

Journal of the Association of Lunar & Planetary Observers



Founded in 1947

The Strolling Astronomer

Volume 50, Number 1, Winter 2008

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Inside. . .

- ***Mars takes a hit! (Maybe) Observing Alert for ALL ALPO members!***
 - ***Show your ALPO pride with the new ALPO Lapel Pin!***
 - ***Book review on webcam imaging by Robert Reeves***
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 - ***Comets Holmes and Tuttle – What a show!***
 - ***Report on solar Carrington Rotations 2040 thru 2050***
 - ***Report on the 2004-2005 Saturn apparition***
- . . . plus reports about your ALPO section activities and much, much more***

Color image of Comet 17P/
Holmes by ALPO Comets Section
coordinator Gary Kronk taken
2007 November 6 (23:41 UT).
The image is a 50-second expo-
sure using a Canon Digital Rebel
XTi (10.1 MP) camera connected
at the prime focus of Gary's 8-
inch Meade LX-200. Image taken
at Gary's observatory in St.
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Journal of the Association of Lunar & Planetary Observers

The Strolling Astronomer

Volume 50, No. 1, Winter 2008

This issue published in December 2007 for distribution in both portable document format (pdf) and also hardcopy format.

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

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

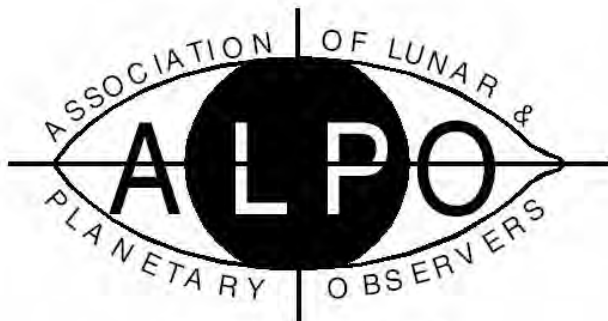
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E-mail to: will008@attglobal.net

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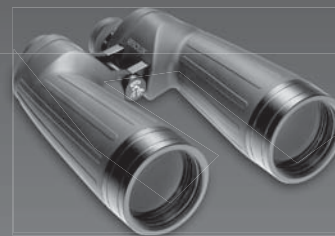


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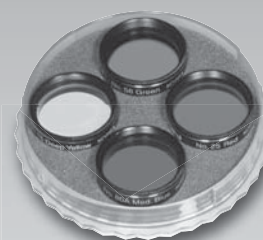
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Eclipse Section: Mike D. Reynolds

ALPO Website: Larry Owens

Point of View

Notes From the Director!

By Mike D. Reynolds, Ph.D., executive director,
Assn of Lunar & Planetary Observers

Greetings, Fellow ALPOers! As noted in the last issue of the JALPO, we are pleased to announce ALPO's new website. If you have not been there to check it out, please go to <http://www.alpo-astronomy.org>.



You will note several new features on the site, most noticeably recent images and observations. Since the Association of Lunar & Planetary Observers was built on regular, systematic observing and data, it seems appropriate that we highlight recent

observations!

Imaging has become such a major part of collecting data, and many ALPO observers have gotten really good at imaging. I have received several e-mails in regard to the new website. I want to offer our sincere thanks to ALPO webmaster Larry Owens for making a smooth transition from the old site and host to the new site.

Thanks to all of our observers for submitting their reports to the various ALPO section coordinators. Your observations are invaluable in contributing not only to ALPO, but to a better understanding of our solar system. And our community is one that can react faster to such events; the case in point was the recent show put on by Comet 17/P Holmes. And thanks to all of our coordinators for a job well done; without your work and efforts our members' observations would possibly never be seen by others!

In this issue the ALPO notes our very first ALPO logo lapel pin. These have been distributed to our ALPO sponsors as sincere thanks for their support. The new ALPO logo pins are available

(Continued on page 16)



Inside the ALPO Member, section and activity news

News of General Interest

ALPO Observer Alert! Possible Mars Impact by Asteroid on January 30

ALPO members are urged to ready their scopes, imaging devices and notetaking skills for a possible impact of Mars by asteroid 2007 WD 5 on Wednesday, January 30, 2008.

As this issue was being readied for distribution at the very end of December, scientists at NASA's Near-Earth Object Program Office at the Jet Propulsion Laboratory in Pasadena, CA, announced that their trajectory estimates for the asteroid make the odds for the asteroid impacting Mars 1-in-25 – or about 4 percent. And by the time you read this, the chances are that the impact odds will be further refined.

The following is from an announcement which appeared on Mars.com <http://www.marstoday.com> on December 29.

Reminder: Address changes

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

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

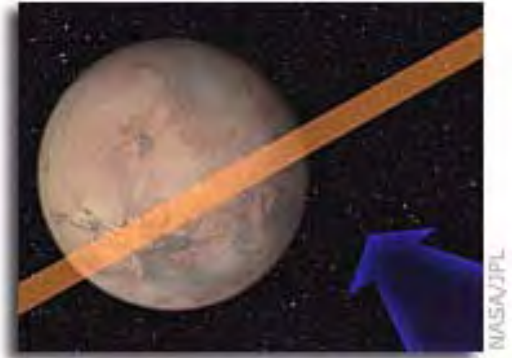
So once again, if you move or change Internet Service Providers and are assigned a new e-mail address, please notify Matt Will at will008@attglobal.net as soon as possible.

Astronomers funded by NASA are monitoring the trajectory of an asteroid estimated to be 50 meters (164 feet) wide that is expected to cross Mars' orbital path early next year. Observations provided by the astronomers and analyzed by NASA's Near-Earth Object Office at the Jet Propulsion Laboratory in Pasadena, Calif., indicate the object may pass within 30,000 miles of Mars at about 6 a.m. EST (3 a.m. PST) on Jan. 30, 2008.

"Right now asteroid 2007 WD5 is about half-way between Earth and Mars and closing the distance at a speed of about 27,900 miles per hour," said Don Yeomans, manager of the Near Earth Object Office at JPL. "Over the next five weeks, we hope to gather more information from observatories so we can further refine the asteroid's trajectory."

NASA detects and tracks asteroids and comets passing close to Earth. The Near Earth Object Observation Program, commonly called "Spaceguard," plots the orbits of these objects to determine if any could be potentially hazardous to our planet.

Asteroid 2007 WD5 was first discovered on November 20, 2007, by the NASA-funded Catalina Sky Survey and put on a "watch list" because its orbit passes near



Area of possible impact on Mars by asteroid 2007 WD 5.

Earth. Further observations from both the NASA-funded Spacewatch at Kitt Peak, Ariz., and the Magdalena Ridge Observatory in New Mexico gave scientists enough data to determine that the asteroid was not a danger to Earth, but could potentially impact Mars. This makes it a member of an interesting class of small objects that are both near Earth objects and "Mars crossers."

Because of current uncertainties about the asteroid's exact orbit, there is a 1-in-25 chance of 2007 WD5 impacting Mars (as of December 28). If this unlikely event were to occur, it would be somewhere within a broad swath across the planet north of where the Opportunity rover is located.



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Inside the ALPO Member, section and activity news

In Memoriam: Peter Wlasuk

By William M. Dembowski,
FRAS

It was with great sadness that I learned from Bob O'Connell of the passing of fellow ALPO member Peter Wlasuk. Peter passed away on September 8th, 2007 after a courageous battle with a debilitating illness which left him bedridden for the past three years.

Elected as a Fellow of the Royal Astronomical Society in 1994, Peter was Adjunct Professor of Astronomy at Florida International University where he was a mathematics and astronomy lab instructor. A brilliant scientist and talented writer, he authored works as varied as a paper on active galactic nuclei photometry for *The Astrophysical Journal*, to a handbook on amateur lunar observing (*Observing the Moon* – Springer-Verlag, 2000).

It was during the writing of *Observing the Moon* that I had my most frequent contacts with Peter and learned to appreciate his complete dedication to astronomy. Only 45 years old at his passing, his wife Patty said of Peter in a recent e-mail: "Sadly, much of his life's work died with him as he was unable to put many things down in writing before he left this earth. He really was a brilliant man and his heart was always in the right place. He wanted so much to continue contributing to the astronomical community and loved hearing from ALPO."

A memorial service and blessing of his ashes was held on October 30 in Gainesville, Florida. Peter Wlasuk will be greatly missed by family, friends, and colleagues.

The accompanying photograph of Peter at the control panel of the Yerkes Observatory was furnished by wife Patty.




"We estimate such impacts occur on Mars every thousand years or so," said Steve Chesley, a scientist at JPL. "If 2007 WD5 were to thump Mars on Jan. 30, we calculate it would hit at about 30,000 miles per hour and might create a crater more than half-a-mile wide." The Mars Rover Opportunity is exploring a crater approximately this size right now.

Such a collision could release about three megatons of energy. Scientists believe an event of comparable magnitude occurred here on Earth in 1908 in Tunguska, Siberia, but no crater was created. The object was disintegrated by Earth's thicker atmosphere before it hit the ground, although the air blast devastated a large area of unpopulated forest.

NASA and its partners will continue to track asteroid 2007 WD5 and will provide an update in January when further information is available. For more information on the Near Earth Object program, visit: <http://neo.jpl.nasa.gov/>.


An audio interview/podcast regarding 2007 WD5 is available at: <http://www.jpl.nasa.gov/multimedia/podcast/mars-asteroid-20071221/>

A videofile related to this story is available on NASA TV and the Web. For information and schedules, visit: <http://www.nasa.gov/ntv>. 

Strolling Astronomer Online Indexes Now Available

Indexes to volumes 18 through 29 and 42 thru 48 of *The Strolling Astronomer* are now available online at <http://www.alpo-astronomy.org>. At the ALPO homepage, click on "Publications", then scroll down and click on the "JALPO Indexes" button.


The online indexes to *The Strolling Astronomer* are provided as a service to ALPO members, researchers and interested others whose search brings them to the Assn of Lunar & Planetary Observers.

Additional indexes to the remaining volumes of the Journal will be added as they become available. 

ALPO Online Membership Payments are Back

We are pleased to announce that ALPO memberships can once again be purchased online. Direct your web browser to:

<http://www.galileospace.com/ALPO/>

The ALPO wishes to thank *Telescopes by Galileo* for hosting the ALPO and accepting ALPO membership payments on our behalf. Their support of the ALPO is most appreciated. See the ALPO membership application form near the back of this issue of your Journal for dues and other details. 

ALPO Interest Section Reports

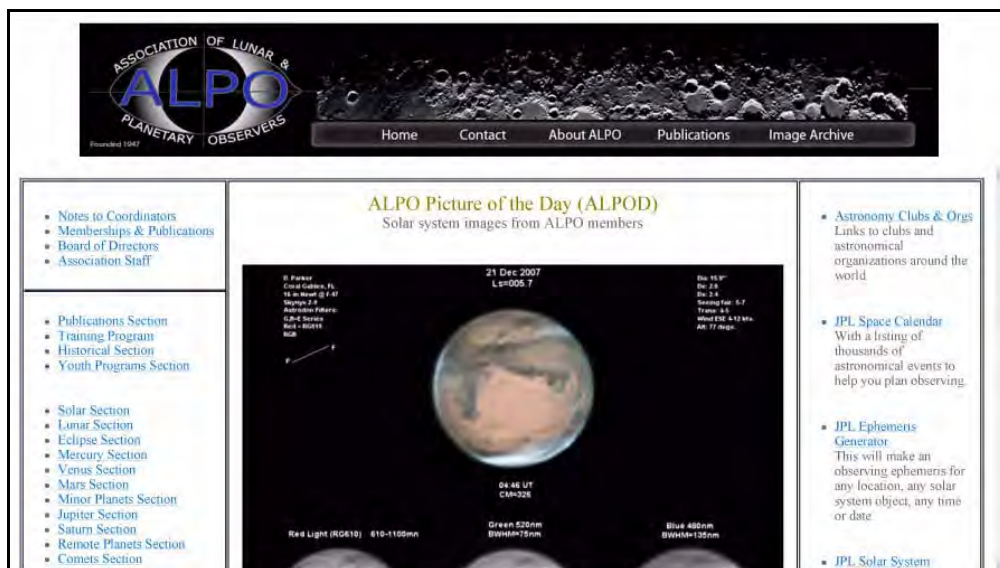
Web Services

Report by Larry Owens, acting coordinator, ALPO Website

The ALPO website has certainly changed over the past few months. We've moved to a new domain and we've retired the old website that Rik Hill so admirably managed for many years. With the new



Inside the ALPO Member, section and activity news



domain (alpo-astronomy.org), we have a new look and feel for the homepage, and easy-to-remember addresses for each ALPO section. As part of a continuing effort to keep our website dynamic, we've also created the ALPO picture of the day (ALPOD). The best images and drawings from our members are prominently displayed as the centerpiece of our website. Hopefully this will stimulate interest in ALPO and foster a bit of friendly competition among observers.

As a benefit of our new website hosting service, we are also able to offer "alpo-astronomy.org" e-mail addresses to staff members. This is an excellent option in this ever-changing sea of new e-mail addresses we find ourselves in today. The addresses can be client-based or forwarding accounts, and can remain the same regardless of the staff member's home internet service provider. If you're a staff member and don't already have an "alpo-astronomy.org" address, please contact me and I'll set it up for you.

Currently, all ALPO sections are up and running on the new domain. Each section appears basically as it did before, but some sections have changed slightly and a minor number of files were lost during the transition. Also, each section now uses an easy-to-remember address. The address is

based on the title of each section; for example, the address for the Mars section is simply our domain followed by a forward slash (/) and the word "mars" (<http://www.alpo-astronomy.org/mars>). For the most part, addresses are self-explanatory; however some sections may not be obvious. To verify the address used for a particular section, simply access our homepage. Moving your mouse over each section link (left column) will cause the address to appear in the lower left margin of your browser.

If you're a staff member and don't already have an "alpo-astronomy.org" address, please contact me and I'll set it up for you.

When our new website was first brought up this summer, one of the hot topics from section coordinators was how to submit a section website update. Coordinators who asked were given the option of updating the section themselves with an FTP account or else simply submitting the changes to me. Presently, these two options are still open to any coordinator. Other options are available such as "content manager" applications for those who want to do their own updates but lack

web publishing expertise. In any event, please feel free to contact me about updates, FTP accounts or a desire to use a content manager application.

A lot of work still needs to be done, and the future of our website largely depends on each section coordinator and of course input from ALPO members. I think we can all agree that a website which is well-organized, pleasing to the eye and frequently updated has the most potential for making a positive impact on ALPO. To help increase this potential, each section coordinator is urged to look at the current state of his or her section, and think about how the section could be better organized, what would make the section more appealing and what needs to be added or changed. When your ideas or changes are ready to be implemented, you are welcome to update the section yourself (contact me if you need an FTP account), or communicate your changes to me, and I will do my best to get it done for you.

I think we've made a great start on our new website and with your continued help, I'm certain the site can have a very positive influence on the future of ALPO.

Larry.Owens@alpo-astronomy.org
Visit the ALPO home page on the World Wide Web at <http://www.alpo-astronomy.org>

Computing Section

Report by Kim Hay, coordinator,
ALPO Computing Section

As of November 11, 2007, the ALPO Computing Section (ALPOCS) has seen recent activity with new members joining (up to 254) and the newly uploaded link by Jeff Beish to:

<http://www.dustymars.net-a.googlepages.com/marsobserverscave>

The biggest event right now in astronomy is Comet 17P/Holmes, which was first discovered in 1892 and showed the same characteristics as now, however, it only



Inside the ALPO Member, section and activity news

brightened to magnitude 4 at that sighting. First seen in its present form on October 23, 2007, it has been growing in size, and its central core has been changing shape. The fantastic note about this comet is that it was moving away from the Sun when it brightened from magnitude 17 to magnitude 2.5 within 24 hours — that is nearly 700,000 times.

Some question, why this comet would brighten at all while moving away from the Sun? Some theorize that though there was some warming of the outer crust, it did not melt, but instead created some form of internal pressure, resulting in the release of the outside shell and exposing new material.

What does this have to do with computing? Well check out the orbit of Comet Holmes, at <http://ssd.jpl.nasa.gov/sbdb.cgi?sstr=17p&orb=1>

There you'll find a 3D image of the orbit — very interesting. The comet is now out between the orbit of Mars and Jupiter, and was out near Jupiter when it brightened . . . hmm, did Jupiter's gravity have anything to do with it?

No one seems to be at the computer reading, writing or doing astronomical computations, because they are all out observing. If you want more information on the comet, check out <http://www.alpo-astronomy.org/> in the ALPO Comets Section, headed up by Gary W. Kronk.

Please check out the above listed files and more at www.yahoo.com and join the ALPOCS group. Here's how: go to Yahoo.com or in our e-mail program send a note to

Subscribe: alpo-cs-subscribe@yahoo-groups.com with just subscribe in the message body, nothing else. The moderator will update you into the listing, and voila you're on the list.

To post, either on the site or via your e-mail program, use alpo-cs@yahoo-groups.com. You can also unsubscribe


from the list using alpo-cs-unsubscribe@yahoo-groups.com but if you need to go, we understand.

We do have programmers that can help if you're looking for a specific program, or just have questions in your own programming.

It's up to the members of ALPO to let us know how we as the ALPO Computing Section can assist you in anything you need help with computer-wise.


If you are running a certain program that you wish to share with others, well this is the place to put your review. Better yet, send a note to the section coordinator (me, at Kim.Hay@alpo-astronomy.org), and I'll get it submitted for publication in this Journal, and share with others.

Come join us, see what we are about.

Visit the ALPO Computing Section on the World Wide Web at <http://www.alpo-astronomy.org>, then Computing Section. 


Lunar & Planetary Training Program

**Report by Tim Robertson, coordinator,
ALPO Lunar & Planetary Training
Program**

For information on the ALPO Lunar & Planetary Training Program on the World Wide Web, go to <http://www.cometman.net/alpo/>; regular mail to Tim Robertson at 2010 Hillgate Way #L, Simi Valley CA, 93065; e-mail to cometman@cometman.net 

Instruments Section

**Report by Mike Reynolds,
acting coordinator, ALPO Instruments
Section**

Visit the ALPO Instruments Section on the World Wide Web at <http://www.alpo-astronomy.org>, then Instruments Section. 

ALPO Observing Section Reports


Eclipse Section

**Report by Mike Reynolds,
coordinator, ALPO Eclipse Section**

Thanks to many ALPO members for reports on the 28 August 2007 total lunar eclipse; an article on those observations appears in this issue. Additional thanks to Dr. John Westfall for his collection of naked eye timing observations for the eclipse. We also request the same naked eye timing observations, as well as all other observations made following the 20 February 2008 total lunar eclipse.

I hope you are making plans to observe the February total lunar eclipse. This eclipse is well-timed for North American observers in particular. Make certain you forward your observations; a full report will be prepared for this Journal.

If you send images please send the highest file-size possible, along with images in the largest data file-size possible. Include specifics, such as equipment used, location, exposure length, other photographic parameters, etc. It is important to share with JALPO readers the "how" of obtaining these images.

Please visit the ALPO Eclipse Section on the World Wide Web at <http://www.alpo-astronomy.org>, then Eclipse Section. 

Comets Section

**Report by Gary Kronk, acting
coordinator, ALPO Comets Section**

See "Notes on Comets 17P/Holmes and 8P/Tuttle" later in this JALPO.

Visit the ALPO Comets Section on the World Wide Web at <http://www.alpo-astronomy.org>, then Comets Section. 




Inside the ALPO Member, section and activity news

Meteors Section

**Report by Robert Lunsford,
coordinator, ALPO Meteors
Section**

Many thanks to the ALPO observers who made efforts to contribute observing data in 2007, and I look forward to more of your valuable data in the coming year.

Visit the ALPO Meteors Section on the World Wide Web at <http://www.alpo-astronomy.org>, then Meteors Section. 

Solar Section

**Report by Kim Hay, coordina-
tor, ALPO Solar Section**

See report on Carrington Rotations 2040-2050 later in this JALPO.

In at least the last few months (September thru October) we are into the downward side of our solar minimum of Cycle 23; there have been a few days of some sunspots, thus producing M-class flares, but for the most part, the Sun has been blank. This is apparent in the number of submissions that we have received in CR2061 and CR2062 (Carrington Rotations 2061 and 2062).

Since our last report, we have gone through CR2053 and are now currently in CR2063. With this report is a chart that represents CR2053 to CR2062 with the number of submitters and images, which include drawings, white light, H-alpha, and K band and the Sunspot Numbers per Rotation, which are based on the report from the Solar Influences Data analysis Center based at the Royal Observatory of Belgium. (<http://www.sidc.be>), compared in a separate graph to the author's Relative Sunspot Count.

The ALPO Solar Section only collects and archives images and drawings of sunspots prominences, aurorae, light bridges, and

Carrington Rotation	Date of Rotation Period (2007)	Number of Observers	Number of Submissions	Relative Sunspot Numbers per Rotation (Kim Hay)	Relative Sunspot Numbers per Rotation (Royal Observatory of Belgium)
CR2053	Feb 2-March 4	10	149	12.16	9.90
CR2054	Mar 5-Mar 31	8	150	3.91	4.11
CR2055	April 1-April 27	9	107	1.5	4.18
CR2056	April 28-May 24	11	160	16.10	29.33
CR2057	May 25-June 21	12	172	9.22	22.35
CR2058	June 22-July 18	12	201	14	24.66
CR2059	July 19-Aug 14	9	150	5.33	9.85
CR2060	Aug 15-Sept 10	9	132	7.06	11.15
CR2061	Sept 11-Oct 8	9	84	2.45	3.85
CR2062	Oct 9- Nov 4	9	76	Complete but not included	Data not complete

white light flare images and presents them online. The Relative Sunspot program is handled by the AAVSO (<http://www.aavso.org>) under their Solar Section.

However, to show both the sunspot count and the number of submissions, it also shows that we are on the downward side of activity on the Sun, and no spots make for a boring Sun. However, images capturing the prominences (which are generally photographed and drawn) are not counted like sunspots, but instead they are recorded as these events show that the Sun is active and releasing its fury, with the possibility of future flares, or pores and which could turn into sunspots.

But for interest sake, I am including the Relative Sunspot numbers per Rotation Period from the Royal Observatory of Belgium, and comparing them to my own Relative sunspot numbers, which I submit to the AAVSO for its monthly Relative Sunspot Count. So my numbers and those of the Royal Observatory have been aligned to cover the Carrington Rotation Periods.

You will notice that my numbers are in the same ballpark, while the reported numbers for other rotations are off. This is due to the number of days observed and, of course, the weather conditions at the time.

The Royal Observatory of Belgium has between 45 and 57 stations reporting their numbers, while there is only one station reporting my data — that being myself. The AAVSO program generally has around 60 observers worldwide, thus their numbers can be closer to that of the Royal Observatory of Belgium, which also runs on a monthly basis.

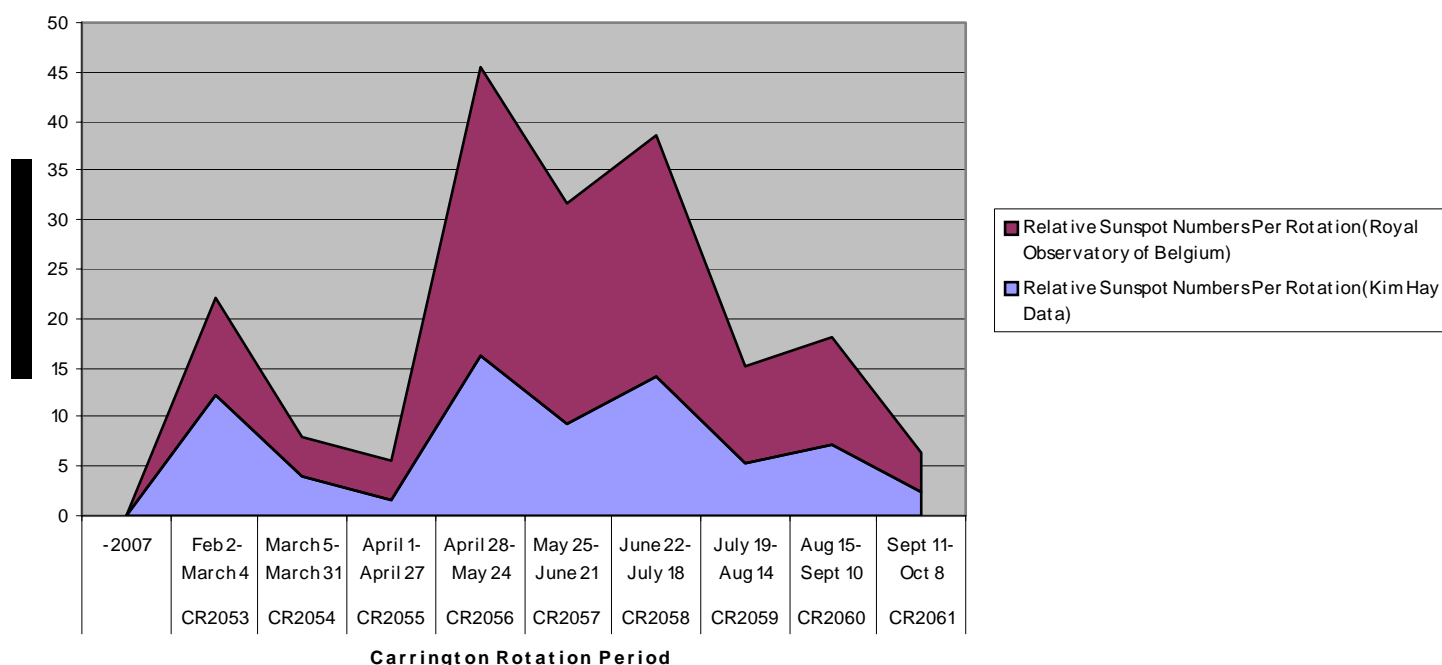
This also brings up another comment on our submissions. Like all aspects of visual astronomy, we are hampered by our weather; so having many submissions helps to fill in the days when another observer cannot submit, plus it also alerts others to get out and look. You never know when the Sun may surprise us and show us a pore, with the hopes that it may turn into sunspot or group.

In conclusion, if our Sun is active either in sunspots or in prominence ejecta, our submission ratio goes up. It's not to say



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Relative Sunspot Numbers in Carrington Rotations



that our observers are not out there looking, but there may be nothing to report in whatever medium they use. However, I would like to suggest to everyone, please take images daily where possible in order to help become part of the archive of the ALPO Solar Section. For what we do not see today, may turn into something big tomorrow.

As noted in the previous issue of *The Strolling Astronomer*, we now have a new home for the ALPO website, one which gives us a new web location for the Solar Page. To visit the ALPO Solar Section on the World Wide Web at <http://www.alpo-astronomy.org>, then Solar Section.

To view all submissions, scroll down then click on *Recent ALPOSS Observations*.

These observations include drawing of sunspot groups with added H-alpha phenomena. Photography includes images of

White Light, H-alpha, prominences and some animated images of the Sun.

The ALPO Solar Section web pages, will be going through some transitions over the next few months, so make sure that you return often to see the exciting new changes.

If you wish to contribute to the Solar Section by sending in images or drawings, please e-mail them to kim@starlightcascade.ca. All digital images should be in jpg format and no more than 300 kilobytes in size. If you are unsure on how to go about submitting or how to start, drop me a line or join the Solar ALPO Yahoo group at <http://www.yahoo.com>, go to groups, look for Solar-ALPO and sign in to join. We are all looking forward to seeing your drawings and images of our Sun.



Mercury Section

Report by Frank J. Melillo, coordinator, ALPO Mercury Section

It has been a slow year for the Mercury section. However, in November, I did begin to receive more observations than for any other apparition during the year. Mercury is in a favorable position in the morning sky, but that's not the main reason why I received so many reports. I called for observations because most of the surface facing the Earth is unknown and it wasn't imaged by the Mariner 10 spacecraft.

I keep tabs on observers who are interested in drawing and imaging Mercury. I find that they tend to forget Mercury after awhile and begin concentrating on other planets more easily observed; Mars is a perfect example right now. The giant planets are well observed, too. But Mercury is a much lesser known planet. We have an



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opportunity to take advantage of our techniques using much better optics, software and the Internet to improve our knowledge. This makes it more pleasant to observe Mercury and it may lead to a discovery.

