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Journal of the Association of Lunar & Planetary Observers

The Strolling Astronomer

Volume 53, Number 1, Winter 2011

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Inside this issue . . .

- *Founding member Elmer Reese passes away; a look at his contribution to understanding the famous Jupiter SEB*
- *Making a solar eclipse sojourn really pay off*
- *Lunar Selected Area photometry for everybody*
- *Apparition reports: Mercury in 2008 and Venus in 2007-08*

. . . plus reports about your ALPO section activities and much, much more!

A thin layer of clouds moves in at the Diamond Ring third contact at the 11 July 2010 total solar eclipse on Easter Island, allowing for an extremely rare image of shadow bands on the clouds as seen by the thin black lines in this 1/800-second exposure using the Explore 80mm APO and Canon 5D Mark II DSLR. The image was processed in Photoshop for unsharp masking and an adjustment in contrast. More images and story inside by Mike D. Reynolds.

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Journal of the Association of Lunar & Planetary Observers

The Strolling Astronomer

Volume 53, No. 1, Winter 2011
This issue published in December 2010 for distribution in both portable document format (pdf) and also hardcopy format.

This publication is the official journal of the Association of Lunar & Planetary Observers (ALPO).

The purpose of this journal is to share observation reports, opinions, and other news from ALPO members with other members and the professional astronomical community.

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http://www.alpo-astronomy.org

Founded in 1947

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Point of View
Eclipse-chasing, anyone?

By Ken Poshedly, JALPO editor & publisher

With the new year comes new hopes, new plans, and hopefully new ideas. For some of us, that might include the chance to finally or maybe once again view a solar eclipse.

The 2011 events are all partial eclipses, but hey!, if you're near the viewing path or have the interest and money to go to some very exotic locales, why not?

You've got three to choose from (there was a fourth, but January 4 is already behind us). Coming up is one on June 1 that will be viewable from far northeastern Asia, over the North Pole, Greenland, Iceland and northernmost North America.

Chance number 2 comes only a month later on July 1 when another will be viewable primarily to sailors, merchant marine folks and wayward teenagers trying to circumnavigate the globe and who are conveniently placed in the south Indian Ocean and off the coast of Antartica.

The third opportunity will be on November 25 and will be super-duper for scientists and all others on or anywhere near the entire continent of Antarctica.

As for me here in metro Atlanta, I guess my hopes are pinned on the August 21, 2017, total solar eclipse which will traverse the entire United States. One website I checked (*http://www.hermit.org/eclipse/2017-08-21/*) describes it thusly: "This will be an impressive total eclipse, lasting over 2½ minutes at maximum and visible over a path up to 115 km wide.

"The path starts in the Pacific well north of Hawaii at 16:48:33 UT, and then crosses to make landfall in the U.S. in the northern half of Oregon. It then crosses Idaho, Wyoming, and Nebraska, and clips the north-east corner of Kansas before passing right over Missouri. It cuts over the southern tip of Illinois and the western end of Kentucky, then crosses Tennessee and the western tip of North Carolina; the extreme north-east corner of Georgia will also be in the path of totality.

"Finally, the total eclipse crosses South Carolina and passes into the Atlantic, where it runs southeasterly into the tropics and finally ends over open ocean at 20:02:30 UT."

I can't wait! In the meantime, check out our own Mike Reynolds' great accounts of his own eclipse voyages.

Inside the ALPO
Member, section and activity news

News of General Interest

Founding ALPO member news

We are sorry to report on the passing of Elmer J. Reese, a charter member of our fine organization, on October 15.

An extended obituary about Mr. Reese appears later in this section of your ALPO Journal, plus we also include in this issue a beautiful account by ALPO member Tom Dobbins of how Mr. Reese contributed to the understanding of the periodic disappearances and reappearances of Jupiter's South Equatorial Belt.

We also report of the ill health of another charter member, Tom Cragg. This was learned several moths ago when ALPO member Rik Hill informed us through Robert McNaught that Tom had suffered a stroke.

According to ALPO Membership Secretary Matt Will, "Since then, Mary Cragg, the wife of Tom Cragg, has communicated to me that Tom suffered another stroke that resulted in a loss of vision. This, and injuries from the first stroke, have put Tom in a high-care nursing home. Mary visits him daily and can still normally converse with him."

Matt notes that Tom is now one of only four charter members left in our 63 year old organization. Some of you may remember Tom back in early years of the ALPO as not only an outstanding observer, but also the Saturn "recorder" (what section coordinators were called way back when) during the 1950's and 1960's. In 2009, Tom was the recipient of the Walter H. Haas Observers Award, for his past observational achievements.

Mary invites past friends and acquaintances that have not had the opportunity in recent years to communicate with Tom to feel free to do so. Although Tom is now blind and can no longer read for himself, Mary can still read correspondence to him. Mary can be reached at mcragg1@me.com

If you would like to send a card, their postal address is:

Tom Cragg
19 Belar Street
Coonabarabran NSW 2357
Australia

Venus Volcano Watch

By Michael F. Mattei
micmattei@comcast.net

Beginning on 25 January 2011 the watch begins with the volcanoes about 15 degrees before the terminator on the dark side of the planet. accompanying this text is a list of times to be watching Venus for cloud activity both on the terminator and on the bright sun lit side.

Watch for a bulge on the terminator where the uplifted sunlit clouds would show on the dark side of the terminator, and on the sunlit side, watch for bulges of circular cloud formation like the tops of cumulus clouds.

There are three volcanoes that are believed to be active; Maat Mons, Ozza Mons and Sapas Mons. All are near the equator centered near CM 165°. From research of cloud formations and lit clouds on the dark side and circular sunlit side clouds, it may be possible to determine if a volcano has erupted. A correlation of these observations can be made to locate volcanoes on the surface of Venus.

Observations should be made at all times because there may be many more volcanoes that could be active. I would be happy to receive observations, drawings, sketches, CCD images. Please be sure of the time in UT and location of observer.

See Volume 51, No. 1, page 21 this Journal for an article of the events and what they look like. You can find the article by going to http://www.alpo-astronomy.org/djalpo/51-1/JALPO51-1%20-%20Free.pdf

Date	Location from Terminator
25 Jan 2011	Volcanoes are 15 deg on dark side.
31 Jan 2011	Volcanoes on the terminator watch for a bulge on dark side.
3 Feb 2011	Volcanoes 15 degrees on the sun lit side.
16 Feb 2011	Volcanoes are 45 deg or midway into sunlit side.
2 Mar 2011	Volcanoes nearing the bright limb watch for possible bulge on the bright limb.
9 Mar 2011	Volcanoes pass beyond the bright limb.

ALPO Interest Section Reports

Web Services

Larry Owens,
Section Coordinator

Larry.Owens@alpo-astronomy.org
Follow us on Twitter, become our friend on FaceBook, or join us on MySpace.

Section Coordinators: If you need an ID for your section's blog, contact Larry Owens at larry.owens@alpo-astronomy.org

For details on all of the above, visit the ALPO home page online at www.alpo-astronomy.org

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Computing Section

Larry Owens,
Section Coordinator,
Larry.Owens@alpo-astronomy.org

Important links:

- To subscribe to the ALPOCS yahoo e-mail list, http://groups.yahoo.com/group/alpocs/
- To post messages (either on the site or via your e-mail program), alpocs@yahoogroups.com.
- To unsubscribe to the ALPOCS yahoo e-mail list, alpocs-unsubscribe@yahoogroups.com
- Visit the ALPO Computing Section online at www.alpo-astronomy.org/computing.

Lunar & Planetary Training Program

Tim Robertson,
Section Coordinator
cometman@cometman.net

For information on the ALPO Lunar & Planetary Training Program, go to www.cometman.net/alpo/; regular postal mail to Tim Robertson, 195 Tierra Rejada Rd. #148, Simi Valley CA, 93065; e-mail to cometman@cometman.net

ALPO Observing Section Reports

Eclipse Section

Mike Reynolds, section Coordinator
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Please visit the ALPO Eclipse Section online at www.alpo-astronomy.org/eclipse.

Meteors Section

Report by Bob Lundsford,
Section Coordinator
lunro.imo.usa@cox.net

Visit the ALPO Meteors Section online at www.alpo-astronomy.org/meteorblog/ Be sure to click on the link to viewing meteors, meteor shower calendar and references.

Meteorites Section

Dolores Hill, Section Coordinator
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Member, section and activity news

Comet 103P/Hartley 2 (at lower right) on 2010 October 8.09 as the comet was approaching the Double Cluster in Perseus. Equipment: Orion EON 80-mm ED Apo refractor (f/6.25) and a Canon T2i digital camera set at 1600 ISO and single 2-minute exposure was obtained. The field of view is 1.3 degree. Image by Gry Kronk. Source: http://cometography.com/pcomets/103p.html

Visit the ALPO Meteorite Section online at www.alpo-astronomy.org/meteorite/

Comets Section

Gary Kronk,
acting Section Coordinator
kronk@cometography.com

While many reports about Comet 103P/Hartley 2 from ALPO members were expected, none were received.

I did take numerous images during late September through the first half of October and offer one for publication here of when it was near the Double Cluster in Perseus on October 8. Enjoy!

For details on Comet 103P/Hartley 2 and others, go to http://cometchasing.skyhound.com/

Visit the ALPO Comets Section online at www.alpo-astronomy.org/comet.

meteors, meteor shower calendar and references.

Solar Section

Kim Hay, Section Coordinator,
kim.hay@alpo-astronomy.org

For information on solar observing – including the various observing forms and information on completing them – go to www.alpo-astronomy.org/solar

Geocentric Phenomena of the 2010-2011 Western (Morning) Apparition of Venus in Universal Time (UT)

Inferior Conjunction	2010	Oct 19 (angular diameter = 58.3 arc-seconds)
Greatest Brilliancy	2010	Dec 04 ($m_v = -4.6$)
Greatest Elongation West	2011	Jan 08 (47º west of the Sun)
Predicted Dichotomy	2011	Jan 08.28 (exactly half-phase)
Superior Conjunction	2011	Aug 16 (angular diameter = 9.6 arc-seconds)

Mercury Section

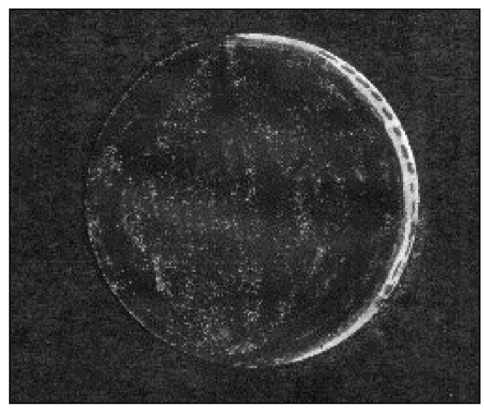
Report by Frank J. Melillo,
Section Coordinator
frankj12@aol.com

Visit the ALPO Mercury Section online at www.alpo-astronomy.org/mercury.

Venus Section

Report by Julius Benton,
Section Coordinator
jlbaina@msn.com

Venus emerged West of the Sun during late October 2010 following superior conjunction and is now visible in the Eastern sky before sunrise. During the current 2010-11 Western (Morning)



Carl Roussell of Hamilton, Ontario, Canada, submitted a sketch of the crescent Venus using a 15.2 cm (6.0 in.) refractor at 200-400x in integrated light and with W25, W47, and W58 filters on November 11, 2010, at 15:25 UT. Apparent diameter of Venus is 57.1", phase (k) 0.062 (6.2% illuminated), and visual magnitude 4.4. South is at top of

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LUNAR CALENDAR FOR FIRST QTR. 2011 - ALL TIMES UT

Jan. 02	10:06	Extreme South Declination
Jan. 02	16:00	Moon 3.9 Degrees SSE of Mercury
Jan. 03	20:00	Moon 4.3 Degrees SSE of Pluto
Jan. 04	09:03	New Moon (Start of Lunation 1089)
Jan. 04	24:00	Moon 2.7 Degrees N of Mars
Jan. 06	12:00	Moon 0.71 Degrees SSE of asteroid 15 Eunomia
Jan. 07	21:00	Moon 4.8 Degrees NNW of Neptune
Jan. 10	05:39	Moon at Apogee (404,975 km / 251,640 miles)
Jan. 10	09:00	Moon 6.0 Degrees NNW of Uranus
Jan. 10	11:00	Moon 6.5 Degrees NNW of Jupiter
Jan. 12	11:32	First Quarter
Jan. 16	22.54	Extreme North Declination
Jan. 19	21:22	Full Moon
Jan. 22	00:11	Moon at Perigee (362.792 km / 225,428 miles)
Jan. 25	04:00	Moon 7.6 Degrees SSW of Saturn
Jan. 26	12:58	Last Quarter
Jan. 29	16:30	Extreme South Declination
Jan. 30	03:00	Moon 3.5 Degrees S of Venus
Jan. 31	02:00	Moon 4.1 Degrees S of Pluto
Feb. 01	17:00	Moon 3.5 Degrees N of Mercury
Feb. 03	02:00	Moon 4.5 Degrees NNW of Mars
Feb. 03	02:31	New Moon (Start of Lunation 1090)
Feb. 04	04:00	Moon 4.8 Degrees NNW of Neptune
Feb. 06	20:00	Moon 5.9 Degrees NNW of Uranus
Feb. 06	23:14	Moon at Apogee (405,923 km / 252,229 miles)
Feb. 07	04:00	Moon 6.3 Degrees NNW of Jupiter
Feb. 11	07:19	First Quarter
Feb. 13	09:00	Extreme North Declination
Feb. 18	08:36	Full Moon
Feb. 19	07:28	Moon at Perigee (358,246 km / 222,604 miles)
Feb. 21	12:00	Moon 7.5 Degrees SSW of Saturn
Feb. 24	23:27	Last Quarter
Feb. 25	22:12	Extreme South Declination
Feb. 27	09:00	Moon 3.9 Degrees S of Pluto
Feb. 28	00:00	Moon 0.88 Degrees SSE of asteroid 4 Vesta
Mar. 01	02:00	Moon 1.6 Degrees NW of Venus
Mar. 03	15:00	Moon 4.8 Degrees NNW of Neptune
Mar. 04	06:00	Moon 5.7 Degrees NNW of Mars
Mar. 04	20:46	New Moon (Start of Lunation 1091)
Mar. 05	13:00	Moon 6.0 Degrees NNW of Mercury
Mar. 06	04:00	Moon 5.7 Degrees NNW of Uranus
Mar. 06	07:51	Moon at Apogee (406,582 km / 252,638 miles)
Mar. 06	24:00	Moon 6.0 Degrees NNW of Jupiter
Mar. 12	17:06	Extreme North Declination
Mar. 12	23:45	First Quarter
Mar. 19	18:10	Full Moon
Mar. 19	19:10	Moon at Perigee (356,577 km – 221,567 miles)
Mar. 20	21:00	Moon 7.5 Degrees SSW of Saturn
Mar. 25	05:06	Extreme South Declination
Mar. 26	12:07	Last Quarter
Mar. 26	18:00	Moon 3.7 Degrees SSE of Pluto
Mar. 28	04:00	Moon 1.5 Degrees NW of asteroid 4 Vesta
Mar. 30	23:00	Moon 5.0 Degrees NNW of Neptune
Mar. 31	07:00	Moon 5.5 Degrees NNW of Venus

Table courtesy of William Dembowski

Apparition, the planet will pass through its waxing phases (a progression from crescent through gibbous phases). At the time of this report (November 2010), the disk of Venus is about 55.0" across and roughly 8.1% illuminated. Venus will attained Greatest Illuminated Extent (greatest brilliancy) on December 4 at visual magnitude 4.6, and will attain Greatest Elongation West and theoretical dichotomy (half phase) on January 8, 2011. The table here of Geocentric Phenomena in Universal Time (UT) is presented for the convenience of observers for the 2010 Eastern (Evening) Apparition as well as for the forthcoming 2010-11 Western (Morning) Apparition for planning purposes:

Although this apparition is just beginning, observers have submitted a few images already, with more surely to come as the planet appears higher in the morning sky. Readers are reminded that high-quality digital images of the planet taken in the near-UV and near-IR, as well as other wavelengths through polarizing filters, continue to be needed by the Venus Express (VEX) mission, which started systematically monitoring Venus at UV, visible (IL) and IR wavelengths back in May 2006. This Professional-Amateur (Pro-Am) effort continues, and observers should submit images to the ALPO Venus Section as well as to the VEX website at:

http://sci.esa.int/science-e/www/object/index.cfm?fobjectid=38833&fbodylongid=1856.

Regular Venus program activities (including drawings of Venus in Integrated Light and with color filters of known transmission) are also valuable throughout the period that VEX is observing the planet, which continues into 2010. Since Venus has a high surface brightness, it is potentially observable anytime it is far enough from the Sun to be safely observed.

The observation programs conducted by the ALPO Venus Saturn Section are listed on the Venus page of the ALPO website at

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http://www.alpo-astronomy.org/venusblog/ as well as in considerable detail in the author's ALPO Venus Handbook available from the ALPO Venus Section. Observers are urged to carry out digital imaging of Venus at the same time that others are imaging or making visual drawings of the planet (i.e., simultaneous observations).

Although regular imaging of Venus in UV, IR and other wavelengths is extremely important and highly encouraged, far too many experienced observers have neglected making visual numerical relative intensity estimates and reporting visual or color filter impressions of features seen or suspected in the atmosphere of the planet (e.g., categorization of dusky atmospheric markings, visibility of cusp caps and cusp bands, measurement of cusp extensions, monitoring for the Schröter phase effect near the date of predicted dichotomy, and looking for terminator irregularities).

Routine use of the standard ALPO Venus observing forms will help observers know what needs to be reported in addition to supporting information such as telescope aperture and type, UT date and time, magnifications and filters used, seeing and transparency conditions, etc.

ALPO Venus Section urges interested readers worldwide to join us in our projects and challenges ahead.

The ALPO Venus Section encourages interested readers worldwide to join us in our projects and challenges ahead.

Individuals interested in participating in the programs of the ALPO Venus Section are encouraged to visit the ALPO Venus Section online http://www.alpo-astronomy.org/venusblog/.

Lunar Section:

Lunar Topographical Studies / Selected Areas Program

Report by Wayne Bailey, Program Coordinator

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During this past quarter, the ALPO Lunar Topographical Studies Section (ALPO LTSS) received a total of 166 new observations from 15 observers. Five contributed articles were published and 9 observations included extensive comments. This quarter's observations also included height measurements for 22 features; measurements that I hope will continue and attract more observers.

The "Focus On" features in *The Lunar Observer* continued with articles on the Mare Nectaris Basin and the Milichius-T. Mayer area. Future subjects include the Marius-Reiner Gamma area and Central Peaks with Craters.

One of the most prolific and innovative contributors is Maurice Collins who grew up in a rural area near Dannevirke in the North Island of New Zealand, and now lives in Palmerston North.

Maurice writes: "I have always liked the Moon. I started out with binoculars and a small toy telescope, and then bought a larger 60mm refractor after leaving high school. My telescopes include a Meade ETX-90/RA, which I use for visual observing and afocal photography. My main instrument is a Celestron 8-inch SCT which lets me do imaging easier because it is computer-controlled and can be used remotely from inside the house when it is cold outside.

"Today, my lunar work involves imaging the Moon every clear night as well as using spacecraft data for studying the lunar surface. One bit of work I am involved with is in creating Digital Terrain Models of the Moon using the Lunar Terminator Visualization Tool (LTVT) and Lunar Orbiter Laser Altimeter (LOLA) data. I am interested in all aspects of the Moon, from lunar rocks to large-scale topography and origin of the Moon. I am also interested in spaceflight and Apollo missions especially. I have travelled around the U.S. space centers to see the hardware and Moon rocks. I also gained my private pilot license in 1988.

"I like to do a mix of my own imaging and computer-based investigations. Mostly, I do imaging rather than visual observing with my telescope, but do enjoy visual observing in the summer months. Each clear night, I try to complete a full mosaic of the Moon. I am always trying to think of new ways of looking at the Moon with the images and other data just to see what I can see up there on the Moon. It is a

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fascinating place and there is so much the amateur can do!"

Visit the following online web sites for more info:

- The Moon-Wiki: the-moon.wikispaces.com/Introduction
- ALPO Lunar Topographical Studies Section moon.scopesandscapes.com/alpo-topo
- ALPO Lunar Selected Areas Program moon.scopesandscapes.com/alpo-sap.html
- ALPO Lunar Topographical Studies Smart-Impact WebPage moon.scopesandscapes.com/alpo-smartimpact
- The Lunar Observer (current issue) moon.scopesandscapes.com/tlo.pdf
- The Lunar Observer (back issues) moon.scopesandscapes.com/tlo_back.html
- Selected Areas Program: moon.scopesandscapes.com/alpo-sap.html
- Banded Craters Program: moon.scopesandscapes.com/alpo-bcp.html

Lunar Domes Survey

Marvin Huddleston, FRAS,
Program Coordinator
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Visit the ALPO Lunar Domes Survey on the World Wide Web at www.geocities.com/kc5lei/lunar_dome.html

Lunar Meteoritic Impacts

Brian Cudnik,
Program Coordinator
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We ask all who are considering an online purchase of Orion astronomical merchan-

Please visit the ALPO Lunar Meteoritic Impact Search site online at www.alpo-astronomy.org/lunar/lunimpacts.htm.

Lunar Transient Phenomena

Dr. Anthony Cook,
Program Coordinator
tony.cook@alpo-astronomy.org

Finally, live LTP alerts are now available via Twitter at http://twitter.com/lunarnaut.

Please visit the ALPO Lunar Meteoritic Impact Search site online at www.alpo-astronomy.org/lunar/lunimpacts.htm.

Mars Section

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Visit the ALPO Mars Section online at www.alpo-astronomy.org/mars.

Minor Planets Section

Frederick Pilcher,
Section Coordinator
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Minor Planet Bulletin Vol. 37, No. 4, 2010 Oct. - Dec., is the final issue to be published in printed form. Starting with Vol. 38, No. 1, 2011 Jan. - March, it will be available only in digital format, downloaded freely from http://www.MinorPlanetObserver.com/astlc/default.htm.

Printed versions will still be sent to astronomical libraries retaining archival collections.

Brad Timerson, IOTA, and many contributing authors report combining multiple chord occultation observations with lightcurves to improve shape models and actual sizes. For 694 Ekard two observed occultation profiles closely match those found by lightcurve inversion models. For 81 Terpsichore the phase of the lightcurve at which the occultation

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profiles were observed is located with precision, but additional lightcurves at future oppositions are required to complete a shape model. Shape modeling from lightcurves combined with occultation profiles is a field with great promise.

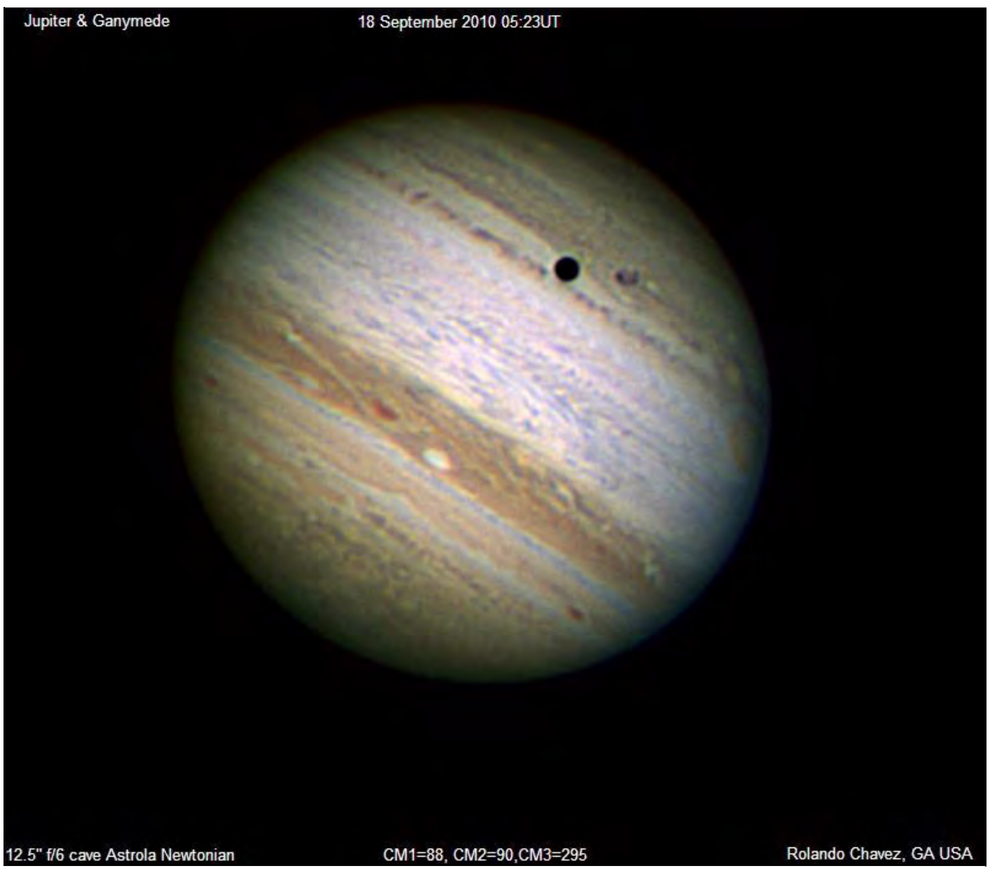
G. Roger Harvey completed his quest to become the first person ever to observe visually all of the first 1,000 numbered asteroids by finding the faintest of these, 878 Mildred, at the Rainwater Observatory, French Camp, Mississippi. He has now seen nearly 5000 asteroids visually, most of them with a backyard 29-inch telescope, in a career beginning in 1973.

