



Current Notes



The Journal of the Manchester Astronomical Society
June 2011

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Opening Remarks

On Dec 16th 2010 one of our long standing members, Mukti Bhattacharyya, died following a short illness. Kevin Kilburn has written a very personal tribute about Mukti and his association with our Society. I am sure that Mukti will be missed by many of our members.

We all seem to be more and more dependent upon the internet for providing the information we require. Can we trust the sites that a search engine lists? Are these search engines efficient? The article "The Invisible Web" may provide some answers to these questions.

Summer is upon us but that is no excuse to put away your telescope until the winter months. Kevin Kilburn's article "Some Notes in White Light Solar Observing" may provide the incentive for you to observe our nearest star, the sun.

As all members know the Godlee has been closed since the end of November 2010 and our meetings have been held in Room H8 of the Sackville Street Building. As this issue of Current Notes goes to press it looks likely that we will not have to wait too long before returning to our rightful home. Refurbishment is complete and the scaffolding is being dismantled. Mike Oates has written a short article detailing some of the work that has taken place together with some photographs of before and after.

There are also short articles of our visit to the Museum of Science and Industry (MOSI) on Wednesday 15th June coinciding with a total lunar eclipse. Members of MAS also visited Jodrell Bank to collaborate at an eve of Fathers Day Moonwatch event. Both were a great success.

Those not attending our Annual Photographic Competition have the opportunity to view the winning entries and Michael Gilligan has written a short report on how to use the Winter Hill Transmitter as a calibration target.

Our treasurer, Anthony Jennings, is putting together a special issue of Current Notes entitled "Space Shuttle Special" which I am sure will be of interest to all.

During the last Council meeting there was discussion about the editorship, content and distribution of Current Notes.

We have not had a permanent editor for Current Notes for some time and I feel that this must be addressed if we are to continue this publication. I will be only too pleased to talk with any member who feels that they would like to take on this role. As a temporary measure I will act as Editor until someone within our Society volunteers for the rôle. Also I would like to say that if anyone in this Society (regular contributors should not heed this) happens to have a particular interest in a branch of astronomy; they might try to infect their fellow members with their interest. To such members, I would suggest

that there could be no better way than writing a short article about their favourite subject. Without your help I see little future in the continued publication of Current Notes.

Council have decided that all future issues of Current Notes will be distributed by e-mail wherever possible. Please ensure our Secretary, Michael Oates, has your up-to-date e-mail address otherwise you may risk missing an issue. Those without an e-mail address will receive a paper copy as usual but this could be in a slightly different format to the digital copy.

The reason for this decision is two fold. Printing costs are escalating to such a degree that upwards of 30% of our members subscription could be needed to cover publication in this financial year. Distribution by e-mail reduces the printing run from about 50 copies to about 10 and these can be printed relatively easily in-house. In addition a digital copy allows the editor to be more flexible with content. More coloured images, for instance, enhance the appearance of articles and the journal in general.

If Council had not taken this decision then I feel that either members' subscription would have to be raised to cover printing costs or the publication of Current Notes would have to be discontinued.

Dr Mukti Bhattacharyya 1934-2010



At about 6pm on Sunday, 19 December, I had a phone call from Robin Bhattacharyya to say that his father, Mukti, had died in hospital three days earlier having been admitted the previous week with pneumonia. Apparently stabilized initially, his condition had suddenly deteriorated and he died peacefully two days later on Thursday 16th December. His wife, Brenda, was at his bedside.

Mukti Bhattacharyya was not only a loyal member of Manchester A. S., he was a highly respected friend of over thirty years who I shall sorely miss. He was the last of the few. This needs some explanation as the story of our initial meeting and later friendship probably hasn't been recorded before now.

In 1975 or 1976, MAS president Mike Duckworth pointed out that Stockport Borough Council had advertised for someone to teach astronomy night school at Bredbury. Mike couldn't do it, he had already run one in Manchester that led to me joining MAS in 1969, and he had personal family and work matters that took priority. So I applied, without realising that to teach astronomy one was obliged to have some basic knowledge of the subject; sink or swim, but sinking wasn't an option as those signing up for the course obviously relied on the tutor to keep it afloat. My thought was that to put the course together I had to learn faster than the students and I was daft enough to give it a try. To keep the 20-week (2hr) class running we also had to have a minimum weekly attendance of 12 students. But it went OK, we were always around the 10-12 mark when the register was called and the class ran for two terms during 1976 and again in 1977.

But in 1978 we had just 10 enrolments. Not enough, but shortly before closing on the last enrolment evening a man and his son and another lad came in to join the class. I signed them up but it was pointed out by the headmaster that the boys were too young, adult evening classes were restricted to over 18s. We couldn't run the course. I was disappointed but the father was livid. A few days later he was in the Manchester Evening News and on local TV complaining about the ridiculous age restrictions in Stockport's further education for a popular science course that simply wasn't taught in school. All to no avail, the night school was cancelled.

So MAS president, Ken Brierley, and I decided that we would run a course for beginners at the Godlee observatory. As a follow up to the earlier publicity, Felicity Goodie from BBC NorthWest came to interview us. We didn't promote it in competition with more formal local adult education but as a free introductory course in basic astronomy to anyone joining the MAS that Autumn. We were inundated, over 40 people enrolled and on the first evening we had over 60 people, new recruits and established members, crowding into the observatory. Among the new recruits were future stalwarts of MAS, Ken Davis, Bert Mottishead, Eric Hartas, Ted Horgan ... and Mukti Bhattacharyya. Sadly, they have now all passed on. The lads from Bredbury never joined. From the outset Mukti showed himself as a keen learner, a loyal member of MAS, but a hopeless practical amateur astronomer. I don't think he ever bought a telescope although he did have binoculars, but his enthusiasm and support for MAS was unshakeable for over thirty years. He loved to be included in MAS activities but never actually did anything unless it was pre-organised. That was part of his charm and I respected him, as did many other members who knew him.

In November 1986, Mukti, together with his two young sons, Robin and Neil, came down to our home in Bollington to see Halley's comet. It was in November. There was snow on the ground and we saw the faint, head-on, tailless fuzzy blob through the 12-inch Newtonian as it moved surprisingly quickly against the background stars. That Christmas, Mukti, his wife Brenda (also a doctor) and their sons made the first of many Christmas visits. Our three-year-old son, Alex, was a few years younger than Robin and Neil but

they would play with him while we talked in front of a log fire. Gwen and I were also guests of the Bhattacharyyas at their home in Heaton Mersey on many occasions.

