



# Current Notes

The Journal of the Manchester Astronomical Society  
August 2007

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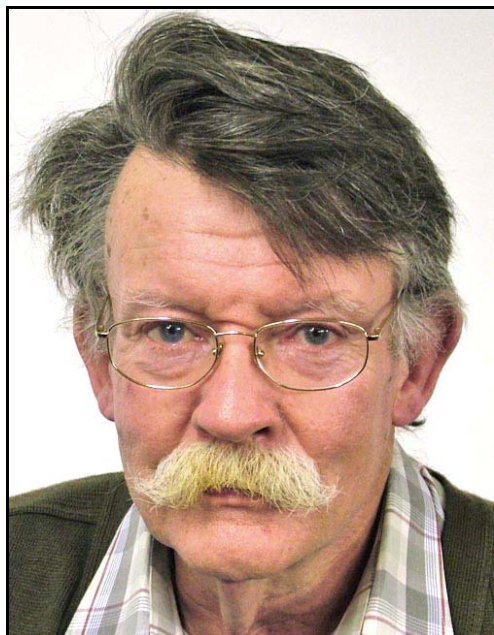
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## Obituary

John Bolton joined the Manchester Astronomical Society (MAS) sometime during the summer of 1967, although it was not until the General Meeting in October of that year that his membership was recorded in the MAS Register of Members.



**John Bolton, 13 July 1936 to 24 July 2007**

John's main interest was, and continued to be, the Earth's moon. During the 1970s and 1980s, John was involved with the Lunar Section of the MAS, making and recording observations and advising others. This was in the days when observers made drawings of their observations rather than photographic records. John was interested in the Moon's effects on the tides and, at one time, also regularly observed for sightings of Transient Lunar Phenomena (TLP). He was rewarded with a sighting, which he recorded and sent to NASA scientists who were at that time collecting data on TLPs. The lunar landings by the United States beginning in 1969, had increased people's interest in the Moon, although John remained somewhat sceptical of the actual manned landing in 1969.

John was also a solar observer, being interested in the Sun's effect on weather patterns. Indeed, such was his interest in the weather that he managed to photograph an instance of Nacreous Clouds, a rare occurrence in the UK; the photographs are available to see on the MAS website. These images were until recently used by the US Meteorological Service in their training programme.

After serving on the Council for a number of years, in 1986 John was elected President of the MAS and served a term of three years,

being re-elected in 1987 and 1988. In accordance with MAS rules, upon his retirement as President he served as Immediate Past President under the presidency of Ray Brierley until the election of Kevin Kilburn as President in 1991 when John took on the office of Vice President. There were four Vice Presidents in the MAS at this time in its history. This structure continued until 1996 when the management of the MAS underwent radical change and the number of council posts was reduced to a total of 10 with three of the Vice President positions being abolished along with the re-classification of others. At the Annual General Meeting (AGM) in 1996, John was elected to the sole remaining post of Vice President and continued in this capacity until the AGM in April 2007.

Throughout his almost 40 years of membership, John's enthusiasm was infectious and many current members owe much to his passion for astronomy.

His dry and sometimes wry sense of humour brought many instances of mirth to MAS meetings; a one-line quip often delivered to the amusement or embarrassment of the speaker.

A star is born and lives a long life but eventually must fade away. So it is with us all.

John will be sadly missed but never forgotten.

A handwritten signature in black ink, appearing to read 'Graham Hodson', written over a horizontal line.

**Graham Hodson FRAS, President**

## Letters and News

### Society Rules

At the Annual General Meeting of the Manchester Astronomical Society (MAS), held on Thursday 19 April 2007, a revision of the MAS Rules was approved. These revised Rules have now been produced in booklet form and are available for collection with this edition of Current Notes. Please ensure that you collect (and sign for) your copy of the Rules with your copy of Current Notes. Those members that normally have Current Notes posted to them will receive the copy of the Rules with their copy of Current Notes.

**Graham Hodson FRAS, President**

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## *The Sky at Night*

Tuesday, 24 April 2007, marked a very special day in UK's recent astronomical history. It was the 50th anniversary of *The Sky at Night* TV programme.

### A good egg

With only one exception, when taken ill and hospitalized after eating a dodgy duck egg, Patrick Moore has presented his TV programme in person every month since April 1957 for over 650 editions. *The Sky at Night* predates the space age – the launch of the first satellite, Sputnik 1 – by half a year. It began in the same year that saw the commissioning of the 250-foot diameter radio telescope at Jodrell Bank, which is still the UK's leading astronomical observatory.

*The Sky at Night* has since become an institution in its own right, and most of my generation of amateur astronomers, and very many professionals who also grew up with the TV programme, owe a lot to Patrick's enthusiasm in fuelling our interest in the sky at night.



Patrick Moore and Brian May comparing shirts

On the actual 50th anniversary of the first broadcast of *The Sky at Night*, the BBC had provided Patrick with a large, internally blackened and star-studded marquee, luxury portaloos and catering. Guests invited by the BBC and Patrick were those who had, over the years, contributed to the programme. Although very informal, much of the day was spent recording a celebratory episode of *The Sky at Night*, which was broadcast on the evening of Sunday 6 May. I understand that the guests celebrated for about 15 hours and well into the early hours of Wednesday morning, with a host of astronomers and the odd astronaut or two getting spaced-out on the free booze.

Patrick is largely chair-bound nowadays but, as always, was in total command. According to Dr Allan Chapman, Patrick was the life and soul of the party, running rings round professional astronomers when it came to identifying lunar craters.

### Mixing with the Stars

Then it was our turn to attend a house party on Wednesday afternoon as invited friends of Patrick. Jerry Grover and I had driven down to Sussex on the Tuesday afternoon and had stayed overnight at Redwalls, a comfortable B&B run by Jerry's uncle, Noel Grover, and his wife, Daphnie, on Hayling Island. The following morning we arranged to pick up Allan and Rachel Chapman from their hotel in Chichester before the short drive to Selsey for the bash. Jerry and I were there as Council members of the Society for the History of Astronomy (SHA). Allan is our Honorary President and Sir Patrick Moore is one of our two Vice Presidents, the other being Cambridge historian, Dr Michael Hoskins, the editor of the *Journal for the History of Astronomy*. We got to Patrick's home, Farthings, at about 1pm. There were already quite a lot of guests wandering about but no sign of the man himself. I found him in his study talking to Dr Chris Lintott, his co-presenter on *The Sky at Night* and a few other BBC bods. Patrick was as welcoming as ever and warmly received the bottle of his favourite tippie, Jameson Irish whisky, that I gave him.

### Way back when

I first met Patrick in the Renold Building, here at Manchester University, at a meeting of the Lunar Section of the British Astronomical Association (BAA) organised by Manchester Astronomical Society (MAS) in 1967. By then, we had already corresponded for a couple of years about various aspects of Moon observing. We haven't met that often since but we have kept in touch during the past 40 years, especially since about 1990, on those infrequent occasions that he visited Manchester and stayed in Didsbury as the guest of Dame Kathleen Ollerenshaw. I once had the surreal experience of watching *The Sky at Night* sitting next to Patrick and Kathleen, having sipped a glass or two of vintage port, late one Sunday evening. The last time we met in the north was about five years ago when he was guest of honour at the dedication of the Ollerenshaw Observatory at Lancaster University.



