Current Notes

View on 1st September from Whitworth Street after external work was completed.

The Journal of the Manchester Astronomical Society
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Contents

Cover Photograph; **View on 1 Sept from Whitworth street after external work was completed.**

Mike Oates

Opening Remarks

At a Thursday meeting soon after the issue of the June edition of Current Notes it was decided, after considerable discussion, that an attempt should be made to publish at a more regular interval than has been the case during the recent past. Four issues per year were decided upon. I must admit it has been a struggle to collect sufficient articles to warrant publication but, on this occasion, we have been successful. A heart felt thank you to those members who have provided articles. However, if we are going to continue and publish an issue at the end of the year then I will need your help, no matter how small. At the moment the cupboard is bare, so to speak.

Library News

The following have been donated to the library by Cliff Meredith: -

Observing Guide to Variable Stars – A Beginners Guide to Making Variable Star Observations published by the British Astronomical Association.

The Planets: - A 3-DVD set by the History Channel

- The Inner Planets – Mercury & Venus
- The Earth & the Moon, Mars – The Red Planet & Jupiter – The Giant Planet.
- Saturn – Lord of the Rings, The Outer Planets.

The Universe: - A 3-DVD set by the History Channel
Explore the Edges of the Universe – Series One.

Public Lectures 2011/2012

The public lectures will be held between October and March (excluding December) at 7:30pm on the 3rd Thursday of the month. All lectures will be held in the John Dalton Building, Manchester Metropolitan University, located opposite the BBC on Oxford Road. The Presidential Lecture will be at 7.30pm and held in the Sackville Street Building.

20th October 2011 Kopel Memorial Lecture. “The Hunt for Earth” given by Eamonn Kerins. Eamonn is an astrophysicist and lecturer based at the Jodrell Bank Centre for Astrophysics, part of the School of Physics & Astronomy within the Faculty of Engineering & Physical Sciences at the University of Manchester.

17th November 2011 "100,000 Not Out" by Tony Markham
Society for Practical Astronomy. Tony is one of only four people in the UK to have made over 100,000th visual estimates of variable stars.

15th December 2011 Presidential Lecture “The Birth of Astrophotography” by Barry Henshall

19th January 2012 "Panspermia" by Prof. Chandra Wickramasinghe
Prof. Chandra Wickramasinghe is Professor and Director of the Cardiff Centre for Astrobiology, Cardiff University Honorary Professor, University of Glamorgan

16th February 2011 “Observing the Moon” by Bill Leatherbarrow, Director of the BAA Lunar Section. Bill is an enthusiastic visual observer of the Moon and planets. He is also interested in using modern high-resolution imaging of the lunar surface to shed light on historical problems. He is currently Director of the Lunar Section. http://www.baalunarsection.org.uk/whoswho.htm

15th March 2011 "The Liverpool Telescope: A Giant Robotic Eye on the Sky" by Michael Bode.
Michael is Professor of Astrophysics and Director of the Astrophysics Research Institute at Liverpool John Moores University.

Out and About With the Manchester Astronomical Society

1st August Space Day at the Museum of Science and Industry (M.O.S.I.), supported by the M.A.S. with Barry and Tony in attendance at the M.A.S. stand, the images of the Godlee Observatory are always a focal point of the display, along with 3D images which always draw a lot of attention. Space images were on hand for the younger members of the public to take home; the days was also a celebration of Yuri Gagarin’s first flight into Space and his visit to Manchester, Barry and myself were busy answering questions from both parents and children relating to Astronomy and Space.

3rd August Guide Day at the Museum of Science and Industry (M.O.S.I.), supported by the M.A.S. with Barry and Tony in attendance. Situated next to the Planetarium we had a very busy day as Guides from all over the country were in constant procession for the shows that were put on, Barry and myself had to be on top form as we were tested to the full with probing questions from a very enthusiastic audience, as the day drew to a close the display was stored away in the knowledge that another M.A.S. event had been a success.

October Science 8th Day Astronomy and Space at the Museum of Science and Industry (M.O.S.I.), 10.30 -- 3.30

Looks like this will be a very good event, followed by a Family Gathering in the evening, which will be hosted by the B.B.C. with guest stars, and you will be able to don fancy gear and dress up like a Spaceman/Woman/Alien.
There is bound to be a big demand for tickets, I suggest that you contact M.O.S.I for ticket details.

You can be sure the M.A.S. will be present at this all day event.

Anthony W Cross. M.A.S.

A Thursday evening review

July 14 2011
This was a general meeting where members were invited to show their recent photographs. Barry Henshall showed 4 images of a Sundog taken on the 9th June 2011 at Canterbury whilst Kevin Kilburn continued his survey of the night sky for Noctilucent Clouds. He showed a number of images and estimated that the clouds were some 150-200 miles away to the North East.

Tony Cross continued with some daylight shots of a Circumzenithal Arc and Sundogs photographed in the centre of Manchester again on the 9th of July 2011. The lesson – always carry a camera. Janet Maresh showed some pictures taken at Herstmonceux during a recent visit.

The evening was brought to a close with a brief discussion about Current Notes and its recent issue as an electronic document. This form of distribution was well received. A suggestion ensured and a proposal was made to issue Current Notes quarterly but this would rely entirely upon members contributing articles. It was also suggested that Council should consider a monthly/bimonthly newsletter.

July 21 2011
Michael Gilligan discusses in more detail using the Winter Hill transmitter for calibration purposes and Tony Cross showed more examples of atmospheric phenomena. There was also a general discussion about Current Notes and our website with the thought that an area of the site could be used rather than a monthly/bimonthly newsletter as discussed the previous week.

July 28 2011
Tony Cross hosted the meeting, and opened with apologies from Barry Henshall and Mike Oates.

The first speaker was Marc Gyssens, from Belgium; Professor of Computer Science and an enthusiastic amateur Astronomer. Marc manages "Urania" which is one of several public observatories in Flanders. <

http://www.urania.be/english/index.php > Situated about 10 km South of Antwerp, Urania also has the use of the Planetarium at Antwerp Zoo. Direct funding from central and local Government covers the major costs, and staffing is by volunteers. The Flanders region seems particularly well-provided with Planetaria, including a 3D one at Ghent. Unfortunately the skies are not particularly dark, due to prolific "linear" housing development, and lighted Motorways.
Note that, in the interests of cost-saving the Politicians in Genk {yes, that's Genk, not Ghent} are reducing the lighting on Motorways, so the seeing should improve.

