

THE LUNAR OBSERVER

A PUBLICATION OF THE LUNAR SECTION OF THE A.L.P.O.

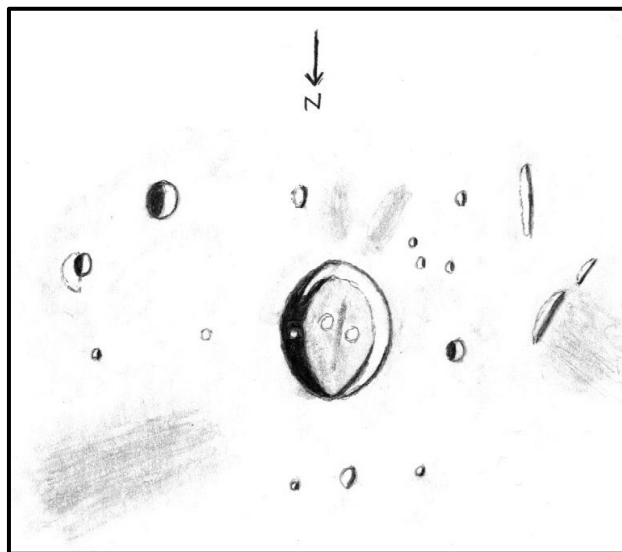
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RECENT BACK ISSUES: http://moon.scopesandscapes.com/tlo_back.html

FEATURE OF THE MONTH – MAY 2016

Kepler



**Sketch and text by Robert H. Hays, Jr. - Worth, Illinois, USA
March 17, 2011 01:18-01:58 UT, 15 cm refl, 170x, seeing 8-7/10.**

I observed this crater and vicinity on the evening of March 16/17, 2011 after the moon hid 6th-magnitude ZC 1381. Kepler is the center of a conspicuous ray system, but this sketch concentrates on detail in and around Kepler instead of its ray system. Kepler's floor is dominated by a dusky streak extending from north to south. This feature is flanked by two shadowless bright spots. There is a darker streak (shadow?) from the north point southwestward along the base of the sunlit interior west wall. The shadowed inside east area shows evidence of terracing and has a tiny bright dot near a blunt point on Kepler's east rim. This sunlit point is probably too conspicuous of the sketch. Kepler A is the fairly large crater southeast of Kepler, and Kepler B is the smaller crater to its northeast. Kepler B has a wide bright rim on its east side. This may be a substantial slope catching the rising sun. This slope extends northward, coming to a point north of Kepler B. There is no such slope by Kepler A. There is a tiny peak north of Kepler B, and a tiny bright spot east of Kepler. Kepler omega is the middle and largest of three peaks north of Kepler. The pit Kepler F is just west of Kepler, and Kepler kappa is the longer of two ridges farther to the west. Another, lower ridge is south of Kepler kappa. A loose group of four small peaks is southwest of Kepler, and another peak is between this group and Kepler A. There are dusky wedges to the northeast of Kepler and west of Kepler kappa. These are gaps in Kepler's otherwise smooth ray system. Two more grayish areas lie south of Kepler.

LUNAR CALENDAR

MAY-JUNE 2016 (UT)

2016		UT	EVENT
May	03	01:27	Moon Descending Node
	06	04:14	Moon Perigee: 357800 km
	06	19:30	New Moon
	08	08:21	Moon-Aldebaran: 0.5° S
	09	21:54	Moon Extreme North Dec.: 18.4° N
	13	17:02	First Quarter
	14	07:06	Moon-Regulus: 2.5° N
	15	09:30	Moon-Jupiter: 2.2° N
	15	20:39	Moon Ascending Node
	18	22:06	Moon Apogee: 405900 km
	21	21:15	Full Moon
	22	21:59	Moon-Saturn: 3.5° S
	24	11:16	Moon Extreme South Dec.: 18.5° S
	29	12:12	Last Quarter
	30	04:45	Moon Descending Node
Jun	03	09:47	Moon-Mercury: 0.7° N
	03	10:55	Moon Perigee: 361100 km
	05	03:00	New Moon
	06	09:13	Moon North Dec.: 18.6° N
	10	14:47	Moon-Regulus: 2.2° N
	11	19:35	Moon-Jupiter: 1.6° N
	11	22:20	Moon Ascending Node
	12	08:10	First Quarter
	15	12:00	Moon Apogee: 405000 km
	19	00:40	Moon-Saturn: 3.6° S
	20	11:02	Full Moon
	20	18:52	Moon Extreme South Dec.: 18.6° S
	26	05:28	Moon Descending Node
	27	18:19	Last Quarter

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 nonmember 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 Journal of the Association of Lunar and Planetary Observers-The Strolling Astronomer**, contains the results of the many observing programs which we sponsor including the drawings and images produced by individual amateurs. Additional information about the A.L.P.O. and its Journal is on-line at: <http://www.alpo-astronomy.org>. I invite you to 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.alpo-astronomy.org/main/member.html> which now also provides links so that you can enroll and pay your membership dues online.

When submitting observations to the A.L.P.O. Lunar Section

In addition to information specifically related to the observing program being addressed, the following data should be included:

Name and location of observer

Name of feature

Date and time (UT) of observation

Size and type of telescope used

Magnification (for sketches)

Filter (if used)

Medium employed (for photos and electronic images)

Orientation of image: (North/South - East/West)

Seeing: 0 to 10 (0-Worst 10-Best)

Transparency: 1 to 6

Full resolution images are preferred-it is not necessary to compress, or reduce the size of images. *Additional commentary accompanying images is always welcome.* **Items in bold are required. Submissions lacking this basic information will be discarded.**

Digitally submitted images should be sent to both

Wayne Bailey – wayne.bailey@alpo-astronomy.org

and Jerry Hubbell – jerry.hubbell@alpo-astronomy.org

CALL FOR OBSERVATIONS:

FOCUS ON: Capuanus-Palus Epidemiarum

Focus on is a bi-monthly series of articles, which includes observations received for a specific feature or class of features. The subject for the **July 2016** edition will be **the Capuanus-Palus Epidemiarum area**. Observations at all phases and of all kinds (electronic or film based images, drawings, 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 to your observing list and send your favorites to (both):

Jerry Hubbell – jerry.hubbell@alpo-astronomy.org

Wayne Bailey - wayne.bailey@alpo-astronomy.org

Deadline for inclusion in the Capuanus-Palus Epidemiarum article is June 20, 2016

FUTURE FOCUS ON ARTICLES:

In order to provide more lead time for potential contributors the following targets have been selected:

<u>Subject</u>	<u>TLO Issue</u>	<u>Deadline</u>
Montes Apennines-Palus Putredinis	September 2016	August 20, 2016

FOCUS ON: KEPLER

By Jerry Hubbell

Assistant Coordinator: Lunar Topographical Studies

Crater Kepler is named in honor of famous German mathematician and astronomer Johannes Kepler (1571-1630), he is best known for the development of the laws of planetary motion. This relatively small crater located in Mare Insularum. Although conspicuous in its own right due to the lack of large craters in the local area, the main show to the east is of course is the crater Copernicus. Kepler is about 20 miles (32 km) in diameter and located at Selenographic coordinates 8.1° N, 38.0° W.

The crater Encke is to the southeast of Kepler and is of similar size but has a different morphology in its formation. It is interesting to compare Kepler to both Copernicus (56 miles, 93 km) and Encke (18 miles, 30 km) in that both Copernicus (figure 3.) and Kepler (figures 1. and 3.) have an extensive ray system.

Figure 1. KEPLER, Oro Verde, Argentina, January 2, 2016 - Francisco Alsina Cardinalli, 05:17 UT. LX200 250 mm SCT, QHY6 CCD.

They are of very differing sizes, but Encke is practically the same size as Kepler with no discernable ray system. The reason is that Encke was formed during the Imbrium period 3.5 billion years ago, and Kepler was formed during the Copernican period about 1 billion years ago. Encke has had any possible



evidence of a ray system erased over the eons and has also been filled with lava making it much less conspicuous in images compared to Kepler (figure 2.)

