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The Strolling Astronomer

Volume 53, Number 4, Autumn 2011

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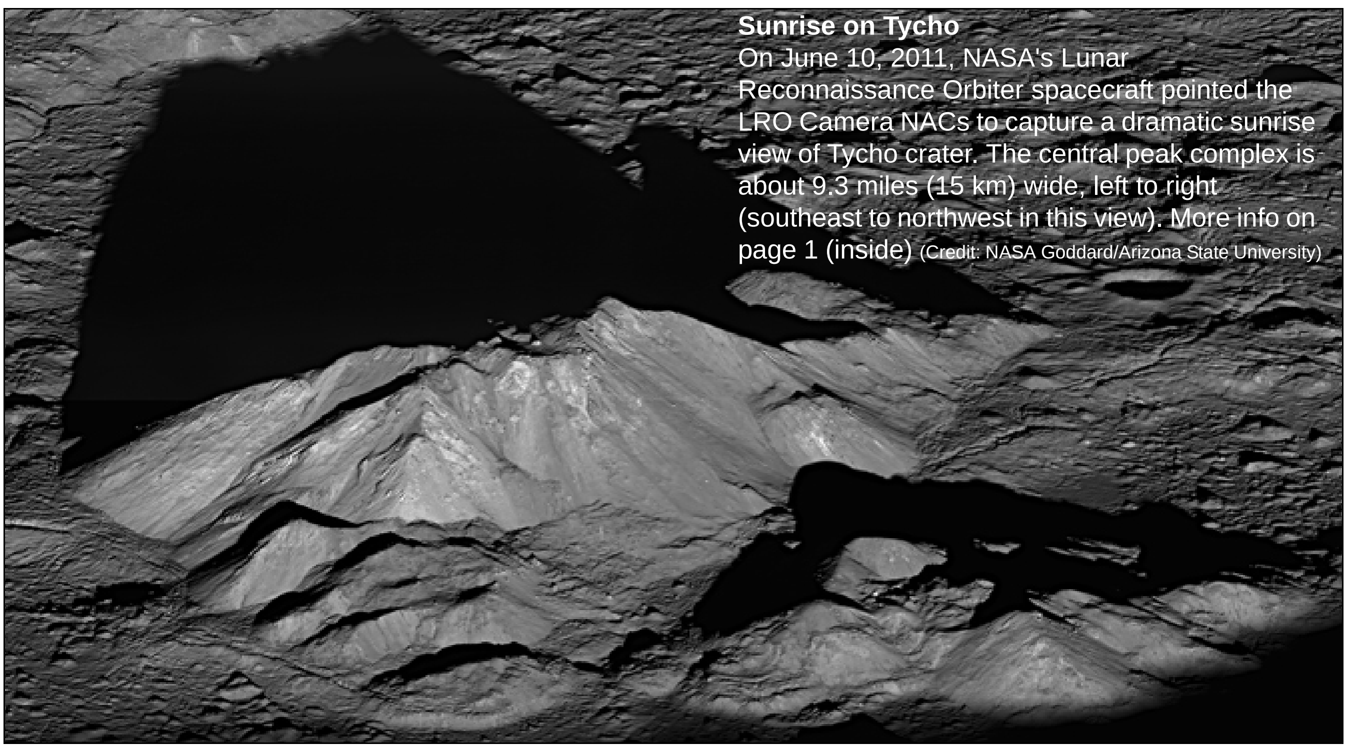
Founded in 1947

Inside this issue. . .

- ***Minutes of the ALPO Board Meeting in Las Cruces***
- ***The comings and goings of Mercury in 2010 -- all six times!***
- ***"Double-Digit" observations of the Moon for even more appreciation***
- ***The rotation period of minor planet 280 Philia finally established***
- ***Observations of Jupiter in 2009 and 2010 . . . plus reports about your ALPO section activities and much, much more!***



Sunrise on Tycho
On June 10, 2011, NASA's Lunar Reconnaissance Orbiter spacecraft pointed the LRO Camera NACs to capture a dramatic sunrise view of Tycho crater. The central peak complex is about 9.3 miles (15 km) wide, left to right (southeast to northwest in this view). More info on page 1 (inside) (Credit: NASA Goddard/Arizona State University)

Journal of the Association of Lunar & Planetary Observers

The Strolling Astronomer

Volume 53, No.4, Autumn 2011
This issue published in September 2011 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.

For membership or general information about the ALPO, contact:

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Visit the ALPO online at:
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Founded in 1947

In this issue

Inside the ALPO

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Sunrise on Tycho (cover image details from NASA)
Tycho is located at 43.37°S, 348.68°E, and is about 51 miles (82 km) in diameter. The summit of the central peak is 1.24 miles (2 km) above the crater floor. The distance from Tycho's floor to its rim is about 2.92 miles (4.7 km). Many rock fragments ("clasts") ranging in size from some 33 feet (10 m) to hundreds of yards are exposed in the central peak slopes. Were these distinctive outcrops formed as a result of crushing and deformation of the target rock as the peak grew, or do they represent pre-existing rock layers that were brought intact to the surface? Tycho's features are so steep and sharp because the crater is only about 110 million years old -- young by lunar standards. Over time, micrometeorites and not-so-micro meteorite will grind and erode these steep slopes into smooth mountains.

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***The Leo Trio** (M65, M66 and NGC 3628) – Taken with the Orion ED102T CF Refractor, StarShoot Pro V2.0, Orion Atlas EQ-G, and Orion StarShoot AutoGuider. 23 x 10 minute exposures combined. Orion image.*

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Point of View
Another JALPO — Finally!

By Ken Poshedly, editor & publisher, *The Strolling Astronomer*

OK, ok, ok! Yep, your JALPO is a little bit later than usual. Even when it looked like it would actually be either on time or even a little early, disaster struck — two, in fact, in my case.

The lessons: Prepare for two inevitables — a hard disk crash (with some kind of backup strategy) and a major computer virus infection (I already have good antivirus protection, but a new rootkit virus slowed me down, a lot.)

Anyway . . . the highlights in this JALPO are:

- A report by ALPO Membership Secretary/Treasurer on our membership rolls. We're doing ok, but all of you should talk up our fine group to your astro-friends.
- The official proceedings of this summer's meeting of the ALPO board of directors. There you'll see how our group is handling these tough times.
- A new feature with the spotlight on the ALPO Minor Planets Section. We hope this report on the determination of the rotational period of asteroid 280 Philia will spur more of you to try your hand at this challenging activity. More such reports will follow.
- A nice look at how "double-digit" (that is, higher focal length, lower power) lunar observing can actually be more rewarding than one might think. Thank Bill Dembowski for this unexpected treat.
- A compilation and report by Frank Melillo of the six apparitions of Mercury in 2010. This guy is a veritable expert of all-things Mercury and we're lucky to have him and his enthusiasm.
- Another exhaustive study, this one of the many observation reports submitted by 175 different observers about Jupiter during its 2009 - 2010 apparition. You will be pleased to know that Jove is behaving normally and the South Equatorial Belt is definitely back (or at least for awhile).

Inside the ALPO
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News of General Interest

Archival Issues of 'The Minor Planet Bulletin' Seeking New Home

Several complete sets of *The Minor Planet Bulletin* (Volume 10 through present; covering the years 1983 to present) are available for a new home. These are being offered from the private collection of Derald D. Nye, distributor of the respected publication since 1983.

Persons interested in receiving ownership of one (or more) of these sets are encouraged to submit a proposal outlining:

1. Why you are interested in receiving a set?
2. How will the set(s) be used?
3. How many people will use them and how often?
4. What is the long-term plan for their ongoing availability and protection against loss or degradation for many decades into the future?

Note that an archive recipient will receive future printed issues so as to continue to build a long-term collection.

Individuals, organizations, and institutional libraries are all eligible to propose.

The deadline for receipt of proposals is April 15, 2012. Your proposal must address each of the four questions above within a limit of two pages maximum.

Please also include one additional page that gives a brief biography that shows your ability and experience (or an organization / institution description, including and the name and contact for the responsible curator) as it relates to supporting your proposal. Your entire proposal package (in pdf format and not to exceed three pages) should be sent to *rpb@mit.edu* no later than the April 15, 2012 deadline.

Venus Volcano Watch

By Michael F. Mattei
micmattei@comcast.net

The Venus Volcano Watch continues. See the accompanying table for 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.

Date	Location from Terminator
13 Oct 2011	Volcanoes on 45° from bright limb.
28 Oct 2011	Volcanoes near CM.
7 Nov 2011	Volcanoes midway from CM to terminator.
17 Nov 2011	Volcanoes at the terminator.
5 Feb 2012	Volcanoes at the bright limb.

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.p*

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*

Computing Section

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

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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

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

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dhill@lpl.arizona.edu

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

Comets Section

Gary Kronk, Section Coordinator
kronk@cometography.com

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

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 entered conjunction with the Sun on August 16th and marking the end of the 2010-11 Western (Morning) apparition.

Nearly 300 visual observations and images have been received so far, although reports continue to flow in as participants wrap up their activities in preparation for next observing season.

In late September, after the 2011-12 Eastern (Evening) Apparition had begun, Venus appeared at first low in the West after sunset and passed through its waning phases (a progression from fully illuminated through crescentic phases). Around September 30th, the gibbous disk of Venus was about 10.0" across and 98.0% illuminated.

During the 2011-12 Eastern (Evening) Apparition, observers will witness the leading hemisphere of Venus at the time of sunset on Earth.

(Continued on page 8)

ALPO Observing Section Reports

Eclipse Section

Mike Reynolds, section Coordinator
alpo-reynolds@comcast.net

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

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Solar Section

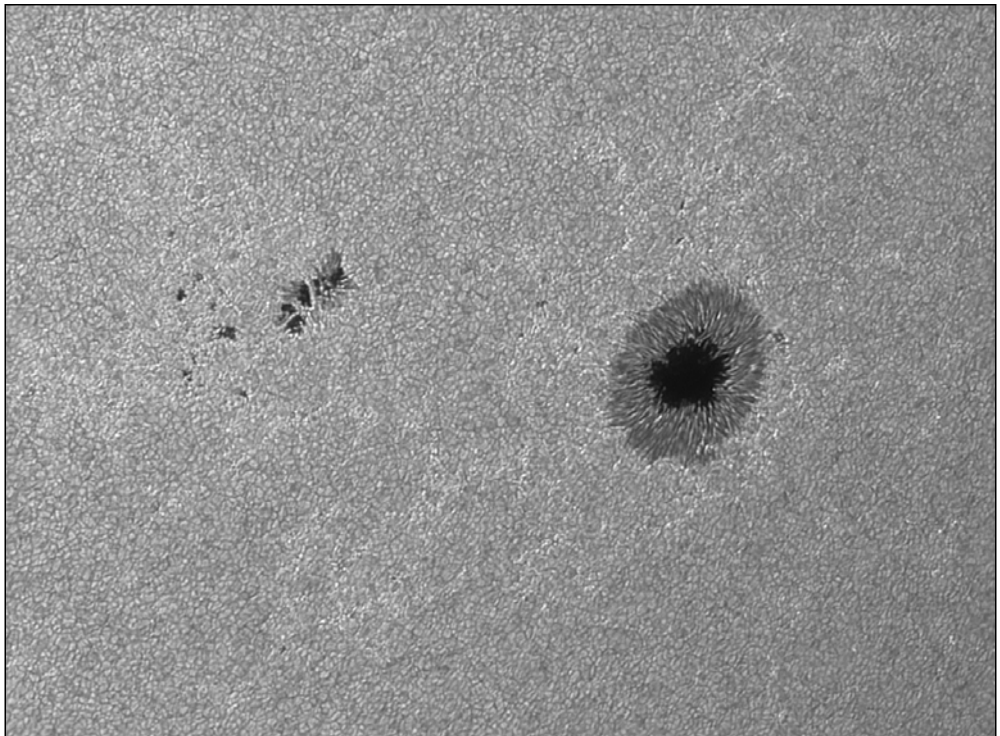
Kim Hay, Section Coordinator,
kim.hay@alpo-astronomy.org

Solar Activity increased in late August, with extensive activity at sunspot groups AR12060, 1261, 1262, 1263,1264, and 1265. Sunspot group AR1263 that has produced several C, M, and an X6.2 class flare. There as also been auroral activity throughout Canada and the mid-potion of the United States.

Enclosed are images by ALPO Solar Observer Christian Viladrich of Sunspots AR1260, AR1261, AR1263 taken August 2, in Ca K and K-line.

The ALPO Solar Section has over seven contributors for the solar archives from all over the world; they are Gema Araujo, Michael Borman, Tony Broxton, Howard Eskildsen, Jerry Fryer, Monty Leventhal and Christian Viladrich. The ALPO Solar Yahoo list has many observers that post their images in the online folders, but are not included in the archives. If members of the ALPO Solar Yahoo group would like to have their images included in the ALPO Solar Section Carrington Rotation's archive, please send your images to kim.hay@alpo-astronomy.org
The images should be in jpg or gif format up and be no more than 250 kb in size. Please include date, time in UT and CR rotation number and indicate the direction of north up and west to the left on the images. Also include details about your observing and recording equipment, eyepiece and camera if imaging, and your observing location.

This outburst seems rather interesting, since at the American Astronomical Society meeting in Las Cruces New Mexico, on June 14, 2011, had



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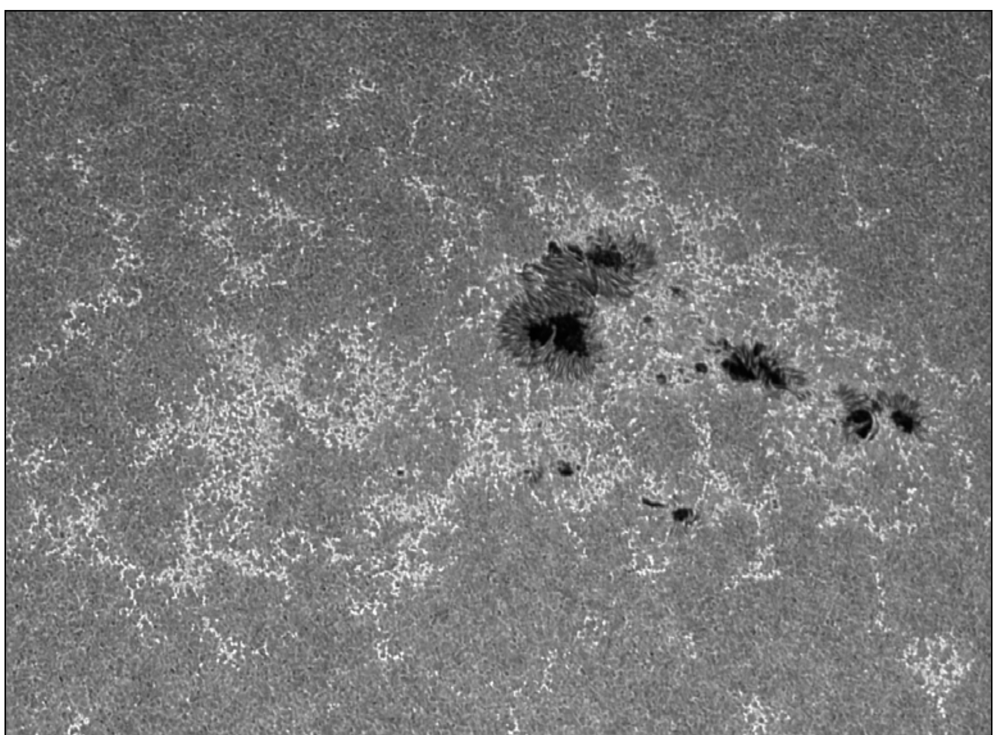
AR1260 - 2 August 2011 - 9h38mn UT - Takahashi TOA 150 - K line filter (396 nm FWHM 10 nm) - Baader helioscope and FFC
Approximate scale = 0.17 arcsec/pixel - Skynyx 2.1M camera - 20 x 0.56 ms exposure - gain = 1 - 12 bits acquisition
Christian Viladrich



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2 August 2011 - AR 1261 - Takahashi TOA 150 - Ca K 393.3 nm FWHM 0.24 nm
Approximate scale = 0.24 arcsec/pixel - Skynyx 2.1M - 60 x 10 ms - gain = 5 - 12 bits acquisition
Christian Viladrich

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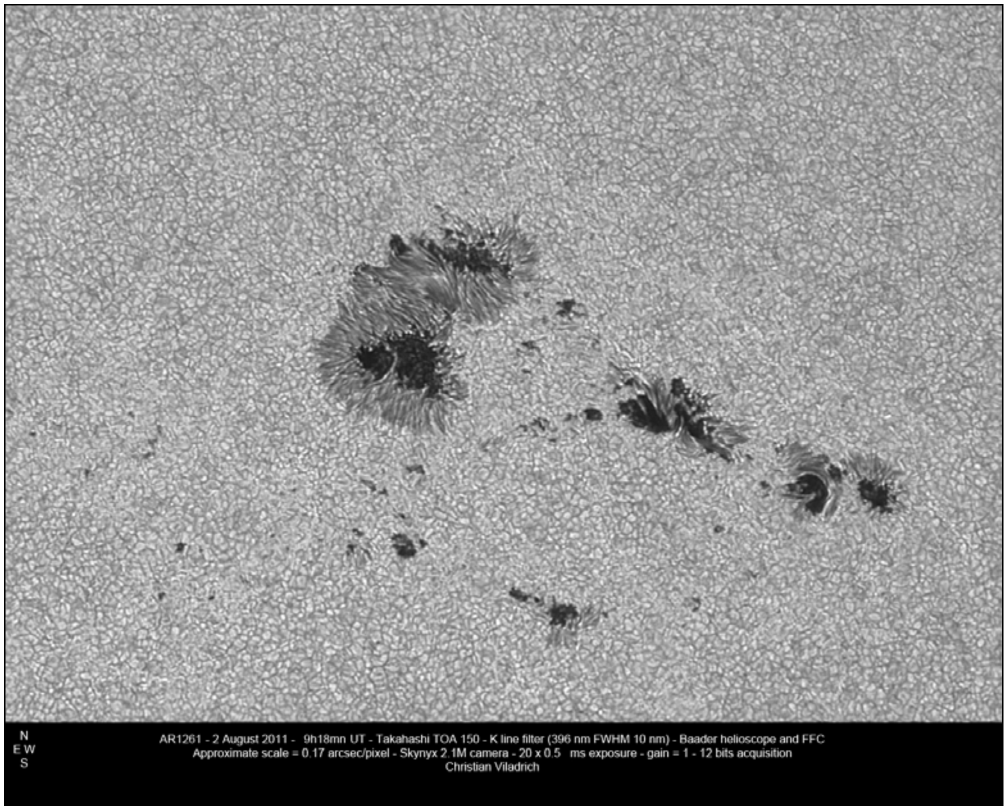
announced a prediction of the return of the Mauder Minimum at *http://wattsupwiththat.com/2011/06/14/the-major-aas-solar-announcement-suns-fading-spots-signal-big-drop-in-solar-activity/*

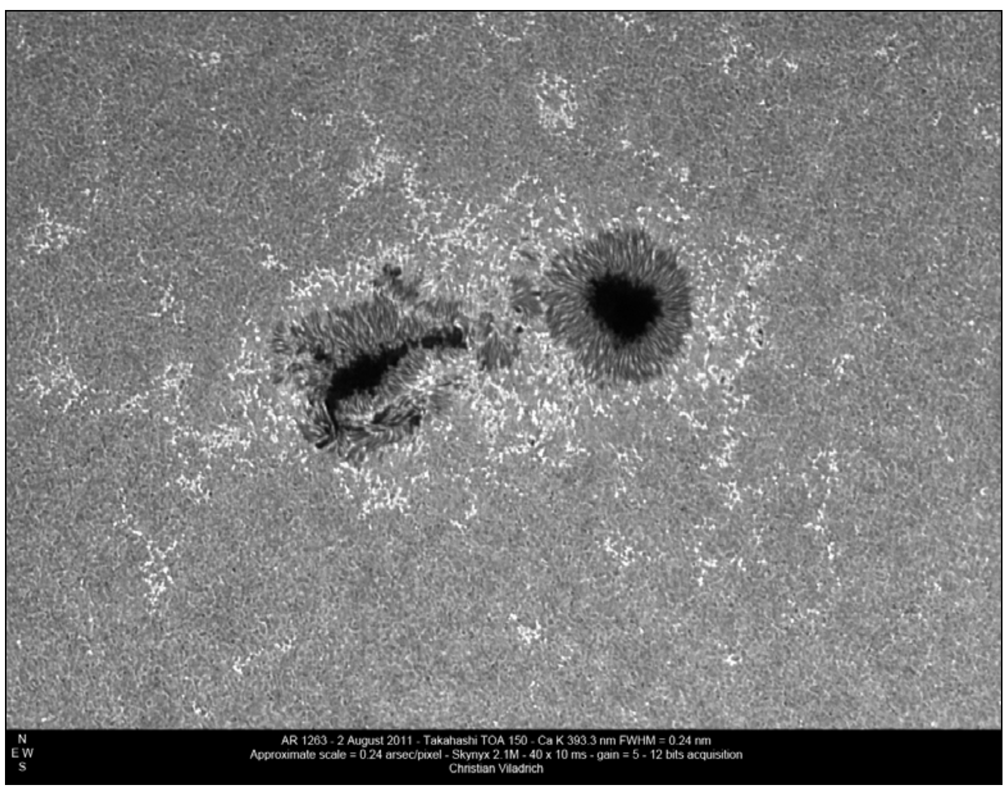
This was also mentioned in Sky& Telescope magazine *http://www.skyandtelescope.com/news/123844859.html*

One last item from SOHO. A movie, from January 1, 2010 to July 5, 2011 showing the Sun over a one-and-a-half-year observation.
Go to *http://sohowww.nascom.nasa.gov/hotshots/2011_07_25/TheSunH_RASC_A.mov*

Remember to visit the ALPO Solar Section webpage at *www.alpo-astronomy.org/solarblog* for information and updated observations.