Lightcurves with derived rotation periods are also published for 107 other asteroids, 31, 40, 80, 105, 145, 185, 188, 217, 274, 279, 310, 413, 567, 824, 826, 869, 890, 918, 932, 983, 996, 1049, 1167, 1181, 1227, 1329, 1451, 1582, 1604, 1636, 1729, 1826, 1845, 1977, 2004, 2023, 2090, 2114, 2196, 2204, 2297, 2303, 2307, 2375, 2449, 2500, 2601, 2609, 2851, 2881, 2954, 2965, 3118, 3162, 3225, 3305, 3324, 3416, 3483, 3640, 3800, 4191, 4207, 4461, 4536, 4569, 4713, 4838, 4904, 5081, 5235, 5240, 5274, 5427, 5641, 5691, 6019, 6091, 6249, 6635, 6867, 6911, 6961, 7111, 7476, 8041, 8228, 11017, 11100, 11116, 13023, 14741, 15938, 16463, 17633, 19483, 21023, 21558, 21594, 22295, 26853, 29147, 30856, 34459, 48147, 103501, 189099, 2010 NR1.

Some of these provide secure period determinations, some only tentative ones. Some are of asteroids with no previous lightcurve photometry, others are of asteroids with previous period determinations which may be consistent or inconsistent with the earlier values.

To repeat what was stated earlire in this report, the *Minor Planet Bulletin* is a refereed publication and that it is available on line from *http://www.MinorPlanetObserver.com/astlc/default.htm.*

In addition, please visit the ALPO Minor Planets Section online at *http://www.alpo-astronomy.org/minor*.



Jupiter and Ganymede as imaged by Rolando Chavez of metro Atlanta, Georgia, USA, on September 18, 2010 05:23 UT. Scope details: Cave Astrola 12.5 -in., f/6 Newtonian on Parks Superior Mount w/ OpticCraft 6.6 in. Drive & JMI Drive Corrector, True Technology Filter Wheel, Astronomik RGB filters, and 4x Barlow. Imaging details: DMK 21AU04 Camera at 30 fps, captured with IC Capture Software(proprietary), AutoStakkert & Registax5 (for aligning and stacking), PhotoShop & Astroart4 for processing. Transparency 4 of 6 (haze), Seeing 4-5 of 10, CM1=88°, CM2=90°, CM3=295°

Jupiter Section

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Christopher Go (Cebu City, Phillipines) has imaged a new white oval on Nov. 9. The oval is located at a System II longitude of 288° W and at a System III longitude of 147° W. Its latitude is close to 23° S which is the approximate location of the southern border of the South Equatorial Belt.

This oval is of interest because it may lead to a new South Equatorial Belt. It was not visible in a November 7 Methane band image taken by Chris Go at 11:57 UT. At this time, the oval would have been close to the central meridian.

Don Parker imaged the new white oval on November 10. It is brighter than the surrounding area in his visible light (RGB) image. This oval also appeared as a very bright spot in his methane band image

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(wavelength of 889 nm) taken on November 10.

Gary Walker and Akihiro Yamazaki also imaged this white oval. Craig MacDougal has written a nice newsletter presenting a few early images showing the early stages of this white spot. A more thorough source of images can be found on the ALPO Japan Latest website at http://alpo-j.asahikawa-med.ac.jp/Latest/Jupiter.htm.

I've completed 2009-2010 Jupiter report. I may submit 2010-2011 photometric measurements of Jupiter in the next few months. I will not work on drift rates for the 2010 apparition until the manuscript for my book on artificial satellites is complete (late 2011 or early 2012). I am planning to submit a review of Jupiter brightness measurements to the professional journal, *Icarus*, sometime in 2011.

Visit the ALPO Jupiter Section online at http://www.alpo-astronomy.org/jupiter

Galilean Satellite Eclipse Timing Program

John Westfall, Assistant Jupiter Section Coordinator
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New and potential observers are invited to participate in this worthwhile ALPO observing program.

Contact John Westfall via regular mail at P.O. Box 2447, Antioch, CA 94531-2447 USA or e-mail to johnwestfall@comcast.net to obtain an observer's kit, also available on the Jupiter Section page of the ALPO website.

Saturn Section

Julius Benton, Section Coordinator
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Saturn is now visible very low in the east just before sunrise in brightening skies at apparent visual magnitude +0.9. The planet's northern hemisphere and north face of the rings are becoming increasingly visible as the ring tilt toward Earth increases throughout the next several years, with regions south of the rings becoming progressively less favorable to view. Right now the rings are inclined about +8.6° toward Earth and will reach as much as +11.5° during the apparition. The table of geocentric phenomena for 2010-11 apparition is presented for the convenience of observers.

For the 2010-11 apparition, inclinations of the rings around 9.0° may allow observers to witness and digitally image transits, shadow transits, occultations, and eclipses of satellites lying near Saturn's equatorial plane. Apertures under about 20.3 cm (8.0 in.) are usually insufficient to produce the best views of these events, except perhaps in the case of Titan. Those

Digital image taken on November 5, 2010, at 20:46UT by Toshihiko Ikemura of Osaka, Japan, using a 38.0 cm (15.0 in.) SCT in visible light. S is at the top of the image. Ring tilt is +8.2º. CMI = 116.8° , CMII = 204.2° , CMIII = 40.6°.

Geocentric Phenomena for the 2010-2011 Apparition of Saturn in Universal Time (UT)	
Conjunction	2010 Oct 01^d
Opposition	2011 Apr 04^d
Conjunction	2011 Oct 13^d
Opposition Data:	
Equatorial Diameter Globe	19.3 arc-seconds
Polar Diameter Globe	17.5 arc-seconds
Major Axis of Rings	43.8 arc-seconds
Minor Axis of Rings	6.6 arc-seconds
Visual Magnitude (m_v)	0.4 m_v (in Virgo)
B =	+8.6º

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who can image and obtain precise timings (UT) to the nearest second of ingress, CM passage, and egress of a satellite or its shadow across the globe of Saturn should send their data to the ALPO Saturn Section as quickly as possible. Notes should be made of the belt or zone on the planet crossed by the shadow or satellite, and visual numerical relative intensity estimates of the satellite, its shadow, and the belt or zone it is in front of is important, as well as drawings of the immediate area at a given time during the event.

So far in this apparition, there have been only an handful of observations submitted, but as the planet becomes more favorably placed, observers should be able to determine if activity similar to that observed during the immediately preceding apparition continues this observing season.

The observation programs conducted by the ALPO Saturn Section are listed on the Saturn page of the ALPO website at http://www.alpo-astronomy.org/ as well as in considerable detail in the author's book, ***Saturn and How to Observe It***, available from Springer, Amazon.com, etc., or by writing to the ALPO Saturn Section for further information. Observers are urged to carry out digital imaging of Saturn at the same time that others are imaging or visually watching Saturn (i.e., simultaneous observations). Although regular imaging of Saturn is extremely important and highly encouraged, far too many experienced observers have neglected making visual numerical relative intensity estimates, which are badly needed for a continuing comparative analysis of belt, zone, and ring component brightness variations over time. So, this type of visual work is strongly encouraged before or after imaging the planet.

The ALPO Saturn Section appreciates the dedicated work by so many observers who regularly submit their reports and images. *Cassini* mission scientists, as well as other professional specialists, are continuing to request drawings, digital images, and supporting data from amateur observers around the globe in an active Pro-Am cooperative effort.

Information on ALPO Saturn programs, including observing forms and instructions, can be found on the Saturn pages on the official ALPO Website at www.alpo-astronomy.org/saturn.

All are invited to also subscribe to the Saturn e-mail discussion group at Saturn-ALPO@yahoogroups.com

Remote Planets Section

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Several people have submitted observations of the remote planets in 2010. Jim Fox has made several brightness measurements of both Uranus and Neptune. This section coordinator has also made a few brightness measurements of Uranus and Neptune in 2010. The R-filter brightness measurements of Uranus in 2010 are a bit dimmer than what they were ten years ago possibly indicating that Uranus may undergo seasonal brightness changes. In 2013, I am planning to write a review paper of all brightness measurements of Uranus and Neptune made since the early 1960s and will submit this paper to the professional journal, *Icarus*.

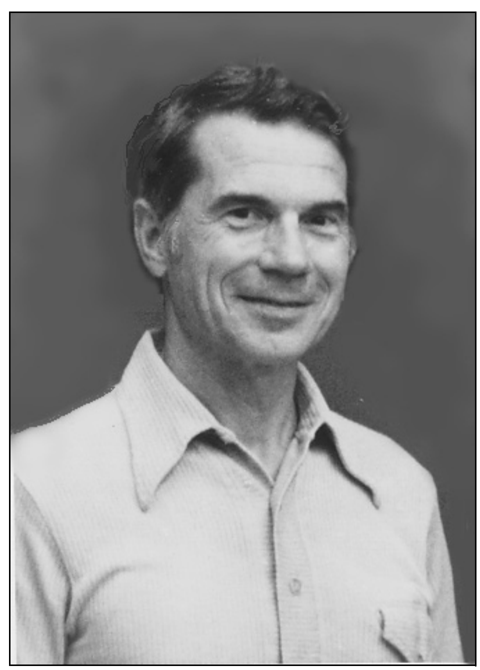
The Remote Planets 2009 Apparition Report was published in JALPO53-4. I am planning to complete the 2010-2011 apparition report in the spring or summer of 2011. Please be sure to get your 2010 observations in by March 1, 2011.

A reminder that the book *Uranus, Neptune and Pluto and How to Observe Them* is now available from Springer at www.springer.com/astronomy/popular+astronomy/book/978-0-387-76601-0 or elsewhere (such as www.amazon.ca/Uranus-Neptune-Pluto-Observe-Them/dp/0387766014) to order a copy.

Visit the ALPO Remote Planets Section online at http://www.alpo-astronomy.org/remote.

Elmer Jacob Reese, May 24,1919 - October 15, 2010

During the pre-World War II era, Elmer Reese was an active observer who corresponded routinely with other amateur astronomers. From 1942 through early 1946 he served with U.S. Army Ordnance and was stationed at the Aberdeen Proving Grounds for more than two years. He was then transferred to the European Theater and during the last few months of the war he was sent to New Guinea and the Philippines. On returning to civilian life, he went back to Uniontown, Pennsylvania and renewed his interaction with other amateur astronomers in Great Britain as well as the U.S. In 1947 he was elected to membership in the British Astronomical Association (BAA) and was one of the charter members of the Association of Lunar and Planetary Observers (ALPO) here in the U.S. and became the first ALPO Jupiter Recorder in 1949. He remained an active contributor to both the BAA and the ALPO throughout the following years. In 1963, while visiting the editor of the ALPO journal, Walter Haas, who worked at New Mexico State University (NMSU), Mr. Reese was induced to join the planetary research group led by Clyde Tombaugh and Bradford Smith (participant in the Viking and Voyager Missions). Mr. Reese was known for his ability to produce accurate transit measurements of Jovian cloud features as well as render scaled drawings of changes in the cloud deck. From 1963 until he retired in 1977 he utilized



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large-scale images produced by the NMSU Planetary Group to systematically measure cloud displacements and quantify many of the phenomena he had observed over the years.

After retiring, Mr. Reese and his wife, Margaret, resided in Longview,Texas, where Mr. Reese continued to observe with a small telescope and to follow planetary exploration. When Comet Shoemaker-Levy 9 (SL-9), impacted Jupiter in 1994, the planetary community sought Mr. Reese's insight to answer the question of whether such an event had been recorded by visual observers. He pointed out that typical dark clouds on Jupiter become indistinct near the planet limb; they are overlain by upper atmospheric hazes and are obscured near the limb by the increasing line of sight through these hazes. This was not the case for the black stratospheric debris left by the SL-9 impacts. Because of the respect the community had for his awareness of the temporal state of Jupiter's cloud deck, Mr. Reese helped to set limits for the frequency of events by pointing out that such an impact is inconsistent with recorded data. He noted out that the increase in apparent area and the dark aspect would have been very noteworthy with telescopes having objectives as small as four inches.

Astronomical Contribution and Significance

Professional astronomers made very few observations of Jupiter and Saturn in the mid-20th Century and the BAA activity was slow to return to the pre-war level. It is conceivable that the manner in which the White Ovals, a system of long-lived atmospheric features similar to the Red Spot, evolved might have gone undocumented without Mr. Reese.

As an amateur, Mr. Reese maintained an extensive observational record that he incorporated with the photographic records at NMSU. His analyses of the large-scale NMSU photographic plates have been published in peer-reviewed j"The Planet Jupiter", Faber & Faber, 1958) and provided a basis for advanced planning of the Voyager 1 and 2 observational sequences, which were in preliminary form at the time of his retirement. Analysis of the Voyager data confirmed many of his results, and his measurements of the observed drift rates of cloud systems and longitudinal extent of the Red Spot have been integrated into analysis of the Galileo data.

Not only did Mr. Reese utilize his long-term knowledge of Jupiter's changing cloud deck, he also worked successfully with young researchers, teaching them to respect careful analysis and encouraging them to apply new approaches to the work.' After the time in history when people "read" in professional fields, without a terminal professional degree, Mr. Reese played an integral role in the planetary research at NMSU and in establishing a historical basis for understanding jovian climatology.

Not only did Mr. Reese utilize his long-term knowledge of Jupiter's changing cloud deck, he also worked successfully with young researchers.

Other studies by Mr. Reese have included the 4-day retrograde rotation of Venus' upper atmosphere, efforts to understand the aperiodic convective outbursts with Jupiter's South Equatorial Belt, and a search for evidence of variability of the wind speeds in Jupiter's atmosphere.

One of his major achievements was the detection of vortical motion in Jupiter's Great Red Spot. Wrongly heralded by NASA in 1973 as a major discovery by the Pioneer 10 spacecraft, the Great Red Spot's vortical nature and its rotation period had already been published by Mr. Reese more than five years before Pioneer 10's flyby of Jupiter. He also organized visual and photographic data to document the behavior of Jupiter's other large, long-lived weather systems, the White Ovals. These three ovals, centered at 33 deg. S. latitude, formed in the mid-1930s, individually accelerated and appeared to repel each other for six decades and only recently merged into a single cloud system. The fact that Mr. Reese's work, which documents the onset and evolution of these storms, will help to define the changing conditions that led to their demise illustrates the manner in which the systematic record continues to have current significance.

Mr. Reese's papers include:

Reese, E. "A Possible Clue to the Rotation Period of the Solid Nucleus of Jupiter", Journal of the British Astronomical Assoc., 63, no. 6, p.219, 1953.

Reese, E. "Observing Jupiter", Sky & Telescope, August 1962, pp.70.

Reese, E. J. with Smith, Bradford A., "A Rapidly Moving Spot on Jupiter's North Temperate Belt", Icarus, 5, 1966, p. 248.

Reese, E. J. with Solberg, H. Gordon, Jr., "Recent Measures of the Latitude and Longitude of Jupiter?s Red Spot", Icarus, 5, 1966, p. 266

Reese, E. J. with Smith, Bradford A., "Evidence of Vorticity in the Great Red Spot of Jupiter", Icarus 9, 1968, p. 47.

Reese, E. J. with Chapman, Clark R. "A Test of the Uniformly Rotating Source Hypothesis for the South Equatorial Belt", Icarus, 9, 1968, p. 326.

Reese, E. J., "Jupiter's Red Spot in 1968-1969", Icarus, 12, 1970, p. 249.

Reese, E. J., "Recent Photographic Measurements of Saturn", Icarus, 15, 1971, p. 466.

Reese, E. J. with Scott, A. H., "Venus: Atmospheric Rotation", Icarus, 17, 1972, p. 589.

Reese, E. J., "Jupiter: Its Red Spot and Disturbances in 1970-1971," Icarus, 17, 1972, p. 57.

Reese, E.J., An Earlier Generation of Long-Enduring South Temperate Ovals on Jupiter, Icarus, 17, 1972, p. 704.

Reese, E. J. with Beebe, Reta F. "Velocity Variations of an Equatorial Plume Throughout a Jovian Year", Icarus 29, 1976,p. 225.

Reese, E. J. with Beebe, Reta F., "A Review of the Coincidence of the Position of Mercury with the Ninety-Day Oscillation of Jupiter's Red Spot", Planetary and Space Science, 25, 1977, p. 890.

Feature Story

Total Solar Eclipses — A Perspective

By: Dr. Mike D. Reynolds, coordinator, ALPO Eclipse Section
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All images here were taken by the author.

Introduction

Over 40 years and 17 successful total solar eclipse expeditions – some with very close calls, weather-wise – I am still in awe of the splendor of a total solar eclipse. A total solar eclipse is indeed one of the wonders of our visual universe. If you have seen one – or many – you certainly understand and can relate to this statement. The phenomenon brings about numerous effects that challenge the human senses. Even though much of the dynamics of total solar eclipses are well-understood, these events still bring intrigue, anticipation, and scientific investigation.

Planning…

A well-planned eclipse expedition will result in more success and less frustrations. There will be things beyond your control. Start with planning well before you depart for the eclipse on what you would like to accomplish. If it is your first eclipse expedition, do not try to do everything; in fact, you should probably spend most of totality enjoying the event. But if you are planning on specific projects, plan them out well-in advance. If you are going to image, set up your equipment and make certain everything is in working order. I always prepare a detailed checklist of my planned observations and a second checklist of what equipment and supplies I will need to accomplish these observations. The equipment/ supplies checklist will help to confirm you have everything packed when you head out to the eclipse. I also take extra hardware, some tools (screwdrivers, pliers; a Leatherman), duct tape, batteries; even a few garbage bags to cover equipment if the weather becomes poor.

Some eclipse-chasers like to pre-record an audio tape of what they should be doing at specific times before the eclipse. This aids the observer in overcoming the emotions during the eclipse and reminds the observer what needs to be done at a specific time.

All Readers

Your comments, questions, etc., about this report are appreciated. Please send them to: *ken.poshedly@alpo-astronomy.org* for publication in the next Journal.

Online Feature

Left-click your mouse on the e-mail address in blue text under the byline to contact the author of this article.

Fig. 1. 2010-07-11 IMG_1953 PSa - Taken about 40 seconds prior to the 11 July 2010 total solar eclipse Second Contact, the Sun's photosphere is merely a sliver as imaged on Easter Island using the Explore 80mm APO and Canon 5D Mark II DSLR at 1/400 second exposure.

Fig. 2. 2010-07-11 IMG_1998 PSa - The outer corona appeared quite boxy or squarish at the 11 July 2010 total solar eclipse, indicative of a rather quiet Sun in this 1/125 second exposure.

Fig. 3 2006-03-29 TSE Composite1 - A five-image composite of the 29 March 2006 eclipse taken on the Aegean Sea with the Meade 80mm APO and Canon 10D DLSR. The image, from exposures of 1/2,000 second to 1/60 second, clearly shows the outer and inner corona and prominences. The extended outer corona is an indicator of a more-active Sun. The image was processed in Photoshop for unsharp masking, noise and contrast.

Your Eclipse Site and Weather…

One of the challenges of most total solar eclipses is first getting to the right place at the right time, especially for some of the more-remote locations that the path of totality seems to always pass over. This is not as difficult as it was 100 or even 50 years ago with today's transportation options. A number of eclipse tour opportunities are also available for those who do not want to strike out on their own, from the simplicity of camping once you get to the chosen eclipse site to luxury cruises that will take you within the path of totality. There are event expeditions that will fly you along the path of totality; usually specially-configured planes that allow easy access to the aircraft windows. Traveling at modern jet speeds along the path of totality will extend the length of totality for these jet-setters, as well as avoid possible eclipse-spoiling clouds.

Note that even though most countries are initially welcoming hosts, there are often some locals who will try to take advantage of the once-in-a-lifetime event and visitors. Extra charges are not unusual as well as something different than promised or paid for by the group.

The weather can present the major challenge for successfully observing a total solar eclipse. Today's weather forecasting and up-to-the-minute site weather data for out-of-the-ordinary locations has provided eclipse chasers and researchers better chances for success. My last two eclipse observations – off of Marekei, Kiribati (2009) and Easter Island (2010) – were initially prognosticated to be a 50% chance of clear weather at totality. The ability to receive up-to-date weather and satellite imagery allowed for successful eclipse observations, especially the 2009

Fig. 4 2005-04-08 TSE Stacked 4 - Imaged by Fred Bruenjes (off of the Galapagos), Mike Reynolds (off of Tahiti), Jen Winter and Vic Winter (off of the Galapagos), this stacked image of the 4 April 2005 hybrid eclipse shows the diamond ring, inner corona, prominences, and the chromosphere, which is difficult to view except at shallow eclipses.

eclipse. A change in our observing location of approximately five miles meant success.

Leading Up to Totality…

The goals one can set for observing specific total solar eclipse phenomena can be similar to those goals of 50 or 100 years ago. The partial phase is more than a run-up to totality or, after totality, the time to pack up equipment; timings of 1st and 4th contacts as well as observations in hydrogen-alpha can be conducted. I was impressed to observe the 2010 partial eclipse phases through a Coronado PST; I plan on future observations with an H-α system.

As the Sun grows smaller, a number of interesting phenomena occur. First is the sharpening of shadows. The uneclipsed Sun is not a point light source; it extends a ½ degree of arc disc. As the eclipse deepens, the Sun's disc is lessened, thus the Sun is becoming more of a point source. Shadows become sharper; for example, one can easily make a solar eclipse projector with their fingers or look to nature and tree leaves to make pinhole projectors. On the ground it is fascinating to see multiple crescent suns; almost a reassurance that the physics indeed works and the astronomical computers were correct in predicting the eclipse.

As the eclipse deepens and less and less of the Sun is visible, several phenomena occur. To me, the sky changes color due to less sunlight. The temperature starts to drop. I have noted a drop of temperature as much as 6-7° C between 1st and 2nd contact (totality). About 10 minutes before totality, I begin a search for planets and stars that might be visible; at the July 2010 eclipse, I easily saw Venus a full 10 minutes before totality. I also look towards the direction the Moon's shadow will be coming from; depending on local circumstances from the altitude of the Sun, length of totality, and humidity, the shadow can be seen as a darkening zone on the horizon. At the February 1979 eclipse which I observed from north of Winnipeg, Manitoba, against full sky of light cirrus clouds, the shadow was so prominent as it swept through the sky I felt like I needed to duck!

As the Sun appears to be eaten by the dragon, as ancient Chinese mythology stated, other interesting phenomena begin to occur. The sky continues to darken; the shadow approaching usually has become more prominent. Planets and stars may begin to be visible. I have noted at a couple of eclipses that animals began to behave differently. My first total solar eclipse, March 7, 1970, was observed in a cow pasture in Waycross, Georgia. I was surprised at how the cattle reacted; a little restless at first but then calm. The people were not calm, however…

With the Sun's photosphere nearly totally eclipsed by the Moon, events seem to happen very quickly. The Moon's shadow is rapidly approaching. I have noted at several total solar eclipses the wind appears to pick up out of roughly the same direction as the Moon's shadow, adding eeriness to an already surreal surrounding. Usually the shadow is easy to see approaching your site regardless if it is clear or cloudy skies. In fact, if one is ever clouded out, look for the shadow and sky darkening.

Fig. 5 2001-06-21 TSE Stacked 10 images - Imaged with a Tonika 400mm telephoto and 2x tele-extender with Ektachrome professional film; 10 exposure composite (1/1000 to 1/15 second) stacked in Photoshop. Chisamba, Zambia 21 June 2001.

Finally: THE Moment…

As the Sun fades out and 2nd contact approaches, more planets and stars might become visible. If you are fortunate and happen to be looking at the ground (a strange act as totality approaches) or at the side or roof of a building, you might notice fine alternating black and white lines racing across the surface. Shadow bands are best described as ripples, waves, or alternating dark and light bands sometimes seen running across the ground or on buildings just prior to and/or just after totality. Most likely an atmospheric phenomena (there has been a lot of discussion about the cause of shadow bands), shadow bands are not seen at every total solar eclipse. I have only seen shadow bands at four of my 17 total solar eclipses.

