RECENT BACK ISSUES: http://www.zone-vx.com/tlo_back.html

A PUBLICATION OF THE LUNAR SECTION OF THE A.L.P.O. EDITED BY: William M. Dembowski, F.R.A.S. - dembowski@zone-vx.com

Elton Moonshine Observatory - http://www.zone-vx.com 219 Old Bedford Pike (Elton) - Windber, PA 15963

## FEATURE OF THE MONTH - MAY 2006



## MADLER

Sketch and text by Robert H. Hays, Jr. - Worth, Illinois, USA December 8, 2005-01:15 to 01:45 UT 15cm Newtonian - 170x - Seeing 7-8/10

I observed this crater and vicinity on the evening of Dec. $7 / 8,200$ while timing a couple of occultations. This crater is just east of Theophilus and is probably overlooked due to its prominent neighbor. It has a somewhat odd, lobed shape with possible interior rims. I have to wonder if Madler is the product of two impacts. Madler has a large central peak and much shadowing to the southwest. There may be a gap or two at the north end. Two pits are conspicuous to the southeast; the LQ map labeled the one to the northwest as Madler D. Three ray segments are near these pits and. south of Madler. The middle one (just west of the pits) had some slight shading on its west side. A long ridge extends north from Madler, and a longer one extends to the east. The longer one looked much like a ray, but there was shadowing along its south edge. A bright, round, shadowless patch is near the end of this ridge, and a shallow pit is just to its northwest. There is a bright, fan-shaped area between the two ridges near Madler. Farther out, the terrain is dark right up to the north edge of the east-west ridge, but is lighter to the south, out to the aforementioned bright spot. It then gradually darkens southward toward the pair of pits. I have tried to show this on the sketch, but this effect was not easy to draw.

## 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 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.


## A.L.P.O. LUNAR COORDINATORS

Dr. Anthony Cook - Coordinator, Transient Lunar Phenomena acc@cs.nott.ac.uk

Brian Cudnik - Coordinator, Lunar Meteoritic Impact Search cudnik@sbcglobal.net

David O. Darling - Asst. Coordinator, Transient Lunar Phenomena DOD121252@aol.com

William M. Dembowski - Coordinator, Lunar Topographical Studies Dembowski@zone-vx.com

Marvin W. Huddleston -Coordinator, Lunar Dome Survey kc5lei@comcast.net

## COPERNICAN VOLCANOES

## Mardi Clark - Whitepeak Observatory, Tacoma, Washington, USA

While examining an image taken Wednesday evening (March 8, 2006 PST) of the Copernicus area (beautifully situated right on the terminator) I noticed some positive elevation features in the dark albedo area situated east of Copernicus and south of Stadius. I was unaware of any mention of domes/volcanoes in this area so decided to see what exactly these features were. Here's the image of the area in question:


## FIGURE 1 Whitepeak Observatory Image

Dashed lines indicate general area covered by enlargements.
(See text for details)

Here (dashed box) you can see the dark patch delineating the volcanic province, which the geologists call the Sulpicius Gallus formation, quite clearly. Copernicus C is located in this image just to the right of the ' C ' (unresolved dot) and is the reference point for the following images. The domes/volcanoes in question are also marked with small arrows.

Now, the resolution of this image is quite poor, nonetheless these features are quite obvious! Are these features "really" overlooked examples of lunar volcanoes? Let's take a closer look .....

| FIGURE 2 |
| :---: |
| NASA Image |
| (See text for details) |



The above image contains the 'smoking gun'. This is an enlargement of the printed page out of the Bower \& Hughes Lunar Orbiter atlas. The relevant features (crater pits) are unfortunately too small to show clearly on the digitized version that the Lunar and Planetary Institute hosts so I had to resort to taking a photo enlargement of the page of the actual atlas. This image is still less clear than it is under a magnifying glass.