Janet Maresh presented SkyNotes, concentrating upon the Summer Triangle region, and recommending the use of a sun-lounger when viewing with binoculars.

Kevin Kilburn showed some recent pictures of the increased activity on the Sun, and of Comet Garrad [which is near M15]. For the benefit of our guest, Kevin also gave a brief run through of the history and key features of the Godlee.

David Nicholson then completed the SkyNotes with a review of the current state of Space Exploration.
... Keep an eye on this: < http://dawn.jpl.nasa.gov/ > we should see some impressive pictures!

4 August 2011
Mike Oates demonstrated how to manipulate RAW images prior to conversion to a JPEG format. This allows much higher quality images to be produced, showing greater tonal range and detail. If you cannot justify purchasing Adobe CS5 for RAW data manipulation then there are many programmes available on the internet. Mike suggests 'Googling' Camera Raw to find this type of software. Mike also mentioned the following: - Capture One www.phaseone.com, DxOptics Pro www.dxo.com and Oloneo www.oloneo.com but these require a monetary outlay. Alternatively you could try using the software that is normally packaged with your camera. However which way you choose use RAW to get the image as best you can before converting to an alternative format for manipulation in Photoshop, Paint Shop Pro etc. Finally the RAW image file can be converted to a DNG file (Digital Negative file) available free from Adobe and then opened in Photoshop.

11 August 2011
Following the riots in Manchester on Tuesday members met on the Thursday to hear Kevin Kilburn give a talk on the possibility of the 25th solar cycle not happening. This talk was based on an article in Sky & Telescope, September 2011 and was followed by a general discussion of solar phenomena.

18 August 2011
Because of a power down at the Sackville Building our meeting was held at the Bulls Head. Kevin and Tony brought us up-to-date with their ideas for rearranging the furniture in order that the stain glass windows, previous

hidden by bookshelves, could be seen once more. A general discussion followed. Mention was made of a possible visit to Norway a couple of years hence to observe the Aurora Borealis. This idea followed on from Kevin's talk the previous week when he mentioned the reduction in solar activity over the last 2 or 3 cycles with the possibility of little activity after about 2020.

25 August 2011

Anthony Jennings described the night sky for September whilst Kevin Kilburn repeated his talk 'The Missing 25th Solar Cycle' to a larger audience than that present on the 11th of this month. Finally Tony Cross showed a short video on progress of the work at the Godlee. He and Kevin Kilburn have rearranged the furniture to show off the stain-glass windows hidden from view for so many years.

1 September 2011

Kevin Kilburn continued his series of Starfile 2011 with the title 'Starfile2011 Cygnus, the summer Milky Way and things that *move.*' Tony Cross also brought us up to date with progress at the GODLEE with news that the whole of G-floor is being rewired and is therefore out of bounds to everyone.

8 September 2011

Tonight we welcomed a former member, a variable star observer and the joint discoverer of Supernova 1987a – Colin Henshaw.

Colin opened the evening by showing a slide of the whole of Lunation 1094 form the New Moon on the 1st June 2011 through to the 30th June. This was followed by his talk 'Astronomy without a Telescope'. After listing all the equipment Colin felt was necessary for an observing session he then went on to list what observing can be done, namely naked eye observations, using binoculars, photography and using CCD cameras..

Naked eye observing included meteors, variable stars planetary, the Milky Way, eclipses (both solar and lunar), Auroras, Noctilucent clouds, Zodiacal light and other atmospheric phenomena.

Binocular observations include meteors, variable stars comets, planets and deep sky objects. Not only can photographs be taken using film but modern digital cameras make photography so much easier. For the more adventurous CCD systems are available but tend to need cooling and are much more expensive than a digital camera.

15 September 2011

Tony Cross gave a short talk and showed videos of solar activity. Michael Gilligan talked about observations of the crater Hipparchus from the mid 17th century to the present day. His project over the next few months is to observe and produce a 3-D image/topography of the crater.

22 September 2011

An open evening with discussions ranging from solar photography and solar activity with emphasis on light bridges (Kevin Kilburn) to an aurora video taken from the ISS. Kevin then gave an overview of the forthcoming public

lectures to be held at the MMU and this was followed by Bob ---- who gave a short talk on the formation of heavy metals (atomic number higher than iron) arising from supernova and from collisions involving neutron stars

29 September 2011
Sky notes for October (Barry Henshall) and an update of solar activity during the past month by Kevin Kilburn

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The 17th Century interpretation of Stellar Magnitudes

Prior to MAS meetings, I spend my Thursday afternoons in the John Rylands University Library on Deansgate. The Special Collection contains many wonderful, and rare, early scientific texts.

I am currently studying a fascinating book by Joseph Moxon:

A TUTOR TO ASTRONOMY AND GEOGRAPHY
Or, an easie and speedy way to know the USE of both the GLOBES,
Coelestial and Terrestrial

The Fifth Edition Corrected and Enlarged
Printed for [his son] James Moxon, in 1698

I have often wondered about our use of "Magnitude" to describe the visibility, or brightness, of stars: I know that the term was originally used for grouped divisions [like in a Histogram] … First Magnitude, Second Magnitude, etc., and was later interpolated to produce a Logarithmic Scale. But that doesn't really explain why we use "Magnitude" [which I would intuitively relate to bigness rather than brightness].

Thanks to Mr. Moxon, I have the answer.

His book contains the following account [transcribed *verbatim*]

XII. Of the Magnitudes of the Stars.

For the better distinction of the several sizes of Stars, they are divided into six several magnitudes. The biggest and brightest Stars are called Stars of the first Magnitude: Those one size inferior in light and Bigness are called Stars of the Second Magnitude; those again one size inferior to the Stars of the Second Magnitude, are called Stars of the Third Magnitude, and so the Stars gradually decrease unto the Sixth Magnitude, which is the small, some few Obscure Stars only excepted, which for their minority and dimness are called Nebula. These several Magnitudes of the Stars are expressed on the Globe in

several shapes: as may be seen in a small Table placed on the Globe for that purpose.

