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The Strolling Astronomer

Volume 52, Number 1, Winter 2010

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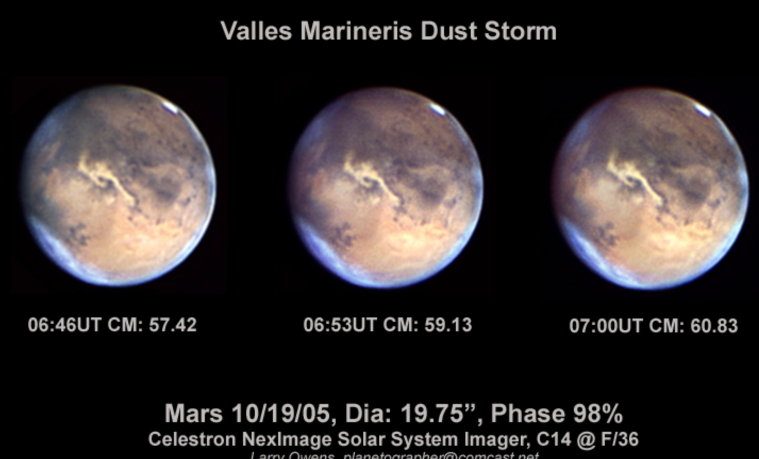
ASSOCIATION OF LUNAR & PLANETARY OBSERVERS – ALPO – Founded in 1947

Inside this issue . . .

- ***TWO lunar book reviews!***
- ***Volcanism on the Moon – is there still?***
- ***Discovery of a previously unknown Imbrium radial ridge***
- ***Apparition report: Saturn in 2006-2007***

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

Lowell Observatory Sequence, 1971



Planetary Imaging, Then and Now. A striking comparison of just how far amateur astronomy has advanced to equal (or even surpass) what was attained after painstaking hours using equipment most amateurs did not have access to not that many years ago. (Top) A series of four film-based images of Mars taken at the Lowell Observatory in 1971. (Bottom) Three digital images of Mars taken by ALPO's Larry Owens in 2005 using a 14-in. (35.5 cm) catadioptric telescope and the Celestron NextImage Solar System Imager. Note that north is at the top in the Lowell images, north is at bottom in the Owens images.

Journal of the Association of Lunar & Planetary Observers

The Strolling Astronomer

Volume 52, No. 1, Winter 2010
This issue published in December 2010 for distribution in both portable document format (pdf) and also hardcopy format.

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

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

For membership or general information about the ALPO, contact:

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Point of View
ALPO 2009

By Robert A. Garfinkle, FRAS,

I have heard it mentioned on numerous occasions and in various astronomy-related events that people are no longer interested in the Moon and to a lesser degree the rest of our solar system companions. After all with regards to the Moon, 'we've been there and done that', but I disagree. A case in point is the turnout at NASA Ames in Mt. View, California for the campout on the parade grounds the night/morning of the LCROSS impact on the Moon on October 9, 2009. There were over 500 people there on a chilly overcast morning waiting the see if we could observe the impact. NASA had set-up a two-story tall movie screen and we first watched three movies, then at about 3 a.m., they started showing the live NASA TV feed from a building very close to us. People of all ages, including school-age kids out on a learning experience on a school night were there with many of them staying awake the whole time until the 4:31am PDT impact.

My home astronomy club gets to host a star party one weekend during the summer at Glacier Point in Yosemite National Park (in central California). I enjoy watching the smiles and enthusiasm on the park visitors faces as they look through my telescope (and those of my fellow astronomers) and see the Moon or a planet or maybe even the Andromeda Galaxy live and personal for the first time.

I also see the commercial interest in our Solar System in the never-ending flow of books from publishers like Cambridge University Press or Springer. As your JALPO Book Review Editor, I receive a lot of books that we just cannot fit into the Journal. Some of these that you might be interested in have enticing titles, such as: *Carl Sagan: A Biography*, *One Giant Leap: Neil Armstrong's Stellar American Journey*, *Unmasking Europa: The Search for Life on Jupiter's Ocean Moon*. For those interested in what may or may not be alive on other worlds there are such titles as: *The Cosmic Connection: How Astronomical Events Impact Life on Earth*, *Planets and Life: The Emerging Science of Astrobiology*, *Planetary Systems and the Origins of Life*, and *Origins of Life in the Universe*. For the optical instrument history buff, take a look at: *Astronomical Spectrographs and their History*, and *The Telescope: Its History,*

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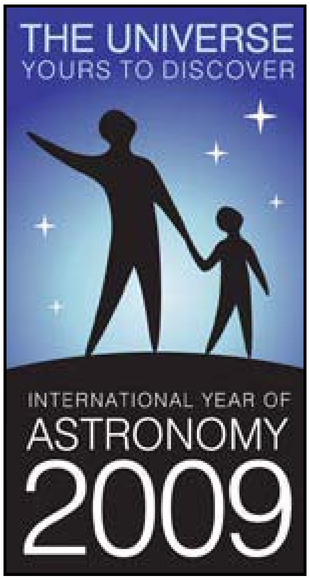
Galilean Nights: Global Astronomy Event Invites the World to Discover Our Universe



Call for Submissions to the IYA2009/Mani Bhaumik Prize for Excellence in Astronomy Education and Public Outreach
The International Year of Astronomy 2009 is soliciting nominations and submissions for the IYA2009/Mani Bhaumik Prize for Excellence in Astronomy Education and Public Outreach. Read the press release: http://www.astronomy2009.org/news/pressreleases/detail/iya0917/

She is an Astronomer exhibition to open in Bonn
On Sunday 13 December, Dr. Helen Walker (Co-Chair of IYA2009 Cornerstone project She is an Astronomer), Ulrike Tscherner-Bertoldi (exhibition organiser) and Marianne Pitzen (museum director) will be opening a new exhibition at the Frauemuseum in Bonn. It is called Women in Astronomy - Reaching for the Stars ("Astronominnen - Frauen die nach den Sternen greifen"). There will be a light-show with the astronomer Dr. Nadya Ben Bekhti, a performance, and celestial-themed food! The exhibition itself will run until April 2010. http://www.sheisanastronomer.org/index.php/events

Tour of the Universe by Children of the World: a call for entries
Did you host or participate in an event involving children during IYA2009? Tour of the Universe by Children of the World, a beautiful and inspirational multimedia video project, is seeking contributions in the following categories: astrophotography and nightscape photography by children, children's artwork of or inspired by the cosmos, photographs of children sharing and enjoying astronomy, and video clips related to children and astronomy. http://www.astronomy2009.org/news/updates/667/

30 Years at the Top - In celebration of the CFHT's 30th anniversary
After viewing a creative and humorous Illustrated Essay made by David Gillette for the PBS affiliate Twin Cities Public Television following his visit to CFHT in Waimea and to Mauna Kea, CFHT decided to commission David for an illustrated essay describing CFHT's story over the past 30 years. Once established the main ideas CFHT wanted to communicate to the audience, David was given free rein to produce the final version, entitled "30 Years at the Top". http://www.cfht.hawaii.edu/en/gallery/30YearsAtTheTop/hd.php

United States of America - IYA2009 update
http://www.astronomy2009.org/news/updates/658/

Journey through the Universe
Journey through the Universe is a national science education initiative that engages entire communities-students, teachers, families, and the public-using education programmes in the Earth and space sciences and space exploration to inspire and educate. The initiative engages communities in sustained science, maths, and technology education, and is a celebration of exploration and the joys of learning. http://www.astronomy2009.org/news/updates/657/

Close your IYA2009 celebrations with a lunar eclipse
IYA2009 will be coming to an end within a few weeks, and many supporters are searching for a fitting way to see off this most special of years. The Universe itself will provide an opportunity, as a partial lunar eclipse will be occurring on New Year's Eve. Visible from a large portion of the Earth, combined with a public star party it could be a dramatic end to IYA2009! http://www.astronomy2009.org/news/updates/656/

Links
- Galilean Nights website: *www.galileannights.org*
- IYA2009 website: *www.astronomy2009.org*
- European Planetary Science Congress website: *http://meetings.copernicus.org/epsc2009/*

Notes
The vision of the IYA2009 is to help the citizens of the world rediscover their place in the Universe through the day and night-time skies the impact of astronomy and basic sciences on our daily lives, and understand better how scientific knowledge can contribute to a more equitable and peaceful society.

The aim of the IYA2009 is to stimulate worldwide interest, especially among young people, in astronomy and science under the central theme,"The Universe, Yours to Discover". IYA2009 events and activities will promote a greater appreciation of the inspirational aspects of astronomy that embody an invaluable shared resource for all countries.

The IYA 2009 United States node home page is at *www.astronomy2009.us/*

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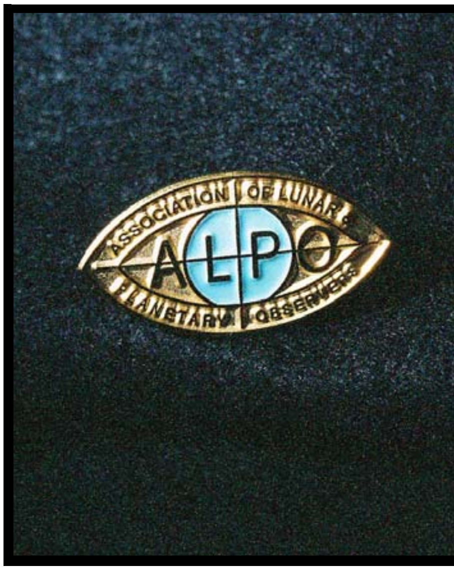

Announcing, the ALPO Lapel Pin

Now you can display your affiliation with our fine organization proudly with the new, colorful ALPO Lapel Pin.

With bright raised gold lettering against a recessed gold sandblast finish, each pin features the pupil of the ALPO "eye" in fluorescent aqua blue. A "pinch" clasp at the rear secures the pin in place. Pin dimensions are $1\frac{1}{8}$ in. by $\frac{9}{16}$ in.

Free for those who hold or purchase ALPO Sponsor level memberships.
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Only $8.50 for all other ALPO members.
Not available to non-ALPO members.

Price includes shipping and handling.

Send orders to: ALPO, PO Box 13456, Springfield, IL 62791-3456. E-mail to: matt.will@alpo-astronomy.org

News of General Interest

Staff appointment announced

Bruce Wingate has been named acting assistant membeship secretary to ALPO membership secretary/treasurer Matt Will by ALPO Executive Director Richard Schmude. As such, Bruce will handle special projects as assigned by Matt.

An ALPO member since 2004, Bruce lives in Las Vegas, Nevada, is retired from the fire service after 26 years, but is now working for a fire alarm company.

As for astronomy, he is a co-founding member of the Antique Telescope Society and was the editor of its Journal in the first year of publication.

"I have been involved with astronomy for over 40 years. I own five telescopes, two of them are antiques. One is a 6-inch Clark (100% complete) and a 5-inch Petitdidier." He has had several articles published and is working on about a dozen others; he has also authored a book currently in the process of being published. His current interests are the Sun and Moon and he has also done work on the Sun through the AAVSO.

Join/ renew your ALPO membership online

Save yourself the postage and either join or renew your ALPO membership at either of two online locations:

Telescopes by Galileo
www.galileosplace.com/ALPO/

The Astronomical League, (online readers click *here*); hard copy readers, go to http://www.astroleague.org, then left-click on "Login for AL Store" in the left panel, then left-click on ALPO in the list of categories page, then left-click on the ALPO membership choice.

The ALPO thanks both *Telescopes by Galileo* and *The Astronomical League* for providing this valuable online service.

ALPO Interest Section Reports

Web Services

Larry Owens,
acting section coordinator
Larry.Owens@alpo-astronomy.org

Visit the ALPO home page online at *www.alpo-astronomy.org*

Computing Section

Larry Owens,
acting section coordinator,
Larry.Owens@alpo-astronomy.org

Important links:

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

Lunar & Planetary Training Program

Tim Robertson,
section coordinator
cometman@cometman.net

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

ALPO Observing Section Reports

Eclipse Section

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

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Three images of Mercury showing comparisons between MESSENGER spacecraft images and Earth-based images. Top left image taken during third flyby of MESSENGER on September 29; bottom center image taken by John Boudreau using a C11 at fl 6200 mm; top right image MESSENGER image processed to match the resolution of an amateur telescope, in this case, the Boudreau image.

Please visit the ALPO Eclipse Section online at *www.alpo-astronomy.org/eclipse*.

Comets Section

Gary Kronk,
acting section coordinator
kronk@cometography.com

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

Meteors Section

Report by Bob Lundsford,
section coordinator
lunro.imo.usa@cox.net

Visit the ALPO Meteors Section online at *www.alpo-astronomy.org/meteor*.

Meteorites Section

Dolores Hill, section coordinator
dhill@lpl.arizona.edu

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

Solar Section

Kim Hay, section coordinator,
kim@starlightcascade.ca

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

Mercury Section

Report by Frank J. Melillo,
section coordinator
frankj12@aol.com

I would like to thank John Boudreau of Massachusetts and Stuart Parker of New Zealand for their outstanding lectures on Mercury at the ALPO / ALCON 2009 meeting in New York. It was such a thrill to see Stuart from half-way around the world to be at the ALPO conference. On the first day of the meeting, the entire morning was dedicated just to Mercury presentations. We have covered lectures like apparition reports, CCD imaging and the MESSENGER flybys. It was amazing that no other planet had so much attention at the meeting.

The MESSENGER flew by Mercury for the final time on September 29, 2009. After that flyby, scientists were sure that we are on course for MESSENGER's insertion into orbit around Mercury in March 2011.

John Boudreau was in the spotlight once more for his outstanding images of Mercury during the planet's morning apparition. John's pix show details that were captured by the MESSENGER just four days after the closest approach. Never before has there been seen such incredible images of Mercury done by an amateur. Boudreau's techniques had improved every year and his images can be compared easily with the MESSENGER's. Also, Ed Lomeli of California, has his own fair share of showing incredible images of Mercury,

Reminder: Address changes

Unlike regular mail, electronic mail is not forwarded when you change e-mail addresses unless you make special arrangements.

More and more, e-mail notifications to members are bounced back because we are not notified of address changes. Efforts to locate errant members via online search tools have not been successful.

So once again, if you move or change Internet Service Providers and are assigned a new e-mail address, please notify Matt Will at matt.will@alpo-astronomy.org as soon as possible.

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and again, his techniques have improved over the years.

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

Venus Section

Report by Julius Benton, section coordinator
jlbaina@msn.com

Venus remains visible in the Eastern sky before sunrise, but rapidly approaching superior conjunction, so attempts to observe the planet will diminish substantially as 2009 draws to a close.

During the current 2009-10 Western (Morning) Apparition, the planet is passing through its waxing phases (a progression from crescent through gibbous phases). At the time of this report (late Novmber), the gibbous disk of Venus is about 10.2” across and 97.6% illuminated. Venus reached Greatest Illuminated Extent (greatest brilliancy) on May 2 at visual magnitude -4.7, attained Greatest Elongation West on June 5, and theoretical dichotomy (half phase) on June 6. During the 2009-10 Western (Morning) Apparition observers are seeing the trailing hemisphere of Venus at the time of sunrise on Earth.

A table of Geocentric Phenomena in Universal Time (UT) is presented here for the convenience of observers; included are data for the forthcoming 2010 Eastern (Evening) Apparition for planning purposes.

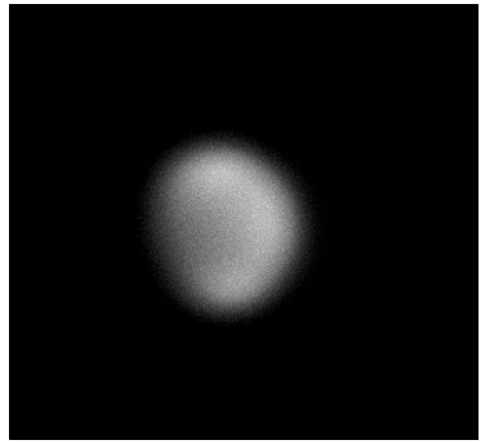
Venus observers have contributed several hundred visual drawings, descriptive reports, and images of the planet at various wavelengths (many in the UV and near-IR). Analysis of all submitted observations will begin soon after closure of the current observing season, followed by a detailed apparition report at a future date in this Journal. Observers are also 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, are still needed by the Venus Express (VEX) mission, which started systematically monitoring Venus at UV, visible (IL) and IR wavelengths back in late May 2006. This organized Professional-Amateur (Pro-Am) effort continues, and observers should submit images in JPEG format 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.

Routine observations of Venus are still needed throughout the period that VEX is observing the planet, which continues in 2010. Since Venus has a high surface brightness, it is potentially observable anytime it is far enough from the Sun to be safely observed.

Geocentric Phenomena of the 2009-10 Western (Morning) Apparition of Venus in Universal Time (UT)

Inferior Conjunction	2009	Mar 27 (angular diameter = 59.7 arc-seconds)
Greatest Brilliancy	2009	May 2 (m_V = – 4.7)
Greatest Elongation West	2009	Jun 05 (46º west of the Sun)
Predicted Dichotomy	2009	Jun 06.61 (exactly half-phase)
Superior Conjunction	2010	Jan 11 (angular diameter = 9.8 arc-seconds)
Predicted Dichotomy	2010	Aug 17.64 (exactly half-phase)
Greatest Elongation East	2010	Aug 20 (46º east of the Sun)
Greatest Brilliancy	2010	Sept 24 (m_V = – 4.7)
Inferior Conjunction	2010	Oct 11 (angular diameter = 58.3 arc-seconds)



A recent digital image of Venus on October 10, 2009 at 21:18 UT by Tomio Akutsu of Cebu, Philippines, using a 35.6 cm (14.0 in.) SCT, UV and IR blocking filters, showing dusky features roughly resembling a “spoke” pattern so typical of many UV images. S = 5, Tr = 3. Apparent diameter of Venus is 10.9”, phase (k) 0.922 or 92.2% illuminated, and visual magnitude -3.9. South is at top of image.

Key observational endeavors:

- Visual observations and drawings in dark, twilight, and daylight skies to look for atmospheric phenomena including dusky shadings and features associated with the cusps of Venus
- Visual photometry and colorimetry of atmospheric features and phenomena
- Monitoring the dark hemisphere for Ashen Light
- Observation of terminator geometry (monitoring any irregularities)
- Studies of Schröter's phase phenomenon near date of predicted dichotomy (A curious difference

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Lunar Calendar, January thru March 2010 (all times U.T.)

Jan. 01	20:37	Moon at Perigee (358,682 km - 222,875 miles)
Jan. 03	06:00	Moon 6.3 degrees SSW of Mars
Jan. 06	13:00	Moon 7.4 degrees SSW of Saturn
Jan. 07	10:41	Last Quarter
Jan. 12	08:30	Extreme South Declination
Jan. 13	19:00	Moon 4.6 degrees SSE of Mercury
Jan. 15	07:00	Moon 1.5 degrees NW of Venus
Jan. 15	07:12	New Moon (Start of Lunation 1077)
Jan. 17	01:41	Moon at Apogee (406,433km - 252,546 miles)
Jan. 17	21:00	Moon 3.4 degrees NNW of Neptune
Jan. 18	04:00	Moon 4.3 degrees NNW of Jupiter
Jan. 20	04:00	Moon 5.5 degrees NNW of Uranus
Jan. 23	10:53	First Quarter
Jan. 26	21:06	Extreme North Declination
Jan. 30	03:00	Moon 6.2 degrees SSW of Mars
Jan. 30	06:18	Full Moon
Jan. 30	09:04	Moon at Perigee (356,592 km - 221,576 miles)
Feb. 02	21:00	Moon 7.5 degrees SSW of Saturn
Feb. 05	23:50	Last Quarter
Feb. 08	14:30	Extreme South Declination
Feb. 12	03:00	Moon 2.3 degrees NW of Mercury
Feb. 13	02:07	Moon at Apogee (406,541 km - 252,613 miles)
Feb. 14	02:52	New Moon (Start of Lunation 1078)
Feb. 14	03:00	Moon 3.5 degrees NW of Neptune
Feb. 14	21:00	Moon 5.0 degrees NNW of Venus
Feb. 15	01:00	Moon 4.6 degrees NNW of Jupiter
Feb. 16	15:00	Moon 5.4 degrees NNW of Uranus
Feb. 22	00:42	First Quarter
Feb. 23	06:00	Extreme North Declination
Feb. 26	02:00	Moon 5.1 degrees SSW of Mars
Feb. 27	21:41	Moon at Perigee (357,831 km - 222,346 miles)
Feb. 28	16:37	Full Moon
Mar. 02	04:00	Moon 7.4 degrees SSW of Saturn
Mar. 07	15:43	Last Quarter
Mar. 07	21:24	Extreme South Declination
Mar. 12	10:08	Moon at Apogee (406,009 km - 252,282 miles)
Mar. 13	13:00	Moon 3.5 degrees NNW of Neptune
Mar. 14	22:00	Moon 5.1 degrees NNW of Jupiter
Mar. 15	21:02	New Moon (Start of Lunation 1079)
Mar. 15	23:00	Moon 5.4 degrees NNW of Uranus
Mar. 15	24:00	Moon 6.0 degrees NNW of Mercury
Mar. 17	05:00	Moon 6.1 degrees NNW of Venus
Mar. 22	12:18	Extreme North Declination
Mar. 23	10:59	First Quarter
Mar. 25	11:00	Moon 4.3 degrees SSW of Mars
Mar. 28	04:57	Moon at Perigee (361,876 km – 224,859 miles)
Mar. 29	12:00	Moon 7.4 degrees SSW of Saturn
Mar. 30	02:25	Full Moon

(Table courtesy of William Dembowski)

between the observed percentage of illumination and the actual geometric percentage when the planet is near greatest elongation from the Sun.)

- Routine digital imaging of Venus at visual, UV, and IR wavelengths
- Special efforts to accomplish simultaneous observations (observers are always encouraged to try to view and image Venus simultaneously; that is, as close to the same time and date as circumstances allow, which improves confidence in results and reduces subjectivity.
- Contribution of observation data and images to the Venus Express mission is encouraged

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

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

Lunar Section:
Lunar Topographical Studies / Selected Areas Program

Report by Wayne Bailey, acting program coordinator
wayne.bailey@alpo-astronomy.org

The October 9, 2009 impact of LCROSS on the Moon was one center of interest in this period. Neither of the two amateur observers that I've heard about detected the debris plume. NASA has reported that the impact crater, debris plume, and water in the plume have been seen. More information will become available as detailed analyses continue.

Focus On features in *The Lunar Observer* continued with articles on Menelaus and Deslandres. Future subjects include Atlas-Hercules, Snellius-Furnerius, and Ray Craters.

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In addition to individual observations and the continuing *Feature of the Month* note by Robert Hays, five articles on high sun observing, the effect of changing illumination, and the Ritter-Sabine rilles by Bill Dembowski, Fred Corno and Phil Morgan were published.

Visit the following online web sites for more info:

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

Lunar Domes Survey

Marvin Huddleston, FRAS, program coordinator
kc5lei@sbcglobal.net

Visit the ALPO Lunar Domes Survey on the World Wide Web at *www.geocities.com/kc5lei/lunar_dome.html*

Lunar Transient Phenomena

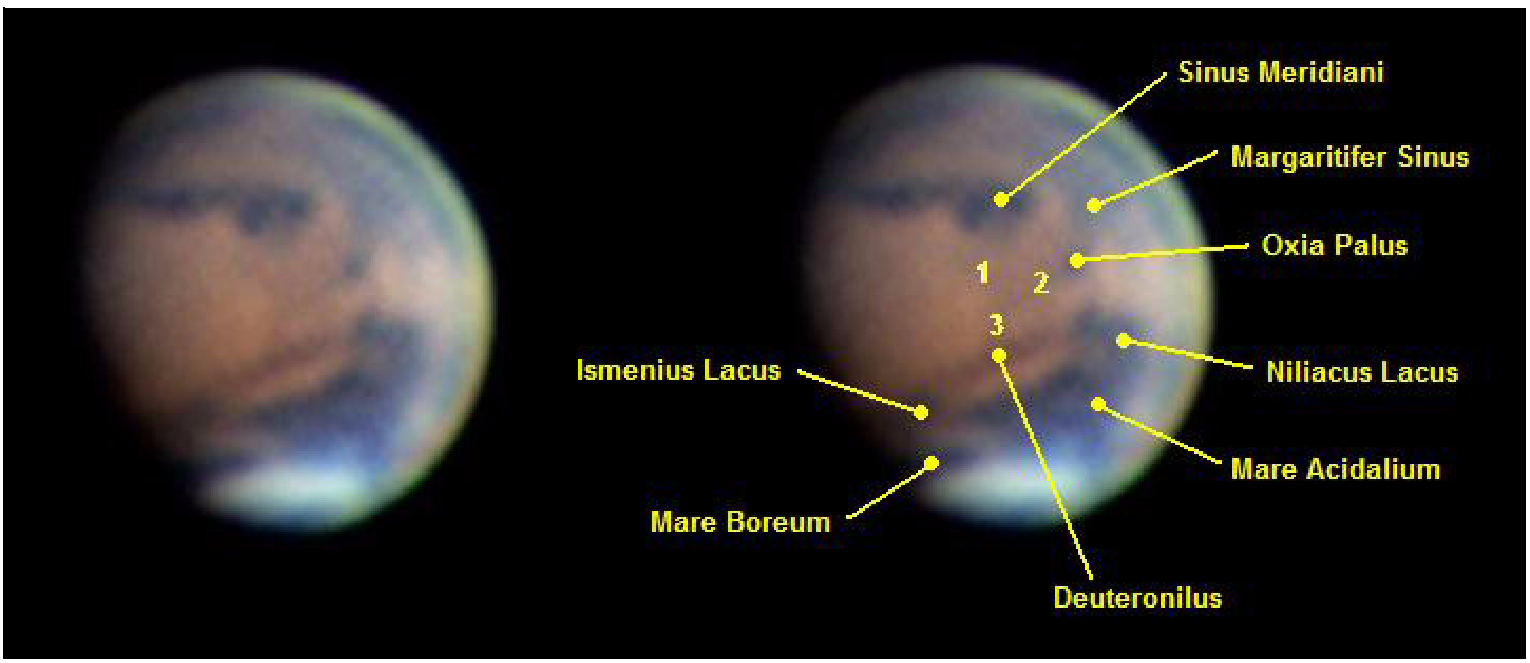
Dr Anthony Cook, program coordinator
tony.cook@alpo-astronomy.org

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

Mars Section

Report by Roger Venable, section coordinator
rjvmd@hughes.net

Mars is in the midst of an aphelic apparition, so that it appears smaller than it has in recent apparitions. Nevertheless, many observers are eagerly imaging it, some of them nearly every night! The North Polar Hood will be gone by the



This image of Mars was made by George Tarsoudis of Alexandroupolis, Greece, on Nov. 22, 2009, at 03:21 UT. Mars was 9.2 seconds of arc in apparent diameter at the time. South is at the top. The two images are identical, except for the labels. The familiar dark albedo features of this aspect of the planet are well seen, including Sinus Meridiani, Margaritifer Sinus, Niliacus Lacus, Mare Acidalium, and Mare Boreum. Also well seen are the subtle dark features called Ismenius Lacus, Deuteronilus, and Oxia Palus. This image is an unusually good depiction of the still subtler dusky features between Sinus Meridiani and Deuteronilus. These are labeled with numbers: (1) Gehon Lacus, (2) Oxus I, and (3) Siloe Fretum. Have you ever spotted these? Other details: CM 351°, Ls 13°, De 19°, Ds 5°. 10-inch Newtonian telescope, DMK21AF04 camera.

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time you read this, and Mars will be approaching opposition, visible in the sky nearly all night. We are monitoring the size of the North Polar Cap as it sublimates in the Northern Spring.

Observers continue to post their webcam images and drawings in the Yahoo "Photos" folder of the Mars observers group. Join us at *http://tech.groups.yahoo.com/group/marsobservers* . We want to hear from you!

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

Minor Planets Section

Report by Frederick Pilcher, section coordinator
pilcher@ic.edu

The *Minor Planet Bulletin* continues to grow in size as ever increasing numbers of observations of minor planets are being submitted. *Minor Planet Bulletin* Volume 36, No. 4, 2009, Oct. - Dec., has a new size record 62 pages.

While this shows that minor planet research has prospered, it is placing a strain on the all volunteer staff who prepare the Bulletin. Consequently the decision has been made that starting in 2011 January-March, the *Minor Planet Bulletin* will become available in printed form (hardcopy) only to institutional subscribers and libraries who maintain long-term archives. Individuals will still be able to download and print the electronic versions for their personal, professional, or educational use from http://www.MinorPlanetObserver.com.

Adrian Galad, Leonard Kornos, and Marek Husarik of Modra Observatory have determined for 1807 Slovakia a very long sidereal rotation period 311.75 +/- 0.09 hours and amplitude up to 1.1 magnitudes with retrograde rotation. Their own observations in 2001 and 2003 at Modra obtained a preliminary value. To these data they have added approximate magnitudes from the astrometric images at the U. S. Naval Observatory, Flagstaff, AZ, and a few from Steward Observatory and LINEAR, at all oppositions from 1998 to 2009 to obtain a definitive result.

