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Journal of the Association of Lunar & Planetary Observers

ASSOCIATION OF LUNAR & PLANETARY OBSERVERS
ALPO
Founded in 1947

The Strolling Astronomer

Volume 49, Number 3, Summer 2007

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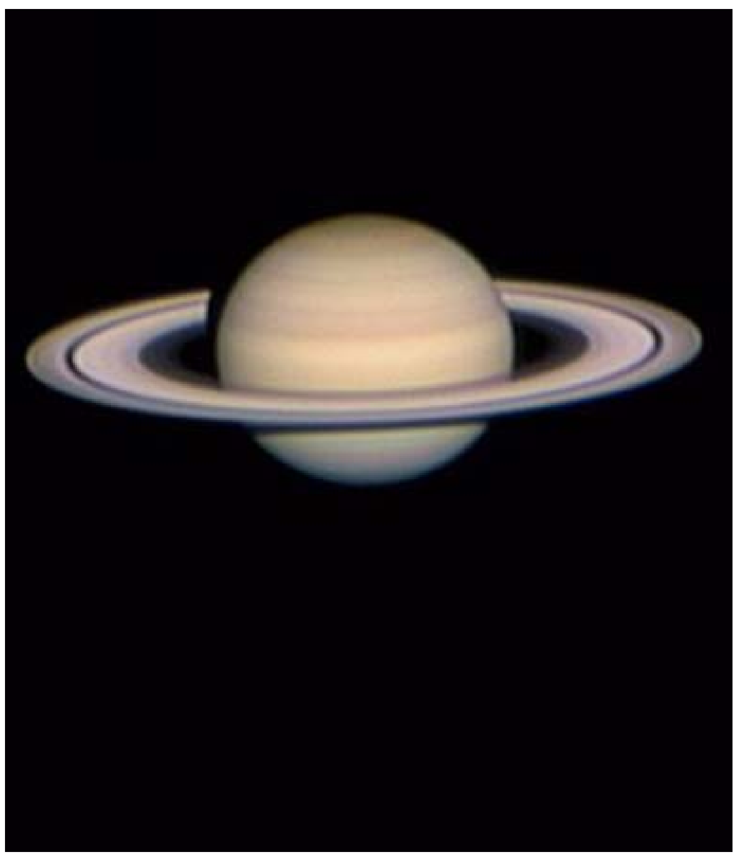
Inside. . .

- ***Index to Volume 47 of your ALPO journals***
- ***A heads-up on this summer's total solar eclipse***
- ***A report on Mercury's comings and goings in 2005***
- ***A novel method to time the phases of this summer's lunar eclipse***
- ***A report on the 2002-2003 Jupiter apparition***

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



Saturn as imaged by ALPO member Rolando Chavez on November 26, 2007, 10:12 UT, from his home in Powder Springs (Atlanta), Georgia USA. Seeing 5 - 7 (scale 1 - 10 best), transparency 6 (1 - 6 best). Image acquired using a 12.5-inch Cave Astrola Newtonian reflector at f/27 equipped with a Philips ToU-cam webcam; exposure 1/25 sec., 10 fps for a total of 1,000 frames; stacked using Registax 3. South is at top of this simply inverted image.

Journal of the Association of Lunar & Planetary Observers

The Strolling Astronomer

Volume 49, No. 3, Summer 2007
This issue published in June 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.

For membership or general information about the ALPO, contact:

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

E-mail to: will008@attglobal.net

Visit the ALPO online at:
http://www.lpl.arizona.edu/alpo

Founded in 1947

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Point of View
The Future of Lunar Observing

By William M. Dembowski, coordinator, ALPO Lunar Topographical Studies

The United States, England, Russia, China, Japan and India are all planning lunar missions over the next several years. As a result, the Moon will be imaged and measured as never before, and I am compelled once again to ponder the future of amateur lunar observing.

Through e-mail exchanges with staff members of the British Astronomical Association, the American Lunar Society, the Society for Popular Astronomy and other ALPO lunar coordinators, I learned that their outlook is as positive as mine.

We all agree that there will always be a place for lunar observing as a training ground for beginning observers — both in the operation of a telescope and in acquiring the skill of how to record scientific observations — and that no other celestial object can match the Moon for visual impact or as a source of subjects of high-resolution imaging.

But what of science, will the Moon still be a viable subject for doing science?

Regardless of the accuracy of spacecraft measurements or the resolution of their imagery, the results will still cover only a short span of time. Long term monitoring of the lunar surface will continue to be the most effective way of verifying the validity of historical observations, understanding Lunar Transient Phenomena, and adding to the various albedo studies of the ALPO Selected Areas Program.

Far from being a nemesis, spacecraft imagery can become a vital tool for the discovery and verification of domes, cones, dark-haloed craters, and other minor features presently at or beyond the limits of backyard telescopes. Amateurs can employ spacecraft imagery along with readily available software to measure the heights and slopes of low profile features on the lunar surface. The resulting catalogs and maps can be digitized and uploaded for use by planetary geologists and mission planners. Naturally, all of the aforementioned practices can be applied to the lunar farside, which will always be unobservable with ground-based instruments.

(Continued on page 13)

Inside the ALPO
Member, section and activity news

News of General Interest

New ALPO Publications Section Web Site Up and Running

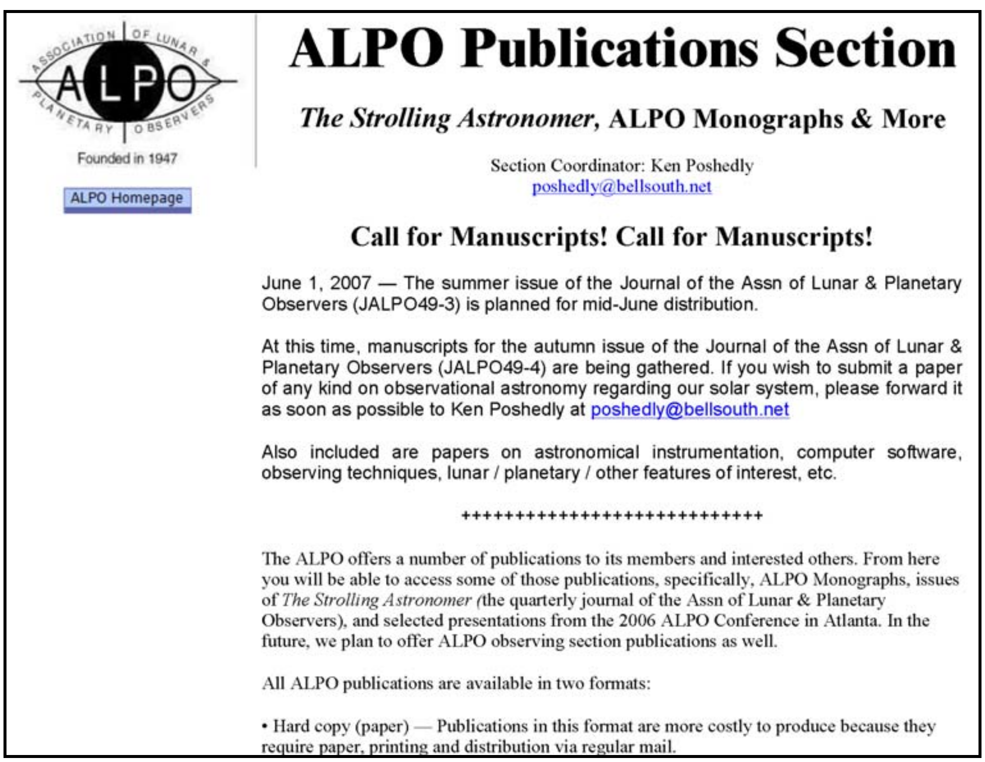
Finding and downloading a number of ALPO publications is now easier with the addition of an ALPO Publications Section web site. Located at http://www.alpo-astronomy.org the new site can be accessed either directly or via the ALPO home page at http://www.lpl.arizona.edu/alpo.

The new site includes access to the following:

- The online library of *The Strolling Astronomer*
- Most of the ALPO Monographs (with the exception of the Wilkins Moon-map)
- Selected presentations from the 2006 ALPO Conference in Atlanta, GA
- The publication guidelines for authors to follow when submitting manuscripts
- A listing of the ALPO Publications Section volunteer staff

Work is in progress to include links to various ALPO observing sections and interest section publications, as well.

All are available for downloading for free and are in portable document format (pdf) — thus, no photocopying fees; however, those fees remain in place if hard-copies of the ALPO Monographs or *The Strolling Astronomer* are requested.


ALPO Publications Section

The Strolling Astronomer, ALPO Monographs & More

Section Coordinator: Ken Poshedly
poshedly@bellsouth.net

Call for Manuscripts! Call for Manuscripts!

June 1, 2007 — The summer issue of the Journal of the Assn of Lunar & Planetary Observers (JALPO49-3) is planned for mid-June distribution.

At this time, manuscripts for the autumn issue of the Journal of the Assn of Lunar & Planetary Observers (JALPO49-4) are being gathered. If you wish to submit a paper of any kind on observational astronomy regarding our solar system, please forward it as soon as possible to Ken Poshedly at poshedly@bellsouth.net

Also included are papers on astronomical instrumentation, computer software, observing techniques, lunar / planetary / other features of interest, etc.

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The ALPO offers a number of publications to its members and interested others. From here you will be able to access some of those publications, specifically, ALPO Monographs, issues of *The Strolling Astronomer* (the quarterly journal of the Assn of Lunar & Planetary Observers), and selected presentations from the 2006 ALPO Conference in Atlanta. In the future, we plan to offer ALPO observing section publications as well.

All ALPO publications are available in two formats:

• Hard copy (paper) — Publications in this format are more costly to produce because they require paper, printing and distribution via regular mail.

A portion of the ALPO Publications Section web page. See text for all details.

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.

Currently, JALPO43-1 (Winter 2001) through JALPO48-2 (Spring 2006) pdf issues of *The Strolling Astronomer* are available without password protection.

Newer issues remain password-protected and are available only to those whose ALPO memberships specifically include the online version of this Journal as a club benefit.

The library of online issues of *The Strolling Astronomer* can be accessed directly at http://www.justfurfun.org/djalpo or via the new ALPO Publications web site.

Finally, Astrophysics Data System (http://adswww.harvard.edu/), a service provided by the Smithsonian Astrophysical Observatory, is currently scanning our entire catalog of archival ALPO Journals

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to make them available for online viewing and printing as well.

Additional details about that project will be published as they become available. Many thanks go out to all who contributed their own time and effort to producing the various publications and papers included on this new feature for ALPO members.

JALPO Welcomes Orion

The ALPO welcomes *Orion Telescopes & Binoculars* to the fold of advertisers in this Journal.

Long a staple of quality astronomical goods, *Orion* is a recognized and respected name by virtually all who have an interest in astronomy.

Orion joins two other top-notch astro-equipment suppliers, *Anacortes Telescope & Wild Bird* located in Anacortes, Washington, and *Scope City*.

And last but definitely not least, we also thank *Sky Publishing* for its longtime and continued support, as well as *Accurate Graphics* of suburban Atlanta for its consistently top-notch handling of this Journal.

We urge our readers to contact our advertisers as you make plans to either add to your book or magazine collection, purchase scopes or equipment or even seek professional printing services.

ALPO Online Membership Payments are Back

The Assn of Lunar & Planetary Observers (ALPO) is pleased to announce that ALPO memberships can once again be purchased online. Direct your web browser to:

http://www.galileosplace.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. Many thanks to Don Parker and Matt Will for helping to arrange this.

The Astronomical League's online payment service was previously used for ALPO membership payments, but has been offline for some time.

See the ALPO membership application form near the back of this issue of your Journal for dues and other details.

ALPO Resources Updates

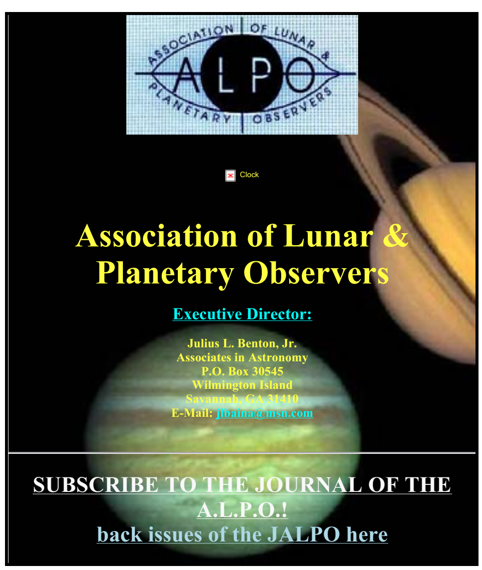
With new phone numbers, etc, in place, don't forget to refer to the *ALPO Resources* at the back of each Journal before you correspond with any of the ALPO staff or board members. Changes have been made.

ALPO Interest Section Reports

Web Services

Rik Hill, coordinator / manager

The ALPO homepages have grown steadily at about 10% per year. Some ALPO observing sections make more use



of this than others, but it is interesting to note that those sections making the most use of the pages with regular updates and postings of observations are the sections showing the most growth in numbers of observers.

Several sections have posted manuals and instructions for observing. New inquiries coming to the ALPO web manager are referred to these section web pages and to the section coordinators themselves. Similarly, several sections also post regular newsletters to keep observers informed and also to direct observations and observational campaigns. This is excellent use of the resources.

Most postings can be made quickly, in a day or so, but some requiring modifications and handling of data and posting by the web manager, are delayed for a week or so.

Our "World Astronomy Club Links" on the ALPO home page is perhaps the largest such collection of amateur club and society web pages on the Internet. It is vital that any errors, additions or changes in URLs be reported to the ALPO web manager since with such a large collection, it is necessary to rely on feedback to maintain the list.

Ten years ago, when our website was only two-years-old, our web space was 20-30 megabytes on the Lunar & Planetary Lab (Univ. of Arizona) system. Today, we are at approximately 310 Mb — a clear indication of greater use of our web services by ALPO coordinators. System administrators at LPL have indicated that this is negligible and foresee no problem with our future needs. We are very appreciative of the generosity of LPL in granting us this space and maintenance.

Visit the ALPO home page on the World Wide Web at *http://www.lpl.arizona.edu/alpo*

Inside the ALPO
Member, section and activity news

Computing Section
Kim Hay, coordinator

The ALPO Computer Section (ALPOCS) is a very low key group, answering computer questions that may come up, mainly on coding issues these days. In the day when computers were new and questions were many, this group was quite busy, but now, with more commercially available programs, and the tremendous explosion of resources on the internet, we seem to be less busy.

However, our email group has 248 members, generally new members who are new to the hobby and looking for help in astronomy, planetary studies and celestial mechanics.

Jeff Beish has uploaded in January updates to the WIMP files.

In order to access these new files, visit http://www.yahoo.com you can go to the group's area and look for ALPOCS. If not already a member of this Yahoo e-mail list, you will have to sign into Yahoo to create an identity, then you can go the files area and download. Take a look around, post a message, see what there is.

Join the group, ask questions, and if you have an astronomical program that you would like to share, please upload it.

Visit the ALPO Computing Section on the World Wide Web at: http://www.lpl.arizona.edu/~rhill/alpo/computer.html

Lunar & Planetary Training Program
Tim Robertson, coordinator

The ALPO Training Program currently has 3 active students at various stages of training. And in the past 12 months, we have had orders for 30 copies of the *ALPO Novice Observers Handbook.*

Statistics show that about 20% of those who order the *ALPO Novice Observers Handbook*, actually start the training program, and out of that, 15% actually complete the Novice phase of the program. In my informal poll of some of the past and current students, it seems that personal commitments and time to observe constraints hinder the advancement in the program.

The ALPO Training Program is a two-step program, and there is no time requirement for completing the steps. But I have seen that those students that are motivated usually complete the steps in a short amount of time. The motivation comes from the desire to improve their observing skills and contribute to the pages of this Journal.

The Lunar & Planetary Training Program is open to all members of the ALPO, beginner as well as the expert observer. The goal is to help make members proficient observers. The ALPO revolves around the submission of astronomical observations of members for the purposes of scientific research. Therefore, it is the responsibility of our organization to guide prospective contributors toward a productive and meaningful scientific observation.

As stated, the course of instruction for our Training Program is two-tiered. The first tier is known as the "Basic Level" and it includes using the *ALPO Novice Observers Handbook* to master the fundamentals of observing. These fundamentals include performing simple calculations and understanding observing techniques.

When the student has successfully demonstrated these skills, he or she can advance to the "Novice Level" for further training, where one can specialize in one or more areas of study. This includes obtaining and reading handbooks for specific lunar and planetary subjects. The novice then continues to learn and refine upon observing techniques specific to his or her area of study and is assigned to a tutor to monitor the novice's progress in the Novice Level of the program.

When the novice has mastered this final phase of the program, he or she can then be certified to "Observer Status" for that particular field.

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
R.B. Minton, coordinator

Visit the ALPO Instruments Section on the World Wide Web at http://www.lpl.arizona.edu/~rhill/alpo/inst.html and http://mypeoplepc.com/members/patminton/astrometric_observatory/

ALPO Observing Section Reports

Eclipse Section
Mike Reynolds, coordinator

Visit the ALPO Eclipse Section on the World Wide Web at http://www.lpl.arizona.edu/~rhill/alpo/eclipse.html

Comets Section
Gary Kronk, acting coordinator

I'm back! After my workload on my *Cometography* book series forced me to fall back from section coordinator to assistant coordinator a few years back, things are finally beginning to lighten up. I am still working on *Cometography*, but the final two volumes will not be mine alone, as I have brought in my long-time friend Maik Meyer of Germany to co-author the final two volumes. This leaves me time for family, friends, and comet observing again!

The last year has been a particularly good one for me, as I personally made the most comet observations since 1997. Most of

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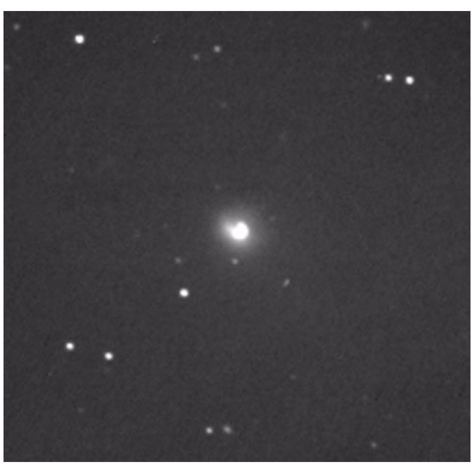
the reason for this was the building of my observatory last September. I am 51 years old and this was the realization of a dream. The imaging system has allowed me to observe more comets and fainter comets than ever before and this has really got me pumped! Interestingly, just when I realized I was missing visual observing, Comet McNaught (2006 P1) became a nice object to see in the evening sky early in January from my location in southern Illinois! I continue to be pumped!

One of the things I want to resume is the digitization of all images in the ALPO Comet Section archives. Due to some lost files, these only go back to the late 1970s, but there is certainly much material to go through. I actually had most of the images digitized during my last stint as coordinator, so once I get the files back into my hands from the previous coordinator, I hope to quickly complete this project and will make the files available to anyone who wants them. I would like to then begin getting all of the observation reports digitized.



Comet 29P/Schwassmann-Wachmann 1 as imaged on 2004 June 23.36 UT with the 14-inch SoTIe telescope (Las Campanas, Chile). Image obtained by stacking three 60-second images, revealing a coma 50 arc-seconds across and a jet extending 20 arc-seconds towards PA 45°. The field of view is 6.5 arc minutes by 6.5 arc-minutes.