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





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The accompanying table is presented to assist those who wish to plan their Venus observing activities.

Geocentric Phenomena of the 2011-2012 Eastern (Evening) Apparition of Venus in Universal Time (UT)		
Superior Conjunction	2011	Aug 16 (angular diameter = 9.6 arc-seconds)
Greatest Elongation East	2012	Mar 27 (46º east of the Sun)
Predicted Dichotomy	2012	Mar 29.34 (exactly half-phase)
Greatest Brilliancy	2012	Apr 28 ($m_V = -4.6$)
Inferior Conjunction	2012	Jun 05 (angular diameter = 58.3 arc-seconds)

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 2011. Since Venus has a high surface brightness it is potentially observable anytime it is far enough from the Sun to be safely observed.

An excellent, detailed digital image of Venus during gibbous phase taken by Christian Viladrich of Paris, France, using a 15.2 cm (6.0 in.) refractor and ultraviolet filter on July 9, 2011 at 09:32 UT. Apparent diameter of Venus is 9.9 arc seconds, phase (k) 0.983 (98.3% illuminated), and visual magnitude -3.9. South is at top in this image.

The observation programs conducted by the ALPO Venus Saturn Section are listed on the Venus page of the ALPO website at *http://www.alpo-astronomy.org/venus* 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 both 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.

The ALPO Venus Section urges 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
wayne.bailey@alpo-astronomy.org

The ALPO Lunar Topographical Studies Section (ALPO LTSS) received a total of 73 new observations from 10 observers during the April-June quarter, including 4 observations for the Banded Crater Program and 2 for the Rays Program.

Nine contributed articles were published. The "Focus-On" series in *The Lunar Observer* newsletter continued with articles on Central Peaks with Craters, and Alphonsus. Upcoming subjects of the "Focus-On" series include Plato, Posidonius and Mare Humorum.

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Lunar Calendar for Fourth Quarter, 2011 - All Times UT

Oct. 02	11:42	Extreme South Declination
Oct. 03	19:00	Moon 2.8° SSE of Pluto
Oct. 04	03:15	First Quarter
Oct. 07	22:00	Moon 5.4° NNW of Neptune
Oct. 10	18:00	Moon 5.7° NNW of Uranus
Oct. 12	02:06	Full Moon
Oct. 12	11:44	Moon at Apogee (406,434 km – 252,546 miles)
Oct. 13	18:00	Moon 4.7° N of Jupiter
Oct. 17	02:06	Extreme North Declination
Oct. 20	03:31	Last Quarter
Oct. 21	21:00	Moon 6.1° SSW of Mars
Oct. 26	02:00	Moon 6.4° SSW of Saturn
Oct. 26	12:27	Moon at Perigee (357,050 km – 221,861 miles)
Oct. 26	19:56	New Moon (Start of Lunation 1099)
Oct. 28	01:00	Moon 0.57° WSW of Mercury
Oct. 28	03:00	Moon 2.0° SW of Venus
Oct. 31	02:00	Moon 2.3° S of Pluto
Nov. 02	16:38	First Quarter
Nov. 04	03:00	Moon 5.6° NNW of Neptune
Nov. 06	22:00	Moon 5.8° NNW of Uranus
Nov. 08	13:21	Moon at Apogee (406,176 km – 252,386 miles)
Nov. 09	17:00	Moon 4.9° N of Jupiter
Nov. 10	20:17	Full Moon
Nov. 13	07:24	Extreme North Declination
Nov. 18	15:09	Last Quarter
Nov. 19	04:00	Moon 7.2° SSW of Mars
Nov. 22	20:00	Moon 6.3° SSW of Saturn
Nov. 23	23:25	Moon at Perigee (359,691 km - 223,502 miles)
Nov. 25	06:10	New Moon (Start of Lunation 1100)
Nov. 26	06:48	Extreme South Declination
Nov. 26	09:00	Moon 1.9° NNW of Mercury
Nov. 27	03:00	Moon 2.9° NNW of Venus
Nov. 27	15:00	Moon 2.1° SSE of Pluto
Dec. 01	11:00	Moon 5.6° NNW of Neptune
Dec. 02	09:52	First Quarter
Dec. 04	03:00	Moon 5.8° NNW of Uranus
Dec. 06	01:14	Moon at Apogee (405,412 km – 251,911 miles)
Dec. 06	19:00	Moon 5.0° N of Jupiter
Dec. 10	13:36	Extreme North Declination
Dec. 10	14:37	Full Moon (Total Eclipse of the Moon)
Dec. 17	07:00	Moon 7.9° SSW of Mars
Dec. 18	00:48	Last Quarter
Dec. 20	06:00	Moon 6.3° SSW of Saturn
Dec. 22	02:58	Moon at Perigee (364,800 km – 226,676 miles)
Dec. 22	02:00	Moon 2.7° SSW of Mercury
Dec. 22	18:07	New Moon (Start of Lunation 1101)
Dec. 23	17:24	Extreme South Declination
Dec. 25	01:00	Moon 1.9° S of Pluto
Dec. 27	06:00	Moon 6.1° NNW of Venus
Dec. 28	22:00	Moon 5.6° NNW of Neptune
Dec. 31	12:00	Moon 5.7° NNW of Uranus

Table courtesy of William Dembowski

Visit the following online web sites for more info:

- The Moon-Wiki: *the-moon.wikispaces.com/Introduction*
- Chandrayaan-1 M3: *pds-imaging.jpl.nasa.gov/portal/chandrayaan-1_mission.html*
- LROC: *lroc.sese.asu.edu/EPO/LROC/lroc.php*
- 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 *moon.scopesandscapes.com/alpo-topo*
- The Lunar Observer (current issue) *moon.scopesandscapes.com/tlo.pdf*
- The Lunar Observer (back issues) *moon.scopesandscapes.com/tlo_back.html*
- Banded Craters Program: *moon.scopesandscapes.com/alpo-bcp.html*
- The Lunar Discussion Group: *tech.groups.yahoo.com/group/Moon-ALPO/*

Lunar Meteoritic Impacts

Brian Cudnik,
Program Coordinator
cudnik@sbcglobal.net

The meteor on Jupiter observed by amateurs on 20 August 2010 from the other side of our planet prompted a call for anyone equipped with larger telescopes to monitor Jupiter for more events. This was the second such observation that summer; the first was made June 3, and both events fit the criteria for being confirmed.

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Lunar meteor activity has been intermittent during this period, owing to the placement of the Moon during the time of the annual showers. The December Geminids offered the best opportunity for impacts from major annual showers during the second half of 2010 and several reports of impact events have been received. NASA-MSFC submitted a list of 12 impact candidates (at least, all observed on 14 December 2011) from the Geminids opportunity, one of which was confirmed by videotape from the coordinator of ALPO-LMIS.

Activity during the first half of 2011 was also sparse, given the lack of favorable conditions for lunar meteor observing. The sporadic background is always present, and an impact by one such object was reported by the Geologic Research Group of Italy. This observation was made on 11 February 2011 at a time when no major or moderate showers are active. The next best shower opportunity came with the eta Aquarids of early May, but no reports of impact events have been received from this one.

This Section will continue to coordinate observations of meteoroid impacts on the Moon (and Jupiter and any other planet within range of such observations). Aside from sporadic activity and very minor showers, the Moon is only favorably placed for the Orionids and the Leonids (now a minor shower) for the remainder of 2011. In the opening days of 2012, the Moon will be favorably placed to show Earth impacts from the Quadrantid meteor shower. More information on these and other opportunities can be found at the Lunar Meteoritic Impact Search section webpage at www.alpo-astronomy.org.

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
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Three Lunar Transient Phenomena (LTP) observations have come to light since the last LTP report and have been assigned weights on a scale of 1 (slight chance of being an LTP) to 5 (unquestionably an LTP):

- 2011January 21st 22:30 UT: Nigel Longshaw (Oldham, UK) suspected a

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brown sepia hue on the eastern edge of Geminus, on the border of the crater filled shadow and the eastern illuminated rim. LTP weight=2.

- 2011 April 7th 19:45-20:10 UT: Aristarchus was seen to be exceptionally bright in Earthshine and this was confirmed independently by Lajos Bartha (Budapest, Hungary) and Giorgio Sancristoforo (Milan, Italy). Tim Haynes (Reading, UK) did not notice anything exceptional in Earthshine though whilst observing an occultation earlier at 19:14UT. LTP weight=3.
- 2011 April 8th 19:30-20:00 UT: Arthur Kemp (Mold, UK) observed that one of the Leibnitz peaks was shining brilliantly like a spot light, so bright in fact that it was difficult to make out its shape. LTP weight=2.

Dates and UTs on which to see features under similar illumination conditions to past LTPs, can be found at http://users.aber.ac.uk/atc/tlp/tlp.htm .

Twitter LTP alerts are now available at http://twitter.com/lunarnaut.

Finally, please also visit the ALPO Lunar Transient Phenomena site online at http://alpo-astronomy.org/lunar/ltp.html.

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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Brian Warner, Robert Stephens, and Alan Harris, after much hard work, have established a repository for lightcurves, analogous to that for astrometric measures, at the Minor Planet Center of the Smithsonian Astrophysical Observatory. To date nearly a million photometric data points have been archived, with the number increasing steadily.

Minor Planet Bulletin Vol. 38, No. 3, 2011 July-September, has published graphs of reduced magnitudes (corrected for changing Earth and Sun distances) versus phase angle for asteroids 158, 535, and 1342. These provide the most reliable values of the absolute magnitude H and phase function G ever obtained for these asteroids. Three new very long period rotators were announced: 846 Lipperta, 1641 hours; 1663 van den Bos, 740 hours; and 27810 Daveturner, 540 hours.

Lightcurves with derived rotation periods are published for 87 other asteroids, numbers 28, 33, 81, 126, 150, 161, 280, 283, 321, 334, 419, 434, 632, 862, 890, 902, 919, 933, 938, 948, 1019, 1080, 1177, 1318, 1383, 2035, 2047, 2120, 2650, 2715, 2802, 2869, 3152, 3237, 3252, 3266, 3388, 3447, 3511, 3577, 4175, 4290, 4452, 4464, 4490, 4970, 5168, 6384, 6493, 6577, 6619, 7187, 7579, 7781, 9190, 9233, 9549, 10779, 12265, 12466, 13578, 13822, 14790, 15154, 16562, 16694, 17939, 19131, 20936, 21056, 22696, 23336, 23766, 31485, 32505, 42612, 46784, 48470, 52266, 61461, 65739, 89550, 101771, 113567, 137605, 2001 GU8, 2010 JL33.

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.

Minor Planets Section Coordinator Frederick Pilcher delivered the keynote address at the 2011 ALPO convention on the topic: “How Amateurs Have Contributed to Asteroid Research.” The text of this presentation and all the images are available for download at the ALPO website.

Minor Planet Bulletin Vol. 38, No. 2, 2011 April - June, contains lightcurves and rotation periods for 13 additional Trojan asteroids found by Linda French, Robert Stephens, and colleagues. A binned graph of rotation periods for 40 Trojan asteroids larger than 70 kilometers, most of those in that size range, is presented.

The *Minor Planet Bulletin* is a refereed publication and that it is available online at http://www.minorplanet.info/mpbdownloads.html. Annual voluntary contributions of $5 or more in support of the publication are welcome.

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

Jupiter Section

Richard W. Schmude, Jr.,
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This coordinator has been busy analyzing recent Jupiter observations and also gave three talks about the 2010-2011 Jupiter apparition at the ALPO conference in Las Cruces, New Mexico. He also gave a Jupiter workshop to participants at that conference. He submitted the 2010-2011 Jupiter report to Ken Poshedly on July 5, 2011. Some of the highlights during the previous apparition were the reappearance of Jupiter's South Equatorial Belt, the appearance of a string of small dark spots near Jupiter's South Tropical Zone and two impact flashes imaged in June and August of 2010.

During early 2011, Jupiter's South Equatorial Belt is dark and wide. Based on images made in late July, the Great Red Spot is at a longitude of 167° W and Oval BA is at a longitude of 349° W. There are also barges in Jupiter's North Equatorial Belt.

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The Jupiter archive contains all types of observations made between 1928 and 2011. There are, however, almost no observations during the period of 1949 to 1961 in the archive. To give you an idea of the value of the Jupiter archive, I just analyzed photographs made from 1963 to 1966 for an important paper that a colleague and I are writing. People are encouraged to upload their images at either the Arkansas Sky Observatory website or on the ALPO Japan Latest website.

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

Galilean Satellite Eclipse Timing Program

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(Editor's Note: The following is a slightly updated article which appeared in JALPO53-3, but which is still very important to our ALPO Galilean Satellite Eclipse Timing observers.)

If you have not yet submitted your timings of the eclipses of the Galilean satellites for the past apparition (2010-2011), we would be happy to receive them. We have placed on the ALPO Jupiter Section webpage a schedule of satellite eclipses for the 2011-2012 Apparition of Jupiter.

Completely Visible Eclipses of Europa by Jupiter, 2011-2012

Series 1 (17 eclipses)			Series 2 (15 eclipses)			Series 3 (18 eclipses)		
TT Date	Begin	End	TT Date	Begin	End	TT Date	Begin	End
2011 Jul 05	hh mm 05 07	hh mm 07 39	2011-12 Dec 29-30	hh mm 22 25	hh mm 00 52	2012 Aug 06	hh mm 07 28	hh mm 09 51
Jul 08	18 24	20 56	Jan 02	11 44	14 11	Aug 09	20 45	23 08
Jul 12	07 41	10 14	Jan 06	01 04	03 31	Aug 13	10 02	12 25
Jul 15	20 59	23 31	Jan 09	14 23	16 50	Aug 16-17	23 19	01 42
Jul 19	10 16	12 48	Jan 13	03 43	06 10	Aug 20	12 36	14 59
Jul 22-23	23 33	02 05	Jan 16	17 02	19 29	Aug 24	01 53	04 16
Jul 26	12 51	15 22	Jan 20	06 23	08 49	Aug 27	15 10	17 33
Jul 30	02 08	04 40	Jan 23	19 42	22 08	Aug 31	04 27	06 50
Aug 02	15 26	17 57	Jan 27	09 02	11 28	Sep 03	17 44	20 07
Aug 06	04 43	07 14	Jan 30-31	22 21	00 47	Sep 07	07 01	09 24
Aug 09	18 01	20 32	Feb 03	11 41	14 07	Sep 10	20 18	22 41
Aug 13	07 18	09 49	Feb 07	01 00	03 26	Sep 14	09 35	11 58
Aug 16	20 36	23 07	Feb 10	14 20	16 46	Sep 17-18	22 52	01 15
Aug 20	09 53	12 24	Feb 14	03 39	06 04	Sep 21	12 09	14 32
Aug 23-24	23 11	01 42	Feb 17	16 59	19 24	Sep 25	01 26	03 49
Aug 27	12 28	14 59	-	-	-	Sep 28	14 43	17 06
Aug 31	01 46	04 17	-	-	-	Oct 02	04 00	06 24
-	-	-	-	-	-	Oct 05	17 18	19 41

Currently, three circumstances have come together to allow us to view something we see only rarely – both the beginnings and endings of the same eclipses of Europa. For the great majority of the time, we can see only disappearances of the satellite before opposition, and only reappearances after opposition (indeed, some literature incorrectly states that this is always the case).

The first condition that helps create this series of events is that Jupiter is closer than average to the Sun, having reached perihelion on 2011 March 17 (4.9494 AU from the Sun). The second situation is that the Earth is well north of Jupiter's equator (and thus the orbital planes of the Galilean satellites; 3.89° north on 2011 October 01). Finally, the Sun also is north of the Jupiter's equator (3.57° north on 2012 March 10). This allows us to peek past the planet and, before opposition see both eclipse disappearances and reappearances; the last very close to Jupiter's limb. After opposition, we have the opposite, with the disappearances next to Jupiter's limb and the reappearances well away from the planet.

There are three periods when we will be able to see these complete eclipses of Europa: 2011 July 5 - August 31; 2011 December 29/30 - 2012 February 17; and 2012 August 06 - Oct 05. These three series contain a total of 50 eclipses of Europa, all taking place well away from solar conjunction.

We hope that some of our readers will watch and time some of these events. (Normally, we must time Europa's eclipse reappearances months after we time its disappearances.) The accompanying table gives the dates and terrestrial times (TT) of these events. (Subtract about one minute to convert TT to UT.)

There is one more unusual event, and this concerns the satellite Io. Most of the time, the visibility of Io's eclipses resembles what is the normal situation for Europa – only disappearances before opposition and only reappearances afterward. However, in 2011,

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Digital image of Saturn taken by Damian Peach, Norfolk, UK, on June 9, 2011 at 20:32 UT. Note massive, evolving NTrZ storm. Equipment, conditions included 35.6 cm (14.0 in.) SCT in visible light (RGB) in excellent seeing. Ring tilt is +9.9 degrees, CMI = 216.2, CMII = 172.5, CMIII = 1.0. South at top in this image.

Io will be in eclipse at the moment of opposition, on 2011 October 29, with predicted UTs as follows: Io disappearance 00h 40m, Jupiter in opposition to the Sun 01h 27m, Io reappearance 02h 51m. Thus we will be able to see disappearance and reappearance for the same eclipse of Io, although the two events will occur when the satellite is very close to the planet's limb. (This last happened in 2009 and 2006, but then not since 1996.) As with the unusual complete eclipses of Europa, we hope that some of our readers will watch and time this event.

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

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Saturn became more and more difficult to readily observe in the western sky after sunset as it progressed towards conjunction with the Sun on October 13. The planet's northern hemisphere and north face of the rings are becoming readily visible as the ring tilt towards 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 +9.0° towards Earth, reaching as much as +11.5° during the apparition.

The accompanying geocentric phenomena for 2010-11 apparition, as well as the immediately following 2011-12 observing season, are presented for the convenience of readers who wish to plan their Saturn observing activities.

As of this writing, there have been over 1,100 visual observations and digital images submitted this apparition. By far, the most notable highlight this apparition has been the emergence of a massive storm in the region of Saturn's North Tropical Zone (NTrZ) that was first detected by ALPO observers in early December 2010. It has been regularly observed and imaged ever since, easily the brightest feature seen on the planet in recent years. This long-enduring NTrZ white "complex" has exhibited considerable brightening over time, undergoing rapid evolution and showing morphologically differentiation into bright and dusky structures along its length. The storm has progressively widened showing longitudinal growth, essentially encircling the globe of the planet at the latitude of the NTrZ, and still apparent despite Saturn's less favorable altitude during late August. Cassini images also have documented how the storm has rapidly grown nearly ten times its original size and exhibited structural metamorphosis since last December.

Presumably as the inclination of Saturn's northern hemisphere toward the Sun increases, with subsequently greater solar insolation affecting these regions, conditions are more favorable for activity to develop, such as the NTrZ white storm currently being monitored. Observers are encouraged to continue watching and imaging for further changes in the NTrZ storm over the coming months. Color filter techniques can be used by visual observers to determine which visual wavelengths produce the best views of the NTrZ storm, and consistent digital imaging at visual, infrared, UV, and methane (CH_4) wavelength bands is particularly important.

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

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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 =	+8.6°

Geocentric Phenomena for the 2011-2012 Apparition of Saturn in Universal Time (UT)	
Conjunction	2011 Oct 13^d
Opposition	2012 Apr 15^d
Conjunction	2012 Oct 25^d
Opposition Data:	
Equatorial Diameter Globe	19.0 arc-seconds
Polar Diameter Globe	16.9 arc-seconds
Major Axis of Rings	43.0 arc-seconds
Minor Axis of Rings	28.6 arc-seconds
Visual Magnitude (m_v)	0.2 m_v (in Virgo)
B =	+13.7°

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

Richard W. Schmude, Jr., Section Coordinator
schmude@gdn.edu

This coordinator gave a talk about Uranus and Neptune observations in 2010-2011 at the ALPO conference in Las Cruces, New Mexico. He submitted the final 2010-2011 remote planets report to JALPO editor Ken Poshedly on July 5, 2011. It will be published in the Winter 2012 issue of this Journal (JALPO54-1). He also sent out the annual newsletter of the section, *The Remote Planets Review.* About 30 - 40 people should have received copies of this publication. If you want a copy let me know so that I can send you one.

Frank Melillo has carried out a valuable study of Pluto during June and July. He imaged that dwarf planet on 10 different nights between June 30 and July 18 and then used software to measure the brightness of it. (His measurements are based on unfiltered CCD images.) He then constructed a light curve. More details will be presented in the 2011-2012 apparition report. I congratulate Frank on an excellent set of data on a very dim object.

During 2011-2012, I am hoping that people will continue to image Uranus and Neptune with different filters. One project that I am interested in is to see if the limb darkening changes with the wavelength of light. I am also hoping that people will measure the relative brightness of the brighter moons of Uranus.

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*.

Sponsors, Sustaining Members, and Newest Members

by Matthew L. Will, ALPO Membership Secretary/Treasurer

The ALPO wishes to thank the following members listed below for voluntarily paying higher dues. The extra income helps in maintaining the quality of the *Journal* while helping to keep the overall cost of the *Journal* in check. Thank you!

As of August 14, 2011:

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NEWEST MEMBERS...

The ALPO would like to wish a warm welcome to those who recently became members. Below are those persons who have become new members from May 1, 2010 through August 14, 2011: where their location and their interest(s) in lunar and planetary astronomy. The legend for the interest codes are located at the bottom of the page. Welcome aboard!

