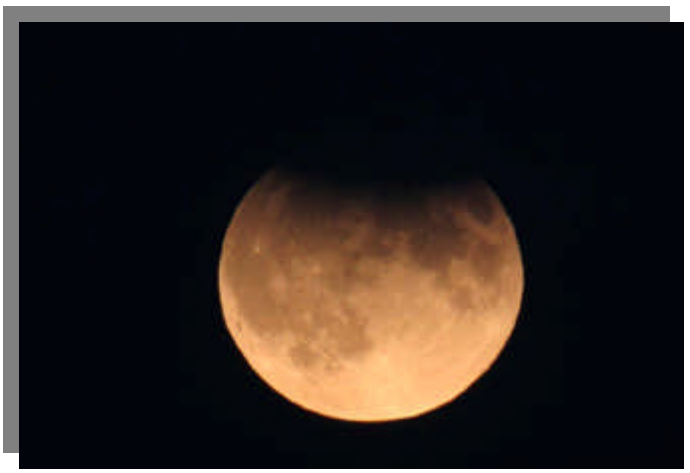
TRANSIT

The Newsletter of

Cleveland & Darlington Astronomical Society

05 December 2006

Start of the eclipse



Full Lunar eclipse

07 September 2006 – Lunar eclipse. From Jurgen Schmoll in West Cornforth

"Using a 300D with an old 500mm f/8 telephoto lens, 2x converter, from a tripod,

additionally I used a 100-300mm Canon zoom lens".

Editorial

Next meeting : 08 December 2006 – by Jurgen Schmoll

Letters to the Editor :

Any new observations, any comments on local or international astronomy, anything you want to share with your fellow members?

Dear Editor, no letters received. (come on guys, play the game)

Borders Bookshop at Teesside Park off the A66 (lovely coffee shop) are stocking the latest edition of Norton's Star Atlas.. Thanks to Ed the Webmaster.

----------OOOOOOOOOOOOOO----------

The Thomas Wright Trophy – results

Unfortunately, York A.S. couldn't compete; due to a combination of people's work commitments and other circumstances, they weren't able to raise a team. So it was a two-way contest between CaDAS and Durham.
The questionmaster was Neil Haggath.
Despite a gallant effort by Durham, CaDAS came out clear winners, by scores of 67 to 48.
The winning team were Darran Summerfield, Michael Roe and Rob Peeling.

----------OOOOOOOOOOOOOO----------

On November 24, 2006, **Durham astronomy Society** (DAS) hosted a talk presented by everyone's favourite uncle, the irrepressible Sir Arnold Wolfendale. His talk, entitled "Asteroids and things which go bump in the night" was his famous mix of science, humour and audience participation. An appreciative audience of 35 were both educated and entertained by Sir Arnold's vast technical knowledge on the subject of asteroids and comets, interspersed with his reminiscences of incidents on his speaker tours on such eminent platforms as the "Queen Elizabeth 2" cruise ship. Congratulations to DAS on capturing such a prominent speaker.

----------OOOOOOOOOOOOOO----------

High-Tech Telescopes

Defining Terms Used in Marketing Telescopes and Accessories

Culled off the newsgroup sci.astro.amateur (Author Unknown)

With the advent of CCDs and the new computer-controlled telescope drives, this may be your first brush with the arcane world of really high-tech. For anyone who may be considering some of the advanced products now on the market, this page will provide an interpretation of a few terms that you've no doubt seen widely used in advertisements.

ALL NEW - The power supply, connectors, and software are not compatible with previous versions. Even the screw threads are different.

ADVANCED DESIGN - Salespeople don't understand it.

BREAKTHROUGH - It nearly worked on the first try.

DESIGN SIMPLICITY - It was developed on a shoestring budget.

EXCLUSIVE - We're the only ones who have the directions telling how to use it.

FIELD TESTED - The manufacturer has no way to test it.

FOOLPROOF OPERATION - It's un-repairable, short of sending it back to the factory (which can't fix it either).

FUTURISTIC - It only runs with the help of a next-generation computer, which isn't available yet.

HIGH ACCURACY - The screw threads match the threads of the holes they're supposed to mate with.

IT'S HERE AT LAST - We've released a 26-week project in only 48 weeks.

MAINTENANCE FREE - see Foolproof Operation.

MEETS OR EXCEEDS OPTICAL STANDARDS - We haven't the foggiest idea about the total wavefront accuracy.

