Current Notes

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Presentation of the Dalton Medal to Sir Bernard Lovell FRS, *OBE*.

The Continuing Story of Jodrell Bank presented by Sir Francis Graham-Smith, dated Wednesday 7th October 2009.
Presentation of the Dalton Medal to Sir Bernard Lovell FRS, OBE. After receiving an email from our very own President Barry Henshall, myself and Anthony Jennings decided to go to the lecture on behalf of the society. All we knew at the time was that there would be a lecture given followed by the presentation of the Manchester Literary and Philosophical (Lit & Phil) Society's own Dalton Medal to Sir Bernard Lovell FRS, OBE by their own President.

When we arrived, we were met with many people milling around, staff and pupils handing out prospectus', which led to some confusion. It soon dawned on us that the lecture was occurring on the same night as the Manchester Academy's School Open Evening! Luckily a member of the Lit & Phil Society was on hand to direct us to the tea and coffee that was laid out for those attending the lecture. Once reaching this point, we bumped into Peter Cook and Joan Sims just before being asked to make our way to the Lecture Hall.

The Hall was like the school, still fairly new, well lit and clean. The seating was tiered, so everyone could see the speaker without any heads getting in the way. After a brief introduction by the Lit & Phil President the speaker, Sir Francis Graham Smith took the floor and delivered a very well known and very knowledgeable lecture. Hearing him speak so passionately and fondly of Jodrell Bank and its various telescopes, the Lovell telescope in particular, brought a smile to my face, as well as conjuring up a few long forgotten memories of the last time I had visited, some 16-17 years ago when I was still only in primary school.

To give you a general overview of what was said, I will remind you of the history of the Lovell telescope and its involvement at Jodrell Bank.

The Jodrell Bank Observatory is an observatory that hosts a number of radio telescopes, and is part of the Jodrell Bank Centre for Astrophysics at the University of Manchester. The observatory was established by Sir Bernard Lovell in 1945, who wanted to investigate cosmic rays after his work on radar in the Second World War. He originally intended to use the equipment in Manchester, however electrical interference from the trams that then ran down Oxford Road prevented him from doing so. Consequently, this led to the move of the equipment to Jodrell Bank, 25 miles (40 km) south of the city on 10 December 1945. His main topic of research at the time was transient radio echoes, which he confirmed were from ionized meteor trails by October 1946.

Coincidentally, the first time he turned on the radar at Jodrell Bank – the 14 December lead up to the building of the Lovell telescope were a searchlight telescope, provided by the Army on loan and a transit telescope.

The telescope that we all know so well was first called the 'Mark I', later to be re-named after Sir Bernard, was at the time the world's largest steerable dish radio telescope, measuring 76.2 m (250ft) in diameter upon its completion in 1957. It is now the third largest, after the Green Bank and Effelsberg telescopes. The telescope became operational in the summer of 1957, just as Russia launched the first artificial satellite, Sputnik 1. The telescope was the only one in the world able to track its booster rocket by radar, locating it for the first time just before midnight on 12 October 1957.

The President of the Lit & Phil presenting the Dalton Medal to Sir Bernard Lovell OBE FRS.

In the following years, the telescope was used to track various space probes, including the Pioneer 5 probe. The telescope was also used to send commands and to receive data back from the probe, again being the only telescope capable to do so at the time. In February 1966, Jodrell Bank tracked the USSR unmanned moon lander Luna 9 and listened in on the facsimile transmission of photographs from the moon's surface. The photos were sent to the British press and published before the Soviets themselves had made the photos public. In 1969 the Soviet Union's Luna 15 was also tracked. The probe was a Soviet last minute attempt to steal some of Apollo 11's publicity. A recording of the dramatic moment in which Jodrell Bank's scientists observed the Soviet attempt to scupper American victory in the race to the moon was made available to the public for the first time on 3 July 2009, just in time for the 40th anniversary of the moon landings! In 1987, the 'Mark I' was renamed the Lovell telescope after Sir Francis and was granted the accolade of becoming a Grade I listed building the year later in 1988.

The remainder of the time, between observing satellites, was used for scientific observations. These include using radar to measure the distance to the moon and to Venus,

observations of astrophysical masers around star-forming regions and giant stars, observations of pulsars (including the first pulsar in a globular cluster), observations of quasars and the detection of gravitational lens as well was the first Einstein ring. The telescope has also been used for SETI observations.

Other telescopes that can be found within the grounds of Jodrell Bank include the Mark II, an elliptical radio telescope constructed in 1964 and mainly used in pairing with the Lovell telescope on the MERLIN network of telescopes around the country. There are many other, smaller dishes that are used for various research and teaching aids.

As mentioned earlier, Jodrell Bank is involved in the MERLIN network of currently 7 radio telescopes that are spread across England and the Welsh borders. The 7 telescopes involved in this project are the Lovell telescope, Mark II, Cambridge, Defford, Knockin, Darnhall and Pickmere. Those that attended the first winter lecture on the MAS calendar will know all about MERLIN from the speaker, Professor Tim O'Brien. Jodrell Bank is also involved in the VLBI (Very Long Baseline Interferometry) and has been since the late 1960's, when the Lovell telescope took part in the first transatlantic interferometer experiment in 1968, with other telescopes being those at Algonquin and Penticton in Canada. The Lovell and Mark II telescopes are regularly used for VLBI with telescopes across Europe (the European VLBI Network).

The first director of Jodrell Bank was Bernard Lovell, who established the observatory in 1945. He was succeeded in 1980 by Sir Francis Graham-Smith (the speaker of the lecture), followed by Professor Rod Davies around 1990 and Professor Andrew Lyne in 1999.

The current director is Professor Phil Diamond, who took over the role on 01 October 2006.

There is an educational visitors' centre at the site, which covers the history of Jodrell Bank and also has a 3D theatre hosting trips to Mars. There is also a path around the Lovell telescope, approximately 20m from the telescope's outer railway This hosts a number of information boards explaining how the telescope works and the research that it has done with it. The visitor's centre also organizes a series of public outreach events, including public lectures, star parties and "ask an astronomer" sessions. There is also an astronomy podcast from the observatory, named 'The Jodcast'. The original visitor's centre, which was opened in 1971 by the Duke of Devonshire now no longer, exists, but there is an interim centre on the site, which currently receives around 70,000 visitors a year.

The site boasts a 35 acre Arboretum, which was created in 1972 and houses the UK's national collections of crab apple and mountain ash species, as well as the Heather Society's *Calluna* collection. The arboretum also features a small scale model of the solar system, the scale being approximately 1:5,000,000,000.

Sir Francis Graham-Smith

As many of you know, there was a threat of closure due to a shortfall in Britain's Science and Technology Facilities Council (STFC) budget. In April 2008, Cheshire's 106.9 Silk FM unveiled its own campaign to its listeners. It was in the form of a song entitled "The Jodrell Bank Song", sung by a group dubbed "The Astronomers". Silk FM released the song for download from Monday 21 April 2008 and all proceeds went towards saving Jodrell Bank. On 9 July 2008, it was reported that, following an independent review, the STFC had reversed its initial position and would guarantee the funding of the e-MERLIN project for a further three years. Jodrell Bank was saved!

Back to the Lecture hall and the lecture finished too much applause and a handful of question, including one from our very own Treasurer.

The presentation of the Dalton Medal by the Lit & Phil Society's President has only ever occurred 11 times in the history of the society, which dates back to 1781. The medal is presented to someone who is or has been eminent in the field of science and I think Sir Bernard fits into that category! The Dalton Medal is also the society's most prestigious award, hence why the low number of receivers.

Upon receiving the award, Sir Bernard graced us with a 20 minute speech, which is some feat considering his age, that of 96. After the presentation we were informed that there was food being served for those who had either been invited or booked a place. Not knowing what to do, myself and Anthony held back to speak to Sir Francis and asked him if he would possibly sign a picture of the Lovell telescope we just happened to have on us, pen too of course! Once he knew where we were from, he was only too happy to sign his name. He then turned and disappeared with the picture and pen, soon returning with a signature from Sir Bernard for us and the Society. We thanked him and that was when we were told that we could take Barry's place at the 'invited guests' table for the meal.

So not only did we attend an interesting lecture, had a picture signed by two of the former directors of Jodrell Bank, we were also treated to a very nice meal and pleasant conversation with others who had been invited to eat.
The signed picture was presented by me and Anthony Jennings in November 2009 for the society to place within the observatory for all to see.

The next Manchester Lit & Phil lecture of note for the MAS is one that will take place in April 2010.