Gerard Faure and Lawrence Garrett have published their fourth in an ongoing series of reports of Suggested Revised H Values of Selected Asteroids.

Experienced amateur observers of asteroids, both visual and CCD, continue to report magnitudes which differ

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significantly from those predicted from the absolute magnitudes in the Minor Planet Center's Orbital Database. These are useful in improving the absolute magnitudes in that data base. The new listing includes only asteroids for which consistent results at three or more oppositions show discrepancies of 0.3 magnitudes or more. Asteroids listed are 658, 870, 1002, 1122, 1194, 1365, 1403, 1909, 3198, 3873, 3913, 4790, 5222, 5231, 5518, 5917, 6000, 6838, and 6911.

In addition to the preceding highlights from *Minor Planet Bulletin* Volume 36, No. 4, 2009, Oct. - Dec., new lightcurves have been published for asteroids 8, 13, 14, 25, 40, 48, 54, 74, 118, 122, 169, 191, 193, 198, 226, 239, 362, 364, 427, 470, 511, 521, 677, 780, 875, 901, 929, 946, 1019, 1025, 1051, 1055, 1122, 1146, 1160, 1167, 1446, 1449, 1506, 1574, 1590, 1622, 1676, 1836, 1845, 1909, 1919, 2074, 2294, 2303, 2345, 2577, 2666, 2679, 2986, 3043, 3062, 3162, 3259, 3266, 3353, 3376, 3453, 3527, 3560, 3576, 3614, 3713, 3873, 3895, 4142, 4164, 4171, 4182, 4285, 4332, 4483, 4490, 4542, 4795, 4797, 4976, 5070, 5132, 5236, 5489, 5598, 5604, 5619, 5752, 5875, 6000, 6071, 6179, 6250, 6400, 6493, 6510, 6821, 6867, 6976, 7087, 7569, 7949, 8359, 8388, 9780, 11789, 11976, 12815, 13578, 14901, 15914, 16182, 16717, 17770, 18434, 20231, 24039, 27204, 27851, 34036, 34155, 44217, 48073, 93768, 99812, 101549, 136849, 143651, 1998 OR2, 1999 AQ10, 2006 SZ217, 2008 SV11, 2008 TC3, 2008 UE7, 2009 FH, 2009 HM82, 2009 KW2, 2009 KL8.

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 determinations and may be consistent or inconsistent with the earlier values.

We remind all users and inquirers that the *Minor Planet Bulletin* is a refereed publication and that it is available on line at *www.minorplanetobserver.com/mpb/default.htm*.

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

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We ask all who are considering an online purchase of Orion astronomical merchandise to do so via this online method to support the ALPO.

Jupiter Section

Report by Richard W. Schmude, Jr., section coordinator
schmude@gdn.edu

Jupiter is well-placed for evening observation during December and early January 2010. Afterwards it will sink into the western sky and reach conjunction with the Sun in February.

This writer is planning to write up the 2007, 2008 and 2009-10 Jupiter apparition reports during the first half of 2010. Two recent developments on Jupiter have been the comet/asteroid impact first imaged on July 19, 2009, and the color change of the Great Red Spot noted by Christophe Pellier. This writer also notes that Jupiter is a few percent brighter than expected, possibly due to the Equatorial Zone becoming whiter since last year.

If you have observations that you would like included in the upcoming apparition reports then send them to me. Please also be aware that we have two excellent websites where images/drawings can be posted. These are the Japan ALPO latest site (*http://alpo-j.asahikawa-med.ac.jp/Latest/index.html*) and the site at the Petit Jean Observatory (*http://www.arksky.org/*).

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

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Galilean Satellite Eclipse Timing Program

John Westfall,
assistant Jupiter section coordinator
johnwestfall@comcast.net

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.

Saturn Section

Report by Julius Benton,
section coordinator
jlbaina@msn.com

Last apparition, Saturn's rings passed through edgewise orientation to our line of sight on September 4, but with conjunction with the Sun occurring on September 17, the planet was too close to the Sun for observations of the actual edgewise ring event. As of this writing (late November), over 600 observations and images were received for the 2008-09 observing season, which are now being analyzed in preparation of a future apparition report to appear in this Journal.

For 2008-09, a substantial number of observers imaged small white spots in the SEBZ and EZn, dusky features along the SEB, as well as transits of Saturn's brighter satellites that lie close to the ring plane.

Saturn is now visible in the East before sunrise, situated in the constellation of Leo at apparent visual magnitude +1.1. Already observers are getting up before sunrise, drawing and imaging the planet and submitting their observations.

Prior to the September 4 edgewise presentation of the rings, the southern hemisphere and south face of the rings were inclined toward Earth, but starting with the 2009-10 apparition and since the Earth has now passed through the ring plane to the north, the northern hemisphere and north face of the rings are becoming increasingly visible for the next decade. Right now the rings are inclined about +4.0° toward Earth.

A table of Geocentric Phenomena for 2009-10 is provided here for planning upcoming observations.

For the 2009-10 apparition, as was the case during the immediately preceding observing season, small inclinations of rings will allow observers to continue to witness transits, shadow transits, occultations, and eclipses of bright satellites lying very near Saturn's equatorial plane and also close enough to the planet. Apertures under about 20.3 cm (8.0 in.) are usually unable to produce the best views of these events, except perhaps in the case of Titan. Those who can image and obtain precise timings (UT) to the nearest second of ingress, CM passage, and egress of a satellite or its shadow across the globe of the planet at or near edgewise presentations of the rings should send their data to the ALPO Saturn Section as quickly as possible. Notes should be made of the belt or zone on the planet crossed by the shadow or satellite, and visual numerical relative intensity estimates of the satellite, its shadow, and the belt or zone it is in front of is important, as well as drawings of the immediate area at a given time during the event.

The following are important activities for ALPO Saturn observers and include Pro-Am opportunities in support of the ongoing Cassini mission:

- Visual numerical relative intensity estimates of belts, zones, and ring components.
- Full-disc drawings of the globe and rings using standard ALPO observing forms.
- Central meridian (CM) transit timings of details in belts and zones on Saturn's globe.
- Latitude estimates or filar micrometer measurements of belts and zones on Saturn.
- Colorimetry and absolute color estimates of globe and ring features.
- Observation of "intensity minima" in the rings plus studies of Cassini's, Encke's, and Keeler's divisions.
- Systematic color filter observations of the bicolored aspect of the rings and azimuthal brightness asymmetries around the circumference of Ring A.
- Observations of stellar occultations by Saturn's globe and rings.

Image of Saturn taken on October 18, 2009 at 20:55UT by Tomio Akutsu of Cebu, Philippines, at visual wavelengths using a 35.6 cm (14.0 in.) SCT in poor seeing. S is at the top of the image. Ring tilt is +1.4º. CMI = 47.5°, CMII = 265.6°, CMIII = 203.9°. Seeing = 3, Transparency = 3.

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- Visual observations and magnitude estimates of Saturn's satellites.
- Multi-color photometry and spectroscopy of Titan at 940 nm - 1,000 nm.
- Imaging Saturn using a 890 nm narrow band methane (CH_4) filter with apertures of 31.8 cm (12.5 in.) or larger to alert the Cassini team of interesting large-scale targets and suspected changes in belt and zone reflectivity.
- Regular digital imaging of Saturn and its satellites at various wavelengths.

Observers are urged to carry out digital imaging of Saturn at the same time that others are imaging or visually watching Saturn (i.e., simultaneous observations). All observers should compare what can be seen visually with what is apparent on their images, without overlooking opportunities to make visual numerical intensity estimates using techniques as described in the author's new book, *Saturn and How to Observe It* (available from Springer, Amazon.com, etc.). Although regular imaging of Saturn is extremely important and encouraged, far too many experienced observers have neglected making 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 work of so many dedicated observers. The ALPO Saturn Section is grateful for the hard work of so many dedicated observers who faithfully submit observations and images, prompting more and more professional astronomers to request drawings, digital images, and supporting data from amateur observers around the globe.

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

Report by Richard W. Schmude, Jr., section coordinator
schmude@gdn.edu

The planets Uranus and Neptune will be visible during the late evening in both December and January. Uranus will reach conjunction in March 2010 while Neptune will reach conjunction in February. Pluto is very close to the Sun during December and January.

I have submitted the 2008 remote planets apparition report to the editor of this Journal; look for its publication in JALPO52-2 (Spring 2010). If you have observations for the 2009-2010 apparitions, then please send them to me. I will start working on the 2009-2010 remote planets apparition report possibly in June 2010.

The biggest development related to the remote planets is that Uranus appears to be a bit brighter in 2009 than in the previous two years.

My 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.

Geocentric Phenomena for the 2009-2010 Apparition of Saturn in Universal Time (UT)	
Conjunction	2009 Sep 17^d
Opposition	2010 Mar 21^d
Conjunction	2010 Oct 01^d
Opposition Data:	
Equatorial Diameter Globe	15.7 arc-seconds
Polar Diameter Globe	14.0 arc-seconds
Major Axis of Rings	35.6 arc-seconds
Minor Axis of Rings	4.2 arc-seconds
Visual Magnitude (m_v)	0.9 m_v (in Leo)
B =	+6.4°

Point of View

Continued from page 3

Technology and Future. In this issue are my two book reviews. Take a look at Richard Stroud's lunar reference book *The Book of the Moon* and from the UK, John Moore has skillfully created a very user friendly *Moon Atlas in 20 Maps*, which can be purchased in the telescopic version to match the view of the Moon you see in your instrument.

If you are interested in acquiring a home library or a book on your favorite solar system object, there are any number of on-line sources, besides Amazon. My favorite site is ABEbooks.com. They are a vast collection of booksellers from around the world and offer just about any book that is for sale. Another great site is BookFinder.com. Also take a look at Astromart and cloudynights.com/classifieds. These last two are books and astronomical things being sold or traded by amateurs.

From the standpoint of looking at the number of solar-system-related books, the number and enthusiasm of the kids at NASA on LCROSS night, and the size of our organization, I would say that the "demise" of interest in our branch of astronomy is unfounded.

Robert A. Garfinkle, FRAS is an independent scholar of the history of astronomy and author of *Star-Hopping: Your Visa to Viewing the Universe*, and your JALPO Book Review Editor.

Book Review

Books of the Moon

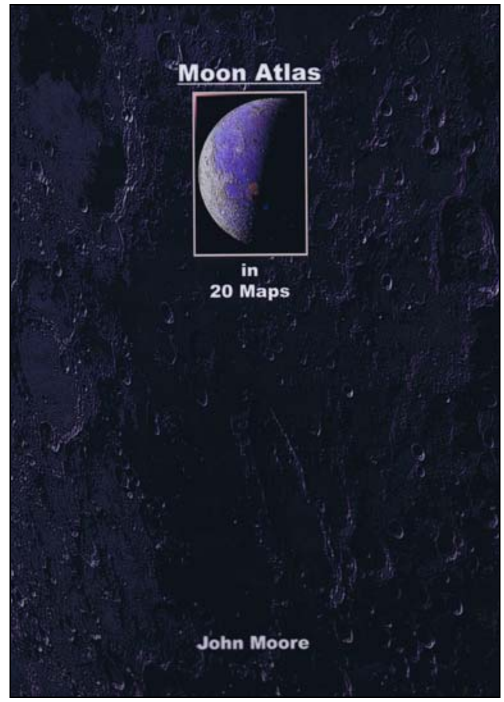
Both reviews by Robert A. Garfinkle, ALPO Book Review Editor
ragarf@earthlink.net

Moon Atlas: A Detailed View of the Nearside in 20 Maps by John Moore, 2009; no ISBN; 103 pages, spiral-bound with index & illustrations; Euro 42.00 (includes postage & handling); order directly from the author at *www.moonposter.ie/natoptions.htm* (major credit cards accepted, use currency converter on author's web page for final cost).

This fabulous lunar atlas is the work of UK author/illustrator John Moore. The photographic atlas comes in three varieties and you will need to order what type fits your observing equipment. Moore has produced an atlas for "Natural View" (or "Normal" view, with lunar north at top and IAU east at right), "Inverted Mirror View" (or "Simple Inversion" view, with south at top and west at right), and another for "Mirror View" (or "Inversion with lateral reversal" view, with south at top and east at right). The text is the same in all three books, only the maps of the Moon and the hi-resolution images are different in order to show how the Moon appears in your type of instrument. In an e-mail correspondence with the author, he informed me that a lot of effort went into creating the three different versions in that all of the text on the maps and illustrations had to be individually done three times. The text includes information on the lunar coordinate system, the geologic units and their ages, along with a brief overview of the geological history of the Moon.

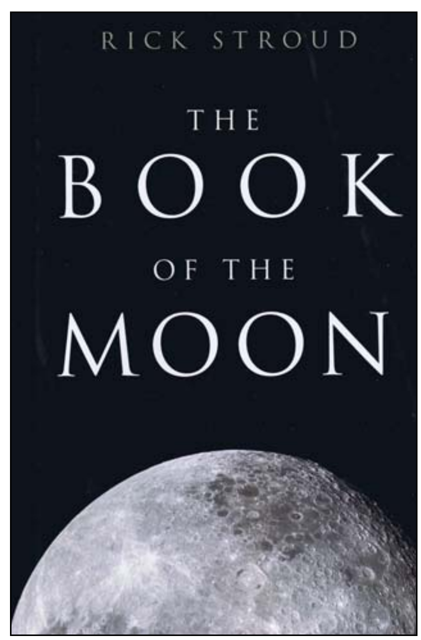
The maps are a little glossy when used at the telescope, but having a lunar map to match the view in my Schmidt-Cassegrain was very helpful. One problem is that the author used a variety of colors to identify features and he used red to give the diameters of the craters. Red print virtually disappears when you use a red-lighted flashlight. Of course if you are only going to observe the Moon and no deep-sky observers are nearby, and being dark-adapted is not a problem, then you can use a white-light flashlight and all is well with the maps.

The index includes all of the named lunar features, including all of the satellite named features as well. The layout of the book was well thought out and it is a breeze to go from the edge of one map to the adjoining map, because the author added the adjoining map numbers along edges of all of the maps.



Order your atlas directly from the author's website. He also has for sale a large (33 x 23 inches) fact-filled poster of the Moon and a CD from which you can printout gores to make a moon globe. I highly recommend this atlas to all lunar observers.

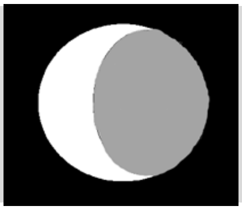
The Book of the Moon by Rick Stroud, 2009, published by Walker & Company, with index and illustrations. ISBN-13-978-0-8027-1734-4; 360 pages, hardcover; list price $27, though $18.47 at Amazon.com



This nonfiction work by UK author Rick Stroud is not a lunar observers' handbook, but instead a reference work for lunar observers. The author covers an array of lunar-related subjects, such as the Moon's influence on gardening (when to plant or reap crops based on lunar phases), how the Moon affects the Earth's weather, the history of mapping the Moon, Moon mythology, werewolves and other strange things believed to be caused by the Moon. I myself liked the section on Moon gods and their stories. Stroud gives brief coverage to the lore of the Moon from around the world and from many long gone cultures and ages. He even devotes a page to listing pagan lunar festivals.

One really annoying thing about this book, however, is that an author of a book devoted to telling his readers all about the Earth's closest celestial neighbor should know that the proper name of the object is the (proper noun) "Moon" and not the (generic noun) "moon". Though the book is loaded with interesting facts, figures and illustrations, the author too often only skims the particular subject at hand and misses important details. In one instance, he starts his section on photographic lunar atlases in 1910, thereby leaving out the first such work, *The Moon: A Summary of the Existing Knowledge of Our Satellite, With a Complete Photographic Atlas*, published in 1903 by William Henry Pickering.

Stroud compounds the error by even stating in a table that the "*Atlas Photographique de la Lune* by Loewy and Puiseux is the "First photographic atlas of the moon." I also found numerous factual errors in other areas of the book, which in my opinion, drastically reduce the book's overall value as a reference work.



Feature Story:
Volcanism on the Moon

By William M. Dembowski, FRAS,
Asst. Program Coordinator,
Lunar Topographical Studies/
Selected Areas Programs
dembowski@zone-vx.com

Note that all images have lunar north at the top and lunar east (per IAU) at the right

Online Features

Left-click your mouse on the author's e-mail addresses in blue text to contact the author of this article.

Introduction

As recently as the 1950's there were still heated debates as to the origin of lunar craters; were they impact or volcanic in nature? Volcanism was highly favored by many scientists largely because impact craters were virtually unknown on the Earth. It was not until the Apollo missions returned samples of the lunar surface for direct examination and analysis that the impact origin of craters was widely accepted.

Lava Flows

Although we now recognize that virtually all lunar craters are the result of impacts, there are still many signs of other volcanic activity on the Moon. The largest volcanic features are the maria — lava-filled impact basins which cover about 30% of the Earth-facing side of the Moon. Interestingly, mare lavas cover only 2% of the far side (see Figure 1). Although closely associated with impact basins, the lava flows did not necessarily occur as a direct and immediate result of the impact itself. For example, the Imbrium basin was formed 3.9 billion years ago but the lavas that fill it, as sampled by the Apollo 15 mission, are about 3.3 billion years old.

Lunar petrologists have described 21 different types of lunar lavas, but most of their differences are minor and all can be grouped into three major families:

- High titanium (widespread on the lunar surface)
- Low titanium (northern maria)
- Very low titanium (eastern maria).

One property which they all share is their low viscosity; it is much closer to that of motor oil than the high viscosity Earth lavas with which we are more familiar. It is this fluidity which allowed the lunar lavas to travel great distances in a relatively short period of time and cover vast areas before they cooled and solidified.

Evidence of lava flows can be detected best in southwestern Mare Imbrium, where lava fronts can be traced for hundreds of kilometers (see Figure 2). At the eyepiece, care should be taken not to confuse these formations with wrinkle ridges which are tectonic structures caused by the subsidence and contraction of the lavas.

Sinuous Rilles

Arcuate (curved) and straight rilles are graben-like tectonic structures; that is, they are the result of faulting and subsidence where mare lavas collapsed into the underlying impact basin. On the other hand, sinuous rilles are volcanic in nature and are found along the margins of nearly all the mare filled basins. Sinuous rilles are meandering channels that commonly begin at crater or crater-like formations and end by fading downslope

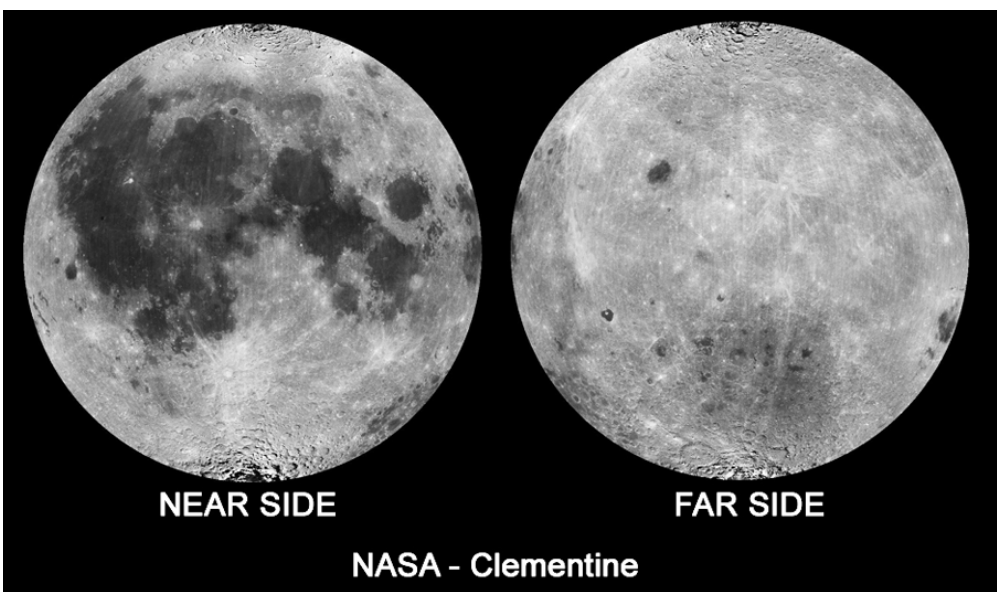


Figure 1. Maria on near side and far sides of Moon (Source: NASA - Clementine)

into the mare surface. They are analogous to the lava channels and lave tubes found in Hawaii. The most striking difference between these lunar and terrestrial features is one of scale, with the lunar rilles being larger by a factor of 30-50. This disparity in size can be attributed to the Moon's weaker gravity, and the higher temperatures and lower viscosity of its lavas.

The largest concentrations of sinuous rilles are found on the Aristarchus Plateau (see Figure 3) and near the Marius Hills. They range in size from a few tens of meters to 3 km in width, from a few kilometers to 300 km in length, and about 100 meters deep.

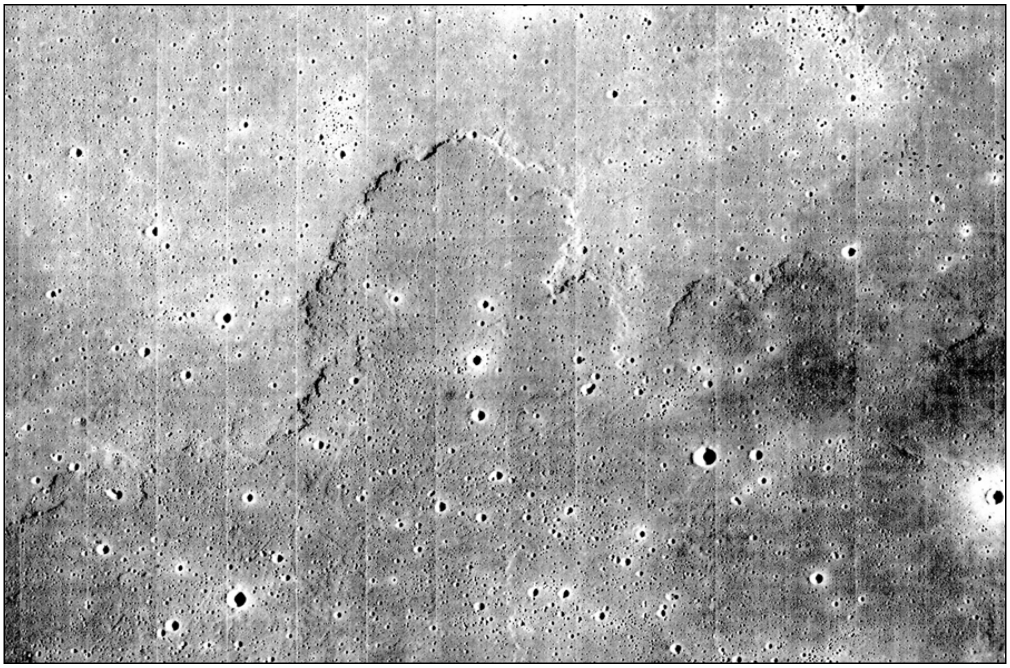


Figure 2. Lava flows in Mare Imbrium (Source: NASA - Lunar Orbiter V-161M)

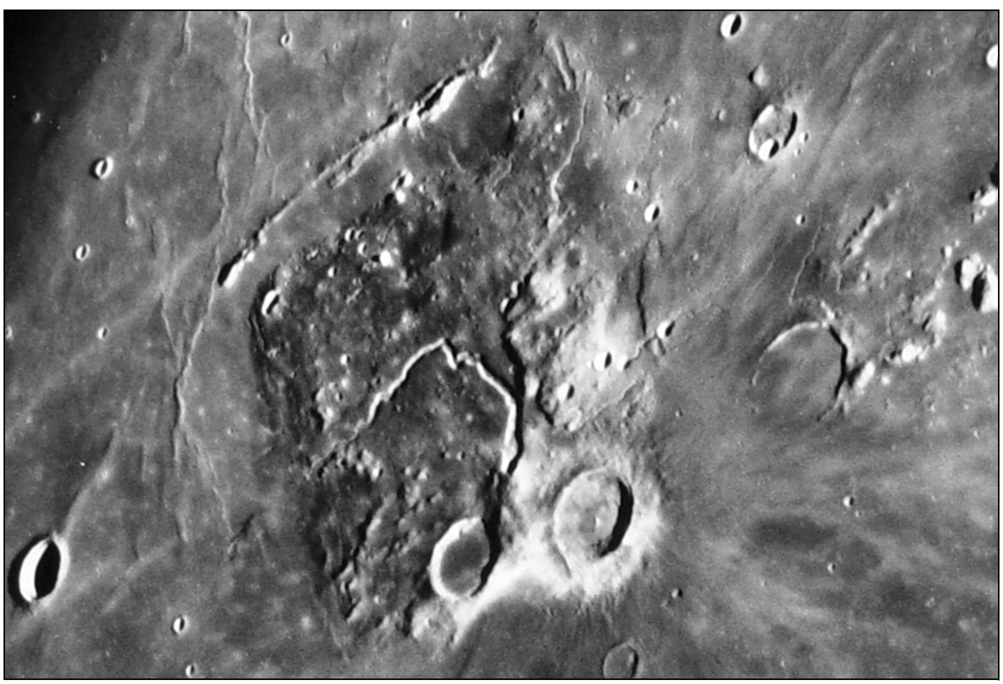


Figure 3. Sinuous rille (Schroter's Valley) on Aristarchus Plateau (Source: NASA/LPI - Consolidated Lunar Atlas)

Domes

Domes are low profile swellings of the mare surface, many with small central pits. With diameters between 5-15 kilometers and just a few hundred meters high, they can be difficult features to observe even under the best of conditions. There is a major concentration of domes to the west and south of Copernicus, particularly around the craters Milichius and Hortensius (see Figure 4).

Domes are clearly not impact features and there are two major schools of thought as to their origin. Some scientists believe them to be small shield volcanoes like those found in Iceland. Shield volcanoes are caused by the quiet eruption of lava from a central crater, which would account for the central pits. Others argue that they are laccoliths, localized swellings of the mare surface as lava uplifted, but failed to break through, the overlying layers. The similarity between the domes and surrounding mare in both texture and albedo would seem to favor the latter theory.

Cinder Cones

Unlike shield volcanoes, cinder cones are constructed by the explosive ejection of blobs or sprays of molten rock which are then deposited around the vent. On the Earth, cinder cones tend to be very steep sided but the Moon's lower gravity allows the ejected materials to travel much farther from their source. The resulting lunar cones are not as steep as their terrestrial counterparts measuring less than 100 meters high with diameters of approximately 2-3 km at the base. Lunar cones can be found in groups or as isolated forms; lines of cones associated with rilles are generally interpreted as fissure vents.

Cinder cones found on mare or mare-like surfaces tend to have albedos that are lower than their surroundings whereas those found on the rough volcanic floors of craters, such as Copernicus, have relatively higher albedos than their regional settings.

Dark-haloed Craters

As the name implies, dark-haloed craters are those which are surrounded by dark deposits rather than the bright ones of the more numerous bright-rayed craters. Dark-haloed craters can be grouped into two types; (1) those created when an impactor penetrates a thin veneer of surface material into a darker underlying deposit and produces low-albedo ejecta, and (2) those which are truly volcanic in origin, much like cinder cones except with a lower profile.

The floors of Alphonsus (see Figure 5) and Atlas contain fine examples of dark-haloed craters which spectral analysis has shown to be composed of volcanic glass and lava fragments. As with many other lunar volcanic features, dark-haloed craters are closely associated with rilles.

Conclusion

Having shown that the Moon was once volcanically active, the question becomes: "Is it still active and, if not, how long has it been inactive?"

Apollo data indicate that basaltic lavas on the Moon are between 4.3 and 3.2 billion years old, but the more recent Japanese Kaguya mission has detected flows in Oceanus Procellarum and the far side of the Moon that date back 2 to 2.5 billion years. None more recent have been confirmed.

Discovered by Apollo 15 and confirmed by the Clementine spacecraft, the lunar feature Ina in Lacus Felicitatis appears to be a non-impact formation less than 10 million years old. Apparently formed by the sudden release of volcanic gases, indications are that the gas had been trapped beneath the surface for billions of years and just "recently" released by geologic rather than volcanic activity. The same may be said for the highly controversial detection of outgassing recorded by Nikolai Kozyrev near the central peak of Alphonsus in 1958.

Although the Moon may no longer be volcanically active, the evidence of past volcanic activity and possible current geologic activity still provides important areas of lunar study. For more information, interested observers should contact any of the folowing:

- Marvin W. Huddleston (ALPO Lunar Dome Survey) at *kc5lei@sbcglobal.net*
- Dr. Anthony Cook (ALPO LTP Program) at *tony.cook@alpo-astronomy.org*
- Wayne Bailey (ALPO Lunar Topographical Studies) at *wayne.bailey@alpo-astronomy.org*.

