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Founded in 1947

The Strolling Astronomer

Volume 54, Number 2, Spring 2012

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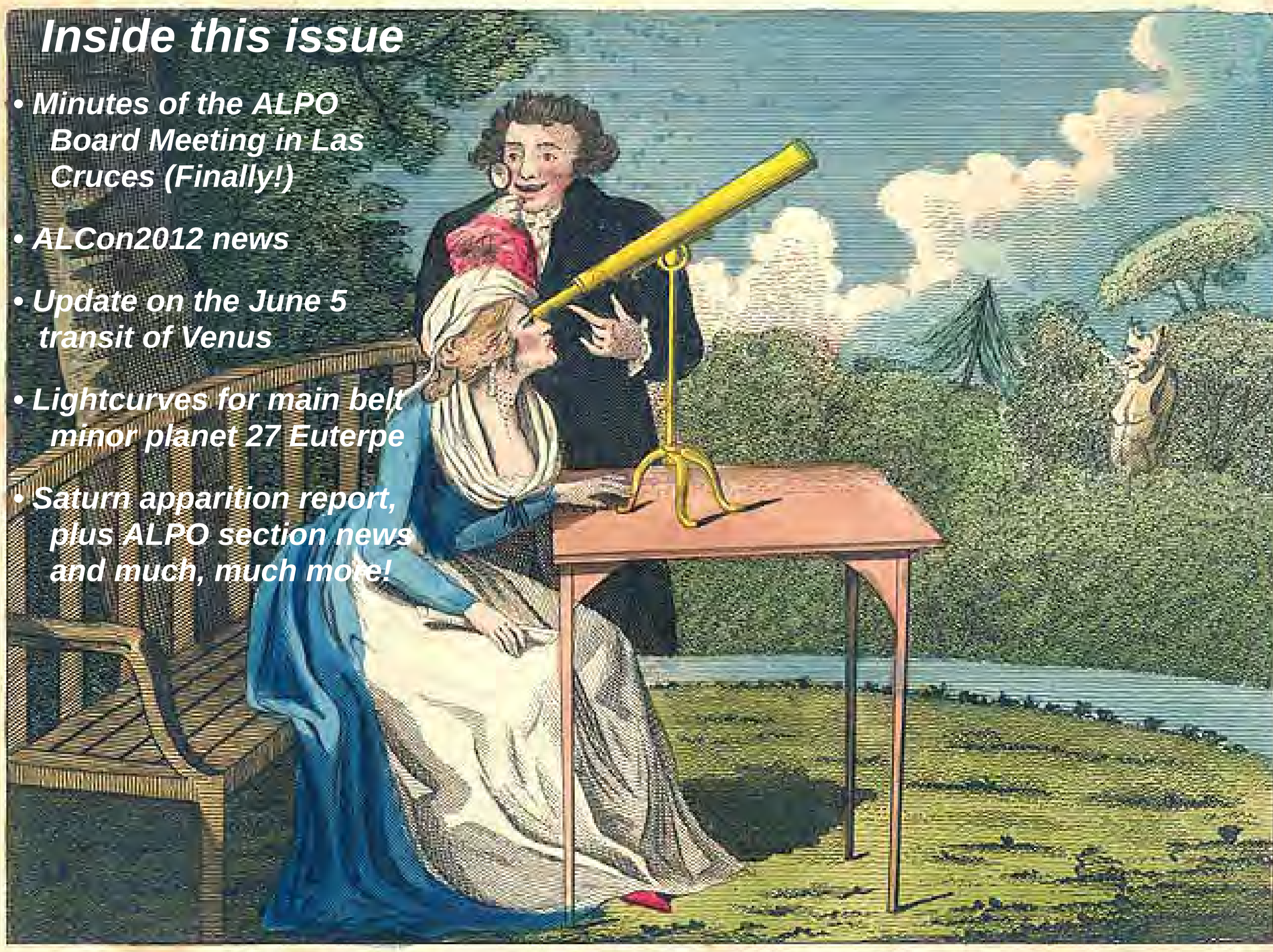
- *ALCon2012 news*
- *Update on the June 5 transit of Venus*
- *Lightcurves for main belt minor planet 27 Euterpe*
- *Saturn apparition report, plus ALPO section news and much, much more!*



VIEWING THE TRANSIT OF VENUS.

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Journal of the Association of Lunar & Planetary Observers
The Strolling Astronomer

Volume 54, No.2, Spring 2012
This issue published in March 2012 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:

Matthew Will
ALPO Membership Secretary/Treasurer
P.O. Box 13456
Springfield, Illinois 62791-3456

E-mail to: matt.will@alpo-astronomy.org

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

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Point of View
For All of You Armchair Amateur Astronomers Out There — Books!

By Robert A. Garfinkle, FRAS, ALPO Book Review editor

I have a life long love of books and other forms of the written word. I read a lot and the self-taught knowledge [trivia?] drives my family nuts when we watch the TV show *Jeopardy* together and I constantly get a vast majority of the questions right. “Dad—You should go on the show.” I’ve been hearing that for years.

So where does the *Jeopardy* stuff lead to when writing an opinion piece for this astronomical journal. My interest in the night sky began with my father telling me about the stars and the Moon. The question that I kept asking my self is what exactly am I looking at. When I hit the end of my Dad’s knowledge base, I began checking out books from the public library, then started my own home library of astronomy books (about 6,000 now). I also have a great affinity for ancient history and some of the ancient writers wrote about astronomy. I continued to gather astronomy books to not only read for the pleasure of gaining knowledge, but to assist in writing my *Star-Hopping: Your Visa to Viewing the Universe* and my in-process major lunar observers’ handbook (to be published by Springer).

Even with so many resources now available on the Internet, I still want to grab a book from my library shelf to find the information that I need. For me, there will always be a place for astronomy books in my home, and I hope at your abode as well. Keep looking up and keep reading.

Inside the ALPO

Member, section and activity news

News of General Interest

ALCon 2012 News

Look to the inside back cover of this issue for a full-page ad with the latest info about this summer's next astro get-together when the ALPO joins the Astronomical League in Chicago.

Note that the Midwest Astrophotography and Imaging Conference (MWAIC) will be held in conjunction with ALCon 2012 at the Marriott Lincolnshire Resort near Chicago. Also, one of the keynote speakers will be our own Dr. Donald C. Parker.

ALCon 2012 will be held Wednesday through Saturday, July 4-7, while the MWAIC will be held July 4-6.

Early registration deadline for the event is June 1, but the deadline for getting the preferred room rate ($69 per night plus taxes) for accommodations is May 24. Phone the Marriott directly at 1-888-236-2427 to make your room reservation and be sure to state that you are with the Astronomical League to get this special rate.

Various tours and other items are priced separately.

Register either online at http://alcon2012.astroleague.org/alcon-2012-2/registration/ or print out the hard copy registration form at http://alcon2012.astroleague.org/wp-content/uploads/2012/02/General-5.pdf and pay with check by regular mail.

Visit the official ALCon2012 website for scheduling news and paper presentation times.

Call for ALPO Papers

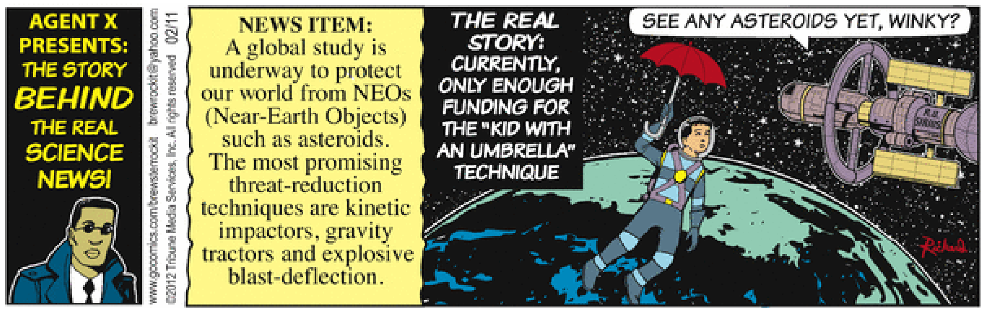
Participants are encouraged to submit research papers, presentations, and experience reports concerning Earth-based observational astronomy of our solar system for presentation at the event.

Suggested topics for papers and presentations include the following:

- New or ongoing observing programs and studies of solar system bodies, specifically, how those programs were designed, implemented and continue to function.
- Results of personal or ALPO group studies of solar system bodies possibly including (but not limited to) Venus cloud albedo events, dust storms and the polar caps of Mars, the various belts and Great Red Spot of Jupiter, the various belts and ring system of Saturn, variances in activity of periodic meteor showers and comets, etc.

More Real Astronomy in the 'Mainstream Media'

While lots of folks like to criticize the so-called absence of "relevant" news these days, every so often you will find actual and accurate science. One of the latest examples is a gentle nudge to the general public that virtually no research is being done on a topic that could have a dire impact (pun intended) on our continued existence. This time, it's in "Brewster Rockit: Space Guy", a satirical, retro-futuristic comic strip that chronicles the (mis)adventures of the lantern-jawed, lunkheaded, and sometimes childlike Brewster Rockit, captain of the space station R.U. Sirius, and his crew of misfits. More at http://www.gocomics.com/brewsterrockit/



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- New or ongoing activities involving astronomical instrumentation, construction or improvement.
- Challenges faced by Earth-based observers including increased or lack of interest, deteriorating observing conditions brought about by possible global warming, etc.

The preferred format is Microsoft PowerPoint, though 35mm slides or overhead projector slides are also acceptable. The final presentation should not exceed 20 minutes in length, to be followed by no more than five (5) minutes of questions (if any) from the audience.

May 15, 2012 is the deadline for submitting the titles of papers to be presented along with a four- or five-sentence abstract of each paper and in what format the presentation will be.

Address all ALPO materials to:

Julius L. Benton, Jr., Ph.D.
Association of Lunar and Planetary Observers (ALPO)
c/o Associates in Astronomy
P.O. Box 30545
Wilmington Island
Savannah, GA 31410 USA
jlbaina@msn.com

Venus Volcano Watch

By Michael F. Mattei
micmattei@comcast.net

Beginning on 05 February, 2012 the watch begins with the volcanoes on the bright limb of the planet. Contact me directly at the e-mail address above for a list of times to be watching Venus for cloud activity both on the terminator and on the bright sun lit side. Watch for a bulge on the terminator where the up lifted sun lit clouds would show on the dark side of the terminator, and on the sun lit side watch for bulges of circular cloud formation like the tops of cumulus clouds. There are three volcanoes that are believed to be active, they are, Maat Mons, Ozza Mons and Sapas Mons. All three are near the equator centered near CM 165.

From research of cloud formations and bright clouds on the dark side of the terminator and circular sun lit clouds on the bright side it may be possible to determine if a volcano has erupted. A correlation of these observations can be made to locate volcanoes on the surface of Venus. Observations should be made at all times because there may be many more volcanoes that could be active.

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I would be happy to receive observations, drawings, sketches, CCD images. Please be sure the time is in UT and the location of the observer.

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

Astronomy News and Updates from Beyond International Year of Astronomy 2009

By Kevin Govender, director, Office of Astronomy for Development, Intl Astronomical Union (IAU)
kg@astro4dev.org
www.astro4dev.org

Some news and updates from the astronomy education and outreach community:

- Astronomy Phone and Table Apps (Many Free)

  An annotated overview of 98 astronomy applications for smart phones and tablets has been published in the on-line journal "Astronomy Education Review." Compiled by Andrew Fraknoi (Foothill College), the list features a brief description and a direct URL for each app. It may be especially useful for everyone who got a phone or tablet for the holidays and is looking for something fun or educational to do with it. You can access the article free of charge at: http://dx.doi.org/10.3847/AER2011036 (The link to the full text is right under the author's name). The listing includes a variety of apps for displaying and explaining the sky above you (some using the GPS function in your device); a series of astronomical clocks, calculators, and calendars; sky catalogs and observing planners; planet atlases and globes; citizens science tools and image displays; a directory of astronomy clubs in the U.S.; and even a graphic simulator for making galaxies collide. A number of the apps are free, and others cost just a dollar or two. A brief list of articles featuring astronomy app reviews is also included.

- International Astronomical Union General Assembly:

  The IAU General Assembly takes place every 3 years. This year the 28th General Assembly will take place in Beijing, China. Special sessions include SpS14 (Communicating Astronomy) and SpS11 (Strategic Plan and OAD) as well as many other exciting developments in Astronomy. Early registration and deadline for abstracts are both 17th March 2012. Please have a look at www.astronomy2012.org

- Universe Awareness:

  - Become a Student Ambassador for UNAWE: http://www.unawe.org/updates/unawe-update-1212/

  - Celebrating the Transit of Venus 2012 in Timor-Leste: http://www.unawe.org/updates/unawe-update-1221/

  - Space Scoop (astronomy news service for kids) now available in 14 different languages: http://www.unawe.org/kids/unawe1213/

ALPO Interest Section Reports

Web Services

Larry Owens, section coordinator

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

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

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

Computing Section

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

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

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ALPO Observing Section Reports

Eclipse Section

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

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

Meteors Section

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

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

Meteorites Section

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

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

Comets Section

Gary Kronk, section coordinator
kronk@cometography.com

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

Solar Section

Kim Hay, section coordinator
kim.hay@alpo-astronomy.org

At the time this report was compiled, we were in CR2120 (Carrington Rotation 120), which ran from February 7 to March 4, 2012. More information and the charts for upcoming Carrington Rotations can be found at *www.alpo-astronomy.org/solarblog*

On January 24 at about 15:00 UT, a coronal mass ejection (CME) hit the Earth's magnetic field and produced aurora's seen all over Europe, Greenland, Iceland, Canada and Alaska, as well as in the upper part of the U.S. On January 27, at 18:37 UT, an X2 class occurred, producing aurora's as well.

More information on this can be found at *www.spaceweather.com*

February continued with auroral activity on February 18. In mid-February, Sunspot AR1422 was growing in size and was expected to produce some M-class flares. Images taken on February 20 by Theo Ramakers of Social Circle (near Atlanta), Georgia, USA, show the C2.1 and C4.1 flares, plus dark filaments. For more images by Theo, see *http://ceastronomy.org/tramakers*

Though we are in the middle of Cycle 24, the Sun continues to produce events. On February 17, the SDO (Solar Dynamic Observatory *http://sdo.gsfc.nasa.gov/*) caught and imaged a tornado on the sun (*http://www.npr.org/blogs/thetwo-way/2012/02/17/147071253/video-a-tornado-on-the-sun?ft=1&f=1001&utm_medium=referral&utm_source=pulsenews*). Amateurs also caught the Tornado; Theo processed 50 images to gain this animation. *http://ceastronomy.org/tramakers/?p=1232*

The ALPO Solar Section archives sketches and images in any wavelength of the Sun. We currently have 6 observers sending in their data for archiving. The past CR2118 can be seen online at *www.alpo-astronomy.org/solarblog*

The past CR (Carrington Rotation Number) reports have been taken off-line to be newly processed and will be uploaded once more when finished. Processing the Carrington Reports does take some time, and I am streamlining the process a bit to make it a bit easier to do and get them all back online quickly. After collecting the submitted images, they are entered into a spreadsheet and renamed to the filenames you see online. The past CR's went through many renditions of the "ACDSee" program and text editors in order to create the html files, I am now using "Picasa 3" to pull the images online and also create a pdf file for the text information for the observations.

"Picasa 3" is an image organizer and image viewer for organizing and editing digital photos, plus an integrated photo-sharing website, originally created by a company named Lifescape in 2002 and is owned by Google since 2004.

If you would like to include your images or sketches for archival purposes, please send to *kim.hay@alpo-astronomy.org*. Images/sketches should be no more than 250 kb in size, with the CR number, UT time, date and observing information. If you would like to talk solar stuff and show your images online for all, join in on the Solar-ALPO Yahoo Group.

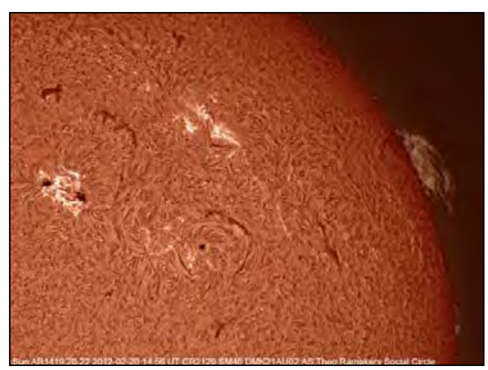

Figure 2. Details of visible active regions AR1419, 1420, 1421 and 1422 shown in Figure 1 image by ALPO member Theo Ramakers. This image taken February 20, 2012, at 14:56UT. All other info same as Figure 1.

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Figure 1. Whole Sun image in hydrogen-alpha by ALPO member Theo Ramakers at Social Circle, Georgia, USA, on February 20, 2012, at 14:47UT during CR (Carrington Rotation) 2120 with visible active regions AR1419, 1420, 1421 and 1422 shown here. Equipment details: Coronado "SolarMax 40" 40 mm (1.6 in.) aperture solar telescope & DMK41AU02.AS astronomy camera using "IC Capture" software; image processed with Registax 6, then finalized in Photoshop. Transparency 4 out of 5; Seeing 4/5. Image inverted (negative) with north at top.

We are always looking for members to submit an article to the JALPO on solar work. Please send to myself (*kim.hay@alpo-astronomy.org*) and to Ken Poshedly (*ken.poshedly@alpo-astronomy.org*)

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

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

Mercury Section

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

As we entered into 2012, hopefully we will see more observations of Mercury from our ALPO members. It has been slow lately, but now we have a MESSENGER spacecraft around Mercury for at least another year to cover much of the surface. The 2011 apparition report will be written up and you can see John Boudreau continued to take more high resolution image of the surface of Mercury. Yes, Mercury's surface, not just a phase. And Carl Roussell continues with his skilled drawings.

You will see one example of Boudreau's image of September 13, 2011. This is perhaps the best image yet. It can be easily compared with MESSENGER's snapshot of the same surface. One dark feature, Solitudo Amphrodites (formerly known as the "Skinakas Basin"), bright and other dark regions and especially rayed craters are all seen in Boudreau's image that are detectable in the MESSENGER snapshot. It is just awesome!

You will see many more of Boudreau's images and from others during the 2011 apparition write up.

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

Venus Section

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

An update on the June 2012 transit of Venus appears later in this issue.

Venus is situated in the western sky after sunset at apparent visual magnitude -4.1, rapidly approaching Greatest Elongation East on March 27, 2012. During the 2011-12 Eastern (Evening) Apparition, Venus is passing through its waning phases (a progression from fully illuminated through crescentic phases) as observers witness the leading hemisphere of Venus at the time of sunset on Earth. In mid-January, the gibbous disk of Venus will be nearly 14" across and 80.0% illuminated.

The Table of Geocentric Phenomena in Universal Time (UT) is presented here for

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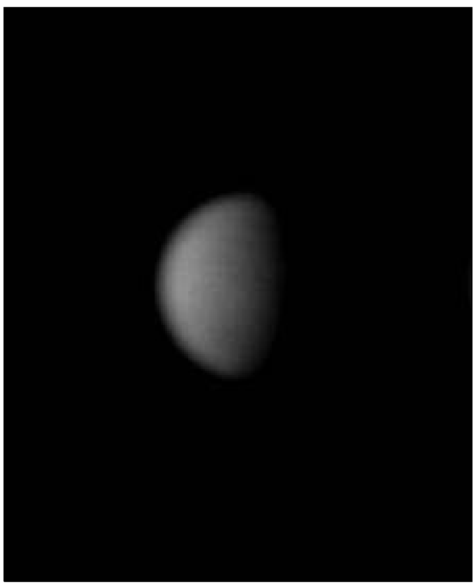
the convenience of observers for the 2011-12 Eastern (Evening) Apparition.

Observers have already begun contributing images and drawings of Venus, and many more will surely follow in the months to come. Readers are reminded that high-quality digital images of the planet taken in the near-UV and near-IR, as well as other wavelengths through polarizing filters, continue to be needed by the Venus Express (VEX)



Digital image of the gibbous planet Venus as imaged on January 18, 2012 at 19:38 UT by Orlando Benìtez Sànchez of the Canary Islands. Equipment includes a 23.5 cm (9.25 in.) SCT and ultraviolet filter S = 7.0, Tr = 6.0. Apparent diameter of Venus is 14.2 arc-seconds, phase (k) 0.781 (78.1% illuminated), and visual

mission, which started systematically monitoring Venus at UV, visible (IL) and IR wavelengths back in May 2006. This Professional-Amateur (Pro-Am) effort continues, and observers should submit images to the ALPO Venus Section as well as to the VEX website at:

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

Regular Venus program activities (including drawings of Venus in Integrated Light and with color filters of known transmission) are also valuable throughout the period that VEX is observing the planet, which continues into 2011-12. Since Venus has a high surface brightness, it is potentially observable anytime it is far enough from the Sun to be safely observed.

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

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

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

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

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

Geocentric Phenomena of the 2011-2012 Eastern (Evening) Apparition of Venus in Universal Time (UT)

Superior Conjunction	2011	Aug 16 (angular diameter = 9.6 arc-seconds)
Greatest Elongation East	2012	Mar 27 (46º east of the Sun)
Predicted Dichotomy	2012	Mar 29.34 (exactly half-phase)
Greatest Brilliancy	2012	Apr 28 (m_v = – 4.6)
Inferior Conjunction	2012	Jun 05 (angular diameter = 58.3 arc-seconds)

Lunar Section

Lunar Topographical Studies / Selected Areas Program

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

The ALPO Lunar Topographical Studies Section (ALPO LTSS) received a total of 98 new observations from 14 observers during the October-December quarter. These included one Banded Crater program observation, four Ray observations, and two sets of elevation measurements. Twelve contributed articles were published.

The Focus-On series in *The Lunar Observer* newsletter continued with an article on Mare Humorum. Upcoming Focus-On subjects include Copernicus, Archimedes, and the Pyrenees Mountains.

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Lunar Calendar for Second Quarter of 2012 – All Times UT

Apr. 03	22:00	Moon 8.3 degrees SSW of Mars
Apr. 06	19:19	Full Moon
Apr. 07	10:00	Moon 6.0 degrees SSW of Saturn
Apr. 07	17:00	Moon at Perigee (358,313 km – 222,645 miles)
Apr. 10	21:06	Extreme South Declination
Apr. 12	08:00	Moon 1.3 degrees SSW of Pluto
Apr. 13	10:50	Last Quarter
Apr. 16	10:00	Moon 5.7 degrees NNW of Neptune
Apr. 18	21:00	Moon 7.0 degrees NNW of Mercury
Apr. 19	03:00	Moon 5.2 degrees NNW of Uranus
Apr. 21	07:19	New Moon (Start of Lunation 1105)
Apr. 22	09:01	Moon at Apogee (406,420 km – 252,538 miles)
Apr. 22	19:00	Moon 2.5 degrees N of Jupiter
Apr. 25	05:36	Extreme North Declination
Apr. 25	02:00	Moon 5.7 degrees S of Venus
Apr. 29	09:57	First Quarter
May 01	07:00	Moon 7.3 degrees SSW of Mars
May 04	20:00	Moon 6.2 degrees S of Saturn
May 06	03:34	Moon at Perigee (356,953 km – 221,800 miles)
May 06	03:35	Full Moon
May 08	06:18	Extreme South Declination
May 09	20:00	Moon 1.5 degrees ESE of Pluto
May 12	21:47	Last Quarter
May 13	19:00	Moon 5.9 degrees NNW of Neptune
May 15	22:00	Moon 1.1 Degree ESE of asteroid 2-Pallas
May 16	13:00	Moon 5.2 degrees NNW of Uranus
May 19	16:14	Moon at Apogee (406,450 km – 252,556 miles)
May 20	04:00	Moon 2.1 degrees NNW of Mercury
May 20	14:00	Moon 1.8 degrees N of Jupiter
May 20	23:47	New Moon (Start of Lunation 1106)
May 22	11:12	Extreme North Declination
May 22	22:00	Moon 4.7 degrees S of Venus
May 28	20:15	First Quarter
May 29	05:00	Moon 6.5 degrees SSW of Mars
June 01	01:00	Moon 6.2 degrees SSW of Saturn
June 03	13:21	Moon at Perigee (358,482 km – 222,750 miles)
June 04	11:11	Full Moon (Partial Eclipse of the Moon)
June 04	17:06	Extreme South Declination
June 06	02:00	Moon 1.2 degrees SSW of Pluto
June 10	01:00	Moon 5.9 degrees NNW of Neptune
June 11	10:42	Last Quarter
June 12	18:00	Moon 1.2 Degree NNE of asteroid 2-Pallas
June 12	22:00	Moon 5.1 degrees NNW of Uranus
June 16	01:25	Moon at Apogee (405,790 km – 252,146 miles)
June 17	06:00	Moon 1.4 degrees NW of Jupiter
June 18	17:36	Extreme North Declination
June 18	00:00	Moon 2.1 degrees N of Venus
June 19	15:02	New Moon (Start of Lunation 1107)
June 21	17:00	Moon 5.5 degrees S of Mercury
June 26	11:00	Moon 5.4 degrees SSW of Mars
June 27	03:29	First Quarter
June 28	08:00	Moon 6.1 degrees SSW of Saturn

Table courtesy of William Dembowski

Visit the following online web sites for more info:

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

Lunar Meteoritic Impacts

Brian Cudnik, program coordinator
cudnik@sbcglobal.net

September 2011 - February 2012 lunar meteor activity has been rather sparse owing to a series of not so favorable configuration events between the Moon, the Earth and the meteoroid streams of the more substantial annual showers. The Moon was at last quarter during the recent Leonids peak of November 18, and, as such, was too close to the radiant to offer a significant enough part of its

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surface area for monitoring by Earth-based observers. That leaves only minor showers and sporadic backgrounds to provide the projectiles for meteoroid impact flashes, and these are few and far between.

As a result, I have not received any reports during the reporting period of successful observations of lunar meteoroid impact candidates. The ALPO-LMIS will continue to coordinate observations whenever possible, focusing primarily on the annual showers and the upcoming LADEE (Lunar Atmosphere and Dust Environment Explorer) mission, scheduled to launch in May of this year, More information about the mission itself can be found at this website: *http://www.nasa.gov/mission_pages/LADEE/main/* . I am in contact with lead publicity officer and mission scientist Brian Day and we are coordinating an effort to closely monitor the Moon during the favorable August 2013 Perseids encounter with the Moon in support of this mission. More information, as I receive it, will be posted via the ALPO-LMIS section reports, the LMIS website, and the "yahoogroups!" list server.

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

Lunar Transient Phenomena

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

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

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

Mars Section

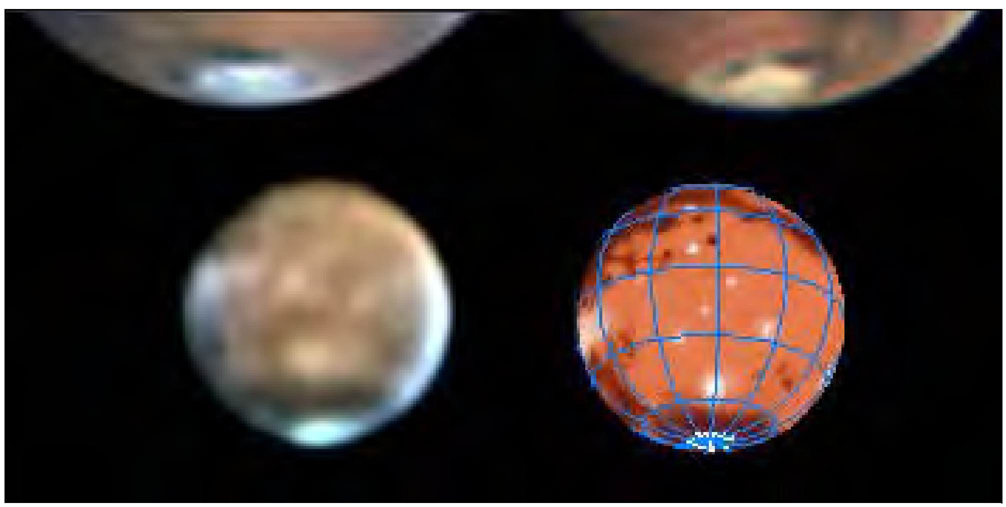
Roger Venable, section coordinator
rjvmd@hughes.net

Mars is now past its March 3rd opposition and is ideally placed for observation in the evening. Several observers say that aphelic apparitions such as the present one are more interesting than perihelic ones, and this one has been very interesting.

Highlights have included the excellent visibility of the albedo features of the Northern Hemisphere, the regression of the North Polar Hood and the North Polar Cap (NPC,) and the very cloudy condition of the planet. A dust streak across the NPC was imaged by Efrain Morales Rivera on February 11 and again on the 12. This deposition occurred some 30 degrees of Ls later than the NPC dust detected in the 2009-2010 apparition. The breakup of what is left of the seasonal cap has been documented by many observers, both visually and by images (see the image.) The image by Melillo (see the image) is typical of the cloud-studded images that have been received.

Some albedo features appear to have changed from their appearances from previous apparitions. For example, Trivium Charontis is nearly undetectable, while Cerberus appears merely as two small dark spots rather than the more typical east-west streak at the south border of Elysium. At the northern tip of Syrtis Major, the western side of that dark feature appears lighter than usual, and in some images a lighter streak seems almost to separate it from the rest of Syrtis Major.

What do ***you see***? Keep sending me your descriptions, drawings, and images -- I am *rjvmd@hughes.net* . The Mars



Mars images from February 2012. South is up. Top left: The NPC showing irregularities on its outer edge as the seasonal cap sublimates. Central meridian (CM) = 94º. RGB composite image by Don Parker on February 20, 2012, at 06:32 UT, using a Schmidt-Cassegrain telescope of 35 cm aperture at f/44, a DMK 21AU618.AS camera and Astrodon filters; seeing 3 to 5, transparency 5. Top right: The NPC showing asymmetry, with sublimation having occurred further northward on its right than on its left, and part of the left edge seeming to have become separate from the central part of the cap. CM = 353º. RGB composite image by John Sussenbach on February 19, 2012, at 23:38 UT, using a Schmidt-Cassegrain telescope of 28 cm aperture at f/30, a Flea3 camera, and Astrodon filters; sky conditions not given. Bottom left: Bright clouds in Chryse at far left and in Arcadia below center; with clouds at Olympus Mons to the upper right of Arcadia, Pavonis Mons above Arcadia, and Tempe to the left of Arcadia; and other fainter clouds, also. Color image by Frank Melillo on February 19, 2012, at 07:24 UT, using a Schmidt-Cassegrain telescope of 25 cm aperture and a Toucam Pro II camera; seeing 5 to 6. Bottom right: An explanatory, comparison image from Guide 8, matching the time of Frank's image at bottom left.

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Observers Group has had a stream of pleasant interaction and discussion of observations, and you are invited to participate. Join us at tech.groups.yahoo.com/group/marsobservers . This forum also provides a good resource for you to store your images online.

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

Minor Planets Section

Frederick Pilcher,
section coordinator
pilcher@ic.edu

A report on the Main-Belt Asteroid 27 Euterpe appears later in this issue.

In *Minor Planet Bulletin* Vol. 39, No. 1, 2012 January - March, R. D. Stephens, B. D. Warner, R. Megna, and D. Coley report a spin/shape model for a historically difficult asteroid, 27 Euterpe. This model was further complicated because albedo spots, rarely found on asteroids, are evident.

Through arrangement between Minor Planet Bulletin editor Richard Binzel and JALPO editor Ken Poshedly, this article is being reprinted in this issue of your ALPO Journal.

G. Tancredi, S. Bruzzone, S. Roland, R. Salvo, and M. Martinez have found for 5088 Tancredi a precise rotation period and H and G parameters from their lightcurves over a 42 day interval.

Lightcurves with derived rotation periods are published for 54 other asteroids, numbers 185, 414, 518, 668, 688, 903, 918, 1077, 1103, 1305, 1406, 1413, 1820, 1858, 2008, 2052, 2083, 2141, 2150, 2272, 2306, 2567, 2573, 2731, 2931, 3031, 3248, 3385, 4125, 4930, 5571, 6952, 7660, 7750, 7933, 16256, 16959, 17822, 18890, 27568, 31898, 32928, 32953, 33356, 35055, 39890, 42265, 54234, 62117, 67404, 70030, 140428, 153591, 282081. Some of these provide secure period determinations, some only tentative ones. Some are of asteroids with no previous lightcurve photometry, others are of asteroids with previous period determinations which may be consistent or inconsistent with the earlier values.

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

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

Jupiter Section

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

The most important development on Jupiter has been the thin NEB. The NEB is only about one-half as wide as normal. In fact, the NEB is currently thinner than it has been since at least 1994. The NEB is so narrow, that dark barges are outside of it. It will be interesting to see how the NEB develops over the next few months. Please keep imaging Jupiter.

This ALPO section coordinator is currently reviewing the proofs of the 2010-2011 Jupiter apparition report. He will start work on the 2011-2012 report in a few months. The writer is also working with another scientist on a paper about Jupiter's brightness and color. That paper covers measurements taken since the 1960s and has been submitted to the professional journal *Icarus.*

Please continue making images of Jupiter. I am also interested in methane band images and visual intensity estimates.

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

Galilean Satellite Eclipse Timing Program

John Westfall,
program coordinator
johnwestfall@comcast.net

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

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

The first condition that helps create this series of events is that Jupiter is closer than average to the Sun, having reached perihelion on 2011 March 17 (4.9494

Completely Visible Eclipses of Europa by Jupiter, 2012

Series 3 (18 eclipses)		
TT Date	Begin	End
	hh mm	hh mm
Aug 06	07 28	09 51
Aug 09	20 45	23 08
Aug 13	10 02	12 25
Aug 16-17	23 19	01 42
Aug 20	12 36	14 59
Aug 24	01 53	04 16
Aug 27	15 10	17 33
Aug 31	04 27	06 50
Sep 03	17 44	20 07
Sep 07	07 01	09 24
Sep 10	20 18	22 41
Sep 14	09 35	11 58
Sep 17-18	22 52	01 15
Sep 21	12 09	14 32
Sep 25	01 26	03 49
Sep 28	14 43	17 06
Oct 02	04 00	06 24
Oct 05	17 18	19 41

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

There are 18 remaining occurrences when we will be able to see these complete (beginning and ending) eclipses of Europa during the time period 2012 August 06 thru Oct 05.

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

New and potential observers are invited to participate in this worthwhile ALPO observing program.

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

Saturn Section

Julius Benton, section coordinator
jlbaina@msn.com

A report on Saturn during its 2008-2009 apparition appears later in this issue.

With an apparent visual magnitude +0.7 at the beginning of March, Saturn is reasonably well-placed for observing later during the evening hours. The planet's northern hemisphere and north face of the rings are now visible as the ring tilt toward Earth increases throughout the next several years, with regions south of the rings becoming progressively less favorable for viewing. Right now the rings are inclined about +15.0° toward Earth. The following geocentric phenomena for 2011-12 apparition are presented for the convenience of readers:

The table of geocentric phenomena for the 2011-12 apparition is presented for the convenience of readers who wish to plan their Saturn observing activities.

Observers have been submitting impressive images of the planet in recent weeks now that it is more favorably placed for viewing. The emergence of a massive storm in the region of Saturn's North Tropical Zone (NTrZ) caught the attention of ALPO observers during the 2010-11 apparition, appearing in early December 2010 and regularly observed and imaged ever since. The NTrZ white "complex" was the brightest feature seen on the planet in quite a few years, showing considerable brightening over time, then undergoing rapid evolution and differentiation into bright and dusky structures along its length. The storm progressively widened in latitude and underwent considerable longitudinal growth, eventually encircling the globe by the end of the last apparition. Cassini images also dramatically showed how the storm rapidly evolved with time.

Observations during the current apparition clearly show the morphologically complex remnants of the enormous NTrZ storm. It is important for observers to carefully document how the appearance of this feature changes throughout the 2011-12 apparition. Indeed, as the inclination of Saturn's northern hemisphere toward the Sun increases, with subsequently greater solar insolation affecting these regions, conditions remain favorable for activity to develop similar to the NTrZ white storm. Color filter techniques can be used by visual observers to determine which visual wavelengths produce the best views of the NTrZ in the aftermath of the storm as well as other similar features that might emerge. Continued consistent digital imaging at visual, infrared, UV, and methane (CH_4) wavelength bands is particularly important.

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

Geocentric Phenomena for the 2011-2012 Apparition of Saturn in Universal Time (UT)

Conjunction	2011 Oct 13^d
Opposition	2012 Apr 15^d
Conjunction	2012 Oct 25^d
Opposition Data:	
Equatorial Diameter Globe	19.0 arc-seconds
Polar Diameter Globe	16.9 arc-seconds
Major Axis of Rings	43.0 arc-seconds
Minor Axis of Rings	28.6 arc-seconds
Visual Magnitude (m_v)	0.2 m_v (in Virgo)
B =	+13.7º

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ring component brightness variations over time. So, this type of visual work is strongly encouraged before or after imaging the planet.

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

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

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

Recent digital image showing the appearance of the NTrZ region in the aftermath of the impressive storm discovered last year. The bright storm remnants quite noticeably still encircle the globe of Saturn at this latitude. Image was taken on February 7, 2012 at 18:08UT by Trevor Barry observing from Australia using a 40.6 cm (16.0 in.) Newtonian in visible light (RGB) in good seeing (S = 6.5 using the standard ALPO scale). Apparent diameter of Saturn's globe is 17.7" with a ring tilt of +15.1º. CMI = 268.6°, CMII = 318.1°, CMIII = 321.9°. S is at the top of the image.

Remote Planets Section

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

Jim Fox has sent in over three dozen high-quality brightness measurements of Uranus and Neptune. Based on Jim's measurements, Uranus has brightened by about one to two percent since 2010. The planet appears to be following a seasonal trend in brightness whereby it is dimmest when the equator faces us and is brightest when its polar regions face us.

This section coordinator also measured the brightness of Uranus in October and December of 2011. He used the red and infrared filters. The data show that Uranus was several percent brighter in December than October. One possible explanation is the large bright cloud that was imaged on that planet in mid-October. Uranus, however, was not brighter in December through the B and V filters.

I am planning to submit the 2011-2012 remote planets report to the editor sometime this summer. The 2010-2011 report was published in JALPO54-1 (Winter 2012).

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

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

Correction/Clarification

By **Tom Dobbins**

The references cited in my recent article "Clouds and Chimera, Self-Deception and Serendipity" omitted two seminal documents that I co-authored with William Sheehan, namely William Sheehan and Thomas A. Dobbins, "Lowell and the Spokes of Venus," Sky & Telescope, July 2002, pp. 99-103 and William Sheehan and Thomas Dobbins, "Charles Boyer and the Clouds of Venus," Sky & Telescope June 1999, 56-60. My exclusion of these references is embarrassing but quite innocent. When I was writing the draft during the summer of 2010, I was in the throes of moving from Ohio to Florida. My issues of Sky & Telescope had been boxed and were awaiting shipment to my new home. Unable to access the issue dates and page numbers of these articles, I planned to insert these references when I completed and submitted the article. After a lapse of a year and a half, I simply forgot to do so. Sheehan's contributions to this subject matter should have been recognized but were not, which I deeply regret and wish to correct.

Feature Story:

ALPO Board Meeting Minutes, July 21, 2011 Las Cruces, New Mexico

Minutes provided by Matt Will, ALPO Secretary / Treasurer

Call to Order

On July 21, 2011, at 8:39 p.m. MDT (Mountain Daylight Time), ALPO Executive Director and Board Chairman, Richard W. Schmude called the ALPO Board to order in the Breakfast Room of the Comfort Inn, in Las Cruces, New Mexico.

Attendance

ALPO Board members, Walter Haas (Founder), Ken Poshedly, Richard Schmude (Chairman), John Westfall, and Matthew Will were present. Robert Garfinkle, the ALPO Book Review Editor was invited to sit in on the Board meeting. Board members, Julius Benton, Don Parker, Michael Reynolds, and Sanjay Limaye could not attend this year's conference were therefore absent from the meeting. No phone service was available to tie them into by phone. Matthew Will acted as Julius Benton's proxy and Richard Schmude acted as Don Parker's proxy.

Issue One: Approval of the Board Meeting Minutes of 2010 (Introduced by Matthew Will)

Board meeting minutes for our 2010 ALPO Board meeting were approved by all the present Board members.

Issue Two: Location for the ALPO to Convene in 2012 (Introduced by Richard Schmude)

Executive Director Richard Schmude announced that Carroll Iorg, president of the Astronomical League had extended an invitation to the ALPO to meet with it next year at the 2012 ALCon, in Highland Park, Illinois. The local host society, the Chicago Astronomical Society will be hosting this meeting as it celebrates its 50th Anniversary. We haven't had a meeting in the Midwest since 2008 or a meeting with the League in what will be three years. So this was an easy decision for the ALPO Board to make. Richard Schmude made the motion for the ALPO to meet with the Astronomical League in Highland Park next year and Ken Poshedly seconded. The Board vote in favor of meeting in Highland Park, Illinois, in 2012, was 7 votes to 0 with the five present Board members voting with Matt Will acting as Julius Benton's proxy and Richard Schmude acting as Don Parker's proxy.