The Kepler ray system is very noticeable when the sun is high overhead near full moon. It extends more than

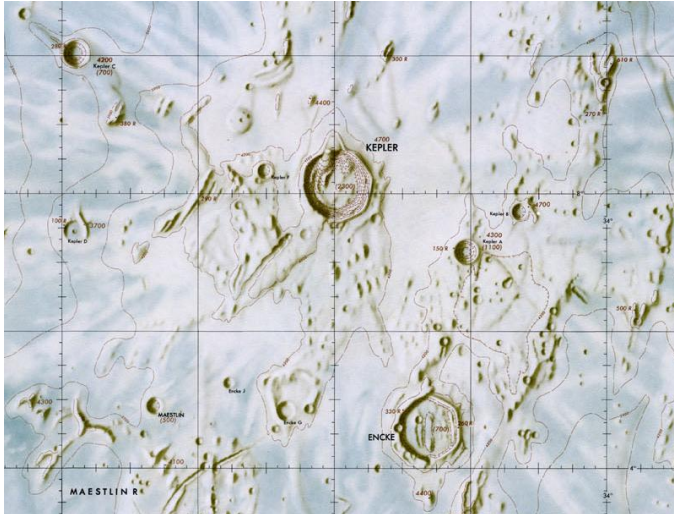
Figure 2. KEPLER ENCKE, Ocala, Florida USA, February 18, 2016 – Howard Eskildsen, 23:56 UT, 6" f/8 refractor, 2x Barlow, DMK 41AU02.AS CCD, North: UP, East: Right, Transparency 5/6, Seeing 7/10.

200 miles (320 km) from the center of the crater. In figure 3 you can see the difference in the ray systems between Copernicus and Kepler. It is interesting to note that Copernicus' ray system has more filaments on the outer edge of the ray system than Kepler

The Lunar Aeronautical Chart LAC57 Kepler (figure 4) shows the topographic data for Kepler and surrounding area. Encke is also included on this chart. It is interesting to note the differences in rim height, Kepler's rim is 2300 m above its floor, and Encke's is

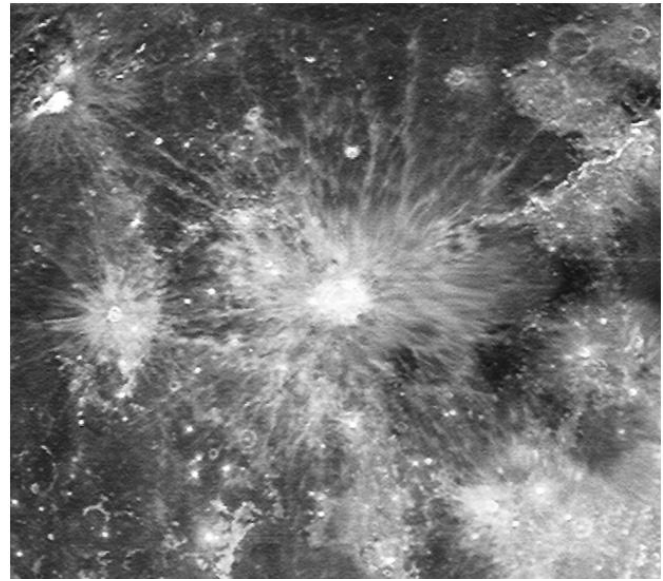
Figure 3. KEPLER COPERNICUS Locust Grove, VA. November 13, 2011-Jerry Hubbell, 03:38 UTC, 0.13-m refractor, f/7.5, DMK 21AU04, North: UP, East: RIGHT, Colongitude: 120.1°, Transparency 5/6, Seeing 7/10.

only 700 m above its floor. Kepler's crater walls are slumped and not well formed into terraces like Copernicus, and it is very steep towards the top of the rim at around a 40° angle. There is an interesting dome formation about 20 miles (12 km) to the northwest that would be a good object to study. This dome, listed as KE1 with coordinates 39.53° N, 8.88° W, is 8.6 miles (13.9 km) in diameter, is 550 ft. (170 m) tall, and has a slope of 1.4°.



although much smaller, still provides a very satisfying view either photographically, or visually (figure 5).

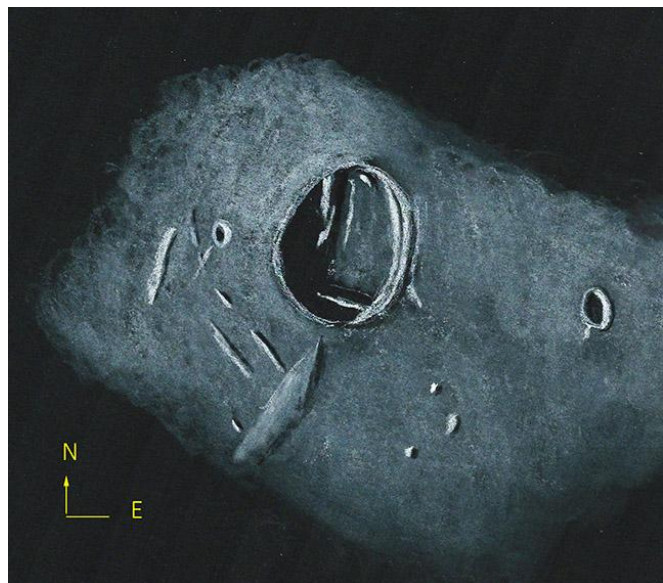
Figure 5. KEPLER, Louisville, Mississippi, December 5, 2015-David Teske, 11:29-12:10 UTC, 235mm SCT, 8 mm Baader Hyperion eyepiece 294x, North: UP, East: Right, Seeing 7/10.



only 700 m above its floor. Kepler's crater walls are slumped and not well formed into terraces like Copernicus, and it is very steep towards the top of the rim at around a 40° angle. There is an interesting dome formation about 20 miles (12 km) to the northwest that would be a good object to study. This dome, listed as KE1 with coordinates 39.53° N, 8.88° W, is 8.6 miles (13.9 km) in diameter, is 550 ft. (170 m) tall, and has a slope of 1.4°.

Figure 4. Crop of LAC57 Kepler chart dated May 1962. (courtesy NASA and Lunar and Planetary Institute)

Overall, Kepler is a fascinating crater set out amongst the smooth lava plain of Mare Insularum and sets itself off with its magnificent ray system that bears studying. Its big brother crater, Copernicus grabs every observer's attention but Kepler,



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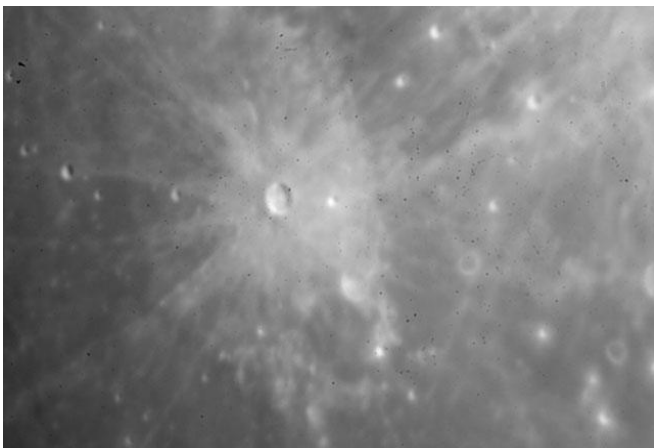
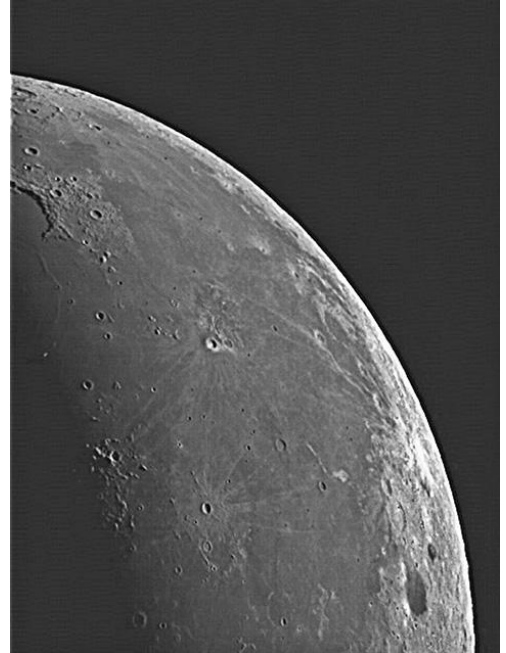
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ADDITIONAL KEPLER OBSERVATIONS

OCEANUS PROCELLARUM - Jay Albert, Lake Worth, Florida USA. December 16, 2014 10:54 UT. Seeing 7/10, transparency 4/6. Nexstar 6, f/6.3, NextImage 5.