Group photograph of some members of the SHA

The group photograph on the previous page shows some members of the SHA council, with Allan Chapman presenting Patrick with an award for his contribution to the history of astronomy in recognition as the foremost British popularizer of astronomy of the 20th century. I am standing with Jerry Grover, MAS member and SHA co-opted councillor, behind SHA Chairman, Gilbert Satterthwaite.

Gilbert was the last person to use the Airy transit telescope at Greenwich, making the last formal observation with that historic instrument – a meridian transit of Saturn in March 1954. Stuart Williams, our Secretary (with the beard), is in the middle. I took over from him as the Secretary the SHA when the SHA met at the Maritime Museum at Greenwich. Madeline Cox, our librarian, is on the left-hand side of the picture, as is Patrick look-alike, physiologist and editor of SHAs publication *Antiquarian Astronomer*, Dr Reg Withey. Bespectacled assistant editor Kevin Johnson, from the Science Museum, London, stands next to Roger Jones, and SHA's UK regional survey coordinator is in the white T-shirt. It's good that three SHA councillors, Allan, Jerry and me, are from North West Group of Astronomical Societies (NWGAS) but it's a pity we don't have more NWGAS members in the SHA, considering the unrivalled importance of northern societies – Leeds, Liverpool and Manchester were all foremost in the scheme of UK amateur astronomy in Victorian times.



**Patrick and Dr Ron Maddison**

I was particularly pleased to meet my old friend Dr Ron Maddison, a former Director of the BAA Lunar Section, who took over from Patrick in the late 1960s. He took early retirement from Keele University to live in Florida some years ago. There he ran the Cocoa Beach Planetarium. Its former director was Dr Ian Griffin, now director of the Museum of Science and Industry, in Manchester. Ron flew back specially to be at Patrick's do. He was an active supporter of Macclesfield AS in its early years and a close friend of Dennis and Cherry Moss and of MAS members, Ken and Eileen Brierley. Ken once told me that Ron had the 'hots' for Eileen! (I am sure she will not mind me saying this.) He is a senior member of the Antique

Telescope Society so I am keen to get him, and that society, onboard with the SHA.



**Lintott phones home...**

Other notables at the party included the aforementioned Chris Lintott (who, in the picture above seems to have something interesting happening to his finger... rather like ET), and guitarist/astronomer Brian May. It was interesting to see that Brian was largely ignored and simply accepted as just another astronomer and not as a rock star. He is a genuinely very nice chap, very unassuming and very interested in astronomy.

Richard Sargant from Chester AS was there as president of the Federation of Astronomical Societies (FAS) and secretary of the NWGAS, as were Phil Masding and Chris Tyrell from Altrincham & District AS. I was able to discuss with them the MAS Moon colour project and its successor, the multispectral polarimetry project that Andrew Fearnside is interested in doing (with a bit of contribution from me).

We left the party shortly after 5pm to begin the long drive back to Manchester, dropping off Allan and Rachel at their home in Oxford. As we left, we learned that there was a bet going on between Patrick and his BBC producer as to which day had seen the most guests. Tuesday was packed with visitors but as we left on Wednesday, the consensus was that Patrick's friends had won him the bet. I don't remember the first *The Sky at Night* programme, but I do recall seeing it later in 1957 and occasionally thereafter until I was old enough to stay up late on a regular basis. It was always there in the background as I learned astronomy in my childhood and as a teenager. I feel extremely privileged to have been able to attend Patrick's 50th anniversary party for *The Sky at Night* and sincerely hope that despite increasing immobility, and now aged 84, he can continue to present the programme for many more years to come.

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**Kevin J Kilburn FRAS**

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## Some Open Star Clusters in our Winter Skies

### In the Beginning...

The American astronomer Edwin Powell Hubble established that the Universe is larger than previously thought. After observing Cepheid variable stars in the Great Nebula of Andromeda to determine its distance, Hubble and Milton Humason measured the redshifts of dozens of other spiral galaxies. Whilst he himself made no extravagant claim that his observations proved the Universe to be expanding, Hubble's work provided the foundation of the Big Bang Theory.

The supposed moment of creation of the Universe, the Big Bang of 13.7 billion years ago, was likely neither very loud nor any ordinary explosion. By the time the infant Universe reached a condition about which anyone can presently make any meaningful statements about its properties, within a splinter of a split second of its birth, the Universe seems to have reached the size of a grapefruit. The Universe subsequently expanded over the next 300,000 years, after which ordinary matter as we think of it (atoms etc.) came into being and photons could travel more freely throughout the Universe.

### Early Star Formation

It is believed the very first real stars formed 200 million years after the Big Bang. About 13.5 billion years later, new stars are still forming in a similar way as they did back then. However, there are probably some subtle differences, and possibly some or even all the very early stars were much larger than any that are being formed now.

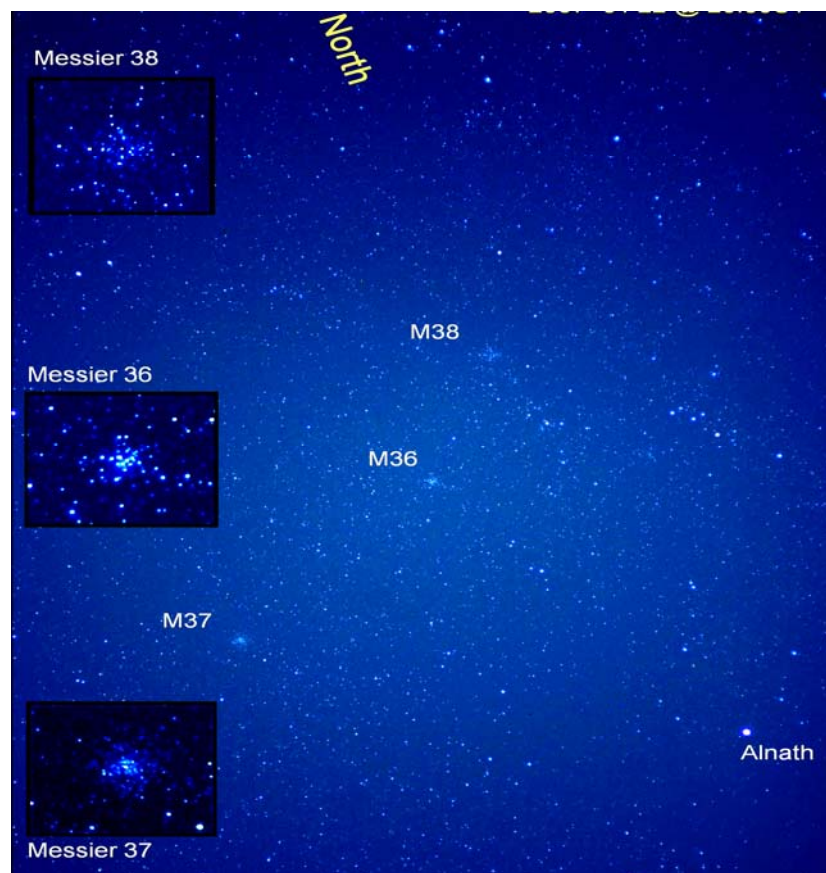
To form a star, huge clouds of gas and dust, made mostly of hydrogen and helium, contract gravitationally. The energy accumulated by this simple act of in-falling causes the gathering material to heat up. However, it seems that the creation of a lone single star is a rare, indeed unlikely, event. Most of the cool molecular clouds that spawn star birth are truly immense. Because there are theoretical limits to the maximum size and mass at which

