THE LUNAR OBSERVER

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A PUBLICATION OF THE LUNAR SECTION OF THE A.L.P.O.
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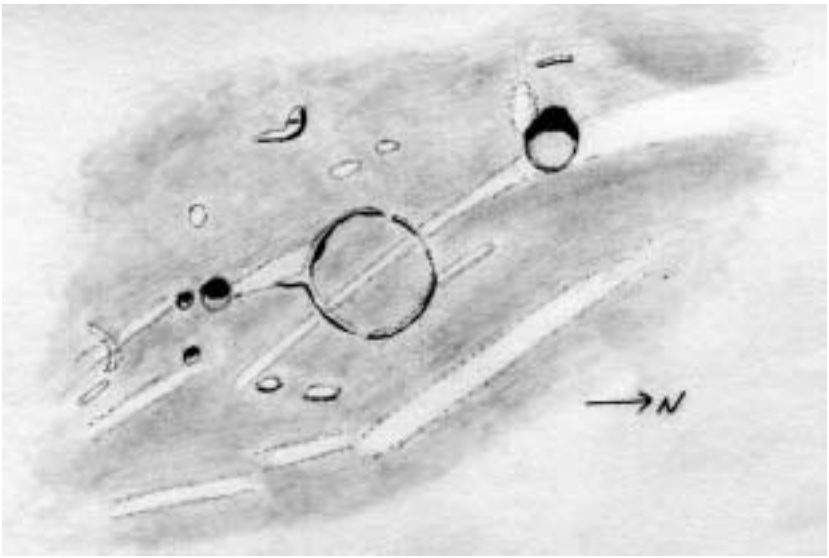
FEATURE OF THE MONTH - OCT. 2005



RAYS NEAR KIES

Sketch and text by Robert H. Hays, Jr. - Worth, Illinois, USA
September 6, 2004 - 10:25 to 10:45 UT
15cm Newtonian - 116x - Seeing 5-6/10

I drew this area on the morning of Sept. 6, 2004 after watching the reappearance of ZC 703. It was a dull sky with mediocre seeing, so I made a sketch of the ray pattern in southwest Mare Nubium. The largest crater in the sketch is the shallow broken feature Kies. Konig is the deeper crater northwest of Kies, and Kies A is the largest of a trio seen south of Kies. This area was still relatively far from the terminator, so there are no fine details. The rays were the main interest. They generally ran from southeast to northwest, but they were not all parallel to each other.

There were three separate ray segments east and north of Kies. The two short segments to the south extended in a nearly south-north direction, while the longer one farther north extended more from the southeast to northwest. The longest ray in this field began southeast of Kies, cut through that crater and continued on past Konig. This ray turned in a more northerly direction at Konig, and also became wider

and less distinct than it was at Kies. There were two ray segments on either side of Kies A which might be one ray interrupted by Kies A and E. One segment continued south into what might be a partial ghost ring. Another ray segment was east of Kies B, but it was not an extension of the long ray through Kies. A short ray segment was adjacent to the north rim of Kies, but I'm not sure if this was purely an albedo feature. There may have been some slight shading on its east side. There were also a few shadowless bright spots south and west of Kies and on the west rim of Konig.

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FOCUS ON: GASSENDI

CALL FOR OBSERVATIONS

Focus On is a bi-monthly series of articles which includes observations received for a specific feature or group of features. The subject of the next installment is **Gassendi. Focus On: Gassendi** is scheduled for publication in the November 2005 issue of TLO and the deadline for submissions is **October 20, 2005**. Observations of all kinds (electronic or film based images, sketches, etc.) are welcomed and invited. Keep in mind that observations do not have to be recent ones, so search your files and/or add this fascinating crater to your observing list and send your images to one of the addresses shown in the banner on Page One.

AN INVITATION TO JOIN THE A.L.P.O.

The Lunar Observer is a publication of the Association of Lunar and Planetary Observers that is available for access and participation by non-members free of charge, but there is more to the A.L.P.O. than a monthly lunar newsletter. If you are a non-member you are invited to join our organization for its many other advantages.

We have sections devoted to the observation of all types of bodies found in our solar system. Section coordinators collect and study members' observations, correspond with observers, encourage beginners, and contribute reports to our Journal at appropriate intervals.