NEW - It comes in a different color than the first version.

PERFORMANCE PROVEN - It worked through beta test.

QUALITY STANDARDS - It works most of the time.

REVOLUTIONARY - Everything that's supposed to go round and round actually goes round and round.

SATISFACTION GUARANTEED - We'll send you another manual if this one fails to work.

STOCK ITEM - We shipped it once before and we can do it again, probably.

UNMATCHED - No one else wants to copy our design.

UNPRECEDENTED PERFORMANCE - May mean two different things:

1. Actually worked the first time right out of the box.
2. Nothing before ever ran so erratically.

YEARS OF DEVELOPMENT - We finally got one to work.

----------**oooooooooooooo**----------

Jupiter's small Spot Changes Hue

Just a little more than a year ago, the small spot on Jupiter was a pale white; now it matches the reddish hue of its bigger sibling, the Great Red Spot, and boasts 400 mph winds, according to new data from the Hubble Space Telescope.

Both spots are actually fierce storms in Jupiter's atmosphere. While the red spot – at three times the size of Earth – is much more noticeable, strange things are happening to the smaller spot.

Scientists aren't quite sure what's happening to the smaller storm, nicknamed the Little Red Spot or Red Spot Jr. but officially called "Oval BA." It probably gained strength as it shrunk slightly, the same way spinning ice skaters go faster when they move their arms closer, said NASA planetary scientist Amy Simon-Miller. Her findings from the Hubble data were published in the astronomical journal Icarus.

As the storm has grown stronger it's probably picked up red material from lower in the Jupiter atmosphere, most likely some form of sulfur which turns red as part of a chemical reaction, she said.

The color change took astronomers by surprise. And now they figure more surprises are in store as the solar system's largest planet goes into hiding from Earth's prying eyes until January, moving behind the sun.

"We found that Jupiter tends to do interesting things behind the sun and we can't see it," Simon-Miller said.

----------**oooooooooooooo**----------

The four stages of scientific acceptance :-

i) *this is worthless nonsense*
ii) *this is interesting but a perverse point of view*
iii) *this is true but quite unimportant*
iv) *I've always said so!*

JBS Haldane (1892-1964)

Philosophy of science is about as useful as ornithology is to birds.

Richard Ferguson (1918 – 1988)

Variable Stars

Part I. The Beginning

From Alex Menarry

Astronomy first attracted me because I found that looking at the night sky was just so fascinating and absorbing. Where I was brought up the skies were wonderfully dark and my Dad encouraged me, pointing out the big, obvious constellations. Learning what was out there and the stunning things going on were a constant source of amazement. The wonder at the big philosophical questions, the cosmology and the astounding physical processes being discovered all the time, has never gone away. I remember buying my first copy of Norton's Star Atlas in 1962. This slim volume widened the scope of the interesting objects to look for and how to find them. Each page of "interesting objects" provided more and more education. And of course the text sections on telescopes, optics and general astronomy, were no less interesting than the sky itself. One of the important points about the subject of astronomy is that one can take it at any level one chooses.

Although I went on for many years taking a general interest, both practical and arm-chair, my astronomy never really developed into what I would call a "study". Not until I discovered Distance Learning Courses. (Some of my friends found amusement in me doing Astronomy as a distance learning course – geddit?). This was another step change in my progress with astronomy, comparable with discovering Norton. One year, doing a course with the University of Central Lancashire, an observing project was required. This provided the stimulus to decide on a particular class of objects to study in some detail and find out all I could about them. For reasons which are lost in the mists of time, out popped Eclipsing Binaries.

They had everything. The need to search for specific objects by star-hopping with binoculars; learning star designations; using star catalogues, both in a library and on-line; delving into constellations I hadn't even noticed before. An added skill required was how to estimate magnitudes visually, which required a lot of reading about Pogson and others, a lot of practice and the use of "sequences" – the official chart of known magnitudes for stars near the one of interest.

The whole idea of eclipsing binaries is just amazing. Here are two massive, sun-sized objects rotating about one another in periods measured in a few days. The distance between the two is a handful of star diameters, so they cannot be distinguished as two stars by any telescope in existence yet - maybe in the near future . . . . ? They can be combinations of just about every object one can imagine – star and star (of various kinds), star and white dwarf, star and black hole and many more. It was John Goodricke and Edward Pigott in 1783, who first suggested that the periodic variation in the magnitude of Algol could be explained by postulating a binary pair with orbits in the plane of our line of sight, eclipsing one another. This concept proved to be correct and

has been developed to very fine degrees by measuring the exact form of the light curve as eclipse takes place.