In July 1991 Mukti and I travelled with a group from MAS to see 'The Big One', a long-duration total eclipse of the sun. We went first to Anaheim, Los Angeles, and then on our separate ways to Hawaii and Baja California. Most of the group went to Hawaii, a lush tropical island on the dry volcanic summit of which is one of the world's premier observatories...which was out of bounds for visiting eclipse chasers...and from where on the roads up the mountain John Bolton, Kathleen Ollerenshaw and others dodged cloud and mist. Mukti and I went to the near-deserted Pacific coastline at the tip of the Baja peninsula amid desert cactus and bone dry, wind-blown tumbleweed where we later met up with Dr Peter Mack, former MAS president, then living in Tucson.

On the flight from L.A. down to Cabo, the stewardess served drinks. Not thinking, I asked for a whisky and dry ginger with ice. 'NO ICE !', shouted Mukti: The poor girl jumped so hard that she poured me a half tumbler of neat whisky!

We spent three days in rehearsal for the eclipse at Cabo with a host of astronomers from all over the world, and eventually observed the 6.25 minute eclipse under perfectly cloudless conditions. We set up our observing site on the beach amid fly-infested cactus scrub, Mukti with his aluminium-solar-filtered binoculars and me with my 400mm lens and camera. We watched the partial phase shrink and then the glorious solar corona shone brightly overhead in a violet sky...immediately followed by an anxious cry from Mukti, 'I can't see anything'! ... 'Well take off the bloody filters' !!

Mukti and Brenda had also travelled to Finland the previous year to see the solar eclipse of 22 July 1990 but along with Kathleen Ollerenshaw and Patrick Moore was clouded out. 'Has anyone got a compass?' ... as the party scanned a mist covered landscape for where to look for the cloud obscured sun.

The solar eclipse of August 11 1999 was one that could be seen from the UK mainland, a small contingent from the MAS went to Penzance, Cornwall, including Mukti, Brenda and Mike Oates. Unfortunately that was also clouded out and the only eclipse seen that day was Mukti's umbrella shielding Mike from the rain!

Mukti Bhattacharyya was brought up in Calcutta, India, where his father was professor of English studies. His uncle was a respected civil engineer. Mukti began his medical career in the UK as an obstetrician in Sheffield, where he met Brenda, before moving to Manchester and specializing in genitourinary medicine at Manchester's Royal Infirmary.

Mukti retired as a Consultant Physician from Manchester Royal Infirmary in 1996 but continued to be connected with medical matters both as

an Appointed Governor at the University Hospital of South Manchester NHS Foundation Trust and as a Fellow of the British Medical Association. He was a Fellow of the Royal College of Obstetricians and Gynaecologists and was actively involved with their Retired Fellows and Members Society from its inception.

Mukti was a former president of the Manchester Rotary Club, a member of the Manchester Literary & Philosophical Society and maintained a keen interest in education. He was latterly a member of the General Assembly and of the Nomination Committee of the University of Manchester and a Trustee of William Hulme's Grammar School Foundation. He was involved with many community organisations in Manchester including the Manchester Council for Community Relations and was a Deputy Lieutenant of Greater Manchester. He held the Chair of the Strategic Race Independent Advisory Group in the Greater Manchester Police Authority and was also a member of Stockport's I.A.G. He was Council Member of the Order of St. John in Greater Manchester and had been honoured with the award of Serving Brother of the Order of St. John.

As non-participatory recreation, football was his passion, especially in avid support of Manchester United, and for many years was a season ticket holder.

During his long medical career and after retirement Mukti and Brenda travelled widely; to India, Australia and the Great Barrier Reef, to the USA and to South America where he was especially fond of Manaus in the depth of the Amazon rainforest. His most recent astronomical expedition that he told us about in early 2009 was to Scandinavia to see the Aurora Borealis.

In recent years Mukti was a rather infrequent visitor to MAS. His other more formal commitments had to take precedence, but he will always be remembered as a loyal supporter of the society and a friend to many of its members. His passing is a sad time for me and no doubt for many others who have had the pleasure to have known him.

Kevin Kilburn

The Requiem Mass for Mukti was celebrated by Father Bernard Wilson at the church of St Catherine of Siena on the 23rd of December. I arrived at just after 9 o'clock and the car park was already quite full, and a large number of Mukti's friends and colleagues were gathered in small groups outside the church. Members of St. John Ambulance were conspicuous in their uniforms. It had been a bitterly cold night and the temperature was still below freezing. I was impressed by the number of people there.

At about 9.25 we all went into the church to await the arrival of Mukti and his immediate family. The first hymn was "Abide With Me" and this was followed by a reading from the book of Isaiah by Maryam Hobbs - a friend. Maryam also read the Responsorial Psalm "The Lord is my Shepherd". The New Testament reading from the first letter of St. John was read by Neil

Bhattacharyya, followed by the Bidding Prayers which were led by Robin and Georgina Bhattacharyya. The Offertory Hymn was "All That I Am" and was followed by the Eucharistic Prayer, and then the Communion Hymn "Gather around, for the table is spread". Holy Communion was followed by the Recessional Hymn "How Great Thou Art", which concluded the church service.

Mukti's family waited outside the church to exchange a few words with the mourners, many of whom accompanied the family to the Manchester Crematorium to conclude the service.

I did not know Mukti very well, but he was a sincere and compassionate man who always asked after my somewhat erratic health on the few occasions when we met at the Godlee Observatory. I will remember him with great affection.

Jerry Grover

I joined other mourners from many of the organisations and societies that Mukti was connected with at the Manchester Crematorium, to await the arrival of the Funeral Cortege from the earlier Requiem Mass

The service was conducted by Fr McGarry, who at the point of the service where he would point out some of the highlights of the deceased's life, asked with the permission of the Bhattacharyya family if anybody would like to make any comments in favour of Mukti to please do so.

Quite a number of the mourners from the various organisations and societies said a few words; at this point I thought it proper that I would make some comments on Mukti's involvement with the Manchester Astronomical Society. Afterwards I spoke at length with Brenda, who introduced me to her sons Neil and Robin and it later became apparent that few other people knew that Mukti was interested in astronomy.