At any rate, one can see three of the domes possess summit crater pits and the second \& fourth have what looks to me to be an enlarged flank blow-outs typical of a cinder cone type feature. The second also has a summit crater. The first looks very similar to the Gruithuisen domes, gamma \& delta.


Above is the USGS Geological quad for this area delineating (in blue) the extent of the volcanic provinces in the immediate area and the corresponding location of the features in question.

Factors which lead to classification of these features as lunar volcanoes: (1)These features appear in a well-known volcanic province, evidenced by extensive surrounding areas of dark pyroclastics (ash etc).
(2) All possess summit pits and/or conspicuous negative features (flank craters) congruent with volcanic cones. (3) These craters appear isolated in size \& frequency in this area, reducing the possibility to virtually zero that they are merely coincident impact features.

The summit pit of \#1 is only about 800 meters in diameter ... quite a challenge for an observer with a larger scope to see under the best of seeing conditions.

I found the age of the volcanic areas, at least partially, predates Copernicus. I examined high sun ray images of the area and there are indeed rays that cross these provinces. Also I looked at the new geological quad of this area that Paul Spudis et al are working on and evidently, other than predating Copernicus, the exact age of these volcanic provinces has even them ambivalent as they list these on
their new map as of indeterminate age (bracketed by question marks! Link to the new geo-quad: http://www.lpi.usra.edu/meetings/lpsc2006/pdf/2135.pdf

There is, it seems to me, still a possibility that there may have been limited activity within this volcanic province near Copernicus C after Copernicus was emplaced.

Take a look at the examination of rays in the below graphic. Note that although the dark volcanic province south of Copernicus C is crossed by rays, it shows as much less impacted by them than the dark maria above it and also less than the extension of this same volcanic province to the southward has been impacted by ray material. Why is this?


FIGURE 4 - Whitepeak Observatory Graphic (NASA images)

One explanation would be later Copernican era pyroclastic eruptions overlay some of the earlier Copernican impact rays. Also this entire volcanic province extends southward and slightly west of the upper dark area (outlined irregular area on graphic)--and the lower portion seems pretty heavily impacted by rays/ejecta compared to the same area to the north, despite their being purportedly the same, pre-Copernican, age.

One thing is for sure though--there are quite a number of lunar volcanoes and volcanic vents in this province. I counted >20 in this enlargement of LO image IV-121-H1:


FIGURE 5 - NASA Image (See text for details)
At any rate this is a fascinating area -- or, as Paul Spudis et al put it in their paper on this area with typical professional understatement, "...curious stratigraphic relationships with highland and mare units make this an interesting region to study..."

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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 always be included:
Name and location of observer
Name of feature
Date and time (UT) of observation
Size and type of telescope used
Seeing: }1\mathrm{ to 10 (1-Worst 10-Best)
Transparency: }1\mathrm{ to }
Magnification (for sketches)
Medium employed (for photos and electronic images)
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## FOCUS ON: Pitatus

## William M. Dembowski, FRAS

Coodinator, Lunar Topographical Studies
Pitatus is a 100 km ( 60 miles) diameter crater that sits on the southern shore of Mare Nubium, just southwest of one of the Moon's biggest tourist attractions, the Straight Wall (Rupes Recta). (See Figure 1)


## FIGURE 1

Digital image by Wayne Baily Sewell, New Jersey, USA
December 9, 2005-02:43 UT
11 inch f/10 SCT
Schuler IR72 Filter
Philips Toucam

The floor of Pitatus is completely lava covered and surrounded by a heavily damaged rim which rewards the patient observer with a number of interesting features. One of the more nicely formed rim-craters is Pitatus C, an 11 km crater with a flat floor that marks the northeastern wall of Pitatus. The most prominent valley breaches the wall with the adjoining crater Hesiodus to the west. Both are nicely shown on Figure 2.

