

# THE BRITISH ASTRONOMICAL ASSOCIATION



## LUNAR SECTION CIRCULAR

Director Alan Wells  
Assistant Director/Editor John Pedler

Volume 42 No. 7

Data on pages 7-8 are for Aug. 2005

Lunation 1021

July 2005

### TOPOGRAPHICAL SUB-SECTION

COLIN EBDON

This is a time of the year when many lunar observers close down operations in anticipation of the darker Autumn skies ahead, when the post Full Moon phases are well displayed. This season can often bring nights of good seeing, especially if conditions are stabilised by a slight ground mist.

However, it should be remembered that by late July and August the waning crescent phase of the Moon is favoured, if little observed, and after first quarter will be high enough in the pre-dawn sky to be worth viewing. In 2005, two of the critical days fall conveniently on the weekend of 30 and 31 July when, assuming clement weather, it will be worth making the effort to rise early in order to see some familiar lunar features, literally in a new light.

For those who wish to obtain some spectacular images, the early morning hours of 30 July will see sunset over Clavius and Copernicus. For those who wish to undertake more detailed studies, the early hours of 31 July will provide, amongst other features, the opportunity to obtain fine views of Encke and Kepler, Mons Harbinger, the Hainzel/Mee pair and anything in the Mare Humorum region. I would be particularly interested to see any record of the Diophatus/Deslisle region, not least because I would like to investigate past observations of domes in this region.

region.

This month I must thank Harold Hill, Grahame Wheatley, Phil Morgan Peter Grego and Roy Bridge for having forwarded drawings to me in May and June and Ed Crandall and Paul Brierley for sending on digital photographs. I have included a selection here, and others will appear in future issues of The Circular and 'The New Moon'.

Details of those reproduced here are:

Paul Brierley: Wide Angle shot of Copernicus and Aristarchus, showing the ghost

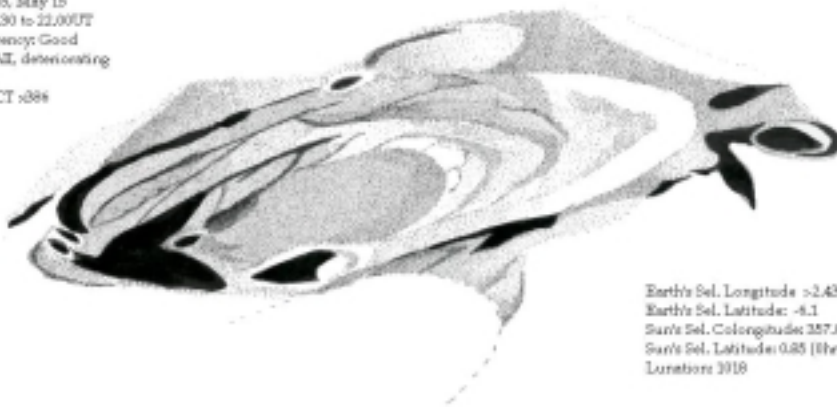
crater Stadius and much other detail. 2005 May 17. 20.06.23UT 8" f6 Newtonian. Vixen 8-24mm eyepiece. Canon S10 Digital camera. Seeing: AIII.

Ed Crandall Region centred on Darwin. 2005 May 22. 01.50UT. 110mm APO Refractor, 3x Barlow and TOUCAM. Seeing: Average.

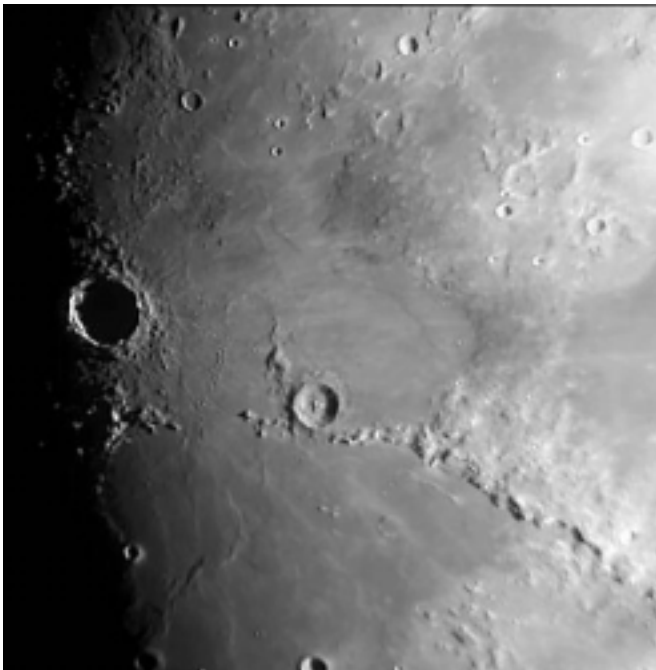
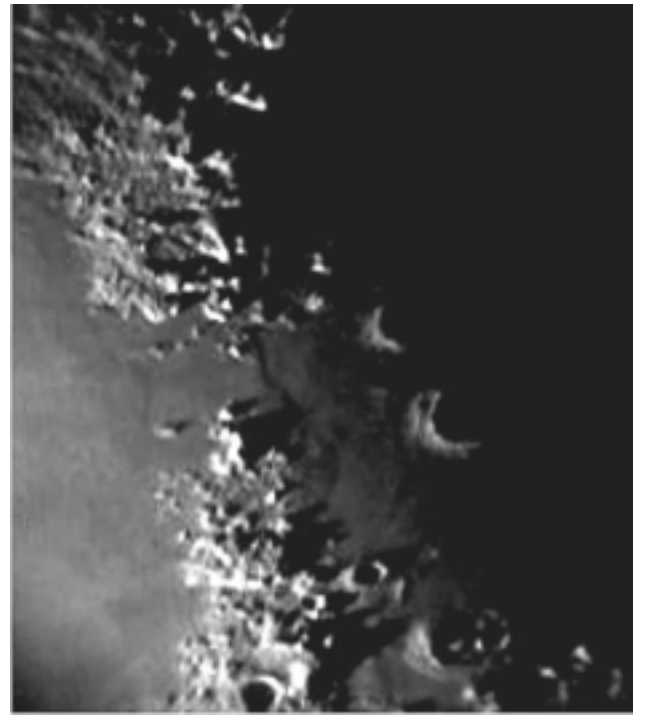
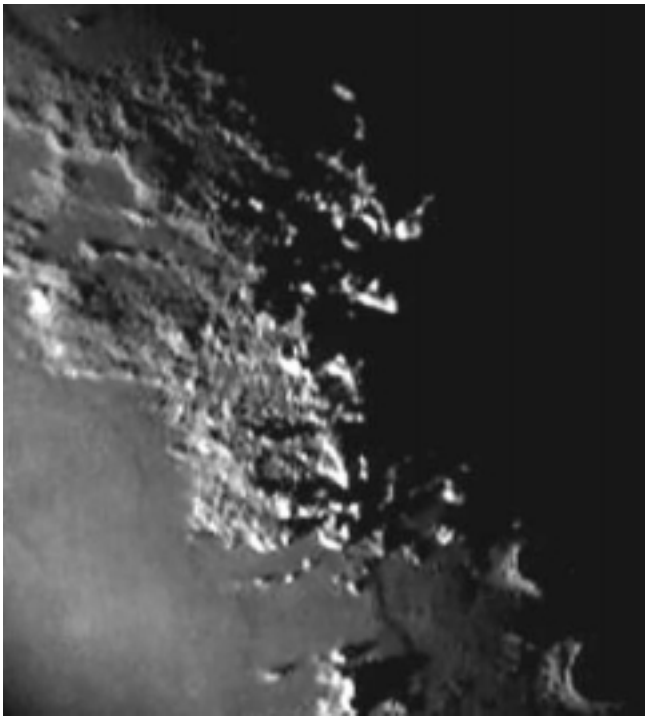
Colin Ebdon Drawing of Bousingault under high lighting conditions - details as marked. Two general views of the Alps and Apennines. 2005 May 15. 20.30UT. 7" f15 Maksutov-Cassegrain and Sony Camcorder. Eight frames stacked.