Our quarterly journal, **The Strolling Astronomer**, contains the results of the many observing programs which we sponsor including the drawings and images produced by individual amateurs. Several copies of recent journals can be found on-line at: **http://www.justfurfun.org/djalpo/** Look for the issues marked FREE, they are not password protected. Additional information about the A.L.P.O. can be found at our website: **http://www.lpl.arizona.edu/alpo/** Spend a few minutes browsing the Section Pages to learn more about the fine work being done by your fellow amateur astronomers.

To learn more about membership in the A.L.P.O. go to: **http://www.lpl.arizona.edu/~rhill/alpo/member.html** which now also provides links so that you can enroll and pay your membership dues online.

OBSERVING THE MOON: Rilles

By William M. Dembowski, FRAS
A.L.P.O. Acting Coordinator, Lunar Topographical Studies

This article originally appeared in
The Journal of the Association of Lunar & Planetary Observers
Vol. 40 - No. 4 - October 1998

The topographical study of the Moon, selenography, is an old and noble pursuit. Although of limited scientific value, there is no better way to sharpen your observing skills than to sketch what you see at the eyepiece; and no greater challenge to the high resolution astro-imager than to record the details of the lunar surface. There has been a renewed interest in general lunar observing in recent years, perhaps fired by the availability of affordable CCD equipment which helped bring the focus of attention back to our Earth's only natural satellite. In this series we hope to further that renewed interest by featuring informative and enjoyable explorations of the Moon and provide a showcase for the work of those who engage in topographical studies.

Rilles, or clefts as they are sometimes called in older lunar writings, are channels or grooves in the Moon's surface. Rilles are most often divided into three classes: straight, arcuate, and sinuous. As with many other lunar features these classifications are based on appearance rather than on origin.

Straight rilles can be found on virtually all mare surfaces and on the floors of many large craters. Their origins are due largely to faulting although some volcanic action is also evident. Perhaps the most readily observable rille is that which runs for about 80 km across the floor of the crater Petavius. The most prominent section of this rille runs from the central peak of Petavius to its southeast wall. Easily seen in even a small telescope it is an ideal target for beginning lunar observers.

Another easily seen rille is Rima Cauchy and it is of particular interest. (See Figure 1) It runs for 210 km in a relatively straight line northeast of Cauchy. To the southwest is Rupes Cauchy, a scarp that perfectly parallels the rille and, therefore, hints at a similar origin. Both features may appear similar under a low sun but their differences become evident under a high sun when the rille virtually disappears and the scarp appears as a bright line.

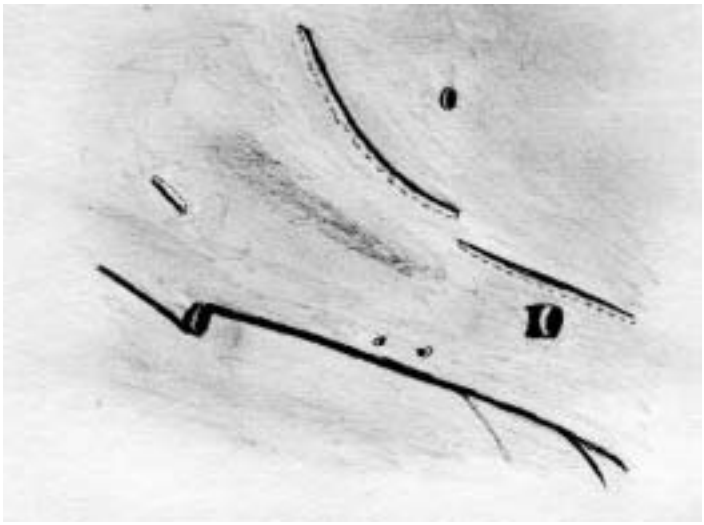
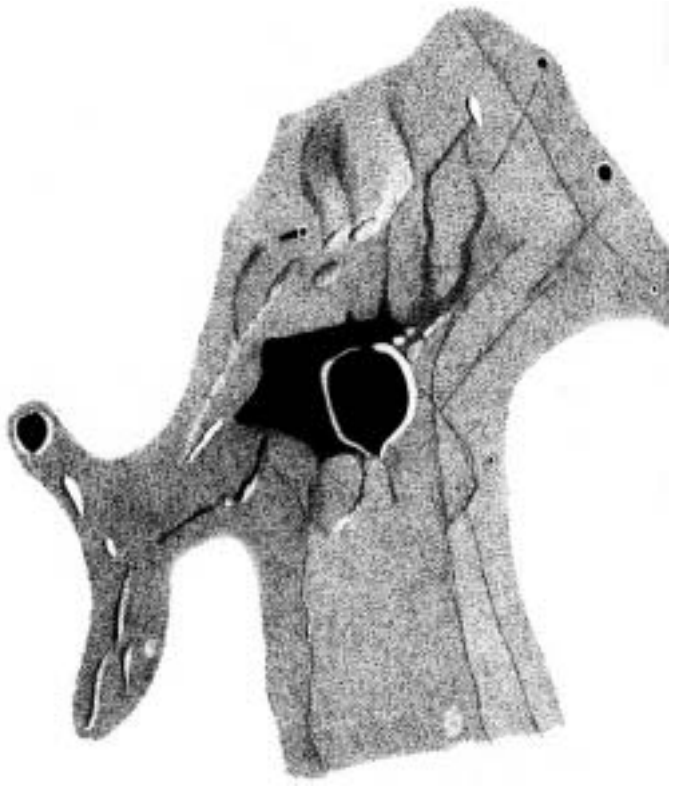