I really feel we need to jump start the Comet Section. My perusing of the latest issues of the Journal of the ALPO and my conversations with various members over the years have brought to my attention that there are quite a few observatories and GoTo telescopes in the possession of ALPO members. Most of you spend your time viewing the Moon and planets, but you must know that it does not take a lot of time to download comet orbits into almost any planetarium program or GoTo telescope and have your telescope slew over to a comet. While there, jot down your observation and/or capture the image through drawings, photography, or CCD imaging!

A project I would like to start later this year is the near nightly monitoring of periodic comet 29P/Schwassmann-Wachmann 1. The comet is known for outbursts. If you are interested in participating in this project, please let me know. My e-mail address is kronk@cometography.com. I will be glad to prepare a project plan for this and I hope to hear from a lot of you!Visit the ALPO Comets Section on the World Wide Web at http://www.lpl.arizona.edu/~rhill/alpo/comets.html

Meteors Section

Robert Lunsford, coordinator

Visit the ALPO Meteors Section on the World Wide Web at http://www.lpl.arizona.edu/~rhill/alpo/meteors.html

Solar Section

Kim Hay, coordinator

Visit the ALPO Solar Section on the World Wide Web at http://www.http://www.lpl.arizona.edu/~rhill/alpo/solar.html

Mercury Section

Frank J. Melillo, coordinator

Visit the ALPO Mercury Section on the World Wide Web at http://www.lpl.arizona.edu/~rhill/alpo/merc.html

Venus Section

Julius Benton, coordinator

Venus is a brilliant object about halfway up in the evening sky after sunset, progressing through its waning phases (a gradation from gibbous through crescentic phases). As of this writing, the gibbous disc of Venus is about 16 arc seconds across, slowly increasing in angular diameter as it heads toward Inferior Conjunction on August 18, 2007, when it will be about 58 arc seconds in angular diameter. Note that Venus will have reached theoretical dichotomy (half phase) on June 8, 2007.

Observers are always encouraged to try to view Venus as close to the same time and date as possible (simultaneous observations) to improve confidence in results and reduce subjectivity.

Geocentric Phenomena of the 2006-07 Eastern (Evening) Apparition of Venus in Universal Time (UT)

Superior Conjunction	2006	October 27^d UT (angular diameter = 9.7 arc-seconds)
Predicted Dichotomy	2007	June 8.65^d (exactly at half-phase predicted)
Greatest Elongation East		June 9^d (45º east of the Sun)
Greatest Brilliancy		July 12^d (m_v = – 4.6)
Inferior Conjunction		August 18^d (angular diameter = 58 arc-seconds)

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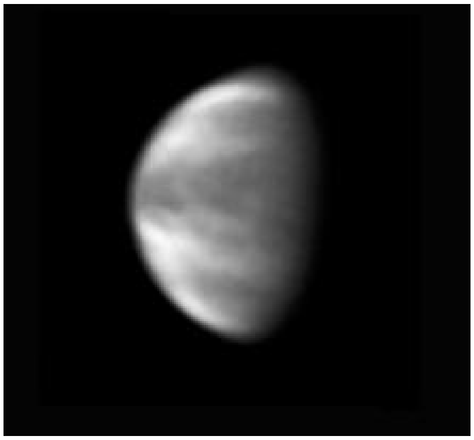

Venus as imaged by Paolo Lazzarotti of Massa, Italy, using a 25.4 cm (10.0 in.) Newtonian on April 19, 2007, at 17:58 UT. The diameter of the disc is 15.3 arc sconds and gibbous phase of ***k*** = 0.726 (72.6% illuminated). Image was made using an ultraviolet (UV) 320-380nm filter + IR blocker. Note the obvious dusky atmospheric features on Venus in this excellent image. South is at the top in this image.

The Venus Express (VEX) mission began 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 and a few 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 to be seen without threat of eye damage.

Observational Highlights (thru late April)

- 385 digital images of Venus have been submitted.
- 79 drawings and intensity estimates of dusky features suspected on Venus have been received.
- Numerous UV images have shown dusky banded and amorphous atmospheric features
- No instances of dark hemisphere phenomena (e.g., Ashen Light) have been reported
- Pro-Am collaboration in association with the Venus Express (VEX) mission continues.
- Incidence of simultaneous observations of Venus is increasing.

Key Observational Pursuits

- 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.lpl.arizona.edu/~rhill/alpo/venus.html*

Lunar Section:

Lunar Topographical Studies / Selected Areas Program

William M. Dembowski, FRAS section coordinator

Focus On is a bi-monthly series of articles that appears in the ALPO Lunar Section newsletter *The Lunar Observer*; each article highlights a specific feature on the lunar surface. A “call-for-observations” is issued in advance so that observers may add the feature to their observing list or search their personal files for submissions to the project.

Response to this informal program continues to be excellent. In recent months, *Focus On* has become a collaborative effort of the ALPO Lunar Topographical Studies (LTSS) and Lunar Transient Phenomena Section, with Dr. Anthony Cook, coordinator of the ALPO LTP Section, furnishing a schedule of dates and times for observing the selected feature for the purpose of verifying, or disqualifying, earlier reports of LTP's. This cooperative approach should prove to be beneficial to both observing sections.

LTSS Activity: During the first quarter of 2007, the Lunar Topographical Studies Section received a total of 183 new images from 16 observers in 7 countries and 8 of the United States.

A regular contributor to the LTSS programs is skilled imager, Ed Crandall. Ed observes and images the Moon with a 10 in., f/7 Cave Newtonian, which he acquired in 1958 and sold in 1962 when he went to college. He found the Cave in a hometown garage about 8 years ago and fixed it up. Ed also uses a 110 mm f/6.5 APO triplet to image the Moon with a Philips ToUcam and a Starlight Express HX 516 CCD camera. Ed strives to produce images that appear much as one would observe visually. He and his wife Sonia live in Winston-Salem, North Carolina, USA, and when not observing the Moon, he likes to pedal road bikes in the Piedmont and Blue Ridge mountains.

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The ALPO-LTSS continued to promote the various observing projects within the Selected Areas Program via this section’s newsletter, *The Lunar Observer*. Although some interest has been shown, it is yet unclear how viable these programs will be. Web pages for two of the programs have

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Lunar Calendar, July thru Sept. 2007 (all times in UT)

July 03	17:00	Moon 1.2° SSE of Neptune
July 05	19:00	Moon 1.7° NNW of Uranus
July 07	16:54	Last Quarter
July 09	11:00	Moon 5.9° NNW of Mars
July 09	21:39	Moon at Perigee (368,533 km - 228,996 miles)
July 13	04:00	Moon 8.6° N of Mercury
July 14	12:04	New Moon (Start of Lunation 1046)
July 16	23:00	Moon 0.18° SE of Saturn
July 17	12:00	Moon 2.4° NNE of Venus
July 18	12:00	Moon 0.33° SSW of asteroid Massalia
July 22	06:28	First Quarter
July 22	08:44	Moon at Apogee (404,150 km - 251,127 miles)
July 25	17:00	Moon 5.7° S of Jupiter
July 30	00:49	Full Moon
July 31	02:00	Moon 1.2° SSE of Neptune
Aug. 02	00:00	Moon 1.8° NNW of Uranus
Aug. 03	23:53	Moon at Perigee (368891 km - 229,218 miles)
Aug. 05	21:21	Last Quarter
Aug. 07	02:00	Moon 6.3° NNW of Mars
Aug. 12	17:00	Moon 0.29 ENE of Mercury
Aug. 12	23:02	New Moon (Start of Lunation 1047)
Aug. 13	14:00	Moon 0.43° S of Saturn
Aug. 13	15:00	Moon 8.3° SSE of Venus
Aug. 19	03:29	Moon at Apogee (404,620 km - 251,419 miles)
Aug. 20	23:54	First Quarter
Aug. 22	01:00	Moon 5.7° S of Jupiter
Aug. 27	10:00	Moon 1.3° SSE of Neptune
Aug. 28	10:36	Full Moon (Total eclipse of the Moon)
Aug. 29	07:00	Moon 1.7° NW of Uranus
Aug. 31	00:14	Moon at Perigee (364,173 km - 226,287 miles)
Sep. 04	02:34	Last Quarter
Sep. 04	13:00	Moon 5.9° N of Mars
Sep. 09	01:00	Moon 8.7° NNE of Venus
Sep. 10	02:00	Moon 0.76° SW of Saturn
Sep. 11	12:44	New Moon (Start of Lunation 1048)
Sep. 13	11:00	Moon 2.2° SSW of Mercury
Sep. 15	21:07	Moon at Apogee (405,644 km - 252,056 miles)
Sep. 19	16:48	First Quarter
Sep. 22	20:00	Moon 1.3° SSE of Neptune
Sep. 25	16:00	Moon 1.6° NNW of Uranus
Sep. 26	19:46	Full Moon

(Table courtesy of William Dembowski)

been established and interested members are encouraged to visit them:

Selected Areas Program:
http://www.zone-vx.com/alpo-sap.html

Banded Craters Program:
http://www.zone-vx.com/alpo-bcp.html

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

- ALPO Lunar Topographical Studies Section *http://www.zone-vx.com/alpo_topo.htm*
- ALPO Lunar Selected Areas Program *http://www.lpl.arizona.edu/~rhill/alpo/lunarstuff/selarea.html*
- ALPO Lunar Topographical Studies Smart-Impact WebPage *http://www.zone-vx.com/alpo-smartimpact.html*
- *The Lunar Observer* *http://www.zone-vx.com/tlo.pdf*
- Selected Areas Program: *http://www.zone-vx.com/alpo-sap.html*
- Banded Craters Program: *http://www.zone-vx.com/alpo-bcp.html*

Lunar Dome Survey
Marvin Huddleston, FRAS, coordinator

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 Dome Survey on the World Wide Web at *http://www.geocities.com/kc5lei/lunar_dome.html*

Lunar Transient Phenomena
Dr Anthony Cook, coordinator

Since the last ALPO LTP subsection report which was compiled in June 2006 and appeared in the autumn 2006 ALPO Journal (JALPO48-4), there have been two accounts of possible LTP:

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- 2006 Jun 08 UT 20:30-20:45; colongitude 59.8°. Aristarchus observed by Clive Brook (crater very bright).

- 2006 Dec 02 UT 03:50-05:30; colongitude 50.8° - 51.7°. Bullialdus observed by Robin Gray (transient yellow color seen).

The first of these (Aristarchus) may have just been the slopes of the crater wall just catching the sunlight. The second LTP (Bullialdus) may be related to natural surface colour of this crater (also yellow), though this does not fully explain the transient visibility of this color to the observer.

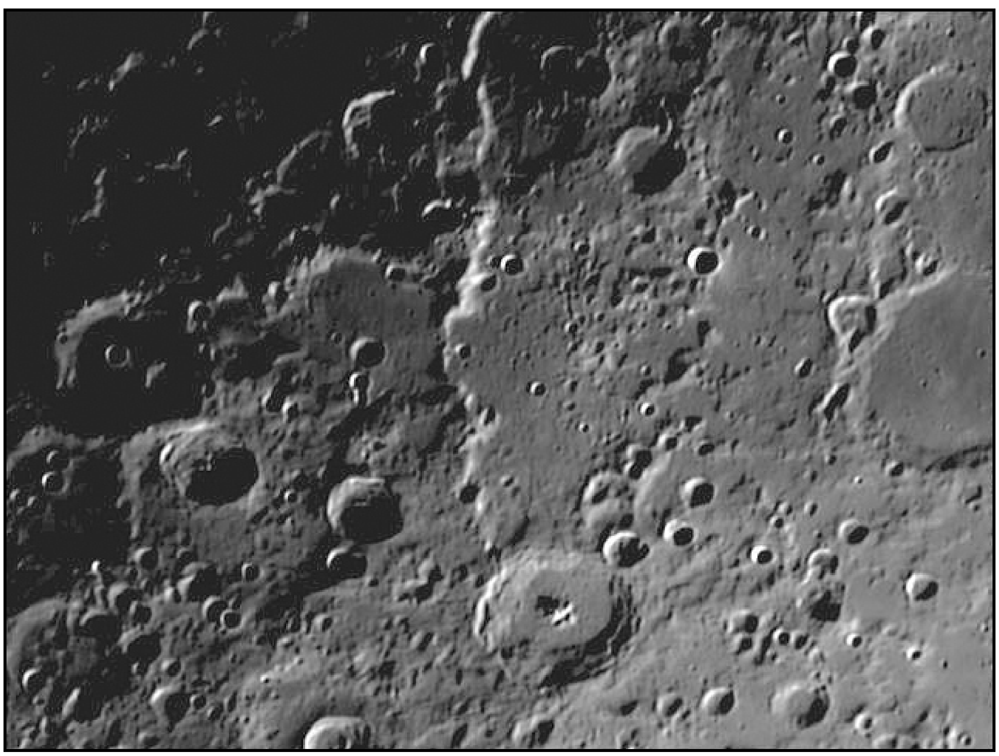
Although the repeat illumination/libration project continues, observers are also being encouraged to choose one or more of the following projects:

- Monitoring of Earthshine for impact Flash Clouds – Following along the success of the detection of the long duration SMART-1 impact plume, albeit in the thermal IR by a professional telescope in Hawaii, would it be possible to detect ejecta plumes from impacts just within the night side of the terminator?

- Monitoring of crater interior shadows at lunar sunrise – Is it possible to see interior detail in shadows in craters from scattered light from the walls, and could this explain some past LTP reports?

- Also can we detect any evidence of clouds of eletrostatically levitated dust particles scattering sunlight above the dark shadowed floors of craters?

- Monitoring of lunar “Ina”-type features – Prof Pete Schultz of Brown University (Providence, Rhode Island, USA), has suggested that these features are geologically recent and may in the recent past have been involved with outgassing. We shall monitor the appearance of these features on a regular basis, looking for any tell-tale signs of outgassing or other changes. For more info, go to http://www.brown.edu/Administration/News_Bureau/2006-07/06-051.html



Crater Piccolomini (bottom center of image) and the Altai Scarp (leading upwards from Crater Piccolomini) as imaged by Ed Crandall of Winston-Salem, North Carolina, USA, on March 25, 2007, 01:24 UT. Colongitude 344.3°; Seeing: 5/10; Transparency: 4/6. Equipment details 110mm, f/6.5, APO Refractor, equipped with 3x Barlow and 2x extension tube and Philips ToUcam webcam.

Visit the ALPO Lunar Transient Phenomena program on the World Wide Web at http://www.lpl.arizona.edu/~rhill/alpo/lunarstuff/ltp.html and http://www.ltpresearch.org/

Lunar Meteoritic Impact Search

Brian Cudnik, coordinator

Information on impact-related events can be found at http://www.i2i.pvamu.edu/physics/lunimpacts.htm

Visit the ALPO Lunar Meteoritic Impact Search site on the World Wide Web at http://www.lpl.arizona.edu/~rhill/alpo/lunarstuff/lunimpacts

Mars Section

Dan Troiani, coordinator & Daniel P. Joyce, assistant coordinator

A report on the current (2007 - 2008) apparition of Mars appears later in this issue of *The Strolling Astronomer*.

Visit the ALPO Mars Section on the World Wide Web at http://www.lpl.arizona.edu/~rhill/alpo/mars.html

Minor Planets Section

Frederick Pilcher, coordinator

We congratulate Brian D. Warner, assistant editor of the *Minor Planet Bulletin*, who has received the first Chambliss Amateur Achievement Award Medal awarded by the American Astronomical Society (AAS) for 2006.

The AAS cited Warner “for his many contributions to the photometric study of asteroids. His skillful, methodical observations using multiple CCD-equipped telescopes at Palmer Divide Observatory have resulted in the publication of more than 200 asteroid lightcurves. His discovery of numerous binaries in the main belt has overturned the idea that binary asteroids form only through tidal interactions with planets. Warner encourages and supports other asteroid observers, both amateur and professional, through his ongoing development of the software *MPO Canopus*, his regular writing in the *Minor*

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Planet Bulletin, and his book *A Practical Guide to Lightcurve Photometry and Analysis*, now in its second edition (Springer, 2006). His efforts have facilitated a 21st-century renaissance in precision measurements of asteroid lightcurves."

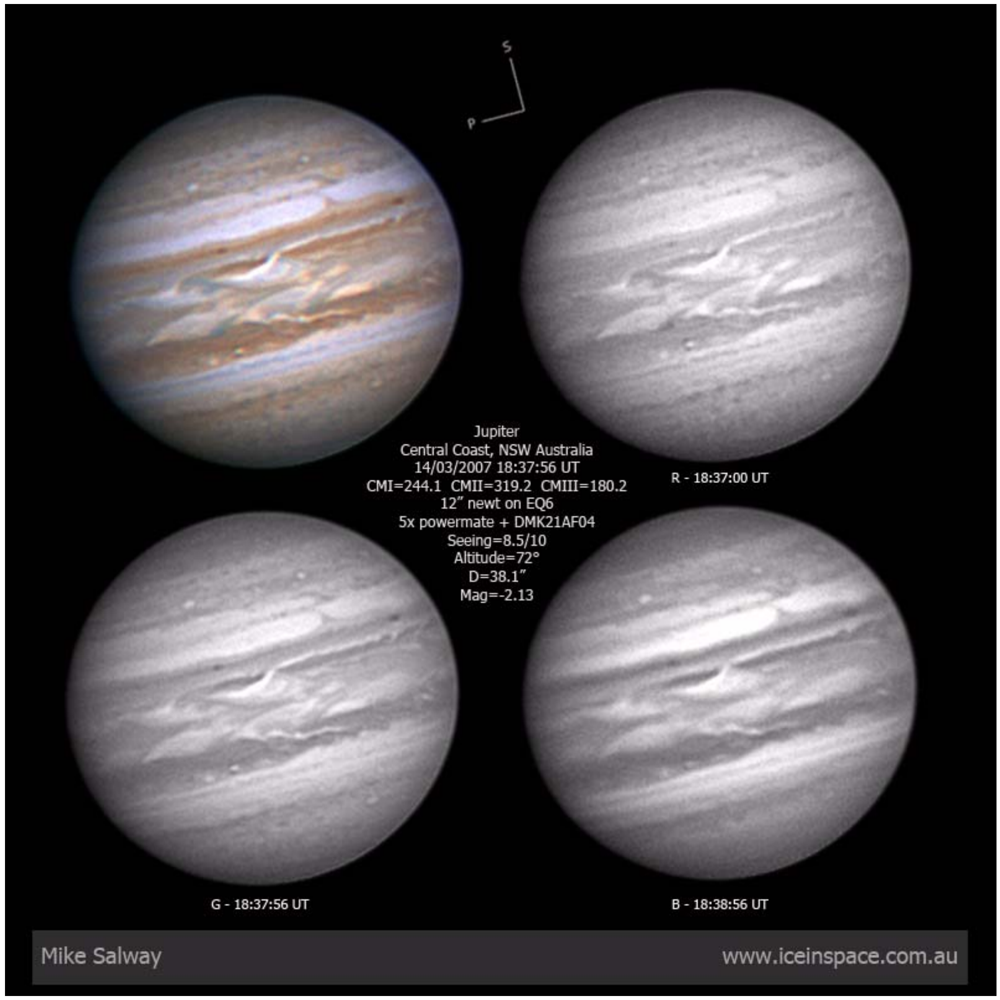
Minor Planet Bulletin Volume 34, Number 2, 2007 April-June, published lightcurves and period determinations for 48 asteroids, with 3 others having indeterminate periods due to incomplete coverage of the lightcurve.