#### BOUSSINGAULT

Observer C.Ebdon  
Date: 2005, May 15  
Time: 20.30 to 22.00UT  
Transparency: Good  
Seeing: All, deteriorating  
Alt.  
7" f15 MCT x384



Earth's Sel. Longitude: -2.43 to -2.5  
Earth's Sel. Latitude: -8.1  
Sun's Sel. Longitude: 357.01 to 357.76  
Sun's Sel. Latitude: 0.85 (After 16 May)  
Lunation: 1018



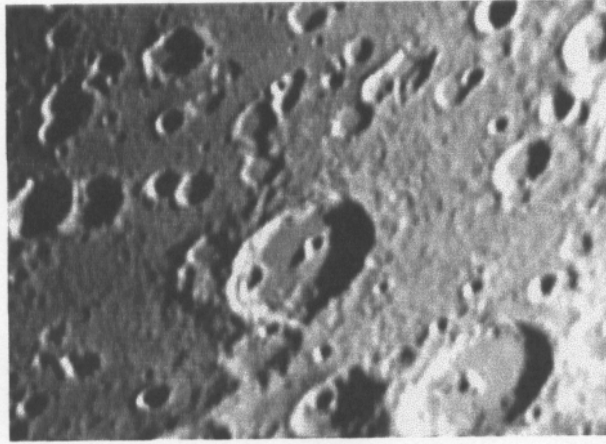
CLOUDWATCH

Andrew Bytnar

Tabulated data for April 2005

| <u>Observer and location</u> | <u>Excellent</u><br><i>days</i> | <u>Cloudy</u><br><i>days</i> | <u>Overcast</u><br><i>days</i> | <u>Hazy</u><br><i>days</i> | <u>No watch</u><br><i>days</i> |
|------------------------------|---------------------------------|------------------------------|--------------------------------|----------------------------|--------------------------------|
| P.Burt (Chatham)             | 6 (20%)                         | 4 (13%)                      | 18 (60%)                       | 0 ( 0%)                    | 2 ( 7%)                        |
| A.Bytnar (Mansfield)         | 4 (13%)                         | 16 (53%)                     | 10 (33%)                       | 0 ( 0%)                    | ----                           |
| M.Cook (Cromer)              | 13½ (45%)                       | 4 (13%)                      | 12 (40%)                       | 0½ ( 2%)                   | ----                           |
| K.Hall (Warrington)          | 5½ (18%)                        | 10½ (35%)                    | 12½ (42%)                      | 1½ ( 5%)                   | ----                           |
| A.Heath (Nottingham)         | 6 (20%)                         | 8 (27%)                      | 16 (53%)                       | 0 ( 0%)                    | ----                           |

Observers who contributed observations in the month of May 2005 are Clive Brook (UK) who observed on 22<sup>nd</sup> May the crater Aristarchus. On 14<sup>th</sup> May David O. Darling (USA) examined Mare Crisium, Theophilus, and Proclus. Brendan Shaw (UK) observed Kant, Pitiscus and Censorinus on 14 May and Thaeatetus, Pitatus, and Plato on 17<sup>th</sup> May. Finally Don Spain (USA) observed on the 17<sup>th</sup> & 18<sup>th</sup> of May and examined: Archimedes, Alphonsus, Plato, Ptolemaeus, Straight Wall, Copernicus, Tycho, and Moretus. The total number of days that we had observations from was 4 and the total number of minutes for which observations were received was covered was 376. No TLP were reported during these observations.