FIGURE 1
Rima Cauchy
Sketch by Robert H. Hays, Jr.
Worth, Illinois, USA
June 29, 1998 - 02:26 to 02:42 UT
15cm Newtonian - 170x - North up

For sheer numbers and complexity it is difficult to match the rilles near the very center of the lunar disk. Those surrounding the craters Triesnecker, Hyginus, and Ariadaeus are a virtual spiderweb of cracks in the lunar surface. The Triesnecker rilles, on Sinus Medii, are approximately 1-1/2 to 2 km wide, between 500 and 750 meters deep, and have a V-shaped profile. (See Figure 2) The Hyginus rilles, by contrast, have flat floors and may be grabens. Grabens are areas that have subsided between two parallel faults. Under high magnification, and with good seeing, the northern section of Rima Hyginus can be seen to be composed of a chain of craterlets. Their perfect alignment and interconnection reveals that they are not impact craters but are tectonic in nature.

FIGURE 2
Rimae Triesnecker
Sketch by Colin Ebdon
Colchester, Essex, England
May 3, 1998 - 21:20 to 21:40 UT
21cm Newtonian - 183x-262x
North up



Arcuate rilles are similar in origin to straight rilles in that they are subsidence features. As their name implies, however, they form sweeping arcs rather than straight or branching lines. Arcuate rilles are grabenlike and cross both mare and highland terrains near the periphery of circular maria. Irregular mare, such as Mare Frigoris, are regions of relatively shallow flooding and do not contain arcuate rilles which are the result of gradual downwarping. One fine example of arcuate rilles can be found on the eastern shore of Mare Humorum. Rimae Hippalus is a series of concentric rilles that are easily seen in a small telescope. One of the wide rilles passes directly through the walls and across the floor of the partially submerged crater Hippalus. The total length of Rimae Hippalus is about 240 km.

Another series of arcuate rilles, Rimae Sosigenos, skirt the western shore of Mare Tranquillitatis. Running for approximately 150 km, one rille is interrupted by a small young crater Sosigenos A. For a more challenging view observers should turn their telescopes to Rima Riccioli, a 390 km. rille that is actually associated with Mare Orientale. Being on the extreme western limb of the Moon, it is best studied under conditions of favorable libration.

The third class of rilles, sinuous, may be the most interesting. Sinuous rilles typically begin at a crater or craterlike depression and end by fading into the mare surface or into a chain of elongated pits. Although they can be found anywhere on a mare, and even in a few highland locations, they are most likely to be found along the margins of mare filled basins. They differ from straight and arcuate rilles in that they are not the result of subsidence but of erosion. One result is that sinuous rilles go around obstructions rather than through them as do straight and arcuate rilles.