The Sun is now exhibiting interesting characteristics, first the brilliant "Diamond Ring" as sunlight leaks through a lunar valley along the edge of the Moon. As the Diamond Ring diminishes, "Bailey's Beads" appear; again, more sunlight leaking through the Moon's rough edge and producing little beads of light as the Sun is nearly covered by the Moon.

As the Moon's shadow sweeps over the site and the last speck of the Sun's photosphere disappears, brilliant colors usually appear at the horizon, what I term as the sunset-sunrise effect. It has become night – or at least a deep twilight. The Sun's corona is now visible; through a telescope the coronal lines can be defined. And if one is fortunate, solar prominences are also visible. These looping gases vary in visibility as the Moon moves across the Sun. One of the advantages of using an H-α instrument prior to totality is to see what prominences might be visible as well as their location.

The shape of the corona defines the state of the Sun. Less solar activity is illustrated through a fairly squarish corona. More solar activity is indicated by extended coronal features.

Some eclipse enthusiasts and researchers will take time to look for sun-grazing comets. This is always a challenge yet a real reward if one happens to catch a sun-grazer.

As totality progresses – whether a shallow or deep total solar eclipse – I have found the views of not only the Sun but the surroundings at my observing site change. For short total solar eclipses, specifically hybrids, an opportunity exists to see the Sun's chromosphere. This beautiful yet illusive deep red atmospheric layer is easily visible at the 2nd and 3rd contacts of a hybrid total.

Imaging…

If you decide for the first time to image the eclipse you will have a variety of options from which to choose. There are some plusses and even a few minuses to today's DSLR's. Maybe the most important piece of advice is if you are going to image through a telescope is to make certain you are able to determine the point for your sharpest focus. Like soft or fuzzy stars, a soft total eclipse image is disheartening. Local circumstances can affect focus. Also note that the infinity mark on the expensive camera lenses is not always correct. I was testing a DSLR for an *Astronomy* magazine equipment review and was stunned to find that the infinity focus mark on a major and expensive brand name lens was not infinity!

Many first-time eclipse imagers will set their DSLR's on automatic; personally I do not advise this setting. The reason is simple: you will get only one type of image exposure. There are some advantages to the single exposure: it is simple and allows the eclipse observer the

Fig. 6 2009-07-22 TSE Wide Angle - With the back-up camera available, a series of 16mm images were taken, showing the eclipsed Sun, background sky, and foreground of the boat and observers during the 22 July 2009 total solar eclipse. The Canon 16-24mm IS lens and Canon 10D DSLR were used for this 1/60 second image. This image was processed in Photoshop for unsharp masking, noise, and curves as well as brightness and contrast.

opportunity to focus on other aspects of the eclipse.

I set my DSLR on manual exposure and run through a sequence of exposures, usually from 1/5,000 second up to 1/15 second. With the DSLR, I can shoot multiple exposures for each; ranging as I do is referred to as bracketing. Here is where practice is so important: you will be running through a sequence in the twilight and during a fast-moving period of time, no matter how long you have for totality. There are a couple of excellent ways to control exposures, from software programs like *Eclipse Orchestrator* to remote shutter releases for the specific DSLR you are using.

Another DSLR setting, either on the lens or as a feature of the camera setting, is autofocus. More often than not, your camera will have a challenge focusing on the eclipsed Sun. Determine what mark is infinity, set the camera to manual focus and to the proper infinity mark. Recall my comment about lenses and the infinity mark: even on the best and most-expensive camera lenses, it is probably off a little bit. Determine this in advance! Planning…

Many DSLR's and point-and-shoot digital cameras have built-in flashes. Prior to the eclipse, determine how to disable (turn off) the flash, otherwise the camera's sensor will detect a low light level and fire during totality. You will not be a popular individual if your flash is going off during totality. Some have used electrical or duct tape to cover their flash; this can and will work but I have seen flash covers burned or even melted after covering the flash with tape.

Make certain you have fully-charged batteries with you. I always bring at least two extra batteries for each camera. And I have not had a problem using my charger at hotels in other countries; you might need to buy an adapter for your plug to the outlet type.

One other important battery issue is the danger of lithium batteries. The possible problem is that something metallic could come across the battery terminal, causing a short and a fire. According to the TSA, you can only pack extra batteries in your carry-on luggage. They must be packed in their original container or the package must be such that the battery contacts cannot come in touch with other metals.

The same back-up equipment and supplies philosophy applies to the camera's memory cards, such as Compact Flash (CF) Cards. Just as one would do with extra film make certain the card you are using has enough available memory on the card to record all of the images you will take during the eclipse; you would not want to fill the card before third contact! Part of the number of potential images is, of course, the card's storage capability. The quality of the images also has a direct relationship to the potential number of images stored. One feature of the digital camera is the ability to choose the quality of the image. I always shoot totality in RAW, the highest quality possible. Yet this setting means far less images total on my CF card than if I imaged at even the JPEG Large setting. So I do have to carefully plan my imaging.

I even bring back-up cameras. I know this is probably taking my redundancy philosophy a little too much to the extreme. If I don't need the back-up camera in the primary roll, I place the camera on a tripod and program it to image the shadow and sunset-sunrise colors.

Some observers also take video of the eclipse itself. This is not something I have attempted since I am more interested in still imaging. Some of the newer DSLR cameras have a setting that allows one to take video through the DSLR. Experiment with this option well in advance to check for quality, battery drain, and space available on the camera's memory card.

Many eclipse chasers utilize video cameras to capture the action at their eclipse site. Today's video cameras are

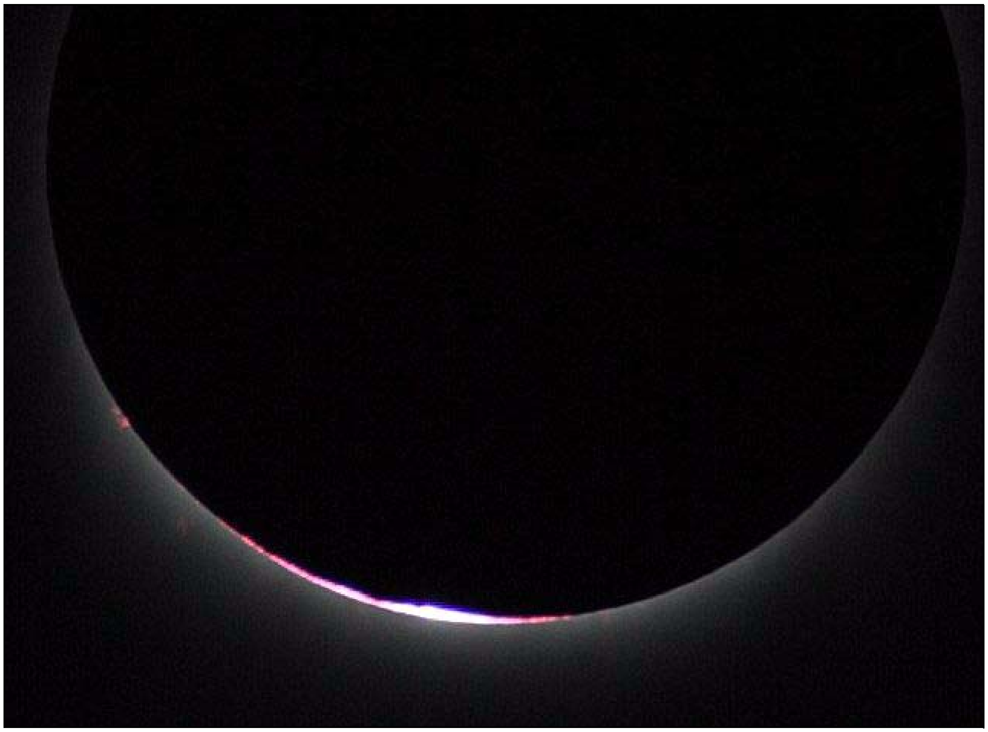

Fig. 7 2009-07-22 TSE Diamond Ring - Off of the island of Marakei, Kiribati, the 22 July 2009 total solar eclipse Diamond Ring was imaged using the Explore 80mm APO and Canon 20Da DSLR at 1/500 second exposure.

lightweight, easy to operate, and employ a variety of useful settings. Like with DSLRs and point-and-shoot cameras, bring extra batteries. I prefer a video camera with built-in hard drives; this eliminates one possible failure point with video tapes. I have seen as well as videoed interesting eclipse scenarios, from the darkening due to the eclipse shadow to horizon colors to reactions of the eclipse observers at your site.

Post-eclipse is an opportunity to review your observations. Images can easily be processed in Photoshop; processing is somewhat different than most deep sky or planetary image processing. Stacking eclipse totality images of various exposures allows for a more-natural look. My last use of film imaging a total solar eclipse was the 2001 eclipse in Chisamba, Zambia. I imaged at ½,000, 1/1,000, 1/750, 1/500, 1/250, 1/125, 1/60, 1/30, 1/15 and 1/8 second. I took a total of 10 images of various exposures and stacked them in Photoshop. This composite image showed inner and outer corona and prominences. This is difficult to capture in one specific exposure.

One of the things I cannot stress enough is to take the time and look at the eclipse. Get out from behind the camera or telescope. Look at the horizon and sunrise-sunset effect colors. Look at the eclipse naked-eye. How does the corona appear to you; its shape and color? What stars and/or planets do you see? Even if you are viewing a hybrid total-annular with 30 seconds of totality, take some time to look at the eclipse. Each eclipse has its own characteristics; none are the same.

It is also possible to see shadow bands after 3rd contact; usually people are celebrating seeing the eclipse and not looking. I am usually imaging 3rd contact and the associated Bailey's Beads and 3rd contact Diamond Ring. At the July 2010 total solar eclipse, I was following my regular imaging program, made easier by today's digital cameras. I was rapidly imaging, controlling the exposure length manually (more on that tip later…). When I examined the images the following day, I saw a couple of nice 3rd contact Diamond Ring with a thin cloud images, making for an aesthetically-pleasing image. I also noted that the 3rd contact image appeared to be accompanied by what appeared to be fine lines. My first thought was "what caused the internal interference?" Then I noted that the lines were parallel to the motion of the Moon and the Diamond Ring. It turns out that I had imaged shadow bands across thin clouds that came in right as the 3rd contact occurred. This appears to be the first time such images have been captured. I have noted at least one other astronomer also captured the incredible 3rd contact-shadow bands image; Dr. Stephen Schneider, University of Massachusetts Astronomy Department, imaged the unique 3rd contact shadow bands from the French Polynesian atoll of Hao.

Photographs of shadow bands are rare; they are elusive and not very photogenic. Those who try to photograph shadow bands set up a screen with ruler or meter stick. These screens can be as simple as a sheet or as elaborate as a specially-constructed screen. I have used white beach towels in the past (I like the screen-like quality and weight of a towel versus a sheet – and it's easy to transport!). For this eclipse I did not set up a towel-meter stick combo, mostly due to weather uncertainties.

Out of my 100+ July 2010 total solar eclipse images, the two 3rd contact Diamond Ring images were exposed at 1/800 second and show shadow bands on the thin layer of clouds in front of the Sun. Photoshop processing clearly delineates the shadow bands, in this case, I used unsharp masking and an adjustment in contrast.

I am not aware of anyone reporting visually seeing shadow bands at Easter Island in the more-traditionally observed manner. Nor did I see the shadow bands as they raced across the light clouds over the Sun at 3rd contact. At this time I am not aware of any reports of visual confirmation of this unusual phenomenon.

Keep Looking…

One very important point when it comes to seeing an eclipse: if it is cloudy, never give up. A couple of eclipses have been very close calls for me. In July 1972, I was set up along the eclipse limit; part of a three-station set of observers. The weather was terrible; nothing but clouds. I could see the Moon's shadow approaching and even with the clouds I continued to observe. Suddenly there was one hole in the clouds – and there was a dim but visible 2nd contact Diamond ring. The shadow rushed over my site, I could see the Sun's corona. Since I was near the limit, totality was brief. As soon as totality ended, the hole closed up and it started raining. One station south of me also saw totality, a station 500 feet to the north saw the hole but it did not pass over the eclipsed Sun.

A similar weather situation happened to me at the 2002 eclipse in South Africa. We had set up early and it was beautifully clear. Then the clouds moved in; I thought "Well, I guess you've got to miss an eclipse sometime." My telescope and videocam were tracking the Sun which was behind a thick layer of clouds as 2nd contact approached. Several of us kept looking… and it paid off. Just 30 second before 3rd contact, we could see the eclipsed Sun behind a layer of clouds so we started imaging. After 3rd contact, several people behind us started mumbling about how they missed seeing anything – and they were mere feet behind us. We showed them the video and they were shocked at what they missed. The moral of this story: do not give up; keep looking!

In Closing…

Regardless if you are going to attempt your first total solar eclipse observation or you are a well-seasoned eclipse chaser, good advance planning will give you more opportunity for success as well as a more-enjoyable expedition. Thoroughly know your equipment and its capabilities. Be flexible and just know that everything is not going to be perfect. If you have never seen a total solar eclipse – and this must be on everyone's bucket list – take time to look at and enjoy the eclipse. And you will probably be asking that same question others ask at the end of totality: when is the next total solar eclipse?

Table of Upcoming Solar Eclipses; 2011 - 2015

Date	Eclipse Type	Saros Cycle	Eclipse Magnitude	Central Duration Maximum	Eclipse Visibility
1-Jun-2011	Partial	118	0.601	--	e Asia, n N. America, Iceland
1-Jul-2011	Partial	156	0.097	--	s Indian Ocean
25-Nov-2011	Partial	123	0.905	--	s Africa, Antarctica, Tasmania, N.Z.
20-May-2012	Annular	128	0.944	05m 46s	Asia, Pacific, N. America; **Annular: China, Japan, Pacific, w U.S.**
13-Nov-2012	Total	133	1.05	04m 02s	Australia, N.Z., s Pacific, s S. America; **Total: n Australia, s Pacific**
10-May-2013	Annular	138	0.954	06m 03s	Australia, N.Z., c Pacific; **Annular: n Australia, Solomon I., c Pacific**
3-Nov-2013	Hybrid	143	1.016	01m 40s	e Americas, s Europe, Africa; **Hybrid: Atlantic, c Africa**
29-Apr-2014	Annular	148	0.987	--	s Indian, Australia, Antarctica; **Annular: Antarctica**
23-Oct-2014	Partial	153	0.811	--	n Pacific, N. America
20-Mar-2015	Total	120	1.045	02m 47s	Iceland, Europe, n Africa, n Asial **Total: n Atlantic, Faerie Is., Svalbard**
13-Sep-2015	Partial	125	0.788	--	s Africa, s Indian, Antarctica

Data from NASA Eclipse Website; Fred Espekak

http://eclipse.gsfc.nasa.gov/SEdecade/SEdecade2011.html

Feature Story

ALPO Observations of Mercury During the 2009 Apparitions

By Frank J Melillo, coordinator,
ALPO Mercury Section
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Abstract

There were seven apparitions of Mercury in 2009. During the course of the year, there were only six observers, who submitted 13 drawings, 1 CCD image, and 17 webcam images for a total of 31 observations. The observers used apertures from 9 to 27.5 centimeters (3.5 to 11 inches). The features they described show good correlation with the MESSENGER flybys and the 1971 albedo chart prepared by Murray, Smith and Dollfus, and adopted officially by the IAU (Murray, Smith, and Dolfus, 1972).

Introduction

In 2009, all observers contributed high quality observations. In addition to that, the MESSENGER spacecraft made a final flyby and sent back many stunning images. Most of the planet's surface that MESSENGER imaged in 2009 had been imaged during the second flyby in 2008, but there was a part of the surface imaged in 2009, along the terminator, that had never before been documented. As of now (November 2010), the spacecraft is in good health and the scientists are preparing for the orbit insertion in 2011.

In 2009, Ed Lomeli made the most observations of Mercury. His outstanding images have continued to improve over the years. John Boudreau also contributed several excellent images, in which albedo features can be compared to those in the MESSENGER images (Melillo, 2010a). Both Mario Frassati and Carl Roussell continued to make high quality drawings, as in previous years.

There were four evening and three morning apparitions. However, in one evening apparition, no Mercury observation was made. Six observers contributed to the section, which was a slight reduction from the last few years (Melillo, 2009b; Melillo, 2010b). These observers have committed themselves to the special challenges of observing the unexplored surface of Mercury (Boudreau, 2009; Melillo, 2004). With MESSENGER approaching orbit around the planet, our observing experiences are more pleasurable than ever before. We hope that this article will inspire more readers to observe this tiny planet.

A diagram showing the oribital dynamics of Mercury and Venus and their appearance from Earth in relation to the Sun is presented as Figure 1.

Apparition 1: Evening, 25 November 2008 to 20 January 2009

On 25 November 2008, Mercury entered the evening sky. This evening appearance was somewhat favorable for both hemisphere viewers. Nevertheless, only two observers braved the cold weather.

Ed Lomeli started with his image on 20 December when the CM was 189 °. Mercury showed nearly a full disk, with a large light feature at north center that may be Caloris. Lomeli continued to image Mercury on 26 December (CM 216°), 29 December (CM 231°), 03 January (CM 255°), 04 January (CM 260°), 06 January (CM 270°), 09 January (CM 287°) and 10 January (CM 292°). All of his images

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• The references in blue text to jump to source material or information about that source material (Internet connection must be ON).

Special Note

In this paper, the planetographic longitude convention, with increasing longitude toward planetary west, is used exclusively. This is the convention that ALPO Mercury and Mars observers have long used, and it differs from the planetocentric longitude system, in which longitude increases to the east.

Table 1. Characteristics of the Apparitions of Mercury in 2009 (All dates UT)

Number and Type	Beginning Conjunction*	Greatest Elongation	Final Conjunction*	Aphelion	Perihelion
1. Evening	25 Nov (2008) (s)	04 Jan	20 Jan (i)		13 Jan
2. Morning	20 Jan (i)	13 Feb	31 Mar (s)	26 Feb	
3. Evening	31 Mar (s)	26 Apr	18 May (i)		11 Apr
4. Morning	18 May (i)	13 Jun	13 Jul (s)	25 May	08 Jul
5. Evening	13 Jul (s)	24 Aug	20 Sept (i)	21 Aug	
6. Morning	20 Sept (i)	06 Oct	05 Nov (s)		04 Oct
7. Evening	05 Nov (s)	18 Dec	04 Jan (2010) (i)	17 Nov	31 Dec
*(i) – inferior conjunction, (s) – superior conjunction					

showed a large light feature – possibly Caloris – as a bright region in the north and rotating in his later images to the NE limb (Figure 2, panels A through F). His image of 29 December is similar to that of the MESSENGER first flyby during the outbound journey (Melillo, 2009a). Lomeli's 10 January image was made only a few hours from the drawing of Mario Frassati, both at CM 292° (Figure 2, panel G). Although albedo features were depicted in these, it is hard to judge how they correspond to features that are known or seen in other images. Frassati finished the observations with another drawing on 11 January (CM 298°). Mercury went through inferior conjunction on 20 January.

Apparition 2: Morning, 20 January to 31 March

This apparition lasted more than two months, but it was unfavorable for northern hemisphere viewers. Only one person contributed observations.

Mario Frassati observed Mercury three times within a week. On 9 February, Mercury was nearly 26 degrees west of the Sun (only four days before its greatest elongation), but it was very low in the southeastern sky. His drawing on that date, with CM 126°, shows a half phase (Figure 3, panel A). The dusky features just south of the equator may be Solitudos Jovis and Maiae. He again drew Mercury on both 12 and 13 February (CM's 142° and 147°). Both drawings showed the same dusky features near the terminator just south of the equator (Figure 3, panels B and C). The drawing of 13 February shows the planet to be slightly gibbous, while at greatest elongation on that date.

After this long morning apparition, Mercury went through superior conjunction on 31 March.

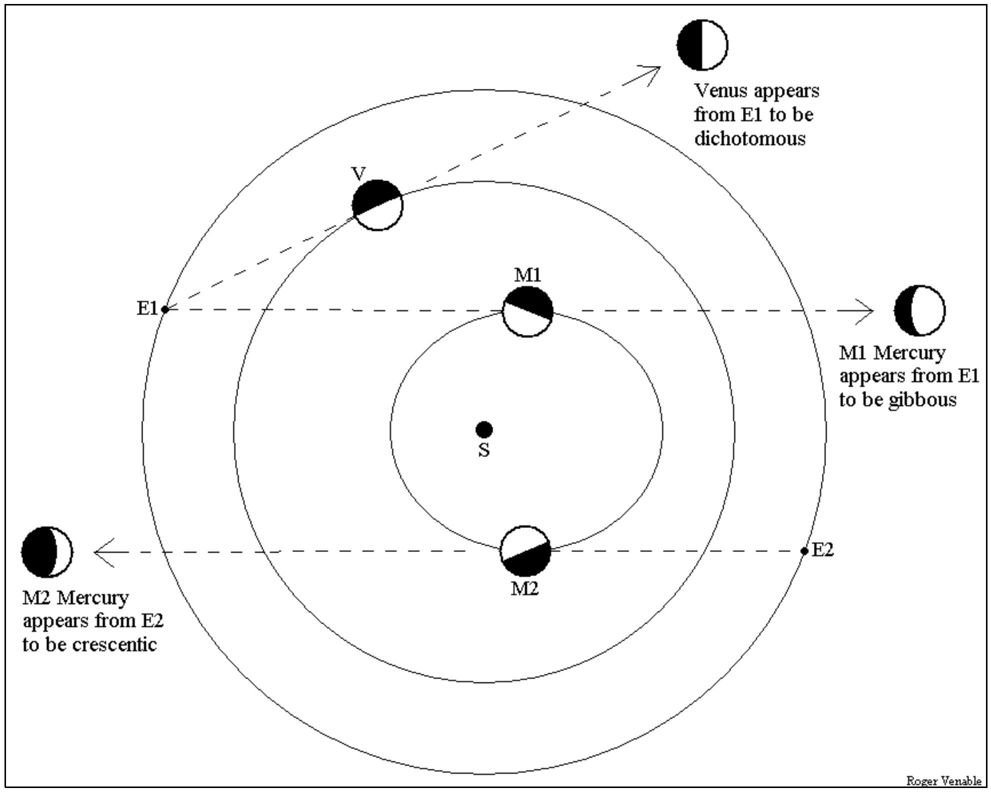

Figure 1. Although Venus appears to be near half-phase when at greatest elongation, Mercury often does not. The the orbits of Earth, Venus, and Mercury are drawn here, with the Sun 'S' at the center. E1 and E2 represent two positions of Earth along its orbit, V represents Venus, and M1 and M2 represent two positions of Mercury in its orbit. An observer at E1 will see Venus at greatest elongation when his line of sight is tangent to the orbit of Venus, as drawn. Since the orbits of Earth and Venus are nearly round, the E1-Venus-Sun angle is close to 90 degrees, and Venus appears at half-phase ("dichotomy".) In contrast, the observer at E1 who sees Mercury at its greatest elongation at M1, with his line of sight tangent to the orbit of Mercury, sees a gibbous planet because the E1-M1-Sun angle is less than 90 degrees. On the other hand, an observer at E2 who sees Mercury at its greatest elongation at M2 sees a crescentic planet because the E2-M2-Sun angle is greater than 90 degrees. Due to the oval shape of Mercury's orbit, its phase at greatest elongation can be anywhere from 37 percent to 63 percent.