It will be delivered by yet another prominent person from Jodrell Bank's scientific history, Professor Dame Jocelyn Bell Burnell. She was one of a group of people who helped discover the existence of pulsars some nearly 35 years ago. The event will take place on Thursday 22 April 2010 at 7pm in the Schusler Building, University of Manchester, Brunswick Street.

Who knows, we might ask Dame Jocelyn to sign the same picture as Sir Bernard! If only we dare to be cheeky enough.

Marion Mills

The Bayer System for the naming of stars.

The Society has welcomed a number of new members recently. It is possible that some of you may not be versed in elementary classical Greek & Latin, necessary for using this naming system, so I have devised this article as an introduction.

Johann Bayer (1572-1625) invented a method of naming stars, which is still in common use today.

A Greek lower case letter is followed by the genitive case of the constellation name in Latin (or its official IAU (International Astronomical Union) three letter abbreviation).

In theory, the brightest star is named α (alpha), all the way down to ω (omega), giving a naming system for the brightest 24 stars of any constellation, useful as proper names have only been given for some of the stars. After 24 has been reached, other naming systems have to kick in such as Flamsteed numbers and special numbers for double and variable stars, but these are outside the scope of the article.

In the opinion of this author, knowledge of how to use the Bayer system should be mandatory for all amateur astronomers, for without it, you will not be able to communicate properly with your fellows. Knowledge of this system is quite simply, very basic astronomy. It is equally important to use it correctly, otherwise the society would be in danger of falling into sloppy practices and cease to become worthy of occupying the Godlee observatory.

Remember the dictum "Vocare est Invocare". To voice is to invoke. Get it wrong and it results in wrong energies coursing through you. On a lighter note, the young students of Hogwarts are terrified of sounding Lord Voldemort's name for this reason.

Firstly, it is important to realise that the Latin & Greek employed in astronomy are NOT modern Italian and Greek, but their Classical forms. For the Greek, all that is required is knowledge of the alphabet. The Latin is more complicated as it involves grammar and Latin has five different declensions of nouns. This is not the place for a complete course in classical grammar, so I have produced some rule of thumb tables below to ease the process; eventually you will get a "feel" for the right endings. Remember, the genitive is a possessive case, meaning "of" or "belonging to "something or someone, thus β Canum Venaticorum (or β CVn) means the star beta belonging to the constellation of Canes Venatici.

Who knows, an introduction such as this may spark an interest in classical languages! Reading the New Testament, for instance, in its original form, can give insights not normally available to those unversed in classical Greek, whereas Latin opens doors to the understanding of law, government and medicine (and astronomy of course!).

To begin, here is the Greek alphabet: the Bayer system only uses the lower case letters.

Greek Letter		Name	Equivalent	Sound When Spoken
Α	α	Alpha	A	al-fah
Β	β	Beta	B	bay-tah
Γ	γ	Gamma	G	gam-ah
Δ	δ	Delta	D	del-tah
Ε	ε	Epsilon	E	ep-si-lon
Ζ	ζ	Zeta	Z	zay-tah
Η	η	Eta	E	ay-tay
Θ	θ	Theta	Th	thay-tah
Ι	ι	Iota	I	eye-o-tah
Κ	κ	Kappa	K	cap-ah
Λ	λ	Lambda	L	lamb-dah
Μ	μ	Mu	M	mew
Ν	ν	Nu	N	new
Ξ	ξ	Xi	X	zzEye
Ο	ο	Omicron	O	om-ah-cron
Π	π	Pi	P	pie
Ρ	ρ	Rho	R	row
Σ	σ	Sigma	S	sig-ma
Τ	τ	Tau	T	tawh
Υ	υ	Upsilon	U	oop-si-lon
Φ	φ	Phi	Ph	figh or fie
Χ	χ	Chi	Ch	kigh
Ψ	ψ	Psi	Ps	sigh
Ω	ω	Omega	O	o-may-gah

The best way to tackle constellation genitives is to divide them into groups, finishing with the (apparently) irregular ones, thus:

Ones ending in an -a:

Constellation Name	End	Genitive	To form genitive	IAU
Andromeda	a	Andromedae	Add -e to root	And
Antlia	a	Antliae	"	Ant
Aquila	a	Aquilae	"	Aql
Ara	a	Arae	"	Ara
Auriga	a	Aurigae	"	Aur
Carina	a	Carinae	"	Car
Cassiopeia	a	Cassiopeiae	"	Cas
Columba	a	Columbae	"	Col
Coma	a	Comae	"	Com
Corona Australis	a,s	Coronae Australis	" (& no change)	CrA
Corona Borealis	a,s	Coronae Borealis	" (& no change)	CrB
Hydra	a	Hydrae	Add -e to root	Hya
Lacerta	a	Lacertae	"	Lac
Libra	a	Librae	"	Lib
Lyra	a	Lyrae	"	Lyr
Mensa	a	Mensae	"	Men
Musca	a	Muscae	"	Mus
Norma	a	Normae	"	Nor
Sagitta	a	Sagittae	"	Sge
Tucana	a	Tucanae	"	Tuc
Ursa Major	a,r	Ursae Majoris	"	Uma
Ursa Minor	a,r	Ursae Minoris	"	Umi
Vulpecula	a	Vulpeculae	"	Vul

Ones ending in -um:

Caelum	um	Caeli	um changes to -i	Cae
Horologium	um	Horologii	"	Hor
Microscpium	um	Microscopii	"	Mic
Reticulum	um	Reticuli	"	Ret
Scutum	um	Scuti	"	Sct
Telescopium	um	Telescopii	"	Tel
Triangulum	um	Trianguli	"	Tri
Triangulum Australe	um,e	Trianguli Australis	" & -e changes to is	TrA

Ones ending in –us:

Aquarius	us	Aquarii	-us changes to -i	Aqr
Centaurus	us	Centauri	-us changes to -i	Cen
Cepheus	us	Cephei	-us changes to -i	Cep
Cetus	us	Ceti	-us changes to -i	Cet
Circinus	us	Circini	-us changes to -i	Cir
Corvus	us	Corvi	-us changes to -i	Crv
Cygnus	us	Cygni	-us changes to -i	Cyg
Delphinus	us	Delphini	-us changes to -i	Del
Equuleus	us	Equulei	-us changes to -i	Eql
Eridanus	us	Eridani	-us changes to -i	Eri
Hydrus	us	Hydri	-us changes to -i	Hyi
Indus	us	Indi	-us changes to -i	Ind
Lupus	us	Lupi	-us changes to -i	Lup
Ophiuchus	us	Ophiuchi	-us changes to -i	Oph
Pegasus	us	Pegasi	-us changes to -i	Peg
Perseus	us	Persei	-us changes to -i	Per
Sagitarius	us	Sagittarii	-us changes to -i	Sgr
Scorpius	us	Scorpii or Scorpionis	-us changes to -i or -onis	Sco
Taurus	us	Tauri	-us changes to -i	Tau

Ones where –is is added to the root (-nis for Draco, Leos' & Pavo)

Crater	er	Crateris	add -is	Crt
Draco	o	Draconis	add -nis	Dra
Leo	o	Leonis	add -nis	Leo
Leo Minor	o,or	Leonis Minoris	add -nis & -is	LMi
Orion	n	Orionis	add -is	Ori
Pavo	o	Pavonis	add -nis	Pav
Pictor	or	Pictoris	add -is	Pic
Sculptor	or	Sculptoris	add -is	Scl

Ones that don't change (first name at least)

Canis Major	r	Canis Majoris	no change & add -is	CMa
Canis Minor	r	Canis Minoriis	no change & add -is	CMi
Camelopardalis	s	Camelopardalis	no change	Cam
Piscis Austrinus	s	Piscis Austrini	no change & -us changes to -i	PsA
Puppis	s	Puppis	no change	Pup

Ones where –x changes to –cis:

Crux	x	Crucis	-x changes to -cis	Cru
Fornax	x	Fornacis	-x changes to -cis	For
Lynx	x	Lyncis	-x changes to -cis	Lyn
Phoenix	x	Phoenicis	-x changes to -cis	Phe

Ones where –s changes to –tis:

Aries	s	Arietis	-s changes to -tis	Ari
Monoceros	s	Monocerotis	-s changes to -tis	Mon
Octans	s	Octantis	-s changes to -tis	Oct
Serpens	s	Serpentis	-s changes to -tis	Ser
Sextans	s	Sextantis	-s changes to -tis	Sex
Volans	s	Volantis	-s changes to -tis	Vol

Nouns that are plurals:

Vela	a	Velorum	replace a with -orum	Vel
Canes Venatici	es,i	Canum Venaticorum	es changes to -um & i changes to -orum	CVn
Gemini	i	Geminorum	replace i with -orum	Gem
Pisces	es	Piscium	-es changes to -ium	Psc

Unusual ones:

Apus	s	Apodis	-us changes to -odis	Aps
Bootes	s	Bootis	-es changes to -is	Boo
Cancer	r	Cancri	-er changes to -ri	Cnc
Capricorn	n	Capricorni	add -i	Cap
Chamaeleon	n	Chamaeleontis	add -tis	Cha
Dorado	o	Doradus	-o changes to -us	Dor
Grus	s	Gruis	-s changes to -is	Gru
Hercules	s	Herculis	-es changes to -is	Her
Lepus	s	Leporis	-us changes to -oris	Lep
Pyxis	s	Pyxidis	-s changes to -dis	Pyx
Virgo	o	Virginis	-o changes to -inis	Vir

This list may look quite a mouthful, but out of 88, only about 15 are a little odd, the rest conforming to simple rules.