Issue Three: Membership and Finances (Introduced by Matthew Will)

ALPO Secretary and Treasurer Matthew Will reported to the ALPO Board the ALPO's finances for the preceding year in the annual report submitted to the Board last February. An interim report concerning this year's activities was issued earlier this month. The ALPO has $4191.93 in the Springfield account and $3100.15 in the Las Cruces account as of June 30, 2011. The current value of the ALPO Endowment is $26,128.32.

The ALPO is spending more money than it is taking in from the Journal. While voluntary contributions at higher membership levels help us shoulder the burden for production and organizational cost, the ALPO finances are still in a deficit. It would be wise at this time, to consider a modest membership dues increase to keep from posing some potential finance problems in producing the Journal. The membership dues increases are listed later in the minutes as Issue Four. While fundraising as a topic directed toward increasing the ALPO Endowment was discussed later in the meeting, Ken Poshedly brought up the possibility of supplementing funding for the Journal with grants. Ken mentioned one possibility of seeking a grant from NASA and other scientific governmental or non-governmental organizations. John Westfall commented that the National Science Foundation might be another source for a grant. Bob Garfinkle suggested that the

Group photo at the Saturday evening dinner. Standing left to right: Ken Poshedly, Wayne Bailey, Phil Budine, Richard Schmude, John Westfall, Roger Venable, Gene Cross and Daniel H. Harris. Seated left to right: Derald Nye, Walter Haas, Cecil Post, and Janet Stevens. Standing in background at far right: Elizabeth Westfall and Joan Post.

private sector could contribute some funding as well, as such companies as American Express have done this sort of thing in the recent past. Matthew Will said that he had done some research involving grants for the Endowment and cautioned that there were complications to consider in such an approach, but taking a fresh look at potential income of this nature should be reviewed. Both Ken and Matt will work together to research the grants angle.

The ALPO membership dropped off a bit from the start of this year where we were at 421 members to 392 members with the release of this summer's issue of the Journal. The ALPO Secretary is now mailing brochures and sample copies of the Journal to the educational community (planetariums, science centers, and other educational institutions) in an effort to raise our profile in these circles and possibly attract both new members and people that could help in promoting our organization. ALPO materials have been distributed to a couple of non-ALPO meeting venues earlier this spring and summer to attract new members.

Issue Four: Membership Dues Increase (Introduced by Matthew Will)

As stated above under Issue Three, entertaining a modest dues increase now reverses our deficit and prevents a more dramatic increase in dues in the future. So the time may be right to consider a modest dues increase for calendar year 2012. Below is the proposal from the Membership Secretary.

The Membership Secretary suggested that the dues increase would begin on January 1, 2012. After a brief discussion, Matt Will made the motion for the membership dues increase and John Westfall seconded. The motion passed 7 votes to 0. An announcement will be made in the next two issues of the Journal about this increase, encouraging members to early renewal under old membership rates before January 1st.

Revised Dues Structure (Effective January 1, 2012)

Type of Membership	Old Rates	New Rates
One Year Paper Domestic	$30	$33
Two Year Paper Domestic	$54	$60
One Year Paper International	$37	$40
Two Year Paper International	$68	$74
One Year Digital	$12	Unchanged
Two Year Digital	$20	Unchanged
Sustaining Member	$60	$65
Sponsor	$120	$130

Issue Five: Fundraising For the Endowment (Introduced by Matthew Will)

Matthew Will discussed the need for fundraising regarding the ALPO Endowment. The purpose of the Endowment is to provide funding for a future central headquarters or office for the ALPO. The ALPO Endowment has been growing very slowly. At the same time, there has been an interest among some ALPO members in contributing to the ALPO beyond the Sustaining and Sponsors memberships. Earlier this year, Matt proposed to the Board that memberships beyond the Sponsor level could be created that would encourage members to give more. This could be set up in such a way that members would have the option of paying at these higher levels by check or online by credit card. A separate web page on the ALPO Web Site could explain in some detail our plans for growing the Endowment and how the funds would be utilized, since members contributing additional funds beyond their regular dues, would want to know the purpose for raising these funds. Finally, as a thank you to contributors, the ALPO would offer some free items that are normally paid for by members such as lapel pins and printed back issues. At some higher level of giving, the ALPO would leverage its notoriety in the book publishing business by offering a free book published by an ALPO staff member. All of this is tentative. The Board wished to see the final product before this effort is launched. Matt, plans to produce most, if not all the elements for this fundraising plan for presentation to the Board before the end of the year. Matt is also developing a work plan for assisting persons that would want to contribute charitable bequests. Corporate sponsorships are also being looked at as well as grants, that were discussed earlier. Matt Will made the motion to commence with the "membership" fundraising plan, with Board review before this plan commences. Richard Schmude seconded. The Board voted 7 to 0 in favor of the motion.

Issue Six: Staff Changes (Introduced by Richard Schmude and Matthew Will)

The ALPO Board reviewed acting staff appointments for possible promotion to permanent status. There were no acting staff members that needed to be considered for promotion to permanent staff. There were, however, two staff members that had not renewed their ALPO memberships. In accordance with our standing rules and our guidance to staff in the Staff Guidelines, staff members that don't answer repeated renewal notices are subject to automatic dismissal if there is no response four weeks after the third renewal notice is sent. John Sandford and Robert Ulrich of the Publications Section have been dropped from the ALPO Staff since renewal notices have gone unanswered. The Board wishes to thank John and Robert for their past participation in the Publication Section and in helping to edit the Journal.

Issue Seven: ALPO Website (Introduced by Matthew Will)

The ALPO Board wishes to express its sincerely thanks and gratitude to Larry Owens, the ALPO Web Master, for his work in rejuvenating the ALPO website by updating and reformatting all section web pages and other related materials on our website. Larry's work has given the ALPO web pages some uniformity and consistency in appearance and has given the ALPO a "professional quality" look. However, there are still issues that have to be resolved concerning out-of-date material maintained on staff pages that link to section pages on the ALPO website. After some discussion, the consensus from the Board was that some consideration should be given to moving staff materials not already on the ALPO website, to our web site. This might help in cleaning up obviously out-of-date material that hasn't been removed. Larry will be consulted about the possibility of going forward on this in the near future. Matt plans to talk to Larry about this. Matt will also discuss with Larry a plan for utilizing the ALPO website as a gateway for section archiving of observational data. Larry had proposed a plan of sorts earlier in the year, however, this is all subject to Larry's schedule and what he is free to do for the ALPO, in addition to his usual duties in supporting our website.

Issue Eight: Section Inactivity (Introduced by Ken Poshedly)

Ken Poshedly discussed issues concerning the inactivity of some sections. Earlier this spring the ALPO Board voted to close the Lunar Domes Survey due to inactivity with this program and to forward any and all materials related to this program to the Lunar Topographical Studies Program. The Board thanks Marvin Huddleston for coordinating this program since 2002. Current concerns are focused on the Meteorite Section and activity within this section. After some discussion, Ken Poshedly made a motion to ask Dolores Hill, the coordinator for the section, if this section has still active, in other words, are members participating in programs under this section. If so, then to ask Robert Lunsford, coordinator of the Meteors Section, if the Meteorites Section can be incorporated into the Meteors Section, as a subsection or separate program. Richard Schmude seconded. The Board vote was 7 to 0 in favor of the motion.

Issue Nine: The Future of the ALPO Board (Introduced by John Westfall)

John Westfall opened discussion about the future of the ALPO Board. John observed the current membership of the Board was getting on in years. In all probability, most if not all current Board members will not be on the Board twenty years from now. John stated that the ALPO Board needs to recruit new Board members as positions open up and in a manner that insures continuity of leadership and in sustaining the mission of the ALPO. In that regard, the Board should be thinking about where the ALPO as an organization will be in the future. Matt Will had commented that part of the reason for the central headquarters or office project was to eventually entice other persons outside of the ALPO that might have a broader range of expertise in helping to manage and administrate the ALPO. Both Ken and Matt expressed concerns in finding successors if and when either one of them had to vacate their present positions. Although no motions were made, John said that this is something we have to seriously think about in the coming years.

Issue Ten: New Officers (Introduced by Richard Schmude)

In accordance with a longstanding agreement with the Board members the rotation for the positions of Executive Director and Associate Executive Director continue. Julius Benton

will become our new Executive Director for the next two years and Ken Poshedly will be the new Associate Executive Director. Matthew Will continues on as both Secretary and Treasurer.

Richard Schmude made a motion to affirm the approval of these proposed officers serving for the next two years and John Westfall seconded the motion. The vote was an affirmative seven to zero.

Issue Eleven: Observer's and Service Awards (Introduced by Richard Schmude)

The ALPO has two awards to honor persons providing outstanding work for our programs.

The ALPO Walter H. Haas Observer's Award is given yearly when the ALPO meets each summer and conferred on an amateur astronomer for excellence in observational Solar System astronomy. The selection of this award is performed by an independent committee that rotates its membership each year, and is currently chaired by Donald C. Parker. The award consist of an engraved plaque and a two-year complimentary membership in the ALPO.

This year's recipient is John Boudreau of Saugus, Massachusetts. John is an expert CCD imager of planetary bodies. In particular, John is a major contributor of Mercury observations for the ALPO Mercury Section. John has done wonderful work with his C11 SCT telescope, taking planetary images that have graced the pages of our Journal. Lately, John has become a true luminary on the subject of Mercury, co-authoring an article about the planet with William Sheehan and Alessandro Manara in the March 2011 issue of Sky and Telescope magazine. Thanks for your continued work, John, and your support of the ALPO!

The Peggy Haas Service Award is presented to an ALPO member for providing outstanding service to our organization. Selection for this award is done solely at the discretion of the ALPO executive director. The award is not considered to be a yearly award, but rather when the presenter deems it appropriate to recognize the awardee.

The recipient of the 2011 Peggy Haas Service Award is Julius Benton at the time of this year's conference. Julius has performed many duties over many years as an ALPO member. Julius has been our ALPO Saturn Section coordinator for the past 40 years, beginning in May of 1971, and is also our ALPO Venus Section coordinator, serving in that role since December of 1972. He had been serving as Lunar Selected Areas Program coordinator for more than 20 years before that program was merged into the Lunar Topographical Studies Program.

Julius has been an ALPO Board member since August 1994 and is now our current executive director, having previously served for two terms in that position in the years 2000-2002 and 2005-2007.

Julius has done an exemplary job in performing the services of all the positions he has held and has demonstrated the best of what the ALPO has to offer through his knowledge, keen interest, and enthusiasm that he conveys in his apparition reports, correspondence with other amateurs, and presentations he does for interested individuals. Thanks Julius for making the ALPO the very best it can be!

Adjournment

With no other business to conduct, Richard Schmude made a motion to adjourn the Board meeting. Ken Poshedly seconded. The motion passed with present Board members voting in the affirmative with Board meeting adjourning at 10:33 p.m. MDT on July 21, 2011.

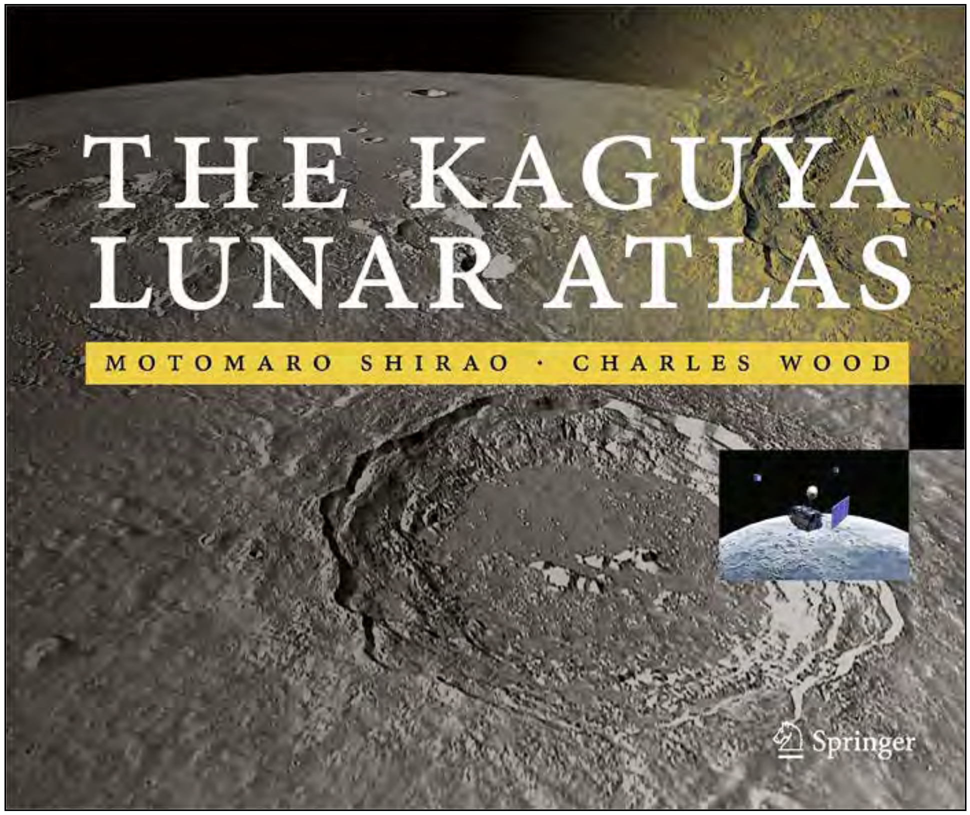
John Boudreau, recipient of the 2011 ALPO Walter H. Haas Observer's Award for his outstanding imaging work with Mercury and other planetary bodies.

Julius L. Benton, recipient of the 2011 ALPO Peggy Haas Service Award. Julius currently serves as both the ALPO Venus Section Coordinator and the ALPO Saturn Section Coordinator, and has served as the organization's executive director at various times.

Book Review

The Kaguya Lunar Atlas

Review by Wayne Bailey, PhD, FRAS
ALPO Lunar Topographical Studies & Selected Areas Program Coordinator
wayne.bailey@alpo-astronomy.org



The Kaguya Lunar Atlas by Motomaro Shirao & Charles A. Wood, 2011, published in New York by Springer (ISBN 978-1-4419-7284-2); 173 pages, hardcover; list price $39.95.

The Japanese lunar orbiter Kaguya (also known as SELENE, the **SEL**enological and **EN**gineering **E**xplorer) began science observations in 2007. It initially operated at 100 km altitude, with its altitude reduced successively to 50 km, then 10 km until it impacted the surface on June 10, 2009, prior to losing attitude control. The current atlas is a product of the High-Definition Television (HDTV), whose primary purpose was to engage the public in lunar science. The HDTV viewed off-nadir, with both wide-angle and telephoto cameras viewing fore and aft along the orbit track, giving an astronaut-view type of image. These images are higher resolution than Earth-based telescopic images and some previous lunar orbiters, but not as high as those of the nadir-viewing cameras carried by Kaguya and other recent spacecraft.

The first thing to point out is that this atlas is not a comprehensive map of lunar features, in the sense of Rukl's *Atlas of the Moon*. Instead, it is a collection of 100 images of specific lunar features (77 nearside) from a unique viewpoint. However, global lunar topography is presented in six small-scale hemispheric images (East, West, Near, Far, North & South) from the Kaguya Laser Altimeter.

The book contains two parts. Part I presents information about the Kaguya spacecraft and mission, the HDTV cameras, and a general discussion of the lunar surface. I found the discussion in Chapter 2 concerning the challenges and techniques of processing the TV images particularly interesting. Creating a panoramic perspective view by combining successive video frames is challenging because the view angle remains constant, but orbital motion changes the camera location. We usually view a panorama by turning our head (i.e., changing the view direction while in a fixed position). The method used to create this atlas is described, as well as an alternate technique that produces a push-broom type, constant angle view. Chapter 4 is a nice, very readable, introduction to the lunar surface, but doesn't include anything new for those who are already familiar with the Moon. These four chapters are important though, since they provide background for the images in Part II.

Part II is a collection of 100 images, preceded by introductory material that describes the location and orientation labels, and the sequencing of images in the atlas. The image labels seemed self-explanatory to me, but this is nice material to have anyway. I was curious about one thing that I didn't find addressed here: Why are the images divided into three chapters? Not of any significance, but I'm curious. Each image includes a description of the features visible and their interpretation.

The combination of unique viewpoint of the images and the accompanying discussion, make this a book that should be on the bookshelf of every student of the Moon.

Overall, I'd recommend this book to anyone that is at all interested in the Moon. Scientifically, the off-nadir view complements the usual nadir view. For the observer, the discussion accompanying each image provides a guide to interpreting your own observations of these or other features. And finally, the impressive images also make it suitable as a coffee table book.

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Book reviews appropriate for the ALPO are welcome for publication in this journal. Please send your reviews to the ALPO Book Review Editor, Bob Garfinkle at *ragarf@earthlink.net*.

Feature Story: Venus

The Upcoming Transit of Venus in June 2012

By John Westfall, coordinator
ALPO Mercury/Venus Transit Section
johnwestfall@comcast.net

Why the Excitement?

What, another transit of Venus? Didn't we have one just eight years ago?

Yes, there was a transit of Venus in June 2004, still fresh in the memories of those who watched it. However, after the 2012 event is over we have to wait 105 years for the next one. Thus, the June 5-6, 2012 transit is the last viewing opportunity for all persons living today (except for a few very young children and those optimistic about medical breakthroughs). They are indeed rare; humanity has witnessed only six transits of Venus: in 1639, 1761, 1769, 1874, 1882 and 2004.

What Will Happen When and Where

In Universal Time (UT), the transit begins on June 5th, 2012 and ends on June 6th. More precisely, for the imaginary geocentric observer, **Table 1** lists the five significant events during the transit and the times they take place.

The "shadow" of Venus moves so rapidly over the Earth that no matter where you are located, if you can see the transit at all, the event times for you will differ by no more than 7 minutes from the geocentric times. The ALPO Mercury/ Venus Transit Section web page gives predicted contact times for selected cities throughout the visibility area. In addition, to find the precise event times for your exact location (by city or by latitude and longitude), visit the website http://aa.usno.navy.mil/data/docs/Transit.php. **Figure 1** shows the path Venus will take as it crosses the disk of the Sun, lasting about 6h 40m from Contact I to Contact IV.

As with all fleeting astronomical events, the transit will not be visible throughout the world. In terms of area (if not people), about a third of our planet will see the entire event, another third will see part of it, and the remaining third will have to wait until 2117. Fortunately, North and Central America, northwest South America, most of Africa, almost all of Europe, and all of Asia and Australasia will have a chance (depending on weather) – the great majority of the human race. **Figure 2** maps the zones of the six different types of visibility. If you choose to travel to a location where you can see the entire transit, another factor to consider is the probability of clear skies (**Figure 3**). Remembering that the weather on transit day may well differ from the long-term statistics, it appears that northern Australia (or perhaps the leeward sides of some Pacific islands) is the most favorable area for those wishing to see the event from beginning to end, while the Middle East and the southwest United States are promising areas for those content to see just part of the event.

Watching Safely

While crossing the Sun's disk, Venus will cover only about 0.1 percent of the solar surface. In other words, you should take the same viewing precautions you would were you observing sunspots or a partial solar eclipse. To avoid injuring your eyesight or your equipment, you have your choice of three safe methods to do this.

- The first method is to shield your eyes by viewing through a specially designed solar filter, covering your eyes (if viewing naked-eye) or the entire aperture of your telescope (with the finder similarly filtered or covered), binoculars (both lenses) or camera (including any separate view-finder). The point is to cut down the visible, infrared and ultraviolet light by a factor of at least 100 thousand times. For naked-eye viewing, "eclipse glasses" can be had cheaply or you can use a #14 welding filter. For more than 1-power magnification, though, you'll need something of better optical quality – either metal-on-glass, metal-on-mylar or black polymer.
- A second alternative is to view the transit by projecting the Sun's image through binoculars or a telescope onto a white surface. The farther the image from the eyepiece, the greater the magnification, although the image then becomes fainter. To get

All Readers

Your comments, questions, etc., about this report are appreciated. Please send them to: ken.poshedly@alpo-astronomy.org

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

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

IAU directions are used in all instances.

Table 1. Schedule of Events, Transit of Venus, 2012 (Geocentric)*

Event	Universal Time	Position Angle†	Description
Contact I	June 5, 22h 09m 41s	040.7°	Ingress, exterior contact
Contact II	June 5, 22h 27m 29s	038.2°	Ingress, interior contact
Least Angular Distance‡	June 6, 01h 29m 36s	------	Venus farthest into disk
Contact III	June 6, 04h 31m 43s	292.7°	Egress, interior contact
Contact IV	June 6, 04h 49m 31s	290.1°	Egress, exterior contact

* Data are from: United States, Nautical Almanac Office (2011). *The Astronomical Almanac for the Year 2012*. Washington: U.S. Government Printing Office. p. A97. Note that the values are calculated for the diameter of the solid body of Venus (57.80"), rather than that of its cloud-tops (58.26").

† Measured counterclockwise from celestial north. ‡ 554.4" or 0.586 solar semidiameters.

better contrast, try to shade the projection surface as much as possible from sunlight and skylight. This method is a bit more dangerous than using a full-aperture solar filter because the beam of sunlight emerging from the eyepiece is hot enough to damage the eyepiece, burn someone, start a fire, and immediately blind anyone attempting to look directly through the eyepiece. With reflecting telescopes, there is the additional risk of overheating and damaging the secondary mirror during prolonged viewing.

- A third alternative is to use a telescope specifically designed for solar observation. Two instruments that project images in integrated (white) light are the Sunspotter Solar Telescope (© Learning Technologies, Inc.) and the Solarscope (© Solarscope, LLC). Another approach is a direct-viewing narrow-band telescope like the Personal Solar Telescope (PST), most often centered on the H-α line (656.28 nm).

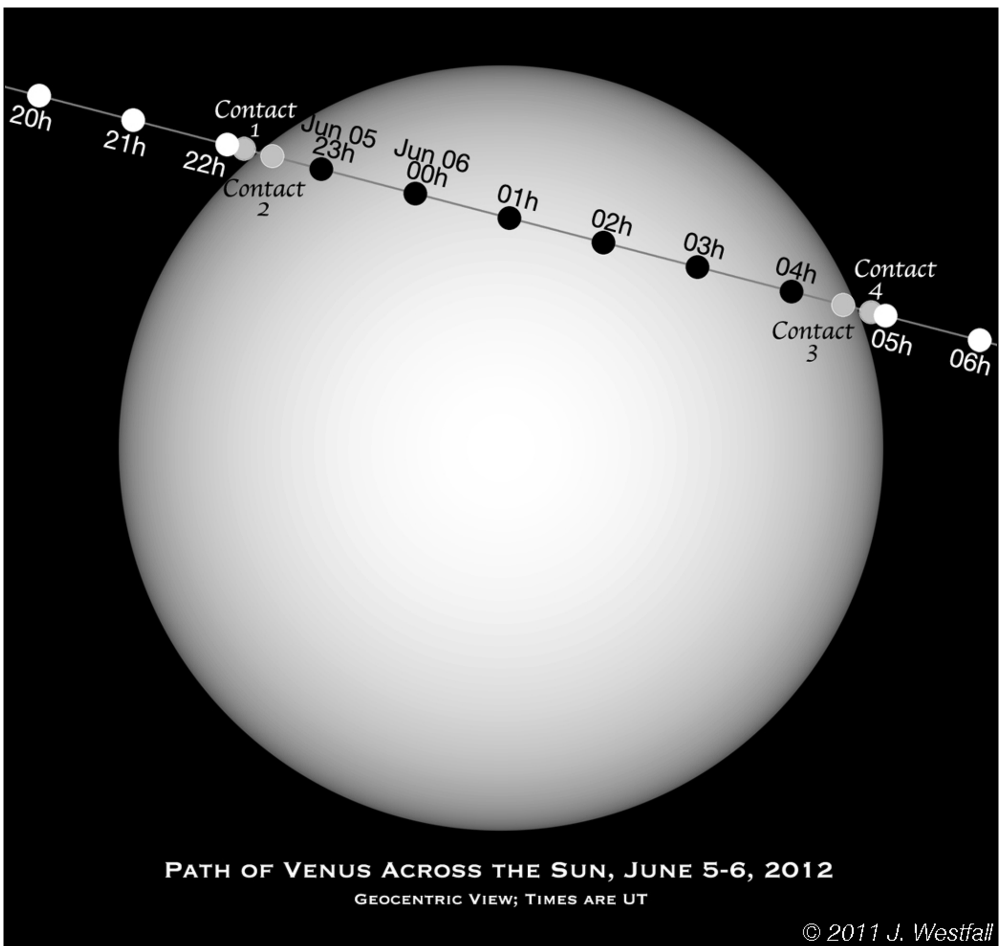

Figure 1. The path of Venus across the Sun during the June 05-06, 2012 transit. Geocentric view – the apparent path may shift north or south by up to one-third a Venus diameter, depending on the observer's location. Celestial north at top.

Understanding that the form of observing must be restricted to one of the safe methods listed above, there is considerable choice in the type of equipment, as proven by observers during the 2004 transit. The most basic approach is the safely filtered naked eye. Many observers, along with members of the general public, thus watched Venus creep across the face of the Sun during the 19th-century transits or that of 2004. This writer used this method to view the Venus transit of 2004.

Still, magnification helps, even if just a pair of binoculars (safely filtered or utilized to project an image). With a small telescope, perhaps a 60-mm aperture instrument or more, at 50-100X, you can time the contacts of Venus's limb with that of the Sun and probably see the notorious black drop phenomenon. To see the elusive aureole, though, we recommend at least 150-mm aperture and 150X or greater.

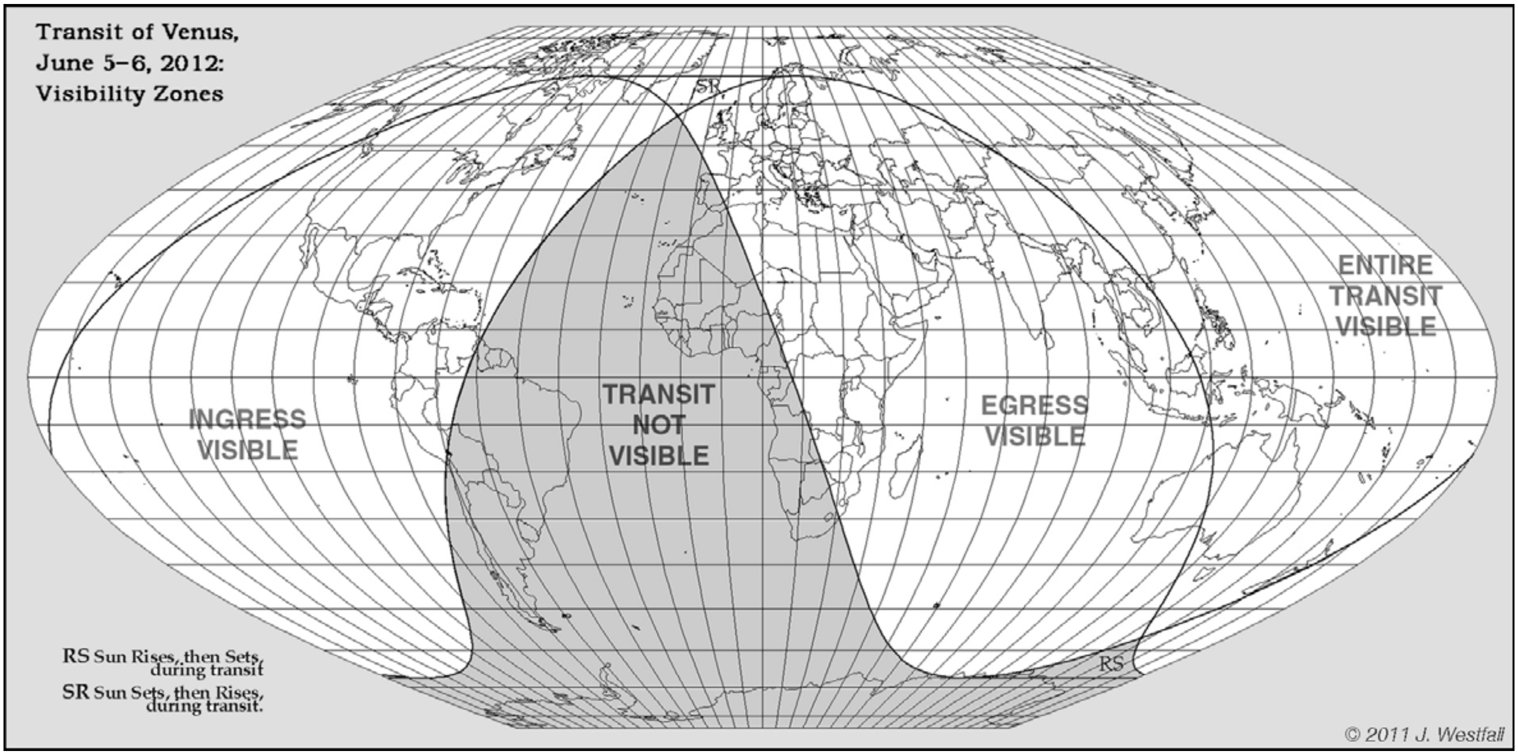

Figure 2. Visibility zones for the transit of Venus on June 05-06, 2012. In local time, in areas of partial visibility, the transit occurs on June 5th east of the International Date Line and on June 6th to its west.

The transit will offer many photographic opportunities, using anything from a telephoto lens to a telescope-mounted video or CCD camera. Remember that even a simple camera will need a safe solar filter to be placed over its lens and over its viewfinder lens if there is one. Prior to the transit, experiment with different ISO (light sensitivity) values and exposure times to decide on the best combination for the event itself. For examples of transit of Venus photography, hundreds of photographs of the 2004 Venus transit can be found on the ESO website, listed under "More Transit Information" below. The same section lists websites and publications about transits of Venus that provide further observing information.

What to Watch

You can also observe one interesting phenomenon involving the planet Venus both before and after the actual transit date; that is, for about two weeks on either side of June 5-6. During that period of time, Venus's apparent size is large, but it takes the form of a narrow crescent. Unlike, for example, the crescent Moon, Venus's outline then extends for more than the theoretical 180 degrees – a phenomenon called the elongation of the horns (also known as the "cusp extension"), caused by scattering of light in the planet's upper atmosphere and one of the earliest proofs that the planet had an atmosphere. **Figure 4** shows the appearance of this phenomenon. During this four-week period, Venus is within about 20 degrees of the Sun and thus is difficult to observe in a dark sky. However, if you choose instead to observe the planet during daytime, you obviously have to exercise extreme caution not to accidentally turn the telescope upon the Sun itself.

A much more rare phenomenon has sometimes been reported when Venus displays a crescent phase – an elusive faint illumination of the planet's night side, called the ashen light. During this apparition, Venus will appear as a narrow crescent, less than 25-percent sunlit, from early May through early July 2012. You should report any observations, positive or negative, of either the elongation of the horns, or of the ashen light, to the ALPO Venus Section Coordinator, Dr. Julius L. Benton, Jr., jlbaina@msn.com . Use the Venus Visual Observation form which follows this article.

The actual 2012 transit of Venus begins when the planet's limb first touches that of the Sun, called Contact I. Venus then takes about 17 minutes to reach Contact II, when it has fully entered the Sun's disk, and the interval between the two contacts is called ingress.

After crossing the northern portion of the Sun's disk, about six hours later, Venus's limb again touches that of the Sun, marking Contact III. Venus's egress takes another 17 minutes, with the entire event completed at Contact IV.

Of course, of the portion of the Earth where the transit is visible, some areas will witness all four contacts, while other areas will see only two or even just one. Accurately timing these contacts was an important activity in the 18th and 19th centuries because differences in the times as seen from different terrestrial locations allowed the solar parallax to be calculated – the key to the scale of the entire solar system. Although that particular application is no longer needed, many

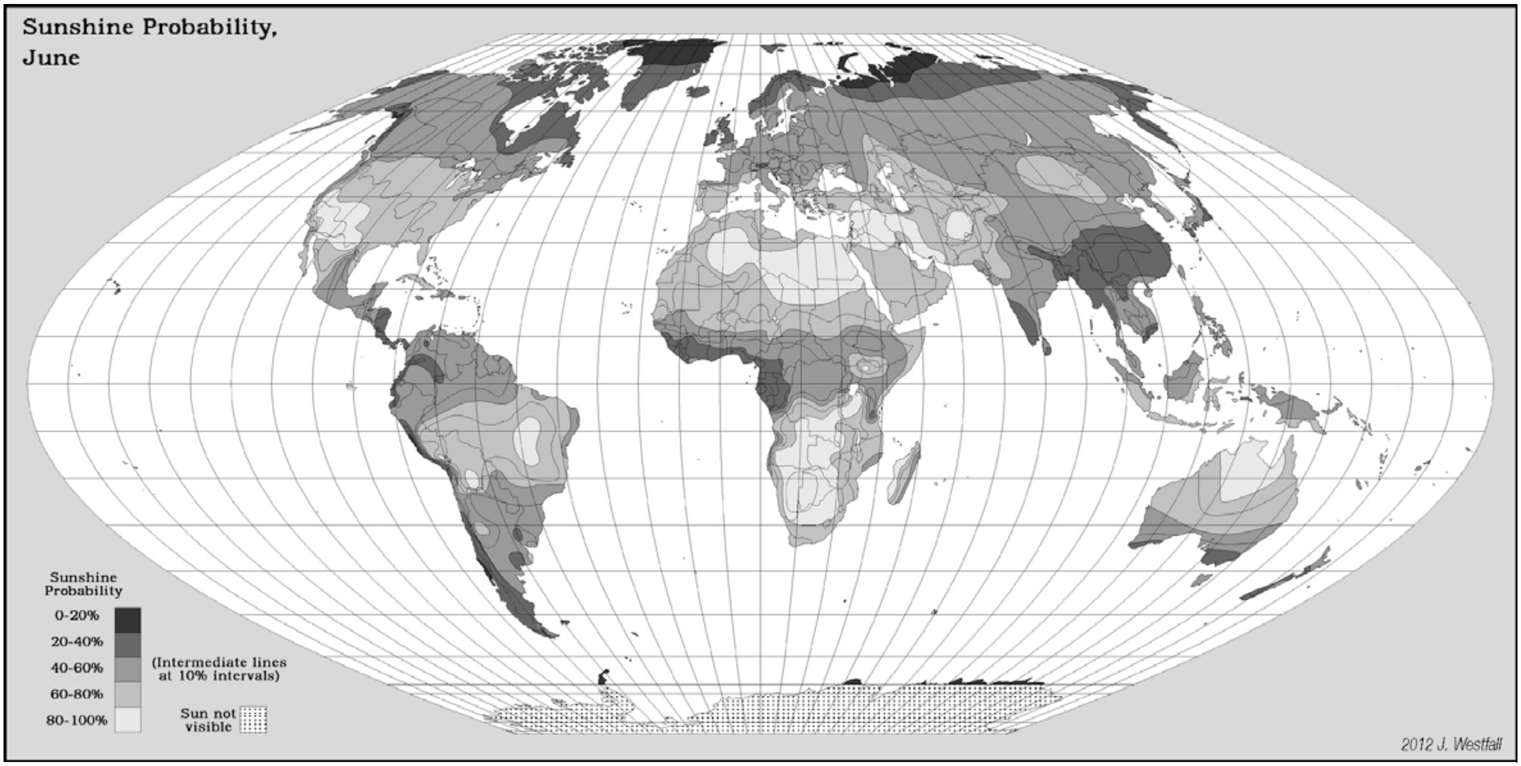

Figure 3. Worldwide mean long-term probability of sunshine during daylight hours for the month of June. Sources: [1] Leemans, Rik and Cramer, Wolfgang P. (1991). *The IIASA database for mean monthly values of temperature, precipitation, and cloudiness on a global terrestrial grid*. IIASA Publication RR-91-18. Laxenburg, Austria: International Institute for Applied Systems Analysis. [2] Rudloff, Willy (1981). *World-climates: With tables of climatic data and practical suggestions.* Stuttgart: Wissenschaftliche Verlagsgesellschaft mbH. [3] Ruffner, James A. and Bair, Frank E., Eds. (1987). *The weather almanac*. 5th ed. Detroit: Gale Research.

observers of the 2004 transit of Venus made such timings as an educational exercise and in order to investigate the sources of error in the historic observations. The same type of program will be conducted in 2012; see http://transitofvenus.nl/wp/getting-involved/measure-the-suns-distance for further information.

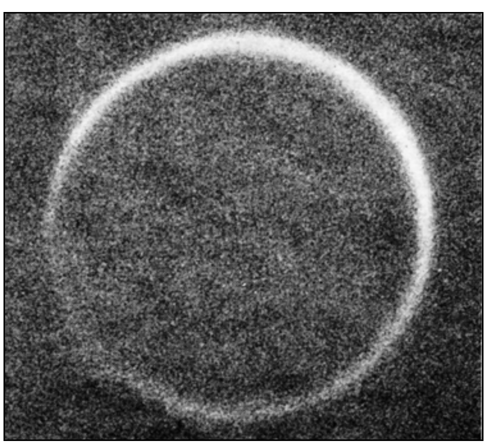

Figure 4. Venus 1.83° from the Sun on June 19, 1964, showing the elongation-of-the-horns phenomenon. Photograph by B. A. Smith with a 12-in. (30-cm) reflector with a red filter. North at top.

The periods of ingress and egress are the most interesting portions of the transit, chiefly because it is then that the phenomenon of the planet's aureole ("ring of light") takes place. This is when the portion of Venus outside the Sun's disk is outlined by an extremely bright, but extremely narrow, arc of sunlight refracted by the planet's atmosphere. The aureole is quite different in nature from the aforementioned elongation of the horns, and is challenging to observe – one needs good optics, good seeing (steady atmosphere) and good transparency (clear skies). It was glimpsed at the two 18th century transits, seen more clearly with the improved telescopes used in the 19th century transits, but never photographed until the 2004 event (**Figure 5**).

At the end of ingress, near Contact II, or near Contact III at the beginning of egress, it is unlikely that you will see a clean break between the limbs of Venus and the Sun. Instead there is a blurring between the two limbs, often forming a filament of darkness seemingly attached to the planet (**Figure 6**). Its appearance, called the "black drop," was a surprise when first seen by the 18th century observers, has been reported at every transit since then, and seen at transits of Mercury as well as of Venus. Although sometimes described as mysterious, the black drop is nothing more than a simple blurring effect caused by imperfect optics (no telescope has infinite resolution), atmospheric seeing and limb darkening at the extreme solar limb. Any blurring due to the atmosphere of Venus is negligible compared with the other factors – note that airless Mercury also exhibits a black drop during its transits.

The interval between Contact II and III is, frankly, less interesting than during ingress and egress, although there is an outside chance of the planet passing near or even over a sunspot. The Venus

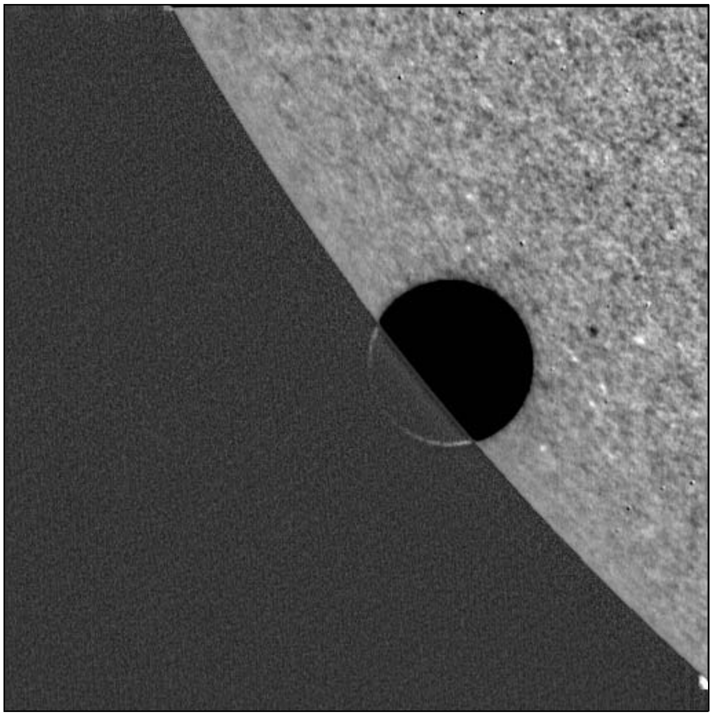

Figure 5. The aureole, outlining the portion of Venus still outside the Sun's disk during ingress during the transit of June 08, 2004. Taken by the TRACE (Transition Region and Coronal Explorer) spacecraft in white light. The portion of the image outside the solar limb has been enhanced. North at top.