| FIGURE 2 |
| :---: |
| Digital image by |
| Paolo Lazzarotti - Massa, Italy |
| February 18, 2005-20:17 UT |
| 252mm Newtonian |
| Lumenera LU075M Camera |




## FIGURE 3

Digital image by Zac Pujic
Brisbane, Australia
March 3, 2005
32 cm Newtonian at $\mathbf{f} / 28$
Philips Toucam Pro

Many details on the floor of Pitatus are small and/or subtle, and usually require a sizeable telescope and steady seeing. Among the more easily seen are the off-center peak, a cluster of hills to the northeast, and a series of rilles that encircle the floor (Figure 3). Several of the rilles extend well into the interior of the crater but, as is usually the case with rilles, their visibility is largely dependant upon the lighting conditions at the time.

> FIGURE 4 Digital image by Anthony Ayiomamitis Athens, Greece November 11, 2005 AP160 f/7.5 Refractor Philips Toucam Pro


Under a high sun there are several broad comet-like streaks south of the "central" peak, and one to the North (Figure 4). When seen in isolation one might tend to attribute their origin to the extensive ray system of Tycho to the Southwest. But, with a broader view (Figure 5), it is obvious that these bright Pitatus features do not "point back" to Tycho. We should be careful not to underestimate the value of low-powered views and images of the lunar surface.


> FIGURE 5
> Digital image by Howard Eskildsen Ocala, Florida, USA
> March 18, 2006-10:57 UT 6 inch f/8 Newtonian V-Block Filter - NexImage Camera

## CALL FOR OBSERVATIONS - FOCUS ON: MARE SERENITATIS

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 2006 edition will be Mare Serenitatis. 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 favorites to one of the addresses shown in the banner on Page One.

Deadline for inclusion in the Mare Serenitatis article is June 20, 2006

## ADDITIONAL PITATUS OBSERVTIONS



Digital image by Rafael Benavides Palencia Posadas, Cordoba, Spain January 8, 2006-20:26 UT
15cm f/8 Refractor - 3x Barlow - Philips Toucam Pro


Digital image by Michael Boschat - Halifax, Nova Scotia, Canada April 18, 2005
$105 \mathrm{~mm} \mathbf{f} / 10$ Refractor - Centrios 3MP Camera

## ADDITIONAL PITATUS OBSERVTIONS



Digital image by Achille Giordano - Naples, Italy March 8, 2006-21:40 UT

## ETX125 5 inch Mak-Cass - 2x Barlow - Philips Toucam Pro



Digital image by Antonio Marino - Ercolano, Italy August 27, 2005-03:59 UT 150mm Intes Micro - 2x Barlow - Philips Vesta

## ADDITIONAL PITATUS OBSERVTIONS



Digital image by George Tarsoudis - Alexandroupolis, Greece March 9, 2006-17:38 UT
8 inch SCT - 2.5x Barlow - IR/UV Cut Filter - Philips Toucam Pro


Digital image by Davide Zompatori - Anzio (Rome) Italy
August 27, 2005-02:20 UT
Celestron 11 inch SCT - Logitech QuickCam Pro

## ADDITIONAL PITATUS OBSERVTIONS



Digital image by Claude Libert - Gent, Belgium May 17, 2005
12 inch SCT - Webcam


Digital image by K.C. Pau - Hong Kong, China March 16, 2003
212mm Cass-Newt - Philips Toucam Pro

## LUNAR TOPOGRAPHICAL STUDIES

## Acting Coordinator - William M. Dembowski, FRAS <br> dembowski@zone-vx.com

## OBSERVATIONS RECEIVED

WAYNE BAILEY - SEWELL, NEW JERSEY, USA
Digital images of Posidonius, Daguerre, Dionysius, Aristarchus, Aristoteles (2), Pitatus (5), Atlas, Ptolemaeus Chain (4), Piccolomini, Theophilus, Deslandres (4), Maginus \& Tycho, Rupes Recta, Eratosthenes