KEPLER- Juan Manuel Biagi-Oro Verde, Argentina. September 7, 2014 06:09 UT. LX200 250 mm SCT, Canon Eos Digital Rebel XS

MARIUS HILLS-KEPLER - Maurice Collins, Palmerston North, New Zealand. April 19, 2016 10:15 UT. FLT-110, f/21, (South up)



ALCON 2016 & ALPO CONVENTION

This year, the ALPO annual meeting will again be in conjunction with the Astronomical League's ALCON 2016, August 10-13, 2016 in Arrlington, VA (Washington, DC area). Additional information is on the Astronomical League ALCON website (<https://alcon2016.astroleague.org/>) and in the JALPO. Registration and accommodation information is on the AL website.

SUB-ARC SECOND IMAGING CONFERENCE **AT STELLAFANE**

The Springfield Telescope Makers, founded by Russell W. Porter, is host organization of the Stellafane Convention, a gathering of amateur telescope makers and amateur astronomy enthusiasts, which has been held, in Springfield, Vermont, since 1926.

<http://stellafane.org/>

http://www.astrosurf.com/re/russell_porter_glass_giant.pdf

For the past eight years, in association with the Convention, the STMs have held what we call the "Hartness House Workshop". This workshop is a day long event, attended by, typically, fifty or so mostly advanced amateur astronomers and a few professionals. The workshop is held at the historic Hartness House Inn and Observatory, including the Hartness-Porter Museum of Telescope Making. All modest proceeds from the event are donated to the upkeep and expansion of the ATM Museum.

<http://www.hartnesshouse.com/>

<http://stellafane.org/history/early/museum-home.html>

The topic that we have chosen for this year is "Sub-Arcsecond Spatial Resolution Imaging". The workshop is scheduled for Thursday, August 4th, which will be followed by the Stellafane Convention proper on August 5th and 6th.

Anyone who might be willing and able to make a presentation at the workshop and/or the Convention should contact Thomas Spirock (tspirock@gmail.com).

LUNAR TOPOGRAPHICAL STUDIES

Coordinator – Wayne Bailey - wayne.bailey@alpo-astronomy.org

Assistant Coordinator – William Dembowski - dembowski@zone-vx.com

Assistant Coordinator – Jerry Hubbell – jerry.hubbell@alpo-astronomy.org

Website: <http://moon.scopesandscapes.com/>

OBSERVATIONS RECEIVED

JAY ALBERT – LAKE WORTH, FLORIDA, USA. Digital images of Kepler & Oceanus Procellarum.

ALBERTO ANUNZIATO - ORO VERDE, ARGENTINA. Digital image Tycho.

JUAN MANUEL BIAGI - ORO VERDE, ARGENTINA. Digital images of Kepler(2).

FRANCISCO ALSINA CARDINALI-ORO VERDE, ARGENTINA. Digital images of Copernicus & Grove.

MAURICE COLLINS - PALMERSTON NORTH, NEW ZEALAND. Digital images of 5, 6, 7, 8, 9, 10, 11, 13, 17 & 18 day moon, Aristarchus, Clavius, Copernicus(2), Earthshine, Marius Hills, Plato, Rheinhold, Schickard, southwest Moon & Tycho.

HOWARD ESKILDSEN - OCALA, FLORIDA, USA. Digital image waning Crescent.

CESAR FORNARI - ORO VERDE, ARGENTINA. Digital images Aristarchus & Mare Serenitatis.

ROBERT HAYS - WORTH, ILLINOIS, USA. Drawings of Kepler, LaHire & W. Bond B.

RICHARD HILL – TUCSON, ARIZONA, USA. Digital images of Aristoteles, Gemma Frisius, Montes Apennines & Montes Caucasus-Plato.

JERRY HUBBELL – LOCUST GROVE, VIRGINIA, USA. Digital image of gibbous Moon.

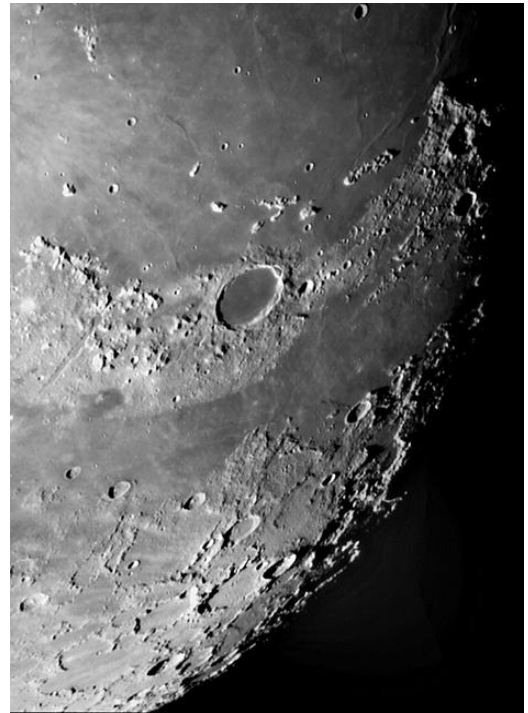
MICHAEL SWEETMAN – TUCSON, ARIZONA USA. Digital images of Janssen.

FRANCO TACCOGNA - GRAVINA IN PUGLIA (BA), ITALY. Digital images of Eratosthenes(3), Mersenius(6) & Rima Birt(14).

RECENT TOPOGRAPHICAL OBSERVATIONS



TYCHO- Alberto Anunziato-Oro Verde, Argentina. March 27, 2016 05:12 UT. C-11 HD edge SCT, Canon EOS Digital Rebel XS.

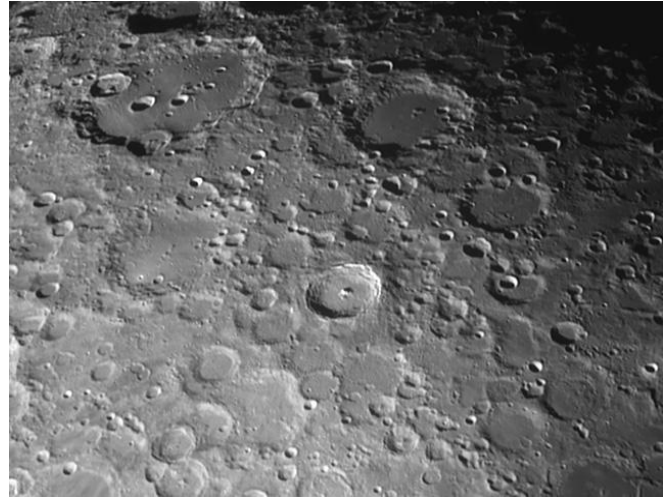


PLATO - Maurice Collins, Palmerston North, New Zealand. April 17, 2016 08:55-08:56 UT. FLT-110, f/21, ASI120MC (South up).



SCHICKARD - Maurice Collins, Palmerston North, New Zealand. April 19, 2016 10:18 UT. FLT-110, f/21, ASI120MC (South up).

TYCHO - Maurice Collins, Palmerston North, New Zealand. April 17, 2016 08:57 UT. FLT-110, f/21, ASI120MC (South up).