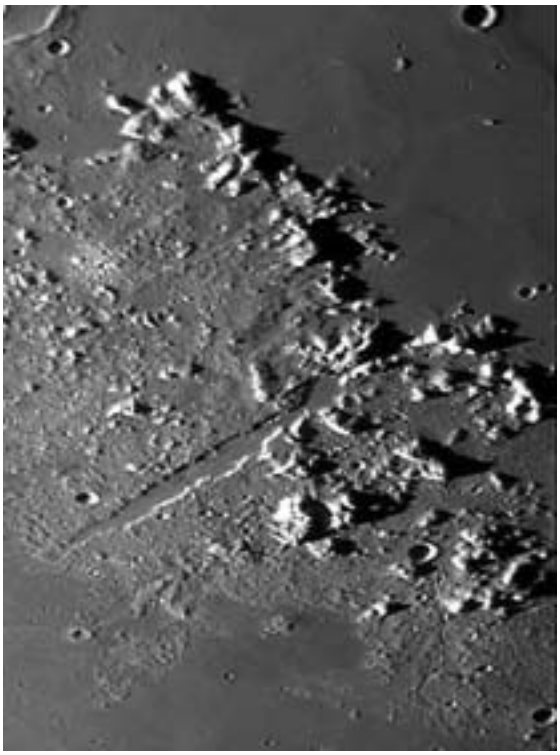
In pre-Apollo years there were two principal theories as to the origins of sinuous rilles. In one theory the head crater was the source of water in the form of ice which was released by an impacting body. The rille itself was the dry river bed that resulted after the flooding waters boiled off into space. A second theory has the source crater as a vent from which free flowing lava originated. The rilles themselves were seen as collapsed lava tubes like those found in Craters of the Moon National Park in Idaho. It is almost certain now that the rilles are the result of basaltic lava flows but the exact details of their formation are still uncertain. Even with the lower gravity of the Moon, and the low viscosity of the mare lava (about the consistency of motor oil), it is difficult to explain the great width of the rilles (up to 3 km) and their tremendous length (some over 250 km).

The first sinuous rille was discovered on Oceanus Procellarum by Johannes Schroter in 1787 and it still bears his name. Easily seen in a small telescope, it's source crater is near Herodutus and is about 6 km in diameter. (See Figure 3) The rille (in this case called a valley) widens to a 10 km feature known as the Cobra Head then narrows and fades into the mare surface 160 km later. Interesting in its own right, Schroter's Valley is also the site of frequent reports of lunar transient phenomena and is well worth a close look.

FIGURE 3
Vallis Schroteri
Photograph by David Lehman
Fresno, California, USA
October 24, 1996 - 05:30 UT
25cm Newtonian at f/41
Film: TP2415 - 1/2 second
North up

About 200 km south of Schroter's Valley is another classic sinuous rille, Rima Marius. Rima Marius is approximately 2 km wide and meanders across Oceanus Procellarum for 250 km before fading from view. For a real challenge in rille observing, however, there is no more famous and elusive example than the rille that traverses the floor of the Alpine Valley. (See Figure 4)

FIGURE 4
Rille in Alpine Valley
Digital image by K.C. Pau
Hong Kong, China
February 10, 2003
212mm Cass-Newt
North up



The rille has both the characteristics of a tension fracture and erosion from lava flows and is, therefore, difficult to label. It is also difficult to observe. Excellent optics and excellent seeing are essential to catching a glimpse of the rille and seldom is its entire length of 180 km visible at the same time. Rukl's Atlas of the Moon lists 38 major rilles (Rima) and 26 networks or systems of rilles (Rimae) so there are plenty to give observers hours of pleasure and first hand knowledge of the lunar surface. Your observations, sketches, and images of these fascinating features are welcomed by the Coordinator of Lunar Topographical Studies.

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REFERENCES:

Heiken, Grant.H.; Vaniman, David T.; & French, Bevan, M. (1991) "Lunar Sourcebook", Cambridge University Press

Kitt" Michael T. (1991) "The Moon/An Observing Guide for Backyard Telescopes", Kalmbach Publishing

Rukl, Antonin (1991) "Atlas of the Moon", Paul Hamlyn Publishing

Schultz, Peter H. (1976) "Moon Morphology/Interpretations Based on Lunar Orbiter Photography" University of Texas Press

EDITORS NOTE:

The above image (Figure 4) did not appear in the original article published in 1998. The image used in the original version was one taken by Donald Parker (Coral Gables, Florida) on April 27, 1996. Unfortunately, the Parker image was one of several that were lost in a subsequent computer crash and the image by K.C. Pau was substituted. It should be noted that the imaging of this rille in 1996, without the benefit of stacked images, was an enormous accomplishment and a tribute to the skill of Dr. Parker as a lunar and planetary imager ……W.M.D.