Member Name	City	State	Country	Interest
Jason Adamik	Plano	TX		
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Member Name	City	State	Country	Interest
Raymond Rosolina	Friars Hill	WV		
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Interest Abbreviations

0 = Sun	6 = Saturn	D = CCD Imaging	P = Photography
1 = Mercury	7 = Uranus	E = Eclipses	R = Radio Astronomy
2 = Venus	8 = Neptune	H = History	S = Astronomical Software
3 = Moon	9 = Pluto	I = Instruments	T = Tutoring
4 = Mars	A = Asteroids	M = Meteors	V = Videography
5 = Jupiter	C = Comets	O = Meteorites	X = Visual Drawing

Feature Story

ALPO Observations of Mercury During the 2010 Apparitions

By Frank J Melillo, coordinator, ALPO Mercury Section
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Abstract

There were six apparitions of Mercury in 2010. During the course of the year, there were only nine observers who submitted 19 drawings, one CCD image and 13 webcam images for a total of 33 observations. They used apertures from 9 to 27.5 centimeters (3.5 to 11 inches). The features detected show good correlation with images from the MESSENGER flybys and with the 1971 albedo chart prepared by Murray, Smith and Dollfus that was adopted officially by the IAU.

Introduction

Mercury is a tough planet to observe, regardless of the equipment and observing conditions. But with the MESSENGER spacecraft approaching the planet, our observing experience was more pleasurable than ever before. This paper describes the observations reported in 2010.

There were three evening and three morning apparitions in 2010 (Table 1). Each of them had at least one observation (Table 2). There were three more observers than in the previous year, but the same total number of observations (Table 2; Melillo, 2011.)

There were more drawings submitted than in the previous year. Sometimes, a drawing can show more details than a person can document by making a webcam image. It depends on the person's skill, and also the seeing condition. In some of the apparitions in 2010 and also in recent years, drawings appeared to show more than webcam images did near the terminator, while webcam images did better job near the limb. Making drawings is the best way to learn how to observe visually.

Throughout 2010, all observers contributed high quality observations of Mercury. Carl Roussell made the most observations. His drawing skills have continued to improve over the years. John Boudreau continued to improve his images, having acquired a new chip for his camera. His images show somewhat better resolution than they did in previous years, and can be compared to the MESSENGER images. This is quite an achievement, considering that he uses a 27.5 cm (11 inch) telescope. In addition, his images now can be compared with Giovanni Schiaparelli's observations of Mercury during the late 19th century. It is hoped that Boudreau's images can reconstruct Schiaparelli's study in detail. (More about Schiaparelli's observations may be published in a future ALPO Journal.)

In 2010, the MESSENGER spacecraft had completed it flybys of Mercury and was on its way to the planned orbital insertion in 2011. The craft had flown 4.9 billion miles in 6.5 years, making one Earth flyby, two Venus flybys, and three Mercury flybys in order to use gravitational breaking to slow its infall toward the Sun. It will match the speed of Mercury during the insertion.

Apparition 1: Morning, 4 January – 14 March

After the inferior conjunction of 4 January, Mercury became a morning object. It was difficult for observers during the wintertime in the Northern Hemisphere. Only one observer who braved the cold weather sent in a report.

Carl Roussell made the sole observation on 8 February (CM 200°), when

Table 1. Characteristics of the Apparitions of Mercury in 2010 (All dates UT)

Number and Type	Beginning Conjunction*	Greatest Elongation	Final Conjunction*	Aphelion	Perihelion
1. Morning	04 Jan (i)	27 Jan	14 Mar (s)	13 Feb	
2. Evening	14 Mar (s)	08 Feb	28 Apr (i)		29 Mar
3. Morning	28 Apr (i)	26 May	28 June (s)	12 May	25 June
4. Evening	28 June (s)	06 Aug	03 Sept (i)	08 Aug	
5. Morning	3 Sept (i)	19 Sept	16 Oct (s)		21 Sept
6. Evening	16 Oct (s)	01 Dec	20 Dec (i)	04 Nov	18 Dec

*(i) – inferior conjunction, (s) – superior conjunction

All Readers

Your comments, questions, etc., about this report are appreciated.

Please send them to: *poshedly@bellsouth.net* for publication in the next Journal.

Online Features

Left-click your mouse on:

• 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).

Mercury was in a gibbous phase with most of the surface visible. Solitudo Helii could be seen as a band in the southern hemisphere, and Solitudo Neptuni also as a band in the northern hemisphere. Both features are pretty good in contrast, especially near the terminator (Figure 2).

Mercury spent about two months and 10 days as a morning object and then went through superior conjunction on 14 March.

Apparition 2: Evening, 14 March – 28 April

This apparition was quite favorable for Northern Hemisphere viewers, and it generated the largest number of observations of the year. Eight observers contributed reports. A number of simultaneous observations were made.

After superior conjunction on 14 March, Carl Roussell made one drawing on March 24 (CM 34°), and Mario Frassati made drawings on 24 March (CM 34°), 26 March (CM 42°) and 28 March (CM 51°). These drawings show two somewhat dark bands near the terminator, one in the Northern Hemisphere and one in the Southern Hemisphere. It is possible that these bands are Solitude Martis in the south and Solitudo Lycaonis in the north (Figure 3, panel A).

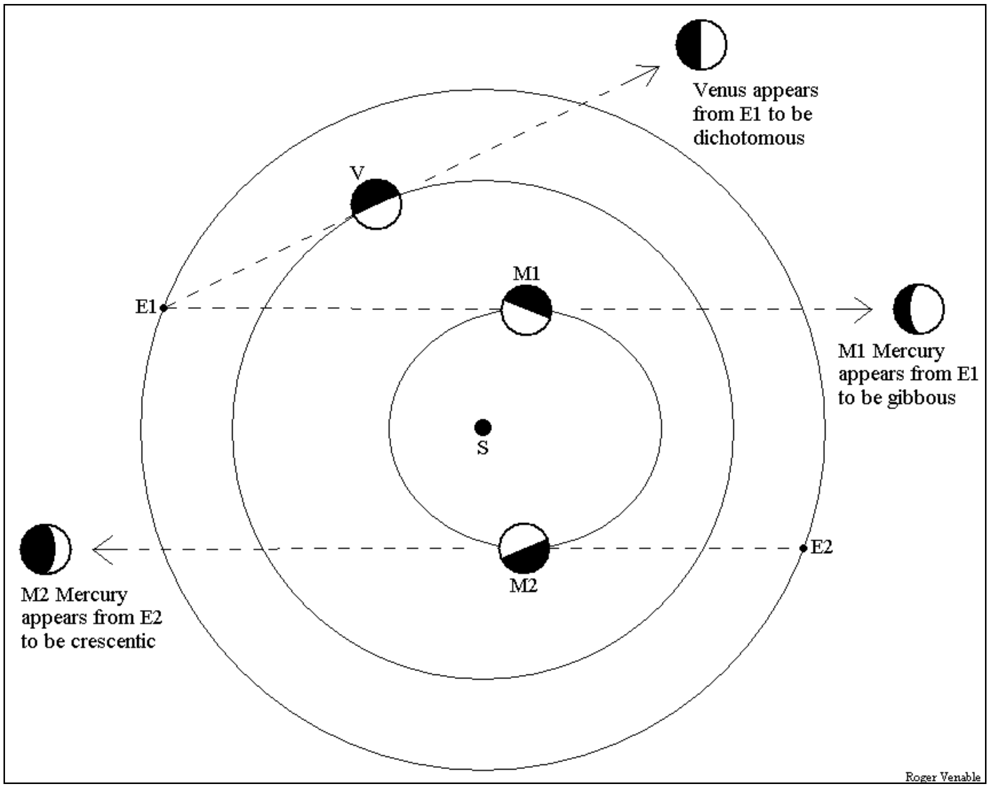


Figure 1. Although Venus appears to be near half-phase when at greatest elongation, Mercury often does not. The the orbits of Earth, Venus, and Mercury are drawn here, with the Sun 'S' at the center. E1 and E2 represent two positions of Earth along its orbit, V represents Venus, and M1 and M2 represent 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°, 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°. 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°. 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 2010

Observers	Location	Instrument*	Number & Type Of Observations**	Apparition Observed
John Boudreau	Saugus, MA, USA	27.5 cm SCT	7 W	2, 3, 5
Marc Delcroix	Toumefeuille (31), FR	24.5 cm SCT	1 W	2
Peter Edwards	West Sussex, UK	27.5 cm SCT	1 W	2
Mario Frassati	Cresentino, Italy	20.3 cm SCT	6 D	2
Daniel Gasparri	Perigia, IT	23.5 cm SCT	3 W	2
Peter Grego	St Dennis, Cornwall, UK	20.3 cm SCT	1 D	2
Emil Kraaikamp	The Netherlands	24.5 cm NT	1 W	2
Frank J Melillo	Holtsville, NY, USA	24.5 cm SCT	1 CCD	5
Carl Roussell	Hamilton, ON, CA	15.0 cm RL	12 D	1, 2, 4, 5, 6

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

Daniel Gasparri, Frassati and Boudreau made nearly simultaneous observations on 1 April (CM 69°) from 17:20 UT to 22:13 UT. All three observations show a dark band near the terminator that could be Solitudos Martis and Lycaonis somewhat connected together. Also, Gasparri's and Boudreau's webcam images show a white spot toward the limb that may be Kuiper Crater (Figure 3, panels B, C and D).

Another set of simultaneous observations was made on 5 April (CM 87° - 88°) by Frassati, Peter Edwards and Roussell, from 18:25 UT to 23:05 UT. The drawings by both Frassati and Roussell show Solitudo Martis again in the south and Solitudo Lycaonis in the north, but they are not connected as was seen on 1 April.

Figure 2. A drawing of apparition 1 by Carl Roussell, 8 Feb 2010, 12:47 UT, CM = 200°. In this and all other figures in this article, north is up and planetary east to the right.

Still another set of simultaneous observation was done on 6 April (CM 91°). The two images by Gasparri and Emil Kraaikamp are one hour apart. That by Gasparri may show Solitudos Martis and Lycaonis again (Figure 3, panel E), while Kraaikamp's image is somewhat difficult to make out.

More nearly simultaneous observations were done on 7 April (CM 97°,) when an image by Gasparri and a drawing by Peter Grego were made about three hours apart. Both may show the Southern Hemisphere feature known as Solitudo Martis, while Solitudo Lycaonis may be visible in the north (Figure 3, panels F and G). These two dark features were quite apparent in this evening apparition.

A final set of simultaneous observations was made on 10 April (CM 113°). There is one drawing by Frassati and one image by Marc Delcroix. The two observations are 19 minutes apart and both show Mercury as a crescent phase. In Frassati's drawing, Solitudo Jovis appears in the south, while in Delcroix's image it is present very subtly (Figure 3, panels H and I).

East or West?

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. Planetary east is defined as the direction towards which the planet rotates, just as it is with Earth.

For planets with direct rotation, including Mercury, Mars, Luna, Jupiter, and Saturn, planetary east is approximately opposite to east in the sky. (East in the sky is defined by the axis of Earth, so it is not exactly opposite to east of directly rotating planets.) For Venus, with its retrograde rotation, planetary east is approximately the same direction as east in the sky. Uranus is confusing, but if one considers it to rotate retrograde with an axial tilt of 82 degrees, and you are looking at its equatorial region, then planetary east is nearly at right angles to east in the sky; but if you are looking at its polar region, all bets are off.

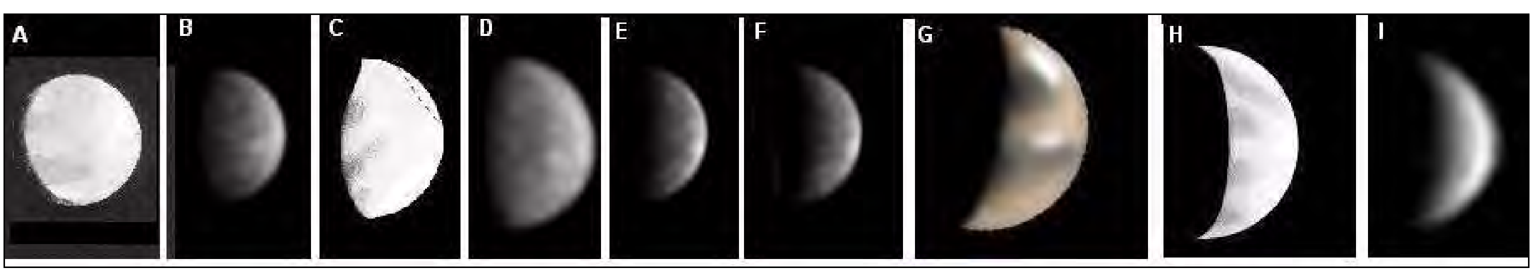


Figure 3. Observations of apparition 2.

A. Drawing by Carl Roussell, 24 Mar 2010, 19:04 UT, CM = 34°.

B. Image by Daniel Gasparri, 1 Apr 2010, 17:20 UT, CM = 69°.

C. Drawing by Mario Frassati, 1 Apr 2010, 18:05 UT, CM = 69°.

D. Image by John Boudreau, 1 Apr 2010, 22:13 UT, CM = 69°.

E. Image by Daniel Gasparri, 6 Apr 2010, 13:30 UT, CM = 91°.

F. Image by Daniel Gasparri, 7 Apr 2010, 16:06 UT, CM = 97°.

G. Drawing by Peter Grego, 7 Apr 2010, 19:20 UT, CM = 97°.

H. Drawing by Mario Frassati, 10 Apr 2010, 18:30 UT, CM = 113°.

I. Image by Marc Delcroix, 10 Apr 2010, 18:49 UT, CM = 113°.

Carl Roussell ended with his observation on 13 Apr (CM 131°). His drawing shows a thin crescent phase, with a dark feature in the south that may be Solitudo Jovis.

Mercury then became difficult to observe as it approached the inferior conjunction with the Sun of 28 April.

Apparition 3: Morning, 28 April – 28 June

Mercury's appearance was rather unfavorable as seen from the Northern Hemisphere. Only one observer contributed observations of this apparition.

John Boudreau used the new chip in his camera to make three incredible images, on 8 June (CM 97°), 15 June (CM 127°) and 19 June (CM 144°). In each, the contrast looks very good and all of the features on the disk are somewhat mottled, hinting at detail considerably beyond that seen previously in almost all Earth-based images. In the second and the third images, Solitudos Helii and Martis can be seen as dark blotches just south of the equator, and what may be Solitudo Neptuni is a dark area in the north (Figure 4, panels A, B and C).

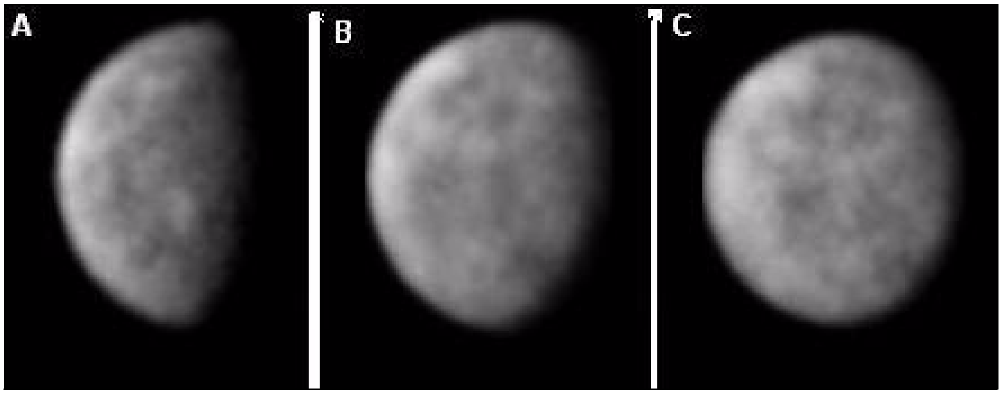


Figure 4. Observations of apparition 3.
A. Image by John Boudreau, 8 Jun 2010, 11:47 UT, CM = 97°.
B. Image by John Boudreau, 15 Jun 2010, 12:28 UT, CM = 127°.
C. Image by John Boudreau, 19 Jun 2010, 11:28 UT, CM = 144°. °

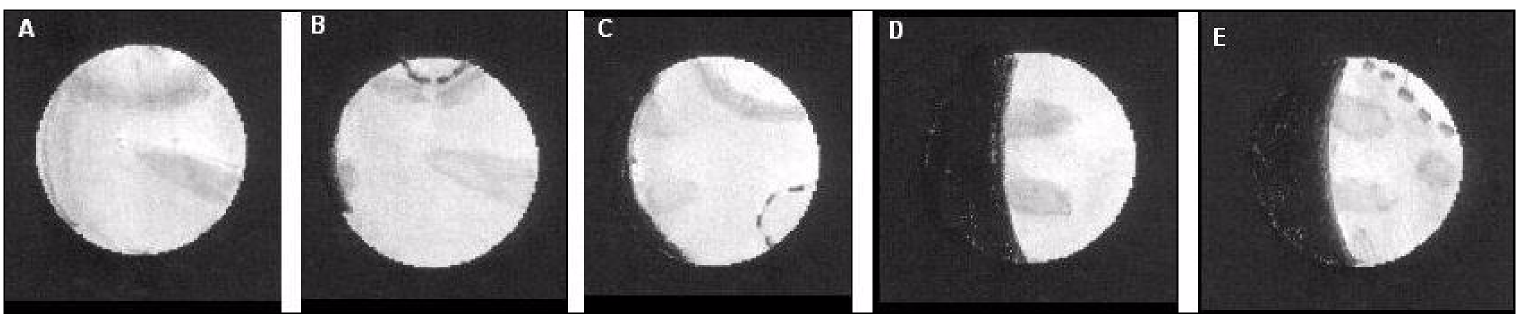


Figure 5. Observations of apparition 4.
A. Drawing by Carl Roussell, 2 Jul 2010, 23:40 UT, CM = 198°.
B. Drawing by Carl Roussell, 3 Jul 2010, 22:52 UT, CM = 201°.
C. Drawing by Carl Roussell, 11 Jul 2010, 00:04 UT, CM = 231°.
D. Drawing by Carl Roussell, 25 Jul 2010, 23:24 UT, CM = 298°.
E. Drawing by Carl Roussell, 26 Jul 2010, 23:59 UT, CM = 302°.

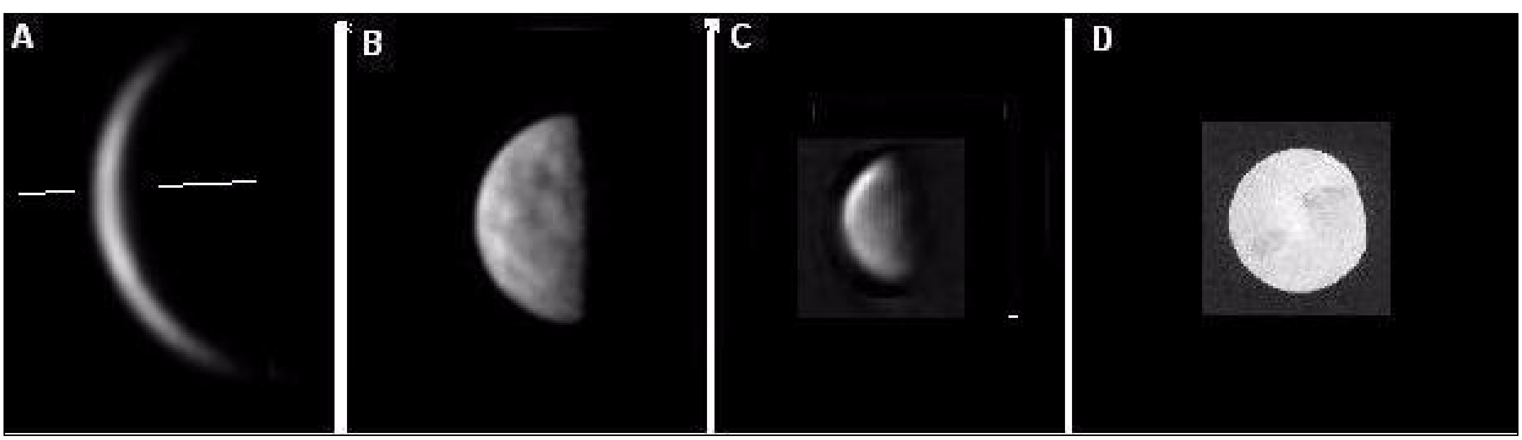


Figure 6. Observations of apparition 5.
A. Image by John Boudreau, 10 Sept 2010, 14:41 UT, CM = 215°.
B. Image by John Boudreau, 21 Sept 2010, 13:44 UT, CM = 278°.
C. Image by Frank J Melillo, 21 Sept 2010, 14:19 UT, CM = 278°.
D. Drawing by Carl Roussell, 7 Oct 2010, 18:30 UT, CM = 350°.

Many more features will be identified by comparing Boudreau's images with the MESSENGER map when it is completed.

Figure 7. Drawing of apparition 6 by Carl Roussell, 9 Nov 2010, 18:09 UT, CM = 139°.

Mercury went through superior conjunction with the Sun on 28 June.

Apparition 4: Evening, 28 June – 3 September

Mercury's evening appearance was quite poor as seen from the Northern Hemisphere. Only one person contributed observations of this apparition.