Now for your further satisfaction and delight, I have inserted a Collection of Dr. Hood's, wherein is expressed the Measure of every Magnitude, and the Proportion it hath, first to the Diameter, and secondly to the Body of the Earth.

The greatness of any thing (saith he) cannot be better expressed than by comparing it to some common Measure, whose quantity is known: the Common Measure whereby Astronomers express the greatest of the Stars, is the Earth.

Sometimes they compare them with the Diameter of the Earth, sometimes with the Globe thereof: The Diameter, according to their account, which allow but 60 Miles to a Degree, containeth 6822 $^{8}/_{11}$ Miles; and the whole Solidity of the Globe contains 165, 042, 481, 238 Miles and $^{70}/_{187}$. According to Ptolomy, who alloteth to every Degree 62 $^{1}/_{2}$ Miles: The Diameter containeth 7159 Miles $^{1}/_{112}$ and the whole Solidity of the Globe hath 192, 197, 184, 917 $^{473}/_{1331}$ Miles.

The proportion of the Diameters of the fixed Stars, compared with the Diameter of the Earth.

The Diameter of a Fixed Star of the First Magnitude compared with the Diameter of the Earth hath such Proportion to it as 19 hath to 4: therefore it containeth the Diameter of the Earth 4 times and $^{3}/_{4}$.

The Diameter of a Star of the Second Magnitude is unto the Diameter of the Earth as 269 is to 60: therefore it containeth it 4 $^{29}/_{60}$ times.

The Diameter of a Fixed Star of the Third Magnitude is unto the Diameter of the Earth as 25 unto 6: therefore it containeth it 4 $^{1}/_{6}$ times.

The Diameter of a Fixed Star of the Fourth Magnitude is unto the Diameter of the Earth as 19 and 5: therefore it containeth it 3 $^{4}/_{5}$ times.

The Diameter of a Fixed Star of the Fifth Magnitude is unto the Diameter of the Earth, as 119 unto 36: therefore it containeth it 3 $^{11}/_{36}$ times.

The Diam. of a Fixed Star of the Sixt Mag. is unto the Diam. of the Earth, as 21 unto 8; therefore it containeth it $^{5}/_{8}$ times. {Note: this is obviously a typo, and should read 2 $^{5}/_{8}$ times.}

As for the Proportions of the Cloudy and Obscure Stars, they are not expressed; because they are but few, and of no great account in respect of their smallness.

The Proportions of the Fixed Stars compared with the Globe of the Earth, are as follow.

A Star of the First Magnitude is to the Globe of the Earth, as 6859 to 64
therefore it containeth the Globe of the Earth 107 $^{1}/_{6}$ times.

A Star of the Second Magnitude is to the Globe of the Earth, as 19465109 is to 216000
therefore it containeth the Globe of the Earth 90 $^{1}/_{8}$ times.

A Star of theThird Magnitude is to the Globe of the Earth, as 15625 is to 216
therefore it containeth the Globe of the Earth 72 $^{1}/_{3}$ times.

A Star of the Fourth Magnitude is to the Globe of the Earth, as 6850 is unto 125
therefore it containeth the Globe of the Earth 54 $^{11}/_{12}$ times.

A Star of the Fifth Magnitude is to the Globe of the Earth, as 1685159 is unto 46656
therefore it containeth the Globe of the Earth 36 $^{1}/_{8}$ times.

A Star of the Sixth Magnitude is to the Globe of the Earth, as 9261 is unto 512
therefore it containeth the Globe of the Earth 18 $^{1}/_{10}$ times.

I confess all this may seem matter of incredulity to those whose understanding is swayed by thir visual Sence, but if thay be capable to consider the vast distance of those Huge Bodies (the Stars) from the face of the Earth, and also the diminutive quality of Distance, their reason will be rectified; and their incredulity turn'd into an acknowledgement of the unspeakable Wisdom of Almighty God; and they will say with the Psalmist, Great is our Lord, Great is his Power, his Wisdom is infinite, Psal. 147. 5.

The distance of the Stars therefore from the Earth, is according to Mr. John Dee's Computation, 20081 $^{1}/_{2}$ Semidiameters of the Earth. The Semidiameter of the Earth containeth of our common Miles 3436 $^{4}/_{11}$, Such Miles as the whole Earth and Sea round about is 21600 : allowing for every Degree of the greatest Circle 60 Miles : so that the distance of the Stars from the Earth is in Miles 69006540. Now as Mr. Dee saith (almost in the same words) if you weigh well with yourself this little parcel of Fruit Astronomical ; as concerning the Bigness and Distance of the Stars &c. and the huge massiness of the Starry Heaven, you will find your Conciences moved with the Kingly Prophet to sing the Confession of God's Glory ; and say, The Heavens declare the Glory of God, and the Firmament showeth forth the Works of his Hands.

……

So, I have my answer:

In the 17th Century it was "known" that the Starry Firmament was located 69,006,540 Miles from Earth; and, with all Stars being at this same distance; their relative visual brightness was obviously determined by their size … which was carefully quantified in terms of both diameter and volume.
Ergo, "Magnitude" is [or rather, was] a perfectly reasonable term.
A description, by N.R. Pogson, of the logarithmic scale of Stellar Magnitudes may be found at
http://articles.adsabs.harvard.edu/full/seri/MNRAS/0017//0000012.000.html
... This is well worth reading, for its combination of science and pragmatism.

Michael Gilligan

The Red Planet - Some Notes about Mars before the Space Age.

After the mid 20th century, space probes dispelled many old myths about the planets. However, for some (amateur) astronomers the reality of eyeballing a planet through a telescope is far more exciting than any of the incredible modern images of planets displayed in glossy coffee table books.

Long ago Ancient Skywatchers discovered five mysterious - wandering stars, now called "planets" stemming from the Ancient Greek "planetes" meaning "wanderers". One was the red planet now named after the Roman God of War, although it was known long before Rome or Greece.