WANING CRESCENT IN DAYLIGHT- Howard Eskildsen, Ocala, Florida, USA. April 03, 2016 14:15 UT. Seeing 5/10, Transparency 6/6. Orion ED80 600mm FL Refractor, 0.72 reducer, W25 red filter, DMK 41AU02.AS.

Was imaging the sun which was about 41 degrees above the horizon. I noticed the moon just past the median, so after getting the sun photos, I attached a W25 red filter and imaged the moon as well.

MARE SERENTATIS- Cesar Fornari-Oro Verde, Argentina. March 27, 2016 05:04 UT. C-11 HD edge SCT, Canon EOS Digital Rebel XS.





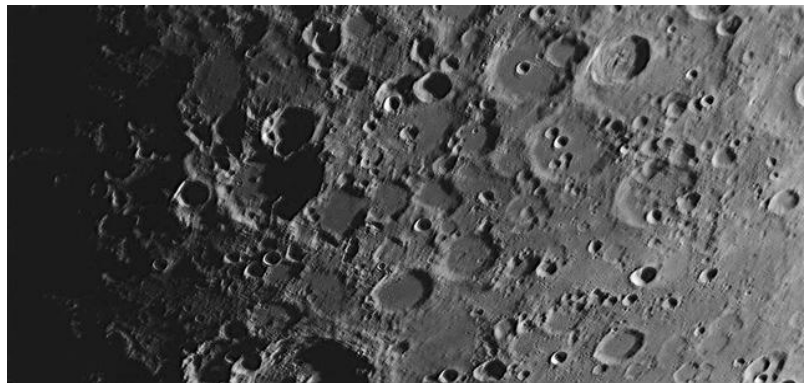
ARISTOTELES – Richard Hill – Tucson, Arizona, USA
 April 14, 2016 02:29 UT. Seeing 8-9/10. TEC 8" f/20 Mak-Cass, SKYRIS 445M, 656.3 nm filter.

I love to turn my telescope to the moon and even after planning and checking what the phase and terminator will be you see something that gives such surprising pleasure. Such was the sight I was privileged to see on Apr.13/14 when these two great craters were on the terminator. The upper one is, of course, the great 90km diameter Aristoteles with the little 31km Mitchell clinging to its right side here. Below it, more than half in shadow, is the younger 70km crater Eudoxus. It is the youngest of the named features in this image being formed less than a billion years ago. This would account for that very sharp, uneroded right wall. The dramatic lighting in this image really brings out details of the impacts like the ejecta splash radially around Aristoteles and the hummocky terrain about Eudoxus. Below the latter is another embayment named Alexander. It is given a diameter of 85km but it is obviously non-round so I'm not sure "diameter" is a good word here. It may well have been a crater when it was first formed over 4 billion years ago but subsequent impacts have destroyed its crater-like appearance. Notice the broken circular thread of

light to the lower left of Aristoteles. This is the 37km diameter Egede, an old flooded crater, older than either of the main craters in this writing but younger than Alexander.

GEMMA FRISIUS – Richard Hill – Tucson, Arizona, USA April 14, 2016 02:49 UT. Seeing 8/10. TEC 8" f/20 Mak-Cass, SKYRIS 445M, 656.3 nm filter.

Lost in the regal dominance of Maurolycus and Stofler, the 90km diameter Gemma Frisius, left of center in this image, and largely in shadow, is often overlooked. But there are many gems besides Gemma in this region.



There is an unusual unnamed crater on the lower wall of Gemma that only shows as a thread of light in this image. The walls of this feature would appear to be fairly high. The crater above Gemma is the 48km Goodacre, named for the British selenographer. Directly to the left of Gemma is Gemma Frisius D (which I will abbreviate as GF-D), with a remarkably straight wall on the left side. A look at the LROC QuickMap shows that this is the product of post impact slumping and is not as sharp as this 2km resolution image shows. The whole area has a soft appearance in LROC, overlain by ejecta from all the large impacts in the area. Three flooded craters come off of Gemma's lower right wall. From Gemma out to the right they are: GF-A (68km), GF-B (41km) and GF-C (35km). Note the unnamed nearly vertical feature that seems to be row of 3 or 4 contiguous craters that range in size from 3-10km. While they look like separate impact craters here on LROC it appears to be a single feature that must have a very interesting origin. Below the three GF craters are two more that form a line parallel to them. These are Buch (56km) on the left and Busching (54km) on the right. They point to the right to a crater with 4 good sized craters on its floor. This crater is listed as 83km in diameter and is named Rabbi Levi. Following that line a little further to the upper right corner we find another 54km crater, Lindenau with its interesting ridges on its floor that appear to be from some sort of compression. In a future lunation I may go for this one and its companion (not shown here) Rothman that has a similar floor.

GIBBOUS MOON – Jerry Hubbell · Wilderness,
Virginia USA.. April 17, 2016 20:00 UT. 0.3m SCT,
SBIG 2000XM..

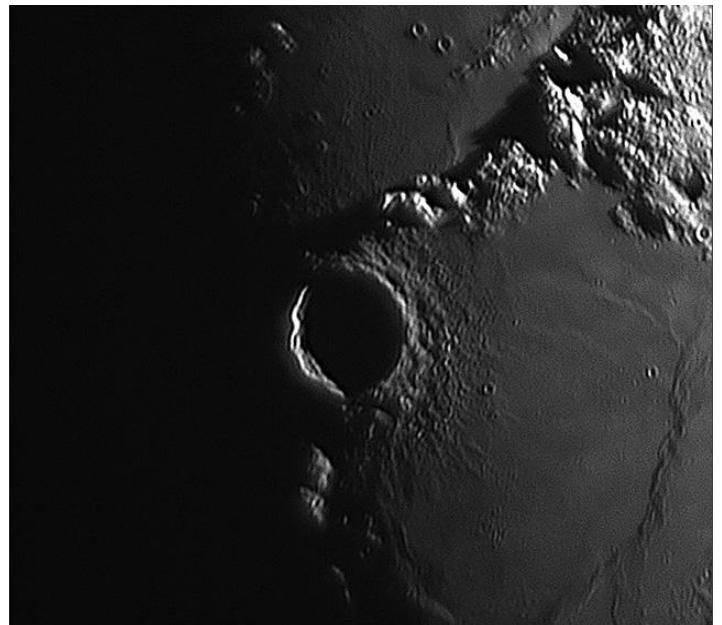


JANSSEN. Michael Sweetman, Tucson,
Arizona, USA, April 13, 2016 04:42 UT.
Seeing 6/10, transparency 3/6. 11" f/10 SCT.
DMK21, Astronomik Pro IR742 filter.



RIMA BIRT-Franco Taccogna-Gravina in Puglia (BA), Italy. April 15, 2016 18:28 UT. 200mm f/5 Newtonian, 2x APO barlow. ASI120mm, #21 red filter.

ERATOSTHENES-Franco Taccogna-Gravina in Puglia (BA), Italy. April 15, 2016 18:26 UT. 200mm f/5 Newtonian, 2x APO barlow. ASI120mm, #21 red filter.



LUNAR GEOLOGICAL CHANGE DETECTION PROGRAM

Coordinator – Dr. Anthony Cook – atc@aber.ac.uk
Assistant Coordinator – David O. Darling - DOD121252@aol.com

Observations/Studies for March were received from: Jay Albert (Lake Worth, FL, USA - ALPO) observed: Alphonsus, Aristarchus, Plato, and Tycho. Alberto Anunziato (Argentina – AEA) imaged: Grimaldi and Roca, despite appalling weather conditions in Argentina during much of March. Maurizio and Francesca Cecchini (Italy – UAI) imaged Gassendi. Maurice Collins (New Zealand – ALPO) imaged: Aristarchus, Clavius, Copernicus, Gassendi, Gruithuisen, Lansberg, Mare Humorum, Schiller, Sinus Iridum, Tycho and made some whole Moon mosaics. Marie Cook (Mundesley, UK – BAA) observed Proclus. Tony Cook (Newtown & Mundesley, UK – BAA) captured color webcam images of several features. Pasquale D’Ambrosio (Italy – UAI) imaged Gassendi. Valerio Fontani (Italy – UAI) imaged Censorinus. Rik Hill (Tucson, AZ, USA – ALPO) imaged: Heraclitus, Littrow, Montes Apennines, Murchison, and several other features. Marcelo Mojica (Bolivia – ICAROS) imaged several features. Franco Tacogna (Italy – UAI) imaged Gassendi, Herodotus, Plato and Proclus. Aldo Tonon (Italy – UAI) imaged: Aristarchus, Censorinus, and Marius. Claudio Vantaggiato (Italy – UAI) imaged Gassendi.