I will always remember Mukti for the times he used to ring me to offer words of support and comfort during my wife's illness. He was a man of great compassion and love for his fellow human beings. He will be missed by all who knew him.

Anthony W Cross

The Invisible Web

I think it is fair to say that everyone is familiar with the Internet (otherwise called the World Wide Web: www) and most people use Google as a search engine to find information. But questions must be asked; "How efficient are your searches?", "Would a different search engine provide different results?" Perhaps the key question should be "Do search engines cover the whole of the Internet?" The answer to this last question is a definite no.

Efficient as search engines appear to be they do not index everything. In fact search engines only index about 10% of the entire web. What remains is called the "Invisible Web". It is also sometimes referred to as the "Deep Web" or "Cloaked Web".

It was estimated in spring 2010 that there were over 80 billion web pages that were available for indexing by Google and other search engines. Of these 80 billion approximately 23.5 billion have been catalogued by search engines. It was also estimated that about 9.5 billion pages are purposely hidden from view by companies and businesses. These private intranet sites are only available to employees of these firms such as banks etc. However, the largest part of the World Wide Web, some 300 plus billion pages are invisible to these search engines. These invisible pages are usually part of a database and can only be accessed when called from these databases.

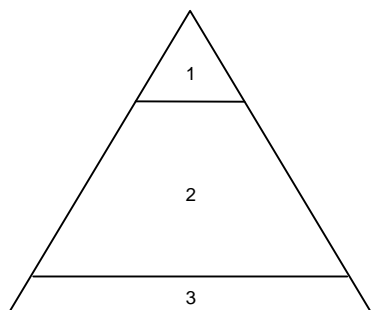


Figure 1 A pictorial representation of the World Wide Web.

1. Internet sites open to search engine spiders and crawlers.
2. The Invisible Web.
3. Completely private websites which may require paid membership or are closed to everyone

except employees of business enterprises

Web search companies such as Google use software programs called spiders (or crawlers) to trawl the public Internet and read millions of static web pages. The results are then incorporated into a prime database which is the basis for the search engine catalogues accessed by you and I. So why don't the spiders identify and catalogue all pages? The most common reason is that the site owners have deliberately used technical barriers to prevent spiders delving deep within their databases. The web address of the database is logged but the contained data is not.

The next question that needs answering is "How do you gain access to the Invisible web? The key is in the previous sentence. The database can be identified, so why not produce a list of databases and catalogue them (manually) by content. These "gateways" to the Invisible Web are, in the main,

the key to obtaining data hidden from search engines. Some search terms I have found useful when searching are:

“astronomy directory”

“astronomy links”

“astronomy database”

“astronomy library”.

During my talk in September last year I identified a number of sites which I have found extremely useful.

Internet Archive (www.archive.org)

This gateway leads to a digital library providing links to a moving images archive, a live music archive, an audio archive and a texts archive. It is the latter that I will discuss in a little more detail. At the time of writing the site boasted 2,785,798 texts freely available. Clicking on the texts option leads to a page allowing a full search option. Entering astronomy and searching the text database leads to an astonishing 3138 hits. You will quickly note that the texts have been collected from many sources.

The first hit, for example, is "Astronomy" by Joseph Norman Lockyer digitised by Google from the library of Oxford University. I also noted books from the Guttenberg site as well as many others. One thing I did note was that although many are available as a PDF file those digitised by Google were designated PDF (Google.com). Following this through I could not find a link on the Google site to download the file. It may be that Google PDF files are only available in the United States and not elsewhere. However, it is possible to read online, get a Kindle file but not, it would seem, an HTML file. Although the site may have a few problems for viewing some books offline there is still a wealth of information at your fingertips. This is a site for the inquisitive and those members interested in the history of astronomy.

SCIRUS (www.scirus.com)

The home page displays the following message, “SCIRUS is the most comprehensive scientific research tool on the web. With over 410 million scientific items indexed at last count, it allows researchers to search for not only journal content but also scientists' homepages, courseware, pre-print server material, patents and institutional repository and website information.”

Entering “Astronomy” into the search box results in 3,673,726 hits. Perhaps a more focussed search term would be more appropriate. Carry out a search for Rigel and you get 21,569 hits. For an even more specific search such as “Joseph Norman Lockyer” you get 371 hits. You can carry out more specific searches using the advanced search option. A site well worth investigating further.

CompletePlanet (www.completeplanet.com)

“Discover over 70,000+ searchable databases and specialty search engines. A comprehensive listing of dynamic searchable databases. Find databases with highly relevant documents that cannot be crawled or indexed by surface web search engines.” The opening page displays 42 major topics from agriculture to weather. Highlighting the science topic takes you to a page displaying 18 scientific categories, in which there are 1002 databases. Choosing astronomy leads you to 309 relevant databases. Instead of using this tree structure to find a list of databases relating to your interest you can enter a search term in the box provided thus allowing for more specific searches.

SAO/NASA Astrophysics Data System (www.adsabs.harvard.edu)

This is perhaps the site to visit for primary source material. The home page states the following:-

The SAO/NASA Astrophysics Data System (ADS) is a Digital Library portal for researchers in Astronomy and Physics, operated by the Smithsonian Astrophysical Observatory (SAO) under a NASA grant. The ADS maintains three bibliographic databases containing more than 8.9 million records: Astronomy and Astrophysics, Physics, and arXiv e-prints*. The main body of data in the ADS consists of bibliographic records, which are searchable and full-text scans of much of the astronomical literature which can be browsed or searched via a full-text search interface. Integrated in its databases, the ADS provide access and pointers to a wealth of external resources, including electronic articles, data catalogues and archives.

In addition to its databases, the ADS provides the “myADS Update Service”, a free custom notification service promoting current awareness of the recent technical literature in astronomy and physics based on each individual subscriber's queries. Every week the myADS Update Service will scan the literature added to the ADS since the last update, and will create custom lists of recent papers for each subscriber, formatted to allow quick reading and access. Subscribers are notified by e-mail in html format. As an option, users can elect to receive updates on preprints published on the [arXiv](http://arxiv.org) e-print archive via daily emails or by subscribing to a custom RSS feed.