The Ancients eventually concluded the Earth is spherical not flat and that all the stars, Sun and Moon, move around the Earth. Although one Greek dissenter, Aristarchus, suggested the Earth and other planets travel round the Sun, the old Earth centred system belief persisted nearly 2,000 years. Even then it was another 100 years after Copernicus revived Aristarchus' idea before Kepler brilliantly made more mathematical sense of the problem by explaining the elliptical form of planets orbits.

Then using recently invented telescopes, despite subsequent attempted religious suppression, Galileo about 1609 - 10 provided observational evidence that, Aristarchus, Copernicus and Kepler were right. Galileo observed Jupiter's four biggest moons and (probably) Venus' phases although his crude telescopes did not satisfactorily reveal Saturn's Rings (Galileo only detecting blobs which confusingly varied in unison either side of Saturn). He saw no surface detail when observing Mars only hints its small reddish disc sometimes seemed somewhat gibbous (i.e. not quite a fully circular shape).

Using better telescopes in 1659 Huygens observed and sketched a dusky triangular feature (now called Syrtis Major) on Mars. Soon after that J. D. Casini assessed Martian days as 24 hours 40 minutes.

In 1671 Casini measured Mars' distance from Earth (by him making observations from Paris and an associate observing from Brazil) enabling the first good assessment of the Astronomical Unit i.e. mean Earth - Sun distance to be made i.e. 138,700,000 kilometres. Interestingly, 200 years before Copernicus had guestimated the A.U. as only 3.2 million km: Aristarchus 2,000 years before being better 4.8 million km. An accepted modern value of the AU obtained from 1992 radar measurements of Venus is 149,597,871 Km.

About 1672 Huygens observed a white spot on Mars - the South Polar Cap.

In 1704 Maraldi observed white spots at both of Mars' poles, noting the south spot not exactly centred on the rotational pole - a very remarkable observation in my book at that time. Eighty years on William Herschel observed two stars pass "near" Mars and concluded Mars has (only) a thin atmosphere. In 1784 he identified Mars' 30 degree axial tilt and noting seasonal changes of the polar caps suggested they could be snow and ice. Flangergues observed Mars sometimes displayed yellow (rather than white) clouds in 1809, probably the first sighting of Martian dust storms. However, he later wrongly thought the rapid thawing of its polar caps, suggested Mars was hotter than Earth.

In 1840, using a mere 4.5 inch refractor, Madler and Beer created the first global map of Mars and refined its day rotation as 24h 37m 22.6sec. (within 2 seconds/minutes or current value). Secchi sketched Mars in 1858 labelling our currently named Syrtis Major feature as the "Atlantic Canal" thinking the dark features were seas.

In the 1860's, Liais thought Mars' dark regions were vegetation and Janssen and Huggins attempted to detect Martian oxygen and water using spectroscopy but without success.

Based on observation drawings by Dawes made from 1852 to 65 Proctor 1868 published "The Lands and Seas of Mars". Proctor's choice of Mars zero meridian is still used now.

In 1869 Secchi referred to martian canali, possibly inadvertently instigating a trend resulting in a furore lasting best part of a century before being finally settled.

Whist Flammarion put Mars' red colour wrongly down to vegetation.

Then in 1877 observing Mars' favourable apparation Schiaparelli reported seeing many martian "canali" which really got the mystic red planet ball rolling. Although that same year very importantly but much less sensationally Asaph Hall discovered Mars' two moons Phobos and Deimos.

Two years later Schiaparaelli reported the apparent doubling of some canals. Perrotin and Thollon using Nice observatory's refractor observed Martian canals in 1886.

(Amateur) Astronomer Percival Lowell, member of a very rich influential Boston family, got completely taken up by the idea of canals on Mars (though now often assumed a result of a general acceptance of an inadequate translation of the Italian "canali" really meaning "channels" though sometimes possibly "canals" as well ".

What, or whoever was to blame, Lowell seemed convinced of the existence of Martian Canals even before he observed them himself, even though Schiapareli, who had seen them was unsure what his "canali" features/markings really were.

In 1894 Lowell completed building his observatory with a 24 inch refractor at Flagstaff Arizona, mainly to be used for observing Mars, (although it subsequently also produced other varied useful astronomy, including the discovery of Pluto by Tombaugh in 1930).

Ironically in 1894 the great observer Edward Emmerson Barnard failed to see any Martian Canals at all using the 36 inch Lick refractor, but he may have recorded several dark round spots much later found to be volcanoes. Whatever, unperturbed Lowell and his collaborators got cracking observing Mars with their 24 inch Flagstaff refractor.

Schiaparelli had observed about 40 canali in 1877 and more than double that in all after 1879. By 1895 Lowell recorded 183 "canals" in the regions of Mars observable that year and on which Schiaparelli had observed 79. All as mentioned in Lowell's book "Mars" published that same year.

Schiaparelli's 1881 - 82 map of Mars possibly shows in excess of 100 canals depending how one interprets their lines and intersections.

By 1909 Lowel had probably recorded several hundred more canals.

Even though some say Antoniadi (one time Director of the BAA Mars Section) did not believe in the existence of Martian Canals, his "definitive" Map of Mars 1903, shows about 150 or more darkish linear features which I think enthusiasts might thing of as canals.

Indeed towards the end and even after the turn of the 19th century, many astronomers, though not all, were observing canals on Mars. Some amateurs even observed canals with quite modest telescopes. But thereafter enthusiasm for Martian Canals dwindled in the astronomical community. Even so, the main culprit Percival Lowell not only observed numerous canals but continued to ardently believe they were artificial, made by martian beings and proof of Martian life.

Amongst other things some astronomers had pointed out that the resolution of even the best telescopes was only such that linear features needed to be several tens of miles wide to be seen at Mars' distance (nearest being about 35 million miles). Percival Lowell countered by suggesting the visible features were not just the canals, but included tracts of vegetation on either side. After

all, creating such growth was part of the reason for constructing the canals. (?)

However, in 1909 when Lowell published his fourth and final book "The Evolution of Worlds", Ellery Hale, using the brand new Mount Wilson 60 inch reflector, saw no Martian Canals. Somewhat ironically a meteorite which fell in Egypt supposedly killing a dog in 1911 was much later, 1986, assessed to have originated from Mars.

Lowell died suddenly in 1916 aged 61.