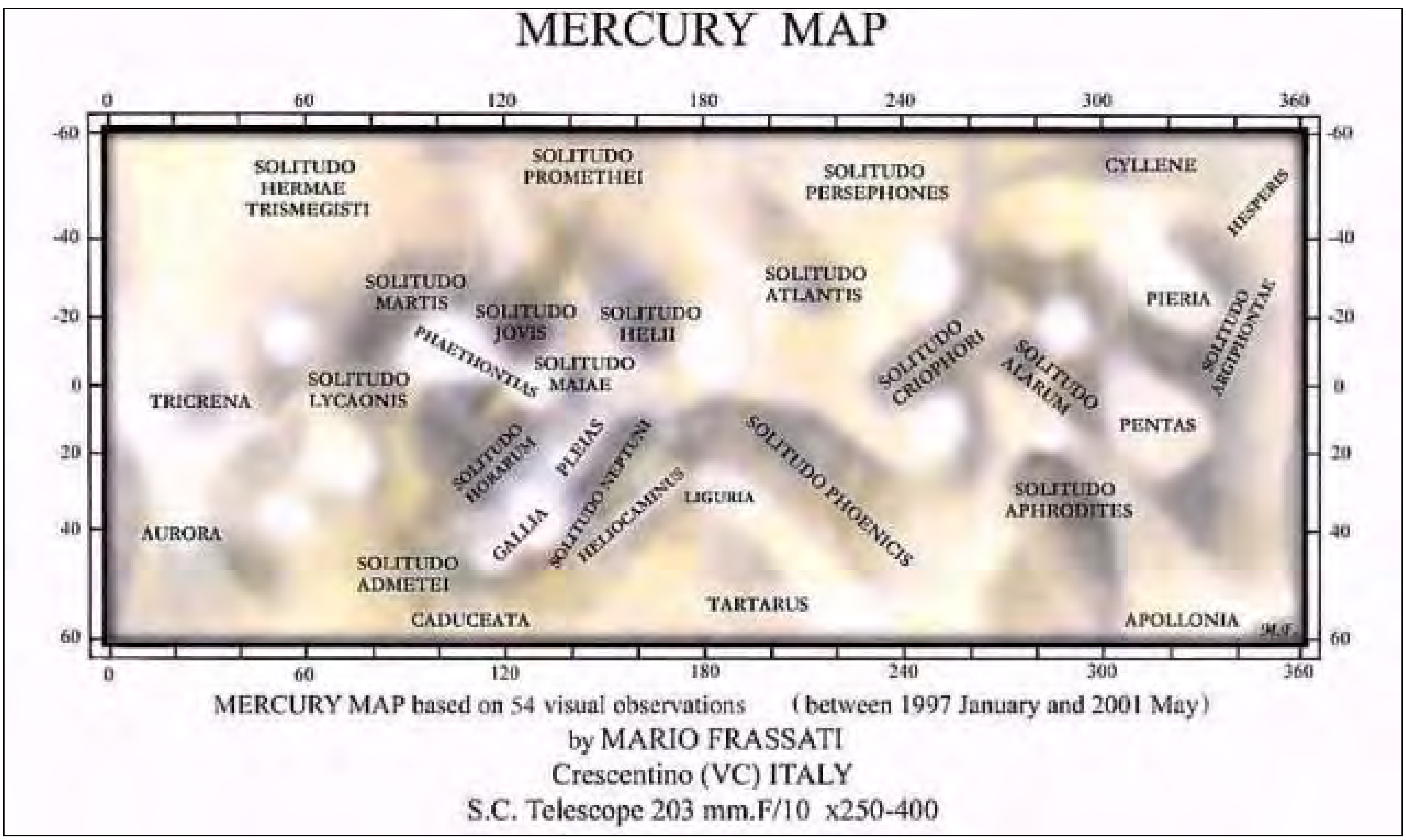
Carl Roussell made five drawings. On 2 July (CM 198°), Mercury was only four days past superior conjunction with a nearly full phase, and a disk diameter of only 5.1 arc seconds. Reports of observations of the planet this close to the Sun are rare. Yet under this condition, some details could be seen. Roussell drew a dark arc in the north with a brighter area in the North Polar Region. The dark arc may be Solitude Phoenicis, especially the eastern half, and the bright area near the polar region may be Liguria-Tartarus. The next day, 3 July (CM 201°), Roussell's drawing showed essentially the same features (Figure 5, panels A and B).

Roussell continued with observations on 11 July (CM 231°), 25 July (CM 298°) and 26 July (CM 302°). Solitudo Phoenicis may be seen as an arc in the north on 11 July (Figure 5, panel C). In the drawings on both 25 and 26 July, Solitudos Aphrodites (formerly "Skinakas Basin") may be seen in the north and Solitudo Criophori in the south (Figure 5, panels D and E).

Mercury ended the evening apparition with the inferior conjunction of 3 September.

Apparition 5: Morning, 3 September – 16 October

Mercury made a fine appearance in the morning sky. Unfortunately, only five observations were made by three people.



John Boudreau made an incredible image of Mercury showing a thin crescent on 10 September (CM 215°) and again on 11 September (CM 221°). On the 10th, the disk was 11% illuminated and displayed what may be Solitudo Aphrodites (the former "Skinakas Basin") as a dusky dark area along the crescent. (It is marked in Figure 6, panel A.) Though the feature is subtle, this area would be the brightest area of the crescent were it not for an albedo feature at that longitude. Boudreau and Frank J Melillo (this author) made simultaneous observations on 21 September (CM 278°). The images were made 35 minutes apart. Boudreau's image showed some incredible details with Solitudo Aphrodites as a dark spot and perhaps Solutido Criophori toward the equator and below. Melillo's image showed the same features, but at a lower resolution. Also, in Boudreau's images, two bright, rayed craters can be seen near the eastern limb. These bright features have been seen many times in the last few years.

Carl Roussell made a drawing on 7 October (CM 350°), which showed Solitudo Aphrodites as dark area toward the northwest of the disk.

Mercury went through superior conjunction with the Sun on 16 October.

Apparition 6: Evening, 16 October – 20 December

Mercury made a mediocre appearance after the superior conjunction of 16 October. There was only a single observation during this apparition.

Carl Roussell made a drawing on 9 November (CM 139°). The apparent disk diameter was quite small at 5.0 arc seconds and the seeing condition was average at the time the drawing was made. Through the eyepiece, the planet appeared gibbous and Roussell drew a large band across the north and central latitudes (Figure 7). It is uncertain what the feature is. Perhaps part of it is Solitudo Maiae in the northwest, appearing continuous with Solitudo Jovis near the equator in the east.

Mercury ended the evening apparition with the inferior conjunction of 20 December.

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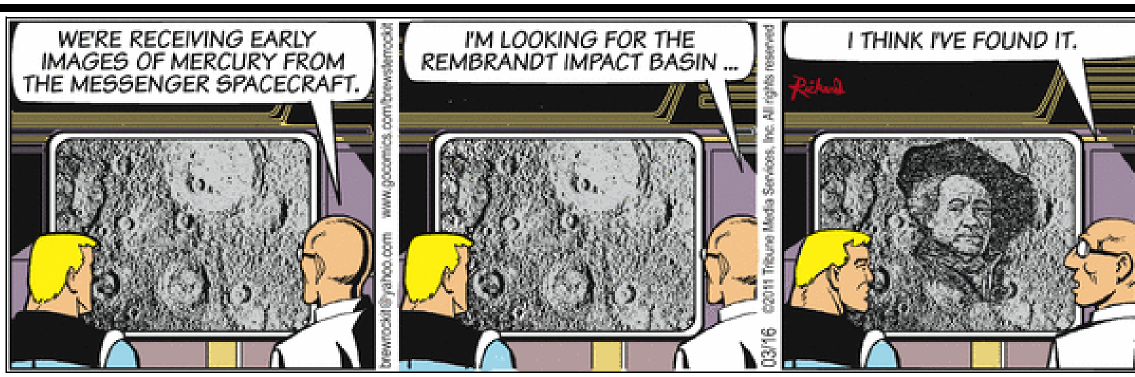
Murray JB, Smith BA and Dollfus A (1972). *Cartography of the Surface Markings of Mercury. Icarus,* 17(Dec):576-584

With the arrival of the MESSENGER spacecraft at Mercury earlier this year, the "Brewster Rockit" comic strip by Tim Rickard noted the feat with six days of cute and accurate panels like this one from March 16.



Source: http://www.gocomics.com/brewsterrockit/2011/03/16

Feature Story

Double-Digit Observing the Moon

By William M. Dembowski, FRAS,
Assistant Coordinator,
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Online Readers

Left-click your mouse on the e-mail address in blue text to contact the author of this article, and selected references also in blue text at the end of this paper for more information there.

Introduction

When observing the Moon, the tendency is to reach for power and more power; but low magnifications (those below 100x, or "double-digit" magnifications) can be equally interesting and useful. Most commercially available telescopes come equipped with a standard 25mm eyepiece which, in a typical 8 inch SCT, will provide a magnification of 80x.

Depending on the design of the eyepiece, this will cover most if not all of the lunar disc and serve well for the observations noted here (Figure 1).

Mare

The most dominating features at low power are the lunar maria. These dark regions of basaltic lava cover about 31% of the near side surface. There are about 10 major mare, and although nearly all are part of an interconnected network — much like the oceans of the Earth — their borders are still relatively well-defined. Learning the names and locations of the maria is traditionally the first step in familiarizing oneself with the lunar surface.

The maria are not expanses of uniform darkness. Some display several shades of brightness, indicative of the age and composition of the lava flows. Most evident under high Sun illumination, Mare Serenitatis is a brightly hued mare edged by darker lavas along its southern and eastern shores. Only under low magnification, with its wider field of view, can these changes in albedo be fully encompassed and appreciated (Figure 2).

Bright Rays

Second only to the maria in sheer size, the Moon's many systems of bright rays is another class of features that are well-suited to study at low magnification. In fact, some of the systems are so extensive that many observers feel that magnifications in excess of 200x are more of a hindrance than a help when studying them.

The most extensive lunar ray system is that associated with the crater Tycho. Long and straight, the rays of Tycho reach halfway across the face of the Moon and are so bright that they are highly visible even on the relatively bright highlands where they originate. One ray from Tycho appears to divide Mare Serenitatis in half. If this is in fact a ray from Tycho and not

Figure 1. Full Moon - NASA/Lick Observatory.

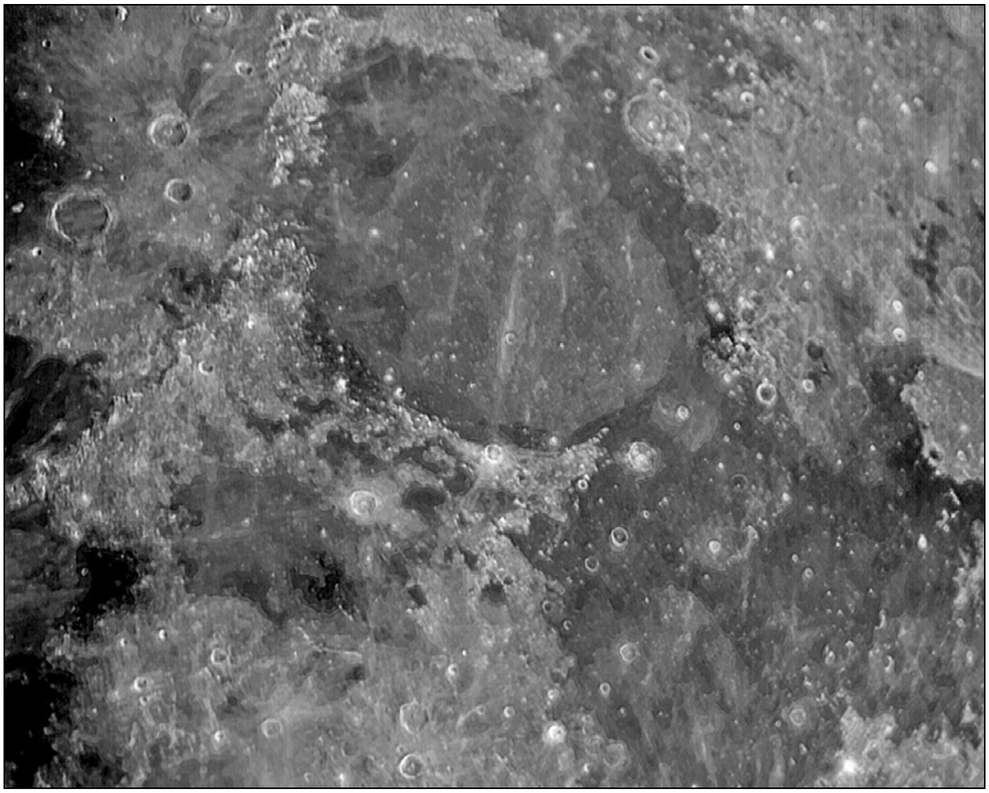

Figure 2. Mare Serenitatis – William Dembowski – Elton, Pennsylvania - July 15, 2008 – 02:07 UT – Seeing: 4/10 – Colongitude: 53.9° – Celestron 8 inch SCT – Orion StarShoot II Camera - North up and east at right.

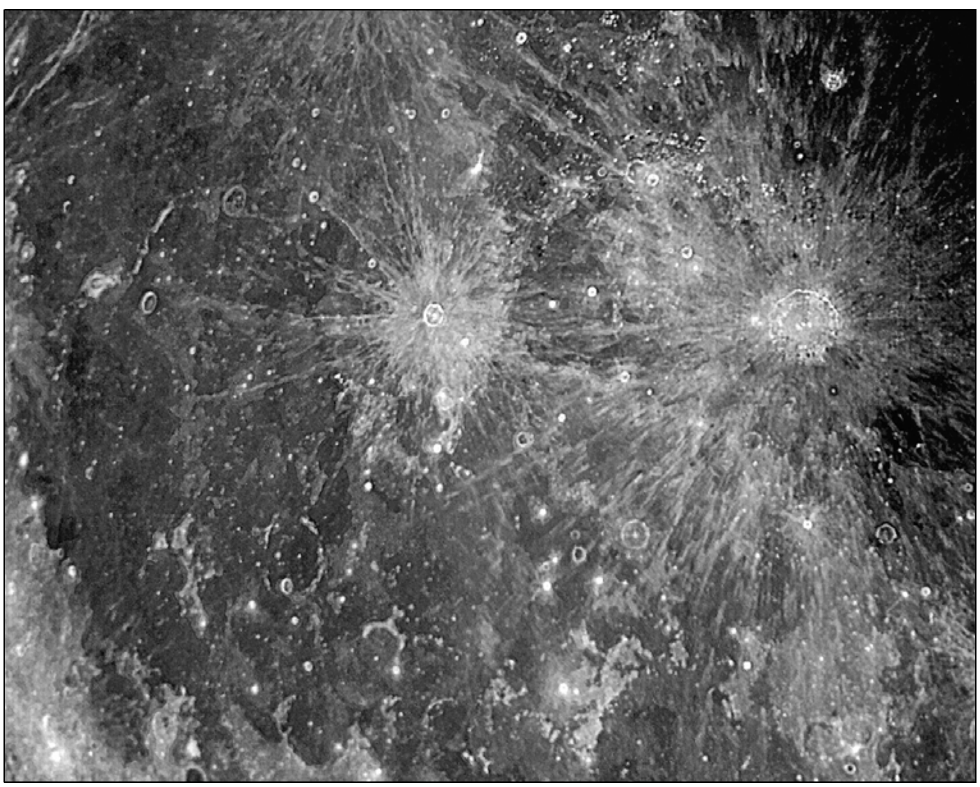

Figure 3. Ray systems of Copernicus & Kepler – William Dembowski – Elton, Pennsylvania - July 31, 2007 – 04:09 UT – Seeing: 4/10 – Colongitude: 106.6° – Celestron 8 inch SCT – Orion StarShoot II Camera - North up and east at right.

from Menelaus as some believe, the span of the Tycho system exceeds 2,000 km (1,242 miles).

Far north of Tycho, in northern Oceanus Procellarum, are the craters Copernicus and Kepler. Their ray systems are rather different than Tycho's. Whereas the rays of Tycho are straight and narrow the Copernicus and Kepler rays are broader and more feather-like. They appear to spread like ostrich plumes, sometimes doubling back upon themselves to form oval loops. The two systems overlap in a complex pattern that is difficult to decipher (Figure 3). Some observers find it useful to note the position and extent of ray systems on copies of the Lunar Quadrant Maps, thereby creating their own map of bright rays, something which does not exist in any widely accepted form.

Bright Spots

Under shadowless illumination, the lunar surface is peppered with bright spots. These are impact craters, often too small to be seen at low magnifications, but whose haloes (rays of limited extent) shine with almost starlike brilliance. As with larger ray systems, the use of a polarizing filter can be of great help in viewing bright spots. These filters will not only reduce the brightness of the lunar disk, which is heightened by low power eyepieces, but will also increase the contrast between the bright spots and their surroundings.

Once again, marking bright spot locations on a set of the Lunar Quadrant Maps can form the basis of a rewarding personal observing program. Especially for, but not limited to, those who possess neither the drawing skills nor the imaging capabilities that many believe are the only techniques essential to lunar observing.

Mountain Ranges

The mountains of the Moon are quite different from those of Earth. In fact, by earthly standards, they are not really mountains at all. On Earth, mountains are formed by tectonic forces, the folding and lateral movement of the crust. On the Moon, however, nearly all of the mountains are the result of impact events. The classic examples of this are the Montes Carpatus, Apenninus, Caucasus, Alpes and Jura, which encircle the

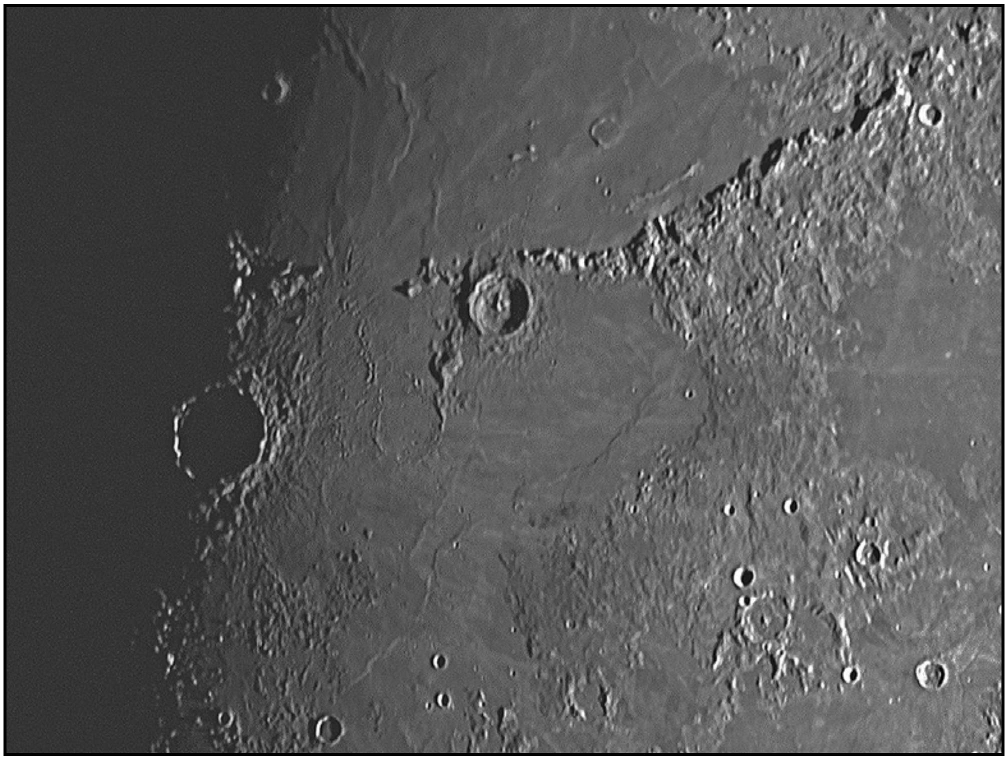

Figure 4. Apennine Mountains & Eratosthenes – William Dembowski – Elton, Pennsylvania - August 19, 2010 – 01:21 UT – Seeing: 4/10 – Colongitude: 20.8° – Celestron 9.25 inch SCT – ImagingSource DMK41 Camera – North up and east at right.

Imbrium Basin. They are actually segments of the broken rim of an enormous impact crater; but since they do not form a continuous circle, we consider them to be mountains rather than a crater rim. Once again, just as with the bright ray systems, only with a low-power eyepiece can the interrelationship of mountain ranges be seen and studied.

Some mountain ranges can be used as landmarks in the location of other, smaller features. The Apennines, for example, serve as a perfect pointer to the crater Eratosthenes (Figure 4). At less than 60 km (37 miles) in diameter, Eratosthenes, would otherwise be more difficult to locate.

Craters

Craters are unquestionably the Moon's iconic class of features and a fair number of them, by virtue of their large size, can be explored with double-digit magnification. The southern hemisphere is a particularly good hunting ground for large craters. The south/central crater chains of Ptolemaeus/Alphonsus/Arzachel and Theophilus/Cyrillus/Catharina are of particular interest on the nights surrounding first and last quarter. Further south, Longomontanus, Maginus, Clavius and Bailly — the Moon's largest crater at 300 km (186 miles) — make for fine viewing as well.

Some craters such as Schickard, Plato, Endimion and Grimaldi have dark floors, which make them even more visible at low power, while others (Copernicus and Archimedes), though smaller, are easily seen because they lie on the relatively flat plains of the maria. Of course, the key to observing lunar craters at low power is to view them when they are at or near the terminator.

Non-topographical Observations

There are several types of astronomical observations that involve the Moon but which do not include the study of its topographical features. During a lunar eclipse, it is scientifically useful to make timings of when various craters enter and exit that portion of the Earth's shadow called the umbra. These data are used to calculate the size of the Earth's shadow which tends to change from one eclipse to another. High magnifications are useless for these observations since they make it virtually impossible to determine the boundary between the umbra and penumbra of the Earth's shadow.

Another type of non-topographical lunar observation within the grasp of double digit magnification is the timing of stars being occulted by the Moon. Not only are high magnifications unnecessary, the wider field of view provided by low powers make it much easier to observe the star as it emerges from behind the Moon.

Conclusion

In addition to low-power observations for their own sake, double-digit viewing is also useful for locating interesting features before zooming in with higher powers to study them in detail. But the real lesson to be learned here is that before reaching for that high-powered eyepiece, try some serious double-digit observing. You may discover some new aspects of lunar observing that are very much to your liking.

Admittedly, the narrow field of view of the webcam used for the images that accompany this article is not consistent with that of a low power eyepiece, but the principles described in the text still apply.

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Wood, Charles A., "*The Modern Moon – A Personal View*", Sky Publishing, 2003.