Table 2. ALPO Observers of Mercury 2009

Observers	Location	Instrument*	Number & Type of Observation	Apparitions Observed
Boudreau, John	Saugus, MA, USA	27.5 cm SCT	4 W	4, 6
Frassati, Mario	Cresentino, Italy	20.3 cm SCT	7 D	1, 2, 6
Lomeli, Edward	Sacramento, CA, USA	23.5 cm SCT	13 W	1, 6
Melillo, Frank J.	Holtsville, NY, USA	24.5 cm SCT	1 CCD	6
Roussell, Arwen	Hamilton, ON, Canada	15 cm RL	1 D	3
Roussell, Carl	Hamilton, ON, Canada	15 cm RL	5 D	3, 4, 6

* NT = Newtonian, RL = reflector, RR = Refractor, SCT = Schmidt-Cassegrain
** CCD = CCD imaging, D = Drawing, W = Webcam

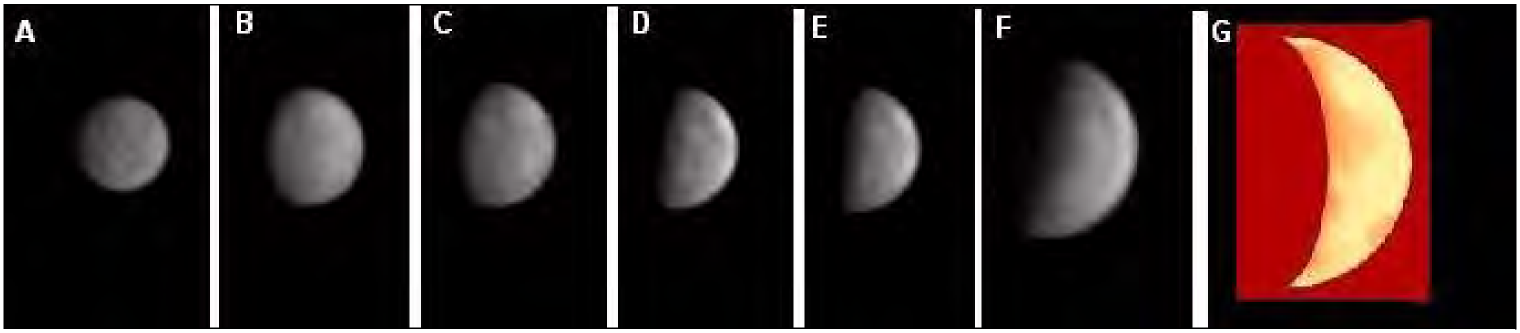

Figure 2. Observations of Apparition 1. In this and all other figures in this article, north is up and planetary east to the right.

A. Image by Ed Lomeli, 20 Dec 2008, 22:19 UT, CM = 189°
B. Image by Ed Lomeli, 26 Dec 2008, 21:13 UT, CM = 216°
C. Image by Ed Lomeli, 29 Dec 2008, 22:18 UT, CM = 231°
D. Image by Ed Lomeli, 03 Jan 2009, 22:41 UT, CM = 255°
E. Image by Ed Lomeli, 04 Jan 2009, 20:18 UT, CM = 260°
F. Image by Ed Lomeli, 06 Jan 2009, 21:06 UT, CM = 270°
G. Drawing by Mario Frassati, 10 Jan 2009, 16:25 UT, CM = 292°

Apparition 3: Evening, 31 March to 18 May

The apparition was quite favorable as seen from the northern hemisphere, but only three observations were received.

Carl Roussell observed Mercury on 18 April (CM 71°). He drew it slightly gibbous with Solitude Martis in the south (Figure 4, panel A). Also, Roussell's daughter, Arwen, drew Mercury just 20 minutes later, depicting two vertical bright bands, one in the north and one in the south (Figure 4, panel B). However, it is not known what these features might be. Roussell ended with his drawing on 30 April (CM 131°), showing a crescent phase. The dark feature in the south may be Solitudo Martis (Figure 4, panel C). After this brief evening apparition, Mercury went through inferior conjunction on 18 May.

Apparition 4: Morning, 18 May to 13 July

This apparition was somewhat favorable as seen from either hemisphere. Only two observers made reports.

John Boudreau made one image on 17 June (CM 65°). Mercury displayed a fat crescent, but it was difficult to identify the details (Figure 5, panel A). Carl Roussell drew Mercury on 22 June (CM 89°) and showed Solitudo Martis in the south, and perhaps Solitudo Horarum north of the equator (Figure 5, panel B). Mercury went through superior conjunction on 13 July.

Apparition 5: Evening, 13 July to 20 September

This was rather a poor apparition for northern hemisphere viewers, and no observations were received.

Apparition 6: Morning, 20 September 20 to 05 November

As always, Mercury made a spectacular display in the morning sky during the fall season, as seen from the northern hemisphere. This section received observations of very high quality, and they all can be compared with the MESSENGER images during the recent flybys. These are perhaps the best images ever taken from Earth, especially by amateurs (Figure 6, panel A).

After superior conjunction on 20 September, John Boudreau and Ed Lomeli started imaging Mercury during the crescent stage. From 2 October (CM 253°) to 6 October (CM 274°), the dark feature formerly called the Skinakas basin was prominent in the north, and images showed it to be connected with Solitudo Alarum in the south. Boudreau's image of 6 October, along with a simultaneous drawing by Carl Roussell, showed two dusky bands, one in the north and one in the south (Figure 6, panel B). Roussell's

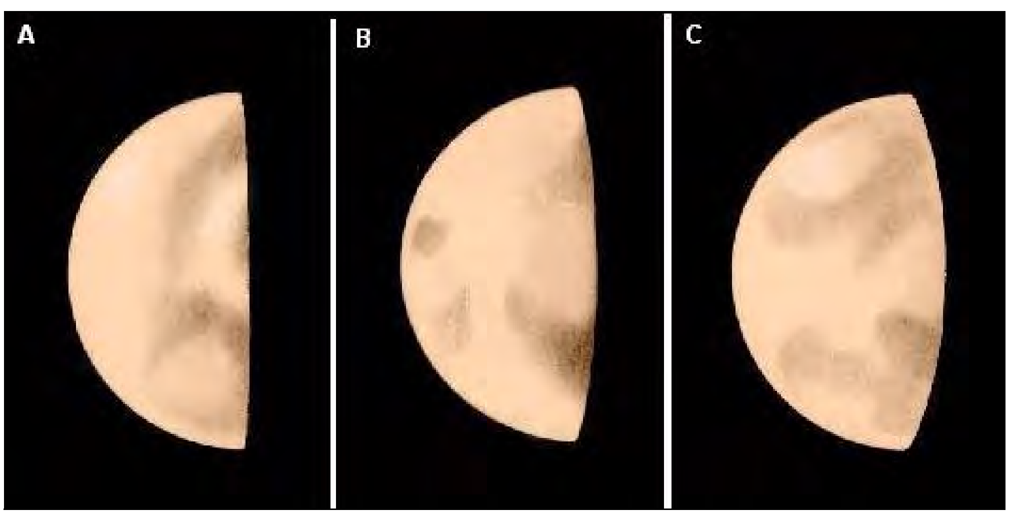

Figure 3. Observations of Apparition 2.
A. Drawing by Mario Frassati, 09 Feb 2009, 6:10 UT, CM = 126°.
B. Drawing by Mario Frassati, 12 Feb 2009, 6:15 UT, CM = 142°.
C. Drawing by Mario Frassati, 13 Feb 2009, 6:10 UT, CM = 147°.

drawing on 8 October (CM 284°) showed the same appearance with two bands (Figure 6, panel C).

Three imagers, Boundreau, Frank J Melillo, and Lomeli, made nearly simultaneous observations on 11 October (CM 299°). First was Boudreau at 13:58 UT, then Melillo at 14:30 UT, and then Lomeli at 16:13 UT (Figure 7). All three images showed the former Skinakas basin near the terminator, and bright spots (rayed craters) toward the limb. Though Melillo's image was at lower resolution, it did show the major features.

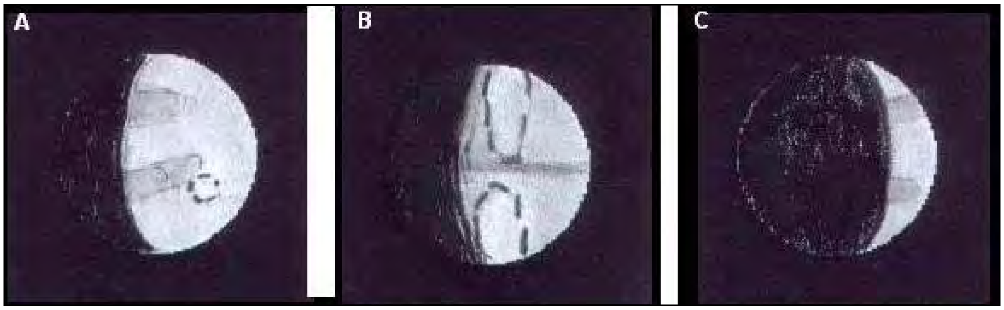

Figure 4. Observations of Apparition 3.
A. Drawing by Carl Roussell, 18 Apr 2009, 0:20 UT, CM= 071°.
B. Drawing by Arwen Roussell, 18 Apr 2009, 0:40 UT, CM = 071°.
C. Drawing by Carl Roussell, 30 Apr 2009, 0:44 UT, CM = 131°.

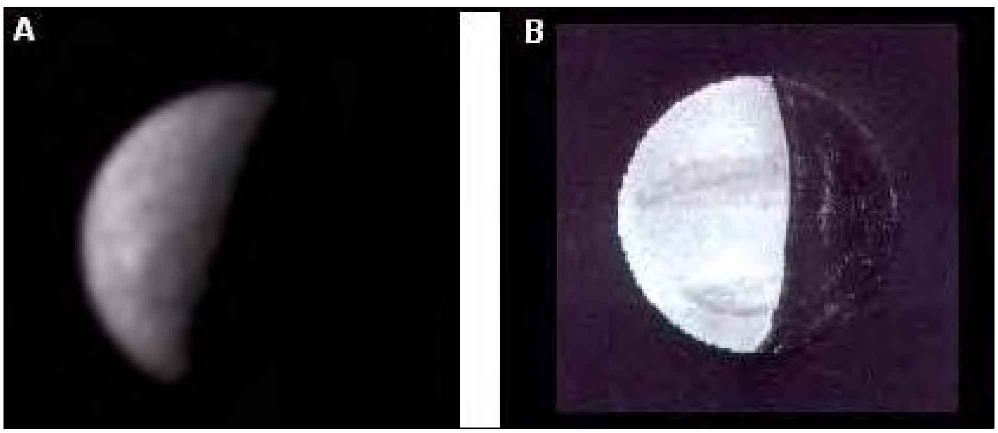

Figure 5. Observations of Apparition 4.
A. Image by John Boudreau, 17 Jun 2009, 11:49 UT, CM = 065°.
B. Drawing by Carl Roussell, 22 Jun 2009, 10:22 UT, CM = 089°.

On 16 October (CM 320°), Mario Frassati drew the planet with three large bright areas (Figure 6, panel E). The southern one appears to correspond to a known region of rayed craters, but it is not clear what the other two might be. Finally, on 17 October (CM 326°), Lomeli completed the observations with his spectacular image showing all four rayed craters (Figure 6, panel F). The one near the SW limb is the Kuiper rayed crater, and the one near bottom center is a rayed crater that was seen by the Arecibo radar mapping. The other two rayed craters were confirmed by the MESSENGER spacecraft during the recent flybys. Mercury went through superior conjunction on 5 November.

Apparition 7: Evening, 05 November 2009 to 04 January 2010

Mercury made a mediocre appearance in the evening sky. There was only one observer, Mario Frassati. In his drawing of 16 December (CM 242°), he shows two bands leading out from the terminator -- perhaps Solitudo Phoenicis in the north and Solitudo Criophori in the south (Figure 8). Mercury went through inferior conjunction on 4 January (2010).

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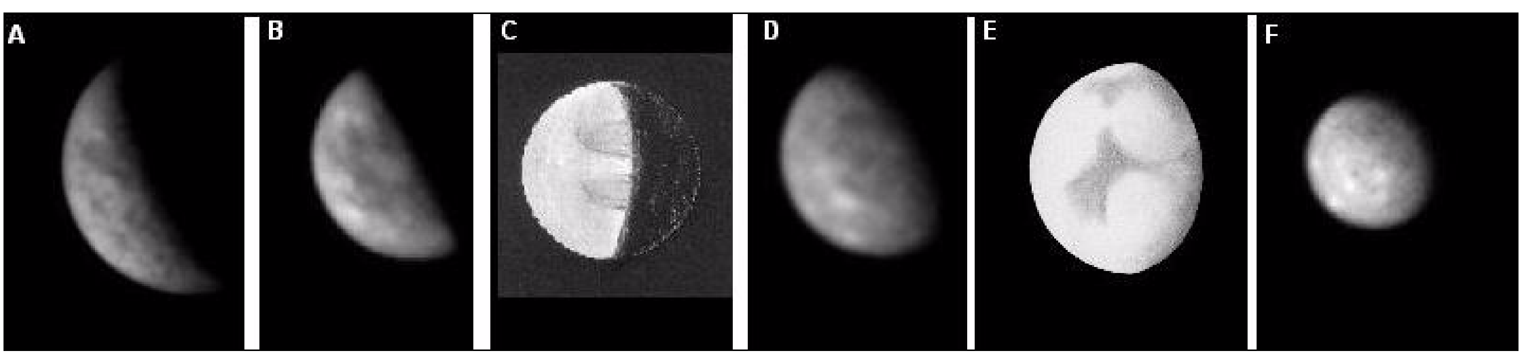

Figure 6. Observations of Apparition 6.

A. Image by John Boudreau, 02 Oct 2009, 13:49 UT, CM = 253°
B. Image by John Boudreau, 06 Oct 2009, 13:41 UT, CM = 274°
C. Drawing by Carl Roussell, 08 Oct 2009, 11:02 UT, CM = 284°
D. Image by Ed Lomeli, 10 Oct 2009, 16:11 UT, CM = 294°
E. Drawing by Mario Frassati, 16 Oct 2009, 5:30 UT, CM = 320°
F. Image by Ed Lomeli, 17 Oct 2009, 15:36 UT, CM = 326°

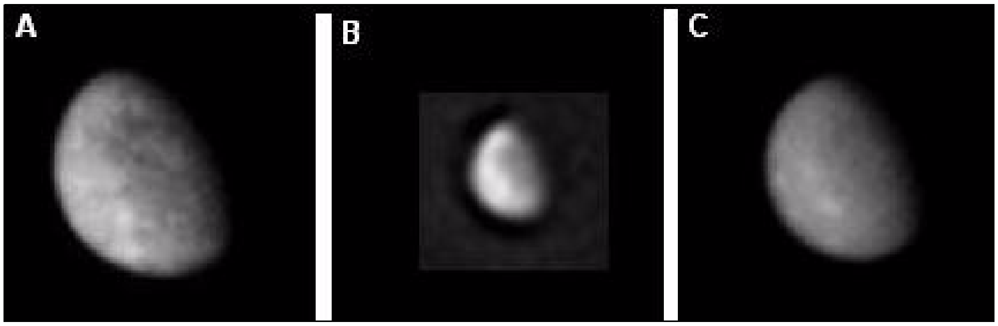

Figure 7. A nearly simultaneous observation on 11 October 2009 at CM = 299°.
A. Image by John Boudreau, 11 Oct 2009, 13:58 UT.
B. Image by Frank J Melillo, 11 Oct 2009, 14:30 UT.
C. Image by Ed Lomeli, 11 Oct 2009, 16:13 UT.

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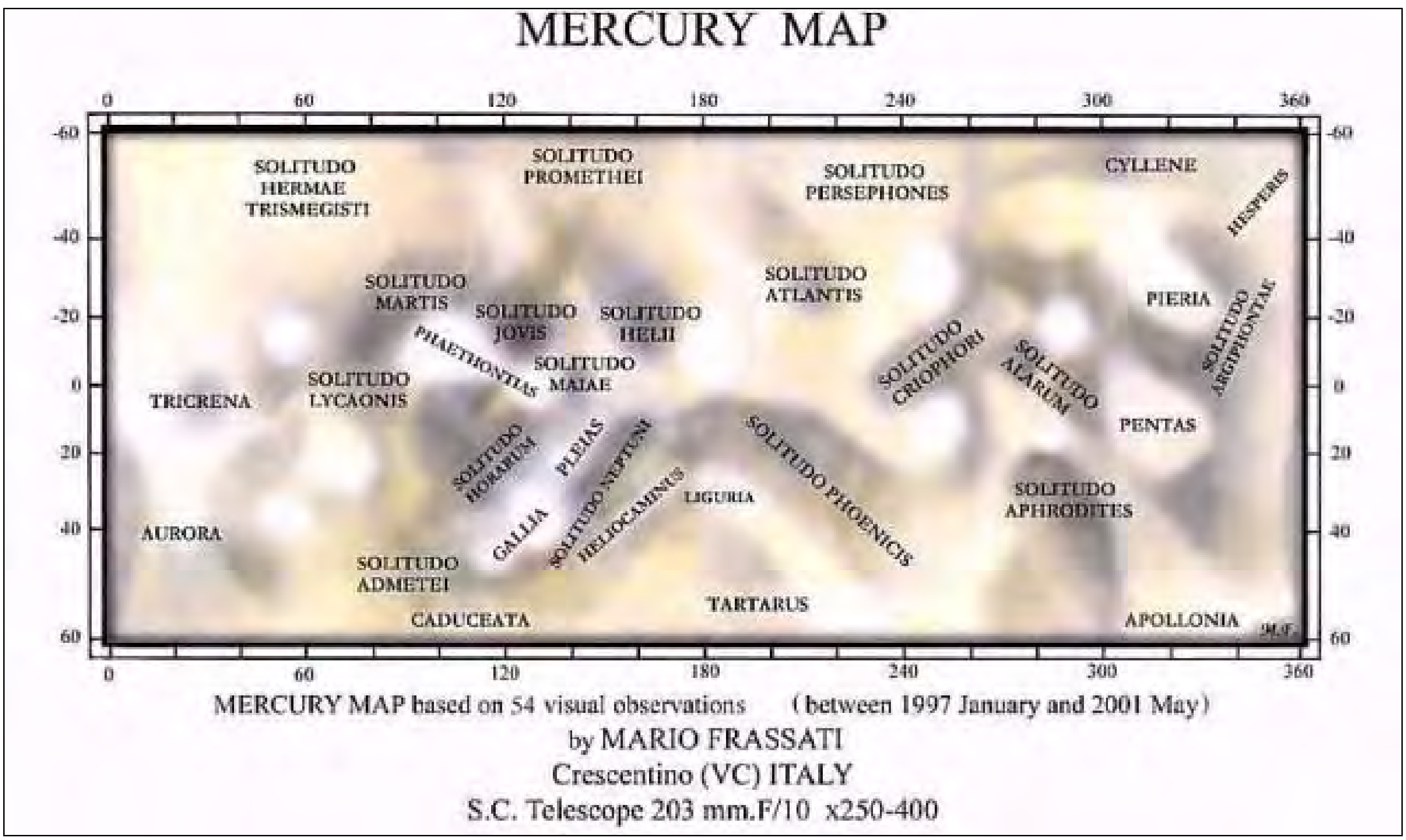
Figure 8. An observation of Apparition 7.
A. Drawing by Mario Frassati, 16 Dec 2009, 16:10 UT, CM = 242°.



ALPO MERCURY SECTION

NAME________________________________

ADDRESS______________________________

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APPARITION:
Morning_____
Eveining_____

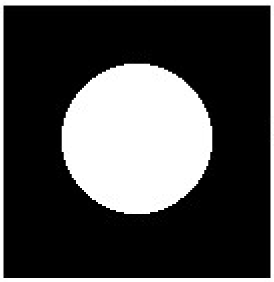
ARC SECONDS____"
ELONGATION:
_____° from the sun

For Coordinator Only:

Sketch

DATE__________________
TIME (UT)______________
Telescope____________________________
Magnification_________________________
Filter(s)____________________________
Seeing (10-best/1-worst)_______________
Visual Description:

NORTH



WEST

Central Meridian Longitude______°

Photo or CCD

DATE:_____________
TIME (UT):__________

Image 1

Central Meridian Longitude______°

Telescope:______________________
Camera Type:____________________
Exposure:_______________________
f/ratio:________________________
Filter:_________________________

Comments:

Date:________________
TIME (UT):_____________

Image 2

Central Meridian Longitude______°

Telescope______________________
Camera Type____________________
Exposure_______________________
f/ratio________________________
Filter_________________________

Comments:

Send all observations to: Frank J Melillo
ALPO Mercury Coordinator
14 Glen-Hollow Dr., E-#16
Holtsville, NY 11742

E-mail for questions, special observations and alerts: frankj12@aol.com

Feature Story: Venus

ALPO Observations of Venus During the 2007-2008 Western (Morning) Apparition

By Julius L. Benton, Jr., coordinator
ALPO Venus Section
jlbaina@msn.com

An ALPO Venus Section Observing Report Form is located at the end of this report.

Abstract

The report is an analysis of 154 photovisual observations submitted to the ALPO Venus Section during the 2007-08 Western (Morning) Apparition by a total of 16 observers residing in Italy, Germany, Canada, Netherlands, United Kingdom, and United States. Types of telescopes employed when making these observations and data sources are described. The apparition report is based on a comparative analysis of digital images at visual, UV, and IR wavelengths, as well as drawings made in integrated light and with color filters. Included is a continuing statistical analysis of the categories of atmospheric markings on Venus reported at visual wavelengths or captured on digital images in the atmosphere of Venus, plus notes on the extent and prominence of the planet's cusps, cusp-caps, and cusp-bands. Terminator irregularities and the apparent phase are also noted, as well as status on the continued monitoring of the dark hemisphere of Venus for the Ashen Light.

Introduction

Geocentric phenomena in Universal Time (UT) for this observing season appear in *Table 1*, while *Figure 1* shows the distribution of observations by month during the apparition. Sixteen observers contributed a total of 154 visual drawings and digital images of Venus during the 2007-08 Western (Morning) Apparition, and *Table 2* gives their observing location, number of observations submitted and instruments used.

The 2007-08 viewing season ranged from August 18, 2007 to May 24, 2008, with 61.7% of the observations occurring between September and November 2007. During this period, Venus passed through greatest brilliancy (-4.8mv), maximum elongation (46.0°) from the Sun, and dichotomy (half-phase). Observers made drawings or imaged Venus up to about two weeks before Superior Conjunction, which occurred on June 9, 2008. Observational coverage of Venus during every apparition from beginning to end is always our goal, and such regular surveillance of the planet is becoming the norm in recent years.

Figure 2 shows the distribution of observations that were contributed by nation of origin for the 2007-08 Western (Morning) Apparition, while *Figure 3* shows the breakdown of observers by nation. A smaller percentage of those participating in our observing programs (43.5%) were from the United States, and they contributed 34.4% (see *Figure 3*) of all reports, drawings, and images; in contrast, 56.3% of contributing observers and the 65.6% of all observations came from other countries. The international flavor of our programs, therefore, continued during 2007-08, and the ALPO Venus Section seeks to sustain valuable global cooperation by observers in the coming years as we together pursue the unique challenges presented by Venus to both visual observers and digital imagers alike.

Telescopes used in making observations of Venus in 2007-08 are shown graphically in *Figure 4*, where it can be

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- The author's e-mail address in blue text to contact the author of this article.
- The references in blue text to jump to source material or information about that source material (Internet connection must be ON).

Observing Scales

Standard ALPO Scale of Intensity:
- 0.0 = Completely black
- 10.0 = Very brightest features
- Intermediate values are assigned along the scale to account for observed intensity of features

ALPO Scale of Seeing Conditions:
- 0 = Worst
- 10 = Perfect

Scale of Transparency Conditions:
- Estimated magnitude of the faintest star observable near Venus, allowing for daylight or twilight

IAU directions are used in all instances.

Terminology: Western vs Eastern

"Western" apparitions are those when an "inferior" planet (Mercury or Venus, whose orbits lie inside the Earth's orbit around the Sun) is **west of the Sun**, as seen in our morning sky before sunrise.

"Eastern" apparitions are those when that planet is **east of the Sun,** as seen in our sky after sunset.

seen that the overwhelming majority (98.7%) of all observations were made with telescopes are equal to or exceed 15.2 cm (6.0 in.) in aperture. Schmidt-Cassegrains were employed a little over two-thirds (65.6%) of the time for digital imaging and visual studies of Venus during the apparition. Visual observers typically utilized refractors and Newtonian reflectors, accounting for 33.8% of the data. Throughout the apparition, all observations were made under twilight or generally light-sky conditions and several individuals even tracked Venus into the bright daylight sky after sunrise to cut down on the overwhelming glare of the planet's illuminated disk. This methodology also allowed observers to see and image Venus when it was higher in the sky, thus avoiding image degradation and less-than-favorable seeing near the horizon.

The author expresses his sincere thanks to all 16 observers mentioned in *Table 1* for their digital images, excellent drawings, and accompanying descriptive reports during the 2007-08 observing season.