Of course, The British Astronomical Association has a Variable Star Section, which I joined to learn more about this fascinating class of objects. As well as observing and studying the many types of intrinsically variable star, they have a programme covering the most interesting eclipsing binaries. Predictions of when eclipses are due to occur are published in the newsletter and on the website for what are considered to be the most important 15 or 20 eclipsing binaries at any one time. For a couple of years, I observed the "easy" eclipsing binaries like Algol, beta Lyra, lambda Tau, RZ Cassiopeia and a few others, well within the capacity of a pair of hand-held binoculars. More difficult ones, such as U Cep, were beyond my meager skills and the light-polluted skies above my back yard.

After a couple of years of trying to acquire the necessary accuracy of observation it became obvious that I didn't have it!! It was really thrilling to watch throughout the night as a star like Algol slowly dimmed by a couple of magnitudes and then returned to full brightness. It really does happen! However, drawing the light curve from my magnitude observations showed that the accuracy was just not up to the job. When you consider that the variation in magnitude may be only one magnitude, or less, great skill is required. The BAAVSS want to confirm, among other things, the exact time of full eclipse. This important parameter shows how the period of the binary pair may be changing. To do the job properly, it needs an accuracy of about 0.1 of a magnitude in the observation. My accuracy never improved beyond 0.3 or 0.4.

In the course of all this I became involved, along with another CaDAS member Dave Blower, in converting the masses of paper records, generated by BAAVSS members over the years from early in the last century, into modern digital format. There are about 4 or 5 of us typing away at this mountainous and very boring task. I've been at it for about 3 or 4 years now and have typed up the data for 50 or so stars. There have been some lovely moments, though. Patrick Moore's observations, with a massive 12 and a half inch refractor at Selsey, are always, like him, gloriously, wonderfully eccentric. He refuses to use Greenwich Astronomical Mean Time (GMAT – the astronomer's time) and always sends his records in using Universal Time. His records are always typed out meticulously and neatly. Some of the observations were made during World War II in the desert of North Africa, with notes like "the artillery bombardment is interfering with visibility tonight".

This typing job has taught me a great deal about the recording and observing of variable stars but has tended to divert energies away from observing of late. But now the enthusiasm to restart observing is returning. However, my visual magnitude estimation inaccuracy problem has convinced me that I have to acquire a more accurate, non-visual method of doing the observations. I tried out a cheapy security TV camera but they have an automatic adjustment for brightness of subject, which is exactly what you don't want! I did get some great pictures of Jupiter's moons moving round the planet, though. Nowadays, as Keith Johnson and other members have demonstrated, relatively cheap

cameras can record down to remarkably low star brightnesses. Modem computer techniques can deal very well with the images. What I would like to do is use a camera to estimate magnitudes. I know "conventional" CCD cameras can do the job of accurate photometry but I am looking for the poor man's method.

The idea is that a Mintron, or similar, camera fitted with a conventional camera lens, can take perfectly adequate images of a star field and computer-store the images. Now, does anyone know of suitable software to examine the image to give an accurate assessment of the star brightness? It needn't be absolutely accurate, only relative, because we have the BAAVSS charts and sequences to put the observations on an absolute scale. I need the help of any members who have the knowledge and experience to solve this problem for me, please.

In future articles I will try to tell you what I have discovered about eclipsing binaries and other types of variable star, hoping to enthuse some of you to take up observations of these outstanding objects.

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The scientist is not a person who gives the right answer, he is the one who asks the right questions.

Claude Levi strauss (1908 -)

Science is organized knowledge.

Herbert Spencer (1820 – 1903)

Science is what you know, philosophy is what you don't know.

Betrand Russel, 1872 – 1972)

That is the essence of science, ask an impertinent question and you are on the way to a pertinent answer.

Jacob Brownowski (1908 – 1974)

The scientific approach begins from observation of the here and now, working outwards and backward from this basis.

Eric Lerner (Astrophysicist)

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New Website for the Durham Astronomy Society

The Durham Astronomical Society has a new Website – www.durhamastronomy.org

The Society itself has been running for a number of years and meets at St Oswald's Church Hall, Church Street, Durham, Co. Durham. DH1 3DQ usually on the last Friday of each month at 1930 hours.