The asteroids for which the definitive lightcurves and periods were obtained are 71, 143, 340, 469, 554, 595, 880, 1515, 1564, 1756, 1920, 2183, 2215, 2544, 2645, 2651, 2793, 2943, 3279, 3402, 3533, 3773, 3868, 4125, 4142, 4690, 4860, 5740, 6497, 6794, 6815, 7033, 7262, 10171, 12336, 13025, 14211, 15786, 17681, 24827, 30019, 31180, 31354, 32814, 34777, 34817, 2006 BQ2. 2006 WH.

Indeterminate periods were obtained for 2599, 2942, and 2006 RZ, for which observations at future oppositions are requested.

We remind all users and inquirers that the *Minor Planet Bulletin* is a refereed publication. It is now 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.lpl.arizona.edu/~rhill/alpo/minplan.html*



Jupiter Section

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

There were many interesting features on Jupiter in late March of 2007, the most interesting one of which was a southward-pointing festoon on the south edge of the South Equatorial Band. On March 17, the festoon was at a System II longitude of ~213° and it was imaged by several people. (These images may be included in the formal Jupiter apparition report at a later date.)

A second important development was a set of dark reddish features in the South Equatorial Belt. These features resemble the barges imaged in the North Equatorial Belt a few years ago. They will give us information about the wind speeds within this belt.

A third development that is obvious even in small telescopes is the darkening of the Equatorial Belt, which has resulted in the North and South Equatorial belts appearing almost as one large belt.

Finally, the North Temperate Belt is coming back and is becoming more obvious. It is quite pronounced in a March 17 image made by Ed Lomeli. (Again, this image may be included in the formal Jupiter apparition report at a later date.)

Jupiter will reach opposition in early June and I request that you will continue to observe through the summer months. The air is usually more steady during June thru August in the U.S., so the good seeing conditions should make up for the low altitude of Jupiter.

Visit the ALPO Jupiter Section on the World Wide Web at *http://www.lpl.arizona.edu/~rhill/alpo/jup.html*

Galilean Satellite Eclipse Timing Program

John Westfall, Jupiter Section assistant coordinator

New and potential observers are invited to participate in this worthwhile 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 2007.

Note that this is one of our least technology-intensive programs – it involves visual timing of the beginning and end of the eclipses by Jupiter of its major satellites, using telescopes of 2.25-in. (60-mm) aperture on up. (There is, admittedly, a minor need for electronics, in that you need a time source accurate to one second, such as an "atomic" watch or clock or a GPS receiver.)

Saturn Section

Julius Benton, coordinator

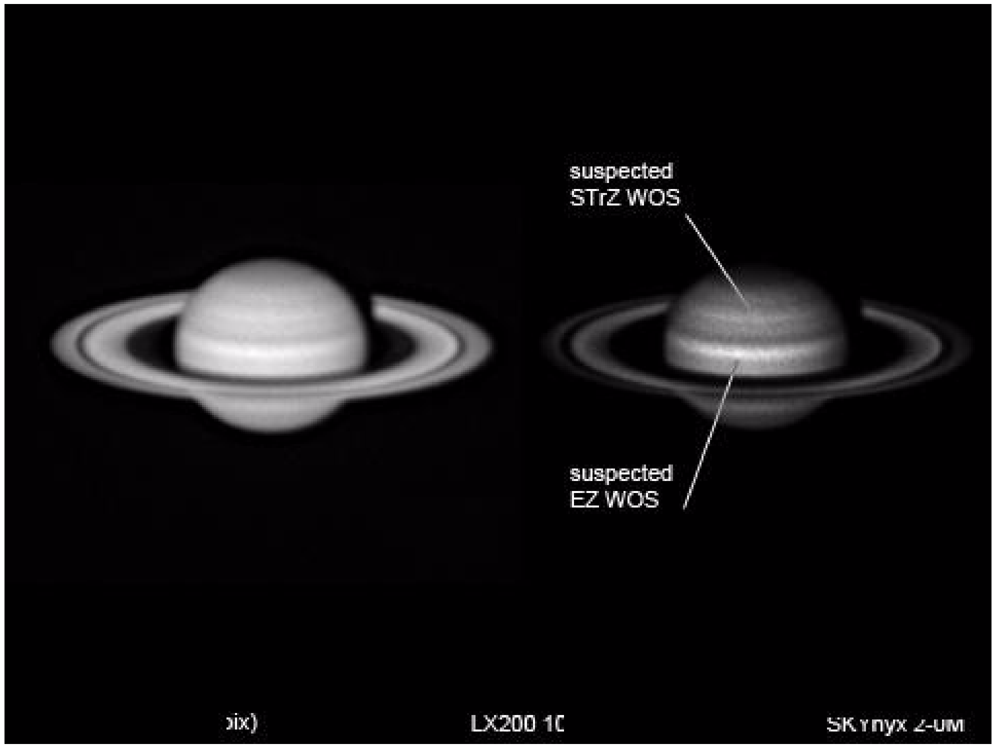
The 2006-07 observing season is slowly winding down with 355 digital images and 65 drawings submitted by observers at the time of this report. Saturn passed opposition on 2007 February 10 and now appears relatively high in the southwestern sky right after sunset in the constellation of Leo at m_v = +0.5. The southern hemisphere and south face of the rings remain visible from Earth, but portions of the northern hemisphere of Saturn can be glimpsed now that the tilt of the rings to our line of sight is nearly -15°.

Observational Highlights for the 2006-07 Apparition (as of late April):

- 355 digital images of Saturn have been submitted.
- 65 drawings and intensity estimates of Saturn have arrived
- A few highly elusive white mottlings have been suspected in the EZs by visual observers during this apparition.
- Several tiny, transient dark features have been imaged in the SEBZ, emanating from the N edge of the SEBs, as well as in the SPR.
- Extremely small white spots have been imaged in the STeZ and STrZ from time to time, as well as in the SEBZ and in the SPR.
- Pro-Am collaboration in association with the Cassini Mission is continuing in 2006-07.
- Incidence of simultaneous observations of Saturn steadily increased this observing season.

Activities of the ALPO Saturn Section this apparition

- Visual numerical relative intensity estimates of belts, zones, and ring components



Two digital images of Saturn by Marc Delcroix of Tournefeuille, France, on April 7, 2007 at 21:38 UT using a 25.4cm (10.0 in.) SCT. The image at left was taken with no filter, while the one at right was made with a UV + IR blocking filters. Captured in the UV image were possible small white spots in the STrZ and EZs. Seeing = 5.0, Transparency = 3.0. CMI = 339.8º, CMII = 194.7º, and CM III = 168.0º. South is at the top in the image.

- Full-disc drawings of the globe and rings using standard ALPO observing forms
- Central meridian (CM) transit timings of details in belts and zones on Saturn's globe
- Latitude estimates or filar micrometer measurements of belts and zones on Saturn
- Colorimetry and absolute color estimates of globe and ring features
- Observation of "intensity minima" in the rings, plus studies of Cassini's, Encke's, and Keeler's divisions
- Systematic color filter observations of the bicolored aspect of the rings and azimuthal brightness asymmetries around the circumference of Ring A
- Observations of stellar occultations by Saturn's globe and rings
- Visual observations and magnitude estimates of Saturn's satellites
- Multi-color photometry and spectroscopy of Titan at 940nm - 1,000nm
- Regular imaging of Saturn and its satellites using webcams, digital and video cameras, and CCDs

Observers are encouraged to perform 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, and observers are encouraged to

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participate in this effort during the 2006-07 apparition and beyond. Employing classical broadband filters (Johnson UBVRI system) on telescopes with suggested apertures of at least 31.8 cm (12.5 in.), Saturn should be imaged as often as possible, as well as through a 890nm narrow band methane (CH_4) filter. Observers should make note of any features, their motions and morphology, and report such observations promptly.

Geocentric Phenomena for the 2006-2007 Apparition of Saturn in Universal Time (UT)	
Conjunction	2006 Aug 07^d UT
Opposition	2007 Feb 10^d
Conjunction	2007 Aug 21^d
Opposition Data:	
Equatorial Diameter Globe	20.2 arc-seconds
Polar Diameter Globe	18.0 arc-seconds
Major Axis of Rings	45.8 arc-seconds
Minor Axis of Rings	11.0 arc-seconds
Visual Magnitude (m_v)	–0.0m_v (in Leo)
B =	–13.8º

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 and 2008 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.lpl.arizona.edu/~rhill/alpo/sat.html

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

The Future of Lunar Observing (from page 3)

Finally, lunar-associated observations (those which do not deal directly with the Moon's topography) will continue to be of value. Meteoritic impact searches, occultation timings and eclipse studies will remain fertile ground for amateur observers, especially those equipped with GPS and time-stamping technology.

This is not meant to minimize the impact of spacecraft missions on observations by the amateur. We are most certainly at another crossroad of lunar observing, but as Steve Boint (ALPO member and Vice President of the American Lunar Society) remarked: "We may be relegated even further to the fringes, but the fringes aren't so bad. True, they lack easy pickings; but paradigm shifts begin on the fringes. We may be pushed to the cutting edge of a new understanding of the Moon."

My thanks to the following individuals for their insight and input: Steve Boint, vice president, American Lunar Society; Dr. Anthony Cook, coordinator, ALPO Lunar Transient Phenomena; David O. Darling, assistant coordinator, ALPO Lunar Transient Phenomena; and Peter Grego, coordinator, British Astronomical Assn Lunar Topographical Sub-section and director, Society for Popular Astronomy Lunar Section.

Remote Planets Section

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

Both Uranus and Neptune will appear in the early morning sky through August; I am especially interested in images and high resolution drawings of Uranus under favorable seeing conditions. When drawing Uranus, use a telescope with as large an aperture as possible. If your telescope aperture is at least 24 inches, then try using a red filter as well. Red filter CCD images are also useful and may show high altitude clouds on that planet.

Neptune's small moon Nereid (magnitude 19) is predicted to be eclipsed by Neptune on April 27, 2007 and again on April 21, 2008. More information about this can be found in *Icarus* (Volume 187, pp. 620-622).

Pluto is in a great location in the early morning sky. It will reach opposition in June.People are encouraged to measure the brightness of this object using CCD cameras and the appropriate software for photometry

Visit the ALPO Remote Planets Section on the World Wide Web at http://www.lpl.arizona.edu/~rhill/alpo/remplan.html

Feature Story:

Index to Volume 47 (2005) of The Strolling Astronomer

By Michael Mattei
E-mail: *micmattei@comcast.net*

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Feature Story: ALPO Eclipse Section

The 2008 Total Solar Eclipse – A Look Ahead

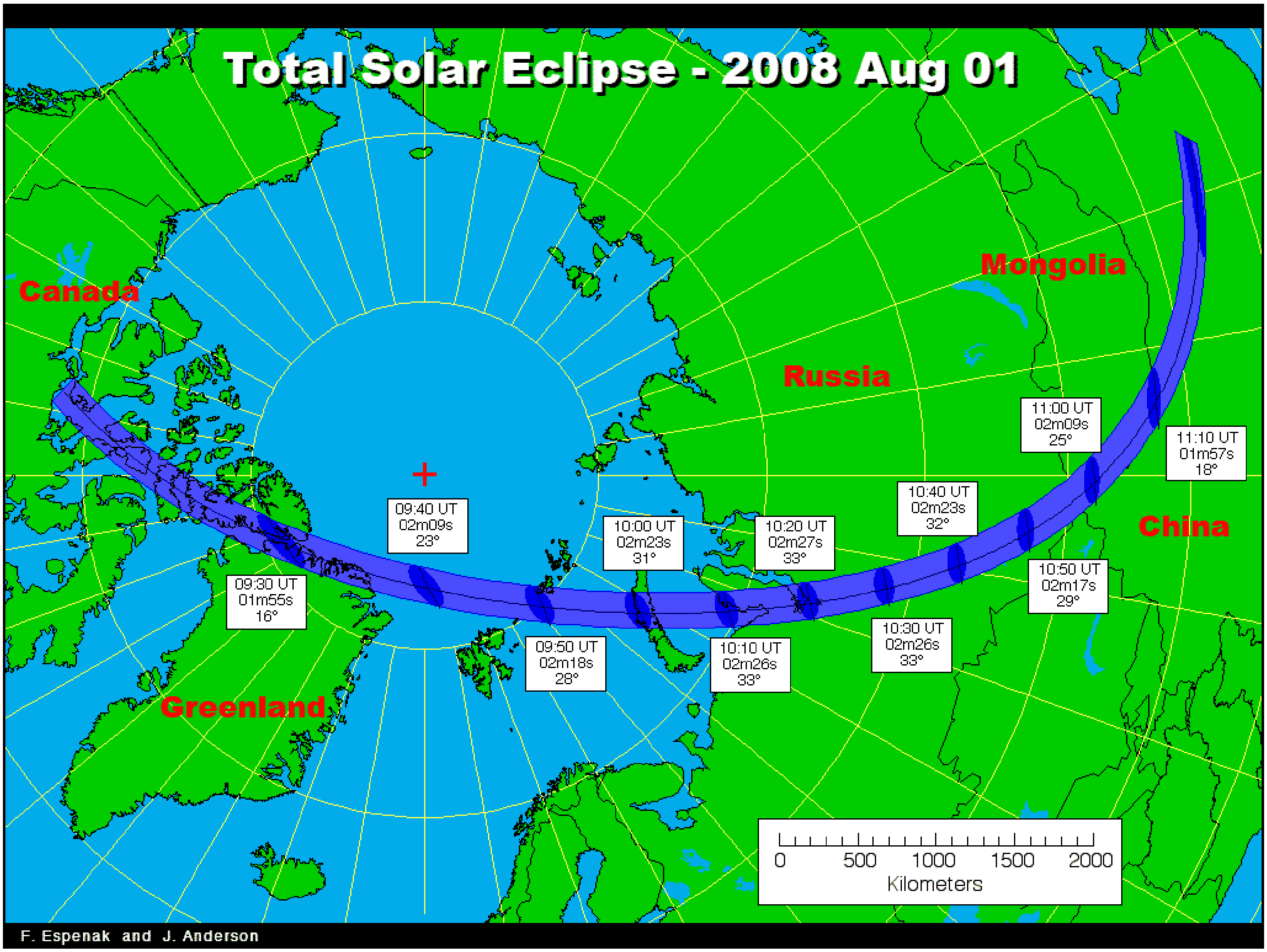
By Dr. Mike Reynolds, coordinator, ALPO Eclipse Section
E-mail: *astrogator90@comcast.net* **or** *mreynold@fccj.edu*

Online Features

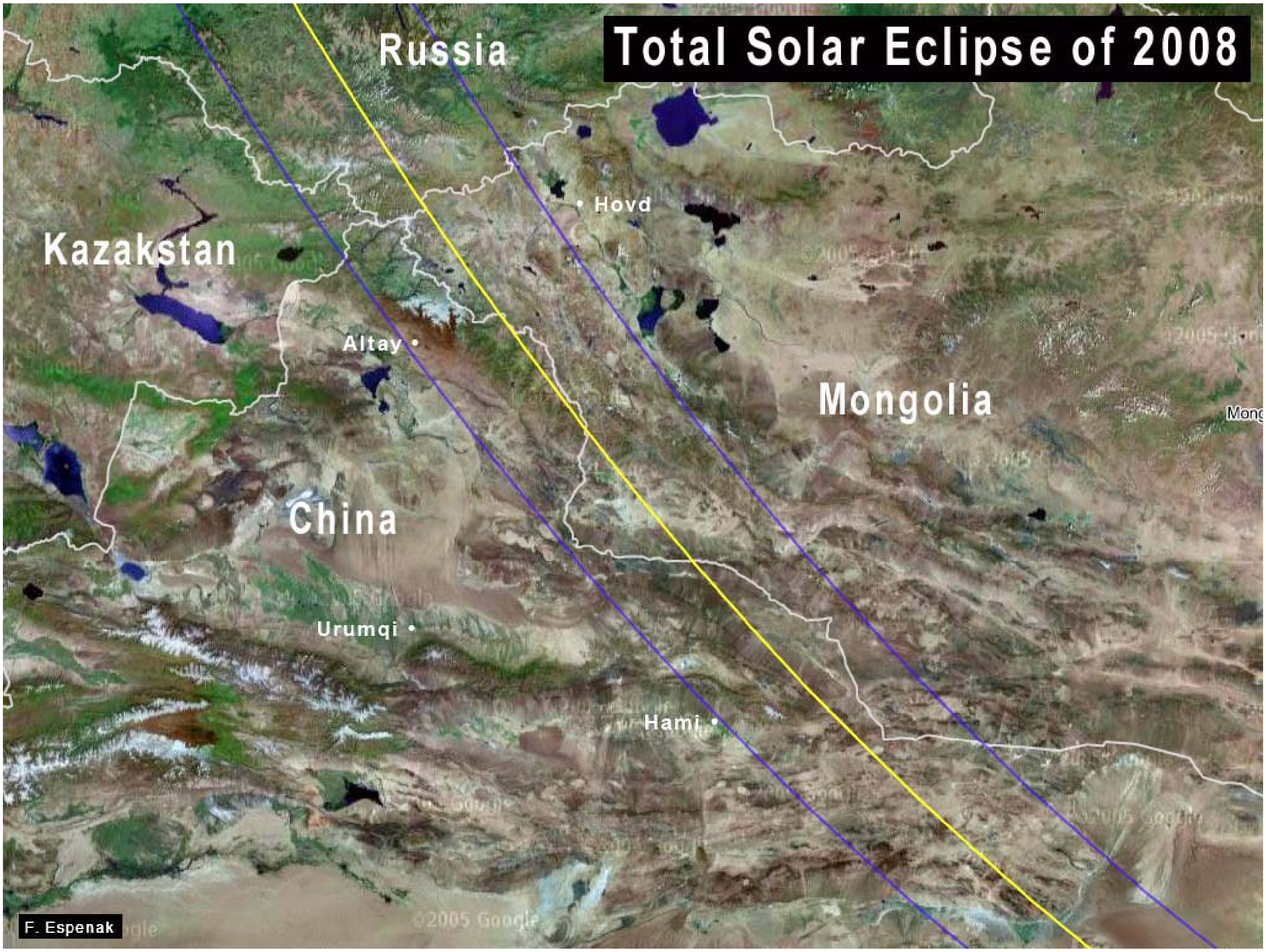
Left-click your mouse on:
- The author's e-mail address in blue text to contact the author of this article.
- The references in blue text to jump to source material or information about that source material (Internet connection must be ON).

For many, the eclipse chasers' mantra is: "as soon as 4th contact occurs at one total solar eclipse, it is time to seriously ponder the next total solar eclipse." But in reality, many seasoned eclipse observers are well ahead of that curve, pondering several eclipses into the future, the prospects for ease of getting to the eclipse path, and other important factors such as the weather forecasts for eclipse day.

Here, we offer a brief review of the 2008 total solar eclipse for those who have pondered traveling to an eclipse.



Eclipse maps courtesy of Fred Espenak, NASA/Goddard Space Flight Center]



Eclipse maps courtesy of Fred Espenak, NASA/Goddard Space Flight Center]

A number of expeditions are already being planned and advertised, which will offer the novice (and even the seasoned) eclipse chaser a variety of options – and prices.

The 2008 total solar eclipse is a Northern Hemisphere event, grazing Earth at extreme northern latitudes. The Moon's shadow first touches Earth in extreme northern Canada; Nunavut, and races across to extreme northern Greenland. From there the path across land will cover Siberia, Mongolia, and finally China. Maximum central duration of totality is 2 minutes and 27 seconds.