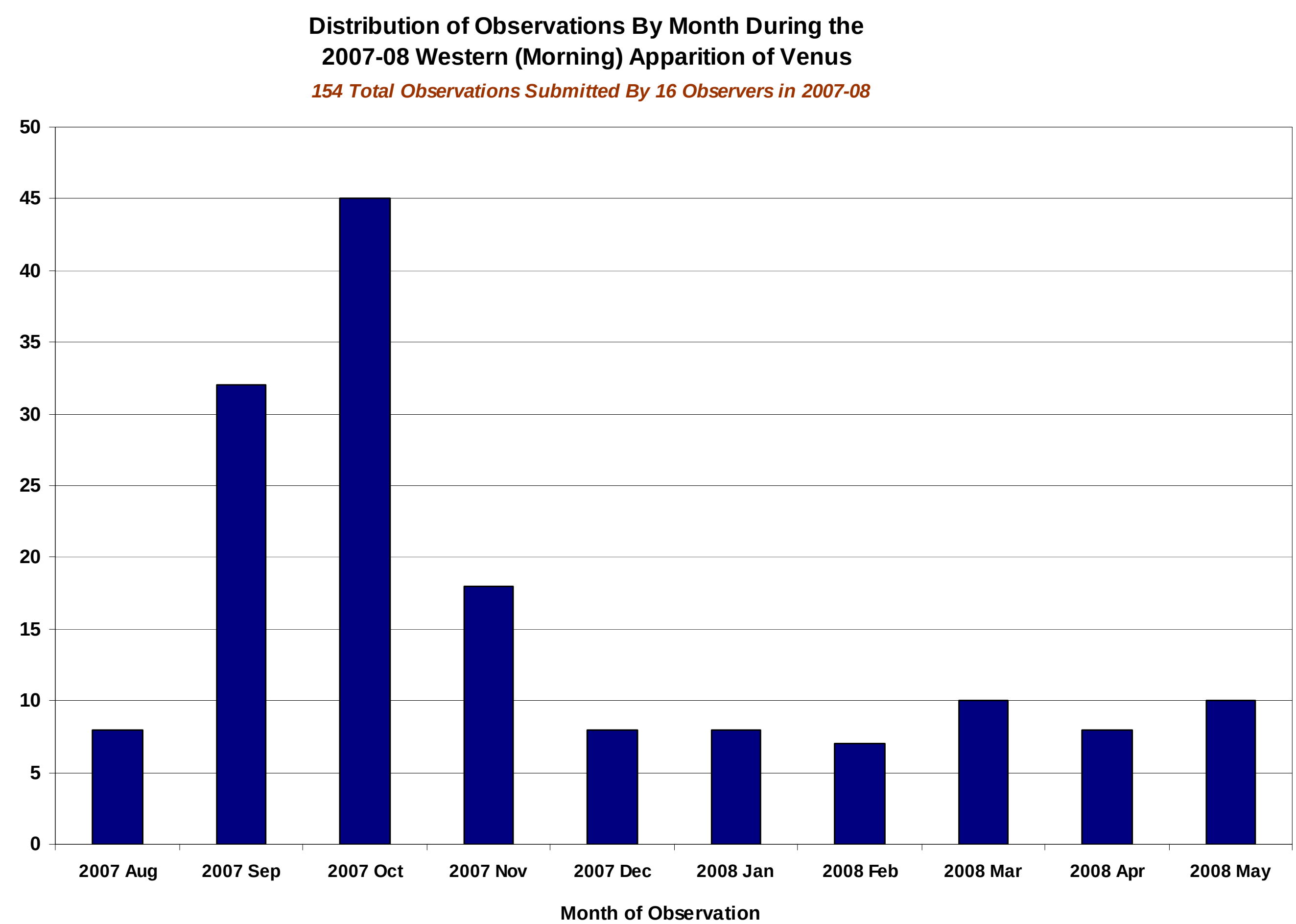
Table 1: Geocentric Phenomena in Universal Time (UT) for the 2007-08 Western (Morning) Apparition of Venus

Inferior Conjunction	2007 Aug 18^d 04^h UT
Initial Observation	Aug 18 10
Greatest Brilliancy	Sep 23 23 ($m_V = -4.8$)
Dichotomy (predicted)	Oct 27 15.36
Greatest Elongation West	Oct 28 05 (46.0°)
Final Observation	2008 May 24 10
Superior Conjunction	Jun 09 04
Apparent Diameter (observed range): 58.0" (2007 Aug 18) ↔ 9.7" (2008 May 24)	
Phase Coefficient, ***k*** (observed range): 0.010 (2007 Aug 18) ↔ 0.997 (2008 May 24)	

The diligent efforts of these individuals is highly commendable, since viewing or imaging the planet before sunrise often necessitated rising early in the morning and fitting in an observing run prior to heading off to work the same day. Readers aspiring to learn more about the planet Venus and our numerous observing endeavors are cordially invited to join the ALPO and become regular contributors to the ALPO Venus Section in upcoming apparitions.

For the last several apparitions, there has been a considerable growth in the number of submitted digital images of Venus taken at visual and other wavelengths, and nearly all of the results have been remarkable, especially UV (ultra-violet) and IR (infra-red) images. The ALPO

Figure 1



Venus Section encourages those who possess digital imagers to capture images the planet routinely at different wavelengths, but as crucial as these high-tech methods are to the success of our programs, observers should never mistakenly believe that well-executed drawings of the planet are outmoded. Observers with trained eyes, painstakingly watching and sketching the planet in integrated light (no filter) and with color filters of precisely known transmission characteristics, can take advantage of intermittent periods of excellent seeing to record detail and subtle contrasts in the atmosphere of Venus. Comparative analysis of drawings and images is extremely important, since some of the features sketched by experienced observers also appear with the same morphology on digital images made at the same time and on the same date. Of course, visual observations always suffer from an inherent level of subjectivity, but that is precisely why we emphasize the enormous value of making simultaneous observations as a means of improving opportunities for confirmation of discrete phenomena. There is no doubt that routine simultaneous visual observations concurrent with digital imaging add a valuable collaborative dimension to data acquisition.

Table 2: ALPO Observing Participants 2007-08 Western (Morning) Apparition

Observer and Observing Site	No. Obs.	Telescope(s) Used*
1. Arditti, David; Middlesex, UK	1	35.6 cm (14.0 in) SCT
2. Bee, Ron; San Diego, CA, USA	2	12.7 cm (5.0 in) REF
3. Benton, Julius L.; Wilmington Island, GA, USA	18	15.2 cm (6.0 in) REF
4. Frassati, Mario; Crescentino, Italy	1	20.3 cm (8.0 in) NEW
5. Kingsley, Bruce; Maidenhead, UK	1	28.0 cm (11.0 in) SCT
6. Lazzarotti, Paolo; Massa, Italy	1	31.5 cm (12.4 in) CAS
7. Lomeli, Ed; Sacramento, CA, USA	14	23.5 cm (9.25 in) SCT
8. Maxson, Paul; Phoenix, AZ, USA	12	25.4 cm (10.0 in) SCT
9. Melillo, Frank J.; Holtsville, NY, USA	3	25.4 cm (10.0 in) SCT
10. Niechoy, Detlev; Göttingen, Germany	65	20.3 cm (8.0 in) SCT
11. Pettenpaul, Oliver; Hannover, Germany	2	23.5 cm (9.25 in) SCT
12. Roussell, Carl; Hamilton, ON, Canada	24	15.2 cm (6.0 in) REFR
13. Sandel, Jeffrey; Hilton Head, SC, USA	3	25.4 cm (10.0 in) NEW
14. Schrantz, Rick; Nicholasville, KY, USA	1	25.4 cm (10.0 in) NEW
15. van Kranenburg, Arnaud; Vlaardingen, The Netherlands	3	23.5 cm (9.25 in) SCT
16. Vandenbergh, Ralf; Maastricht, The Netherlands	3	25.4 cm (10.0 in) NEW
Total No. of Observers	**16**	
Total No. of Observations	**154**	

*REF = Refractor, SCT = Schmidt-Cassegrain, NEW = Newtonian, MCT = Maksutov-Cassegrain, DALL = Dall-Kirkham

Observations of Venusian Atmospheric Details

Different methods and techniques for performing observations of the vague and elusive "markings" in the atmosphere of Venus are covered in detail in the latest edition of *The Venus Handbook*. This valuable guidebook for observing the planet is now available either as a printed manual or as a pdf file for download. Also, readers with access to prior issues of this Journal may find it worthwhile to study previous apparition reports for a historical perspective on ALPO Venus observations.

A substantial number of the Venus observations in 2007-08 used for this analysis were made at visual wavelengths (in integrated light and with color filters), but the ranks of those regularly capturing digital images of the planet in integrated light, UV, and IR wavelengths continue to grow every observing season. Representative drawings, as well as some of the best digital images, accompany this report as illustrations.

After a thorough study of the photo-visual data for the 2007-08 Western (Morning) Apparition, all of the traditional categories of dusky and bright markings in the atmosphere of Venus were seen or suspected by observers (see the literature referenced earlier in this report). *Figure 5* shows the frequency of the specific forms of markings that were reported by visual observers or captured by digital imagers at visual, near-IR, and near-UV wavelengths. The majority of the observations referred to more than one category of marking or feature; so totals exceeding 100% are not unexpected. Although conclusions from these data appear realistic, readers are reminded that some level of subjectivity exists in at least the visual accounts of the normally elusive atmospheric markings of Venus. It is likely that this factor affected visual impressions of atmospheric phenomena, thus the need for regular simultaneous observing efforts, ideally at the same time that imaging occurs at visual and other wavelengths.

Those who carried out strictly visual work during the 2007-08 apparition frequently pointed out how difficult the faint, dusky atmospheric markings on Venus are to detect. This is a well-known characteristic of the planet that is largely independent of the experience of the visual observer, and is a factor that often exasperates and discourages many who begin viewing Venus with their telescopes for the first time. At visual wavelengths, employing color filters and variable-density polarizers improves opportunities for seeing subtle cloud detail on the planet. The morphology of features revealed in images taken at near-UV or near-IR wavelengths is frequently different from what is seen visually, especially radial dusky spokes or shadings. Yet, sometimes digital images show almost exactly what careful visual observers have sketched with color filters. So, as mentioned elsewhere in this report, in addition to visual work, the ALPO Venus Section urges observers to attempt to capture images of the planet at various wavelengths for comparative analysis.

Figure 2

Distribution of Observers by Nation of Origin During the 2007-08 Western (Morning) Apparition of Venus

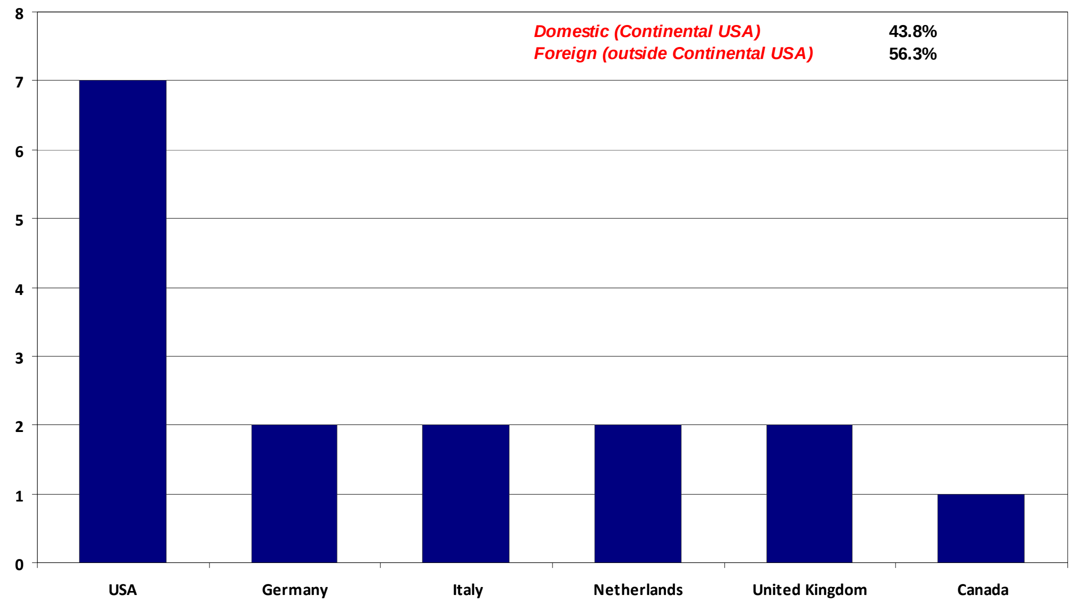


Figure 3

Distribution of Observations by Nation of Origin During the 2007-08 Western (Morning) Apparition of Venus

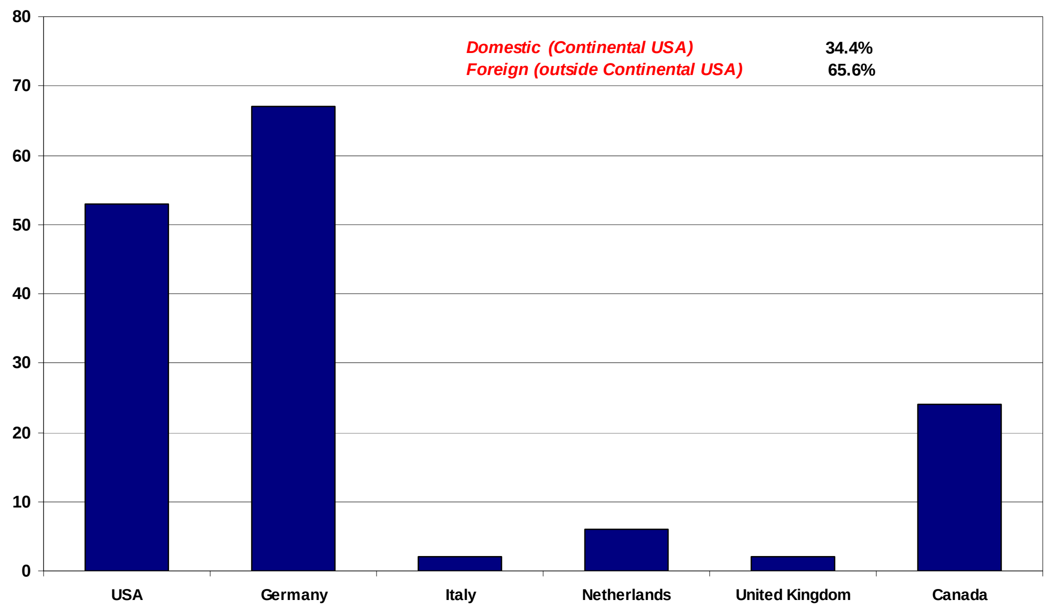


Table 3: Reported Sightings of Ashen Light During the 2007-08 Western (Morning) Apparition

UT Date and Time	Observer	Location	Inst	Aper (cm)	Type	Mag. (X)	Filter	Filter	Filter	S	Tr	Notes
2007 Aug 29 11:30-11:40UT	Roussell	CAN	REF	15.2	Drawing	400	W25	W58	W47	4.0		Ashen Light suspected (twilight sky)
2007 Sep 7 10:10-11:00UT	Sandell	USA	NEW	25.4	Drawing	240	W47	W82A	W80A	6.5	3.5	Ashen Light suspected (twilight sky)
2007 Sep 11 11:15-13:00UT	Sandell	USA	NEW	25.4	Drawing	315	W47	W80A	W8	5.0		Ashen Light suspected (twilight sky)
2007 Sep 17 03:53-04:29UT	Niechoy	GER	SCT	20.3	Drawing	225	W47	W15	W25	3.0	3.0	Ashen Light definitely visible, centrally located in dark hemisphere; most prominent in W47 (twilight sky)
2007 Sep 24 03:53-05:53UT	Niechoy	GER	SCT	20.3	Drawing	225	W47	W15	W25	3.0	3.0	Ashen Light suspected in W25 and W15 filters (twilight sky)

Figure 5 shows that only 8.1% of the observations and images of Venus in 2007-08 recorded a brilliant disc that was completely devoid of any markings, presumably because more observers are employing good filter techniques coupled with a growing incidence of digital images that show detail. When faint dusky features were seen, suspected, or imaged, most fell into the categories of "Amorphous Dusky Markings" (66.2%), "Banded Dusky Markings" (81.6%), and "Irregular Dusky Markings" (54.4%) during the 2007-08 Western (Morning) Apparition, with 4.4% falling into the "Radial Dusky Markings" category [see images 1 thru 6 and 8 thru 12].

Terminator shading was visible during most of the 2007-08 observing season and reported in 85.3% of the observations (see *Figure 5*), usually extending from one cusp region to the opposite one and assumed a higher intensity progressively from the region of the terminator toward the bright planetary limb [see image 7]. This gradation in brightness culminated in the Bright Limb Band in most accounts. Many of the digital images at near-UV wavelengths this apparition showed terminator shading as well.

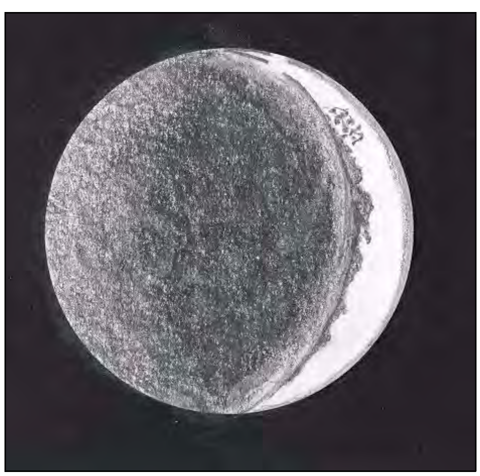


Image 1. See Table 4.

The mean relative intensity of all of the dusky features on Venus during the observing season ranged from 8.5 to 9.2. The ALPO Scale of Conspicuousness (running sequentially from 0.0 for "definitely not seen" up to 10.0 for "certainly seen") was used by observers

Image 2. See Table 4.

Figure 4

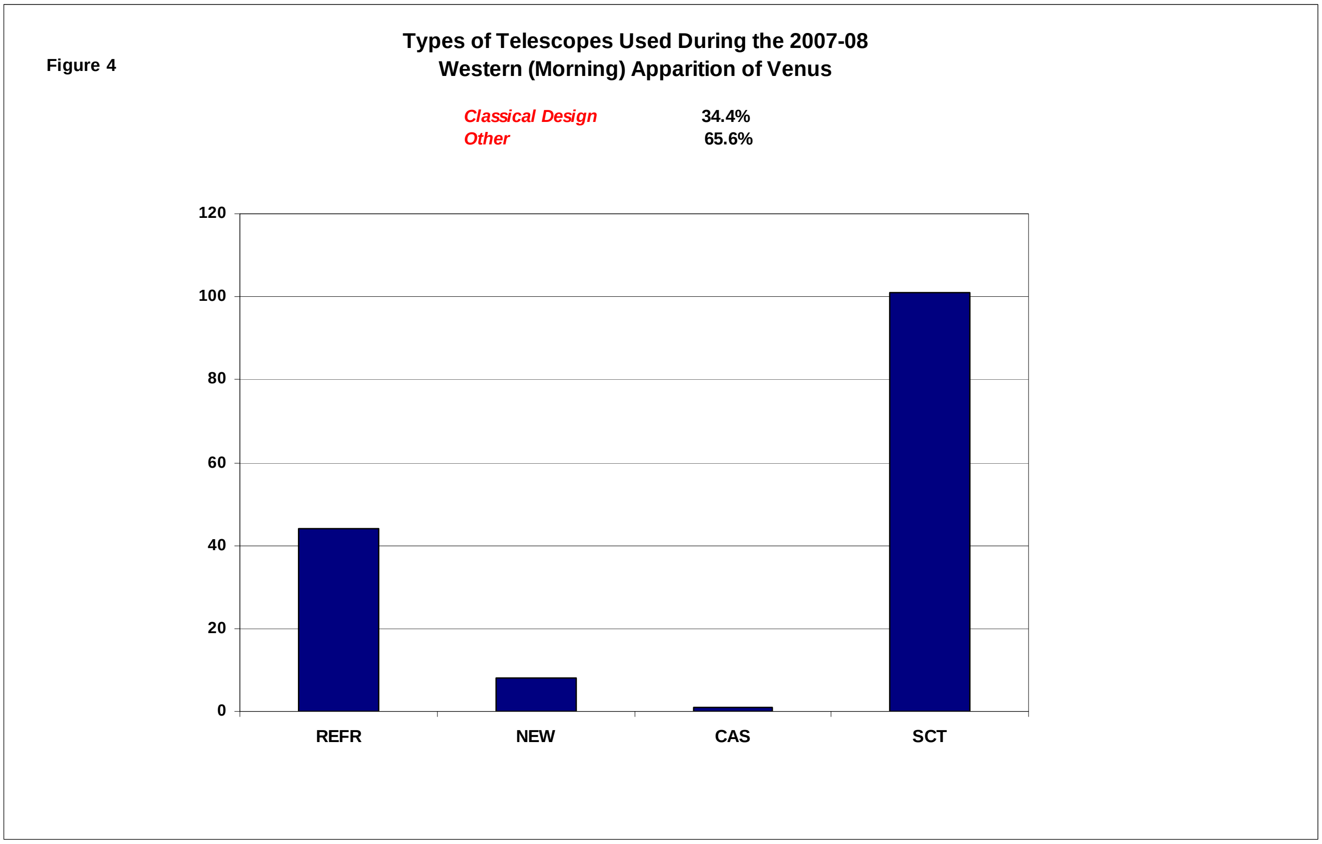


Figure 5

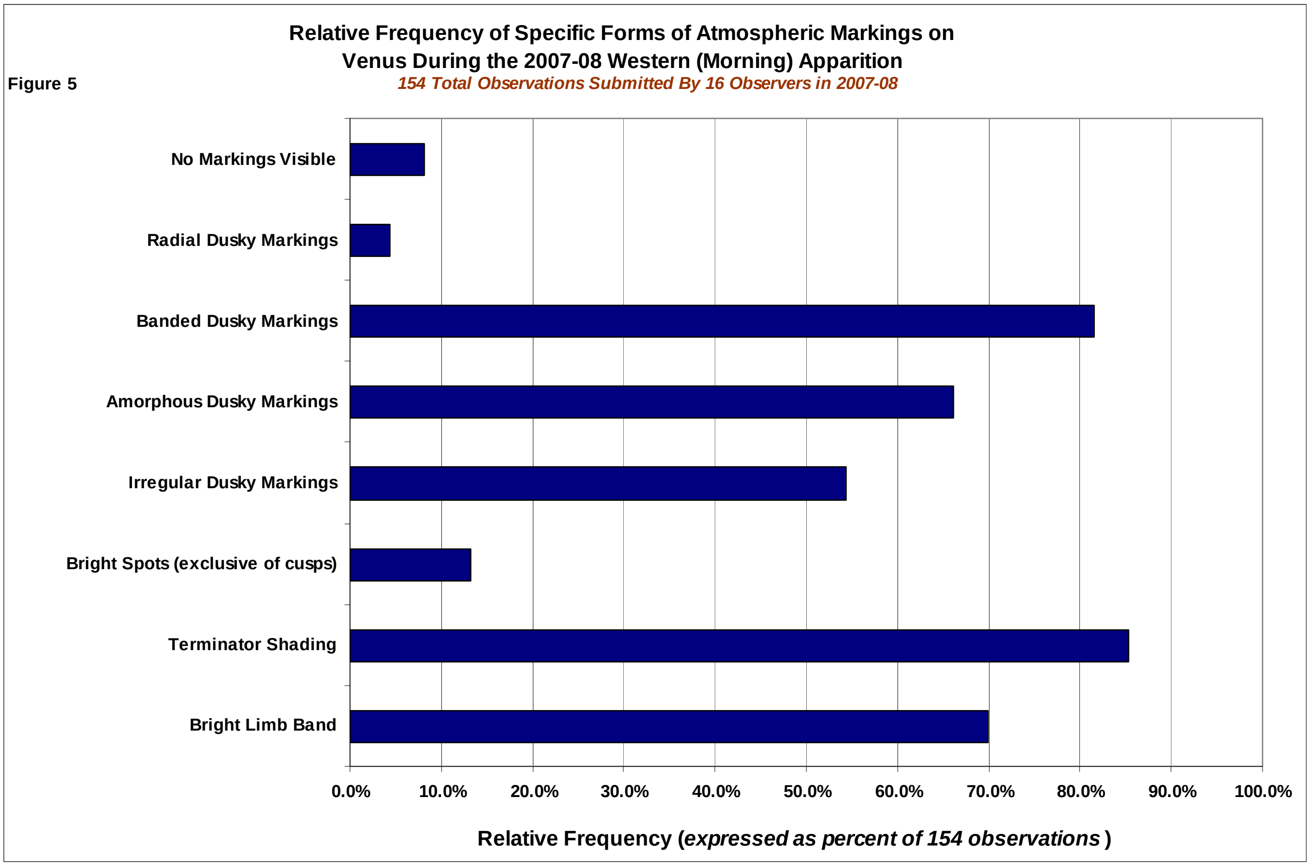


Image 3. See Table 4.

Image 4. See Table 4.

Image 5. See Table 4.

during 2007-08 to rate their visual impressions at the eyepiece. On this scale, the dusky markings in Figure 5 had a mean conspicuousness of ~3.8 during the apparition, which suggests that these features fell within the range from very indistinct impressions and fairly good indications of their actual presence on Venus.

Figure 5 also shows that "Bright Spots or Regions," exclusive of the cusps, were suspected and sometimes imaged in 13.2% of the submitted observations. It is a routine practice for observers to call attention to such bright areas by sketching in dotted lines around such features in drawings made at visual wavelengths [see image 13].