While Carl Roussell, Ed Lomeli and I remain the most active observers, we now have two new observers, John Boudreau of Massachusetts and Elias Chasiotis of Greece. Both Messrs. Boudreau and Chasiotis, along with Mr. Lomeli have produced some outstanding images. All are working with different filter types in order to get most out of Mercury. Also, we don't forget Andy Allen from last year with his incredible images, and Tim Wilson and Mario Frassati with their incredible drawings. One more thing, the late Erwin VD Velden was the first person I personally knew who actually imaged the real albedo features on Mercury. All of them are true pioneers for imaging Mercury as we have never seen it before. (my own images were good, but not as good as theirs!)

The first flyby of Mercury by MESSENGER spacecraft will take place on January 14, 2008. I don't know what part of the surface will be visible to the spacecraft, but I'm pretty sure the images will be at a better resolution and contrast than those by Mariner 10 spacecraft over 30 years ago. Also, there will be two more flybys before the craft finally goes into orbit in 2011. The ALPO Mercury section will keep a close eye on the results of the MESSENGER spacecraft.

Visit the ALPO Mercury Section on the World Wide Web at <http://www.alpo-astronomy.org>, then Mercury Section.



Venus Section

Report by Julius Benton, coordinator, ALPO Venus Section

Venus is now a very bright object situated in the morning sky just before sunrise, following the close of the 2006-07 Eastern (Evening) Apparition on August 18, 2007 when the planet passed through Inferior Conjunction. A report on that apparition will appear in this Journal once all observations have been carefully analyzed.

The planet is now passing through its waxing phases (a gradation from crescentic through gibbous phases) as the apparition continues.

The disc of Venus started out about 60 arc-seconds across, attaining greatest brilliancy the third week of September, but has slowly decreased in angular diameter and brightness as it heads toward Superior Conjunction on June 9, 2008 at 9.6 arc-seconds in extent. Venus reached theoretical dichotomy (half-phase) on October 27, just one day before it passed through Greatest Elongation West. Observers are now seeing the trailing hemisphere (dawn side) of Venus at the

time of sunrise on Earth. Observers are always encouraged to try to view Venus



Digital image of Venus taken on October 11, 2007 at 05:47UT by Arnaud van Kranenburg from The Netherlands using a 23.5 cm (9.25 in) SCT with a UV filter (340-400nm) in good seeing. Note the very obvious banded and irregular dusky markings on the crescent of Venus (diameter of Venus is 29.9" and gibbous phase of $k = 0.402$ or 40.2% illuminated).

simultaneously (as close to the same time and date as circumstances allow) to improve confidence in results and reduce subjectivity.

The Venus Express (VEX) mission started systematically monitoring Venus at UV, visible (IL) and IR wavelengths in late May 2006. As part of an organized Professional-Amateur (Pro-Am) effort, a few ALPO Venus observers have submitted high quality digital images of the planet taken in the near-UV and near-IR, as well as other wavelengths through polarizing filters. The observations should continue to be contributed in JPEG format to the ALPO Venus Section Coordinator as well as to the VEX website at: <http://sci.esa.int/science-e/www/object/index.cfm?fobjectid=38833&fbodylongid=1856>.

Routine observations of Venus are needed throughout the period that VEX is observing the planet, which continues in 2007-08 and a couple of years henceforth, as well as after completion of the mission. Since Venus has a high surface brightness, it is potentially observable anytime it is far enough from the Sun in

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

Inferior Conjunction	2007	August 18 ^d 04 ^h (angular diameter = 59.2 arc-seconds)
Greatest Brilliancy		Sep 23 ^d 23 ^h ($m_v = -4.8$)
Predicted Dichotomy	2007	Oct 27 ^d 15.36 ^h (exact half-phase)
Greatest Elongation West		Oct 28 ^d 15 ^h (45° west of the Sun)
Superior Conjunction	2008	June 9 ^d 00 ^h (angular diameter = 9.6 arc-seconds)



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the sky to be seen without threat of eye damage.

Key observational endeavors:

- Visual observations and drawings in dark, twilight, and daylight skies to look for atmospheric phenomena, including dusky shadings and features associated with the cusps of Venus
- Visual photometry and colorimetry of atmospheric features and phenomena
- Monitoring the dark hemisphere for Ashen Light
- Observation of terminator geometry (monitoring any irregularities)
- Studies of Schröter's phase phenomenon near date of predicted dichotomy
- Routine CCD and webcam imaging of Venus at visual, UV, and IR wavelengths
- Special efforts to accomplish simultaneous observations
- Contribution of observation data and images to the Venus Express mission is encouraged

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

Complete details can be found about all of our observing programs in the ALPO Venus Handbook.

Individuals interested in participating in the programs of the ALPO Venus Section are cordially invited to visit the ALPO Venus Section on the World Wide Web at <http://www.alpo-astronomy.org>, then Venus Section. 

Lunar Section:

Lunar Topographical Studies / Selected Areas Program

Report by William M. Dembowski,
FRAS, coordinator, ALPO Lunar
Topographical Studies /
Selected Areas Program


During the third quarter of 2007, the ALPO Lunar Topographical Studies Section (LTSS) received a total of 237 new images and timings of 58 lunar occultations from 22 observers in 9 countries and 8 of the United States.

As part of an ongoing program (Focus On), observers are assigned, on a bi-monthly basis, a specific feature or class of features to study. During the first three quarters of 2007, those assignments were Sinus Iridum, Plato, Theophilus, Proclus, and Copernicus. Participation was excellent for all assignments and the resulting reports were published in the Lunar Section newsletter *The Lunar Observer* (or "TLO").

Recently, the online encyclopedia, Wikipedia, added an entire section devoted exclusively to the Moon. Spearheaded by Chuck Wood (formerly of the Lunar & Planetary Lab at UA and now a columnist for *Sky & Telescope* magazine), the website features a separate page for each named lunar feature. At his request, the LTSS uploaded approximately 500 links from each appropriate crater page to information on the ALPO Rayed Crater and Banded Crater Programs. It is hoped that this additional exposure will increase awareness of, and participation in, many ALPO observing projects.

With the January 2008 issue, *The Lunar Observer* newsletter will begin its 12th year of publication. Our online newsletter is now averaging nearly 600 hits per month.

Visit the following web sites on the World Wide Web for more info:

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

Lunar Domes Survey

Report by Marvin Huddleston, FRAS,
coordinator, ALPO Lunar Domes
Survey

Participants are encouraged to contact Harry D. Jamieson, e-mail harry@persoftware.com in order to obtain a copy of the *Lunar Observers Tool Kit*, (Windows edition).

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





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Lunar Calendar, January thru March 2008 (all times in UT)

Jan. 03	08:07	Moon at Apogee (405,327 km - 251,859 miles)
Jan. 05	04:00	Moon 7.0° S of Venus
Jan. 07	11:00	Moon 4.3° S of Jupiter
Jan. 08	11:36	New Moon (Start of Lunation 1052)
Jan. 09	16:00	Moon 0.35° ESE of Mercury
Jan. 10	06:00	Moon 1.4° NNW of asteroid Vesta
Jan. 11	01:00	Moon 0.42° S of Neptune
Jan. 12	23:00	Moon 2.3° NNW of Uranus
Jan. 15	19:45	First Quarter
Jan. 19	08:40	Moon at Perigee (366,435 km - 227,692 miles)
Jan. 19	24:00	Moon 1.1° N of Mars
Jan. 22	13:34	Full Moon
Jan. 25	04:00	Moon 2.6° SSW of Saturn
Jan. 30	05:02	Last Quarter
Jan. 31	04:27	Moon at Apogee (404,531 km - 251,364 miles)
Feb. 04	07:00	Moon 4.0° S of Jupiter
Feb. 04	13:00	Moon 4.2° S of Venus
Feb. 07	03:44	New Moon (Start of Lunation 1053)
Feb. 07	03:00	Moon 4.6° SSE of Mercury
Feb. 07	10:00	Moon 0.34° SSW of Neptune
Feb. 09	07:00	Moon 2.5° NNW of Uranus
Feb. 14	01:09	Moon at Perigee (370,215 km - 230,041 miles)
Feb. 14	03:33	First Quarter
Feb. 16	08:00	Moon 1.6° N of Mars
Feb. 21	03:29	Full Moon (Total Lunar Eclipse)
Feb. 21	09:00	Moon 2.5° SSW of Saturn
Feb. 28	01:28	Moon at Apogee (404,441 km - 251,308 miles)
Feb. 29	02:19	Last Quarter
Mar. 03	02:00	Moon 3.6° S of Jupiter
Mar. 05	15:00	Moon 0.28° ESE of Mercury
Mar. 05	20:00	Moon 0.33° NNE of Venus
Mar. 05	22:00	Moon 0.26° ESE of Neptune
Mar. 07	17:14	New Moon (Start of Lunation 1054)
Mar. 07	19:00	Moon 2.6° NNW of Uranus
Mar. 10	21:40	Moon at Perigee (366,301 km - 227,609 miles)
Mar. 14	10:45	First Quarter
Mar. 15	03:00	Moon 1.7° N of Mars
Mar. 19	13:00	Moon 2.4° SSW of Saturn
Mar. 21	18:39	Full Moon
Mar. 26	20:14	Moon at Apogee (405,093 km - 251,713 miles)
Mar. 29	21:48	Last Quarter
Mar. 30	19:00	Moon 3.1° SSE of Jupiter

(Table courtesy of William Dembowski)

Lunar Transient Phenomena

Report by Dr Anthony Cook, coordinator, ALPO Lunar Transient Phenomena

Since the last ALPO-LTP subsection report (JALPO49-3), three new LTPs and one flash (impact?) have been reported to me. This does not necessarily mean that they are strong LTP candidates, as none were corroborated and terrestrial explanations might be the cause. Nevertheless, here are the details below:

- 2006 Dec 08 UT ~17:52 South of Godin – Maurice Collins (New Zealand) – Saw a very bright flash, in daylight, lasting a fraction of a second. It might have been an impact flash or a TLP flare, but without backup reports, it could have easily been a cosmic ray or pollen, etc.
- 2007 Apr 20 UT 22:40-23:50 Aristarchus (and possibly Moltke/Torricelli B) – Marie Cook (Mundesley, UK) – Noticed that the bands in Aristarchus were fainter than usual and that there was some hint of color through a “Moon Blink” device. Possible variation in brightness seen when comparing Moltke with Torricelli B. Observations not confirmed by Gerald North, so the effects may have been local seeing-related?
- 2007 Oct 21 UT 18:43-18:59 Censorinus – Gerald North (Narborough, UK) – Crater appeared much brighter than normal, but then faded rapidly to its usual brightness, albeit with some fluctuation towards the end. All observations before and after Gerald’s report made by other observers showed nothing unusual. Also, from the reports received so far, no other observers were observing at the precise same time as Gerald North. So unfortunately we cannot confirm the report.
- 2007 Oct 23 UT 21:15 Gassendi – Clive Brook (Plymouth, UK) – Noted



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a fleeting reddish patch inside the crater.

"The Lunar Observer" (TLO) newsletter published by the Lunar Section.

Visit the ALPO Lunar Transient Phenomena program on the World Wide Web at

Further details about these reports and general articles on LTP can be found in


- <http://www.alpo-astronomy.org>, then Lunar Section, then Transient Phenomena
- <http://www.ltpresearch.org/> 



Figure 1. (Left) Image by Dave Tyler on November 2, 2007 at 03:40 UT (Ls=341). Small bright dust clouds surround Nilokeras and Lunae Lacus. Image details: Left, 36-cm SCT; RGB image with Skynyx-2.0 camera. (Right) Image by Andrea Tasselli on November 3 at 04:07 UT (Ls=341) and reveals obscuration of Niliacus Lacus in addition to Lunae Lacus and Nilokeras. Image details: 25-cm Newtonian; red light image with DMK21AF04 camera..


Lunar Meteoritic Impact Search Report by Brian Cudnik, coordinator, ALPO Lunar Meteoritic Impact Search

The Lunar Meteoritic Impact Search Section was rather active this year as monitoring continued on the Moon both during active showers and non-shower periods at dusk and pre-dawn when the Moon was favorably placed (to include phase) for observation.

Some showers monitored for lunar strikes include: the Lyrids of April, the eta Aquarids of May, the total lunar eclipse on August 28, the Orionids of October 21 and the south Taurids of November 5. Several impact candidates were reported for the Lyrids and the Orionids.

One upcoming opportunity is the Quadrantids of 4 January 2008. The February total lunar eclipse will be monitored as well.

And the "second edition" of the book *An Observer's Guide to Lunar Meteoritic Phenomena* is nearing completion, with only two more chapters and the appendices to give the final once-over. An online (shorter) version of the book may be available by the end of the year.

For information on impact-related events, please visit the ALPO Lunar Meteoritic Impact Search site on the World Wide Web at <http://www.alpo-astronomy.org>. 

Mars Section

Report by Donald C. Parker, assistant coordinator, ALPO Mars Section, Roger Venable, acting assistant coordinator, and Jim Melka, ALPO acting assistant coordinator

We have just witnessed a planet-encircling dust storm! Although most of the dust has settled, and Mars's familiar albedo features are again visible, new dust clouds are still

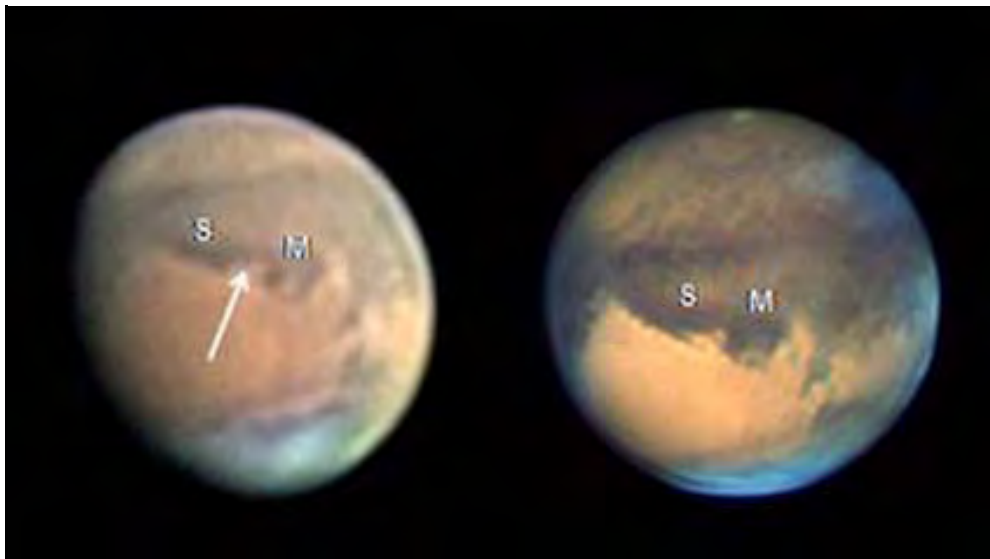


Figure 2. (Left) Image by Ed Grafton taken on Oct. 12, 2007, at 11:34 UT. Note that the connection (arrow) between Sabaeus Sinus (denoted by S) and Meridiani Sinus (M) is thin, as though the two are nearly separated. Image details: 14-inch SCT @ f/42. RGB image with ST402 camera. (Right) Image by Christopher Go taken during the previous apparition, Nov. 6, 2005, showing the more usual appearance of the two features. Image details: 11-inch SCT, 3x Barlow, RGB, DMK21BF04 camera.



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appearing in various places. On November 2, Spain's Jesus Sanchez and England's Dave Tyler reported several small, bright

dust clouds surrounding Nilokeras and Lunae Lacus. By November 3, the dust had expanded south and east to cover much of

Niliacus (Figure 1). By November 6, however, the region returned to a normal appearance for the season.


One of the most exciting activities in planetary observation is the search for changes in Martian albedo features after a big dust storm. Jeff Beish noted on August 29 that Meridiani and Sabaeus Sinuses seem to be separating from one another (Figure 2). Meanwhile, a dark bar — nicknamed the “Sirenum Extension” — materialized across Daedalia.

In addition, a dark area west of and similar in size to Aonius Sinus and a linear marking connecting Solis Lacus and Phoenicis Lacus appeared (Figure 3). Also, notice that Solis Lacus is smaller and darker than it was in 2005. The Hyblaeus Extension is much more extended than usual, with a dark streak that connects it to the Tritonis Sinus area across Ethiopia (Figure 4).

These changes show that some areas of Mars owe their albedos to a thin layer of dust that can be deposited or removed by the winds of a storm. Although these particular changes have all been seen before, some of them have not been seen in many years. We'll be watching to see how long they last.

The dust season will weaken and the cloud season will begin soon (see the calendar of events in JALPO49-2 (pp 29-30; Spring 2007). To stay abreast of changes on Mars, we highly urge that you join the Mars observers' group at <http://tech.groups.yahoo.com/group/marsobservers> and check for ALPO alerts at <http://alpo-astronomy.org/mars/alert/>. And above all, keep sending us your observations!

Join us on the Yahoo Mars observers' message list at <http://tech.groups.yahoo.com/group/marsobservers>. There you can share in discussions of observing Mars and post your images and drawings.

Visit the ALPO Mars Section on the World Wide Web at <http://www.alpo-astronomy.org>, then Mars Section. 

Minor Planets Section

**Report by Frederick Pilcher,
coordinator, ALPO Minor Planets Section**

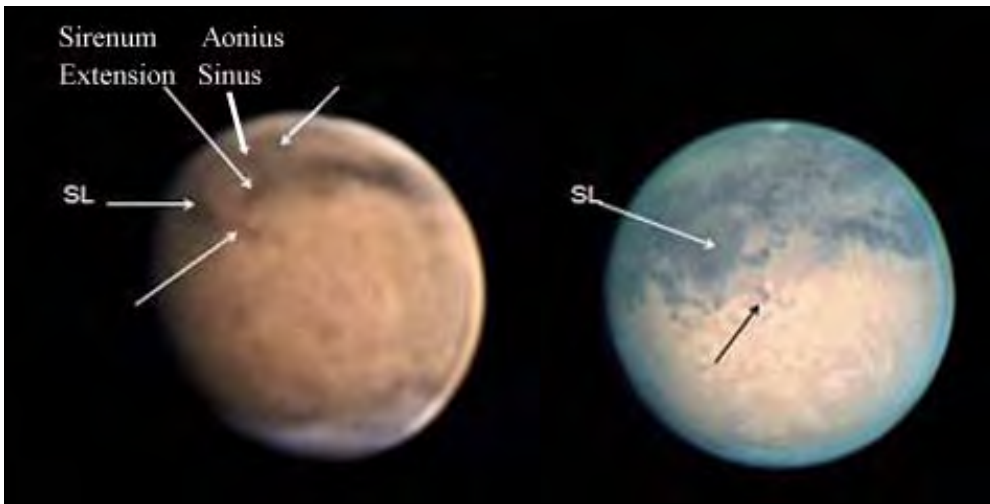


Figure 3. On the left is an image by Jim Melka taken on November 2, 2007 (Ls 341,) while on the right is an image by Robert Heffner taken during the previous apparition, on October 27, 2005 (Ls 314.) Note the smaller size of Solis Lacus (SL) after this year's dust storm. Phoenicis Lacus is denoted by the short arrow in the right image. Notice the new dark streak (arrowed) between it and Solis Lacus in the left image. The other long arrow on the left image denotes a new darkening of the Daedalia area (the “Sirenum Extension”). Image details: left, 30-cm Newtonian, DBK21AF01 AS camera. Right, 11-inch SCT, 3x Barlow, RGB, LU075 camera.

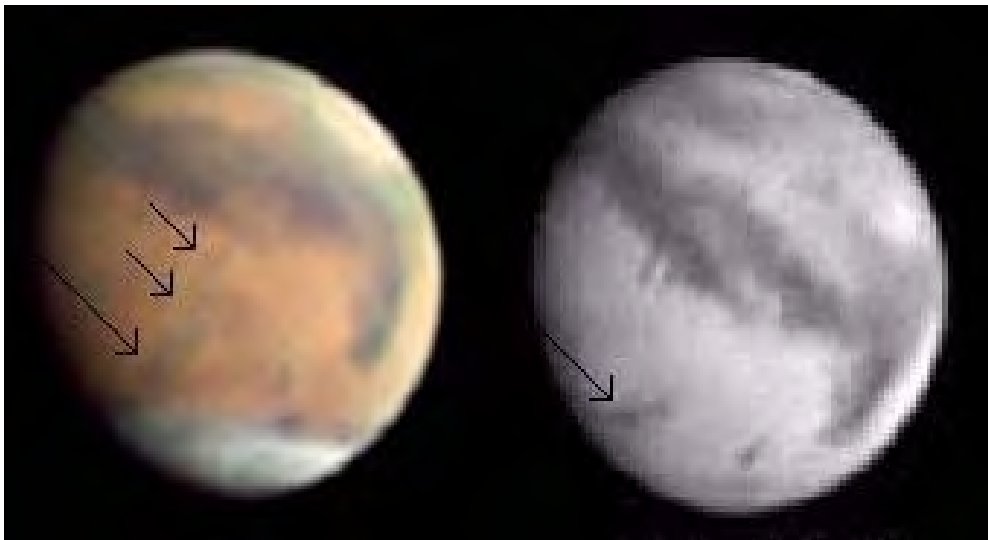


Figure 4. Image on left by Ethan Allen on Oct. 24, 2007 (Ls 336,) while image on right was taken by Mark Schmidt during the previous apparition, on Sept. 27, 2005 (Ls 296.) The long arrow in each image designates the Hyblaeus Extension, while the short arrows in Ethan's image indicate the new dark streak across Ethiopia. Image details: left, 12-inch Newtonian, Barlowed to f/46, RGB, SKYnyx2-DM camera. Right, 14-inch SCT, red filter, SBIG ST5c camera.



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Minor Planet Bulletin Vol. 34, No. 4, 2007 Oct.-Dec. contains a landmark report by Gerard Faure and Lawrence Garrett of the Magnitude Alert Program listing improved absolute magnitudes H of 16 asteroids.

Observations of each asteroid for at least three oppositions by several observers show with high confidence that for each of these, the tabulated values in the Minor Planet Center files require revision by 0.4 up to 2.6 magnitudes, and also demonstrate that experienced visual observers of asteroids, as is also true for AAVSO members, can obtain accuracy of 0.1 to 0.3 magnitudes.


The asteroids for which improved magnitudes are published are 612, 881, 921, 1166, 1239, 1296, 1353, 1384, 1388, 1444, 1656, 3904, 4483, 5641, 6354, 9117. Many other asteroids have reports of similar magnitude discrepancies but require many more magnitude measures at future oppositions and by multiple observers before the corrections can be considered secure.

Gianluca Masi and colleagues are looking for cometary emission in main belt asteroids by comparing the FWHM (full width half maximum) of asteroid images in their CCD frames with FWHM of stars in the same frame. Consistently greater asteroidal FWHM is an indication of outgassing.

Ongoing results are posted on <http://asteroidi.uai.it>.

New or improved rotation periods and amplitudes are reported for 57 different asteroids, numbers 28, 56, 148, 223, 235, 273, 335, 348, 502, 533, 542, 559, 621, 715, 747, 791, 872, 1096, 1102, 1132, 1164, 1335, 1534, 1586, 1602, 2167, 2341, 2582, 2658, 2887, 3028, 3091, 3166, 3310, 3406, 3451, 3497, 3575, 3940, 4246, 5384, 5390, 5484, 5654, 6029, 6615, 7055, 7304, 8887, 9873, 10261, 10662, 12168, 15822, 29515, 41577, 2006 VV2.

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

In addition, please visit the ALPO Minor Planets Section on the World Wide Web at <http://www.alpo-astronomy.org>, then Minor Planets. 

Jupiter Section

**Report by Richard W. Schmude, Jr.,
coordinator, ALPO Jupiter Section**

Jupiter will be too close to the Sun during December and January for observing. Please send any Jupiter observations to coordinator Schmude.

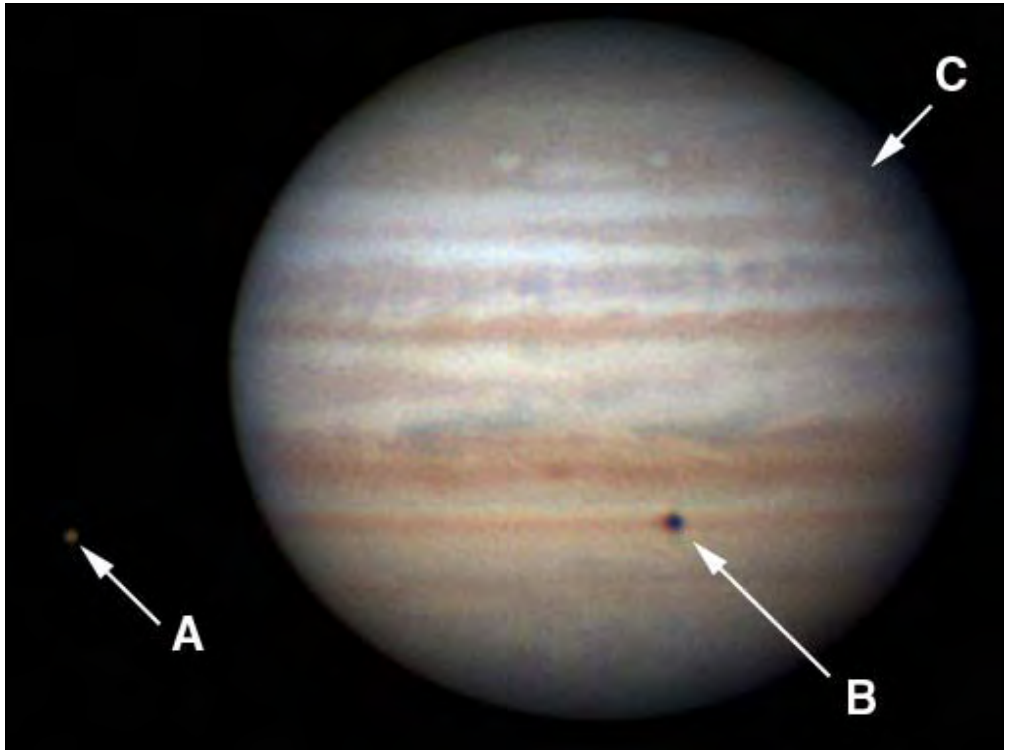
A lot has happened on Jupiter during the past year, and ALPO's Christopher Go of Cebu City, Philippines, has been there to image almost all of it. Chris submitted several dozen high quality images of Jupiter. Some of the developments that have happened during the past year have been a fading of the South Equatorial Belt, the revival of the North Temperate Belt and the development of the circulating current.

Look for a new Jupiter observing guide early in 2008. The ALPO Jupiter Section's

own John McAnally's "Jupiter and How to Observe It" (published by Springer) is scheduled for release on January 4.

Finally, this section coordinator has completed the 2004-05 Jupiter apparition report and has submitted it for publication in this Journal. The 2003-04 Jupiter apparition report will appear in JALPO 50-2. The 2005-06 Jupiter apparition report will be prepared in early 2008 and will be followed by the 2006-07 Jupiter apparition report during mid 2008.

Visit the ALPO Jupiter Section on the World Wide Web at <http://www.alpo-astronomy.org>, then Jupiter Section.



Jupiter: Europa and Red Jr. as imaged by ALPO member Christopher Go, Cebu City, Philippines on September 23, 2007, 10:05 UT. $\lambda_I = 68^\circ$, $\lambda_{II} = 213^\circ$, $\lambda_{III} = 128^\circ$; Seeing 7 (out of possible 10, with 10 best); Transparency 3 (out of possible 5, with 5 best). South is at top. Europa located at A near left edge of frame, shadow of Europa on globe at B and Red Jr. faintly visible at C (at arrow). All images were taken using a DMK 21BF04 camera configured to a Celestron C11 mounted on an AP900GTO mount. RGB is done using a Hoyer Motorized filter wheel. Image acquisition software was IC Capture 2.0 and processing was done with Registax V4. (Source: <http://jupiter.cstoneind.com/>)



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Galilean Satellite Eclipse Timing Program

Report by John Westfall, assistant
coordinator, ALPO Jupiter Section

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; e-mail to johnwestfall@comcast.net to obtain an observer's kit, which includes Galilean satellite eclipse predictions for the 2007-9 apparition.