Pitiscus by Brendan Shaw taken on 2005 May 14 UT 20:52

In the March 1991 edition of *Sky and Telescope*, Dr Winifred Sawtell Cameron published an interesting article on TLP. One of the observations shown, although not discussed in detail, were two photographs taken by Gary Slayton of Fort Lauderdale, FL, USA on 1981 September 5 (no UT was given). They showed: “*a bright glow in the crater Pitiscus that appeared to move. Slayton alleges to have observed it visually, noting that it looked gray with a tinge of red*”. I have not reproduced 1981 images here as these are probably copyright, but if you have the above mentioned *Sky and Telescope* then you can look these up on page 266. During the generation of the May 2005 predictions of repeat illumination and libration conditions, the above observation was flagged up for UK observers as occurring on 2005 May 14 from 19:50-22:17UT. Brendan Shaw was out observing on that night and managed to obtain the image seen in Fig 1. I do not have a good copy of the 1991 *Sky and Telescope* article, so would be very interested to hear from readers out there who could compare the images. It is likely that we have the above observation in the archives of ALPO or the BAA, but at the time of writing have not had a chance to look this up. The BAA TLP archives are contained in several large boxes and it takes considerable time to locate observations, although observations are gradually being scanned in and permanently filed on DVD disk to make access and retrieval easier.

The 1981 observation sounds to me like image flare that crops up on photographs and CCD images due to internal reflection within the telescope eyepiece tube, although Slayton did report to have seen it visually. However the *Sky and Telescope* article does not state whether he was looking through the camera at the time or through an eyepiece? There is also another problem, the *Sky and Telescope* article does not give a time of the observation, so in the computer predictions, there are two possible time periods for 1981 Sep 5 when the Moon was above the horizon (and it was night) at Fort Lauderdale (assume alt > 5deg): 00:00-03:09 (AM) and (23:35-23:59 (PM). Brendan Shaw’s observation in Fig 1 corresponds to the “AM” predictions. Obviously Brendan’s observation will not show a moving bright spot, as this sort of thing is not the norm, but his CCD image is useful for checking whether the date and time slots for the 1981 observation are correct. Also when we find a better copy of the original 1981 observation, then it should be feasible to scan this in, align and normalize it, and then subtract from Brendan’s “usual” appearance image in order to show what the difference is. In this way if the effect is image glare it should reveal some consistent shape that will appear on both of Slayton’s images, otherwise it may vindicate the 1981 images as being due to a cause other than glare.

Anyway I will keep you posted with further developments in this analysis. I included the above report to show how useful your observations are if you can observe during repeat illumination and/or libration conditions as listed in the predictions. Your observations can really help eliminate many past TLP reports that have remained an enigma for a number of years, or high light other reports that may be genuine TLP. So do please try to make some observations during July at some of the times given in the predictions as your reports will be very helpful in our analysis!

**The following repeat illumination and libration events for UK observers occur for July:**

Event: Aristarchus (Bartlett, 1965 Nov 06) can be seen on/from (UT): 2005 Jul 18 (20:14-21:24) - [*Any sign of a blue-violet glare on the E & NE walls?*]

Event: Aristarchus Area (Greenacre and Barr, 1963 Oct 30) can be seen on/from (UT): 2005 Jul 18 (21:14-23:36) - [*This was a famous TLP report – try to see if any spurious colour present could be mistaken for ruby red spots around the Schroter’s Valley or if there is any pink/violet on the crater rim. The lighting and illumination are the same to within +/- 1 deg of this famous 1963 event! Even try observing through different sized telescope if you have these available*]

Event: Darwin (Moore, 1945 Oct 19) can be seen on/from (UT): 2005 Jun 20 (00:14-00:34) - [*Can you see three brilliant points of light on the wall as Sir Patrick Moore did back in 1945 – if so then this is normal appearance? If not then the 1945 observation was of a real TLP*]

Event: Aristarchus (Bartlett 1965 Sep 10) can be seen on/from (UT): 2005 Jul 20 (21:38-22:56) - [*Is the S. region of the floor granulated and does it have a colour to it?*]

Further predictions, including the more numerous illumination only events can be found on the following web site: <http://www.cs.nott.ac.uk/~acc/Lunar/tlp.htm>. For members who do not have access to the internet, please drop me a line and I will post predictions to you. If you would like to join the TLP telephone alert team, please let me know your phone No. and how late you wish to be contacted. If in the unlikely event you see a TLP, please give me a call on my cell phone: +44 (0)798 505 5681 and I will alert other observers. Note when telephoning from outside the UK you must not use the (0). When phoning from within the UK please do not use the +44!

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## **Occultation subsection news**

**Andrew Elliott**

The grazing occultation list and chart for the period July to December 2005 is included in this Circular.

Only one graze is predicted for July, on the night of 22<sup>nd</sup> (see below). This involves the bright star 4.7 magnitude kappa Capricorni and an almost full moon (96% sunlit). However, the graze takes place entirely against the remaining northern ‘dark cusp’ of the moon. This is in the ‘Cassini region’ – an area where the data on the moon’s limb is sparse, so observations from a graze expedition would be extremely valuable. The moon will be low in the south east at 11° altitude. (This accounts for the very curved track.) The track only crosses east Sussex and Kent. It hits the south coast at the east end of Brighton at about 22:54 UT (23:54 BST). It then travels across rural parts of east Sussex and Kent and leaves the north coast of Kent near Herne Bay at about 22:57 UT. Anyone willing to organise a graze expedition for this event should contact me early for detailed predictions for this graze. (Email: [ae@f2s.com](mailto:ae@f2s.com), Tel: 01772 632450)

Total occultations were listed in last month’s LSC. There are some reasonably bright ones but the moon’s altitude is relatively low during the short dark period at this time of year.