*<http://arxiv.org>. Open access to 676,432 e-prints in Physics, Mathematics, Computer Science, Quantitative Biology, Quantitative Finance and Statistics

Google Directory (<http://directory.google.com>)

This site claims to be the web organized by topic into categories. There are 16 to choose from including science. Following this link leads to a page containing 35 categories. Instead of choosing one of these you can search by letter. Following the astronomy link gives a page with 38 sub-categories. I will leave it to you to investigate further.

Yahoo Directory (<http://dir.yahoo.com>)

This is a similar site to Google's offering.

Project Gutenberg (www.gutenberg.org).

Project Gutenberg is a site where you can download over 33,000 free e-books. They can be downloaded to your PC in a number of formats including PDF, .txt and HTML. If a PDF format is not available then you can download the HTML version (to retain any graphics etc) and then convert to a PDF format using one of the numerous free conversion programmes. Many of the e-books are also available in Kindle format.

A quick look at the astronomy bookshelf lists 31 titles. There is also an option to link to the Library of Congress Astronomy list yielding further results.

The site is easy to navigate but it should be remembered that although the e-books are out of copyright in the U.S. this may not be the case for the U.K.

This site is ideal for those members who enjoy reading early published works or for those who are actively carrying out research.

Carrying on with the research theme why not look at the **Chetham's Library** site at www.chethams.org.uk? The online catalogue includes most of the library's printed material, but some of the early material has not yet been added. An appointment is needed to look at any of the material in the collection.

When searching for information it must be remembered that the internet is dynamic and sites are continually being generated and abandoned. One such site is **Intute** (<http://www.intute.ac.uk>). Unfortunately this site will close in July 2011 through lack of funding. After July 2011 the website will be available, but it will not be maintained or updated.

Care should always be taken when using the internet. It is all too easy to be misinformed by people unintentionally (or intentionally) posting incorrect information. If possible always search out primary documentation rather than relying on Google or some other search engine to find what you are looking for. As stated at the beginning of this article the vast majority of information is hidden from search engines. Take your time, take care with your search terms and look for that hidden information.

An afterthought: Why not send me the web addresses of your favourite astronomy web sites? Any you send could be published in the next issue of Current Notes or displayed on our web site.

Barry Henshall

Using Winter Hill Transmitter as a Calibration Target

On a clear night, the aircraft warning lights on the Winter Hill transmitter are

In the 2011 MAS Photographic Competition, I entered the slide that is included below. Predictably enough, presented 'cold' it caused some bewilderment; so here is a more detailed explanation.

visible for many miles. [http://en.wikipedia.org/wiki/Winter_Hill_\(North_West_England\)](http://en.wikipedia.org/wiki/Winter_Hill_(North_West_England))

This prompted me to experiment with their use as an optical calibration target for telescopes, etc.

In Microscopy, we typically use a "stage micrometer" to calibrate the optical system ... <http://www.ruf.rice.edu/~bioslabs/methods/microscopy/measuring.html> ... and I here propose a similar working method:

- 1) Determine the line-of-sight distance from your chosen observation point to the transmitter mast. This is easily done with the benefit of Google Earth ... the mast being at Latitude 53°37'32.00"N and Longitude 02°30'53.00"W
- 2) Set up your telescope, focus on the lights, and estimate your visual field of view by simple trigonometry. [*see below*]
- 3) Now add your imaging system and photograph the lights [noting that they are VERY bright, so you will only need a short exposure].
- 4) Process the image and calibrate the system in "seconds of arc per pixel" or whatever units you prefer.

Clearly, there is something missing from this description ... knowledge of the actual spacing between the lights!

As you will see from published photographs (or by visiting the transmitter), the mast has a central steel tube [nine feet in diameter]; surrounded in some areas by a shroud. The lights are clustered around the mast, so their lateral spacing will depend upon

- (a) where they are attached, and
- (b) the angle from which they are observed

... This is not a good start for calibration purposes, but

We now **know the vertical spacing with some reasonable precision**, thanks to Mr. Bruce Randall of Arqiva. Arqiva handles the maintenance of the mast, and Mr. Randall kindly advised me of the relevant dimensions, which I have paraphrased in the diagram.

The image of the lights in the diagram was taken at a focal length of 3000mm, using my MTO1000 Maksutov Cassegrain, plus 3x teleconverter, on a 'Micro Four Thirds' chip [Panasonic Lumix G1].

Only the top five sets of lights are imaged on this occasion, but the spacing of the other three sets is given for reference.

Trigonometry:

... in decimal degrees ... Angle = atan (perpendicular / base)
... to convert to seconds of arc, multiply by 3600

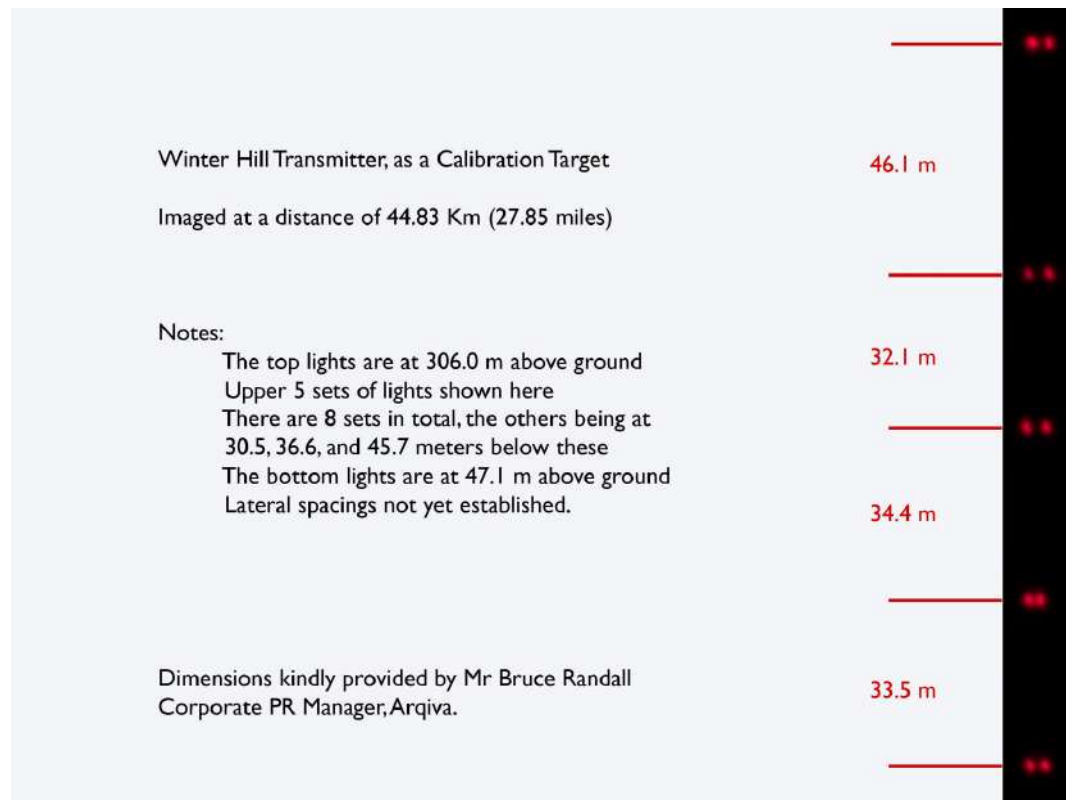
Example [as per the top section of the diagram]