News: I have now solved the software/data problem which has been severely attenuating the number of repeat illumination predictions. Now that lecturing to students duties have just finished at University I may also add some extra observing stations around the world, so if you cannot find a nearby geographical locality on http://users.aber.ac.uk/atc/lunar_schedule.htm, just send me an email with your nearest town, country, or lon/lat, and I will add it to the web site. Remember this is not just for disproving past LTP observations, but can be used for solving other historical observational puzzles, or for checking out the appearance of any crater at a specific set of Selenographic Colongitudes.

LTP Reports: The UAI Lunar Section, Italy, would like your help. Two of their members imaged something interesting in earthshine on 2016 Mar 12, at a specific time between 18:30 and 18:35 UT. If you were observing/imaging/videoing earthshine at this time, please get in contact with Antonio Mercatali, the UAI Lunar Section director on: luna @ uai.it , or email me and I will pass your observation on.

Routine Reports: Below is a selection of reports received for March that can help us to re-assess unusual past lunar observations. As you will see we have had a high degree of success in eliminating several past LTP reports using our repeat illumination method. I am asked from time to time what I feel about eliminating past LTP reports (even some of my own)? Well hindsight (what we now know, as opposed to what we knew then) is a wonderful thing. We also have a methodical checklist now which was not available to past observers: <http://users.aber.ac.uk/atc/alpo/ltp.htm> .

Rocca: On 2016 Mar 06 UT 17:45 Alberto Anunziato (AEA) imaged this crater under the same illumination and topocentric libration (both to within $\pm 1^\circ$) to what Walter Haas would have seen back in 1938:

Rocca 1938 Apr 26 UT 09:30 Observer Haas? (NM?, USA, 12" ? reflector) "Colored (dark?) area was intensity I=1.0". NASA catalog weight=4. NASA catalog ID #434. ALPO/BAA weight=3.

As you can see Alberto’s image in Fig. 1, there is a dark area on the floor, namely the east rim shadow, and indeed it maybe on the Elger scale of 1.0 in terms of darkness, however it certainly does not exhibit any color. I shall therefore keep the weight of this LTP report at 3. Does anybody else have any images or sketches of this crater at a similar waning lunar phase?

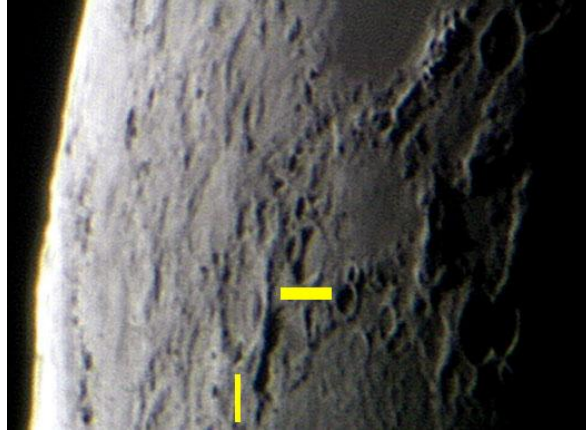


Figure 1. Roca as imaged by Alberto Anunziato (AEA) on 2016 Mar 06 UT 17:45 orientated with north towards the top. The image has been sharpened, very slightly color normalised, and then had its color saturation increased to 50%. For those unfamiliar with Roca, the location of the crater is indicated by two yellow markers.

Censorinus: On 2016 Mar 14 Valerio Fontani (UAI) imaged Censorinus, trying to replicate Maurice Collins image of noticeable blueness on the ejecta blanket of this crater. Although Valerio captured some blueness at 18:42 UT (Selenographic Colongitude 342.3°), one the sharper images was taken at 19:36UT (Selenographic Colongitude 342.7°) as can be seen in Fig 2. Both of these are still a little later than Maurice Collin's image (See the March 2016 newsletter) which shows the blue ejecta blanket at a Selenographic Colongitude of 342.2°. Images of Censorinus, on the same night, but later in Selenographic Colongitude, were also captured by Aldo Tonon (UAI) and myself (ALPO). How much earlier in Colongitude does the blue color start to become visible, or could we be detecting a color artifact from atmospheric spectral dispersion or chromatic aberration from this bright contrasty feature instead? I will reset the parameters in the Lunar Schedule web site generator to try to encourage earlier images of this area to see what we can find out.

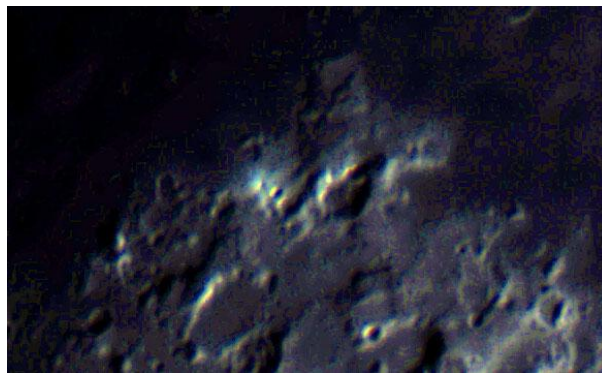


Figure 2. A color image of Censorinus as captured by Valerio Fontani (UAI) on 2016 Mar 14 UT 19:36 (Selenographic Colongitude = 342.7°). The image is orientated with north towards the top right. The image has been sharpened, contrast stretched and had its color saturation increased.

Proclus: On 2016 Mar 14 UT 18:50-19:10 Marie Cook (BAA), using a 90mm Questar telescope (x80-130, seeing II, transparency very good), observed this crater under the same illumination conditions (to within $\pm 0.5^\circ$) to the following LTP report:

On 1989 Feb 11/12 at UT23:30-01:39 D. Darling (Sun Prairie, WI, USA, 12.5" reflector, x159, seeing=7/10) observed a linear east to west feature in Proclus. D. Weier (WI, USA, 11" reflector, x378)

found the NNW part of the crater to be brighter than expected and confirmed the presence of the east to west feature - this crossed the shadow on the east floor and over into Mare Crisium. R. Manske (WI, USA) detected another "streak" parallel to this. All observers suspect that the linear features were due to raised topography on the floor of Proclus - however Cameron comments that there does not seem to be any linear features on the floor of Proclus to cause these effects. The Cameron 2006 catalog ID=351 and the weight=5. The ALPO/BAA weight=2.

Marie found the crater sharp and clear with floor features clearly seen. The brilliance of the rim was normal and the shadow was black, with no linear E-W feature seen, and certainly with no linear feature (streak) crossing over into Mare Crisium. In other-words the crater looked perfectly normal. So I wonder if it could be an issue over telescope resolution? Just out of interest I had a look through the Lunar Section archives and came across a copy of David Darling's sketch (See Fig 3 Left), and as a comparison we can compare this to an even higher resolution image still, namely from NASA LROC Quickmap mosaic (Fig 3 Right). Although the illumination differs, the LROC WAC mosaic images do suggest that there should be a lineament to the west of Proclus (It appears to be an eroded rim of low lying crater remains in the mare, I cannot see much which corresponds to an E-W, or rather more accurately a SW-NW lineament across the floor of Proclus and over the crater rim on the other side. The brilliance of the NNW rim, mentioned in David's sketch may just be due to a combination of illumination and topocentric libration. In view of all this I will keep the weight at 2, and encourage further repeat resolution imaging and sketches of this crater, but made with large scopes e.g. 12" reflectors.