LUNAR TOPOGRAPHICAL STUDIES

Acting Coordinator - William M. Dembowski, FRAS
dembowski@zone-vx.com

OBSERVATIONS RECEIVED

JEFF BARTON - DALLAS, TEXAS, USA
CCD images of Gassendi (3)

MICHAEL BOSCHAT - HALIFAX, NOVA SCOTIA, CANADA
Digital images of Aristarchus (2) …… AND …… Sketch of Aristarchus

JUAN-LUIS GONZALEZ CARBALLO - BADAJOZ, SPAIN
Digital images of Mare Crisium (2)

DANIEL DEL VALLE - AGUADILLA, PUERTO RICO
Sketches of Dome near Birt, Reiner

COLIN EBDON - COLCHESTER, ESSEX, ENGLAND
Sketch of region between Vendelinus & Langrenus

HOWARD ESKILDSEN - OCALA, FLORIDA, USA
Digital images of Mare Crisium, Gassendi (2), 27-day old Moon, Marius, Mairan, Marius & Reiner & Reiner Gamma, Babbage & Anaximander

KIM HAY - ONTARIO, CANADA
Digital image of 27-day old Moon

ROBERT H. HAYS, JR. - WORTH, ILLINOIS, USA
Sketches of Spallanzani, Rays near Kies …… AND …… Timings of 38 stars occulted by the Moon

ANTONIO MARINO - ERCOLANO (NAPOLI) ITALY
Digital image of Tycho

RANDY TATUM - RICHMOND, VIGINIA, USA
CCD images of South Polar Region, Descartes, Maurolycus, Sabine to Dionysius, Godin, Catena Abulfeda, Ariadaeus, Hyginus

DIANA TODD - REDCAR, CLEVELAND, ENGLAND
Digital images of Gassendi (2)

ALEXANDER VANDENBOHEDE - GHENT, BELGIUM
Sketch of Gassendi …… AND …… Digital image of Gassendi and Mare Humorum

ROBERT WLODARCZYK - CZESTOCHOWA, POLAND
Sketches of Endymion (2)

Observations submitted to the Topographical Studies Section should include the following:

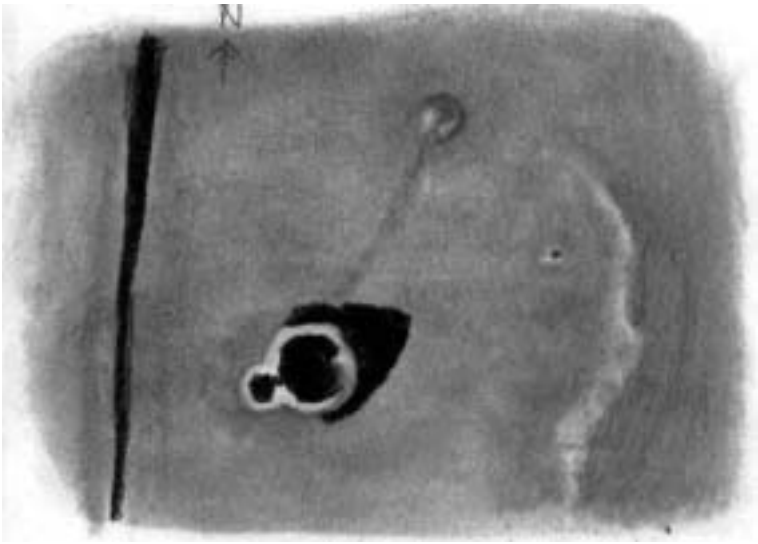
Name and location of observer
- **Name of feature**
- **Date and time (UT) of observation**
- **Size and type of telescope used**
- **Magnification (for sketches)**
- **Medium employed (for photos and electronic images)**

RECENT TOPOGRAPHICAL OBSERVATION

REGION BETWEEN VENDELINUS & LANGRENUS

Sketch by Colin Ebdon - Colchester, Essex, England
August 21, 2005 - 22:30 to 00:00 UT
7 inch Mak-Cass - 225x

RECENT TOPOGRAPHICAL OBSERVATIONS



DOME NEAR BIRT
Sketch by Daniel del Valle - Aguadilla, Puerto Rico
September 12, 2005 - 00:40 to 01:02 UT
4.7 inch f/8.3 Refractor - 222x