individual stars can form, this limits the consumption of material in the formation of any given star, and so many dozens or even hundreds of stars can form in a single big cloud at much the same time. Even so, all stars are not exactly the same, although those born in the same cloud tend to have many similarities. There are, though, still some mysteries surrounding why cloud material should initially contract gravitationally to form individual stars and what might trigger the gravitational contraction in the first place. Possibly, in some cases, shock waves emanating from supernova explosions may trigger this contraction and the subsequent birth of new stars.

Ironically, the very biggest stars have relatively short life spans lasting only a few million years. More modestly sized stars might live for billions of years. Our own Sun is roughly five billion years old and set to last as long again.

### Star Clusters

The large open star clusters born in big gas clouds can exist loosely gravitational bound for quite long periods of time, of the order of several million years. However, tightly bound globular clusters contain many hundreds of thousands of stars, and some possibly a million or more stars, in relatively small spherical volumes of space.



Clusters in Auriga, by Cliff Meredith

It seems that in general most (though apparently not all) globular clusters consist of very old stars. Some globular clusters in our Milky Way galaxy are about 11 billion years old. Some astronomers think globular clusters possibly formed in very different ways to open clusters. They suggest that globular clusters may be the remnants of former dwarf galaxies.

Whilst about 150 globular clusters are now known in our Milky Way galaxy and halo, astronomers have discovered about ten times as many open clusters, although, of course, individual globular clusters contain many more stars than open clusters do. Globular clusters seem to travel around the outside of our galaxy's central bulge in sometimes quite wildly eccentric orbits in the galaxy's halo and cross the spiral arms. Open clusters, however, are usually only found within 2000 light years on either side of the plane of the galaxy's disc. It is thought that there may be many unknown open clusters hidden from astronomers' view by the considerable amounts of gas and dust in the galaxy's disc arms and hub.

### Auriga through the Eyepiece

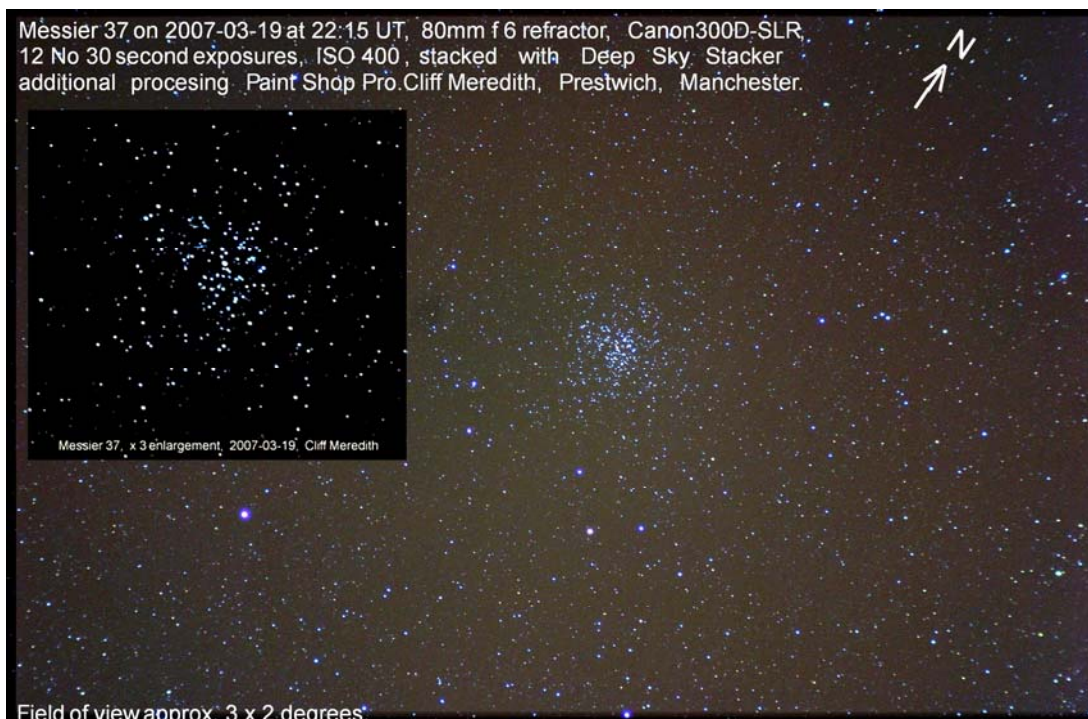
Globular clusters and open clusters provide excellent observing targets for amateur astronomers with quite modest telescopes or binoculars. One or two open clusters can even be seen just using unaided naked eyes. The Hyades and Pleiades open clusters in Taurus immediately come to mind as examples of this. Of the 109 (or possibly 110, or 103, or whatever!) of the objects in Messier's famous catalogue, 29 objects are globular clusters and 27 objects are open clusters (or galactic clusters as they are sometimes called).

However, these numbers may perhaps now be 28 each, as M71 now seems to be considered to be an open cluster. Messier's list does not include the Hyades nor the magnificent Double Cluster in Perseus.

The Charioteer's constellation, Auriga, lies along the Milky Way's galactic plane, and rides high overhead in our evening UK skies for several months every winter. Auriga's brightest star, at magnitude 0.08, is Capella, which never sets below the horizon at Manchester's latitude, although much of Auriga is effectively lost from our UK view in summer.

In their book *Night Sky Observers Guide*, Vol.2 (Willmann-Bell), Kepple and Sanner list 28 open clusters in Auriga. Half of these open clusters are fainter than magnitude 11, with their brightest individual stars being fainter than magnitude 14. Those clusters are quite a challenge for visual observers using big telescopes at dark-sky sites.

However, a dozen open clusters in Auriga are probably very good targets for observers with more modest equipment (e.g. a 200 mm aperture Newtonian telescope) even when observed from less-than-ideal locations with quite significant light pollution. Starting with the faintest of these clusters, the first nine are listed in Table 1. This leaves only three more open clusters to discuss. They are the brightest in Auriga and happen to be listed in the Messier Catalogue as objects M36, M37 and M38. These three objects all lie within 5° of our galactic plane and are excellent targets for observers using small telescopes and even users of ordinary 10x50 binoculars at moderately light polluted locations.