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

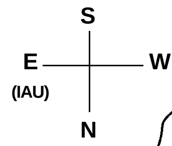
Albedo Data

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

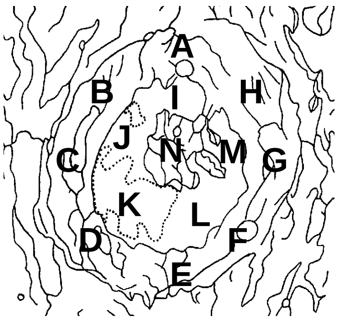
Assigned Albedo Index	Albedo IL	Albedo F1	Albedo F2	Assigned Albedo Index	Albedo IL	Albedo F1	Albedo F2
A				J			
B				K			
C				L			
D				M			
E				N			
F				O			
G				P			
H				Q			
I				R			

NOTES:

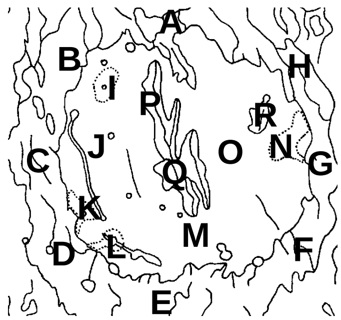
A.L.P.O. Lunar Selected Areas Program



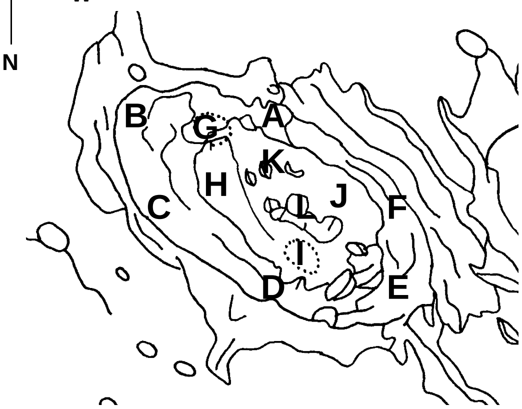
page 1 of 2



Theophilus



Alphonsus



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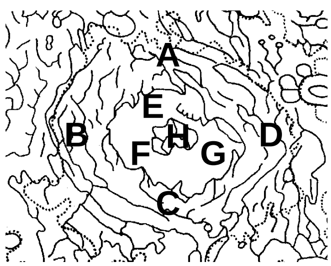
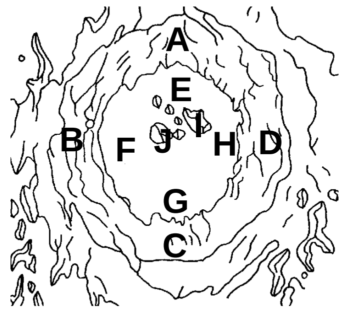
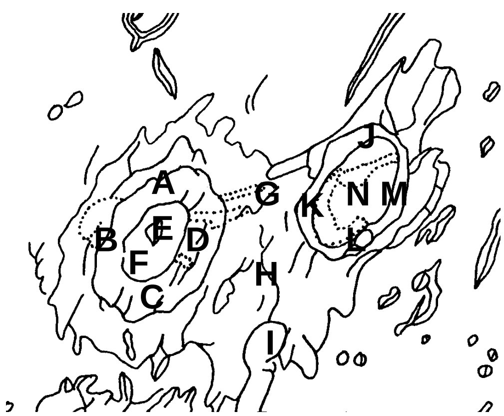


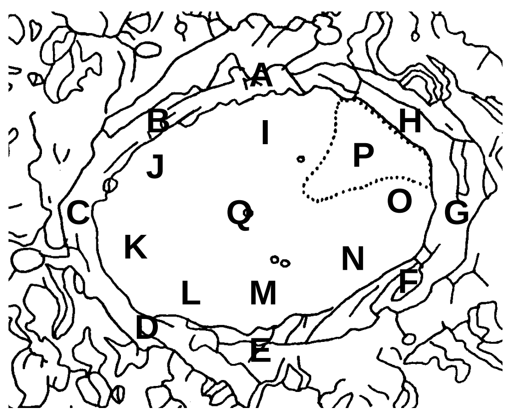
Tycho



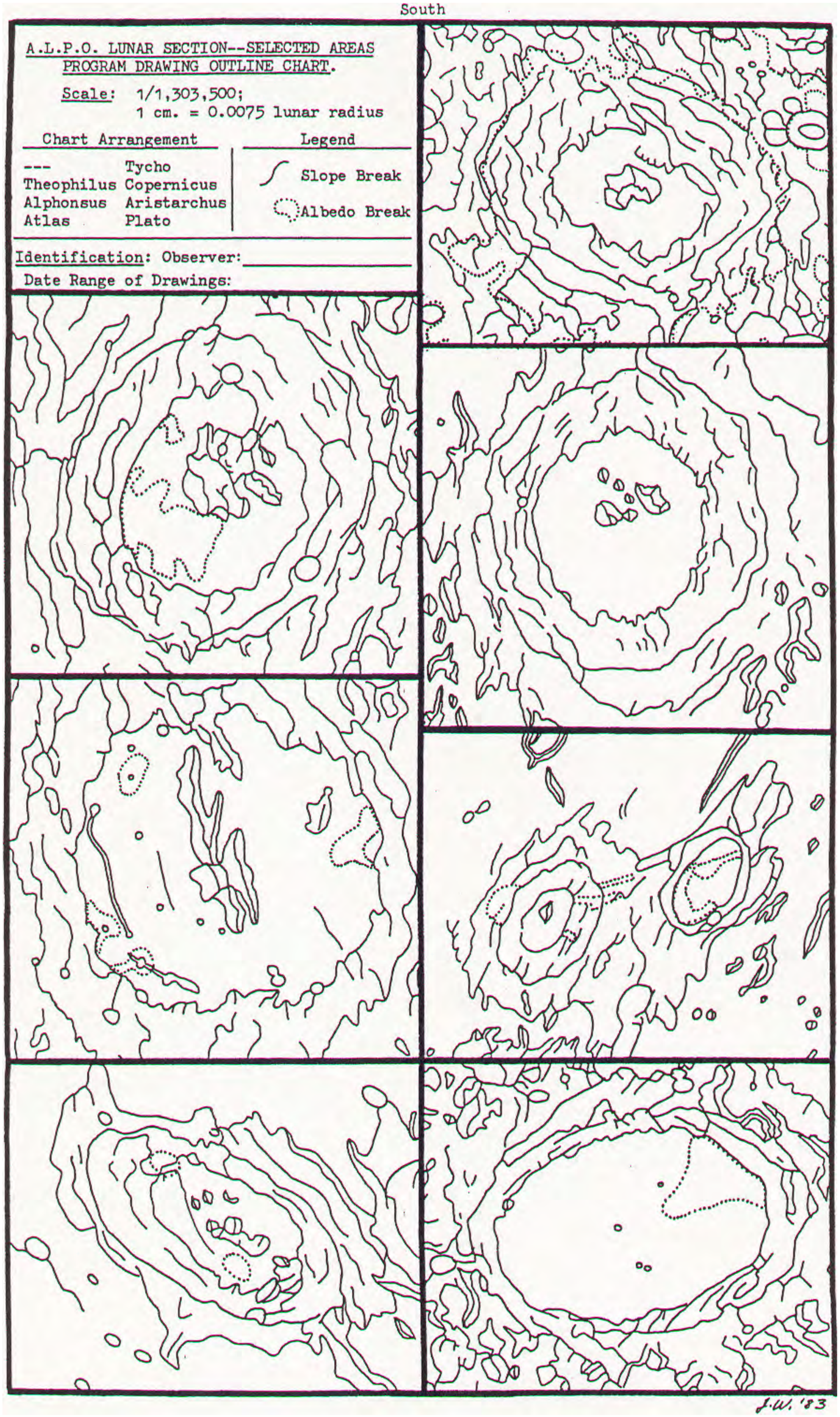
Copernicus



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

Feature Story

Rotation Period Determination for Minor Planet 280 Philia – A Triumph of Global Collaboration

By Frederick Pilcher, ALPO Minor Planets Section coordinator
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Andrea Ferrero, Bigmuskie Observatory, Asti, Italy

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This report is only one of many found in the *Minor Planet Bulletin*, Volume 38, Number 3, available at no charge online at *http://www.MinorPlanetObserver.com/astlc/default.htm*.

Abstract

To determine the rotation period of the slowly rotating asteroid 280 Philia, five observers from three continents, East Asia, Europe, and North America, collaborated for full global phase coverage. A unique solution was found: P =70.26 ± 0.03 hr; A=0.15 ± 0.02 mag.

Discussion

The only previous observations of 280 Philia are by Binzel (1987) who suggested a 64 hour period based on a very sparse and irregular lightcurve containing 26 points on 6 consecutive nights in 1984. With a suspected long period and possible commensurability with Earth's rotation period, first author Pilcher organized a campaign in which 5 observers with wide global distribution of longitudes participated. The first two sessions 2010 Dec. 26 and 29 showed slightly displaced maxima which suggested a period near 23 hours or multiple thereof. Lightcurves separated by 8 days (192 hours, or 3 cycles of 64 hours each) 2010 Dec. 26 and 2011 Jan. 3 should be identical if the period is 64 hours, but looked completely different and ruled out a period near 64 hours. During the interval 2010 Dec. 26 – 2011 Mar. 10 observations a total of 9037 data points on 38 sessions were obtained. To make the lightcurve more readable these have been reduced to 1828 points with binning in sets of 5 with time interval no greater than 10 minutes.

Table 1: Contributing Observers for This Paper

Observer	Instrument	CCD	No. of Sessions
Vladimir Benishek	40 cm S-C	SBIG ST-10 XME	7
Andrea Ferrero	30 cm R-C	FLI cm9	3
Hiromi & Hiroko Hamanowa	40 cm Newt	SBIG STL-8	5
Frederick Pilcher	35 cm S-C	SBIG STL-1001E	17
Robert Stephens			2
	30 cm S-C		4
* Newt = Newtonian; R-C = Ritchey-Chretien; S-C = Schmidt-Cassegrain			

Table 2: Angular Data for This Paper

Observation Date	Phase Angle (PA) in Degrees (°)	Longitude of Phase Angle Bisector (LPAB) in Degrees (°)	Latitude of Phase Angle Bisector (BPAB) in Degrees (°)
2010/12/26	13.1	124.0	+8.8
2011/01/26	4.0	124.9	+8.7
2011/03/10	16.7	126.9	+7.3

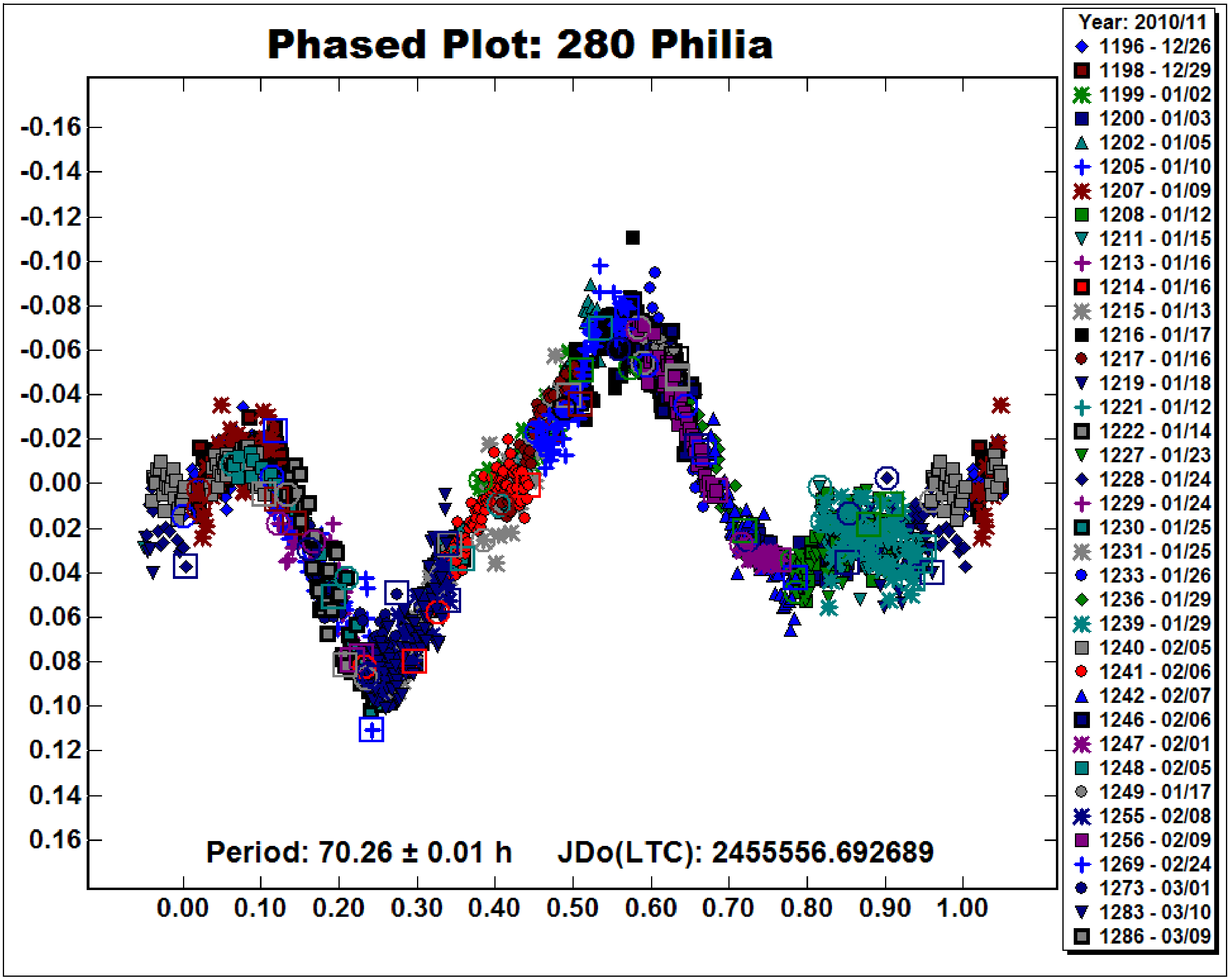
MPO Canopus software was used for lightcurve analysis and expedited the sharing of data among the collaborators, who independently obtained several slightly different rotation periods. A synodic period of 70.26 hours, amplitude 0.15 ± 0.02 magnitudes, represents all of these fairly well, but we suggest a realistic error is ± 0.03 hours rather than the formal error of ± 0.01 hours.

The double period 140.55 hours was also examined. With about 95% phase coverage the two halves of the lightcurve looked the same as each other and as in the 70.26 hour lightcurve. Furthermore for order through 14 the coefficients of the odd harmonics were systematically much smaller than for the even harmonics. A 140.55 hour period can be safely rejected.

The dates of the sessions by the several observers are listed here. For European observers the session ends on the date following that on which it began; the starting date is provided here. Vladimir Benishek 01/09, 01/16, 01/29, 02/06, 02/08, 02/09, 03/09; Andrea Ferrero 01/13, 01/23, 01/24; Hiromi and Hiroko Hamanowa 01/12, 01/14, 01/17, 02/01, 02/05; Frederick Pilcher 12/26, 12/29, 01/02, 01/03, 01/05, 01/10, 01/12, 01/15, 01/17, 01/25, 01/29, 02/05, 02/06, 02/07, 02/24, 03/01, 03/10; Robert Stephens 01/16, 01/18, 01/24, 01/25, 01/26.

Reference

Binzel, R. P. (1987). A Photoelectric Survey of 130 Asteroids. *Icarus* **72**, 135-208.



Feature Story

ALPO Observations of Jupiter During the 2009-2010 Apparition

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This paper includes Jupiter images submitted by a number of observers.

Abstract

Drift rates of 123 different features in over a dozen currents are reported. Twenty small, dark spots followed the South Temperate Belt North Jetstream and had an average system II drift rate of -86.3°/30 days. Drift rates of other currents were usually consistent with historical values. Data between 1998 and 2009 are consistent with the bright polar hoods, visible in methane band images, becoming smaller during the summer and larger during the winter. The selected normalized magnitudes of Jupiter are: B(1,0) = -8.63±0.04, V(1,0) = -9.47±0.02, R(1,0) = -9.89±0.04 and I(1,0) = -9.72±0.04.

Introduction

Belt, zone and current names and their abbreviations are listed in Table 1. Abbreviations are used in this report.

Two significant events in 2009 were the impact on July 19, 2009 and the development of 20 small dark spots following the South Temperate Belt North Jetstream. In addition to these events, white ovals were observed following the S^3TC jetstream; several barges developed in the SEB and in the second half of the year the SEB began to fade. Rogers (2009a, 235-236; 2009b, 308) gives overviews of the first half of the 2009 apparition. Rogers, Wesley and Mettig (2009) give a summary of the July 19, 2009 impact. Rogers (2009c-i) has also posted seven preliminary Jupiter reports at: *http://www.britastro.org/jupiter/2009reports.htm*.

The characteristics of Jupiter for 2009-2010 are listed in Table 2. The people who submitted observations, images or measurements of Jupiter to either the writer, the websites *http://alpo-j.asahikawa-med.ac.jp/Latest/Jupiter2008Apparition.htm* or *http://www.arksky.org* or to the ALPO Jupiter group are listed in Table 3.

This paper will follow certain conventions. The planetographic latitude is always used. West refers to the direction of increasing longitude. Longitude is designated with the Greek letter λ, followed by a subscript Roman numeral that is the longitude system. As an example, $\lambda_I = 54°$ means that the system I longitude equals 54° W. The three longitude systems are described in (Rogers, 1995, 11; 2006, 334), (Astronomical Almanac, 2003, L9). All dates and times are in Universal Time (UT). Belts and currents are abbreviated. Unless stated otherwise, all data are based on visible light images. All methane band images were made in light with a wavelength near 0.89 μm. All currents, except where noted, are named in accordance with Rogers (1990, 88). In all cases the drift rate, except where noted, is for the center of the feature.

Disk Appearance

Cudnik, Roussell, Plante and others made over 200 light intensity estimates of Jupiter's belts and zones. These estimates were made between May and November of 2009. The average light intensities based on the ALPO scale (10 = white and 0 = black) are: SPR (5.8), STrZ (9.0), SEB (4.3), EZ (8.2), EB (7.5), NEB (3.3), NTrZ (8.5), NTB (5.6), NTZ (7.5), NNTB (5.5), NNTZ (6.7), GRS (5.1) and NPR (6.0). The biggest change between 2008 and 2009 is that the GRS grew darker.

The writer measured latitudes of Jovian belts from images made in August 2009. Latitudes were measured using the procedure described in Peek (1981, 49). Latitudes were measured from images in each of the six 60°–longitude intervals (system II). Average latitudes were then computed and are listed in Table 4 (visible wavelengths) and Table 5 (methane-band wavelength).

Figures 1 and 2 show several graphs of the longitude versus date for features on Jupiter during the 2009-2010 apparition. The drift rates are proportional to the slopes. Unless noted otherwise, the drift rates in 2009-2010 compare well with those measured in the late 19^{th} and 20^{th} centuries (Peek, 1981; Rogers, 1995) and with those measured in the two previous apparitions (Schmude, 2010a, b). Figure 3 shows drawings of Jupiter along with a labeled drawing showing the names of a few belts and zones. Figure 4 shows images of Jupiter made throughout the 2009-2010 apparition. Figure 5 shows images of an occultation of Ganymede by Europa, an image of Jupiter and Amalthea, and two images of Jupiter showing features D3 and D4.

Tables 6 through 8 list feature names, a one to three letter description of the appearance of the feature, the number of data points used in determining the drift rate, planetograhic latitudes and drift rates. Table 9 summarizes wind speeds for the various currents. Tables 10 and 11 summarize whole-disk brightness measurements of Jupiter.

Most feature names in this report have a letter followed by a number. Names follow the convention described in Schmude (2010a).

All Readers

Your comments, questions, etc., about this report are appreciated. Please send them to: *poshedly@bellsouth.net* for publication in the next Journal.

Online Features

Left-click your mouse on:

- The author's e-mail address in blue text to contact the author of this article.
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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:
- Magnitude of the faintest star visible near Jupiter when allowing for moonlight and twilight

IAU directions are used in all instances (so that Jupiter rotates from west to east).

Table 1: Names and Abbreviations of Belts and Zones on Jupiter

Belt and Zone Name	Abbreviation	Current Name	Abbreviation
South Polar Region	SPR	South Polar Current	SPC
South Polar Belt	SPB	South South South South Temperate Current	S^4TC
South Temperate Zone	STZ	South South South Temperate Current	S^3TC
South Tropical Zone	STrZ	South South South Temperate Current Jetstream	S^3TC jetstream
South Equatorial Belt	SEB	South South Temperate Current	SSTC
Equatorial Zone	EZ	South Temperate Current	STC
Equatorial Band	EB	South Tropical Current	STrC
North Equatorial Belt	NEB	North Equatorial Current	NEC
North Tropical Zone	NTrZ	North Temperate Current	NTC
North Temperate Belt	NTB	North North Temperate Current Jetstream	NNTC jetstream
North Temperate Zone	NTZ	North North Temperate Current	NNTC
North North Temperate Belt	NNTB	North North North Temperate Current	N^3TC
North Polar Region	NPR	North North North North Temperate Current	N^4TC
Great Red Spot	GRS	North Polar Current	NPC

Region I: Great Red Spot

The GRS is shown in Figures 3B, 3D-3E, 3I, 4E, 4G-4I and 4K. In methane band light (near 0.89 µm), the GRS appears as a white oval (Figure 4H). Pellier reports that the GRS intensified in color and contrast throughout 2009. He bases this observation on both color images and unprocessed violet light images. Cudnik describes the GRS as having a “salmon-gray’ color on May 16, a “pink-gray” color on September 27 and a “pink” color on November 25. Adachi reports that the GRS was not reddish on July 14 but had a faint reddish color on August 14. A few days later, however, he reports that the GRS was not reddish.

Between July 31 and August 29, 2009 the average system II longitude of the GRS was 138.6°W ± 0.2°. This is 12.8° further west than thirteen months ago.