Figure 6. Venus near Contact III during the June 08, 2004 transit, taken in white light by the TRACE spacecraft showing the black drop effect. North at top.

transit event takes place near solar maximum, and the proximity of the pitch-black disk of Venus to a sunspot would demonstrate than even the umbra of a spot is far from black. In addition, you could photograph the Sun at regular intervals during the transit to plot the passage of the planet across its disk. Another possible project would be to team up with another observer, far distant from your location, in order to take simultaneous photographs to illustrate the parallactic shift of the planet; when mounted properly, the paired photographs would bring home the actual three-dimensional nature of the phenomenon.

Dissemination and Coordination

Your observations, whether in the form of timings, drawings, film photographs or digital images, are far more valuable when shared, and more valuable still when part of an organized program. The ALPO Mercury/Venus Transit Coordinator (John Westfall. johnwestfall@comcast.net, P.O. Box 2447, Antioch, CA 94531-2447) welcomes all forms of observation of this coming event. In addition, check the several programs described on http://www.transitofvenus.nl .

More Transit Information

Printed Sources

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Transit Websites

Association of Lunar and Planetary Observers, Mercury/Venus Transit Section: http://alpo-astronomy.org

Fred Espenak's website at NASA's Goddard Spaceflight Center: http://sunearth.gsfc.nasa.gov/eclipse/transit/venus0412.html

A useful website by Chris Bueter, http://www.transitofvenus.org , has links to many other transit-related websites.

European Southern Observatory (ESO), Educational Office, website http://www.eso.org/outreach/eduoff/vt-2004

HM Nautical Almanac Office: http://astro.ukho.gov.uk/nao/transit/V_2012

Steven van Roode's Transit of Venus site: http://www.transitofvenus.nl

A U.S. Naval Observatory website that provides local event predictions: http://aa.usno.navy.mil/data/docs/Transit.php

Eclipse/transit weather expert Jay Anderson for weather prospects: http://home.cc.umanitoba.ca/~jander/tov2012/tovintro.htm

Feature Story: Minor Planets

A Shape Model of the Main-Belt Asteroid 27 Euterpe

Submitted by Frederick Pilcher, ALPO Minor Planets Section coordinator
pilcher@ic.edu

Paper by:
R. Stephens, Center for Solar System Studies / MoreData!, *rstephens@foxandstephens.com*
B. D. Warner, Palmer Divide Observatory /MoreData!, *brian@MinorPlantObserver.com*
R. Megna, Center for Solar System Studies, r*megna@planetary-sciences.org*
D. Coley, Center for Solar System Studies, *dcoley@planetarysciences.org*

This report first appeared in *The Minor Planet Bulletin*, Vol. 39, No. 1. The purpose of this republication is to demonstrate the good work being done by the ALPO Minor Plants Section and recruit others to likewise participate. While five-dollar contributions are most welcome, you may access the *The Minor Planet Bulletin* at no charge online at *http://www.minorplanet.info/mpbdownloads.html*. Please note that the hardcopy version of the *Journal of the Assn. of Lunar & Planetary Observers* (JALPO) does not allow for color in these reports. To see this report with color images, please visit online at *www.alpo-astronomy.org/djalpo* Finally, Euterpe 27 was discovered by J. R. Hind on November 8, 1853, and named after Euterpe, the Muse of music in Greek mythology.

Online Readers

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

Abstract

We obtained dense rotational lightcurves for the main-belt asteroid 27 Euterpe during four apparitions in 2000, 2009, 2010 and 2011. The analysis indicates retrograde rotation and suggests, but does not confirm, that Euterpe has albedo features making the determination of an unambiguous spin vector and model shape difficult. Euterpe's apparent nearly spherical shape, low inclination, and pole within about 35 degrees of the plane of the solar system, caused two pole and shape solutions to be present, differing by about 180° in longitude. We found solutions of (83°, -39°, 10.40825 ± 0.00003 h) and (261°, -30°, 10.40818 ± 0.00003 h). The approximate error in the pole solutions is ± 10 degrees.

Results

The main-belt asteroid 27 Euterpe has long been an enigma to observers. Its apparent nearly non-elongated shape and low amplitude frustrated the attempts of many observers to determine a rotational period. It wasn't until 2000 that Stephens (Stephens et al. 2001) published an accurate period for Euterpe.

Euterpe has also been suspected of having albedo features. Bus (Bus and Binzel, 2002) reports disparities in spectra and ECAS reported colors for Euterpe.

Mostly unfiltered observations were obtained by the authors using small telescopes (0.30 to 0.35 m) with SBIG or FLI CCD cameras. Processing, lightcurve analysis, and lightcurve inversion were done using MPO Canopus, which incorporates the Fourier analysis algorithm (FALC) developed by Harris (Harris et al., 1989), and MPO LCInvert.

In our analysis, we use the dense lightcurve data from apparitions in 2000, 2009, 2010 and 2011 to find a probable period. Figures 1 – 3 show previously unpublished lightcurves from 2009, 2010 and 2011. Figures 4 and 5 shows the PAB longitude and latitude Distributions of the dense (blue) and sparse (red) data used to form the final

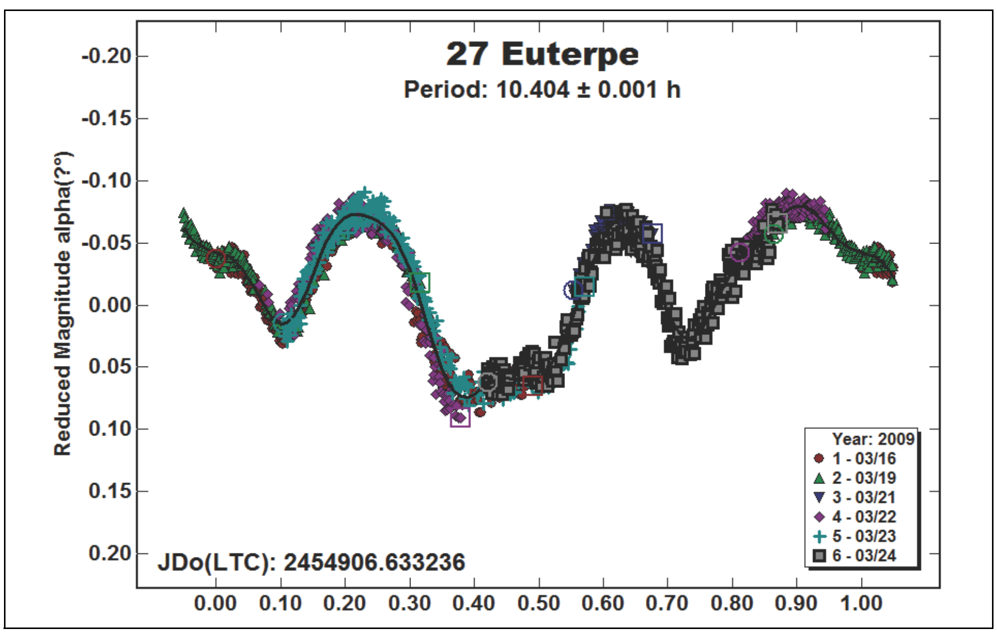

Figure 1: Lightcurve from 2009 March.

model. We started with the synodic periods from the dense lightcurves to find a sidereal period using LCInvert. This was then applied in a pole search that generated 264 solutions using discrete, fixed longitude-latitude pairs but allowing the sidereal period to "float."

The results of this initial search are shown in Figure 7. Dark blue indicates the lower values of log (chi-square) in the range of solutions. Colors progress towards bright red with increasing log (chi-square) with the highest value indicated by maroon (dark red). From Figure 7, two general solutions near latitude B = -30° are easily seen (see Hanus and Durech, 2011, for a discussion of guidelines to determine the validity of the "best solution" within a given solution set).

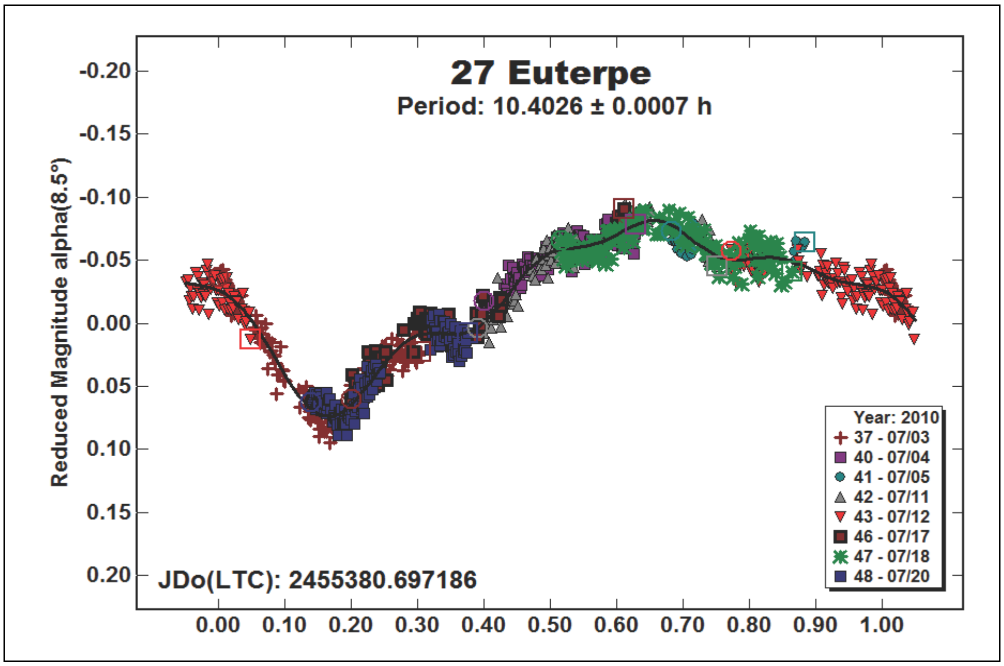

Figure 2: Lightcurve from 2010 July.

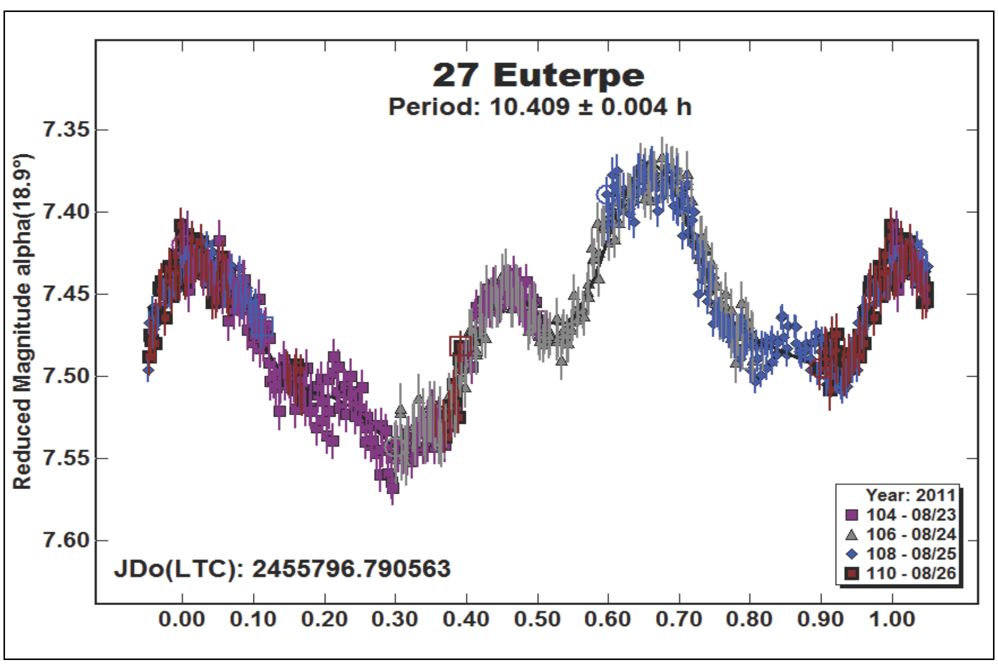

Figure 3: Lightcurve from 2011 August.

The two intermediate solutions where then refined by running the search again using one of the two solutions as a starting point and allowing the longitude and latitude as well as the sidereal period to float. For final modeling, we included a sparse data set of USNOFlagstaff to complement the dense lightcurve data sets, but giving a much smaller weighting to the USNO data.

The modeling was complicated by initial "dark facet" sizes exceeding 1%, which can indicate the possibility of albedo variations (Durech et al., 2009). When the weighting was raised to 2.0 before modeling, the final dark facet size fell well below 1%. This leaves the issue of albedo variations somewhat in question.

Our final results show two possible solutions, both with retrograde rotation. The preferred solution is (83°, -39°, 10.40825 h) with an alternate solution of (261°, -30°, 10.40818 h). Given the low orbital inclination (1.6°) and the nature of the lightcurve inversion process, it is common to find a double solution with the two usually differing by 180° in longitude. The error for the poles is ±10° while the period solutions have errors on the order of 2-3 units in the last decimal place.

Further supporting our preference for the (83°, -39°) solution is that the derived shape (Figure 8) is a close match to the 1993 occultation profile obtained by Dunham (1996), when nine observed chords yielded a 124 x 75 km (77 x 47 mile) ellipse. In order to reconcile radar observations with the occultation profile, Magri et al. (1998) modeled Euterpe as a triaxial ellipsoid of a/b = 1.15 ± 0.15 and b/c = 1.3 ± 0.3, or 127 x 110 x 85 km (79 x 68 x 53 miles).

In 2011 August, we obtained observations through standard V and R filters to determine if any color changes to the rotational phase could be found. Figure 10 shows that no color variations were detected within V-R 0.02 mag.

The dense lightcurve data from all apparitions have been uploaded to the ALCDEF database (see Warner et al., 2011) on the Minor Planet Center's web site (*http://minorplanetcenter.net/Light_curve*).

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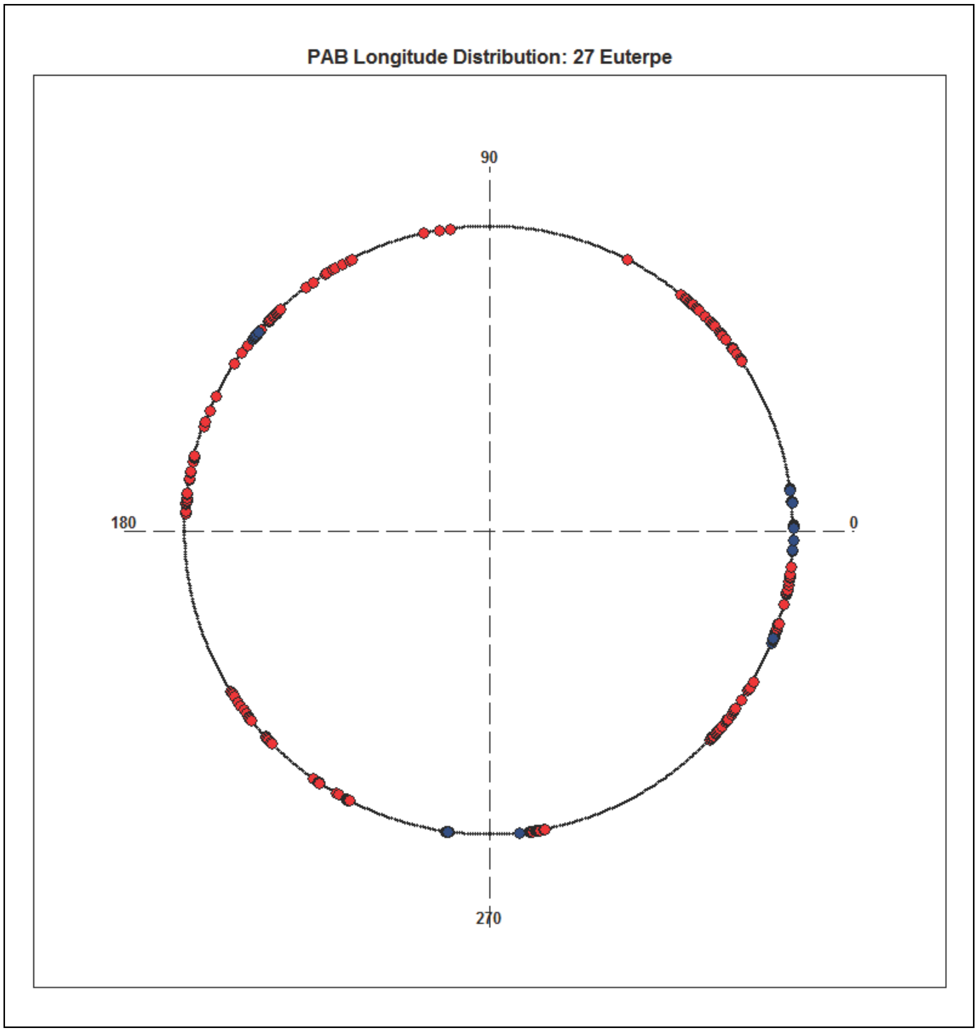


Figure 4. PAB Longitude Distribution of the dense (blue) and sparse (red) data used in the model.

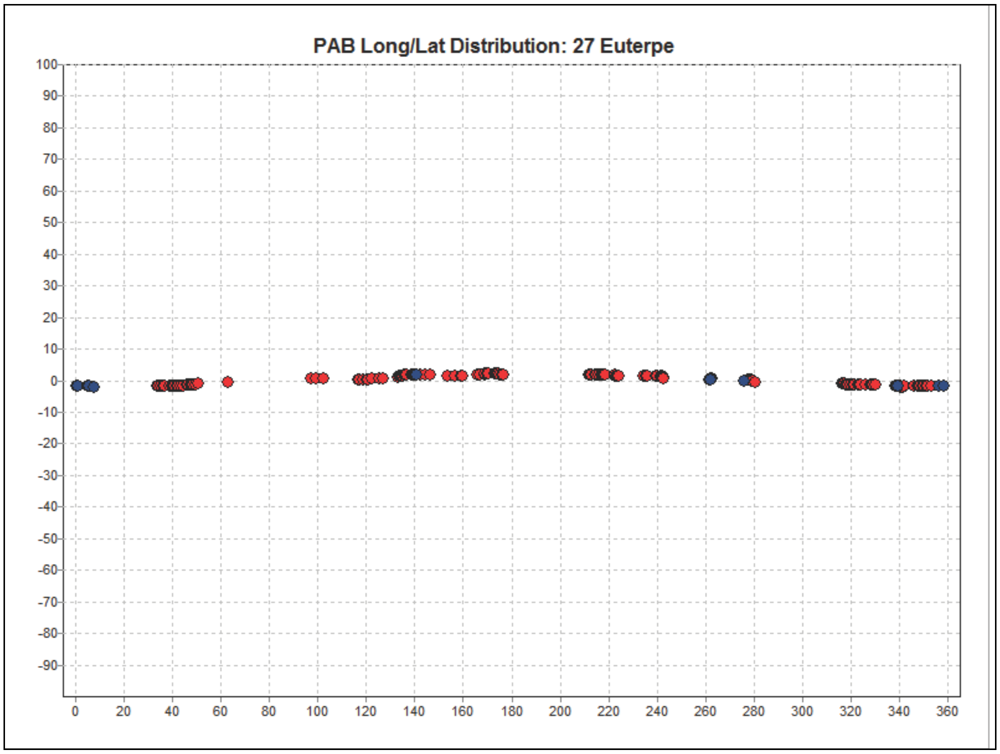


Figure 5. PAB Latitude Distribution of the dense (blue) and sparse (red) data used in the model.

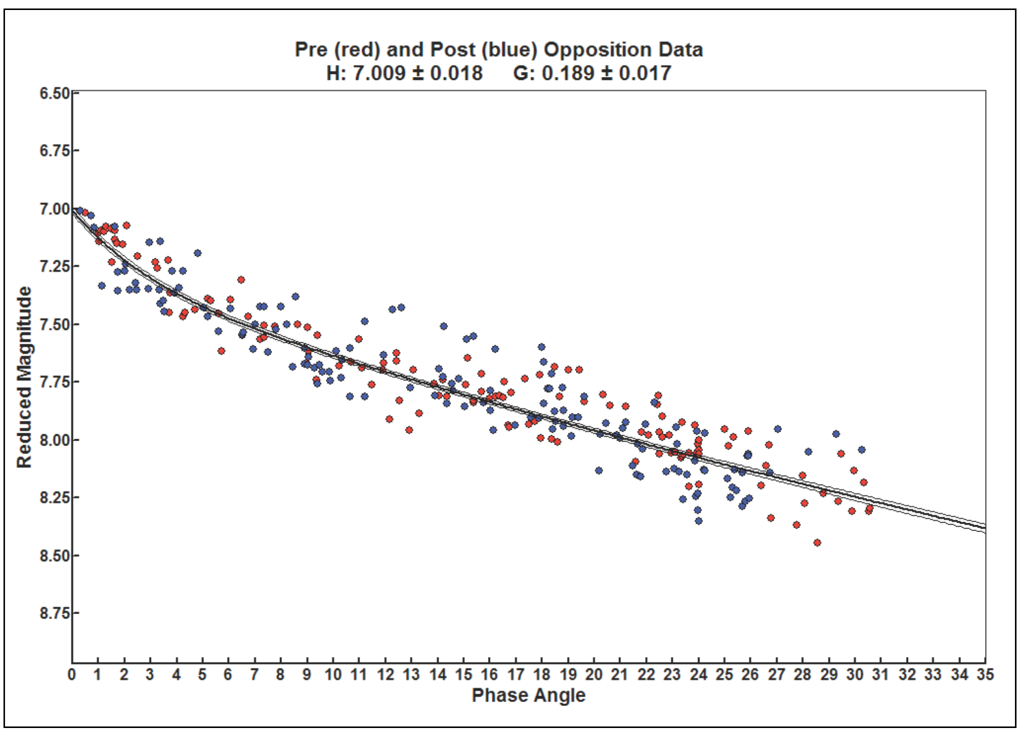


Figure 6. Phase curve of the sparse data from USNO of the Pre- (red) and Post- (blue) Opposition Data.

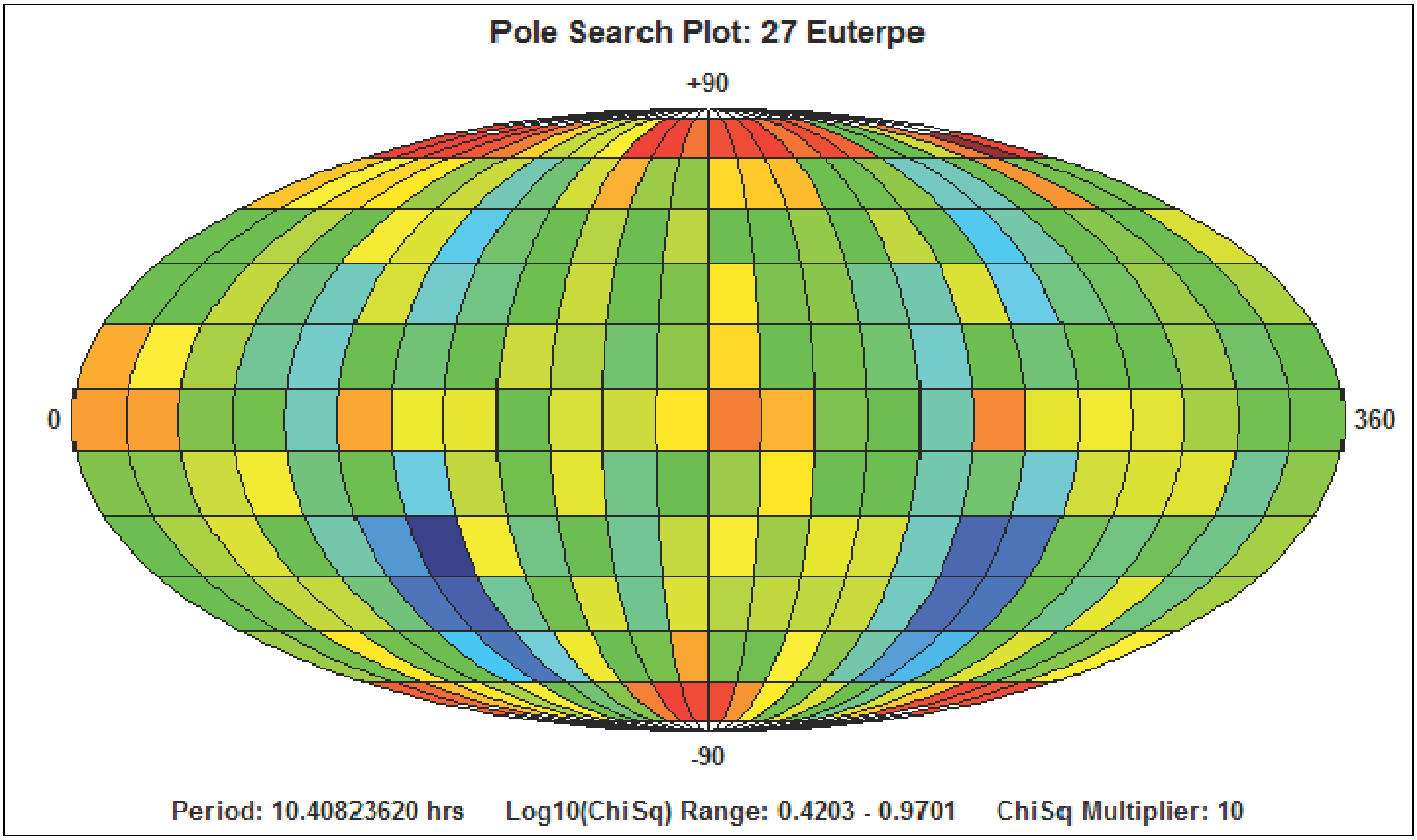


Figure 7. Plot of the log (chi-square) values. Dark blue represents the lowest chi-square value.

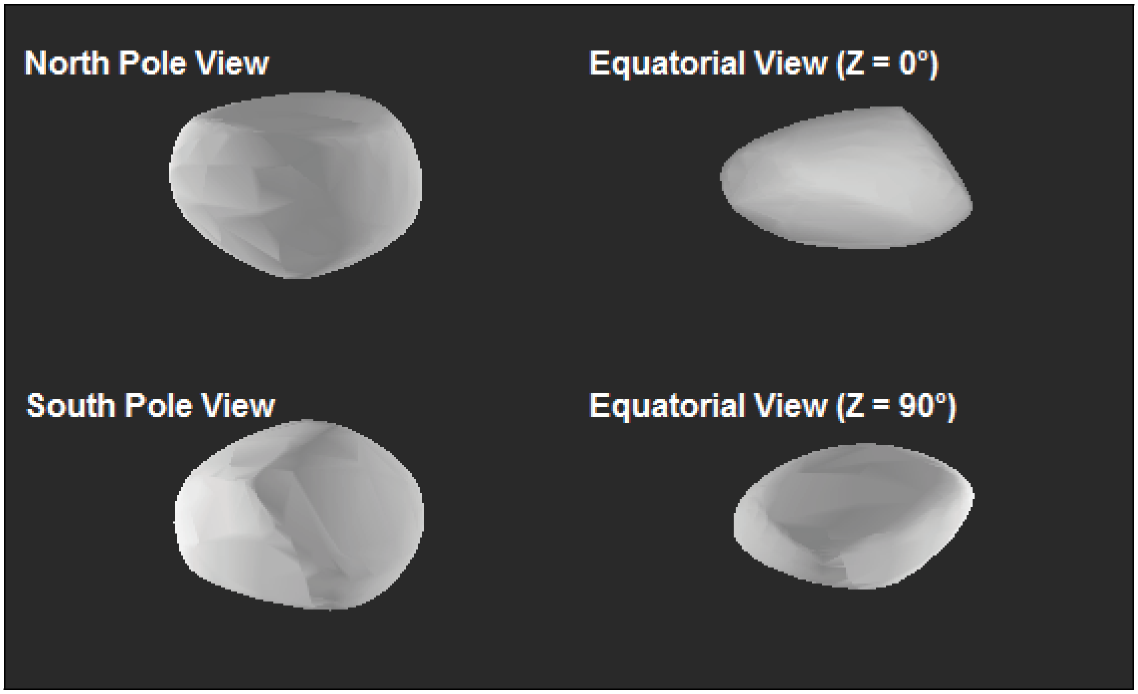


Figure 8. The shape model with the lowest chi-square value.

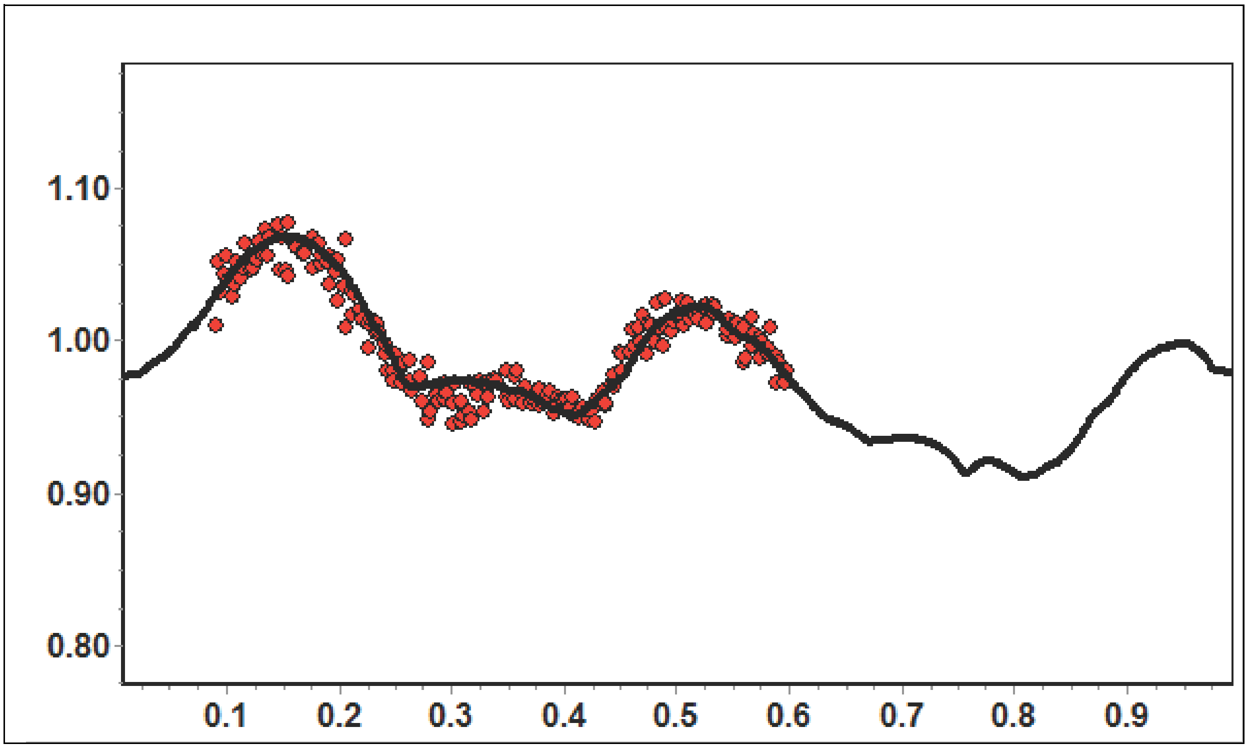


Figure 9. Fit of the data points vs. the model for 2011 August 25.

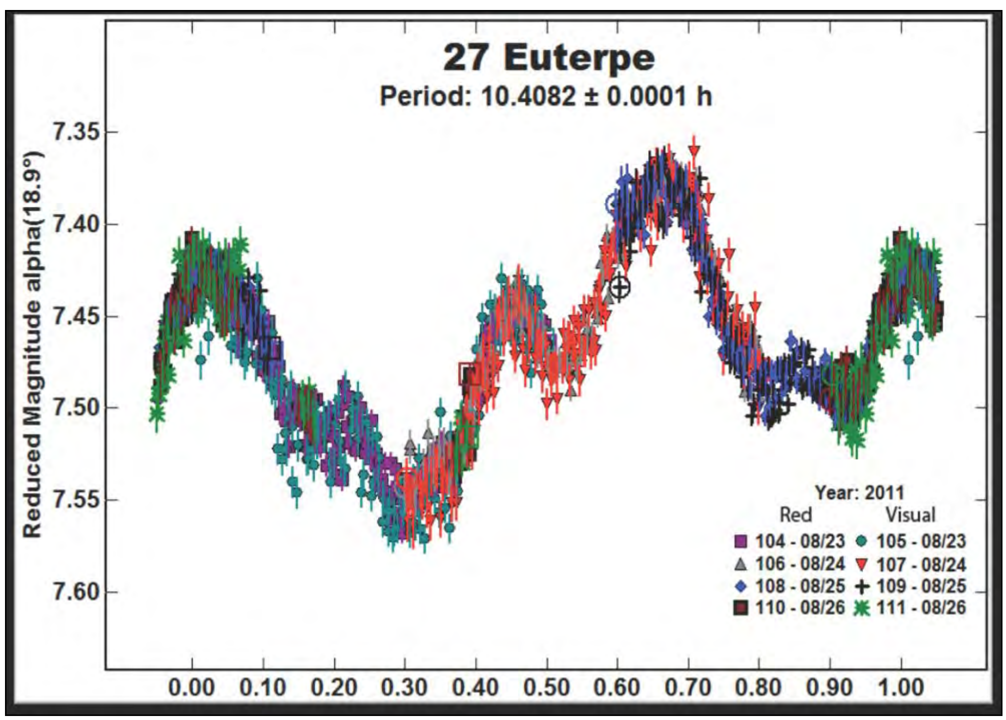


Figure 10. Plot of Cousins V and R observations with V observations zero point shifted 0.47 magnitude to see if any color changes due to rotational phase could be detected. None were seen to the limit of the noise.

Feature Story: ALPO Observations of Saturn During the 2008 - 2009 Apparition

By Julius L. Benton, Jr.,
Coordinator, ALPO Saturn Section
E-mail: j*lbaina@msn.com*

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 System 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 379 visual observations and digital images during the 2008-09 apparition (from October 17, 2008 through August 14, 2009) which were contributed by 44 observers in the United States, Puerto Rico, Canada, China, France, Germany, Iran, Australia, Japan, The Netherlands, Philippines, Portugal, Spain, and United Kingdom. Instruments used to carry out the observations ranged from 9.0 cm (3.5 in.) up to 38.0 cm (15.0 in.) in aperture. Recurring short-lived dark features were observed or imaged throughout much of the observing season in the South Equatorial Belt (SEB), as well as dusky festoons in the EZs just after opposition, and small dark condensations were suspected in the North Equatorial Belt (NEB) and North Temperate Belt (NTeB). Observers imaged the recurring presence of small white spots in the South Tropical Zone (STrZ), South Equatorial Belt Zone (SEBZ), and Equatorial Zone (EZ) during the apparition, while a rare white spot was also imaged in the North Polar Region (NPR). A few recurring central meridian (CM) transit timings were

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 2008-2009 Apparition

Conjunction		2008	Sep	04d
Opposition		2009	Mar	08d
Sun passes through Ring Plane S→N		2009	Aug	10d
Earth passes through Ring Plane S→N		2009	Sep	04d
Conjunction		2009	Sep	17d
Opposition Data				
Visual Magnitude		+0.5		
Constellation		Leo		
B		-2.6°		
B'		-2.5°		
Globe	Equatorial Diameter	19.6"		
	Polar Diameter	17.6"		
Rings	Major Axis	44.6"		
	Minor Axis	2.0"		

Table 2. 2008-09 Apparition of Saturn: Contributing Observers

	Observer	Location	No. of Observations	Telescopes Used
1.	Abel, Paul G.	Leichester, UK	12	20.3 cm (8.0 in.) NEW
2.	Adelaar, Jan	Arnhem, Netherlands	9	23.5 cm (9.25 in.) SCT
3.	Akutsu, Tomio	Cebu City, Philippines	19	35.6 cm (14.0 in.) SCT
4.	Allen, Ethan	Sebastopol, CA	2	35.6 cm (14.0 in.) SCT
5.	Arditti, David	Middlesex, UK	12	35.6 cm (14.0 in.) SCT
6.	Benton, Julius L.	Wilmington Island, GA	27	15.2 cm (6.0 in.) REF
7.	Bosman, Richard	Enschede, Netherlands	4	28.0 cm (11.0 in.) SCT
8.	Boucheau, John	Saugus, MA	2	28.0 cm (11.0 in.) SCT
9.	Brimacombe, Joseph	Cairns, Australia	1	35.6 cm (14.0 in.) SCT
10.	Casquinha, Paolo	Palmela, Portugal	16	35.6 cm (14.0 in.) SCT
11.	Chang, Daniel	Hong Kong, China	1	25.4 cm (10.0 in.) SCT
12.	Chavez, Rolando	Powder Springs, GA	1	35.6 cm (14.0 in.) SCT
13.	Chester, Geoff	Alexandria, VA	4 1	20.3 cm (8.0 in.) SCT 30.5 cm (12.0 in.) REF
14.	Delcroix, Marc	Tournefeuille, France	26	25.4 cm (10.0 in.) SCT
15.	Edwards, Peter	West Sussex, UK	2	28.0 cm (11.0 in.) SCT
16.	Ghomizadeh, Sadegh	Tehran, Iran	2	35.6 cm (14.0 in.) SCT
17.	Go, Christopher	Cebu City, Philippines	27	28.0 cm (11.0 in.) SCT
18.	Haas, Walter H.	Las Cruces, NM	1	31.8 cm (12.5 in.) NEW
19.	Haberman, Bob	San Francisco, CA	3	25.4 cm (10.0 in.) SCT
20.	Heard, Kearon	Suffolk, UK	1	20.3 cm (8.0 in.) CAS
21.	Hill, Rik	Tucson, AZ	3 12	9.0 cm (3.5 in.) MAK 35.6 cm (14.0 in.) SCT
22.	Ikemura, Toshihiko	Osaka, Japan	9	38.0 cm (15.0 in.) NEW
23.	Jakiel, Richard	Douglasville, GA	5	30.5 cm (12.0 in.) SCT
24.	Lawrence, Pete	Selsey, UK	1	35.6 cm (14.0 in.) SCT
25.	Mattei, Michael	Littleton, MA	1	35.6 cm (14.0 in.) SCT
26.	Maxson, Paul	Phoenix, AZ	56	25.4 cm (10.0 in.) DAL
27.	Melillo, Frank J.	Holtsville, NY	2	25.4 cm (10.0 in.) SCT
28.	Melka, Jim	St. Louis, MO	6	30.5 cm (12.0 in.) SCT
29.	Niechoy, Detlev	Göttingen, Germany	9	20.3 cm (8.0 in.) SCT
30.	Owens, Larry	Alpharetta, GA	3	35.6 cm (14.0 in.) SCT
31.	Peach, Damian	Norfolk, UK	28	35.6 cm (14.0 in.) SCT
32.	Pellier, Christophe	Bruz, FR	7	25.4 cm (10.0 in.) CAS
33.	Phillips, Jim	Charleston, SC	8 3	20.3 cm (8.0 in.) REF 25.4 cm (10.0 in.) REF
34.	Phillips, Michael A.	Swift Creek, NC	5	20.3 cm (8.0 in.) SCT
35.	Ramakers, Theo	Social Circle, GA	15	23.5 cm (9.25 in.) SCT
36.	Robbins, Sol C.	Fair Lawn, NJ	2	15.2 cm (6.0 in.) REF
37.	Roussell, Carl	Hamilton, ON, Canada	8	15.2 cm (6.0 in.) REF
38.	Sanchez, Jesus	Cordoba, Spain	1 1	26.0 cm (10.2 in.) CAS 28.0 cm (11.0 in.) SCT
39.	Santacana, Guido	San Juan, Puerto Rico	2	15.2 cm (6.0 in.) REF

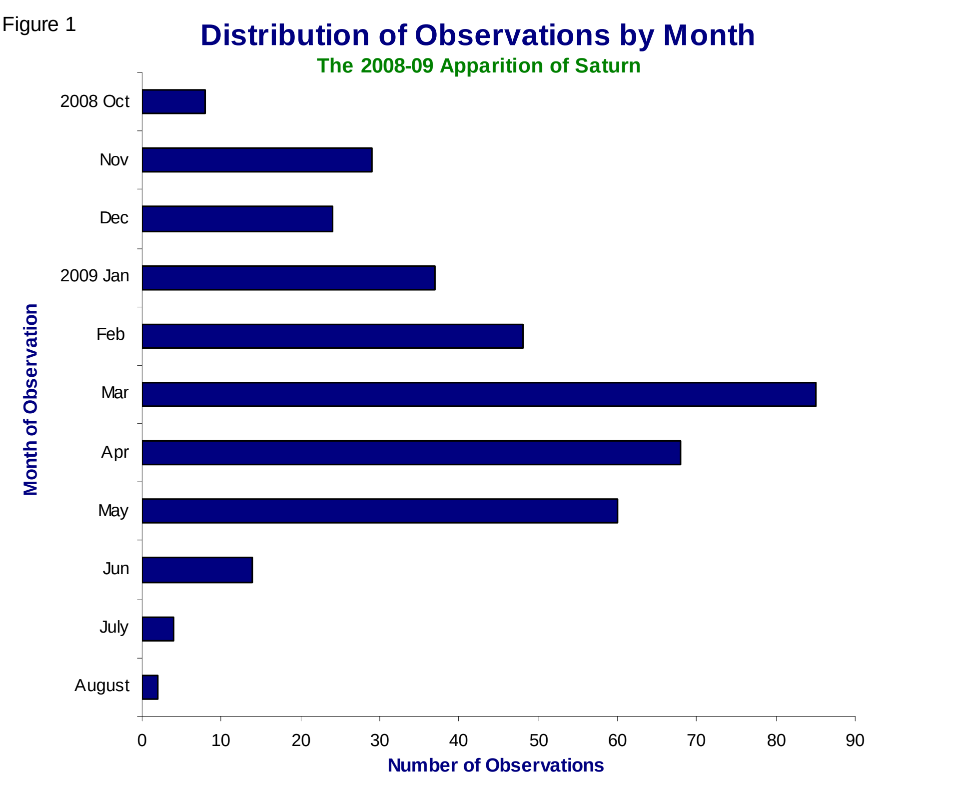
Table 2. 2008-09 Apparition of Saturn: Contributing Observers (Continued)

	Observer	Location	No. of Observations	Telescopes Used
40.	Sharp, Ian	West Sussex, UK	5	28.0 cm (11.0 in.) SCT
41.	Viladrich, Christian	Paris, France	1	35.6 cm (14.0 in.) SCT
42.	Walker, Sean	Manchester, NH	1	35.6 cm (14.0 in.) SCT
43.	Warren, Joel	Amarillo, TX	3	20.3 cm (8.0 in.) SCT
44.	Wesley, Anthony	Murrumbateman, Australia	9	36.8 cm (14.5 in.) NEW
	TOTAL OBSERVATIONS		**379**	
	TOTAL OBSERVERS		**44**	

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

submitted for a few of these features. The inclination of Saturn's ring system toward Earth, **B,** attained a maximum value of –4.2° on May 13, 2009. The Earth passed through the ring plane on September 4, 2009 (**B** = 0.0°) marking the first edgewise orientation of the rings since 1995, albeit extremely unfavorable for observers since the ring passage occurred only about two weeks before conjunction with the Sun. Because of the diminished ring tilt in 2008-09, observers were able to see and image many of Saturn's traditional global feature in both hemispheres. In subsequent apparitions, until the next edgewise orientation in March 2025, it will be the Northern Hemisphere of the planet and North face of the rings that will be increasingly inclined toward Earth for visual observations and imaging. A summary of visual observations and digital images of Saturn contributed during the apparition are discussed, including the results of continuing efforts to image the bicolored aspect and azimuthal brightness asymmetries of the rings. Accompanying the report are references, drawings, photographs, digital images, graphs, and tables.