## **Observer news**

Mr Martin Gaiger (Kingston-upon-Thames) wrote to me about his observation of a predicted graze near his home – he had only seen a total occultation there. Checking the detailed predictions showed that the graze track actually passed a few km from his location. This has highlighted the point that it is not possible to assess precisely where graze tracks pass from the low precision maps used in the BAA Handbook and these circulars. Mr Gaiger has subsequently requested general details about occultation observing. I am currently undertaking a massive update of our general information and observing philosophy and will send further details when done. Once completed, I hope to include extracts in this column, and hopefully on the Lunar Section web site.

**Predictions for 52°27'41.4"N 1°44'44.0"W Birmingham**

**August 2005**

| Day  | Time-UT | P  | Object | O           | Max Sp    | %   | Elg | Sn   | Mn  | Mn  | CA | PA    | Watts | a   | b   | Star's | apparent       |                 |
|--|---------|----|--------|-------------|-----------|-----|-----|------|-----|-----|----|-------|-------|-----|-----|--------|----------------|-----------------|
|  | H       | M  | S      | D           | Reference | V   | Mag | Snlt | Alt | Alt | Az | Angle | Min/° | RA  | Dec |        |                |                 |
| 1/01   | 11      | 18 | /R     | PPM 94499   | 85        | 7.9 | F0  | 14-  | 45  | 7   | 52 | 64N   | 299   | 301 | .2  | .8     | 53441.1 272008 |                 |
| 2/02   | 11      | 06 | /R     | PPM 96100   | 88        | 6.5 | M8  | 8-   | 33  | 7   | 54 | 70S   | 261   | 257 | .5  | 1.2    | 63119.3 272701 |                 |
| ABOVE STAR IS A VARIABLE STAR -- MINIMUM MAGNITUDE = 11.9. |         |    |        |             |           |     |     |      |     |     |    |       |       |     |     |        |                |                 |
| 3/03   | 39      | 52 | /R     | PPM 97535   | 95        | 7.2 | A2  | 4-   | 22  | -7  | 11 | 61    | 47S   | 248 | 240 | .5     | 1.5            | 72820.0 261308  |
| 8/20   | 35      | 57 | /DC    | FK5 445     | 55        | 3.8 | F8  | 12+  | 41  | -7  | 3  | 269   | 89S   | 113 | 91  | .0     | -1.5           | 115058.1 14407  |
| 21/03  | 34      | 14 | /R     | PPM 207366  | 98        | 4.9 | MB  | 97-  | 161 | -12 | 24 | 215   | 72N   | 272 | 294 | -.8    | -.7            | 231709.5 -74140 |
| ABOVE STAR IS A VARIABLE STAR -- MINIMUM MAGNITUDE = 5.1.  |         |    |        |             |           |     |     |      |     |     |    |       |       |     |     |        |                |                 |
| 24/03  | 56      | 52 | /R     | PPM 117745  | 75        | 8.2 | A0  | 75-  | 120 | -10 | 50 | 183   | 71S   | 230 | 249 | -.7    | .7             | 15255.6 122820  |
| 24/04  | 39      | 05 | /R     | PPM 117759  | 76        | 7.1 | F5  | 75-  | 120 | -4  | 49 | 198   | 89S   | 247 | 266 | -.8    | .2             | 15348.4 124242  |
| 25/02  | 41      | 20 | /R     | PPM 118466  | 65        | 8.2 | G5  | 66-  | 108 |     | 49 | 136   | 86N   | 255 | 272 | -.7    | .8             | 24221.4 174658  |
| 25/03  | 34      | 18 | /R     | FK5EXT 2190 | 87        | 6.5 | K0  | 65-  | 108 |     | 53 | 154   | 27S   | 189 | 206 | -.1    | 2.7            | 24438.1 174721  |
| 25/06  | 07      | 21 | /RK    | PPM 118572  | 85        | 6.0 | K0  | 64-  | 106 | 8   | 52 | 214   | 12S   | 174 | 190 | -.1    | 6.1            | 24851.2 181831  |
| 26/05  | 05      | 31 | /R     | PPM 92691   | 65        | 6.6 | A0  | 55-  | 95  | -1  | 60 | 170   | 87S   | 254 | 266 | -.9    | .5             | 33900.4 224045  |
| 28/04  | 27      | 06 | /RM    | PPM 94373   | 66        | 7.8 | F8  | 35-  | 72  | -7  | 51 | 114   | 82N   | 276 | 279 | -.7    | .6             | 52721.9 273659  |
| 29/01  | 27      | 37 | /R     | PPM 95676   | 65        | 8.0 | K2  | 27-  | 62  |     | 18 | 67    | 82N   | 283 | 281 | .0     | 1.0            | 61615.2 275142  |
| 29/02  | 17      | 22 | /R     | PPM 95731   | 76        | 7.4 | A0  | 27-  | 62  |     | 25 | 76    | 58N   | 307 | 305 | -.4    | .5             | 61820.4 280023  |
| 29/02  | 35      | 44 | /R     | PPM 95753   | 76        | 8.0 | K0  | 27-  | 62  |     | 28 | 79    | 49N   | 316 | 314 | -.6    | .2             | 61907.8 280318  |
| 29/03  | 23      | 14 | /R     | PPM 95798   | 75        | 8.6 | K0  | 26-  | 62  |     | 35 | 88    | 56N   | 309 | 307 | -.7    | .3             | 62041.9 280436  |
| 29/04  | 46      | 27 | /R     | PPM 95863   | 67        | 7.5 | K2  | 26-  | 61  | -4  | 47 | 105   | 85S   | 270 | 268 | -.6    | .9             | 62308.2 275909  |
| 29/04  | 28      | 52 | /R     | PPM 95875   | 86        | 7.9 | A0  | 26-  | 61  | -7  | 44 | 101   | 10S   | 195 | 193 | .8     | 5.5            | 62326.2 274349  |
| 30/02  | 03      | 32 | /R     | FK5EXT 2553 | 88        | 5.6 | A2  | 19-  | 51  |     | 15 | 65    | 45S   | 237 | 230 | .5     | 1.8            | 71143.0 265058  |
| 30/02  | 27      | 01 | /RZ    | PPM 97203   | 98        | 6.4 | F5  | 19-  | 51  |     | 19 | 69    | 32N   | 339 | 332 | -.8    | -.7            | 71309.0 271303  |
| ABOVE STAR IS A VARIABLE STAR -- MINIMUM MAGNITUDE = 6.5.  |         |    |        |             |           |     |     |      |     |     |    |       |       |     |     |        |                |                 |
| 31/01  | 19      | 08 | /RC    | PPM 98236   | 85        | 6.2 | A0  | 12-  | 41  |     | 2  | 49    | 67N   | 311 | 300 | .2     | .5             | 80203.0 250435  |