Visual observers employed color filters and variable-density polarizers during 2007-08 to help enhance the visibility of vague atmospheric phenomena on Venus. This may be why some of the best drawings by experienced observers showed similar features that were captured on some of the digital images examined this apparition.

The ALPO Venus Section is always looking for ways to cooperate with the professional community in studies of the atmosphere of Venus. Ground-based observers, many of them amateur astronomers, have contributed vital information about the atmosphere Venus over many years. Mikhail Lomonosov was the first to hypothesize the presence of an atmosphere on the planet when he made observations of the transit of Venus in 1761 in a small observatory near his home in St. Petersburg, Russia. In 1961 Charles Boyer and Pierre Guérin in France called attention to dark "y-shaped" features seen on UV images, then calculated a 4d retrograde rotation period for Venus, which was later confirmed for the higher atmospheric clouds. Observers in ever increasing numbers have captured digital images of changing cloud features on Venus in the near-UV as well as thermal emissions from its surface in the near-IR. Readers who have been keeping up with Venus reports in this Journal will recall that on May 24, 2004, between 20:04-20:43 UT, Christophe Pellier of Bruz, France, using a 35.6 cm (14.0 in.) SCT with a 1000nm (1m) IR filter captured historically unprecedented amateur digital images of the night side emission from the hot surface of Venus, and ever since then, observers have been successful in capturing similar images. During the 2007-08 Western (Morning) Apparition, an image taken on September 25, 2007 at 05:47UT with a 35.6 cm (14.0 in.) SCT by David Arditti of Middlesex, UK, very possibly shows a hint of the night side emission of Venus at 870nm [see image 14], for which the observer offered the following interesting remarks:

> *"I did another of my experiments in severely over-exposing the planet in the IR. I have tried this at 807nm before, and got negative results on the night side, but this is the first time I have used so large an aperture as the C-14. I imaged at f11. Subjecting this image, below, to a substantial and careful levels stretch in Photoshop, it seems to me that the night side glow may just about be detected. This has been demonstrated before with*

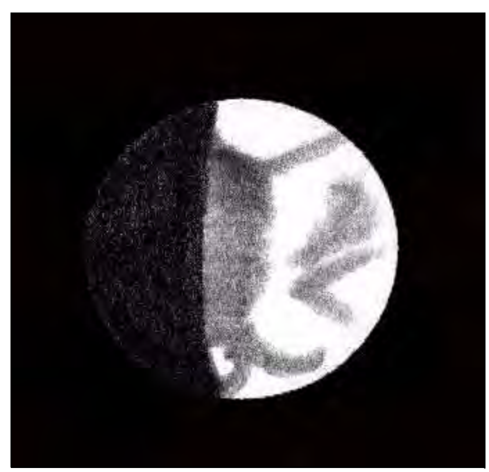


Image 6. See Table 4.

1000nm and 990nm filters, where the effect seems to be much more visible. It may be faintly present at 807nm as well, but it is not clear. The camera stream rate was 30 fps, the exposure was 33.3ms, gain was 14.5, and 50% of 1775 frames were stacked. No sharpening was used."

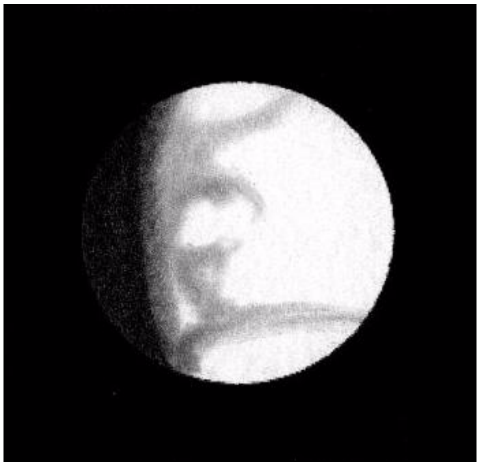


Image 7. See Table 4.

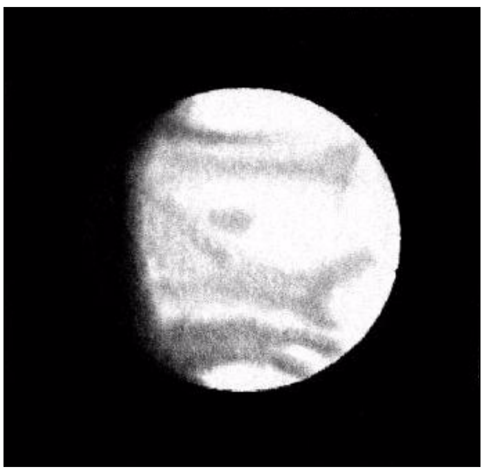


Image 8. See Table 4.

Image 9. See Table 4.

So, amateurs with CCD cameras and the appropriate filters can effectively contribute useful data to support professional studies of Venus. Regular amateur UV and polarized-light imaging of the planet's atmosphere as a means for studying circulation patterns will be valuable for quite some time to come.

The Venus Express (VEX) spacecraft started systematically monitoring Venus at near-UV, visible and near-IR wavelengths in May 2006 and continues at the time of this writing into 2010, with the possibility of further extension of the mission. Even though spacecraft images of Venus are naturally higher resolution than those from Earth-based observers, monitoring of the planet by the VEX cameras will not be continuous. So, this is a wonderful chance for amateurs to try to get high-quality digital images of Venus in the wavelength range of 350nm to 1,000nm (near-UV to near-IR).

For example, compare simultaneous UV images by Oliver Pettenpaul of Hannover, Germany, using a 23.5 cm (9.25 in.) SCT on October 5, 2007 at 04:32 UT [see image 15] and B.A. Kingsley of Maidenhead, UK, employing a 28.0 cm (11.0 in.) SCT on the same date at 04:38 UT [see image 16].

Also, look at UV images of Venus at 340-450nm taken by Arnaud van Kranenburg of Vlaardingen, The Netherlands, on October 6, 2007, at 05:43 UT using a 23.5 cm (9.25 in.) SCT [see image 17] and one captured by Rick Schrantz of Nicholasville, KY, USA, on the next day (October 7) at 12:22 UT with a 25.4 cm (10.0 in.) NEW [see image 18].

Lastly, compare features on a UV image also taken by Arnaud van Kranenburg on October 23, 2007, at 05:44 UT using a 23.5 cm (9.25 in.) SCT [see image 19] and one captured by Ed Lomeli of Sacramento, CA, USA, on the same date at 14:28 UT with a 23.5 cm (9.25 in.) SCT [see image 20].

It should be pointed out that carefully-executed visual observations using color filter techniques, especially simultaneous work by two or more observers, add significant value to contributions that are passed on to the Venus Express (VEX) as well. All of these near-simultaneous observations exemplify precisely the kind of work we are seeking from as many observers as possible during every apparition. The Venus Amateur Observing Project (VAOP) was organized in cooperation with the European Space Agency (ESA) where such images can be

Image 10. See Table 4.

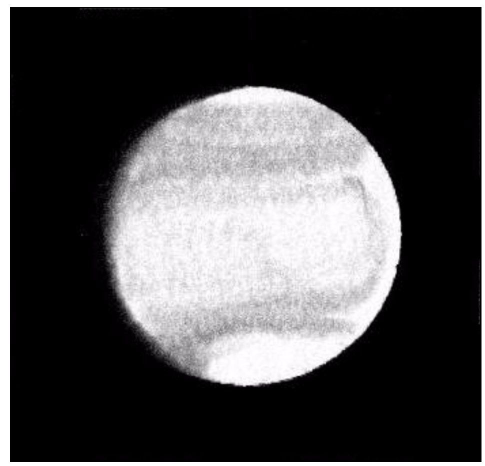


Image 11. See Table 4.

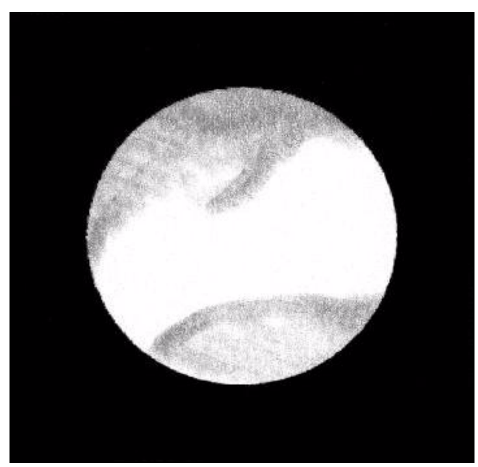


Image 12. See Table 4.

contributed by amateur astronomers to complement the Venus Express (VEX) spacecraft results. More information about this project, as well as prerequisites for participation and instructions for uploading images, can be obtained by contacting the ALPO Venus Section or by visiting the VAOP website at:

Image 13. See Table 4.

http://sci.esa.int/science-e/www/object/index.cfm?fobjectid=38833&fbodylongid=1856

In addition to dispatching observations to the VAOP project, observers should forward their results to the ALPO Venus Section, which will be archived for analysis and comparison with results on the planet's atmospheric circulation obtained from the VEX mission. The ALPO Venus Section looks forward to a continued successful Pro-Am cooperation during this mission, and we heartily encourage observers throughout the world to participate.

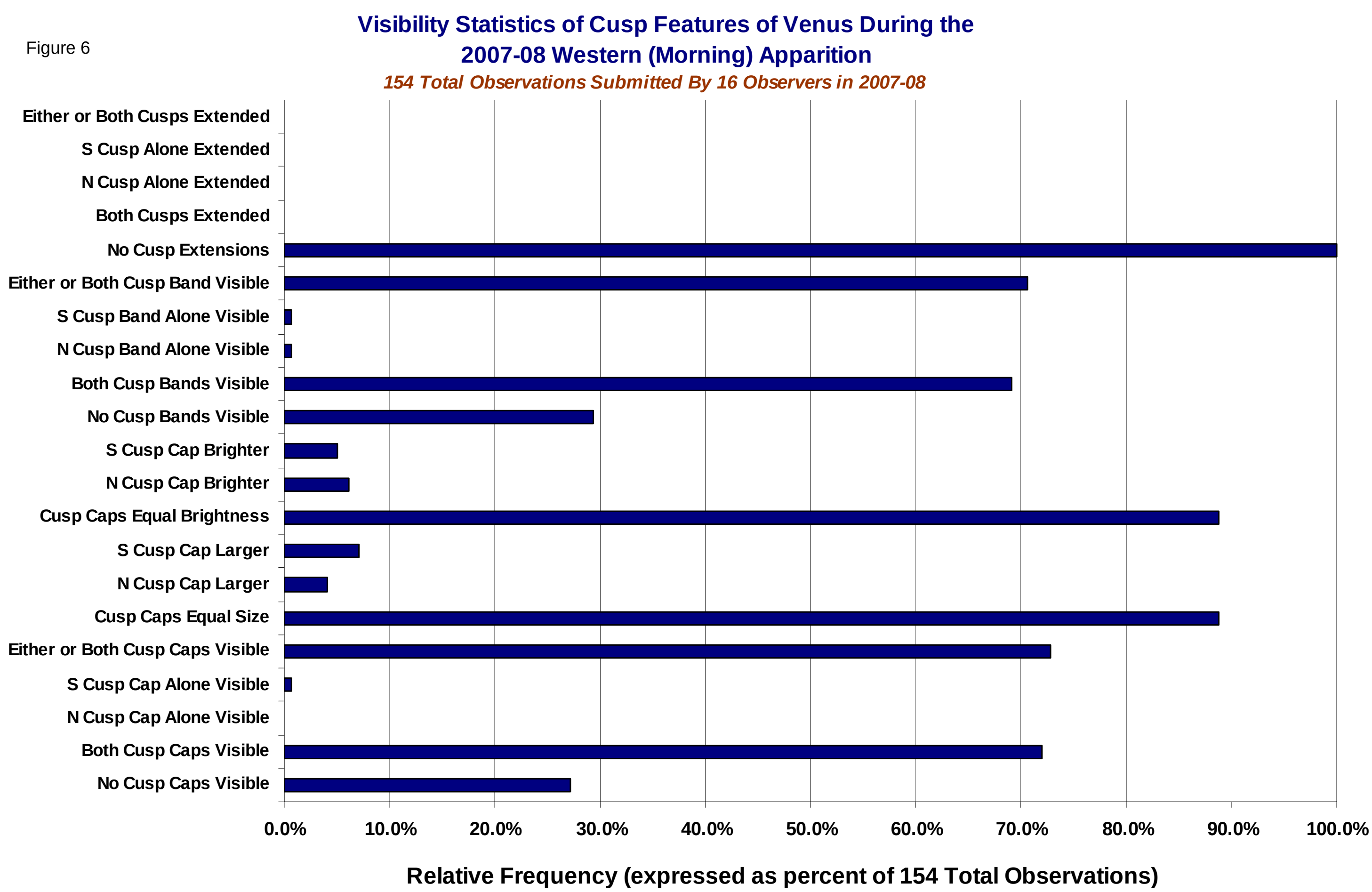
The Bright Limb Band

Figure 5 shows that about half (69.9%) of the submitted observations and images in 2007-08 showed a "Bright Limb Band" on the illuminated hemisphere of Venus. When this feature was recorded, it appeared as a continuous, brilliant arc extending from cusp to cusp 32.6% of the time, and interrupted or only partially visible along the limb of Venus in 67.4% of the positive sightings [see image 21]. The mean numerical intensity of the Bright Limb Band was 9.8, becoming more apparent visually when color filters or variable-density polarizers were utilized, while showing up on digital images that were taken at near-UV wavelengths.

Terminator Irregularities

The terminator is the geometric curve that separates the sunlit and dark hemispheres of Venus. Observers described or imaged an irregular or asymmetric terminator in 48.5% of the observations in 2007-08. Amorphous, banded, irregular, and radial dusky atmospheric markings appeared to blend with the shading along the terminator, probably contributing to reported deformities [see image 22]. Filter techniques enhanced the visibility of terminator irregularities and dusky atmospheric features closely associated with it during the 2007-08 Western (Morning) Apparition. Because of irradiation, bright features adjacent to the terminator may occasionally look like bulges, and dark features may look like dusky hollows. It also was more pronounced in near-UV images of Venus.

Figure 6



Cusps, Cusp-Caps and Cusp-Bands

In general, when the *phase coefficient*, **k**, lies between 0.1 and 0.8 (the phase coefficient is the fraction of the disc that is illuminated), features on Venus with the most contrast and prominence are frequently sighted and sometimes imaged at or near the planet's cusps. These cusp-caps are often bordered by dusky, usually diffuse, cusp-bands. *Figure 6* shows the visibility statistics for cusp features of Venus in 2007-08.

When the northern and southern cusp-caps of Venus were observed in 2007-08, *Figure 6* illustrates that they were equal in size 88.8% of the time and equal in brightness in 88.8% of the observations. The northern cusp-cap was considered larger 4.1% of the time and brighter in 6.1% of the observations, while the southern cusp-cap was larger in 7.1% of the observations and brighter 5.1% of the time. Neither cusp-cap was visible in 27.2% of the reports. The mean relative intensity of the cusp-caps was about 9.5 during the 2007-08 apparition. Dusky cusp-bands bordering the bright cusp-caps were not reported in 29.4% of the observations when cusp-caps were visible, and the cusp-bands displayed a mean relative intensity of about 6.8 (see *Figure 6* and illustration 23].

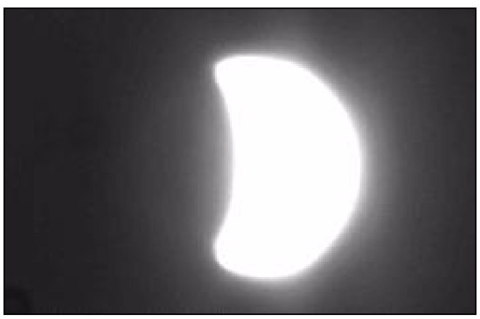


Image 14. See Table 4.

Image 15. See Table 4.

Cusp Extensions

As can be noticed by referring to Figure 6, there were no cusp extensions reported beyond the 180° expected from simple geometry (in integrated light and with color filters). Early in the 2007-08 apparition, as Venus progressed through its crescentic phases after inferior conjunction on August 18, 2007, the possibility of seeing or imaging cusp extensions existed, but no observers described or imaged extensions. As a general rule, cusp extensions (if present) show up better with color filters and variable-density polarizers because irradiation is minimized. Observers are encouraged to try recording cusp extensions using digital imagers.

Estimates of Dichotomy

Any discrepancy between the predicted and observed dates of dichotomy (half-phase), known as the "Schröter Effect" on Venus, was not reported to the ALPO Venus Section during the 2007-08 Western (Morning) Apparition. The predicted half-phase occurs when k = 0.500, and the phase angle, i, between the Sun and the Earth as seen from Venus equals 90°. During the 2007-08 observing season, the theoretical date of dichotomy was October 27d 15.36h (*see Table 1*).

Dark Hemisphere Phenomena and Ashen Light Observations

The Ashen Light, first reported by G. Riccioli in 1643, refers to an extremely elusive, faint illumination of Venus' dark hemisphere. Although the latter has a different origin, the Ashen Light resembles Earthshine on the dark portion of the Moon. Most observers agree that Venus must be viewed against a completely dark sky for the Ashen Light to be seen, but such circumstances occur only when the planet is very low in the sky where adverse terrestrial atmospheric conditions contribute to poor seeing. Also, substantial glare in contrast with the surrounding dark sky influences such observations. Even so, the ALPO Venus Section continues to hear from observers who say they have seen the Ashen Light when the Venus was against a twilight sky.

Among professional astronomers, the case for the Ashen Light has weakened considerably over the past several years. For example, skepticism is bolstered in part by high-resolution spectrographic studies with the 10m Keck telescope that revealed an extremely faint greenish luminescence on the dark hemisphere of Venus at 558nm. Ultraviolet light emanating from the Sun breaks down carbon dioxide (CO_2) in the upper atmosphere of Venus into carbon monoxide (CO) and oxygen atoms (O), which are subsequently transported to the planet's dark side by the prevalent high-velocity winds.

Image 16. See Table 4.

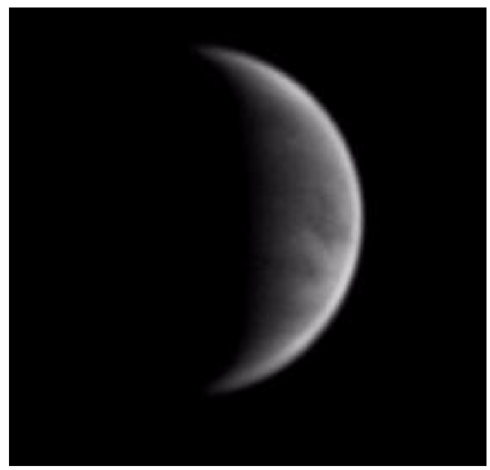


Image 17. See Table 4.

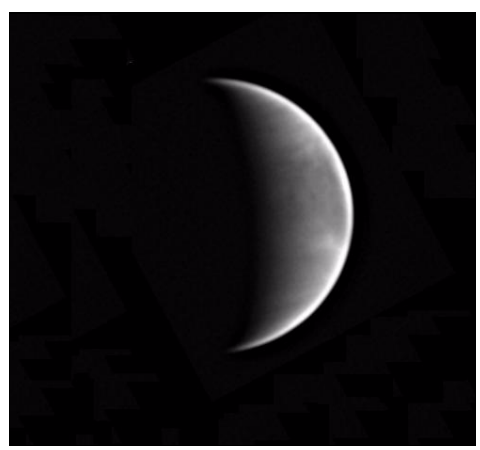


Image 18. See Table 4.

As the oxygen atoms re-associate into molecular O_2, the green "airglow" emission occurs at 558nm. This faint illumination, however, is believed to be far too subtle to account for all of the visual reports by amateur astronomers over the decades. Furthermore, when the Cassini spacecraft flew by Venus during 1998-99, the on-board instrumentation failed to detect any high-frequency noise at radio wavelengths attributable to lightning. Over the years, observers have postulated that the Ashen Light might be caused by widespread lightning deep within the dense atmosphere of Venus that would spread out into a sustained glow throughout the dark hemisphere of the planet. Based on current available data, it appears that if lightning does actually take place in Venus' thick atmosphere, it must be very uncommon and markedly different from what we experience on Earth.

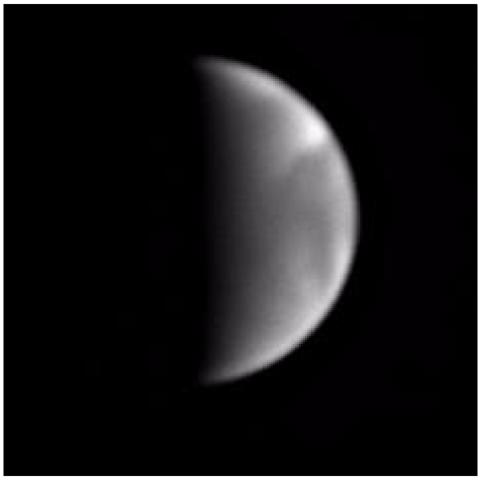


Image 19. See Table 4.

Image 20. See Table 4.

Image 21. See Table 4.

Yet, in spite of all the recent arguments against it, the Ashen Light mystery just won't go away. Experienced visual observers still contend that the dark hemisphere illumination reported by them is not illusory. Complicating matters further is the fact that the optimum times to view the night side of Venus against relatively dark sky occurs only when the planet is near the horizon, where seeing conditions are not particularly good, or during twilight conditions.

For observers to confirm visual impressions of the presence of the Ashen Light, visual simultaneous observations are extremely vital to add credence to any reports of the phenomenon. Digital images of the Ashen Light would be even more valuable, including images taken at the same time it is suspected visually. As of this writing (mid-August 2010), the ALPO Venus Section is unaware of any modern digital images that have captured the elusive glow, but it would be absolutely unprecedented if the Ashen Light could be imaged at visual wavelengths by more than one observer!

Table 3 lists the reported sightings of the Ashen Light during the 2007-08 Western (Morning) Apparition. Detlev Niechoy of Göttengen, Germany was the only observer to report the Ashen Light as "definitely seen" during the observing season, using a 20.3 cm (8.0 in.) SCT at 225X on September 17, 2007, between 04:08-04:15 UT. He reported that the phenomenon was visible in Integrated Light (no filter), W15 (yellow), and W25 (red) filters, but best seen with a W47 (violet) filter, the "glow" centrally located in the dark hemisphere [see image 24].

There were no reports of the dark hemisphere of Venus appearing slightly *darker* than the background sky, which is attributable to a contrast effect.

Conclusions

Visual observations contributed to the ALPO Venus Section during the 2007-08 Western (Morning) Apparition suggested only limited activity in the atmosphere of the Venus. Readers are reminded how troublesome it can be to differentiate between what are real atmospheric phenomena and what is purely illusory on Venus at visual wavelengths, but confidence in visual impressions will grow as observers become more engaged in simultaneous work. The ALPO Venus Section is stressing combined visual observations and digital imaging for comparative analysis of resultant data. Digital images of Venus captured in the near-UV in 2007-08 often showed banded features, and in a few cases radial atmospheric cloud patterns were also apparent. There were several instances when visual impressions with a W47 (violet) filter

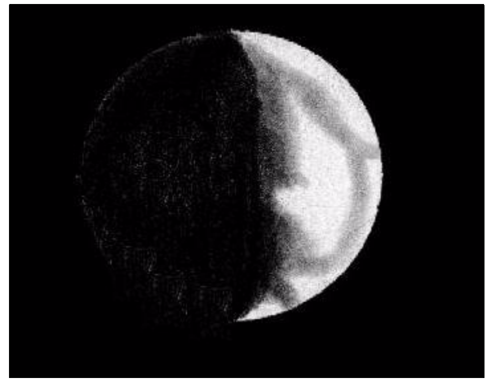


Image 22. See Table 4.

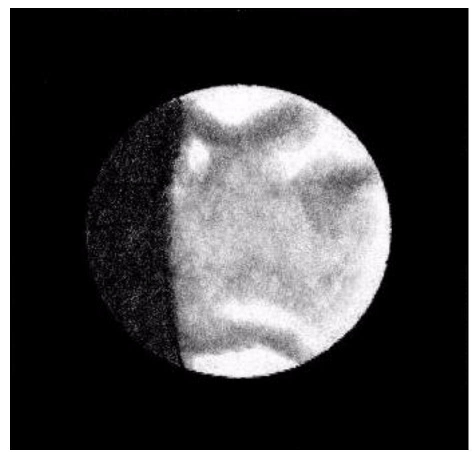


Image 23. See Table 4.