Saturn Section

Report by Julius Benton,
coordinator, ALPO Saturn Section

See report on the 2004 - 2005 Apparition later in this issue.

With the 2006-07 observing season already behind us (Saturn reached conjunction with the Sun on August 21, 2007), observers are already getting up well before sunrise to view and image Saturn as the 2007-08 apparition gets underway. The detailed report for 2006-07 will appear in this Journal once observations have been compiled and analyzed. As of this writing, the ALPO Saturn Section has received over 50 reports and images for the 2007-08 observing season.

Saturn emerged in the east before sunrise during September 2007, when several observers started viewing and imaging the planet. The pertinent geocentric phenom-

Geocentric Phenomena for the 2007-2008 Apparition of Saturn in Universal Time (UT)

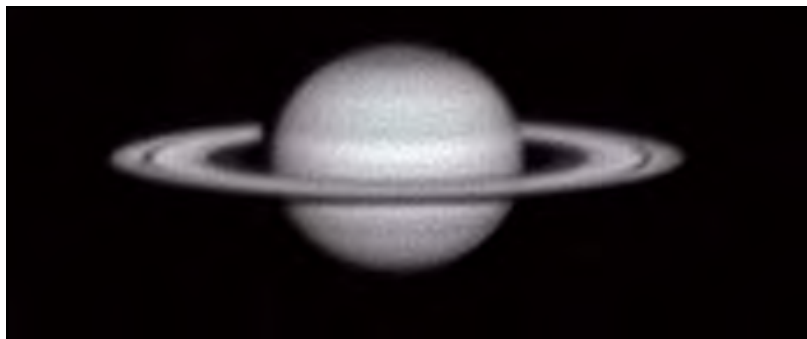
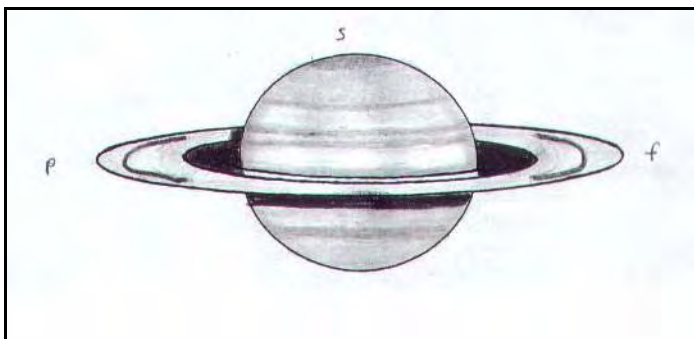
Conjunction	2007 Aug 21 ^d
Opposition	2008 Feb 24 ^d
Conjunction	2008 Sep 4 ^d
Opposition Data:	
Equatorial Diameter Globe	20.0 arc-seconds
Polar Diameter Globe	17.8 arc-seconds
Major Axis of Rings	45.2 arc-seconds
Minor Axis of Rings	6.6 arc-seconds
Visual Magnitude (m_v)	-0.2 m_v (in Leo)
B =	-8.4°

ena for 2007-08 are presented for the convenience of observers in the accompanying table.

The southern hemisphere and south face of the rings are visible from Earth during 2007-08, but more and more of the northern hemisphere of Saturn is coming into view since the inclination of the rings to our line of sight is only -8.4°, with the next edgewise orientation of the rings of Saturn upcoming on September 9, 2009.

For 2007-08, the following are activities that are already in progress by ALPO Saturn observers:

- Visual numerical relative intensity estimates of belts, zones, and ring components.
- Full-disc drawings of the globe and rings using standard ALPO observing forms.
- Central meridian (CM) transit timings of details in belts and zones on Saturn's globe.
- Latitude estimates or filar micrometer measurements of belts and zones on Saturn.
- Colorimetry and absolute color estimates of globe and ring features.



These two near-simultaneous observations were among the first submitted for the 2007-08 apparition. Illustration No. 1 (at left) is a drawing of Saturn made by Carl Roussell of Canada, on October 22, 2007, at 09:37UT using a 15.2 cm (6.0 in.) refractor at 200X with W23A (light red), W58 (green), and W38A (light blue) filters; S=4.5, Tr=3.5. CMI=27.2° CMII=342.5° CMIII=78.2°. Illustration No. 2 is a digital image captured by Marc Delcroix of France on October 22, 2007 at 05:19UT with an L'Astronomik SKYnyx camera attached to a 25.4 cm (10.0 in.) SCT; S=4.0, Tr=4.0 CMI=235.9° CMII=197.0° and CMIII=292.9°. The tilt of the rings is -7.8°. South is at the top in the images.



Inside the ALPO Member, section and activity news

- Observation of “intensity minima” in the rings in plus studies of Cassini’s, Encke’s, and Keeler’s divisions.
- Systematic color filter observations of the bicolored aspect of the rings and azimuthal brightness asymmetries around the circumference of Ring A.

Observations of stellar occultations by Saturn’s globe and rings.

- Visual observations and magnitude estimates of Saturn’s satellites.
- Multi-color photometry and spectroscopy of Titan at 940nm – 1000nm.
- Regular imaging of Saturn and its satellites using webcams, digital and video cameras, and CCDs.

Observers are encouraged to carry out digital imaging of Saturn at the same time that others are imaging or visually watching Saturn (i.e., simultaneous observations). All observers should compare what can be seen visually with what is apparent on their images, without overlooking opportunities to make visual numerical intensity estimates using techniques as described in the author’s new book, **Saturn and How to Observe It**, available from Springer, Amazon.com, etc.

The Saturn Pro-Am effort that began back on 2004 Apr 01 when Cassini started observing the planet at close range is still underway. Observers are encouraged to participate in this effort during the 2007-08 apparition and beyond. Employing classical broadband filters (Johnson UBVRI system) on telescopes with suggested apertures of 30 cm (approx. 12 in.) or more, Saturn should be imaged as often as possible, as well as through a 890nm narrow band methane (CH₄) filter. Observers should make note of any features, their motions and morphology, and report such observations promptly. Resulting data serve as input to the Cassini imaging system, thereby suggesting where interesting (large-scale) targets exist.

Suspected changes in belt and zone reflectivity (i.e., intensity) and color will be also useful, so visual observers can play a vital role by making careful visual numerical relative intensity estimates in Integrated Light (no filter) and with color filters of known transmission.

The Cassini team will combine ALPO images with data from the Hubble Space Telescope and from other professional ground-based observatories.

Observations should be immediately dispatched to the ALPO Saturn Section throughout 2007-08 for immediate dispatch to the Cassini team. Be sure to include all supporting data such as time and date (UT), instrumentation used, observing conditions and location, etc., since without such fundamental information, observations are essentially useless.

The ALPO Saturn Section appreciates the work of so many dedicated observers who continue to submit observations and images, prompting more and more professional astronomers to request drawings, digital images, and supporting data from amateur observers around the globe.

Information on ALPO Saturn programs, including observing forms and instructions, can be found on the Saturn pages on the official ALPO Website at <http://www.alpo-astronomy.org>, then Saturn Section.

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

Remote Planets Section

**Report by Richard W. Schmude, Jr.,
coordinator, ALPO Remote Planets
Section**

See report on the upcoming eclipse of Nereid by Neptune on April 21, 2008 later in this issue.

Several observers have submitted images of Uranus and Neptune. I have measured the polar flattening on a couple of these. Frank Melillo has also measured the relative brightness of two of Uranus’ moons, Titania and Oberon. And Jim Fox has continued to make excellent brightness measurements of Uranus.

The biggest news this apparition has been the excellent work by Richard Miles of the British Astronomical Association; he used a CCD camera along with a small telescope to make several dozen brightness measurements of Uranus, using both a V filter and an I filter to do this. A preliminary analysis shows that his results are consistent with a

Notes From the Director

(From page 3)

only to ALPO members. The pins are \$8.50 for regular ALPO members and \$3.50 for supporting members; this includes postage. The pins will be mailed to you in a padded envelope to almost assure safe arrival. Again I have received a number of e-mails from our sponsors upon receiving their ALPO logo pins; this seems to be a hit and well-received. So show your ALPO pride and support by ordering a pin today!

The pins have created such an interest that we are contemplating a nice, ALPO polo shirt, to be available in time for next summer’s meeting in Des Moines. The polo shirt would have the ALPO logo embroidered on the front left side of the shirt, as is standard with shirts of this design. Only preorders would be accepted, because we do not have the capacity to store items like shirts. So if you might be interested, please e-mail me. The estimated cost will be around \$25 each, including postage, and will be available in all sizes.

As I have previously noted, please feel free to contact me at any time with your ideas, concerns, or issues. And, as always...

Keep Looking Up,

Mike D. Reynolds, Ph.D

small change in brightness as Uranus rotates. He plans to make a more in-depth analysis and plans to publish his results in a future issue of the Journal of the British Astronomical Association.

My own manuscript for the upcoming book, "The Remote Planets and How to Observe Them" is now about complete and ready for the publisher (Springer). I expect publication sometime in 2008.

Finally, this section coordinator has completed the 2006 Remote Planets apparition report and has submitted it for publication in this Journal.

Visit the ALPO Remote Planets Section on the World Wide Web at <http://www.alpo-astronomy.org>, then Remote Planets.

Book Review

Introduction to Webcam Photography

By Rik Hill, scientific advisor,
ALPO Solar Section

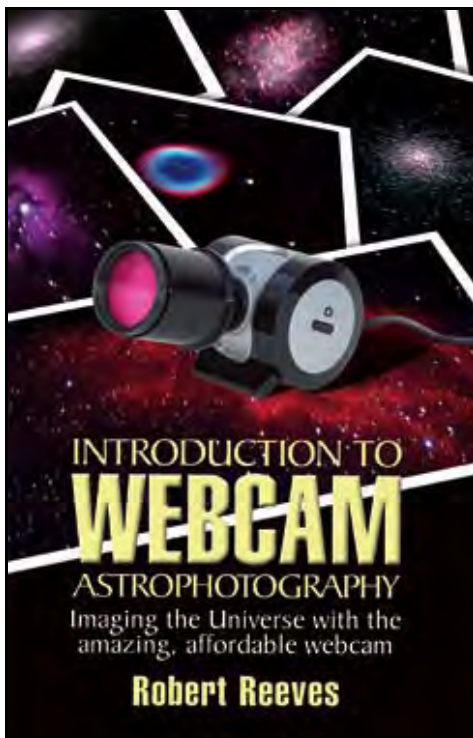
Introduction to Webcam Photography by Robert Reeves, 2006. Hardbound, 368 pages, 156 illustrations, 21 tables; published by Willmann-Bell, P.O. Box 35025, Richmond, Virginia 23235 USA. ISBN-10: 0943396867, ISBN-13: 978-0943396866; retail price \$34.95.

I read about 3–4 books a month, but once or twice a decade, a book comes along that so fires my enthusiasm for the topic that I am compelled to do more than just read about the subject. Such is *Introduction to Webcam Astrophotography* by Robert Reeves. It is not an exaggeration to say that webcams (and their higher-end cousins like DMK and Atik) have revolutionized not only amateur astrophotography, but also most particularly amateur lunar, planetary and solar imaging.

Some readers may recognize Reeves as the author of *Introduction to Digital Astrophotography* and *Wide Field Astrophotography*, as well as articles in various popular astronomical publications.

As you might expect, the author starts with an overview on the basics of digital imaging and how CCD and CMOS detectors work in various cameras. A chapter that discusses the terms of digital webcam imaging follows this. Topics like exposure, gain, frame rates, noise sources and files size and allocation are covered in detail. I was glad to see that the author included a few pages on cleaning these tiny chips – a ticklish procedure at best that, if not done properly, can lead to permanent damage to these cameras.

I appreciated how, throughout the book, Reeves discusses the problems and solutions for observers using older equipment like USB 1.1. Too often, books like this assume all readers have cutting edge (as of the publishing date) equipment, leaving behind those who don't upgrade on an annual basis. There's even discussion for



people using older versions of Windows (98, 2000, etc.). Further, there are numerous great suggestions for maximizing the performance of older equipment and the throughput of the cameras, as on page 43, where Reeves gives suggestions for the avoidance of dropped frames. These kinds of suggestions have helped me to dramatically improve my own imaging.

Chapters 4 and 5 consist of 70 pages devoted to telescopes, lenses, filters, and other accessories that may be desired by the astro-imager. Some of these devices, like the Spectrographic Star Analyzer, are guaranteed to pique the interest of any amateur astronomer. Included in these two chapters are a number of suggestions and tips on alignment, a sure way to kill good images if not attended to diligently.

The book is filled with lots of low cost tips to improve your image quality. For example in Chapter 6.4, the author discusses manual focusers and gives the simple suggestion of attaching a clothes pin to the focusing knob (whether a micrometer type or rack-and-pinion) and just lightly touch-

ing that with one finger to achieve that precise “best” focus without all the shiver and shake that frustrates so many when doing high magnification astro-imaging. I used this as soon as I saw it and found it greatly decreased my focusing time and increased the focusing precision. Unlike the author, I did not use a clothespin but rather an old test tube holder, thereby maintaining my science-geek status!

While the author admits to being most familiar with the Phillips line of cameras, he still discusses in detail other cameras based on this technology and yet others of different origins.

A great deal of information on the basics of image processing is presented in a straightforward and easy-to-understand manner — not only what to do, but why you are doing it. I particularly appreciated that the author constantly stresses how not to overdo the image processing, a common problem in lunar and planetary imaging.

Tracking, guiding, auto-guiding issues and equipment are discussed in some depth in Chapter 9. Most of this will be familiar to the seasoned astro-imager, but some things will be new. For example, I was introduced to the term “tracked, but not guided”, a kind of going-for-broke method, where the camera exposes frame after frame while the telescope tracks on the object blindly. The images are then aligned and stacked using software mentioned throughout the book.

In the subsequent chapter, computers, their peripherals, interfaces, recording media and formats are covered. I was shocked to learn just how short the lifetimes of CDs and DVDs can be! The author gave some good suggestions around this problem that I will certainly be implementing in my own observatory. The section on image formats taught me a number of new tidbits I did not know, such as the origin of the LZW compression for TIFF images. I was also sorry to see that the GIF format was not discussed. One point missed was the image viewer

DS9, available for free and will handle FITS images with JPEG/FITS/GIF outputs. Those who use the FITS format would be well-advised to get this.

The section entitled "Troubleshooting" (10.3), though only 5 pages long, is a must-read for every webcam astro-imager. I wish I had read this section before starting with my own ToUcam; it would have saved me several lost nights! Common problems with recalcitrant software (that come up often on the various astro-webcam e-mail lists) are discussed along with solutions.

While all the previous instrumental information is very valuable in producing a quality raw image, the post-processing information contained in this book is perhaps of even greater value. There are specific */examples */given in Registax and Photoshop processing, and a number of

freeware programs are recommended that aid in producing superior quality lunar and planetary images. I was a little dismayed that IRIS and GIMP software (actually freeware) were not mentioned. But this book should encourage any astro-imager to explore the web for such freeware.

The last chapter examines how seeing, weather and other environmental factors can affect your images. Even mosquitoes and other pests were considered. The author did not mention snakes, particularly the rattling kind. There are many tales of the astrophotographer, who sitting still for an extended period of time, finds one of these desert dwellers has taken up residence near his feet!

The book ends with six appendices which, while being very useful, will likely be the first portions of this work that will become

outdated. These discuss how to use several of the more popular software tools, do autoguiding and how to assemble those breathtaking large mosaics of the Moon. Another appendix has a list of "Webcam Astrophotography Resources" consisting of three fine-print pages of URLs referencing most of the major topics in the book.

I cannot recommend this book more highly for anyone interested in digital astro-imaging especially of the Sun, Moon, and planets. While this book is timely now, it may become dated in only five or ten years, but that's inevitable in a field as dynamic as this. I would encourage the author, Robert Reeves, and publisher, Willmann-Bell, to keep this book current with subsequent editions. The amateur astro-imaging community would be well served by that. I think that every astro-imager should have a copy of this book.

Reeves on webcams

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

Sometimes, but not all of the time, the best present you get is the one you give to yourself. After reading Rik Hill's rave review of Robert Reeves' book, I gave myself a copy for Christmas. And because I already own one of the webcams covered in the book and having already dabbled in using it, I'm excited to now learn all I can about the why's, wherefore's and how-to's of REAL webcamming. But for those who don't already have one or are just plain old baffled, here are snippets of what Mr. Reeves has to say about a select few models.

Meade Lunar & Planetary Imager (LPI)



Meade LPI imager mounted on LX200GPS telescope.

"... not a modification of an existing webcam, but is instead a new 640 x 480 pixel camera built from the ground up to be user-friendly and easy for the novice to operate."

Philips ToUcam Pro II 840K and SPC900NC



"very popular webcams for lunar and planetary imaging. . . "faster frame rate available with the SPC900NC is attractive to planetary imagers . . . However, the higher frame rate inherently limits the shutter speed."

Atik ATK-1C



"... color camera is a modified ToUcam Pro II 840K. . . electronically modified to allow long exposures. . . costs about twice as much as the standard ToUcam, but it allows the 'electronically-challenged' to not only immediately begin imaging deep sky objects with a very capable CCD camera, but also to use the same device for short-exposure webcam photography of solar system objects."

Feature Story: **Notes on Comets 17P/Holmes and 8P/Tuttle**

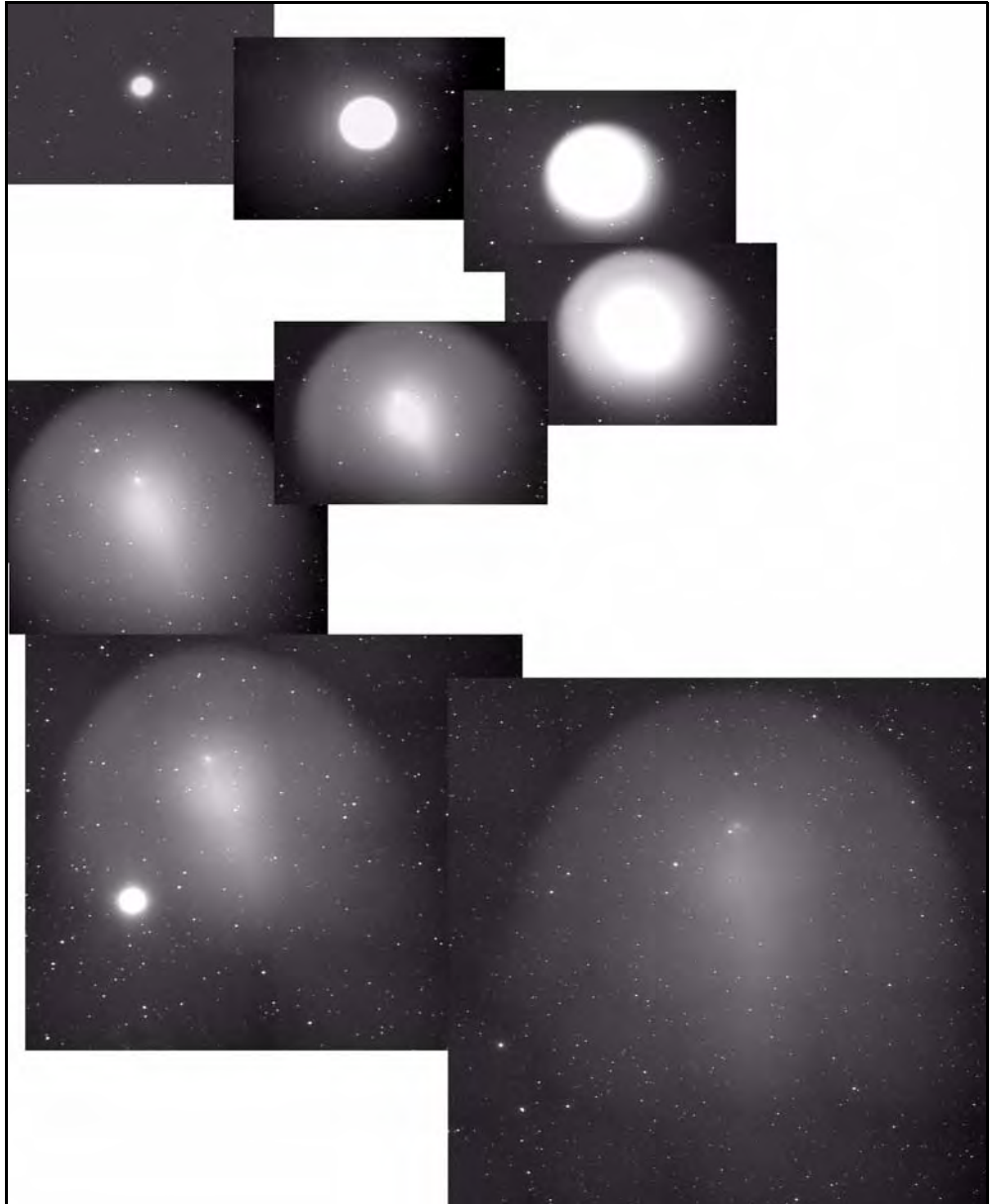
**By Gary Kronk,
acting coordinator
ALPO Comets Section**

Every year comet observers hope for a bright comet that can be easily observed using a small telescope, binoculars, or even the naked eye. The year 2007 certainly started out with a bang with the appearance of comet C/2006 P1 (McNaught) being an easy naked-eye object through most of January and even becoming visible in broad daylight just before the middle of that month.

Since January, comet observers have been treated to a handful of comets that became visible in binoculars. Unfortunately, the brightest of these, 96P/Machholz 1 and C/2007 F1 (LONEOS), which attained maximum magnitudes of 2 and 5, respectively, remained at small solar elongations when at their best. Nevertheless, the ALPO Comets Section has seen a resurgence of sorts, with a number of observers starting to turn in observations and images. So far, in 2007, contributions have been made by this author, as well as Jay Albert, Michael Amato, Klaus Brasch, Frank J. Melillo, R. B. Minton, John D. Sabia and Walter H. Haas.

Of course, the great thing about comet observing is that you never know when you might be surprised by something. Such a surprise occurred late in October, when the generally faint periodic comet 17P/Holmes suddenly became an easy naked-eye object by undergoing an unprecedented outburst in brightness.

Shortly after midnight local time on October 24, Juan Antonio Henriquez Santana (Canary Islands) obtained a photograph of the comet which revealed it had substantially increased in brightness. During the next few hours, the news spread across the Internet and each subsequent observer reported the comet as brighter than the previous observer. Roughly 17 hours after Santana's initial observation, the comet seemed to have attained a maximum brightness of about 2.6, indi-



Evolution of a Comet. Gary Kronk explains: "I took all of the images using the MallinCam Hyper black and white video camera. It was attached to an f/3.3 teleconverter, which was attached to my 8-inch Meade LX-200 at my observatory in St. Jacob, Illinois. Starting from the top, the images were taken in the following order: October 25, October 28, November 2, November 6, November 11, November 16, November 20, and November 30. The images from October 25 to November 11 are each a 30-second AVI that was averaged in Registax (software). From November 16 onward, the comet was bigger than the field of view of the telescope and the resulting images were constructed using several 30-second AVIs that were processed using Registax software, with the November 16 image requiring four separate images and the November 30 image requiring 20 separate images. These last three images were then assembled using the PhotoMerge function in PhotoShop.

cating the comet had undergone an outburst of around 14 magnitudes!

The comet maintained its peak brightness throughout most of November, but its physical appearance underwent a rather dramatic change. Beginning its brightness surge as a nearly stellar object, the comet quickly began displaying a coma which showed noticeable signs of expansion with each passing day. During the first half of November, the coma was subtending an angle equal to that of the full Moon. By the beginning of December, the coma was easily twice the apparent size of the Moon!

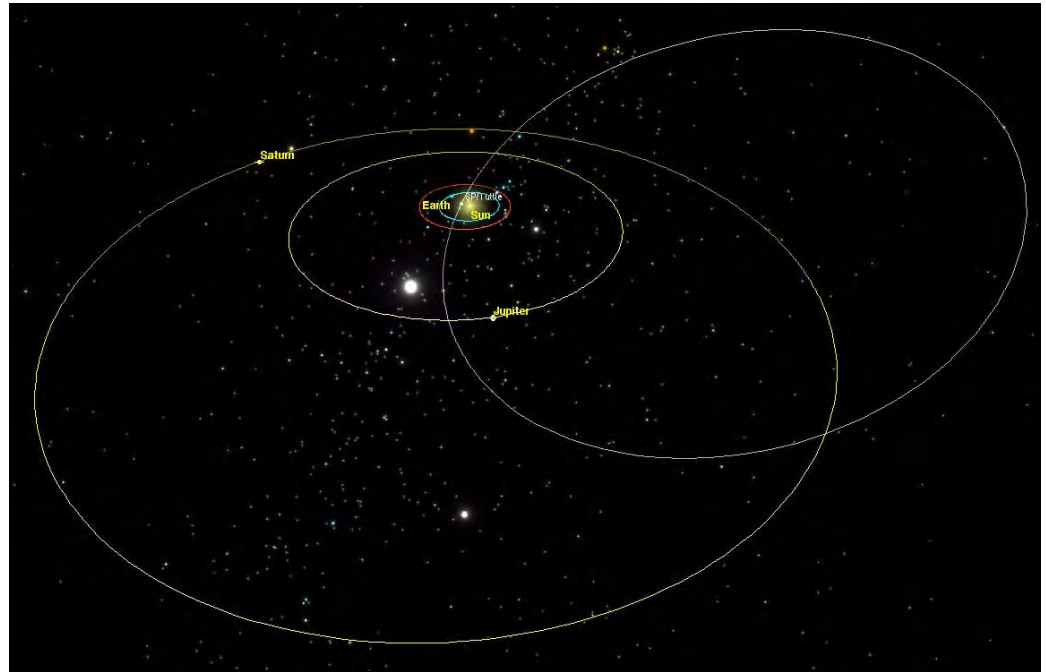
What caused this sudden outburst has become a matter of debate among professional and amateur astronomers. Interestingly, although no other comet has experienced an outburst as great as this, there was one cometary apparition that probably came quite close...the discovery apparition of comet 17P/Holmes!

This same comet that surprised us in late October, was actually discovered on 1892 November 6 during a very similar outburst. Edwin Holmes (London, England) thought he was looking at the core of his favorite astronomical object, the Andromeda galaxy, through the finder of his 12-inch reflector when he first spotted it; however, his first view of the object through the telescope revealed this was something quite different. His report of a new bright comet in Andromeda was almost not taken seriously, but reports of the comet being a naked-eye object on November 7 turned the skeptics into believers.

The comet faded during the next two months and then suddenly attained naked-eye visibility again on 1893 January 16. Thereafter, it steadily faded until last seen on April 6. Occasional visual and photographic searches for the comet continued through 1894 January 12, just in case the comet flared again, but no further observations were obtained.

Comet Holmes was observed during its next two apparitions and experienced minor outbursts in brightness at each one. Thereafter, it was moved into a slightly larger orbit when it passed 0.54 AU from Jupiter during 1908. Searches were made at every apparition through 1942, but no trace was found.

During 1963, B. G. Marsden examined the comet's orbit and noted that the predictions for the apparitions of 1913 through 1942 were generally not that far off. He concluded that the comet had either been too faint to



Trajectory of Comet 8/P Tuttle.

be seen with the telescopes of that time or that the "physically rather unstable" nature, as evidenced by the outbursts, "hints of an alternative reason for its disappearance." Marsden published a prediction for a return in 1964 and the comet was subsequently found by E. Roemer almost exactly where it was supposed to be. The comet's magnitude was then 19.2, far fainter than telescopes of the first half of the 20th century could have detected.

The comet passed about 1 AU from Jupiter in 1968, which decreased the perihelion distance from 2.35 AU to 2.16 AU. The comet was seen at each apparition thereafter, but remained a rather faint object, with maximum magnitudes generally around 17. Another approach to within 1.5 AU from Jupiter in 2004 further decreased the perihelion distance to 2.05 AU, which was the closest the comet had been to the sun within the last 300 years. The comet will remain in its present orbit until 2051.

Now that Holmes has shown signs of fading, some observers are eagerly awaiting for January 2008 to arrive to see if the comet undergoes a second strong outburst as it did at the beginning of 1893. Of course, January also brings another long-known periodic comet into prominence.