However, Edgar Rice Burrough's 1912 novel "A Princess of Mars - A John Carter tale", helped to continue the general public's enthusiasm for intelligent Martian life, even if astronomers were going off the idea (?) and professionals were/had lost confidence in visual observations.

In 1925 Menzel studied photos of Mars at different wave lengths, concluding Mars' air pressure was low, less than 6687 pascals.

Using spectroscopy Walter Adams found Mars to be "ultra-arid" in 1926. The next year Coblentz and Lampland assessed big temperature differences between Mars' day and night sides.

On a lighter (or some might say) more serious note, Orson Well's "War of the Worlds" 1938 radio broadcast caused some panic and pandemonium in New York.

1947, Kuiper detected CO_2 but no oxygen in Mars' atmosphere.

USSR launched Mars 1 in 1962, but radio contact was lost, although it passed within 193,000 km of Mars. 1964, USA probe Mariner 3 was lost, but Mariner 4 flew within 9846 km of Mars and took 22 photos covering one percent of Mars' surface.

USSRs Zond 2 also launched in 1964 passed within 1609km of Mars, but sent no data back in 1965. That latter year Zond 3 was launched, took 25 images of the Moon but failed with Mars.

A century after Secchi's second reference to canali, the USA launched Mariner 6 which passed within 3437km of Mars on 31st July 1969, sending back 200 images and measured Mars' surface and atmospheric pressures.

The space age was really seriously underway so far as Mars was concerned.

The Red Planet would never be quite the same again, but perhaps some of its magic had gone.

Even so, when you get the chance point your telescope at Mars and if you are lucky you'll see some "real" surface detail - a fantastically lovely gleaming icy cap and maybe even "A Canal !".

That's the magic of eyeballing Mars through a telescope.

Cliff Meredith,

August 2011.

Acknowledgements:-

My wife for deciphering my poor handwriting and typing the above notes.

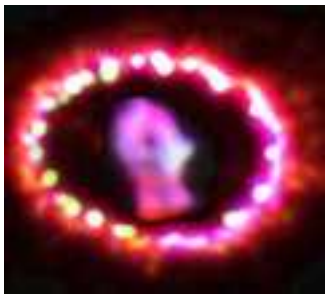
I made extensive use of “The Cambridge Planetary Handbook" (2000) by Michael E Bakich, and in particular his "Historical Timeline" pages 196 to 202.

Arguably I almost plagiarised some bits of it, but any mistakes in the above will be mine.

"Patrick Moore's Data Book of Astronomy" by Patrick Moore and Robin Rees (Cambridge 2011).

Supernova 1987A

In this 2006 Hubble Space Telescope image of Supernova 1987A, a shock wave from the supernova explosion almost 20 years earlier lights up material around the stellar remnant.NASA, ESA, K. France (University of Colorado, Boulder), and P. Challis and R. Kirshner (Harvard-Smithsonian Center for Astrophysics)



In 1987, Colin Henshaw, one of our former members, was joint discoverer of Supernova 1987A in, the Large Magellanic Cloud. It was the closest supernova explosion witnessed in almost 400 years, allowing astronomers to study it in unprecedented detail as it evolves.

Astronomers have recently announced that the supernova debris, which has faded over the years, is brightening. This shows that a different power source has begun to light the debris, and marks the transition from a supernova to a supernova remnant.

As shown in the accompanying image, SN 1987A is surrounded by a ring of material that blew off the progenitor star thousands of years before it exploded. The ring is about one light-year (6 trillion miles) across. Inside that ring, the "guts" of the star are rushing outward in an expanding debris cloud.

Most of a supernova's light comes from radioactive decay of elements created in the explosion. As a result, it fades over time. However, the debris from SN 1987A has begun to brighten, suggesting that a new power source is lighting it.

For more information see

http://earthsky.org/space/supernova-1987a-remnant-lights-up

http://www.nature.com/news/2011/110708/full/news.2011.404.html.

More notes on white light solar observing

It's now well over a year that I began whole disc solar photography. Tony Cross, using a stopped down Celestron 8-inch SCT has become a regular contributor to the 'solar section' of MAS and is producing some remarkably good images of our nearest star. We are averaging one solar picky roughly every 2.5 days and are circulating them by e-mail to several members of MAS and in the North West Group of Astronomical Societies. Let me have your e-mail address if you want to be included on the circulation list.
In 2011 we have been joined by Geoff Pilkington with his stopped down 8-inch Newtonian, Barry Henshall with his Newt. and Jerry Grover with his recently purchased SkyWatcher ED80 refractor, an up-dated version of the one I use. It's a cracking little 'scope and one I heartily recommend for general astronomy, particularly if mounted on a driven EQ3 or larger equatorial mounting. EQ3s are reasonably priced, less than £200 (excluding drive), and are superb for carrying a small telescope or a digital SLR camera and telephoto lens for wide-field astrophotography.
So much for the advertisement and H&S. What are we learning about the sun?
As always, I am obliged by common sense and health and safety to stress that THE SUN IS DANGEROUS. Under no circumstances must it be looked at directly with unprotected eyes nor especially with any form of binocular or telescope. The sun is a naked hydrogen fusion reaction, a continuously erupting nuclear bomb with a surface temperature of nearly 6000 degrees C. To look at it directly will cause immediate and permanent damage to the eye and blindness. The insidious thing is that *you won't feel it*; the retina of your eye doesn't contain any pain sensors, so your eyesight is damaged irreparably and you don't know about it until the spots before your eyes don't go away. By then it's too late!
Manchester Astronomical Society does not accept any responsibility for the miss-use of any method of unsafe solar observing or resultant eye injury...It is your responsibility to observe correctly and safely. If in doubt, ask!
There are yards of books devoted to safe solar observation, by projection or by the use of aluminised Baader film [1], designed specifically for solar

[1] Baader AstroSolar Safety film, supplied from the Baader Planetarium, Germany, is recognised internationally as being one of the best solar filters. It is available from most dealers of astronomical equipment including Stockport Binocular and Telescope Centre. At the time of writing, September 2011, an A4 sheet costs about £18 for making home – constructed solar filters for placement ***in front of*** telescope or binocular objective lenses.