For pronunciation, I would refer you to Norton's star atlas, especially the older editions.

As a word to the wise, getting this system wrong can have embarrassing consequencies, as the BBC found out a few years ago. They were doing a documentary involving spectroscopy, which naturally would mention the father of stellar spectroscopy, Angelo Secchi. He nicknamed a prominent red, circumpolar carbon star "La Superba", which has the variable star designation Y (English capital letter). When the BBC had finished with it, its name ended up as "Gamma Canes Venatici", when it should have been Y Canum Venaticorum. If they had said, Upsilon Canum Venaticorum, they might have been forgiven, but as it was, it must have made the likes of Messrs Chapman & Moore, roar with laughter at such a basic error.

It might be a good idea if next year's quizmaster were to include some of this system amongst the questions. As a scientific society, learning should always form an essential part. For those who make the effort, it will have also opened doors to what are effectively, two secret languages these days.

Guy Duckworth

Shadow Bands

During my Presidential Lecture (2009) I mentioned shadow bands but had little time in which to describe this phenomenon.

Shadow bands have been observed on many occasions during total solar eclipses but photographic evidence is sparse. The bands occur just before second contact and just after third contact. Our atmosphere, as we are all aware, is not of uniform density but various continually from place to place. If we imagine small pockets of air at slightly different densities then light arriving from our sun will be refracted at slightly different angles (depending upon the density of the air).

This produces a degree of light scatter. In some places the light waves will reinforce one another increasing light intensity whilst in other places they will cancel each other out thus decreasing light intensity. Overall contrast is very low and it is only near totality that these bands can be observed. They can be best seen against a white background such as a whitewashed wall or even a white sheet stretched out on the ground.

Although, at times, the bands appear to be static in other instances the bands will appear to ripple. This is because density variations in the atmosphere are not fixed but move depending upon the wind. The wind speed and direction all have an effect on the appearance of the shadow bands.

For a more detailed account see Journal of Atmospheric and Solar - Terrestrial Physics, 1999 (61), 965-974.

Barry Henshall

Library News

The following books have been donated by Cliff Meredith.

Astronomy by Dinah L. Moché; John Whiley & Sons Inc, 2004.

This self-teaching guide (6th Edition) will be useful to all members who are new to astronomy.

Our Final Century by Martin Rees, William Heinemann, London, 2003.

The question on the dust jacket 'Will the human race survive the 21st century' is one that many people are asking. This book explores the downsides of unpredictable science and runaway technology and emphasises the great difficulty of countering these risks.

Gaia – A New Look at Life on Earth by James Lovelock, Oxford University Press, 2000.

This book was first published in 1979 and Lovelock puts forward the notion that from the evolution of life and the evolution of the Earth as a single, tightly-coupled process, the self-regulation of the environment emerges.

A Brief History of Science by Thomas Crump, Robinson, London, 2001.

This book, sub-titled 'As Seen Through the Development of Scientific Instruments' covers many aspects of science including astronomy.

We have also received a number of books from the personal library of Julian D. M. Henderson (1928-2008) who was a member of the Royal Astronomical Society.

Man's Relation to the Universe by Bernard Lovell, W. H. Freeman & Co, 1975.

Sir Bernard reviews the techniques and economics of astronomical investigation relating to the solar system, \Milky Way and the extragalactic system.

Space and Time in the Modern Universe by P. C. W. Davies, Cambridge University Press, 1977.

Perhaps considered to now be out of date this book explores the changing ideas of space and time particularly as illustrated by their application to astronomical and cosmological scenarios.

The Amateur Astronomer's Handbook – A Guide to Exploring the Heavens by James Muirden, Harper & Row, 1983.

This book is described as 'an illustrated guide for the novice who wants to make telescope observations' and includes chapters on equipment, the solar system, stars & nebulae, astrophotography and optical work for amateurs.

Black Holes: The End of the Universe by John Taylor, Souvenir Press, 1974.

Are black holes the beginning of the end for the universe? This book may help you to decide.

Essentials of Astronomy by L. Motz & A. Duveen, Wadsworth Publishing Co. Inc., 1966.

This book is divided into a number of sections including the solar system, stellar properties and the structure of the stars, stellar systems and the structure of the Milky Way, galaxies and cosmology. A text book rather than light bed-time reading.

The Universe Unfolding by Ivan R. King, W. H. Freeman & Co., 1976.

Not as technical as 'Essentials of Astronomy' but nevertheless a good introduction to the mechanics of our universe

Galaxies by Timothy Ferris, Stewart, Tabori & Chang, Publishers, 1982.

A book containing many black/white and colour photographs of galaxies accompanied by very readable text.

Moon Flight Atlas by Patrick Moore, A Mitchell Beazley Book, 1970.

A large format book with many original photographs of the moon and Apollo moon landings

Other books received are:-

Mathematical Astronomy Morsels	Jean Meeus
More Mathematical Astronomy Morsels	Jean Meeus
Mathematical Astronomy Morsels III	Jean Meeus
Q is for Quantum - Particle Physics from A to Z	John Gribbin
The Nature of Comets	N. B. Richter
Theoretical Astronomy	James C Watson
Astrophysical Quantities	C. W. Allen
Photoelectric Astronomy for Amateurs	Frank B Wood
Web Society Deep-Sky Observer's Handbook. Vol 1, Double Stars	Ed Kenneth Glyn Jones
Web Society Deep-Sky Observer's Handbook. Vol 2, Planetary and Gaseous Nebulae	Ed Kenneth Glyn Jones
Web Society Deep-Sky Observer's Handbook. Vol 3, Open and Globular Clusters	Ed Kenneth Glyn Jones
Web Society Deep-Sky Observer's Handbook. Vol 4, Galaxies	Ed Kenneth Glyn Jones
Astronomical Navigation Made Easy	G. W. Ferguson
Basic Principles of Marine Navigation	D. A. Moore
Software and data for Practical Astronomers	David Ratledge
Astronomical Algorithms	Jean Meeus
Orbits For Amateurs with a Microcomputer	D. Tattersfield
Orbits For Amateurs with a Microcomputer Vol II	D. Tattersfield
Navigation without Logarithms	S de Neufville
Comets, Meteorites and Men	P. L. Brown
An Introduction to Celestial Mechanics	Forest Ray Moulton
Elements Of Solar Eclipses 19510-02200	Jean Meeus
The Complete On-Board Celestial Navigator 2007-2011 Edition	George G. Bennett
A Short Guide to Celestial Navigation	Hennig Umland
The Moon - A complete Description of the Surface of the Moon, Containing the 300" Wilkins Lunar Map	H. P. Wilkins & Patrick Moore
The Moon and the Condition of its Surface	Edmund Neison
Canon of Lunar Eclipses 1500BC - AD3000	Bao-Lion Liu & Alan D Fiala
The Revised General Catalogue of Non-stellar Astronomical Objects	J. W. Sulentic & W. G. Tifft
Falkauer Atlas 0-12 hrs	Hans Vehrenberg
Falkauer Atlas 12-24 hrs	Hans Vehrenberg
The Cambridge Encyclopedia of Space	Ed Michael Rycroft

Although a little belated I would like to thank all members who contributed to the exhibition held at the Portico Library and Gallery during October. I received an e-mail from a couple who visited which read -

Thank you for putting on the exhibition - my wife and I enjoyed it very much. We first met each other at an MAS lecture (we were both members) in December 1955, and married in 1958 with an MAS telegram which we still have. While we now have other interests, we both still like astronomy, and found some of the exhibits very nostalgic, especially the sunspot observations of Mr Farrer who was then President, with Sid Mottram as Secretary. We knew Ken Brierley very well, and (with Ray Wolstencroft) made many binary star measurements with the micrometer.