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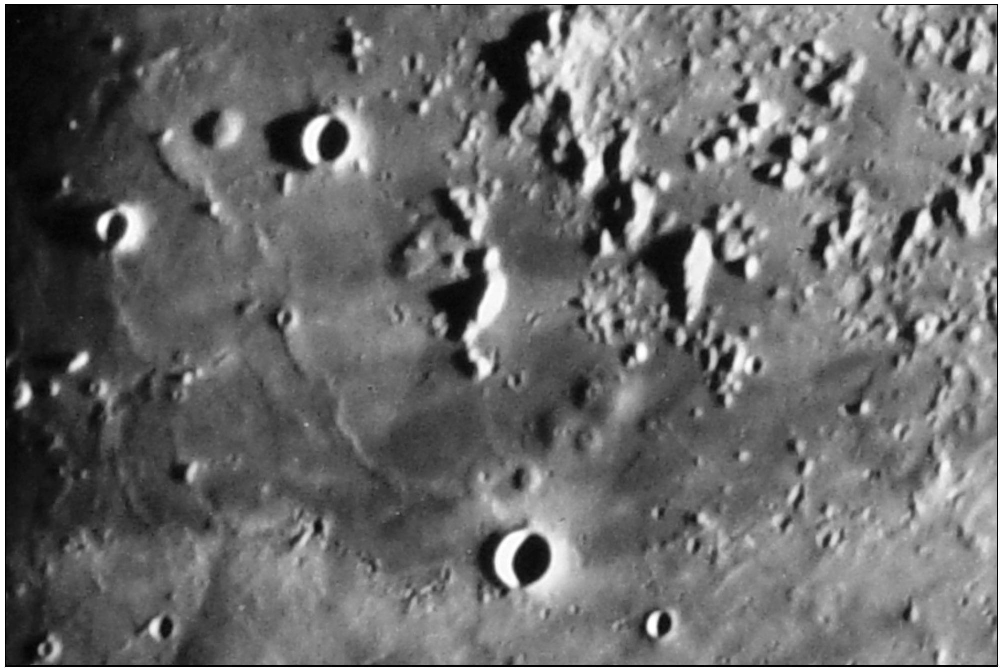

Figure 4. Lunar domes near Milichius and Horensius (Source: NASA/LPI - Consolidated Lunar Atlas)

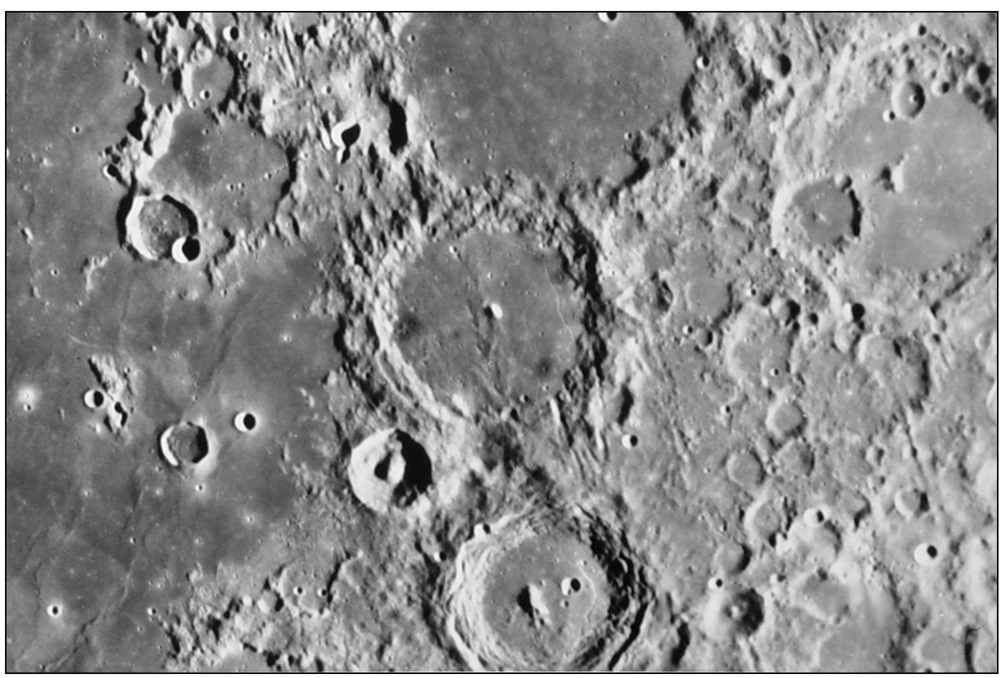

Figure 5. Dark-haloed craters in Alphonsus (Source: NASA/LPI - Consolidated Lunar Atlas).

Feature Story:
Discovery of a Previously Unknown Imbrium Radial Ridge

By Maurice Colins,
mauricejscollins@hotmail.com

Online Features

Left-click your mouse on the author's e-mail addresses in blue text to contact the author of this article.

Note that all images have lunar north at the top and lunar east (per IAU) at the right unless otherwise stated.

Introduction

With the recent release of the Kaguya topographical lunar dataset and a 3D Moon globe visualization tool, http://wms.selene.jaxa.jp/3dmoon_e/index_e.html, it is now possible for amateurs to look at the Moon from new perspectives that have not previously been available.

Shortly after installing the Kaguya 3D globe and selecting the LALT (Laser Altimeter) overlay centered on Mare Imbrium, I noticed a radial area of high topography extending away from the Imbrium basin in a straight line toward the horizon (Figure 1). It was also radial to the center of Imbrium's inner ring, as was the Alpine Valley. I had never seen this before and it looked very unusual (Figure 2).

I constructed a graphic to illustrate this ridge and sent it out to various amateur lunar organizations for confirmation. I also checked the Lunar Orbiter images and constructed a mosaic of the region in order to see whether it could be seen in this too. The ridge can indeed be traced along its length in the Lunar Orbiter mosaic (Figure 3) but would have otherwise gone unnoticed because it gives the impression of an unrelated series of peaks and crater rims. The ridge was confirmed by Chuck Wood as a previously unrecognized feature and appeared as "Lunar Photo of the Day" on Nov 16, 2009, at http://lpod.wikispaces.com/November+16,+2009

Looking at the overall topography with the Kaguya Laser Altimeter data, it seems to be an area of high terrain that diminishes in thickness further away from Imbrium.

The linear mountain ridge extends for an approximate distance of 940 km (584 miles) from near Promontorium Agassiz, ending to the east, just short of Cepheus. It starts approximately at 42.1° N, 1.8° E and ends around 40.3° N, 44.7° E. The height of the ridge is approximately 430 m (1,300 ft) above the surrounding terrain, or about 2,300 m (7,546 ft) below the lunar reference datum average radius of 1,738 km (1,080 miles) as is most of the nearside of the Moon.

I realized also that if the Montes Caucasus were offset approximately 185 km (115 miles) to the west along this fault/ridge, the mountains would form a continuous arc of the Imbrium basin rim joining the Montes Alps. Could this be evidence for some limited localized plate tectonics occurring on the early Moon?

It is interesting to note that there is another linear ridge-like feature along the same radial direction as the Alpine valley, but further out, in the form of wrinkle ridges. There are other radial features in the region between these features that show up in low illumination angles near the terminator. This newly discovered radial Imbrium feature may not have been noticed before in Earth-based or spacecraft-based imagery because it requires an illumination angle almost perpendicular to the terminator in order to cast a shadow at low sun grazing angles sufficient to cause it to be visible as a continuous raised ridge. This ridge, however, is visible in telescopic imagery as a line of connected relief once one knows exactly where to look. It can be seen in images of the 6- to 10-day old Moon.

It is hoped that this discovery will encourage other amateur astronomers to study the newly available spacecraft datasets to supplement their traditional Earth-based telescopic studies of the Moon. It is the beginning of an exciting new era in lunar studies!

Acknowledgements

The writer wishes to thank ALPO Lunar Transient Phenomena Studies Coordinator Dr. Anthony Cook for suggestions in preparing this article.

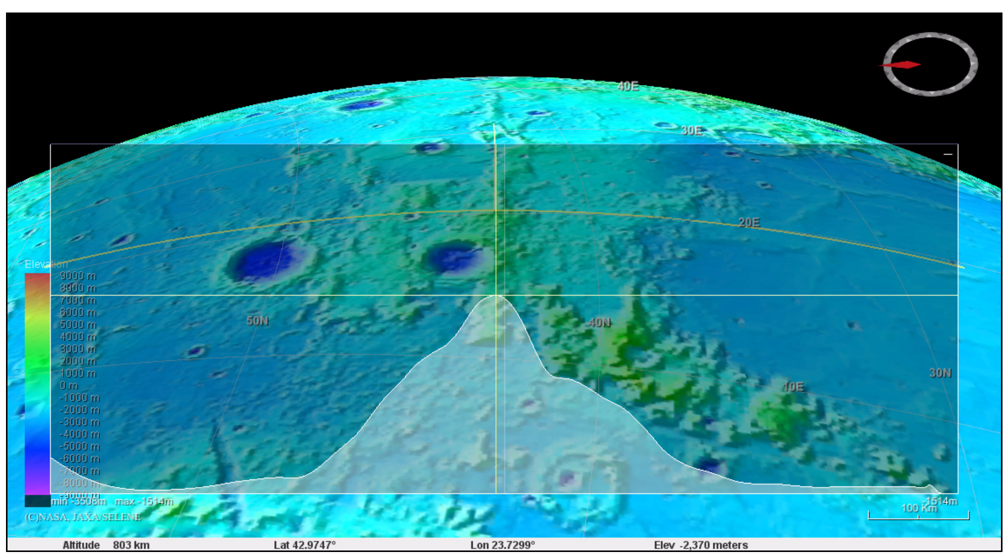

Figure 1. Topography cross-section of ridge from Kaguya 3D globe. Lunar north at left, east at top. (All images supplied by author.)

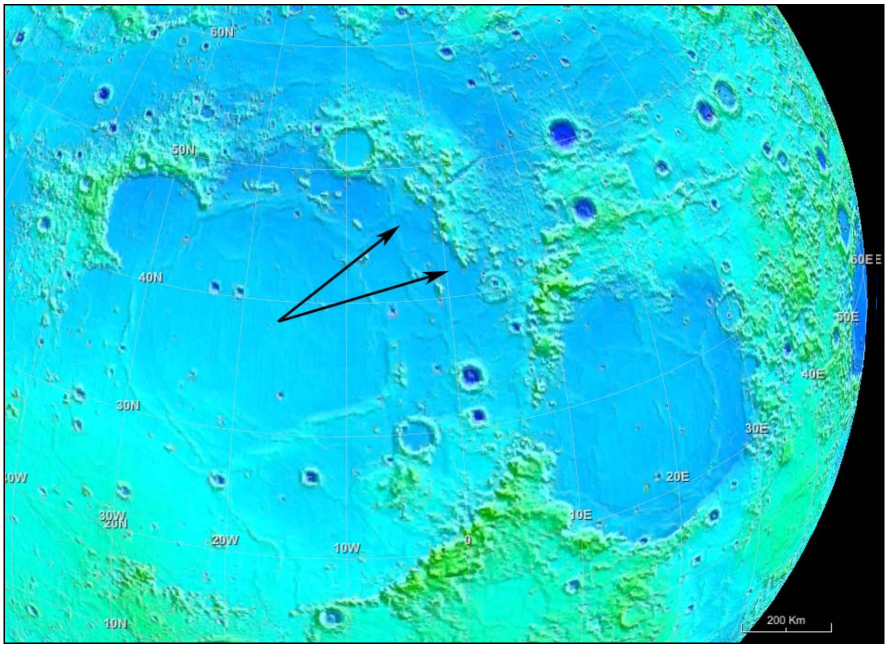

Figure 2. Radial nature of ridge and Alpine Valley to Imbrium basin.

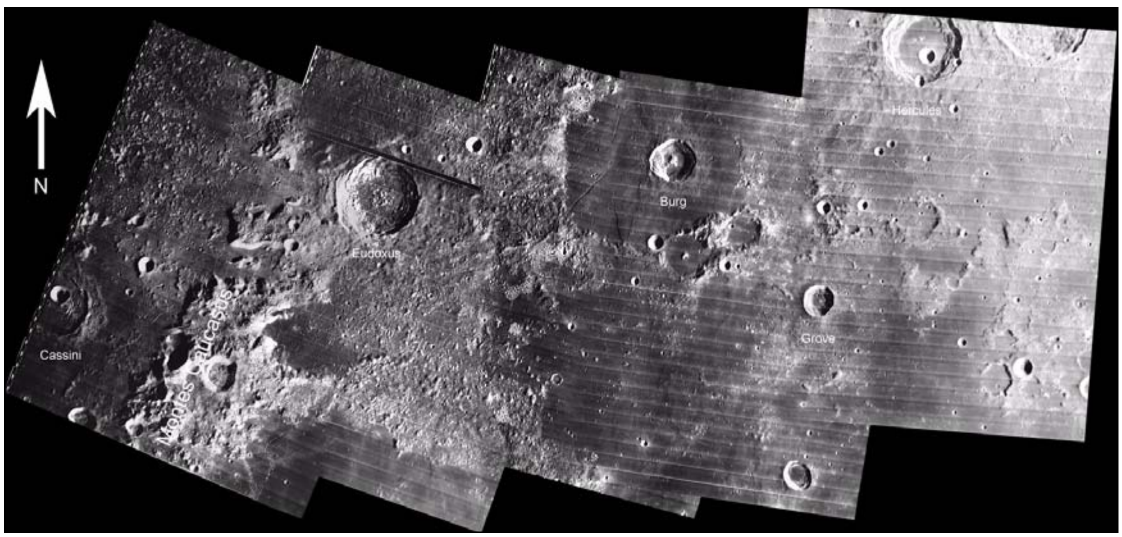

Figure 3. Lunar Orbiter mosaic.

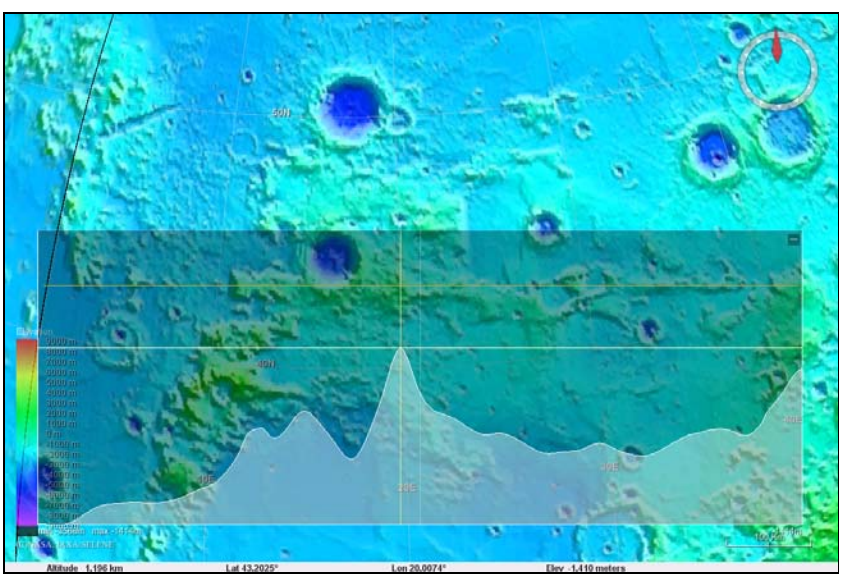

Figure 4. Profile of elevations along ridge.

Feature Story:

ALPO Observations of Saturn During the 2006 - 2007 Apparition

By Julius L. Benton, Jr.,
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This paper includes a gallery of Saturn images submitted by a number of observers.

Please note that when a visual observer records or suspects a specific feature on Saturn, it is important to secure future observations quickly if we wish to obtain the period of rotation. For this purpose we encourage observers to use these facts: In System I (EZ plus NEB or SEB), 7 rotations are accomplished in close to 3 Earth-days, while in Sysyem II (rest of planet), 9 rotations require close to 4 such days.

A complete set of Saturn Observing Forms are available for downloading at *http://www.alpo-astronomy.org/publications/ALPO Section Publications/SaturnReportForms - All.pdf*

See the *ALPO Resources Section, ALPO Observing Section Publications* of this Journal for hardcopy availability.

Abstract

The ALPO Saturn Section received 395 visual observations and digital images during the 2006-2007 observing season (from 2006 SEP 08 through 2007 JUL 13) which were contributed by 54 observers in the United States, Canada, France, Germany, Italy, Japan, The Netherlands, The Philippines, Portugal, Puerto Rico, Spain, The United Kingdom, and Thailand. Instruments used to carry out the observations ranged from 12.0 cm (4.5 in.) up to 152.4 cm (60.0 in.) in aperture. Recurring short-lived dark features were observed or imaged throughout much of the observing season in the South Equatorial Belt (SEB), sometimes extending as dusky festoons into the EZs, with perhaps an isolated detection of a dark spot in the South Polar Region (SPR). Observers imaged the repeated presence of small white spots in the South Tropical Zone (STrZ) and South Equatorial Belt Zone (SEBZ) during 2006-2007, and less frequently, similar white features were observed or imaged in the South Temperate Zone (STeZ) and Equatorial Zone (EZs). A few recurring central meridian (CM) transit timings were submitted for a few of these features. The inclination of Saturn's Ring System toward Earth, B, attained a maximum numeric value of –15°.41 on 2007 APR 18. Despite the reduced tilt of the Globe and Rings toward Earth in 2006-2007, observers could still see and image reasonable por-

All Readers

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

Online 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).

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
Ring B has been adopted (for most apparitions) as the standard on the numerical sequence. The outer third is the brightest part of Ring B, and it has been assigned a constant intensity of 8.0 in integrated light (no filter). All other features on the globe and in the rings are estimated using this standard of reference.

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

Scale of Transparency Conditions:
Magnitude of the faintest star visible near Saturn when allowing for daylight and twilight

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

Table Geocentric Phenomena in Universal Time (UT) for Saturn During the 2006-2007 Apparition

Conjunction		2006	Aug	07d	12h UT
Opposition		2007	Feb	10d	19h
Conjunction		2007	Aug	21d	23h
Opposition Data					
Visual Magnitude		0.00			
Constellation		Leo			
Declination		+15.53°			
B		–13.93°			
B'		–13.81°			
Globe	Equatorial Diameter	20.27"			
	Polar Diameter	18.39"			
Rings	Major Axis	45.99"			
	Minor Axis	11.07″			

Table 2: 2006-07 Apparition of Saturn: Contributing Observers

	Observer	Location	Number of Observations	Telescopes Used
1.	Acquarone, Fabio	Genova, Italy	1	23.5-cm (9.25-in) SCT
2.	Adelaar, Jan	Arnhem, Netherlands	5	23.5-cm (9.25-in) SCT
3.	Allen, Ethan	Sebastopol, CA	3	30.5-cm (12.0-in) NEW
4.	Arditti, David	Middlesex, UK	9 13	25.4-cm (10.0-in) DAL 28.0-cm (11.0-in) SCT
5.	Bee, Ron	San Diego, CA	1	12.7-cm (5.0-in) REF
6.	Bell, Charles	Vicksburg, MS	1	30.5-cm (12.0-in) NEW
7.	Benton, Julius L.	Wilmington Island, GA	40	15.2-cm (6.0-in) REF
8.	Bosman, Richard	Enschede, Netherlands	3	28.0-cm (11.0-in) SCT
9.	Casquinha, Paolo	Palmela, Portugal	12	25.4-cm (10.0-in) NEW
10.	Chavez, Rolando	Powder Springs, GA	3	31.8-cm (12.5-in) NEW
11.	Chester, Geoff	Alexandria, VA	3 3 1	20.3-cm (8.0-in) SCT 30.5-cm (12.0-in) REF 66.0-cm (26.0-in) REF
12.	Cudnik, Brian	Houston, TX	4 2 4	20.3-cm (8.0-in) CAS 31.8-cm (12.5-in) NEW 35.6-cm (14.0-in) CAS
13.	Delcroix, Marc	Tournefeuille, France	22	25.4-cm (10.0-in) SCT
14.	Einaga, Hideo	Kasai, Japan	1	25.4-cm (10.0-in) NEW
15.	Fattinnanzi, Cristian	Macerata, Italy	3	25.4-cm (10.0-in) NEW
16.	Gasparri, Daniele	Perugia, Italy	2	23.5-cm (9.25-in) SCT
17.	Go, Christopher	Cebu City, Phillipines	16	28.0-cm (11.0-in) SCT
18.	Grafton, Ed	Houston, TX	1	35.6-cm (14.0-in) SCT
19.	Haberman, Bob	San Francisco, CA	1	25.4-cm (10.0-in) SCT
20.	Hatton, Jason P.	Noordwijk, Netherlands	1	23.5-cm (9.25-in) SCT
21.	Heard, Kieron	Suffolk, UK	1	20.3-cm (8.0-in) SCT
22.	Hernandez, Carlos	Miami, FL	1	22.9-cm (9.0-in) MAK
23.	Hill, Rik	Tucson, AZ	7 1	35.6-cm (14.0-in) SCT 152.4-cm (60.0-in) NEW
24.	Ikemura, Toshihiko	Osaka, Japan	6 9	31.0-cm (12.2-in) NEW 38.0-cm (15.0-in) SCT
25.	Kazemoto, Akira	Kumiyama, Japan	1	30.8-cm (12.1-in) NEW
26.	Lawrence, Pete	Selsey, UK	7	35.6-cm (14.0-in) SCT
27.	Lazzarotti, Paolo	Massa, Italy	3	31.5-cm (12.4-in) NEW
28.	Lomeli, Ed	Sacramento, CA	8	23.5-cm (9.25-in) SCT
29.	Maxson, Paul	Phoenix, AZ	24	25.4-cm (10.0-in) CAS
30.	Melillo, Frank J.	Holtsville, NY	7	25.4-cm (10.0-in) SCT
31.	Melka, Jim	St. Louis, MO	8	30.5-cm (12.0-in) SCT
32.	Mobberley, Martin	Suffolk, UK	5	25.4-cm (10.0-in) NEW
33.	Niechoy, Detlev	Göttingen, Germany	45	20.3-cm (8.0-in) SCT
34.	Olivetti, Tiziano	Bangkok, Thailand	1	27.5-cm (10.8-in) NEW
35.	Owens, Larry	Alpharetta, GA	3	35.6-cm (14.0-in) SCT

Table 2: 2006-07 Apparition of Saturn: Contributing Observers (Continued)

	Observer	Location	Number of Observations	Telescopes Used
36.	Parker, Donald C.	Coral Gables, FL	1 1	25.4-cm (10.0-in) DAL 40.6-cm (16.0-in) NEW
37.	Peach, Damian	Norfolk, UK	1 18 1	15.2-cm (6.0-in) REF 23.5-cm (9.25-in) SCT 35.6-cm (14.0-in) SCT
38.	Pellier, Christophe	Bruz, France	12	25.4-cm (10.0-in) CAS
39.	Pettenpaul, Oliver	Littfeld, Germany	1	24.5-cm (9.6-in) NEW
40.	Phillips, Jacob	Swift Creek, NC	1	20.3-cm (8.0-in) SCT
41.	Phillips, Jim	Charleston, SC	6	22.9-cm (9.0-in) REF
42.	Phillips, Mike	Swift Creek, NC	1	20.3-cm (8.0-in) SCT
43.	Plante, Phil	Braceville, OH	1 2 1 2	15.2-cm (6.0-in) NEW 20.3-cm (8.0-in) SCT 20.3-cm (8.0-in) REF 31.8-cm (12.5-in) NEW
44.	Robbins, Sol	Fair Lawn, NJ	3 3	15.2-cm (6.0-in) REF 24.8-cm (9.75-in) NEW
45.	Roussell, Carl	Hamilton, ON, Canada	12	15.2-cm (6.0-in) REF
46.	Sanchez, Jesus	Cordoba, Spain	2 1	25.4-cm (10.0-in) SCT 28.0-cm (11.0-in) SCT
47.	Santacana, Guido	San Juan, PR	1 2	12.0-cm (4.7-in) REF 15.0-cm (5.9-in) MAK
48.	Sharp, Ian	West Sussex, UK	2	28.0-cm (11.0-in) SCT
49.	Sherrod, Clay	Little Rock, AR	1 2	20.3-cm (8.0-in) REF 50.0-cm (19.7-in) RC
50.	Tasselli, Andrea	Florence, Italy	3 2	20.3-cm (8.0-in) SCT 24.5-cm (9.6-in) NEW
51.	Tyler, David	High Wycombe, Bucks, UK	1 3	15.2-cm (6.0-in) REF 35.6-cm (14.0-in) SCT
52.	Vandebergh, Ralf	Maastricht, Netherlands	14	24.5-cm (9.6-in) NEW
53.	Viladrich, Christian	Paris, France	1	20.3-cm (8.0-in) MAK
54.	Walker, Sean	Chester, NH	1	31.8-cm (12.5-in) NEW
	TOTAL OBSERVATIONS		**395**	
	TOTAL OBSERVERS		**54**	

Instrumentation Abbreviations:
CAS = Cassegrain, DAL = Dall-Kirkham, MAK= Maksutov-Cassegrain, NEW = Newtonian, SCT = Schmidt-Cassegrain,
REF = Refractor, RC = Richey-Chretien

tions of Saturn's Southern Hemisphere and South ring face, with increasing areas of the Northern Hemisphere of the planet coming into view. Visual observations and digital images of Saturn contributed during 2006-2007 are summarized, including the results of continuing efforts to image the bicolored aspect and azimuthal brightness asymmetries of the Rings. Accompanying the report are references, drawings, digital images, graphs, and tables.

Introduction

This report was prepared following an analysis of 395 visual observations, descriptive notes, and digital images dispatched to the ALPO Saturn Section by 54 observers from 2006 SEP 08 through 2007 JUL 13, defined as the 2006-2007 "observing season." The actual apparition of Saturn, defined as the period between successive solar conjunctions, was between 2006 AUG 07 and 2007 AUG 21. Several drawings and images are included with this summary, integrated as much as feasible with topics discussed in the text, with times and dates all given in Universal Time (UT).

Table 1 provides geocentric data in Universal Time (UT) for the 2006-2007 Apparition. During the observing season, the numerical value of **B**, or the Saturnicentric latitude of the Earth

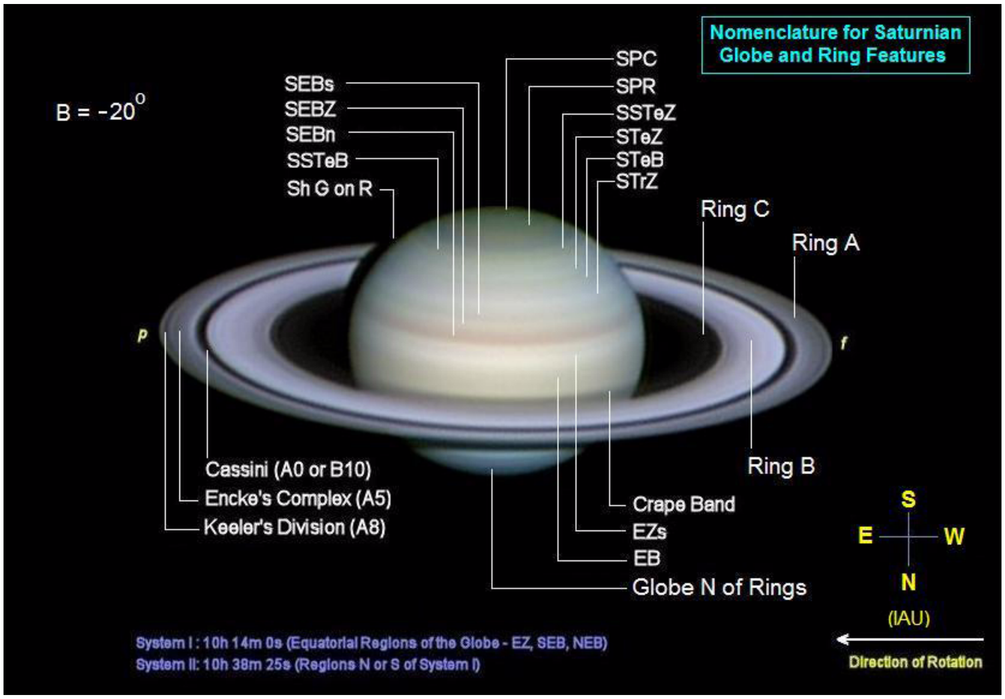


Diagram 1. Nomenclature for Saturnian globe and ring features.

referred to the ring plane (negative when south), ranged between the extremes of 12.27° (2006 DEC 06) and 15.41° (2007 APR 18). The value of **B**', the saturnicentric latitude of the Sun, varied from 15.96° (2006 SEP 08) to 11.61° (2007 JUL 13).