observation when placed in front of the telescope or binocular objective lenses.
It has become apparent during the current sunspot cycle 24[2], that all is not well with the bun. Cycle 24 was several months overdue and although it's showing increasing sunspot activity as might be expected, it's been happening in fits and starts. Sunspots take several days to develop and to decay so a spot coming over the eastern limb might be visible for a week or longer as it crosses the disc and then rotates out of view on the western limb. But there have been several spells during spring and summer 2011 when sunspot activity has been very quiet; sometimes no spots have been visible for days, with the exception of very minor pores.
It is being suggested, in Sky &Telescope, September 2011[3], that the present Cycle 24 could be the last of a century-long, super-cycle of enhanced solar activity that began around 1880 and peaked in the late 1950s [4]. It has since been in decline. We simply can't be sure but there is evidence to suggest that the sun's magnetic activity, responsible for driving sunspot formation, is weakening. This is coupled with recent research, based on helioseismology, that jet-streams just below the solar surface starting at high latitudes and migrating towards the equator, have not yet begun to form for Cycle 25. Jet streams should have started three years ago, in 2008, but haven't yet been detected. It's this equator-wards progression and subsequent re-start of sub-surface jet streams at high latitudes that produces the sunspot butterfly diagram, carrying sunspots towards the equator. When these jet streams reach solar latitudes or +/-35 degrees is when sunspots in the next cycle start to form, as happened for Cycle 24 in early 2010.

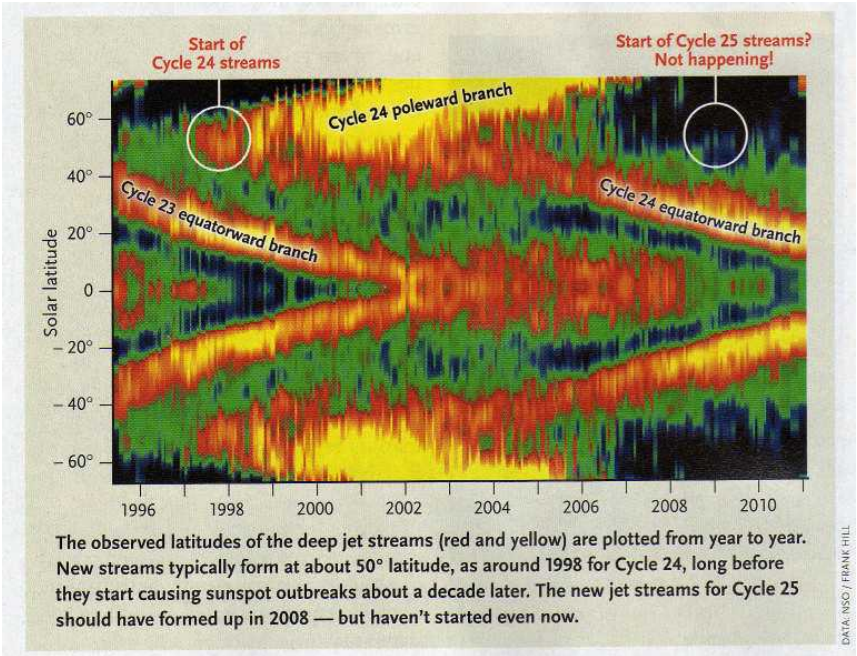
A spotless sun, 26 June 2011

[2] Sunspot cycles, of high and low sunspot counts, average about 11yrs. Often referred to as Carrington cycles, after the 19th C solar observer, Richard Carrington, the 11yr solar cycle was discovered in 1843 by Samuel Heinrich Schwabe, who after 17 years of observations noticed a periodic variation in the average number of sunspots seen from year to year on the solar disk. Rudolf Wolf compiled and studied these and other observations, reconstructing the cycle back to 1745, Ref Wikipedia.
[3] All associated images are credited to Sky& Telescope
[4] Peak solar activity was co-incident with the International Geophysical Year (IGY) that lasted from July 1, 1957, to December 31, 1958.

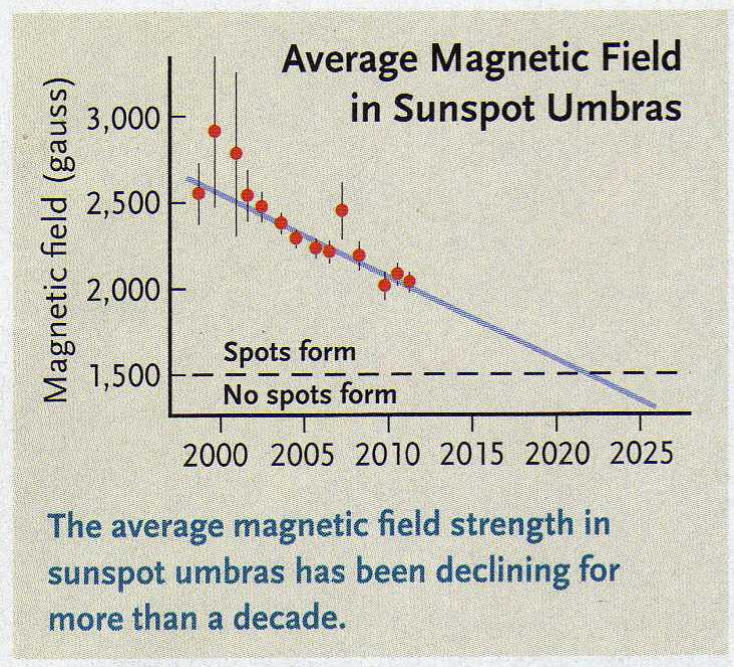
Diminishing magnetic field in sunspot umbrae could also predict a dearth of sunspot activity in Cycle 25, otherwise anticipated to peak in 2023. This research suggests that a weakening solar magnetic field would be insufficient to drive sunspot formation.

Above: Copyright Sky&Telescope, Sept 2011.