Region II: South Polar Region to the South Tropical Zone

The SPB was again visible in the SPR. Latitudes for this belt are listed in Table 4. The latitude of the southern edge is similar to what it was in the two previous apparitions. The northern edge of the SPB, however, is a bit different than the corresponding latitudes of 65.1° ± 1.0° S and 64.3° ± 0.5° S measured in 2006-2007 and in 2008, respectively (Schmude, 2010a, b). The SPB is shown in Figure 4B. Adachi drew this belt on July 14 (at 15:07 UT) using a 0.31 m Newtonian at 400 X. He described it as being very dark. His drawing is at: *http://alpo-j.asahikawa-med.ac.jp/Latest/Jupiter2008Apparition.htm*. The second polar belt between 74° S and 78° S, suspected in 2008, (Schmude, 2010b) was not visible in 2009.

Figure 4H shows a methane band image of Jupiter. Note the bright areas above both the south and north polar regions; hereafter, these bright areas will be called polar hoods. Since the late 1990s, the edges of both polar hoods have been measured. Do the polar hoods change with the seasons? To answer this question, Figure 6 was constructed. This figure shows three graphs. The top graph shows the latitude of the northern edge of the south polar hood, the middle graph shows the latitude of the southern edge of the north polar hood and the bottom graph shows the planetographic declination of the Sun for Jupiter. The latitudes of the polar hoods appear to oscillate with the planetographic declination of the Sun. It appears that the hoods are smallest in the summer and largest in the winter. More data, however, are needed to confirm this trend.

Wesley imaged a new dark spot near Jupiter’s limb on July 19 at 14:02.1 UT. Shortly thereafter, this spot rotated to a more favorable location and was imaged by Wesley, Mishina, Yoneyama, Tokujiro, Oyamada and Naitou. It is not visible on Rivera’s July 19 (5:19 UT) image. Therefore, the impact took place on July 19. The average system II drift rate for A5 is -5.7°/30 days. This is consistent with the drift rate of -4°/month reported for the center

Table 2: Characteristics of the 2009 - 2010 Apparition of Jupiter[a]

First conjunction date	2009 Jan 24
Opposition date	2009 Aug 14
Second conjunction date	2010 Feb 28
Brightness at opposition (stellar magnitude)	-2.9
Equatorial angular diameter at opposition	49.0 arc-seconds
Right Ascension at opposition	21h 39m
Declination at opposition	15.2º S
Planetocentric latitude of the Earth at opposition	0.5° N
Planetocentric latitude of the Sun at opposition	0.3° N

[a]Data are from the Astronomical Almanac (2003, 2007, 2008)

Table 3: Contributors to the 2009-2010 Jupiter Apparition Report[a, b]

Name; location (type of observation)	Name; location (type of observation)	Name; location (type of observation)	Name; location (type of observation)
P. Abel, UK (I)	H. Fukui, Japan (I)	R. Meier, Canada (I)	M. Salway, Australia (I)
M. Adachi, Japan (D, DN)	C. Galdies, Malta (D)	I. Melandri, Italy (I)	J. Sanchez; Spain (I)
G. Adamoli, Italy (D, DN)	S. Ghomizadeh, Iran (I)	J. Melka, USA (I)	R. Schmude, Jr.; USA (PP)
J. Adelaar; The Netherlands (I)	C. Go, Philippines (I)	F. Melillo, USA (I)	R. Schrantz (I)
T. Akutsu; Philippines (I)	Y. Goryachko, Belarus (I)	J. Melquist, USA (I)	R. Schulz, Austria (I)
L. Albero, Spain (I)	E. Grafton, USA (I)	H. J. Mettig, Germany (I)	I. Sharp, UK (I)
J. Albert, USA (I)	G. Grassmann, Brazil (I)	M. Mingo, Italy (I)	C. Sherrod, USA (I)
P. Amadio, Italy (I)	P. Grego, Italy & UK (I)	T. Mishina, Japan (I)	K. Silvia, Germany (I)
V. Amadori, Italy (I)	B. Haberman, Jr.; USA (I)	K. Morozov, Belarus (I)	A. Sonka, Romania (I)
K. Ando; Japan (I)	T. Hansen, Germany (I)	M. Naitou, Japan (I)	N. Sotera, Italy (I)
D. Arditti; UK (I)	T. Hasebe, Japan (I)	K. Nakai (I)	S. Spampinato, Italy (I)
T. Ashcraft, USA (R)	A. Hatanaka, Japan (I)	M. Neichi, Japan (I)	G. Stelmack, Canada (I)
L. Azorin, Spain (I)	T. Hayashi, Japan (I)	D. Niechoy, Germany (D)	J. Strikis, Greece (I)
G. Bailey, USA (I)	C. Hernandez, USA (D, DN)	T. Nonoguchi, Japan (I)	M. Sweetman, USA (D)
T. Barry, Australia (I)	R. Hill, USA (I)	M. Notoya, Japan (I)	J. Sussenbach, The Netherlands (I)
D. Blesser, USA (I)	T. Hino, Japan (I)	R. Nunes, Portugal (I)	T. Suzuki, Japan (I)
G. Blesser, USA (I)	M. Hood, USA (I)	C. O'Beirnes, Ireland (I)	R. Taggart, USA (I)
R. Bosman; The Netherlands (I)	K. Horikawa, (D)	T. Olivetti, Thailand (I)	G. Tarsoudis, Greece (I)
M. Boschat (DN)	M. Hui, China (D)	L. Owens, USA (I)	R. Tatum, USA (I)
R. Bouchet (I)	M. Jacquesson, France (I)	H. Oyamada, Japan (I)	M. Teodorescu, Romania (I)
S. Buda, Australia (I)	R. Jakiel, USA (I)	K. Ozaki, Japan (I)	M. Toet, The Netherlands (DN, I, O)
F. Carvalho; Brazil (I)	J. Jovani (I)	D. Parker, USA (I)	K. Tokujiro, Japan (I)
P. Casquinha; Portugal (I)	S. Kanno, Japan (I)	S. Parker, New Zealand (I)	T. Trenter (I)
J. Castella, Spain (I)	H. Karasawa, Japan (I)	D. Peach, UK (I)	D. Tyler, UK (I)
C. Cellini, Italy (I)	J. Kazanas, Australia (I)	C. Pellier, France (I)	T. Usude, Japan (I)
D. Chang; Hong Kong, China (I)	W. Kivits, The Netherlands (I)	Jacob Phillips, USA (I)	M. Vajda, Slovakia (I)
R. Chavez, USA (I)	M. Koishikawa, Japan (I)	Jim Phillips, USA (I)	M. Valimberti, Australia (I)
G. Chester; USA (I)	S. Kowollik, Germany (I)	Michael Phillips, USA (I)	R. Vandebergh, The Netherlands (I)
A. Cidadao, Portugal (I)	E. Kraaikamp (I)	Megan Phillips, USA (I)	R. Vanur (I)
J. Colorado, El Salvador (I)	T. Kumamori, Japan (I)	P. Plante, USA (D)	G. Walker, USA (I)
B. Combs, USA (I)	P. Lawrence, UK (I)	J. Poupeau, France (I)	S. Walker, USA (I)
B. Cudnik, USA (D, DN)	P. Lazzarotti, Italy (I)	D. Pretorius, Australia (I)	J. Warren, USA (I)
V. da Silva, Jr., Brazil (I)	M. Lewis, UK (I)	J.-P. Prost, France (I)	A. Wesley, Australia (I)
J. Davidson, Brazil (I)	M. Libert, Germany (I)	Z. Pujic, Australia (I)	R. Wheeler, USA (I)
P. De Gregorio, Italy (I)	D. Llewellyn, USA (I)	K. Quin, USA (I)	K. Wildgoose (I)
M. Delcroix, France (I)	O. Lopez, Spain (I)	T. Ramakers, USA (I)	C. Winterer, Germany (I)
K. Dimitrios, Greece (I)	C. Mac Dougal, USA (DN)	E. Rivera, USA (I)	T. Winterer, Germany (I)
P. Edwards, UK (I)	K. Manos, Greece (I)	J. Rogers, UK (DN)	B. Worsley, USA (I)
H. Einaga, Japan (I)	D. Mason, UK (I)	M. Rosolina (I)	A. Wrembel, Poland (I)
C. Fattinnanzi, Italy (I)	P. Mason, USA (I)	J. Rozakis, Greece (I)	M. Yamamoto, Japan (I)
D. Fell, Canada (I)	M. Mattei, USA (I)	C. Roussell, Canada (D, DN)	A. Yamazaki, Japan (I)
M. Fischer, Germany (I)	P. Maxson, USA (I)	J. Sabia, USA (I)	S. Yoneyama, Japan (I)
S. Fong, Hong Kong, China (I)	G. Medina, Spain (I)	T. Saitou, Japan (I)	K. Yunoki, Japan (I)
J. Fremerey, Germany (I)	A. Medugno, Italy (I)	S. Saltamonti, Italy (I)	

[a]Type of observation: D = drawing, DN = descriptive notes, I = image, O = occultation, PP = photoelectric photometry, R = radio studies and TT = transit times
[b]All people who submitted images to http://www.arksky.org in the ALPO Jupiter archive and in the ALPO Japan Latest website in the Jupiter archive are acknowledged in this table.

of this feature by Rogers, Wesley and Mettig (2009).

One dark bar (A7) at 54.6° S followed the S^4TC. The length of this feature remained nearly constant throughout the study period. The system II drift rate of A7 is -20.9°/30 days. This is similar to the rate of A5 in 2008 (Schmude, 2010b) but is a bit more negative than the drift rates of the three features at 55° S listed in Rogers (1995, 240).

Two white ovals A2 and A4 followed the S^3TC. The average drift rate of these features is -15°/30 days. White oval A2 oscillated in longitude during most of 2009. This is similar to A3 which oscillated during most of 2008.

Twenty dark spots (C3-C4, C6-C9, C11-C24) at a latitude near 29° S followed the South Temperate Belt North Jetstream (STBn jetstream). These spots were approximately 2000 km across. Figure 4C shows one of these spots (C3) just above the right edge of the GRS. The average drift rate of the STBn jetstream is -86.3°/30 days. This is consistent with rates measured in the mid-1960s (Rogers, 1995, 214-215). One difference for the spots in 2009 though is that they are about 3° farther south than those measured in the mid-1960s. Phillips apparently drew a similar series of spots on August 2, 1927 (Rogers, 1995, Plate P6).

Region III: South Equatorial Belt

Sweetman described the SEB as "dark" on September 25 and October 20. Cudnik described it as "brown" on May 16; "burnt orange" on July 25; "brown-gray" on September 27 and "gray" on November 25. Adachi described the SEB as "very dark and prominent" on July 23.

Barges (D6-D10, D14-D15) developed within the SEB. Rogers may have drawn an SEB barge on October 18, 1989 and Miyazaki apparently photographed a similar feature on September 28, 1989 (Rogers, 1995, Plates P22 and P23). On both dates, the SEB was fading. The average system II drift rate of the seven SEB barges in 2009 is 3.4°/30 days. This rate is consistent with the drift rates of dark spots in the SEB(S) in Figure 10.5 (Rogers, 1995, 164-165).

A white oval (D3) has a latitude and system II drift rate that is consistent with it being in the SEBs jetstream (Rogers, 1995, 161-162). Figure 5D shows D3 as a small white oval in the south component of the SEB about halfway between the central meridian and the right edge of the disc. The east-west length of D3 is two degrees of longitude.

A dark spot (D4) in the STrZ has a latitude and system II drift rate that is consistent with the "STropZ (misc. fast)" current listed in Table 10.1 of Rogers (1995, 161). Figure 5C shows this spot as being ~5° left of the edge of the GRS.

Region IV: Equatorial Zone

Roussell noted that the EZ had a gray-yellow color on June 22. Abel drew the EZ as white with a faint yellow hue on July 30. Adachi described the equatorial band as visible but obscured on July 14.

Region V: North Equatorial Belt

Sweetman described the NEB as "still double" on September 25. Cudnik described it as "brown" on May 16; "brownish" on July 25; "brown-gray" on September 27 and "orange-brown" on November 25.

The NEB had one bright spot (N2) that developed into a long rift. The system II drift rate for N2, before it became a rift, is -92°/30 days. This is consistent with similar features in the North Intermediate Current (Rogers, 1995, 124), (Schmude, 2003, 60).

The NEB had six barges (N5, N16-N20). These features followed the NTrC. The latitudes of the NEB barges ranged from 14.9° N to 18.5° N. These latitudes are consistent with historical values (Rogers, 1995, 399). The average system II drift rate of the NEB barges is 1.7°/30 days. This rate is different than that for the NTrC between 1887 and 1991 which is -9.0°/30 days (Rogers, 1995, 114-115).

Region VI: North Tropical Zone to the North Polar Region

Sweetman described the NTB as "not dark and looks thin" on September 30. Cudnik described it as "gray" on May 16, "orange-gray" on July 25; "gray" on September 27 and "bisected and dusky" on August 20. Adachi described this belt as "many dark spots on NTBn" on July 14.

One white oval (I4) was at a planetographic latitude of 61.7° N and, hence, followed the North Polar Current. Its system II drift rate is 12.1°/30 days. This rate is somewhat different from feature I1 measured in July 2000 (Schmude, 2007a, 44) but is consistent with three features measured by Rogers et al. in 2001 (Rogers, 2004, 208).

Wind Speeds

Table 9 summarizes wind speeds. The wind speeds are with respect to the system III longitude. They were computed in the same way as in Rogers (1995, 392). Uncertainties were computed in the same way as in Schmude (2003, 50).

Table 4: Planetographic Latitudes of Belts on Jupiter Table (based on images made in visible wavelengths, August 2009)

Feature	South Edge	North Edge
South Polar Belt	68.9° S ± 1°	63.4° S ± 0.5°
South Equatorial Belt	21.2° S ± 0.5°	8.1° S ± 0.5°
North Equatorial Belt	7.1° N ± 0.5°	17.8° N ± 0.5°
North Temperate Belt	23.9° N ± 0.5°	31.0° N ± 1.0°

Table 5: Planetographic Latitudes of Belts on Jupiter (based on methane-band images made at a wavelength of 0.889 μm, August 2009)

Feature	South Ege	North Ege
South Polar Cap	---	66.1° S ± 0.5°
South Equatorial Belt	20.1° S ± 0.5°	3.1° S ± 0.5°
North Equatorial Belt	9.2° N ± 0.5°	17.6° N ± 0.5°
North Temperate Belt	23.7° N ± 0.5°	31.3° N ± 0.5°
North North Temperate Belt	34.6° N ± 0.5°	37.8° N ± 0.5°
North Polar Cap	70.6° N ± 1.5°	---

Table 6: Planetographic Latitudes and Drift Rates of Features South of the Equatorial Zone (2009-2010 Apparition)

Feature (Descr.)	Number of Points	Planetographic Latitude	Drift rate Deg./30 days System II	Feature (Descr.)	Number of Points	Planetographic Latitude	Drift rate Deg./30 days System II
South Polar Current at 61° S (SPC at 61° S)							
A1 (wo)	95	61.3° S	-15.4	A3 (wo)	7	60.5° S	-16.6
A6 (wo)	22	61.2° S	-10.1				
Average		61.0° S	-14.0				
Impact spot							
A5 (is)	25	57.9° S	-5.7				
South South South South Temperate Current (S^4TC)							
A7 (ds)	16	54.6° S	-20.9				
South South South Temperate Current (S^3TC)							
A2 (wo)	106	52.0° S	-15.4	A4 (wo)	33	51.4° S	-14.5
Average		51.7° S	-15.0				
South South South Temperate Current Jetstream (S^3TC jetstream)							
A8 (wo)	31	44.3° S	-90.8	A9 (wo)	25	44.6° S	-92.4
A10 (wo)	18	44.4° S	-91.9				
Average		44.4° S	-91.7				
South South Temperate Current (SSTC)							
B1 (wo)	93	41.1° S	-30.0	B2 (wo)	88	40.9° S	-30.2
B3 (wo)	94	40.9° S	-28.7	B4 (wo)	87	41.1° S	-27.8
B5 (wo)	88	41.0° S	-28.4	B6 (wo)	27	40.1° S	-29.0
B7 (wo)	85	40.4° S	-29.6	B8 (wo)	74	41.1° S	-28.8
B9 (wo)	30	41.2° S	-25.7	B10 (wo)	67	40.9° S	-28.5
B12 (wo)	63	38.4° S	-29.1	B13 (wo)	11	38.5° S	-33.5
B14 (wo)	31	38.4° S	-25.0				
Average		40.3° S	-28.8				
South Temperate Current (STC)							
BA (ro)	95	32.8° S	-11.9	C1 (wo)	61	33.0° S	-12.2
C5 (ds)	86	32.1° S	-11.7	C10 (ds)	26	31.2° S	-14.2
Average		32.3° S	-12.5				
South Temperate Belt North Jetstream (STBn jetsteam)							
C3 (ds)	8	28.2° S	-87.5	C4 (ds)	8	28.6° S	-78.5
C6 (ds)	6	28.6° S	-93.7	C7 (ds)	8	29.0° S	-93.4
C8 (ds)	7	29.1° S	-94.4	C9 (ds)	7	29.3° S	-94.6
C11 (ds)	9	29.7° S	-71.7	C12 (ds)	19	29.6° S	-86.2
C13 (ds)	12	29.4° S	-97.8	C14 (ds)	15	28.8° S	-89.0
C15 (ds)	13	29.5° S	-76.6	C16 (ds)	13	29.4° S	-80.0
C17 (ds)	6	29.0° S	-81.9	C18 (ds)	9	29.0° S	-84.2
C19 (ds)	7	28.8° S	-77.5	C20 (ds)	6	28.5° S	-97.6
C21 (ds)	6	28.3° S	-89.8	C22 (ds)	6	28.8° S	-87.9
C23 (ds)	8	28.5° S	-83.8	C24 (ds)	8	29.7° S	-80.2
Average		29.0° S	-86.3				
“STropZ Misc fast Current”?							
D4 (ds)	32	25.7° S	-41.9				
South Tropical Current (STrC)							
GRS (ro)	16	22.7° S	1.3	D1 (wo)	40	21.3° S	5.6
D2 (f)	20	22.8° S	7.7	D5 (f)	16	23.3° S	6.1
Average		22.5° S	5.2				
SEBs jetstream							
D3 (wo)	6	18.6° S	73.5				
South Equatorial Belt Current barges (SEBC barges)							
D6 (b)	44	16.6° S	2.2	D7 (b)	107	16.1° S	1.1
D8 (b)	88	16.4° S	1.1	D9 (b)	70	17.0° S	1.2
D10 (b)	4	15.9° S	6.6	D14 (b)	25	16.8° S	2.6
D15 (b)	16	16.9° S	8.7				
Average		16.5° S	3.4				
Note: descr. = descrption: wo = white oval, ds = dark spot, b = barge, bay = bay, lp = low projection, f = festoon, is = impact spot, ro = red oval, ws = white spot							

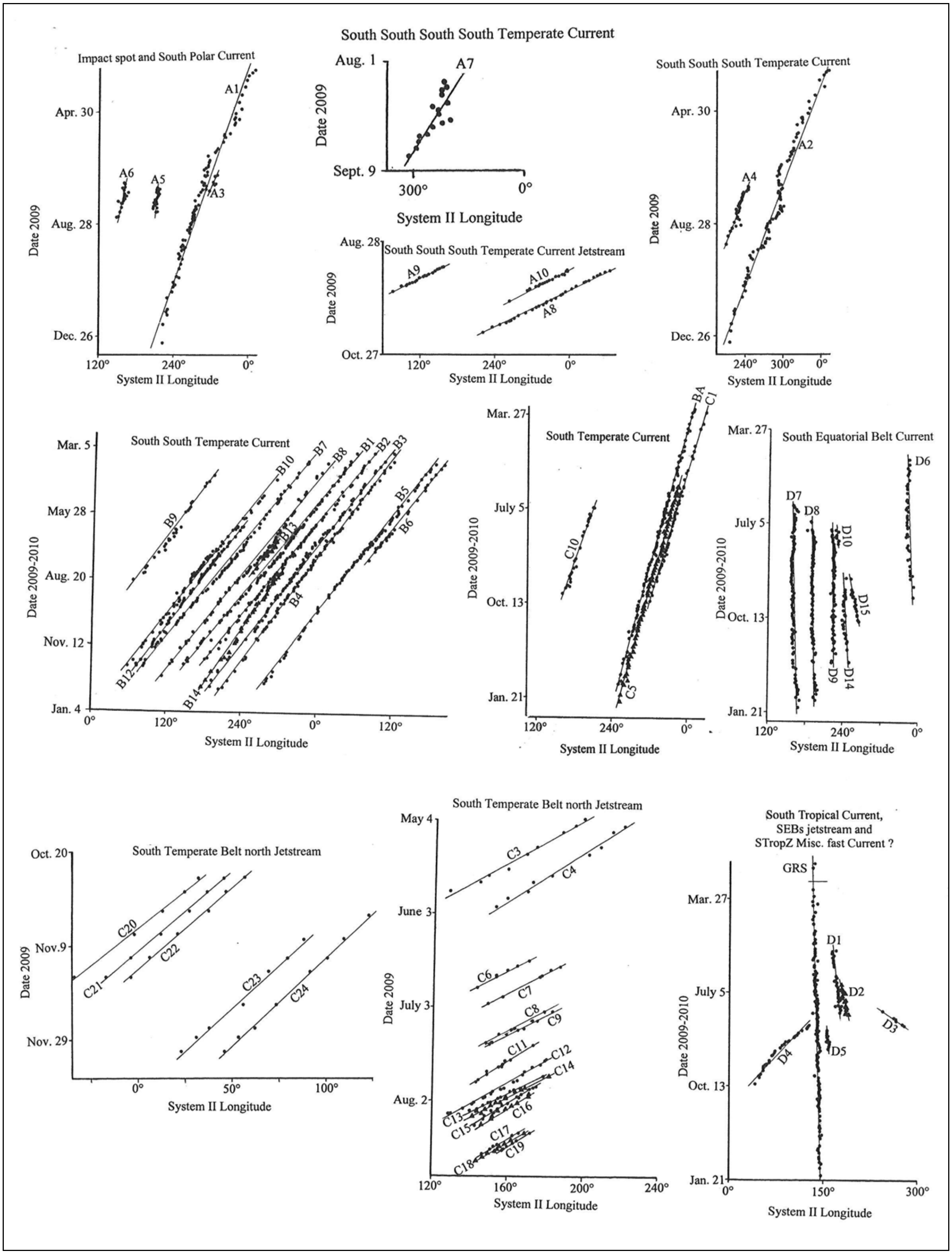

Figure 1. Drift rates of features between Jupiter's SPC (south polar current) and STC (South Tropical Current). The dash is an approximate longitude and all other points are measured longitudes.