A letter in the "D" column indicates a possible double star.

See LSC 35, 5 (May 1999) for comments on recording observations using the new format predictions.

**Grazing Occultations, UK and Ireland, July-December 2005, Magnitude <= 7.0**

**See accompanying graze track map in this LSC**

| TRACK NO.                        | DATE (2005) | USNO REF: | SAO/PPM REF: | D | MAG | %SUN-LIT | L | W.U.T. HH | MM   | M    | CUSP ANGLE | T | STAR NAME        | MAG1 | MAG2 |
|----------------------------------|-------------|-----------|--------------|---|-----|----------|---|-----------|------|------|------------|---|------------------|------|------|
| nos. continued from January LSC) |             |           |              |   |     |          |   |           |      |      |            |   |                  |      |      |
| 14                               | JUL 22      | ZC 3175   | 164593       |   | 4.7 | 96-      | N | 22        | 41.5 | 16.3 | D          | A | 43 kappa Cap     |      |      |
| 15                               | AUG 30      | ZC 1093   | 79170        | Z | 6.6 | 18-      | N | 2         | 14.7 | 11.0 | D          | A |                  | 7.2  | 7.2  |
| 16                               | SEP 15      | ZC 3175   | 164593       |   | 4.7 | 93+      | N | 20        | 3.0  | 1.7  | D          | A | 43 kappa Cap     |      |      |
| 17                               | SEP 24      | ZC 773    | 76998        | C | 7.0 | 61-      | N | 4         | 42.3 | 4.7  | D          | B |                  | 7.1  | 8.7  |
| 18                               | SEP 24      | ZC 885    | 77625        | Y | 5.6 | 53-      | N | 21        | 31.1 | 6.8  | D          | C | 406 B. Tau       | 5.9  | 7.2  |
| 19                               | OCT 13      | ZC 3284   | 165032       | K | 7.0 | 83+      | S | 22        | 27.2 | 8.0  | D          | C |                  | 7.9  | 7.9  |
| 20                               | OCT 23      | ZC 1022   | 78593        | M | 6.0 | 68-      | N | 3         | 9.6  | 1.5  | D          | A | 54 Aur           | 6.2  | 7.8  |
| 21                               | OCT 28      | ZC 1576   | 99305        |   | 5.3 | 21-      | N | 4         | 36.9 | 4.0  | B          | B | 53 l Leo         |      |      |
| 22                               | NOV 11      | ZC 3514   | 146954       | C | 5.9 | 80+      | S | 23        | 38.1 | 10.5 | D          | A | 24 Psc           | 6.9  | 6.9  |
| 23                               | NOV 20      | ZC 1105   | 79241        | V | 6.5 | 83-      | S | 5         | 16.6 | 11.2 | D          | A | 134 B. Gem       | 7.0  | 7.7  |
| 24                               | NOV 20      | ZC 1206   | 79861        |   | 5.9 | 76-      | N | 23        | 22.8 | 2.0  | D          | A | 2 omega Cnc      |      |      |
| 25                               | NOV 26      | ZC 1730   | 119147       |   | 6.2 | 28-      | S | 5         | 4.4  | 11.3 | D          | A | 27 B. Vir        |      |      |
| 26                               | DEC 11      | ZC 299    | 92763        |   | 6.0 | 85+      | S | 19        | 22.3 | 14.0 | D          | A | 12 Hl. Ari       |      |      |
| 27                               | DEC 14      | ZC 598    | 76425        | T | 5.5 | 97+      | S | 4         | 17.7 | 7.3  | D          | A | 36 Tau           | 6.4  | 6.4  |
| 28                               | DEC 23      | ZC 1696   | 119003       |   | 6.9 | 56-      | S | 4         | 47.3 | 13.4 | D          | A | 451 B. (Leo)/Vir |      |      |