The 2008 eclipse is part of Saros 126. These eclipses occur at the Moon's descending node and the Moon moving north with each eclipse. Saros 126 began with a partial eclipse in the southern hemisphere on 10 March 1179 and will end with a partial eclipse in the northern hemisphere on 3 May 2459.

Some of the challenges for the 2008 eclipse are accessibility. China and Mongolia seem the most likely spots for many observers, yet some expeditions plan everything from ice breakers in the extreme northern parts of the shadow to flying along the path of totality. It has been the experience of this writer that China's openness to visitors is positive, yet barriers such as language and food persist. One does not want to eat or drink something that adversely affects them on eclipse day!

Weather prospects for the 2008 eclipse are perhaps the biggest challenge, with most of the path typically experiencing significant patterns of cloudiness around the date of the eclipse. The location for the best (historically-speaking) opportunity of clear skies is near Hami in China. According to Jay Anderson, long-time eclipse chaser and professional meteorologist, Hami has the best prospects of clear skies and sunshine at 76%. For most of the path the historical prospects are very poor: 10% to 40% chance of clear skies.

Observers are highly encouraged to examine in detail the data and overviews posted by Fred Espenak and Jay Anderson at these sites:

http://sunearth.gsfc.nasa.gov/eclipse/eclipse.html

http://www.mreclipse.com

http://home.cc.umanitoba.ca/~jander/

Feature Story:

Mercury Apparition Observations in 2005

By Frank J Melillo, coordinator, ALPO Mercury Section
E-mail: *frankj12@aol.com*

Abstract

There were six apparitions of Mercury in 2005, three in the morning and three in the evening. Many excellent observations were submitted by 13 observers and included 63 drawings, five CCD images and 19 web cams images for a grand total of 87. Telescopes used ranged in aperture from 9 to 254 cm (3.5 to 100 in.). Many of the features shown are in agreement with the official IAU albedo chart prepared by A. Dollfus and J. Murray (1971).

Introduction

While most of the 13 observers whose work is summarized here have contributed to the Mercury Section in the past, a few are new to our group. In addition, several simultaneous independent observations of Mercury were also submitted. The overall quality of the data is excellent, especially that obtained with web cams. Many of the new observers used web cams even though they had little prior experience with these techniques. Surprisingly, the number of CCD-based images has declined especially among newcomers now that web cams are readily available. In 2005, the striking improvement in technology and Internet communications have made observing Mercury a real pleasure.

According to all NASA reports, the MESSENGER spacecraft to Mercury continues to be in good condition. Several tests have been carried out to make sure all onboard equipment is in good working order.

MESSENGER, or MErcury Surface Space ENvironment GEochemistry and Ranging, was launched from Cape Canaveral Air Force Station, FL, on August 3, 2004 and uses gravity assists from Earth, Venus and Mercury to lower its speed relative to Mercury at orbit insertion. During its Earth flyby on August 2, 2005, MESSENGER produced a nice animation image sequence showing the rotation of our home planet; it will fly past Venus in October 2006 and again in June 2007. Three Mercury flybys will put MESSENGER in position to enter Mercury orbit in March 2011.

We were saddened in 2005 by the news that Erwin V. D. Velden of Brisbane, Australia, had passed away unexpectedly on September 27 at the age of 39. He was a great friend via the Internet, and I wish I could have known him personally. He joined our group in 2002 and was one of the first observers to use the webcam. He was quite experienced in webcam imagery and always helpful when I sought his advice after first obtaining my webcam.

Since joining the ALPO in 2002, Velden had contributed many observations of Mercury and was one of the most active observers in Australia. Among his most important work was his possible imaging of crater ejecta rays and the fascinating animations showing Mercury rotating. He will certainly be missed.

Apparition 1: (Evening) 14 Feb – 30 Mar

(Figure 1) After Superior conjunction with the Sun on February 14, Mercury quickly became an evening object and

Table 1: Characteristics of the Apparitions of Mercury in 2005 (all dates UT)

Apparition Number and Type	Beginning Conjunction*	Greatest Elongation	Final Conjunction*	Aphelion	Perihelion
1. Evening	Feb 14 (s)	Mar 12 18E	Mar 30 (i)	—	Mar 7
2. Morning	Mar 30 (i)	Apr 26 27W	Jun 3 (s)	Apr 20	Jun 3
3. Evening	Jun 3 (s)	Jul 9 26E	Aug 6 (i)	Jul 17	—
4. Morning	Aug 6 (i)	Aug 23 18W	Sept 18 (s)	—	Aug 30
5. Evening	Sept 18 (s)	Nov 3 23E	Nov 24 (i)	Oct 13	—
6. Morning	Nov 24 (i)	Dec 12 21W	Jan 26 (2006) (s)	—	Nov 26

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

All Readers

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

Online Features

Left-click your mouse on:

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

Observing Scales

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

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

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

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

Table 2: ALPO Observers of Mercury 2005

Observer	Location	Instrument *	No. & Type of Observations **	Apparitions Observed
Michael Amato	West Haven, CT USA	10.4 cm RR	4 D	1,3,6
Danielle Bottallo	Polermo, Italy	250 mm RL Mak - Greg	3 W	1
Lawrence Carlino	Lockport, NY USA	15.2 CM APO RR	4 D	3
Brian Cudnik	Houston, TX USA	25.4 cm NT	8 D	1,3,4,6
Mario Frassati	Crenscentino, Italy	20.3 cm SCT	8 D	1,3,6
Steve Massey	Sydney, Australia	24.5 cm NT	2 W	2
Ed Lomeli	Sacramento, CA USA	23.5 cm SCT	9 W	1,3,4,5,6
Frank J Melillo	Holtsville, NY USA	20.3 cm SCT	5 CCD	1,4,6
Carl Roussell	Hamilton, Ont Canada	15 cm RL	30 D	1,2,3,4,5,6
John Sheff	Cambridge, MA USA	23 cm RR	1 W	6
Erwin V D Velden	Brisbane, Australia	23.5 cm SCT	3 W	2
Tim Wilson	Jefferson City, MO USA	9.0 cm RR	9 D	1,3,4
Christian Wohler	Heroldstatt, Germany	20 cm NT	1 W	4

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

readily visible after sundown in the northern hemisphere. Tim Wilson made his first observation of the planet on March 1, when the CM=225°. The planet exhibited gibbous phase and showed a possible albedo feature, Solitudo Phoenicis, toward the SE section of the disk. Wilson continued to observe Mercury on March 2 and March 5, at CM = 231° and CM = 239°, respectively. His drawings show the same feature previously noted in the northern hemisphere but other markings are also tentatively indicated in the south.

Frank Melillo recorded his first CCD image in broad daylight on March 5 at CM = 242°. The seeing was mediocre, but the gibbous disk was clearly recognizable. Later that day, Carl Roussell and Ed Lomeli made their observations at CM = 244°, possibly showing the dark features Solitudo Atlantis and Criophori in the south. These may be the same features that Wilson reported earlier that week. Wilson and Roussell continued to observe Mercury, and reported similar features.

As its phase narrowed, Mercury reached greatest elongation on March 12th. At this stage, surface features were getting more difficult to detect since much less disk area was visible. On that date, Brian Cudnik drew the crescent Mercury at CM=271°. Mario Frassati, Ed Lomeli and Michael Amato also observed the planet on the 12 but later in the day, noting rather sketchy detail especially along the terminator. However on March 14, CM = 283°, Wilson observed Solitudo Atlantis and Criophori in the south near the western limb. Late that day, Danielle Botallo imaged Mercury while Amato drew the planet at CM = 285°. Botallo and Cudnik continued observing (CM = 287° – 303°) during that latter part of the week, though not much detail was evident.

Apparition 2: (Morning) 30 Mar – 3 Jun

(Figure 3) Only three members contributed observations during this unfavorable apparition of Mercury for northern observers, but favorable in the southern hemisphere. Two Australian observers had perfect views, as Mercury rose high above the horizon nearly vertically at the maximum distance 27° from the Sun! These optimal conditions resulted in some fine imagery from Erwin Velden and Steve Massey. The latter began imaging on April 21 at CM = 166° followed by Velden on April 24 at CM = 181°. Both images showed Mercury at crescent phase with shady markings along the terminator.

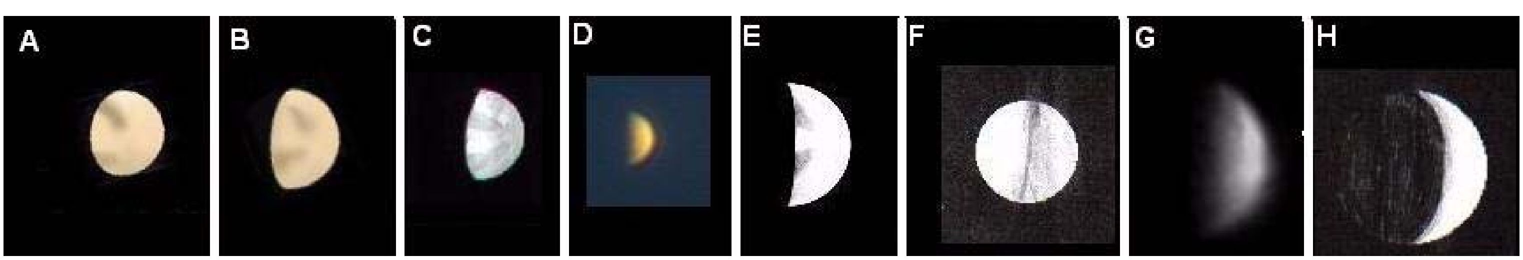


Figure 1: Apparition 1 images. North is up and celestial east is to left. A. Drawing by Tim Wilson, 1 Mar 2005 0:20 UT, CM = 226°. B. Drawing by Tim Wilson, 7 Mar 2005 0:25 UT, CM = 248°. C. Drawing by Carl Roussell, 8 Mar 2005 21:50 UT, CM = 253°. D. Image by Ed Lomeli, 12 Mar 2005 1:30 UT, CM = 271°. E. Drawing by Mario Frassati, 12 Mar 2005 17:55 UT, CM = 274°. F. Drawing Michael Amato, 12 Mar 2005 21:05 UT, CM = 275°. G. Image by Daniel Botallo, 14 Mar 2005, 17:35 UT, CM = 285°. H. Drawing by Brian Cudnik, 18 Mar 2005 0:45 UT, CM = 303°.

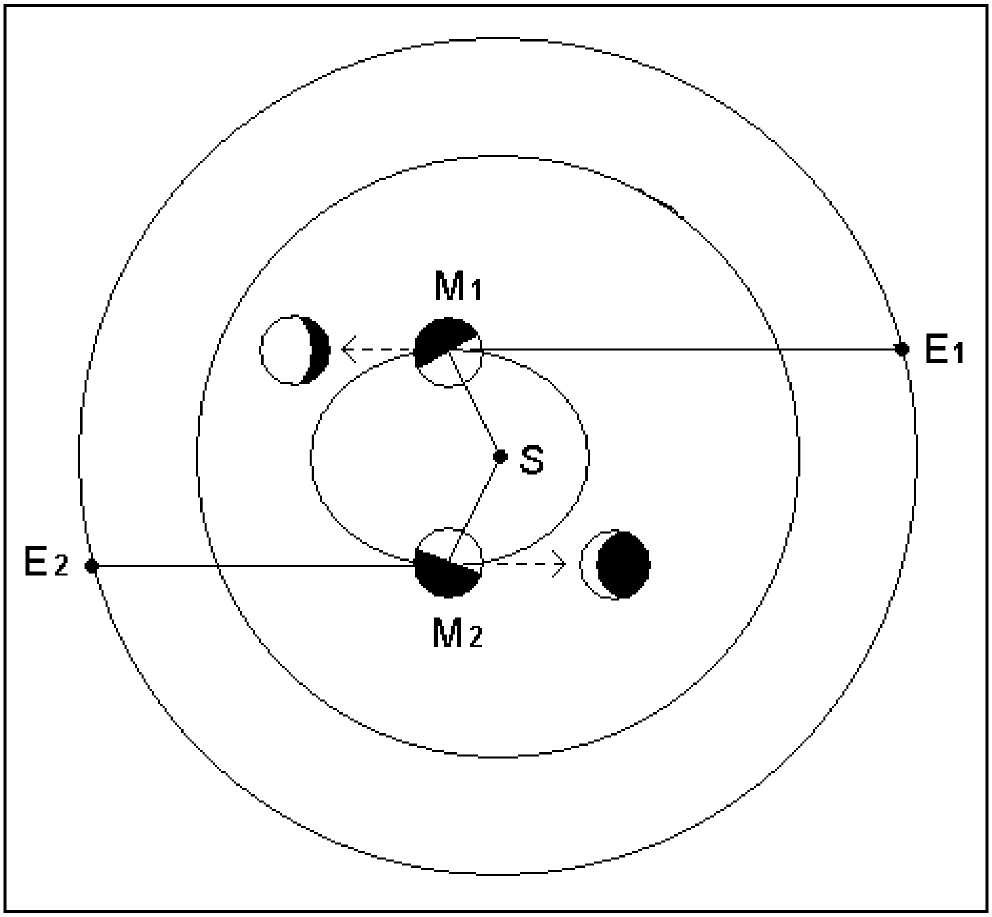


Figure 2. The phase of Mercury at both greatest elongations. In the diagram, S is the Sun, E1 and E2 are two positions of Earth, and M1 and M2 are two positions of Mercury corresponding to E1 and E2. Greatest elongation occurs when the line of sight from Earth to Mercury is tangent to the orbit of Mercury. These greatest elongation lines of sight are drawn in the diagram; E1-to-M1 indicates greatest eastern elongation, and E2-to-M2 indicates greatest western elongation as seen from Earth. The elliptical orbit of Mercury causes its appearance at greatest elongation to vary greatly, because the S - E - M angle varies greatly. S - E1 - M1 is less than 90°, so that Mercury is seen as gibbous, while S - M2 - E2 is greater than 90° so that Mercury is seen as a crescent. The phase of Mercury at elongation can be anywhere from about 35% to 65% illuminated.

After greatest elongation on April 26, Velden continued imaging on April 28 at CM = 201° and May 5 at CM = 235°. The phase went from crescent to gibbous in one week with no details visible beyond the darkened terminator.

Massey imaged Mercury again on May 8 at CM = 249°, revealing something interesting near the NW portion of the limb. The possibly darkest feature visible appeared near 280° longitude north of equator, and extended toward the southern portion of the disk along with such features as Solitudo Criophori. No additional observations were made until May 26 at CM = 330° when Carl Roussell made a drawing possibly showing the dark Solitudo Criophori near the terminator.

Apparition 3: (Evening) 3 Jun – 6 Aug

(Figure 3) Although this was only a moderately favorable apparition in the northern hemisphere, it was generally well observed. Most of the observations were made during the three-planet conjunction when, Mercury, Venus and Saturn formed a nice trio right after sunset on June 21 until the end of the month. On June 25, the three planets were within 1.5° of one another and Mercury appeared just 4 arcminutes south of Venus on the 27 when both planets were visible in the same field of a high power eyepiece. This also made it possible to easily locate Mercury in the daytime using Venus as a guide, and. probably accounts for the relatively large number of observations received at that time.

Tim Wilson started off with two drawings on June 17 and June 19 at CM = 61° and 66°, respectively. Both sketches show two elongated markings with the more prominent one in southern portion. Solitudo Martis may be the more prominent feature while the fainter marking could be Solitudo Lycaonis. Drawings by Carl Roussell on June 21 and June 23, CM = 73° and 82°, respectively, were quite similar to those by Wilson.

Several near-simultaneous observations were also obtained during this apparition. Ed Lomeli, Carl Roussell and Lawrence Carlino all observed Mercury within one hour of each other on June 23, and the next day, June 24, CM = 88°, Roussell, Carlino and Michael Amato observed the planet within a half an hour of each other. On both days, they indicated a dark albedo marking in the south, which again could be Solitudo Martis. Carlino and Roussell again observed Mercury within 20 minutes of each other on June 27 at CM = 100°, and though both showed some details these did not match well.

Roussell and Lomeli monitored Mercury again on June 28 and 29 at CM = 105° and 109°, respectively. Both observers reported some details, especially Roussell's drawing, but this was hard to detect in Lomelis' webcam image. Mario Frassati submitted a drawing on July 2 CM = 125° showing Solitudo Martis, Jovis and Helii. All three features connected together appeared as one elongated marking, and may be the same marking that Frassati saw extending from the terminator to SW limb.

Brian Cudnik had his turn at observing Mercury on July 3 and 4 at CM = 129° and 133°, respectively. Both of his drawings showed a nearly blank disc except for slight shading along the terminator. On July 7 CM = 147°, Carlino drew Mercury a half-phase with a slight shading on the terminator. Mercury was at greatest elongation on July 9 when it was located about 26° east of the Sun but still

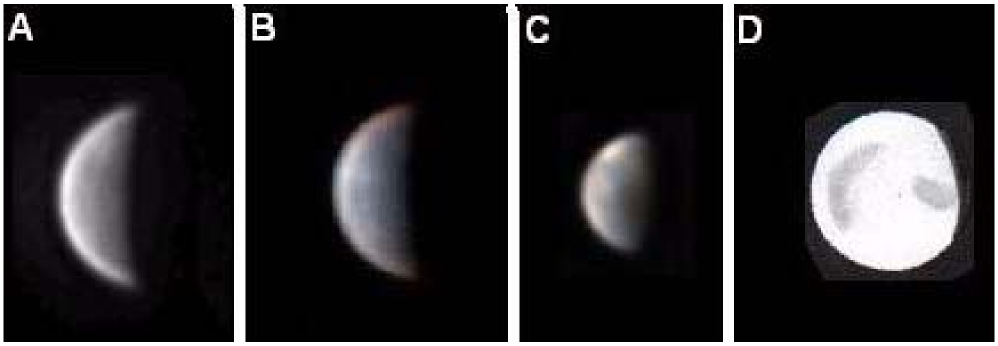


Figure 3. Apparition 2 images. North is up and celestial east is to left. A. Image by Steve Massey, 21 Apr 2005 20:33 UT, CM = 166°. B. Image by Erwin V D Velden, 28 Apr 2005 21:35 UT, CM = 201°. C. Image by Steve Massey, 8 May 2005 21:27 UT, CM = 249°. D. Drawing by Carl Roussell, 26 May 2005 13:07 UT, CM = 330°.

appeared low in the west owing to the low inclination of the ecliptic at that time.

Roussell ended his observing sequence on July 8 at CM = 154°, July 10 at CM = 164°, and July 11 at CM = 169°. All of his drawings revealed albedo markings, including Solitudo Jovis and Helii in the south and possibly Solitudo Maiae near the equator. Mercury was no longer visible after that and proceeded through to inferior conjunction with the Sun on August 6.

Apparition 4: (Morning) 6 Aug – 18 Sept

(Figure 5) After inferior conjunction on August 6, Mercury entered the morning sky and an apparition quite favorable for the northern observers. It was also a relatively short apparition, however, as the planet went from a crescent to full phase in just three weeks! The reason for this is that Mercury reached solar perihelion on August 30, and that explained its rapid orbital motion.

Carl Roussell made six sequential drawings of Mercury covering Aug 15, CM = 33°, through to August 26, CM = 94°, during which its disk grew from crescent to half-phase. At greatest elongation on August 23, it appeared as a wide crescent. Nearly all these drawings exhibited albedo markings mainly in the southern portions of the disk and could represent Solitudo Martis.