Comet 8P/Tuttle was discovered in 1790, thanks in part to its passing only 0.37 AU from Earth on January 3 of that year. That remained the comet's closest approach to our planet for every apparition that followed. This changes as 2008 begins, when

the comet will pass 0.25 AU from Earth on January 2. The result of this close approach will be that the comet will become slightly brighter than magnitude 6.

The comet has been very well-placed for observation since August 2007, when it became a circumpolar object for observers in the Northern Hemisphere. Unfortunately, it was quite faint and remained fainter than magnitude 15 until late October, at which time a rapid brightening began. During the next four weeks the comet increased in brightness by nearly six magnitudes!

The comet's path in the sky caused it to loop around Polaris, being closest to that star early in October. As December began, the comet was approaching Cepheus and its motion was accelerating as its distance from Earth decreased. Throughout December, the comet moves through Cassiopeia, Andromeda, Triangulum, and into Aries. Near the end of the month, observers will have a photo opportunity as the comet passes quite close to the galaxy M33 in Triangulum. During January, the comet continues its rapid southward motion. Beginning in Aries, it will pass through Pisces, Cetus, Fornax, and southern Eridanus, at which point it will become exclusively visible to observers in the Southern Hemisphere.

I eagerly await to hear about your observations, as well as see your images, of these two fascinating comets!

Feature Story: Solar activity report

Carrington Rotations 2040-2050 (2006-01-2.05 to 2006-06-14.7)

By Frincu Marc Edward,
coordinator, Faculty of Mathematics
& Computer Science, West University
of Timisoara, Romania
E-mail: fmarc83@yahoo.com

Introduction

This report covers the Carrington 2040 through 2050, minus rotations 2045, 2046, 2047, 2048, which correspond to the months of July through September 2006 when no data were recorded due to different problems.

It contains an absolute first for the amateur astronomers in Romania, that is, a successful photograph of the Sun through a H-alpha filter. The picture was taken on June 5 during rotation 2044. While the number of observations is smaller than the recorded number in the previous report, they are still worthy of consideration.

While preparing this report, much was learned about taking solar digital images, and some experiments with H-alpha filters were made.

Also, it was planned that by the middle of the 2007 observational period, we would acquire a solar telescope to improve the quality of the observations and take at least one digital image per observation.

As in the last two reports, the place of observation is in the city of Timisoara, Romania, located at coordinates 45°45'35" N, 21°13'48" E. The Sun was observed with a 60mm refractor equipped with a 9mm Plossl eyepiece and a 3x magnifying Barlow lens. For the images, we used a 30 cm Dobson reflector belonging to and constructed by Octavian Stanescu.

Data

Rotation 2040

Was characterized by the lowest level of solar activity in the last year. The Relative number for this rotation was 0; all 7

observation taken in this period confirming it.

Rotation 2041

During this rotation, an increase in the Sun's activity was noticed, but it was a slow change, not surprisingly, following a rotation with no observed activity. On March 15, AR858 was first observed as an Hxx or Axx spot. The classification is vague due to atmospheric conditions which didn't allow for any umbra to be seen. March 16 also marked the appearance of another Hxx spot different from the previous one and which vanished as quickly as it appeared. Bad atmospheric conditions prevented any observations of the second part of the rotation.

Rotation 2042

One of the most clear photographs taken during this rotation is a splendid image of AR875 and AR876 taken April 26 by amateur astronomer Octavian Stanescu. April 30 was marked by the highest activity (R=30) noted from this period's observations, with two groups, a Cso and a Cko, observed. The entire period was marked with observations of no active regions, R=0. The period ended with the observation of a Cso group on May 6.

Online Readers

- Left-click your mouse on the author's e-mail address in [blue text](mailto:fmarc83@yahoo.com) to open your own e-mail program with the To: field completed and ready for you to compose your own message. (Internet connection must be ON).

- In the References section at the end of this paper, left-click your mouse on the [blue text](#) to be taken to an Internet site where you can either view or obtain that particular work.

Rotation 2043

Five observations were made during this period, of which only one (on May 10) had a relative number different from 0 (R=26). During this period, two groups, an Axx class and an Hxx class, were observed.

Rotation 2044

The first H-alpha photograph taken by a Romanian amateur astronomer was taken during this rotation. This was on June 5 and the imager was Octavian Stanescu,

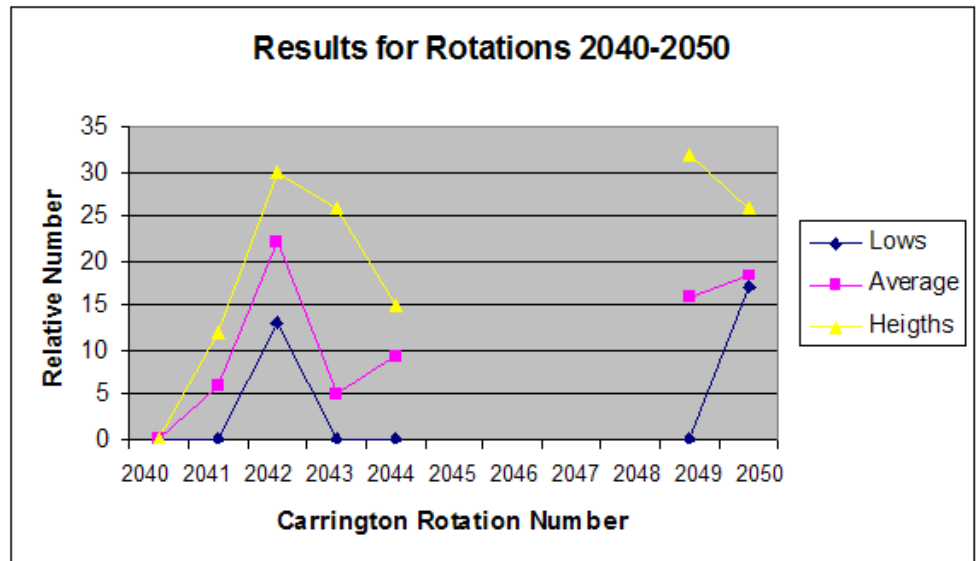


Image 1. Results for Carrington Rotations 2040-2050.

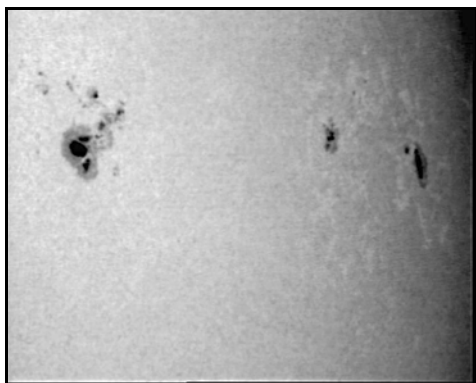


Figure 2. Image of Sunspots AR875 and AR876 on April 26, 2006, by Octavian Stanescu.

who had also taken the April 26 photo. The relative number on that day was $R=15$, due to a Cki group. The rest of the period was marked by a slow decrease in the activity of the Sun. June 20 had a relative number of $R=13$, and the only group present was of Cso class. The last observation was made on June 25 when the relative number was $R=0$.

Rotation 2049

Starting with this rotation, the solar activity seemed to be increasing. Only one observation from this period had a relative number of 0. The peak of the rotation was on November 2, when $R=32$ was recorded. This was due to a huge group of class E(F)hi, and a smaller Cro class.

Rotation 2050

No observations with $R=0$ were made during this rotation, although the number of recordings was quite small due to bad atmospheric conditions. The evolution of AR926 was observed starting on November 27, when it was first recorded having a Chi class. The next day, November 28, this group transformed into a Cho. On December 8, and just before disappearing, it was a Cso class.

The last observation in this report took place on December 12 at the limb between Rotation 2050 and 2051. The relative number recorded that day was 12, and the group was of Hhx class.

Puzzled about Sunspots?

Go to http://magaxp1.msfc.nasa.gov/outreach/education/spotclass_t.html

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Table 1: Data for Carrington Rotations 2040 thru 2050

Rotation No	Minimum & Date	Average	Maximum & Date
2040	0 (02.16, 02.18, 02.19, 02.20, 02.21, 02.27, 03.10)	0	0 (7 days)
2041	0 (03.26, 03.27)	6	12 (03.15, 03.16)
2042	13 (05.06)	22.25	30 (04.30)
2043	0 (05.13, 05.14, 05.19, 06.01)	5.2	26 (05.10)
2044	0 (06.25)	9.3	15 (06.05)
2045	n/a	n/a	n/a
2046	n/a	n/a	n/a
2047	n/a	n/a	n/a
2048	n/a	n/a	n/a
2049	0 (10.30)	16	32 (11.2)
2050	17 (11.27)	18.3	26 (11.28)

Conclusions

The average relative number in this report is 11.007, which is well-below the average found in the previous two reports covering the Rotations 2025 thru 2035 (those average relative numbers were 24.73 (2025-2030) and 20.58 (2030-2035)). In fact, this decrease in the average relative number is a clear sign of the solar minimum that was expected in 2006. The drop of almost 50% in activity for the year 2006 as compared to 2005 is a sign that the expected solar minimum indeed arrived as predicted, at an average of 11.1 years.



Figure 3. H-alpha image taken in Timisoara, Romania, on June 5, 2006, by Stanescu Octavian.

Feature Story:

A Report on the August 28, 2007 Total Lunar Eclipse

By Mike Reynolds, coordinator,
ALPO Eclipse Section
E-mail: alpo-reynolds@comcast.net
John Westfall, ALPO Science Editor
E-mail: johnwestfall@comcast.net

Overview

Reports and observations of the 28 August Total Lunar Eclipse were received from a number of ALPO members. These reports included visibility of the eclipse, timings, intensity estimates and photographs. Weather did play a factor, as reported by a number of observers. And those observers reporting from the United States and Canadian eastern regions had to contend with an eclipse that was low in the western skies. Many of these observers did not see contacts U3 or U4 (end of totality and end of umbral partial) because the eclipsed Moon had already set at their locations.

Several types of observations were submitted, including contact and crater contact timings, descriptions of totality, Danjon Luminosity estimates during totality, photography and videography, and overall general reports of the eclipse itself. Other types of observations included magnitude estimates during totality, occultation timings, lunar magnitude estimates, sky brightness measurements, and overall sky brightness observations. A total of 22 observers submitted reports of the eclipse (see Table 1).

Naked-Eye Umbral Contact Timings

Dr. John Westfall asked members to observe and submit naked-eye umbral limb contact times. This would include U1 (begin of the first umbral partial phase), U2 (begin of the umbral totality), U3 (end of the umbral totality), and U4 (end of the umbral partial phase). A total of 17 observers submitted 32 contact timings.

For all contacts, observers generally agreed with each other, and agreed surprisingly closely with the 2007 *Astronomical Almanac* limb contact-time predictions (see Table 2).

Inter-observer differences were highest (typically ± 2 minutes) for the beginning of the first partial phase (U1), but tended to agree well with the *Astronomical Almanac* (averaging just 0.5 minutes early).

The observers varied among themselves by an average of about $\pm 1\text{--}1/2$ minutes for the beginning of totality (U2), but by less than a half-minute for its end (U3). The observer mean times agreed closely with the *Astronomical Almanac* predictions (0.3 minutes and 0.2 minutes early, respectively).

Unfortunately, due to observers' local circumstances, too few timings were made of the final partial phase (U4) to make general conclusions, although two of the three

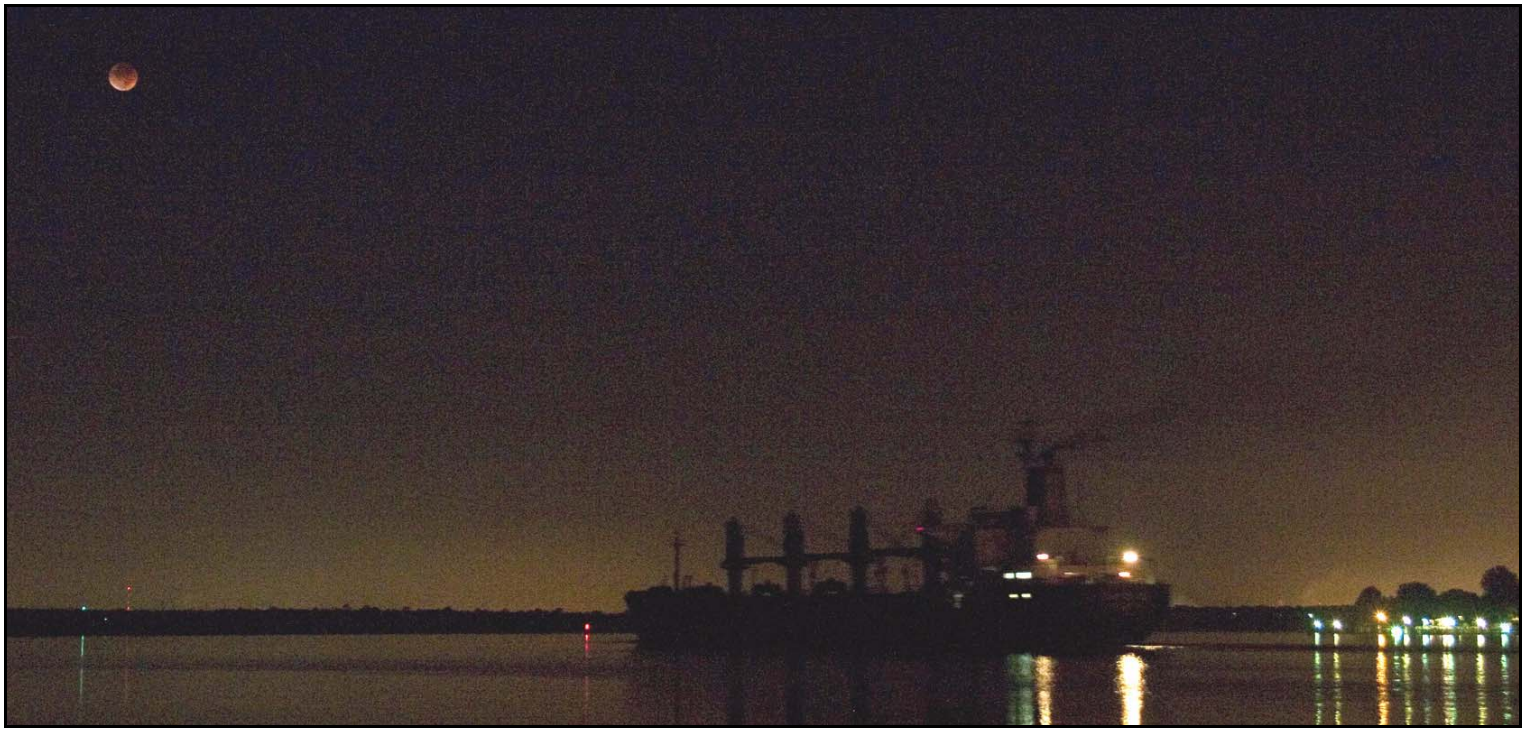


Figure 1. Lunar eclipse over the St. Johns River, Mayport, Florida, USA, as imaged by ALPO Executive Director Mike Reynolds on 2007 Aug 28, 9:23 UT with a Canon EOS 10D and a 24-135mm Image Stabilized lens at 109mm, f/5.6, ASA 800, and 1/3 second exposure. At exposure time, seeing conditions were a 7 (out of a possible 10) and transparency 5 (out of possible 10).



Figure 2. Lunar eclipse, initial partial phase, as imaged by John Westfall on 2007 Aug 28, 09:34 UT, 4 seconds, ISO 100 with a Fuji S2 Pro digital camera at the prime focus of a clock-driven C-5 (127-mm aperture, 1270-mm FL, f/10), Antioch, CA, USA. Celestial north is at the upper right. Seeing conditions not recorded as it was not a factor at the low magnification used. Transparency was excellent (no haze or clouds).

- Mike Reynolds: the (celestial) southern limb was a dull yellow-white; the part of the Moon that was deeper in the umbra appeared to be a very dull brown; visible until approximately 10 degrees above the horizon.
- John Westfall: umbra interior visible throughout; outer 1/3 neutral hue; inner portion a dark reddish-grey.

Three observers reported Danjon Luminosity Estimates, a five-point system (L=0 to 4) for visual as well as brightness evaluations of the Moon during a total lunar eclipse. The Danjon

shadow is relatively bright.

- L=3 Brick-red eclipse. Umbral shadow usually has a bright or yellow rim.
- L=4 Very bright copper-red or orange eclipse. Umbral shadow has a bluish, very bright rim.

As the Moon moves through Earth's umbral shadow, variations in umbral appearance, color and intensity will change. First and foremost is the Moon's path through the Earth's umbral shadow; is it central to the shadow or closer to the edge of the shadow? Another factor possibly not as obvious is the Earth's atmosphere. Cloud coverage along the Earth's limb as seen from the Moon, particulate matter in the atmosphere (such as volcanic ash) and variable amounts of water vapor will affect the darkness and coloration during totality. No one total lunar eclipse is like the next.

who timed the event timed it early as compared with the *Astronomical Almanac*.

Impressions and Observations of Totality

Several observers reported observations of totality itself, from the overall coloration to visibility of the eclipsed Moon.

- Jay Albert: beautiful deep copper color while it was still dark and relatively high.
- Maurice Collins: the color of the eclipsed Moon was yellow-orange-red.
- Walter Haas: the (celestial) east and south parts of the Moon were a bright yellow; the rest, deeper in the umbra, a dull brown.
- Robert H. Hays, Jr.; substantial orange-red coloration with a grayish umbra edge.

Luminosity Estimate Scale was proposed by French astronomer André-Louis Danjon and is as follows:

- L=0 Very dark eclipse. Moon almost invisible, especially at mid-totality.
- L=1 Dark eclipse, grey or brownish in coloration. Details distinguishable only with difficulty.
- L=2 Deep red or rust-colored eclipse. Very dark central shadow, while outer edge of



Figure 3. Lunar eclipse, total phase, imaged by John Westfall on 2007 Aug 28, 10:16 UT, 10 seconds, ISO 200 with a Fuji S2 Pro digital camera at the prime focus of a clock-driven C-5 (127-mm aperture, 1270-mm FL, f/10), Antioch, CA, USA. Celestial north is at the upper right. As with Figure 2, seeing conditions not recorded as it was not a factor at the low magnification used. Transparency was excellent (no haze or clouds).

Table 1: Eclipse Observations Submitted (22 Observers Total)

Observer	Site	General Report	Contact Timings	Crater Contact Timings	Totality Descriptions	Lunar Mag. Estimates	Sky Brightness Measurements	Danjon Luminosity Estimates	Drawings Photos / Video
Albert, Jay	Lake Worth, FL		+		+				
Benson, Mike	Nashville, TN	+							
Burrows, Jim	Seattle, WA		+						
Colaco, Gail	Acton, CA		+						
Collins, Maurice	Palmerston N., New Zealand	+			+			+	+
Fischer, Daniel	Randsburg, CA		+						
Gamboa, Vladimir	Caracas, Venezuela		+						
Haas, Walter	Las Cruces, NM	+	+		+				
Hands, Dennis	Huntsville, AL		+						
Hay, Kim	Yarker, ON Canada	+							+
Hays Jr., Robert H.	Worth, IL			+	+				+
Hoffler, G. Wyckliffe	Titusville, FL		+						
Kunze, Jay	Pocatello, ID		+						
Lundin, Dana	n.a.		+						
Malone, Daniel	Irving, TX		+						
Penela, Juan	Caracas, Venezuela		+						
Reynolds, Mike	Mayport, FL	+	+		+			+	+
Roussell, Carl	Hamilton, ONT, Canada		+						
Sandel, Jeffery	Hilton Head Isl., SC		+						
Spain, Don	Hillview, KY		+						
Westfall, John	Antioch, CA	+	+		+	+	+	+	+
Willis, Mike	Palo Alto, CA		+						

Observers are encouraged to make a number of Danjon Luminosity Estimates during totality if at all possible (See Table 3). The estimates can be made of different sections of the Moon due to the Moon's position in the Earth's shadow, and/or as an overall estimate.

Next February's Eclipse

Observers are encouraged to observe the 20-21 February 2008 total lunar eclipse. This event is well-placed for most observers in the Americas as well as Western Europe. With the Moon's path being in the southern portion of the Earth's shadow, the eclipse is not a central umbral shadow eclipse, yet totality will last just under 50 minutes. Saturn will be about 3° northeast of the Moon and Regulus about 3° northwest (see Table 4).

Observations of the 20-21 February 2008 eclipse are requested, especially naked-eye umbral limb contact timings, other timings such as crater contacts, overall impressions of totality, Danjon Luminosity Estimates, lunar magnitude estimates, sky brightness measurements, and photographs and drawings. Also include specifics about telescopes and equipment used for your observations, as well as the location where you observed the eclipse.

In order to avoid bias in the naked-eye limb-contact timing project, we ask observers to use the following procedure: Beginning 10 minutes before the predicted time of an eclipse contact, view the Moon with the naked eye only. Also, during this period do not look at a timepiece or listen to time signals until the instant that you believe the eclipse contact has

occurred. Then note that time to 0.1-minute precision. You can now resume viewing through binoculars or a telescope. Naked-eye limb-contact results should be sent to both:

Dr. Michael D. Reynolds, 604 11th Ave. North, Jacksonville Beach FL 32250; e-mail to alpo-reynolds@comcast.net

Dr. John Westfall, P.O. Box 2447, Antioch, CA 94531; e-mail to johnwestfall@comcast.net

Table 2: Naked-Eye Umbral Limb Contact Times

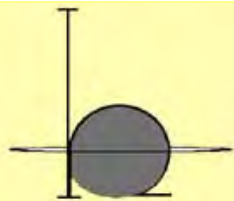
Observer	U1	U2	U3	U4	Observing Site
Burrows, Jim	08:49.3	09:51.9	11:22.2	12:18.8	Seattle, WA
Colaco, Gail	08:50.4	-	-	-	Acton, CA
Fischer, Daniel	-	09:52.3	11:22.9	-	Randsburg, CA
Gamboa, Vladimir	08:52.3	-	-	-	Caracas, Venezuela
Haas, Walter	08:50.7	-	11:22.1	-	Las Cruces, NM
Hands, Dennis	08:51.0	09:53.3	-	-	Huntsville, AL
Hoffler, G. Wyckliffe	08:52.1	-	-	-	Titusville, FL
Kunze, Jay	-	-	11:22	-	Pocatello, ID
Lundin, Dana	08:45.6	-	-	-	n.a.
Malone, Daniel	-	09:52.7	-	-	Irving, TX
Penela, Juan	08:52.2	-	-	-	Caracas, Venezuela
Reynolds, Mike	08:51.8	09:52.0	-	-	Mayport, FL
Roussell, Carl	08:50.9	09:48.1	-	-	Hamilton, ONT, Canada
Sandel, Jeffery	08:52.5	09:52.0	-	-	Hilton Head Isl., SC
Spain, Don	08:51.2	-	-	-	Hillview, KY
Westfall, John	08:46.1	09:51.3	11:23.0	12:24.4	Antioch, CA
Willis, Mike	08:49.6	09:51.9	11:22.8	12:22.7	Palo Alto, CA
Number of Timings	14	9	6	3	
Mean Time (O; min)	50.41	51.72	22.50	21.97	
Standard Deviation (min)	2.16	1.47	0.45	2.87	
Std. Error of Mean (min)	0.58	0.49	0.18	1.66	
AA Prediction (C; min)	50.9	52.0	22.7	23.8	
(O – C) [min]	-0.5	-0.3	-0.2	-1.8	

Table 3: Danjon Luminosity Estimates, L, Near Mid-Eclipse

Observer	L =	Observing Site
Collins, Maurice	~3.5	Palmerston North, New Zealand
Reynolds, Mike	~2.8 naked eye	Mayport, FL
Westfall, John	~2.4 naked eye and binoculars (25x70)	Antioch, CA

Table 4: Timing Data for the 20-21 February 2008 Total Lunar Eclipse in UT

Penumbral Eclipse begins	00:36:35
Partial Eclipse begins	01:43:19
Total Eclipse begins	03:01:10
Greatest Eclipse	03:26:05
Total Eclipse Ends	03:50:57
Partial Eclipse Ends	05:08:47
Penumbral Eclipse Ends	6:15:39



Feature Story: ALPO Observations of Saturn During the 2004 - 2005 Apparition

By: Julius L. Benton, Jr., Coordinator,
ALPO Saturn Section
jlbaia@msn.com

This paper includes a gallery of Saturn images submitted by a number of observers.

Abstract

The ALPO Saturn Section received 400 visual observations and digital images submitted by 47 observers in the United States, Germany, Philippines, Japan, France, Canada, Puerto Rico, Italy, United Kingdom, Spain, The Netherlands, Belgium, and Australia during the 2004-05 apparition (August 3, 2004 through July 3, 2005). Apertures employed to perform observations ranged from 10.0 cm (3.9 in.) up to 50.8 cm (20.0 in.). Saturn observers reported sporadic dusky festoons and short-lived dark spots in the South Equatorial Belt (SEB) during the observing season, plus several small but persistent white spots or ovals in the South Equatorial Belt Zone (SEBZ) and South Tropical Zone (STrZ). In addition, at least one observer suspected an elongated whitish feature within the southern Equatorial Zone

(EZs). Occasional recurring central meridian (CM) transit timings were contributed for some of these features. The inclination of Saturn's ring system toward Earth, **B**, attained a maximum numeric value of $-23^{\circ}.96$ on March 25, 2005 and accordingly, observers could view and image substantial portions of Saturn's Southern Hemisphere and the South face of the rings throughout the observing season. A summary of visual observations and images of Saturn made during the apparition is 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.

Introduction

This report is the result of an analysis of 400 visual observations and digital images that were submitted to the ALPO Saturn Section by 47 observers from August 3, 2004 through July 3, 2005 defining the 2004-05 "observing season" or apparition of Saturn. Carefully chosen drawings and images accompany this report and are integrated as much as possible with topics discussed in the text. All times and dates mentioned in this obser-

All Readers

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Online Features

Left-click your mouse on:

- The author's e-mail address in [blue text](mailto:poshedly@bellsouth.net) 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 when Ring B can be seen) as the standard on the numerical sequence. The outer third is the brightest part of Ring B, and it has a stable 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

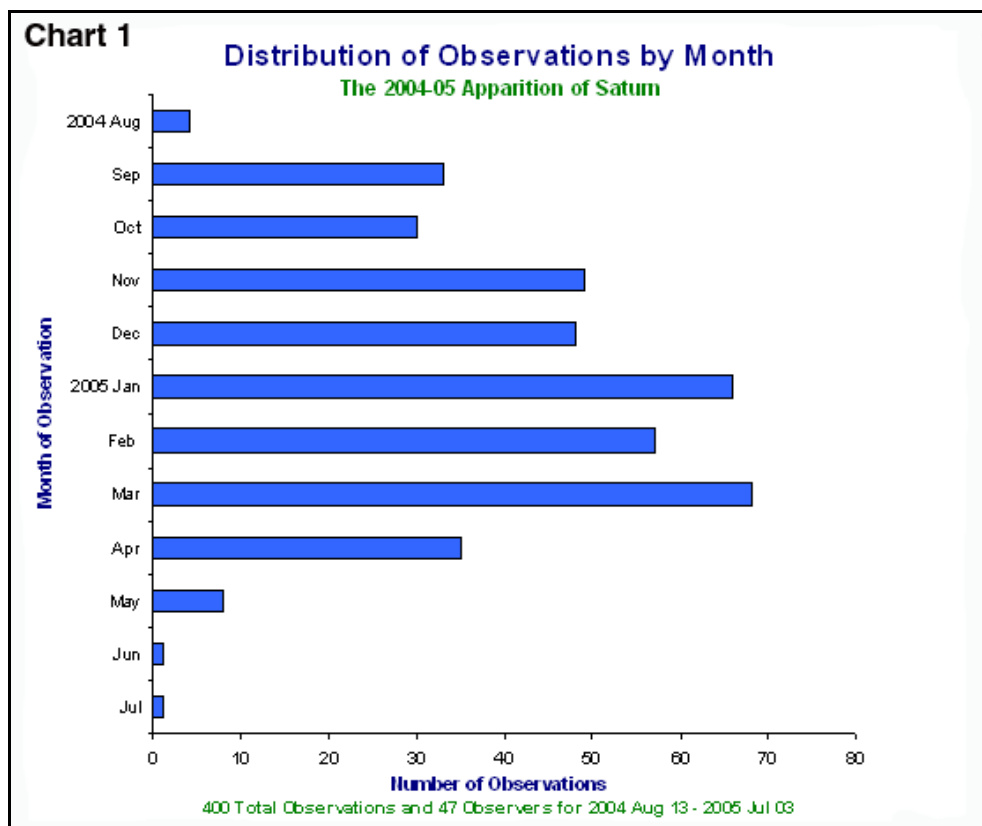
IAU directions are used in all instances (so that Saturn rotates from west to east).