The first of these three to consider is NGC 1912 (M38). This is positioned at R.A.(2000) 5<sup>h</sup> 29<sup>m</sup>, Dec. +35° 50', and has an apparent diameter 21 arcminutes, giving it an overall magnitude of 6.4. With a diameter of about 25 light years, over 100 stars are known to belong to this cluster, the brightest of which shines at magnitude 9.53. Most of the earliest stars formed in this cluster fall into the spectral class B5, with a few A-type main-sequence stars and several G-type giants. The brightest star in the cluster is a yellow GO giant with a luminosity equivalent to 900 suns. Our Sun would appear as a star having a magnitude of 15.3 when viewed from this cluster, being a distance of about 4200 light years.

The second of the threesome is NGC 1960 (M36). This is positioned at R.A.(2000) 5<sup>h</sup> 36<sup>m</sup>, Dec. +34° 08', and has an apparent diameter 12 arcminutes, giving it an overall magnitude of 6.0. Of the 60 or so stars of this cluster, the brightest shines at a magnitude of 8.86. The cluster is brighter than, and less than 3° away from, M38, so both clusters are readily seen in the same binocular field. The 60 stars of this cluster range in brightness down to about magnitude 14, and include a nice double star with components of separation 10.7 arcseconds. It is one of the youngest galactic star clusters known, containing 15 splendid brightish stars, 13 having B-type spectra. The brightest stars have absolute magnitudes of -1.6, being equivalent in brightness to 360 suns. They display broad spectral lines, suggesting rapid rotation. Total cluster luminosity is equivalent to about 5000 suns. Its distance is about 4100 light years from Earth and is 14 light years diameter.

Finally, NGC 2099 (M37), located at R.A.(2000) 5<sup>h</sup> 22<sup>m</sup>, Dec. +32° 33', and has an apparent diameter 20 arcminutes, giving it an overall magnitude of 5.6. The brightest star of this cluster shines at magnitude 9.21. It is the brightest and finest of all the Auriga open star clusters, and quite easy to see using binoculars. Anything larger than a 50 mm aperture telescope providing reasonable magnification (x50) should allow some individual stars in the cluster to be resolved. It contains at least 150 stars down to magnitude 12.5 and possibly in excess of 500 stars, including fainter stars. The earliest cluster stars are of B9 spectral type, but there are at least a dozen red giants. The brightest member lies near the centre of the cluster, which is about 4600 light years away and 25 light years in diameter.

In conclusion, although open star clusters are not usually thought of as being the most exotic or glamorous objects to observe, they provide some of the prettiest sights, indeed real splendors, in the night sky. Furthermore, whilst "faint fuzzies", especially galaxies, become lost in light pollution and murk, open star clusters, with their many brighter point sources, are more observer-friendly for anyone stuck in a light polluted location.

If you want to be a real star gazer, try pointing your binoculars or telescope at some of Auriga's real beauties.

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**Cliff Meredith**

**Table 1**

<b>Name</b>	<b>R.A. (2000)</b>	<b>Dec.</b>	<b>Mag.</b>	<b>Diam.</b>	<b>Brightest Star Mag.</b>
King 8	5 <sup>h</sup> 49 <sup>m</sup>	+33° 38'	11.2	7' 30"	13.48
NGC 2192	6 <sup>h</sup> 15 <sup>m</sup>	+39° 51'	10.9	5' 45"	14.0
NGC 2126	6 <sup>h</sup> 03 <sup>m</sup>	+49° 54'	10.2	6' 40"	13.0
Basel 4	5 <sup>h</sup> 49 <sup>m</sup>	+30° 13'	9.1	6' 15"	12.18
NGC 1907	5 <sup>h</sup> 28 <sup>m</sup>	+35° 19'	8.2	6' 30"	11.26
NGC 1778	5 <sup>h</sup> 08 <sup>m</sup>	+37° 03'	7.7	6' 25"	10.06
NGC 1664	4 <sup>h</sup> 51 <sup>m</sup>	+42° 22'	7.6	18'	
NGC 1893	5 <sup>h</sup> 23 <sup>m</sup>	+33° 24'	7.5	12' 60"	9.31
NGC 1857	5 <sup>h</sup> 20 <sup>m</sup>	+39° 21'	7.0	5' 40"	7.38

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Picture Gallery



**Figure 1: Lunar eclipse, 3 to 4 March 2007, by Anthony Jennings**



**Figure 2: The lunar crater Copernicus and environs, 5 August 2007, by Andrew Fearnside**

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Picture Gallery

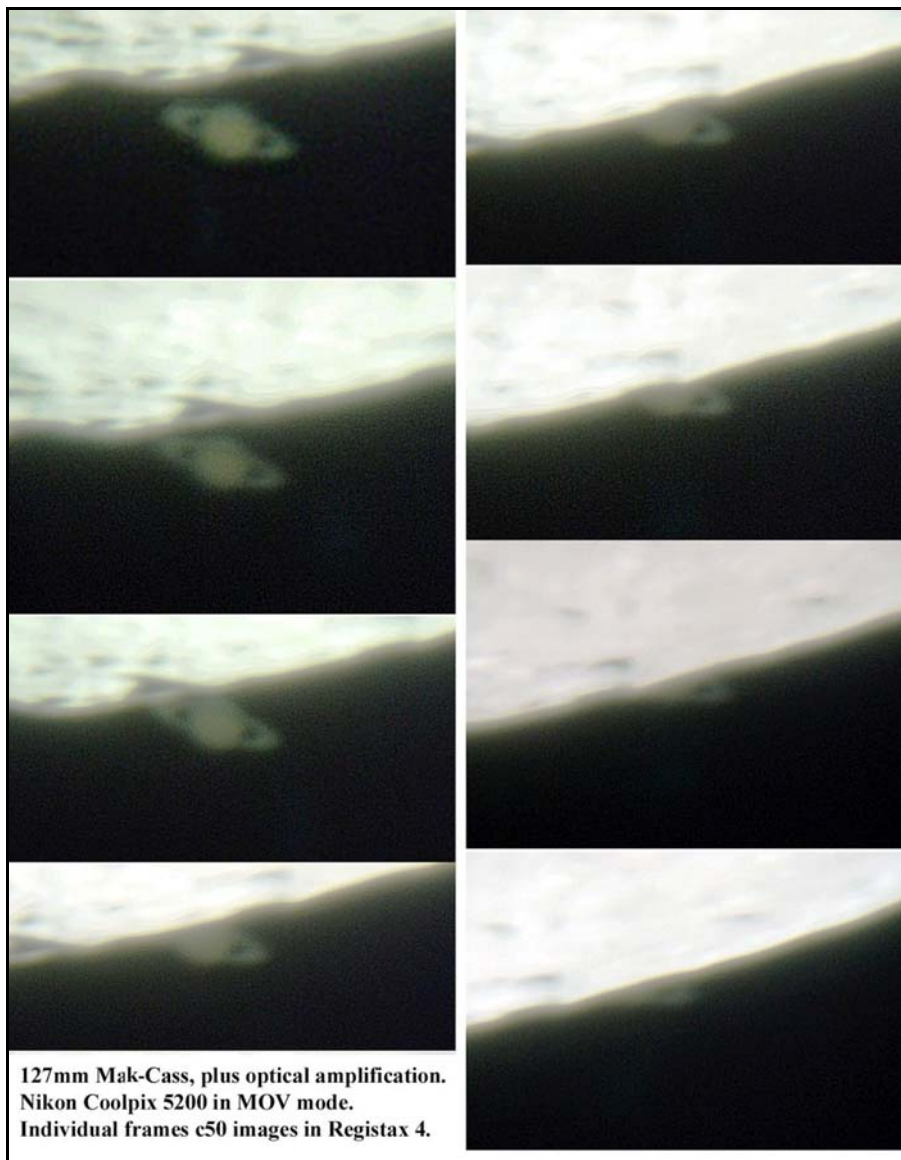


Figure 3: The occultation of Saturn by the Moon, 7 March 2007, by Kevin J Kilburn