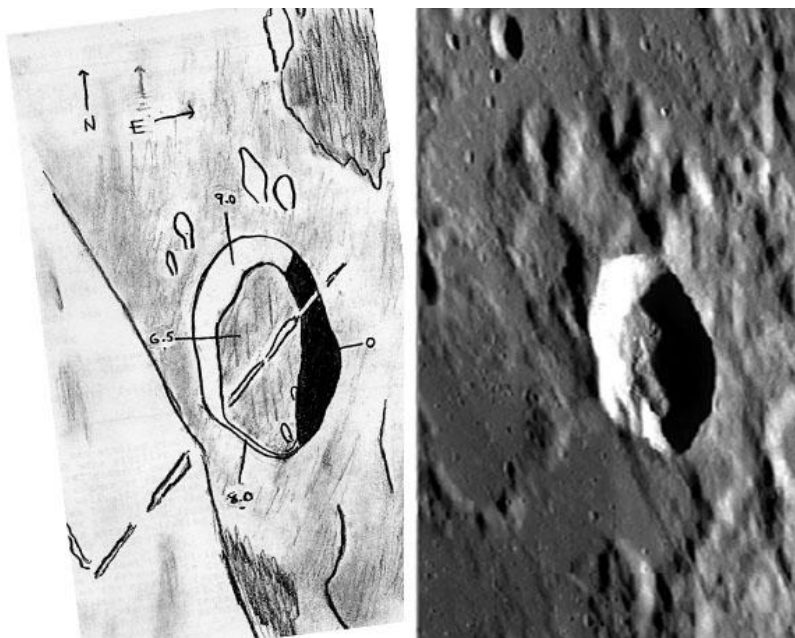


Figure 3. Proclus orientated with north towards the top. **(Left)** Sketch by David Darling from 1989 Feb 12 UT 00:30 – note that annotations have been rotated to match N-S sketch orientation. **(Right)** A slightly earlier state of illumination image from the NASA LROC Quickmap web site with the WAC – with “Big Shadows Nearside Mosaic” selected.

Plato: On 2016 Mar 17 UT 02:20 Rik Hill (ALPO) imaged the Plato area, and at UT 02:00-02:20 & 02:40-02:50 & 02:55-03:00 Jay Albert (ALPO) observed visually under similar illumination (to within $\pm 0.5^\circ$) to a report of a colored streak in the shadow filled floor of Plato:

Plato 1967 Apr 18 UT 03:10-04:00 Observed by Kelsey (Riverside, CA, USA, 8" reflector x300, S=8, T-4-5). "Streak on floor showed slight enhancement in red filter comp. to blue. Later, a 2nd streak formed. Probably the sun shining thru a valley in the rim. Red enhancement permanent? (Wise suspected a blink

here 6h earlier)." NASA catalog weight=3. NASA catalog ID #1027. ALPO/BAA weight=2.

Although Rik's image, which I have over contrast stretched on purpose in Fig 4, was taken about 0.5° in colongitude earlier than the Kelsey observation, (this explains why no shadow streaks were visible from the Sun breaking through gaps in the eastern rim), Rik was using a red 656nm filter, which would be ideal to test for color on the light floor streaks. Accounts of color on the Moon are always interesting to explain. I wonder if there was more scattered light when Kelsey used the blue filter in 1967, and this gave the image a lower contrast, than the red filter, giving the impression of the streak looking brighter in red? Now Jay Albert was observing visually over three time slots during the Mar 2016 repeat illumination window. On the first session, which encompassed Rik's image, Jay saw no sign of a streak in the shadow filled floor (as per Rik's image), nor approximately 20 minutes later, however 20 minutes after that a streak of sunlight reaching the floor was visible (despite worsening seeing). Interestingly enough Jay comments that this streak was brighter in a red Wratten 25 filter than in a blue green Wratten 44a filter – confirming Kelsey's observation.

Because the effect seen by Kelsey has repeated, I will lower the weight from 2 to 1, because it looks less likely to be a LTP and more of a Rayleigh scattering effect in our atmosphere. However if this is the case, it should be possible to image sun-ray effects like this in color on Plato, and indeed other craters, and record these in red too. So let us keep this on the LTP database for now, but try to confirm this effect using color imaging in future!

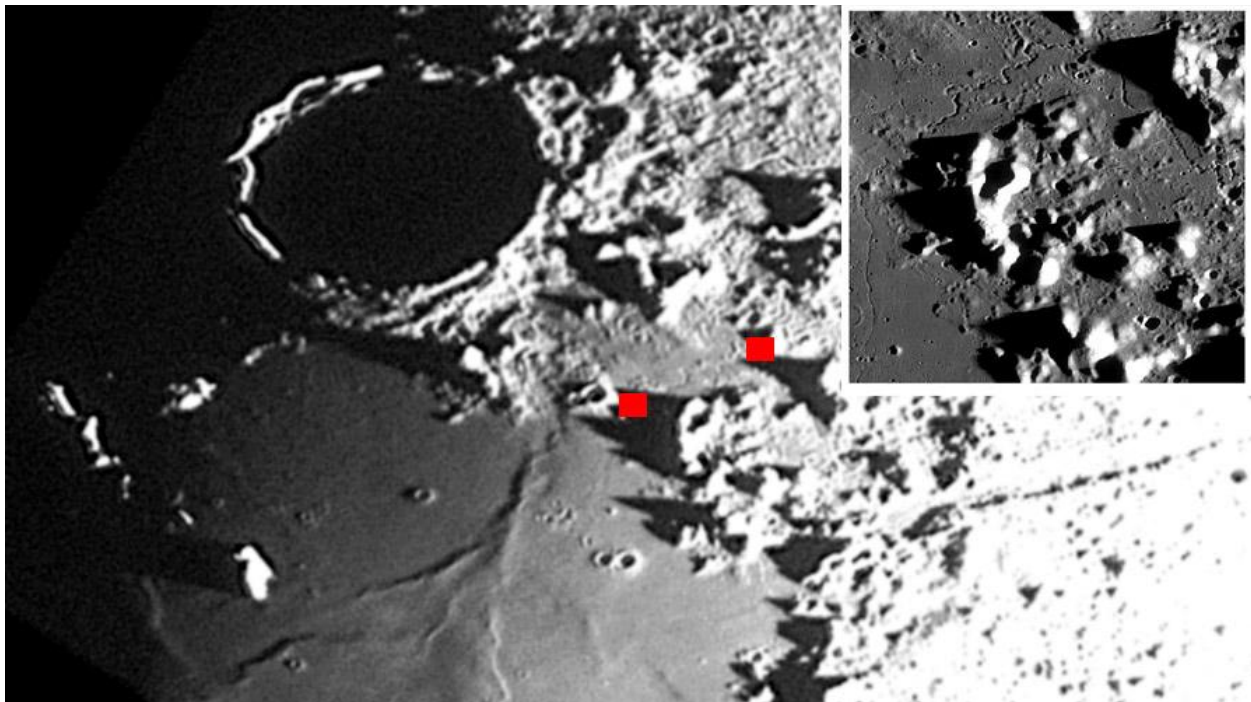


Figure 4. Plato orientated with north towards the top, imaged by Rik Hill (ALPO) on 2016 Mar 17 UT 02:20. The red rectangles show the start and end of the SW trending part of Rimae Plato. An inset of this rimae, from NASA's LROC Quick Map program can be seen in the top right.