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Astrophotography from Jurgen Schmoll

Below are my pictures of 24 September 2006.

Camera: Canon EOS300D w/o blocking filter
Telescope: Vixen ED102SS 102/660 ED driven on GPDX mount
Filter: Apart from "M33nof", which was unfiltered, I used an ASTRONOMIK PROFI 2" CLS filter

Most exposures of around 150 sec.

1) M33nof: No filter here. Use of 7 exposures.

2) M33: 9 stacks, this time with filter. Image slightly cropped.

3) M45: Stack of just 3 pictures, however one was a 300 sec long one.

4) M31: Single 150 s shot (after which my mount collided - so I had to stop).

5) zeta: Theta Orionis with flame and horsehead nebula. 5 pictures of 150 s each.

6) M42: 17 pictures stacked: 3 x 10 s, 3 x 30 s, 1 x 60 s, the rest around 150 s.

What I learnt:

- The ED copes quite well with an IR sensitive chip. The blurring is very small.
- The CLS filter requires about 2x longer exposures, but the nasty red background is sorted quite well.

Fig 1

Fig 2

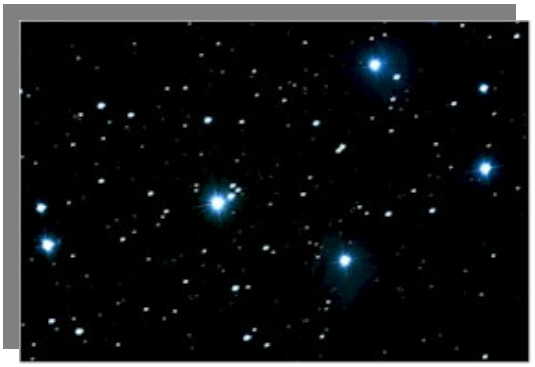

Fig3

Fig 4

Fig 5

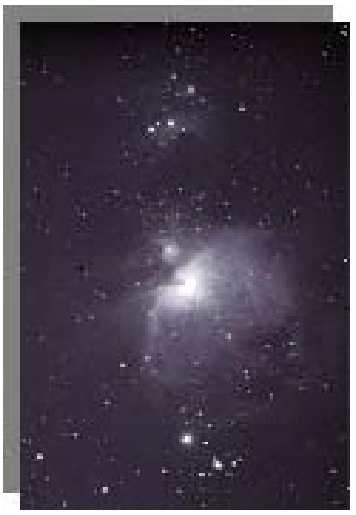

Fig 6

Early Optics

from Universe today

The ability for convex and concave transparent objects to enlarge or reduce had been known since Antiquity and by the end of the thirteenth century; quality glass was relatively inexpensive, particularly in Italy. At the same time, techniques for grinding and polishing had reached a high state of relative precision in Venice. So, handheld magnifying glasses became relatively common. During the fourteenth century, the craftsmen of Venice began producing small double-sided convex glass disks that could be mounted and worn in a frame- the first reading glasses. By the middle of the fifteenth century the Italians were also producing spectacles that corrected for nearsightedness. Therefore, around 1450 the ingredients to produce the first telescope were in place but it would be another 150 years before children would trigger its invention and change everything.

Spectacles became popular throughout Europe during the two hundred years following 1300 and could be purchased from a spectacle maker's shop. Generally, a suitable pair was selected by trying on different glasses until one provided the best vision improvement. Interestingly, peering through a lens that corrects for nearsightedness, held near your eye, then through a lens that corrects for farsightedness, held farther away, will magnify objects in the distance. Why no one stumbled upon this until the early 17th century remains a mystery given the wide availability of these lenses. Regardless, the first telescopic view may have occurred not through a pair of lenses but through a lens and mirror produced by two Englishmen, Leonard and Thomas Digges, in the 1570's. Unfortunately, their experimental instrument never reached maturity.

Finally, in late September 1608, Hans Lipperhey, a German-born spectacle maker who had settled in the Netherlands, requested a patent on a new optical instrument. It featured a convex and concave lens mounted on a tube about one foot in length that could make far away objects seem three or four times closer. It is said he got the idea when his children, who were playing in his shop, looked through two lenses and could see the weathervane on a distant church as if it were much closer. During the review of his application, he was asked to make an improvement so that the instrument could be used with both eyes; therefore Lipperhey also produced several binocular telescopes as a result of his patent request. Unfortunately, the news of his invention did not remain a secret during the patent review, undoubtedly due to the bureaucracy involved with granting approvals. For example, his application was shared with a high-ranking official of the Vatican who immediately dispatched a message to Rome and thus news of his invention started to spread across Europe as fast as coaches could carry it. Ironically, Lipperhey's patent was denied on the basis that his invention could not remain secret and was too easy to copy.

