

fully, but in the absence of such time, we felt the our best option was to eat our lunch as we walked up the hill (probably giving us both indigestion on the way) and use what little time we had to just see what we could. On our last visit we did manage to walk through the observatory, though with little time to stop and study things, but enough to get a flavour of the place.

The programme consisted of four lectures starting with Dr Chapman who spoke of *'Understanding the universe from the ancient world to the Copernican middle ages'* followed by *'You want a revolution? The problem of proof in Early Modern Cosmological Innovation'* by Patrick Boner (University of Cambridge), then *'How Newton, Huygens and Herschel changed our understanding of the universe'* by Emily Winterburn (Greenwich Observatory) and finally *'Our understanding of the universe in the 20<sup>th</sup> and 21<sup>st</sup> centuries'* by Professor Peter Coles (Nottingham University).

The titles of the lectures are pretty self explanatory but it was interesting to hear how so much depended upon what was seen in the sky and how it was so entwined with religious thinking. As time progressed and knowledge grew, it was not so easy to put such new ways of thinking forward, not only might you upset the powerful church, but the great thinkers were just as afraid of looking stupid. It was a hard slog getting new ideas accepted but once the basis was set, things began to move faster and the advent of the telescope helped greatly

in backing up the new ideas with visual confirmation. Men such as Newton and Herschel contributed greatly. There was one interesting point that came out (and I think it was in the Q & A session following Patrick Boner's lecture) about Father Bruno. This unfortunate clergyman was burned alive for daring to go against the beliefs of the church, his forward thinking views on astronomy were considered as heresy. His terrible end coupled with Gallileo's confinement and Coperincus not daring to publish his views, fuelled the notion that the church stifled such progressive thinking. In the case of Bruno we heard that in various other ways he had very seriously upset the church and his astronomical views were probably the last straw and led to his death.

Once in the 20<sup>th</sup> century and with space flight developing, ideas that would have seemed absurd in the time of Copernicus were accepted as how things are. Peter Coles in the final lecture spoke of the big bang and the future of the universe, whether it could expand forever, get to a point where it becomes static or begin to contract (all this dependent upon how much matter in the universe). This is an unanswered question. The day started with Dr Chapman speaking of early astronomers who believed that the sun, stars and planets went around the earth and our little planet was truly the centre of the universe and the day finished with the unanswered question of the fate of the universe, in which we are such a small body going round such an ordinary star in one of

millions and millions of galaxies. In 2000 years the knowledge of astronomy has come such a long way and so much has been learned, but you can't help feeling that there is still so much to discover and many more radical concepts are just around the corner.

Jessica and I had to leave during the question time following the last lecture to ensure that we got the train for the airport in time, it was a shame as the Q & A session was quite lively as Professor Coles had quite a sense of humour and a great way of explaining things. However, at Greenwich station Dr Chapman was also getting the train to London Bridge and we travelled together, chatting all the way. He is a

most interesting and knowledgeable man with a great sense of humour. We talked about various topics and told him about what we do in Guernsey.

I got back home having had a very good day and my interest in the history of astronomy has increased making me want to learn more. I am going to start off by reading the Cambridge Illustrated History of Astronomy, which was one of Dr Chapman's recommended readings, as I have this book. I strongly recommend the Greenwich lecture programmes and if anyone wants more details please contact me.

*Debby Quartier*

## **The March 2006 Solar Eclipse**

Weather conditions along the path of totality for the 29 March 2006 eclipse appear to have been favourable, with good results reported, and some excellent photographs appearing on the Internet. Here in Guernsey conditions for the 27% eclipse were good also, with just a little high cloud for half an hour after maximum.

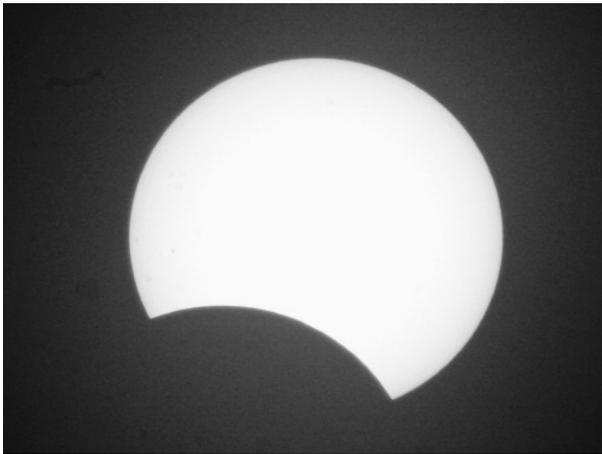
The eclipse was observed at the Observatory by Geoff Falla and myself, with the filtered 11-inch Celestron and the 6-inch coelostat. Exactly as predicted, first contact occurred at 10.40 am. We watched and photographed the progress of the eclipse, and were interested to note a small group of sunspots. Only

recently the Sun was unusually devoid of spots altogether. Maximum eclipse was at 11.27 am. We wondered whether the Moon would occult the spots, but, although it came close it did not quite reach them.