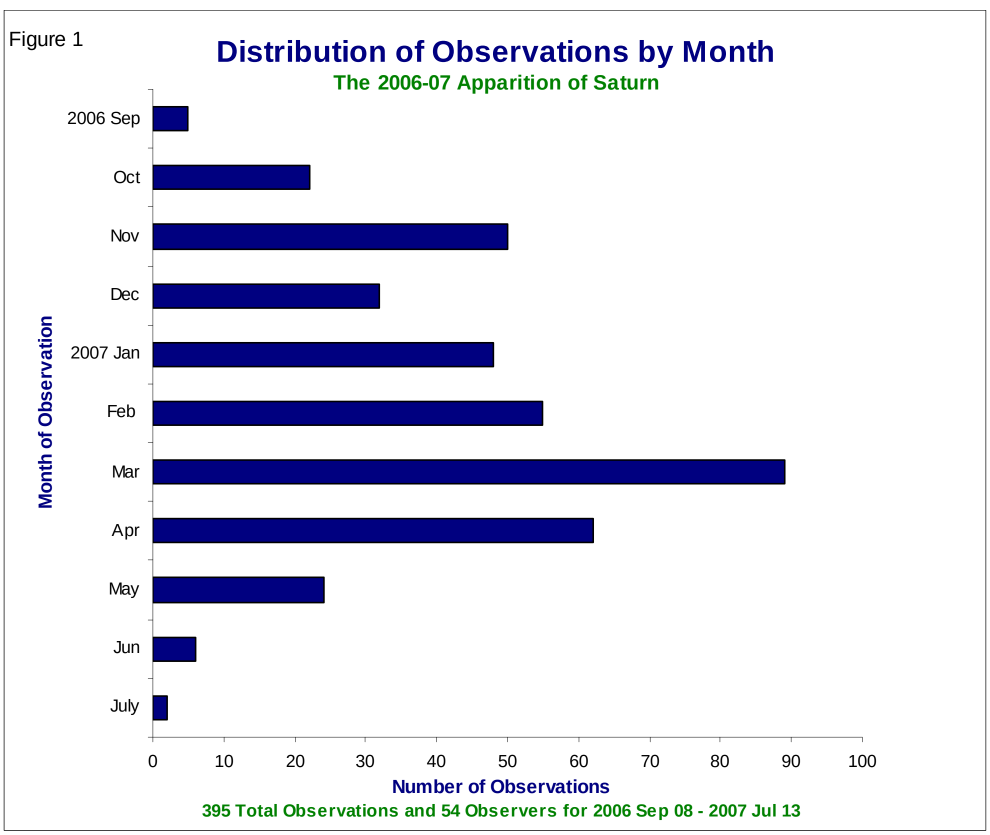


Table 2 lists the 54 individuals who collectively submitted 395 reports to the ALPO Saturn Section this apparition, along with their observing sites, number of observations, telescope aperture, and type of instrument. *Graph 1* is a histogram showing the distribution of observations by month, where it is can be seen that 45.82 percent were made prior to opposition, 0.51 percent at opposition (2007 FEB 10), and 53.67 percent thereafter. There is a continuing natural tendency for observers to view Saturn around the date of opposition when the planet is well-placed high in the evening sky (85.06 percent of all observations occurred from November 2006 through April 2007), but to improve overall coverage, observers are encouraged to begin drawing and imaging Saturn as soon as it becomes visible in the eastern sky before sunrise right after conjunction. Our goal is to carry out regular observational surveillance of the planet for as much of its mean synodic period of 378 days as possible (this is the period of time elapsed from one conjunction of Saturn with the Sun to the next, which is slightly longer than a terrestrial year).

Graph 2 and *Graph 3* show the ALPO Saturn Section observing base and the international distribution of all observations contributed during the apparition. The United States accounted for somewhat less than half of the participating observers (44.44 percent) and a little more than a third of the submitted observations (38.48 percent). With 55.56 percent of all observers residing in Canada, France, Germany, Italy, Japan, The Netherlands, The Philippines, Portugal, Puerto Rico, Spain, The United Kingdom, and Thailand, whose total contributions represented 61.52 percent of the observations, international cooperation remained very strong this observing season.

Graph 4 plots the number of observations this apparition by instrument type. About half (47.59 percent) of all observations were made with telescopes of classical design (refractors, Newtonians, and Cassegrains). Classical designs with great optics and excellent collimation frequently produce high-resolution images with superb contrast, presumably the reason they have often been the instruments of choice for visual studies of the Moon and planets. In recent apparitions, however, since a variety of adapters are readily available to attach digital imagers to them, the utilization of comparatively compact and portable Schmidt-Cassegrains and Maksutov-Cassegrains has been growing. It has been demonstrated that such instruments outfitted with high-quality well-collimated optics can produce really fine images of Saturn.

Telescopes with apertures of 15.2 cm (6.0 in.) or larger accounted for 98.99 percent of the observations contributed this apparition. Even so, there are numerous historical instances where considerably smaller instruments of good quality ranging from 10.2 cm (4.0 in.) to 12.7 cm (5.0 in.) have been quite useful for many aspects of our Saturn observing programs.

The ALPO Saturn Section is extremely grateful for all the data, descriptive reports, digital images, and visual drawings faithfully submitted by the observers listed in *Table 2* for the 2006-2007 Apparition, without which this report would not have been possible. Anyone who desires to participate in regular observational studies of Saturn employing visual methods (i.e., drawings, intensity and latitude estimates, and CM transit timings), film photography, or more contemporary digital imaging techniques is encouraged to do so in forthcoming observing seasons as we continue our quest for maintaining international cooperative studies of Saturn. All methods of recording observations are considered crucial to the success of our programs, whether there is a preference for sketching Saturn at the eyepiece or simply writing descriptive reports, making visual numerical relative intensity or latitude estimates, or pursuing film photography or digital imaging. Unfortunately, in recent years too few experienced observers are making routine visual numerical relative intensity estimates, which are badly needed for a continued comparative analysis of belt, zone, and ring component brightness fluctuations over many apparitions. Consider this an urgent appeal to observers to set aside a few moments while at the telescope and carry out intensity estimates (visual photometry) in integrated light and with standard color filters. As a reminder, the ALPO Saturn Section is always happy to receive observations from novices, and the author will be pleased to offer assistance as one becomes acquainted with our programs.

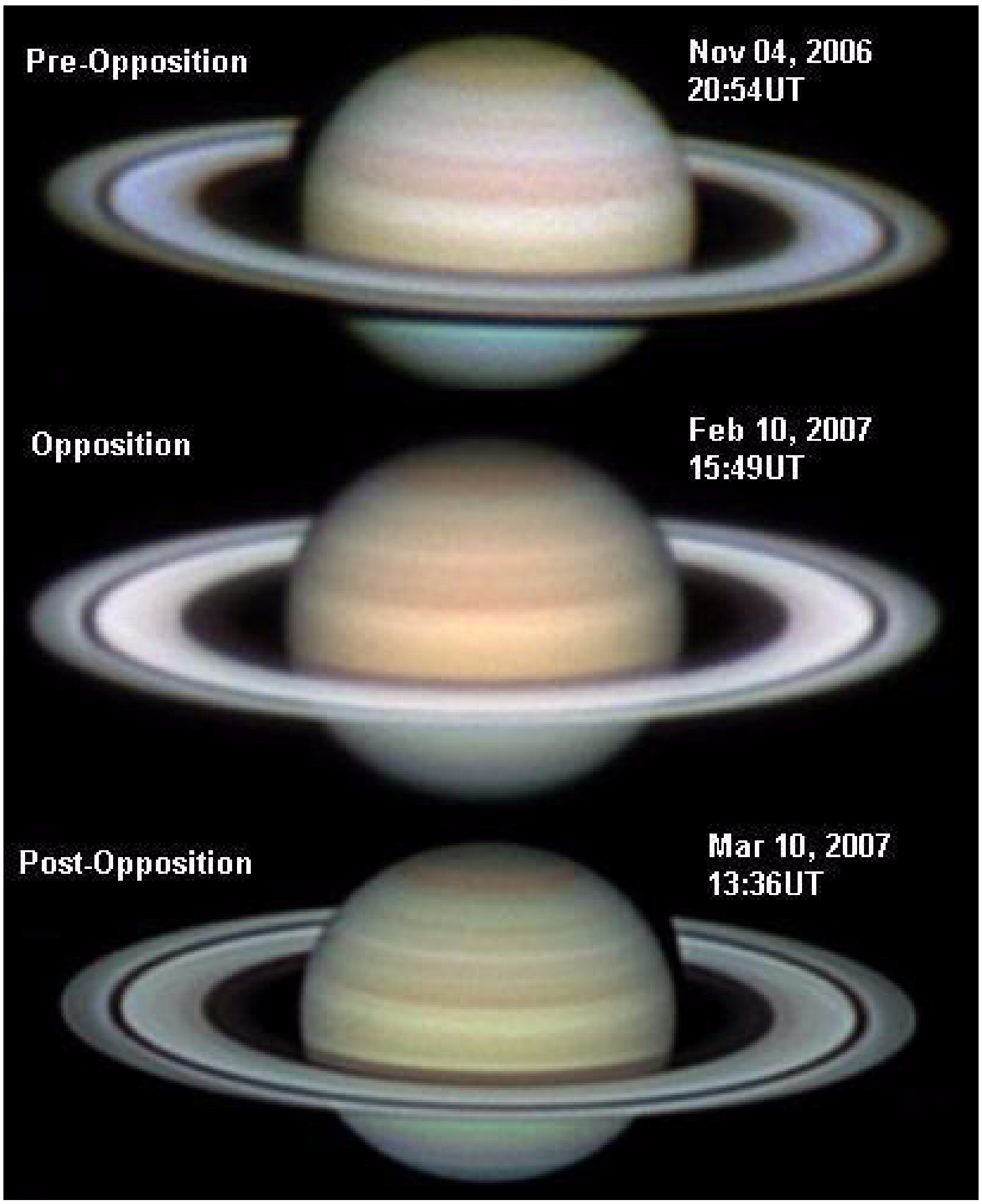


Diagram 2. These images of Saturn taken by Christopher Go of the UK using a 28 cm (11.0 in.) SCT and a DMK digital imager in integrated light show how the position of the shadow of the globe on the rings (Sh G on R) changes before and after opposition. S is at the top and E is at left (IAU).

The Globe of Saturn

The 395 observations submitted to the ALPO Saturn Section during 2006-2007 were used in preparing this summary of the observing season. Except in captions accompanying illustrations or in instances where the identity of individuals is relevant to the discussion, names have been omitted for the sake of brevity. Drawings, digital images, tables, and graphs are included herewith so that readers may refer to them as they study the text. Features on the Globe of Saturn are described here in south-to-north order and can be identified by referring to the nomenclature diagram shown in the accompanying *Diagram*. If no reference is made to a global feature in our south-to-north discussion, the area was not reported by observers during the 2006-2007 Apparition. It has been customary in past Saturn apparition reports to compare the morphology and brightness of atmospheric features between observing seasons, and this process continues in this report so readers are aware of very subtle, but nonetheless recognizable, variations that may be occurring seasonally on the planet.

Figure 2

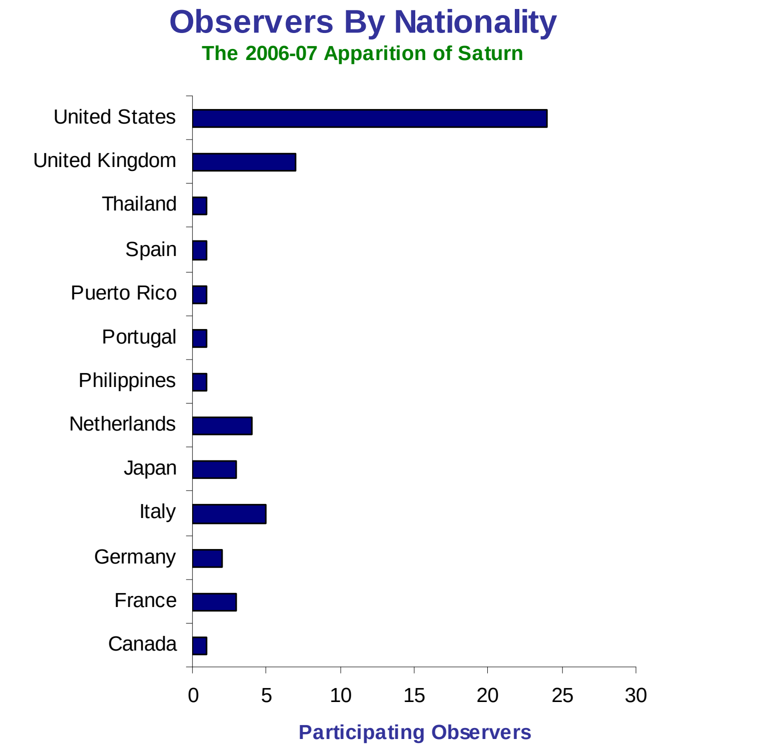
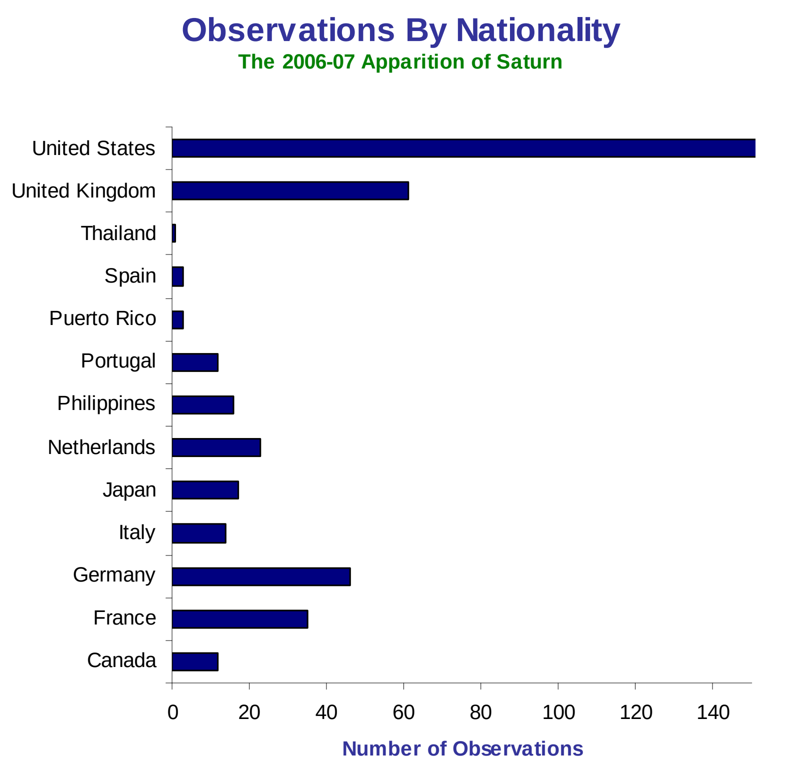


Figure 3



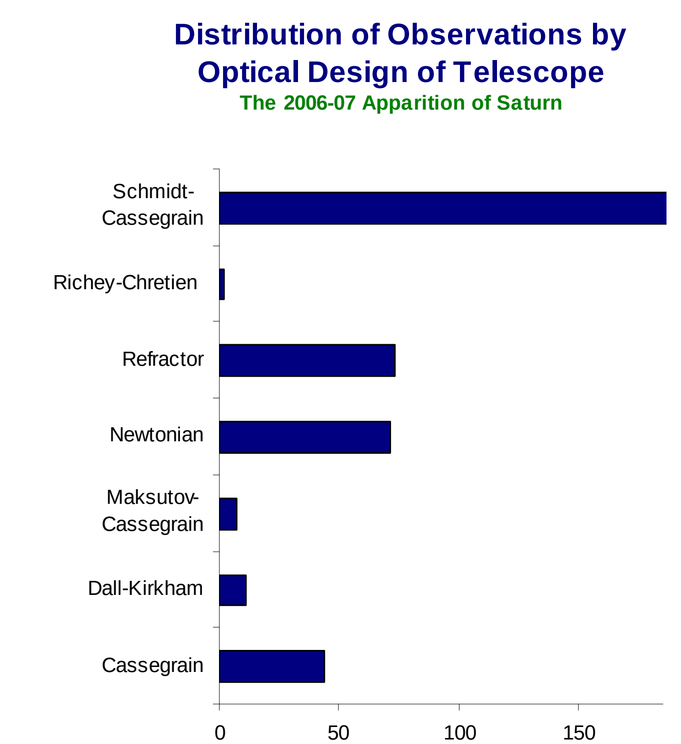
Small intensity fluctuations of Saturn's atmospheric features (see *Table 3*) may be simply a consequence of the varying inclination of the planet's rotational axis relative to the Earth and Sun, together with its phase angle, although photometric work in the past has shown that tiny oscillations of roughly $\pm$0.10 visual magnitude of Saturn over nearly a decade likely occur. Transient and longer-lasting atmospheric features seen or imaged in various belts and zones on the Globe may also play a role in subtle apparent brightness fluctuations. Regular photoelectric photometry of Saturn, in conjunction with carefully-executed visual numerical relative intensity estimates, is encouraged.

The intensity scale routinely employed by Saturn observers is the standard *ALPO Standard Numerical Relative Intensity Scale*, such that 0.0 denotes a total black condition (e.g., complete shadow) and 10.0 is the maximum brightness of a feature or phenomenon (e.g., an unusually bright EZ or dazzling white spot). This numerical scale is normalized by setting the outer third of Ring B at a "standard" intensity of 8.0. The arithmetic sign of an intensity change is determined by subtracting a feature's 2005-06 intensity from its 2006-2007 value. Suspected differences of *0.10 mean intensity points are usually considered insignificant, while reported changes in intensity less than roughly three times the standard error are probably not important.

It is always meaningful to evaluate digital images of Saturn contributed by ALPO observers who use different apertures and filter techniques. The goal is to understand the level of detail seen and how it compares with visual impressions of the Globe and Rings, including any correlation with spacecraft imaging and results from professional observatories. So, in addition to routine visual studies, such as drawings and visual numerical relative intensity estimates, Saturn observers should systematically image the planet every possible clear night to attempt to document individual features on the Globe and in the Rings, their motion and morphology (including changes in intensity and hue), to serve as input for combination with images taken by professional ground-based observatories and spacecraft monitoring Saturn at close range. Furthermore, comparing images taken over several apparitions for a given hemisphere of Saturn's Globe provides information on seasonal changes long suspected by observers making visual numerical relative intensity estimates. Images and systematic visual observations by amateurs are being used as initial alerts of interesting large-scale features on Saturn that professionals may not already know about but can subsequently examine further with larger specialized instrumentation.

Particles in Saturn's atmosphere reflect different wavelengths of light in very distinct ways, which cause some belts and zones to appear especially prominent, while others look very dark, so imaging the planet with a series of color filters may help shed light on the dynamics, structure, and composition of its atmosphere. In the UV (ultraviolet) and IR (infrared) regions of the electromagnetic spectrum, it is possible to determine additional properties as well as the sizes of aerosols present in different atmospheric layers not observable at visual wavelengths, as well as useful data about the cloud-covered satellite Titan. UV wavelengths shorter than 320 nm are effectively blocked by the Earth's stratospheric ozone (O_3), while H_2O-vapor and CO_2 molecules absorb in portions of the IR region beyond 727 nm, and the human eye is insensitive to UV light shorter than 390 nm and can detect only about 1.0 percent at 690 nm and 0.01 percent at 750 nm in the IR (beyond 750 nm visual sensitivity is essentially nil). Although most of the reflected light from Saturn reaching terrestrial observers is in the form of visible light, some UV and IR wavelengths that lie on either side and in close proximity to the visual region penetrate to the Earth's surface, and imaging Saturn in these near-IR and near-UV bands has in the past provided some remarkable results. The effects of absorption and scattering of light by the planet's atmospheric gases and clouds at various heights and with different thicknesses are often noticeable. Indeed, such images periodically show differential light absorption by particles with dissimilar hues intermixed with Saturn's white NH_3 clouds.

Figure 4



Estimates of Latitude of Global Features. Observers should try to utilize the handy visual method developed by Haas over 60 years ago to perform estimates of Saturnian global latitudes every apparition. It is easy to employ. Observers simply estimate the fraction of the polar semidiameter of the Saturn's Globe subtended on the central meridian (CM) between the limb and the feature whose latitude is desired. As a control on the accuracy of this method, observers should include in their estimates the position on the CM of the projected ring edges and the shadow of the Rings. The actual latitudes can then be calculated from the known values of **B** and **B'** and the dimensions of the Rings, although this test cannot be effectively applied when **B** and **B'** are near their maximum positive or negative numerical values. Experienced observers have used this visual technique for many years with very reliable results, especially since filar micrometers are hard to find and tend to be very expensive, not to mention sometimes tedious to use. Few observers submitted estimates of Saturnian latitudes during 2006-2007, and it would be very good if more observers would employ this simple and convenient method in future apparitions. A detailed description of the technique can be found in the author's book entitled *Saturn and How To Observe It,* published by Springer and widely available.

Southern Regions of the Globe. During the 2006-2007 Apparition, **B** attained a maximum negative value of 15.41, so observers could see Saturn's Southern Hemisphere to good advantage. Although much of the Northern Hemisphere was still hidden by the Rings as they crossed in front of the planet's Globe, limited views were possible of a few features North of the Rings. After reducing visual numerical relative intensity estimates received this apparition, the mean brightness of the Southern Hemisphere features of Saturn showed no significant change since 2005-06. Some visual observers strongly suspected that several belts and zones in the Southern Hemisphere exhibited an extremely subtle, progressive decline in overall brightness over the last five observing seasons. It will be interesting to see if this alleged trend continues as the tilt of Saturn's equator and ring plane

Table 3 Visual Numerical Relative Intensity Estimates and Colors for the 2006-07 Apparition of Saturn

Globe/Ring Feature	Number of Estimates	2006-07 Mean Intensity & Standard Error	Intensity Change Since 2005-06	Mean Derived Color
Zones:				
SPC	1	4.00 ± -----	-0.13	Dark Gray
SPR	18	4.03 ± 0.17	-0.37	Dark Gray
STeZ	19	5.75 ± 0.19	–0.30	Dull Yellowish-White
STrZ	14	6.11 ± 0.09	+0.21	Dull Yellowish-White
SEBZ	11	4.84 ± 0.08	–0.16	Dull Yellowish-Gray
EZs	20	7.26 ± 0.12	-0.22	Bright Yellowish-White
EZn	6	6.50 ± 0.00	-----	Yellowish-White
NNTeZ	1	5.00 ± -----	-----	Dull Yellowish-Gray
NPR	9	4.72 ± 0.18	-----	Dull Gray
Globe N of Rings	12	4.79 ± 0.11	-----	Dull Gray
Belts:				
STeB	2	4.40 ± 0.28	-0.85	Dull Grayish-Brown
SEB (entire)	12	4.33 ± 0.11	-0.24	Dull Grayish-Brown
SEBs	12	4.17 ± 0.08	-0.24	Dark Grayish-Brown
SEBn	11	3.99 ± 0.06	+0.03	Dark Grayish-Brown
NTeB	1	5.00 ± -----	-----	Light Grayish-Brown
NNTeB	1	4.50 ± -----	-----	Dull Gray
Rings:				
A (entire)	21	6.79 ± 0.09	-0.06	Yellowish-White
A (outer portion)	2	5.75 ± 0.18	-----	Dull Yellowish-White
A (inner portion)	2	6.75 ± 0.18	-----	Yellowish-White
A5	8	1.00 ± 0.35	-0.10	Very Dark Gray
A0 or B10	11	0.00 ± 0.00	–0.05	Grayish-Black
B (outer 1/3)	24	8.00 ± 0.00 **STD**	0.00	Brilliant White
B (inner 2/3)	22	7.04 ± 0.05	+0.02	Bright Yellowish-White
C (ansae)	20	1.11 ± 0.10	+0.03	Very Dark Gray
Crape Band	16	2.66 ± 0.32	-0.34	Dark Gray
Sh G on R	12	0.00 ± 0.00	-0.00	Black shadow
Sh R on G	12	0.00 ± 0.00	-0.41	Black shadow
Terby White Spot (TWS)	2	9.50 ± 0.35	-----	Brilliant white

Notes:

For nomenclature see text and Diagram. A letter with a digit (e.g. A0 or B10) refers to a location in the Ring specified in terms of units of tenths of the distance from the inner edge to the outer edge. Visual numerical relative intensity estimates (visual surface photometry) are based upon the ALPO Intensity Scale, where 0.0 denotes complete black (shadow) and 10.0 refers to the most brilliant condition (very brightest Solar System objects). The adopted scale for Saturn uses a reference standard of 8.0 for the outer third of Ring B, which appears to remain stable in intensity for most ring inclinations. All other features on the Globe or in the Rings are compared systematically using this scale, described in the Saturn Handbook, which is issued by the ALPO Saturn Section. The "Intensity Change Since 2005-06" is in the same sense of the 2005-06 value subtracted from the 2006-07 value, "+" denoting an increase (brightening) and "–" indicating a decrease (darkening). When the apparent change is less than about 3 times the standard error, it is probably not statistically significant.

toward our line of sight gets smaller with the approaching edgewise ring orientation in 2009.

Starting in mid-November 2006 through late April 2007 quite a number of observers sketched or imaged small white spots in the SEBZ, and white-spot activity was also reported visually or imaged in the STrZ from early February through mid-May 2007, as well as in the STeZ from mid- to late-April 2007. The STeZ features, however, were questionable and may have only been noise in the images submitted. Numerous dusky features within the SEBn and SEBs were drawn or imaged from late October 2006 through late May 2007, and in mid-April 2007, a dark spot was imaged at the edge of the SPR. All of these phenomena are discussed in the following paragraphs dealing separately with each region of Saturn's Globe. The EZs, SEBZ, STrZ, and STeZ white spots, normally caused by upward convection of NH_4 (ammonia) in Saturn's atmosphere, displayed small but recognizable morphological changes with time. The structure of zonal wind profiles in these latitudes seem to contribute to the emergence and behavior of these discrete features. High-resolution imaging documented several white spots and dark features in these regions for a few rotations of Saturn, but re-identification and subsequent tracking of the same features proved difficult, thus no CM transit timings were provided to allow the derivation of drift rates of these transient phenomena.

Ever since Saturn reached perihelion, with a solar distance 5.4 percent less than its mean value, on 2003 JUL 26, which occurs every 29.5 Earth years (one Saturnian year), some speculate that presumed subtle increases in atmospheric activity on Saturn are a consequence of the planet's seasonal insolation cycle. However, measurements in the past only suggest a slow thermal response to solar heating at Saturn's perihelion distance of ~9.0 astronomical units from the Sun. So, as time elapses with succeeding apparitions following Saturn's perihelion passage, observers should keep a careful eye on the planet's Southern Hemisphere, since a lag in the planet's atmospheric thermal response could roughly mimic what we experience on Earth; that is, the warmest days do not arrive on the first

Table 4: White-Spot Activity in the STeZ during the 2006-07 Apparition of Saturn

Date and Time (UT)	CM Start			CM End			Observer and Location	Instru-ment (cm)	S	Tr	NOTES
	I (°)	II (°)	III (°)	I (°)	II (°)	III (°)					
2007 APR 15 20:44-21:08	222.4	179.6	143.9	236.5	193.1	157.4	Vandebergh Netherlands	25.4 NEW	--	--	Small white spot in STeZ or merely noise?
2007 APR 22 21:26-21:42	036.6	126.8	082.6	046.0	135.8	091.6	Vandebergh Netherlands	25.4 NEW	--	--	STeZ white spot or noise?

Notes for Tales 4-8: Central Meridians (CM) are given in the three longitude systems I, II, and III; instrument apertures are followed by optical type; Seeing (S) is in the ALPO 0-10 Scale; Transparency (Tr) is the limiting naked-eye magnitude.

day of summer but occur up to a month or two later. Any similar effect on Saturn would be extremely subtle, however, and probably not noticed for quite a number of years.

South Polar Region (SPR). Based on visual numerical relative intensity estimates submitted during the 2006-2007 Apparition, the dark gray SPR may have been slightly duller in appearance than in 2005-06 (by an unimpressive mean visual intensity value of only -0.37). Despite the suspicion of a slight brightening of this region in 2004-05, the weak darkening trend believed to be underway every apparition since the 2001-02 observing season may have continued in 2006-2007. The small, dark gray South Polar Cap (SPC) was basically at the same mean numerical relative intensity in 2006-2007 as in 2005-06 in integrated light, reported only once this observing season by visual observers as barely discernible from the surrounding SPR. Based on digital images submitted this observing season at visual wavelengths, the dark gray SPC was very slightly darker than the encompassing dark gray SPR [see *Figure 1*]. Alternatively, most images taken in red light showed the SPC as somewhat brighter than the SPR [see *Figure 2*].

As far as activity in the SPR during 2006-2007, other than a few suspected small, ill-defined, irregular patterns of white patches or dusky features within the SPR in a few digital images taken in April 2007, there was no recurring discrete activity in the SPR. No drawings by visual observers of SPR white or dark spots were submitted during 2006-2007. The South Polar Belt (SPB) encircling the SPR was not reported by visual observers during the apparition, although this feature was apparent in at least a few of the digital images received [see *Figure 3*].