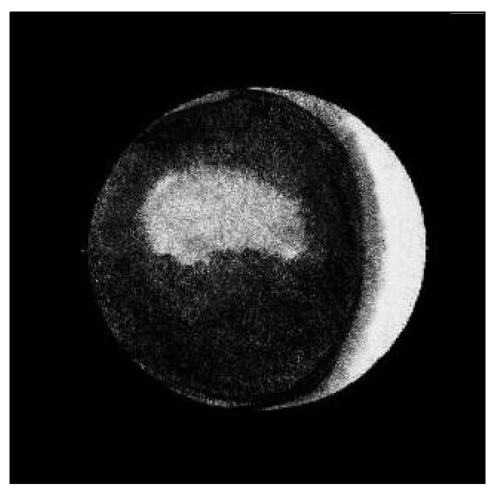


Image 24. See Table 4.

were consistent with what was captured on digital images of the planet. Some observers seem to have a slight visual sensitivity in the near-UV range, so they occasionally report radial dusky features that are typically more apparent on UV images. Thus, there is an enduring need for additional near-UV images of Venus taken simultaneously with visual observations for comparative analysis.

ALPO studies of the Ashen Light, which reached a peak during the Pioneer Venus Orbiter Project years ago, are continuing every apparition. Steady simultaneous visual monitoring and digital imaging of the planet at crescent phases for the presence of this phenomenon by a large number of observers is vital as a means of improving our opportunities for confirming dark hemisphere events.

The ALPO Venus Section welcomes interested readers to join us in our projects as we pursue the unique observational challenges that the planet Venus presents in forthcoming apparitions.

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Table 4: Illustrations for the 2007-08 Western (Morning) Apparition of Venus (south at top in all)

Illustration Number	UT Date yyyy-mmm-dd	UT hh:mm	k	Observer	Observing Station	Inst	Magn (X)	Filters	S	Tr
1	2007 Sep 11	11:15	0.	Sandell,	Hilton Head, SC	25.4 cm (10.0	315	W47	5.	
2	2007 Oct 07	06:10	0.	Vandebergh	Maastricht,	25.4 cm (10.0	Digital	UV		
3	2007 Oct 11	05:47	0.	van	Vlaardingen,	23.5 cm (9.25	Digital	W47 +	4.	4.
4	2007 Oct 25	14:03	0.	Lomeli, Ed	Sacramento,	23.5 cm (9.25	Digital	UV	7.	4.
5	2007 Nov 07	14:33	0.	Lomeli, Ed	Sacramento,	23.5 cm (9.25	Digital	UV	6.	4.
6	2007 Nov 29	06:44	0.	Niechoy,	Göttingen,	20.3 cm (8.0	225	IL	3.	3.
7	2008 Jan 13	09:24	0.	Niechoy,	Göttingen,	20.3 cm (8.0	225	IL	3.	3.
8	2008 Feb 09	09:32	0.	Niechoy,	Göttingen,	20.3 cm (8.0	225	IL	3.	3.
9	2007 Oct 16	06:08	0.	Lazzarotti,	Massa, Italy	31.5 cm (12.4	Digital	UV	5.	4.
10	2008 Apr 18	14:07	0.	Roussell,	Hamilton, ON,	15.2 cm (6.0	400	IL + W25	6.	
11	2008 Mar 24	07:42	0.	Niechoy,	Göttingen,	20.3 cm (8.0	225	IL	3.	3.
12	2008 May 08	09:38	0.	Niechoy,	Göttingen,	20.3 cm (8.0	225	IL	3.	3.
13	2007 Nov 13	14:15	0.	Roussell,	Hamilton, ON,	15.2 cm (6.0	400	IL + W25	5.	
14	2007 Sep 25	05:47	0.	Arditti,	Middlesex, UK	35.6 cm (14.0	Digital	IR		
15	2007 Oct 05	04:32	0.	Pettenpaul,	Hannover,	23.5 cm (9.25	Digital	UV	6.	6.
16	2007 Oct 05	04:38	0.	Kingsley,	Maidenhead,	28.0 cm (11.0	Digital	UV	4.	
17	2007 Oct 06	06:29	0.	van	Vlaardingen,	23.5 cm (9.25	Digital	UV 340-	5.	4.
18	2007 Oct 07	12:22	0.	Scrantz, R	Nicholasville,	25.4 cm (10.0	Digital	UV		
19	2007 Oct 23	05:04	0.	van	Vlaardingen,	23.5 cm (9.25	Digital	UV 340-	4.	4.
20	2007 Oct 23	14:01	0.	Lomeli, Ed	Sacramento,	23.5 cm (9.25	Digital	UV	6.	3.
21	2007 Oct 12	13:30	0.	Roussell,	Sacramento,	15.2 cm (6.0	400	IL + W25	4.	
22	2007 Oct 13	10:32	0.	Niechoy,	Göttingen,	20.3 cm (8.0	225	IL	2.	2.
23	2007 Dec 22	05:40	0.	Niechoy,	Göttingen,	20.3 cm (8.0	225	IL	3.	3.
24	2007 Sep 17	03:53	0.	Niechoy,	Göttingen,	20.3 cm (8.0	225	W47	3.	3.

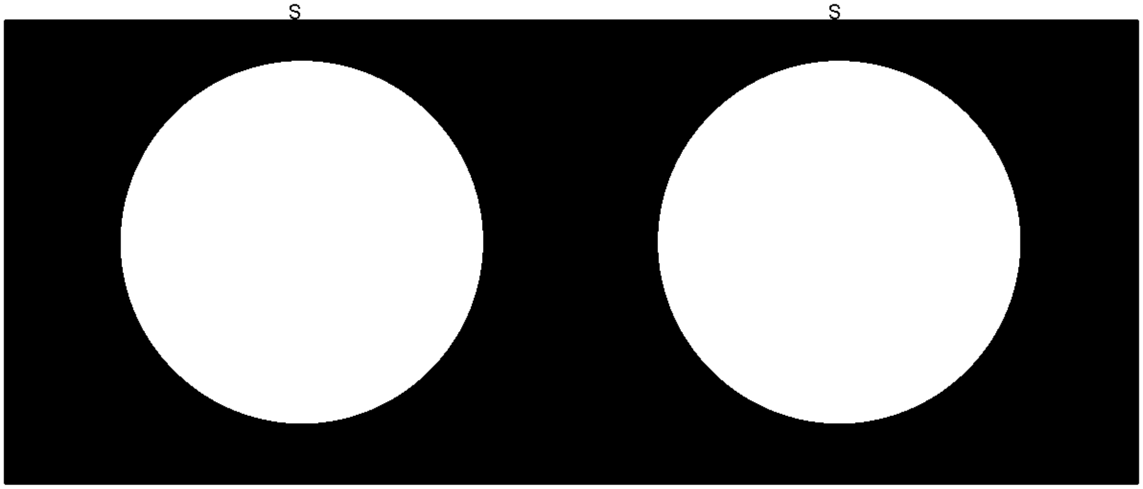
Association of Lunar and Planetary Observers (A.L.P.O.): Venus Section

A.L.P.O. Visual Observation of Venus

Drawing Blank *Intensity Estimates Blank*

S S

p



f

N (*all coordinates are IAU*) N

Observer_________________________________Location____

UT Date _____________ UT Start _______________ UT End _______________ D = __________" k_m = __________ k_c = ___________

m_v = ___________ Instrument ____ Magnification(s) _____________ x_{min} _____________ x_{max}

Filter(s) IL(none) ___________ f_1 ___________ f_2 ___________ f_3 ____________ Seeing ______________ Transparency _______________

Sky Illumination (*check one*): [ ] Daylight [ ] Twilight [ ] Moonlight [ ] Dark Sky

Dark Hemisphere (*check one*): [ ] No dark hemisphere illumination [ ] Dark hemisphere illumination suspected
[ ] Dark hemisphere illumination [ ] Dark hemisphere darker than sky

Bright Limb Band (*check one*): [ ] Limb Band not visible
[ ] Limb Band visible (complete cusp to cusp)
[ ] Limb Band visible (incomplete cusp to cusp)

Terminator (*check one*): [ ] Terminator geometrically regular (no deformations visible)
[ ] Terminator geometrically irregular (deformations visible)

Terminator Shading (*check one*): [ ] Terminator shading not visible
[ ] Terminator shading visible

Atmospheric Features (*check, as applicable*): [ ] No markings seen or suspected [ ] Radial dusky markings visible
[ ] Amorphous dusky markings visible [ ] Banded dusky markings visible
[ ] Irregular dusky markings visible [ ] Bright spots or regions visible (exclusive of cusp regions)

Cusp-Caps and Cusp-Bands (*check, as applicable*): [ ] Neither N or S Cusp-Cap visible [ ] N and S Cusp-Caps both visible
[ ] N Cusp-Cap alone visible [ ] S Cusp-Cap alone visible
[ ] N and S Cusp-Caps equally bright [ ] N and S Cusp-Caps equal size
[ ] N Cusp-Cap brighter [ ] N Cusp-Cap larger
[ ] S Cusp-Cap brighter [ ] S Cusp-Cap larger
[ ] Neither N or S Cusp-Band visible [ ] N and S Cusp-Bands both visible
[ ] N Cusp-Band alone visible [ ] S Cusp-Band alone visible

Cusp Extensions (*check, as applicable*): [ ] No Cusp extensions visible [ ] N Cusp extended (angle = _____°)
[ ] S Cusp extended (angle = _____°)

Conspicuousness of Atmospheric Features (*check one*): [ ] 0.0 (nothing seen or suspected) [ ] 3.0 (indefinite, vague detail)
[ ] 5.0 (suspected detail, but indefinite) [ ] 7.0 (detail strongly suspected)
[ ] 10.0 (detail definitely visible)

IMPORTANT: Depict morphology of atmospheric detail, as well as the intensity of features, on the appropriate blanks at the tope of this form. Attach to this form all supporting descriptive information, and please do not write on the back of this sheet. The intensity scale is the *Standard A.L.P.O. Intensity Scale*, where 0.0 = completely black ⇔ 10.0 = very brightest features, and intermediate values are assigned along the scale to account for observed intensity of features.

Feature Story:

Lunar Selected Area Photometry

By Wayne Bailey, FRAS,
Acting Program Coordinator, Lunar Topographical Studies/ Selected Areas Program
wayne.bailey@alpo-astronomy.org

Note to Readers

Because only the online (pdf) version of this publication is in full color and the hardcopy version text pages are available only in black-and-white, readers of the hardcopy version will not see the color variations in Figure 2 of this article. Contact the ALPO secretary for information on obtaining pdf viewing rights.

Also, online readers may left-click their mouse on the author's e-mail addresses in blue text to contact the author of this article.

Introduction

The ALPO Lunar Selected Areas Program (SAP) monitors the photometric behavior of selected areas within seven craters. For more information, including the SAP Handbook, and charts of the selected areas, go to *moon.scopesandscapes.com/alpo-sap.html*. This article is a brief description of a project to investigate whether images that have not been fully calibrated can be used to determine differences in photometric behavior.

The rationale is that high quality, electronic images of the Moon are relatively easy to obtain, but very few, if any, are photometrically calibrated. In fact, a full calibration to a standard intensity scale is a difficult problem for lunar images. But with a few simple procedures and precautions, images with a known zero point and linear intensity scale can be produced. Determination of the scale factor to convert image brightness to absolute intensity is the difficult part. However, even without a known scale factor, relative intensity within an image can be measured, so differences in photometric behavior can be determined.

Van Diggelen (1959) measured the absolute intensity of several lunar locations at several phases (Hedervari, 1983, includes a table of his results) that can be used for absolute intensity calibration if one of them is included within the image, but typical image sizes seldom include one of the measured points.

The intensity of a point on the Moon varies throughout the lunation. This variation can be described by its albedo (the fraction of incident light reflected at full moon), and a phase function that describes how the reflected fraction varies with phase angle (the angle, as seen from the moon, between the Sun and Earth. It is -90° at First Quarter, 0° at Full Moon, +90° at Last Quarter, ±180° at New Moon.)

With this definition of albedo, the phase function is unity at Full Moon. If the zero point of intensity is known, and the intensity scale is linear, the ratio of the intensity between any two points in the image can be measured. Images at different lunar phases then show whether this ratio changes, which would indicate that the shape of the phase function is different for

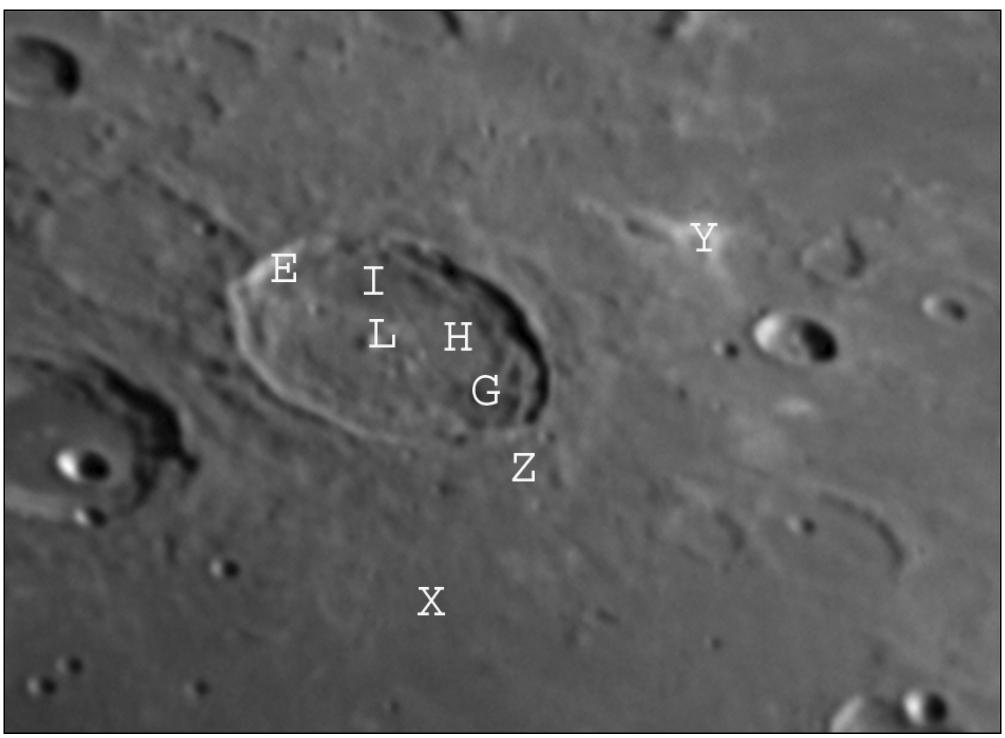


Figure 1. Atlas measured points. Lunar north up, east at right.

the two points. Some examples of features that are expected to show differences are bright and dark patches and rays that are more visible (higher contrast) near Full Moon than at other times. Their phase function should be different than the surrounding area. Such differences are probably due to differences in surface structure (grain size, slope, slope orientation which cause differences in shadowing and surface brightness). Inherently lighter or darker, but structurally similar, regions are more likely to respond similarly to changing phase.

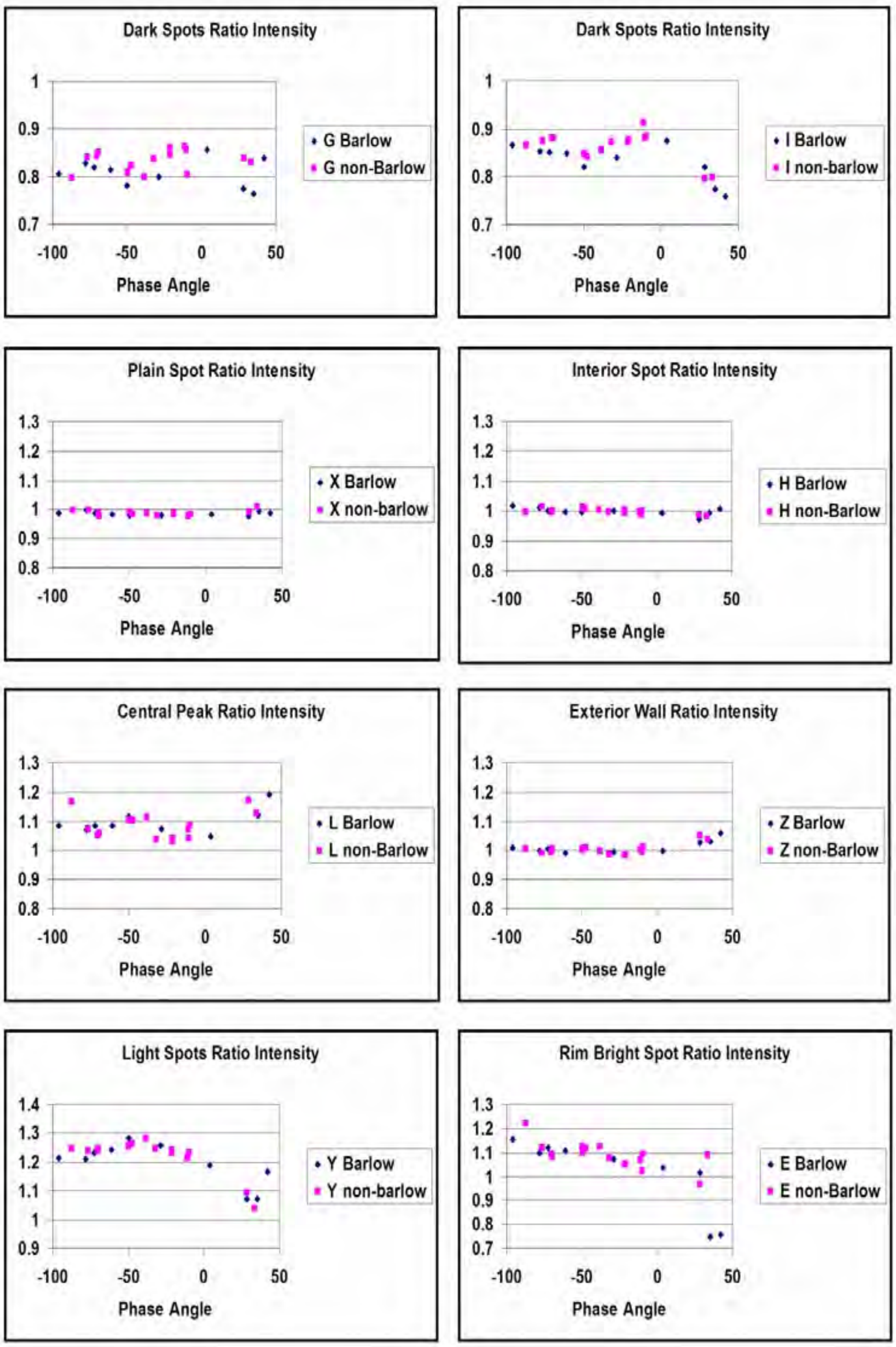


Figure 2. Measured Relative Intensity versus Phase Angle.

Image Considerations

First, the date and time of the image must be accurately known, so that the phase angle can be calculated. Or described another way, the direction to the Sun must be known. Without this information, the image is useless.

Proper focus, of course, is important, but several constraints need to be applied in order to produce images that are linear with a known zero point.

The true zero point (indicating no light) of the image must be known. This may be raised above the zero pixel value by scattered light or by noise introduced by the camera. Most image capture software also adds a constant value to each pixel. Clean optics and not imaging through clouds will minimize scattered light. The offset introduced by noise and software can be removed by subtracting a dark image from the Moon image. The dark image should be taken using the same exposure time as the lunar image, but with the telescope aperture covered to exclude light. It will then contain a similar noise level and the same software offset as the image.

Proper exposure is critical, and this involves more than simply avoiding saturation. Most CCD cameras become somewhat non-linear in their response to light when the exposure approaches saturation. There are methods to measure a camera's linearity (see, for example, Berry & Burnell, 2000, chapter 8), but setting the exposure so that the brightest point in each image doesn't exceed about 2/3 of full scale will provide adequate linearity in most cases.

Finally, we need to ensure that processing the image doesn't introduce non-linearity. So contrast stretching and all of the commonly used sharpening routines (such as wavelet processing) must be avoided. Co-adding images, as is commonly done with video imaging, is ok, but a dark image should be subtracted from each.

Numerous texts (Berry & Burnell, 2000, among them) discuss the finer points of photometry. Following these simple considerations will produce useful results.

Table 1: Image Data

Date (UT mm/dd/yy)	Time (UT)	Colongitude (0-360)	Phase Angle (-180,+180)
06/10/08	2:52	347.00	-95.89
05/24/07	2:31	357.00	-87.29
05/13/08	3:07	5.00	-78.13
05/25/07	1:41	9.00	-76.55
05/25/07	3:11	9.00	-75.87
06/12/08	3:28	11.00	-72.39
07/24/07	1:33	22.00	-70.29
07/24/07	3:04	23.00	-69.59
06/13/08	3:54	24.00	-61.02
06/14/08	3:49	36.00	-50.07
03/29/07	4:46	35.00	-49.56
03/29/07	4:48	35.00	-49.55
07/26/07	2:23	47.00	-47.57
03/30/07	4:45	47.00	-38.39
05/29/07	4:29	59.00	-32.01
06/16/08	3:08	60.00	-28.76
05/30/07	4:21	71.00	-21.33
05/30/07	4:54	71.00	-21.08
05/31/07	3:20	83.00	-11.30
05/31/07	5:48	84.00	-10.28
09/26/07	3:00	84.00	-9.78
08/17/08	4:32	98.00	3.69
08/19/08	4:49	123.00	28.25
08/01/07	5:51	122.00	28.40
09/29/07	4:34	122.00	33.48
09/29/07	7:03	123.00	34.92
10/29/07	3:28	126.00	41.83

Analysis

I used an existing set of monochrome images of the crater Atlas, which is one of the SAP targets. These were all produced using the same equipment, except that some include a 2x barlow to increase the image scale while others do not. The barlow and non-barlow images were analyzed separately to determine whether image scale affects the results. All images used a Schuler IR72 infrared filter. A future project is planned to investigate whether the behavior varies with color.

Ideally, the analysis would be performed separately for each lunation, since libration causes the viewing geometry to vary in successive lunations. The images available were obtained over a two-year time span, which may introduce scatter in the results. Table 1 lists the images used. I used *The Lunar Observer's Toolkit* (Harry Jamieson, contact *harry@persoftware.com*) to calculate phase angle and colongitude.

Pairs of measurements (target and reference area) were measured using IRIS image processing software by Christian Buil (*www.astrosurf.com/buil/us/iris/iris.htm*). I found that using a three-ring aperture gave the most consistent results. The target is the inner circle, and the reference is a ring surrounding – but separated from – the target. The aperture size is constant for each target, but varies among the targets to accommodate different target sizes and surroundings. The aperture size was also scaled between the barlow and non-barlow images to include the same physical area. Since the apertures are circular on the image and libration changes the viewing angle, the region included in the aperture varies from image to image.

Results

Figure 1 shows the measurement locations. Locations G, H, L & I are SAP standard points. X, Y & Z are additional locations. G & I are dark spots, L is the largest central peak, E is a bright patch on the rim, and H is a non-descript, faint bright spot on the floor of Atlas. Y is a bright feature near Atlas, X is a featureless spot on the plain south of Atlas chosen as a check point, and Z is a spot on the outer wall of the crater. Location X is not expected to show any difference between the target and reference measurements since the area appears to be uniform, and the only obvious characteristic of Z is its slope so it's also unlikely to exhibit differences. Figure 2 shows graphs of the measured intensity ratios for these eight points.

Locations H and X, as expected, show no dependence on phase angle. Z seems to show a small increase in relative brightness as sunset approaches which may be an effect of shadowing on the curved slope.

Dark spots G and I show some darkening around local noon (around phase angle -46°, but this varies by several degrees due to libration). Both spots are near the inner crater wall, so the results near sunrise and sunset are affected by changes in the reference ring lighting.

The central peak, L, shows the effect of the darkening floor near sunrise and sunset, but also varies somewhat erratically through mid-day, probably due to the multiple smaller hills in the vicinity.

Rim bright spot, E, shows decreasing brightness through the lunar day, probably due to the different slopes of the inner and outer wall, both of which contribute to the reference brightness.

The bright patch, Y, brightens until about local noon, then fades almost to the brightness of its surroundings by sunset. The reference ring was set large enough to avoid most of the bright area, although the ends of the two longest bright extensions are included, which reduces the measured difference between the target and reference. The change here amounts to about 30% — much more than the other locations where possible changes are only on the order of 5%.

In general, the brightness of the lunar surface peaks at or close to Full Moon, so it's interesting that both light and dark spots seem to show maximum difference from the average behavior near local noon (when the Sun appears at the same longitude as Atlas) rather than at Full Moon (zero phase angle).

Comparing the results of the barlow and non-barlow images indicates that there are no systematic differences due to image scale. The larger scale images do produce less scatter in the results, as would be expected, since the larger scale facilitates setting the aperture on the same location.