$$\text{atan}(46.1 / 44830) = 0.0589 \text{ degrees} = 212 \text{ seconds}$$

Please try this yourself, and let me know how you get on.

Michael Gilligan

michael.gilligan@btinternet.com



Photographic Competition 2011

The Manchester Astronomical Society Photographic Competition was held on Thursday April 7th 2011 and was open to all members. This year there were two categories

- 1) Astronomy
- 2) Atmospheric phenomena

The members who entered the astronomy category were (Anthony Jennings, Geoffrey Pilkington, Guy Duckworth, Keith Barkwith, Kevin Kilburn, Michael Gilligan, Michael Oates, Bob Edwards, Simon Pardoe and Marion Mills with a total of 29 images.

The atmospheric category was entered by Anthony Jennings, Keith Barkwith, Michael Oates, Michael Gilligan and Barry Henshall with a total of 10 images.

The standard of entries this year was very high in both categories and it was pleasing to see that two prints had been entered as well as the usual digital images.



The Astronomy Category was won by Michael Oates with this image of Orion over Snettisham, Norfolk on the evening of 5th March this year. A 52 second exposure at f4.5 on a tripod using a Canon 500D 17-55zoom at 17mm, the foreground being painted with a torch



The Atmospherics Category was won by Anthony Jennings of a Volcanic Sunrise in Alkrington Woods with a Canon 300D, 200mm lens at ISO 100 1/20th on 17th April 2010.

Overall the evening was a great success and a big thank you to all those members who entered the competition this year. I am sure that with clear skies, warm clothing and enthusiasm next year's competition will be an even greater success.

Barry Henshall

Library News

The following books have been donated to our library by our Secretary Michael Oates.

Comets, Creators and Destroyers by David H. Levy, A Touchstone Book, 1998.

Giotto to the Comets, by Nigel Calder, Presswork, 1992.

Comet of the Century, From Halley to Hale Bopp by Fred Schaaf, Springere-Verlag, 1997.

The Origin of Comets by M.E. Bailey, S.V.M. Clube, W.M. Napier, Pergamon Press, 1990.

Of Stars and Men by Zdeněk Kopal, Adam Hilgar, 1986.

Moon Dust, In Search of the Men Who Fell to Earth by Andrew Smith, Bloomsbury Publishing, 2006.

Impact Earth: Asteroids, Comets and Meteoroids, The Growing Threat, by Austen Atkinson, Virgin Publishing, 1999.

Comets, Meteors and Asteroids by John Man, BBC Worldwide Ltd, 2001.

Comet by Carl Sagan and Ann Druyan, Headline, 1997.

The Moon, A Biography by David Whitehouse, Headline, 2001.

Lifecloud by Fred Hoyle and N.C. Wickramasinghe, J.M. Dent & Sons Ltd, 1978.

The Return of Halley's Comet by Patrick Moore & John Mason, Patrick Stephens Ltd, 1985.

Comets: Speculation and Discovery by Nigel Calder, Dover Publications, Inc, 1994.

Collision Earth, The Threat from Outer Space by Peter Grego, Blandford, 1998.

Redshift by Stuart Clark, University of Hertfordshire Press, 1997.

International Halley Watch Amateur Observers' Manual for Scientific Comet Studies by Stephen J. Edberg, Sky Publishing Corporation, 1983.

Celestial Charts: Antique Maps of the Heavens by Charlotte Stott, Studio Editions, 1995.

The Astronomy Encyclopaedia, Ed Patrick Moore, Mitchell Beazley, 1987, signed by Patrick Moore.

The Illustrated Longitude by Dava Sobel and William J.H. Andrewes, Fourth Estate, London, 1998.

The Cambridge Encyclopaedia of Astronomy, Ed Simon Mitton, 1977.

Comets, Meteorites and Men by Peter Lancaster Brown, The Scientific Book Club, 1975.

Comets Ed John C. Brandt, Readings from Scientific American, W.H. Freeman and Company, 1981.

Barry Henshall

The Godlee Observatory Repairs

As you know, we vacated the observatory in November 2010 so that repairs to the roof could be made as well as other works to the building such as decorating, re-wiring etc. While this has been taking place we have been meeting in room H8 provided by the University as well as another room we are using for storage.

Extensive work has been made to the observatory, far more that we originally thought was going to happen. This is largely due to the persuasive efforts of Tony Cross asking the right people if they can see to other issues that need work, work that can only be done while there is scaffolding around the observatory, work that if not done now, may not get done for another 100 years due to the cost of installing scaffolding to such a great height. As I write this the finishing touches are being made to the repairs and some of the scaffold will be removed shortly, with the rest to follow in a few days.

The extra work I refer to relates to the dome itself. All those that use the observatory will know that it has been very difficult to open the slit for many years and it only opened about half way, even then with great difficulty. So the moving parts of the slit have been cleaned down, the areas where there is metal to metal contact have been greased and the result is a slit that now opens all the way with greater ease. The dome itself was in need of repair as there were many holes and gaps in the covering. Now the dome has been patched up and the whole dome coated in a fibreglass skin and painted with a couple of coats of special sealing paint.

The major work, included re-leading, and the lead work is very extensive as there is a lot of wood needing protection. The walkway around the outside has been completely refurbished, the asbestos wall panels replaced with tong and grove timber, the drainage replaced, new duck boards and new balustrades have been fitted replacing the boarded in walls. This was done to put the appearance of the observatory back to what it was like when it was built in 1902, thanks to a lucky find by Tony Cross of a glass slide showing the observatory from many years ago. The outside woodwork has all been repainted.