It is noteworthy that two other spectacle makers also claimed to be the telescope's inventor. Jacob Metius presented his patent petition shortly after Lipperhey's was rejected and Sacharias Janssen made a similar assertion several decades later. While Hans Lipperhey was never officially recognized as the inventor of the telescope, and thus did not reap what would have been a considerable fortune, he is nonetheless credited with its

discovery because his was the first written submission for a patent of the telescope's design.

Within six months of Lipperhey's patent attempt, spyglasses, as they were called, could be purchased in Paris and four months after that they could be bought in Italy, too. The telescope so thrilled people that it became one of Europe's most popular toys. A mathematics professor at the University of Padua, Italy, on the lookout for any opportunity to offset the costs of supporting his family, learned of the telescope and set about to build his own but make it better. Unlike the craftsmen who built the first telescopes, Professor Galileo leveraged his mathematical background to improve the quality of his lenses.

He constructed his first telescope during the summer of 1609, presented an eight-powered instrument to the Senate of Venice in August (for which he was handsomely rewarded), and then turned a twenty-powered instrument to the heavens early in the fall of the same year. He observed the Moon, discovered the four largest satellites of Jupiter, and found that the Milky Way was made of individual stars- all this was with the latter telescope. In March 1610, he published his discoveries in *The Starry Messenger* and stood the universe, as humankind understood it, on it's head.

At first, no one could verify all of Galileo's discoveries- telescopes other than his were optically inferior. For example, independent verification of Jupiter's moons waited six months after Galileo's publication before others could obtain instruments of sufficient quality. The phases of Venus would not be corroborated until the first half of 1611 but by this time, Galileo's lead in telescope making had ended. His next discovery- sunspots- was made my several observers independent of each other.

Interestingly, just as Galileo did not invent the telescope, neither was he the first to observe the sky with the new instrument. That distinction goes to a little known Englishman named Thomas Hariot who observed the Moon with a six-powered spyglass early in August 1609. His telescopic drawing of the Moon, during early August 1609, is the first on record and preceded Galileo's lunar studies by several months. Hariot's observation of sunspots during December 1610 was also made prior to Galileo's.

Other than *A Brief and True Report*, Hariot did not publish his work whereas Galileo did. Both the distribution of his words and the controversy that turned him into a prisoner gave Galileo the stature that he occupies to this day. Conversely, Hariot left a large number of manuscripts on various scientific subjects that have, over the past three centuries, only slowly surfaced. As a result, Hariot remains somewhat unknown.

The object that appears in the picture accompanying this article would have been totally invisible through any of the one hundred telescopes produced by Galileo during his lifetime.

First, his telescopes suffered from various optical flaws. For example, Galileo's instruments had a narrow view- at twenty times magnification only a quarter of the moon was visible. They also had color aberrations- bright objects were surrounded by false halos or fringes of distracting hues. Their focus was not flat- it was best at the center of

the image and grew fuzzy towards the edge of the field of view. Telescopes are a reflection of the technology at the time they are produced and Galileo's lenses were also filled with air bubbles and tinted green due to the iron content of the glass from which they were made.

Second, his telescopes were small. They had an aperture- the diameter of the front lens- of between one half and one inch. That severely restricted the amount of light entering into the observer's pupil. The primary purpose of an astronomical telescope is to collect light. For example, if a modern telescope had a light gathering surface that was ten inches in diameter. That means it collects over 1,500 times more light than the eyes of a normal 40-year-old person - stars appear 1,500 times brighter when viewing the sky through this size of telescope. Conversely, Galileo's largest telescope collected only 15 times as much light. Of course, the comparison is not completely fair. We are talking about 21st Century technology versus renaissance period artifacts built almost 400 years ago.

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We are all ignorant. We are just ignorant about different things.

Will Rogers

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A new DAS Telescope

from Bob Mullen

Our friends from 'Up North' - the Durham Astronomical Society - were very generously offered free gratis a 14inch Newtonian telescope, base and mounting made 25 years ago by a very skilled amateur astronomer and engineering enthusiast, Mr Bob Wilson from Chester le Street.