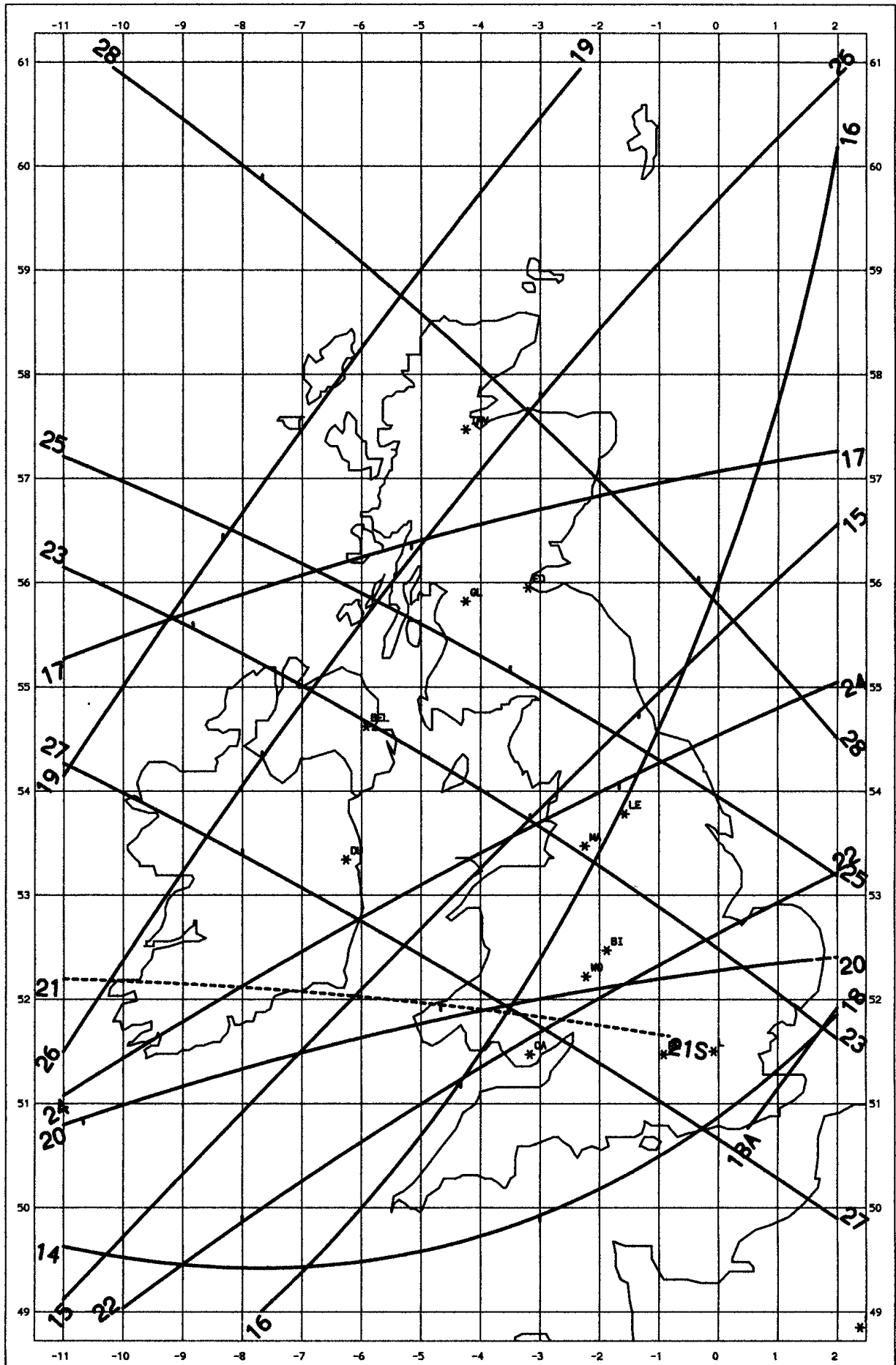
'D' column after PPM indicates double star code. 'W.U.T.' = Start UT at west end of track

Letter in column after "CUSP ANGLE": - Column 'T' = Telescope size required: -

'B' = Bright Limb 'A' = 4"  
 'D' = Dark Limb 'B' = 6"  
 'T' = Near Terminator 'C' = >6"

Predictions courtesy of the International Occultation Timing Association – European Section (IOTA/ES) – “OCCMOON” and “GRAZEREG” programs.