Satellite Observations

Maxson imaged the occultation of Ganymede by Europa on May 18, 2009. See Figure 5A. The mid-time of the eclipse according to Maxon's images is 11:42 UT. This is about two minutes before the predicted time of mid-eclipse for this event (Astronomical Almanac for the Year 2009, 2007, F38). Einaga imaged the occultation of Europa by Ganymede on June 1, 2009 from 18:13:46 UT to 18:24:40 UT. His results are consistent with the predicted occultation times (Astronomical Almanac for the Year 2009, 2007, F38) to within one minute.

Mattei imaged Amalthea near Jupiter on August 15 at 3:24. See Figure 5B. He used a 0.36 m telescope to make this image.

Photoelectric Photometry

The writer used an SSP-3 solid-state photometer along with a 0.09 m (3.5 inch) Maksutov telescope and color filters transformed to the Johnson B, V, R and I system in making all photometric magnitude measurements in Table 10. The method and equipment are described elsewhere (Schmude, 1992, 20; 2008b, 161-167), (Optec, 1997). All measurements in Table 10 are corrected for both atmospheric extinction and color transformation in the same way as in Hall and Genet (1988, Chapter 13). The comparison star for all measurements is Zeta Capricorni. The brightness values for Zeta Capricorni B = 4.746, V = 3.744, R = 3.10 and I = 2.68. The B and V values are from Westfall (2008) who cites Mermilliod (1991) and the R and I values are from (Irairte et al, 1965, 30).

Normalized magnitudes are computed from the equation:

$$X(1,0) = X_{mag} - 5.0 \, \mathrm{Log}[r \, \Delta] - c_X \alpha - 2.5 \, \mathrm{Log}[k] \qquad (1).$$

In this equation, X(1,0) is the normalized magnitude for filter X, X_{mag} is the measured brightness of Jupiter in magnitudes, r is the Jupiter-Sun distance, Δ is the Jupiter-Earth distance, c_X is the solar phase angle coefficient of Jupiter for filter X, α is the solar phase angle of Jupiter and k is the fraction of Jupiter's disc that is illuminated by the Sun as seen from the Earth. Both r and Δ are in astronomical units. Values of 0.0076, 0.0076, 0.0060 and 0.0035 magnitudes/degree are used for c_B, c_V, c_R and c_I, respectively. These are average values based on studies made between 1999 and 2008 (Schmude 2003, 41; 2007a, 31; 2007b, 25; 2008a, 30.; 2009a, 24; 2009b, 29; 2010a, b), (Schmude and Lesser, 2000, 67).

The normalized magnitude or V(1,0) value of Jupiter during 2009-2010 is -9.47 ± 0.02. This is brighter than the corresponding value for the previous apparition (Schmude, 2010b).

Occultation of 45 Capricorni

Toet observed/imaged the occultation of the star 45 Capricorni by Jupiter from The Netherlands. He reports that the seeing was very bad. In spite of this he secured a short video of this event. Just before the star was occulted, it disappeared and reappeared. The most probable explanation for this is that the star disappeared as a result of its light being bent away from the Earth and the star reappeared because the light was no longer bent away from the Earth. Occultation events are described more fully elsewhere (Schmude, 2008, 204-206).

Acknowledgements

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Table 7. Planetographic Latitudes and Drift Rates of Festoons in the Equatorial Current (2009-2010 Apparition)

Feature	Number of Points	Planetographic Latitude	Drift Rate Deg./30 days System I	Feature	Number of points	Planetographic Latitude	Drift rate Deg./30 days System I
North Equatorial Current, festoons (NEC)							
E1 (f)	22	7.1 ° N	6.1	E2 (f)	10	7.1 ° N	3.3
E3 (f)	4	7.1 ° N	4.1	E4 (f)	12	7.1 ° N	-0.5
E5 (f)	9	7.1 ° N	7.5	E6 (f)	58	7.1 ° N	5.3
E7 (f)	35	7.1 ° N	7.2	E8 (f)	16	7.1 ° N	4.5
E9 (f)	21	7.1 ° N	11.7	E10 (f)	6	7.1 ° N	9.8
E11 (f)	11	7.1 ° N	-3.5				
Average		7.1 ° N	5.0				

Table 8: Planetographic Latitudes and Drift Rates of Features North of the Equatorial Zone (2009-2010 Apparition)

Feature	Number of points	Planetographic Latitude	Drift rate Deg./30 days System II	Feature	Number of points	Planetographic Latitude	Drift rate Deg./30 days System II
North Tropical Current barges (NTrC barges)							
N5 (b)	19	15.7° N	-1.3	N16 (b)	19	15.6° N	3.7
N17 (b)	21	17.9° N	4.9	N18 (b)	22	18.5° N	1.8
N19 (b)	23	16.2° N	-2.3	N20 (b)	15	14.9° N	3.1
Average		16.5° N	1.7				
North Tropical Current projections and bays/ovals (NTrC)							
N1 (lp)	17	17.1° N	0.3	N3 (lp)	7	15.8° N	-9.5
N4 (lp)	19	16.5° N	-6.1	N7 (lp)	11	19.7° N	-20.0
N9 (bay)	79	19.2° N	-2.9	N10 (lp)	23	18.8° N	-3.8
N12 (ds)	20	15.9° N	1.7	N13 (bay)	71	17.7	-3.3
Average		17.6° N	-5.5				
North Tropical Current, dark spots in the NTrZ (NTrC)							
N6 (ds)	11	19.2° N	-20.8	N11 (ds)	71	17.2° N	-0.5
N14 (ds)	45	19.5° N	-2.7	N15 (ds)	16	19.2° N	-1.6
Average		18.8° N	-6.4				
North Intermediate Current (NIC)							
N2 (ws)	4	12.3° N	-92.0				
North Temperate Current (NTC)							
F1 (lp)	6	32.8° N	15.6	F2 (ds)	9	33.5° N	11.0
F3 (wo)	5	33.0° N	23.1	F4 (ds)	10	33.1° N	28.2
F5 (lp)	13	32.2° N	20.1	F6 (lp)	11	32.2° N	25.1
F7 (lp)	11	32.7° N	22.1	F8 (lp)	11	32.8° N	20.4
F9 (ds)	30	30.9° N	19.5	F10 (ds)	41	30.3° N	16.8
F11 (ds)	10	34.0° N	28.4				
Average		32.5° N	20.9				
North North Temperate Current B (NNTBs Jetstream)							
H1 (ds)	33	35.0° N	-83.9	H2 (ds)	25	35.2° N	-83.7
H3 (ds)	25	35.4° N	-83.2	H4 (ds)	21	36.1° N	-77.6
H5 (ds)	12	35.4° N	-86.7				
Average		35.4° N	-83.0				
North North Temperate Current (NNTC)							
G1 (wo)	71	41.9° N	-0.2	G2 (wo)	49	41.3° N	a
G3 (wo)	63	42.5° N	-8.6	G4 (ro)	74	42.4° N	-10.3
G8 (wo)	26	41.2° N	1.4	G14 (wo)	15	41.1° N	-8.2
G15 (wo)	11	41.9° N	3.3				
Average		41.8° N	-3.8				
North North North Temperate Current (N^3TC)							
G5 (wo)	23	45.6° N	-18.4	G6 (ds)	29	44.3° N	-22.4
G9 (ds)	14	45.8° N	-15.4	G12 (wo)	15	46.1° N	-20.7
G13 (wo)	9	45.5° N	-20.8				
Average		45.5° N	-19.5				
North North North North Temperate Current (N^4TC)							
I1 (wo)	20	49.8° N	5.6	I2 (wo)	6	50.5° N	13.4
I3 (wo)	25	54.3° N	-1.8				
Average		51.5° N	5.7				
North Polar Current (NPC)							
I4 (wo)	12	61.7° N	12.1				
[a] No drift rate is reported due to extreme oscillation							

Table 9: Average Drift Rates, Rotation Periods and Wind Speeds[a] for Several Currents on Jupiter (2009-2010 Apparition)

Current	Feature(s)	Drift Rate (degrees/30 days)			Rotation Rate	Wind Speed (m/s)
		Sys. I	Sys. II	Sys. III		
SPC	A1, A3, A6	214.9	-14.0	-6.0	9h 55m 21s	1.5 ± 0.4
Impact spot	A5	223.2	-5.7	2.3	9h 55m 33s	-0.6 ± 2[b]
S^4TC	A7	215.6	-13.3	-5.3	9h 55m 22s	3.8 ± 2[b]
S^3TC	A2, A4	213.9	-15.0	-7.0	9h 55m 20s	2.2 ± 0.2
S^3TC jetstream	A8-A10	137.2	-91.7	-83.7	9h 53m 36s	29.7 ± 0.2
SSTC	B1-B10, B12-B14	200.1	-28.8	-20.8	9h 55m 01s	7.8 ± 0.3
STropZ Misc fast	D4	187.0	-41.9	-33.9	9h 54m 44s	14.9 ± 2[b]
STC	BA, C1, C5, C10	216.4	-12.5	-4.5	9h 55m 24s	1.9 ± 0.3
SEBs jetstream	D3	302.4	73.5	81.5	9h 57m 22s	-37.4 ± 2[b]
STBn jetstream	C3-C4, C6-C9, C11-C24	142.6	-86.3	-78.3	9h 55m 43s	33.4 ± 0.7
STrC	GRS, D1-D2, D5	234.1	5.2	13.2	9h 55m 48s	-5.9 ± 0.6
SEBC barges	D6-D10, D14-D15	232.3	3.4	11.4	9h 55m 45s	-5.3 ± 0.6
NEC	E1-E11	5.0	-223.9	-215.9	9h 50m 37s	103.1 ± 0.6
NTrC barges	N5, N16-N20	230.6	1.7	9.7	9h 55m 43s	-4.5 ± 0.5
NTrC bays/ovals & projections	N1, N3-N4, N7, N9-N10, N12-N13	223.4	-5.5	2.5	9h 55m 33s	-1.2 ± 1.1
NTrC dark spots	N6, N11, N14-N15	222.5	-6.4	1.6	9h 55m 49s	-0.7 ± 1.9
NEBC (center)	N2	136.9	-92.0	-84.0	9h 53m 35s	39.6 ± 2[b]
NTC	F1-F11	249.8	20.9	28.9	9h 56m 09s	-11.9 ± 0.7
NNTC-B	H1-H5	145.9	-83.0	-75.0	9h 53m 47s	-30.0 ± 0.6
NNTC	G1-G4, G8, G14-G15	225.1	-3.8	4.2	9h 55m 35s	-1.5 ± 0.7
N^3TC	G5-G6, G9, G12-G13	209.4	-19.5	-11.5	9h 55m 14s	4.0 ± 0.4
N^4TC	I1-I3	234.6	5.7	13.7	9h 55m 48s	-4.3 ± 1.1
NPC	I4	241.0	12.1	20.1	9h 55m 57s	10.0 ± 2[b]

[a]The wind speed is the speed that a current moves with respect to the System III longitude; it is computed from the equation in Table A1.2 (Rogers, 1995, 392).

[b]Estimated uncertainty.

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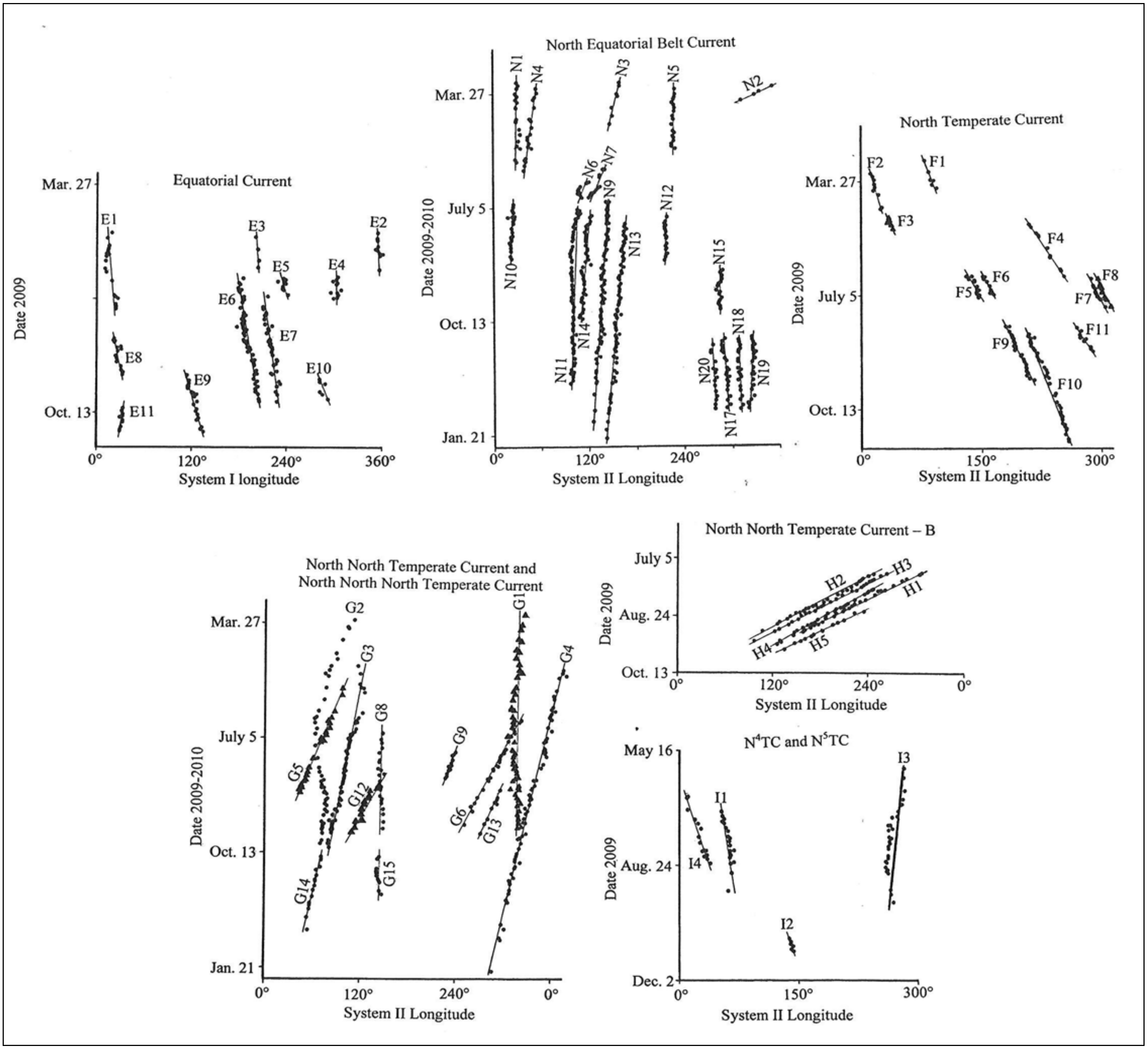

Figure 2. Drift rates of features between Jupiter's EQ (equatorial current) and its NNNNNC (north north north north north temperate current).

Table 11: Photometric Constants of Jupiter (2009-2010 Apparition)

Filter	X(1,0)
B	-8.63 ± 0.03
V	-9.47 ± 0.02
R	-9.89 ± 0.02
I	-9.72 ± 0.02

Table 10: Photometric Magnitude Measurements of Jupiter (2009-2010 Apparition)

Date (2009)	Filter	α (deg.)	Measured Magnitude	X(1,0)
Sept. 28.119	V	8.5	-2.75	-9.49
Oct. 8.123	V	9.7	-2.63	-9.44
Oct. 8.145	B	9.7	-1.75	-8.56
Oct. 9.078	V	9.8	-2.64	-9.45
Oct. 9.104	R	9.8	-3.09	-9.89
Oct. 9.126	I	9.8	-2.94	-9.71
Nov. 5.020	V	11.3	-2.44	-9.44
Nov. 6.011	V	11.3	-2.46	-9.47
Nov. 6.024	B	11.3	-1.62	-8.63
Nov. 6.036	R	11.3	-2.88	-9.88
Nov. 6.051	I	11.3	-2.74	-9.70
Nov. 7.025	V	11.4	-2.43	-9.45
Nov. 7.041	B	11.4	-1.61	-8.63
Nov. 9.020	V	11.4	-2.44	-9.48
Nov. 9.036	R	11.4	-2.88	-9.89
Nov. 9.050	I	11.4	-2.74	-9.72
Nov. 12.992	V	11.4	-2.39	-9.45
Nov. 15.990	V	11.3	-2.35	-9.44
Nov. 16.002	B	11.3	-1.58	-8.66
Nov. 16.016	R	11.3	-2.78	-9.84

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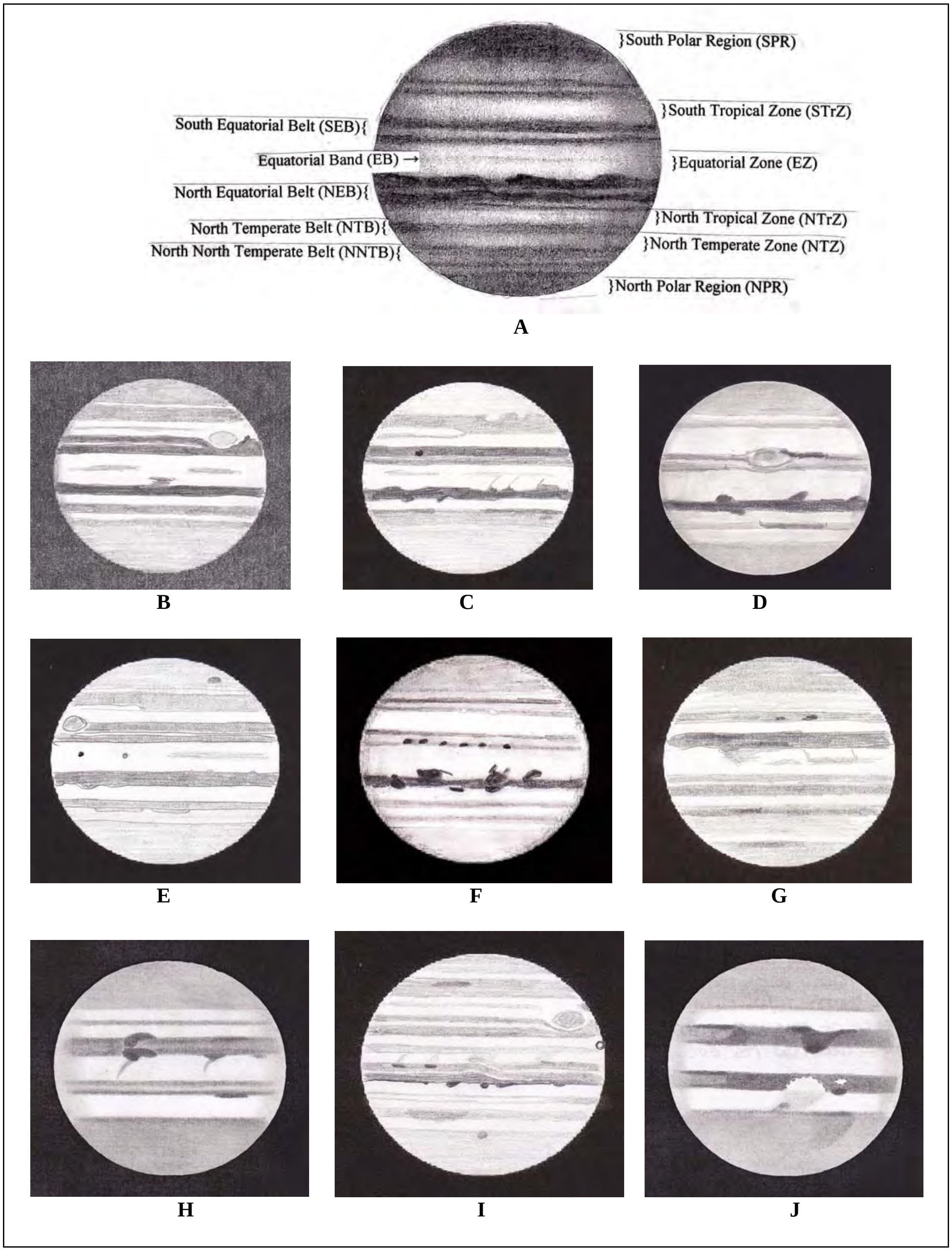


Figure 3. Drawings of Jupiter made in 2009. In all cases, south is at the top. The belt and zone names are shown in Figure A. A: September 6 at 4:42 UT by Phil Plante, 0.64 m RL, 185X, seeing = 4-5, λ_I = 333°, λ_{II} = 332°; B: May 16 at 10:50 UT by Brian Cudnik, 0.32 m RL, 370X, seeing = 8-10, λ_I = 344°, λ_{II} = 123°; C: June 20 at 7:20 UT by Brian Cudnik, 0.32 m RL, 370X, seeing = 6-8, λ_I = 343°, λ_{II} = 217°; D: June 22 at 6:50 UT by Carl Roussell, 0.15 m RR, 133X, seeing = 6, λ_I = 281°, λ_{II} = 139°; E: July 25 at 10:20 UT by Brian Cudnik, 0.32 m RL at 139, 185 and 370X, seeing = 3-9, λ_I = 224°, λ_{II} = 189°; F: September 1 at 4:05 UT by Carl Roussell, 0.15 m RR at 133 & 200X, seeing = 5, λ_I = 240°, λ_{II} = 278°; G: September 3 at 3:55 UT by Brian Cudnik, 0.20 m SC at 163X, seeing = 7-9, λ_I = 190°, λ_{II} = 212°; H: September 25 at 5:53 UT by Michael Sweetman, 0.15 m Mak. At 200X, seeing = 4-5, λ_I = 137°, λ_{II} = 351°; I: September 27 at 0:35 UT by Brain Cudnik, 0.32 m RL at 185 & 370X, seeing = 10, λ_I = 259°, λ_{II} = 99°; J: October 20 at 6:45 UT by Michael Sweetman, 0.15 m Mak. At 200X, seeing = 4-7, λ_I = 155°, λ_{II} = 178°.