South South Temperate Zone (SSTeZ). The normally yellowish-white SSTeZ was not described by visual observers during this observing season, but several digital images in 2006-2007 showed a narrow SSTeZ without any recognizable activity.

South South Temperate Belt (SSTeB). There were no visual reports of the SSTeB during this observing season, but this narrow light grayish-brown belt was fairly obvious on many of high-resolution digital images.

South Temperate Zone (STeZ). The dull yellowish-white STeZ was frequently

Table 5: White-Spot Activity in the STrZ during the 2006-07 Apparition of Saturn

Date and Time (UT)	CM Start			CM End			Observer and Location	Instru-ment (cm)	S	Tr	NOTES
	I (°)	II (°)	III (°)	I (°)	II (°)	III (°)					
2007 FEB 07 00:18	174.7	163.4	209.5	---	---	---	Lawrence UK	35.6 SCT	5.0	7.0	Small STrZ white spot W of CM (more obvious in R light)
2007 FEB 07 00:20-01:02	175.9	164.5	210.7	200.5	188.2	234.3	Tasselli Italy	25.4 NEW	6.5	2.0	Small STrZ white spot near CM (more obvious in R light)
2007 MAR 15 21:36-21:46	000.6	237.8	239.5	006.4	243.5	245.1	Vandebergh Netherlands	25.4 NEW			STrZ white spot near CM
2007 APR 07 21:38	340.2	194.5	168.4	---	---	---	Delcroix France	25.4 SCT	5.0	3.0	STrZ white spot imaged or just noise?
2007 MAY 13 02:05-02:25	164.2	322.1	253.6	175.9	333.4	264.9	Plante USA	20.3 REF	6.5	4.0	STrZ white spot near E limb?

Table 6: White-Spot Activity in the SEBZ during the 2006-07 Apparition of Saturn

Date and Time (UT)	CM Start			CM End			Observer and Location	Instru-ment (cm)	S	Tr	NOTES
	I (°)	II (°)	III (°)	I (°)	II (°)	III (°)					
2006 NOV 16 04:24-04:46	075.1	219.3	005.4	088.0	231.7	017.7	Niechoy Germany	20.3 SCT	2.5	3.0	White spot at CM in SEBZ (poor seeing)?
2006 NOV 23 05:46	273.6	189.9	327.4	---	---	---	Grafton USA	35.6 SCT	--	--	SEBZ white spots near CM
2006 DEC 12 19:01	222.8	227.5	341.5	---	---	---	Go Philippines	28.0 SCT	8.0	5.0	SEBZ white spot is W of CM
2007 JAN 15 17:33	080.6	069.0	142.0	---	---	---	Go Philippines	28.0 SCT	6.0	4.0	Small SEBZ white spot E of CM?
2007 JAN 20 02:07-02:13	159.6	007.3	075.0	163.1	010.7	078.4	Casquinha Portugal	25.4 NEW	--	--	Small SEBZ white spot W of CM
2007 JAN 24 09:44-09:56	205.2	273.4	335.9	212.2	280.1	342.7	Allen USA	30.5 NEW	5.0	4.0	Small SEBZ white spot just W of CM
2007 JAN 31 02:42-02:56	108.5	320.0	014.5	116.7	327.9	022.4	Arditti UK	28.0 SCT	6.0	4.0	Small SEBZ white spot just W of CM
2007 FEB 04 02:15-02:31	230.2	313.1	002.8	239.6	322.2	011.8	Vandebergh Netherlands	25.4 NEW	--	--	SEBZ white spot E of CM
2007 FEB 04 02:15	230.2	313.1	002.8	---	---	---	Casquinha Portugal	25.4 NEW	--	--	SEBZ white spot E of CM
2007 FEB 18 14:41-15:14	248.9	222.9	255.0	268.2	241.5	273.6	Ikemura Japan	31.0 NEW	--	--	SEBZ white spot E of CM
2007 FEB 22 14:14	010.5	215.9	243.2	---	---	---	Go Philippines	28.0 SCT	8.0	5.0	SEBZ white Spot E of CM
2007 MAR 06 21:02-21:05	301.8	110.5	123.0	303.5	112.2	124.7	Peach UK	23.5 SCT	--	--	Elongated SEBZ white spot W of CM
2007 MAR 10 13:36	177.6	227.1	235.2	---	---	---	Go Philippines	28.0 SCT	9.0	4.0	Diffuse SEBZ white area E of CM
2007 MAR 10 21:06-21:28	081.4	120.8	128.5	094.3	133.2	140.9	Casquinha Portugal	25.4 NEW	--	--	SEBZ white spot E of CM
2007 MAR 13 21:10	096.7	039.1	043.2	---	---	---	Peach UK	23.5 SCT	--	--	SEBZ white spot W of CM; very subtle
2007 MAR 13 22:34	146.0	086.5	090.5	---	---	---	Bosman Netherlands	28.0 SCT	--	--	SEBZ white spot near CM; very subtle
2007 MAR 14 20:00	180.0	091.7	094.6	---	---	---	Peach UK	23.5 SCT	--	--	SEBZ white spot E of CM
2007 MAR 16 22:10-23:19	144.8	349.0	349.4	185.5	027.9	028.3	Acquarone Italy	23.5 SCT	7.0	3.0	SEBZ white spot W of CM; very subtle
2007 MAR 17 21:17	238.1	051.1	050.4	---	---	---	Casquinha Portugal	25.4 NEW	--	--	SEBZ white spot slightly W of CM
2007 MAR 20 01:23-01:37	270.9	013.8	010.5	279.1	021.7	018.4	Phillips USA	22.9 REF	--	--	SEBZ white spot W of CM
2007 APR 05 20:02	016.0	297.9	274.3	---	---	---	Peach UK	23.5 SCT	--	--	SEBZ white spot E of CM
2007 APR 07 21:38	340.2	194.5	168.4	---	---	--	Delcroix France	25.4 SCT	5.0	3.0	SEBZ white spot imaged or is it just noise?

Table 6: White-Spot Activity in the SEBZ during the 2006-07 Apparition of Saturn (Continued)

Date and Time (UT)	CM Start I (°)	CM Start II (°)	CM Start III (°)	CM End I (°)	CM End II (°)	CM End III (°)	Observer and Location	Instru-ment (cm)	S	Tr	NOTES
2007 APR 08 20:07	051.1	235.1	207.9	---	---	---	Peach UK	23.5 SCT	--	--	SEBZ white spot W of CM (near W limb)
2007 APR 12 20:44	209.7	263.8	231.7	---	---	---	Peach UK	23.5 SCT	--	--	SEBZ white spot just W of CM
2007 APR 19 21:20-21:41	020.4	207.6	167.1	032.8	219.5	178.9	Delcroix France	25.4 SCT	5.0	3.0	SEBZ white spot in R light
2007 APR 21 02:40-03:01	332.3	120.0	078.0	344.6	131.8	089.8	Robbins USA	24.8 REF	7.0	--	Possible white spot W of CM in SEBZ?
2007 APR 27 20:59-21:59	281.9	211.1	161.0	317.0	245.0	194.7	Delcroix France	25.4 SCT	4.0	3.0	Small SEBZ white spot?

reported by visual observers in 2006-2007, as well as being apparent on most submitted digital images of Saturn. Compared with the previous observing season, the STeZ seemed slightly dimmer in overall intensity this apparition (mean factor of -0.30), and ranked third behind the EZs and STrZ in mean brightness. The STeZ appeared uniform in intensity during this observing season as it crossed the Globe of Saturn, but Ralf Vandebergh of The Netherlands imaged what he described as a very small white spot using a 25.4-cm (10.0 in.) Newtonian in mid-to-late April 2007, particularly obvious in red wavelengths (see *Table 4*) [see *Figure 4*]. No other observers submitted confirming images of these ill-defined, apparently ephemeral STeZ white spots.

No white-spot activity in the STeZ was reported by visual observers during the 2006-2007 Apparition.

South Temperate Belt (STeB). The dull grayish-brown STeB was reported only twice by visual observers during this apparition, but high-resolution digital images depicted this dusky feature in 2006-2007. There was no apparent activity within the STeB when it was seen visually or imaged. Limited mean intensity data suggested the STeB may have dropped slightly in mean intensity by -0.85 since the immediately preceding apparition, and it was the lightest of the belts in the Southern Hemisphere of Saturn based on mean intensity data.

South Tropical Zone (STrZ). Visual observers reported the dull yellowish-white STrZ fairly frequently during the 2006-2007 Apparition. The STrZ did not change substantially in mean intensity this observing season compared with 2005-06 (a minor change of +0.21), ranking third in order of brightness behind the Ezs and the EZn. Visual impressions of this feature suggested no variations in morphology during the apparition, but there were several images and one drawing submitted from early February through mid-May 2007 showing extremely small and poorly-defined STrZ white spots. The STrZ white spots imaged in early February appeared more obvious in red wavelengths (see *Table 5*), and these small features showed very little change in appearance or development over time. [see *figures 5 - 8*].

South Equatorial Belt (SEB). The dull grayish-brown SEB was routinely reported by visual observers in 2006-2007. It was frequently subdivided into SEBn and SEBs components (where **n** refers to the North Component and **s** to the South Component), with the SEBZ lying in between them during good seeing conditions and with larger apertures. Taken as a whole, the SEB was the darkest belt on Saturn's Globe during this apparition, seeming to visual observers to be marginally darker in 2006-2007 compared with 2005-06 (a visual mean intensity change of a mere -0.24 points). When the SEBn and SEBs were both reported visually, the dark grayish-brown SEBn was usually slightly duller in appearance than its dark grayish-brown SEBs counterpart, but mean numerical relative intensity data showed the SEBn only darker than the SEBs by an insignificant factor of -0.18. The SEBn was the darkest belt of all on Saturn this observing season, basically unchanged between 2006-2007 and 2005-06 in mean intensity. The SEBs may have dimmed ever so slightly by -0.24 visual numerical relative intensity points since 2005-06. The dull yellowish-gray South Equatorial Belt Zone (SEBZ) showed very little change in overall intensity since 2005-06 (a trivial difference of -0.16 mean intensity points). Most digital images of Saturn submitted during 2006-2007 generally supported the aforementioned visual impressions of the SEB as a whole, as well as showing the SEB as a very prominent belt and virtually always subdivided into a darker SEBn and a lighter SEBs with the SEBZ lying in between [see *Figure 9*]. The SEBn appeared considerably wider than the SEBs in images as well as visually.

From mid-November 2006 through late April 2007 observers imaged one or more small, diffuse white spots within the SEBZ that appeared to elongate somewhat with time; however, these features tended not to evolve as much in morphology during the 2006-2007 Apparition as did those described in 2005-06. [see *figures 10-15*]. Visual observers suspected white spots in the SEBZ as well during 2006-2007, but it is questionable if any of the small white spots imaged in this region during the observing season could be detected visually [see *figures 16 and 17*]. Simultaneous visual observations concurrent with imaging will help determine the threshold of visibility of

Table 7: Dark-Spot Activity in the SEB during the 2006-07 Apparition of Saturn

Date and Time (UT)	CM Start			CM End			Observer and Location	Instru-ment (cm)	S	Tr	NOTES
	I (°)	II (°)	III (°)	I (°)	II (°)	III (°)					
2006 OCT 31 04:39-04:51	254.6	195.3	000.6	261.6	202.1	007.4	Niechoy Germany	20.3 SCT	--	--	Suspected dusky features along S edge SEB
2006 OCT 31 09:33-09:57	067.0	001.1	166.2	081.0	014.6	179.7	Robbins USA	15.2 REF	7.0	--	Dusky features along the S edge of SEB projecting into EZs
2006 NOV 07 05:10-05:46	063.0	136.9	293.8	084.0	157.2	314.1	Vandebergh Netherlands	25.4 NEW	--	--	Dusky festoon along N edge SEBs extending into SEBZ?
2006 NOV 22 04:39	110.0	060.1	198.9	---	---	---	Niechoy Germany	20.3 SCT	3.0	3.0	Details in SEB and SEBZ
2006 NOV 23 05:46	273.6	189.9	327.4	---	---	---	Grafton USA	35.6 SCT	--	--	Dusky features along the N edge of SEBs?
2006 NOV 26 07:41-07:59	354.1	170.9	304.7	004.7	181.1	314.9	Robbins USA	24.8 NEW	8.0	--	Dark features in the SEB and SEBZ
2006 NOV 28 04:41-05:07	137.3	253.5	025.1	152.6	268.2	039.7	Niechoy Germany	20.3 SCT	2.5	2.5	Details in SEB and SEBZ
2007 JAN 02 00:04-00:28	008.3	080.2	169.7	022.4	093.7	183.2	Niechoy Germany	20.3 SCT	2.5	2.5	Festoons emanating from N edge SEBn into EZs
2007 JAN 11 03:05-03:17	154.1	291.1	009.7	161.1	297.9	016.4	Roussell Canada	15.2	6.0	4.0	Dark knots along N edge SEBn
2007 JAN 14 04:00	199.5	238.4	313.3	---	---	---	Hernandez USA	22.9 MAK	5.0	3.0	Dusky features along N edge SEBn
2007 JAN 18 03:10-03:34	307.8	218.6	288.7	321.8	232.1	302.2	Robbins USA	15.2 REF	7.0	--	Several dark areas along N edge SEBn
2007 JAN 21 01:02-02:27	245.9	062.7	129.3	295.8	110.6	177.2	Niechoy Germany	20.3 SCT	2.5	2.5	Dusky features emanating from SEBn extending into EZs
2007 JAN 21 04:23-04:35	003.8	176.1	242.5	010.8	182.8	249.3	Roussell Canada	15.2 REF	5.5	3.5	Dark features along N edge SEBn protruding into SEBZ
2007 JAN 22 21:43-22:07	018.0	134.7	199.0	032.1	148.2	212.5	Niechoy Germany	20.3 SCT	2.5	2.5	Dusky features emanating from SEBn extending into EZs
2007 JAN 24 20:34-20:43	226.3	279.9	341.9	231.6	285.0	347.0	Niechoy Germany	20.3 SCT	2.5	2.5	Dusky features emanating from SEBn extending into EZs
2007 JAN 25 21:12-22:47	013.0	033.5	094.2	068.7	087.0	147.7	Niechoy Germany	20.3 SCT	2.5	2.5	Dusky features emanating from SEBn extending into EZs
2007 FEB 16 19:03-19:19	153.8	186.5	220.8	163.1	195.5	229.8	Niechoy Germany	20.3 SCT	2.5	2.5	Dusky features emanating from SEBn extending into EZs
2007 FEB 17 21:46-23:15	013.7	010.5	043.5	065.9	060.7	093.6	Niechoy Germany	20.3 SCT	2.5	2.5	Dusky features emanating from SEBn extending into EZs
2007 MAR 01 02:58-03:17	124.5	119.0	138.5	135.7	129.7	149.2	Robbins USA	24.8 REF	7.0	--	Dusky features along the S edge SEBn protruding into SEBZ

Table 7: Dark-Spot Activity in the SEB during the 2006-07 Apparition of Saturn (Continued)

Date and Time (UT)	CM Start I (°)	CM Start II (°)	CM Start III (°)	CM End I (°)	CM End II (°)	CM End III (°)	Observer and Location	Instru-ment (cm)	S	Tr	NOTES
2007 MAR 01 17:37	279.9	254.7	273.4	---	---	---	Niechoy Germany	20.3 SCT	2.5	2.5	Dusky features emanating from SEBn extending into EZs
2007 MAR 05 20:08-20:40	145.8	348.0	001.8	164.6	006.0	019.8	Niechoy Germany	20.3 SCT	2.5	2.5	Dusky features emanating from SEBn extending into EZs
2007 MAR 07 20:17-21:20	039.7	177.1	188.5	076.7	212.7	224.0	Niechoy Germany	20.3 SCT	2.5	2.5	Dusky features emanating from SEBn extending into EZs
2007 MAR 14 20:00	180.0	091.7	094.6	---	---	---	Peach UK	23.5 SCT	--	--	SEBZ dusky elongat-ion is W of the CM and SEBZ white spot
2007 MAR 18 21:23-22:08	005.9	146.5	144.5	032.3	171.9	169.9	Niechoy Germany	20.3 SCT	2.5	2.5	Dusky features emanating from SEBn extending into EZs
2007 MAR 19 19:41	070.4	181.0	177.9	---	---	---	Niechoy Germany	20.3 SCT	2.5	2.5	Dusky features emanating from SEBn extending into EZs
2007 MAR 27 19:23-19:54	334.1	186.7	174.0	352.3	204.2	191.5	Niechoy Germany	20.3 SCT	2.5	2.5	Dusky features emanating from SEBn extending into EZs
2007 MAR 28 19:30-19:45	102.5	282.7	268.7	111.3	291.1	277.2	Niechoy Germany	20.3 SCT	2.5	2.5	Dusky features emanating from SEBn extending into EZs
2007 APR 02 19:29	003.2	022.0	002.0	---	---	---	Niechoy Germany	20.3 SCT	2.5	2.5	Dusky features emanating from SEBn extending into EZs
2007 APR 05 20:04-20:42	036.5	317.6	294.0	058.5	339.0	315.4	Niechoy Germany	20.3 SCT	2.5	2.5	Dusky features emanating from SEBn extending into EZs
2007 APR 13 20:29-20:57	325.2	347.3	314.0	341.6	003.1	329.8	Niechoy Germany	20.3 SCT	2.5	2.5	Dusky features emanating from SEBn extending into EZs
2007 APR 15 18:44-20:14	152.1	111.9	076.3	204.8	162.7	127.0	Niechoy Germany	20.3 SCT	2.5	2.5	Dusky features emanating from SEBn extending into EZs
2007 APR 17 20:54-21:03	116.7	009.1	331.0	122.0	014.2	336.1	Vandebergh Netherlands	25.4 NEW	--	--	Dusky features in SEB or simply noise?
2007 APR 19 19:42-19:58	323.0	152.4	111.9	332.4	161.4	120.9	Niechoy Germany	20.3 SCT	2.5	2.5	Dusky features emanating from SEBn extending into EZs
2007 APR 21 02:40-03:01	332.3	120.0	078.0	344.6	131.8	089.8	Robbins USA	24.8 REF	7.0	--	Dark undulations in SEBn
2007 APR 27 20:54-21:03	278.9	208.3	158.1	284.2	213.4	163.2	Vandebergh Netherlands	25.4 NEW	--	--	Dark features in SEB or noise?
2007 MAY 05 02:52-03:13	278.2	333.5	274.6	290.5	345.3	286.4	Roussell Canada	15.2 REF	5.5	3.5	Dark features in SEBs and SEBn
2007 MAY 05 20:44-20:49	186.7	217.9	158.1	189.6	220.7	160.9	Vandebergh Netherlands	25.4 NEW	--	--	Dark features in SEB or noise?
2007 MAY 23 20:34	256.0	066.1	344.6	---	---	---	Vandebergh Netherlands	25.4 NEW	--	--	Dark spots along N edge SEBs projecting into SEBZ

Table 8: White-Spot Activity in the EZ during the 2006-07 Apparition of Saturn

Date and Time (UT)	CM Start I (°)	CM Start II (°)	CM Start III (°)	CM End I (°)	CM End II (°)	CM End III (°)	Observer and Location	Instru-ment (cm)	S	Tr	NOTES
2006 NOV 07 05:10-05:46	063.0	136.9	293.8	084.0	157.2	314.1	Vandebergh Netherlands	25.4 NEW	--	--	White mottlings in EZs may just be noise in image
2007 APR 07 21:38	340.2	194.5	168.4	---	---	---	Delcroix France	25.4 SCT	5.0	3.0	EZ white spot imaged
2007 APR 10 22:08-22:20	010.5	127.3	097.5	017.5	134.0	104.3	Vandebergh Netherlands	25.4 NEW	--	--	White mottlings in EZs may just be noise in image
2007 APR 11 22:58-23:15	164.0	247.4	216.4	174.0	257.0	226.0	Arditti UK	25.4 DAL	--	--	Small white spot may be near the CM in the EZn north of the EB
2007 APR 18 19:54-21:49	205.8	067.2	027.9	273.2	132.1	092.7	Arditti UK	25.4 DAL	--	--	Mottlings in EZ near CM (more obvious in R light)
2007 APR 20 21:13-21:20	140.6	295.6	253.9	144.7	299.6	257.8	Vandebergh Netherlands	25.4 NEW	--	--	Possible white EZn spot in R light crossing the CM or is it noise?

such features in future apparitions. *Table 6* gives a complete listing, with supporting data and short comments, of the small white spots imaged in the SEBZ during 2006-2007, along with two instances when SEBZ white spots were suspected visually. It was not clear whether the SEBZ white spots originated from a single feature that had already evolved and split apart by the time they were detected, or whether dual white features in the SEBZ already existed from the beginning of the observing season, perhaps remaining from the immediately preceding apparition.

Recurring visual accounts of suspected dusky markings and festoon activity within the SEB were received from late October 2006 through late May 2007, including a few digital images supporting at least some of the visual impressions during this period. Most of these reports described dusky markings or festoons along the northern edge of the SEBs extending into the SEBZ, similar dark features protruding from the SEBn into the EZs, or simply dark knots or disturbances within either the SEBs or SEBn in varying seeing conditions. *Table 7* lists all of the reports of dark-spot activity associated with the SEB and SEBZ during 2006-2007 [*see figures 15 and 18-22*].

Equatorial Zone (EZ). The southern half of the bright yellowish-white Equatorial Zone (EZs) was the region of the EZ mostly visible and imaged between where the Rings cross the Globe of Saturn and the SEBn in 2006-2007. Observers also began reporting and imaging portions of the EZn during the apparition due to the diminished tilt of the Rings to our line of sight. Based on visual observations and accompanying numerical relative intensity estimates, the EZs was the brightest zone on Saturn's Globe during 2006-2007, showing only a

Table 9: Visual Observations of the Bicolored Aspect of Saturn's Rings During the 2006-07 Apparition

Observer	UT Date and Time	Telescope	Mag.	S	Tr	Filter Bl	Filter IL	Filter Rd
Roussell	2006 NOV 02 09:50 -10:00	REF 15.2 cm (6.0 in.)	300	5.0	4.5	E	=	=
Cudnik	2006 DEC 27 12:21-12:42	CAS 20.3 cm (8.0 in.)	338	9.0	6.0	=	=	W

Notes:
Telescope types are as in Table 2. Mag. is magnification, Seeing (S) is the 0-10 ALPO Scale, and Transparency (Tr)y is the limiting visual magnitude in the vicinity of Saturn. Under “Filter,” l**B** refers to the blue W47 or W80A filters, **IL** to integrated light (no filter), and **Rd** to the red W25 or W23A filters. **E** means the east ansa was brighter than the w, **W** that the west ansa was the brighter, and **=** means that the two ansae were equally bright. East and west directions are as noted in the text.

rather trivial drop in brightness of -0.22 mean intensity points since 2005-06. Although visual observers did not report white-spot activity in the EZs during 2006-2007, small white mottlings that were marginally apparent on some images in early November 2006 and April 2007 (*see Table 8*) suggest minor spot activity could have been present in the EZs and EZn during the apparition [*see figures 8 and 23*].

The typically narrow light-gray Equatorial Band (EB) was not reported by visual observers during the apparition, but it was often captured using digital imagers during the observing season [*see figures 24 and 25*].

Northern Portions of the Globe. With Saturn tipped at 13.93° to our line of sight at opposition during 2006-2007, regions of the extreme Northern Hemisphere of the planet could be viewed or imaged, particularly the NPR. Studies of Saturn's Northern Hemisphere will become more favorable in forthcoming apparitions as geometric circumstances for observing these regions offer improved views. The few features seen or imaged in the Northern Hemisphere of the planet [*see Figure 26*] could not be compared with their appearance in the immediately preceding apparition because visual numerical relative intensity estimates of it were not submitted in 2005-06.

North Temperate Belt (NTeB). The light grayish-brown NTeB was viewed only once during the 2006-2007 Apparition, but high-resolution digital images showed this feature from time to time. If a single visual intensity estimate is of any real consequence, the NTeB was lighter by an intensity factor of +0.60 than the STeB in the South. There was no activity noted within the NTeB either visually or when imaged.

General Caption Note for Figures 1-35. B = saturnicentric latitude of the Earth; B’ = saturnicentric latitude of the Sun; CMI, CMII and CMIII = central meridians in longitude systems I, II and III; IL = integrated light; S = Seeing on the Standard ALPO Scale (from 0 = worst to 10 = perfect); Tr = Transparency (the limiting naked-eye stellar magnitude). Telescope types as in Table 2; feature abbreviations are as in Diagram 1. In all figures, south is at the top and IAU east is to the left.

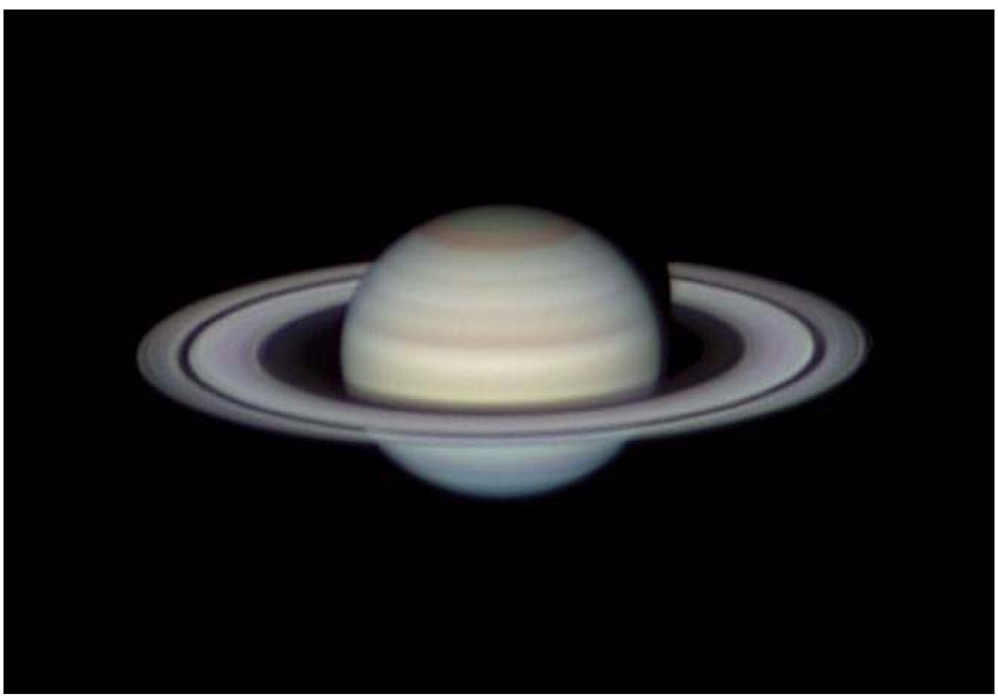


Figure 1. 2007 APR, 10 20:17 UT. Damian Peach. 23.5-cm (9.25-in.) SCT, with an ATK - 1HS digital imager, IL. S and Tr not specified. CMI = 305.4°, CMII = 064.7°, CMIII = 035.0°, B = –15.4°, B´ = –13.0°. The dark-gray SPC was very slightly darker than the encompassing dark-gray SPR.

North Temperate Zone (NTeZ). This feature was not reported during 2006-2007.

North North Temperate Belt (NNTeB). Described on one occasion during the 2006-2007 Apparition, the dull-gray NNTeB was apparent on at least a few of the higher-resolution digital images in good seeing conditions. There was no activity detected along this narrow belt [*see Figure 27*].

North North Temperate Zone (NNTeZ). During 2006-2007, although the dull yellowish-gray NNTeZ was reported only one time visually, it was been occasionally evident in the best images submitted during the observing season [*see Figure 27*]. There was no activity sighted or imaged within this zone.

North Polar Region (NPR). Visual numerical relative intensity estimates received during the 2006-2007 Apparition hinted that the dull-gray NPR was somewhat lighter (by a mean factor of +0.69) in visual numerical relative intensity than the dark gray SPR. Digital images routinely showed what appeared to be the dusky Southernmost edge of the NPR just inside the north limb of Saturn.

Shadow of the Globe on the Rings (Sh G on R). The Sh G on R was visible to observers as a geometrically regular black shadow on either side of opposition during 2006-2007. Any presumed variation of this shadow from a totally black intensity (0.0) is a merely a consequence of bad seeing conditions or the presence of extraneous light. Digital images revealed this feature as completely black. Readers are reminded that, in an inverting telescope with south on top, the Globe of Saturn casts a shadow on the Ring System to the left (IAU East) prior to opposition, to the right (IAU West) after opposition, and on neither side precisely at opposition (no shadow) as illustrated in *Diagram 2*.