Five of the DAS musketeers (Jurgen, the Gargett Twins, Ed Restall and Bob Mullen) gathered at Bob Wilson's house to dismantle the telescope and van it to Jurgen's house in West Cornforth.

The first thing that struck us was how well constructed were the telescope, the base and the mount - a superb piece of engineering.
The second thing that struck us was the weight of the component parts. There is so much distributed mass in the assembly that no unwanted movement would be possible when observing, even in a howling gale.

Bob Wilson has been a serious telescope maker for many years, grinding his own mirrors and lenses and using his very obvious engineering skills to produce an excellent completed product.

Bob Wilson with the 14" reflector in his back garden

As Jurgen says – "the plan was to dismantle the instrument in Chester-le-Street at Bob Wilson's place . Then we aimed to transport the parts to my garden. I will create space in my garden sheds and cover the bulkier parts outside on my terrace. The parts will be in good company with my old Zeiss observatory pillar there. The optics will be stored in my house, cleaned, tested and possibly realuminized".

"In the long run I intend to renovate the scope. Maybe I am going to have to build a shed around it to protect it from the elements after assembly. As I plan another observatory anyhow, I will combine these needs. Also we should find out sites and possible sponsors for a shelter for this scope. Maybe it is time to enlarge the impact of our society by optimising its structure".

John and George Gargett are in discussions with the Ranger in Hamsterly Forest with a view to building an environmentally attractive Observatory. Refurbishing the telescope as well obtaining funding and the eventual building of the Observatory may take some time but in the long run the Society will end up with a superb telescope in a fantastic dark sky site.

The definitive study of the herd instinct of astronomers (and other scientists) has yet to be written, but there are times when they resemble nothing so much as a herd of antelope, head down in tight formation, thundering across the plain. At a given signal from the chosen leader of the time they whirl about, with equally firm determination, and thunder off in a quite different direction, still in parallel formation.

Donald Fernie, Canadian astronomer

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Geminids Meteor Shower - max Dec 14th 05h UT

Disappointed with years Leonid failure to perform? Try the more dependable Geminids in December this year.

Moonlight conditions are fairly favourable for the Geminids in 2006. Geminids are medium-speed meteors. Most of them don't leave glowing trains, but the brighter ones are often colored (yellow, green and blue are most common). The proportion of bright meteors and fireballs is higher during and after maximum than on pre-maximum nights.

Geminid activity can be seen from Dec 7-16. Results from recent years have shown the peak ZHR to be over 100 and to remain above 70 per hour for about 24 hours. The shower is typically rich in bright meteors, but produces few trained meteors. The radiant is highest at about 02h local time and for observers at northern temperate latitudes is above the horizon all night.
The Full Moon of Dec 5 will hinder observations of the early part of the shower, but with Last Quarter occurring on Dec 12, moonrise will be after midnight on the night of maximum. Thus the evening sky will be moon free and with the shower being rich in bright meteors, good rates should still be seen later in the night.