ED CRANDALL - WINSTON-SALEM, NORTH CAROLINA, USA
Digital images of Gassendi, Gruithuisen, Longomontanus

ACHILLE GIARDANO - NAPLES, ITALY
Digital images of Pitatus (2), Arago,

HOWARD ESKILDSEN - OCALA, FLORIDA, USA
Digital images of Tycho Rays to Pitatus, Occultation of Pleiades by the Moon (3), Messier Twins, Thales,

CLAUDE LIBERT - GHENT, BELGIUM
Digital image of Pitatus

RAFAEL BENAVIDES PALENCIA - POSADAS, CORDOBA, SPAIN
Digital images of Guericke to Opelt, Ptolemaeus Chain, Clavius, Cassini, Pitatus (2), Theophilus Chain, Arago, Rupes Altai

DONALD SPAIN - LOUSVILLE, KENTUCKY, USA
Digital image of Pitatus

GEORGE TARSOUDIS - ALEXANDROUPOLIS, GREECE
Digital image of Pitatus

## ALEXANDER VANDENBOHEDE - GHENT, BELGIUM

Digital images of Clavius, Tycho \& Maginus, Atlas \& Hercules, Plato \& Alpine Valley, Sinus Iridum, Normal and rectified views of Southern Polar Region, Northern Limb Region, Normal and rectified views of Mare Marginus, Copernicus, Mare Nubium, Mare Crisium, Petavius to Langrenus, Northeast limb of 4-day Moon, Earthshine on 4-day Moon (composite)

## RECENT TOPOGRAPHICAL OBSERVATIONS



RECTIFIED \& NORMAL VIEW OF SOUTH POLAR REGION Digital images by Alexander Vandenbohede - Ghent, Belgium April 8, 2006-20cm f/15 Refractor


## MONS GAMMA \& DELTA GRUITHUISEN

Digital image by Ed Crandall
Winston-Salem
North Carolina, USA
April 10, 2006
$110 \mathrm{~mm} \mathbf{f} / 6.5$ Refractor
3x Barlow - 2" Extension
Philips Toucam

## BRIGHT LUNAR RAYS PROJECT <br> Coordinator - Willliam M. Dembowski, FRAS

## RECENT RAY OBSERVATIONS



MESSIER \& MESSIER A
Digital image by Howard Eskildsen Ocala, Florida, USA January 5, 2006-00:34 UT 6 inch Refractor - 5x TeleXtender

## DESLANDRES

Digital image by Wayne Bailey
Sewell, New Jersey, USA
April 10, 2006-02:29 UT
11 inch f/10 SCT
UV/IR Block Filter
Philips Toucam


# LUNAR TRANSIENT PHENOMENA <br> Coordinator - Dr. Anthony Cook - acc@cs.nott.ac.uk <br> Assistant Coordinator - David O. Darling - DOD121252@aol.com 

## LTP NEWSLETTER - JANUARY 2006 <br> Dr. Anthony Cook - Coordinator

Observations for March were received from:. Jay Albert (USA), Rafael Benavides (GLR, Italy), Clive Brook (UK), Marie Cook (UK), Raffaello Lena (GLR, Italy), Gerald North (UK), and Piergiovanni Salimbeni (GLR, Italy). March was a quiet month with no LTP reports being received, but instead a lot of useful routine observations, some of which can help to disprove past LTP. My thanks also go to David Darling who has been receiving observations too via his web site and submits these to me in batches at appropriate intervals.