Table 1: Geocentric Phenomena in Universal Time (UT) for Saturn During the 2004-2005 Apparition

Conjunction	2004	Jul	08 ^d	17 ^h UT
Opposition	2005	Jan	13 ^d	23 ^h
Conjunction	2005	July	23 ^d	17 ^h
Opposition Data				
Visual Magnitude	-0.50			
Constellation	Gemini			
B	-22°.86			
B'	-22°.89			
Globe	Equatorial Diameter	20".58		
	Polar Diameter	18".87		
Rings	Major Axis	46".51		
	Minor Axis	18.16"		

ational summary are in Universal Time (UT).

Table 1 gives geocentric data in Universal Time (UT) for the 2004-05 apparition of Saturn. During this observing season, the numerical value of **B**, or the Saturnicentric latitude of the Earth referred to the



ring plane (+ when north), ranged between the extremes of $-23^{\circ}.96$ (March 25, 2005) and $-21^{\circ}.79$ (July 3, 2005). The value of B' , the saturnicentric latitude of the Sun, varied from $-24^{\circ}.29$ (August 3, 2004) to $-21^{\circ}.18$ (July 3, 2005).

Table 2 lists the 47 individuals who cumulatively provided 400 reports to the ALPO Saturn Section this apparition, along with their observing sites, number of observations, telescope aperture, and type of instrument. Chart 1 is a histogram illustrating the distribution of observations by month, showing that 48.25% were made prior to opposition, 1.50% at opposition (2005 January 13), and 50.25% thereafter. There is a recurring natural tendency for people to view Saturn around the date of opposition when the planet is well-placed high in the evening sky (72% of all observations occurred from November 2004 through March 2005), but to provide more thorough coverage, observers are strongly encouraged to begin monitoring, sketching, and imaging Saturn once it appears in the eastern sky before sunrise right after conjunction. Our goal is to consistently carry out observational work for as much of the planet's mean synodic period of 378^d as possible (the time

elapsed between one conjunction of Saturn with the Sun to the next, which is slightly longer than one terrestrial year).

Chart 2 and Chart 3 show the ALPO Saturn Section observing base and the international distribution of all observations contributed during the apparition. The United States accounted for a little less than half of the participating observers (44.68%) and slightly more than a third of the submitted observations (35.75%). With 55.32% of all observers residing in Germany, Philippines, Japan, France, Canada, Puerto Rico, Italy, United Kingdom, Spain, The Netherlands, Belgium, and Australia, whose total contributions represented 64.25% of the observations, international cooperation remained strong this observing season.

Chart 4 graphs the number of observations this apparition by instrument type. As in the immediately preceding observing season, about half (51.25%) of all observations were made with telescopes of classical design (refractors, Newtonians, and Cassegrains). Classical designs with excellent optics and precise collimation usually produce high-resolution images with optimum contrast, no doubt the reason they have historically been the instruments of choice for detailed visual investigations of the Moon and planets. Nevertheless, in recent years there has been an increasing reliance on Schmidt-Cassegrains and Maksutov-Cassegrains

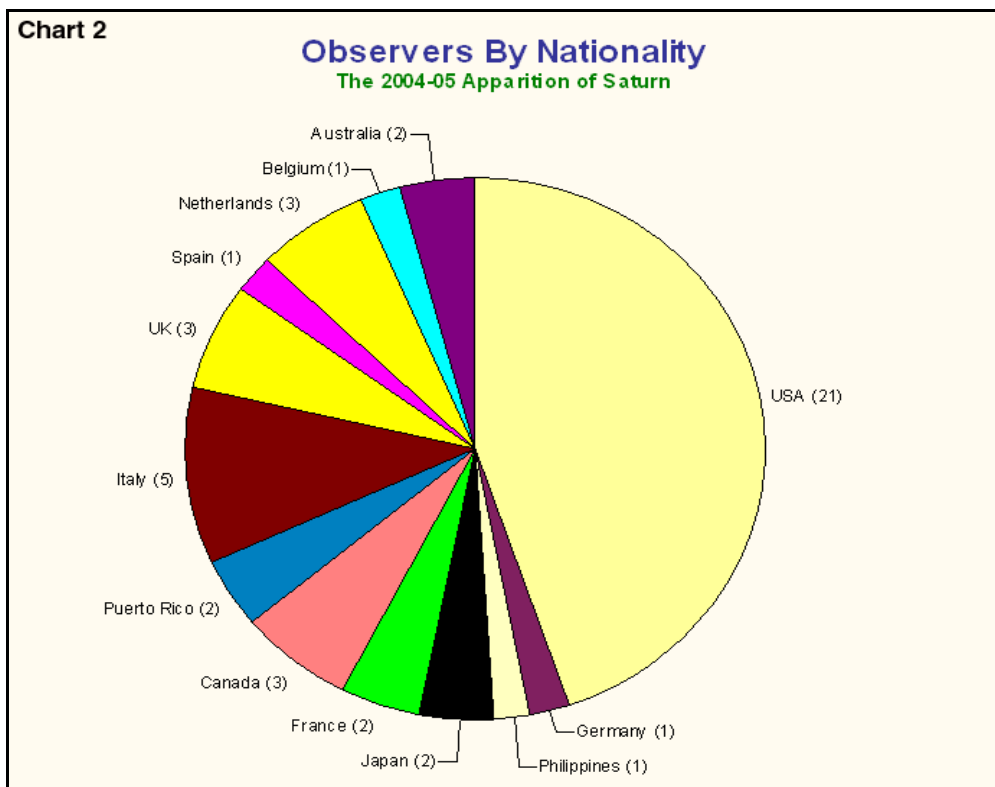
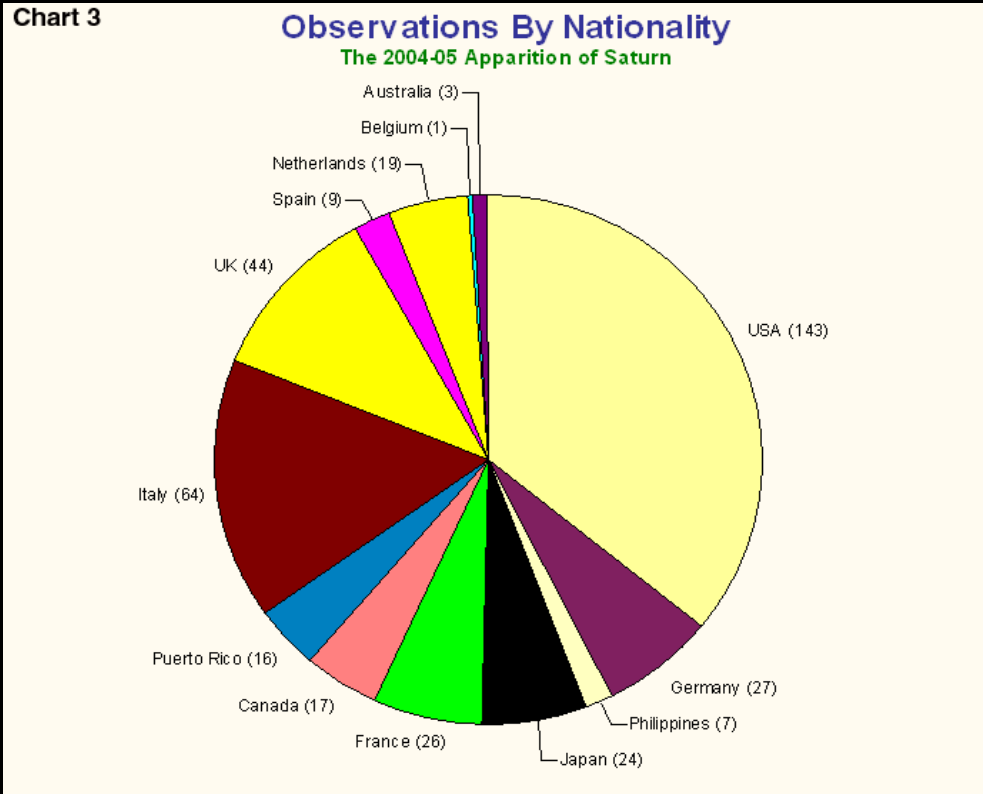


Table 2: 2004-2005 Apparition of Saturn: Contributing Observers

	Observer	Location	No. of Observations	Telescopes Used
1.	Acquarone, Fabio	Genoa, Italy	5	23.5 cm (9.25 in.) SCT
2.	Adelaar, Jan	Arnhem, The Netherlands	3	17.8 cm (7.0 in.) MAK
3.	Akutsu, Tomio	Tochigi, Japan	4	31.8 cm (12.5 in.) NEW
4.	Bell, Charles	Vicksburg, MS	4	30.5 cm (12.0 in.) SCT
5.	Benton, Julius L.	Wilmington Island, GA	34	15.2 cm (6.0 in.) REF
6.	Boisclair, Norman J.	S. Glens Falls, NY	2	50.8 cm (20.0 in.) NEW
7.	Botallo, Daniele	Palermo, Italy	7	25.4 cm (10.0 in.) MAK
8.	Budine, Phillip W.	Binghamton, NY	1	12.7 cm (5.0 in.) REF
9.	Calia, C. Laird	Ridgefield, CT	6	20.3 cm (8.0 in.) SCT
10.	Casquinha, Paolo	Massa, Italy	18	25.4 cm (10.0 in.) NEW
11.	Chavez, Rolando	Powder Springs, GA	2	23.5 cm (9.25 in.) SCT
			1	35.6 cm (14.0 in.) SCT
12.	Chester, Geoff	Alexandria, VA	1	20.3 cm (8.0 in.) SCT
13.	Colville, Brian	Cambray, ON Canada	3	30.0 cm (11.8 in.) SCT
14.	Crandall, Ed	Winston-Salem, NC	5	11.0 cm (4.3 in.) REF
			1	25.4 cm (10.0 in.) NEW
15.	Cudnik, Brian	Houston, TX	6	20.3 cm (8.0 in.) SCT
			4	25.4 cm (10.0 in.) NEW
			2	31.8 cm (12.5 in.) NEW
			5	35.6 cm (14.0 in.) SCT
16.	del Valle, Daniel	San Juan, Puerto Rico	2	12.0 cm (4.8 in.) REF
			4	20.3 cm (8.0 in.) SCT
17.	Fattinnanzi, Cristian	Macerata, Italy	10	25.4 cm (10.0 in.) NEW
18.	Go, Christopher	Cebu City, Philippines	7	20.3 cm (8.0 in.) SCT
19.	Grafton, Ed	Houston, TX	1	35.6 cm (14.0 in.) SCT
20.	Hatton, Jason P.	Mill Valley, CA	1	23.5 cm (9.25 in.) SCT
21.	Hernandez, Carlos	Miami, FL	2	22.9 cm (9.0 in.) MAK
22.	Ikemura, Toshihiko	Osaka, Japan	20	31.0 cm (12.2 in.) NEW
23.	Karakas, Mike	Winnipeg, MAN, Canada	1	20.3 cm (8.0 in.) NEW
24.	Kendrick, Brian	Los Alamos, NM	1	25.4 cm (10.0 in.) NEW
25.	Lazzarotti, Paolo	Massa, Italy	24	25.4 cm (10.0 in.) NEW
26.	Lepine, Thierry	Saint Etienne, France	1	35.6 cm (14.0 in.) SCT
27.	Mancilla, Joseph	Upham, NM	6	20.3 cm (8.0 in.) NEW
28.	Maxson, Paul	Phoenix, AZ	1	10.0 cm (3.9 in.) REF
			33	20.3 cm (8.0 in.) SCT
29.	Melillo, Frank J.	Holtsville, NY	2	20.3 cm (8.0 in.) SCT
30.	Mobberley, Martin	Suffolk, UK	18	25.4 cm (10.0 in.) NEW
31.	Niechoy, Detlev	Göttingen, Germany	27	20.3 cm (8.0 in.) SCT
32.	Parker, Donald C.	Coral Gables, FL	2	25.4 cm (10.0 in.) DALL
33.	Peach, Damian	Norfolk, UK	23	23.5 cm (9.25 in.) SCT
			1	28.0 cm (11.0 in.) SCT
34.	Pellier, Christophe	Bruz, France	5	18.0 cm (7.1 in.) NEW
			20	21.0 cm (8.3 in.) DALL
			1	40.0 cm (15.7 in.) NEW
35.	Phillips, Jim	Charleston, SC	5	20.3 cm (8.0 in.) REF
			1	25.4 cm (10.0 in.) REF
36.	Plante, Phil	Braceville, OH	4	20.3 cm (8.0 in.) SCT
			1	40.6 cm (16.0 in.) CASS
37.	Pujic, Zac	Brisbane, Australia	1	31.0 cm (12.2 in.) NEW
38.	Robbins, Sol	Fair Lawn, NJ	5	15.2 cm (6.0 in.) REF
			2	24.8 cm (9.75 in.) NEW
39.	Roussel, Carl	Hamilton, ON, Canada	14	15.2 cm (6.0 in.) NEW
40.	Sanchez, Jesus	Cordoba, Spain	9	28.0 cm (11.0 in.) SCT
41.	Santacana, Guido	San Juan, PR	8	12.7 cm (5.0 in.) REF
			2	15.2 cm (6.0 in.) NEW
42.	Sherrod, Clay	Little Rock, AR	1	40.6 cm (16.0 in.) SCT
43.	Sussenbach, John	De Bilt, The Netherlands	9	28.0 cm (11.0 in.) SCT
44.	Tyler, David	High Wycombe, Bucks, UK	2	28.0 cm (11.0 in.) SCT
45.	Van der Velden, Erwin	Brisbane, Australia	2	23.5 cm (9.25 in.) SCT
46.	Vandebergh, Ralf	Maastricht, Netherlands	7	18.0 cm (7.1 in.) NEW
47.	Vandenbehode, Alex	Ghent, Belgium	1	20.3 cm (8.0 in.) SCT
	TOTAL OBSERVATIONS		400	
	TOTAL OBSERVERS		47	

REF = Refractor NEW = Newtonian CASS = Cassegrain SCT = Schmidt-Cassegrain MAK= Maksutov DALL = Dall-Kirkham



for observing Saturn, particularly by individuals who perform digital imaging. This could be a consequence of readily available adapters for catadioptrics in the marketplace for different digital imagers, and when well-collimated, such instruments can produce good images of Saturn if they have quality optics.

Telescopes with apertures of 15.2 cm (6.0 in.) or larger accounted for 95.75% of the observations submitted this apparition. Readers should not overlook the fact that historical examples abound where smaller telescopes of excellent quality in the range of 7.5 cm (3.0 in.) to 12.7 cm (5.0 in.) have afforded very worthwhile observations of the planet Saturn.

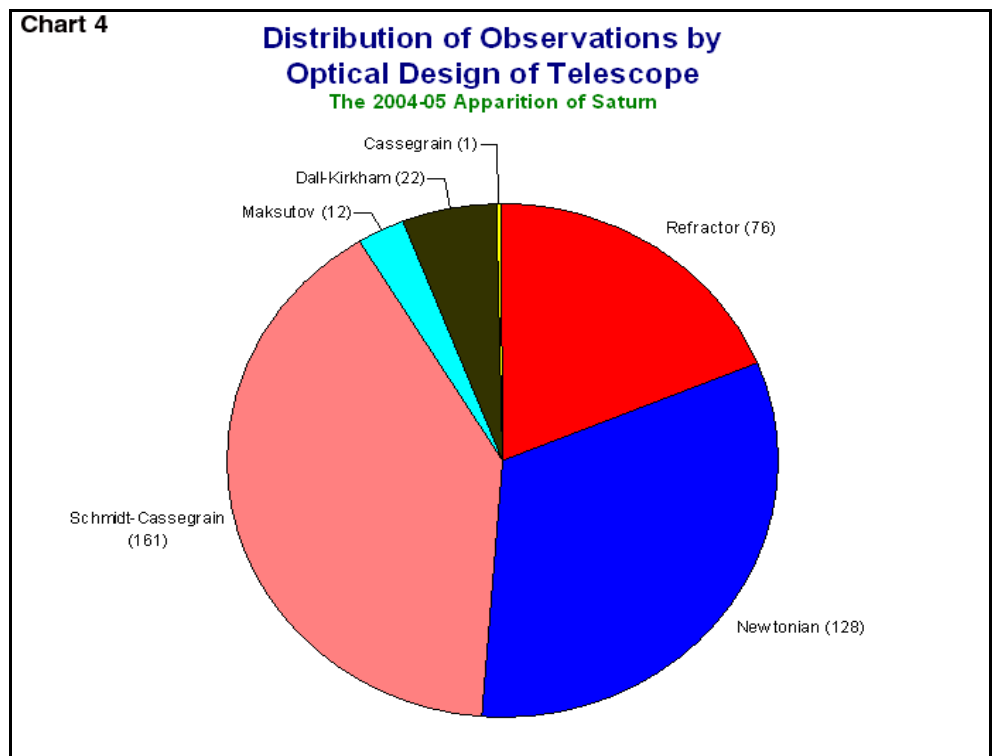
The author sincerely appreciates the efforts of all observers listed in *Table 2* for their submitted data, superb images, well-written descriptive reports, and detailed drawings during 2004-05. Individuals who desire to take part in systematic observational studies of Saturn using visual methods (such as drawings, intensity and latitude estimates, and CM transit timings), regular photography, or more contemporary digital imaging techniques are encouraged to do so in forthcoming apparitions as we strive to continue inter-

national studies of this fascinating planet. The ALPO Saturn Section considers all methods of recording observations mentioned above as crucial to the success of our programs, regardless of 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 performing film photography or digital imaging. Novice observers are always encouraged to submit their work, and the ALPO Saturn Section will be delighted to provide assistance as they become acquainted with our programs.

The Globe of Saturn

All 400 observations submitted to the ALPO Saturn Section in 2004-05 were used to prepare this report. Except in captions accompanying figures or where the identity of individuals is specifically relevant to the discussion, names have been omitted in the interest of brevity. Drawings, digital images, tables, and graphs are included herewith so that readers may refer to them as they study the text. Features on the globe of Saturn are described in south-to-north order and can be identified by looking at the nomenclature diagram shown in *Figure 1*. If no reference is made to a global feature in our south-to-north discussion, the area was not reported by observers during the 2004-05 apparition. Furthermore, it has been customary in Saturn apparition reports to compare data for global atmospheric features between observing seasons, which continues in this report to help make read-



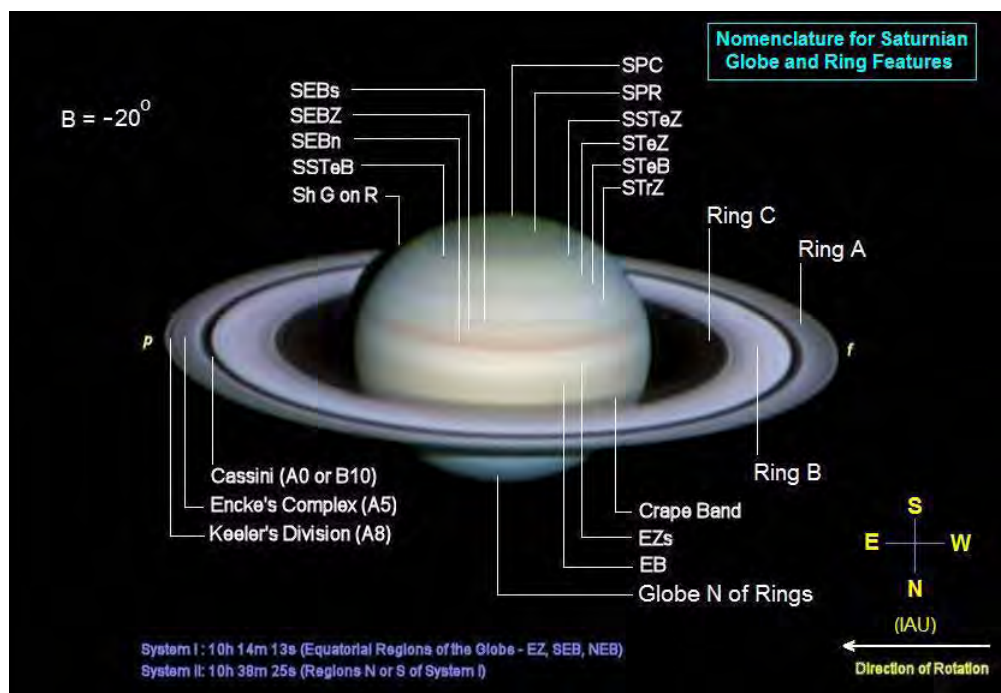


Figure 1. Nomenclature for Saturnian Globe and Ring Features.

ers aware of very subtle, but nonetheless recognizable, variations that may be occurring seasonally on the planet.

Some of the weak intensity fluctuations of Saturn's atmospheric features (see Table 3) may be only a consequence of the varying inclination of the planet's rotational axis relative to the Earth and Sun, and photometric studies have also revealed tiny oscillations of as much as 0.10 in the visual magnitude of Saturn over nearly a decade. There is no ques-

tion, however, that transient and long-enduring atmospheric features seen or imaged in various belts and zones on the globe also factor into apparent brightness fluctuations. Regular photoelectric photometry of Saturn, in conjunction with carefully-executed visual numerical relative intensity estimates, is encouraged.

The intensity scale normally employed by Saturn observers is the standard *ALPO Standard Numerical Relative Intensity Scale*, where 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 2003-04 intensity from its 2004-05 value. Suspected variances of 0.10 mean intensity points are usually considered insignificant, and furthermore, reported changes in intensity are seldom noteworthy unless they exceed about three times the standard error.

It is always meaningful to compare images of Saturn made by amateurs using different apertures, digital imagers, and filter techniques in order to understand the level of detail seen, including any correlation with spacecraft imaging and results from professional observatories, and finally, how they relate to visual impressions of the globe and rings. Accordingly, in addition to routine visual studies, Saturn observers should carefully and systematically image the planet every possible clear night to search for individual features on the globe and in the rings, their motion and morphology (including changes in intensity and hue), to serve as input for combination with images taken by professional ground-based observatories and spacecraft monitoring Saturn at close range. Furthermore, comparing images captured over several apparitions for a given hemisphere of Saturn's globe provides information on seasonal changes long suspected by observers making

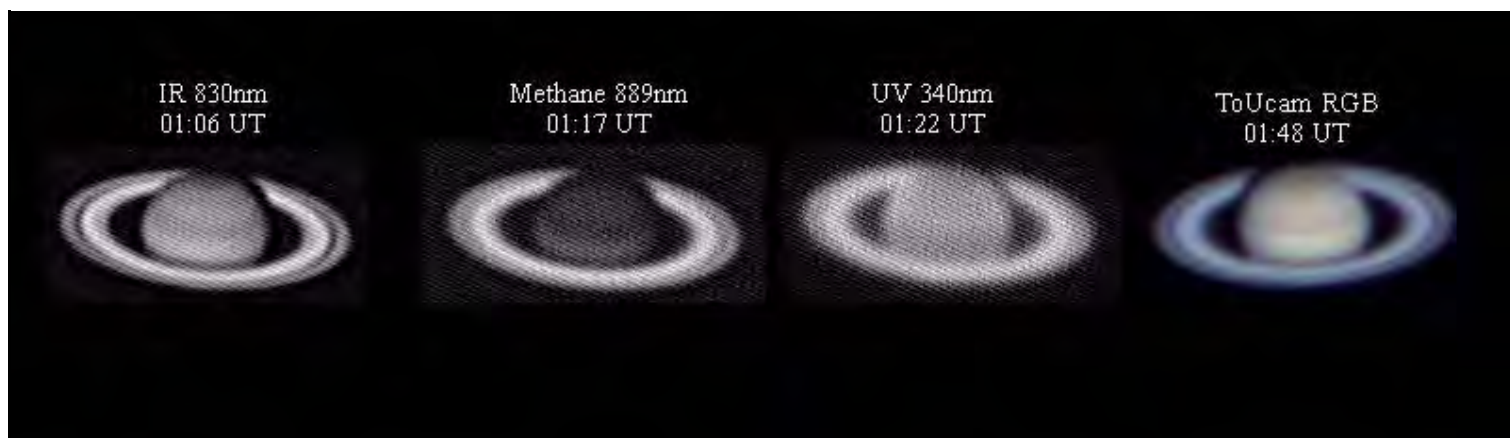


Figure 2. 2005 Mar 06 01:06-01:48UT. Brian Colville. 30.0 cm (11.8 in.) SCT, Digital images using Philips ToUcam with 830nm IR, 889nm (CH_4 -band), 340nm UV filters, and IL. S and Tr not specified. CMI = 329.9°-354.5°, CMII = 344.9°-08.6°, CMIII = 158.3°-182.0° B = -23.8°, B' = -22.4°. Saturn images (left to right) captured in IR, CH_4 -band, UV, and IL (RGB). Note contrasting appearance of ring and globe features in the different wavelengths.

Table 3: Visual Numerical Relative Intensity Estimates and Colors for the 2004-2005 Apparition of Saturn

Globe/Ring Feature	# Estimates	2004-05 Mean Intensity & Standard Error	Intensity Variation Since 2003-04	Mean Derived Color
Zones				
SPC	4	3.30 ± 0.21	+0.67	Dark Gray
SPR	39	4.82 ± 0.11	+1.56	Gray
SSTeZ	7	5.94 ± 0.05	+0.94	Yellowish-Gray
STeZ	33	6.48 ± 0.10	−0.22	Yellowish-White
STrZ	20	6.10 ± 0.08	−0.14	Yellowish-White
SEBZ	5	5.40 ± 0.22	−0.04	Dull Yellowish-Gray
EZs	46	7.53 ± 0.08	+0.52	Bright Yellowish-White
Belts				
SPB	1	3.00 ± 0.00	−0.55	Dark Gray
STeB	8	5.00 ± 0.00	+0.42	Light Grayish-Brown
SEB (whole)	15	3.99 ± 0.05	−0.14	Grayish-Brown
SEBs	6	3.67 ± 0.19	−0.50	Dark Grayish-Brown
SEBn	6	3.67 ± 0.19	−0.11	Dark Grayish-Brown
EB	6	4.93 ± 0.29	+0.19	Light Gray
Rings				
A (whole)	44	6.76 ± 0.07	+0.18	Yellowish-White
Ring A (outer ½)	3	6.33 ± 0.14	−0.42	Dull Yellowish-White
Ring A (inner ½)	3	7.00 ± 0.00	+0.39	Pale Yellowish-White
A0 or B10	21	0.29 ± 0.10	−0.44	Grayish-Black
B (outer 1/3)	54	8.00 ± 0.00 <u>STANDARD</u>	0.00	Brilliant White
B (inner 2/3)	38	7.20 ± 0.04	+0.06	Bright Yellowish-White
C (ansae)	47	1.38 ± 0.10	+0.14	Grayish-Black
Crape Band	18	2.08 ± 0.14	+0.12	Very Dark Gray
Sh G or R	24	0.33 ± 0.10	+0.18	Dark Grayish-Black
Sh R of G	19	0.53 ± 0.17	+0.12	Dark Grayish-Black
NOTES: For nomenclature see text and Figure 1. 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 Variation Since 2003-04” is in the same sense of the 2003-04 value subtracted from the 2004-05 value, “+” denoting an increase in brightness and “−” indicating a decrease (darkening). When the apparent change is less than about 3 times the standard error, it is probably not statistically significant.				

visual numerical relative intensity estimates. It is noteworthy that images (and systematic visual observations) by amateurs occasionally serve as initial alerts of interesting large-scale features on Saturn that professionals may not already know about but can subsequently examine fur-

ther with 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 extremely dark, and imaging the

planet using a series of color filters can 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

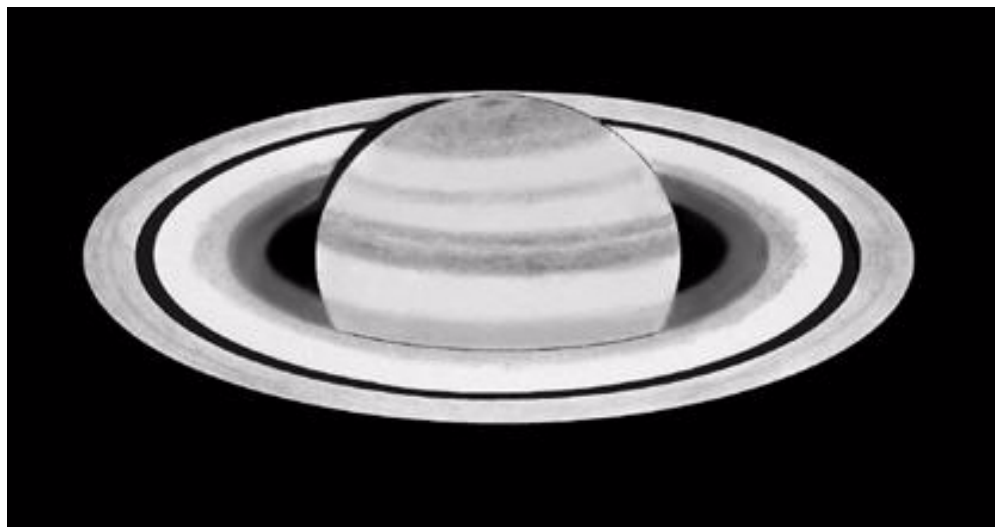


Figure 3. 2004 Nov 05 05:45UT. Carlos Hernandez. 22.9 cm (9.0in.) MAK. Drawing at 248X, IL. S = 6.0, Tr = 6.0. CMI = 204.9°, CMII = 162.1°, CMIII = 121.2° B = -21.7°, B' = -23.4°. The small, dark gray SPC is considerably duskier than the surrounding SPR. S is at top and E at left (IAU).