As you probably know, Ray went on to be professor of astronomy at Edinburgh. We wondered if any of the small instruments in the exhibition had belonged to Ken - he was a great collector of them.

Maureen and Colin Rogers.

It is good to know that some members remember the MAS, even after 50 years.

We also contributed to the Manchester Science Festival Week with a small exhibition at the Manchester Museum on the 28th October. Unfortunately no members attended save for myself and Tony Cross even though it was mentioned a number of times at our Thursday meetings.

Barry Henshall

Moondog and the Partial Lunar Eclipse of New Year's Eve, 2009

The partial lunar eclipse on New Year's Eve was a fitting end to the International Year of Astronomy during which we celebrated the 400th anniversary of Galileo's first telescopic observations of the sky in 1609 and Kepler's first two laws of planetary motion published the same year. The eclipse was a fitting reminder that the moon goes around Earth and the two bodies orbit the sun; just like Kepler and Copernicus, six decades earlier, had said. Inevitably the three bodies line up occasionally and eclipse one another.

But the weather wasn't very good and I didn't expect we would see anything of the moon that evening. So, as darkness fell and the outdoor temperature slipped below freeing, not to regain positive figures until 10 January according to my continually computer-monitored weather station on the garage roof, I lit a log fire, poured a glass of 10yr old Port and settled down with a good book, Kepler's Witch, by James A Connor. It was just after 5pm. Five minutes later from my cosy sofa I spotted through the window the moon above the dark-silhouetted hillside half a mile to the north-east, towards the Kinder Scout plateau, but it was only just peeking through cloud and I ignored it. Ten minutes later the moon was brighter and the cloud lessening so I had a closer look...and saw something unusual; a moondog.

Sundogs (parhelia) are quite commonplace, they are caused by sunlight refracting through layers of ice crystals in the upper atmosphere. According to Wikipedia: Sundogs may appear as a coloured patch of light to the left or right of the sun, 22° (or more) distant and at the same distance above the horizon as the sun, and in ice halos. Sundogs are best seen and are most conspicuous when the sun is low. A moondog (scientific name paraselene, i.e. "beside the moon") is a relatively rare bright circular spot on a lunar halo caused by the refraction of moonlight by hexagonal-plate-shaped ice crystals in cirrus or cirrostratus clouds. Moondogs appear to the left and right of the moon 22° or more distant.

Hanging above the hill, to the right of the moon, was a brilliantly-coloured moondog.

Now, last summer we had several weeks during which noctilucent clouds were seen on several

nights for a few weeks either side of the solstice. From here in New Mills, they were always too far NW for me to observe clearly because my house has no westward views. But I do have good aspects in the other direction; from the north, looking towards Lantern Pike, around towards the NE above the Kinder plateau five miles away and thence to the south via an elevated eastern horizon looking up the hillside towards the back of Cracken Edge and Chinley Churn. Last summer I set up a permanent camera mounting fastened to a roof purline in my loft and so it was a simple matter to attach my Canon 350D and take a few picture of the moondog. The paraselene changed in brightness almost continually, affected by the changing cloud and the increasing altitude of the rising full moon. Sometimes it dimmed and lost colour, a moment later it brightened and the colours were vivid. I took about three dozen shots at ISO 800 and guessed the exposure and aperture. The best of the bunch, taken at 1720UT, is reproduced here, with the moon grossly overexposed but the moondog showing colour that in real life actually looked much more vivid.

Over the next couple of hours the sky continued to clear and the rising full moon washed out the stars. As it climbed the sky and the icy cirrus disappeared, so did the moondog. At 1715 UT the moon entered the Earth's penumbral shadow. The moon was already entering full penumbral eclipse when the moondog was photographed. But now there was every possibility of seeing the partial umbral eclipse due to commence at 1851 UT.

I have seen many eclipses, both lunar and solar, but they always fascinate; they are always different. This was to be a pretty modest affair, no more than an 8% eclipse at its maximum at 1922UT, with the moon just dipping into the Earth's umbral shadow. Only the bottom, southern, edge of the moon was scheduled to fade out.

Six months ago I bought a new telescope intended primarily for prime focus photography. The SkyWatcher Pro series of enhanced dispersion (ED) refractors has since its introduction about three years ago gained international recognition as a low cost alternative to the much more expensive apochromatic (APO) refractors costing ten times as much. Small ED or APO refractors are now all the rage, being optically very good and a lot smaller than an equivalent Newtonian reflector. I bought mine second-hand thanks to a deal struck by Tony Cross but until New Year's Eve, owing to poor weather, I hadn't had the opportunity to use it. Now it came into its own, and yielded a set of decent images of the moon during eclipse taken with the Canon 350D. The composite set of nine, selected and similarly exposed, images is presented here. I'm pleased with them and these results also suggest that whole-disk white-light solar photography via a Bader filter will also be productive with this telescope. The telescope came with a standard dove-tail mounting plate that fits my SkyWatcher EQ5 mounting shown in the accompanying picture.

The partial lunar eclipse, as is often the case, didn't chime exactly with its timeline in the 2009 BAA Handbook (as predicted by NASA's Fred Espenak). The start of umbral eclipse was due at 1851UT, but several minutes before it was evident that the moon had already entered the umbral shadow. This happens because it's almost impossible to allow exactly for atmospheric refraction broadening the earth's fuzzy-edged shadow cast a quarter million miles moonwards towards the anti-solar point. Similarly, the predicted end of umbral eclipse was also delayed beyond 1954 UT. As the picture sequence shows, at 1957 UT the moon was still within the umbra. I didn't record any obvious umbra colour. Sometimes yellow, orange and reds are detectable in the umbral shadow but I didn't see them. The eclipsed lunar surface looked grey to black.

With two interesting moon phenomenon safely 'in the can' on New Year's Eve, I later made another photographic observation of Nova Eridani, but that is reported separately.

So ended 2009.

Kevin Kilburn

The Last Shuttle Missions - End of an Era

5th April 2010	STS-131 Discovery	7 Crew

ISS assembly flight Utility and Logistics Flight 4: Multi-Purpose Logistics Module Leonardo.

14th May 2010	STS-132 Atlantis	6 Crew

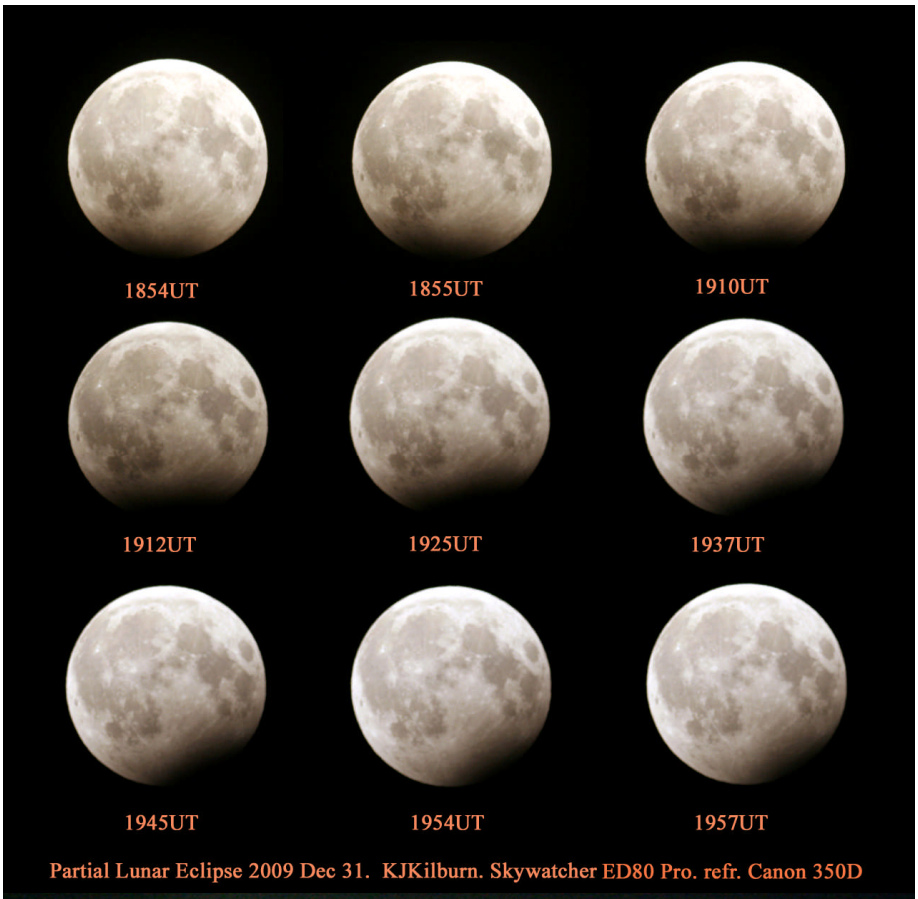
ISS assembly flight 19A: Mini-Research Module 1. Final planned flight of Atlantis.