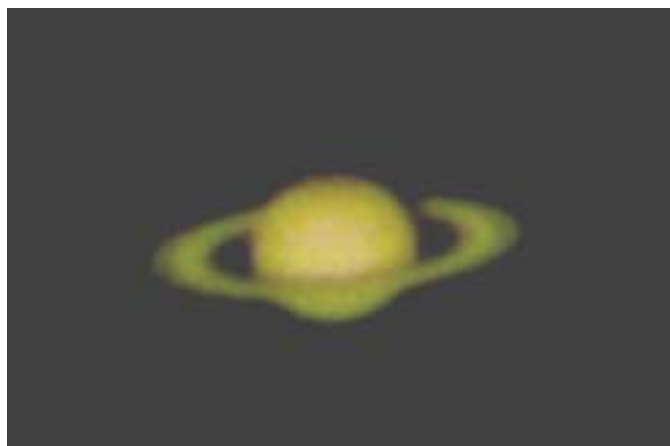


Figure 4: Saturn from the Goddard, 5 April 2007, by Kevin J Kilburn

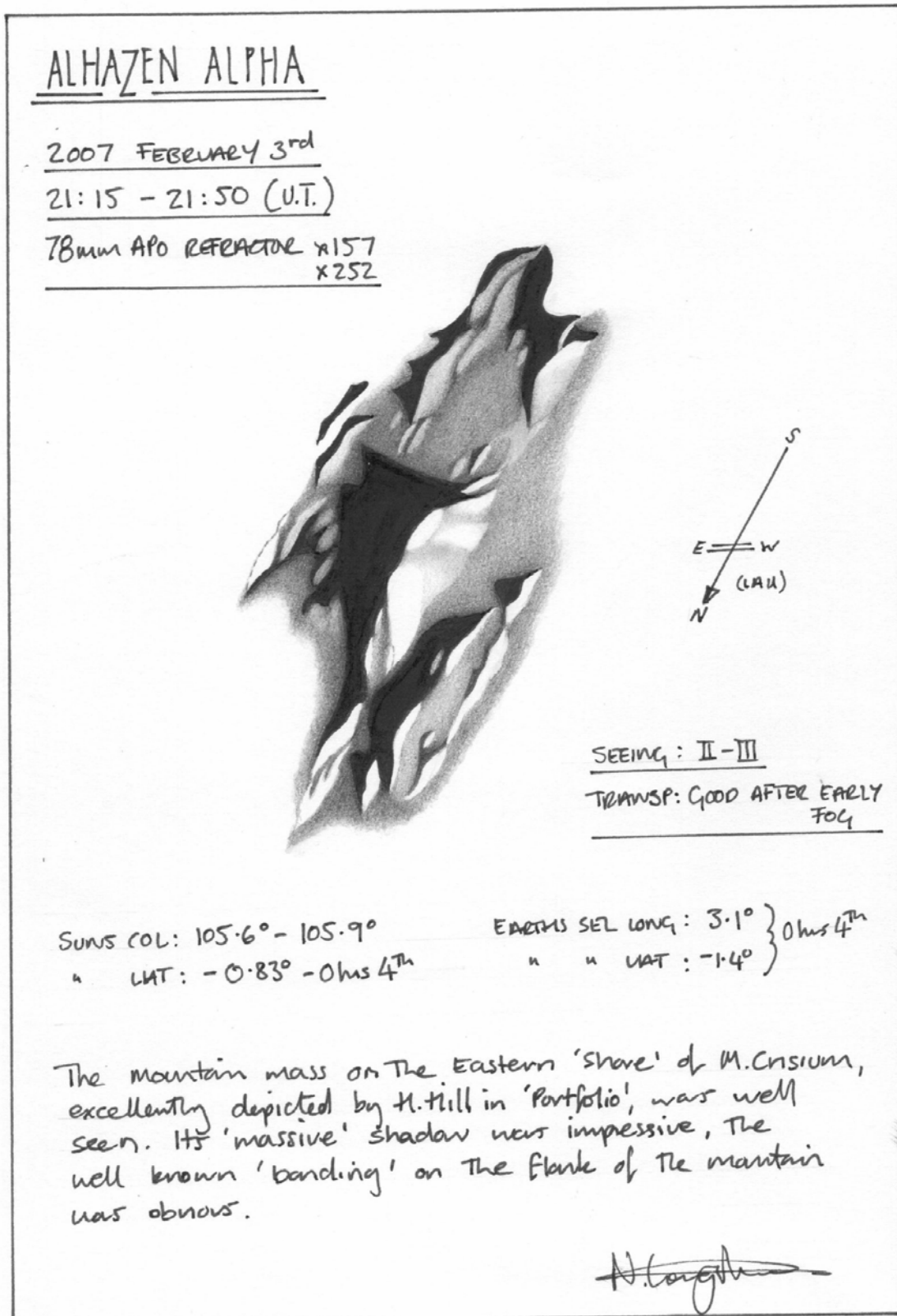


Figure 5: The lunar mountain Alhazen Alpha, by Nigel Longshaw

Picture Gallery

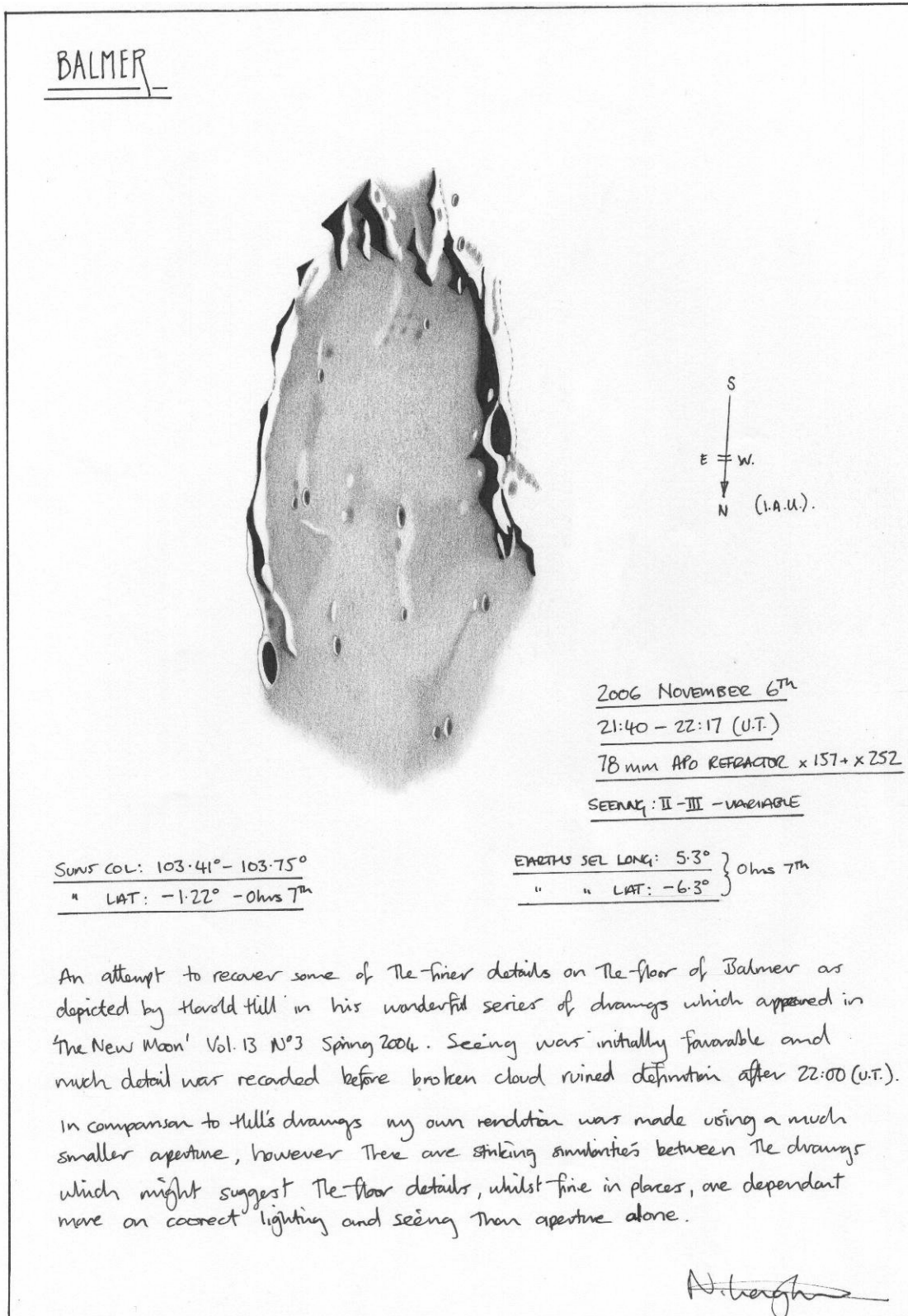


Figure 6: The lunar crater Balmer, by Nigel Longshaw

**Provenance**

A ruinous formation situated south-east of Vendelinus towards the difficult Eastern libratory region, you will not find Balmer named in the older lunar literature. The nomenclature was one of the new names proposed by Whitaker and Arthur whilst compiling the Rectified Lunar Atlas in 1963, and approved by the International Astronomical Union (IAU) in 1964.

Balmer forms the remains of a walled plain, the original diameter of which was probably in the region of 112 km. Subsequent lava intrusion has breached the northern wall and flooded the interior leaving very low and much degraded eastern and Western walls. Later, minor cratering and subsequent modification of the lava intrusions have left a record of minor features on the relatively smooth surface.

**Existing Records**

It is these minor features that have captured the attention of various selenographers in the past, and their differing depictions indicate that they appear to be very difficult objects indeed to record. Neison shows almost nothing in this region other than a few minor ridges, which do not appear to represent the currently observed extremities of the formation. Wilkins depicts the feature much as it appears on the modern charts in terms of its position and outline, and some of the floor details he shows correspond to drawings by later observers, although there are apparent anomalies which need to be checked.

Prospective students of the region should consult the excellent series of drawings by Harold Hill, which appeared in the Spring 2004 issue of *The New Moon*. Vol. 13 number 3, a publication produced by the Lunar Section of the British Astronomical Association. Hill's observations depict the feature over an extended period with decreasing illumination, conditions which bring out a wealth of minor detail on the surface as the shadows lengthen. Hill used eight-inch Schmidt-Cassagrain telescope and a ten-inch Newtonian telescope to compile his drawings and one might assume such apertures are required to detect the finer detail.

**Recent Drawings**

I have had an interest in this particular feature since Harold sent me a copy of one of his drawings back in 1984. However, despite repeated attempts to record the finer details using telescopes in the six to eight inch aperture range, I have never been successful.