Mercury had gone through a full rotation from our perspective since its preceding apparition such that similar features should have been visible but on east side of the disk instead of the west. Ed Lomeli imaged Mercury on August 26 at CM = 95°, when the disk was at half phase just three days after the planet's greatest elongation.

Nearly simultaneous observations were obtained by three observers on August 27. At 11:00 UT, CM = 99°, Tim Wilson drew Mercury showing a dusky marking in the planet's southern half. Brian Cudnik subsequently observed at 11:45 UT, CM = 100° and reported that details appeared only sporadically. Finally, Frank Melillo imaged Mercury at 15:37 UT, CM = 101° in broad daylight. A slight gibbous phase was evident and a darkening in the south, possibly Solitudo Martis. Lomeli and Christain Wohler imaged Mercury on August 28 and 30 at CM = 104° and 112°, respectively. Both images appear to show some markings that are difficult to make out clearly. Roussell continued to observe on September 1, CM = 123°, and September 2 at CM = 128°. Both his drawings show details in the southern and northern portions of the disk, with Solitudo Martis and Jovis as the most prominent features. Melillo captured similar detail in the south in webcam images taken the next day, September 3, CM = 133°. More observations were carried by Roussell and Cudnik between September 4 at CM = 137°, and September 7 at CM = 148°, showing similar features as observed on September 1 and 2. Observations ceased as Mercury reached superior conjunction on September 18.

Apparition 5: (Evening) 18 Sept – 24 Nov

(No images) Only one observation was received during this rather poor apparition for northern hemisphere observers and unfortunately no report was obtained from southern hemisphere where the planet was far more favorably placed.

Carl Roussell observed Mercury on Sept. 23, CM = 217°, when it was located only 4.7° from the Sun five days after superior conjunction. The planet's disk was at nearly full phase and indistinct details were suspected near the equatorial region. These may have been features like Solitudo Criphori on the east side and Solitudo Maiae and Helii on the west side of the disk. Mercury reached inferior conjunction with the Sun on November 24.

Apparition 6: (Morning) 24 Nov – 26 Jan (2006)

(Figure 6) This was probably the most interesting morning apparition of the year, as

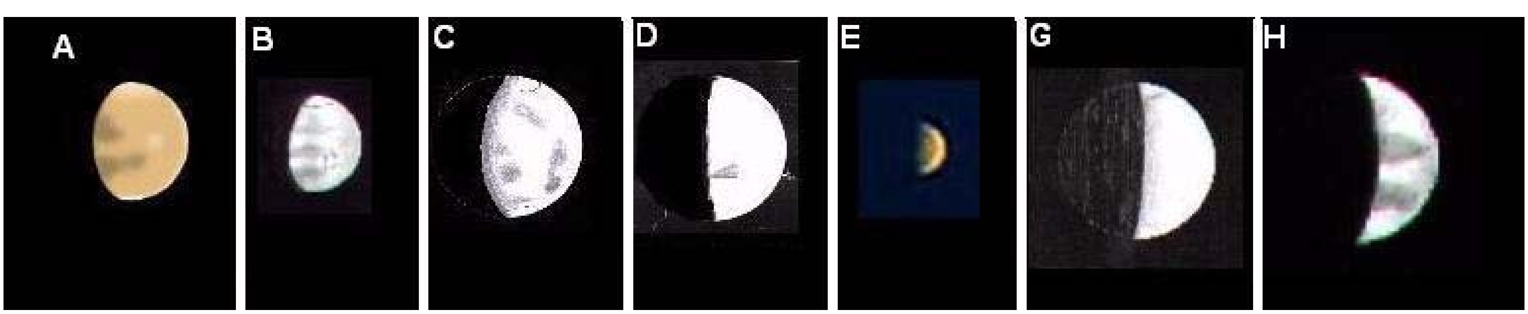


Figure 4. Apparition 3 images. North is up and celestial east is to left. A. Drawing by Tim Wilson, 17 Jun 2005 23:45 UT, CM = 61°. B. Drawing by Carl Roussell, 21 Jun 2005 1:26 UT, CM = 73°. C. Drawing by Lawrence Carlino, 24 Jun 2005 0:55 UT, CM = 86°. D. Drawing by Michael Amato, 24 Jun 2005, 1:15 UT, CM = 86. E. A webcam image Ed Lomeli, 29 Jun 2005 2:00 UT, CM = 109°. F. Drawing by Brian Cudnik, 3 Jul 2005 1:08 UT, CM = 129°. G. Drawing by Carl Roussell, 10 Jul 2005 1:05 UT, CM = 164°.

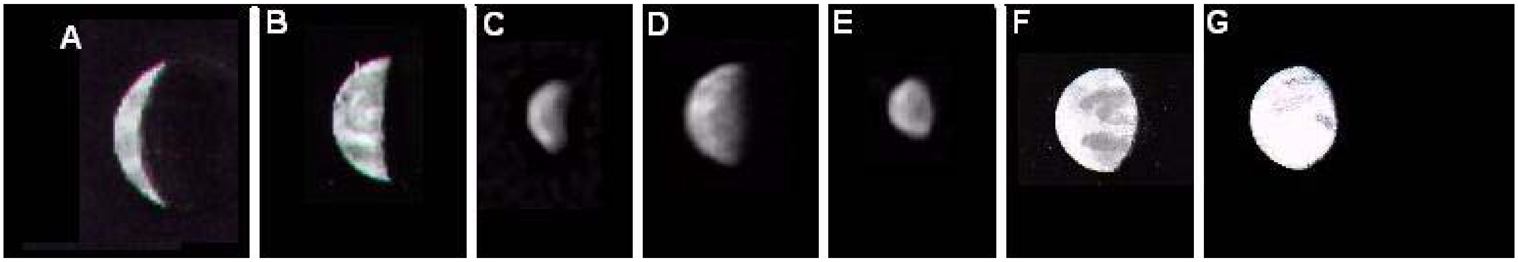


Figure 5. Apparition 4 images. North is up and celestial east is to left. A. Drawing by Carl Roussell, 16 Aug 2005, 10:30 UT, CM = 39°. B. Drawing by Carl Roussell 25 Aug 2005 10:18 UT, CM = 89°. C. Image by Frank J Melillo, 27 Aug 2005, 15:37 UT, CM = 104°. D. A webcam image by Ed Lomeli, 28 Aug 2005 15:35 UT, CM = 104°. E. Image by Frank J Melillo, 3 Sept.2005 15:11 UT, CM = 133°. F. Drawing by Carl Roussell, 2 Sept 2005, 11:00 UT, CM = 128°. G. Drawing by Brian Cudnik, 5 Sept 2005 12:20 UT, CM = 140°

Mercury was well placed for both northern and southern hemisphere observers. It is also quite likely that many observers saw and imaged one of the darkest known albedo features on the planet's surface. A large number of observation reports were received for this apparition, and we reported the circular marking at 280° west longitude north of the equator, an area not mapped by the Mariner 10 spacecraft. This feature has been nicknamed "Skinakas basin" and will be described in more detail in a separated paper.

Carl Roussell began his report on December 8 at CM = 267° when Mercury was nearly half illuminated. He noted the dark marking "Skinakas basin" near the terminator at approximately 280° W longitude. Ed Lomeli imaged Mercury the following day, December 9 at CM = 279° but had difficulties making out any distinct details, although Roussell observing on December 10 at CM = 283° did report detail in that same area of the disk.

Mario Frassati and Frank Melillo observed and imaged Mercury on December 11 at CM = 287°/288°. Observing at 7:00 UT, Frassati sketched the planet and reported "Skinakas basin" at 280°. Melillo imaged Mercury in broad daylight at 15:21 UT and also captured similar detail. Roussell and Melillo observed again on December 12 at CM = 293°/294° and reported a dark feature at 280° longitude. Roussell's drawing at 12:11 UT and Melillo's image at 15:15 UT the same day showed strikingly similar detail. The Skinaka basin feature was also reported by Amato and Lomeli on December 13. Amato's first drawing was made at 11:15 UT, at CM = 298° and Lomeli's image at 19:29 UT at CM = 299°.

Frassati continued to observe Mercury for the rest of the month. His drawings on December 18 at CM = 322°, December 19 at CM = 326°, December 21st at CM = 336°, December 22 at CM = 341° and December 30 at CM = 18°, all showed the dark Skinakas basin feature at 280° longitude which appeared to be rotating in line with the terminator. Brian Cudnik made one drawing on December 25 at CM = 356°, but only showed faint darkening along the terminator. No observations were received after New Year's and Mercury reached superior conjunction with the Sun on Jan. 26 (2006).

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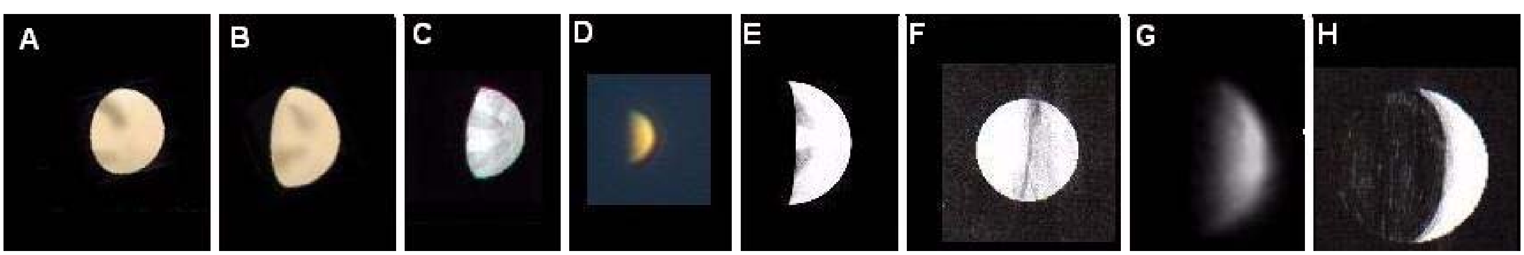

Figure 6. Apparition 6 images. North is up and celestial east is to left. A. Drawing by Carl Roussell, 8 Dec 2005 12:02 UT, CM = 272°. B. Drawing by Mario Frassati 11 Dec 2005 7:00 UT, CM = 287°. C. Image by Frank J Melillo, 11 Dec 2005 15:21 UT, CM = 288°. D. Drawing by Carl Roussell 12 Dec 2005 12:11 UT, CM = 294°. E. Image by Frank J Melillo, 12 Dec 2005 15:15 UT, CM = 293°. F. Drawing by Michael Amato, 13 Dec 2005 11:150 UT, CM = 298°. G. Webcam image by Ed Lomeli, 13 Dec 2005 19:29 UT, CM = 300°. H. Drawing by Mario Frassati 18 Dec 2005 6:30 UT, CM = 322°. I. Drawing by Mario Frassati 22 Dec 2005 6:30 UT, CM = 341°. J. Drawing by Brian Cudnik 25 Dec 2005 14:00 UT, CM = 356°.

Feature Story:
Timing an Eclipse of the Moon with the Unaided Eye

By John Westfall,
ALPO Science Editor
E-mail: *johnwestfall@comcast.net*

Online Features

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

In map-making and navigation, it is essential to be able to find one's latitude and longitude. With GPS we now find these coordinates with ease. We thus may forget that, prior to the invention of the telescope, the only practical way to find longitude involved two observers at different places noting the local time of the phases of eclipses of the Moon. The difference of time between the two locations gave their longitude difference.

This procedure provided the only longitudes measured in ancient and medieval times. The results were not very accurate. Part of the error undoubtedly was due to the imprecision of timing events by "hours of the night." But some of the error was also attributable to the naked-eye timing of the events.

Naked-eye timings of the phases of a lunar eclipse are rarely, if ever, done these days, so there are no published data on their accuracy. For this reason, the writer invites observers to time, without telescope or binoculars, the four umbral contacts (see figure) of the total lunar eclipse of August 28, 2007.*

Although the timings must be made without optical aid, this doesn't mean you can't observe most of the eclipse through binoculars or a telescope. However, to avoid any possible bias in the timings made with your unaided eyes, we recommend the following:

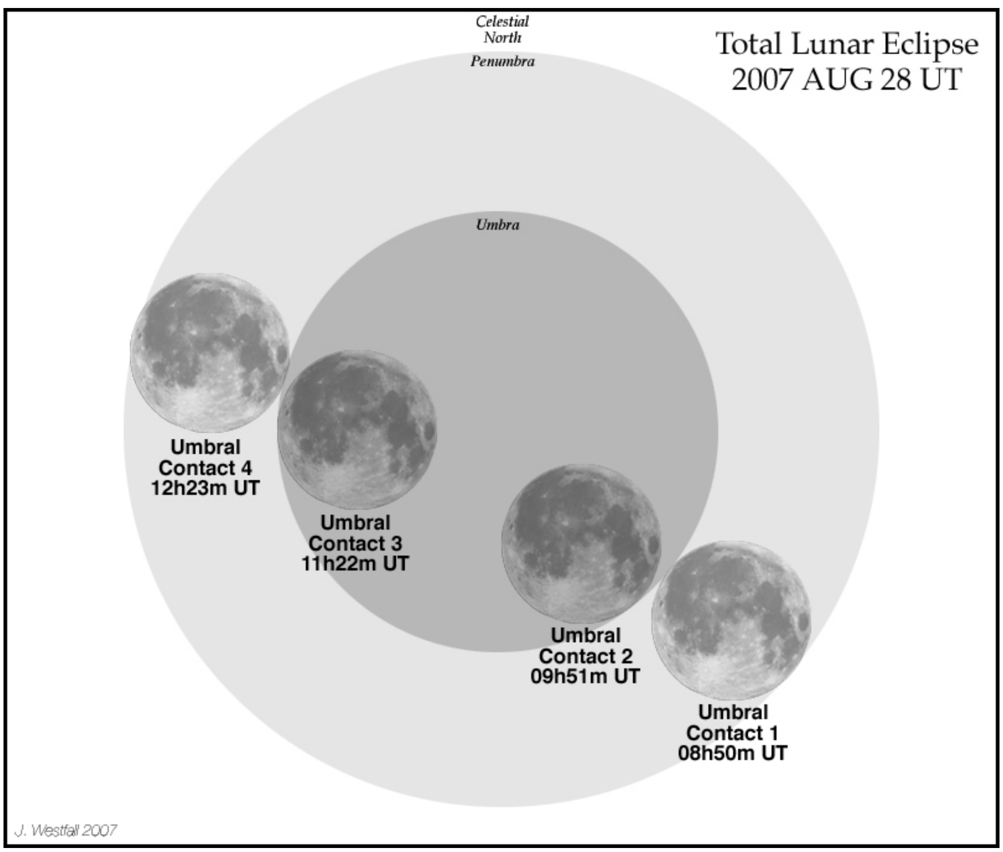
Beginning 10 minutes before the predicted time of an eclipse contact, view the Moon with the naked eye only. Also, during this period do not look at a timepiece or listen to time signals until the instant that you believe the eclipse contact has occurred. Then note that time to 0.1-minute precision. You can now resume viewing through binoculars or a telescope.

We hope that some observers will be interested in this minimal-technology way to observe an eclipse of the Moon. When the event is over, please send your results to the writer at the address above. Be sure to note any circumstances, such as clouds or haze, which may have affected your results.

* The predicted Universal Times of the four umbral contacts on August 28 are:

1. 08h 50m – First Contact; the dark umbral shadow first touches the Moon
2. 09h 51m – Second Contact; the Moon is now completely within the umbra
3. 11h 22m – Third Contact; the umbra begins to leave the Moon
4. 12h 23m – Fourth Contact; the Moon is now completely outside the umbra

At least one of these events should be visible throughout the United States, most of the remainder of the Americas, the Pacific Basin, and East Asia.



Feature Story: Jupiter

Observations During the 2002 - 2003 Apparition

By: Richard W. Schmude, Jr., coordinator, ALPO Jupiter Section
schmude@gdn.edu

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

Abstract

Drift rates for features in over a dozen currents are reported. Several features at planetographic latitude of 29ºN had a system I drift rate of 185º/30 days, which is in between the North Temperate Current and the North Temperate Current B drift rates. The wind speed inside of the GRS was 89±9 m/s (meters/second) in late November and 97±5 m/s in mid-April. Photoelectric magnitude measurements indicate that Jupiter's albedo has not changed much since 1999.

Introduction

Professional astronomers have published several recent papers about Jupiter. Youssef and Marcus (2003, 74), for example, published a thorough report about the South Temperate Belt (STB) ovals BC, DE and FA. These two report that there were four stages in these ovals' development which were: 1) Formation Epoch (1939-1941), Karman Vortex Street Epoch (1941-1994), Pre-merger Epoch (1994-1997) and the Merger Epoch (1997-2000). These two carried out a detailed theoretical study to explain the merging of the STB ovals. They argue that the circulation in the ovals became weaker until they merged in the late 1990s. Raynaud et al (2003, 344) summarize the occultation of a 6.5 magnitude star by Jupiter's North Polar Region. This group reports temperature and pressure data for Jupiter's atmosphere. Betremieux, Yelle and Griffith (2003, 414) report that small amounts of acetylene (C_2H_2) are present in Jupiter's atmosphere. Acetylene is one of the gases used in welding torches.

Amateur astronomers have also studied Jupiter. Three developments monitored by amateurs were: 1) the merging of a white oval with the GRS, 2) the fading of the North Temperate Belt (NTB) and 3) the changing appearance of the North Equatorial Belt (NEB). Amateurs submitted at least 198 drawings and 1213 CCD/video images of Jupiter during the 2002-03 apparition. This report summarizes amateur data.

All Readers

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

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Observing Scales

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

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

Scale of Transparency Conditions:
- Magnitude of the faintest star visible near Jupiter when allowing for moonlight and twilight

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

Table 1: Characteristics of the 2002-03 Apparition of Jupiter*

First conjunction with the Sun	2002 July 20
Opposition date	2003 Feb. 2
Second conjunction with the Sun	2003 Aug. 22
Apparent equatorial diameter (opposition)	45.6 arc-seconds
Visual stellar magnitude (opposition)	-2.6
Planetographic declination of the Sun (opposition)	0.3ºN
Planetographic declination of the Earth (opposition)	0.1ºN
Geocentric declination of Jupiter	17.7ºN

*Data taken from *The Astronomical Almanac* (2000, 2001)

The general characteristics of Jupiter during 2002-03 are listed in Table 1 while Table 2 lists the participating observers. Figure 1 shows drawings of Jupiter made during the 2002-03 apparition. The Jupiter nomenclature is shown in Figure 1.

Throughout this paper, "latitude" means the planetographic latitude. "West" refers to the direction of increasing longitude. Longitude is designated with the Greek letter lambda, λ, followed by a subscript Roman numeral that designates the longitude system. As an example, $\lambda_I = 54°$ means that the system I longitude is 54°.