29th July 2010	STS-134 Endeavour	6 Crew

ISS assembly flight ULF6, ELC 4, ROEU, Alpha Magnetic Spectrometer. Final planned flight of Endeavour.

16th September 2010	STS-133 Discovery	6 Crew

ISS assembly flight ULF5, MPLM Leonardo, (to be left permanently attached), ELC 3. Final flight of Discovery. Last planned Space Shuttle mission.



Partial Lunar Eclipse 2009 Dec 31. KJKilburn. Skywatcher ED80 Pro. refr. Canon 350D

Moondog 20091231 1720UT KJKilburn

Canon 300D Digital camera attached to a Vixen Super Polaris-80M telescope D=80mm f=910mm all taken at the same resolution

This year probably wasn't as eventful as previous years. Life at the Training Centre in the Military Hospital has probably been much more routine. I have had several classes of military personnel, and a private student was dispatched by the Saudi Army to take an advanced course in English before going on to university. My earlier students from the interpreters' course still see me and take me out for dinner on a regular basis. On one occasion, one came round to my house to collect me, and we took a short cut down a minor road to reach our destination. We were in the middle of nowhere, when suddenly we were confronted by a police car parked in such a way that we couldn't get past it. My friend stopped, and a policeman got out of the police car and demanded our documents. We were then surrounded by about four more people in Saudi traditional costumes who suddenly appeared out of nowhere. The Saudi equivalent of policemen in plain clothes. When the policeman checked our documents and found we were colleagues and everything in order we were free to leave. My friend enquired as to why we were stopped, and apparently the security guards at the gate of my compound saw a Westerner getting into a car with a Saudi. They were afraid I was being kidnapped. The police were onto us extremely quickly, and I had to commend them for their efficiency. It was reassuring to know that such action can take place very rapidly in the event of a real emergency.

In October I was approached by a colleague in the Training Centre about teaching some university students. The University of Tabuk had approached us to offer the students some hands on experience in the hospital. They were training to be medical laboratory technicians. I told my colleague I could offer a course in parasitolgy, and within ten days I prepared the aims and objectives of the course, fourteen lectures, to be delivered over three weeks, and an exam. I took parasitology as a special option as an undergraduate, but this was the first time since then that I was able to draw upon that expertise. It was an absolute pleasure. At the end of the course we had a big party, with the assistant dean of the university, and he said that he hoped similar courses would follow in the future.

Earlier in the year I went on several trips to the beach at Sharma, where I indulged in my passion for collecting shells. I have now built up quite a collection from this one beach. The hospital authorities won't let us go anywhere else – "security!" So, I don't travel around as much as I used to. Meanwhile I had placed an order for a book called "Shells of the Egyptian Red Sea," and this will enable me to identify many of the specimens I have found. The Egyptian side of the Red Sea should have the same fauna as the Saudi side, which at Sharma is very close so the book should prove very helpful. On thing it did not include were vermetids, (worm shells). Some of these can grow quite big on the Saudi Red Sea coral reefs, and a few years ago I sent one to the Natural History Museum in London. They were able to identify it, and they put it in the national collection. One day, hopefully, something new will crop up that has never been seen before.

On the astronomy from, I have continued to be active in the campaign against light pollution, but it remains to be seen whether those in the corridors of power will listen. It is all part of the greater problem of climate change, and if they get a handle on LP then they will be making a significant contribution towards its mitigation. However getting them to listen, when many of them are climate change deniers in the first place, is just about impossible. In June along with a few others I recorded the decline of V854 Centauri, having first noticed it on the screen at the back of my Canon camera. Making observations from the back of my camera is not accurate and not something I would recommend, but it definitely seemed to be down. I sent out an alert and the result came back positive. It had also been spotted by Peter Williams in Australia a few days earlier and by a team in Poland using a robotic telescope. In July I returned to Bangladesh for the Total Eclipse of the Sun on July 22nd. This was at the height of the Monsoons, and the chances of even seeing it were minimal. It was swelteringly hot, even in my hotel, a five-cockroach joint in Mokhakali, in Dhaka. Sometimes I took four showers a day just to keep cool. My former flatmate, Jamie, from Edinburgh, with whom I worked at Eminence International College in 2005, had moved into a room above mine, so we often went out in the evenings. Even the minimal prospects of seeing the eclipse were welcome. The local astronomical society had made arrangements to view it from Panchagarh Stadium in the far north of the country, near the Indian border. On the day when we set off it rained, so everyone was very despondent, but we did manage to see it through breaks in the cloud. Suddenly it when very gloomy as totality descended upon us, then the sky opened up and I secured five images of totality through thin haze. I was hoping to record the Earthshine, but because of the thin cloud this was not possible and all the images were fuzzy. Though the images were not the best, I was happy to have them nevertheless. The weather had severely interfered with observations right across the eclipse track stretching from Surat in India to right across China. However the best images were obtained from Iwo Jima in the Pacific Ocean. After I returned from Bangladesh I resumed imaging the 27-year eclipsing binary, Epsilon Aurigæ. I last observed this object in 1982, but now I can follow it photo electrically with my camera. It will remain faint throughout 2010.

Colin Henshaw

Nova Eridani 2009. VSX J044754.2-101043

T

On 25th November 2009, (25.536 UT) an 8th-magnitude nova was discovered in the constellation of Eridanus, at R.A. 4h 47.54min, Dec. – 10deg 10:43, about 6 degrees and a little below and rightwards of Rigel, β Orionis, by Koichi Itagaki of Yamagata, Japan. Itagaki has discovered 50 supernovae and is the 8th most successful supernova hunter in the world. Then at magnitude 8.1, it was retrospectively found on ASAS images dated as early as Nov. 19.241 UT being yet brighter, at mag 7.3 (AAVSO Special Notice #181). No images of Nova Eridani are available between Nov. 10.236 UT when an object in the same position was fainter than 14.0 and Nov. 19.241 UT.

It looks like the real maximum was missed. Since the spectrum of the star in outburst shows bright Balmer emission lines with expansion velocity of 3400-3600km/s, this object is likely to be a classical nova rather than a cataclysmic variable of WZ Sge type. This means that the real outburst amplitude should have been 13-14 magnitudes rather than the observed 7.5, and sometime between Nov. 10th and 19th it "could" have been as bright as mag1-2. Nobody knows for sure, it wasn't seen.

Bright novae are relatively uncommon, perhaps one or two a year, and are thought to be binary systems in which a bloated, relatively cool star is paired with a much hotter, massive and denser dwarf companion.

Occasionally, if the outer atmosphere of the giant expands too close towards the smaller star, material is drawn away from the giant into an accretion disk surrounding the dwarf which then flares. Dumping billions of tonnes of hydrogen onto an already hot accretion disk is like throwing petrol onto a bonfire. It initially flares brightly but then fairly quickly dies down in brightness.

Cliff Meredith photographed the nova during the evening of 26th November when it had faded slightly to about mag 8.2. I photographed it at about mag 8.4 on 30th November with my 300mm Pentacon/Canon 350D and, following a spell of bad weather, again on 31st December, by which time it had faded somewhat, to perhaps mag 9.5. In the picture taken on New Year's Eve, the brighter surrounding star magnitudes are shown with the decimal point omitted. Both of my pictures are close cropped to about 1.6 x 1.3 degrees. Cliff then just managed to record the nova on 4th January 2010 again with his Canon 300D on a photo tripod, and a 80mm f 1.8 lens telephoto set at f 4, ISO 400, 5 second exposure. From the outset, Nova Eridani has been well below naked eye level and at the limit of binocular visibility, although within the range of small telescopes. It can probably be followed with digital cameras, stacked images and telephoto lenses into the first weeks of 2010 provided the skies are clear and reasonably free of light pollution.

Kevin Kilburn & Cliff Meredith

6 Strange and Amazing Astronomy Facts

Even though man has studied the heavens for thousands of years, we still know very little about the Universe we live in. And as we continue to learn more, we are consistently amazed, and sometimes confused, by what we learn. Here is a collection of amazing, interesting, and strange astronomy facts, in no particular order.