**GRAZING OCCULTATIONS UK/IRELAND JULY-DECEMBER 2005**  
**SEE ACCOMPANYING LIST IN THIS LSC (JULY 2005) FOR DETAILS**

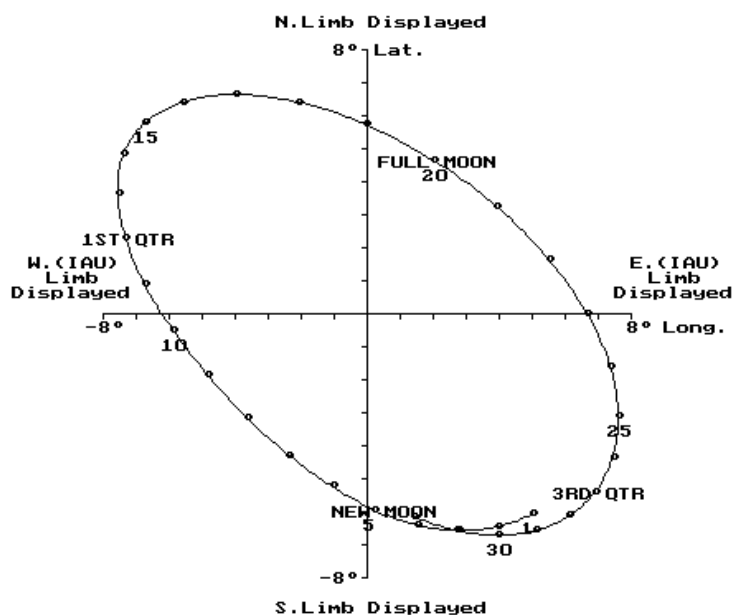


## LIBRATION August 2005

| Date | Libration amount | PA  | Feature presented |
|------|------------------|-----|-------------------|
| 1.0  | 7.6              | 226 | Hamilton*         |
| 2.0  | 7.1              | 217 | Lyot*             |
| 3.0  | 6.6              | 208 | Pontecoulant*     |
| 4.0  | 5.9              | 198 | Neumayer*         |
| 5.0  | 5.2              | 185 | Scott*            |
| 6.0  | 4.6              | 168 | Wilson*           |
| 7.0  | 4.2              | 147 | Pingre*           |
| 8.0  | 4.4              | 123 | Shaler*           |
| 9.0  | 5.1              | 103 | Maunder*          |
| 10.0 | 6.1              | 88  | Hedin*            |
| 11.0 | 7.2              | 76  | Mees*             |
| 12.0 | 8.3              | 68  | Bell*             |
| 13.0 | 9.1              | 61  | Voskresenskiy*    |
| 14.0 | 9.7              | 54  | Ulugh Beigh*      |
| 15.0 | 9.8              | 48  | Bunsen*           |
| 16.0 | 9.5              | 40  | Galvani*          |
| 17.0 | 8.8              | 31  | Xenophanes*       |
| 18.0 | 7.7              | 19  | Horrebow          |
| 19.0 | 6.6              | 3   | Anaxagoras        |
| 20.0 | 5.8              | 342 | Schwabe           |
| 21.0 | 5.6              | 317 | Boss*             |
| 22.0 | 6.1              | 294 | Hubble*           |
| 23.0 | 6.9              | 276 | Tacchini*         |
| 24.0 | 7.7              | 263 | Hirayama*         |
| 25.0 | 8.3              | 254 | Ritz*             |
| 26.0 | 8.7              | 245 | Hecataeus*        |
| 27.0 | 8.8              | 238 | Barnard*          |
| 28.0 | 8.6              | 231 | Gum*              |
| 29.0 | 8.2              | 224 | Oken*             |
| 30.0 | 7.5              | 217 | Lyot*             |
| 31.0 | 6.7              | 209 | Hanno*            |

### LUNAR LIBRATIONS - August 2005

Geocentric: —○—○— The markers show 0:00H UT



Program by Bob Roberts.

Observer at: Lat. 51.00N, Long. 1.00W

\* indicates that the feature is not illuminated.