Figure 1



Introduction

This report is a result of an analysis of 379 visual observations, descriptive notes, and digital images contributed to the ALPO Saturn Section by 44 observers from October 17, 2008 through August 14, 2009, referred to hereinafter as the 2008-09 "observing season" or apparition of Saturn. 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 2008-09 apparition. The numerical value of B, or the Saturnicentric latitude of the Earth referred to the ring plane (+ when north), ranged between the extremes of -4.2° (May 13, 2009) and -1.3° (August 14, 2009). It should be pointed out that the value of B was 0.0° on September 4, 2009, the date of edgewise presentation of the ring plane toward Earth, but there were no observations of the event because Saturn was too near the Sun (only 13 days before conjunction). The value of B', the saturnicentric latitude of the Sun, varied from -4.7° (October 17, 2008) to 0°.0 (August 14, 2009).

Table 2 lists the 44 individuals who all together submitted 379 reports to the ALPO Saturn Section this apparition, along with their observing sites, number of observations, telescope aperture, and type of instrument. *Figure 1* is a histogram showing the distribution of observations by month, where it is can be seen that 43.5% were made prior to opposition, 1.1% at opposition (March 8, 2009), and 55.4% thereafter.

Although there usually is a tendency for observers to view Saturn more frequently around the date of opposition when the planet is well-placed high in the evening sky, coverage was more evenly distributed throughout the 2008-09 apparition (92.6% of all observations took place from November 2008 through May 2009). Observers are always encouraged to begin drawing and imaging Saturn as soon as the planet 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^d as possible (this period refers to the elapsed time from one conjunction of Saturn with the Sun to the next, which is slightly longer than a terrestrial year).

Figure 2 and *Figure 3* show the ALPO Saturn Section observer base and the international distribution of all observations submitted during the apparition. The United States accounted for 45.5% of the participating observers and 43.8% of the submitted observations. With 54.5% of all observers residing in Puerto Rico, Canada, China, France, Germany, Iran, Australia, Japan, The Netherlands, Philippines, Portugal, Spain, and United Kingdom, whose total contributions represented 56.2% of the observations, international cooperation continued to be excellent this observing season.

Figure 4 graphs the number of observations this apparition by instrument type. Roughly one-fourth (25.6%) of all observations were made with telescopes of classical design (refractors, Newtonian, and Cassegrains). Classical designs with superb optics and precise collimation frequently produce high-resolution images with excellent contrast, a likely reason why 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 repeatedly established that such instruments outfitted with quality well-collimated optics produce very fine images of Saturn.

Telescopes with apertures of 15.2 cm (6.0 in.) or larger accounted for 99.2% 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 appreciates all of the data, descriptive reports, digital images, and visual drawings submitted by the dedicated observers listed in *Table 2* for the 2008-09 apparition, without which this report would not have been possible. Readers desiring to participate in the observing programs for Saturn using visual methods (i.e., drawings, intensity and latitude estimates, and CM transit timings) and digital imaging techniques are encouraged to do so in upcoming 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 digital imaging. It should be noted that, 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. The Saturn Section, therefore, appeals to observers to set aside a few enough time while at the telescope to record intensity estimates (visual photometry) in integrated light and with standard color filters. The ALPO Saturn Section is always pleased to receive observations from novices, and the author is always delighted to offer assistance as one becomes acquainted with our programs.

The Globe of Saturn

The 379 observations submitted to the ALPO Saturn Section during 2008-09 were used in preparing this summary of this apparition's activities. Drawings, digital images, tables, and graphs are included so readers may refer to them as they study the content of this report. For drawings or images utilized as examples of the more notable features or phenomena occurring within Saturn's belts and zones, contributors are identified in the text along with dates and times of those specific observations for easy reference back to the relevant tables that list instrumentation employed, seeing, transparency, CM data, and so forth. In addition, captions associated with illustrations provide useful information.

Figure 2

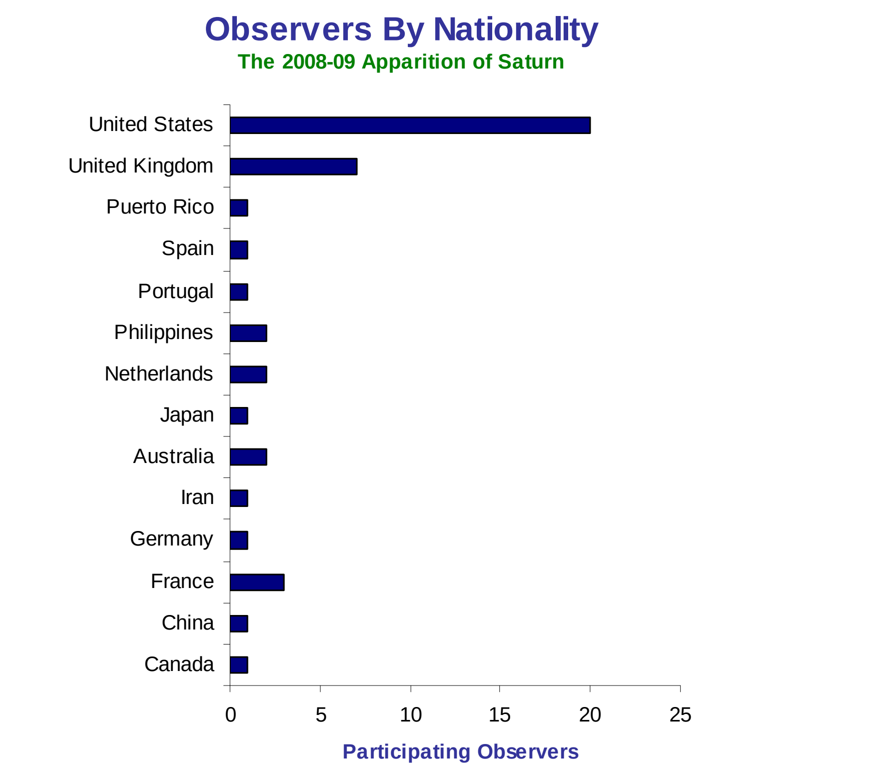


Table 3. Visual Numerical Relative Intensity Estimates and Colors for the 2008-09 Apparition of Saturn

Globe/Ring Feature	# Estimates	2008-09 Mean Intensity & Standard Error	Intensity Variance Since 2007-08	Mean Derived Color
Zones				
SPR	7	2.43 ± 0.16	-1.13	Dark Gray
STeZ	8	5.25 ± 0.15	+0.13	Dull Yellowish-White
STrZ	8	5.88 ± 0.12	-0.39	Yellowish-White
SEBZ	7	4.93 ± 0.07	+0.26	Dull Yellowish-Gray
EZs	9	7.06 ± 0.05	-0.46	Bright Yellowish-White
EZn	9	6.59 ± 0.15	-0.63	Pale Yellowish-White
NTrZ	8	5.75 ± 0.13	+0.37	Dull Yellowish-White
NTeZ	6	5.08 ± 0.08	—	Dull Yellowish-White
NPR	2	5.00 ± 0.00	+0.28	Light Gray
Belts				
SEB (whole)	9	3.89 ± 0.13	+0.30	Dark Grayish-Brown
SEBs	8	4.05 ± 0.04	+0.32	Dark Grayish-Brown
SEBn	9	3.52 ± 0.42	-0.47	Dark Grayish-Brown
NEBw	9	3.82 ± 0.12	-0.11	Dark Grayish-Brown
NTeB	1	4.00 ± 0.00	—	Dark Grayish-Brown
Rings				
A (whole)	8	6.75 ± 0.15	+0.50	Yellowish-White
A0 or B10	4	0.50 ± 0.43	-0.19	Grayish-Black
B (outer 1/3)	9	8.00 ± 0.00 STD	0.00	Brilliant White
B (inner 2/3)	9	7.00 ± 0.00	-0.03	Bright Yellowish-White
Crape Band	2	1.50 ± 0.35	-1.10	Very Dark Gray
Sh G or R	7	0.00 ± 0.00	-0.15	Black shadow
Sh R of G	7	0.00 ± 0.00	-0.36	Black shadow

Notes:
For nomenclature see text and Figure 5. 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 Variance Since 2007-08" is in the same sense of the 2007-08 value subtracted from the 2008-09 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.

Features on the globe of Saturn are described in south-to-north order and can be identified by referring to the nomenclature diagram shown in *Figure 5*. If no reference is made to a global feature in our south-to-north discussion, the area was not reported by observers during the 2008-09 apparition. It has been customary in past Saturn apparition reports to compare the morphology and brightness of atmospheric features between observing seasons, and this practice continues with this report so readers are aware of very subtle, but nonetheless recognizable, variations that may be occurring seasonally on the planet.

Small intensity fluctuations of Saturn's atmospheric features (see *Table 3*) may be simply due to the varying inclination of the planet's rotational axis relative to the Earth and Sun, although photometric work in the past has shown that tiny oscillations of roughly 0.10 in the 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.

Figure 3

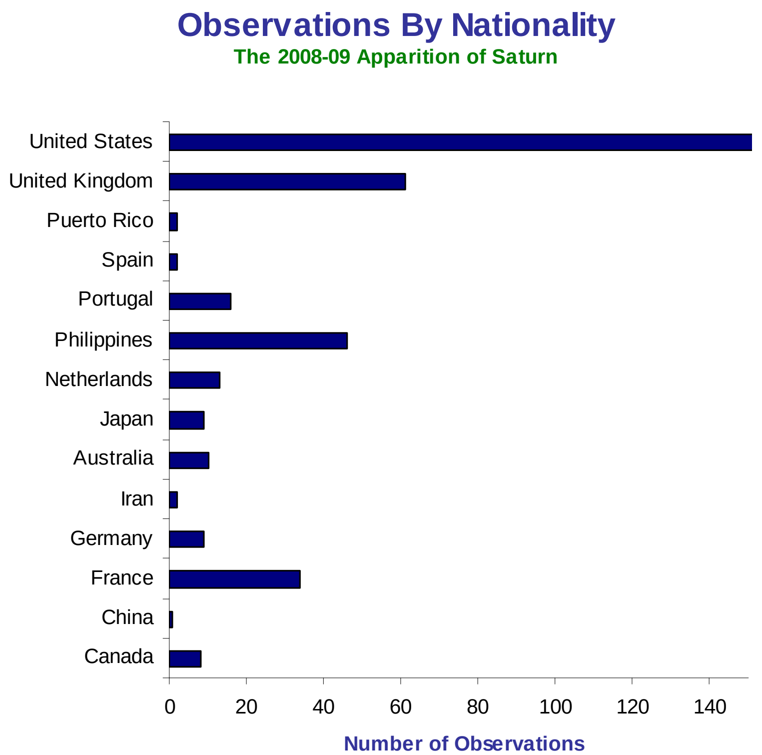
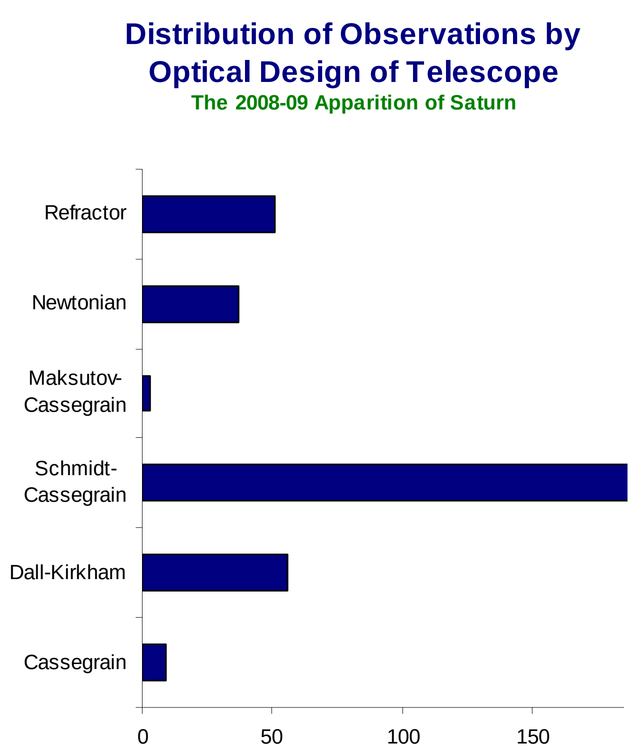


Figure 4



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 2007-08 intensity from its 2008-09 value. Suspected variances of 0.10 mean intensity points are usually considered insignificant, while reported changes in intensity that do not equal or exceed roughly three times the standard error are probably not important.

It is always worthwhile to evaluate digital images of Saturn contributed by ALPO observers using 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 try 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 grouping 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 considerably larger specialized instrumentation.

Particles in Saturn's atmosphere reflect different wavelengths of light in very distinct ways, which causes some belts and zones to appear especially prominent, while others look very dark, so imaging the planet with a series of

Table 4. White Spots in the STrZ During the 2008-09 Apparition of Saturn

Date (UT)	UT Start	UT End	CM Start			CM End									
yyyy mm dd	hh:mm	hh:mm	I (°)	II (°)	III (°)	I (°)	II (°)	III (°)	Obs	Obs Stn	Inst (cm)	Inst Type	S	Tr	Notes
2008 12 07	6:37	6:47	1.7	333.4	292.3	7.5	339.0	297.9	Peach	UK	35.6	SCT			STrZ White Spot
2008 12 07	7:13	7:24	22.8	353.7	312.6	29.2	359.9	318.8	Arditti	UK	35.6	SCT			STrZ White Spot
2008 12 10	19:48	20:53	118.5	335.5	290.2	156.6	12.2	326.8	Akutsu	PHIL	35.6	SCT	6.0	3.0	STrZ White Spot in RGB
2008 12 10	19:59	20:30	125.0	341.7	296.4	143.1	359.2	313.9	Ikemura	JAP	38.0	NEW			Subtle STrZ White Spot in RGB
2009 02 14	22:51	23:54	154.9	35.9	270.8	191.9	71.4	306.3	Pellier	FRA	25.4	CAS	8.0	4.5	STrZ White Spot (more prominent in red filter)
2009 03 02	15:10	15:21	74.8	169.3	25.3	81.2	175.5	31.5	Akutsu	PHIL	35.6	SCT	6.0	3.5	STrZ White Spot
2009 03 03	0:59		60.1	141.4	356.9				Adelaar	NETH	23.5	SCT			STrZ White Spot
2009 03 03	0:33	0:50	44.9	126.8	342.3	54.9	136.4	351.9	Pellier	FRA	25.4	CAS	5.0	5.0	STrZ White Spot
2009 04 19	3:22		227.7	227.7	26.4				Maxson	USA	25.4	DALL			STrZ White spot?
2009 04 23	1:40	1:58	305.0	178.2	332.1	315.6	188.3	342.3	Melka	USA	30.5	NEW	6.0	5.0	STrZ White Spot(s)
2009 05 26	20:00		9.8	232.5	345.7				Peach	UK	35.6	SCT			Diffuse STrZ Wh Spot
2009 06 03	20:26		298.6	262.3	5.9				Delcroix	FRA	25.4	SCT	4.5	4.0	STrZ White Spot
2009 06 11	20:32		215.7	280.8	14.7				Delcroix	FRA	25.4	SCT	6.0	4.0	STrZ White Spot
2009 07 08	7:57		245.6	175.7	237.7				Wesley	AUST	36.8	NEW			STrZ White Spots

color filters may help shed light on the dynamics, structure, and composition of its atmosphere. In the UV and IR 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 otherwise accessible at visual wavelengths, as well as useful data about the cloud-covered satellite Titan. UV wavelengths shorter than 320nm are effectively blocked by the Earth's stratospheric ozone (O_3), while H_2O-vapor and CO_2 molecules absorb in the IR region beyond 727nm, and the human eye is insensitive to UV light short of 320nm and can detect only about 1.0% at 690nm and 0.01% at 750nm in the IR (beyond 750nm 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.

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, but this test cannot be effectively applied when B and B¢ are near their maximum attained 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 2008-09, 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 available from booksellers worldwide.

Southern Regions of the Globe

During the 2008-09 apparition B attained a maximum value of only -4.2°, and although observers could view regions of the Southern Hemisphere of Saturn to good advantage, visibility of areas near the extreme South limb (e.g., SPR) was affected due to the decreasing tilt of the rings toward our line of sight. 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 2007-08. Some visual observers strongly suspected, however, that several belts and zones in the Southern Hemisphere showed signs of a continued subtle decline in overall brightness over the last several observing seasons.

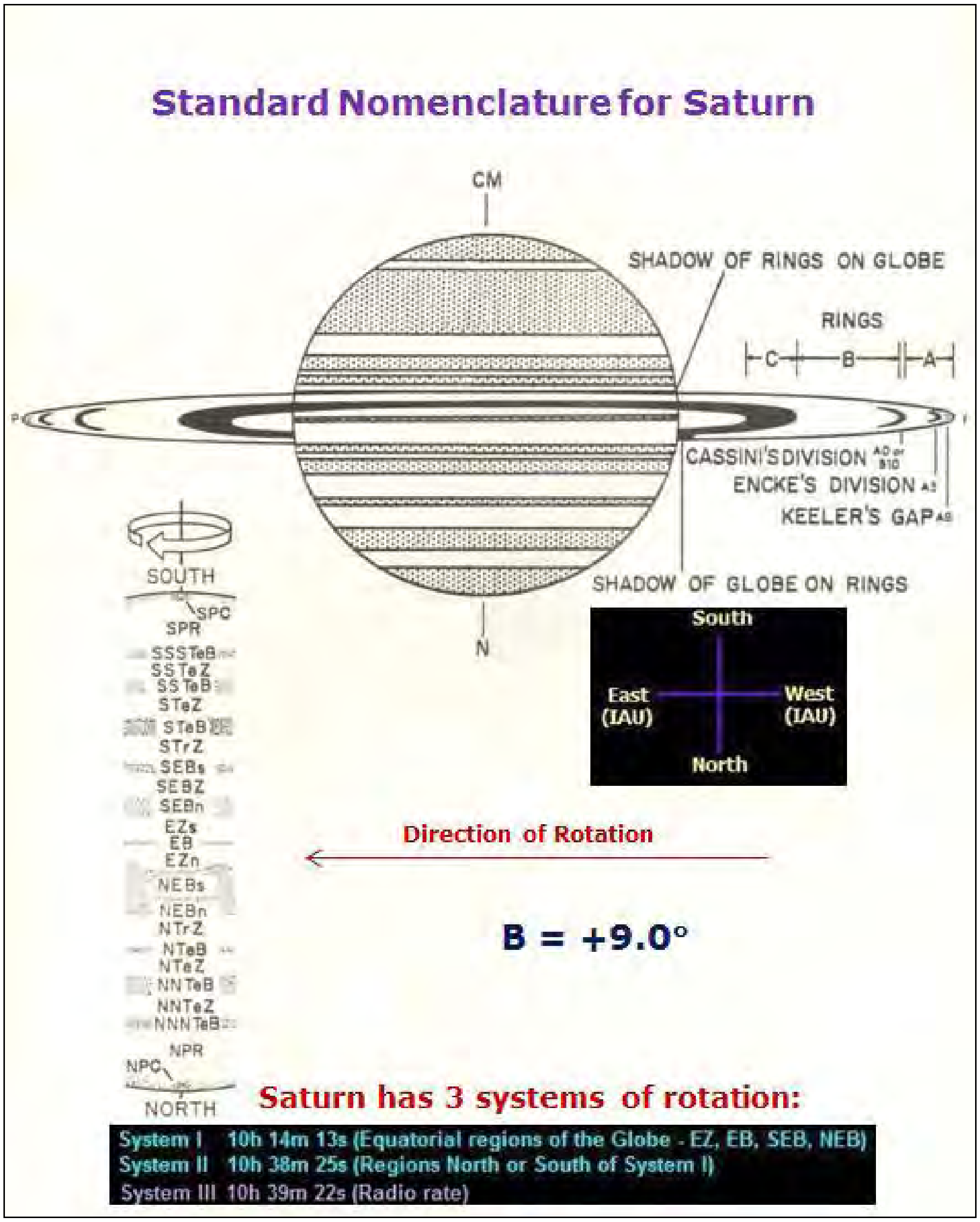


Figure 5. Saturn nomenclature, where A = Ring A, B = Band or Ring B or saturnicentric latitude of Earth, C = Ring C or Cap, E = Equatorial, f = following (celestial east), G = Globe, n = north component, N = North, p = preceding (celestial west), P = Polar, R = Ring(s) or Region, s = south component, S = South, Te = Temperate, Tr = Tropical, Z = Zone. The ring Ansae (not labeled) are the easternmost and westernmost protrusions of the Ring System. Note that "Gap" is also called "Division" or "Complex." South is at the top in this inverted view, similar to the orientation seen through an inverting telescope in Earth's Northern Hemisphere.

From mid-November 2008 through early July 2009, quite a few observers visually suspected (using color filter techniques) or digitally imaged small white spots in the STrZ, SEBZ, and EZ that seemed to evolve with time. Dark condensations and various other dusky features within the SEBs and SEBn were sketched or imaged on several occasions from mid-February through mid-June 2009. Wispy festoons in the EZs were also depicted in submitted drawings on a few occasions in February and April 2009. These phenomena are discussed in the forthcoming paragraphs dealing separately with each region of Saturn's globe. White spots, usually caused by upward convection of NH_4 (ammonia) in Saturn's atmosphere, showed subtle but recognizable morphological changes over time. The structure of zonal wind profiles in the STrZ, SEBZ, and EZ seem to contribute to the emergence and behavior of such 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 facilitate derivation of drift rates of these transient phenomena.

There have been discussions over the last several apparitions that suspected slight increases or decreases in atmospheric activity on Saturn could be a consequence of the planet's seasonal insolation cycle, but measurements in the past suggest only a slow thermal response to solar heating at Saturn's perihelion distance of ~9.0 AU from the Sun. So, as time elapses with succeeding apparitions following Saturn's perihelion passage back in 2003, observers should still maintain a watchful 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 day of summer but occur several weeks later. Any similar effect on Saturn would be extremely subtle, however, and probably not noticed for quite a number of years.

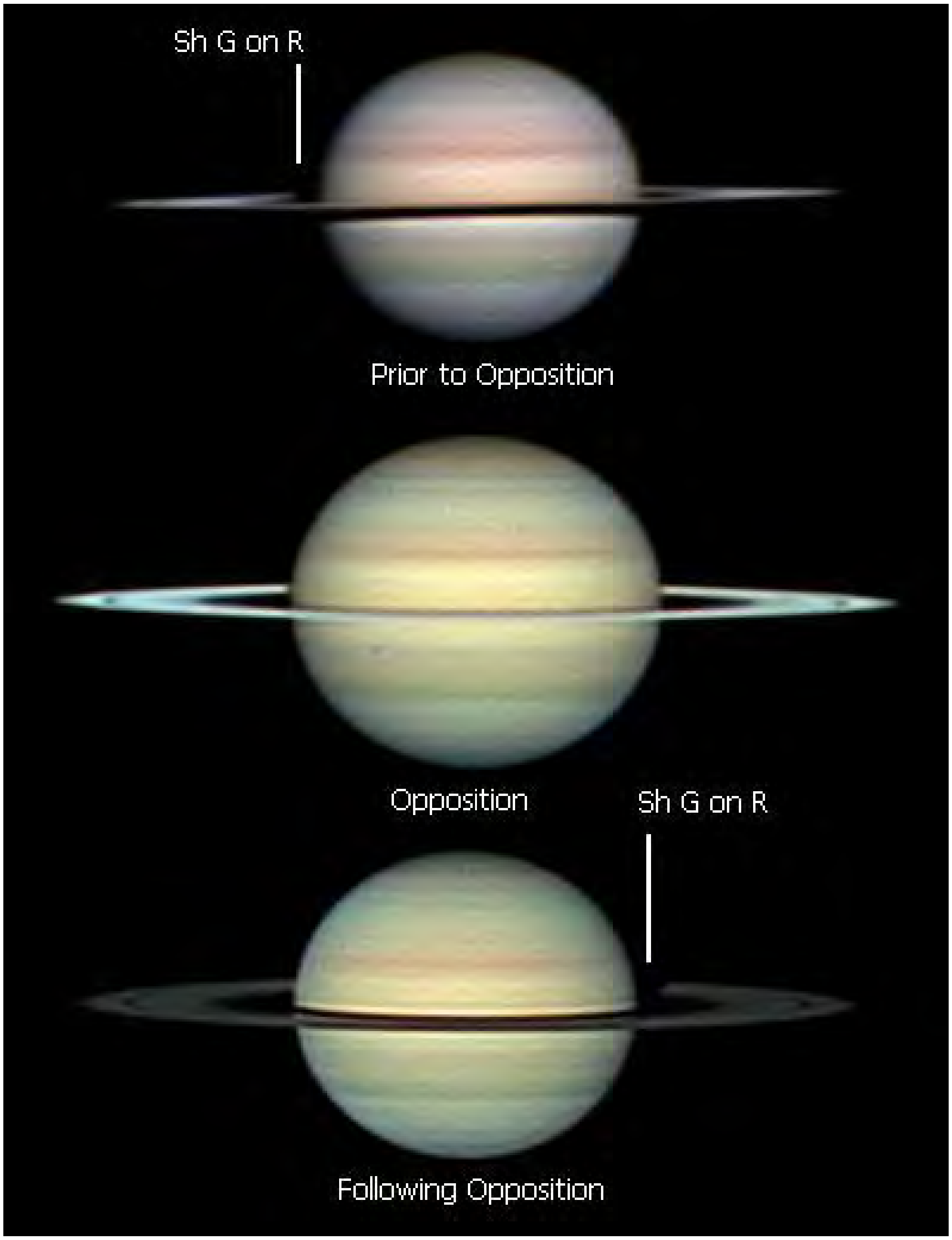


Figure 6. Three images furnished by Christopher Go using a 28.0 cm (11.0 in.) SCT on November 22, 2008, March 8, 2009, and May 23, 2009, to illustrate the changing position of the shadow of the globe of Saturn on the rings (Sh G on R) prior to and following opposition.

South Polar Region (SPR)

Based on visual numerical relative intensity estimates submitted during the 2008-09 apparition, the dark gray SPR may have been a little darker in appearance than in 2007-08 (by a subtle mean visual intensity value of −1.13). Despite the suspicion of a slight brightening of this region back in 2004-05, the weak darkening trend believed to be underway every apparition since the 2001-02 observing season may have continued in 2008-09. No drawings by visual observers or digital images of the SPR revealed discrete activity in this region during the apparition. The South Polar Cap (SPC) was not reported by observers making visual numerical relative intensity estimates in 2008-09, nor was this feature easy to discern in most digital images, likely due to of the increasingly smaller ring tilt to our line of sight. A dark gray South Polar Belt (SPB) encircling the SPR was not reported by visual observers during the apparition, but this feature was apparent in at least a few digital images received [refer to Illustration No. 001].

South South Temperate Zone (SSTeZ)

The SSTeZ was seldom reported by visual observers during this observing season, with no visual numerical relative intensity estimates being contributed. Its detection visually required the best seeing conditions and larger apertures, but several digital images revealed a narrow SSTeZ devoid of any recognizable activity [refer to Illustration No. 002].

South South Temperate Belt (SSTeB)

The very dark gray SSTeB was rarely sighted by contributing observers during 2008-09. No one provided intensity estimates of this always ill-defined belt, but the narrow belt was revealed on

Table 5. White Spots in the SEBZ During the 2008-09 Apparition of Saturn

Date (UT)	UT Start	UT End	CM Start			CM End									
yyyy mm dd	hh:mm	hh:mm	I (°)	II (°)	III (°)	I (°)	II (°)	III (°)	Obs	Obs Stn	Inst (cm)	Inst Type	S	Tr	Notes
2008 11 16	14:14	14:19	178.9	98.7	82.6	181.8	101.5	85.4	Allen	USA	35.6	SCT	4.0	4.0	SEBZ White Spot (especially noticeable in red filter)
2008 12 01	5:09		284.1	91.5	57.8				Niechoy	GER	20.3	SCT			SEBZ White Spot near CM
2008 12 07	7:13	7:24	22.8	353.7	312.6	29.2	359.9	318.8	Arditti	UK	35.6	SCT			SEBZ White Spot
2008 12 07	6:37	6:47	1.7	333.4	292.3	7.5	339.0	297.9	Peach	UK	35.6	SCT			SEBZ White Spot
2008 12 13	20:40	21:26	162.0	281.0	232.0	189.0	306.9	257.9	Akutsu	PHIL	35.6	SCT	6.0	3.0	SEBZ White Spot at CM
2008 12 20	21:20	21:26	336.0	227.9	170.4	339.5	231.3	173.8	Akutsu	PHIL	35.6	SCT	7.0	3.0	SEBZ White Spot
2008 12 22	5:09		15.3	224.5	165.4				Casquinha	PORT	35.6	SCT			SEBZ White Spot
2009 01 08	19:30	20:02	114.6	115.2	34.9	133.3	133.3	52.9	Akutsu	PHIL	35.6	SCT	7.0	3.0	SEBZ White Spot (RGB)
2009 01 27	18:22	18:50	278.1	26.5	283.4	294.5	42.3	299.1	Akutsu	PHIL	35.6	SCT	7.5	3.0	SEBZ White Spot
2009 01 27	18:39	19:11	288.1	36.1	292.9	306.8	54.2	311.0	Go	PHIL	28.0	SCT	7.5	5.0	SEBZ White Spot
2009 02 16	3:30	4:46	82.9	285.3	158.8	127.5	328.2	201.6	Casquinha	PORT	35.6	SCT			SEBZ White Spot and EZn White Spot
2009 02 19	23:46		89.1	167.3	36.2				Delcroix	FRA	25.4	SCT	7.5	4.0	SEBZ White Spot suspected in image
2009 02 28	0:19	0:42	23.5	202.6	61.8	37.0	215.6	74.7	Delcroix	FRA	25.4	SCT	6.0	3.0	SEBZ Wh Spot in IR and faintly noticeable in RGB
2009 02 28	0:04	1:34	14.7	194.2	53.3	67.5	244.9	104.0	Pellier	FRA	25.4	CAS	5.0	6.0	SEBZ Wh Spot in IR
2009 03 02	15:10	15:21	74.8	169.3	25.3	81.2	175.5	31.5	Akutsu	PHIL	35.6	SCT	6.0	3.5	SEBZ White Spot
2009 03 03	0:59		60.1	141.4	356.9				Adelaar	NETH	23.5	SCT			SEBZ White Spot
2009 03 18	22:40		168.5	96.1	292.4				Peach	UK	35.6	SCT			SEB White spot
2009 04 05	13:27	13:45	282.2	0.9	175.9	292.8	186.1		Go	PHIL	28.0	SCT	7.5	5.0	SEBZ White spot
2009 05 02	20:38	21:20	290.6	207.5	439.7	315.2	231.2	13.3	Delcroix	FRA	25.4	SCT	4.5	4.0	SEBZ Wh Spot suspected in R+IR

Table 6. Dark Features in the SEB During the 2008-09 Apparition of Saturn

Date (UT)	UT Start	UT End	CM Start			CM End									
yyyy mm dd	hh:mm	hh:mm	I (°)	II (°)	III (°)	I (°)	II (°)	III (°)	Obs	Obs Stn	Inst (cm)	Inst Type	S	Tr	Notes
2009 02 17	5:33	5:44	279.4	86.8	318.9	285.9	93.0	325.1	Roussell	CAN	15.2	REF	5.0	3.0	Suspected dark elongations in SEBs and SEBn
2009 02 19	23:46		90.9	169.0	37.9				Delcroix	FRA	25.4	SCT	7.5	4.0	SEBs dark spot possible in image
2009 03 01	4:25	4:36	292.2	73.4	291.2	298.6	79.6	297.4	Roussell	CAN	15.2	REF	5.0	3.5	Suspected small dark condensations in SEBn and SEBs
2009 03 13	22:58	23:34	277.2	6.0	208.3	298.4	26.3	228.6	Delcroix	FRA	25.4	SCT	5.0	3.0	Dark spots suspected in SEBn (could be noise)
2009 03 20	23:01		69.5	292.0	125.9				Peach	UK	35.6	SCT			SEBn dusky streak
2009 03 21	0:34		124.0	344.5	178.3				Abel	UK	20.3	NEW			Dusky features in SEBn
2009 04 18	21:20	22:08	15.5	23.6	182.6	43.6	50.7	209.6	Delcroix	FRA	25.4	SCT	5.0	3.0	Possible dark spot in SEBn
2009 06 02	20:15	20:22	168.0	164.2	269.0	172.1	168.2	273.0	Delcroix	FRA	25.4	SCT	4.5	4.0	SEBn dark spot or just noise?
2009 06 11	20:32		215.7	280.8	14.7				Delcroix	FRA	25.4	SCT	6.0	4.0	SEBn dark spot

Table 7. White Spots in the EZ During the 2008-09 Apparition of Saturn

Date (UT)	UT Start	UT End	CM Start			CM End									
yyyy mm dd	hh:mm	hh:mm	I (°)	II (°)	III (°)	I (°)	II (°)	III (°)	Obs	Obs Stn	Inst (cm)	Inst Type	S	Tr	Notes
2008 12 22	5:20	6:08	21.8	230.7	171.6	49.9	257.7	198.6	Delcroix	FRA	25.4	SCT			EZn White Spot most obvious in R + IR
2009 01 04	2:25	4:00	96.0	248.9	174.2	151.7	302.4	227.7	Pellier	FRA	25.4	CAS	8.5	5.0	EZn White Spot most notable in R+IR
2009 01 07	2:10	2:14	100.3	156.6	78.4	102.7	158.9	80.7	Casquinha	PORT	35.6	SCT			EZn White Spot
2009 01 08	19:30	20:02	114.6	115.2	34.9	133.3	133.3	52.9	Akutsu	PHIL	35.6	SCT	7.0	3.0	EZn White Spot (red filter)
2009 01 17	18:13		108.9	180.5	89.5				Wesley	AUST	36.8	NEW			EZn White Spot in Red
2009 01 23	17:08	18:03	97.1	336.4	238.1	129.4	7.4	269.1	Akutsu	PHIL	35.6	SCT	6.0	4.0	EZn Wh Spot
2009 01 23	17:32		111.2	350.0	251.7				Go	PHIL	28.0	SCT	7.0	5.0	EZn Wh Spot
2009 02 01	6:41		129.0	91.7	353.0				Owens	USA	35.6	SCT			EZn White Spot
2009 02 13	5:24	5:48	136.6	73.3	310.3	150.7	86.9	323.8	Melka	USA	30.5	NEW			EZn White Spot
2009 02 14	0:24	0:30	85.1	356.2	232.3	88.6	359.6	235.7	Arditti	UK	35.6	SCT			EZn Wh Spot barely visible in red image
2009 02 14	1:32		124.9	34.6	270.6				Adelaar	NETH	23.5	SCT			EZn Wh Spot near CM
2009 02 14	22:51	23:54	154.9	35.9	270.8	191.9	71.4	306.3	Pellier	FRA	25.4	CAS	8.0	4.5	EZn White Spot (more prominent in red filter)
2009 02 16	3:30	4:46	82.9	285.3	158.8	127.5	328.2	201.6	Casquinha	PORT	35.6	SCT			EZn White Spot
2009 02 19	23:46		89.1	167.3	36.2				Delcroix	FRA	25.4	SCT	7.5	4.0	EZn White Spot
2009 02 22	15:15	15:20	162.6	155.4	21.1	165.6	158.3	23.9	Akutsu	PHIL	35.6	SCT	4.5	3.0	EZn White Spot in IR image
2009 02 28	23:52	23:57	132.1	279.5	137.5	135.0	282.3	140.3	Peach	UK	35.6	SCT			EZn White Spot
2009 03 01	0:10		142.6	289.6	147.6				Peach	UK	35.6	SCT			EZn White Spot; absolutely superb image RGB
2009 03 12	11:37	12:24	113.6	249.9	94.0	141.1	276.4	120.4	Akutsu	PHIL	35.6	SCT	2.5	3.5	EZn white spot at CM
2009 03 12	11:51	13:08	121.8	257.7	101.8	166.9	301.2	145.2	Go	PHIL	28.0	SCT	7.5	5.0	EZn white spot at CM
2009 03 12	23:06	23:39	157.6	278.4	121.9	176.9	297.0	140.5	Sanchez	SPA	26.0	CAS			EZn white spot at CM
2009 03 15	22:48	22:55	160.1	184.4	24.4	164.2	188.4	28.3	Delcroix	FRA	25.4	SCT	5.0	3.0	EZn white spot
2009 03 18	22:23	22:47	158.5	86.5	282.8	172.6	100.0	296.3	Delcroix	FRA	25.4	SCT	5.0	3.0	EZn white spot near CM
2009 03 18	22:40		168.5	96.1	292.4				Peach	UK	35.6	SCT			EZn white spots

Table 7. White Spots in the EZ During the 2008-09 Apparition of Saturn (Continued)

Date (UT)	UT Start	UT End	CM Start			CM End									
yyyy mm dd	hh:mm	hh:mm	I (°)	II (°)	III (°)	I (°)	II (°)	III (°)	Obs	Obs Stn	Inst (cm)	Inst Type	S	Tr	Notes
2009 03 21	23:02	23:09	194.4	24.6	217.3	198.5	28.6	221.3	Delcroix	FRA	25.4	SCT	4.0	3.0	EZn white spot
2009 03 29	4:04		161.9	119.2	303.2				Maxson	USA	25.4	DALL			EZn white spot
2009 04 02	21:18		185.5	350.4	168.7				Adelaar	NETH	23.5	SCT			EZn white spot?
2009 04 02	20:55	21:28	172.0	337.4	155.8	191.3	356.1	174.3	Peach	UK	35.6	SCT			EZn white spot
2009 04 05	20:56	21:09	185.5	254.1	68.8	193.1	261.4	76.1	Peach	UK	35.6	SCT			EZn white spot
2009 04 06	20:37	21:08	298.7	335.4	148.9	316.9	352.8	166.3	Peach	UK	35.6	SCT			EZn white spot
2009 04 09	5:38	6:26	144.5	104.5	275.1	172.6	131.5	302.1	Melka	USA	30.5	NEW			EZn white spot
2009 04 22	22:04		178.4	56.4	210.5				Sharp	UK	28.0	SCT	6.5		EZn white spot
2009 05 19	20:05		223.3	311.9	73.6				Peach	UK	35.6	SCT			EZn White Spot
2009 06 11	20:32		215.7	280.8	14.7				Delcroix	FRA	25.4	SCT	6.0	4.0	EZn Wh Spot

several high-resolution digital images [refer also to Illustration No. 002].