•Scientists believe that we can only see about 5% of the matter in the Universe. The rest is made up of invisible matter (called Dark Matter) and a mysterious form of energy known as Dark Energy

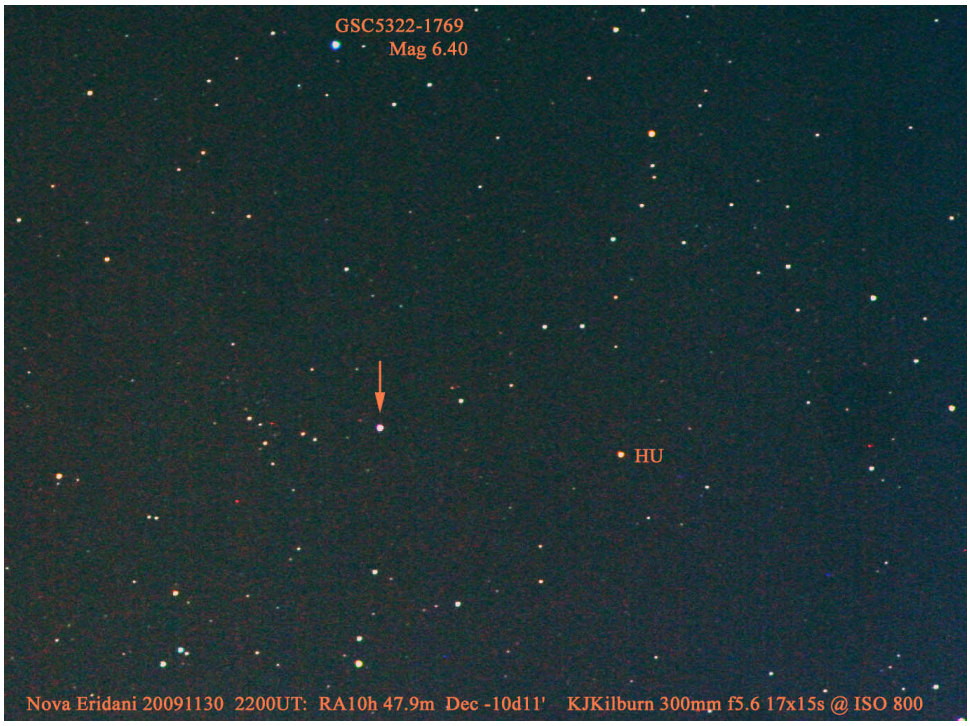
•Neutron stars are so dense; that a soup can full of neutron star material would have more mass than the Moon.

•The Sun produces so much energy, that every second the core releases the equivalent of 100 billion nuclear bombs.

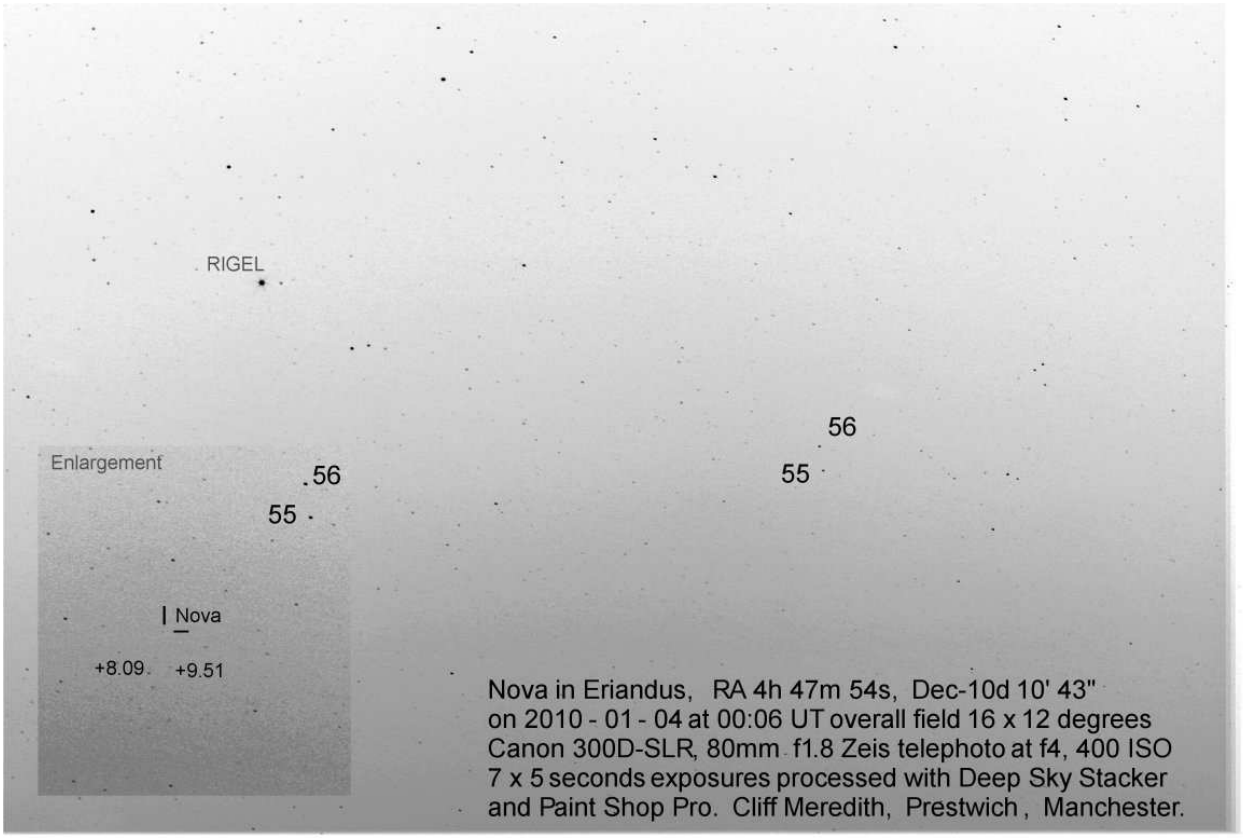
•Galileo Galilei is often incorrectly credited with the invention of the telescope. Instead, historians now believe the Dutch eyeglass maker Johannes Lippershey as its creator. Galileo was, however, probably the first to use the device to study the heavens.

•Black Holes are so dense, and produce such intense gravity, that even light can not escape. Theoretical physicists predict that there is a situation under which light can escape (which is called Hawking radiation).

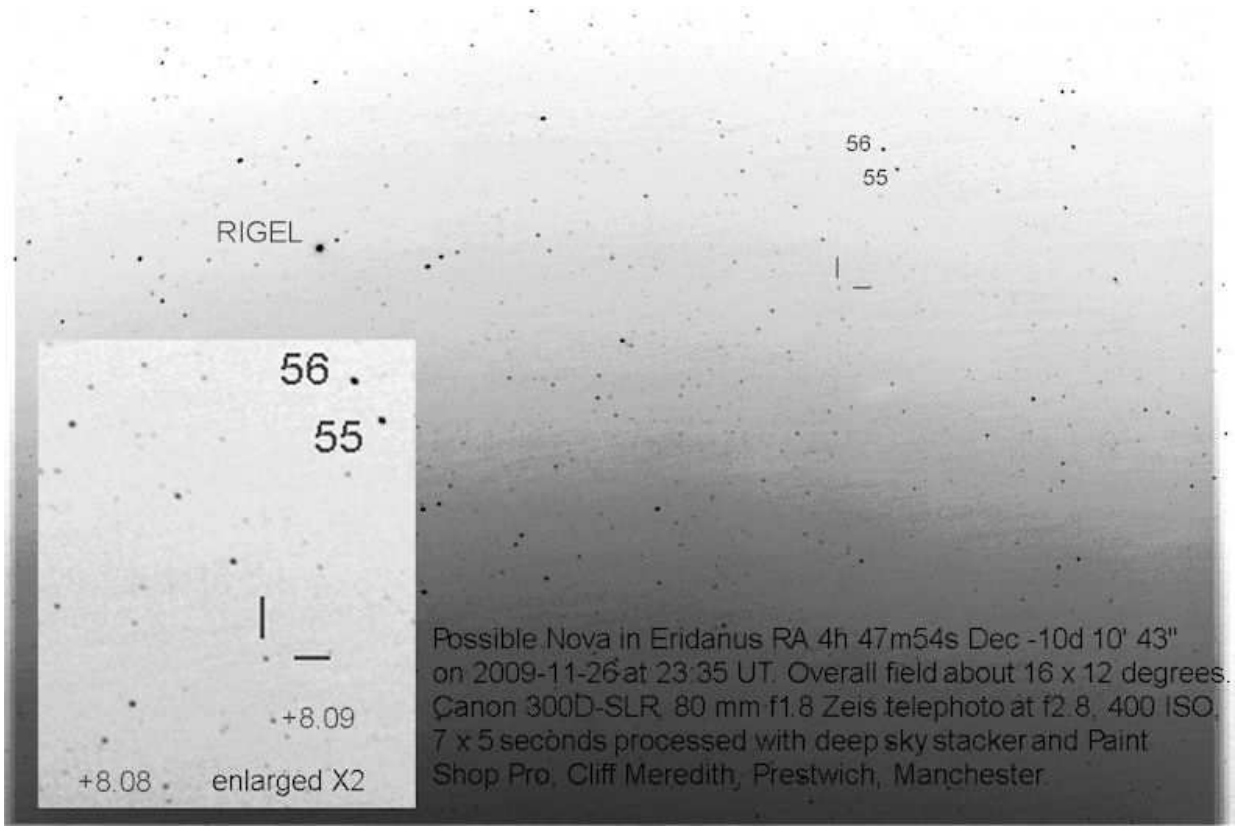
•Light from distant stars and galaxies takes so long to reach us, which we are actually seeing objects as they appeared hundreds, thousands or even millions of years ago. So, as we look up at the sky, we are really looking back in time.