Discussion

This study used existing images that were not optimum for the purpose. The results show that it is possible to measure differences among the phase functions of lunar features using easily obtained images. The primary criteria for usable images are that the pixel value that corresponds to zero intensity is known, only linear processing was performed, and the date and time of acquisition is accurately known.

Choice of reference location requires careful consideration. In particular, differences in shadow/light due to nearby structure must be considered.

Future studies should include the SAP-defined points, but can also include other interesting objects. Dark-haloed craters, rays compared to mare, or albedo features on mare are just a few possibilities. Filters can be used to look for differences in behavior in different colors (i.e., color changes with phase). Color imagers provide the possibility of simultaneously measuring three colors, but also introduce a requirement to control three exposures simultaneously.

Another idea that may be worth investigating is whether rectified images would reduce the effects of libration, or introduce an additional source of error.

For more information about this or other ALPO Lunar programs, visit *http://moon.scopesandscapes.com/* or contact me at *wayne.bailey@alpo-astronomy.org*.

References

Berry, R. & J. Burnell, 2000. *Handbook of Astronomical Image Processing*, 2nd Edition. Willmann-Bell, Richmond. ISBN 0-943396-82-4.

Hedervari, P., 1983. in *Solar System Photometry Handbook*, ed. R.M. Genet. Willmann-Bell, Richmond. ISBN 0-943396-03-4. Chapter 4.

Van Diggelen, J., 1959. Recherches Astronomiques de L'Observatoire d'Utrecht XIV, 2, 1.

A.L.P.O. Lunar Section: Selected Areas Program

Albedo and Supporting Data for Lunar Drawings

Lunar Feature Observed : ______________________________

(use ***Drawing Outline Chart*** for making drawings and attach to this form)

Observer: ____________________________________ Observing Station: __________________________________

Mailing Address: ____

street city state zip

Telescope: ____

instrument type aperture (cm.) focal ratio

Magnification(s): __________X __________X __________X Filter(s): F1 _________ F2 _________

Seeing: ____________________ [A.L.P.O. Scale = 0.0 (worst) to 10.0 (perfect)]

Transparency: _______________________ [Faintest star visible to unaided eye]

Date (UT): ______________________ Time (UT): __________ ___________

year month day start end

Colongitude: ________________° ________________°

start end

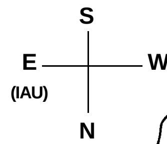
Albedo Data

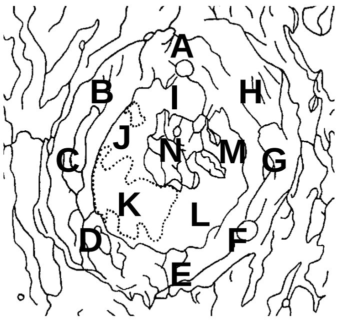
(refer to ***Albedo Reference Chart*** which shows "Assigned Albedo Indices" for feature and attach to this form)

Assigned Albedo Index	Albedo IL	Albedo F1	Albedo F2	Assigned Albedo Index	Albedo IL	Albedo F1	Albedo F2
A				J			
B				K			
C				L			
D				M			
E				N			
F				O			
G				P			
H				Q			
I				R			

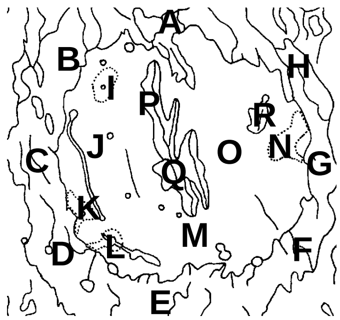
NOTES:

A.L.P.O. Lunar Selected Areas Program

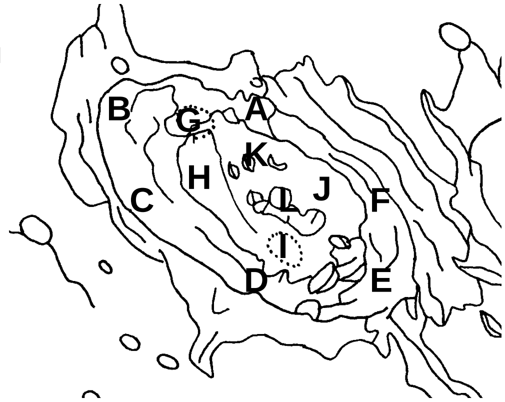




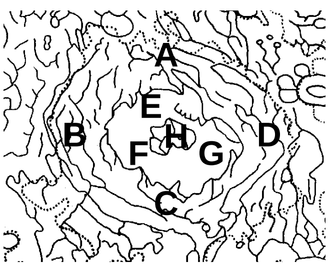
Theophilus



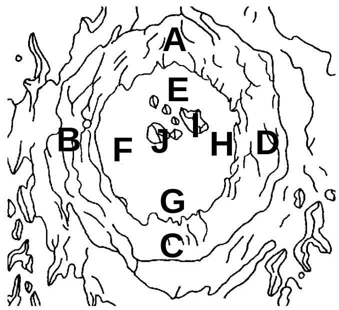
Alphonsus



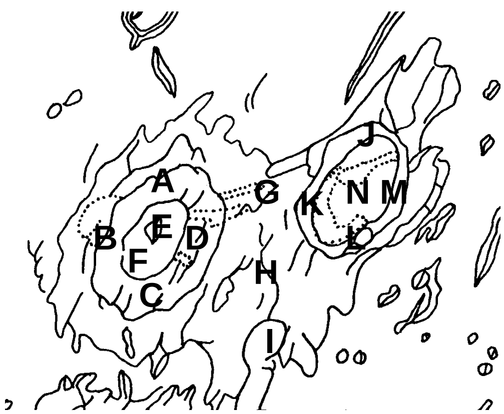
Atlas



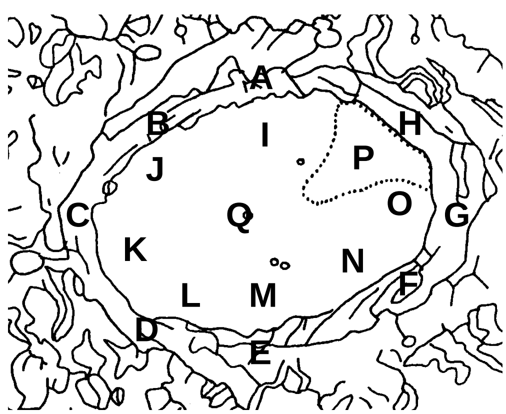
Tycho



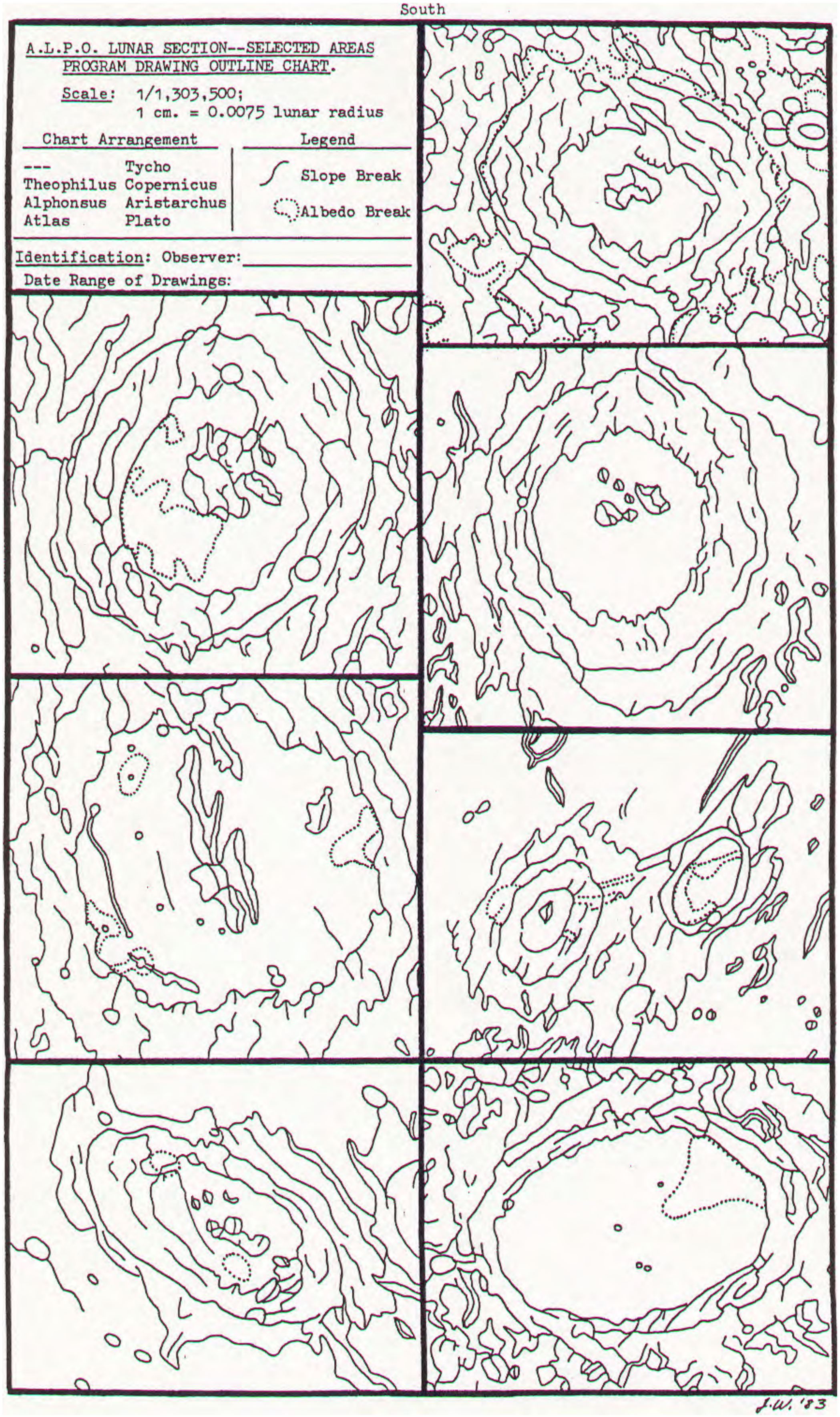
Copernicus



Aristarchus



Plato


South
A.L.P.O. LUNAR SECTION--SELECTED AREAS
PROGRAM DRAWING OUTLINE CHART.
Scale: 1/1,303,500;
1 cm. = 0.0075 lunar radius
Chart Arrangement
--- Tycho
Theophilus Copernicus
Alphonsus Aristarchus
Atlas Plato
Legend
Slope Break
Albedo Break
Identification: Observer:
Date Range of Drawings:
J.W. '83

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The Lunar Observer

http://moon.scopesandscapes.com/tlo.pdf

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- Coordinator; Brian Cudnik, 11851 Leaf Oak Drive, Houston, TX 77065

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- Coordinator; Dr. Anthony Charles Cook, Institute of Mathematical and Physical Sciences, University of Aberystwyth, Penglais, Aberystwyth, Ceredigion. SY23 3BZ, United Kingdom
- Assistant Coordinator; David O. Darling, 416 West Wilson St., Sun Prairie, WI 53590-2114

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- Coordinator; Marvin W. Huddleston, 2621 Spiceberry Lane, Mesquite, TX 75149

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http://www.alpo-astronomy.org/publications/Monographs page.html

ALPO monographs are publications that we believe will appeal to our members, but which are too lengthy for publication in *The Strolling Astronomer*. All are available online as a pdf files. NONE are available any longer in hard copy format.

There is NO CHARGE for any of the ALPO monographs.

- **Monograph No. 1.** *Proceedings of the 43rd Convention of the Association of Lunar and Planetary Observers. Las Cruces, New Mexico, August 4-7, 1993. 77* pages. File size approx. 5.2 megabytes.

- **Monograph No. 2**. *Proceedings of the 44th Convention of the Association of Lunar and Planetary Observers. Greenville, South Carolina, June 15-18, 1994. 52* pages. File size approx. 6.0 megabytes.

- **Monograph No. 3**. *H.P. Wilkins 300-inch Moon Map.* 3rd Edition (1951). Available as one comprehensive file (approx. 48 megabytes) or five section files (Part 1, 11.6 megabytes; Part 2, 11.7 megabytes; Part 3, 10.2 megabytes; Part 4, 7.8 megabytes; Part 5, 6.5 megabytes)

- **Monograph No. 4.** *Proceedings of the 45th Convention of the Association of Lunar and Planetary Observers. Wichita, Kansas, August 1-5, 1995.127* pages. Hard copy $17 for the United States, Canada, and Mexico; $26 elsewhere. File size approx. 2.6 megabytes.

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People, publications, etc., to help our members

- **Monograph No. *5*.** *Astronomical and Physical Observations of the Axis of Rotation and the Topography of the Planet Mars. First Memoir; 1877-1878.* By Giovanni Virginio Schiaparelli, translated by William Sheehan. 59 pages. Hard copy $10 for the United States, Canada, and Mexico; $15 elsewhere. File size approx. 2.6 megabytes.
- **Monograph No. *6*.** *Proceedings of the 47th Convention of the Association of Lunar and Planetary Observers, Tucson, Arizona, October 19-21, 1996.20* pages. Hard copy $3 for the United States, Canada, and Mexico; $4 elsewhere.File size approx. 2.6 megabytes.
- **Monograph No. 7.** *Proceedings of the 48th Convention of the Association of Lunar and Planetary Observers. Las Cruces, New Mexico, June 25-29, 1997.76* pages. Hard copy $12 for the United States, Canada, and Mexico; $16 elsewhere.File size approx. 2.6 megabytes.
- **Monograph No. 8**. *Proceedings of the 49th Convention of the Association of Lunar and Planetary Observers. Atlanta, Georgia, July 9-11,1998.122* pages. Hard copy $17 for the United States, Canada, and Mexico; $26 elsewhere.File size approx. 2.6 megabytes.
- **Monograph Number 9**. *Does Anything Ever Happen on the Moon?* By Walter H. Haas. Reprint of 1942 article. 54 pages.Hard copy $6 for the United States, Canada, and Mexico; $8 elsewhere.File size approx. 2.6 megabytes.
- **Monograph Number 10.** *Observing and Understanding Uranus, Neptune and Pluto*. By Richard W. Schmude, Jr. 31 pages. File size approx. 2.6

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ALPO Resources

People, publications, etc., to help our members

megabytes.

- **Monograph No. 11**. *The Charte des Gebirge des Mondes* (Chart of the Mountains of the Moon) by J. F. Julius Schmidt, this monograph edited by John Westfall. Nine files including an accompanying guidebook in German. Note files sizes: Schmidt0001.pdf, approx. 20.1 mb; Schmidt0204.pdf, approx. 32.6 mb; Schmidt0507.pdf, approx. 32.1 mb; Schmidt0810.pdf, approx. 31.1 mb; Schmidt1113.pdf, approx. 22.7 mb; Schmidt1416.pdf, approx. 28.2 mb; Schmidt1719.pdf, approx. 22.2 mb; Schmidt2022.pdf, approx. 21.1 mb; Schmidt2325.pdf, approx. 22.9 mb; SchmidtGuide.pdf, approx. 10.2 mb

ALPO Observing Section Publications

Order the following directly from the appropriate ALPO section coordinators; use the address in the listings pages which appeared earlier in this booklet unless another address is given.

- **Solar:** Totally revised *Guidelines for the Observation and Reporting of Solar Phenomena*, $10 USD; includes CD with 100 page-manual in pdf with up-to-date techniques, images, and links to many solar references. Produced by ALPO Solar Section Assistant Coordinator and Archivist Jamey Jenkins, this publication replaces *Observe and Understand the Sun* and its predecessor, *The Association of Lunar& Planetary Observer's Solar Section Handbook for the White Light Observation of Solar Phenomena*, both by the ALPO's own Rik Hill. To order, send check or US money order made payable to Jamey Jenkins, 308 West First Street, Homer, Illinois 61849; e-mail to jenkinsjl@yahoo.com

- **Lunar & Planetary Training Section:** *The Novice Observers Handbook* $15. An introductory text to the training program. Includes directions for recording lunar and planetary observations, useful exercises for determining observational parameters, and observing forms. Available as pdf file via e-mail or send check or money order payable to Timothy J. Robertson, 195 Tierra Rejada Rd., #148, Simi Valley, CA 93065; e-mail cometman@cometman.net.

- **Lunar (Bailey):** (1) *The ALPO Lunar Selected Areas Program (*$17.50). Includes full set of observing forms for the assigned or chosen lunar area or feature, along with a copy of the *Lunar Selected Areas Program Manual.* (2) *observing forms,* free at *http://moon.scopesandscapes.com/alpo-sap.html*, or $10 for a packet of forms by regular mail. Specify *Lunar Forms*. NOTE: Observers who wish to make copies of the observing forms may instead send a SASE for a copy of forms available for each program. Authorization to duplicate forms is given only for the purpose of recording and submitting observations to the ALPO lunar SAP section. Observers should make copies using high-quality paper.

- **Lunar**: *The Lunar Observer*, official newsletter of the ALPO Lunar Section, published monthly. Free at *http://moon.scopesandscapes.com/tlo.pdf* or $1.25 per hard copy: send SASE with payment (check or money order) to: Wayne Bailey, 17 Autumn Lane, Sewell, NJ 08080.

- **Lunar (Jamieson):** *Lunar Observer's Tool Kit*, price $50, is a computer program designed to aid lunar observers at all levels to plan, make, and record their observations. This popular program was first written in 1985 for the Commodore 64 and ported to DOS around 1990. Those familiar with the old DOS version will find most of the same tools in this new Windows version, plus many new ones. A complete list of these tools includes Dome Table View and Maintenance, Dome Observation Scheduling, Archiving Your Dome Observations, Lunar Feature Table View and Maintenance, Schedule General Lunar Observations, Lunar Heights and Depths, Solar Altitude and Azimuth, Lunar Ephemeris, Lunar Longitude and Latitude to Xi and Eta, Lunar Xi and Eta to Longitude and Latitude, Lunar Atlas Referencing, JALPO and Selenology Bibliography, Minimum System Requirements, Lunar and Planetary Links, and Lunar Observer's ToolKit Help and Library. Some of the program's options include predicting when a lunar feature will be illuminated in a certain way, what features from a collection of features will be under a given range of illumination, physical ephemeris information, mountain height computation, coordinate conversion, and browsing of the software's included database of over 6,000 lunar features. Contact *harry@persoftware.com*

- **Venus (Benton):** Introductory information for observing Venus, including observing forms, can be downloaded for free as pdf files at *http://www.alpo-astronomy.org/venus*. The *ALPO Venus Handbook* with observing forms included is available as the *ALPO Venus Kit* for $17.50 U.S., and may be obtained by sending a check or money order made payable to "Julius L. Benton" for delivery in approximately 7 to 10 days for U.S. mailings. The *ALPO Venus Handbook* may also be obtained for $10 as a pdf file by contacting the ALPO Venus Section. All foreign orders should include $5 additional for postage and handling; p/h is included in price for domestic orders. NOTE: Observers who wish to make copies of the observing forms may instead send a SASE for a copy of forms available for each program. Authorization to duplicate forms is given only for the purpose of recording and submitting observations to the ALPO Venus section. Observers should make copies using high-quality paper.

- **Mars:** *(1) ALPO Mars Observers Handbook,* send check or money order for $15 per book (postage and handling included) to Astronomical League Sales, 9201 Ward Parkway, Suite 100, Kansas City, MO 64114; phone 816-DEEP-SKY (816-333-7759); e-mail *leaguesales@astroleague.org*. *(2) Observing Forms;* send SASE to obtain one form for you to copy; otherwise send $3.60 to obtain 25 copies (send and make checks payable to "Deborah Hines", see address under "Mars Section").

- **Jupiter:** *(1) Jupiter Observer's Handbook*, $15 from the Astronomical League Sales, 9201 Ward Parkway, Suite 100, Kansas City, MO 64114; phone 816-DEEP-SKY (816-333-7759);

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People, publications, etc., to help our members

e-mail *leaguesales@astroleague.org*. (2) *Jupiter*, the ALPO section newsletter, available online only via the ALPO website at *http://mysite.verizon.net/macdouc/alpo/jovenews.htm;* (3) *J-Net*, the ALPO Jupiter Section e-mail network; send an e-mail message to Craig MacDougal. (4) *Timing the Eclipses of Jupiter's Galilean Satellites* free at *http://www.alpo-astronomy.org/jupiter/GaliInstr.pdf*, report form online at *http://www.alpo-astronomy.org/jupiter/GaliForm.pdf*; send SASE to John Westfall for observing kit and report form via regular mail. (5) *Jupiter Observer's Startup Kit*, $3 from Richard Schmude, Jupiter Section coordinator.

- **Saturn (Benton):** Introductory information for observing Saturn, including observing forms and ephemerides, can be downloaded for free as pdf files at *http://www.alpo-astronomy.org/saturn*; or if printed material is preferred, the *ALPO Saturn Kit* (introductory brochure and a set of observing forms) is available for $10 U.S. by sending a check or money order made payable to "Julius L. Benton" for delivery in approximately 7 to 10 days for U.S. mailings. The former *ALPO Saturn Handbook* was replaced in 2006 by *Saturn and How to Observe It* (by J. Benton), and it can be obtained from book sellers such as *Amazon.com*. NOTE: Observers who wish to make copies of the observing forms may instead send a SASE for a copy of forms available for each program. Authorization to duplicate forms is given only for the purpose of recording and submitting observations to the ALPO Saturn Section.

- **Meteors:** (1) *The ALPO Guide to Watching Meteors* (pamphlet). $4 per copy (includes postage & handling); send check or money order to Astronomical League Sales, 9201 Ward Parkway, Suite 100, Kansas City, MO 64114; phone 816-DEEP-SKY (816-333-7759); e-mail *leaguesales@astroleague.org*. (2) *The ALPO Meteors Section Newsletter*, free (except postage), published quarterly (March, June, September, and December). Send check or money order for first class postage to cover desired number of issues to Robert D. Lunsford, 1828 Cobblecreek St., Chula Vista, CA 91913-3917.

- **Minor Planets (Derald D. Nye):** *The Minor Planet Bulletin*. Published quarterly; free at *http://www.minorplanetobserver.com/mpb/default.htm*. Paper copies available only to libraries and special institutions at $24 per year via regular mail in the U.S., Mexico and Canada, and $34 per year elsewhere (airmail only). Send check or money order payable to "Minor Planet Bulletin", c/o Derald D. Nye, 10385 East Observatory Dr., Corona de Tucson, AZ 8564I-2309.

Other ALPO Publications

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- ***An Introductory Bibliography for Solar System Observers.*** **No charge.** Four-page list of books and magazines about Solar System objects and how to observe them. The current edition was updated in October 1998. Send self-addressed stamped envelope with request to current ALPO Membership Secretary (Matt Will).

- ***ALPO Membership Directory.*** Provided only to ALPO board and staff members. Contact current ALPO membership secretary/treasurer (Matt Will).

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THE ASSOCIATION
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The Association of Lunar & Planetary Observers (ALPO) was founded by Walter H. Haas in 1947, and incorporated in 1990, as a medium for advancing and conducting astronomical work by both professional and amateur astronomers who share an interest in Solar System observations. We welcome and provide services for all individuals interested in lunar and planetary astronomy. For the novice observer, the ALPO is a place to learn and to enhance observational techniques. For the advanced amateur astronomer, it is a place where one's work will count and be used for future research purposes. For the professional astronomer, it is a resource where group studies or systematic observing patrols add to the advancement of astronomy.

Our Association is an international group of students that study the Sun, Moon, planets, asteroids, meteors, meteorites and comets. Our goals are to stimulate, coordinate, and generally promote the study of these bodies using methods and instruments that are available within the communities of both amateur and professional astronomers. We hold a conference each summer, usually in conjunction with other astronomical groups.

We have "sections" for the observation of all the types of bodies found in our Solar System. Section coordinators collect and study submitted observations, correspond with observers, encourage beginners, and contribute reports to our quarterly Journal at appropriate intervals. Each section coordinator can supply observing forms and other instructional material to assist in your telescopic work. You are encouraged to correspond with the coordinators in whose projects you are interested. Coordinators can be contacted either via e-mail (available on our website) or at their postal mail addresses listed in our Journal. Members and all interested persons are encouraged to visit our website at http://www.alpo-astronomy.org. Our activities are on a volunteer basis, and each member can do as much or as little as he or she wishes. Of course, the ALPO gains in stature and in importance in proportion to how much and also how well each member contributes through his or her participation.

Our work is coordinated by means of our periodical, *The Strolling Astronomer*, also called the *Journal of the Assn. of Lunar & Planetary Observers*, which is published seasonally. Membership dues include a subscription to our Journal. Two versions of our ALPO are distributed — a hardcopy (paper) version and an online (digital) version in "portable document format" (pdf) at considerably reduced cost.

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