Although we had not opened the Observatory to visitors on this occasion, we were surprised to have none at all, apart from a fleeting visit from a school teacher asking for some eclipse viewers, which we gladly provided. I have heard that some schools did make an effort to demonstrate the eclipse by projection methods, and other members of the Section observed it from their respective locations, it being a

working day. I know of only one Guernsey person who went on an

expedition to observe it, to Ghana, but there were probably others.



Last contact was at 12.16 pm, and we packed up the equipment, having again enjoyed the experience. We have to wait until 01 August 2008 for the next solar eclipse, which is a minor one in Guernsey – just 15% – the path of totality passing through Russia. The next good one will be on 04 January 2011, sunrise coinciding with the 71% eclipse maximum. In the meantime, there is an annular eclipse in the South Atlantic on 22

September 2006, and, if you are planning your holidays well ahead, a total eclipse in Asia on 22 July 2009.

Incidentally, we also saw the penumbral eclipse of the Moon on 14 March 2006, but not very impressive, the darkening being barely discernible.

*David Le Conte*

## **The International Space Station – Update.**

In November 2000, I gave a talk about the International Space Station, how it had developed as a project from the start of its construction in November 1998. The project has moved on since then and now would seem a good time to give an update on progress to date.

In 2000, everything was going well with Russia and United States working closely together. Three of the modules had been successfully launched and joined together in space. Congress was concerned about the \$100 billion costs and Russia was running short on cash. A number of other countries were also

involved and international cooperation was excellent as was the quality of the construction to date. The completion date remained scheduled for 2005 – which clearly was not met.

Progress between November 2000 and February 2003 was good. There were ten shuttle flights by Endeavour, Atlantis and Discovery and their cargos consisted of various items such as the solar panels along with their supports, airlocks ready for later module attachments, the robotic arm developed in Canada and the fourth module, a United States laboratory named Destiny. By February 2003, the Station had four modules, two Russian and two American with support systems for both astronauts and cosmonauts.

Construction came to an abrupt halt in February 2003, as a result of the Columbia Space Shuttle disaster which claimed the tragic loss of seven Astronauts. The remaining Shuttles were immediately grounded and as delivery of the sections was dependent on the shuttles large cargo bays then construction had to stop. Russian Soyuz spacecraft were not affected so vital supplies and the station crew changes were able to continue. This was much to the relief of the one Russian and two American crew aboard the Space Station at the time of the disaster.

It was on July 26<sup>th</sup> 2005, two and a half years later, that the Shuttle Discovery successfully delivered the next component, an external platform associated with the Canadian arm.

This flight was not without problems. During take off, foam was shed from the external fuel tanks, which was thought to be the cause of the Columbia disaster. Although in this instance, the foam had not caused any danger, NASA decided to once again ground the Shuttles. The next planned launch is for Discovery in July 2006. If successful, it will be followed by Atlantis in August 2006 and Discovery again in December 2006. These three flights will restart the construction program but do depend on the Shuttle's problems being resolved.

The completion date is now scheduled for 2010 by which time four further pressurized modules are to be installed plus supporting equipment. One built by the Italian Space Agency that will provide additional air, power, water and life support systems. One built by the Russians which will be attached to their existing laboratory will be capable of firing rocket motors to move, if necessary, the station to a higher orbit, as a back up to the stations existing engines. A European laboratory will be dedicated to biology, physiology and fluid sciences. The fourth module is an ambitious project by Japanese which consists of two pressurized sections and an exposed external experimental area. Once complete, the International Space Station will accommodate six crew. Presently there is only accommodation for two or three and these are relieved approximately every six months. There is always a Soyuz spacecraft docked at the station as a

permanent lifeboat and this is replaced at each crew change over.

At the time of writing, April 2006, there are three crew on board who are due to be relieved in September 2006. Pavel Vinogradov (Russia), Jeffrey Williams (USA) and Thomas Reiter (Germany). They are 218 miles high, travelling at 17,165 mph, completing just over fifteen orbits each day. They are in sunlight for 45 minutes and in

the Earth's shadow for 45 minutes but they still keep to an artificial day of twenty four hours getting 8 hours sleep, 8 hours work, checking equipment and performing experiments, then 8 hours of relaxing, eating and exercising. Their day is based on GMT.