On another note it was quite pleasing to see Rimae Plato starting to show up in Rik's image. This is a very sinuous rille which spans from Montes Alpes, to the NW, then turns to the SW, then finally turns to the south and vanishes into Mare Imbrium. The length of this often overlooked rille system is 130 km (possibly longer if you include all the winding), of similar length to the rille running through Valles Alpes. I have shown the SW leg of Rimae Plato in Rik's image between two red markers. For comparison, you can see an insert from NASA's Quick Map LROC WAC mosaic also in Fig 4. Fortunately LROC's narrow angle cameras have been targeted a lot on this locality, and for anyone interested you can try zooming down to the metre scale, using Quickmap: <http://target.lroc.asu.edu/q3/>

Gassendi: On March 19 UT 07:58 Maurice Collins imaged (Fig 5) Gassendi about 20 minutes after the repeat illumination window of the following 1966 LTP:

Gassendi observed by Sartory on 1966-4-30 Gassendi 1966 Apr 30 UT 21:30-23:28 Observed by Sartory, Ringsdore (England, 8.5" reflector, S=E), Moore, Moseley (Armagh, Northern Ireland, 10" refractor, S=VG), Corralitos Observatory (Organ Pass, NM, USA, 24" reflector, Moon Blink) "English moon blink system detected red spots with vis. confirm. Ringsdore says no color but saw obscuration. (LRL 60-in photos showed nothing unusual by my casual inspection). Indep. confirm. (even E. wall was in dark). Corralitos did not confirm by MB." N.B. event had finished by the time Corralitos came on-line. NASA catalog weight=5. NASA catalog ID #931. ALPO/BAA weight=4.

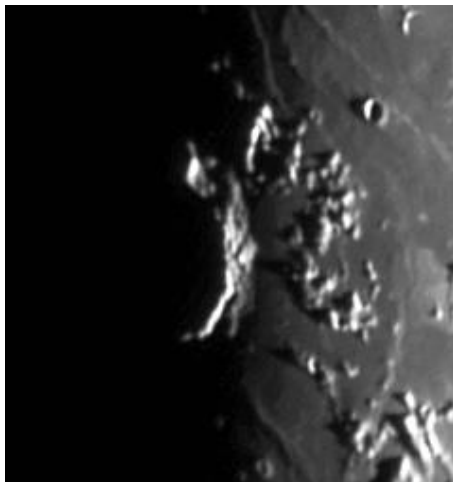


Figure 5. Gassendi as imaged by Maurice Collins on 2016 Mar 19 UT 07:58 orientated with north towards the top.

Although Maurice's image appears to be in monochrome, it is valuable however in showing the general appearance of Gassendi on the night of 1966 Apr 30/May 01. To add more to the description given above: at 21:30UT on that night Sartory noted a blink (red and blue filters) on the outer SE wall of Gassendi. The effect was confirmed independently by Moore, who although had been alerted, was not told where to look on the crater. Ringsdore was also "independently" alerted, but saw no color, but at the same location an obscuration of detail instead. We shall keep the weight of this LTP at 4. Also an earlier repeat illumination set of observations can be found in the 2014 Jul newsletter.

Gassendi: On 2016 Mar 19 UAI observers: Pasquale D'Ambrosio, Franco Taccogna, and Claudio Vantaggiato, managed to re-observe this crater under the similar illumination conditions (to within $\pm 0.5^\circ$) to a LTP report from Switzerland from 2013, and another to a Gassendi observation by myself from 1977 (also to within $\pm 0.5^\circ$):

On 2013 Jan 22 Tony Deyyes noticed a white streak (possibly >10% brightness of the central peaks) on the floor of Gassendi extending from the central peak to the north east. The location covered a small line of mounds. A small scope can be used for this, anything larger than 2.5". It would be useful to obtain some sketches or monochrome images to confirm this appearance, and note how this streak develops over time. ALPO/BAA weight=2.

Gassendi 1977 Sep 23 UT 21:15 Observed by Cook (Frimley, UK, 6" reflector x144, Seeing IV (Antoniadi)) "Prominent red dot seen at central peak, also a hint of red on floor in N. quadrant of crater. More likely to be spurious color than LTP the observer feels" ALPO/BAA weight=1.

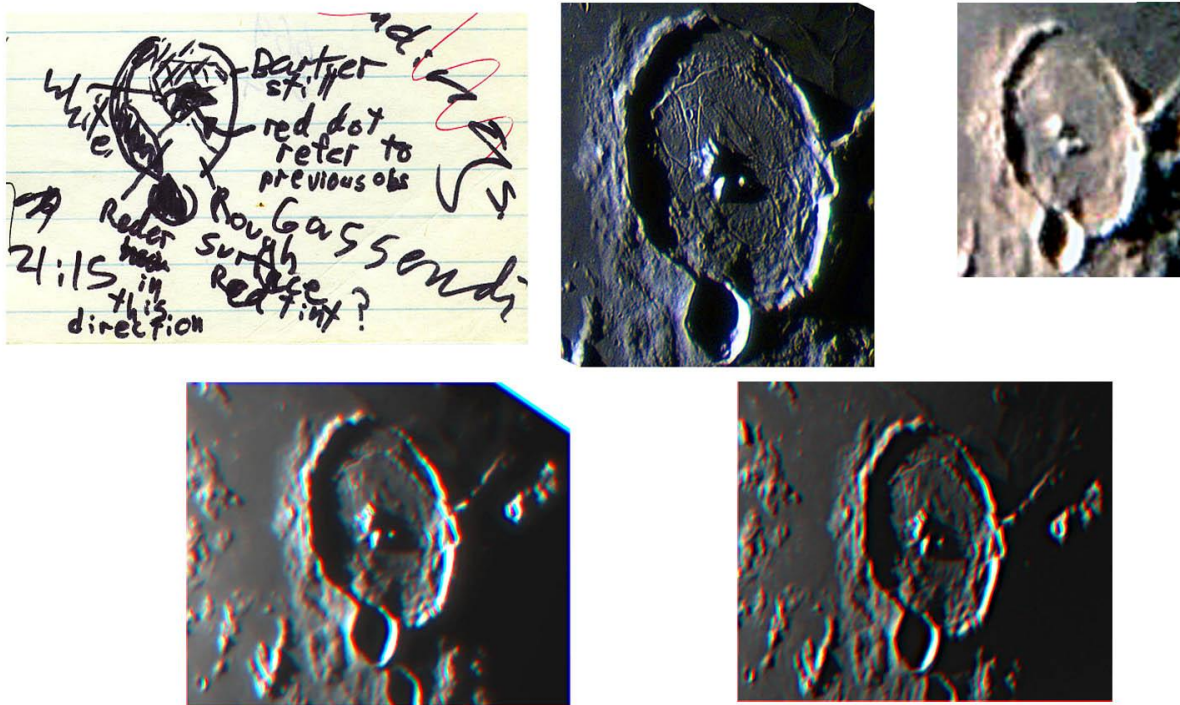


Figure 6. Gassendi orientated with north towards the bottom to match the sketch. **(Top Left)** A sketch by Anthony Cook (BAA) from 1977 Sep 23 UT 21:15 made using a 15cm Newtonian at x144 magnification, seeing conditions IV. **(Top Centre)** Color image taken by Maurizio and Francesca Cecchini (UAI) taken on 2016 Mar 19 UT 20:22. **(Top Right)** Color image by Claudio Vantaggiato (UAI) taken on 2016 Mar 19 UT 22:36. **(Bottom Left)** Monochrome image by Franco Taccogna taken on 2016 Mar 19 UT 17:52 – artificial atmospheric spectral dispersion has been added. **(Bottom Right)** Monochrome image by Pasquale D’Ambrosio (UAI) – artificial atmospheric spectral dispersion has been added.

For my own 1977 report, I have taken images from the UAI observers which were in color, enhanced these and you can see them in Fig 6, however these two color images were outside the repeat illumination window – nevertheless they do not show any natural color on the lunar surface which might explain the colors I saw in Gassendi back in 1977. So I then investigated two monochrome images supplied by Pasquale D’Ambrosio and Franco Taccogna, which matched as close as possible the illumination conditions present in my 1977 report, and attempted to add artificial atmospheric spectral dispersion to these. You can see the results in the lower part of Fig 6.