MARE CRISIUM
Digital image by Juan-Luis Gonzalez Carballo - Badajoz, Spain
July 22, 2005 - 23:26 UT
203mm SCT - 2x Barlow - Philips Toucam Pro

RECENT TOPOGRAPHICAL OBSERVATIONS

MARIUS, REINER, & REINER GAMMA
Digital image by Howard Eskildsen - Ocala, Florida, USA
September 16, 2005 - 01:00 UT
6 inch Refractor - 2x Barlow - Neximage camera

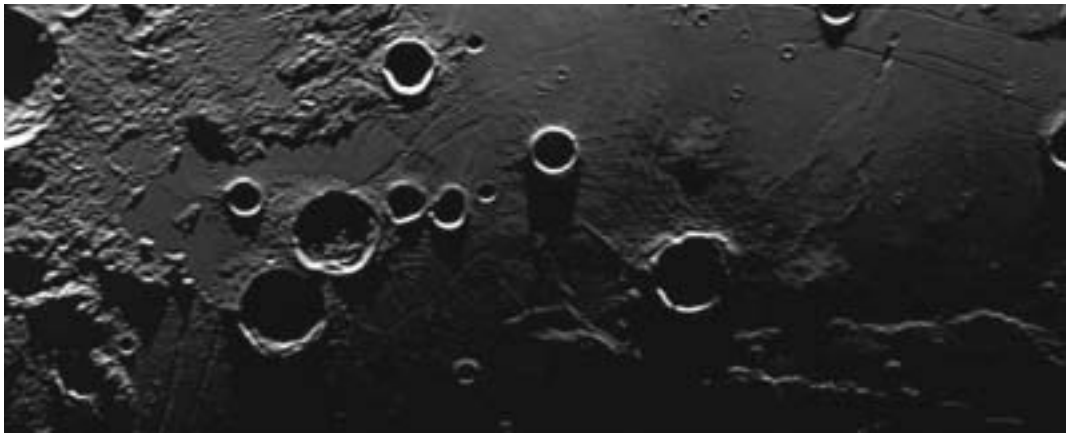
TYCHO
Digital image by Antonio Marino - Ercolano (Napoli) Italy
October 22, 2004 - 19:27 UT
150mm Intes Micro - f/12 with 2x Barlow

RECENT TOPOGRAPHICAL OBSERVATIONS

27-DAY MOON
Digital image by Kim Hay - Ontario, Canada
September 1, 2005 - 09:21 UT
10 inch Newtonian - 32mm EP - Fuji Finepix S3000

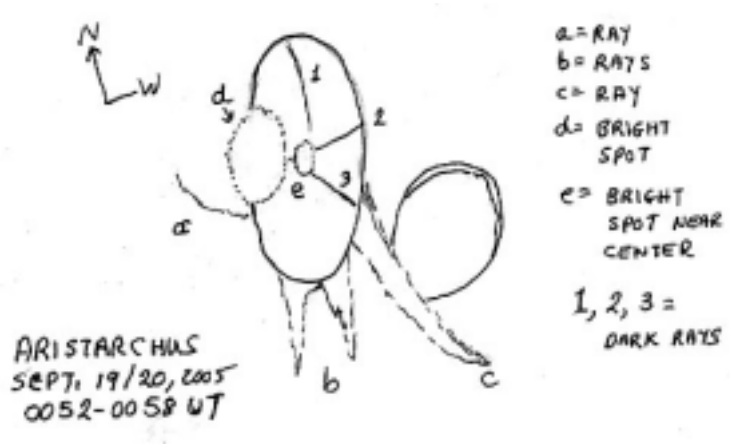
ENDYMION
Sketch by Robert Wlodarczyk - Czestochowa, Poland
August 20, 2005 - 20:45 UT
12cm f/7.5 Newtonian - 112x

RECENT TOPOGRAPHICAL OBSERVATIONS



SABINE TO DIONYSIUS

Digital image by Randy Tatum - Richmond, Virginia, USA
August 25, 2005
10 inch f/12 Newtonian - 2x Barlow



ARISTARCHUS

Digital image and sketch by Michael Boschat
Halifax, Nova Scotia, Canada
September 20, 2005 - 00:52 to 00:58 UT
10cm f/10 Maksutov - 40x 67x 112x
Centrios 3.0 MP DSC-3020 Digital Camera used afocally