GSC5322-1769
Mag 6.40
HU
Nova Eridani 20091130 2200UT: RA10h 47.9m Dec -10d11' KJKilburn 300mm f5.6 17x15s @ ISO 800


640
106
102
HU
980
97
91
810
Nova Eridani VSX J044754.2-101043 20091231 2030UT



Nova in Eriandus, RA 4h 47m 54s, Dec-10d 10' 43"
on 2010 - 01 - 04 at 00:06 UT overall field 16 x 12 degrees
Canon 300D-SLR, 80mm f1.8 Zeis telephoto at f4, 400 ISO
7 x 5 seconds exposures processed with Deep Sky Stacker
and Paint Shop Pro. Cliff Meredith, Prestwich, Manchester.



Possible Nova in Eridanus RA 4h 47m54s Dec -10d 10' 43"
on 2009-11-26 at 23:35 UT. Overall field about 16 x 12 degrees.
Canon 300D-SLR 80 mm f1.8 Zeis telephoto at f2.8. 400 ISO.
7 x 5 seconds processed with deep sky stacker and Paint
Shop Pro. Cliff Meredith, Prestwich, Manchester.

The Solar Dynamics Observatory (SDO)

On Thursday 11th February 2010 an Atlas V rocket carrying the SDO lifted off from Cape Canaveral, Florida, at 10:23 a.m. EST. According to NASA the five year mission "will determine how the sun's magnetic field is generated, structured and converted into violent solar events like turbulent solar wind, solar flares and coronal mass ejections." By so doing it will enable NASA to understand the Sun's influence on Earth and Near-Earth space by studying the solar atmosphere on small scales of space and time and in many wavelengths simultaneously.

The final goal is to be able to predict the solar variations that influence life on Earth and humanity's technological systems by determining how the Sun's magnetic field is generated and structured, how this stored magnetic energy is converted and released into the heliosphere and geospace in the form of solar wind, energetic particles, and variations in the solar irradiance.

Measurements of the interior of the Sun, the Sun's magnetic field, the hot plasma of the solar corona, and the irradiance that creates the ionospheres of the planets are NASA's primary data products.

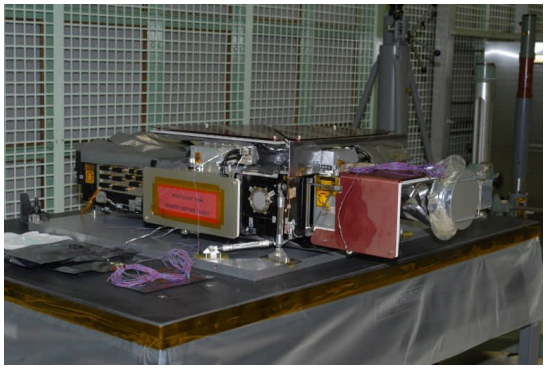
From this data the SDO Project aims to improve our understanding of seven science questions:

1. What mechanisms drive the quasi-periodic 11-year cycle of solar activity?
2. How is active region magnetic flux synthesized, concentrated, and dispersed across the solar surface?
3. How does magnetic reconnection on small scales reorganize the large-scale field topology and current systems and how significant is it in heating the corona and accelerating the solar wind?
4. Where do the observed variations in the Sun's EUV spectral irradiance arise, and how do they relate to the magnetic activity cycles?
5. What magnetic field configurations lead to the Coronal Mass Ejections (CME), filament eruptions, and flares that produce energetic particles and radiation?
6. Can the structure and dynamics of the solar wind near Earth be determined from the magnetic field configuration and atmospheric structure near the solar surface?
7. When will activity occur, and is it possible to make accurate and reliable forecasts of space weather and climate?

The SDO will carry a suite of three instruments.

Each of these instruments will perform several measurements that characterize how and why the Sun varies. These three instruments will observe the Sun simultaneously, performing the entire range of measurements necessary to understand the variations on the Sun.

HMI (Helioseismic and Magnetic Imager)



The Helioseismic and Magnetic Imager will extend the capabilities of the SOHO/MDI instrument with continual full-disk coverage at higher spatial resolution

AIA (Atmospheric Imaging Assembly)

The Atmospheric Imaging Assembly will image the solar atmosphere in multiple wavelengths to link changes in the surface to interior changes. Data will include images of the Sun in 10 wavelengths every 10 seconds.

EVE (Extreme Ultraviolet Variablity Experiment)

The Extreme Ultraviolet Variablity Experiment will measure the solar extreme-ultraviolet (EUV) irradiance with unprecedented spectral resolution, temporal cadence, and precision. Measures the solar extreme ultraviolet (EUV) spectral irradiance to understand variations on the timescales which influence Earth's climate and near-Earth space

This has been only a brief overview of the SDO mission and more information can be found on the official website at

http://sdo.gsfc.nasa.gov

Mars

The first recorded observation of Mars was by Francesco Fontana in Naples in 1636 and for the next 300 years or so studies of Mars depended on Earth based observations.

One of the first thoughts was that Mars was a flat world and that no mountains could exist because they would collapse under their own weight due to great pressure. They also thought there was vegetation and that it covered an area of 10,000,000 square miles of Seas and Deserts, which turned out to be sand dunes. Suante Aechenius of Sweden thought that the dark areas were made of Hydroscopic Salts, which darkened as moisture was carried through the atmosphere from the Polar Caps.

Martian Geology or as it is correctly called Areology:

Olympus Mons is an extinct volcano because it has not erupted in the last 7,000 years. It is of the Hawaiian Type or Shield Volcano. This is where Basalt lavas have erupted through a single central vent. A broad convex swelling has been produced because of the lack of any tectonic movement. The volcano has a small sunken crater on the crest.

There are three other volcanoes on Mars named Ascreus Mons, Pavonis Mons and Arsia Mons. The four volcanoes are grouped together on an elevated bulge on the surface of Mars known as the Tharsis region. Another major feature on Mars is the largest Canyon in the Solar System, named Valles Martineris, after Mariner 9, the craft that discovered it. It has a length of 4,500 kms or 2,800 miles and a depth of 7kms or (4 miles).

Mars is the only other planet that still has Geological Periods, just like the Earth. The surface of Mars, based upon the Martian Meteorites, is thought to be primarily composed of Basalt There is also some evidence that parts of the Martian surface might be more Silica-rich than typical Basalt, more akin to Andesite. There are vast differences between Basalt and Andesite, for instance. Andesite is produced from lava which is more viscous than that which produces Basalt. More recently ice water has been detected just below the surface. The presence of sulphur also indicates active volcanism.

There are 3 geological periods on Mars, namely

Phyllosian, 4.5 - 4.2 Billon years ago

Theiikian, 4.2 - 3.8 Billion Years ago

Siderikian 3.8 to the present.

By comparison Earth has 18 Geological periods.

Are there active Volcanoes on Mars? The answer seems to be no. In Sky and Telescope, Volume 109, No 4 Page 18 it says that there are Lava flows on Mars, some 10,000,000 years old, which geologically is like being born yesterday. High-resolution images from the European Express Orbiter suggest more resent activity and that Olympus Mons was erupting only 2.4 million years ago. This still makes Olympus Mons extinct, since the definition of an extinct volcano is that it has not erupted during the last 7,000 years.