Inside the octagon room has now got new drainage pipework, which is internal to this construction, just below the ceiling, the water damaged ceiling has been re-boarded where needed and the whole room re-painted.

In addition, all external floodlighting has been removed from around the Balcony.

The whole refurbishment is absolutely wonderful and it will be a joy to get back in there to hold meetings without the worry of water running down the internal walls and having to place strategic buckets all over the place to catch the water.

We thank the University of Manchester and the staff who have done their best to make these repairs and for providing the rooms to allow the Society to continue meeting for the past seven months.

Michael Oates



Dome



Dome cracks



Dome after refurbishment



Balustrades



Octagon room



Octagon room



Pipes within Octagon room

Visit to Jodrell Bank



Following Tony Cross's recent contacts with Jodrell Bank, Manchester AS were invited to collaborate at an eve of Father's Day Moonwatch event at their newly opened visitor centre, Saturday 18th June.

As their Moonwatch advert said: 'This a great opportunity to learn more about the beautiful sky at night through our new 14 inch optical telescope. Weather permitting, you will learn about constellations, the moon, the solar system and the major planets. You can also meet members of local astronomical societies and look at samples of moon rock and soil, which were brought back to Earth by NASA's Apollo astronauts.'

It was also a great opportunity for MAS to be involved with this nationally iconic observatory, but after a dull and largely overcast day it was raining heavily when Tony, Geoff Pilkington and I arrived at 7pm to join a long queue of visitors who had booked in advance. It was a sell out with about 150 visitors in attendance but nearly a wash out. Geoff and I were the first to set

up our EQ5 telescope mountings on the rain sodden grass outside the visitor centre cafe where a barbeque was already the immediate attraction. The weather really didn't look promising so we ate our burgers in the crowded cafe while the rain hissed down outside.

Then the sky started to brighten and no time was lost in relocating the 'scopes on the car park where for the next hour or so we viewed the setting sun. Geoff had his SkyWatcher 200mm Newtonian and I had my SkyWatcher 127mm MAK, both fitted with solar filters allowing a direct view of sunspot complex AR1236 dominated by a 30,000km spot whose umbra was cleanly divided by a wide light bridge. We both soon had a string of people wanting to view the sun and ask questions about it and our telescopes. Our old friend, Dr Ian Morison had set up his Takahashi 100mm refractor nearby, as had Paul Brierly from Macclesfield AS with a smaller solar telescope. Another Macclesfield member had a PST hydrogen-alpha telescope and with typical NWGAS collective teamwork we kept the visitors entertained for nearly an hour until the sun eventually disappeared behind trees.

After dusk we attended a talk about the moon by Dr Tim O'Brian and as we left the auditorium about 10.15pm it was to see the brilliantly illuminated International Space Station pass serenely overhead, rising from behind the towering 250ft Lovell telescope in its newly landscaped enclosure. Geoff and I went back to our telescopes in the floodlit carpark (Jodrell still isn't very sympathetic to the dark skies campaign) while Tony 'networked' with visitors and staff in the visitor centre. We never did get to see the 14-inch telescope or the other exhibits, meteorites or moon rock. As dusk fell, we were able to demonstrate the colour/temperature contrast between Vega and Arcturus and split the Lyra 'double double' in Geoff's 'scope. It never really got dark enough to find other astronomical objects but Ian Morisson had Saturn in his go-to telescope and, like us, had a constant stream of viewers. An Iridium flare was forecast and some may have seen it, but we didn't. But it was all very enjoyable and worthwhile.

After 11pm the visitors began to drift away. Moonrise was at about 11.30 but the event was due to end at midnight, anyway. But clouds on the eastern horizon steadily crept over us and by 11.45 we packed up our equipment and Tony stopped talking ! It had been a great evening, meeting with old friends from Macclesfield and Didsbury AS and talking with the public, some of whom had travelled as far as from Surrey and North Wales. Collectively we 'did our bit' for North West astronomy and it has since been acknowledged by Jodrell who are keen to invite us back. Manchester AS will undoubtedly be involved in other events at Jodrell Bank and hopefully many other members will be involved. The new visitor centre is much better than the old facility and at just £2 per person is going to be a very popular place for tourism and amateur astronomers alike.

Kevin Kilburn

Manchester Astronomical Society, Out and About

Wednesday 15th June 2011--Total Lunar Eclipse



Total Eclipse of the Moon; but I must say not too favourable for the British Isles, because of the late start and with the Moon rising already eclipsed. Also as we are approaching the longest day of the year (21st June) moonrise is late in the evening.

However, this did not deter members of the Manchester Astronomical Society (M.A.S.) giving support to the Museum of Science and Industry (M.O.S.I.) who had arranged for a lecturer from the Jodrell Bank Observatory to give a talk to the visitors relating to our Moon.

M.A.S. had the full display boards detailing the work that is being carried out by our members, also highlighting the important points in our history, and Astronomy/Space exploration.

This stand was outside of the Planetarium, which was an ideal area to engage with the public and promote the M.A.S., with members Barry Henshall, Geoffrey Pilkington, Michael Oates, and Anthony Cross in attendance.

Observing did not take place due to cloud cover, punctuated by heavy rainfall.

As the evening drew to a close, staff from M.O.S.I. and guests were taken to Cloud 23 Bar of the Hilton hotel, where it was expected that a view of the rising Moon in eclipse would be visible from such a high vantage point, but alas not to be as the cloud cover dominated the eastern horizon, with the odd patch of blue sky in the west just to give hope.

Good conversation made up for the lack of observing whilst Michael Oates and Geoffrey Pilkington took advantage of the high location by taking images of the streets below, as twilight slowly crept across the city creating a kaleidoscope of colour.

A very good publicity exercise for the M.A.S. with plenty of contacts made for future postings of our society events.

Anthony W Cross (Publicity)

Some Notes on White Light Solar Observing

It may not have escaped your notice that for getting on for nearly a year, since I took up white light, whole disc solar photography in mid 2010, I have been inflicting my pictures of the sun on the unsuspecting audience at MAS at roughly monthly intervals as an addendum to the Monthly Sky Notes. During that time, there have been some very interesting comments and questions raised and our president, Dr. Barry Henshall, has asked if I could pull some of these together to address the wider aspect of what can be seen with small instruments, binoculars and telescopes.