BRIGHT LUNAR RAYS PROJECT

Coordinator - Willliam M. Dembowski, FRAS

Each month TLO features a book or magazine excerpt dealing with Bright Lunar Rays. Some are from current sources, others from vintage astronomical literature. This month's offering is from:

EPIC MOON

William P. Sheehan & Thomas A. Dobbins
Willmann-Bell, Inc. – 2001 – (Various pages)

On the other hand, the bright ray systems emanating from certain craters such as Tycho defied even the most resolute attempts at resolution. Early Observers like (Johannes) Hevelius (1611-1687) had represented them as chains of mountains. (Johann) Madler (1794-1874) demonstrated that, whatever these features might be, they were certainly not elevated. On one occasion he observed one of the rays from Tycho as it reached the terminator and found it vanished immediately, while actual ridges and mountains in the same area continued to stand forth in bold relief.

* * * * * * * * * * * *

(Grove Karl) Gilbert (1843-1918) worked out many details of the impact process. …… The rays – the white streaks emanating from some of the more prominent and fresher-appearing craters – were splash features, consisting of material thrown out from the impact that formed them. Indeed, what else could they be? "The rays systems resemble splashes so closely that it is difficult to understand why the idea that they really are splashes has not sooner found its way into the Moon's literature."

* * * * * * * * * * * *

To (Edward) Pickering (1846-1919) the rays surrounding many craters, invisible under oblique illumination and appearing as if from nowhere under a high sun, argued for the presence of frost or loosely-packed snow lying at the bottom of small hollows and shallow depressions. He believed that most extensive ray system on the Moon, that of the crater Tycho, might consist of a low-lying mist of ice crystals resembling terrestrial "mare's tail" cirrus clouds, and not unlike the white veils often seen in the polar regions of Mars. The configuration of divergent radial streaks he attributed to a host of minute, steam-puffing "active craterlets" lying along "lines of weakness or cracks in the surface" too narrow to be seen.

In the harsh glare and nearly vertical lighting of the Full Moon, the ramparts of many craters are seen as brilliant white circles. The most conspicuous examples of these features, which Pickering dubbed "snow-craters," are an eye-catching pair of small craters in Mare Fecunditatis, Messier and Messier A. A comprises the "head" of a striking "Comet Tail," consisting of two straight, narrow rays that extend 120 kilometers across the surrounding plain.

* * * * * * * * * * * *

(Phillip Fauth – 1867-1941) ……. If the Moon were awash in an ocean covered in turn with a rind of ice, cosmic bombardment would repeatedly penetrate the icy shell, "with massive effects on the intensely cold surface, and the fact of the repetition of the catastrophe enables us to understand the overflows that we call 'seas' and the gradual construction of the remarkable flat walled plains with hollow interior, which would be washed out, so to say, by the ebb and flow of warmer water from below."

Under airless lunar conditions the water vapor released by these events would be converted into clouds of ice-dust. Fauth imagined that this material would often seep through breaches in the surrounding walls and gradually sink outward under the influence of the Moon's feeble gravity to produce a halo of bright radial streaks – the mysterious lunar rays.

LUNAR TRANSIENT PHENOMENA

Coordinator – Dr. Anthony Cook – acc@cs.nott.ac.uk
Assistant Coordinator – David O. Darling – DOD121252@AOL.COM

LTP NEWSLETTER - OCTOBER 2005

Dr. Anthony Cook - Coordinator

Observations for August have been received from: Jay Albert (Lake Worth, FL, USA), Marie Cook (Mundesley, UK), Clive Brook (Plymouth, UK) Robin Gray (Winnemucca, NV, USA), Antonio Marino (Naples, Italy), and Daniel del Valle Hernandez (Puerto Rico). These totalled ~500 minutes.

One of the observations received for August, although probably not LTP, did spark the observers interest, and is probably worthwhile observing again when the illumination is right. On 2005 Aug 13 at UT 00:07-00:29, Daniel del Valle Hernandez, in Puerto Rico, noticed an interesting configuration of umbra and penumbra shadows in Herschel. So if anybody else was observing this area at this date/time, please get in contact with me. It was also pleasing to see so many observers attempting repeat illumination observations now - this really makes a big difference at helping us eliminate many dubious past LTP reports. Antonio Marinio sent in some excellent CCD color images of Aristarchus.