Table 2: List of Contributors to This Apparition Report

Contributor	Location	Instrument*	Type**
Makoto Adachi	Japan	0.31m RL	D
Gianluigi Adamoli	Verona, Italy	0.11m RR	DN, TT
Leo Aerts	Belgium	0.25m SC	CCD
Tomio Akutsu	Japan	0.32m RL	CCD, M
Jorge Almeida	Portugal	0.20m RL	D, DN
Tippy D'Auria	FL, USA	0.25m RL	CCD
Reta Beebe	NM USA	---	N
Dan Boyar	FL USA	0.10m RR	D, DN
Tom Buchanan	GA USA	Spectroscope	SP
Phillip Budine	NY USA	0.13m MC	DN
Charles Calia	CT USA	0.13m MC	D, DN, PP, TT
Lawrence Carlino	NY USA	0.13m RR	D, DN
Antonio Cidadao	Portugal	0.25m SC	CCD, M
Paulo Coelho	Portugal	0.20m SC	CCD
Brian Colville	Canbray, ON Canada	0.30m SC	CCD, M
Ed Crandall	NC USA	0.25m SC	CCD
Brian Cudnik	Weimer, TX USA	0.32m RL	D, DN
Andrew Dan	Hungary	0.30m MC	CCD
Dale Dufresne	LA USA	0.51m RL	D
Hideo Einaga	Japan	0.25m RL	CCD
C. Fattinnanzi	Macerata, Italy	0.25m RL	CCD
S. Faworski	FL, USA	0.25m RL	CCD
Mario Frassati	Crescentino, Italy	0.20m SC	D
Geoff Gaherty	Toronto, ON Canada	0.28m RL	DN
Lawrence Garrett			DN
Ed Grafton	Houston, TX USA	0.36m SC	CCD
Bill Griswold	TN USA	0.25m SC	CCD
Walter Haas	NM USA	0.32m RL 0.20 m RL	DN, TT
Bob Habermann	San Francisco, CA USA	0.25m SC	CCD
Jason Hatton	Mill Valley, CA USA	0.23m SC	CCD
Gino Van Hauwermeiren	Tokyo, Japan	0.08m RR	CCD
Kieron Heard	Suffolk, England	0.15m RR	DN
Alan Heath	Long Eaton, England	0.25m RL	D, DN
Carlos Hernandez	FL USA	0.23m MC	D, DN, TT
Daniel del Valle Hernandez	Puerto Rico, USA	0.20m RL	D, DN, TT
Jared Huckaby	GA USA	0.11m RL	D, DN, TT
Yuichi Iga	Japan	0.28m SC	CCD, D, DN
Toshihiko Ikemura	Nagoya Aichi, Japan	0.31m RL	CCD
James Jacobson	Mt. Pinos, CA USA	0.20m SC	CCD
Michel Jacquesson			CCD

Table 2: (Continued) List of Contributors to This Apparition Report

Contributor	Location	Instrument*	Type**
Eric Jamison	MA, USA	0.18m RR	D, DN
Akira Kazemoto	Japan	0.31m RL	CCD
Jan Koet	The Netherlands	0.18m RR	CCD
Frank Kraljic	AZ, USA	0.25m RL	DN
Teruaki Kumamori	Japan	0.60m C	CCD
Canon Lau	Honk Kong, China	0.36m SC	CCD
Paolo Lazzarotti	Massa, Italy	0.18m MC	CCD
Tan Wei Leong	Singapore	0.25m RL	CCD
Jason Liles	GA USA	0.007m M	PP
Felix Luciano	GA, USA	0.09m RR & 0.20m RL	DN
Craig MacDougal	FL USA	0.15m RL	D
Tony Mallama	MD, USA	---	DN
Malcolm Mallette	IN USA	0.20m RL	DN
Hirohisa Matsumoto	Japan	0.31m RL	CCD
John McAnally	Waco, TX USA	0.20m SC	D, DN, TT
Frank Melillo	NY USA	0.20m SC	CCD
Hans-Joerg Mettig	Freiburg, Germany	---	DN
David Moore	AZ USA	0.25m RL 0.36m C	CCD
Lance Murphy	GA USA	0.007 M	PP
H. Nakanishi	Japan	0.25m SC	CCD
Mitsuyuki Neichi	Japan	0.25m RL	CCD
Eric Ng	Hong Kong, China	0.25m RL	CCD
Detlev Niechoy	Germany	0.20m SC	D, SS
Koji Okuda	Japan	0.25m RL	CCD
Jose Olivarez	FL USA	0.20m RR	DN
Dennis Pang	Hong Kong, China	0.25m RL	CCD
Don Parker	FL USA	0.41m RL 0.25m RL	CCD
Damian Peach	Canary Islands	0.28m SC	CCD, DN
Christophe Pellier	France	0.18m RL	CCD, DN
Cecil Post	NM USA	0.20m RL	TT
Sol Robbins	NJ USA	0.15m RR	D
John Rogers	Cambridge, UK	---	DN
John Sabia	PA, USA	0.61m RL	DN, TT
Jesus Sanchez	Cordoba, Spain	0.28m SC	CCD
Guido Santacana	Puerto Rico, USA	0.15m RL	D, DN, TT
Richard Schmude, Jr	GA USA	Several	D, DN, Pol, PP, TT

Table 2: (Continued) List of Contributors to This Apparition Report

Contributor	Location	Instrument*	Type**
Clay Sherrod	AR USA	0.31m SC	CCD, DN
John Sussenbach	The Netherlands	0.28m SC	CCD
Andrea, Tasselli	Muhlow, Germany	0.20m MN	CCD
Yasuaki Tomita	Japan	0.25m RL	CCD
Robert Vanderbei	NJ, USA	0.09m Cat	CCD
Roger Venable	GA USA	0.41m RL	DN
Thomas Williamson	NM, USA	0.20m RL	CCD
C. Yan	Hong Kong, China	0.25m MC	CCD
S. Yoneyama	Japan	0.20m RL	CCD
Gu Yu	WV USA	0.23m SC	CCD
Kenkichi Yunoki	Sakai City, Japan	0.20m RL	CCD

*C = Cassegrain, Cat = Catadioptric, KC = Klevtzov-Cassegrain, M = Maksutov, MC = Maksutov-Cassegrain, MN = Maksutov-Newtonian, RL = Reflector, RR = Refractor, SC = Schmidt-Cassegrain.
**CCD = CCD or video image, D = drawing, DN = Descriptive notes, M = methane band data, N = notes, P = Photograph, Pol = Polarization, PP = Photoelectric photometry, SP = Spectra, SS = Strip Sketch, TT = Transit time

The three longitude systems are described more fully elsewhere (Rogers, 1995, p11; Astronomical Almanac, 2001, pL8). All dates and times are in Universal Time (UT). In the present paper, belt widths were measured at different longitudes to average out projections and bays; furthermore, a transparent ruler was used in making measurements.

Disc Appearance

Figures 1-3 show the appearance of Jupiter. Over 1000 white light intensity estimates of Jovian features were submitted by Adamoli, Calia, Cudnik, Hernandez, Heath, Santacana and the writer. The mean intensities (on the ALPO scale of 10 = white to 0 = black) are: SPR (6.1), STB (5.6), STrZ (8.3), SEBs (3.9), SEB Z (6.9), SEBn (3.9), EZs (7.7), EB (6.9), EZn (7.6), NEB (3.5), NTrZ (8.1), NTB (after Dec. 27, 2002) = 7.1, NTZ (8.2), NNTB (5.7) and NPR (6.0). Heath also made several dozen intensity estimates through red and blue filters and these show that the GRS was the reddest feature on Jupiter.

The planetographic (or zenographic) latitudes for Jovian features were measured from CCD/video images taken between Sep. 2002 and June 2003; measurements were made for several different system II longitudes. The latitudes are listed in Table 3, and were determined in the same way as in Schmude (2003).

I measured the north-south and east-west dimensions of several white ovals from white light CCD/video images and the results are listed in Table 4. Dimensions were measured in the same way as in Schmude (2002a, 28-29).

The average aspect of the eight SSTB ovals (B1-B8) was 0.78, which is a bit lower than the corresponding value (0.84) in 2001-02. The aspect is the north-south dimension divided by the east-west dimension. The average area of the SSTB ovals (18×10^6 km^2) was a bit higher than in the previous apparition. The mean area and aspect for the NEB ovals were 16×10^6 km^2 and 0.65 respectively, which are close to the corresponding averages of 13×10^6 km^2 and 0.62 for 2001-02.

Region I: Great Red Spot

During late 2002, Calia reported that the GRS had no color but by March, 2003 he reported a salmon color. Boyar and Hernandez reported a pale pink or pale pinkish orange color for the GRS while the writer saw this feature as having a light orange color. The general appearance of the GRS is shown in Figure 3. As in 2001-02, this feature had a dark center and a dark northern border. The northern half of the GRS was generally brighter than the southern half.

The size of the GRS was measured in methane band light; see Table 4. For a comparison, the corresponding east-west and north-south dimensions along with the area in the previous apparition were 20,500 km, 11,400 km and 184×10^6 km^2.

White ovals were imaged within the GRS on Nov. 21-23, 2002 by Grafton and Sherrod and on April 16-20 by Adachi, Einaga, Grafton, Kazemoto, Lazzarotti, Leong, Nakanishi, Ng and Pellier. A GRS wind velocity of 89 ± 9 m/s was measured for Nov. 21-23 and 97 ± 5 m/s was measured for April 16-20. These velocities correspond to the outer edge of the GRS and are similar to velocities measured during the previous apparition (Schmude, 2003).

The longitudes of the GRS are plotted in Figure 4.

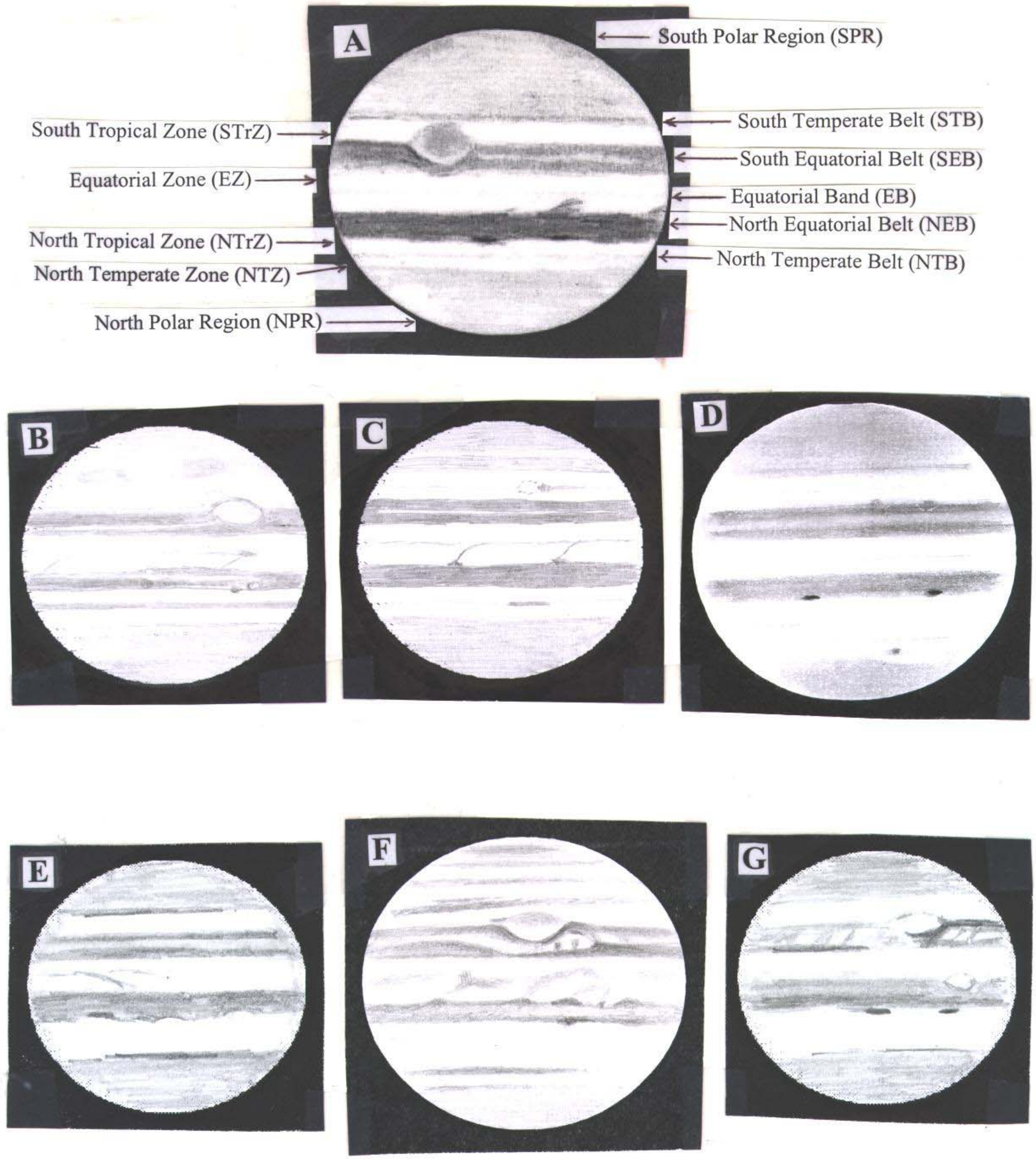

Figure 1: Drawings of Jupiter. A) Jan. 3, 2003 (1:11 UT), λ_I = 265º, λ_{II} = 147º, 0.20 m RL, 266X by Daniel del Valle Hernandez, B) Sep. 2, 2002 (11:50 UT), λ_I = 314º, λ_{II} = 51º, 0.32m RL 278X, 370X by Brian Cudnik, C) Dec. 28, 2002 (11:09 UT), λ_I = 41º, λ_{II} = 326º, 0.32m RL by Brian Cudnik, D) Feb. 17, 2003 (19:00 UT), λ_I = 108º, λ_{II} = 1º, 0.25m RL, 175X by Alan Heath, E) Mar. 17, 2003 (1:24 UT), λ_I = 287º, λ_{II} = 332º, 0.13m MC, 171X by Charles Calia, F) Mar. 22, 2003 (3:35 UT), λ_I = 76º, λ_{II} = 82º, 0.20m RL, 164X by Dan Boyar, G) Apr. 1, 2003 (2:15 UT), λ_I = 166º, λ_{II} = 96º, 0.13m MC, 171X by Charles Calia. All telescope abbreviations are the same as those used in Table 2. South is at the top in all drawings.

Table 3: Average Planetographic Latitudes of Belts on Jupiter*

Belt	Planetographic latitude (Integrated light)	Planetographic latitude (Methane band light)
NPR	—	66.5±1ºN
NNTBn	38.3º±1ºN	—
NNTBs	35.2º±1ºN	—
NTBn	30.8º±0.5ºN	28.4±1ºN
NTBs	25.9º±0.5ºN	22.9±1ºN
NEBn	18.2º±0.5ºN	17.7±0.5ºN
NEBs	7.4º±0.5ºN	10.6±1ºN
EBc	3.0º±0.5ºS	3.1±1ºN
SEBn	7.9º±0.5ºS	5.0±0.5ºS
SEBs	22.4º±0.5ºS	21.7±2ºS
SSTBn	35.3º±0.5ºS	—
SSTBs	39.9º±1ºS	—
SPRn	-----	65.0±1ºS
GRS	21.4º±0.5ºS	20.6±1ºS

*The north and south edge of the belts are designated by a small "n" or "s"; for example, the north edge of the north equatorial belt is called "NEBn". A small c means "center".

Region II: South Polar Region to the South Tropical Zone

After analyzing dozens of images, I found that the SPR was brighter than the NPR in integrated, ultraviolet, blue, red, infrared and methane band (wavelength = 890 nanometers) light. The integrated light results are consistent with telescopic results.

The longitudes of the white ovals A1-A3 are plotted in Figure 4 or are listed in Table 5. Feature A2 in the S^5TC had a drift rage of -15.1°/30 days while features A1 and A3 in the S^4TC had drift rates of -21.6°/30 days and -18.4°/30 days respectively. The drift rates for A1 and A3 are similar to the rate measured for feature A1a in the previous apparition (Schmude, 2003, 47).

The drift rates for eight ovals (B1-B8) in the SSTC are summarized in Table 6. The average drift rate for ovals B1-B8 was -28.4°/30 days, which is close to the corresponding value in the previous apparition.

The longitudes of four STC features (oval BA, C1, C4 and C3) are shown in Figure 4. Oval BA had a drift rate of -9.3°/30 days, which is lower than the 2001-02 value (-11.7°/30 days). Part of oval BA was bright in Colville's March 16 methane band image.

Oval BA's appearance changed during late 2002. During October, BA was surrounded by a dark ring but two months later, the northern portion of this ring became faint. The ring was again complete in Feb. 8 – 10 images, but it was faint in images taken on Feb. 16, Mar. 5, 16, 17 and 19. Rogers assembled a series of images made by several people in March showing the changing appearance of oval BA.

Oval BA had an aspect and area of 0.76 and $61 \pm 3 \times 10^6$ km^2 respectively. Although the area was the same as in 2001-02, the aspect was higher in the current apparition. One explanation for this change is that as oval BA passed the GRS in Feb. 2002, its aspect dropped and later oval BA returned to its normal shape.

Region III: South Equatorial Belt

Figures 1-3 show the general appearance of the SEB. The portion of the SEB preceding the GRS was narrower than the portion following the GRS; see Figure 5.

Figure 6 shows the longitudes for feature S1/S1A at the border of the STrZ and SEB. Between late February and early March, oval S1 had a drift rate of 70.1°/30 days but in mid-March, this feature speeded up to a drift rate of 35.9°/30 days, and was renamed S1A. The change in drift rate may be due to its approach to the GRS. Oval S1A merged with the GRS in mid-April.

White ovals, bays and low projections were followed along the southern (features S2-S5), central (features S10-S14, S16) and northern (feature S18) portions of the SEB. The drift rate for these features was more negative as one moved northward within the SEB, which is consistent with previous observations (Rogers, 1995, pp46-7).

Six white spots (S10-S14, S16) located west of the GRS were studied. In all cases, these spots moved between the north edge of the GRS and the north component of the SEB and were not seen in a recognizable form again. Figure 7 shows S13. On April 30, S13 appeared as a small bright spot in Cidadao's methane band image; apparently S13 attained a high altitude since high altitude features appear bright in methane band light. The average drift rate of S10-S14 and S16 was -49.8°/30 days.

Region IV: Equatorial Zone

Figures 1-3 show the appearance of the EZ. The southern half of the EZ was generally brighter than the northern half. A faint EB was present near 3°S.

Calia reported a faint bluish color for the EZ on Dec. 4 and Jan. 11, but reported a stronger blue color on May 2. Boyar reported a bluish-gray color for the EZ on Feb. 11.

The longitudes for 12 large festoons are plotted in Figure 8. In all cases, I measured the center of the bases of the fes-

Table 4: Dimensions of White Ovals During the 2002-03 Apparition*

Feature	Dimension (km) east-west	Dimension (km) north-south	Aspect	Area 10^6 km^2
A2	4200	4400	1.07	14±1
A1	4700	3600	0.79	13±2
B1	4800	3500	0.75	13±1
B2	4200	3400	0.84	11±1
B3	8300	5500	0.68	36±3
B4	5200	3800	0.74	16±2
B5	4900	3800	0.81	14±1
B6	6300	4700	0.74	23±2
B7	6300	4300	0.67	21±1
B8	3300	3200	1.02	8±1
Oval BA	10,100	7600	0.76	61±3
S1	3700	2500	0.70	7±1
S1A	3800	2400	0.64	7±1
C1	6100	3500	0.57	17±2
N7	5900	3800	0.64	18±2
N8	3600	2800	0.80	8±2
N9	5500	3500	0.65	15±1
N10	7600	3900	0.51	24±3
N23**	13,400	7200	0.55	75±4
H1	3500	3000	0.86	8±1
I1	3300	3400	1.04	9±2
I2	5300	3200	0.62	13±1
I3	5600	3500	0.63	15±2
GRS (methane band light)	19,300	12,200	0.63	185±9

*The aspect is the north-south dimension divided by the east-west dimension. Please keep in mind that the listed aspects are based on average values of the aspect and may not match up exactly with the average dimensions. All areas were computed by assuming an elliptical shape for each feature. All east-west and north-south dimensions have uncertainties of 500 km.