The drawing of Balmer appearing in the Picture Gallery of this issue of Current Notes was

made recently using a Takahashi 78 mm apochromatic refractor, and records a number of the tiny crater pits, lighter regions and darker spots that litter the surface of Balmer. There is certainly more detail depicted here than is shown in Rukl's Atlas (chart number 60 p.147), and compares favourably with the details depicted by Hill. Resolution of the finer detail, in particular the tiny crater pits on the southern floor, was not possible with such a small aperture. The results of my latest observation suggest that perhaps in this particular instance the successful detection of the smaller features within the walls of Balmer might not be wholly dependant upon aperture alone. Seeing conditions during observation were by no means the best I have encountered, but were relatively good for my urban observing site, perhaps this would suggest that the successful observation of the minor features on the floor of Balmer is more dependent upon appropriate lighting and libration conditions than upon telescope aperture.

**Repeat Observations**

There have been discrepancies in the past in the visual record of floor features of Balmer, and it would seem there might be opportunity here for the visual observer to revisit the feature and see what they can record, irrespective of telescope aperture, in order to undertake confirmatory work. Accurate and impartial records of the surface of Balmer are of course available from Orbiter and Clementine missions, and no doubt CCD imagers, with subsequent image processing, could record much more detail than the visual observer. However, the interesting issue here is how the surface appears to the visual observer. Under certain conditions the floor of Balmer appears devoid of much detail, and I have seen the feature when only the main central crater is visible. However, it is apparent that at other times the surface bristles with detail and the formation takes on a somewhat different appearance.

From my own experience, it would appear the visual observer could make a useful contribution by recording the appearance of the interior of Balmer, irrespective of telescope aperture, and by doing so add to our knowledge of how detection of the finer detail is affected by libration and illumination conditions. Working in this way, we obtain a clearer understanding of why reports from past history have suggested that changes have taken place on the lunar surface, and we realise how important it is to observe a feature under many different conditions until satisfactory conclusions can be drawn as to the true nature of a particular feature.