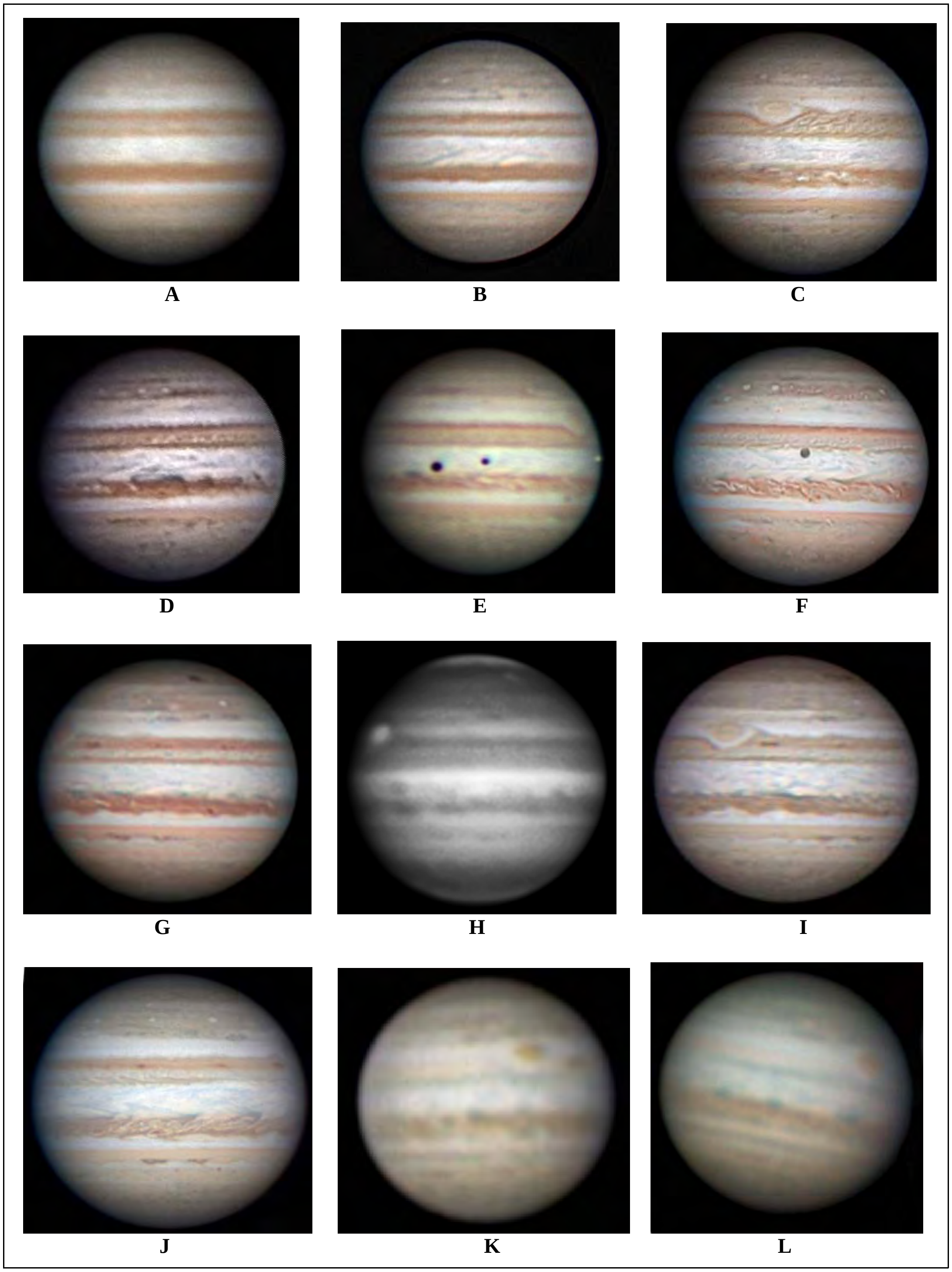


Figure 4. Images of Jupiter made in 2009-2010. In all cases south is at the top and all images are made in visible light unless stated otherwise. A: March 16, 2009 at 21:11 UT by Christopher Go, 0.28 m SC, $\lambda_I = 96°$, $\lambda_{II} = 337°$; B: April 19, 2009 at 19:14 UT by David Pretorius, 0.25 m RL, $\lambda_I = 349°$, $\lambda_{II} = 332°$; C: May 21, 2009 at 20:31 UT by Christopher Go, 0.28 m SC, $\lambda_I = 47°$, $\lambda_{II} = 145°$; D: June 1, 2009 at 21:36.1 UT by Daniel Chang, 0.23 m SC, $\lambda_I = 24°$, $\lambda_{II} = 38°$; E: June 9, 2009 at 9:24 UT by Efrain Morales Rivera, 0.30 m SC, $\lambda_I = 121°$, $\lambda_{II} = 78°$; F: July 15, 2009 at 7:21:33 UT by Don Parker, 0.41 m RL, $\lambda_I = 335°$, $\lambda_{II} = 17°$; G: July 21, 2009 at 7:15:01 UT by Don Parker, 0.41 m RL, $\lambda_I = 199°$, $\lambda_{II} = 196°$; H: July 21, 2009 at 7:22:31 UT by Don Parker, methane band image (wavelength = 0.889 m), 0.41 m RL, $\lambda_I = 203°$, $\lambda_{II} = 200°$; I: August 9, 2009 at 7:01 UT by Rolando Chavez, 0.36 m SC, $\lambda_I = 313°$, $\lambda_{II} = 165°$; J: August 27, 2009 at 13:04.4 UT by Anthony Wesley, 0.37 m RL, $\lambda_I = 139°$, $\lambda_{II} = 212°$; K: December 16, 2009 at 17:25:4 UT by Christophe Pellier, 0.25 m C, $\lambda_I = 175°$, $\lambda_{II} = 119°$; L: Jan. 2, 2010 at 16:05 UT by Damian Peach, 0.35 m SC, $\lambda_I = 286°$, $\lambda_{II} = 101°$

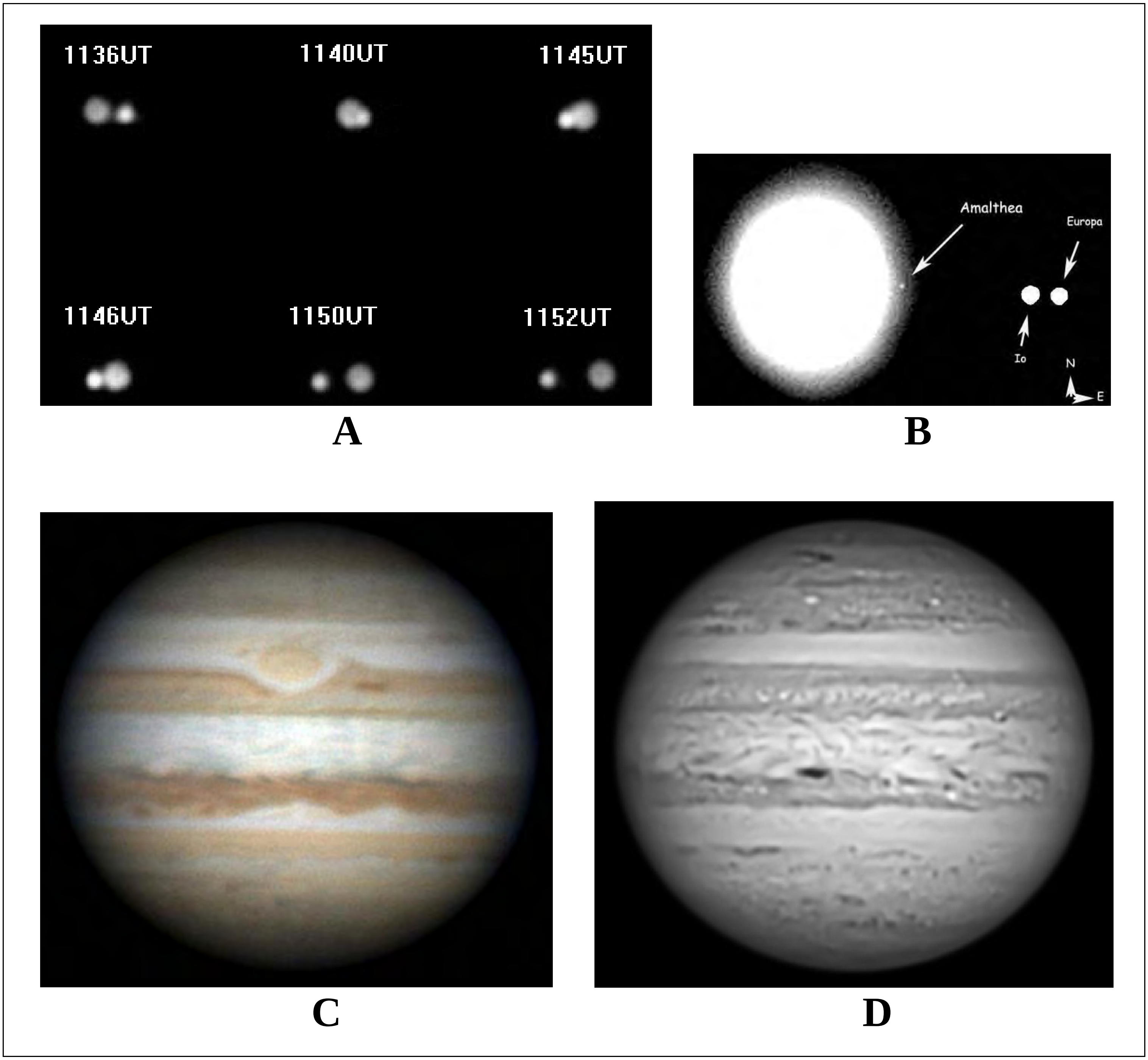


Figure 5. Miscellaneous images. A: May 18, 2009 at 11:36-11:52 UT by Paul Maxson, 0.25 m Mewlon telescope. B: August 15, 2009 at 3:24 UT by Mike Mattei, 0.36 m telescope, 5 second exposure. C: August 9, 2007 16:13 UT by Christopher Go, 0.28 m SC, λ_I = 290°, λ_{II} = 139°; note the dark spot (D4) to the left of the GRS in this image. D: July 31, 2009 at 6:26:07 UT by Don Parker, 0.41 m RL with an infrared (715 nm) filter, λ_I = 310°, λ_{II} = 230°; note the tiny white oval (D3) that is in the south component of the SEB and is between the center of the disc and the right limb.

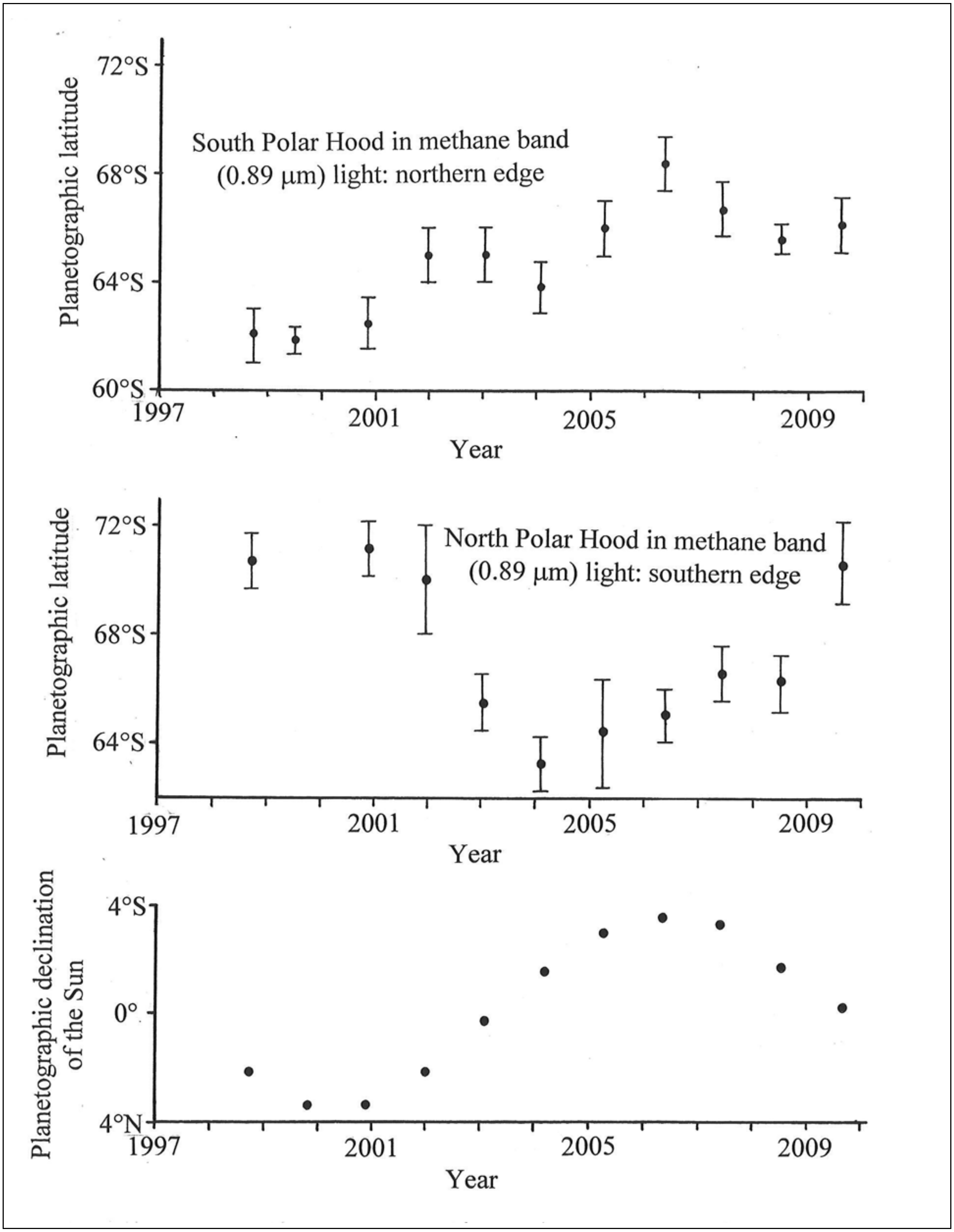
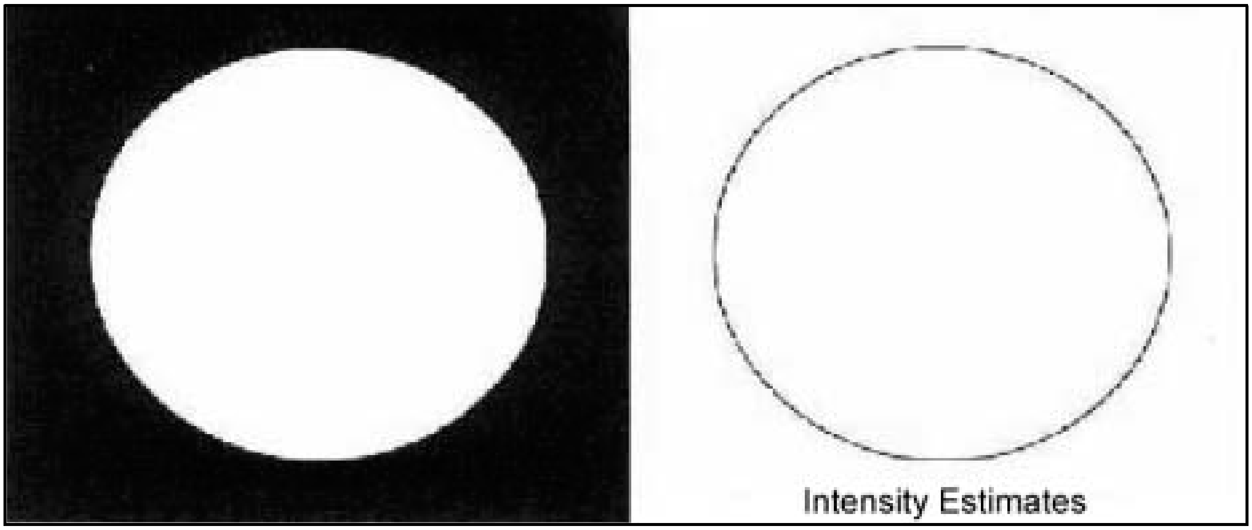


Figure 6: Graphs of the latitude of the northern edge of the South Polar Hood (top), the southern edge of the North Polar Hood Center and the planetographic latitude of the Sun (bottom) plotted against the year. The polar hoods are the bright areas near the polar regions in methane band light.

ALPO Jupiter Section Observation Form No. _____



Date (UT): ______________________________________

Time (UT): ______________________________________

CM I _____ CM II ____ CM III _______

Begin (UT): ______________ End (UT) _____________

Telescope: f/ ___ Size: __________ (in./cm.; RL/RR/SC)

Magnification: _______x ________x ________x

Filters: __________________________________(W / S)

Trnasparency (1 - 5): ____ (Clear / Hazy / Int. Clouds)

Seeing (1 - 10): _________ Antoniadi (I - V): _________

Name: ______________________________________

Address: ______________________________________

____

City, State, ZIP: ________________________________

____

Observing Site: ________________________________

____

E-mail: ______________________________________

No.	Time (UT)	S I (°)	S II (°)	S III (°)	Remarks

Notes

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ALPO Jupiter Sectional Sketch

Time (UT): ______________________________

S I (°): ______________________________

S II (°): ______________________________

S III (°): ______________________________

Date (UT): ______________________

Time (UT): ______________________

CM I _____ CM II ____ CM III _______

Date (UT): ______________________

Begin (UT): __________ End (UT) ________

Telescope: f/ ____ Size: ______ (in./cm.; RL/RR/SC)

Magnification: _______ x _______ x _______x

Filters: ______________________(W / S)

Seeing (1 - 10): ________ Antoniadi (I - V): _______

Tranparency (1 - 6) _____ (Clear / Haze / Int. Clouds)

Name: ______________________

Address: ______________________

____

City, State, ZIP: ______________________

____

Observing Site: ______________________

____

E-mail: ______________________

No.	Time (UT)	S I (°)	S II (°)	S III (°)	Remarks

Notes

ALPO Galilean Satellite Eclipse Visual Timing Report Form

Describe your time source(s) and estimated accuracy	Observer Name: Apparition: 20_____-20_____ (conjunction to conjunction)

Event Type (a)	Predicted UT		Observed UT Time (9d)	Telescope Data (e)			Sky Conditions (0-2 scale) (f)			Notes (g)
	Date (b)	Time (c)		Type	Aperture (cm)	Mag.	Seeing	Transparency	Field Brightness	

(a) 1 = Io, 2 = Europa, 3 = Ganymede, 4 = Callisto; D = Disappearance, R = Reappearance
(b) Month and Day
(c) *Predicted* UT to 1 minute
(d) *Observed* UT to 1 second; corrected to watch error if applicable; indicate in "Notes" if Observed UT date differs from Predicted UT date
(e) R = Refractor, N = Newtonian Reflector, C = Cassegrain Reflector, X = Compound/Catadioptric System; indicate in "Notes" if other type.
(f) These conditions, including field brightness (due to moonlight, twilight, etc.), should be described as they apply to the actual field of view, rather than to general sky conditions. Use whole numbers only, as follows:

- 0 = Condition not perceptible; no effect on timing accuracy
- 1 = Condition perceptible; possible minor effect on timing accuracy
- 2 = Condition serious; definite effect on timing accuracy

(g) Include here such factors as wind, drifting cloud(s), satellite near Jupiter's limb, moonlight interference, etc.

At the end of the apparition, return this form to:

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- **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 mb)

- **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 mb.

- **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 mb.

- **Monograph No. *6.*** *Proceedings of the 47th Convention of the Association of*

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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 mb.

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- **Monograph Number 10.** *Observing and Understanding Uranus, Neptune and Pluto*. By Richard W. Schmude, Jr. 31 pages. File size approx. 2.6 mb.

- **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

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- **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").

- **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.

- **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); e-mail leaguesales@astroleague.org. (2) *Jupite*r, the ALPO section newsletter, available online only via the ALPO website at *http://mysite.verizon.net/macdouc/alpo/jovenews.htm;* (3) *J-Ne*t, 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 Ki*t, $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); 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.

ALPO Resources

People, publications, etc., to help our members

- **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.

Other ALPO Publications

Checks must be in U.S. funds, payable to an American bank with bank routing number.

- ***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).

Back Issues of The Strolling Astronomer

- Download JALPO43-1 thru the latest current issue as a pdf file from the ALPO website at *http://www.alpo-astronomy.org/djalpo* (free; most recent issues are password-protected, contact ALPO membership secretary Matt Will for password info).

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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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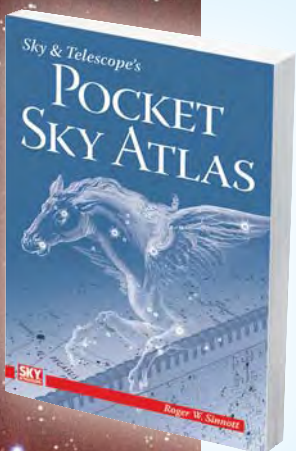

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