**Values computed for this feature when it had the appearance of an oval.

toon when determining longitude. All of the festoons lasted for at least two months, which is in contrast to the previous apparition where most of the festoons lasted only 2-6 weeks. The average drift rate for the festoons in 2002-03 was 9h 50m 37s which is five seconds shorter than the corresponding drift rate in 2001-02. The drift rates for festoons were more uniform in 2002-03 compared to the previous one and this may be the reason for the greater longevity of the 2002-03 festoons.

Region V: North Equatorial Belt

Figure 9 shows the width of the NEB for different months. The NEB reached a maximum width in Jan. 2002 and afterwards it became narrower until Jan. 2003. Between Jan. and June 2003, the NEB kept the same width.

The NEB became narrow as a result of the southward movement of the NEBn; essentially the NTrZ expanded at the expense of the NEB. One consequence of this was that white ovals inside of the NEB in late 2002 were inside of the NTrZ by early 2003. Figure 7 shows the changing background of N7.

The NEB was reported to have a red-brown color on several dates between Dec. 4 and Mar. 20 by Calia. Boyar reported a golden-brown or tan color for the NEB on Feb. 11. These colors are consistent with color filter intensity estimates made by Heath which show the NEB as being darker in blue than in red light.

Figure 10 shows the longitudes of a large bay or oval (feature N23). During late 2002, this feature looked like a bay but by early March, N23 looked like a large oval; see Figure 7. Calia reports that N23 changed during April and early May and this is confirmed in CCD/video images.

Figure 6 shows the longitudes of at least 12 different barges. I am not sure if N15 and N15A are the same feature or not, the two features have different drift rates and are therefore treated as different. The average drift rate for all barges was -3.2°/30 days, which is close to the corresponding 2001-02 value of -2.5°/30 days.

Figure 10 shows the longitudes of four NEB ovals (N7 - N10). The average drift rate for these features is -12.2°/30 days, which is different from the corresponding value (-5.8°/30 days) in 2001-02.

Region VI: North Tropical Zone to the North Polar Region

The NTB was distinct in Sep. 2002, but later on; this feature became both fainter and thinner. By Jan. 2003, this belt was almost completely gone. Figure 11 shows maps of the NTB from Sep. 2002 to Jan. 2003. The NTB was weak at λ_{III} = 280°W in an Aug. 2002 image taken by Kazemoto, and so I conclude that the NTB faded over a five month period (Aug. 2002 to Jan. 2003).

The latitudes of the north and south edges of the NTB along with the NTB width are plotted in Figure 12. The NTB grew narrower during the latter third of 2002; however, it is not clear whether the north or south edges of the NTB began fading first. The NTBs was 0.4°±0.7° and 0.9°±0.7° farther north than in the 2001-02 and 1999-2000 apparitions respectively (Schmude, 2003, 44), (Rogers, 2003, 17). According to

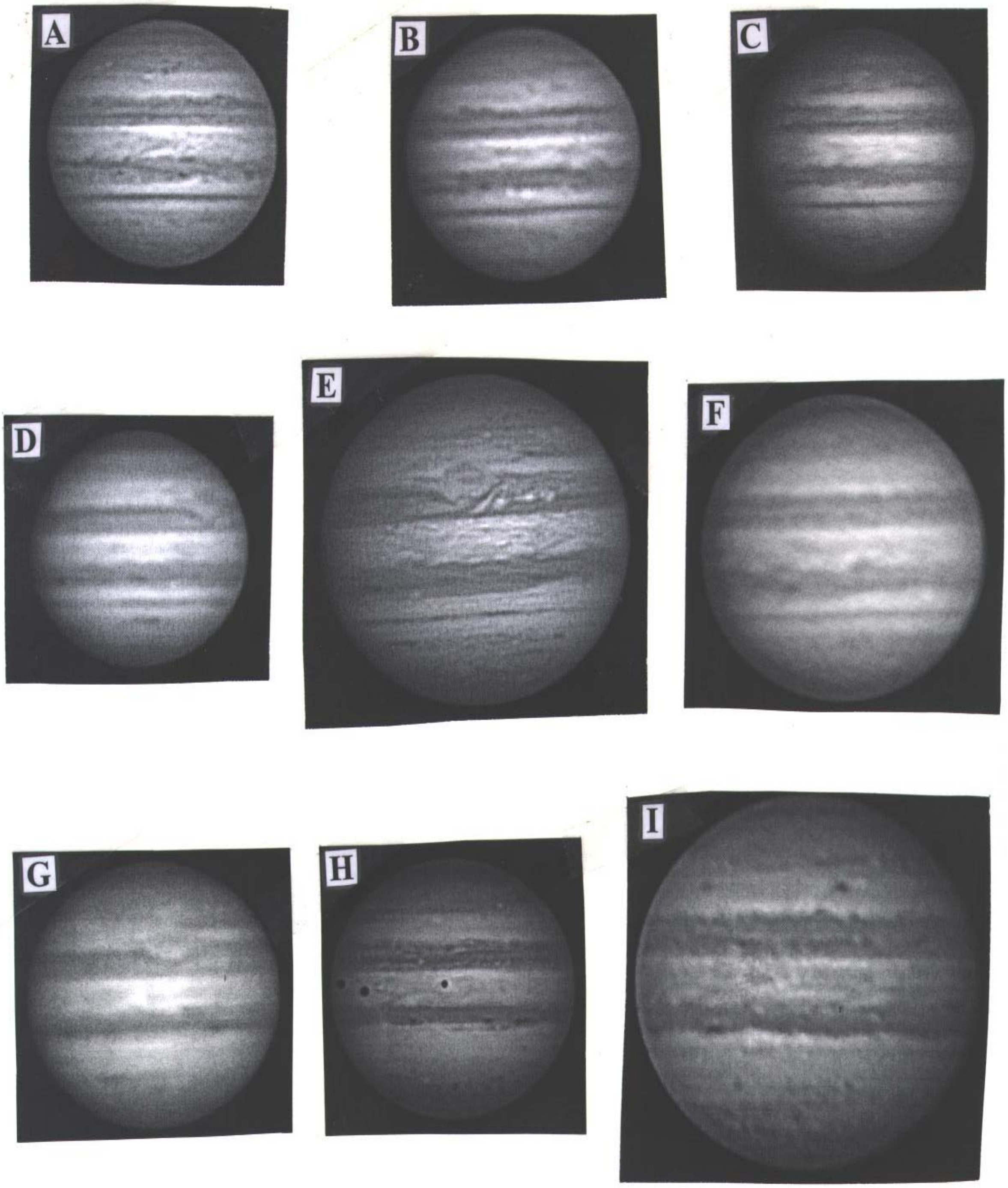

Figure 2: CCD and Video Images of Jupiter; all images were made in visible light. A) Sep. 28, 2002 (9:27 UT) $\lambda_I = 9^\circ$, $\lambda_{II} = 269^\circ$ by Don Parker; B) Oct. 8, 2002 (9:34 UT), $\lambda_I = 151^\circ$, $\lambda_{II} = 334^\circ$ by Don Parker; C) Nov. 2, 2002 (10:00 UT) $\lambda_I = 153^\circ$, $\lambda_{II} = 146^\circ$ by Gu Yu; D) Nov. 23, 2002 (9:29 UT) $\lambda_I = 211^\circ$, $\lambda_{II} = 43^\circ$ by Clay Sherrod; E) Nov. 23, 2002 (10:40 UT) $\lambda_I = 254^\circ$, $\lambda_{II} = 86^\circ$ by Ed Grafton; F) Nov. 28, 2002 (4:48 UT) $\lambda_I = 109^\circ$, $\lambda_{II} = 265^\circ$ by Paolo Lazzarotti; G) Jan. 8, 2003 (8:12 UT) $\lambda_I = 231^\circ$, $\lambda_{II} = 73^\circ$ by Clay Sherrod; H) Jan. 18, 2003 (0:43 UT) $\lambda_I = 98^\circ$, $\lambda_{II} = 226^\circ$ by Damian Peach; I) May 8, 2003 (12:40 UT) $\lambda_I = 264^\circ$, $\lambda_{II} = 269^\circ$ by Eric Ng. South is at the top in all images and longitudes increase as one goes to the right.

Table 5: Longitudes of Features Not Plotted in Figures 4 through 6, 2002-03 Apparition

Features	System II Longitudes
A3	Mar. 18.6 (227°),
	Mar. 23.1 (219°),
	Mar. 26.9 (220°),
	Mar. 31.9 (217°),
	Apr. 5.8 (217°)
S14	Apr. 22.6 (111°)
	, Apr. 23.8 (108°)
	, Apr. 23.8 (107°),
	Apr. 25.5 (105°),
	Apr. 27.2 (99°),
	Apr. 28.8 (98°)

Rogers (1995, p. 105) major fadings of the NTB last between 1.5 and 8 years.

A white oval inside of the NTrZ (G6) at 24.7°N latitude had a drift rate of -9.4°/30 days, which is different from the drift rate of bumps at the NEBn (4.1°/30 days).

The longitudes of the preceding and following edges of dark bars (G1, G2, G4, G5, and G7-G10) near 29.0°N are plotted in Figure 10. The drift rates of these features (185°/30 days – system I) lie between those of the North Temperate Current B (123.4°/30 days – system I) and the North Temperate Current (245.9°/30 days – System I) (Rogers, 1995, pp. 102-103, 107).

Longitudes for features in the North North Temperate Current (H1) and in the North North North Temperate Current (I1-I4) are plotted in Figure 10. The drift rates for these two currents are consistent with historical records (Peek, 1981, p. 193), (Rogers, 1995, Chapter 6).

Methane Band Results

Methane band images are ones that are recorded in light that methane (CH_4) absorbs. Methane band images are useful because they show the relative altitudes of Jovian clouds. A cloud that appears bright in a methane band image indicates that methane absorption is low above this feature and the most likely way that this can happen is if the feature extends to high altitudes where there is little methane. The order of brightness of Jovian features in methane band light (wavelength = 889 nanometers) starting with the brightest feature is: EZ, GRS, SPR, NTrZ, NTZ, STrZ, NPR, Oval BA, STZ, STB, NTB, SEB and NEB. Oval BA was dimmer than the NTrZ, STrZ and the NPR during 2002-03 whereas in 2001-02, Oval BA was brighter than these features.

Table 3 lists the belt latitudes in methane band light. Three changes that have occurred are: 1) the narrow NTB, 2) the northward shift of the NEBs and 3) the wider SEB.

The flattening value (F) of Jupiter was measured in the same way as was done in Schmude (2003, 46). Essentially a positive F value means that Jupiter has a more round shape than predicted whereas a negative value of F means that Jupiter has a more oval shape than predicted. The average value of F in ultraviolet, visible, infrared (wavelength ~1000 nanometers) and methane band light were: -0.004±0.004, 0.008±0.002, 0.020±0.004 and 0.035±0.005. These values are similar to those measured in 2001-02.

The value of F for methane band light did not change much with the solar phase angle; the best fit equation for the 2002-03 apparition is:

$$F = 0.0362 - 0.00011\alpha \qquad (1)$$

where α is the solar phase angle of Jupiter in degrees.

Satellite Observations

Several people imaged detail on the satellites. Ng and Leong, for example imaged two dark Polar Regions on Io as that moon transited Jupiter. In Leong's Feb. 27, 2003 image, Io's South Polar Region appears to be darker than its North Polar Region. Peach imaged a central dark spot on Callisto (Feb. 19, 2003) and a bright polar spot on Ganymede (Dec. 10, 2002). These results attest to the high quality of images received during the current apparition.

I measured the latitudes of the dark polar spots on Io at an Io longitude of 180°W from CCD images made by Leong, Ng and Peach; the north cap extends down to 24°N and the south cap extends down to 19°S.

Several people (Budine, Cudnik, Hernandez, Haas, Robbins and the writer) observed the relative intensity of the satellites and Jovian features as the satellites transited Jupiter. The albedos of the satellites are known (Lockwood, 1983) and so the albedos of Jovian features can be estimated from the satellites. Based on the visual and CCD/video observations, it is concluded that all belts and zones on Jupiter had visible light albedos of between 0.42 and 0.63. The dark barge N16 may have had an albedo as low as 0.41. This range of albedos is consistent with results from 2001-02. The albedo is the fraction of light that an area reflects.

Wind Speeds

Tables 6-8 summarize drift and rotation rates and Table 9 summarizes the wind speeds on Jupiter. Longitudes were measured in the same way as is described in Schmude (2003, 49-50). Garcia-Melendo and Sanchez-Lavega (2001, 318-319) point out that changes not related to Jovian currents can influence wind measurements. These changes were considered as I made longitude measurements.

Wind speeds are listed in Table 9 and are given with respect to the System III longitude. The wind speeds and corresponding uncertainties were computed in the same way as is described in Schmude (2002, 2003).

I have plotted the wind speeds of the NEB barges during the 2001-02 and 2002-03 apparitions in Figure 13. The wind speeds are not random but instead they gradually increase or decrease as the longitude increases. The data is consistent with large scale structure whereby wind speeds gradually change with longitude.

Photoelectric Photometry and Polarimetry

Photoelectric magnitude measurements of Jupiter were measured using the same equipment and procedure that is described elsewhere (Schmude, 2003, 50). A list of magnitude measurements is given in Table 10. A normalized magnitude of V(1,0) = -9.38±0.02 and a solar phase angle coefficient cV = 0.0084±0.0040 were measured for this apparition. The normalized magnitude is the magnitude that a planet has if it is 1.0 astronomical unit from both the Earth and the Sun and is at a solar phase angle of 0°. The solar phase angle of Jupiter is the angle between the observer and the Sun measured from Jupiter. Previous normalized magnitudes for Jupiter were: -9.40±0.01 (1999), -9.38±0.01 (2000) and -9.40±0.01 (2001-02) and so Jupiter has had an almost constant normalized magnitude over the last four years. Slight changes in the planet's brightness could occur due to the changes in the relative widths of dark belts versus light zones. The 2002-03 color indexes at an average solar phase angle of 7° were: B-V = 0.87±0.02, V-R = 0.50±0.01 and R-I = -0.12±0.02.

Polarization data can yield information about haze layers in Jupiter's atmosphere including the mean size and shape of haze particles and whether the haze changes from

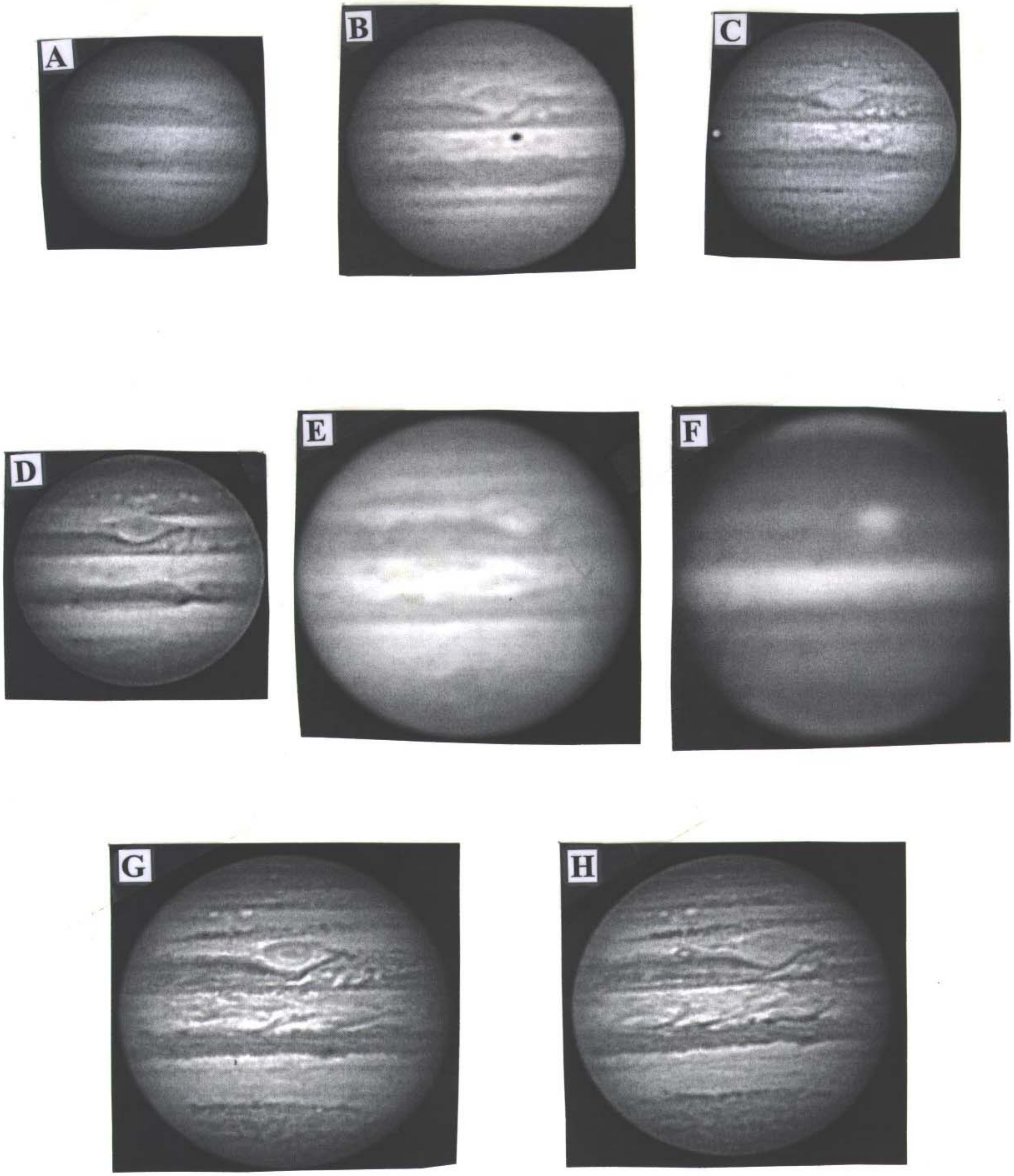

Figure 3: Images of the GRS; all images were made in visible light unless noted otherwise. A) Nov. 3, 2002 (3:17 UT) $\lambda_I = 65^o$, $\lambda_{II} = 52^o$ by Andrea Tasselli; B) Nov. 13, 2002 (12:09 UT) $\lambda_I = 169^o$, $\lambda_{II} = 77^o$ by David Moore; C) Dec. 1, 2002 (7:08 UT) $\lambda_I = 308^o$, $\lambda_{II} = 80^o$ by Don Parker; D) Jan. 5, 2003 (1:10 UT) $\lambda_I = 220^o$, $\lambda_{II} = 87^o$ by John Sussenbach; E) Apr. 18, 2003 (21:21 UT) $\lambda_I = 307^o$, $\lambda_{II} = 102^o$ by Antonio Cidadao; F) Apr. 18, 2003 (20:35 UT) $\lambda_I = 279^o$, $\lambda_{II} = 74^o$ methane band image by Antonio Cidadao; G) Mar. 15, 2003 (2:51 UT) $\lambda_I = 24^o$, $\lambda_{II} = 84^o$ by Ed Grafton; H) Mar. 27, 2003 (2:26 UT) $\lambda_I = 103^o$, $\lambda_{II} = 72^o$ by Ed Grafton. South is at the top in all images and longitudes increases as one goes to the right.

one year to the next. For this reason, whole disc polarimetric measurements of Jupiter were made in the same way as in (Schmude, 2002b, 106), and (Dollfus, 1961, 343). The polarization measurements are listed in Table 11. The V-filter measurements were more positive than in 2001-02.