***Frank Dowding***

## **The Length of the Equinoctial Day**

I was recently asked why the published sunrise and sunset times on the day of the vernal equinox (20 March 2006) were not exactly 6.00 am and 6.00 pm respectively, and why the interval between them, ie the length of the day, was not exactly 12 hours. On the day of the equinox, sunrise in Guernsey was at 6.14 am, and sunset at 6.23 pm, giving a day length of 12 hours 9 minutes. The day length was closest to 12 hours (actually 12h 02m) two days before the equinox, on 18 March.

The first question is mainly answered by the Equation of Time, about which I have written before in *Sagittarius*, and which is described in detail in my book on *Guernsey Sundials*. The fact that the Earth's orbit is elliptical, rather than circular, and its axis of rotation is inclined at  $23\frac{1}{2}^\circ$  to the ecliptic (the orbit plane), results in the apparent movement of the Sun preceding and falling behind clock time. At the vernal equinox the value of the Equation of Time is  $-7\frac{1}{2}$

minutes, ie the Sun is  $7\frac{1}{2}$  minutes later than the clock. In addition, the Sun in Guernsey, at  $2\frac{1}{2}^\circ$  west longitude, is always another  $10\frac{1}{2}$  minutes later than the Sun on the Greenwich Meridian, so in total the vernal equinox Sun is 18 minutes later than the clock.

So sunrise should have been at 6.18 am, and sunset at 6.18 pm. But two further factors have to be taken into account. The first is the definition of sunrise and sunset, which is when the upper limb of the Sun, not the centre of its disc, touches the horizon. Because the Sun is not a point, but subtends an angle of  $\frac{1}{2}^\circ$ , it takes a full minute to move half its diameter. As the ecliptic is at an angle to the horizon, it takes about  $1\frac{1}{2}$  minutes for its semi-diameter to cross the horizon. This means that sunrise is earlier and sunset is later than the above times.

The second factor is atmospheric refraction, the bending of light by the atmosphere, which makes the Sun appear higher than it really is. At the

horizon the refraction is over  $\frac{1}{2}^\circ$ , resulting in sunrise being early and sunset late.

So in summary, we have:

	<b>Sunrise</b>	<b>Sunset</b>
<b>Expected time</b>	06h 00m 00s	18h 00m 00s
<b>Equation of Time</b>	+07m 35s	+07m 26s
<b>Longitude (2° 38')</b>	+10m 33s	+10m 33s
<b>Semi-diameter of Sun (16')</b>	-01m 34s	+01m 35s
<b>Atmospheric refraction (34')</b>	-03m 10s	+03m 30s
	06h 13m 32s	18h 23m 04s

Sunrise and sunset times are usually rounded to the nearest minute, as the actual value of the atmospheric refraction is dependent upon atmospheric temperature and pressure. So the above times, when rounded, equal the published sunrise and sunset

times of 6.14 am and 6.23 pm, respectively.

It is interesting to compare these results with those computed by software.

For example:

	<b>Sunrise</b>	<b>Sunset</b>
<b>SkyMap Pro</b>	06h 13m 56s	18h 23m 06s
<b>Starry Night Pro</b>	06h 13m 57s	18h 23m 07s

The small difference between these times and those which I have calculated is most likely due to an effect caused by the fact that the actual time of the vernal equinox (6.26 pm on 20 March 2006) is 12 hours later than sunrise, but almost exactly at

sunset. In those 12 hours the Sun moves in declination by 12', so at sunrise its declination is negative, and this delays its rising time slightly.

*David Le Conte*

## **Geoff Falla's regular roundup of articles from popular Astronomy and Space Journals**

**Volcanic Worlds.** The presence of volcanoes elsewhere in the solar system has been one of the surprises in space research. From the giant volcanoes of Mars to Jupiter's highly active moon Io, and signs of activity also on the icy surfaces of other moons such as Neptune's moon Triton. (Sky at Night, December 2005)

**The Active Sun.** A summary of solar research, including results obtained from the solar observatory SOHO - a joint NASA and European Space Agency project launched in 1995 to discover more about the Sun's composition, its surrounding corona and the solar wind. (Sky at Night, December 2005)

**The Race to Pluto.** The New Horizons mission to Pluto, the only planet not yet visited by a spacecraft, was launched in January on its long journey. As Pluto is now moving farther away in its orbit, it is hoped that the probe will arrive before there are analysis problems caused by atmospheric cooling and freezing. (Astronomy Now, January 2006)