Clearly it is possible to replicate the red dot on one of the central peaks, but we get the age old problem of false color effects appearing on other rims and contrasty areas too. The redness on the northern floor of Gassendi is more problematic to account for. I observed Mons Pico on that night too but saw no spectral dispersion effect there. For some reason I did not check Gassendi with filters (maybe I did not have any at the time?) and my notes make no mention of looking elsewhere for similar effects. I took a look through the BAA archives and came across a report from F.W. Peters, who was using a larger 8.5” reflector, was equipped with Moonblink filters, and was observing Plato and Gassendi from 20:45-21:29UT, hence overlapping with my observation – he reported: “Checked both craters with Moon Blink – no color. There was no detail inside Plato but much detail inside Gassendi”. I think in view of the negative detection of color with a Moon Blink device, no natural color (In Fig 6) to explain what I saw, and no good way of producing a reddish tinge on the northern floor from atmospheric spectral dispersion, I had better take this off the LTP database by setting the weight to 0. The weight was already low at 1 anyway. I cannot fully account for what I saw at the time – though I did suspect atmospheric effects, however the Moon Blink device trumps (is way more reliable than) white light detection of lunar color any time.

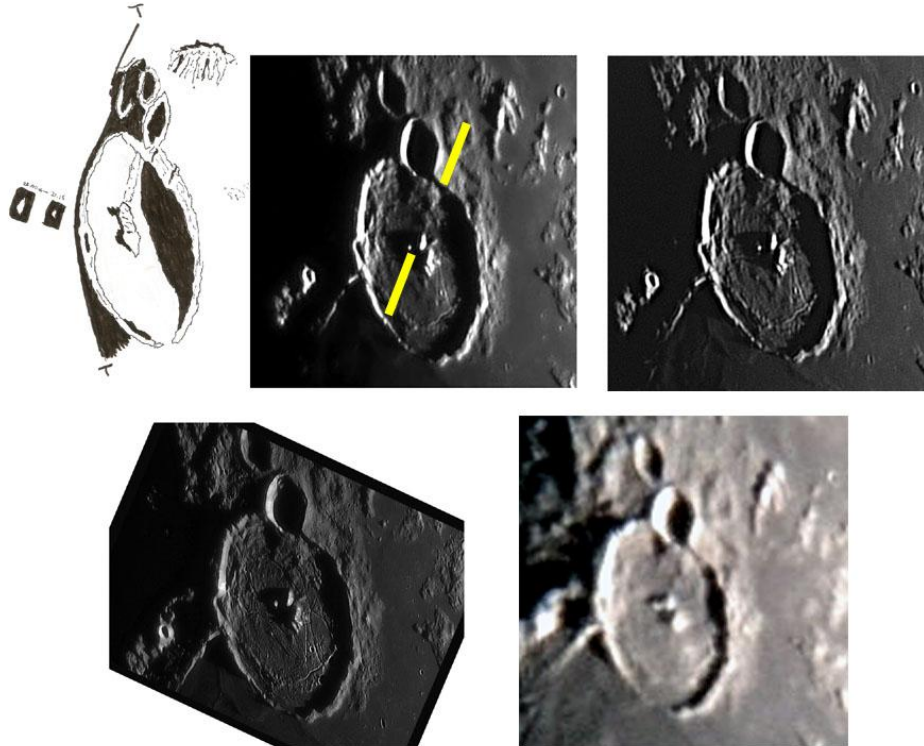


Figure 7. Gassendi orientated with north towards the top. **(Top Left)** The original sketch by Tony Deyes. **(Top Centre)** Image by Franco Taccogna (UAI) from 2016 Mar 19 UT 17:52 – a couple of yellow markers have been added to show the location of the white streak recorded in the Tony Deyyes sketch. **(Top Right)** Image by Pasquale D’Anbrosio (UAI) from 2016 Mar 19 UT 18:11. **(Bottom Left)** Image by Maurizio & Francesca Cecchini from 2016 Mar 19 UT 20:02. **(Bottom Right)** Image by Claudio Vantaggiato from 2016 Mar 19 UT 22:36.

For the Deyyes report, I have included example images supplied by Franco Taccogna (UAI) and Pasquale D’Anbrosio (UAI) which match what would have been seen (see Fig 7), albeit at higher resolution than Tony Deyyes would have obtained with his 2.5” refractor. I have also included images by Maurizio and Francesca Cecchini (UAI) and Claudio Vantaggiato (UAI), which although outside the predicted time, do also exhibit what was described. As you can see, although this streak may have seemed suspicious when Tony Deyyes observed with a relatively small scope back in 2013, the appearance appears to be perfectly normal though, and it does fade over time as the Sun rises. Therefore I shall remove this from the LTP database by assigning a weight of 0.

Marius: On 2016 Mar 21 UT 22:46 and 22:50 Aldo Tonon (UAI) imaged (Fig 8) this crater under similar illumination (to within $\pm 0.6^\circ$) to a 2004 LTP report by fellow UAI observer Antonio Marino:

Marius 2004 Oct 26 UT 19:43 Observed by Antonio Marino (Ercolano, Naples, Italy, - 150 mm Maksutov-Cassegrain f/12, Philips Vestra CCD camera + 2x Barlow seeing III) "Although observer did not report anything unusual at the time, the processed CCD image showed a darker than usual region of the floor at the base of the west rim. A CCD image at 21:20UT by Brendan Shaw revealed only a normal slightly dark area here. It is possible that Antonio's dark area may be an artefact of the processing, but to be sure it is sensible to re-image this area". The ALPO/BAA weight=3.

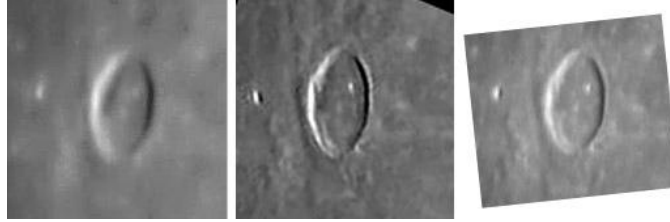


Figure 8. Marius orientated with north towards the top. **(Left)** Image taken by Antonio Marino (UAI) on 2004 Oct 26 UT 19:43 at a Selenographic Colongitude of 69.30° - note that this image has been sharpened. **(Centre)** Image taken by Aldo Tonon (UAI) on 2016 Mar 21 UT 22:46 at a Selenographic Colongitude of 69.53°. **(Right)** Image taken by Brendan Shaw (BAA) on 2004 Oct 26 UT 20:34 at a Selenographic Colongitude of 69.66°.

Now this LTP report (if that is what it was?) has always puzzled me as to what the dark marking was at the base of the west wall? Is it supposed to be dark or just grey, and what is causing this? As you can read above, there was always some doubt over the alleged effect – perhaps it was more to do with imaging rather than actually being lunar. Aldo captured two moderate resolution images, and I have placed one of these “the missing piece of the puzzle” in sequence of Selenographic Colongitude in Fig 8. As you can see the dark area on the inner west rim of Marius, now appears to fade as the Sun rises over the lunar surface. I have checked LROC images, and the area giving rise to the dark patch inside the western rim is from shadow from a series of concentric inner terraces at the foot of the rim, close to the floor. So now with hindsight, we can see why we had that mysterious shadow/shading inside the west rim, and I can remove this LTP from the database by assigning it a weight of 0.

General Information: For repeat illumination (and a few repeat libration) observations for the coming month - these can be found on the following web site: http://users.aber.ac.uk/atc/lunar_schedule.htm . By re-observing and submitting your observations, only this way can we fully resolve past observational puzzles. To keep yourself busy on cloudy nights, why not try “Spot the Difference” between spacecraft imagery taken on different dates? This can be found on: http://users.aber.ac.uk/atc/tp/spot_the_difference.htm . If in the unlikely event you do ever see a LTP, firstly read the LTP checklist on <http://users.aber.ac.uk/atc/alpo/ltp.htm> , and if this does not explain what you are seeing, 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! Twitter LTP alerts can be accessed on <https://twitter.com/lunarnaut> .

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KEY TO IMAGES IN THIS ISSUE

1. Aristoteles
2. Censorinus
3. Copernicus
4. Eratosthenes
5. Gassendi
6. Gemma Frisius
7. Janssen
8. Kepler
9. Mare Serenitatis
10. Marius
11. Oceanus
Procellarum
12. Plato
13. Proclus
14. Rima Birt
15. Rocca
16. Schickard
17. Tycho

FOCUS ON targets

X = Capuanus

Y = Montes Apennines