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 (O₃), while H₂O-vapor and CO₂ 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 capturing images of Saturn in these near-IR and near-UV bands frequently produces very interesting results. The effects of absorption and scattering of light by the planet's atmospheric gases and clouds of various

heights and thicknesses are usually noticeably apparent, and such images sometimes show differential light absorption by particles with dissimilar hues intermixed with Saturn's white NH₃ clouds. Consider, for example, the fine set of images taken at 830nm IR, 889nm (CH₄-band), 340nm UV wavelengths as well as in IL (RGB) furnished by Brian Colville of Cambray (Ontario) Canada using a digital imager attached to a 30.0 cm (11.8 in.) SCT [Figure 2].

Estimates of Latitude of Global Features. During any given apparition of Saturn, observers are always encouraged to employ the handy visual method developed by Haas over 60 years ago to perform estimates of Saturnian global latitudes. Observers simply need only to 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 computed 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. Unfortunately, for the first time in recent years, no observers submitted estimates of Saturnian latitudes during 2004-05. In the future, all observers are encouraged to employ this easy method, for which a detailed description can be found in the author's new book entitled *Saturn and How To Observe It*, published by Springer and available from booksellers worldwide.

Southern Regions of the Globe. During the 2004-05 apparition, **B** attained a maximum value of -23.96°, so observers were able to study Saturn's Southern Hemisphere to good advantage, but most of the Northern Hemisphere was still obscured by the rings as they crossed in front of the planet's globe. From a reduction of visual numerical relative intensity estimates received this apparition, the mean brightness of the Southern Hemisphere features of Saturn showed negligible change since 2003-04. Nevertheless, some visual observers strongly suspected that several belts and zones in the Southern Hemisphere displayed a delicate, progressive decline in overall brightness over the last three observing seasons. Will this

Table 4: White Spot Activity in the STRZ During the 2004-2005 Apparition of Saturn

UT Date and Time	CM Start			CM End			Obs	Obs Stn	Inst (cm)	Inst Type	Method	S	Tr
	I (°)	II (°)	III (°)	I (°)	II (°)	III (°)							
2004 09 15 20:08-20:16UT	130.3	275.5	295.4	135.0	280.0	299.9	Akutsu	JAP	31.8	NEW	Image (IL)	4.5	5.0
2004 09 17 14:11-14:18UT	169.5	258.2	275.9	173.6	262.1	279.9	Pellier	FRA	18.0	NEW	Image (IL + Red)	7.0	6.0
2004 11 23 06:56UT	325.4	59.6	356.9	325.4	59.6	356.9	Casquinha	ITL	25.4	NEW	Image (IL)	-	-

Table 5: White Spot Activity in the SEBZ During the 2004-2005 Apparition of Saturn

UT Date and Time	CM Start			CM End			Obs	Obs Stn	Inst (cm)	Inst Type	Method	S	Tr
	I (°)	II (°)	III (°)	I (°)	II (°)	III (°)							
2004 09 17 14:11-14:18UT	169.5	258.2	275.9	173.6	262.1	279.9	Pellier	FRA	18.0	NEW	Image (IL + Red)	7.0	6.0
2004 10 01 06:32UT	200.5	207.2	208.5	200.5	207.2	208.5	Peach & Tyler	UK	28.0	SCT	Image (IL)		
2004 10 21 11:43UT	349.4	63.1	40.0	349.4	63.1	40.0	Grafton	USA	35.6	SCT	Image (IL)	8.0	3.0
2004 11 06 18:30UT	57.9	325.5	282.8	57.9	325.5	282.8	Akutsu	JAP	31.8	NEW	Image (IL)	6.0	4.0
2004 11 06 18:58UT	74.3	341.3	298.6	74.3	341.3	298.6	Ikemura	JAP	31.0	NEW	Image (IL)	3.0	6.0
2004 11 06 19:44-20:04UT	101.2	7.3	324.5	113.0	18.5	335.7	Go	PHIL	20.3	SCT	Image (IL)		
2004 11 09 06:40UT	14.7	201.4	155.6	14.7	201.4	155.6	Hernandez	USA	22.9	MAK	Visual 248X	5.0	6.0
2004 11 23 01:46-01:53UT	143.7	244.7	182.3	147.8	248.7	186.3	Sanchez	SPA	28.0	SCT	Image (IL)	-	-
2004 11 25 05:54-06:10UT	177.9	208.8	143.7	187.3	217.8	152.8	Parker	USA	25.4	DALL	Image (IL)	5.5	4.0
2004 12 04 00:43UT	35.1	142.3	66.6	35.1	142.3	66.6	Adelaar	NETH	17.8	MAK	Image (IL & IRB)	-	-
2004 12 11 02:26UT	246.4	125.1	40.9	246.4	125.1	40.9	Peach	UK	23.5	SCT	Image (IL & IRB)	-	-
2004 12 12 23:46UT	41.3	219.1	132.6	41.3	219.1	132.6	Lazzarotti	ITL	25.4	NEW	Image (IL & IRB)	7.5	5.0
2004 12 13 00:38-00:58UT	71.8	248.4	161.9	83.6	259.7	173.2	Lazzarotti	ITL	25.4	NEW	Image (IL & IRB)	7.5	5.0
2004 12 15 02:36UT	29.8	139.1	50.1	29.8	139.1	50.1	Lazzarotti	ITL	25.4	NEW	Image (IL & IRB)	7.5	3.0
2005 01 06 23:51UT	274.4	4.4	247.8	274.4	4.4	247.8	Casquinha	ITL	25.4	NEW	Image (IL & IRB)	-	-
2005 01 07 00:06-00:22UT	283.2	12.9	256.3	292.5	21.9	265.3	Casquinha	ITL	25.4	NEW	Image (IL & IRB)	-	-
2005 01 13 23:10-23:47UT	41.1	266.0	141.0	62.2	286.3	161.2	Sanchez	SPA	28.0	SCT	Image (IL)	-	-
2005 01 17 02:49-02:52UT	182.6	305.7	176.9	184.4	307.4	178.6	Phillips	USA	20.3	REFR	Image (IL & IRB)	-	-
2005 02 06 19:24-20:48UT	13.2	188.0	34.2	62.5	235.4	81.6	Pellier	FRA	21.0	DALL	Image (IL + IR)	8.0	6.0
2005 03 18 19:20-20:16UT	302.2	265.2	63.2	335.1	296.8	94.7	Pellier	FRA	21.0	DALL	Image (IL + IR)	8.0	6.0

alleged subtle brightness trend continue in succeeding apparitions as the tilt of Saturn toward our line of sight diminishes as the next edgewise presentation of the rings in 2009 approaches?

From September 15, 2004 through March 18, 2005 at least 20 different observers either made drawings of or imaged small

white spots or features in the STrZ, SEBZ, and EZs that will be covered in the forthcoming discussion of each region of Saturn's globe. Most of these transient white spots, which were confirmed by several observers, evolved morphologically over a span of several months. Such features typically result from the upward convection of NH₄ (ammonia) in Saturn's atmo-

sphere, and the structure of zonal wind profiles in these regions seems to contribute to their emergence and behavior. A few diffuse transient dark spots and dusky festoons were also reported associated with the SEB during the period from December 2004 through February 2005. As a result of high-resolution imaging, many of these white spots and dark fea-

tures could be monitored for several rotations of Saturn, facilitating a limited number of CM transit timings and tentative drift rates.

Saturn reached perihelion back on July 26, 2003 which occurs every 29.5^y (one Saturnian year). Several investigators have speculated that a perceived small increase in atmospheric activity on Saturn may be a consequence of the planet's seasonal insolation cycle, but historical measurements show only a very slow thermal reaction to solar heating at Saturn's perihelion distance from the Sun of ~9.0 AU. Observers are encouraged to keep the Southern Hemisphere under close scrutiny in forthcoming apparitions now that Saturn has passed perihelion, since a lag in the planet's atmospheric thermal response may possibly mimic what we experience on Earth, where the warmest days do not arrive on the first day of summer, but occur several weeks later. On Saturn, however, any similar effect would be extremely subtle and may not be noticed for quite a number of years.

South Polar Region (SPR). The grayish SPR was a bit brighter in 2004-05 (by +1.56 mean visual numerical relative intensity points) than it had been in the immediately preceding observing season,

in contrast with a suspected subtle darkening trend a number of observers had reported every apparition since 2001-02. The small, dark gray South Polar Cap (SPC) appeared considerably darker than the environment of the SPR (darker by a mean intensity value of -1.52) in integrated light, although there were only four intensity estimates made of the SPC.

This difference in visual appearance of the two features is clearly exemplified on drawings made by Carlos Hernandez in Florida using a 22.9 cm (9.0 in.) MAK at 248X at 05:45UT on November 5, 2004 [Figure 3], and by Sol Robbins, observing

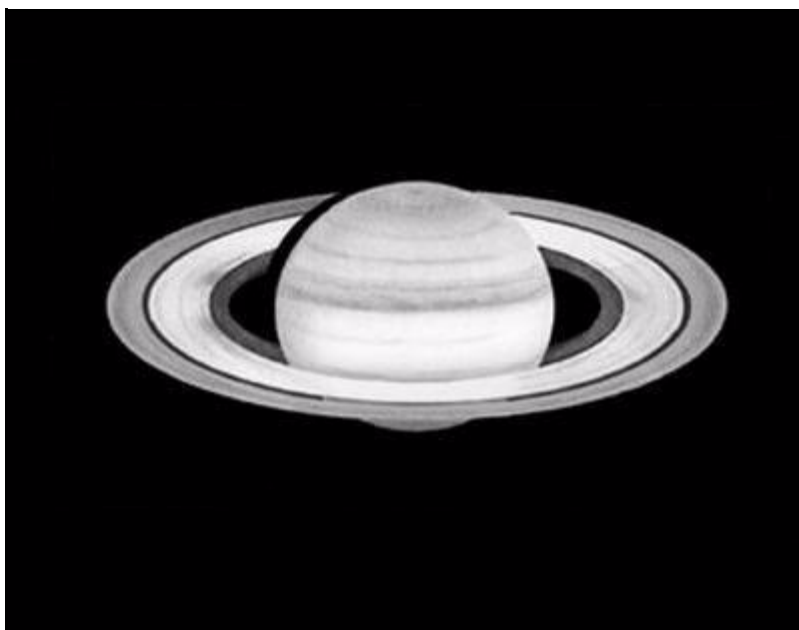


Figure 4. 2004 Nov 14 07:40UT. Sol Robbins. 15.2 cm (6.0 in.) REF. Drawing at 350-400X, IL. S = 8.0. (Tr not specified). CMI = 311.7°, CMII = 335.6°, CMIII = 283.7° B = -21.7°, B' = -23.4°. Dark SPC is surrounded by a lighter encompassing SPR. S is at top and E at left (IAU).

from New Jersey with a 15.2 cm (6.0 in.) REF at 350-400X on November 14, 2004 at 07:40UT [Figure 4]. Several visual observers with more experience made comparable sketches showing the same appearance of the SPC and SPR. The

Table 6: White Spot Activity in the SEB During the 2004-2005 Apparition of Saturn

UT Date and Time	CM Start			CM End			Obs	Obs Stn	Inst (cm)	Inst Type	Method	S	Tr
	I (°)	II (°)	III (°)	I (°)	II (°)	III (°)							
2004 11 28 00:54-02:16UT	15.2	315.9	247.5	63.2	2.1	293.7	Lazzarotti	ITL	25.4	NEW	Image (IL & IRB)	7.5	2.0
2004 12 15 00:10-00:14UT	304.2	56.8	327.9	306.6	59.1	330.2	Fattinnanzi	ITL	25.4	NEW	Image (IL & IRB)	7.0	
2004 12 15 02:36UT	29.8	139.1	50.1	29.8	139.1	50.1	Lazzarotti	ITL	25.4	NEW	Image (IL & IRB)	7.5	3.0
2004 12 16 07:06-07:32UT	312.6	23.5	293.1	327.8	38.2	307.7	Robbins	USA	24.8	NEW	Visual 397X	-	-
2004 12 26 07:05-07:31UT	116.1	224.0	121.5	131.3	238.7	136.2	Robbins	USA	15.2	REFR	Visual 428X	8.0	-
2005 01 07 22:52UT	4.2	63.3	305.5	4.2	63.3	305.5	Lazzarotti	ITL	25.4	NEW	Image (IL)	7.0	5.0
2005 01 11 00:19-00:28UT	68.4	28.6	267.2	73.6	33.7	272.2	Sanchez	SPA	28.0	SCT	Image (IL + W23A)	-	-
2005 02 12 04:50-05:12UT	246.8	247.4	78.1	259.7	259.8	99.5	Robbins	USA	15.2	REFR	Visual 350X	7.0	-

Table 7: White Spot Activity in the EZ during the 2004-2005 Apparition of Saturn

UT Date and Time	CM Start			CM End			Obs	Obs Stn	Inst (cm)	Inst Type	Method	S	Tr
	I (°)	II (°)	III (°)	I (°)	II (°)	III (°)							
2004 11 19 12:13-12:28UT	13.8	230.0	171.9	22.6	238.4	180.3	Cudnik	USA	20.3	SCT	Visual 338X (W80A, W23A)	8.0	4.5

darker SPC and a dusky gray SPR were readily apparent on a large number of digital images captured at visual wavelengths this apparition, confirming the purely visual impressions.

A dark grayish South Polar Belt (SPB) encircling the SPR, extending across the globe of Saturn from limb to limb, was glimpsed on only one occasion during the 2004-05 apparition, but it was readily apparent in some of the best images. Although one visual numerical relative intensity estimate is hardly sufficient evidence, the SPB was the darkest belt of Saturn's Southern Hemisphere this apparition just like in 2003-04. The SPB maintained nearly the same brightness (mean intensity variation of -0.55) as the previous observing season, but again this impression is based on a single estimate.

South South Temperate Zone (SSTeZ).

The yellowish-gray SSTeZ was sighted sporadically by visual observers during this apparition, appearing slightly brighter by an intensity factor of $+0.94$ since 2003-04. Most digital images that were received in 2004-05 showed a nar-

row SSTeZ that was devoid of discrete activity.

South South Temperate Belt (SSTeB).

No visual observers reported the SSTeB in 2004-05, but this narrow light gray belt was fairly obvious on many of the best digital images.

South Temperate Zone (STeZ). The conspicuous yellowish-white STeZ was routinely seen by visual observers in 2004-05, and it was regularly apparent in most digital images of Saturn. When compared with the immediately preceding observing season, the STeZ was virtually unchanged in overall intensity (factor of -0.22), and was second only to the EZs in brightness this apparition. The STeZ appeared uniform in intensity during most of the observing season as it crossed the globe of Saturn. No activity in the STeZ was reported by visual observers, nor were discrete phenomena imaged, during 2004-05.

South Temperate Belt (STeB). The light grayish-brown STeB was occasionally described by visual observers during this apparition, but high resolution digital

imaging easily showed this dusky belt during 2004-05. When visual observers saw this belt, as well as when it was imaged, there was no apparent activity within this feature as it ran uninterrupted across the globe of Saturn. Based on mean intensity data, the STeB was the lightest belt in the Southern Hemisphere of Saturn and exhibited no substantial change in brightness (mean difference of $+0.42$) since 2003-04.

South Tropical Zone (STrZ). Visual observers saw the yellowish-white STrZ numerous times during the 2004-05 apparition. Based on intensity estimates that were contributed to the ALPO Saturn Section, the STrZ had nearly the same mean intensity as in 2003-04 (negligible variance of -0.14), and it ranked third in order of brightness behind the EZs and STeZ. When comparing visual impressions with some of the best digital images at visual wavelengths, the gross morphology of this feature appeared similar, and as in the previous observing season, images of small white spots near saturnigraphic latitude 42° were received periodically from September through November 2004. Table 4 presents a list of the very small

Table 8: Visual Observations of the Bicolored Aspect of Saturn's Rings During the 2004-2005 Apparition

Observer	UT Date and Time	Telescope Type & Aperture	Filter						
			X	S	Tr	Blue	IL	Red	
Cudnik	2004 Aug 03 11:19-11:30UT	NEW 25.4 cm (10.0 in.)	254	3.0	5.0	E	=	=	
Cudnik	2005 Jan 09 03:47-04:12UT	NEW 25.4 cm (10.0 in.)	370	8.0	5.0	=	E	W	
Roussell	2005 Feb 12 03:13-03:25UT	REF 15.2 cm (6.0 in.)	267	7.0	4.5	=	W	=	
Roussell	2005 Mar 30 01:15-01:30UT	REF 15.2 cm (6.0 in.)	267	5.0	3.0	=	W	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. Under "Filter," **BI** refers to the blue W47 or W80A filters, **IL** to integrated light (no filter), and **Red** 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.

STrZ white spots that were imaged by ALPO observers during the 2004-05 apparition [Figures 5, 6 and 7]. No confirming visual sightings of these discrete white features in the STrZ were received, however, probably because they were all below the threshold of vision and of poor contrast in most telescopes employed for visual work. Remember that the smallest features appearing in most digital images are more obvious because of image processing that helps bring out very subtle detail.

South Equatorial Belt (SEB). The grayish-brown SEB was reported by visual observers throughout the 2004-05 apparition, sometimes subdivided into SEBn and SEBs components (where **n** refers to the North Component and **s** to the South Component), with an occasional SEBZ lying in between them during optimum seeing conditions and with larger apertures. Taken as a whole, the SEB ranked second behind the SPB as being the darkest belt on Saturn's globe during this apparition, and it seemed to visual observers to be a tiny bit duller in 2004-05 as opposed to 2003-04; of course, a difference of only 0.14 mean intensity points between observing seasons is hardly noteworthy. When the SEBn and SEBs were visible (both exhibited a mean intensity of 3.67 during the observing season), the brightness of both components was suspected to be somewhat duller than in 2003-04. The dull yellowish-gray South Equatorial Belt Zone (SEBZ) showed negligible change

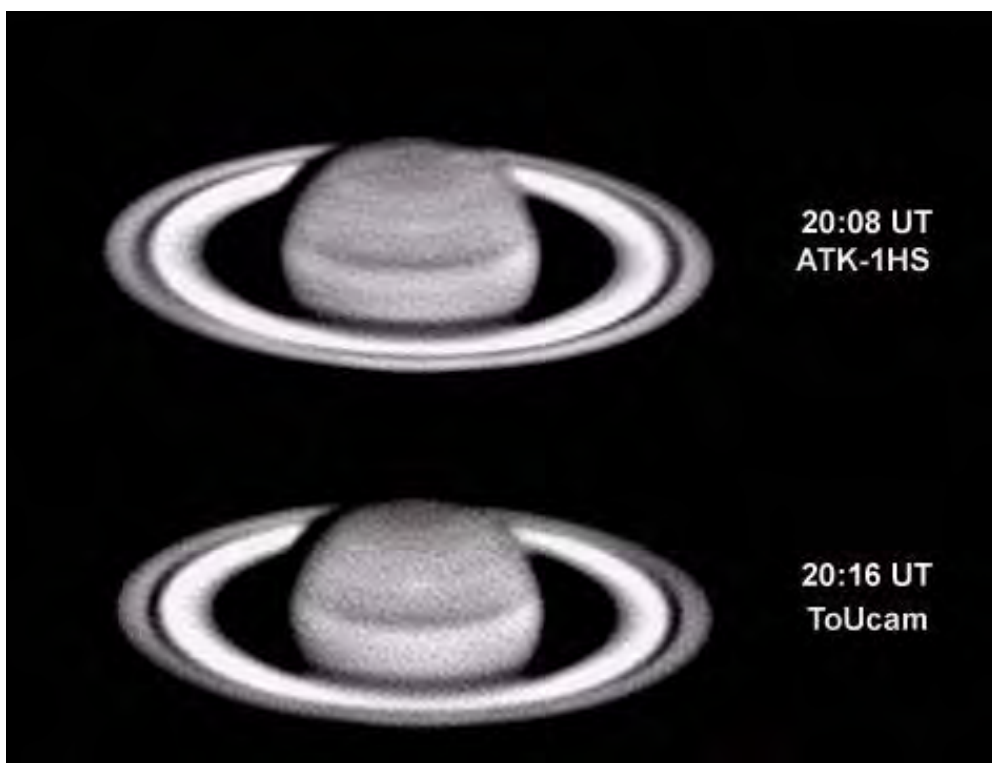


Figure 5. 2004 Sep 15 20:08-20:16UT. Tomio Akutsu. 31.8 cm (12.5 in.) NEW, Digital Images using ATK -1HS + ToUcam, IL. S = 4.5 Tr = 5.0. CMI = 130.3°-135.0°, CMII = 275.5°-280.0°, CMIII = 295.4°-299.9° B = -22.4°, B' = -23.8. 1st reported sighting of a small STrZ white spot this apparition (near CM). S is at top and E at left (IAU).

between the two observing seasons. The best digital images received largely supported visual impressions of these two belt components.

Speaking of digital images of Saturn during 2004-05, the SEB was nearly always

prominent and subdivided into the SEBn and SEBs, separated by the lighter SEBZ. From September 17, 2004 through March 18, 2005, observers imaged one or more small, diffuse white spots in the SEBZ at approximate saturnigraphic latitude -25°. In a few of the submitted images, the SEBZ white spots were captured at that same time that small white spots were also suspected or readily apparent in images of the STrZ farther south, especially during September 2004 [Figures 6, 8 thru 11, and 13 thru 17]. Table 5 provides a complete listing of the small transient white spots imaged in the SEBZ during 2004-05, along with one instance when a small SEBZ white spot was glimpsed visually [Figure 12].

After March 18, 2005, the SEBZ white spots were not reported or imaged again by observers.

In addition to white spot activity in the SEBZ, ill-defined dark features (some described as wispy festoons) were sporadically imaged [Figures 18, 19, and 21] and seen visually in both the SEBn and SEBs

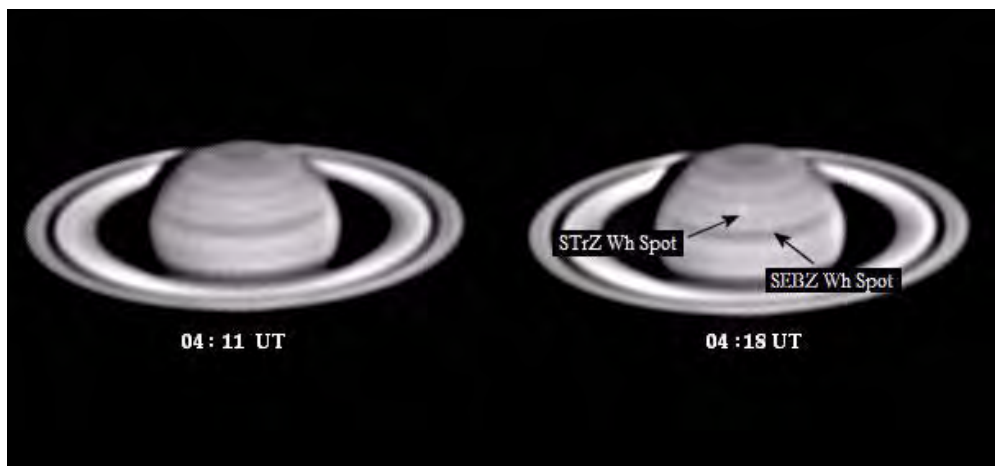


Figure 6. 2004 Sep 17 14:11-14:18UT. Christophe Pellier. 18.0 cm (7.1 in.) NEW, Digital Images using ATK -1HS, IL + red filter. S = 7.0, Tr = 6.0 CMI = 169.5°-173.6°, CMII = 258.2°-262.1°, CMIII = 275.9°-279.9° B = -22.3°, B' = -23.8°. White spots in STrZ and SEBZ near CM (1st image of SEBZ white spot this apparition). S is at top and E at left (IAU).



Figure 7. 2004 Nov 23 06:56UT. Paolo Casquinha. 25.4 cm (10.0 in.) NEW, Digital image using Philips ToUcam in Red, Green, and Blue light. S and Tr not specified. CMI = 325.4°, CMII = 59.6°, CMIII = 356.9° B = -21.8°, B' = -23.3°. Small STrZ white spot near CM in 3 different filters. S is at top and E at left (IAU).

from November 28, 2004 through February 2, 2005, as listed in Table 6.

A few wispy festoons were infrequently sighted within the SEBZ in good seeing by a few visual observers [Figures 20 and 22].

Equatorial Zone (EZ). The southern half of the bright yellowish-white Equatorial Zone (EZs) was the region of the EZ visible (or imaged) between where the rings cross the globe of Saturn and the SEBn in 2004-05 (the EZn was not as readily apparent during the apparition). The EZs during the 2004-05 apparition,

by most observer impressions, seemed to be ever so slightly brighter since 2003-04 by a factor of +0.52 in mean intensity, and it was the brightest zone on Saturn's globe. There was only one visual account of white spot activity in the EZs [Figure 23] during the 2004-05 apparition (see Table 7).



Figure 8. 2004 Oct 01 06:32UT. Damian Peach. 28.0 cm (11.0 in.) SCT, Digital image using Philips ToUcam, IL. S and Tr not specified. CMI = 200.5°, CMII = 207.2°, CMIII = 208.5° B = -22.0°, B' = -23.7°. Small diffuse spot near following (W) limb in SEBZ. S is at top and E at left (IAU).

No digital images were submitted during the observing season clearly depicting EZs white spots. In good seeing during 2004-05, visual observers described the intermittent visibility of a narrow, continuous light gray Equatorial Band (EB) spanning Saturn's globe, but this feature was usually apparent in digital images. The mean intensity data this apparition suggested that the EB was mostly unchanged in brightness since the immediately preceding observing season (a +0.19 mean intensity difference notwithstanding); it was second only to the STeB in being the lightest belt in Saturn's Southern Hemisphere this apparition.

Northern Portions of the Globe. With Saturn tipped as much as -23.96° to our line of sight in 2004-05, very little of the planet's Northern Hemisphere could be viewed or imaged to advantage. Studies of Saturn's Northern Hemisphere will resume in forthcoming apparitions when geometric circumstances for observing these regions are more favorable.