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**Nigel Longshaw**

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## The Total Lunar Eclipse

"Do you mind if I join you tonight for the lunar eclipse?" said my fellow astronomer Robert Philburn over the phone. Having considered which of my two telescopes to use during the eclipse, a Meade LX90 Schmidt-Cassegrain with an eight-inch aperture, and a Meade LX55 Schmidt-Newtonian with a ten-inch aperture, I decided to use my ten inch Schmidt-Newtonian. It has a focal ratio of f/10 and, with an adaptor fitted, I am able to couple to it my Canon 350D digital camera so that an image of the whole of the Moon covers the camera's CCD chip. I had prepared my chosen telescope earlier in the day. I checked its collimation and cleaned its optics. I also checked my camera, emptied its 2Gb memory card of image data to enable the whole card to be dedicated to eclipse images, and made sure I had a spare charged-up camera battery (I used two for the eclipse). Those tasks done, I was ready for the evening's astronomical show and hoped that the typically bad English weather would clear up in time. As dusk fell, Rob Philburn turned up with a camera, a tripod and a camcorder. With all of our equipment set up and ready for the event, Rob and I sat down at my laptop computer with a hot drink, and reviewed the eclipse timings predicted by Skymap Pro. We wondered if the clouds would ever disappear. My first image was taken at 20:22UT at an exposure time of 1/800s with ISO set at 100. Cloud cover was approximately 80% at the time with only brief sightings of the Moon possible. I was hoping to take images at least every 15 minutes so as to be able to compile an image sequence of the eclipse as it unfolded, with the possibility of producing an animation of the event. Partial eclipse began at 21:30:22UT, and I took images of the Moon as often as possible, although this was quite a challenge due to the extent of cloud cover. By the time the eclipse had progressed to the point mid-way between the start of the partial eclipse phase and the start of the full eclipse phase, my camera settings had changed to an exposure time of 0.6s with ISO set at 100 in order to account of changes in illumination levels. At this point the clouds were breaking up and amounted to approximately 25% cover. The start of the full eclipse phase was an awesome sight. I had not realised how dark the Moon had become. My camera settings at this time were 4.5s exposure time with ISO set at 100. Also, to my amazement, the sky was 100% clear by then. At the midpoint of the eclipse, which occurred at 23:20:56UT, I took a series of photographs with a variety of camera settings. These included images taken with camera settings of 15s exposure time and ISO set at 100 and at 1600 to show the background stars; - the latter image showed stars fainter than magnitude 11, and this is included as background in the composite image of figure 1 of the Picture Gallery. Rob Philburn at that time was filming the event with his camcorder to create a diary of that night's astronomical show.

As the total eclipse phase ended, at 23:57:37UT, many images had been taken by Rob and I, and I had almost met my target of an image every 15 minutes. It was now midnight and Rob and I celebrated the evening's eclipse with a nice cup of hot coffee as we both continued taking images. The partial eclipse phase was due to end at 01:11:28UT and so many more images had to be taken. At the midpoint between the total eclipse phase and the end of the partial eclipse phase, which occurred at 00:42UT, my camera settings had changed to an exposure time of 1/320s and ISO set at 100. I took my last image at 02:01UT with an exposure time of 1/2500s and ISO 100, with the penumbral phase due to end at 02:23:44UT. By this time Rob had packed up all of his equipment, had said goodnight and had driven home. This was my first complete lunar eclipse and I know it won't be my last.

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**Anthony Jennings**

## The Occultation of Saturn

The occultation of Saturn by the Moon in the early hours of Friday 2 March 2007 was one of a series visible during 2007 from various parts of the world, this one being the best placed for UK observers. Even so, in the UK the full occultation was only visible to those observing east of a line from Skye to Brighton. Manchester was close to that line and we got a more or less partial occultation between about 02:40UT and 02:50UT with the remarkable apparition of Saturn, in all its ringed glory, gliding majestically behind mountains on the southern limb of the Moon. I took a sequence of images, illustrated in the Picture Gallery of this issue of Current Notes, showing the ingress. The images were taken with a simple Nikon 5200 point-and-shoot digital camera in MOV mode to capture short 20–30s videos. These were converted to AVI files and frame-stacked on Registax 4 to produce individual images with acceptable resolution. Each video clip had to be short, no more than about 250 frames, to minimize blurring due to the relative movement of the moon with respect to Saturn. Each image therefore contains relatively little stackable information and is therefore something of a compromise between obtaining a reasonably exposed planet without too much of a blurred Moon. I used a Maksutov-Cassegrain telescope with a 125 mm aperture. The optical amplification device was that described in my MAS web site article on hi-resolution lunar imaging with a simple digital camera. A month later, on 5 April, Saturn was observed with the 8-inch Godlee refractor and the accompanying image taken with the same camera setup but capturing longer, 40–50s MOV files. This gave rather better contrast and somewhat more detail to be resolved (see figure 4 of the Picture Gallery).

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**Kevin J Kilburn FRAS**

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## Global Warming Propaganda and *The Chilling Stars*

### Introduction

The purpose of this article is twofold. First, it is an attempt to expose the monstrous propaganda that has arisen from the “global warming phenomenon” and second, it is to introduce an antidote to this hype in the form of a book review. The book in question, which dare I say, should be compulsory reading for all astronomers, is called *The Chilling Stars: A New Theory of Climate Change* by Henrik Svensmark and Nigel Calder, published by Icon Books, Cambridge, UK in 2007 (currently £9.99), isbn 10:1-84046-815-7 and isbn 13:978-1840468-15-1.

Svensmark’s work has also recently been endorsed by the Royal Astronomical Society (RAS) in *Astronomy & Geophysics*: Vol 48, issue 1, February 2007. The article is called *Cosmoclimatology* and it is succinctly written and highly recommended.

### Background

Possibly like many of you, I had found myself accepting much of the barrage of publicity surrounding global warming, until I saw Channel 4’s programme *The Great Global Warming Swindle*. That programme provoked me into thinking further. Shortly afterwards, I read the RAS article and *The Chilling Stars*.

One of the keys to persuasive propaganda is excellent presentation. Al Gore’s lectures are very well done. A lot of what is said is correct, but carbon dioxide (CO<sub>2</sub>) does not drive long term climate. What Mr Gore has neglected to say is that there is an 800 year lag of CO<sub>2</sub> levels behind temperature changes, as shown by painstaking examination of fossil records, rocks and ice core samples. CO<sub>2</sub> also only accounts for 0.054% of the atmosphere at present. Of the greenhouse gases, water vapour accounts for a massive 95%, again leaving CO<sub>2</sub> and methane far behind as far as overall significance is concerned. Thus even doubling the amount of CO<sub>2</sub> in the atmosphere would have very little effect on climate.

Carbon dioxide seems also to be treated by the media as a poisonous gas. This is nonsense. All plants and trees live on the gas and need it to produce oxygen for us to breathe. Providing there are still sufficient plants to perform this conversion, an increase in CO<sub>2</sub> may well be a good thing, as the plants will use it to increase oxygen.

I am all for cleaner air, the preservation of oxygen-producing forests and more efficient energy-producing systems, but not at the expense of misinformation: that is bad science, unless the idea in question is too dangerous to

reveal. No, the whole global warming phenomenon has now become a self-perpetuating, multimillion pound industry, with the jobs of tens of thousands of people depending on it. Our unscrupulous treasury, at No.11 Downing St, has not been slow to take advantage either: businesses already have a “climate change levy” added to their energy bills and there will probably be more stealth thieving to come. Unfortunately, exploded hypotheses are frequently maintained if a truer alternative would imply the cessation of funding. There is ample funding available however if you remember to mention the CO<sub>2</sub> global warming phenomenon in your application, particularly if your research might further establish it.