Details of the morphology/chemistry of the Martian surface have been obtained from analysis made by the Mars rovers Sprit and Opportunity. Spirit's landing site was Gusov crater, a basin the size of Connecticut with what appears to be a long river channel flowing into it. From orbit this area looks as if it may have been an ancient lake. However, morphology of the rocks and chemical analysis of the soil have shown only tentative evidence for lake deposits such as sedimentary rocks or water containing minerals. This is not conclusive evidence of little of no water within the region as there is few water containing minerals even on Earth. Opportunity, on the other hand, has found evidence of water in and around Eagle crater. Sulphur, bromine and chlorine have all been identified indicating that this area is almost certainly sedimentary.

Earth

As previously stated Earth has has18 Geological periods:

Pre-Cambrian 4,600 - 543 Billon years ago

Cambrian 543 - 505 Billon years ago

Ordovician 505 - 438 Billon years ago

Silurian 438 - 408 Billon years ago

Devonian 408 - 360 Billon years ago

Depending on whether you are using North American or UK Geological charts, the next period is either Carboniferous or Mississippian and Pennsylvanian.

However, I use the UK Table so we continue with the Carboniferous Period.

Carboniferous 360 - 286 Billon years ago

Permian 286 - 248 Billon years ago

Triassic 248 - 208 Billon years ago

Jurassic 208 - 144 Billon years ago

Cretaceous 144 - 65 Billon years ago

Tertiary 65 - 2 Billon years ago

Quaternary 2Ma - Present Day

Whilst the Cenozoic era is subdivided into Tertiary and Quaternary sub-eras (or Periods), it is more formally subdivided into 7 epochs (or stages). The names of these epochs are from Greek roots, and are as follows:

Palaeocene 65.6 Ma ancient recent

Eocene 55.0 Ma dawn of the recent

Oligocene 33.7 Ma little recent

Miocene 23.8 Ma less recent

Pliocene 5.32 Ma more recent

Pleistocene 2Ma most recent

Holocene 0.01Ma completely recent

By the time of the Palaeocene age, the world was looking more as it is today.

Venus

Venus was initially thought to be Earth's twin, as it was thought to have more or less the same mass, density and therefore size of Earth. The early estimation of the mass of Venus was based on the orbital motion. However, these original measurements had to be adjusted following detailed studies by Mariner 5 and Mariner 10. The accepted figures are that Venus has a mass 70% that of Earth, has a radius 326 km less than Earth and a density 95% of Earth.

Even though Venus has an iron core, similar to our own, Mariner 2 found that Venus does not have a magnetic field. Venus's rotation period of 243 Earth days is just too slow to produce the dynamo effect. Previous measurements were probably the result of interaction of the planets ionosphere with the solar wind plasma. Early observers thought that Venus's atmosphere was water abundant just like Earth and during the early 20th century it was thought that Venus had a very favourable climate, very similar to Earth during the Carboniferous Period, with a high humid climate. Today, spectroscopic measurements indicate very little water vapour content in the atmosphere. This bears out an alternative theory of the time which was that Venus was waterless desert, avoid of any life.

The first surface measurements of Venus were by Radio Astronomy using a Radio Interferometer with a high angular resolution.

Space exploration has led us to conclude that Venus has a single lithospheric plate, which stabilized during the early history of the Solar System. This has enabled us to detect a whole series of morphological/chemical features on the surface, for example Alpha Regio, a series of troughs, ridges, and faults that are oriented in many directions. Ishtar Terra is an immense uplift rising above the basaltic lowlands in the northern hemisphere. Venera 15,16, both Russian space craft, mapped out the region enabled geologists to observe Maxwell Montes a mountain massif at a height of 11 km and Frejya Montes and Akna Montes to the west. On the slope of Maxwell Montes there is a huge double ring impact basin, 95 kms in diameter named Cleopatra Patera and it is obvious that the entire region was formed due to a powerful tectonic process, plus volcanic activity also played an important role. Vast systems of intersecting valleys called tessera are widely shown in Venera images in the regions of Ishtar Terra, Tethus region, and Sedna Planitia. Coronae are unique to Venus. More than 360 have been recorded; the average size is 250kms in diameter. They are defined by a concentric structure consisting of an annulus of ridges or fractures. Volcanic and tectonic land forms in the interior are common and 150 impact craters were identified on Venus by Venera 15 and 16, 84% of the craters have not been modified by Volcanic or tectonic activity. Venus is different from terrestrial plate tectonics in the absence of recycling processes with heat loss due to thermal anomalies and hotspots, this description resembles that of a one-plate planet.

Observations made by Venera and Pioneer Venus Orbiter indicate smooth rolling lowlands probably formed by outflows of basalts, or plate tectonics such as on Earth. As we know now Venus is littered with volcanoes, examples of which are at Aphrodite Terra, especially in the western section identified similar to the Mid Oceanic Ridges on Earth. Venera 14 landed on the Eastern flank of a young volcanic formation known as Beta and Phoebe.

Radioactivity is much higher on Venus than Earth with particularly high figures for thorium and uranium. Venera 13 and 14 landing sites on the East of belong to the typical geographical provinces of Venus, surface of rolling plains Vega 2 shows hilly plans to high Mountains and the rock is comparable to Terrestrial gabbros.

Considering that up until the 1960's, when we were in the infancy of plate tectonic, we have come a long way, not only in understanding our own world, but that of our other terrestrial worlds and maybe, someday close to understanding the Solar systems of other Stars.

The Moons of Jupiter, Saturn and Uranus

Io, the innermost satellite of Jupiter and is the only known volcanic moon. Voyager 1 took the first image of an Eruption on the 8th March 1979.

The two most active vents are Pele & Loki and the ejecta may be due either to silicate magma being forced up through the crust, though the magma is richer in sulphur than the on Earth, or the effect of molten sulphur coming into contact with liquid sulphur dioxide and then is suddenly compressed and explodes to form the plumes..

Europa is the smallest of the Galilean satellites and is mainly made of ice.

Ganymede is the largest and brightest member of the Jovian family.

Saturn's innermost satellite is Mamas, 390kms in diameter with a crater, named Herschel, 130kms in diameter. Mamas has a low density plus it's surface in part is covered in water ice.

Enceladus is split into 5 regions from A-E, Starting with A many of the craters show evidence of collapse and those with central peaks show gentle rounded mountains. In region B, similar size craters are preserved suggesting that the geological histories of the two regions are different. C, D and E are of intermediate type.

Tethys, Dione and Rhea are unlike Titan, which shows a smooth surface.

Iapetus has light and dark regions and is well cratered like Hyperion.

Uranus' Rings were discovered in 1977 during observation of the occultation of star SAO 158687. Thirty five minutes before the Occultation was due, the star winked 5 times due to it being obscured by objects in the vicinity of the planet, after the occultation there where more winks. These were found to correlate with the first set of observations thus indicating a ring system around Uranus.

References.

The Planet Venus by Mikhail Ya. Marov and David H. Grinspoon.

Pages 13,100,103,106,113,114,117,121,123,130

The Oxford Concise Dictionary Pages 1140-325

The Hamlyn Guide to Minerals, Rocks and Fossils by W.R. Hamilton, A.C.Woolley and A.C. Bishop.

Astronomy and Geophysics Volume 47 Issue 3, Page 12

References Sky & Telescope Volume No 2 Page 18

The Atlas of the Solar System,

Pages 292/296,300, 355, 362-363, 366/367/374/375, 378/379/384.

Dennis Jones

4 More Strange and Amazing Astronomy Facts

•The Crab Nebula was produced by a supernova explosion in 1054 A.D. The Chinese and Arab astronomers at the time noted that the explosion was so bright, that it was visible during the day, and lit up the night sky for months.

•Shooting stars are usually just tiny dust particles falling through our atmosphere. Comets sometimes pass through Earth's orbit, leaving trails of dust behind. Then as Earth plows through the dust in its path, the particles heat up, creating the streaks in the night sky.

•Even though Mercury is the closest planet to the Sun, temperatures can reach -280 degrees F. Why? Since Mercury has almost no atmosphere, there is nothing to trap heat near the surface. So, the dark side of Mercury (the side facing away from the Sun) is very cold.

•Venus is considerably hotter than Mercury, even though it is further away from the Sun. The thickness of Venus' atmosphere traps heat near the surface of the planet.

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