Saturn's Ring System

The discussion in this section is based on visual studies of Saturn's Ring System with the traditional comparison of mean intensity data between apparitions, along with impressions from digital images. The southern face of the Rings was still readily apparent during 2006-2007 as the inclination of the Rings (**B**) toward observers on Earth reached as much as 15.41°, but it has increasingly become more difficult to trace divisions and intensity minima around the circumference of the Rings as their tilt toward us diminishes.

Ring A. The majority of visual observers agreed that the yellowish-white Ring A, taken as a whole, had essentially the same intensity in 2006-2007 as in 2005-06. Most digital images of Saturn made during the 2006-2007 Apparition revealed inner and outer halves of Ring A, with the inner half brighter in the images than the outer half, but only very slightly so. Limited visual numerical relative intensity estimates of Saturn produced the same result, with the inner half of Ring A +1.0 mean intensity points brighter than the outer half. Visual observers usually described the brightness of Ring A as a whole, not as being differentiated into inner and outer halves. The very dark gray Encke's division (A5), described at times as an intensity "complex" halfway out in Ring A at the ansae, had a mean visual numerical relative intensity not much different from that of Ring C in 2006-2007. It was imaged often during the observing season, and several digital images captured in good seeing revealed Keeler's Division (A8), but it was not reported by visual observers this apparition [see *Figure 28*].

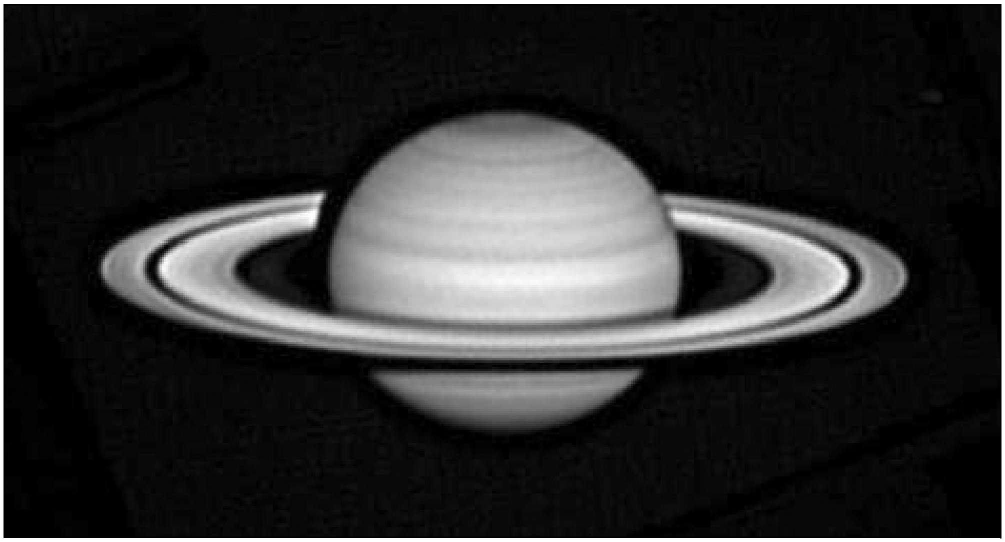


Figure 2. 2006 NOV 04, 06:10 UT. Damian Peach. 23.5-cm (9.25-in.) SCT, with an ATK–1HS digital imager, IL + red filter. S and Tr not specified. CMI = 085.2°, CMII = 254.7°, CMIII = 055.1°, B = –12.6°, B´ = –15.2°. Images taken in red light often showed the SPC as somewhat brighter than the SPR.

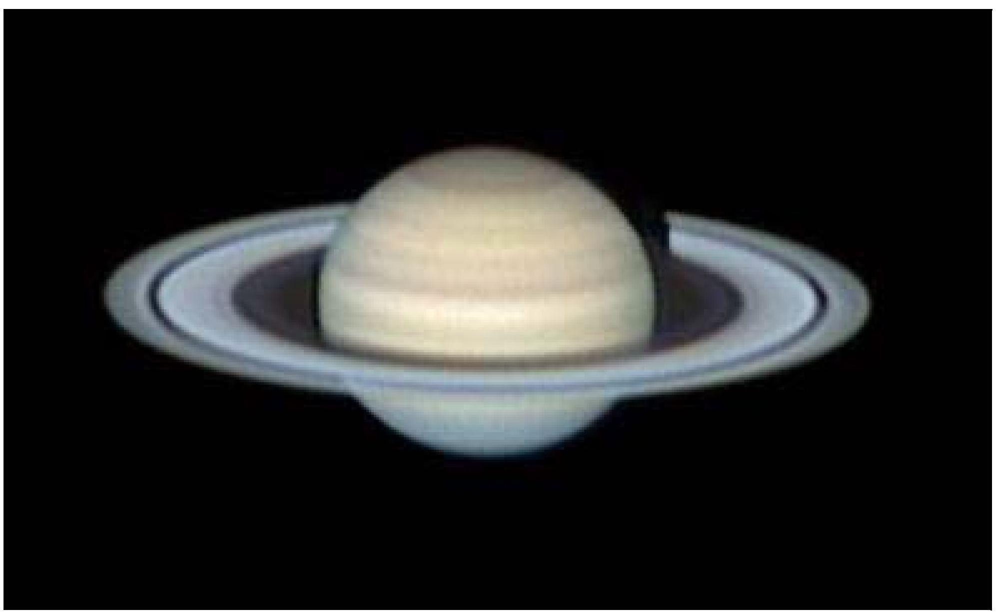


Figure 3. 2007 APR 12, 19:12 UT. Cristian Fattinnanzi. 25.4-cm (10.0-in.) NEW, with a Philips Vesta Pro digital imager, IL + IR blocker. S = 6.0 (Tr not specified). CMI = 155.8°, CMII = 211.9°, CMIII = 179.9°, B = –15.4°, B´ = –13.0°. The SPB encircling the SPR is apparent in this digital image, taken in good seeing.

Ring B. The outer third of Ring B is the long-established standard of reference for the ALPO Saturn Visual Numerical Relative Intensity Scale, with an assigned value of 8.0. To visual observers during 2006-2007 the outer third of Ring B appeared brilliant white with no fluctuation in intensity, and compared with other ring components and atmospheric phenomena of Saturn's Globe, it was always the brightest intrinsic feature. The inner two-thirds of Ring B during this apparition, which was described as bright yellowish-white and uniform in intensity, displayed primarily the same mean intensity as in the immediately preceding observing season. Digital images confirmed most visual impressions during 2006-2007. Dusky, vague spoke-like features were weakly suspected at times within the inner portion of Ring B near the E and W ansae during the apparition, but none were confirmed by other simultaneous visual observations. Digital images periodically captured faint intensity minima at positions B1, B2, B5 and perhaps B8 within Ring B, but visual observers did not describe occurrences of such features during the observing season [see *figures 29 and 30*].

Cassini's Division (A0 or B10). Cassini's Division (A0 or B10) was frequently reported by visual observers during the 2006-2007 Apparition, and described as a grayish-black gap at both ansae traceable all the way around the circumference of Saturn's Ring System. In a few high-resolution images, it was quite easy to see the Globe of Saturn through Cassini's Division [see *Figure 31*]. Any variation from a totally black intensity for Cassini's Division is caused by factors such as bad seeing, scattered light, or insufficient aperture. A black Cassini's Division was usually very apparent on all digital images received during the 2006-2007 observing season. The typical visibility of major ring divisions and other intensity minima across the breadth of the south face of the Rings was less favorable this apparition as the numerical value of **B** continued shrinking toward 0° as Saturn approaches the next edgewise orientation toward our line of sight in 2009.

Ring C. The very dark gray Ring C was often visible at the ansae in 2006-2007, appearing virtually unchanged in visual numerical relative intensity since 2005-05. The Crape Band (merely Ring C in front of the Globe of Saturn) appeared dark gray in color and uniform in intensity, looking possibly a little duller than in the immediately preceding apparition by a rather insignificant mean intensity variance of -0.34. Ring C was captured on most digital images [see *Figure 32]*, by and large confirming many of the visual impressions of this ring component during 2006-2007.

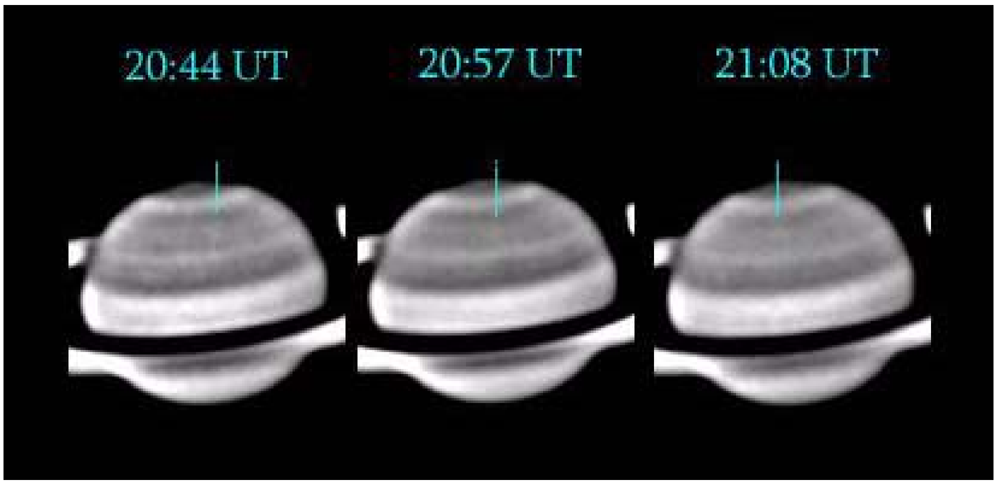


Figure 4. 2007 APR 15, 20:44-21:08 UT. Ralf Vandebergh. 24.5-cm (9.6-in.) NEW, with an ATK –1HS digital imager, R610-nm red filter. S and Tr not specified. CMI = 222.4°-236.5°, CMII = 179.6°-193°.1, CMIII = 143.9°-157.4°, B = –15.4°, B´ = –12.9°. A very small, ill-defined white spot is marginally visible in the STeZ.

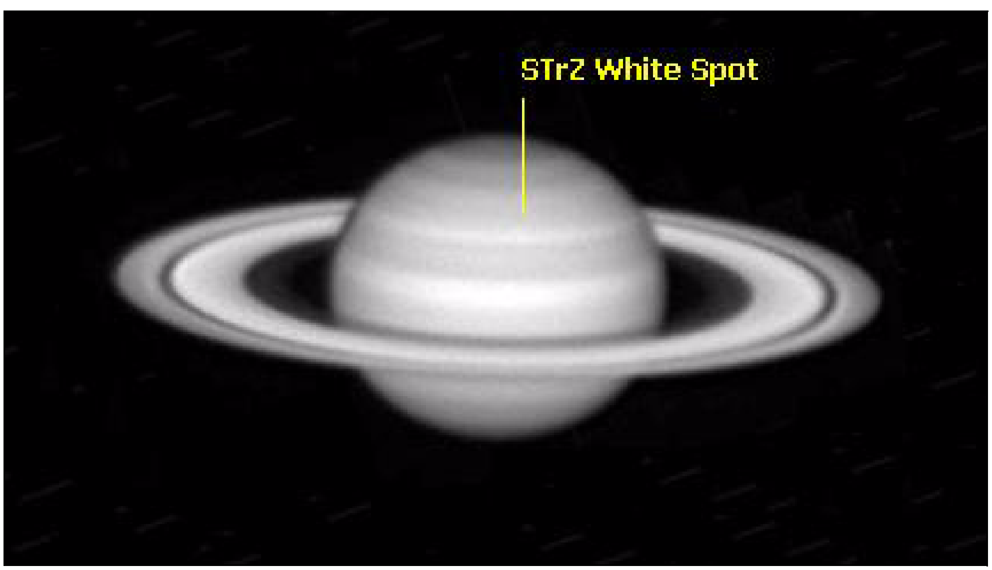


Figure 5. 2007 FEB 07, 00:18 UT. Pete Lawrence. 35.6-cm (14.0-in.) SCT, using a Luminera SKYnyx digital imager, red filter. S = 7.0, Tr = 6.0. CMI = 174.7°, CMII = 163.4°, CMIII = 209.5°, B = –13.8°, B´ = –13.9°. An extremely small white spot is barely discernible in red light just W of the CM in STrZ. See the nearly simultaneous observation of Andrea Tasselli on the same date (*Figure 6*).

Opposition Effect. During 2006-2007, a few observers called attention to the "opposition effect" (also referred to as the Seeliger effect), which is a noticeable brightening of Saturn's Ring System during a very short interval on either side of opposition, typically when the phase angle (i.e., the angle at Saturn between the Sun and Earth) is less than about 0.3°. This ring brightening occurs because of coherent back-scattering of sunlight by their constituent micron-sized icy particles, and they do so far more effectively than the particles of Saturn's atmosphere. This phenomenon was supposed to peak around opposition, 19:00 UT on 2007 FEB 10, with a phase angle of 0.14°, but observers who called attention to the brightening were of the opinion that the effect was much less pronounced this apparition than in the immediately preceding one, when the phase angle at opposition was only 0.07°.

Shadow of the Rings on the Globe (Sh R on G). This shadow in 2006-2007 was always described as a completely black feature where the Rings crossed Saturn's Globe. Any reported departure from an overall black (0.0) intensity occurs for the same reason as previously noted in our discussion regarding the Sh G on R. When **B** and **B'** are both negative, and the value of **B** is numerically less than that of **B'**, the ring shadow is to the north of the projected Rings, which happened prior to 2007 FEB 09 [see *Figure 33*]. When **B** and **B'** are both negative, and the value of **B** numerically exceeds that of **B'**, the shadow of the Rings on the Globe is cast to their south, circumstances that occurred during 2007 FEB 09 - AUG 18 (however, the final observation received for the apparition was n 2007 JUL 13); the Crape Band then is seen south of the projected Rings A and B [see *Figure 34*]. At times when the shadows of Ring A, Ring B, and Ring C projection are superimposed, it is often very challenging to distinguish between them with ordinary apertures and seeing conditions, and the shadow of Ring C is a further complication.

Terby White Spot (TWS). The TWS is an apparent brightening of the Rings immediately adjacent to the Sh G on R. There were two instances when this feature was reported by visual observers during 2006-2007. It is purely an artificial contrast effect, not a real feature of Saturn's Rings, but it is worthwhile to attempt to find any correlation that could exist between the visual numerical relative intensity of the TWS and the varying tilt of the Rings, including its brightness and visibility using variable-density polarizers, color filters, photographs, and digital images.

Bicolored Aspect of the Rings and Azimuthal Brightness Asymmetries. The bicolored aspect of the Rings refers to an observed variance in coloration between the east and west ansae (IAU direction system) when systematically compared with alternating blue filters, such as the W47 (where W denotes the Wratten filter series), W38, or W80A, and red filters such as the W25 or W23A. The circumstances of visual observations are listed in *Table 8* when the bicolored aspect of the ring ansae was thought to be present in 2006-2007. As in the rest of this report, directions in *Table 9* refer to Saturnian or IAU directions, where west is to the right in a normally-inverted telescope image (observer located in middle northern latitudes of the Earth) which has south at the top.

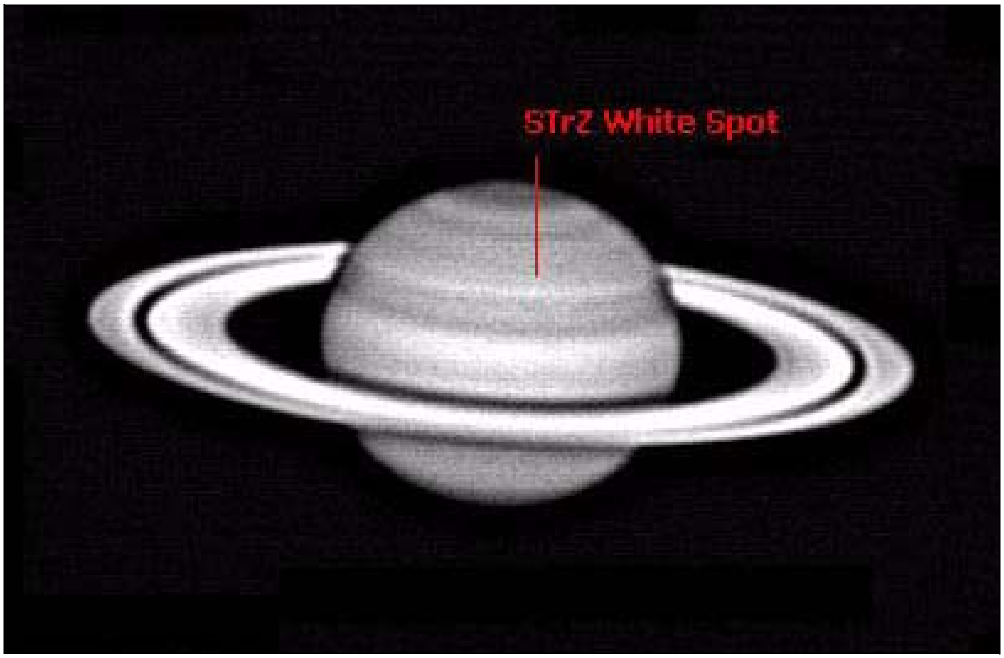


Figure 6. 2007 FEB 07, 00:20 UT. Andrea Tasselli. 24.5-cm (9.6-in.) NEW, with a Luminera 75M digital imager, red filter + IR blocker. S = 6.5, Tr = 2.0. CMI = 175.9°, CMII = 164.5°, CMIII = 210.7°, B = –13.8°, B´ = –13.9°. A very tiny white spot is imaged just W of the CM in the STrZ in red wavelengths. See the nearly simultaneous observation with Pete Lawrence on the same date (*Figure 5*).

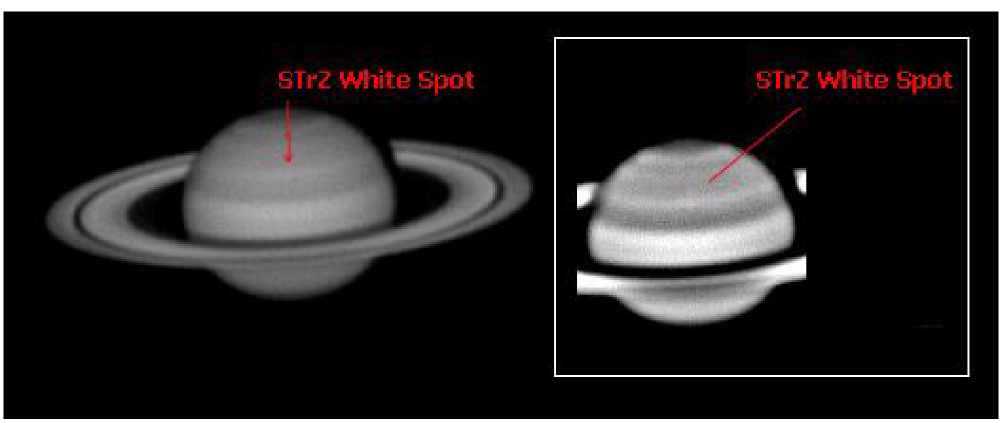


Figure 7. 2007 MAR 15, 21:36 UT. Ralf Vandebergh. 24.5-cm (9.6-in.) NEW, with an ATK – 1HS, R610-nm red filter. S and Tr not specified. CMI = 000.6°, CMII = 237.8°, CMIII = 239.5°, B = –15.0°, B´ = –13.4°. A very small STrZ white spot is near the CM; the inset has been enhanced to bring out detail of the STrZ white spot.

During this apparition and previous observing seasons, observers have been systematically attempting to capture the bicolored aspect of the Rings using digital imagers, but results have so far been largely inconclusive. During 2006-2007 there were no images submitted showing clear evidence of this phenomenon, but now that imaging of Saturn is occurring routinely, the chances of success improve substantially. Combining simultaneous visual observations of Saturn with imaging of the planet on any given night by a well-coordinated team of observers is extremely useful in searching for and attempting to confirm the bicolored aspect of the Rings. Likewise, observers are urged to see if they can capture slight azimuthal brightness asymmetries ("spokes") in Ring A as in the past and when they are reported simultaneously by visual observers. Documenting these phenomena, particularly when they occur independently of similar effects on the Globe of Saturn (which would be expected if atmospheric dispersion was a contributing factor), is of great value. Professional astronomers are well-acquainted with Earth-based sightings of azimuthal variations in the Rings (initially confirmed by Voyager spacecraft) that apparently occur when light is scattered by denser-than-average clumps of particles orbiting in Ring A, so any images obtained by ALPO Saturn observers are very important.

The Satellites of Saturn

Many of Saturn's satellites show tiny fluctuations in visual magnitude as a result of their varying orbital positions relative to the planet and due to asymmetries in distribution of surface markings on a few, while the pronounced brightness changes of Iapetus have been long recognized. Despite close proximity sensing by spacecraft, the true nature and extent of all of the observed satellite brightness variations is not completely understood and merits further investigation.

ALPO Saturn Section observers in 2006-2007 submitted no systematic visual estimates of Saturn's satellites employing systematic techniques, as suggested by the ALPO Saturn Section. Even though photoelectric and CCD photometry has largely replaced visual magnitude estimates of Saturn's moons, visual observers should still try to establish the comparative brightnesses of satellites relative to reference stars of calibrated brightness when the planet passes through a field of stars that have precisely known magnitudes. To do this, observers need to employ a good star atlas that goes faint enough and an accompanying star catalogue that lists reliable magnitude values. A number of excellent computer star atlases exist that facilitate precise plots of Saturn's path against background stars for comparative magnitude estimates.

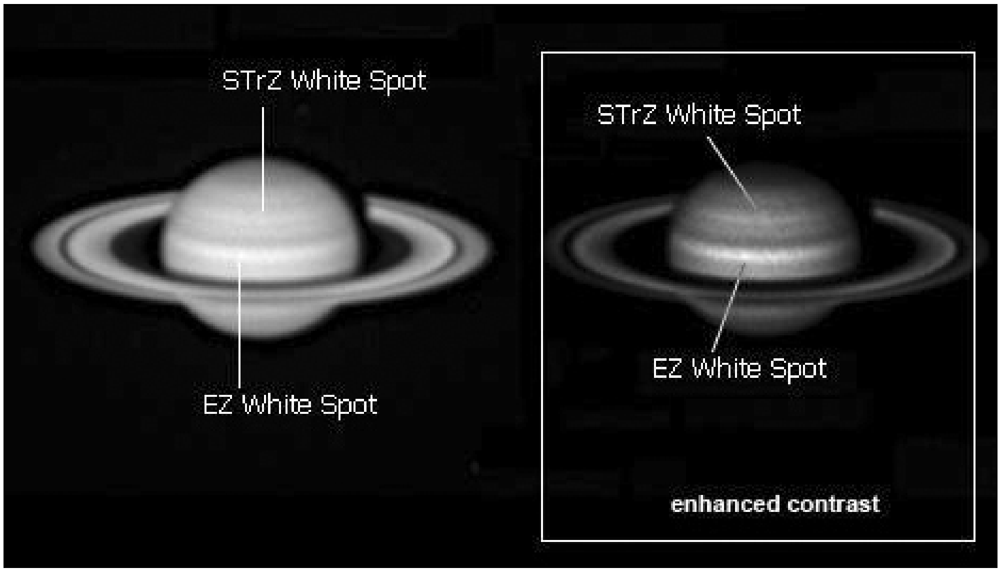


Figure 8. 2007 APR 07, 21:38 UT. Marc Delcroix. 25.4-cm (10.0-in.) SCT, with a Luminera SKYnyx digital imager, IL + IR blocking filter. S = 5.0 Tr = 3.0. CMI = 340.2°, CMII = 194.5°, CMIII = 168.4°, B = –15.4°, B´ = –13.0°. An ill-defined STrZ white spot is on the CM and a slightly more obvious small EZ white spot is also apparent in the image E of the CM; the inset has been enhanced to bring out these delicate features.

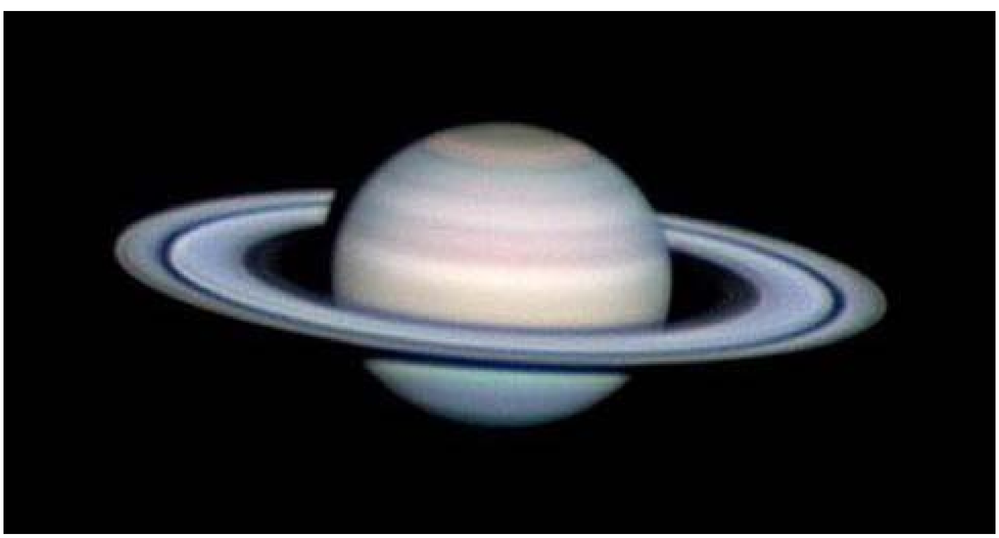


Figure 9. 2006 DEC 16, 10:36 UT. Larry Owens. 35.6-cm (14.0-in.) SCT, with Lumenera Lu075 digital imager, RGB filters. S = 6.0 (Tr not specified). CMI = 064.2°, CMII = 311.0°, CMIII = 060.6°, B = –12.4°, B´ = –14.6°. The SEB is subdivided into a darker SEBn and a lighter SEBs with the SEBZ in between (the SEBn is somewhat wider than the SEBs).

Visual satellite photometry begins by first selecting at least two stars with well-established magnitudes, and which have about the same color and brightness as the satellite. One of the stars chosen should be slightly fainter and the other a little brighter than the satellite so that the difference in brightness between the stars is about 1.0 magnitude. This makes it easy to divide the brightness difference between the two comparison stars into equal magnitude steps of 0.1. Then, to estimate the visual magnitude of the satellite, simply place it along the scale between the fainter and brighter comparison stars. In the absence of suitable reference stars, a last resort alternative is to use Saturn's brightest satellite, Titan, assuming visual magnitude 8.4 at mean opposition (magnitude estimates of course need to be normalized to the standard Earth-Saturn and Sun-Saturn distances). Titan is known to exhibit only subtle brightness fluctuations over time compared with the other bright satellites of Saturn that have measured amplitudes. Some observers are beginning to employ digital imagers with adequate sensitivity to capture the satellites of Saturn, along with any nearby comparison stars, as a permanent record to accompany visual magnitude estimates as described above. Images of the positions of satellites relative to Saturn on a given date and time are tremendously worthwhile for cross-checking against ephemeris predictions of their locations for correct identification. It is important to realize, however, that the brightness of satellites and comparison stars on digital images will not necessarily correspond to visual impressions because the peak wavelength response of the CCD chip is different than that of the eye. Observers who have photoelectric photometers may also contribute measurements of Saturn's satellites, but they are notoriously difficult to so measure owing to their faintness compared with the planet itself. Rather sophisticated techniques are required to correct for scattered light surrounding Saturn and its Rings.

Since 1999 observers were asked to attempt spectroscopy of Titan whenever possible as part of a newly-introduced cooperative professional-amateur project.

There is no question that Titan has been studied by the Hubble Space Telescope (HST), very large Earth-based instruments, and at close range by the ongoing *Cassini-Huygens* mission, but opportunities continue for amateurs to contribute systematic observations using appropriate instrumentation. As the *Cassini-Huygens* mission revealed beginning in 2004, with new discoveries still occurring as of the writing of this report, Titan is a very dynamic world with transient and long-term variations. From wavelengths of 300 nm to 600 nm, Titan's hue is dominated by a reddish methane (CH_4) atmospheric haze, and beyond 600 nm, deeper CH_4 absorption bands appear in its spectrum. Between these CH_4 wavelengths are "portals" to Titan's lower atmosphere and surface, so regular monitoring in these regions with photometers or spectrophotometers is a useful complement to professional work that remains underway during the mission. Long-term studies of Titan's brightness from one apparition to the next help shed light on Titan's known seasonal variations. Observers with suitable equipment are asked to participate in these professional-amateur projects, and further details can be found on the Saturn page of the ALPO website at http://www.alpo-astronomy.org/saturn as well as directly from the ALPO Saturn Section.