I would firmly suggest here and now that climate is ultimately unpredictable to any degree of high accuracy, because there are just too many variables and most of these variables are mutually interfering with each other, which further exacerbates the problem. Let me list a few of these variables randomly, most of which are mentioned in *The Chilling Stars*:

- Cosmic rays, whose impact is varied by the strength of the solar wind and magnetic field and which in turn affect the degree of cloud formation;
- Degree of cloudiness (clouds generally cool, except over Antarctica);
- Galactic magnetic field, which affects the paths of cosmic rays;
- Cannibalism of and by other galaxies, which affects starburst activity and hence cosmic ray production;
- Position of the sun in its galactic revolution with respect to Gould’s Belt and the spiral arms;
- Temperature, evolution and size of the Sun;
- Rotational speed of the Earth;
- Varying distance of the Moon and other planets;
- Precession of the equinoxes (26,000 year cycle);
- Variation in the obliquity of the ecliptic (40,000 year cycle);
- Orbital shape of the Earth (100,000 year cycle);
- Continental growth;
- Mountain building;

- Volcanic eruptions;
- Continental drift affecting ocean currents and circumpolar ice platforms;
- Changes in atmospheric composition;
- Geochemical role of life;
- Depth, mass and temperature of the oceans, (this can have a 10,000 year lag behind climate changes);
- Impact of comets and meteors;
- The Butterfly effect from chaos theory;
- El Nino;
- Man-made pollution;
- Vegetation (CO<sub>2</sub>/O<sub>2</sub> cycle) – the growth and destruction of it;
- Greenhouse gases – water vapour is by far the most dominant, not CO<sub>2</sub>;
- Flatulence of herbivores (CH<sub>4</sub>, a greenhouse gas).

All of these influences may be acting simultaneously at any one time. Would you dare to predict climate accurately from all these variables?

I cannot overemphasize the role of the Sun. It is a two quintillion kg raging step down transformer from the Universe with a luminosity of 386 quadrillion watts, converting four million tonnes of mass into energy each second. Its main influences are the generation of electromagnetic radiation and heat, its solar wind impinging on the Earth's magnetic field, the modulation of cosmic rays (this will be expanded upon later) and gravitational control of the whole Solar system. It has been the major driver of climate for the last 4.5 milliard years and it will be for the next. It certainly has a greater influence than the flatulence of cows and propaganda merchants.

### *The Chilling Stars*

Now I turn to the book. The first half is a little heavy going, with the listing of the names of too many researchers, but it becomes easier reading later on. The graphs are better in the RAS article (being in colour there), but generally serve to make the points. The book frequently refers to geological aeons: those unfamiliar with these should print out a list from say [www.wikipedia.com](http://www.wikipedia.com), then the time scales can be followed more easily.

The advantage of cosmoclimatology is that it is the only theory that consistently follows the long-term effects of climate change. It makes

very clear, the role of clouds: their net effect is to cool the Earth. High-level clouds tend to warm. Middle-level clouds are the most efficient coolers, but account for only 6% of cooling. 60% of cooling is due to low-level clouds such as stratocumulus. Cloud tops are cooler than their bases as they radiate infra red into space and keep Earth cooler than that by direct unimpeded insolation.

Some of the assertions of cosmoclimatology are these. Cosmic rays consist of protons, helium nuclei, heavy nuclei and exotic particles such as muons. The muons (muons, or  $\mu$ -mesons, are similar to electrons, but 206 times the mass of an electron), in particular are able to penetrate the entire atmosphere and release electrons through interaction with other particles, which in turn act as very efficient catalysts for the formation of clouds, particularly providing sulphuric acid molecules – upon which water vapour may condense. This electron catalyst mechanism is very fast and is a mechanism previously unknown in meteorology. Here we have the cosmos and climate conjoined at the microphysical level. Svensmark shows this to be so with experiments. More cosmic rays equal more cloud.

However, two major factors vary this influx. Examples include the strength of the solar wind and solar magnetic field, and the position of the Sun in the galaxy with respect to the spiral arms. If the solar wind is strong, it blows away the cosmic rays and the Earth heats up. If the Sun is quiet, we have more clouds and it cools. This is balanced by the other factor: if the Sun is within or near a spiral arm, we have more cosmic rays (from more supernovae, the biggest producers within the star forming regions of the galaxy) and the Earth tends to cool. Between spiral arms, it tends to be warmer. However, cosmic rays cannot be used to predict climate accurately at present, because their opposer, the Sun, is unpredictable, apart from a poorly understood 11-year cycle. (This has not stopped people from trying: readers might like to check out Dr Piers Corbyn's website [www.weatherwatch.com](http://www.weatherwatch.com). He gives predictions based on solar activity and his method, I am informed, is more accurate than that of the Met Office. He has apparently placed bets on his own method and won every time!)

The book clearly demonstrates that this combination is a major driver of climate change, by using evidence from fossils, geology and ice-core samples to show how climate temperature has varied in the distant and recent past. Also, it is possible to measure the history of cosmic ray strengths with similar analyses. Experiments have so far shown the catalytic power of cosmic rays to produce clouds. An experiment known as CLOUD is to be carried out at CERN in 2010, after much opposition.

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Distinguishing between coincidence and causal action has always been difficult in climatology. This book clearly demonstrates a causal action hugely more significant than man-made pollution. Indeed, it would not surprise me if it were to be used in a court of law one day to discredit such things as "climate change levies".

Nigel Calder, a former editor of *New Scientist*, also wrote a book called *The Weather Machine*, wherein he first put forward the idea of man made pollution possibly driving long term climate change. He has long since recanted and his wide journalistic experience has helped produce a book with a good view of overall patterns amidst a very complex subject, which crosses the boundaries of many different sciences.

The book sportingly deals with one major anomaly and explains why Antarctic weather patterns seem to do the opposite of the rest of the world. It has a useful index and the authors are rigorous in quoting sources.

### **Conclusion**

Although cosmoclimatology may answer many questions, it is still only one part of a very complex whole. Nevertheless, astronomers who support this theory should actively use it to discredit CO<sub>2</sub> propaganda at every opportunity. Ever since Rutherford split the atom and buried forever the idea that atoms were solid and unbreakable, we have known that all phenomena are the product of field forces. Total knowledge and understanding may only be attainable by an infinite mind, but that will not stop science trying its hardest to uncover all truth. Life never ceases to be interesting for enquiring minds.

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**Guy Duckworth FRAS**

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Email: [president@manastro.co.uk](mailto:president@manastro.co.uk)

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The University of Manchester  
Manchester, M60 1QD  
Answerphone (24 hrs): 0161 200 4977  
Fax: 0161 228 7040

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Email: [asfearnside@hotmail.com](mailto:asfearnside@hotmail.com)

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**Manchester Astronomical Society  
Godlee Observatory  
Floor G, Sackville Street Building  
University of Manchester  
Manchester  
M60 1QD**

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