Here and now, 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 the naked, unprotected, eye 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 injury...It is your responsibility to do it 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 Mylar, or preferably Baader film ⁱ, designed specifically for solar observation when placed in front of the telescope or binocular objective lenses ⁱⁱ. I refer you to the books I have read on the subject of solar observing and the sun itself. See the bibliography at the end of these notes.

So, what can be seen on the sun? It's a 1.4million km (864,000 mile) ball of ongoing thermonuclear action interwoven by magnetic field lines that generate constantly changing sunspot and other easily visible surface features. The sun is a very dynamic object of study and no two days are the same. We are looking directly at a nearby G8-type star, a dwarf compared with other stellar objects but because it's close, a mere 150 million kilometres (93M miles) away, an object that is almost exactly similar in apparent size to the full moon, subtending half a degree in diameter. But the sun is about 450,000 times more brilliant than the moon, which is why we have to take extreme care in its observation and study.

Assuming that safe filtration is fitted, what can be seen on the sun? I am starting with white light observations; that is, the sun as we normally see it.

The first impression is that the sun is a white object, especially if an unfiltered image is projected onto a white screen. Well maybe not quite pure white. If anything, being a G8 star, the sun is really a pale yellow-white colourⁱⁱⁱ. The visible surface of our star is called the photosphere, the sphere of light. It looks solid but it isn't. It is the visible, gaseous surface of a thermonuclear reaction converting hydrogen to helium deep inside the star and has a surface temperature of about 5,800 degrees C (ca 6000K).

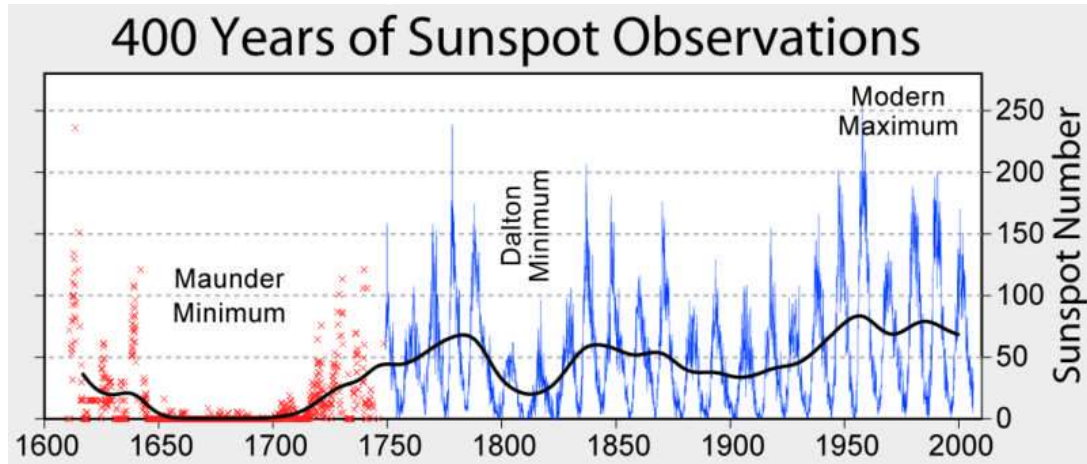
The solar disc is definitely brighter in the centre than at the edge; an effect known as 'limb darkening'. We are looking at a gaseous sphere and at its centre we are looking through deeper layers towards the hotter core: At the edge, the limb, we are looking obliquely through thinner and cooler outer regions of the disc.



Fig.1. This picture was taken 16 April 2011 with an 80mm refractor fitted with an Astro Engineering solar filter. It shows limb darkening, bipolar, single and complex sunspots spanning the disc at a latitude of about 35degrees north of the solar equator. Brighter faculae can be seen surrounding the bipolar sunspot and on the Western limb. N and W depicts the orientation of the sun as seen in the noon sky but owing to the perspective of viewing the sun from Earth, the northern end of the sun's spin axis seems to tilt away from us by -5.53 degrees and is inclined at -26.96 degrees. This rock and roll changes throughout the year.

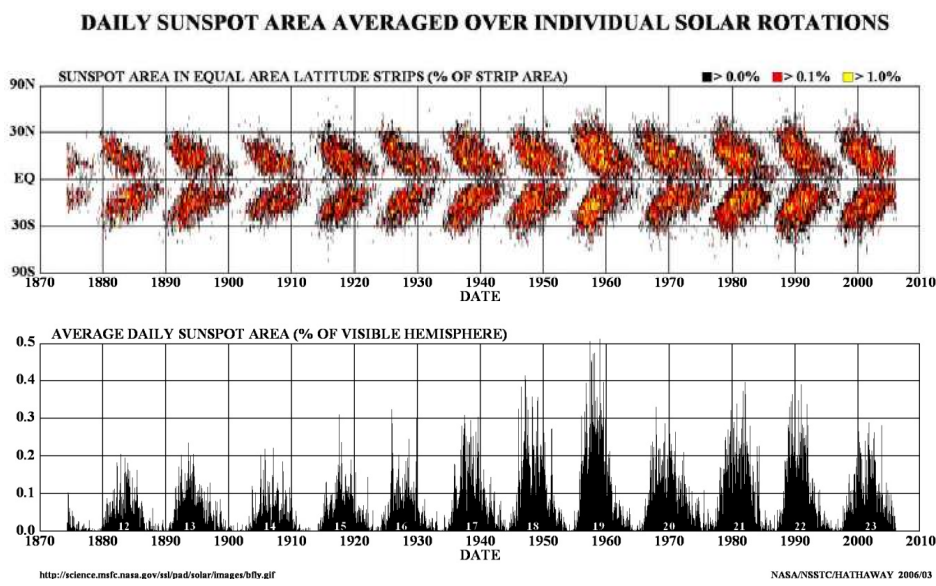
For reasons best known unto itself, the sun experiences periods of sunspot activity, highs and lows, with a period of about 11.2 years^{iv}. In early 2010, with a delay and a prolonged sunspot minimum unparalleled for over

250 years, sunspot cycle 24 began^v and prompted me to start photographic observation. Each cycle is marked by a reversal of the solar magnetic poles, again we don't fully know why, but we do know that as the cycle progresses it's the increasing entanglement of the solar magnetic field that gives rise to sunspots.