South Temperate Zone (STeZ)

The dull yellowish-white STeZ was detected frequently by visual observers in 2008-09, as well as being apparent on most digital images submitted. Compared with the previous observing season, the STeZ was essentially unchanged in overall intensity this apparition (mean factor of +0.13). The STeZ appeared uniform in intensity as it crossed the globe of Saturn, which was also the case with digital images, and no white spot activity in the STeZ was reported [refer to Illustration No. 003]

South Temperate Belt (STeB)

The usually dull grayish-brown STeB was detected by visual observers using larger apertures in 2008-09, although there were no intensity estimates submitted. High-resolution digital images showed this dusky feature during the apparition as devoid of discrete activity [refer to Illustration No. 004].

South Tropical Zone (STrZ)

Visual observers usually reported the yellowish-white STrZ during the 2008-09 apparition. It was considered to be perhaps a shade dimmer in mean intensity this observing season when compared with 2007-08 (slight variation of -0.39), exceeded only in brightness by the EZs and EZn, and roughly comparable to the NTrZ. Visual impressions suggested no variations in overall morphology during the apparition, but there were a considerable number of images received of small STrZ white spots, especially notable at red wavelengths, between December 7, 2008 and July 8, 2009 (see *Table 4*). The first image of an STrZite spot was submitted December 7, 2008 at 6:47UT by Damian Peach [refer to Illustration No. 005A], while less than an hour later David Arditti recorded a near simultaneous image of the same feature at 7:13UT [refer to Illustration No. 005B]. Another pair of near simultaneous images of a white STrZ spot were captured at 20:53UT on

Table 8. Dark Features in the EZ During the 2008-09 Apparition of Saturn

Date (UT)	UT Start	UT End	CM Start			CM End									
yyyy mm dd	hh:mm	hh:mm	I (°)	II (°)	III (°)	I (°)	II (°)	III (°)	Obs	Obs Stn	Inst (cm)	Inst Type	S	Tr	Notes
2009 02 17	21:35	21:45	123.5	269.3	140.6	129.4	274.9	146.3	Niechoy	GER	20.3	SCT	3.0	3.0	Festoons in EZn
2009 04 02	19:51	20:17	134.4	301.4	119.7	149.7	316.0	134.4	Niechoy	GER	20.3	SCT	3.5	3.0	Festoons in EZn
2009 04 11	20:20	21:24	190.2	65.8	233.3	227.8	101.9	269.4	Niechoy	GER	20.3	SCT	3.0	3.0	Festoons in EZn
2009 04 21	20:06	20:28	344.9	257.8	53.3	357.8	270.3	65.7	Niechoy	GER	20.3	SCT	3.0	3.0	Festoons in EZn

Table 9. Dark Features in the NEB During the 2008-09 Apparition of Saturn

Date (UT)	UT Start	UT End	CM Start			CM End									
yyyy mm dd	hh:mm	hh:mm	I (°)	II (°)	III (°)	I (°)	II (°)	III (°)	Obs	Obs Stn	Inst (cm)	Inst Type	S	Tr	Notes
2009 03 13	22:58	23:34	277.2	6.0	208.3	298.4	26.3	228.6	Delcroix	FRA	25.4	SCT	5.0	3.0	Dark spot suspected in NEBs (could be noise)

December 10, 2008 at by Tomio Akutsu [refer to Illustration No. 006A] and by Toshihiko Ikemura at 20:30UT [refer to Illustration No. 006B]. On March 3, 2009, near simultaneous digital images of STrZ white spots were contributed by Christophe Pellier at 00:50UT [refer to Illustration No. 007A] and by Jan Adelaar at 00:59UT [refer to Illustration No. 007B]. Subsequent images of this feature continued to flow in to the ALPO Saturn Section from quite a few other observers for at least another four months. Consider the high-resolution image taken by Damian Peach on May 26, 2009 at 20:00UT depicting a somewhat more diffuse white STrZ spot, suggesting that the feature detected back in December had slowly evolved over time [refer to Illustration No. 008].

South Equatorial Belt (SEB)

The dark grayish-brown SEB was routinely reported by visual observers in 2008-09, subdivided into dark grayish-brown 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 of Saturn's southern hemisphere, appearing to visual observers as ever so slightly lighter in 2008-09 than in 2007-08 (by +0.30 mean intensity points), and virtually the same intensity as its counterpart in the northern hemisphere, the NEBw. The SEBn was usually the darker of the two components visually. Visual observers who made relative numerical intensity estimates considered the SEBn a bit darker by a mean factor of -0.47 since 2007-08, and the SEBs perhaps a shade brighter by +0.32 mean intensity since the immediately preceding apparition. Most digital images of Saturn submitted during 2008-09 showed the SEB as a very prominent belt occasionally as a singular feature, but most often subdivided into SEBs and SEBn components with the lighter SEBZ lying in between [refer to Illustration No. 009]. The SEBn appeared slightly wider and darker than the SEBs in most of the contributed images, consistent with the majority of visual impressions. The dull yellowish-gray South Equatorial Belt Zone (SEBZ) showed very little change in overall intensity since 2007-08, where a +0.26 mean intensity increase between apparitions is considered rather insignificant.

From mid-November 2008 through mid-June 2009 observers imaged one or more small, diffuse white spots within the SEBZ that seemed to elongate somewhat with time, but the overall appearance and brightness of these features did not change significantly during this period. Ethan Allen was the first ALPO Saturn observer to submit an image showing a small SEBZ white spot on November 16, 2008 at 14:14UT [refer to Illustration No. 010]. On December 1, 2008 Detlev Niechoy submitted a sketch of what he described as an SEBZ white spot at 225X in integrated light (no filter) and good seeing at 05:09UT [refer to Illustration No. 011]. Near simultaneous images of the SEBZ white spot in red light were submitted at 6:47UT on December 7, 2008 by Damian Peach [refer to Illustration No. 012A] and David Arditti at 7:13UT [refer to Illustration No. 012B]. Similar images recorded on the same date and virtually the same time were furnished by Tomio Akutsu on January 27, 2009 at 18:22UT [refer to Illustration No. 013A] and Christopher Go at 18:39UT [refer to Illustration No. 013B. Lastly, simultaneous images of the SEBZ white spot were provided by Christophe Pellier on February 28, 2009 at 00:04UT [refer to Illustration No. 014A] and Marc Delcroix at 00:19UT [refer to Illustration No. 014B]. *Table 5* gives a complete listing, with supporting data and short comments, of the small white spots imaged in the SEBZ during 2008-09. Other than the aforementioned drawing submitted by Detlev Niechoy on November 16, 2008, visual observers rarely suspected any white spots in the SEBZ during the observing season. Simultaneous visual observations concurrent with imaging may help identify the threshold of visibility of such features in upcoming apparitions.

Table 10. Dark Features in the NTeB During the 2008-09 Apparition of Saturn

Date (UT)	UT Start	UT End	CM Start			CM End									
yyyy mm dd	hh:mm	hh:mm	I (°)	II (°)	III (°)	I (°)	II (°)	III (°)	Obs	Obs Stn	Inst (cm)	Inst Type	S	Tr	Notes
2009 03 01	4:25	4:36	292.2	73.4	291.2	298.6	79.6	297.4	Roussell	CAN	15.2	REF	5.0	3.5	Suspected small dark features in NTeB.

Recurring visual accounts of suspected dusky markings and festoon activity within the SEB were received from mid-February until mid-June 2009. Most of these were described as dusky markings or festoons along the northern edge of the SEBs, sometimes extending into the SEBZ, as well as 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. For example, consider the dark features in the SEBs and SEBn sketched by Carl Roussell at 200-300X in fair seeing from 5:33 to 5:44UT on February 17, 2009 [refer to Illustration No. 015]. Compare the SEBn dark feature in the image captured by Damian Peach at 23:01UT on March 20, 2009 [refer to Illustration No. 016A] and the drawing made less than two hours later on March 21st at 00:34UT by Paul Abel at 312X in integrated light (no filter) [refer to Illustration No. 016B]. T*able 6* lists all of the reports of dark spot activity in the SEB during 2008-09.

Equatorial Zone (EZ)

With the rings of Saturn at minimal inclination to our line of sight during 2008-09, the southern and northern halves of the Equatorial Zone (i.e., the EZs and EZn, respectively), could be seen and imaged to good advantage. Based on intensity estimates and digital imaging this observing season, the southern half of the bright yellowish-white Equatorial Zone (EZs) was slightly brighter than the pale yellowish-white EZn by mean factor of +0.47, and the EZs was the brightest zone on Saturn's globe during 2008-09. Visual numerical relative intensity data seems to suggest a possible diminution in prominence of the EZs by a factor of -0.46 and the EZn by a factor of -0.63 since 2007-08.

Starting about the third week of December 2008 and continuing until mid-June 2009, discrete white spot activity was imaged regularly within the EZn. Marc Delcroix was the first Saturn observer to image a tiny EZn white spot in red light on December 22, 2008 at 5:56UT [refer to Illustration No. 017]. On January 4, 2009, the EZn white spot was quite prominent at red wavelengths in a set of images provided by Christophe Pellier at 02:25UT [refer to Illustration No. 018]. Simultaneous observations were submitted on January 23rd by Tomio Akutsu at 17:08UT [refer to Illustration No. 019A] and by Christopher Go at 17:32UT [refer to Illustration No. 019B] recorded the EZn white spot while also recording a transit of Titan across the disk of Saturn. More simultaneous imaging was accomplished on February 14th by David Arditti [refer to Illustration No. 020A] at 00:24UT and Jan Adelaar [refer to Illustration No. 020B] at 01:32UT, and as before, the EZn white spot was more obvious at red wavelengths. On March 12th Tomio Akutsu at 11:37UT [refer to Illustration No. 021A] and Christopher Go at 11:51UT recorded simultaneous images of the still rather compact EZn white spot [refer to Illustration No. 021B]. A final

Table 11. White Spots in the NPR During the 2008-09 Apparition of Saturn

Date (UT)	UT Start	UT End	CM Start			CM End									
yyyy mm dd	hh:mm	hh:mm	I (°)	II (°)	III (°)	I (°)	II (°)	III (°)	Obs	Obs Stn	Inst (cm)	Inst Type	S	Tr	Notes
2009 05 02	20:38	21:20	290.6	207.5	439.7	315.2	231.2	13.3	Delcroix	FRA	25.4	SCT	4.5	4.0	NPR Wh Spot suspected in R+IR

Table 12. The Opposition (Seeliger) Effect During the 2008-09 Apparition

Observer	UT Date and Time	Telescope	B	S	Tr
Ramakers	2009 Mar 08 03:47 – 03:56	23.5 cm (9.25 in.) SCT	–2.6°	4.0	6.0
Go	2009 Mar 08 15:06 – 15:53	28.0 cm (11.0 in.) SCT	–2.6°	9.0	5.5

Table 13. Visual Observations of the Bicolored Aspect of Saturn's Rings During the 2008-09 Apparition

						Filter		
Observer	UT Date and Time	Telescope	X	S	Tr	Bl	IL	Rd
Roussell	2009 Mar 03 10:00 - 10:10	REF 15.2 cm (6.0 in.)	325	4.0	3.5	E	=	=

Notes: Telescope types are as in Table 2. Seeing is the 0-10 ALPO Scale, and Transparency is the limiting visual magnitude in the vicinity of Saturn as described on the first page of this report. Under "Filter," **Bl** 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 brighter, and **=** means that the two ansae were equally bright. East and West directions are as noted in the text.

Table 14. Satellite Phenomena During the 2008-09 Apparition of Saturn

Date (UT)	UT Start	UT End	CM Start			CM End									
yyyy mm dd	**hh:mm**	**hh:mm**	**I (°)**	**II (°)**	**III (°)**	**I (°)**	**II (°)**	**III (°)**	**Obs**	**Obs Stn**	**Instr (cm)**	**Inst Type**	**S**	**Tr**	**NOTES**
2008 12 07	7:13	7:24	22.8	353.7	312.6	29.2	359.9	318.8	Arditti	UK	35.6	SCT			Dione in transit; Titan also in image
2008 12 07	6:37	6:47	1.7	333.4	292.3	7.5	339.0	297.9	Peach	UK	35.6	SCT			Dione in transit
2008 12 20	21:20	21:26	336.0	227.9	170.4	339.5	231.3	173.8	Akutsu	PHIL	35.6	SCT	7.0	3.0	Dione and shadow
2008 12 24	5:26		274.0	58.2	356.7				Casquinha	PORT	35.6	SCT			Rhea near ring plane in image
2009 01 04	3:41	4:18	140.6	291.7	217.0	162.3	312.6	237.9	Casquinha	PORT	35.6	SCT			Tethys and shadow
2009 01 04	3:26		131.8	283.3	208.6				Peach	UK	35.6	SCT			Tethys shadow in EZn
2009 01 04	3:31	3:45	134.7	286.1	211.4	142.9	294.0	219.3	Pellier	FRA	25.4	CAS	8.5	5.0	Tethys and shadow
2009 01 07	19:50		1.9	34.4	315.3				Go	PHIL	28.0	SCT	7.0	4.0	Titan Transit
2009 01 09	3:34	3:59	38.4	28.2	307.5	53.0	42.3	321.5	Casquinha	PORT	35.6	SCT			Dione shadow transit
2009 01 23	17:08	18:03	97.1	336.4	238.1	129.4	7.4	269.1	Akutsu	PHIL	35.6	SCT	6.0	4.0	Titan in transit
2009 01 23	17:32		111.2	350.0	251.7				Go	PHIL	28.0	SCT	7.0	5.0	Titan in transit
2009 02 08	16:33	16:48	266.9	350.2	232.6	275.7	358.6	241.1	Akutsu	PHIL	35.6	SCT	7.5	3.0	Titan transit
2009 02 08	18:00	18:22	317.9	39.2	281.6	330.8	51.6	294.0	Go	PHIL	28.0	SCT	7.0	4.0	Titan transit (egress)
2009 02 14	1:32		124.9	34.6	270.6				Adelaar	NETH	23.5	SCT			Rhea in transit
2009 02 14	0:24	0:30	85.1	356.2	232.3	88.6	359.6	235.7	Arditti	UK	35.6	SCT			Rhea and shadow in transit
2009 02 14	3:00	3:10	176.5	84.2	320.1	182.4	89.9	325.8	Casquinha	PORT	35.6	SCT			Rhea in transit
2009 02 18	14:57	15:44	14.5	136.9	7.4	42.1	163.4	33.9	Go	PHIL	28.0	SCT	5.5	4.0	Rhea and shadow in transit
2009 02 24	11:19	11:42	273.0	206.5	69.9	286.5	219.5	82.9	Maxson	USA	25.4	DALL			Titan shadow transit (Titan is just off limb)
2009 02 24	14:13		15.1	304.6	167.9				Wesley	AUST	36.8	NEW			Titan and Dione in transit
2009 02 27	8:24	8:36	183.6	24.1	244.0	190.6	30.8	250.8	Maxson	USA	25.4	DALL			Dione and shadow
2009 03 03	15:06		196.8	259.1	113.9				Go	PHIL	28.0	SCT	5.5	4.0	Tethys transit (extremely vague)
2009 03 05	14:31	14:56	65.0	63.5	275.9	79.7	77.6	290.0	Go	PHIL	28.0	SCT	5.5	4.0	Tethys transit (extremely vague)
2009 03 08	15:06	15:53	98.7	359.4	208.2	126.2	26.0	234.7	Go	PHIL	28.0	SCT	9.0	5.0	Dione and Enceladus in transit
2009 03 12	11:37	12:24	113.6	249.9	94.0	141.1	276.4	120.4	Akutsu	PHIL	35.6	SCT	2.5	3.5	Titan and shadow transit
2009 03 12	11:51	13:08	121.8	257.7	101.8	166.9	301.2	145.2	Go	PHIL	28.0	SCT	7.5	5.0	Titan and shadow transit

Table 14. Satellite Phenomena During the 2008-09 Apparition of Saturn (Continued)

Date (UT)	UT Start	UT End	CM Start			CM End									
yyyy mm dd	hh:mm	hh:mm	I (°)	II (°)	III (°)	I (°)	II (°)	III (°)	Obs	Obs Stn	Instr (cm)	Inst Type	S	Tr	NOTES
2009 03 12	10:11	10:19	63.1	201.4	45.5	67.8	205.9	50.0	Maxson	USA	25.4	DALL			Titan and shadow transit
2009 03 17	13:57	14:30	97.5	69.1	267.1	116.8	87.7	285.6	Go	PHIL	28.0	SCT	8.5	3.5	Rhea transit
2009 03 18	13:37	13:50	210.1	149.9	346.6	217.7	157.2	354.0	Go	PHIL	28.0	SCT	8.5	3.5	Dione and Enceladus transit
2009 03 20	13:41	14:19	101.1	336.2	170.6	123.4	357.7	192.0	Go	PHIL	28.0	SCT	8.5	3.5	Titan eclipse sequence and Tethys Transit
2009 03 22	13:32	14:17	344.5	155.3	347.2	10.9	180.6	12.5	Akutsu	PHIL	35.6	SCT	8.5	3.5	Tethys in transit across globe
2009 03 26	19:03		316.0	350.1	176.9				Ghomizadeh	IRAN	35.6	SCT			Rhea and shadow in transit
2009 04 03	23:57		43.0	172.1	349.1				Viladrich	FRA	35.6	SCT			Dione and shadow transit
2009 04 05	13:27	13:45	282.2	0.9	175.9	292.8	11.0	186.1	Go	PHIL	28.0	SCT	7.5	5.0	Titan eclipse sequence
2009 04 09	5:38	6:26	144.5	104.5	275.1	172.6	131.5	302.1	Melka	USA	30.5	NEW			Rhea shadow transit
2009 04 13	11:16	11:55	119.9	303.1	108.6	142.8	325.1	103.6	Go	PHIL	28.0	SCT	7.0	2.5	Titan shadow transit
2009 04 14	22:11		268.2	44.4	208.2				Adelaar	NETH	23.5	SCT			Dione transit
2009 04 22	2:45	3:17	218.9	122.8	277.9	237.6	140.9	296.0	Maxson	USA	25.4	DALL			Dione and shadow transiting globe
2009 04 22	20:41		129.7	9.6	163.8				Peach	UK	35.6	SCT			Rhea and shadow on globe
2009 04 22	19:50	20:08	99.8	340.8	135.1	110.4	351.0	145.2	Sharp	UK	28.0	SCT	6.5		Rhea and shadow on globe
2009 04 23	2:41		340.8	212.6	6.5				Maxson	USA	25.4	DALL			Shadow of Dione
2009 04 23	1:40	1:58	305.0	178.2	332.1	315.6	188.3	342.3	Melka	USA	30.5	NEW	6.0	5.0	Shadow of Dione
2009 04 29	3:06	7:10	21.1	58.5	205.1	164.1	196.1	342.5	Maxson	USA	25.4	DALL			Titan and shadow transit
2009 05 15	3:18	6:06	216.0	96.4	223.7	314.5	191.1	318.3	Maxson	USA	25.4	DALL			Titan and Shadow Transit
2009 05 19	20:05		223.3	311.9	73.6				Peach	UK	35.6	SCT			Rhea in transit
2009 05 19	22:01	22:59	291.3	17.3	138.9	325.3	50.0	171.5	Abel	UK	20.3	NEW			Sequence of drawings of Rhea and shadow in transit
2009 05 28	20:16		267.6	65.3	176.1				Peach	UK	35.6	SCT			Rhea approaching transit
2009 05 28	20:47		285.8	82.8	193.6				Delcroix	FRA	25.4	SCT	4.5	4.0	Rhea and Enceladus in transit
2009 05 28	20:57		291.6	88.4	199.2				Bosman	NETH	28.0	SCT			Rhea in transit

Table 14. Satellite Phenomena During the 2008-09 Apparition of Saturn (Continued)

Date (UT)	UT Start	UT End	CM Start			CM End									
yyyy mm dd	hh:mm	hh:mm	I (°)	II (°)	III (°)	I (°)	II (°)	III (°)	Obs	Obs Stn	Instr (cm)	Inst Type	S	Tr	NOTES
2009 05 31	3:10	5:18	38.7	122.5	230.6	113.7	194.7	302.6	Maxson	USA	25.4	DALL			Titan shadow transit
2009 05 31	4:41	6:32	92.1	173.8	281.8	157.1	236.4	344.3	Hill	USA	9.0	MAK	7.0		Titan transit sequence

pair of simultaneous images were contributed on April 2nd by Jan Adelaar at 21:18UT [refer to Illustration No. 022A] and Damian Peach at 21:28UT [refer to Illustration No. 022B], showing that the EZn white spot had expanded slightly and seemed more longitudinally elongated than in the past. In an image furnished by Damian Peach on May 19th at 20:05UT [refer to Illustration No. 023], the EZn white spot was pretty similar to its appearance back in early April. Based on the observational work by the ALPO team of observers for the span observations between December 2008 and mid-June 2009, the EZn white spot evolved rather slowly morphologically with perhaps a gradual brightening trend. Visual observers did not report white spot activity in the EZ during 2008-09.

Drawings submitted by Detlev Niechoy in February and April 2009 depicted festoon activity in the EZn. Consider his drawing made at 20:28UT on April 21st at 290X, which shows festoons emanating from the south edge of the NEB in good seeing [refer to Illustration No. 024]. There were no digital images submitted showing dusky features in the EZn during the observing season.

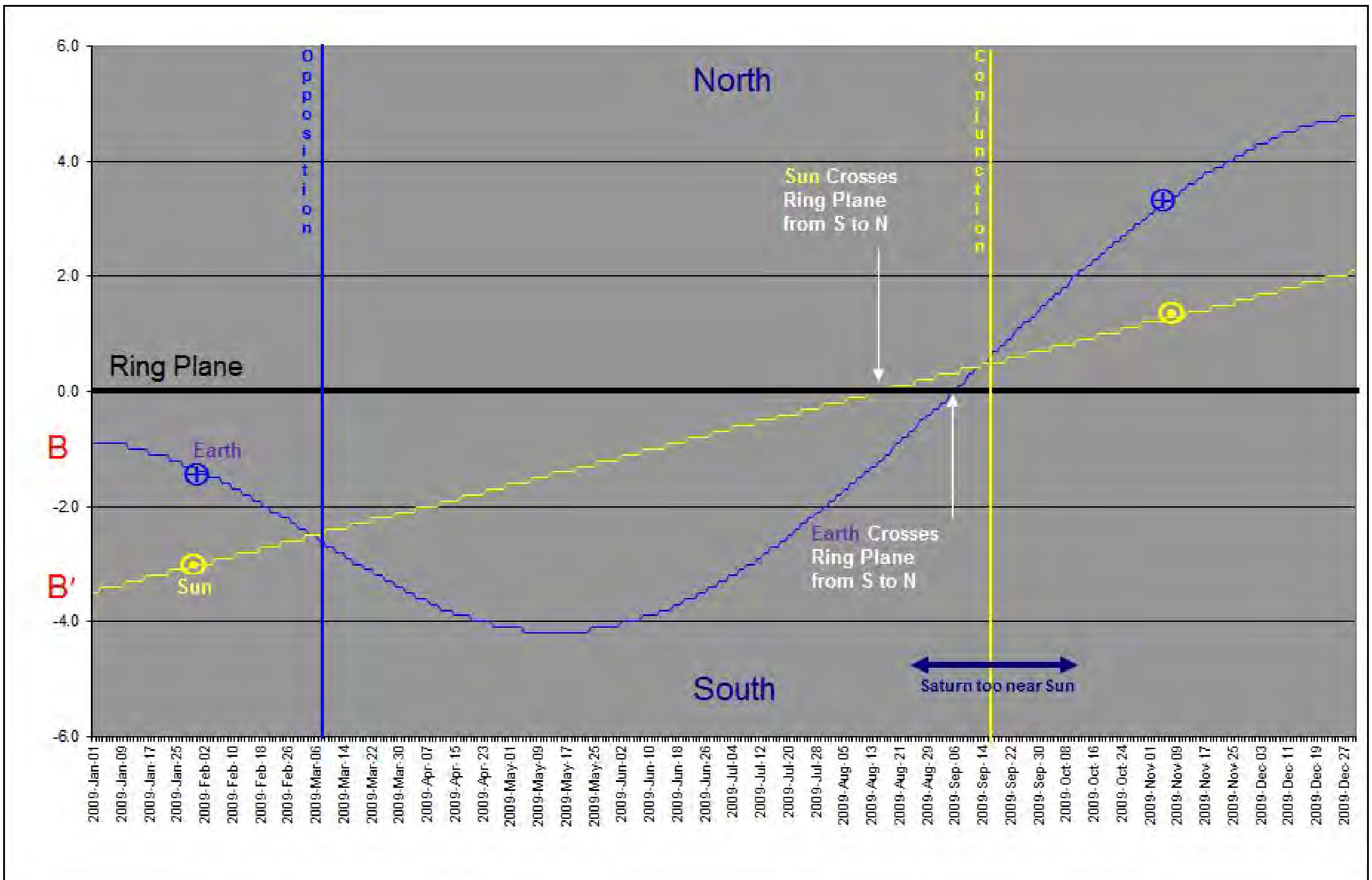


Figure 7. Represents graphically the circumstances of the edgewise presentation of the rings in 2008-09, showing the changing position of the Earth and Sun relative to Saturn's ring plane throughout the apparition. The points where the Sun and Earth both cross the ring plane headed north are shown in the diagram (i.e., the times when the rings were theoretically edgewise to each body).

General Caption Note for Illustrations 1-43*. 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 Figure 5. In all figures, south is at the top and IAU east is to the left.*

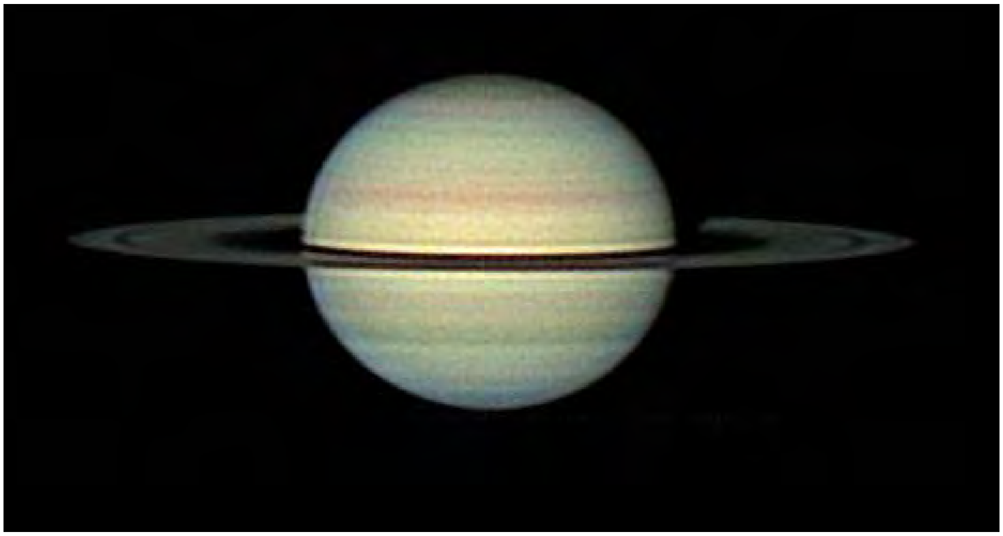


Illustration 001. 2009 May 23 12:02UTUT. Digital image by Christopher Go using a 28.0 cm (11.0 in.) SCT, with RGB + IR blocking filter. S = 7.5 Tr = 4.0. CMI = 77.0°, CMII = 47.2°, CMIII = 164.5°, B = –4.3°, B´ = –1.5. South Polar Belt (SPB) is visible encircling the SPR in this image.

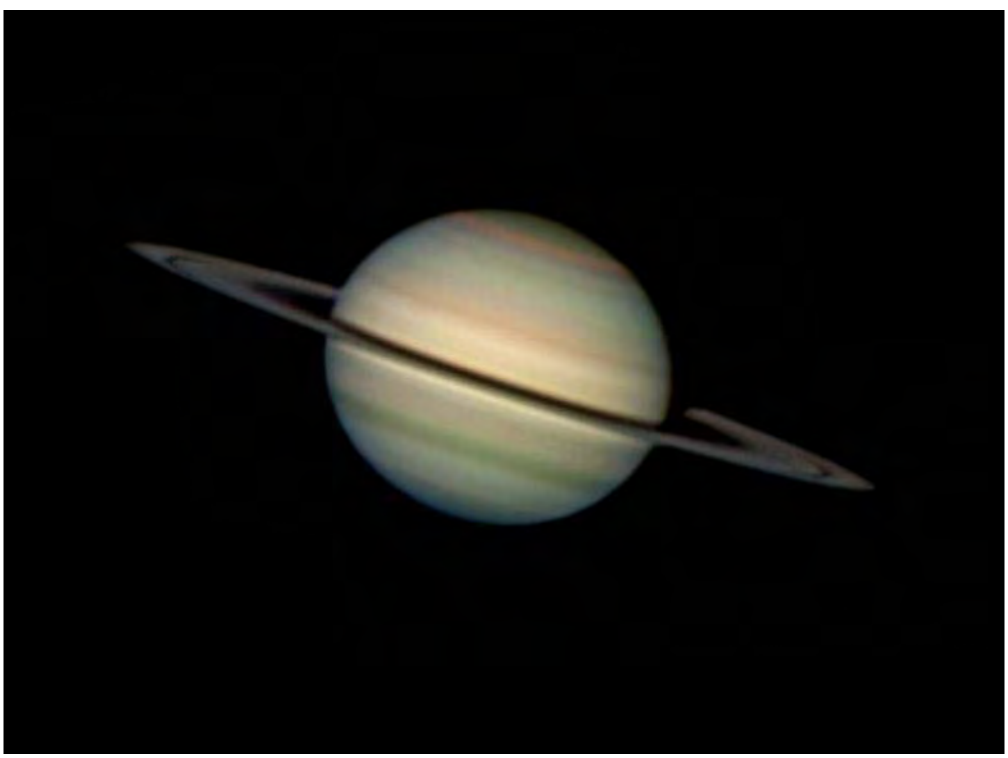


Illustration 002. 2009 Apr 20 20:24UT. Digital image by Damian Peach employing a 35.6 cm (14.0 in.) SCT with RGB filters + IR blocker. S and Tr not specified. CMI = 231.2°, CMII = 176.0°, CMIII = 332.7, B = –4.1°, B´ = –2.0°. SSTeB is apparent in this excellent image.

The typically narrow light gray Equatorial Band (EB) was not reported by visual observers during the apparition, but it was sporadically captured using digital imagers during the observing season. It is quite apparent in the excellent image contributed by Christopher Go on April 10, 2009 at 12:37UT [refer to Illustration No. 025].

Northern Portions of the Globe

With Saturn's rings evolving toward edgewise orientation as the 2008-09 apparition concluded, regions of the planet's northern hemisphere such as the NEB, NTrZ and NPR were more favorably exposed to observers who made drawings and captured images. Now that the Earth is situated north of the rings, and will be for more than a decade henceforth, studies of Saturn's northern hemisphere become advantageous as regions of the southern hemisphere progressively become hidden from view by the rings. With 2008-09 technically an edgewise apparition, albeit unfavorable for reasons stated earlier in this report, it was nevertheless possible to draw comparisons of analogous features between Saturnian hemispheres. Observers began to see and image limited activity such as dark features in the North Equatorial Belt (NEB) and North Temperate Belt (NTeB) in March 2009, as well as a transient white spot in the North Polar Region (NPR) in early May.

North Equatorial Belt (NEB)

Unlike its counterpart in the South in 2008-09, the dark grayish-brown NEB was reported by visual observers most of the time as a singular feature, undifferentiated into North and South components. Visual numerical relative intensity estimates were always made of the NEB as a whole (NEBw), and it was basically the same in overall mean intensity since 2007-08 (a difference of -0.11 mean intensity is insignificant). Even though intensity estimates were not provided, visual observers with larger instruments sometimes described the NEB as split into a narrower NEBs and a wider NEBn, with a fairly broad yellowish Northern Equatorial Belt Zone (NEBZ) situated in between. Imaging often revealed the NEBs and NEBn during the observing season separated by the NEBZ. The NEBn was virtually always the darker and wider of the two components [refer to Illustration No. 026]. A singular report of a dark spot within the NEBs was received from Marc Delcroix on March 13th at 22:58-

23:34UT in red light (see *Table 9*), but the feature was so faint it was hard to discern on the contributed image.

North Tropical Zone (NTrZ)

Visual observers did not describe this feature during the 2008-09 apparition, and it was infrequently visible on even the best submitted high resolution digital images.

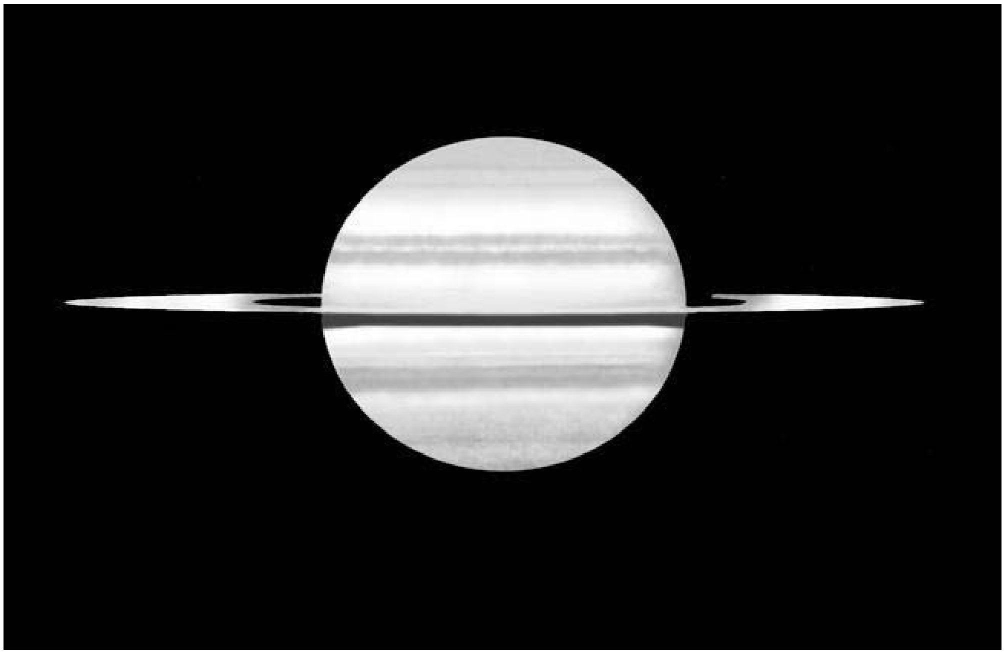


Illustration 003. 2008 Nov 29 08:03UT. Excellent drawing by Sol Robbins with a 15.2cm (6.0in.) REF at 350X in Integrated Light. S = 7.0, Tr = 5.0. CMI = 137.4°, CMII = 5.6°, CMIII = 334.1°, B = –1.4°, B´ = –4.2°. STeZ is quite obvious in this drawing in good seeing.

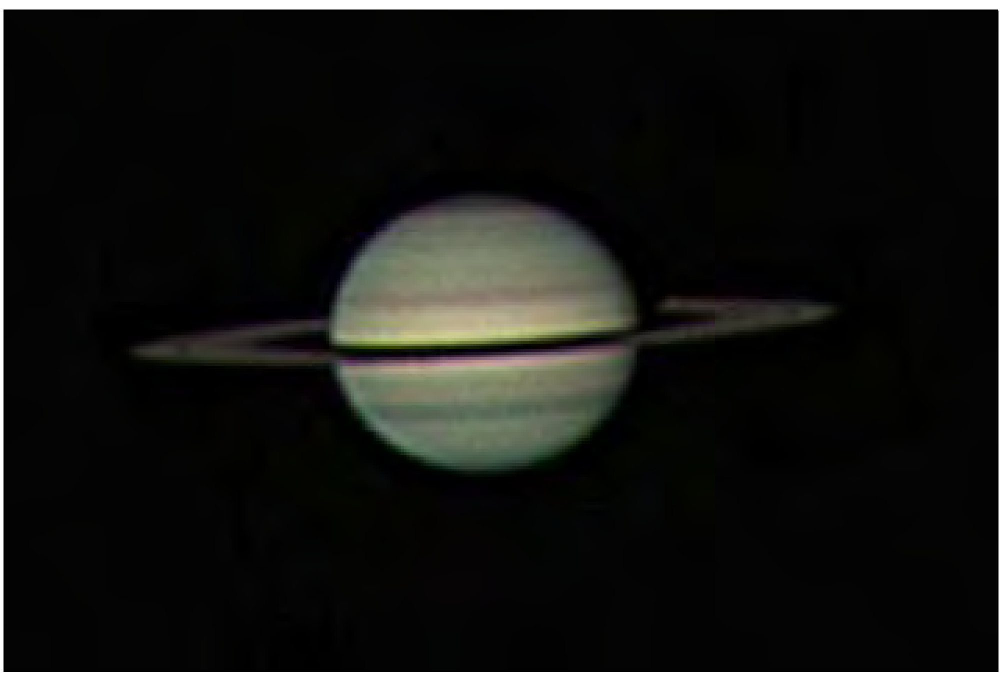


Illustration 004. 2009 May 15 01;14UT. Digital image by Theo Ramakers with a 23.5 cm (9.25 in.) SCT, with RGB filters. S = 6.0 and Tr = 6.0. CMI = 143.3°, CMII = 26.5°, CMIII = 153.9°, B = –4.3°, B´ = –1.6°. The STeB is visible in this very nice image; a considerable number of S- and N-Hemisphere belts and zones are also quite obvious.

North Temperate Belt (NTeB)

The light grayish-brown NTeB was reported by only one visual observer, Carl Roussell, who remarked that small dark condensations were suspected visually at 04:25UT on March 1, 2009 [refer to Illustration No. 027]. The NTeB was captured on many digital images contributed during 2008-09, but there was no activity in this belt detected on images submitted this apparition.

North Temperate Zone (NTeZ)

This yellowish-white zone was reported by visual observers during 2008-09, roughly comparable to the STeZ in mean intensity. Digital images showed this zone generally devoid of discrete phenomena during the apparition.

North North Temperate Belt (NNTeB)

The dull gray NNTeB was hard to detect on even the best images taken in good seeing conditions in 2008-09, and visual observers did not report it.

North North Temperate Zone (NNTeZ)

During 2008-09 the dull yellowish-gray NNTeZ was not reported visually nor was it clearly perceptible on images taken with larger apertures during the observing season.

North Polar Region (NPR)

Even under the best conditions, visual observers had trouble discerning the NPR as a distinct region in the far North of Saturn's globe during 2008-09. Probably because it was always so vague and poorly defined at the eyepiece, there were no intensity estimates sent to the ALPO Saturn Section. Digital images routinely showed what appeared to be the dusky southernmost edge of the NPR, but detail was seldom seen within it. Even so, Marc Delcroix was able to successfully image a tiny white spot at the edge of the NPR at red wavelengths in fair seeing conditions on May 2, 2009 at 20:38-21:20UT [refer to Illustration No. 028].

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 2008-09. Any presumed variation of this shadow from a totally black intensity (0.0) during a given observing season is merely a consequence of bad seeing conditions or the presence of extraneous light. Digital images revealed this feature

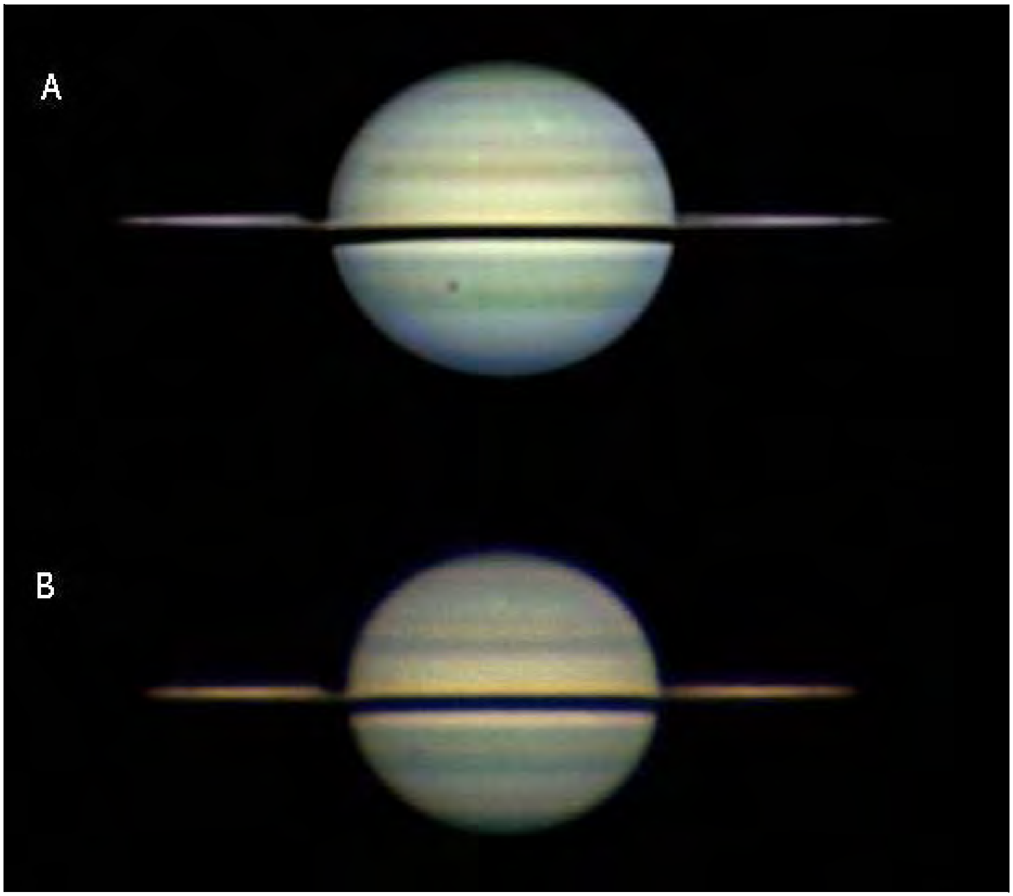


Illustration 005. Simultaneous Observations (digital images)

A. 2008 Dec 08 06:47UT. Digital image by Damian Peach with a 35.6-cm (14.0-in.) SCT and RGB filters. S and Tr not specified. CMI = 7.5°, CMII = 339.0°, CMIII = 297.9°, B = –1.2°, B´ = –4.1°. The STrZ white spot is just W of the CM (dark spot feature North of the rings is the shadow of Dione). SEBZ white spot is also barely visible.