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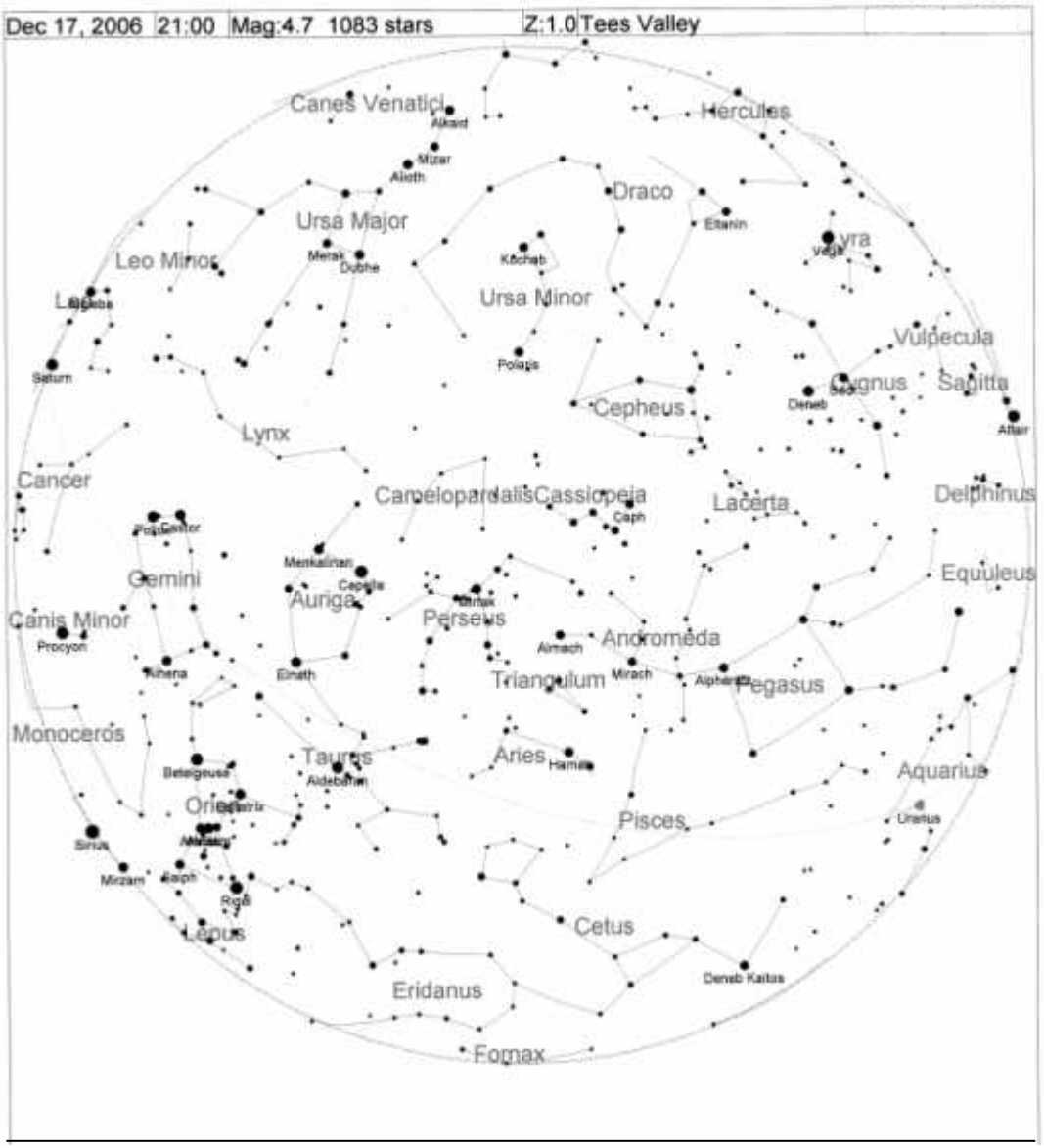
Did you know if you moved Pluto (MPC Asteroid # 134340) closer to the Sun (i.e. 1AU) it would grow a cometary tail one hundred million miles long? Pluto a planet? Duhhh!!

The night sky at 2100 hours, December 17, 2006

facing North

facing East



facing West

facing South

Sky map courtesy of KlassM Skyglobe

The above Sky map can be used during the month of December 2006 and is valid for the whole month. For early December the map represents the stars at approximately 2200 hours, mid December at 2100 hours and end of December at approximately 2000 hours.

To use the map, choose a suitable compass point on your horizon with clear visibility, initially hold the map above your head and rotate the map until the map edge matches the compass direction you are looking in (its probably best to start with a North direction and look for the easily identifiable and always visible Plough).

The stars shown above the map's horizon now match what is in the sky. With confidence you can then re-orientate yourself with the stars above the other compass points.

NB the planets are only shown correct for December 17, 2006 (they gradually move East to West along the ecliptic during the month). Saturn rises in the East after mid-December onwards and is midway along the ecliptic (highest) about 0400 hours in the morning.

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Transit Tailpieces

Custom Telescopes UK.
Glen Oliver, a long-time member of the Society, can supply telescopes and accessories of all kinds. He operates from Hartlepool and has a website,
http://homepage.ntlworld.com/glen.oliver/custom.htm
e-mail glen.oliver@ntlworld.com.

Support local businessmen! Glen tells me that he now has an Astronomy and Space books page on his website

Transit Adverts : If you wish to let members know what you want to sell or what you are looking for, please send an advert for the magazine.

CaDAS Website : Don't forget to visit our very own website at www.**wynyard-planetarium**.net.

Articles : Please send contributions for the newsletter to Bob Mullen, 18 Chandlers Ridge, Nunthorpe, Middlesbrough, TS7 0JL, 01642 324939 (b2mullen@hotmail.com)
Copy deadline date is the 25th of each month.