The sun, like earth, has a magnetic field like a bar magnet, with lines of flux extending from pole to pole. As the sun rotates, these flux lines twist. Unlike the solid earth, the sun is gaseous and its equatorial rotation period is c25 days whilst its polar regions have a rotation period of c30 days. The resultant twisting of the solar magnetic field eventually causes it to knot, loop and break through the photosphere. Where the magnetic loop penetrates and re-enters the surface, cooler darker areas prevail with a temperature of about 4000C as bi-polar sunspots. We don't know why sunspot activity varies with a period of about 11 years and we can't accurately predict what future cycle will do^{vi}.

At the start of a solar cycle, sunspots usually congregate at solar latitudes c35 degrees either side of the equator and as the cycle continues they migrate to lower latitudes, giving rise to the Butterfly Diagram^{vii}.



Sunspots were once thought to be crater-like depressions in the photosphere. Seen obliquely and foreshortened at the limb, they do seem to be saucer shaped (the Wilson Effect) with a central dark umbra surrounded by a lighter coloured penumbral region. It is now thought that the magnetic flux break through causes a less opaque surround to the umbra that only appears to be a depression in the solar surface.

It must be remembered that the sun is a gaseous body heated from within and with outer 'shells' of differing temperature regimes. Deep within the star, hydrogen is converted to helium 'ash' on the surface of a helium core at c15 million degrees C with the release of energy that takes c1 million years to reach the photosphere via a 'random walk' of energy packets. In the upper regions, convection cells break the surface as photospheric granulation with a size of about 1000 miles in diameter, c1 arc second in angular size as seen from earth and with a duration of only 10-20 minutes ^{viii}.

Whereas sunspots are relatively cool areas on the photosphere, a less obvious association is with brighter, hotter features called solar faculae that float like hot clouds above regions that will be (or have been) associated with sunspots. Faculae are best seen in contrast against the limb darkening as amorphous networks of bright 'clouds' floating above the photosphere ^{ix}.



Taken with a 127mm Maksutov- Cassegrain telescope and AE/Baader filter, this picture shows the complex structure of two active regions, AR1195 and AR1196, as they rotated into view on 21 April 2011. AR1195 (on the RHS) is a complex of individual spots with dark umbra immediately surrounded by lighter penumbra. AR1196 (LHS) is less active but displays a

typical bi-polar aspect. Both ARs are surrounded by a complex network of hotter faculae shown clearly against the limb darkening.

The solar surface is a very dynamic region. In extreme are the rarely seen white light flares, more often seen at other wavelengths, associated with very active sunspots that may eject material directly towards Earth (Coronal Mass Ejections) that can interact with our magnetic field to produce aurora. They are occasionally seen as very brilliant, star-like, brightening within active regions associated with complex sunspots. The first was observed in 1859 by Richard Carrington^x. This unprecedented event was notable by the intense auroral displays and disruption of the telegraph system in parts of America and Europe.

In conclusion: Solar observation has its obvious practical difficulties but offers the amateur astronomer a challenging opportunity to see our nearest star in all its ever changing aspects. It is very well worth the effort.

Kevin J Kilburn FRAS

Bibliography: These are a few titles from my own collection.

The Sun and How to Observe It. Jamey L. Jenkins. Springer 2009. Recommended reading as a modern practical guide to solar observing and its photography. Purchased in 2010 to get up to date information on what to see and how to record it.

Getting Started in Astronomy; Observing the Sun. Dr. Eric Strach. Liverpool Astronomical Society 1993. A practical guide by an experienced solar observer and highly recommended.

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The Sun. Ian Nicolson. Mitchell Beazley Publishers 1982. From the Mitchell Beazley Library of Astronomical Atlases for Amateur and Professional Observers. In its day modern and comprehensive with emphasis on the Skylab solar observations of the previous decade. A super-coffee table book but not very practical.

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Solar Research. A Survey of Astronomy 4. Giorgio Abetti. Eyre & Spottiswoode 1962. A classic regarding late 20th C international solar research.

ⁱ 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, May 2011, an A4 sheet costs about £18 for making home – constructed solar filters.

ⁱⁱ I prefer to use commercially manufactured solar filters, based on Baader film, made by Astro Engineering Ltd. and available via Pulsar Optics. At the time of writing, May 2011, these cost about £35-£50 and are available to fit most sizes of telescope up to about 150mm diameter. I have two; one to fit an 80mm refractor and one to fit a 127mm Maksutov-Cassegrain telescope.

ⁱⁱⁱ Baader film transmits a slightly blue-tinged white image.

^{iv} The Maunder Minimum was a period of about 75 years during which very few, if any, sunspots were seen. It remains a mystery but is regarded as a very real phenomenon attested to by many astronomers of the period. By 1725, sunspots and the Aurora Borealis were again being reported.

^v Rotation numbering was begun in the mid 1850s by Rudolph Wolf (1816-1893).

^{vi} The diagram shows that during the 20th C, solar activity increased to a maximum in Cycle 19 and has since declined. Cycle 24 is anticipated to be one of even lower activity.

^{vii} The Butterfly diagram and the Maunder Minimum was first described by Edward Walter Maunder (1851-1928), solar observer at Greenwich at the end of the 19th C. A founder member of the British Astronomical Association in 1890, in 1892 he suggested the formation of a North Western Branch that later, in 1903, became Manchester Astronomical Society. Graphics from Wikipedia.

^{viii} Solar granulation was first described to the Manchester Literary & Philosophical Society on March 5, 1861, by the former Patricroft engineer and astronomer, James Nasmyth. He likened it to rice grains or a willow leaf pattern. James Nasmyth, Engineer: an autobiography. Ed. Samuel Smiles. 1883. 1912 edition in MAS library.

^{ix} Being hotter than the photosphere and sunspots, faculae networks contribute more energy to the average solar efflux than the cooler, and area for area, sunspots detract. Therefore with increased solar activity towards a sunspot maximum, the presence of faculae outweighs the cooling effect of darker sunspots. Thereby earth-warming is increased, not decreased, during sunspot maxima.

^{xx} Richard Carrington (1826-1875) was a reluctant London brewer but passionate solar observer whose tragic early death robbed UK astronomy of a major solar observer.

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