B. 2008 Dec 08 07:13UT. Digital image by David Arditti with a 35.6-cm (14.0-in.) SCT, and RGB filters. S and Tr not specified. CMI = 22.8°, CMII = 353.7°, CMIII = 312.6°, B = –1.2°, B´ = 4.1°. The STrZ white spot is near CM. There are hints of the vague SEBZ in the image.

as completely black. Readers are reminded that the globe of Saturn casts a shadow on the ring system to the left or IAU East prior to opposition, to the right or IAU West after opposition, and on neither side precisely at opposition (no shadow) as illustrated in *Figure 6* (digital images furnished by Christopher Go using a 28.0 cm (11.0 in.) SCT on November 22, 2008, March 8, 2009, and May 23, 2009).

Saturn's Ring System

The discussion in this section is based on visual studies of Saturn's ring system with the customary comparison of mean intensity data between apparitions, and impressions from digital images of the rings are included below as well. The rings were oriented edgewise toward Earth near the close of the 2008-09 apparition. Since the last edge-on orientation of the rings back in 1995, the southern hemisphere and south face of the rings have been inclined toward Earth, but once the Sun and Earth passed through the ring plane headed northward in August and September 2009, respectively, the northern hemisphere and north face of the rings will become increasingly visible for over a decade.

The southern face of the rings was still observable during 2008-09, but only minimally so, making it increasingly troublesome to view major ring components to advantage as their tilt toward our line of sight diminished. It was also difficult to trace divisions and intensity minima around the circumference of the rings. As mentioned earlier in this report, the value of B, or the Saturnicentric latitude of the Earth referred to the ring plane (+ when north), ranged between the extremes of -4.2° (May 13, 2009) and -1.3° (August 14, 2009), and B was 0.0° on September 4, 2009 when the rings were theoretically edge-on toward Earth, occurring roughly 13 days before conjunction. So, Earth-based observers were unable to see or image the actual edgewise event because Saturn was only 11° east of the Sun and hopelessly immersed in the overwhelming solar glare. The value of B', the saturnicentric latitude of the Sun, varied from -4.7° (October 17, 2008) to 0°.0 (August 14, 2009). Figure 7 presents graphically the circumstances of the edgewise presentation of the rings in 2008-09.

Even though the edgewise events were not favorable in 2008-09, for the convenience of readers, it is worthwhile to mention a few of the facts pertaining to edgewise ring orientations:

Saturn’s revolution period about the Sun is 29.5y, and the angle of the rings relative to the Sun varies by ±26.7°.

During this period the intersection of the orbit of the Earth and the plane of the ring system takes place only twice, at intervals of 13.75y and 15.75y.

Since the rings are so thin (~100m thick) when edge-on, they appear to disappear when viewed with a small telescope.

The two periods are of unequal length due to Saturn's elliptical orbit about the Sun.

In the 13.75y period, Saturn’s S pole and S ring face are inclined toward Earth; Saturn reaches perihelion during this span (e.g., 1996 to 2009, with perihelion of 9.0AU occurring back in July 2003).

In the 15.75y period, Saturn’s N pole and N ring face are tilted toward Earth; Saturn reaches aphelion during this time (e.g., 2009 thru 2025, with aphelion of 10.1AU occurring in April 2018).

The last edgewise presentation of the rings occurred in 1995-96, which was extremely favorable and well-observed by the ALPO Saturn Section.

During 2008-09, as the Earth crossed the ring plane on September 4th, Saturn was only 11° E of the Sun, with conjunction only two weeks away, which made observations very unfavorable.

The next edgewise orientation of the rings occurs on March 23, 2025 with Saturn just 10° W of the Sun, and Saturn will be lost in the overwhelming solar glare.

Unfortunately, the next favorable edgewise apparition won't occur until 2038-39!

The only images received by ALPO Saturn observers as near as possible to the theoretical edge-on orientation of the rings was submitted by Tomio Akutsu on August 10, 2009 at 10:32UT [refer to Illustration No. 029] and on August 14th at 11:00UT [refer to Illustration No. 030].

Ring A

The majority of visual observers agreed that the yellowish-white Ring A, taken as a whole, was perhaps marginally darker in 2008-09 than in 2007-08 based on visual numerical relative intensity estimates (difference of -0.50 mean intensity points). Visual observers usually described Ring A as one overall component, not being differentiated into inner and outer halves. Most digital images of Saturn in 2008-09, however, depicted inner and outer halves of Ring A, with the inner half slightly brighter than the outer half, especially at red wavelengths. Visual observers occasionally reported the very dark gray Encke's division (A5) in 2008-09 when the rings were near their maximum tilt but offered no visual numerical relative intensity estimates. It was also apparent on the best digital images [refer to Illustration No. 031], and there were hints of Keeler's gap (A8) on some images in rare instances. The latter was not reported by visual observers.

Ring B

The outer third of Ring B is the established standard of reference for the ALPO Saturn Visual Numerical Relative Intensity Scale, with an assigned value of 8.0. Under circumstances of greater ring tilt during the apparition, visual observers reported that the outer third of Ring B appeared brilliant white with no variation 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 essentially the same mean intensity as in the immediately preceding observing season. Digital images confirmed most visual impressions during 2008-09 [refer to Illustration No. 026].

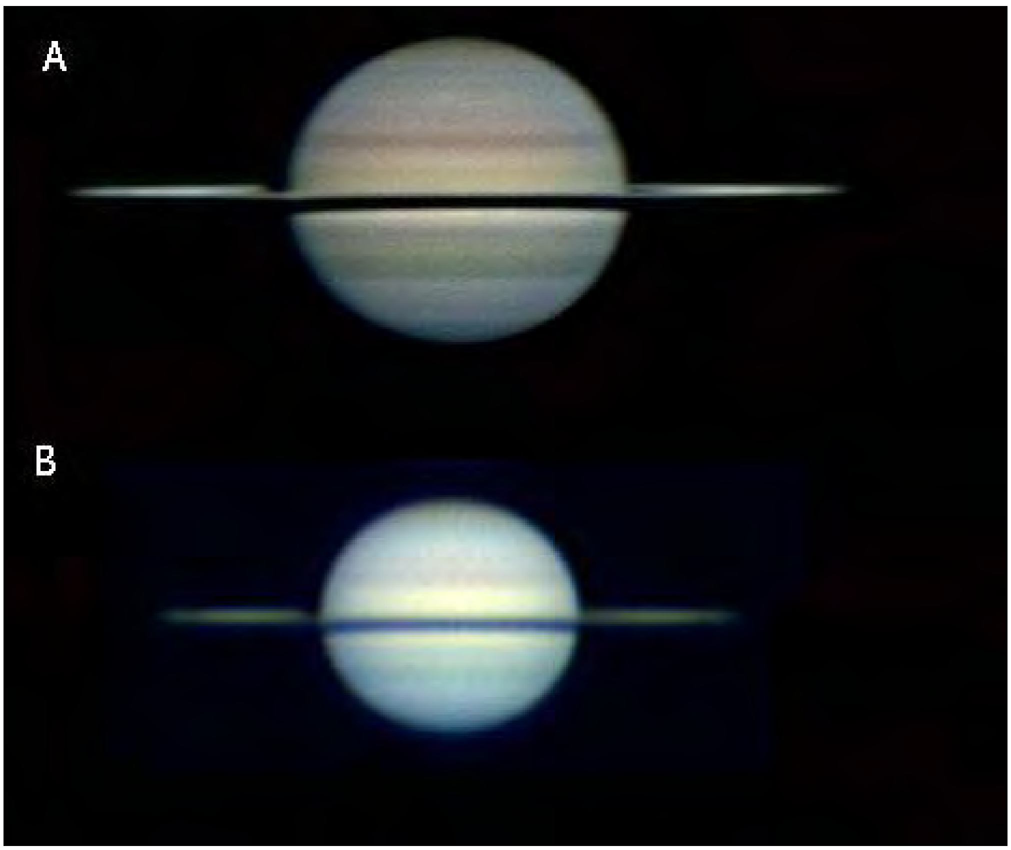


Illustration 006. Simultaneous Observations (digital images)

A. 2008 Dec 10 20:53UT. Digital image by Tomio Akutsu with a 35.6-cm (14.0-in.) SCT and RGB filters. S= 6.0 and Tr = 3.0. CMI = 156.6°, CMII = 12.2°, CMIII = 326.8°, B = –1.1°, B´ = –4.0°. The STrZ white spot is near CM.

B. 2008 Dec 10 20:30UT. Digital image by Toshihiko Ikemura with a 38.0 cm (15.0 in.) NEW and RGB filters. S and Tr not specified. CMI = 143.1°, CMII = 359.2°, CMIII = 313.9°, B = –1.1°, B´ = –4.0°. The STrZ white spot is near CM.

Cassini's Division (A0 or B10)

Despite the minimal inclination of the rings most of 2008-09, Cassini's division (A0 or B10) was frequently reported by visual observers, described as grayish-black gap at both ansae. It was seldom noticeable all the way around Saturn's ring system by visual observers due to the small numerical value of **B** this apparition, also the situation with high-resolution images [refer to Illustration No. 002]. While a black Cassini's division was usually apparent on many of the digital images received during the 2008-09 observing season, a deviation from a totally black intensity for Cassini's Division was a consequence of bad seeing, scattered light, or insufficient aperture. The general visibility of major ring divisions and other intensity minima across the breadth of the South face of the rings was considerably less favorable this apparition with the continued shrinking toward 0° as Saturn approached edgewise orientation toward our line of sight.

Ring C

The very dark gray Ring C was often visible at the ansae in 2008-09 and apparent on most digital images, particularly those submitted when the rings were sufficiently inclined toward our view during the apparition. Visual observers did not submit visual numerical relative intensity estimates. The Crape

Band (merely Ring C in front of the globe of Saturn) appeared very dark gray in color and uniform in intensity, and was generally visible on digital images [refer to Illustration No. 032]. Based on very few intensity estimates, the Crape Band appeared -1.10 mean intensity points dimmer since 2007-08, but observers had rather poor confidence in their results because of the narrow ring tilt.

Opposition Effect

During 2008-09 several observers, despite the narrow tilt of the rings of -2.6° toward Earth, noticed the "opposition effect" (also known 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 between Sun, Saturn, and the Earth is less than about 0.3° (see Table 13). This ring brightening is due to coherent back-scattering of sunlight by their constituent m-sized icy particles, which do so far more effectively than the particles of Saturn's atmosphere. This phenomenon was supposed to peak on March 8, 2009 (date of opposition), but observers who detected it suggested the effect was not as pronounced the last two apparitions because of the narrowing ring tilt toward Earth [refer to Illustration No. 033].

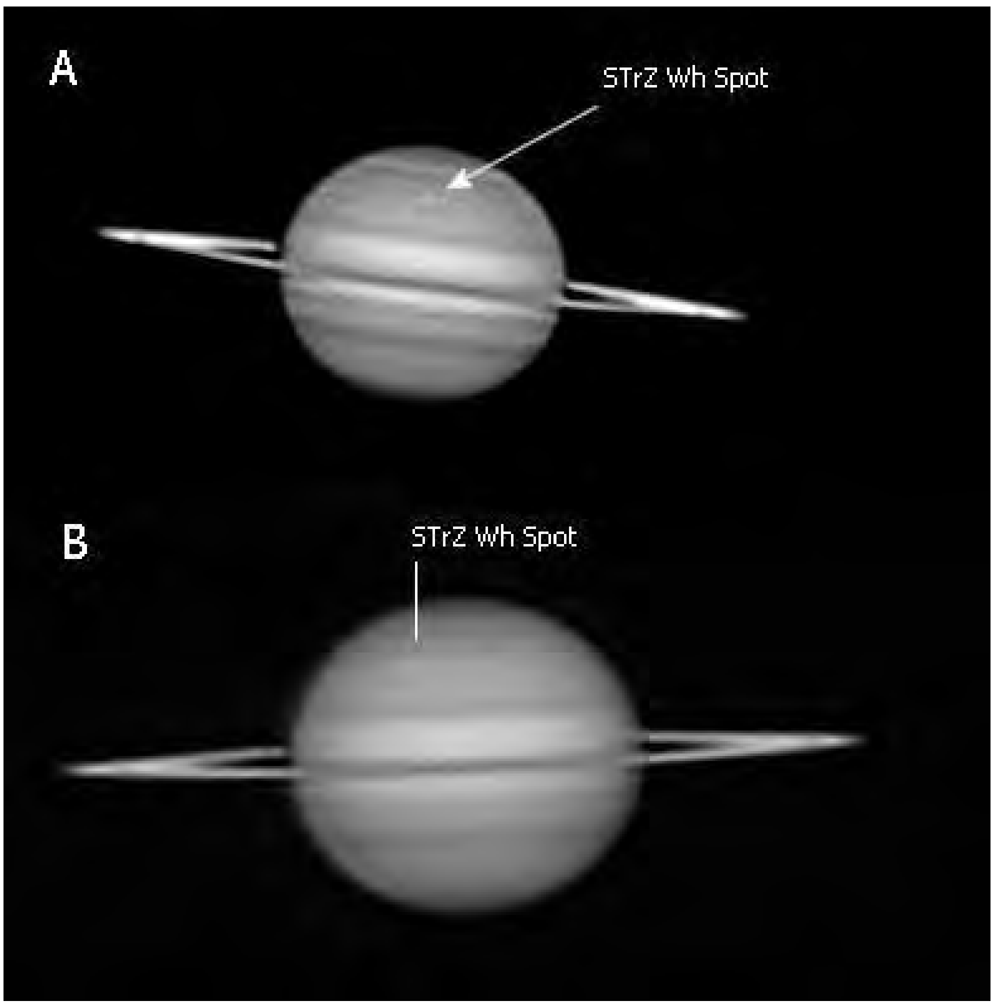


Illustration 007. Simultaneous Observations (digital images)

A. 2009 Mar 03 00:50UT. Digital image by Christophe Pellier with a 25.4 cm (10.0 in.) CAS and RGB filters. S = 5.0 and Tr = 5.0. CMI = 54.9°, CMII = 136.4°, CMIII = 351.9°, B = –2.6°, B´ = –2.7°. The STrZ white spot is near CM.

B. 2009 Mar 03 00:59UT. Digital image by Jan Adelaar with a 23.5 cm (9.25 in.) SCT and RGB filters. S and Tr not specified. CMI = 60.1°, CMII = 141.1°, CMIII = 356.6°, B = –2.6°, B´ = 2.7°. The STrZ white spot is near CM.

Shadow of the Rings on the Globe (Sh R on G)

This shadow in 2008-09 was almost always described as a completely black feature where the rings crossed Saturn's globe. Reported departures 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 less than that of B¢, the ring shadow is to the north of the projected rings, which happened prior to March 4, 2009 [refer to Illustration No. 034]. When B and B¢ are both negative, and the value of B exceeds that of B¢, the shadow of the rings on the globe is cast to their south, circumstances that occurred starting about March 7, 2009 through August 14, 2009 (the final observation received for the apparition); the Crape Band then is seen south of the projected Rings A and B [refer to Illustration No. 035]. 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 in 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 only a few instances when this feature was reported by visual observers during 2008-09. It is purely an artificial contrast effect, not a real feature of Saturn's rings, but it is useful to try to find any correlation that might 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 is an observed difference in coloration between the East and West ansae (IAU system) when systematically compared with alternating W47 (where W denotes the Wratten filter series), W38, or W80A (all blue filters) and W25 or W23A (red filters). There was only one visual observation contributed during 2008-09 apparition of the bicolored aspect of the ring ansae (see *Table 13*). As in the rest of this report, directions in the table refer to Saturnian or IAU directions, where West is to the right and South at the top in a normally-inverted telescope image (observer located in the Northern Hemisphere of the Earth).

In recent years observers have been systematically attempting to document the presence of the bicolored aspect of the rings using digital imagers (there have been rare instances when the phenomenon was allegedly photographed in the past, if at all possible at the same time it is sighted visually. In 2008-09 there were no images submitted with any evidence of this phenomenon, but it is hopeful that observers will eventually be successful imaging this curious effect at the same time visual observers report now that digital imaging is now quite routine. Indeed, documenting the presence of the bicolored aspect of the rings, especially when it occurs independent of similar effects on the globe of Saturn (which would be expected if atmospheric dispersion was a contributing factor), is of enormous value. So, to reiterate, the importance of simultaneous visual observations of Saturn with imaging of the planet cannot be stressed enough so that more objective confirmation of the bicolored aspect of the rings can occur.

Illustration 008. 2009 May 26 20:00UT. Digital image by Damian Peach employing a 35.6 cm (14.0 in.) SCT with RGB filters + IR blocker. S and Tr not specified. CMI = 9.8°, CMII = 232.5°, CMIII = 345.7°, B = –4.3°, B´ = –1.4°. Somewhat diffuse STrZ white spot is apparent in this excellent image.

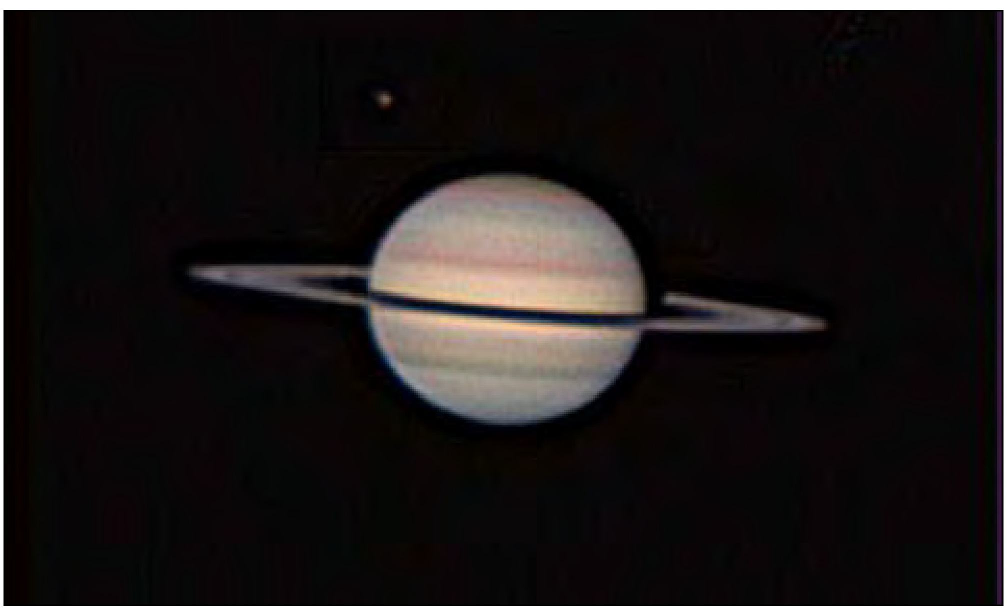


Illustration 009. 2009 Apr 21 03:27UT. Digital image by Paul Maxson using a 25.4-cm (10.0-in.) DAL in IL + IR blocking filter. S and Tr not specified. CMI = 119.2°, CMII = 54.5°, CMIII = 210.8°, B = –4.1°, B´ = –2.0°. SEB is divided into the darker, wider SEBn and narrower SEBs, with SEBZ situated in between.

Professional astronomers are well-acquainted with Earth-based sightings of azimuthal variations in the rings (initially confirmed by *Voyager* spacecraft), which is probably a result of light-scattering by denser-than-average clumps of particles orbiting in Ring A. ALPO Saturn observers are encouraged to try to image any azimuthal brightness asymmetries in Ring A, preferably at the same date that visual observers report it.

The Satellites of Saturn

During the 2008-09 apparition, because the rings were at or near edgewise orientation toward Earth, the glare from the rings was considerably reduced, making it easier to see and image faint objects like satellites close to Saturn. Many of the planet'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. 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.

Visual Magnitude Estimates and Photometry

ALPO Saturn Section observers in 2008-09 submitted no systematic visual estimates of Saturn's satellites employing recommended techniques by the ALPO Saturn Section. Even though photometry has largely replaced visual magnitude estimates of Saturn's moons, visual observers should still try to establish the comparative brightness of a satellite 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.

The methodology of visually estimating satellite magnitudes is quite simple. It first begins with selection of at least two stars with well-established magnitudes and those that 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 roughly 1.0 magnitude. This makes it easy to divide the brightness difference between the two comparison stars into equal magnitude steps of 0.1. 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, however, a last resort alternative is to use Saturn's brightest satellite, Titan, at visual magnitude 8.4. It is known to exhibit only subtle brightness fluctuations over time compared with the other bright satellites of Saturn that have measured amplitudes.

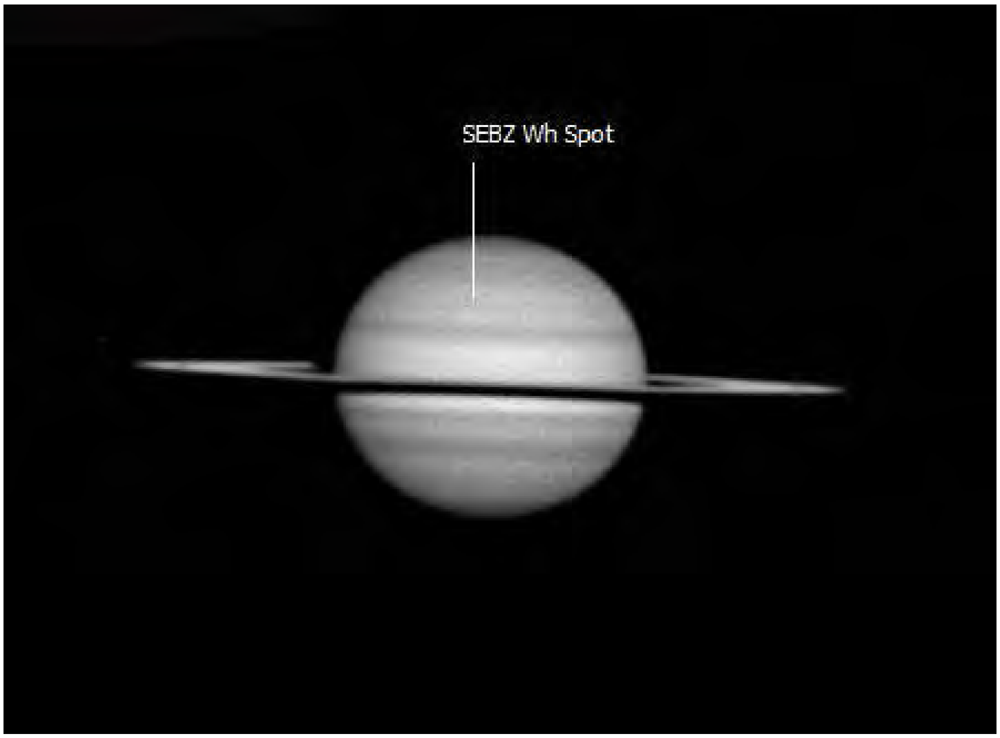


Illustration 010. 2008 Nov 16 14:14UT. Digital image by Ethan Allen using 35.6 cm (14.0 in.) SCT with red filter. S = 4.0 and Tr = 4.0. CMI = 178.9°, CMII = 98.7°, CMIII = 82.6°, B = –1.7°, B´ = –4.4°. SEBZ white spot is particularly noticeable in red wavelengths.

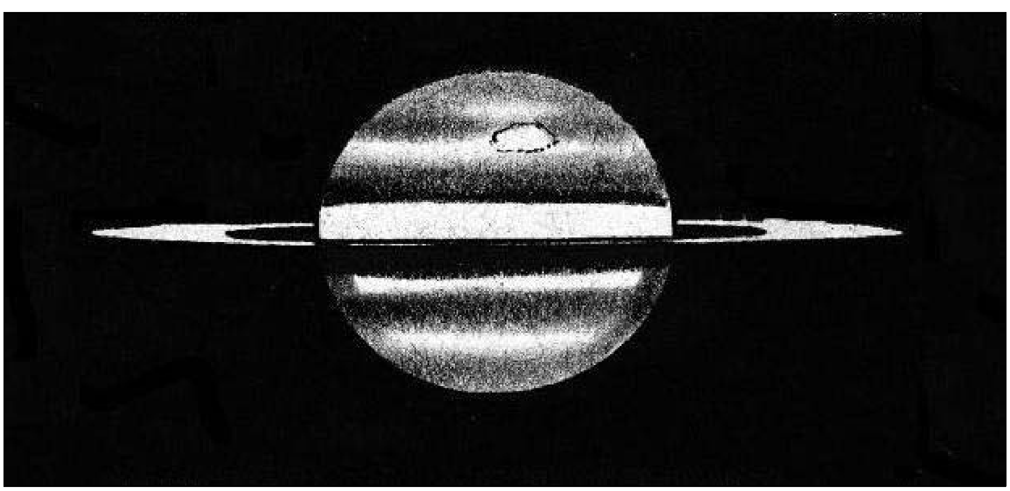


Illustration 011. 2008 Dec 01 19:26 UT. Drawing by Detlev Niechoy using a 20.3 cm (8.0-in.) SCT in Integrated Light at 225X. S = 4.5, Tr = 4.5 (interpolated). CMI = 284.1°, CMII = 91.5°, CMIII = 57.8°, B = –1.3°, B´ = 4.2°. SEBZ is located slightly W of the CM.

Some observers have begun using digital imagers with adequate sensitivity to capture the satellites of Saturn together with nearby comparison stars, thereby providing 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 worthwhile for cross-checking against ephemeris predictions of their locations and identities. It is important to realize, however, that the brightness of satellites and comparison stars on digital images will not necessarily be exactly the same as 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 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.

Spectroscopy of Titan

Since 1999 observers have been urged to attempt spectroscopy of Titan whenever possible as part of a cooperative professional-amateur project. Although Titan has been studied by the Hubble Space Telescope (HST), very large Earth-based instruments, and at close range the ongoing *Cassini-Huygens* mission, opportunities continue for amateurs to contribute systematic observations using appropriate instrumentation. As the *Cassini-Huygens* mission revealed beginning in 2004, Titan is a very dynamic world with transient and long-term variations. From wavelengths of 300nm to 600nm, Titan's hue is dominated by a reddish methane (CH_4) atmospheric haze, and beyond 600nm, 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. Long-term studies of Titan's brightness from one apparition to the next is meaningful in helping shed light on Titan's known seasonal variations. Observers with suitable equipment are being 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/* as well as directly from the ALPO Saturn Section.

Transits of Saturnian Satellites and Their Shadows

During the 2008-09 apparition, even though circumstances were unfavorable for viewing the edge-on event on September 4th, very small inclinations of Saturn's ring plane to our line of sight afforded observers unique opportunities to witness transits and shadow transits of satellites lying near the planet's equatorial plane. Apertures less than about 20.3 cm (8.0 in.) are not usually sufficient to produce the best views of these phenomena for satellites other than perhaps Titan, but observers with digital imagers in 2008-09 submitted some very interesting results as listed in *Table 14*.

Consider for example the superb image submitted by Tomio Akutsu of Dione and its shadow transiting the globe of Saturn on December 20, 2008 at 21:20UT [refer to Illustration No. 036], as well as an image of Tethys and its shadow in UV light in transit across Saturn taken by Christophe Pellier on January 4, 2009 at 03:41UT [refer to Illustration No. 037]. Another superb image of a transit of Titan was captured by Christopher Go at 19:04UT on January 23, 2009 at 17:32UT (EZn white spot discussed earlier in this report is also visible in the image) [refer to Illustration No. 038]. Also, Paolo Casquinha submitted an image of Rhea transiting Saturn's globe in the region of the NEBs near the East limb at 03:00UT on February 14th [refer to Illustration No. 039]. Later in the same month, around 14:25UT on February 24, 2009, observers along the Pacific coast of North America, Hawaii, Alaska, East Asia and Australia were treated to a rare, extraordinarily beautiful quadruple transit of Titan, Mimas, Dione, Enceladus and their shadows crossing Saturn's globe. From those prime locations, observers had an excellent opportunity to capture images of the planet with all four satellites visible at the same time against the backdrop of Saturn's cloud tops! The Hubble Space Telescope took some stunning photos of the four moons situated in front of Saturn [refer to Illustration No. 040]. Elsewhere on February 24th, observers were able to witness at least some of the events, such as the image furnished by Paul Maxson of Titan and its shadow transiting the globe at 11:19UT [refer to Illustration No. 041] and the one of Titan and Dione by Anthony Wesley at 14:13UT [refer to Illustration No. 042].

By mere coincidence, 5th magnitude Comet Lulin (C/2007 N3) was nearing its closest approach to Earth on February 24th and situated just 2.0° away from Saturn, affording rather striking views of the two objects in wide-field, low-power eyepieces under dark skies. Observers continued to submit images and drawings of satellite events during the remainder of the apparition, for which an excellent sketch by Paul Abel of the transit of Rhea and its shadow on May 19, 2009 at 22:53UT is a good example [refer to Illustration No. 043].

Observations of satellite events at minimal ring inclinations remains a highly worthwhile and extremely

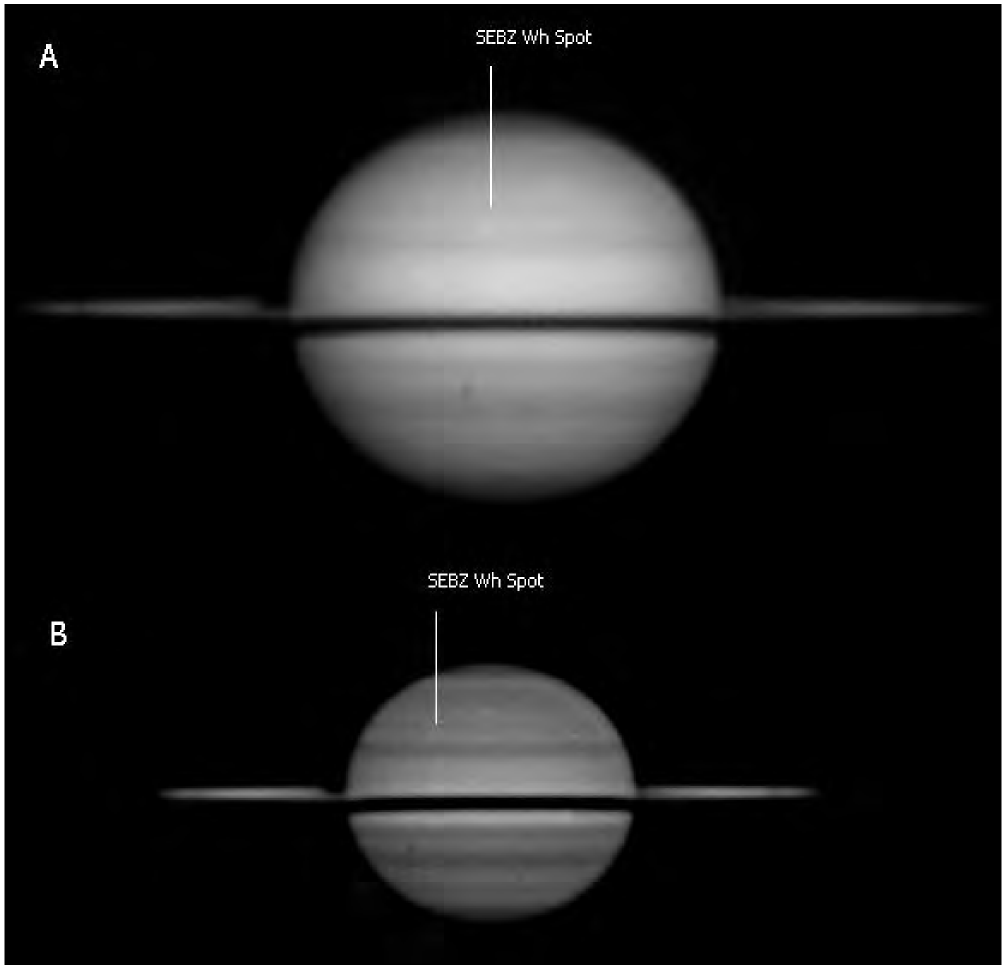


Illustration 012. Simultaneous Observations (digital images)

A. 2008 Dec 08 05:09UT. Digital image by Damian Peach with a 35.6-cm (14.0-in.) SCT using a red filter. S and Tr not specified. CMI = 7.5°, CMII = 339.0°, CMIII = 297.9°, B = –1.2°, B´ = –4.1°. The SEBZ white spot is visible, and the STrZ white spot is just W of the CM (dark spot feature North of the rings is the shadow of Dione).

B. 2008 Dec 08 07:13UT. Digital image by David Arditti with a 35.6-cm (14.0-in.) SCT at red wavelengths. S and Tr not specified. CMI = 22.8°, CMII = 353.7°, CMIII = 312.6°, B = –1.2°, B´ = 4.1°. There are hints of the vague SEBZ in the image. The STrZ white spot is near CM.

interesting endeavor for individuals with adequate aperture. Simultaneous visual observations at the same time that imaging is occurring helps establish limits of visibility of such events using both methods. Precise timings should be made 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 ring orientations. Notes should also 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.

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 another 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. Examples of some simultaneous (or near simultaneous) observations of Saturn were cited earlier in this report, and in forthcoming apparitions such valuable work is strongly encouraged.

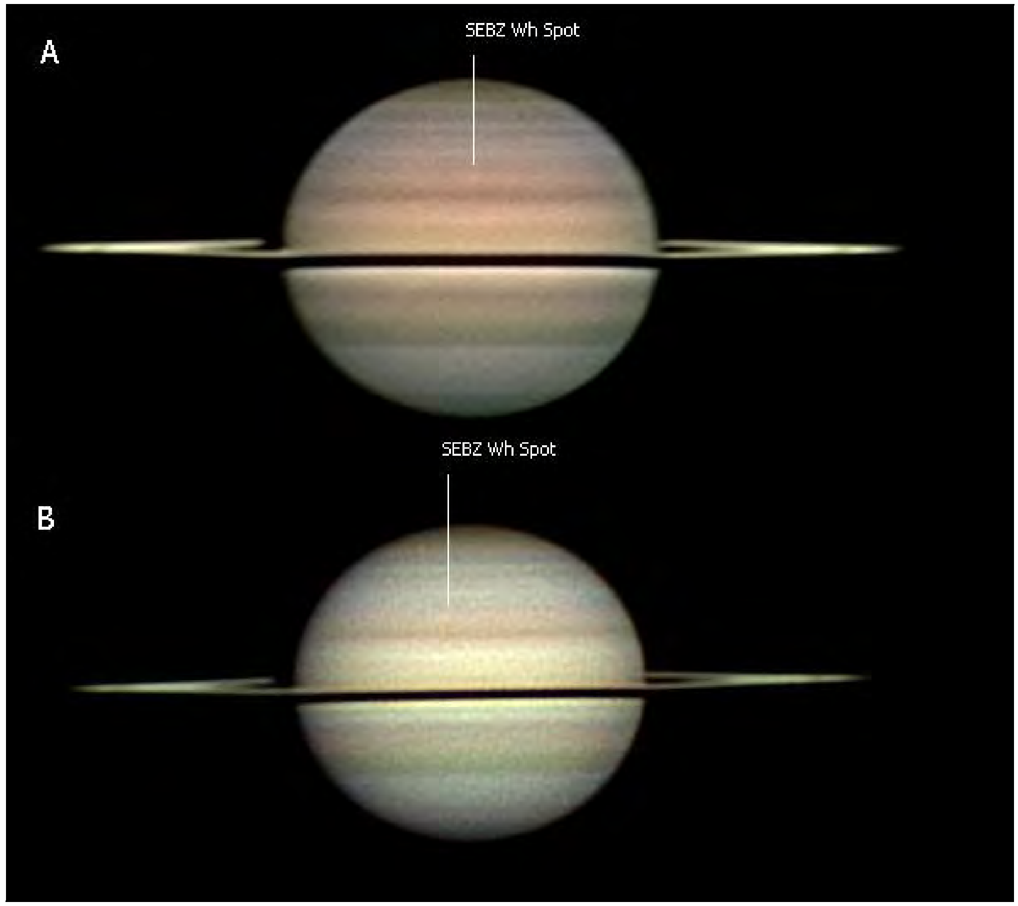


Illustration 013. Simultaneous observations (digital images):

A. 2009 Jan 27 18:22UT Digital image by Tomio Akutsu with a 35.6-cm (14.0-in.) SCT and RGB filters. S= 7.5 and Tr = 3.0. CMI = 278.1°, CMII = 26.5°, CMIII = 283.4°, B = –1.4°, B´ = –3.3°. The SEBZ white spot is near CM.

B. 2009 Jan 27 18:39UT Christopher Go using a 28.0 cm (11.0 in.) SCT, with RGB + IR blocking filter. S = 7.5, Tr = 5.0. CMI = 288.1°, CMII = 36.1°, CMIII = 292.9°, B = –1.4°, B´ = –3.3°. The SEBZ white spot is near CM.

Pro-Am Opportunities

Our cooperative involvement in professional-amateur (Pro-Am) projects continued this apparition. Readers of this Journal may recall the appeal that occurred a few apparitions ago 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 noise caused by a dynamic storm in the STrZ in January 2006. Amateur observers responded right away and contributed images of the small white spots, which apparently corresponded with the outburst of radio noise detected by the Cassini spacecraft. Careful systematic imaging by ALPO observers equivalent to the efforts in 2006 have been continuing, and our results are now routinely being shared with the professional community. It should be pointed out, however, that this was not the first concerted Pro-Am effort in recent observing seasons. Dating back to the time Cassini started observing Saturn at close range in April 2004, digital images at wavelengths ranging from 400nm - 1m under good seeing conditions were solicited by professionals from amateurs. To participate in this specific project, observers simply need to utilize classical broadband filters (e.g. Johnson system: B, V, R and I) with telescope apertures of 30.5 cm (12.0 in.) or larger, while also imaging through a 890-nm narrow band CH_4 (methane) filter. The Cassini Team requests that observers systematically patrol the planet every clear night for individual features, watching their motions and morphology, and thereby furnish input of interesting large-scale targets for Cassini's imaging system to begin close-up surveillance. Visual observers with apertures ranging upwards from 10.2 cm (4.0 in.) can play a very meaningful role by making routine visual numerical relative intensity estimates and keep track of suspected variations in belt and zone reflectivities (i.e., intensity) and color.

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 requested to contact the ALPO Saturn Section with any questions they may have as to 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 2008-09 and comparing the results with the immediately preceding apparition, only very subtle fluctuations in belt and zone intensities were suspected. It would be difficult to conclude that atmospheric activity on Saturn's globe increased or decreased substantially over the last several apparitions. Using standard visual observing methods and digital imaging, however, limited atmospheric activity was apparent in the form of recurring short-lived dark features much of the observing season in the South Equatorial Belt (SEB), as well as dusky festoons in the EZs just after opposition. Small dark condensations were suspected in the North Equatorial Belt (NEB) and North Temperate Belt (NTeB). Observers imaged the recurring presence of small white spots in the South Tropical Zone (STrZ), South Equatorial Belt Zone (SEBZ), and Equatorial Zone (EZ) during the apparition, while a rare white spot was also imaged in the North Polar Region (NPR).

With respect to the Ring System, apart from routine visual observations and digital images showing Cassini's (A0 or B10), Encke's (A5), and possibly Keeler's (A8) divisions, several less conspicuous intensity minima at different locations within Ring B were recorded with digital imagers. There was only one suspicion of the bi-colored aspect of the rings during the apparition, and no submitted digital images hinted at this phenomenon in 2008-09.