Shadow of the Globe on the Rings (Sh G on R). The Sh G on R was visible

to observers as a geometrically regular dark grayish-black feature on either side of opposition during 2004-05. Assumed departures from a true black (0.0) intensity was caused by poor seeing conditions or the presence of extraneous light. Most digital images revealed this feature as completely black. The reader should be aware that the globe of Saturn casts a shadow on the ring system to the left or IAU East prior to opposition [Figure 24], to the right or IAU West after opposition [Figure 25], and on neither side exactly at opposition (no shadow) [Figure 26].

Shadow of the Rings on the Globe (Sh R on G). This shadow in 2004-05 was described as a dark grayish-black feature south of the rings where they crossed Saturn's globe. Any reported variations from an intrinsic black (0.0) condition were due to the same reasons cited above for the Sh G on R.

Saturn's Ring System

The next several paragraphs pertain to visual studies of Saturn's ring system that include traditional comparisons of mean intensity data between apparitions. Impressions based on digital images of the rings are also included in the discussion. The southern face of the rings was readily apparent during 2004-05 as the inclination of the rings (value of **B**) toward

observers on Earth reached as much as -23.96° .

Ring A. Most visual observers were in agreement that the yellowish-white Ring A, when considered as a whole, had nearly the same intensity in 2004-05 as in 2003-04. On rare occasions during the observing season, Ring A appeared visually differentiated into a pale yellowish-white inner half and a dull yellowish-white outer half. The inner half of Ring A was

suspected to be marginally brighter than the outer half, in contrast to the impressions of visual observers in 2003-04. Most digital images of Saturn taken during the 2004-05 apparition clearly showed inner and outer halves of Ring A also, but the two components looked about equal in brightness, although there were a few images that supported the impression of visual observers. The normally very dark gray Encke's Division (A5), sometimes described as an intensity minima "complex" halfway out in Ring A at the ansae, was imaged fairly often during the 2004-05 observing season [Figure 27], but it was not mentioned in any reports submitted by visual observers. A few digital images showed Keeler's Division (A8) [Figure 28], but it also was not described by visual observers this apparition. No other intensity minima in Ring A were reported in 2004-05 either visually or captured with digital imagers.

Ring B. The outer third of Ring B is the traditional standard of reference for the ALPO Saturn Visual Numerical Relative Intensity Scale, with an assigned value of 8.0. To visual observers during 2004-05 the outer third of Ring B was brilliant white, stable in intensity, and consistently the brightest feature on Saturn's globe or in the ring system. The inner two-thirds of Ring B during this apparition, which was described as bright yellowish-white and uniform in intensity, displayed basically



Figure 9. 2004 Oct 21 11:43UT. Ed Grafton. 35.6 cm (14.0 in.) SCT, ST5 Digital imager, IL. S = 8.0, Tr = 3.0 CMI = 349.4°, CMII = 63.1°, CMIII = 40.0° B = -21.8° , B' = -23.6° . SEBZ white spot is W of the CM. S is at top and E at left (IAU).



Figure 10. 2004 Nov 06 18 30UT. Tomio Akutsu. 31.8 cm (12.5 in.) NEW, Digital Image using ATK -1HS, IL. S = 6.0 Tr = 4.0. CMI = 57.9°, CMII = 325.5°, CMIII = 282.8° B = -21.7° , B' = -23.4° . SEBZ white spot W of CM. S is at top and E at left (IAU).

the same mean intensity as in the immediately preceding observing season. Observations using digital imagers were in general agreement with the visual reports during 2004-05. Dusky spoke-like features were reported near the ansae in Ring B during the preceding apparition, and for 2004-05 there was at least one sighting of such features. On March 30, 2005 (01:30UT), Carl Roussel, observing from Canada using an 15.2 cm (6.0 in.) refractor at 267X and W80A (blue), W58 (green) and W21 (yellow) filters, described what vaguely appeared to be radial spokes at the inner edge of Ring B [Figure 29] at the following or W (IAU) ansa in fairly decent seeing conditions ($S = 5.0$). Visual observers also suspected the presence of dark grayish intensity minima at various positions in Ring B during 2004-05, but there were no conclusive observations or visual numerical relative intensity estimates made. Digital images captured some of these faint intensity minima B1, B2, B5 and perhaps B8 positions within in Ring B.

Cassini's Division (A0 or B10).

Cassini's division (A0 or B10) was detected fairly often by visual observers during 2004-05 as a grayish-black gap at both ansae, while in good seeing with larger apertures this division could be traced around the circumference of the Saturn's ring system. A black Cassini's division was generally quite apparent on



Figure 11. 2004 Nov 06 18 58UT. Toshihiko Ikemura. 31.0 cm (12.0 in.) NEW, Digital Image using ATK -2C, IL. $S = 3.0$ Tr = 6.0. CMI = 74.3° , CMII = 341.3° , CMIII = 298.6° B = -21.7° , B' = -23.4° . SEBZ white spot W of CM. S is at top and E at left (IAU).

all digital images received during the 2004-05 observing season [Figure 30], and in some of the highest-quality images, the Northern Hemisphere of Saturn's globe could be perceived through Cassini's Division. It should be pointed out that any departure from a totally black intensity for Cassini's Division is a result of bad seeing, scattered light, inadequate aperture, and so forth. Also, the visibility of major ring divisions and other intensity minima was favorable in 2004-05 because the numerical value of **B** attained -23.96° during the apparition, still a fairly

respectable inclination to our line of sight. At this ring tilt toward Earth, Cassini's Division still looked conspicuously dark, much like it did during 2003-04. Circumstances for optimum views of Cassini's Division all the way around the rings will diminish, however, in succeeding apparitions as the rings close up approaching the next edgewise orientation to observers on Earth in 2009.

Ring C. The grayish-black Ring C at the ansae was routinely visible in 2004-05 and of nearly the same overall intensity variation when compared with 2003-04 data (a mean intensity difference of +0.14). The Crape Band, or simply Ring C in front of the globe of Saturn, appeared very dark gray in color and uniform in intensity, looking much like it did during 2003-04 (mean intensity variance of +0.12). Digital images showed Ring C encircling the globe of Saturn and confirming most of the visual impressions of this ring component during 2004-05 [Figure 31]. 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 transpired beginning January 14, 2005 through July 3, 2005 (the last observation received for the apparition). The Crape Band is seen south of the projected Rings A and B. If 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 January 14. At times when the shadows of Ring A, Ring B, and Ring C projec-



Figure 12. 2004 Nov 09 06:40UT. Carlos Hernandez. 22.9 cm (9.0in.) MAK. Drawing. 248X, IL. $S = 5.0$, Tr = 6.0. CMI = 14.7° , CMII = 201.4° , CMIII = 155.6° B = -21.7° , B' = -23.4° . A small white spot is suspected at S edge SEBZ interacting with SEBs. S is at top and E at left (IAU).

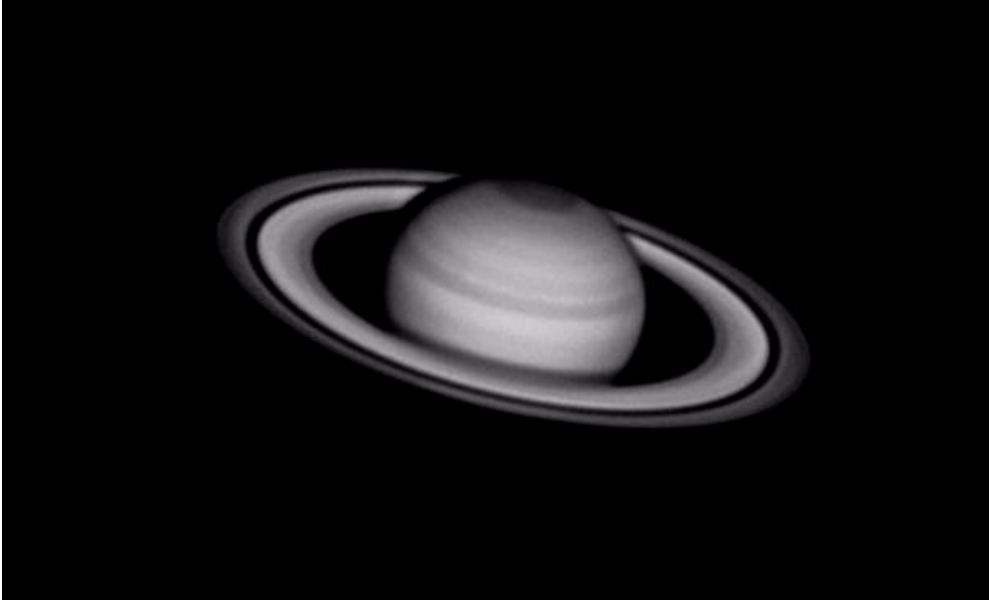


Figure 13. 2004 Nov 23 01:46UT. Jesus R. Sanchez. 28.0 cm (11.0 in.) SCT, using Philips ToUcam digital imager, IL, W23A filter. S and Tr not specified. CMI = 143.7° , CMII = 244.7° , CMIII = 182.3° B = -21.8° , B' = -23.3° . Small SEBZ spot W of CM. S is at top and E at left (IAU).

tion are superimposed, it is troublesome 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. This feature was not reported or imaged during 2004-05. When seen, this feature is surely an artificial contrast effect, not a



Figure 14. 2004 Dec 12 23:46UT. Paolo Lazzarotti. 25.4 cm (10.0 in.) NEW, with Luminera digital imager, IL + IR blocking filter. S = 7.5, Tr = 5.0. CMI = 41.3° , CMII = 219.1° , CMIII = 132.6° B = -22.1° , B' = -23.1° . Small SEBZ white spot slightly E of CM. S is at top and E at left (IAU).

real feature of Saturn's rings. It is always useful, however, to try to determine what correlation might exist between the visual numerical relative intensity of the TWS and the varying tilt of the rings, including its brightness and visibility in variable-density polarizers, color filters, photographs, and digital images.

Bicolored Aspect of the Rings and Azimuthal Brightness Asymmetries.

The bicolored aspect of the rings refers to an observed variance in coloration between the East and West ansae (IAU 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). The circumstances of visual observations are listed in *Table 8* when the bicolored aspect of the ring ansae was thought to be present in 2004-05. As in the rest of this report, directions in *Table 8* refer to Saturnian or IAU directions, where West is to the right in a normally-inverted telescope image (observer located in the Northern Hemisphere of the Earth) which has South at the top.

In the last several apparitions, including 2004-05, observers have been systematically trying to capture the bicolored aspect of the rings using digital imagers, but results have so far been rather inconclusive. During the 2004-05 observing season, there were no images submitted in which this phenomenon was clearly apparent, but now that imaging Saturn is an increasingly routine practice, the chances of success are much greater. Combining simultaneous visual observations of Saturn with imaging of the planet on any given night by a team of observers is a very useful project in searching for and confirming the bicolored aspect of the rings. In addition, observers are urged to try to digitally image subtle azimuthal brightness asymmetries in Ring A that may be simultaneously reported by visual observers. Documenting these phenomena, particularly when they occur independent of similar effects on the globe of Saturn (which would be expected if atmospheric dispersion was at fault), is extremely valuable. Professional astronomers are well-acquainted with Earth-based sightings of azimuthal variations in the rings (which were confirmed by *Voyager* spacecraft) that apparently occur when light is scattered by denser-than-



Figure 15. 2005 Jan 17 02:49UT. Jim Phillips. 20.3 cm (8.0 in.) REF, with Atik Digital imager, IL + IR blocking filter. S and Tr not specified. CMI = 182.6° , CMII = 305.7° , CMIII = 176.9° B = -22.9° , B' = -22.8° . Small SEBZ white spot just E of CM. S is at top and E at left (IAU).

average clumps of particles orbiting in Ring A, so any images obtained by ALPO Saturn observers are extremely valuable. Consequently, observers are urged to continue imaging Saturn while others are viewing it simultaneously to try to capture the bicolored aspect of the rings and any azimuthal brightness differences in upcoming observing seasons.

The Satellites of Saturn

Observers in 2004-05 submitted no systematic visual estimates of Saturn's satellites employing recommended systematic techniques, although Charles Bell of Vicksburg, MS, imaged Saturn and several of its brighter moons on March 19, 2005 at 03:30UT using a 30.5 cm (12.0 in.) SCT with a SBIG ST-2000 SCM digi-

tal imager in good seeing [Figure 32]. In this very striking image (Saturn is overexposed), in the field of view are the moons Titan, Iapetus, Hyperion, Rhea, Dione, Tethys, and Enceladus, and many background comparison stars to approximate visual magnitude $m_v = 15.0$. Mimas was hidden in the overwhelming glare of the planet, although it was supposed to be slightly N of Saturn according to ephemerides and accurate star maps. Nearly a month earlier, on February 28, 2005 at 02:23UT, Paul Maxson of Phoenix, AZ imaged Saturn using a 20.3 cm (8.0 in.) SCT and Atik digital imager (purposely overexposing the planet) to record Mimas, Dione, Tethys, Rhea, Titan, Enceladus, and Iapetus in fair seeing [Figure 33].

Based on some speculation among amateur observers and professional counterparts about whether or not high resolution imaging of Titan using backyard scopes could record any subtle albedo asymmetries shown in multi-spectral HST images, Rolando Chavez of Powder Springs, GA captured an image of Titan [Figure 34] using a 35.6 cm (14.0 in.) SCT and Philips ToUcam (without IR blocking filter) on November 24, 2004 at 08:18UT. His results were inconclusive with regard to visibility of albedo features, but future similar attempts at imaging Titan are certainly encouraged. Photoelectric photometry coupled with regular visual magnitude estimates of Saturn's satellites is also strongly encouraged in upcoming apparitions.

Nearly half a decade ago in 1999-2000, observers were encouraged to try spectroscopy of Titan as part of a newly-introduced professional-amateur cooperative project. Despite the fact that Titan has been studied by the Hubble Space Telescope (HST), very large Earth-based instruments, and more recently by the highly successful *Cassini-Huygens* mission, opportunities still remain for systematic observations by amateurs with appropriate instrumentation. As the *Cassini-Huygens* mission in 2004-05 and henceforth has revealed, Titan is quite a dynamic world with transient as well as long-term variations. As discussed in past apparition reports, 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 bands are "win-



Figure 16. 2005 Feb 06 19:24UT. Christophe Pellier. 21.0 cm (8.3 in.) DALL, Digital Images using ATK -1HS, IL + red filter. S = 8.0, Tr = 6.0 CMI = 13.2° , CMII = 188.0° , CMIII = 34.3° B = -23.4° , B' = -22.6° . Tiny white spot in SEBZ on E side of CM. S is at top and E at left (IAU).



Figure 17. 2005 Mar 18 19:20UT. Christophe Pellier. 21.0 cm (8.3 in.) DALL, Digital Images using ATK -1HS, IL + red filter. $S = 8.0$, $Tr = 6.0$ CMI = 13.2° , CMII = 188.0° , CMIII = 34.3° B = -23.9° , B' = -22.2° . Tiny white spot in SEBZ on W side of CM. S is at top and E at left (IAU).

dows" to Titan's lower atmosphere and

surface, so daily monitoring in these "win-

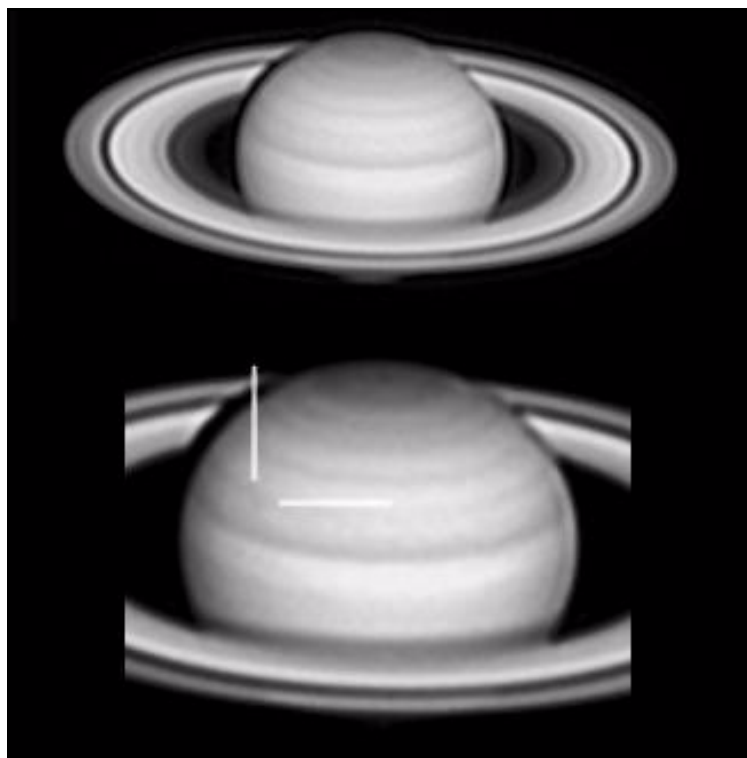


Figure 18. 2004 Nov 28 04:11UT. Paolo Lazzarotti. 25.4 cm (10.0 in.) NEW, with Luminera digital imager, IL + IR blocking filter. $S = 7.5$, $Tr = 2.0$. CMI = 44.5° , CMII = 344.1° , CMIII = 275.6° B = -21.8° , B' = -23.2° . Small dusky festoon E of the CM projecting from N edge of the SEBs into SEBZ. S is at top and E at left (IAU).

tometers or spectrophotometers is worthwhile for cloud and surface studies to supplement professional work still underway in support of *Cassini-Huygens*. Furthermore, long-term studies of other areas from one apparition to the next are meaningful in helping shed light on Titan's known seasonal variations. Observers with suitable equipment are urged to participate in these interesting and immensely useful professional-amateur projects. Further details on these programs 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.

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 great opportunities for verification of ill-defined or traditionally controversial Saturnian phenomena. The ALPO Saturn Section has organized a simultaneous observing team so that several individuals in reasonable proximity of one another can maximize the chances of viewing and imaging Saturn at the same time using similar equipment and methods. Cooperative efforts like this significantly reinforce the level of confidence in the data submitted for each apparition. Several simultaneous, or near-simultaneous, observations of Saturn were submitted during 2004-05, but as in previous observing seasons, such observations occur rather fortuitously. Experienced observers usually are the more common participants in such an endeavor, but newcomers to our programs are most welcome to get involved. Readers are urged to inquire about how to join our simultaneous observing team.

Conclusions

The globe of Saturn during 2004-05 exhibited a fair amount of discrete activity, largely in the form of very small white spots in the STrZ, SEBZ, and EZs, with a few dusky elongations and festoon-like features in the vicinity of the SEB during 2004-05, although it would be difficult to conclude there was any increase in atmospheric activity since the immediately preceding observing season. Just like in 2003-04, a relatively dark SPC surrounded by a bit lighter SPR was reported often this apparition, confirmed both visually and with digital imagers. Apart from many visual observations and digital images showing Cassini's (A0 or B10), Encke's (A5), and Keeler's divisions, visual observers suspected and digital imagers recorded a few different intensity minima at different locations within Ring B. At least one visual observer suspected and sketched dusky ring spokes that were possibly evident at the inner edge of Ring B during 2004-05, but there were no digital images submitted this observing season that showed radial spokes in either



Figure 19. 2004 Dec 15 00:10UT Cristian Fattinnanzi Paul Maxson. 25.4 cm (10.0 in.) NEW, with Philips Vesta Pro digital imager + IR blocking filter, IL. S = 7.0 (Tr not specified). CMI = 304.2°, CMII = 56.8°, CMIII = 327.2° B = -22.1°, B' = -23.1°. Small dusky festoon E of the CM extending from N edge of the SEBs into SEBZ. S is at top and E at left (IAU).

Ring A or B. Two different observers submitted accounts of the visibility of the bicolored aspect of the ring ansae during the apparition. Suspected minor fluctuations in belt and zone intensities were gleaned from an analysis of visual numerical relative intensity estimates performed visually. In the future, it should be expected that digital imaging, which now effectively supplements careful routine

visual work, will reveal details on the globe and in the rings below the normal visual threshold. The combination of both methods only improves our chances of detecting changes on Saturn in any given apparition. Also, an initial recording of phenomena in different regions on Saturn by digital imagers may signal the onslaught of activity that visual observers may eventually be able to witness and

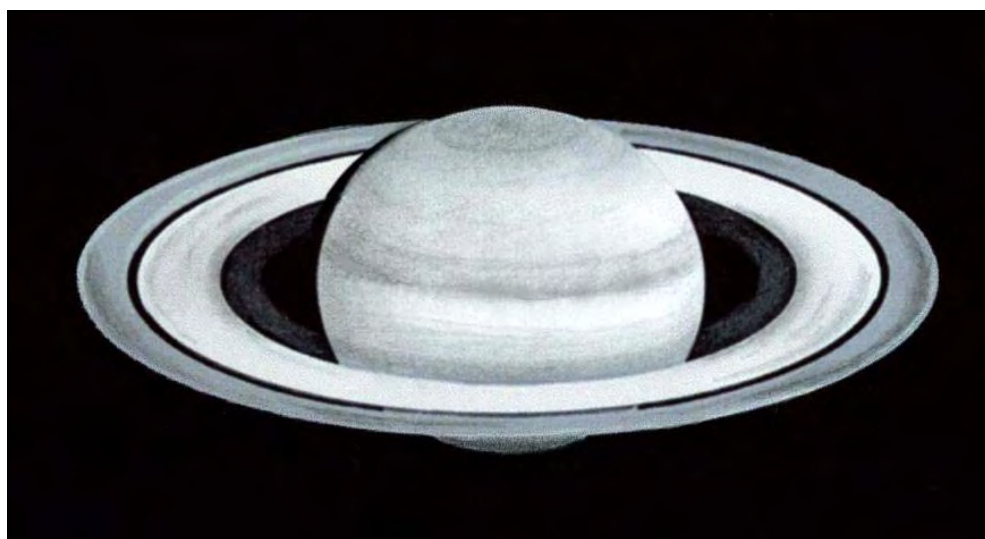


Figure 20. 2004 Dec 16 07:06-07:32UT. Sol Robbins. 24.8 cm (9.75 in.) NEW. Drawing at 397X, IL. S and Tr not specified. CMI = 312.6°-327.8°, CMII = 23.5°-38.2°, CMIII = 293.1°-307.7° B = -22.1°, B' = -23.1°. Several wispy festoons were sighted in the SEBZ. S is at top and E at left (IAU).

monitor with their telescopes, as well as define the limits of visibility of such features.

The author is grateful to all of the individuals mentioned in this report who contributed visual drawings, digital images, descriptive reports, and visual numerical relative intensity estimates during the 2004-05 apparition. Systematic observational work in support of our programs helps amateur and professional astronomers alike to obtain a better understanding of Saturn and its majestic, complex ring system. Observers everywhere are encouraged to join us in our studies of Saturn now and in forthcoming observing seasons. Readers should not forget about the opportunity that arose in 2004-05 for participation in the **Amateur-Professional Cassini Observing Patrol**, with Cassini's arrival at Saturn on 2004 July 01, followed by the Titan Probe Entry and Orbiter flyby that occurred on 2004 November 27. Amateurs were encouraged to participate jointly with the professional community in capturing digital images of Saturn at wavelengths ranging from 400 nm - 1 micron in good seeing using webcams, CCDs, digital cameras, and videocams. This effort started during the 2003-04 observing season in 2004 April, coinciding with the time that Cassini began observing Saturn at close range, and continued into the present 2004-05 apparition. Employment of classical broadband filters (e.g., Johnson system: B, V, R and I) have been recommended, and for telescopes with apertures of 31.8 cm (12.5 in.) or greater, imaging through a 890-nm narrow band CH₄ (methane) filter is desired. The Cassini Team has asked observers to carefully and systematically patrol the planet every clear night to search for individual features, their motions and morphology, to provide input to Cassini's imaging system, thereby suggesting to Cassini scientists where interesting large-scale targets may exist. Accounts of suspected variations in belt and zone reflectivities (i.e., intensity) and color are also extremely useful, so visual observers have a chance to continue to play a very meaningful role by making routine visual numerical relative intensity estimates. The Cassini team plans to combine ALPO Saturn Section images with data from the Hubble Space Telescope and from other professional ground-based observatories. Furthermore, as a means of

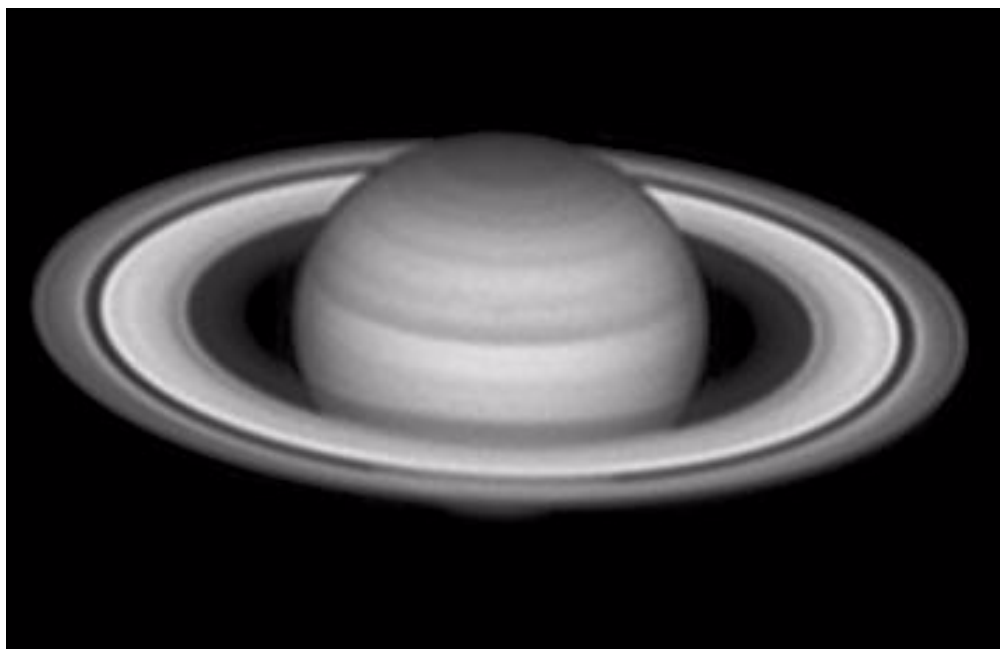


Figure 21. 2005 Jan 07 22:52UT. Paolo Lazzarotti. 25.4 cm (10.0 in.) NEW with Luminera digital imager, IL + IR blocking filter. S = 7.0, Tr = 5.0. CMI = 4.2°, CMII = 63.3°, CMIII = 305.5° B = -22.7°, B' = -22.9°. Several wispy festoons were sighted in the SEBZ. S is at top and E at left (IAU).

facilitating regular amateur-professional observational cooperation, readers are urged to share their observational reports, drawings, and images of Saturn and its satellites with the **International Outer Planets Watch (IOPW)** at www.ehu.es/iopw/ or iopw@lg.ehu.es in addition to sending data to the ALPO Saturn Section.

The ALPO Saturn Section Coordinator is always happy to supply guidance to new, 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.

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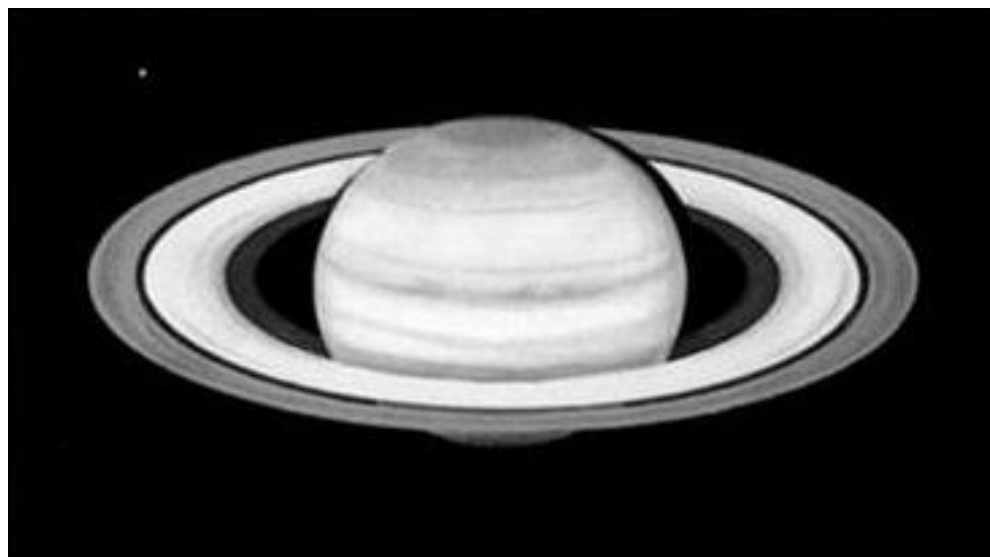
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Figure 22. 2005 Feb 12 04:50-05:12UT. Sol Robbins 15.2 cm (6.0 in.) REF. Drawing at 350X, IL. S = 7.0 (Tr not specified). CMI = 247.1°-260.0°, CMII = 247.2°-259.6°, CMIII = 87.5°-99.9° B = -23.5°, B' = -22.6°. Several dusky features along the S edge of SEBn projecting into the SEBZ. S is at top and E at left (IAU). Enceladus is SE of the planet in the drawing.