Last month I mentioned that I had some exciting news about ESA's SMART-1 probe. On September $3{ }^{\text {rd }}$ at 02:00 UT the spacecraft, at the end of its useful life, with depleted fuel, will be targeted to crash impact into the Moon at approximately 44W and 34S on the night side. The terminator is about 9 deg away. Due to uncertainties in predicting the orbit so far in advance and some uncertainties in the topography in this region as the spacecraft descends, it could crash either 5 hours earlier or 5 hours later in approximately this location. As the spacecraft is just 290 kg and traveling at $2 \mathrm{~km} / \mathrm{sec}$ at the time of the impact, the expected impact flash (duration $1 / 50^{\text {th }} \mathrm{sec}$ ) will be probably be too faint to see against the glare from the Moon with amateur sized telescopes. The impact energy will be the same as a 1 kg meteorite striking the surface at $40 \mathrm{~km} / \mathrm{s}$. However there is a chance that dust will be kicked up $(200 \mathrm{~m} / \mathrm{s}$ vertically) could possibly make it into sunlight. As dust in sunlight is one of the explanations of LTP, I would very much like to urge observers the monitor the region of the impact site on the night side of the terminator for any faint apparent glows. Low light CCTV will be ideal, but visual observations with descriptions made into a tape recorder will be useful too. Unfortunately from the UK and most northern hemisphere sites the Moon will be below the horizon for most of us, therefore low latitude and southern hemisphere observers are encouraged to observe. Glare from scattered light will no doubt be a problem, but it might be worth having a go at. I have in the past video recorded Earthshine with a lunar phase of $70 \%$, but it depends upon one's local sky conditions. If you do plan to have a go (if the Moon will be visible from your site) can you please contact either Brian Cudnik of ALPO, or myself to let us know so that we can coordinate observations and make suggestions to maximize chances of success and usefulness of the observation.

There will also be observing opportunities on Jul $10^{\text {th }}$ and $11^{\text {th }}$ and again on Aug $6^{\text {th }}$ and $7^{\text {th }}$ for coordinated observing of the proposed impact site and elsewhere by SMART-1 and ground based observers. The over-flight of the SMART-1 ground site will take place on Jul 10 at $\sim 17 \mathrm{~h}$ and on Aug 6 at $\sim 17 \mathrm{~h}$. Other observing opportunities, corresponding to the same illumination as the night of the impact will be mentioned in the repeat illumination predictions for LTP that are given on-line on the web site below. I will provide further details as and when I know them.

Predictions, including the more numerous illumination only events can be found on the following web site: http://www.lpl.arizona.edu/~rhill/alpo/lunarstuff/ltp.html. 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 5055681 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

(ESA) SMART-1 maps Humorum edge where highlands and mare mix http://www.esa.int/SPECIALS/SMART-1/SEMHWFOFGLE_0.html
(ASA Astrobiology) Melting the moon http://www.astrobio.net/news/modules.php?op=modload\&name=News\&file=article\&sid=1927\&mode=thread\&order=0\&thold=0
(Oregon State Univ.) New Lunar Rock Ages Indicate Cataclysmic Meteorite Bombardment of Moon, Earth http://oregonstate.edu/dept/ncs/newsarch/2006/Apr06/moonrocks.html
(ESA) Reiner Gamma swirl: magnetic effect of a cometary impact? http://www.esa.int/esaSC/SEM05FNFGLE_index_0.html\#subhead1
(BBC) Europe's lunar vision blossoms
http://news.bbc.co.uk/1/hi/sci/tech/4895610.stm
(Space.com) U.S. not alone in future lunar exploration
http://www.space.com/businesstechnology/060426_international_moon.html
(MSNBC) Commerce said key to moon exploration
http://msnbc.msn.com/id/12536410/
(BBC) 1962: First US rocket lands on moon
http://news.bbc.co.uk/onthisday/hi/dates/stories/april/26/newsid_2950000/2950011.stm
(Space.com) NASA adds moon crashing probes to LRO mission
http://www.space.com/missionlaunches/060410_lro_moon_crash.html
(American Scientist) Mining the moon
http://www.americanscientist.org/template/BookReviewTypeDetail/assetid/50749;jsessionid=baacOHf3v0zoIE
(Physorg.com) Rumblings on the moon could be problematic for lunar base http://www.physorg.com/news63645811.html