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| 2005<br>AUG. | Age<br>d | Phase | Earth's<br>Selenographic |      | Sun's<br>Selenographic |      | R.A. |    | Dec.<br>° | Rises |    | Sets |    | Transit |    | Alt<br>° |
|--------------|----------|-------|--------------------------|------|------------------------|------|------|----|-----------|-------|----|------|----|---------|----|----------|
|              |          |       | Longø                    | Latø | Colongø                | Latø | h    | m  |           | h     | m  | h    | m  | h       | m  |          |
| 1.0          | 25.5     | 0.150 | 5.1                      | -6.1 | 219.4                  | 1.43 | 05   | 31 | 27.9      | ..    | .. | 18   | 24 | 09      | 11 | 66       |
| 2.0          | 26.5     | 0.089 | 4.0                      | -6.5 | 231.7                  | 1.43 | 06   | 25 | 28.3      | 00    | 51 | 19   | 09 | 10      | 03 | 66       |
| 3.0          | 27.5     | 0.043 | 2.8                      | -6.6 | 243.9                  | 1.42 | 07   | 19 | 27.3      | 01    | 53 | 19   | 42 | 10      | 54 | 64       |
| 4.0          | 28.5     | 0.013 | 1.5                      | -6.4 | 256.2                  | 1.42 | 08   | 11 | 25.1      | 03    | 03 | 20   | 05 | 11      | 42 | 61       |
| 5.0          | 29.5     | 0.002 | 0.2                      | -6.0 | 268.4                  | 1.41 | 09   | 00 | 21.8      | 04    | 16 | 20   | 22 | 12      | 28 | 57       |
| 6.0          | 0.9      | 0.008 | -1.1                     | -5.3 | 280.7                  | 1.40 | 09   | 47 | 17.6      | 05    | 30 | 20   | 35 | 13      | 11 | 52       |
| 7.0          | 1.9      | 0.032 | -2.4                     | -4.3 | 292.9                  | 1.39 | 10   | 32 | 12.7      | 06    | 42 | 20   | 45 | 13      | 52 | 47       |
| 8.0          | 2.9      | 0.074 | -3.7                     | -3.2 | 305.1                  | 1.37 | 11   | 16 | 7.4       | 07    | 54 | 20   | 55 | 14      | 32 | 41       |
| 9.0          | 3.9      | 0.131 | -4.8                     | -1.9 | 317.4                  | 1.36 | 11   | 58 | 1.7       | 09    | 06 | 21   | 04 | 15      | 12 | 36       |
| 10.0         | 4.9      | 0.204 | -5.9                     | -0.5 | 329.6                  | 1.34 | 12   | 41 | -4.0      | 10    | 18 | 21   | 14 | 15      | 53 | 30       |
| 11.0         | 5.9      | 0.290 | -6.8                     | 0.9  | 341.9                  | 1.32 | 13   | 26 | -9.8      | 11    | 34 | 21   | 26 | 16      | 36 | 24       |
| 12.0         | 6.9      | 0.386 | -7.3                     | 2.3  | 354.1                  | 1.31 | 14   | 12 | -15.3     | 12    | 54 | 21   | 42 | 17      | 23 | 19       |
| 13.0         | 7.9      | 0.490 | -7.6                     | 3.6  | 6.3                    | 1.29 | 15   | 03 | -20.2     | 14    | 18 | 22   | 03 | 18      | 15 | 14       |
| 14.0         | 8.9      | 0.597 | -7.4                     | 4.8  | 18.5                   | 1.27 | 15   | 58 | -24.3     | 15    | 43 | 22   | 36 | 19      | 12 | 11       |
| 15.0         | 9.9      | 0.703 | -6.7                     | 5.8  | 30.7                   | 1.25 | 16   | 58 | -27.2     | 17    | 02 | 23   | 26 | 20      | 14 | 9        |
| 16.0         | 10.9     | 0.802 | -5.6                     | 6.4  | 42.9                   | 1.22 | 18   | 02 | -28.4     | 18    | 05 | 00   | 38 | 21      | 19 | 10       |
| 17.0         | 11.9     | 0.887 | -4.0                     | 6.6  | 55.1                   | 1.20 | 19   | 08 | -27.7     | 18    | 49 | 00   | 39 | 22      | 24 | 12       |
| 18.0         | 12.9     | 0.952 | -2.1                     | 6.4  | 67.3                   | 1.18 | 20   | 14 | -24.9     | 19    | 18 | 02   | 09 | 23      | 25 | 17       |
| 19.0         | 13.9     | 0.990 | -0.0                     | 5.7  | 79.5                   | 1.16 | 21   | 17 | -20.4     | 19    | 38 | 03   | 47 | ..      | .. | ..       |
| 20.0         | 14.9     | 0.998 | 2.0                      | 4.6  | 91.6                   | 1.13 | 22   | 16 | -14.6     | 19    | 54 | 05   | 24 | 00      | 22 | 23       |
| 21.0         | 15.9     | 0.976 | 4.0                      | 3.2  | 103.8                  | 1.11 | 23   | 12 | -7.9      | 20    | 06 | 06   | 57 | 01      | 16 | 30       |
| 22.0         | 16.9     | 0.926 | 5.5                      | 1.6  | 116.0                  | 1.09 | 00   | 04 | -0.9      | 20    | 18 | 08   | 26 | 02      | 06 | 37       |
| 23.0         | 17.9     | 0.854 | 6.7                      | -0.1 | 128.2                  | 1.07 | 00   | 55 | 5.9       | 20    | 30 | 09   | 52 | 02      | 54 | 44       |
| 24.0         | 18.9     | 0.766 | 7.4                      | -1.7 | 140.4                  | 1.05 | 01   | 45 | 12.3      | 20    | 44 | 11   | 17 | 03      | 43 | 51       |
| 25.0         | 19.9     | 0.668 | 7.6                      | -3.1 | 152.6                  | 1.03 | 02   | 36 | 17.8      | 21    | 02 | 12   | 41 | 04      | 31 | 56       |
| 26.0         | 20.9     | 0.566 | 7.5                      | -4.4 | 164.8                  | 1.01 | 03   | 29 | 22.4      | 21    | 26 | 14   | 02 | 05      | 22 | 61       |
| 27.0         | 21.9     | 0.465 | 7.0                      | -5.4 | 177.0                  | 1.00 | 04   | 22 | 25.8      | 21    | 59 | 15   | 17 | 06      | 13 | 64       |
| 28.0         | 22.9     | 0.367 | 6.2                      | -6.2 | 189.2                  | 0.98 | 05   | 17 | 27.8      | 22    | 45 | 16   | 20 | 07      | 06 | 66       |
| 29.0         | 23.9     | 0.277 | 5.2                      | -6.6 | 201.4                  | 0.97 | 06   | 11 | 28.5      | 23    | 43 | 17   | 10 | 07      | 59 | 66       |
| 30.0         | 24.9     | 0.196 | 4.0                      | -6.7 | 213.7                  | 0.96 | 07   | 06 | 27.8      | ..    | .. | 17   | 46 | 08      | 50 | 65       |
| 31.0         | 25.9     | 0.126 | 2.8                      | -6.6 | 225.9                  | 0.95 | 07   | 58 | 25.8      | 00    | 51 | 18   | 11 | 09      | 39 | 62       |
| <b>SEPT</b>  |          |       |                          |      |                        |      |      |    |           |       |    |      |    |         |    |          |
| 1.0          | 26.9     | 0.071 | 1.5                      | -6.2 | 238.1                  | 0.93 | 08   | 48 | 22.8      | 02    | 04 | 18   | 30 | 10      | 26 | 59       |
| 2.0          | 27.9     | 0.030 | 0.2                      | -5.5 | 250.3                  | 0.92 | 09   | 36 | 18.7      | 03    | 18 | 18   | 43 | 11      | 10 | 54       |
| 3.0          | 28.9     | 0.007 | -1.1                     | -4.6 | 262.6                  | 0.90 | 10   | 21 | 14.0      | 04    | 31 | 18   | 55 | 11      | 52 | 49       |
| 4.0          | 0.2      | 0.001 | -2.3                     | -3.4 | 274.8                  | 0.88 | 11   | 05 | 8.7       | 05    | 44 | 19   | 04 | 12      | 32 | 43       |
| 5.0          | 1.2      | 0.014 | -3.5                     | -2.1 | 287.1                  | 0.86 | 11   | 48 | 3.0       | 06    | 56 | 19   | 13 | 13      | 12 | 37       |
| 6.0          | 2.2      | 0.046 | -4.5                     | -0.7 | 299.3                  | 0.84 | 12   | 31 | -2.8      | 08    | 09 | 19   | 23 | 13      | 53 | 31       |
| 7.0          | 3.2      | 0.096 | -5.4                     | 0.7  | 311.5                  | 0.82 | 13   | 15 | -8.6      | 09    | 24 | 19   | 34 | 14      | 35 | 25       |
| 8.0          | 4.2      | 0.164 | -6.1                     | 2.2  | 323.7                  | 0.79 | 14   | 01 | -14.2     | 10    | 42 | 19   | 48 | 15      | 20 | 20       |
| 9.0          | 5.2      | 0.247 | -6.5                     | 3.5  | 336.0                  | 0.77 | 14   | 50 | -19.2     | 12    | 04 | 20   | 06 | 16      | 09 | 15       |
| 10.0         | 6.2      | 0.343 | -6.7                     | 4.7  | 348.2                  | 0.74 | 15   | 43 | -23.5     | 13    | 27 | 20   | 34 | 17      | 03 | 12       |
| 11.0         | 7.2      | 0.448 | -6.5                     | 5.7  | 0.4                    | 0.71 | 16   | 40 | -26.7     | 14    | 47 | 21   | 15 | 18      | 02 | 9        |
| 12.0         | 8.2      | 0.559 | -5.9                     | 6.4  | 12.6                   | 0.68 | 17   | 42 | -28.4     | 15    | 55 | 22   | 17 | 19      | 04 | 9        |

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**Items for the Aug 2005 circular should reach the Editor by the 10th July 2005**