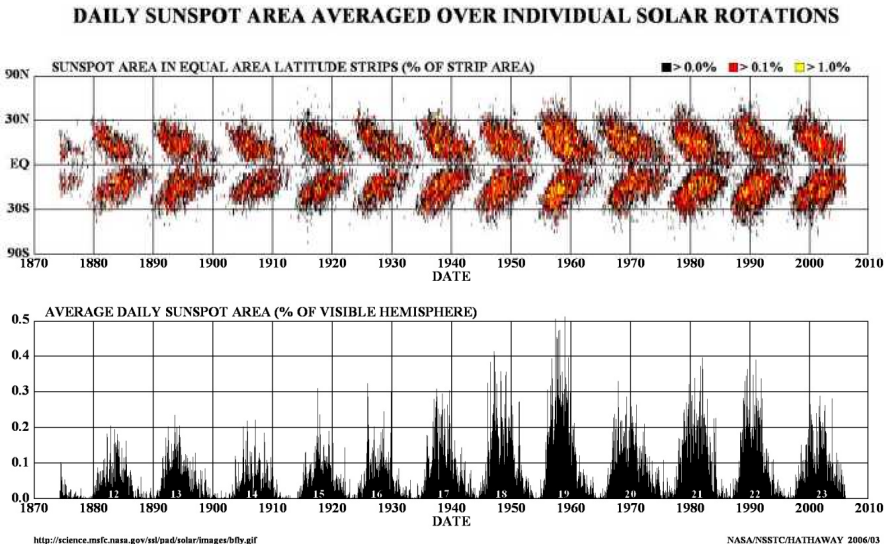
We simply don't know what is happening to the sun. Routine solar observations go back less than three centuries, which is nothing in the lifetime of a star. Evidence suggests that our sun is mildly variable but with current technology solar study is paying off. A possible up-side is that solar warming of our planet would diminish, thus off-setting greenhouse gas solar heating of our globe. Also, there may be less chance of damage from Coronal Mass Ejections of highly energetic electrons that can damage or destroy Earth-orbiting telecommunication satellites and inflict conducted electromagnetic surge damage to power grids, as happened, temporarily, in Quebec in 1989. Reduced solar activity in the next decade may give us time to 'harden' these vulnerable systems.



Above: Copyright Sky&Telescope. Sept 2011.



Above: Copyright Sky& Telescope. Sept 2011.



Above: The Butterfly Diagram and sunspot activity 1870-2005

But when we talk about 'white-light' solar astronomy what are we actually seeing or photographing? Colour perception, whether visual or photographic, is very subjective. An unfiltered, projected solar image is a very pale yellow, not surprising considering that the sun is a G2 class star and yellow, not white[5]. But how does that relate when observing through aluminised filters? These preferentially transmit the shorter wavelengths, the blue end of the spectrum, so at best the viewed image is a neutral, rather 'metallic' looking grey-blue. How should it be represented in our pictures? The solar image above, taken 26 June, illustrates the point. It doesn't look 'natural'. So what colour is 'natural' ?

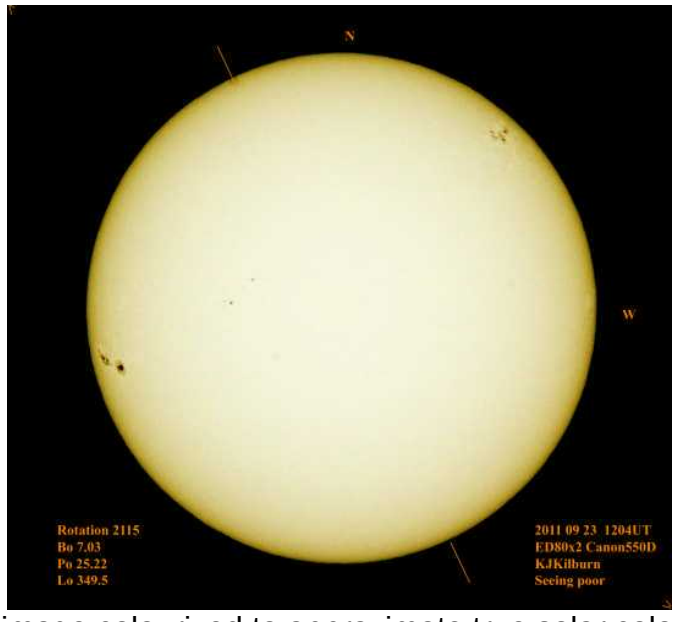
[5] Jaschek C. & Jaschek M. 1990. *The Classification of Stars*. Cambridge University Press.

Colour perception interests me, having spent well over 30yrs in the plastics industry supplying coloured plastics and latterly colour concentrates for many applications. Colour is a very complicated physical and psychological concept. Colour is perhaps best regarded as a three-dimensional concept that can be defined in terms of the Cielab L*a*b* colour space model. There are other systems but I prefer thinking in terms of Cielab. L* defines brightness, L=100 is pure white, L=0 is pure black; neither have any 'colour' or chroma. Chroma, the colour content, is defined by a*, red (+) to green (-) and b*, yellow (+) to blue (-). Most colours can be defined in this system and Photoshop and other image processing software interprets it.

So what is the colour of the sun? It's a star with a surface temperature of 5800K. Does it have a definable 'colour'? How best to interpret and colourize a sun picture in Photoshop?

In midsummer 2011 we were fortunate in welcoming to our meetings Prof. David Oulton, a materials scientist at the University of Manchester, based in the Sackville Building and who has asked exactly the same question, what is the colour of the sun? David has approached the problem from the theoretical consideration of the physics of sunlight and of the sun as a classical black body radiant source with a surface temperature of 5800K. As a photographer, he is also interested in how best to represent solar images and is writing a paper on the subject[6].

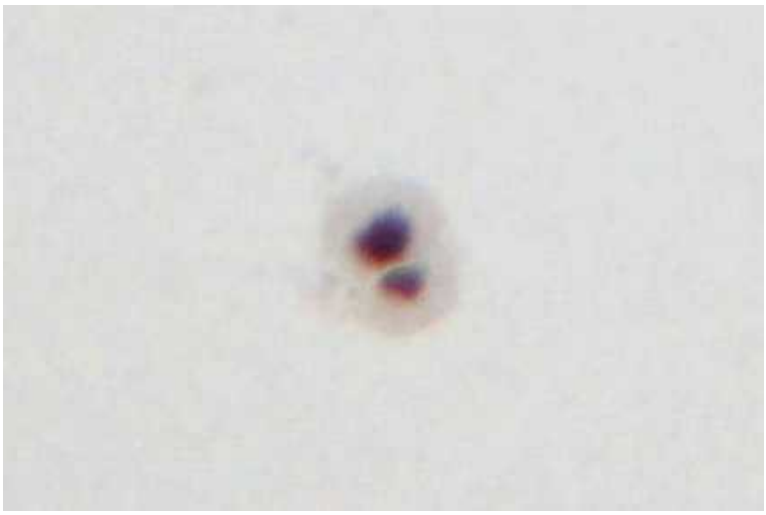
David Oulton has suggested that our pale yellow G2 star is best reproduced by L=100 (technically unachievable as a* and b* would otherwise both be 0), a* ~-3 and b* ~10. This equates to a pale lemon, a very slightly green yellow (a* negative, b* positive). The picture below is a far better colour representation of the sun being very close to the predicted Lab values.