Simultaneous Observations

Simultaneous observations, or studies of Saturn by individuals working independently of one another at the same time and on the same date, offer unparalleled chances for firm verification of ill-defined or traditionally controversial phenomena. The ALPO Saturn Section has organized a simultaneous observing team so that several individuals in reasonable proximity to each other can maximize the opportunities for viewing and imaging Saturn at the same time using similar equipment and methodology. Joint efforts like this significantly reinforce the level of confidence in the data submitted for each apparition. Several simultaneous, or near-simultaneous, observations of Saturn were submitted during 2006-2007 [for example, see *Figures 5 and 6*], but as in previous observing seasons, such observations occur rather fortuitously. Experienced observers usually are the more common participants in such an endeavor, but newcomers are encouraged to get involved as well. Readers are invited to inquire about our simultaneous observing efforts.

Pro-Am Opportunities

Our cooperative involvement in professional-amateur (Pro-Am) projects continued this apparition. Readers of this *Journal* may recall the appeal last apparition from NASA's Radio and Plasma Wave Science (RPWS) team for amateur astronomers to monitor Saturn's Southern Hemisphere for bright clouds following a sudden occurrence of radio

Figure 10. 2006 NOV 23, 05:46 UT. Ed Grafton. 35.6-cm (14.0-in.) SCT, with a ST402 digital imager, IL + RGB filters. S and Tr not specified. CMI = 273.6°, CMII = 189.9°, CMIII = 327.4° B = –12.3°, B´ = –14.9°. Several SEBZ white spots and mottlings appear on and E of the CM in this image.

Figure 11. 2007 JAN 15, 17:33 UT. Christopher Go. 28.0-cm (11.0-in.) SCT, using a DMK digital imager, IL. S = 6.0, Tr = 4.0. CMI = 080.6°, CMII = 069.0°, CMIII = 142.0°, B = –13.0°, B´ = –14.2°. A small SEBZ white spot is marginally visible in this image E of the CM.

noise caused by a dynamic storm in the STrZ in January 2006. Sure enough, on 2006 JAN 25, ALPO observers imaged a small white spot in this zone, which apparently corresponded with the outburst of radio noise detected by the Cassini spacecraft. Throughout the rest of the 2005-06 Apparition, the STrZ white spot and its subsequent evolution was carefully and systematically imaged by ALPO observers. Equivalent observational work continued during 2006-2007, and the results were made available to the professional community for subsequent cross-reference with Cassini data. This was not the first Pro-Am activity in recent years, however.

Cassini-Huygens arrived at Saturn on 2004 Jul 01, followed by the Titan Probe Entry and Orbiter flyby on 2004 Nov 27. Digital images at wavelengths ranging from 400 nm – 1m under good seeing conditions were solicited by the Cassini mission from amateurs. This Amateur-Professional Cassini Observing Patrol coincided with the time Cassini started observing Saturn at close range, and this Pro-Am effort has continued ever since. To participate, observers need to utilize classical broadband filters (e.g., Johnson system: B, V, R and I) with telescopes of 31.8-cm (12.5-in.) aperture or greater, imaging through a 890-nm narrow band CH4 (methane) filter as well [see *Figure 35*].

Figure 12. 2007 JAN 20, 02:13 UT. Paolo Casquinha. 25.4-cm (10.0-in.) NEW, with a Luminera SKYnyx digital imager, IL + IR blocking filter. S and Tr not specified. CMI = 163.2°, CMII = 010.7°, CMIII = 078.4°, B = –13.2°, B´ = –14.1°. A small SEBZ white spot W of the CM is barely visible on this image.

Figure 13. 2007 FEB 18, 14:41 UT. Toshihiko Ikemura. 31.0-cm (12.2-in.) SCT, with an ATK-2C digital imager, IL. S and Tr not specified. CMI = 248.9°, CMII = 222.9°, CMIII = 255.0°, B = –14.2°, B´ = –13.7°. A SEBZ white spot has just passed to the E across the CM.

The Cassini Team requests observers to systematically patrol the planet every clear night for individual features, watching their motions and morphology, to provide input of interesting large-scale targets for Cassini's imaging system to begin close-up surveillance. Accounts of suspected variations in belt and zone reflectivities (i.e., intensity) and color are also very useful, so visual observers can continue to play a very meaningful role by making routine visual numerical relative intensity estimates. The Cassini team combines ALPO Saturn Section images with data from the Hubble Space Telescope and from other professional ground-based observatories for immediate and future study. As a means of facilitating regular amateur-professional observational cooperation, readers are urged to contact the ALPO Saturn Section for instructions on how they can share their observational reports, drawings, and images of Saturn and its satellites with the professional community. The author is always delighted to offer guidance to novices, as well as more experienced observers. A very meaningful resource for learning how to observe and record data on Saturn is the ALPO Training Program, and it is recommended that beginners take advantage of this valuable educational resource.

Conclusions

Based on mean visual numerical relative intensity estimates during 2006-2007, including comparing the results with the immediately preceding apparition, a few very subtle fluctuations in belt and zone intensities were suspected. It is difficult, however, to surmise that atmospheric activity on Saturn's Globe truly increased over the last several apparitions. However, using standard visual observing methods and digital imaging, limited atmospheric activity was apparent in the form of small white spots in the SPR, STrZ, STeZ, SEBZ, and the Ezs in 2006-2007. The white spots recorded in the STrZ and SEBZ did not appear to go through a similar evolution in morphology as they did in 2005-06. Dark spots and other dusky features were also suspected or imaged within the SPR and SEB. With the possible exception of diffuse SEBZ white spots and dark festoons or disturbances associated with the SEBs and SEBn, most of the 2006-2007 atmospheric features were poorly defined and usually short-lived.

With respect to the Ring System, apart from routine visual observations and digital images showing Cassini's (A0 or B10), Encke's (A5), and Keeler's (A8) Divisions, several less conspicuous intensity minima at different locations within Ring B were recorded with digital imagers. A few visual observers suspected and sketched dusky ring spokes within Ring B during 2006-2007, but there were no digital images submitted this observing season that showed such features in Ring A or B. There were only two separate reports of a possible bicolored aspect of the ring ansae during the apparition, and no submitted digital images revealed this phenomenon in 2006-2007.

Digital imaging, which now regularly occurs along with visual studies of Saturn, frequently shows discrete detail on the Globe and in the Rings well below the normal visual threshold. Of course, the combination of both methods greatly improves the opportunities for detecting changes on Saturn during any given apparition. Also, an initial recording of different regions of Saturn with digital imagers may signal outbursts of activity that visual observers may eventually be able to see and monitor with their telescopes, as well as help establish the limits of visibility of such features.

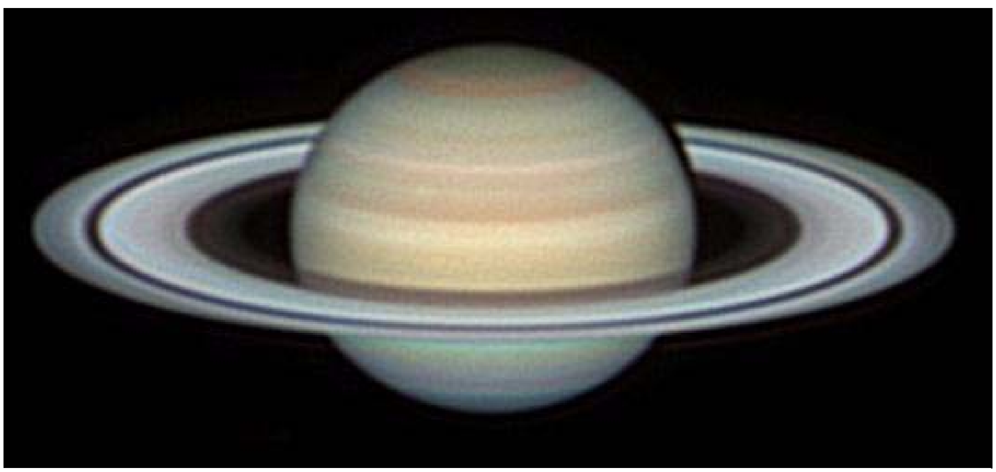


Figure 14. 2007 FEB 22, 14:14 UT. Christopher Go. 28.0-cm (11.0-in.) SCT, with a DMK digital imager, IL. S = 9.0, Tr = 4.0. CMI = 010.5°, CMII = 215.9°, CMIII = 243.2°, B = –14.4°, B´ = –13.7°. A small SEBZ white spot is slightly elongated, situated E of the CM.

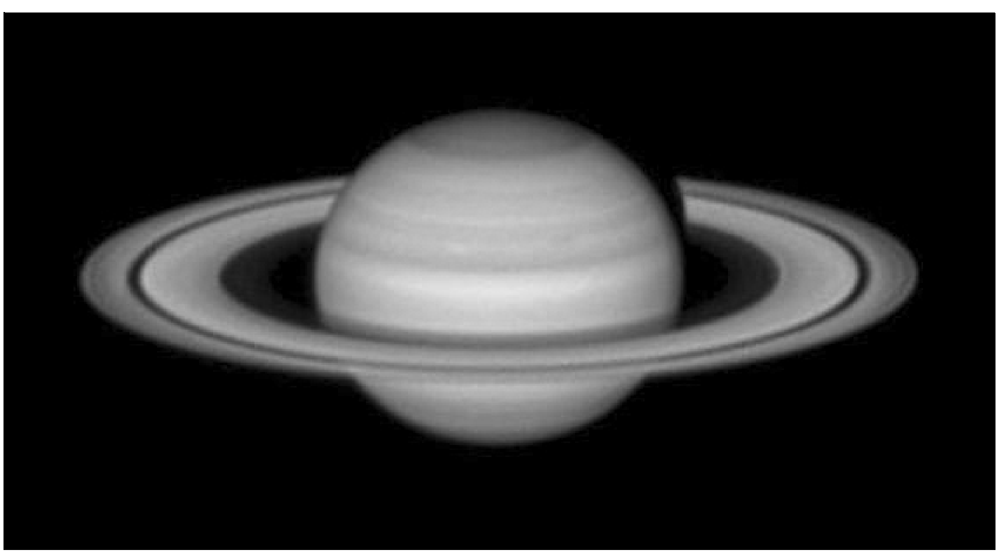


Figure 15. 2007 MAR 14, 20:00 UT. Damian Peach. 23.5-cm (9.25-in.) SCT, with an ATK - 1HS digital imager, in green light. S and Tr not specified. CMI = 180.0°, CMII = 091.7°, CMIII = 094.6°, B = –15.0°, B´ = –13.4°. A SEBZ white spot is E of the CM and noticeably more elongated than earlier in the apparition; a dusky elongated feature is also possibly present W of the CM along the N edge of the SEBs.

The author appreciates the dedicated efforts of all the individuals mentioned in this report who contributed drawings, digital images, descriptive reports, and visual numerical relative intensity estimates during the 2006-2007 Apparition. Such systematic observational work makes our programs a success and helps amateur and professional astronomers alike to obtain a better understanding of Saturn and its dynamic Rings. Observers everywhere are encouraged to participate in our programs in future apparitions.

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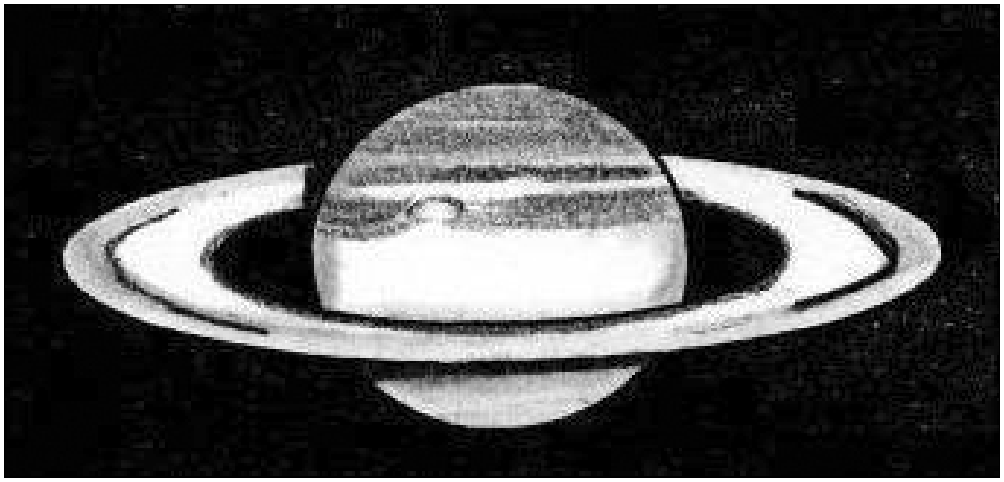

Figure 16. 2006 NOV 16, 04:24 UT. Detlev Niechoy. 20.3-cm (8.0-in.) SCT. Drawing at 225X, IL. S = 5.0, Tr = 2.0. CMI = 075.1°, CMII = 219.3°, C CMIII = 005.4° B = –12.2°, B´ = –15.0°. A small white spot is suspected E of the CM in this rough sketch.

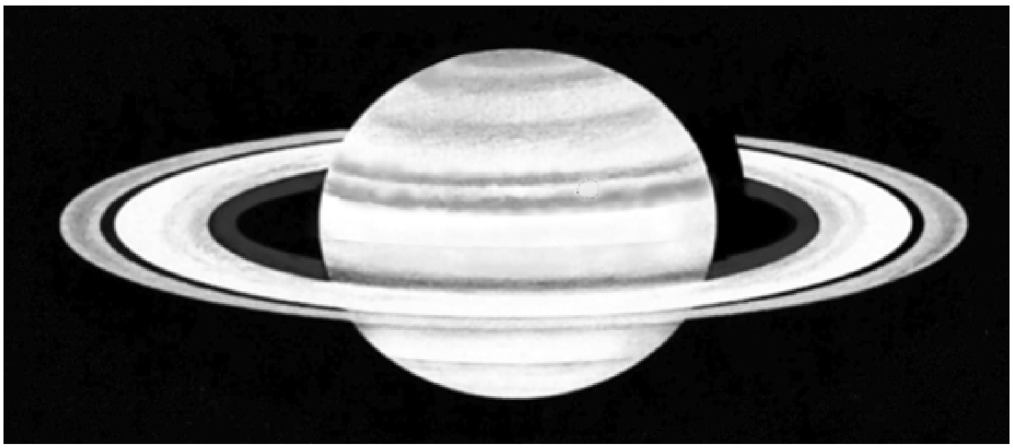

Figure 17. 2007 APR 21, 02:40-03:01 UT. Sol Robbins. 24.8-cm (9.75-in.) NEW. Drawing at 397X, IL. S = 7.0, Tr not specified. CMI = 332.3°-344.6°, CMII = 120.0°-131.8°, CMIII = 078.0°-089.9°, B = –15.4°, B´ = –12.8°. A small white spot is suspected W of the CM in the SEBZ in this very nice drawing; note dusky undulations along the SEBn.

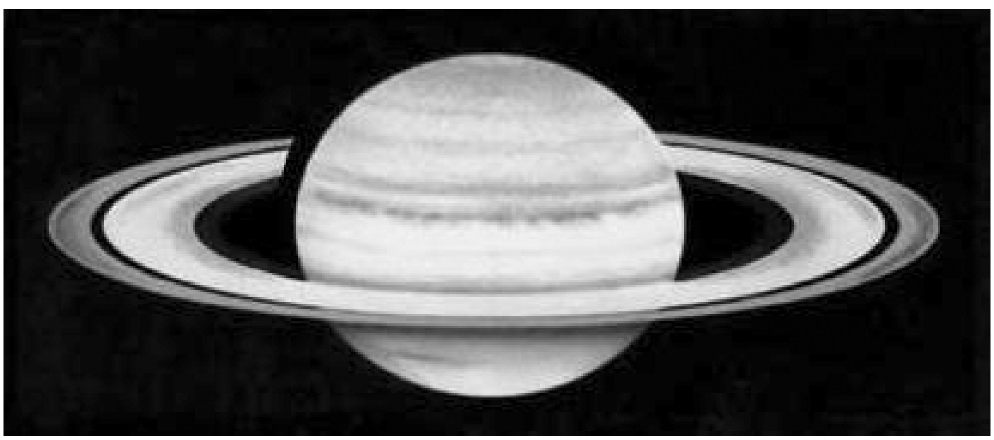

Figure 18. 2006 OCT 31, 09:33-09:57 UT. Sol Robbins. 24.8-cm (9.75-in.) NEW. Drawing at 397X, IL. S = 7.0, Tr not specified. CMI = 067.0°-081.0°, CMII = 001.1°-014.6°, CMIII = 166.2°-179.7°, B = –12.7°, B´ = –15.2°. Several dusky festoons are apparent along the SEBn extending slightly into the EZs.

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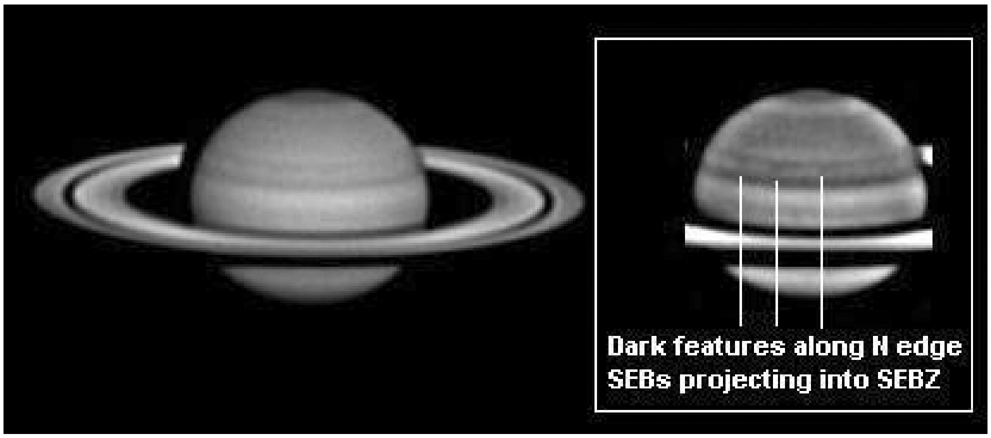


Figure 19. 2006 NOV 07 05:46 UT. Ralf Vandebergh. 24.5-cm (9.6-in.) NEW, with an ATK –1HS digital imager, R610-nm red filter. S and Tr not specified. CMI = 084.1°, CMII = 157.2°, CMIII I = 314.1°, B = –12.5°, B´ = –15.1°. Small dark features are apparent along the North edge of the SEBs and extending into the SEBZ; the inset has been enhanced to bring out detail.

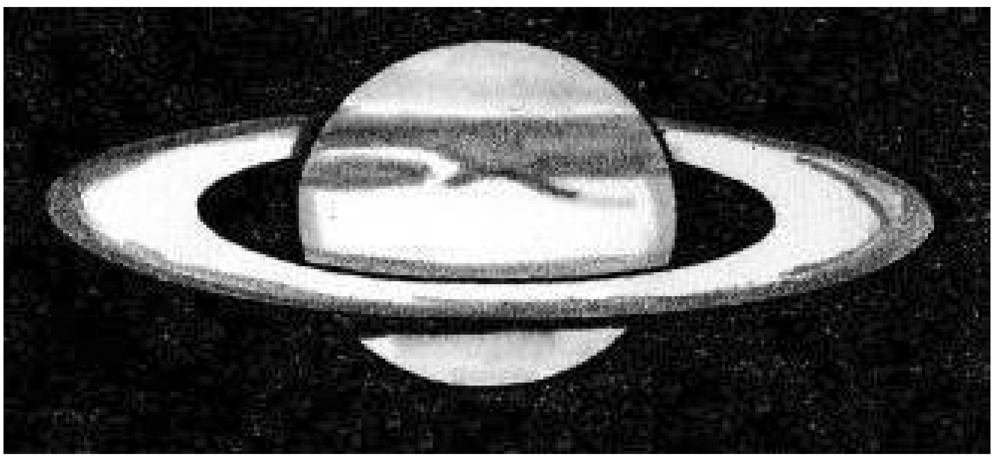


Figure 20. 2006 NOV 28, 04:41 UT. Detlev Niechoy. 20.3-cm (8.0-in.) SCT. Drawing at 225X, IL. S = 4.0, Tr = 2.0. CMI = 137.3°, CMII = 253.5°, CMIII = 025.1°, B = –12.3°, B´ = –14.9°. A dusky elongation is suspected, protruding from the SEBn into a portion of the EZs W of the CM.

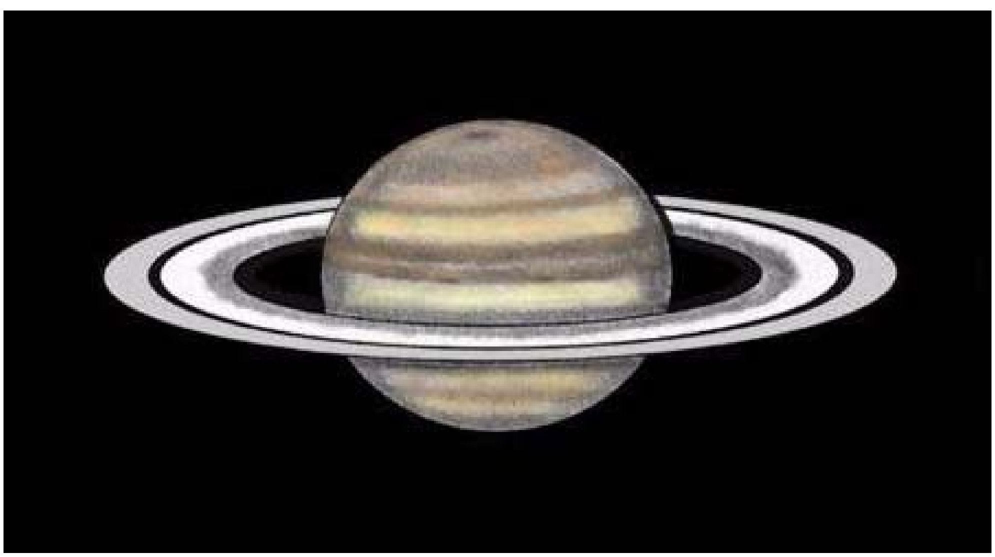


Figure 21. 2007 JAN 14, 04:00 UT. Carlos Hernandez. 22.9-cm (9.0-in.) MAK. Drawing at 273X, IL. S = 5.0, Tr = 3.6. CMI = 199.5°, CMII = 238.4°, CMIII = 313.3°, B = –13.0°, B´ = –14.2°. Dark elongations appear E and W of the CM in this colorful sketch.

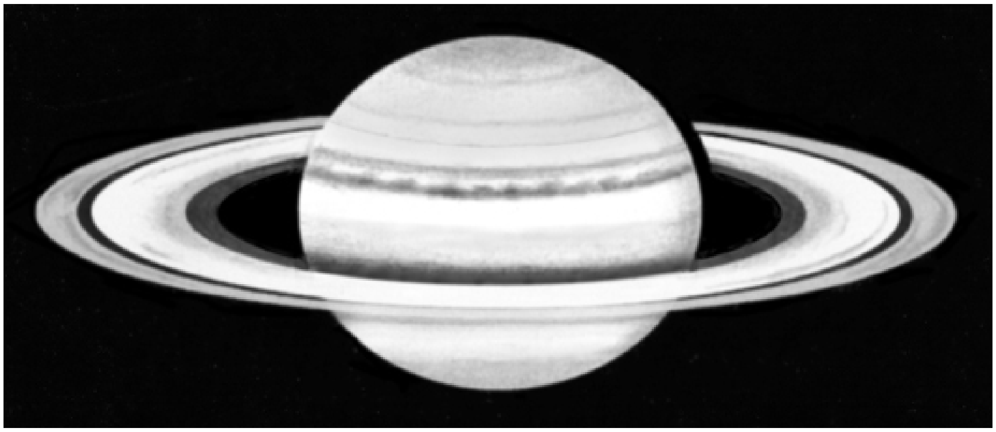


Figure 22. 2007 MAR 01, 02:58 – 03:17 UT. Sol Robbins. 24.8-cm (9.75-in.) NEW. Drawing at 390X, W56 green filter, IL. S = 8.0, Tr not specified. CMI = 124.5°-135.7°, CMII = 119.0°-129.7°, CMIII = 138.5°-149.2°, B = –14.6°, B´ = −13.6°. A host of dusky spots and wispy features exist along the SEBn extending S into the adjacent SEBZ.

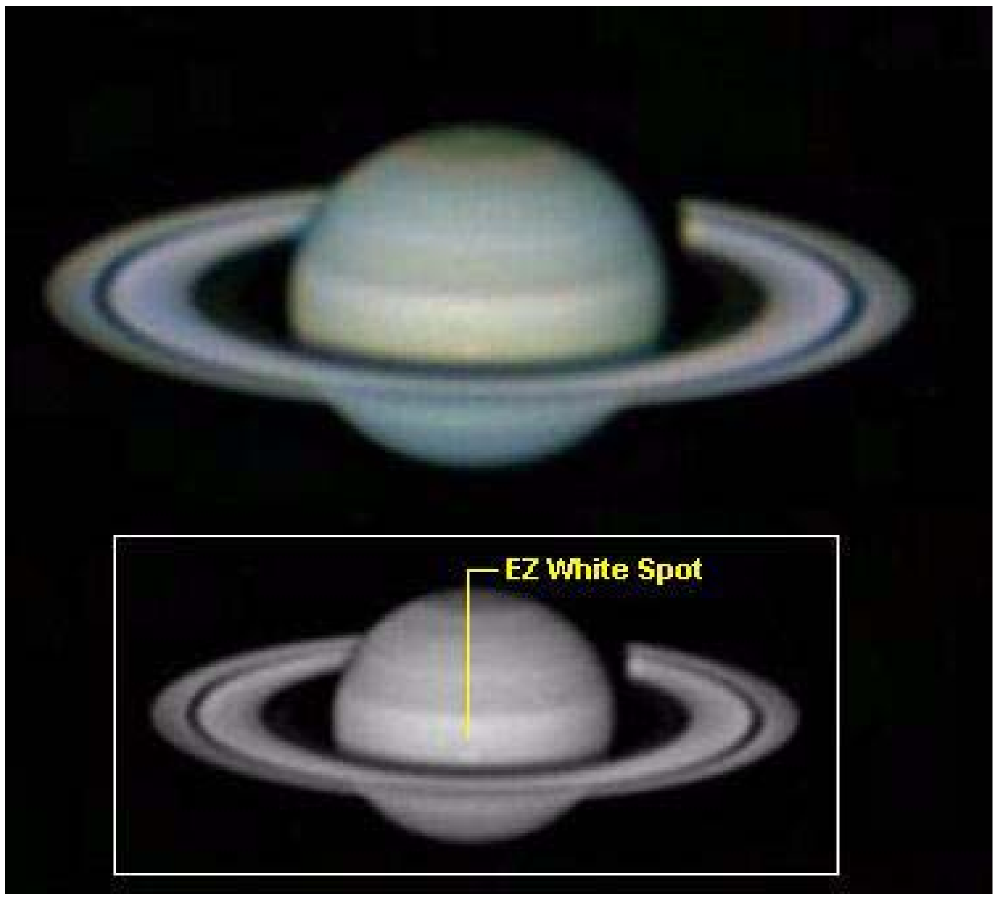


Figure 23. 2007 APR 11, 22:58 UT. David Arditti. 25.4-cm (10.0-in.) DAL, with a Philips ToUcam digital imager + IR blocker. CMI = 164.0°, CMII = 247.4°, CMIII = 216.4°, B = –15.4°, B´ = −13.0°. An oval EZ white spot is situated on the CM. The lower monochrome image inset, made in red light, shows the EZ white spot more prominently.

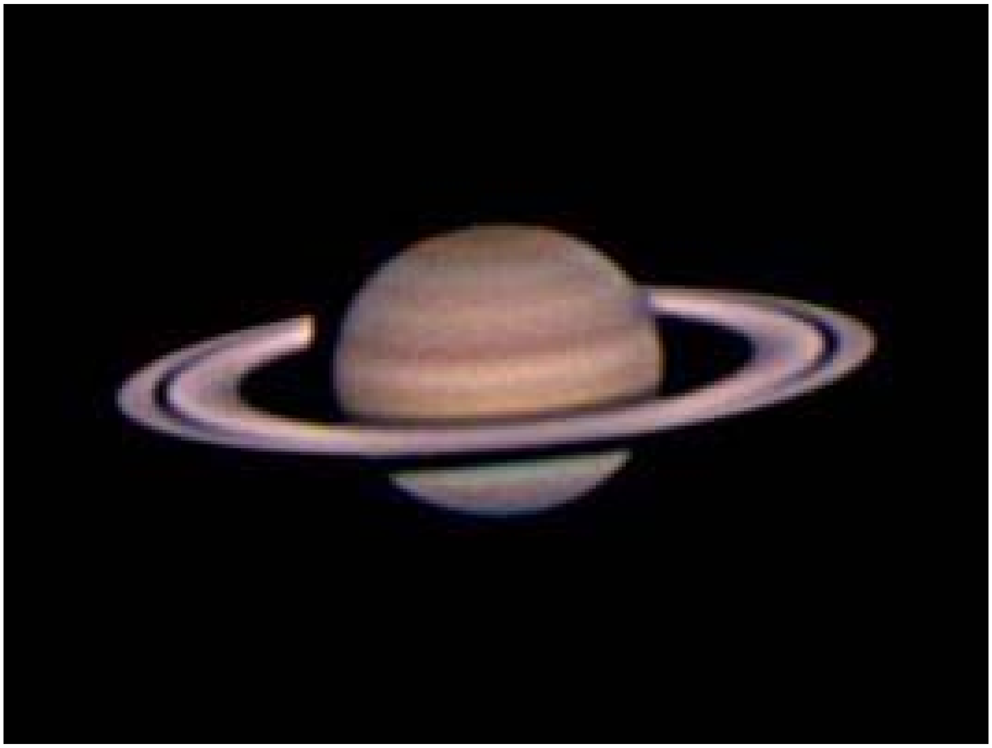


Figure 24. 2006 DEC 01, 12:46 UT. Paul Maxson. 25.4-cm (10.0-in.) CAS, with a Luminera SKYnyx digital imager, IL + RGB filters. S and Tr not specified. CMI = 074.8°, CMII = 083.2°, CMIII = 210.8°, B = –12.3°, B´ = –14.8°. The narrow EB is easily visible within the EZ running across the Globe of Saturn.