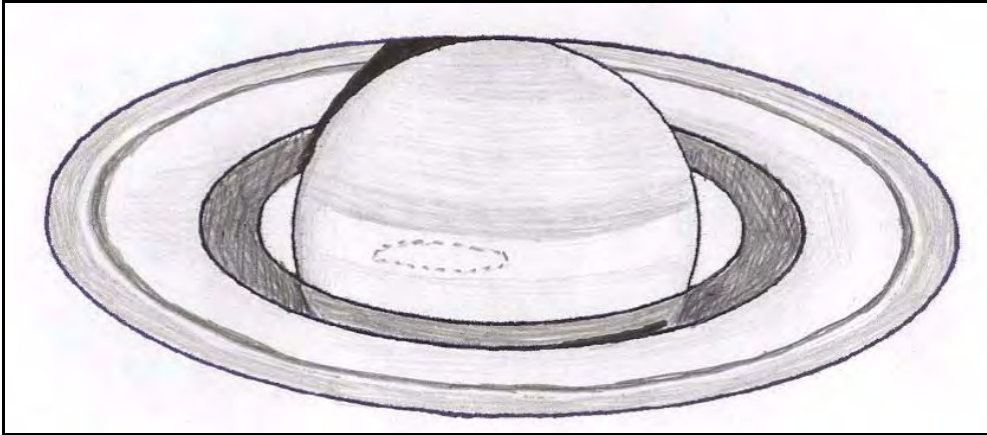


Figure 23. 2004 Nov 19 12:13-12:28UT. Brian Cudnik. 20.3 cm (8.0 in.) SCT. Drawing at 338X in IL + W80A (blue) W23A (red) filters. S = 8.0, Tr = 4.5. CMI = 13.8°-22.6°, CMII = 230.0°-238.4°, CMIII = 171.9°-180.3° B = -21.7°, B' -23.3°. Small white elongation E of CM in EZs. S is at top and E at left (IAU).

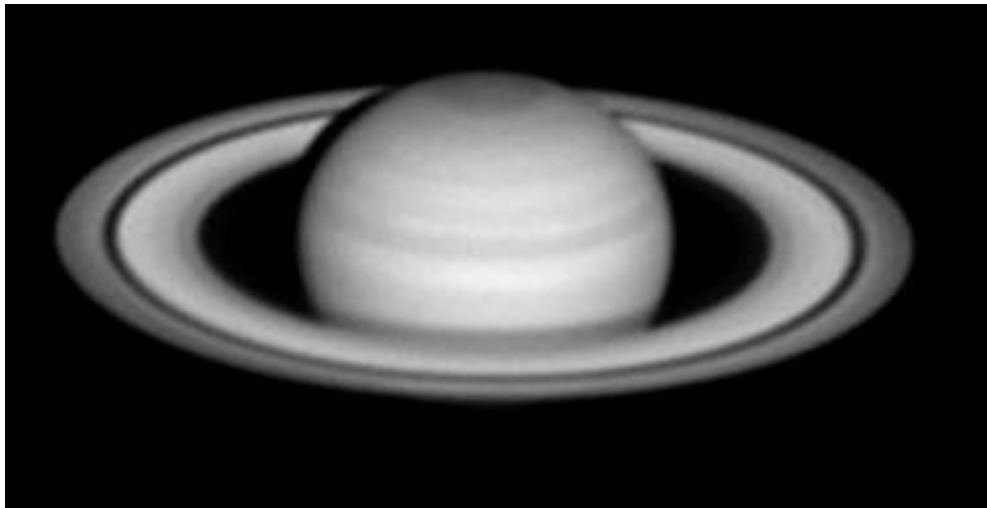


Figure 24. 2004 Nov 08 02:41UT. Jesus R. Sanchez. 28.0 cm (11.0 in.) SCT, using Philips ToUcam digital imager, IL. S and Tr not specified. CMI = 110.1°, CMII = 334.5°, CMIII = 290.1° B = -21.7°, B' -23.4°. Shadow of Globe on Rings appears to the E prior to opposition. S is at top and E at left (IAU).

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Figure 25. 2005 Mar 25 18:52UT. Damian Peach. 28.0 cm (11.0 in.) SCT, with Philips ToUcam digital imager, IL. CMI = 75.4° , CMII = 172.9° , CMIII = 322.5° B = -23.9° , B' = -22.2° . Shadow of Globe on Rings appears to the W after opposition. S is at top and E at left (IAU).



Figure 26. 2005 Jan 13 23:30UT. Jesus R. Sanchez. 28.0 cm (11.0 in) SCT, using Philips ToUcam digital imager, IL. S and Tr not specified. CMI = 52.8° , CMII = 277.2° , CMIII = 152.2° B = -22.8° , B' = -22.8° . Shadow of Globe on Rings is behind the planet and not visible at opposition. S is at top and E at left (IAU).



Figure 27. 2005 Apr 13 02:32UT. Paul Maxson. 23.5 cm (9.25 in.) SCT, with Philips ToUcam digital imager, IL. S = 8.0 (Tr not specified). CMI = 60.6°, CMII = 286.4°, CMIII = 53.9° B = -23.8°, B' = -22.0°. Encke's Complex (A5) appears at both ansae. S is at top and E at left (IAU).

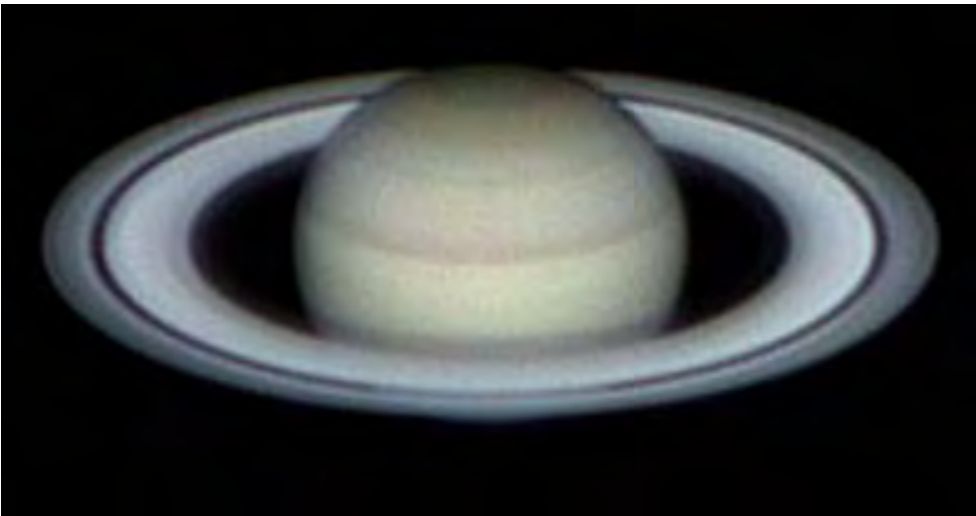


Figure 28. 2005 Jan 16 23:08UT. Fabio Acquarone. 23.5 cm (9.25 in.) SCT, with Philips ToUcam digital imager, IL + IR Blocking filter. S = 7.5, Tr = 4.5. CMI = 53.0°, CMII = 181.1°, CMIII = 52.5° B = -22.9°, B' = -22.8°. Narrow Keeler's Gap (A8) is visible at both ansae. S is at top and E at left (IAU).

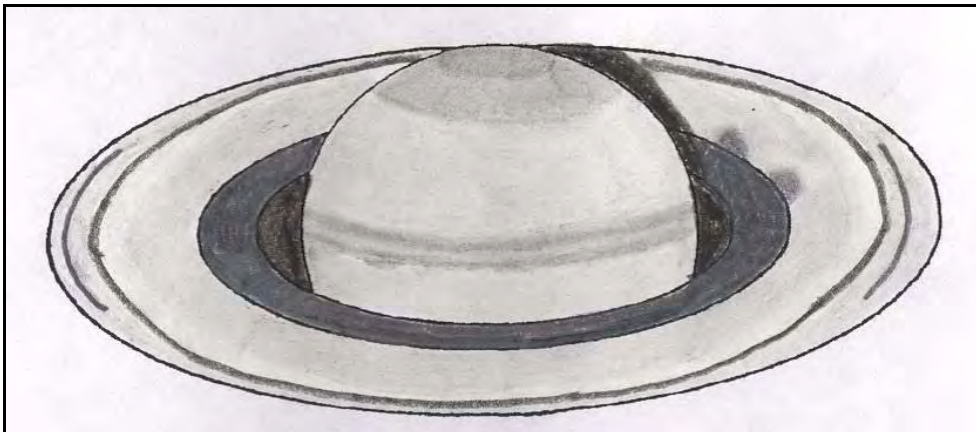


Figure 29. 2005 Mar 30 01:30UT. Carl Rousell. 15.2 cm (6.0 in.) REF. Drawing at 267X with W80A (blue), W58 (green) and W21 (yellow) filters, and IL. S = 5.0. (Tr not specified). CMI = 85.5°, CMII = 44.9°, CMIII = 189.4° B = -23.9°, B' = -22.1°. Radial spoke features suspected along inner edge of Ring B at W ansa. S is at top and E at left (IAU).



Figure 30. 2004 Sep 24 13:39UT. Jason P. Hatton. 23.5 cm (9.25 in.) SCT, with ATK-1HS digital imager + W25 (red) and IR blocking filters. $S = 6.0$, $Tr = 5.0$. $CMI = 300.8^\circ$, $CMII = 164.0^\circ$, $CMIII = 173.4^\circ$ $B = -22.2^\circ$, $B' = -23.8^\circ$. Cassini's Division (A0 or B10) is strikingly obvious all the way around the ring system, as well as other less conspicuous "intensity minima" within Ring B. S is at top and E at left (IAU).

Figure 31. 2005 Feb 09 21:45UT. Thierry Lepine. 35.6 cm (14.0 in.) SCT, Philips ToU-cam digital imager, IL + IR Blocker. S and Tr not specified. $CMI = 108.9^\circ$, $CMII = 183.6^\circ$, $CMIII = 26.1^\circ$ $B = -23.5^\circ$, $B' = -22.6^\circ$. Ring C appears both at ansae and in front of globe (Crape Band). S is at top and E at left (IAU).



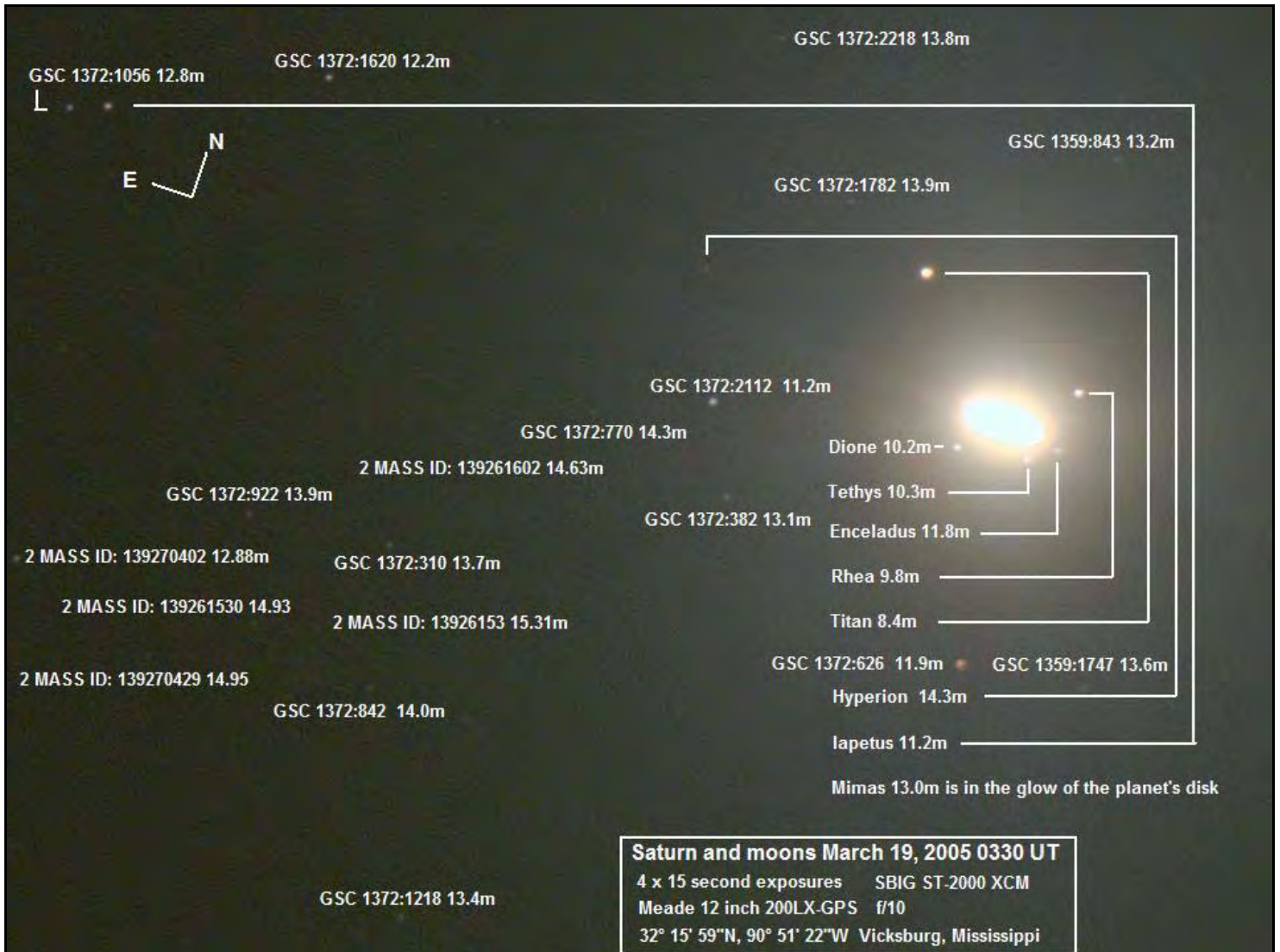


Figure 32. 2005 Mar 19 03:30UT. Charles Bell. 30.5 cm (12.0 in.) SCT with a SBIG ST-2000 SCM digital imager. IL. S and Tr not specified. CMI = 155.9°, CMII = 112.6°, CMIII = 256.9° B = -23.9°, B' = -22.1°. Satellites and comparison stars appear in this excellent image of Saturn; satellites and comparison stars are identified on the image for the convenience of the reader. In this case N is at the top of the image and W to the left (IAU) due to field orientation of the telescope.

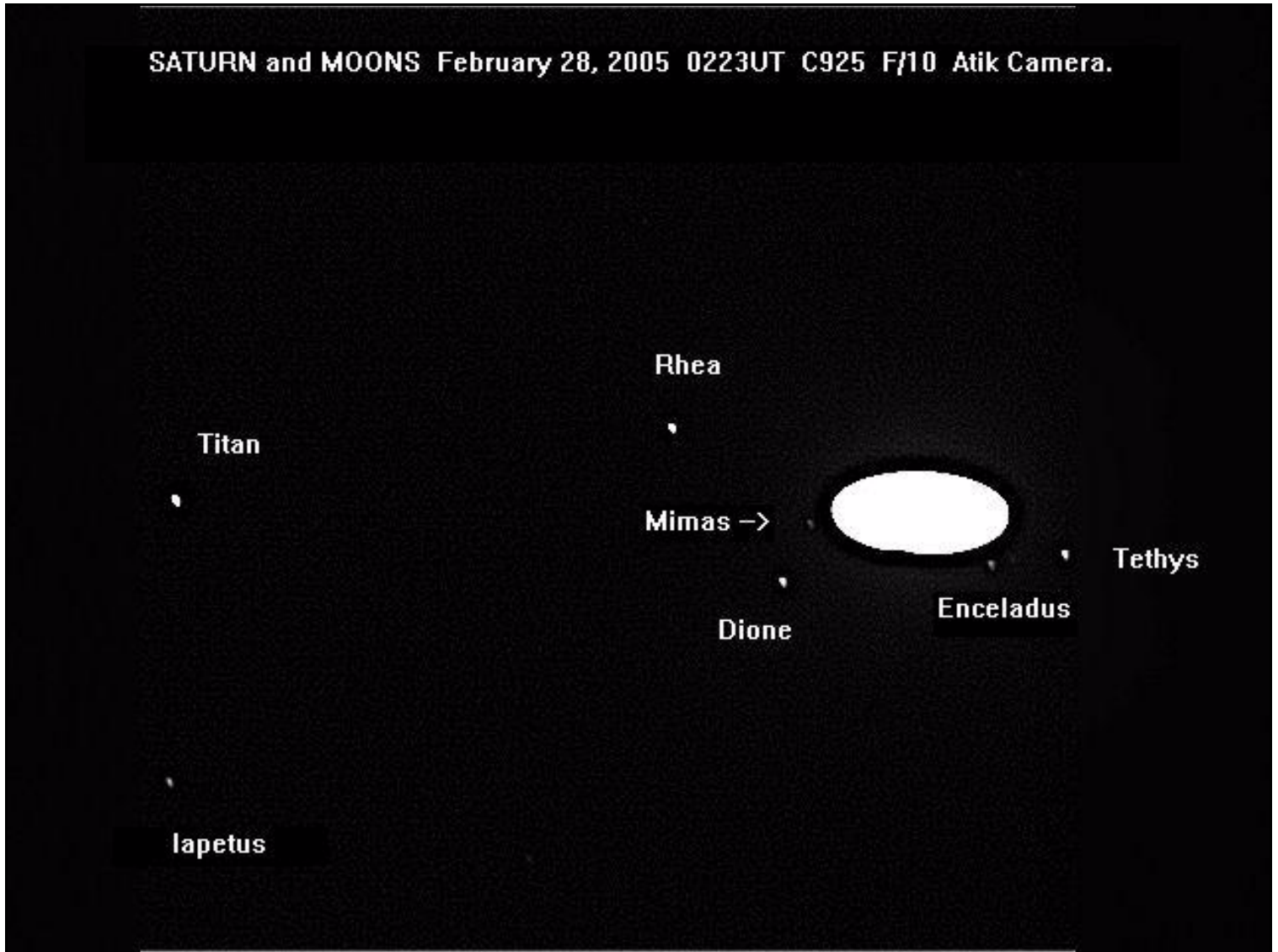


Figure 33. 2005 Feb 28 02:23UT. Paul Maxson. 23.5 cm (9.25 in.) SCT, with Atik digital imager, IL. S and Tr not specified. CMI = 349.4° , CMII = 196.5° , CMIII = 17.1° B = -23.7° , B' = -22.4° . Several satellites (denoted on image) are shown in this image (globe and rings are overexposed to reveal dimmer moons. Note also that satellite images are oval rather than round due to tracking / guiding problems). S is at top and E at left (IAU).



Figure 34. 2004 Nov 26 08:18UT. Rolando Chavez. 35.6 cm (14.0 in.) SCT and Philips ToUcam (without IR blocking filter). S = 5.0, Tr = 5.0. Image of Titan. S is at top and E at left (IAU).



Feature Story:

An Eclipse of Nereid by Neptune on 2008 April 21

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Abstract

Neptune will eclipse its satellite Nereid on 2008 April 21 from 12 to 17 hours UT, with uncertainties of up to 10 hours. Since the orbit of Nereid is not very accurately known, observations that determine the time of the eclipse will be useful for improving its ephemeris.

Details

Observations recorded during planetary eclipses can yield satellite positions of extremely high accuracy as has been demonstrated in this journal (Mallama et al. 2002). In fact, CCD photometry is the most precise ground-based method of satellite astrometry. Only data obtained by interplanetary spacecraft are more accurate.

A very rare eclipse of the satellite Nereid in the shadow of Neptune will occur on 2008 April 21. No previous eclipse observations of Nereid have ever been reported. The predicted times of mid-ingress, totality and egress listed in Table 1 were derived using the orbit of Jacobson et al. (1991) as implemented in the HORIZONS system (Giorgini 1996).

About 10 minutes will elapse during the ingress, followed by a four-hour totality, and a 10-minute egress. Jacobson et al. indicate that the uncertainty in the along-track position of Nereid grows at the rate of 10 minutes of time per year beginning in 1989, thus accumulating to 190 minutes by 2008. Since ephemeris errors up to three times the estimated uncertainty are not uncommon, the recommended times of observation are from April 21 at 02 hours UT until April 22 at 03 hours UT.

At mid-ingress, Nereid will appear 3.5 arc-seconds to the west and 0.4 arc-seconds south of the center of Neptune, and its distance from the limb will be 2.1 planetary radii, as shown in Figure 1.

During egress, the satellite will be 2.1 arc-seconds west and 0.2 arc-seconds north, and its distance from the limb will be 0.9 radii. At visual magnitude 18.8, Nereid will require a good telescope, camera and seeing to be clearly imaged.

Ideally, the satellite should be recorded at frequent intervals during ingress and egress with a V or R photometric filter. However, considering the orbital uncertainties, any time-tagged imaging that indicates whether Nereid is in eclipse or is out of eclipse will probably be useful.

The author has added Nereid in the shadow of Neptune to a computer program originally developed for analyzing Galilean satellite eclipses (Mallama 1991). This program generates an accurate eclipse model to compare with observations for the purpose of deriving precise astrometric results.

I welcome observations of the Nereid event and offer co-authorship, if a scientific paper is published, to those who make significant contributions. More detailed information on this eclipse is available in the scientific literature (Mallama, 2007).

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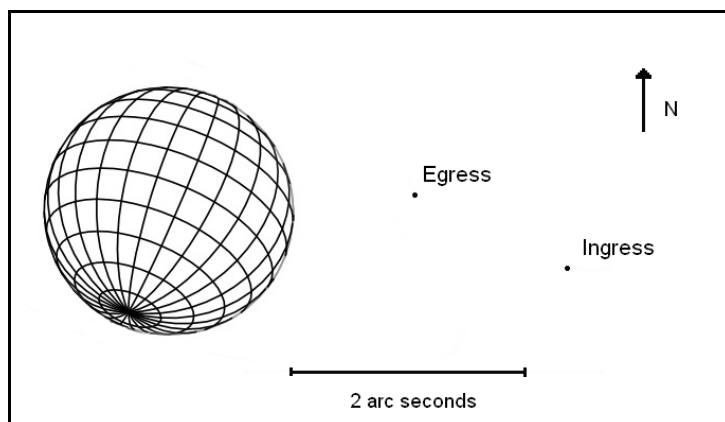


Figure 1. The location of Nereid relative to Neptune at the times of mid-ingress and mid-egress. Adapted from the "Neptune Viewer" at http://pds-rings.seti.org/tools/viewer2_nep.html developed by Mark Showalter for the PDS Rings Node.

Table 1

Date (Times are UT)	Mid-Ingress	Mid-Totality	Mid-Egress	Start Observing	Stop Observing
2008 April 21	12:29	14:39	16:48	02:00	03:00(April 22)

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- **Lunar:** *The Lunar Observer*, official newsletter of the ALPO Lunar Section, published monthly. Free at <http://www.zone-vx.com/tlo.pdf> or 70 cents per copy hard copy; send SASE with payment (check or money order) to: William Dembowski, Elton Moonshine Observatory, 219 Old Bedford Pike, Windber, PA 15963
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- **Venus (Benton):** (1) *ALPO Venus Observing Kit*, \$17.50; includes introductory description of ALPO Venus

ALPO Resources

People, publications, etc., to help our members

observing programs for beginners, a full set of observing forms, and a copy of *The Venus Handbook*. (2) *Observing Forms*, free at <http://www.alpo-astronomy.org> (then Venus Section), or \$10 for a packet of forms by regular mail (specify *Venus Forms*). To order either numbers (1) or (2), send a check or money order payable to "Julius L. Benton, Jr." All foreign orders should include \$5 additional for postage and handling; p/h included in price for domestic orders. Shipment will be made in two to three weeks under normal circumstances. 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, c/o Marion M. Bachtell, P.O. Box 572, West Burlington, IA 52655; FAX: 1-319-758-7311; e-mail at alsales@astronomicalleague.com. (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").
- **Jupiter:** (1) *Jupiter Observer's Handbook*, \$15 from the Astronomical League Sales, c/o Marion M. Bachtell, P.O. Box 572, West Burlington, IA 52655; FAX: 1-319-758-7311; e-mail at alsales@astronomicalleague.com. (2) *Jupiter*, the ALPO section newsletter, available online only via the ALPO website; (3) *J-Net*, the ALPO Jupiter Section e-mail network; send an e-mail message to Craig MacDougall. (4) *Timing the Eclipses of Jupiter's Galilean Satellites* observing kit and report form; send SASE to John Westfall. (5) *Jupiter Observer's Startup Kit*, \$3 from Richard Schmude, Jupiter Section coordinator.
- **Saturn (Benton):** (1) *ALPO Saturn Observing Kit*, \$20; includes introductory description of Saturn observing programs for beginners, a full set of observing forms, and a copy of *The Saturn Handbook*. Newly released book

Saturn and How to Observe It (by J. Benton) replaces *The Saturn Handbook* in early 2006. (2) *Saturn Observing Forms*, free at <http://www.alpo-astronomy.org> (then Saturn Section), or \$10 by regular mail. Specify *Saturn 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 Saturn section.

- **Meteors:** (1) *The ALPO Guide to Watching Meteors* (pamphlet). \$4 per copy (includes postage & handling); send check or money order to Astronomical League Sales, c/o Marion M. Bachtell, P.O. Box 572, West Burlington, IA 52655; FAX: 1-319-758-7311; e-mail at alsales@astronomicalleague.com. (2) *The ALPO Meteors Section Newsletter*, free (except postage), published quarterly (March, June, September, and December). Send check or money order for first class postage to cover desired number of issues to Robert D. Lunsford, 1828 Cobblecreek St., Chula Vista, CA 91913-3917.
- **Minor Planets (Derald D. Nye):** *The Minor Planet Bulletin*. Published quarterly; free at <http://www.minorplanetobserver.com/mpb/default.htm> or \$14 per year via regular mail in the U.S., Mexico and Canada, \$19 per year elsewhere (air mail only). Send check or money order payable to "Minor Planet Bulletin" to Derald D. Nye, 10385 East Observatory Dr., Corona de Tucson, AZ 85641-2309.

Other ALPO Publications

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

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

- **ALPO Membership Directory.** Provided only to ALPO board and staff members. Contact current ALPO membership secretary/treasurer (Matt Will).
- **Back issues of The Strolling Astronomer (JALPO).** Download JALPO43-1 thru present issue in pdf from <http://www.justfurnfurn.org/DJALPO> (no charge).

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The Association of Lunar & Planetary Observers (ALPO) was founded by Walter H. Haas in 1947, and incorporated in 1990, as a medium for advancing and conducting astronomical work by both professional and amateur astronomers who share an interest in Solar System observations. We welcome and provide services for all individuals interested in lunar and planetary astronomy. For the novice observer, the ALPO is a place to learn and to enhance observational techniques. For the advanced amateur astronomer, it is a place where one's work will count. 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 Journal at appropriate intervals. Each 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 through our web site via e-mail or at their postal mail addresses listed in back of 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*. Membership dues include a subscription to our Journal. Two versions of our ALPO are distributed on a quarterly basis, a hardcopy (paper) version and an online (digital) version in "portable document format" (pdf) at considerably reduced cost.

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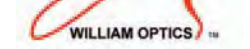
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