Digital imaging, which now regularly takes place along with visual studies of Saturn, often reveals discrete detail on the globe and in the rings often below the normal visual threshold. The combination of both methods greatly improves the opportunities for detecting changes on Saturn during any given observing season, and monitoring different regions of Saturn with digital imagers may signal outbursts of activity

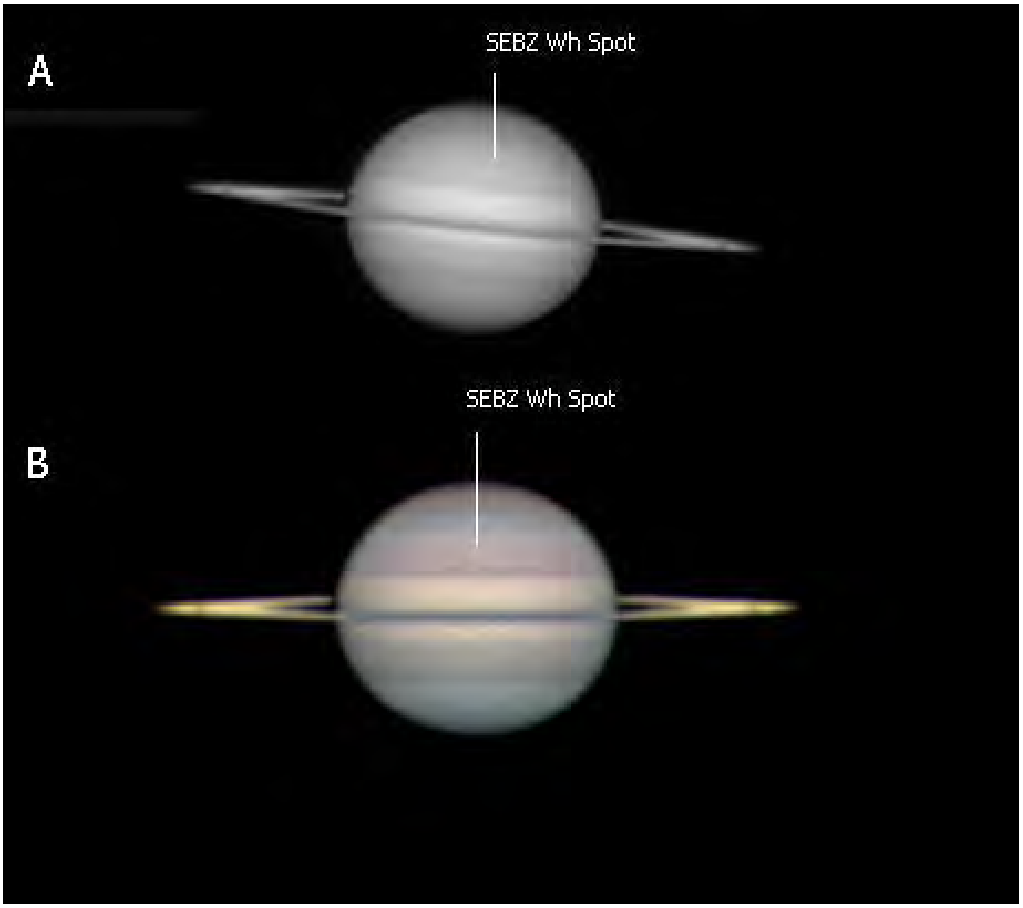


Illustration 014. Simultaneous observations (digital images):

A. 2009 Feb 28 00:04UT Digital image by Christophe Pellier with a 25.4 cm (10.0 in.) CAS and IR filter. S= 5.0 and Tr = 6.0. CMI = 14.7°, CMII = 194.2°, CMIII = 53.3°, B = –2.5°, B´ = –2.8°. SEBZ white spot is most readily detected in IR.

B. 2009 Feb 28 00:19UT Digital image by Marc Delcroix using a 25.4 cm (10.0 in.) SCT with IR and RGB filters. S = 6.0, Tr = 3.0. CMI = 23.5°, CMII = 202.6°, CMIII = 61.8°, B = –2.5°, B´ = 2.8°. SEBZ white spot is more pronounced in IR but only faintly noticeable in RGB.

that visual observers may eventually be able to study with their telescopes, including establishing limits of visibility of such features. In addition, during the 2008-09 apparition, Saturn's very small ring inclinations leading up to the edge-on orientation of the rings, albeit unobservable this apparition, observers were able to witness and image transits of satellites lying near the planet's equatorial plane and their shadows, such as Mimas, Rhea, Dione, Enceladus, Tethys, and Titan.

The author is very grateful for the efforts of all the individuals mentioned in this report who submitted drawings, digital images, descriptive reports, and visual numerical relative intensity estimates during the 2008-09 apparition. It was also quite pleasing to see increased simultaneous observations this apparition. Dedicated 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 ring system. Observers everywhere are encouraged to participate in our programs in future apparitions.

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United States Naval Observatory, *The Astronomical Almanac*. Washington: U.S. Government Printing Office. (Annual Publication; the 2008 and 2009 editions, which were published in 2007 and 2008, respectively, were used for this report).

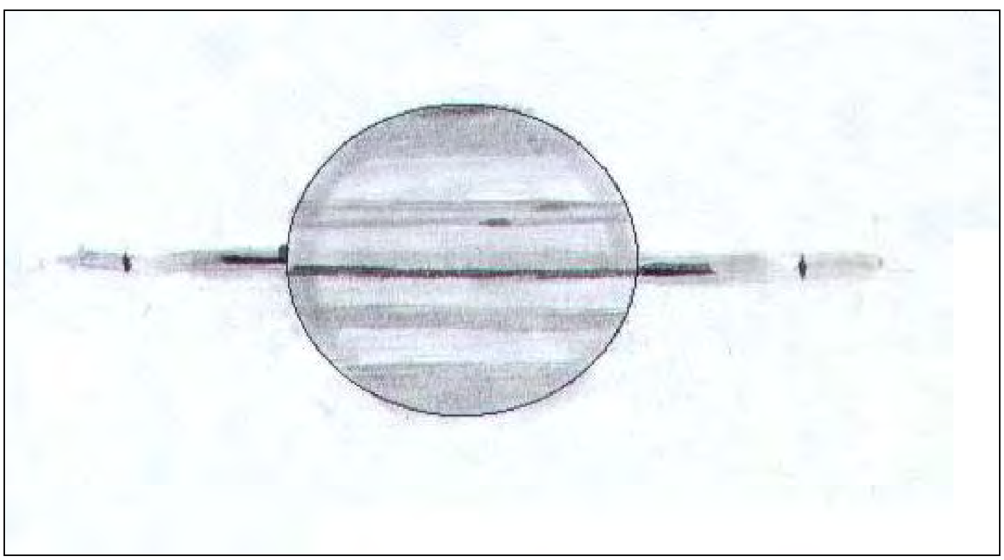


Illustration 015. 2009 Feb 17 05:33UT. Drawing by Carl Roussell using a 15.2-cm (6.0-in.) REF at 200-300X in IL and W23A (light red), W58 (green), and W38A (light blue) filters. S = 5.0, Tr = 3.0. CMI = 279.4°, CMII = 86.8°, CMIII = 318.9°, B = –2.1°, B´ = –3.0°. Suspected dark elongations in SEBs and SEBn.

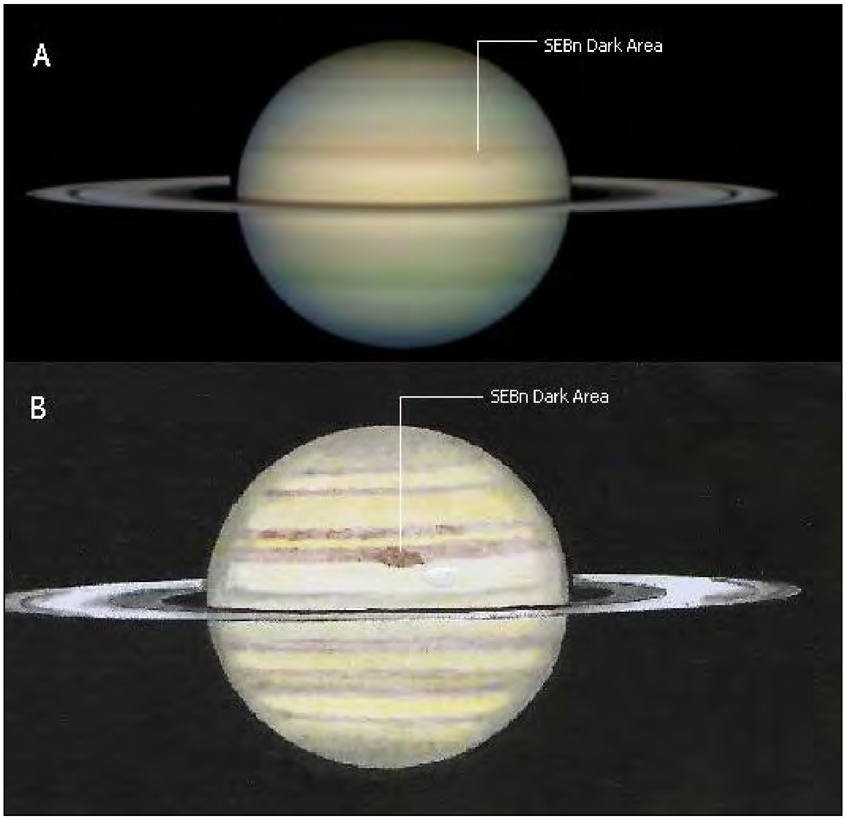


Illustration 016. Simultaneous Observations (digital image and drawing):

A. 2009 Mar 20 23:01UT. Digital image by Damian Peach with a 35.6-cm (14.0-in.) SCT using RGB filters. S and Tr not specified. CMI = 69.5°, CMII = 292.0°, CMIII = 125.9°, B = –3.3°, B´ = –2.5°. SEBn dusky streak W of CM.

B. 2009 Mar 21 00:34UT. Drawing by Paul G. Abel using a 20.3 cm (8.0 in.) NEW at 312X in IL (no filter). S = 4.0 (interpolated), Tr not specified other than hazy sky conditions. CMI = 124.0°, CMII = 344.5°, CMIII = 178.3°, B = –3.3°, B´ = –2.5°. Dark elongation in SEBn near CM.

Illustration 017. 2008 Dec 22 05:56UT. Digital image by Mark Delcroix using a 28.0-cm (11.0-in.) SCT with R + IR filters. S and TR not specified. CMI = 42.9°, CMII = 251.0°, CMIII = 191.9°, B = –1.0°, B´ = –3.8°. EZn white spot most obvious in red wavelengths.

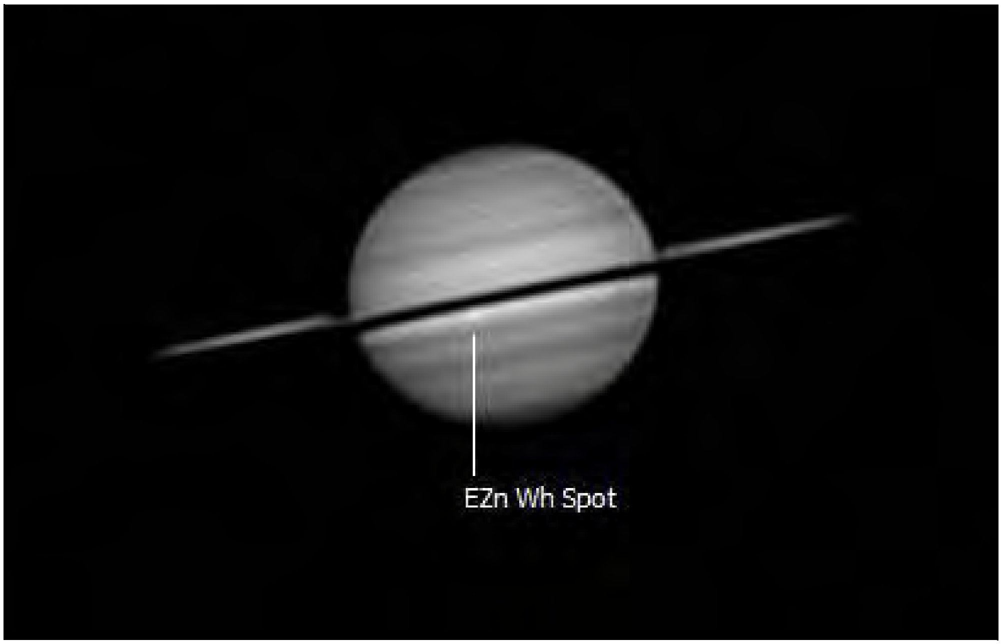


Illustration 018. 2009 Jan 04 02:25UT. Digital image by Christophe Pellier using a 25.4-cm (10.0-in.) CAS with R + IR filters. S = 8.5, Tr = 5.0. CMI = 96.0°, CMII = 248.9°, CMIII = 174.2°, B = –1.1°, B´ = –3.6°. EZn white spot most obvious in red light.

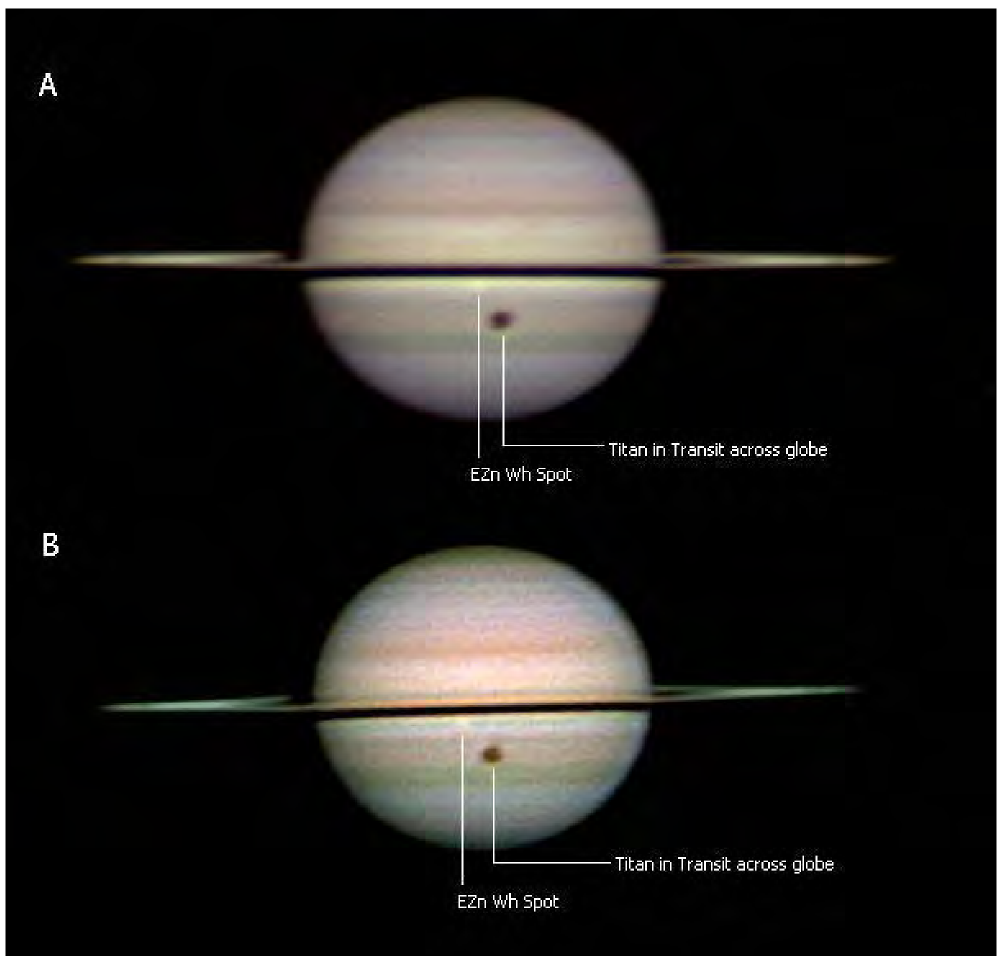


Illustration 019. <u>Simultaneous Observations (digital images):</u>

A. 2009 Jan 23 17:08UT. Digital image by Tomio Akutsu with a 35.6-cm (14.0-in.) SCT and RGB filters. S = 6.0, Tr = 4.0. CMI = 97.1°, CMII = 336.4°, CMIII = 238.1°, B = –1.3°, B´ = –3.3°. EZn white spot near CM (Titan is seen also in transit across disk).

B. 2009 Jan 23 17:32UT. Christopher Go using a 28.0 cm (11.0 in.) SCT, with RGB + IR blocking filter. S = 7.0, Tr = 5.0. CMI = 111.2°, CMII = 350.0°, CMIII = 251.7°, B = –1.3°, B´ = –3.3°. EZn white spot near CM (Titan is seen also in transit across disk).

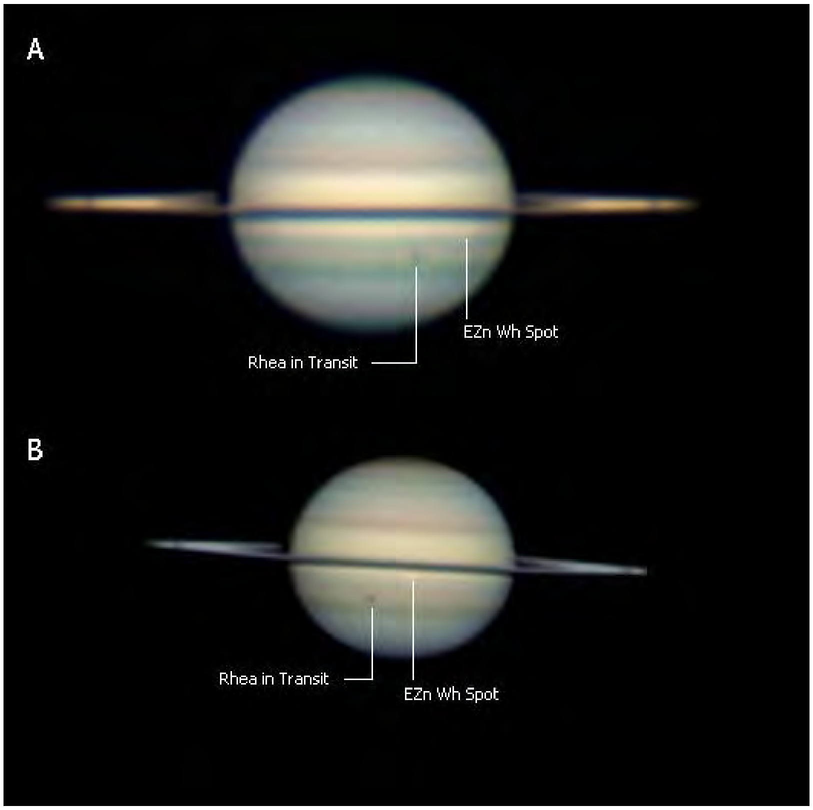


Illustration 020. Simultaneous Observations (digital images):

A. 2009 Feb 14 00:24UT. Digital image by David Arditti with a 35.6-cm (14.0-in.) SCT at red wavelengths. S and Tr not specified. CMI = 85.1°, CMII = 356.2°, CMIII = 232.3°, B = –2.0°, B´ = –3.0°. EZn white spot barely visible in red image. Rhea is in transit.

B. 2009 Feb 14 01:32UT. Digital image by Jan Adelaar with a 23.5 cm (9.25 in.) SCT and RGB filters. S and Tr not specified. CMI = 124.9°, CMII = 34.6°, CMIII = 270.6°, B = –2.0°, B´ = –3.0°. EZn white spot is near CM. Rhea is in transit.

Illustration 021. Simultaneous Observations (digital images):

A. 2009 Mar 12 11:37UT. Digital image by Tomio Akutsu with a 35.6-cm (14.0-in.) SCT and RGB filters. S = 2.5, Tr = 3.5. CMI = 113.6°, CMII = 249.9°, CMIII = 94.0°, B = –2.9°, B´ = -2.6°. EZn white spot near CM (Titan shadow in transit across disk).

B. 2009 Mar 12 11:51UT. Christopher Go using a 28.0 cm (11.0 in.) SCT, with RGB + IR blocking filter. S = 7.5, Tr = 5.1. CMI = 121.8°, CMII = 257.7°, CMIII = 101.8°, B = –2.9°, B´ = -2.6°. EZn white spot near CM (Titan shadow in transit across disk).

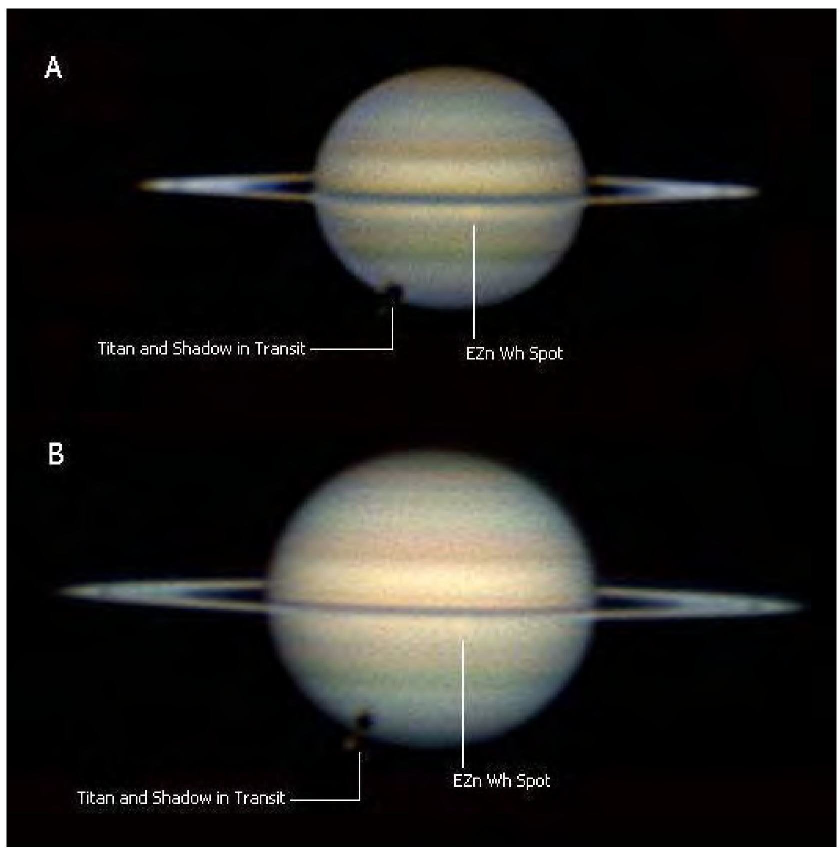
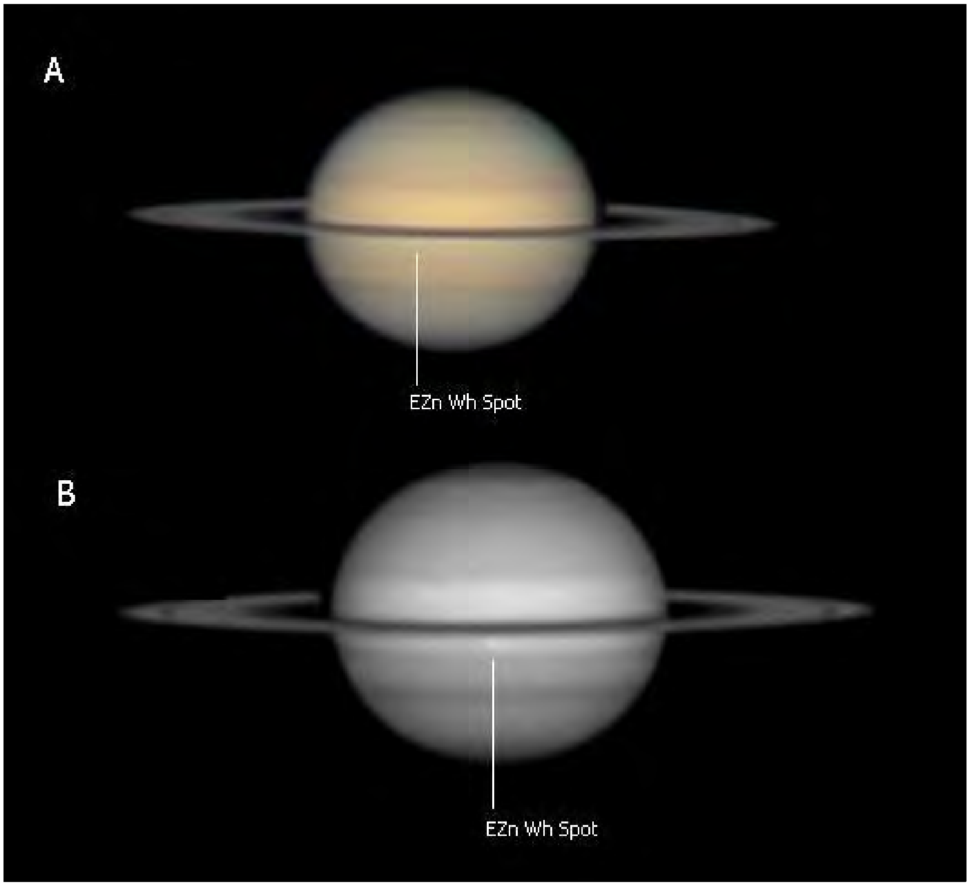


Illustration 022. Simultaneous Observations (digital images):

A. 2009 Apr 02 21:18UT. Digital image by Jan Adelaar with a 23.5 cm (9.25 in.) SCT and RGB filters. S and Tr not specified. CMI =185.5°, CMII = 350.4°, CMIII = 168.7°, B = –3.7°, B´ = -2.3°. EZn white spot is near CM.

B. 2009 Apr 02 21:28UT. Digital image by Damian Peach with a 35.6-cm (14.0-in.) SCT using RGB filters. S and Tr not specified. CMI = 191.3°, CMII = 356.1°, CMIII = 174.3°, B = –3.7°, B´ = -2.3°. EZn white spot is near CM.



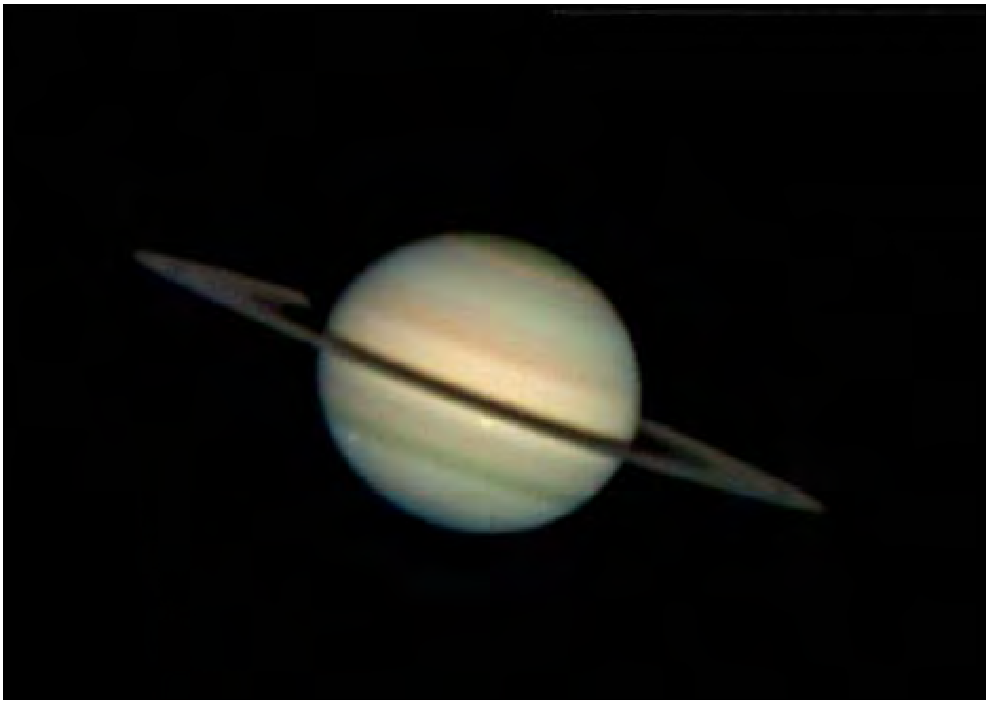


Illustration 023. 2009 May 19 20:05UT. Digital image by Damian Peach employing a 35.6 cm (14.0 in.) SCT with RGB filters + IR blocker. S and Tr not specified. CMI = 223.3°, CMII = 311.9°, CMIII = 73.6°, B = –4.3°, B´ = –1.5°. EZn white spot is apparent near CM. Rhea is in transit across globe farther North.

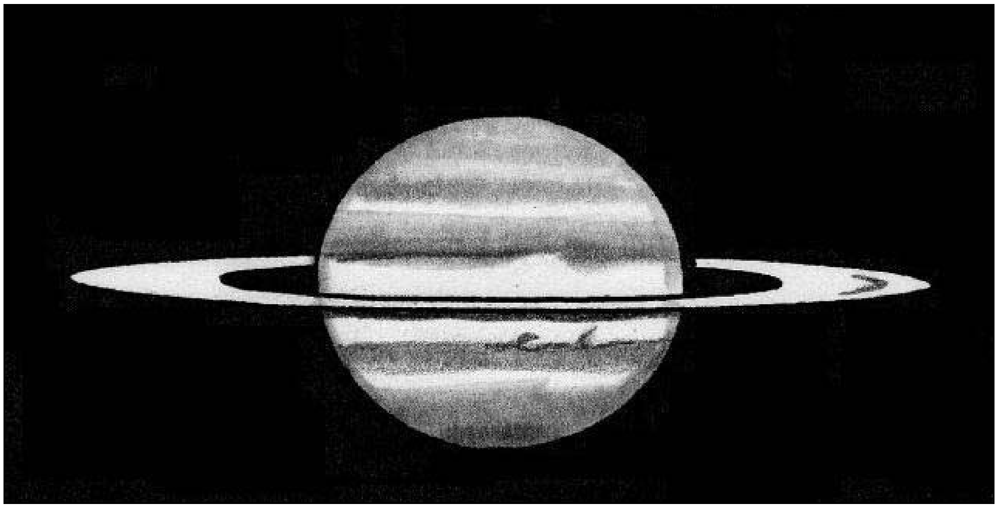


Illustration 024. 2009 Apr 21 20:28UT. Drawing by Detlev Niechoy using a 20.3-cm (8.0-in.) SCT at 225X in IL. S = 3.0, Tr = 3.0. CMI = 357.8°, CMII = 270.3°, CMIII = 65.7°, B = –4.1°, B´ = –2.0°. Festoons projecting into EZn from south edge of NEB.

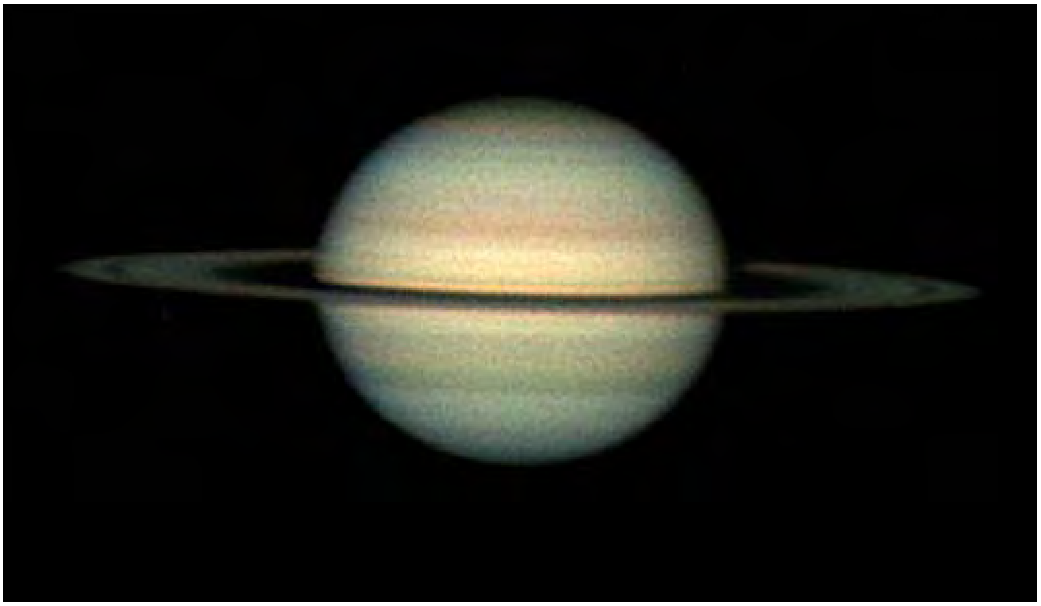


Illustration 025. 2009 Apr 10 12:37UT. Digital image by Christopher Go using a 28.0-cm (11.0-in.) SCT in RBG + IR blocking filter. S = 7.0, Tr = 4.0. CMI = 30.2°, CMII = 340.7°, CMIII = 151.0°, B = –3.9°, B´ = –2.2°. Narrow EB extends across the disk of Saturn in this excellent image.

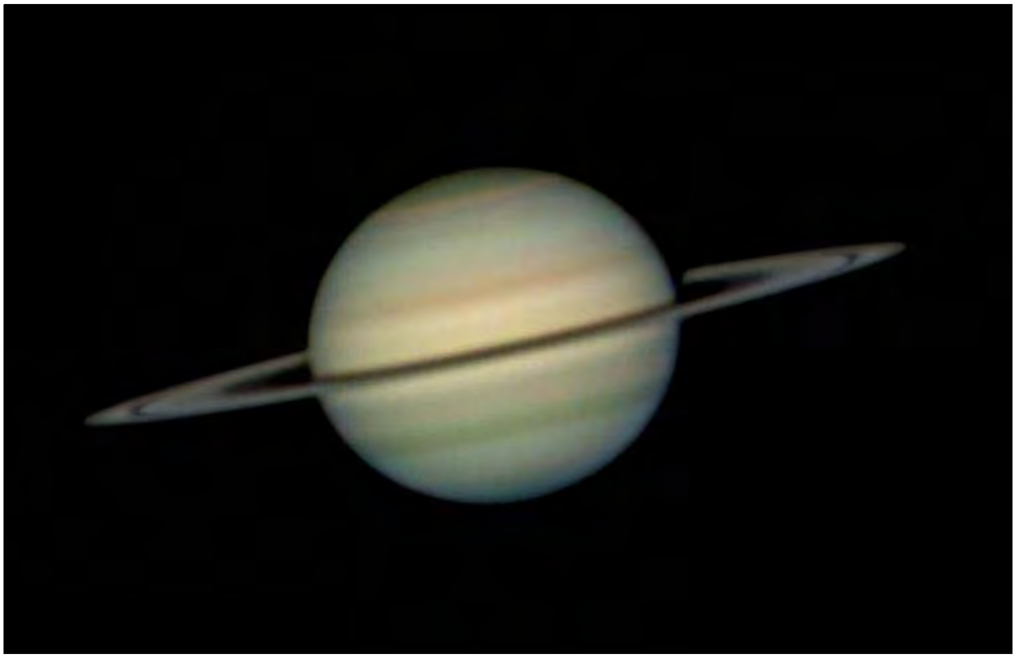


Illustration 026. 2009 Apr 01 22:09UT. Digital image by Damian Peach employing a 35.6 cm (14.0 in.) SCT with RGB filters + IR blocker. S and Tr not specified. CMI = 91.0°, CMII = 287.2°, CMIII = 106.6°, B = –3.7°, B´ = –2.3°. NEBn is clearly darker than the NEBs in this image. Outer third of Ring B is more prominent than the inner two-thirds.

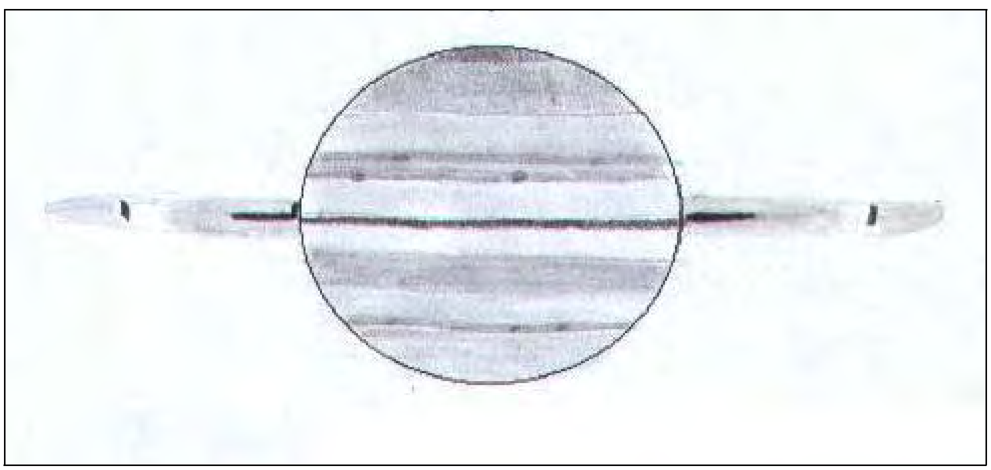


Illustration 027. 2009 Mar 01 04:25UT. Drawing by Carl Roussell using a 15.2-cm (6.0-in.) REF at 200-300X in IL and W23A (light red), W58 (green), and W38A (light blue) filters. S = 5.0, Tr = 3.5. CMI =292.2°, CMII = 73.4°, CMIII = 291.2°, B = –2.5°, B´ = –2.8°. Suspected dark features in NTeB.

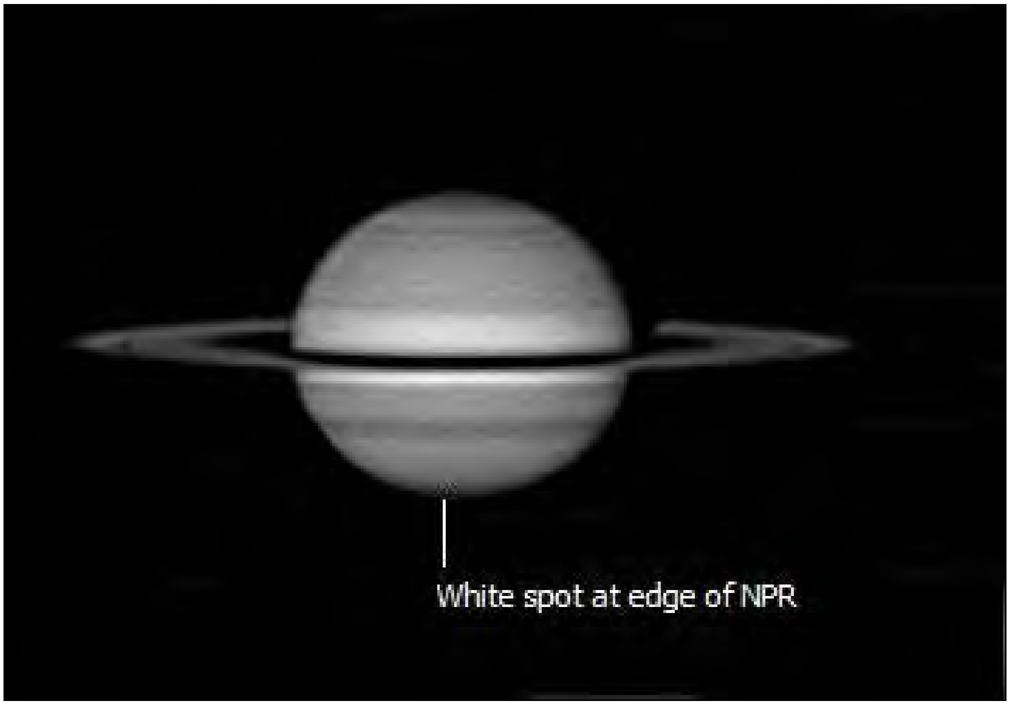


Illustration 028. 2009 May 02 20:38UT. Digital image by Mark Delcroix using a 28.0-cm (11.0-in.) SCT with R + IR filters. S = 4.5, Tr = 4.0. CMI = 290.6°, CMII = 207.5°, CMIII = 349.7°, B = –4.3°, B´ = –1.8°. Tiny white spot appears at the edge of the NPR at red wavelengths in fair seeing conditions.

Illustration 029. 2009 Aug 10 10:32UT. Digital image by Tomio Akutsu with a 35.6-cm (14.0-in.) SCT and RGB filters. S = 3.5, Tr = 2.0. CMI = 113.6°, CMII = 249.9°, CMIII = 94.0°, B = –1.6°, B´ = –0.2°. Rings are nearly edge-on in this image less than a month away from the unfavorable theoretical edgewise orientation on September 4, 2009.

Illustration 030. 2009 Aug 14 11:00UT. Digital image by Tomio Akutsu with a 35.6-cm (14.0-in.) SCT and RGB filters. S = 4.0, Tr = 3.0. CMI = 266.6°, CMII = 77.6°, CMIII = 94.8°, B = –1.3°, B´ = –0.2°. Rings are nearly edge-on in this image less than a month away from the unfavorable theoretical edgewise orientation on September 4, 2009.