**Comet Sample Return.** Details of the Stardust Mission, the first comet sample return mission, which landed safely in January after a six year journey and rendezvous with comet Wild 2. (Astronomy Now, January 2006)

**NASA's other Space Telescopes.** Hubble is not the only space telescope. Details of NASA's four other telescopes - Chandra, Swift, Spitzer and GALEX, now obtaining additional images and information from X ray, Infrared, and Ultraviolet sources of radiation. (Sky and Telescope, January 2006)

**Deep Impact Mission Report.** The effects of the space probe impact with comet Tempel 1 in July last year, and analysis of the results. Surprises include the porous nature of the core, evidence of surface craters, and an indication that comets contain substantial organic material. (Astronomy and Space, January 2006.)

**Mars - Past, Present and Future.** Mars has been the centre of much attention ever since telescopes were first in use on the night sky. A comprehensive summary of observations, what is currently known, and prospects for future exploration. (Astronomy, Mars, 2006)

**Planet Code Cracked?** On a microscopic scale, electrons orbit an atomic nucleus in a similar way to the solar systems planets orbiting the Sun. Is it possible that both may be governed by the same underlying physics? (Astronomy Now, February 2006.)

**Ultraviolet Astronomy.** A set of articles outlining the history of ultraviolet observations. From the X 15 rocket plane observations of the 1950s to NASA's Galaxy Evolution

Explorer (GALEX) which carries the first all-sky ultraviolet camera. Apart from galaxies many other sources can also be studied to advance the understanding of the Universe. (Astronomy Now, February 2006)

**Unveiling Distant Worlds.** In the last ten years astronomers have established the existence of more than 160 planets in orbit around other stars. A few of these are now known to transit the parent star, allowing important information to be discovered about the planets and the composition of their atmospheres. (Sky and Telescope, February 2006)

**A Comet Tale.** How the work of astronomers Jan Oort and Fred Whipple, in scientific papers both published in 1950 on the origin of comets and the nature of the cometary nucleus, has been confirmed by more recent research. (Sky and Telescope, February 2006)

**Time Travel Possibilities.** Time travel into the future has already been shown to exist at higher speeds of travel, and as a result of gravitational effects. More recently the more difficult prospect of travel into the past has also been explored, and it seems that the laws of physics do not rule out this possibility. (Astronomy, February 2006)

**The Volcanoes and Mountains of Io.** Jupiter's moon Io is the most volcanic body in the solar system. Details of Io's remarkable features and most active volcanoes. (Astronomy and Space, March 2006)

**The Best Comets of our Time.** A review of what are considered to have been the ten best comets seen during the past thirty years. (Astronomy Now, March 2006)

**Dust Fountains of the Moon.** A haziness at times above the surface of the Moon was noted by Apollo astronauts. A surface instrument since used to detect the dust of meteor impacts has now found that electrostatic effects of solar radiation is causing surface particles to rise from the Moon's surface. (Astronomy Now, March 2006)

**Five Ancient Mysteries.** Dr Allan Chapman explains how five mysteries of the ancient world, including the Egyptian Pyramids, and Stonehenge, have come to be more clearly understood. (Sky at Night, March 2006)

**Saturn's Mysterious Moons.** During the last two years the Cassini spacecraft has been investigating Saturn's moons in flyby encounters, and with surprising discoveries. (Sky and Telescope, March 2006)

**Japan visits an Asteroid.** In September last year a Japanese spacecraft arrived in close proximity to the small near-Earth asteroid Itokawa, with remarkable close range images obtained. Although there were problems after brief touchdowns on the asteroid surface in November, it is hoped that the probe can be brought back to Earth. (Astronomy, March 2006)

## Star jottings ...

*“I have been looking at the stars, and thinking what an immense distance they are away. What an insignificant thing the loss of, say, 40 years of life is compared with them! It seems scarcely worth talking about.”*

The words of a young British officer, written just before the Battle of the Somme. He fell in the first day's battle.

Quoted in “The Battle of the Somme, First Phase”, by John Buchan. Thomas Nelson & Sons Ltd, 1916.

*(John Buchan was best known for the novel “The 39 Steps”)*

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At 2 minutes and 3 seconds past 1 am on Thursday, 4th May 2006 the time and date will be

01:02:03 04/05/06.

(Contributed by David Le Conte)

**Reminder:** Astronomy Section subscriptions were due on 1<sup>st</sup> January 2006



## Astronomy Section Officers

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**Copy deadline for next issue is  
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