This Month I thought that I would show a new view of the flash that Leon Stuart photographed near the crater Pallas in 1953 Nov 15 UT 02:00 from Tulsa, OK, USA. There have been many papers about this flash, especially as the observer saw the flash both visually and recorded it on a developed photographic plate. As part of a poster presentation to the Division of Planetary Sciences meeting at Cambridge, UK at the start of September, I illustrated how one can take a CCD image under the same illumination as the original photograph, register the two images together, calibrate one to the other in terms of brightness (even though one was a photograph and the other a CCD image) and subtract them to leave just a difference image of the flash. Fig 1 shows this process and although the subtraction was not perfect due to seeing effects causing distortions in the CCD image, it tells us a little more about the flash. Firstly the diameter of the flash was ~25km (in fair agreement with previous values), secondly the halo diameter was larger at ~50km diameter, though whether this is due to photographic halation or the true extent of the flash is uncertain. No obvious illumination of adjacent topography is visible within the

limits imposed by seeing distortion. Also no evidence of diffraction spikes can be seen so this is consistent with the flash being from a diffuse source. I will do further analysis later, but for now just thought I would show you the result.

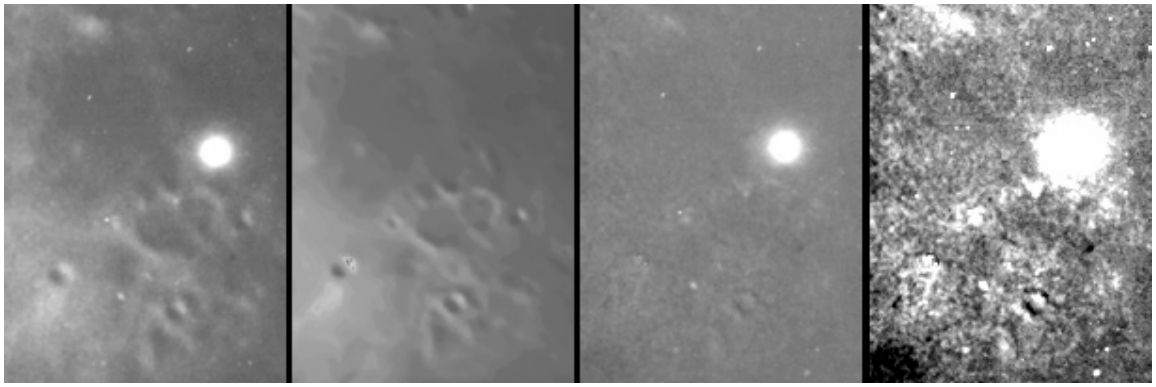


Fig. 1 From left to right: 1) Photograph of the 1953 flash, 2) Registered CCD image under identical illumination (2003 Mar 13 UT 00:03) and calibrated to previous image, 3) Difference image showing some differences due to seeing distortions. 4) Contrast enhanced difference image showing extent of the halo area around the flash.

LTP repeat predictions, including the more numerous illumination only events can be found on the following web site: **http://www.cs.nott.ac.uk/~acc/Lunar/LTP.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 LTP 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 LTP, 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!

Dr Anthony Cook, School of Computer Science & IT, Nottingham University, Jubilee Campus, Wollaton Road, Nottingham, NG6 1BB, UNITED KINGDOM. Email: acc@cs.nott.ac.uk

THE MOON IN THE NEWS

SMART-1 - The Alpine Valley
http://www.esa.int/SPECIALS/SMART-1/SEMM7R7X9DE_0.html

NASA - "Apollo on Steroids"
http://news.yahoo.com/s/nm/20050919/sc_nm/space_moon_dc;_ylt=AgjAOsSUR88esEVhsWs34ioPLBIF;_ylu=X3oDMTBiMW04NW9mBHNlYwMlJVRPUCUl

Canada's Role in Moon Walk
http://www.canada.com/national/nationalpost/news/story.html?id=9f044cbf-96a0-4b78-89d1-97e3e6ce444a

Moon Landing Plans for 2018
http://news.yahoo.com/s/afp/20050920/wl_afp/usspacemoon;_ylt=AkDCoYX2XLAlhhIepikVpHcPLBIF;_ylu=X3oDMTBiMW04NW9mBHNlYwMlJVRPUCUl