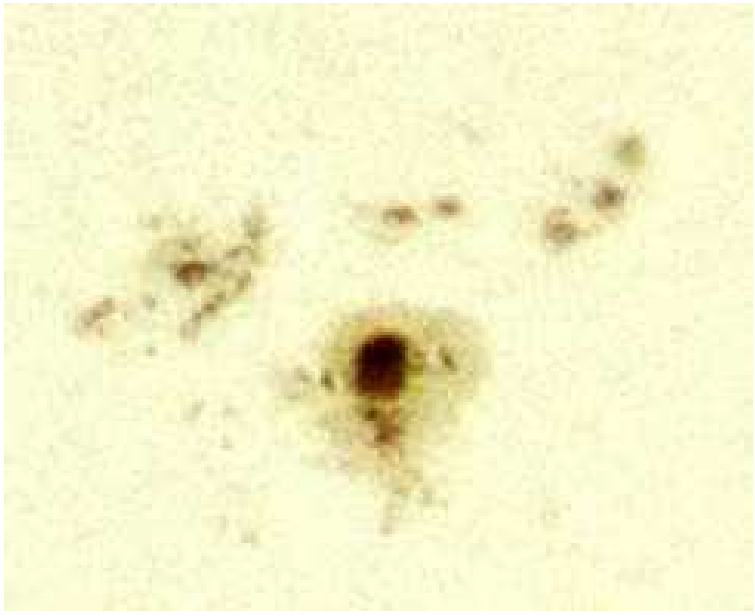
A solar image colourized to approximate true solar colour. KJK

[6] Oulton David, draft 2011. *The Colour of the Sun*, for the Royal Photographic Society.

So far, so good. But what are we learning about the sun itself ? During the past year both Tony and I have observed detail within sunspots that were unfamiliar; light bridges and bright spots.
Light bridges are sometimes seen bisecting the dark umbrae of big sunspots. They often appear brighter than the surrounding photosphere, suggesting much higher temperatures. More is yet to be learned.



Sunspot with light bridge photographed 12 September 2011. KJK

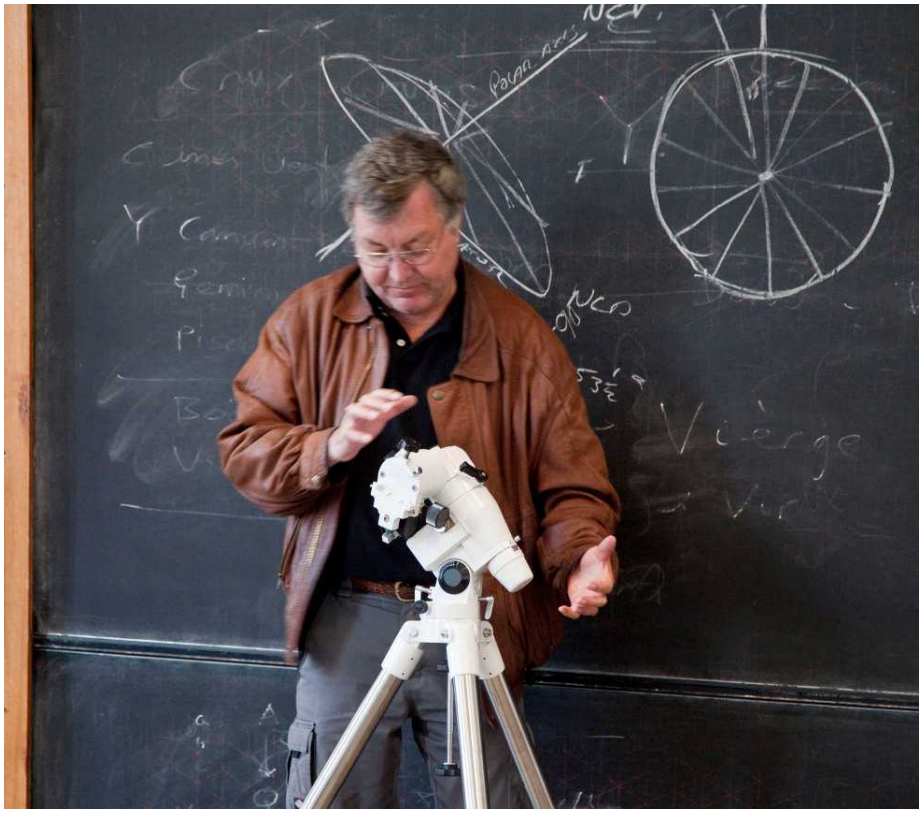


Sunspot active area 18 Sept 2011 showing a bright spot within the penumbra and inner arc around the upper RHS of the umbra. KJK

We are still on a learning curve. Amateur solar observers can and do play an important role in filling in the gaps between professional observations. We have shown at MAS that our white-light solar images are comparable to some of those available on the web from professional observatories using similarly-sized instruments. The sun is a complex subject and deserves more attention from MAS members.

Kevin J Kilburn FRAS September 2011

Picture Gallery



Kevin Kilburn's talk on 16 June on setting up a telescope

Guy Duckworth's talk on star nomenclature on the 9th June

Image by Kevin Kilburn

The Garradd C/2009 P1 comet was discovered, as the name implies, by Gordon J. Garradd in 2009 when its magnitude was 17.5.

Image by Kevin Kilburn. Discovered on September 23, 1846. Neptune has just completed one orbit of the Sun.

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