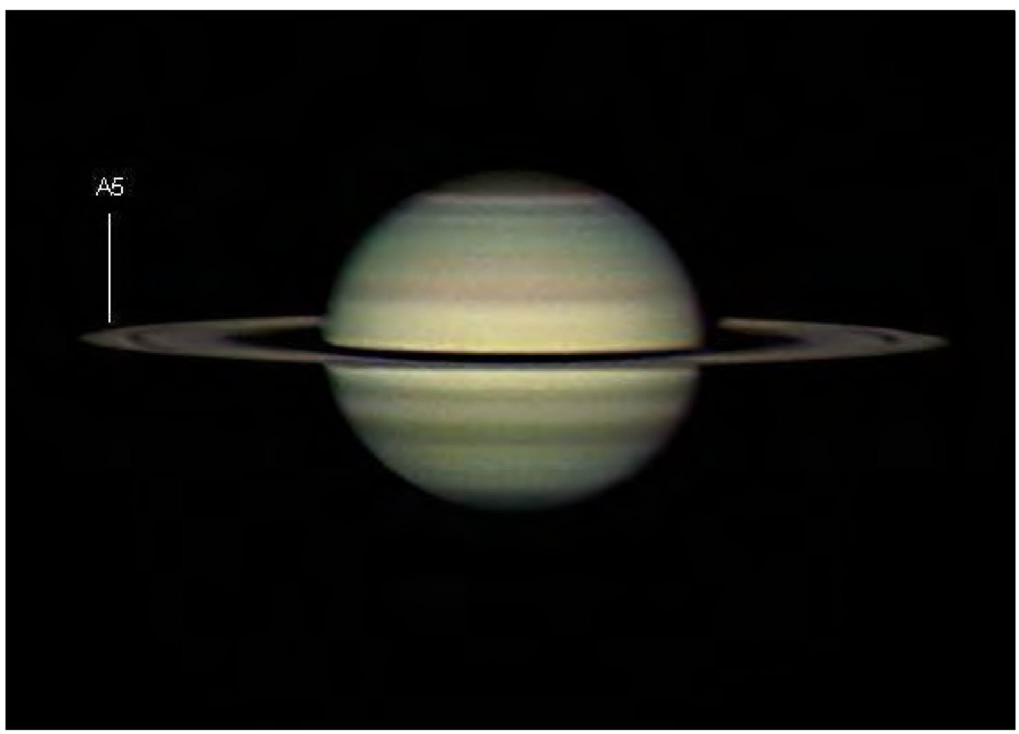


Illustration 031. 2009 Apr 09 01:09UT. Digital image by Paolo Casquinha employing a 35.6-cm (14.0-in.) SCT with RGB + IR blocking filter. S and Tr not specified. CMI = 346.8°, CMII = 312.8°, CMIII = 123.6°, B = –3.9°, B´ = –2.2°. Encke's division (A5) is apparent at the ansae.

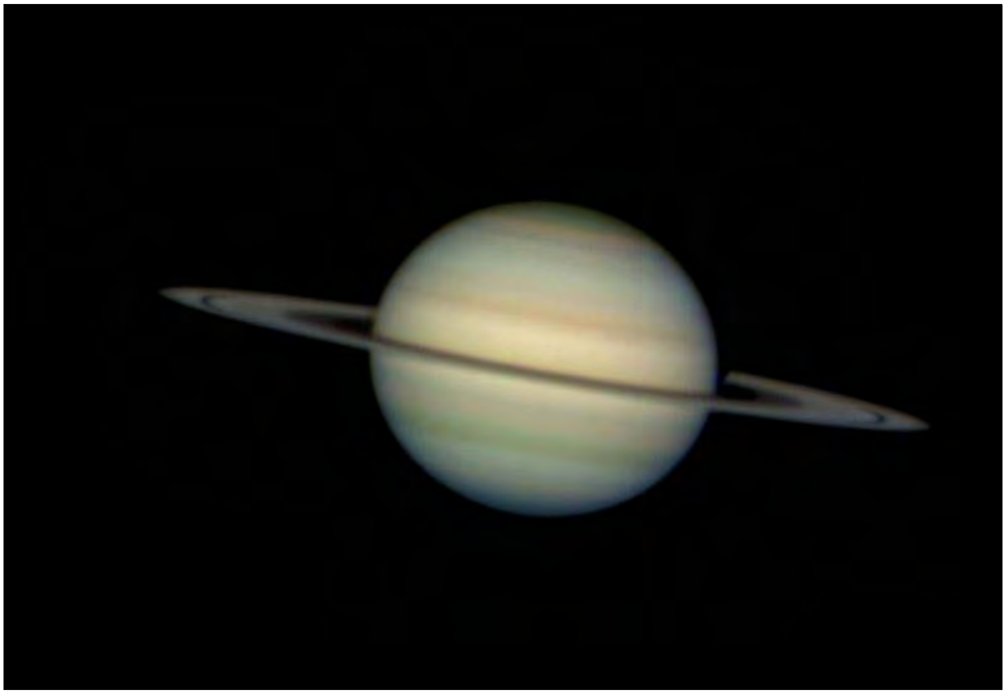


Illustration 032. 2009 Mar 29 23:31UT. Digital image by Damian Peach employing a 35.6 cm (14.0 in.) SCT with RGB filters + IR blocker. S and Tr not specified. CMI = 126.1°, CMII = 57.3°, CMIII = 240.3°, B = –3.6°, B´ = –2.3°. Dusky Ring C is apparent at the ansae in this superb image.

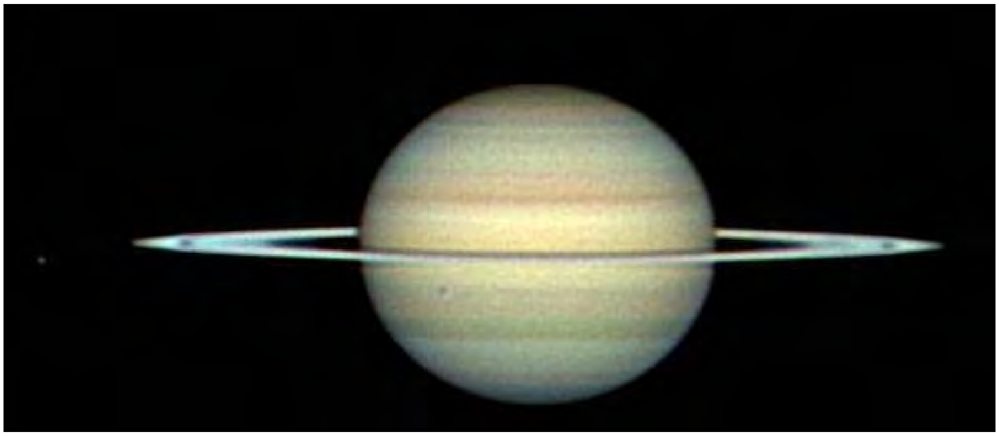


Illustration 033. 2009 Mar 08 15:06UT. Digital image by Christopher Go using a 28.0-cm (11.0-in.) SCT in RBG + IR blocking filter. S = 9.0, Tr = 5.0. CMI = 98.7°, CMII = 359.4°, CMIII = 208.2°, B = –2.8°, B´ = –2.6°. Opposition effect (aka Seeliger effect) is obvious in this image.

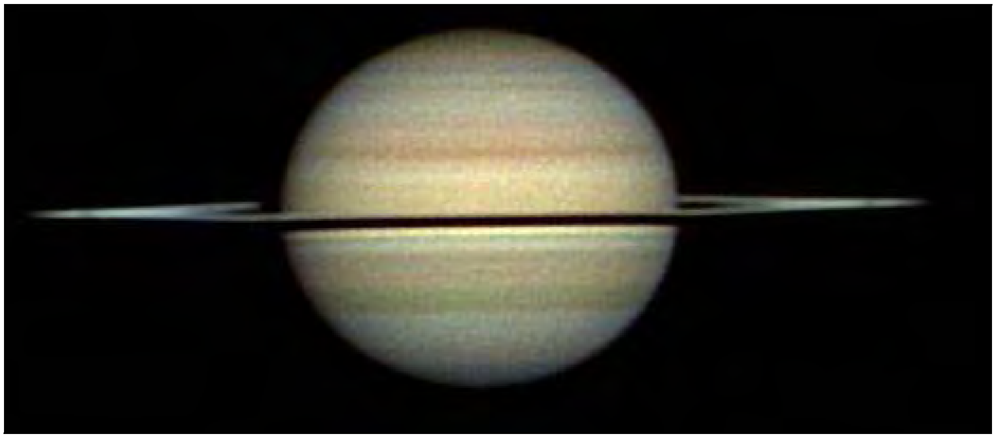


Illustration 034. 2009 Jan 27 18:39UT. Digital image by Christopher Go using a 28.0-cm (11.0-in.) SCT in RBG + IR blocking filter. S = 7.5, Tr = 5.0. CMI = 288.1°, CMII = 36.1°, CMIII = 292.9°, B = –1.4°, B′ = –3.3°. When B and B′ are both negative, and B < B′, the ring shadow is to the north of the projected rings, as shown in this image.

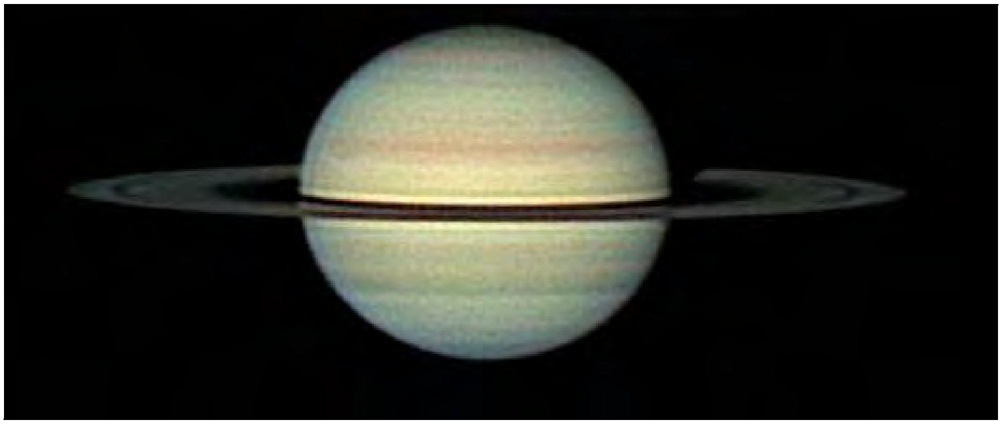


Illustration 035. 2009 May 23 12:02UT. Digital image by Christopher Go using a 28.0-cm (11.0-in.) SCT in RBG + IR blocking filter. S = 7.5, Tr = 4.5. CMI = 77.0°, CMII = 47.2°, CMIII = 164.5°, B = –4.3°, B′ = –1.5°. When B and B′ are both negative, and the value of B > B′, the shadow of the rings on the globe is cast to their south, as depicted in this image.

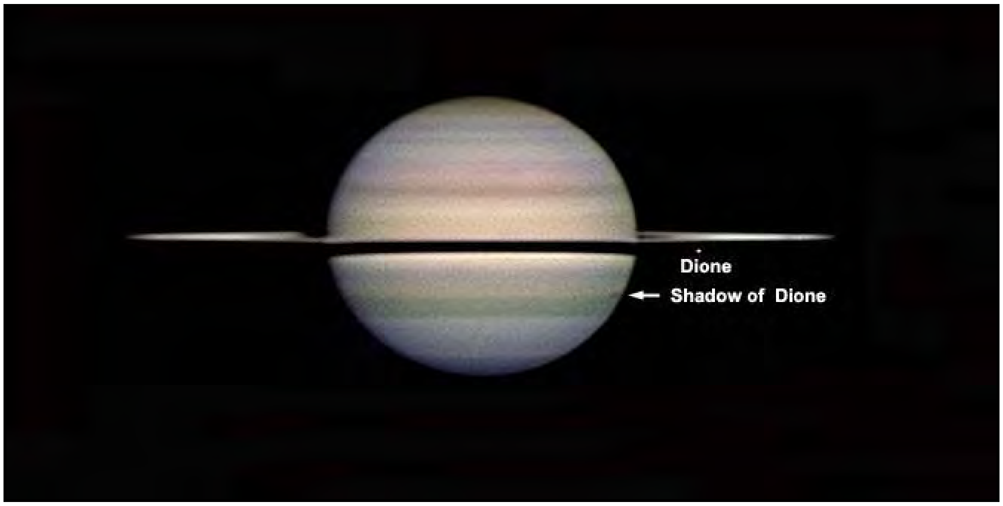


Illustration 036. 2008 Dec 20 21:20UT. Digital image by Tomio Akutsu with a 35.6-cm (14.0-in.) SCT and RGB filters. S = 7.0, Tr = 3.0. CMI = 336.0°, CMII = 227.9°, CMIII = 170.4°, B = –1.0°, B′ = –3.9°. Dione is visible in this image off the globe and its shadow in transit.

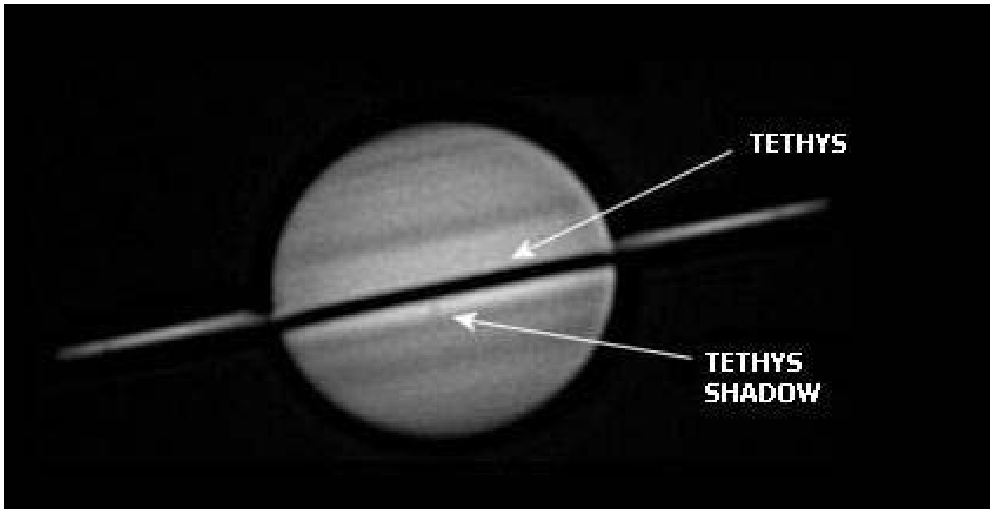


Illustration 037. 2009 Jan 04 03:41UT. Digital image by Christophe Pellier using a 25.4-cm (10.0-in.) CAS with UV filter. S = 8.5, Tr = 5.0. CMI = 140.6, CMII = 291.7°, CMIII = 217.0°, B = –1.1°, B´ = –3.6°. Tethys and its shadow are in transit across Saturn (imaged in UV light).

Illustration 038. 2009 Jan 23 17:32UT. Digital image by Christopher Go using a 28.0-cm (11.0-in.) SCT in RBG + IR blocking filter. S = 7.0, Tr = 5.0. CMI = 111.2°, CMII = 350.0°, CMIII = 251.7°, B = –1.3°, B´ = –3.3°. Titan is in transit across Saturn's disk.

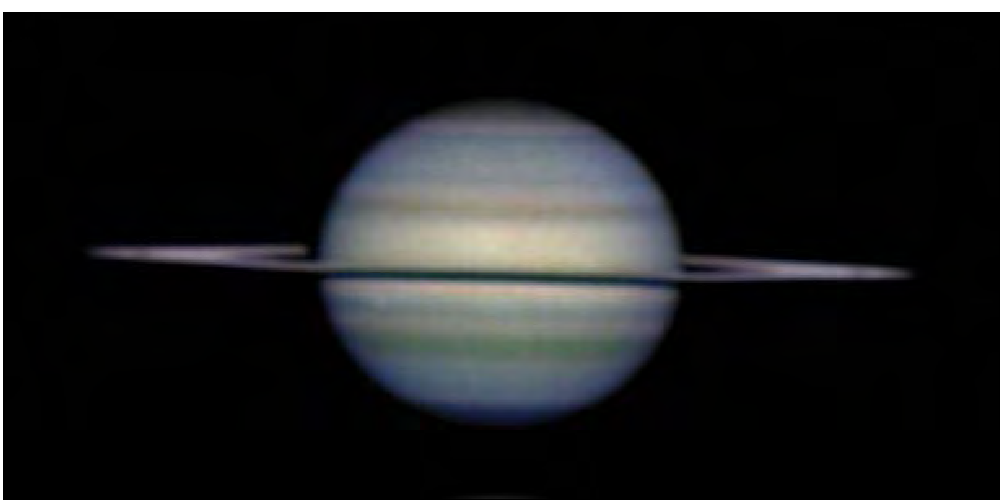


Illustration 039. 2009 Feb 14 03:00UT. Digital image by Paolo Casquinha employing a 35.6-cm (14.0-in.) SCT with RGB + IR blocking filter. S and Tr not specified. CMI = 176.5°, CMII = 84.2°, CMIII = 320.1°, B = –2.0°, B´ = –3.0°. Transit of Rhea across Saturn.

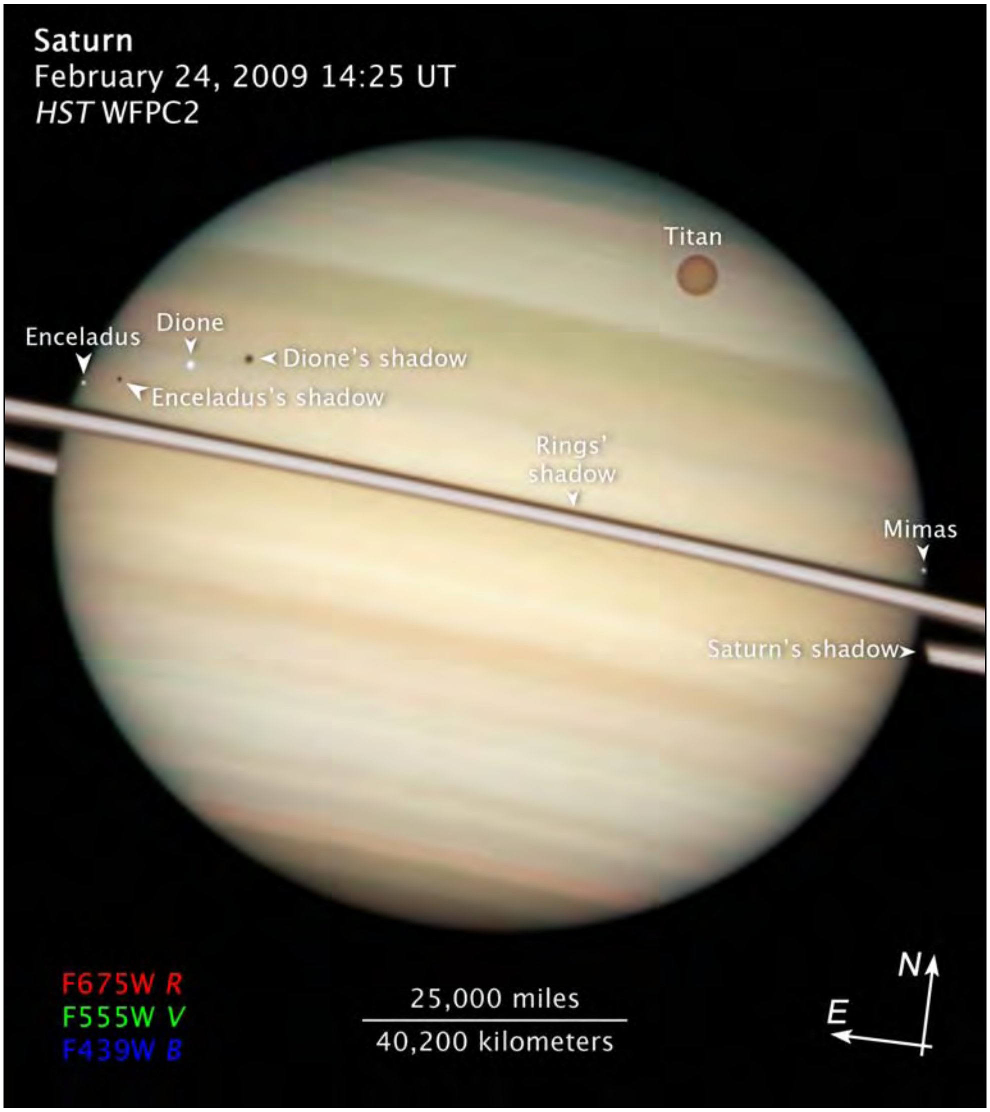


Illustration 040. 2009 Feb 24 14:25UT. Hubble Space Telescope (HST) image of quadruple transit of Titan, Mimas, Dione, Enceladus and their shadows crossing Saturn's globe. Image courtesy of Science@NASA and Hubble Space Telescope Team.

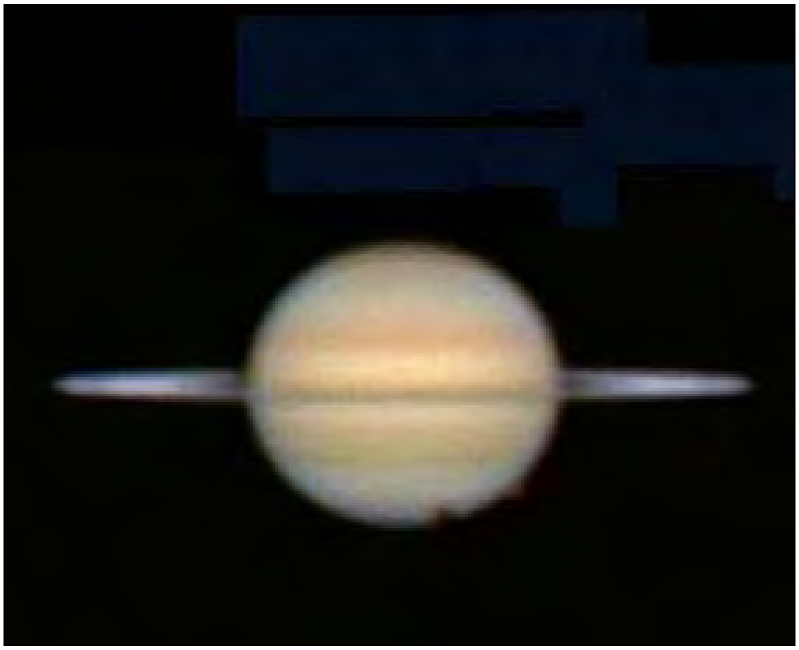


Illustration 041. 2009 Feb 24 11:19UT. Digital image by Paul Maxson using a 25.4-cm (10.0-in.) DAL in IL + IR blocking filter. S and Tr not specified. CMI = 273.0°, CMII = 206.5°, CMIII = 69.9°, B = –2.3°, B´ = 2.8°. Titan and its shadow transiting the globe near northern limb prior to quadruple event.

Illustration 042. 2009 Feb 24 14:13UT. Digital image by Anthony Wesley using a 36.8 cm (14.5 in.) NEW in IL + IR blocking filter. S and Tr not specified. CMI = 15.1°, CMII = 304.6°, CMIII = 167.9°, B = –2.3°, B´ = -2.8°. Titan and Dione in transit across the Saturn's globe.

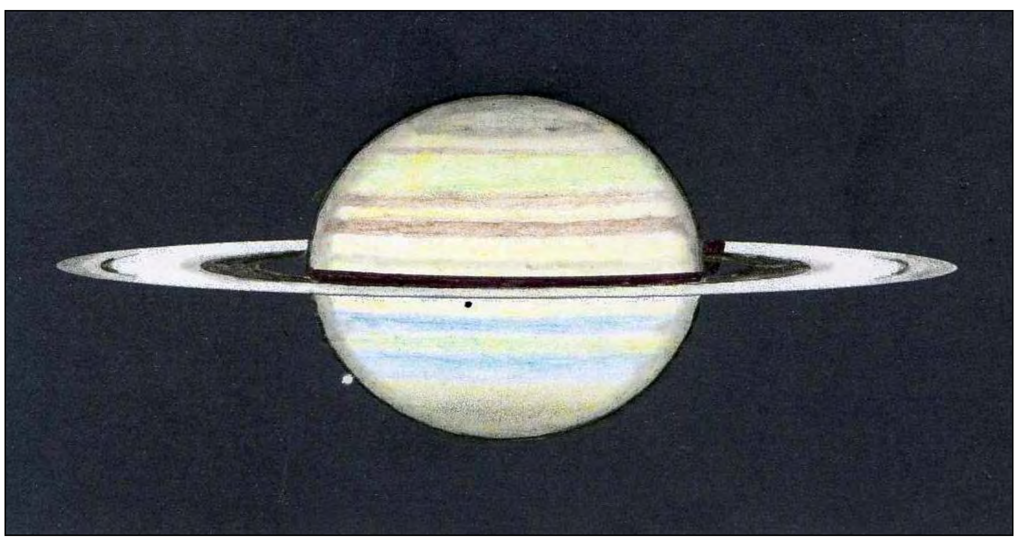


Illustration 043. 2009 May 19 22:53UT. Drawing by Paul G. Abel using a 20.3 cm (8.0 in.) NEW at 312X in IL (no filter). S = 4.0 (interpolated), Tr not specified. CMI = 321.8°, CMII = 46.6°, CMIII = 168.1°, B = -4.3°, B´ = -1.5°. Rhea off globe with shadow in transit.

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- Assistant Coordinator, Eclipses of Galilean Satellites; John E. Westfall, P.O. Box 2447, Antioch, CA 94531-2447
- Scientific Advisor; Prof. A. Sanchez-Lavega, Dpto. Fisica Aplicada I, E.T.S. Ingenieros, Alda. Urquijo s/n, 48013, Bilbao, Spain wupsalaa@bicc00.bi.ehu.es

Saturn Section

http://www.alpo-astronomy.org/saturn

- Coordinator; Julius L. Benton, Jr., Associates in Astronomy, P.O. Box 30545, Wilmington Island, Savannah, GA 31410

Remote Planets Section

http://www.alpo-astronomy.org/remote

- Coordinator; Richard W. Schmude, Jr., 109 Tyus St., Barnesville, GA 30204

Comets Section

http://www.alpo-astronomy.org/comet

- Coordinator; Gary Kronk, 132 Jessica Dr, St. Jacob, IL 62281-1246

Meteors Section

http://www.alpo-astronomy.org/meteor

- Coordinator; Robert D. Lunsford, 1828 Cobblecreek St., Chula Vista, CA 91913-3917
- Assistant Coordinator; Robin Gray, P.O. Box 547, Winnemuca, NV 89446

Meteorites Section

http://www.alpo-astronomy.org/meteorite

- Coordinator; Dolores Hill, Lunar and Planetary Laboratory, University of Arizona, Tucson, AZ 85721

Eclipse Section

http://www.alpo-astronomy.org/eclipse

- Coordinator; Mike D. Reynolds, Dean of Mathematics & Natural Sciences, Florida State College, 3939 Roosevelt Blvd, F-112b, Jacksonville, FL 32205

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ALPO Publications

The Monograph Series

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

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

There is NO CHARGE for any of the ALPO monographs.

- **Monograph No. 1.** *Proceedings of the 43rd Convention of the Association of Lunar and Planetary Observers. Las Cruces, New Mexico, August 4-7, 1993. 77* pages. File size approx. 5.2 mb.
- **Monograph No. 2**. *Proceedings of the 44th Convention of the Association of Lunar and Planetary Observers. Greenville, South Carolina, June 15-18, 1994. 52* pages. File size approx. 6.0 mb.
- **Monograph No. 3**. *H.P. Wilkins 300-inch Moon Map.* 3rd Edition (1951). Available as one comprehensive file (approx. 48 megabytes) or five section files (Part 1, 11.6 megabytes; Part 2, 11.7 megabytes; Part 3, 10.2 megabytes; Part 4, 7.8 megabytes; Part 5, 6.5 mb)
- **Monograph No. 4.** *Proceedings of the 45th Convention of the Association of Lunar and Planetary Observers. Wichita, Kansas, August 1-5, 1995.127* pages. Hard copy $17 for the United States, Canada, and Mexico; $26 elsewhere. File size approx. 2.6 mb.
- **Monograph No. *5.*** *Astronomical and Physical Observations of the Axis of Rotation and the Topography of the Planet Mars. First Memoir; 1877-1878.* By Giovanni Virginio Schiaparelli, translated by William Sheehan. 59 pages. Hard copy $10 for the United States, Canada, and Mexico; $15 elsewhere. File size approx. 2.6 mb.
- **Monograph No. *6.*** *Proceedings of the 47th Convention of the Association of*

ALPO Resources

People, publications, etc., to help our members

Lunar and Planetary Observers, Tucson, Arizona, October 19-21, 1996.20 pages. Hard copy $3 for the United States, Canada, and Mexico; $4 elsewhere.File size approx. 2.6 mb.

- **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 mb.
- **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 mb.
- **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 mb.
- **Monograph Number 10.** *Observing and Understanding Uranus, Neptune and Pluto*. By Richard W. Schmude, Jr. 31 pages. File size approx. 2.6 mb.
- **Monograph No. 11**. *The Charte des Gebirge des Mondes* (Chart of the Mountains of the Moon) by J. F. Julius Schmidt, this monograph edited by John Westfall. Nine files including an accompanying guidebook in German. Note files sizes: Schmidt0001.pdf, approx. 20.1 mb; Schmidt0204.pdf, approx. 32.6 mb; Schmidt0507.pdf, approx. 32.1 mb; Schmidt0810.pdf, approx. 31.1 mb; Schmidt1113.pdf, approx. 22.7 mb; Schmidt1416.pdf, approx. 28.2 mb; Schmidt1719.pdf, approx. 22.2 mb; Schmidt2022.pdf, approx. 21.1 mb; Schmidt2325.pdf, approx. 22.9 mb; SchmidtGuide.pdf, approx. 10.2 mb

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:** *Guidelines for the Observation of White Light Solar Phenomena*, *Guidelines for the Observing Monochromatic Solar Phenomena* plus various drawing and report forms available for free as pdf file downloads at *http://www.alpo-astronomy.org/solarblog*.
- **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

ALPO Staff E-mail Directory

Online readers please note: Items in blue text in the ALPO Staff E-mail Directory above are links to e-mail addresses. Left-click your mouse on the names in blue text to open your own e-mail program with a blank e-mail preaddressed to the person you chose. Your Internet connection MUST be ON for this feature to work.

Bailey, W .... *wayne.bailey@alpo-astronomy.org*
Benton, J.L. ....*jlbaina@msn.com*
Benton, J.L...*jlbaina@gmail.com*
Brasch, K.R. .... *m_brasch@earthlink.net*
Baum, R.. *richard@take27.co.uk*
Cook, A. ....*tony.cook@alpo-astronomy.org*
Cudnik, B...................................... *cudnik@sbcglobal.net*
Darling, D.O................................. *DOD121252@aol.com*
Dembowski, W. .... *dembowski@zone-vx.com*
Dobbins, Tom..............................*tomdobbins@gmail.com*
Garfinkle, R.A...................................*ragarf@earthlink.net*
Garrett, L.S. .... *atticaowl@yahoo.com*
Grafton, E. ....*ed@egrafton.com*
Gray, R. ....*sevenvalleysent@yahoo.com*
Haas, W.H.......................................*haasw@agavue.com*
Hay, K..*kim@starlightcascade.ca*
Hill, D. ....*dhill@lpl.arizona.edu*
Hill, R..*rhill@lpl.arizona.edu*
Jakiel, R...*rjakiel@earthlink.net*
Jenkins, J. .... *jenkinsjl@yahoo.com*
Kronk, G.................................*kronk@cometography.com*
Larson, S.................................... *slarson@lpl.arizona.edu*
Limaye, S....................................*sanjayl@ssec.wisc.edu*
Lunsford, R.D.............................. *lunro.imo.usa@cox.net*
MacDougal, C............................... *macdouc@verizon.net*
McAnally, J. ....*CPAJohnM@aol.com*
Melillo, F..*frankj12@aol.com*
Melka, J. .... *jtmelka@yahoo.com*
Owens, L.......................*larry.owens@alpo-astronomy.org*
Parker, D.C............................... *park3232@bellsouth.net*
Pilcher, F. .... *pilcher@ic.edu*
Poshedly, K. ....*ken.poshedly@alpo-astronomy.org*
Reynolds, M. .... *mreynold@fscj.edu*
Robertson, T.J.........................*cometman@cometman.net*
Sanchez-Lavega, A................ *wupsalaa@bicc00.bi.ehu.es*
Schmude, R.W. ....*schmude@gdn.edu*
Slaton, J.D...*jd@justfurfun.org*
Timerson, B. .... *btimerson@rochester.rr.com*
Venable, R.J.......................................*rjvmd@hughes.net*
Westfall, J.E............................. *johnwestfall@comcast.net*
Will, M. ....*matt.will@alpo-astronomy.org*

ALPO Resources

People, publications, etc., to help our members

file via e-mail or send check or money order payable to Timothy J. Robertson, 195 Tierra Rejada Rd., #148, Simi Valley, CA 93065; e-mail cometman@cometman.net.

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

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

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

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

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

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

- **Jupiter:** *(1) Jupiter Observer's Handbook*, $15 from the Astronomical League Sales, 9201 Ward Parkway, Suite 100, Kansas City, MO 64114; phone 816-DEEP-SKY (816-333-7759); e-mail leaguesales@astroleague.org. (2) *Jupite*r, the ALPO section newsletter, available online only via the ALPO website at *http://mysite.verizon.net/macdouc/alpo/jovenews.htm;* (3) *J-N*et, the ALPO Jupiter Section e-mail network; send an e-mail message to Craig MacDougal. (4) *Timing the Eclipses of Jupiter's Galilean Satellites* free at http://www.alpo-astronomy.org/jupiter/GaliInstr.pdf, report form online at http://www.alpo-astronomy.org/jupiter/GaliForm.pdf; send SASE to John Westfall for observing kit and report form via regular mail. (5) *Jupiter Observer's Startup Ki*t, $3 from Richard Schmude, Jupiter Section coordinator.

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

ALPO Resources

People, publications, etc., to help our members

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

Other ALPO Publications

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

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

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

Back Issues of The Strolling Astronomer

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

  Many of the hard-copy back issues listed below are almost out of stock and there is no guarantee of availability. Issues will be sold on a first-come, first-served basis. Back issues are $4 each, and $5 for the current issue. We can arrange discounts on orders of more than $30. Order directly from and make payment to “Walter H. Haas” (see address under “Board of Directors,”):

$4 each:
Vol. 7 (1953), No.10
Vol. 8 (1954), Nos. 7-8
Vol. 11 (1957), Nos. 11-12
Vol. 21 (1968-69), Nos. 3-4 and 7-8
Vol. 23 (1971-72), Nos. 7-8 and 9-10
Vol. 25 (1974-76), Nos. 1-2, 3-4, and 11-12
Vol. 26 (1976-77), Nos. 3-4 and 11-12
Vol. 27 (1977-79), Nos. 3-4 and 7-8
Vol. 31 (1985-86), Nos. 9-10
Vol. 32 (1987-88), Nos. 11-12
Vol. 33 (1989), Nos. 7-9
Vol. 34 (1990), No. 2
Vol. 37 (1993-94), No. 1
Vol. 38 (1994-96), Nos. 1 and 3
Vol. 39 (1996-97), No. 1
Vol. 42 (2000-01), Nos. 1, 3 and 4
Vol. 43 (2001-02), Nos. 1, 2, 3 and 4
Vol. 44 (2002), Nos. 1, 2, 3 and 4
Vol. 45 (2003), Nos. 1, 2 and 3 (no issue 4)
Vol. 46 (2004), Nos. 1, 2, 3 and 4
Vol. 47 (2005), Nos. 1, 2, 3 and 4
Vol. 48 (2006), Nos. 1, 2, 3 and 4
Vol. 49 (2007), Nos. 1, 2, 3 and 4
Vol. 50 (2008), Nos. 1, 2, 3 and 4
Vol. 51 (2009), Nos. 1, 2, 3 and 4
Vol. 52 (2010), Nos. 1, 2, 3 and 4
Vol. 53 (2011), Nos. 1, 2, 3 and 4
Vol. 54 (2012), No. 1

$5 ea4h:
Vol. 54 (2012), No. 2 (current issue)

THE ASSOCIATION
OF LUNAR & PLANETARY OBSERVERS (ALPO)

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.

Subscription rates and terms are listed below (effective January 1, 2012).

We heartily invite you to join the ALPO and look forward to hearing from you.

- ..$US12 – 4 issues of the digital Journal only, all countries, e-mail address required
- ..$US20 – 8 issues of the digital Journal only, all countries, e-mail address required
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For your convenience, you may join online via the via the Internet or by completing the form at the bottom of this page.

To join or renew online, simply left-click on this Astronomical League web page:
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Afterwards, e-mail the ALPO membership secretary at *will008@attglobal.net* with your name, address, the type of membership and amount paid.

If using the form below, please make payment by check or money order, payable (through a U.S. bank and encoded with U.S. standard banking numbers) to “ALPO” There is a 20-percent surcharge on all memberships obtained through subscription agencies or which require an invoice. Send to: ALPO Membership Secretary, P.O. Box 13456, Springfield, Illinois 62791-3456 USA.

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Name____
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Please share your observing interests with the ALPO by entering the appropriate codes on the blank line below.
Interest____

Interest Abbreviations
0 = Sun 1 = Mercury 2 = Venus 3 = Moon 4 = Mars 5 = Jupiter 6 = Saturn 7 = Uranus 8 = Neptune 9 = Pluto A = Asteroids C = Comets D = CCD Imaging E = Eclipses & Transits H = History I = Instruments M = Meteors & Meteorites P = Photography R = Radio Astronomy S = Computing & Astronomical Software T = Tutoring & Training Program (including Youth)

ALCon2012

Celebrate Starlight

CHICAGO, JULY 4-7, 2012

Celebrating 150 Years of Organized Astronomy: 1862–2012

FEATURED SPEAKERS:

- **Mike Simmons**, *President, Astronomers Without Borders*
- **Dr. Donald Parker**, *ALPO, Planetary Astrophotographer*
- **Dr. Dave Crawford**, *Co-founder IDA (remote presentation)*
- **Wally Pacholka**, *TWAN, Landscape Astrophotographer*
- **Dr. Jason Steffen**, *Kepler Mission Scientist*
- **Dr. Mark Hammergren**, *Adler Asteroid Expert*
- **Dr. Philipp Heck**, *Field Museum Meteorite Curator*
- **Dr. Hasan Padamsee**, *Physics Professor/Playwright, Cornell Univ.*
- **Vivian Hoette**, *Astronomy Educator at Yerkes Observatory*
- **Jeff Talman**, *Artist, Star Sound Installation, "Nature of the Night Sky"*
- **Dr. David Blask**, *Expert in circadian disruption/cancer/light pollution*
- **David Eicher**, *Editor-in-Chief, Astronomy Magazine*
- **Dr. George "Bud" Brainard**, *Expert in human health effects of light*

- Morning talks: **Marriott Lincolnshire Resort** on Wed, Thur, Fri; Morning & afternoon talks on Sat; Day trips*
- **Very special early booking room rate at the Marriott $69+tax** (reg $169)
- Daytrips: Fermilab, Yerkes, Sailing, Field Museum, Adler Planetarium
- Workshop at Yerkes: Outreach for the sensory impaired
- Saturday Awards Banquet, documentary *Saving Hubble*, Star Party on Resort golf course
- July 4th Fireworks, StarParty
- StarBQue, StarParty, chamber music concert at Ravinia
- AL Urban Observing Challenge
- Official **NCRAL, ALPO, AWB** events
- **MWAIC** Astro-Imaging Conference, Wed, Thu, Fri
- Qualified **Teacher CPDU credits**
- Dark Sky Advocacy presentations and roundtable forum
- Celestial Arts Contest: photos, songs, poetry, 3-min videos, art

*Day trips on Wednesday, Thursday, Friday dependent on required sign-ups

CALL FOR MATERIAL:

Call for Material for commemorative **"Celebrate Starlight" book and poster.** Will be released at ALCon2012! Submissions extended until **May 15, 2012.**

Kids: *submit drawings for the Moonbounce on Why Stars are Important to You. Include the words "Celebrate Starlight" in your native language. Ages to 17 years old. Deadline* **April 7**.

Celebrate Starlight Book

We invite your astronomy organization to submit one to four pages describing its history. How do you want your association to be remembered? Let your organization's achievements, members & outreach SHINE on these pages!

Celebrate Starlight Poster

This commemorative poster will be a montage of club logos, famous faces, astrophotos and special projects. We invite organizations to send logos and any other pertinent images to have included in this very unusual poster.

What constructed image will the montage represent? Come to ALCon 2012 and find out!

More information and registration:
alcon2012.astroleague.org

Special additions to the program:

- Visual Moonbounce by OPTICKS on July 4! directed by Daniela De Paulis
- *Creation's Birthday*, the play by Hasan Padamsee about Hubble and the birth of the Big Bang Theory

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RAVINIA FESTIVAL

ida

MWAIC

StarShip Sail – July 5

Registered Tall Ship Windy II, a 149' 4-masted schooner. Evening sail to learn celestial navigation and mythology.