Figure 25. 2006 DEC 07, 13:11 UT. Ron Bee. 12.7-cm (5.0-in) REF, with a Philips ToUcam digital imager + IR blocker. S = 4.0 (interpolated), Tr not specified. CMI = 115.7°, CMII = 289.7°, CMIII = 050.0°, B = -12.3°, B´ = –14.7°. The narrow EB is quite apparent as it extends across the Globe within the EZs.

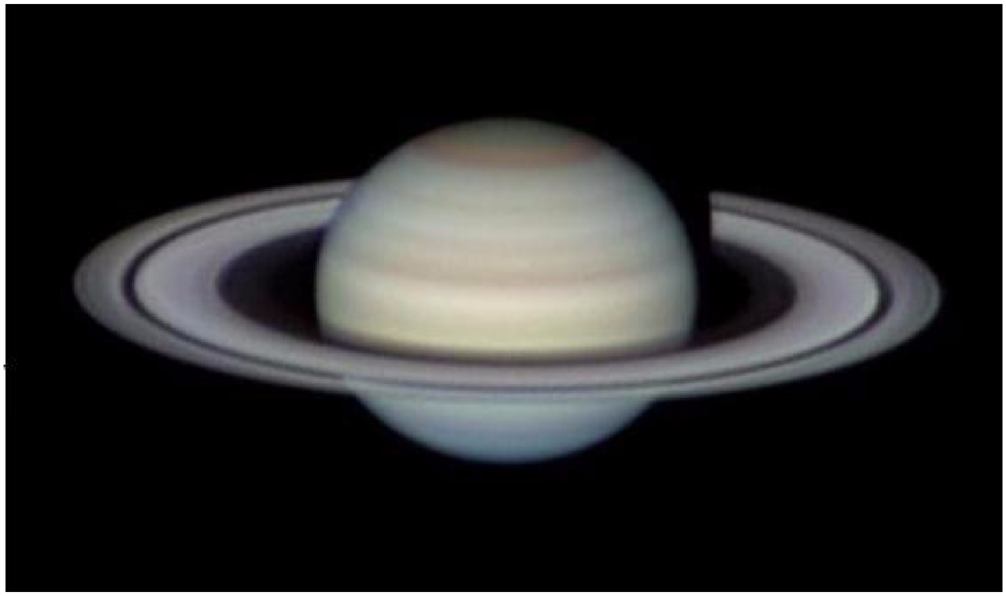
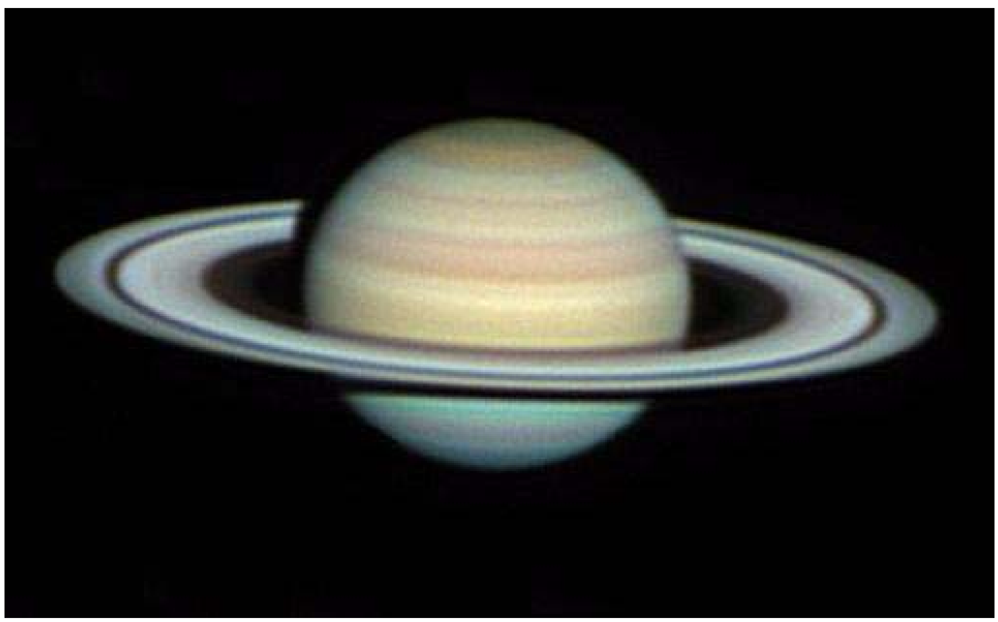


Figure 26. 2007 APR 12, 21:44 UT. Damian Peach. 23.5-cm (9.25-in.) SCT, with an ATK -1HS digital imager, IL. S and Tr not specified. CMI = 244.9°, CMII = 297.6°, CMIII = 265.5°, B = –15.4°, B´ = –13.0°. As the tilt of the Rings of Saturn toward Earth diminishes, more of the Northern Hemisphere of the Globe comes into view, as evidenced in this excellent image.

Figure 27. 2006 NOV 22, 20:09 UT. Christopher Go. 28.0-cm (11.0-in.) SCT, with a DMK digital imager, IL. S = 8.0, Tr = 5.0. CMI = 295.3°, CMII = 224.5°, CMIII = 002.5°, B = –12.3°, B´ = –14.9°. The NNTeZ and NNTeB are both marginally apparent in this image.



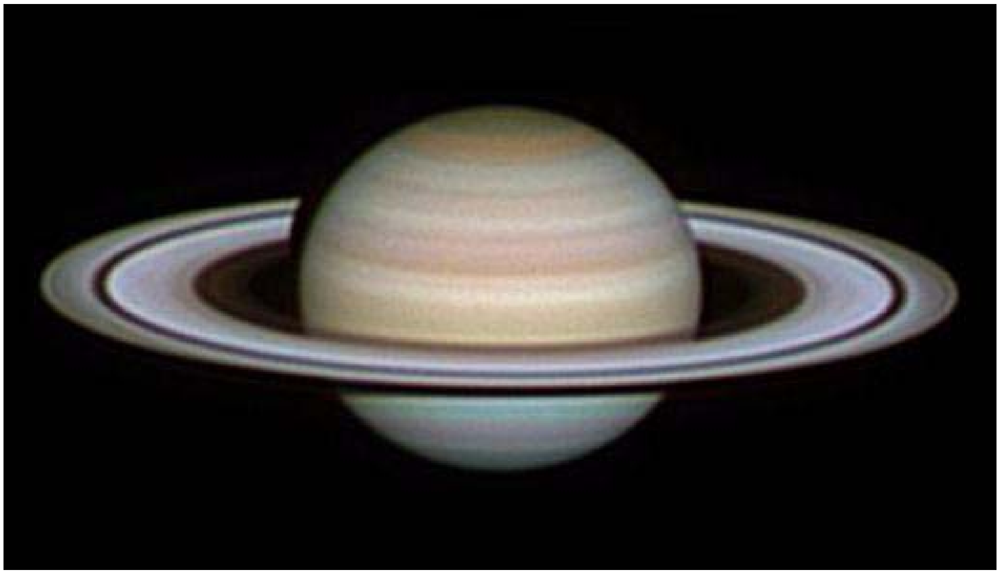
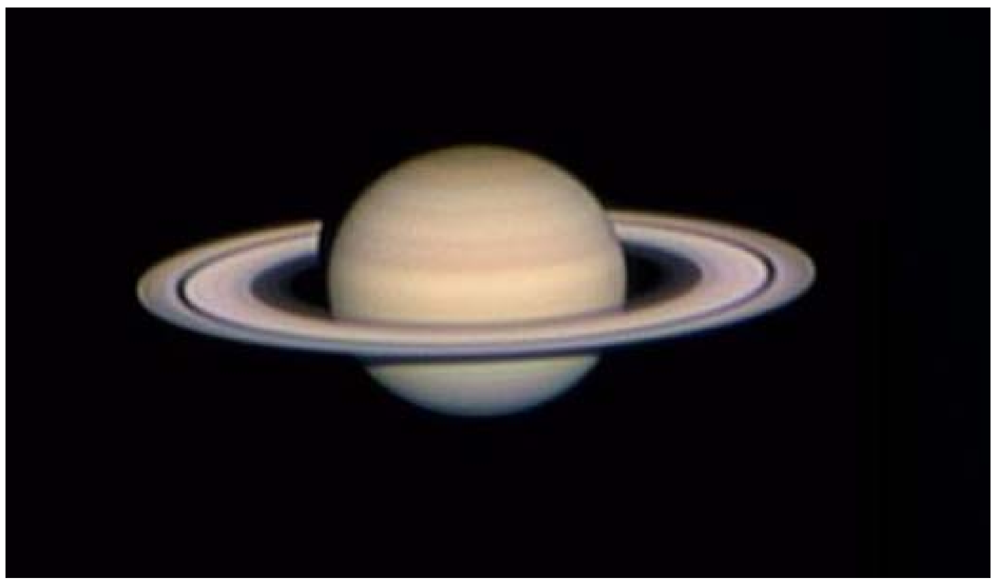


Figure 28. 2006 DEC 21, 20:15 UT. Christopher Go. 28.0-cm (11.0-in.) SCT, with a DMK digital imager, IL. S = 7.0, Tr = 5.0. CMI = 305.7°, CMII = 018.0°, CMIII = 121.0°, B = –12.4°, B´ = –14.5°. The broader structure of Encke's Complex (A5) and the narrow Keeler's Gap (A8) are both visible at both ansae in this superb image.

Figure 29. 2006 NOV 26, 10:12 UT. Rolando Chavez. 31.8-cm (12.5-in.) NEW, with a Philips ToUcam digital imager + IR blocker. S = 6.0, Tr = 6.0. CMI = 082.7°, CMII = 256.1°, CMIII = 029.8°, B = –12.3°, B´ = –14.9°. A few intensity minima can be detected at the B2, B5, and B8 positions at the ansae within the broad Ring B.



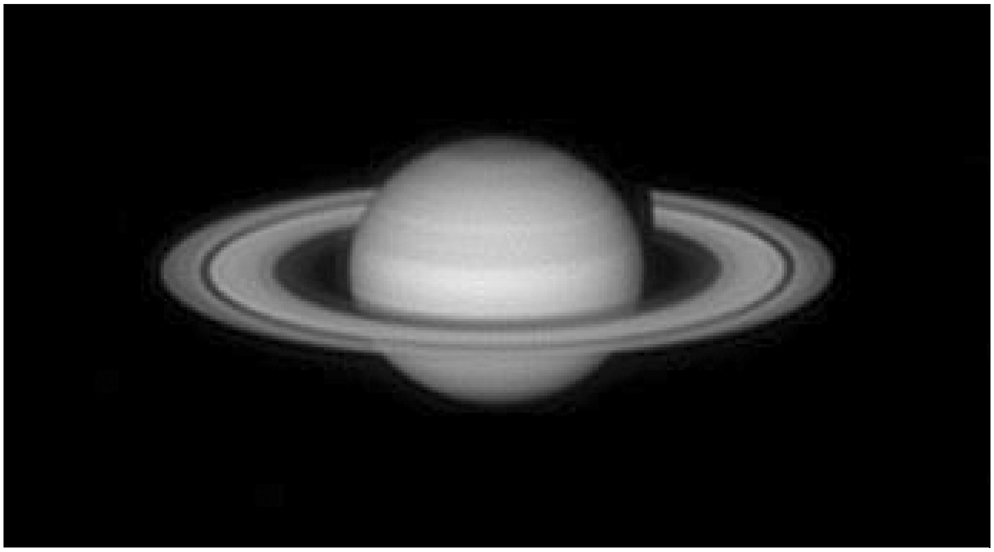


Figure 30. 2007 APR 08, 20:48 UT. Christophe Pellier. 25.4-cm (10.0-in.) CAS, with a Luminera SKYnyx digital imager, Red 630nm filter. S = 6.0, Tr = 6.0. CMI = 075.1, CMII = 258.3°, CMIII = 231.0°, B = -15.4°, B´ = -13.0°. Intensity minima at B2, B5, B8 at both ansae are revealed in this image taken at 630-nm (red) wavelength.

Figure 31. 2007 MAR 29, 02:10 UT. Larry Owens. 35.6-cm (14.0-in.) SCT, with a Lumenera Lu075 digital imager, R (612-670 nm) + RGB filters. S = 6.0 (Tr not specified). CMI = 337.0°, CMII = 148.2°, CMIII = 134.0°, B = -15.2°, B´ = -13.2°. Cassini's Division (A0 or B10) is visible around the circumference of the Rings (except the portion hidden by the Globe) in this very sharp image. The Northern Hemisphere of the Globe can be seen through the gap.

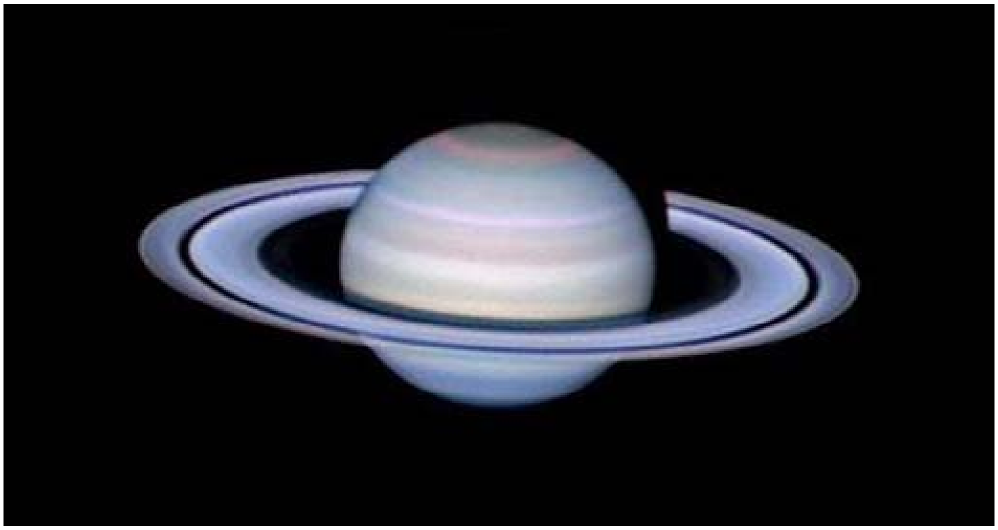


Figure 32. 2007 APR 09, 20:33 UT. Paolo Lazzarotti. 31.5-cm (12.4-in.) NEW, with a Lumenera Infinity 2-1M digital imager, IL. S = 6.0, Tr = 6.0. CMI = 190.5°, CMII = 341.8°, CMIII = 313.3°, B = -15.4°, B´ = -13.0°. Ring C is very easy to see at the ansae in this image, along with the Crape Band where Ring C crosses the Globe.

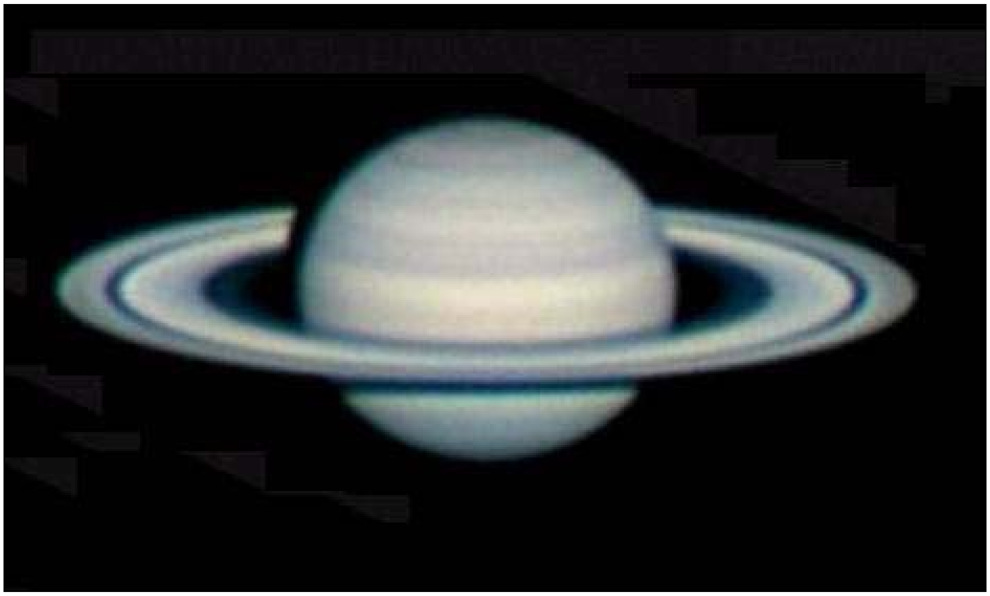
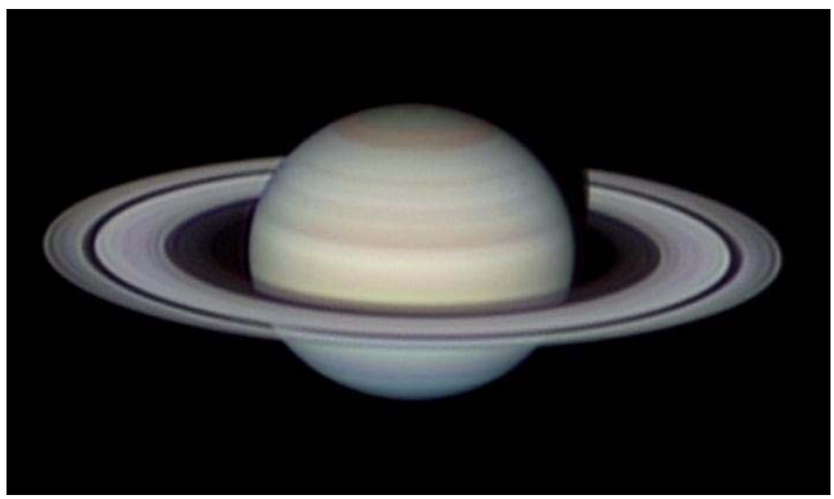


Figure 33. 2006 NOV 29, 03:35 UT. Pete Lawrence. 35.6-cm (14.0-in.) SCT using a Luminera SKYnyx digital imager, IL + LRGB filters. S = 7.0, Tr = 6.0. CMI = 223.0°, CMII = 308.4°, CMIII = 078.8°, B = 12.3°, B´ = -14.8°. The Shadow of the Rings on the Globe (Sh R on G) is cast to the North of the Ring System in this image (see text for a discussion of the circumstances governing the location of this feature with time).

Figure 34. 2007 APR 18, 19:57 UT. Damian Peach. 35.6-cm (14.0-in.) SCT, with an ATK -1HS digital imager, IL. S and Tr not specified. CMI = 207.6°, CMII = 068.9°, CMIII = 029.6°, B = -15.4°, B´ = -12.9°. The Shadow of the Rings on the Globe (Sh R on G) is cast to the South of the Ring System (and visible through the wider Crape Band) in this exquisite, detailed image (see text for a discussion of the circumstances governing the location of this feature with time).



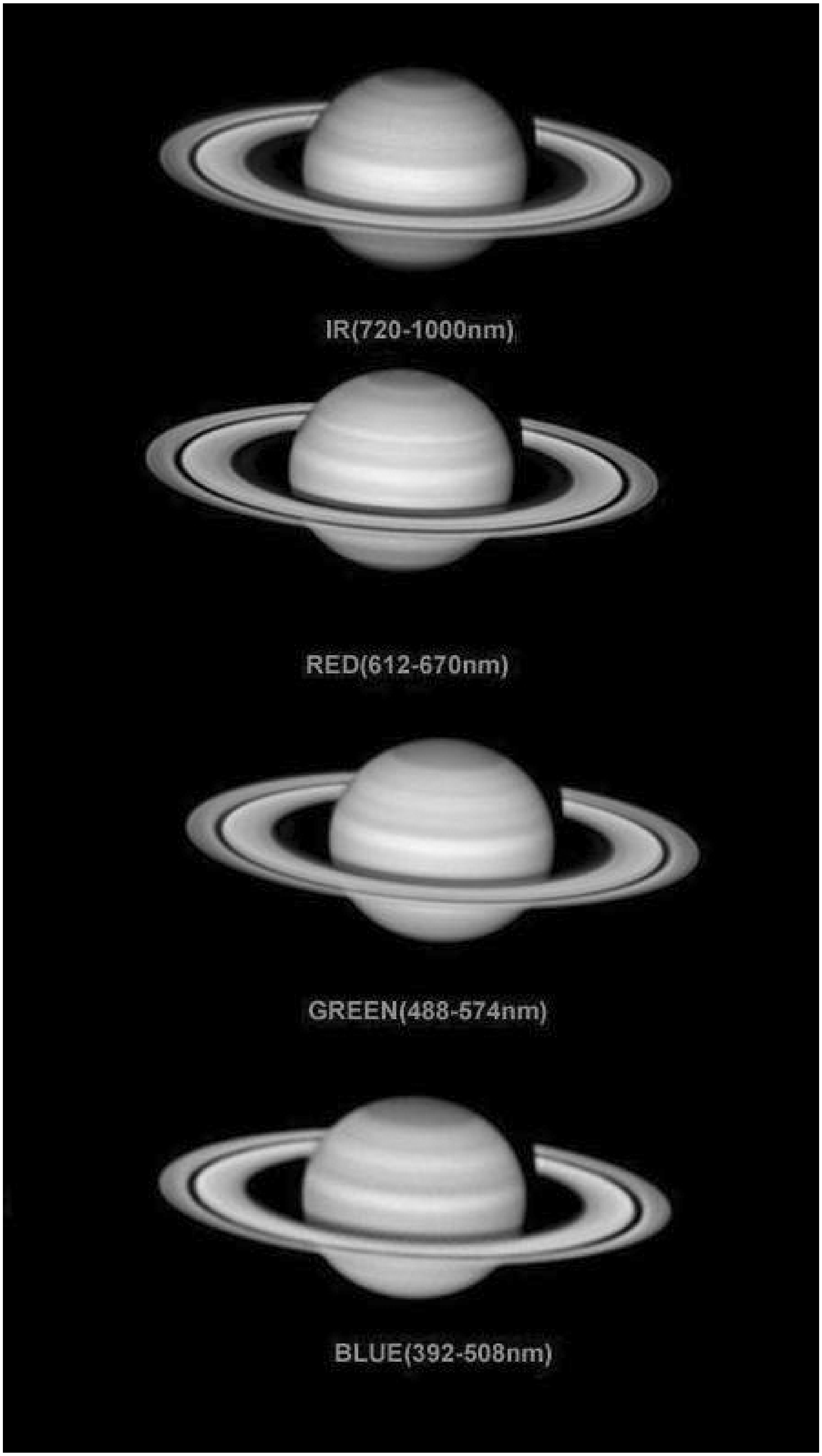


Figure 35. 2007 MAR 29, 02:10 UT. Larry Owens. 35.6-cm (14.0-in.) SCT, with a Lumenera Lu075 digital imager, R (612-670 nm) + RGB filters. S = 6.0 (Tr not specified). CMI = 337.0°, CMII = 148.2°, CMIII = 134.0°, B = -15.2°, B´ = -13.2°. This image is an example of the utilization, for participation in various Pro-Am projects, of different filters with moderate to larger apertures to image Saturn at different wavelengths, including a 890-nm narrow band pass CH_4 (methane) filter (see text).

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Lunar Transient Phenomena

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Remote Planets Section

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Meteorites Section

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Eclipse Section

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ALPO Publications

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

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There is NO CHARGE for any of the ALPO monographs.

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

- **Monograph No. 2**. *Proceedings of the 44th Convention of the Association of*

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Lunar and Planetary Observers. Greenville, South Carolina, June 15-18, 1994. 52 pages. File size approx. 6.0 megabytes.

- **Monograph No. 3**. *H.P. Wilkins 300-inch Moon Map.* 3rd Edition (1951). Available as one comprehensive file (approx. 48 megabytes) or five section files (Part 1, 11.6 megabytes; Part 2, 11.7 megabytes; Part 3, 10.2 megabytes; Part 4, 7.8 megabytes; Part 5, 6.5 megabytes)
- **Monograph No. 4.** *Proceedings of the 45th Convention of the Association of Lunar and Planetary Observers. Wichita, Kansas, August 1-5, 1995.*127 pages. Hard copy $17 for the United States, Canada, and Mexico; $26 elsewhere. File size approx. 2.6 megabytes.
- **Monograph No. *5.*** *Astronomical and Physical Observations of the Axis of Rotation and the Topography of the Planet Mars. First Memoir; 1877-1878.* By Giovanni Virginio Schiaparelli, translated by William Sheehan. 59 pages. Hard copy $10 for the United States, Canada, and Mexico; $15 elsewhere. File size approx. 2.6 megabytes.
- **Monograph No. *6.*** *Proceedings of the 47th Convention of the Association of Lunar and Planetary Observers, Tucson, Arizona, October 19-21, 1996.*20 pages. Hard copy $3 for the United States, Canada, and Mexico; $4 elsewhere.File size approx. 2.6 megabytes.
- **Monograph No. 7.** *Proceedings of the 48th Convention of the Association of Lunar and Planetary Observers. Las Cruces, New Mexico, June 25-29, 1997.*76 pages. Hard copy $12 for the United States, Canada, and Mexico; $16 elsewhere.File size approx. 2.6 mega-

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- **Monograph No. 8**. *Proceedings of the 49th Convention of the Association of Lunar and Planetary Observers. Atlanta, Georgia, July 9-11,1998.122* pages. Hard copy $17 for the United States, Canada, and Mexico; $26 elsewhere.File size approx. 2.6 megabytes.

- **Monograph Number 9**. *Does Anything Ever Happen on the Moon?* By Walter H. Haas. Reprint of 1942 article. 54 pages.Hard copy $6 for the United States, Canada, and Mexico; $8 elsewhere.File size approx. 2.6 megabytes.

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

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

ALPO Observing Section Publications

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

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

- **Lunar & Planetary Training Section:** *The Novice Observers Handbook* $15. An introductory text to the training program. Includes directions for recording lunar and planetary observations, useful exercises for determining observational parameters, and observing forms. Available as pdf file via e-mail or send check or money order payable to Timothy J. Robertson, 2010 Hillgate Way #L, Simi Valley, CA 93065; e-mail *cometman@cometman.net*.

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

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

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

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

- **Mars:** *(1) ALPO Mars Observers Handbook,* send check or money order for $15 per book (postage and handling included) to Astronomical League Sales, 9201 Ward Parkway, Suite 100, Kansas City, MO 64114; phone 816-

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DEEP-SKY (816-333-7759); e-mail *leaguesales@astroleague.org*. *(2) Observing Forms;* send SASE to obtain one form for you to copy; otherwise send $3.60 to obtain 25 copies (send and make checks payable to "Deborah Hines", see address under "Mars Section").

- **Jupiter:** *(1) Jupiter Observer's Handbook*, $15 from the Astronomical League Sales, 9201 Ward Parkway, Suite 100, Kansas City, MO 64114; phone 816-DEEP-SKY (816-333-7759); e-mail *leaguesales@astroleague.org*. (2) *Jupiter*, the ALPO section newsletter, available online only via the ALPO website at *http://mysite.verizon.net/macdouc/alpo/jovenews.htm;* (3) *J-Net*, the ALPO Jupiter Section e-mail network; send an e-mail message to Craig MacDougal. (4) *Timing the Eclipses of Jupiter's Galilean Satellites* free at *http://www.alpo-astronomy.org/jupiter/GaliInstr.pdf*, report form online at *http://www.alpo-astronomy.org/jupiter/GaliForm.pdf*; send SASE to John Westfall for observing kit and report form via regular mail. (5) *Jupiter Observer's Startup Kit*, $3 from Richard Schmude, Jupiter Section coordinator.

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

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

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

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).

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

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

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

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

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