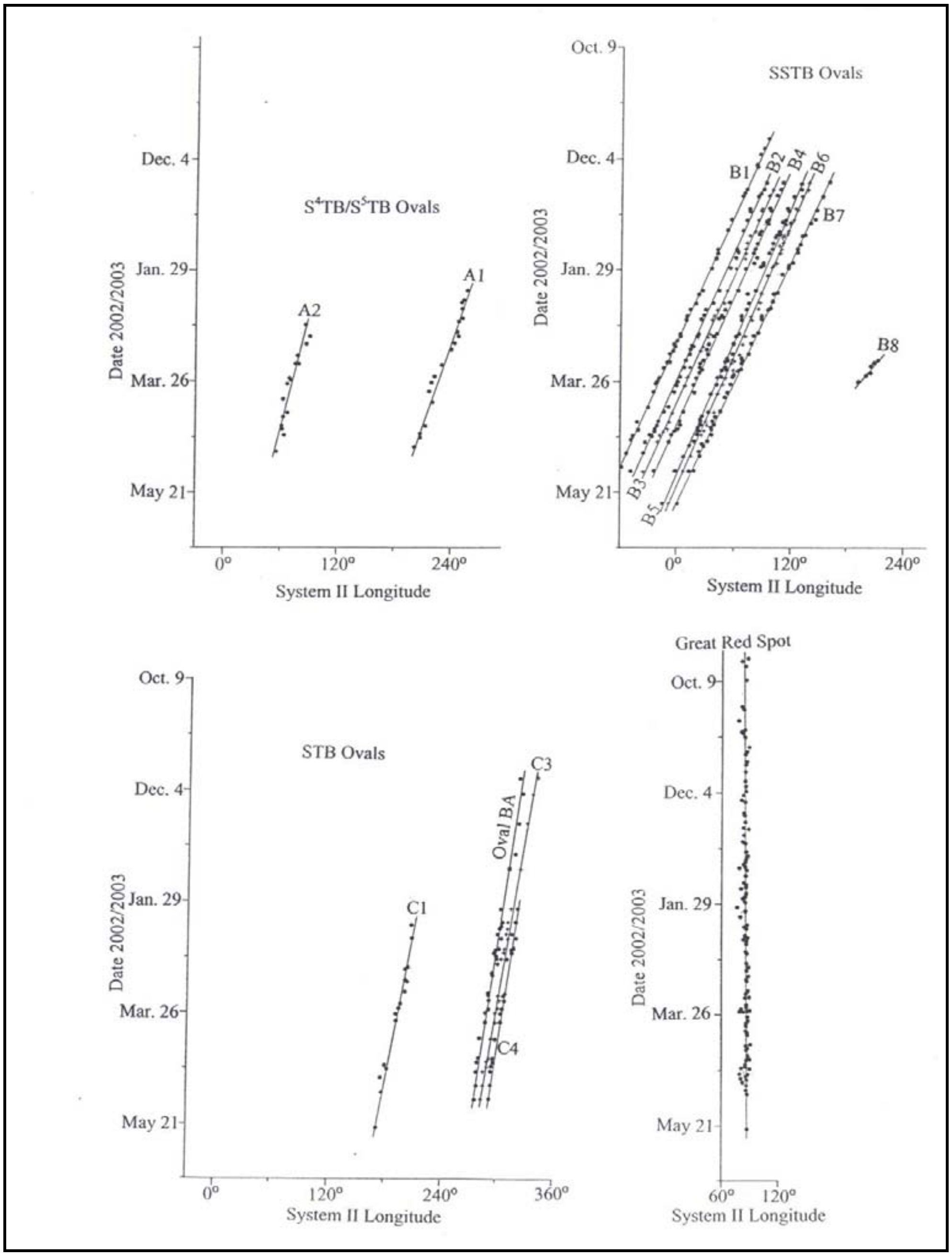

Figure 4: Drift Rates of various features in the southern hemisphere of Jupiter. Dots and plus signs are longitude measurements.

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Table 6: Drift Rates of Features Between the South Pole and the Northern Portion of the SEB, 2002-03 Apparition

I.D.	Number of Points	Time Interval	Planetographic Latitude	Drift Rate (deg./30 days) (System II)	Rotation Rate
South South South South South Temperate Current					
A2	15	Mar. 7 – Apr. 30	59.8ºS	-15.1	9h 55m 20s

South South South South Temperate Current

I.D.	Number of Points	Time Interval	Planetographic Latitude	Drift Rate (deg./30 days) (System II)	Rotation Rate
A1	19	Feb. 10 – Apr. 28	50.9ºS	-21.6	9h 55m 11s
A3	5	Mar. 18 – Apr. 5	54.6ºS	-18.4	9h 55m 15s
		Average	*52.8°S*	*-20.0*	*9h 55m 13s*

South South Temperate Current

I.D.	Number of Points	Time Interval	Planetographic Latitude	Drift Rate (deg./30 days) (System II)	Rotation Rate
B1	43	Nov. 23 – May 8	40.5ºS	-28.1	9h 55m 02s
B2	41	Dec. 15 – May 11	40.8ºS	-27.6	9h 55m 03s
B3	32	Dec. 19 – May 11	39.0ºS	-27.7	9h 55m 03s
B4	43	Dec. 15 – May 11	41.1ºS	-27.0	9h 55m 04s
B5	55	Dec. 15 – May 26	40.6ºS	-25.6	9h 55m 06s
B6	48	Dec. 15 – May 26	38.7ºS	-26.2	9h 55m 05s
B7	55	Dec. 15 – May 26	40.9ºS	-29.8	9h 55m 00s
B8	8	Mar. 3 – Mar. 26	40.6ºS	-35.3	9h 54m 52s
		Average	*40.3°S*	*-28.4*	*9h 55m 02s*

South Temperate Current

I.D.	Number of Points	Time Interval	Planetographic Latitude	Drift Rate (deg./30 days) (System II)	Rotation Rate
Oval BA	32	Nov. 17 – May 8	32.4ºS	-9.3	9h 55m 28s
C1	16	Feb. 10 – May 22	32.4ºS	-12.0	9h 55m 24s
C3	26	Nov. 17 – May 8	31.2ºS	-9.9	9h 55m 27s
C4	23	Feb. 1 – May 8	33.2ºS	-9.5	9h 55m 28s
		Average	*32.3°S*	*-10.2*	*9h 55m 27s*

South Tropical Current

I.D.	Number of Points	Time Interval	Planetographic Latitude	Drift Rate (deg./30 days) (System II)	Rotation Rate
GRS	116	Sep. 28 – May 22	21.4ºS	0.5	9h 55m 41s

Oval on the SEBs edge (this oval merged with the GRS in mid-April 2003)

I.D.	Number of Points	Time Interval	Planetographic Latitude	Drift Rate (deg./30 days) (System II)	Rotation Rate
S1	11	Feb. 21 – Mar. 17	21.3ºS	70.1	9h 57m 17s
S1A	17	Mar. 17 – Apr. 15	21.1ºS	35.9	9h 56m 30s

Table 6 (Continued): Drift Rates of Features Between the South Pole and the Northern Portion of the SEB, 2002-03 Apparition

I.D.	Number of Points	Time Interval	Planetographic Latitude	Drift Rate)deg./30 days) (System II)	Rotation Rate
South Equatorial Current (south edge of the SEB					
S2	32	Feb. 25 – May 14	22.4ºS	10.0	9h 55m 55s
S3	15	Feb. 22 – Apr. 5	22.4ºS	2.6	9h 55m 44s
S4	28	Feb. 21 – May 1	22.4ºS	9.1	9h 55m 53s
S5	14	Mar. 24 – Apr. 25	22.4ºS	17.4	9h 56m 05s
		Average	*22.4°S*	*9.8*	*9h 55m 54s*
South Equatorial Current (central portion of the SEB)					
S10	8	Mar. 20 – Mar. 27	12.7ºS	-49.8	9h 54m 33s
S11	8	Mar. 20 – Mar. 27	12.8ºS	-39.0	9h 54m 47s
S12	8	Apr. 23 – May 3	14.0ºS	-40.3	9h 54m 46s
S13	11	Apr. 13 – Apr. 20	12.7ºS	-51.2	9h 54m 31s
S14	7	Apr. 22 – Apr. 28	14.0ºS	-55.6	9h 54m 25s
S16	14	Dec. 30 – Jan. 15	13.6ºS	-62.9	9h 54m 15s
		Average	*13.3°S*	*-49.8*	*9h 54m 33s*
South Equatorial Current (northern portion of the SEB)					
S18	6	Apr. 19 – May 11	7.9ºS	-109.7	9h 53m 11s

Table 7: Drift Rates of Features within the Equatorial Zone, 2002-03 Apparition

I.D.	Number of Points	Time Interval	Planetographic Latitude	Drift Rate (deg./30 days) (System I)	Rotation Rate
Equatorial Current (northern portion of the EZ)					
E1	33	Jan. 26 – May 11	7.4ºN	5.5	9h 50m 38s
E2	49	Jan. 4 – May 2	7.4ºN	2.7	9h 50m 34s
E3	49	Jan. 11 – May 5	7.4ºN	3.5	9h 50m 35s
E4	44	Feb. 18 – May 3	7.4ºN	4.6	9h 50m 36s
E5	39	Jan. 22 – May 10	7.4ºN	3.0	9h 50m 34s
E6	34	Jan. 27 – Apr. 22	7.4ºN	4.1	9h 50m 36s
E7	28	Feb. 27 – May 8	7.4ºN	11.2	9h 50m 45s
E8	41	Feb. 10 – Apr. 27	7.4ºN	8.4	9h 50m 41s
E9	22	Jan. 11 – Mar. 17	7.4ºN	2.1	9h 50m 33s
E10	44	Jan. 22 – May 10	7.4ºN	7.8	9h 50m 40s
E12	17	Nov. 23 – Feb. 1	7.4ºN	7.9	9h 50m 41s
E13	24	Jan. 11 – Apr. 28	7.4ºN	3.1	9h 50m 34s
		Average	*7.4°N*	*5.3*	*9h 50m 37s*
Equatorial Current (center of the EZ)					
E15	6	Mar. 17 – Mar. 30	1.1ºS	9.7	9h 50m 43s
E16	7	Mar. 24 – Apr. 5	2.1ºN	-4.7	9h 50m 24s
E17	8	Apr. 16 – Apr. 23	1.2ºN	9.7	9h 50m 43s
E18	10	Feb. 10 – Feb. 23	0.0ºN	7.9	9h 50m 41s
		Average	*0.6°N*	*5.7*	*9h 50m 38s*

Table 8: Drift Rates of Features Between the North Equatorial belt and the North Pole, 2002-03 Apparition

I.D.	Number of Points	Time Interval	Planetographic Latitude	Drift Rate (deg./30 days) (System II)	Rotation Rate
North Equatorial Belt (south edge – bright spots)					
N3	12	Feb. 26 – Mar. 21	10.5ºN	-151.9	9h 52m 14s
N5	19	Mar. 23 – Apr. 9	10.2ºN	-151.6	9h 52m 14s
N6	10	Apr. 15 – Apr. 25	10.3ºN	-174.5	9h 51m 43s
		Average	*10.3°N*	*-159.3*	*9h 55m 04s*
North Equatorial Belt (north edge – ovals)					
N7	40	Sep. 14 – Feb. 17	19.2	-10.8	9h 55m 26s
N8	12	Oct. 31 – Jan. 12	19.2	-4.5	9h 55m 35s
N9	6	Oct. 31 – Nov. 18	19.3	-14.1	9h 55m 21s
N10	8	Oct. 16 – Nov. 28	18.5	-19.2	9h 55m 14s
		Average	*19.0°N*	*-12.2*	*9h 55m 24s*
North Equatorial Belt (Barges)					
N11	56	Dec. 21 – May 2	16.2	-8.1	9h 55m 30s
N12	53	Dec. 21 – May 2	15.6	-6.3	9h 55m 32s
N13	114	Oct. 22 – Jun. 5	15.9	-2.6	9h 55m 37s
N14	20	Jan. 16 – Apr. 8	17.2	5.0	9h 55m 48s
N15	22	Oct. 31 – Feb. 5	16.3	-0.6	9h 55m 40s
N15A	29	Feb. 10 – Apr. 19	15.0	-15.1	9h 55m 20s
N16	73	Oct. 31 – May 11	16.7	-5.9	9h 55m 33s
N17	62	Feb. 1 – Jun. 23	16.0	-0.3	9h 55m 40s
N18	39	Jan. 3 – Apr. 28	15.2	-1.0	9h 55m 39s
N19	22	Feb. 26 – May 3	17.2	0.9	9h 55m 42s
N20	17	Feb. 21 – Apr. 22	16.3	1.2	9h 55m 42s
N21	15	Sep. 14 – Dec. 5	15.7	-3.0	9h 55m 37s
N22	10	Oct. 27 – Jan. 7	15.6	-6.0	9h 55m 32s
		Average	*16.1°N*	*-3.2*	*9h 55m 36s*
North Equatorial Belt (bays in the north edge)					
N23	40	Jan. 12 – Jun. 1	18.2	-6.8	9h 55m 31s
N24	19	Feb. 18 – Apr. 10	18.2	-0.1	9h 55m 41s
N26	43	Dec. 15 – Apr. 28	18.2	6.2	9h 55m 49s
N27	12	Feb. 8 – Mar. 17	18.2	11.2	9h 55m 56s
N28	28	Feb. 12 – Apr. 23	18.2	5.3	9h 55m 48s
N29	29	Feb. 10 – Apr. 28	18.2	3.1	9h 55m 45s
N30	8	Apr. 11 – May 8	18.2	10.1	9h 55m 55s
		Average	*18.2°N*	*4.1*	*9h 55m 46s*

Table 8 (Continued): Drift Rates of Features Between the North Equatorial belt and the North Pole, 2002-03 Apparition

I.D.	Number of Points	Time Interval	Planetographic Latitude	Drift Rate (deg./30 days) (System II)	Rotation Rate
G1	40	Jan. 6 – May 5	29.0ºN	-45.9	9h 54m 38s
G2	40	Jan. 6 – May 5	29.0ºN	-45.3	9h 54m 39s
G3	19	Feb. 10 – Mar. 31	29.7ºN	-39.7	9h 54m 46s
G4	29	Jan. 17 – Apr. 24	28.6ºN	-36.1	9h 54m 51s
G5	29	Jan. 17 – Apr. 24	28.6ºN	-33.9	9h 54m 54s
G7	8	Nov. 20 – Jan. 2	28.5ºN	-46.0	9h 54m 38s
G8	8	Nov. 20 – Jan. 2	28.5ºN	-44.6	9h 54m 40s
G9	8	Nov. 20 – Jan. 2	28.5ºN	-49.9	9h 54m 33s
G10	8	Nov. 20 – Jan. 2	28.5ºN	-54.1	9h 54m 27s
		Average	*28.8°N*	*-43.9*	*9h 54m 41s*

North Tropical Zone

G6	7	Feb. 23 – Mar. 25	24.7ºN	-9.4	9h 55m 28s

North North Temperate Current

H1	42	Jan. 4 – Apr. 25	40.7ºN	2.0	9h 55m 43s

North North North Temperate Current

I1	24	Jan. 25 – Apr. 18	45.9ºN	-19.9	9h 55m 14s
I2	25	Feb. 8 – Apr. 15	46.3ºN	-20.9	9h 55m 12s
I3	31	Feb. 8 – Apr. 15	42.2ºN	-22.0	9h 55m 11s
I4	3	Mar. 18 – Mar. 26	45.7ºN	-21.8	9h 55m 11s
		Average	*45.0°N*	*-21.1*	*9h 55m 12s*

Table 9: Average Drift Rates, Rotation Periods and Wind Speeds for Several Currents on Jupiter, 2002-03 Apparition

Current	Feature(s)	Drift Rate (deg/30 days)			Rotation Period	Wind Speed** (m/s)
		Sys. I	Sys. II	Sys. III		
SSSSS Temp. Cur.	A2	213.8	-15.1	-7.1	9h 55m 20s	1.8±0.5[a]
SSSS Temp. Cur.	A1, A3	208.9	-20.0	-12	9h 55m 13s	3.6±0.4
SS Temp. Cur.	B1-B8	200.5	-28.4	-20.4	9h 55m 02s	7.7±0.4
S Temp Cur.	Oval BA, C1, C3, C4	218.7	-10.2	-2.2	9h 55m 27s	0.9±0.3
S Trop. Cur.	GRS	229.4	0.5	8.5	9h 55m 41s	-3.8±0.2[a]
SEB/S Trop. Cur.	S2-S5	238.7	9.8	17.8	9h 55m 54s	-8.0±1.2
S Eq. Cur.	S1	299.0	70.1	78.1	9h 57m 17s	-35.3±0.7[a]
S Eq. Cur.	S1A	264.8	35.9	43.9	9h 56m 30s	-19.9±0.7[a]
S Eq. Cur. (center)	S10-S14, S16	179.1	-49.8	-41.8	9h 54m 33s	19.6±1.6
S Eq. Cur. (north)	S18	119.2	-109.7	-101.7	9h 53m 11s	48.5±0.7[a]
Eq. Cur (central)	E15-E18	5.7	-223.2	-215.2	9h 50m 38s	103.5±1.5
Eq. Cur. (festoons)	E1-E10, E12, E13	5.3	-223.6	-215.6	9h 50m 37s	102.9±0.5
N Eq. Belt cur. (south)	N3, N5, N6	69.6	-159.3	-151.3	9h 52m 04s	71.7±2.6
N Eq. Cur. (ovals)	N7-N10	216.7	-12.2	-4.2	9h 55m 24s	1.9±1.2
N Eq. Cur. (barges)	N11-N22	225.7	-3.2	4.8	9h 55m 36s	-2.2±0.7
N Tr. Cur. (bays)	N23, N24, N26-N30	233	4.1	12.1	9h 55m 46s	-5.6±1.0
N. Tr. Cur	G6	219.5	-9.4	-1.4	9h 55m 28s	0.6±0.5[a]
*	G1-G5,G7-G10	185	-43.9	-35.9	9h 54m 41s	15.4±0.9
NN Temp. Cur. A	H1	230.9	2.0	10.0	9h 55m 43s	-3.7±0.3[a]
NNN Temp. Cur.	I1-I4	207.8	-21.1	-13.1	9h 55m 12s	4.6±0.2

[a]Estimated uncertainty
* This current lies between the North Temperate Current and the North Temperate Current B.
**The wind speed here is the speed that a current moves with respect to the system III longitude; it is computed from the equation in Table A1.2 on p. 392 of Rogers (1995).

Table 10: Photoelectric Magnitude Measurements of Jupiter Made During the 2002-03 Apparition

Date (2002-2003)	Filter	Solar Phase Angle (degrees)	Measured Magnitude	Normalized Magnitude
Nov. 8.414	B	10.8	-1.22±0.02	-8.43
Nov. 8.435	V	10.8	-2.08±0.01	-9.29
Nov. 8.447	R	10.8	-2.58±0.02	-9.79
Nov. 8.462	I	10.8	-2.47±0.02	-9.68
Dec. 15.387	B	8.8	-1.52±0.02	-8.50
Dec. 15.401	V	8.8	-2.30±0.01	-9.28
Dec. 15.419	R	8.8	-2.80±0.02	-9.77
Dec. 15.432	I	8.8	-2.67±0.02	-9.64
Dec. 28.301	B	7.0	-1.60±0.02	-8.50
Dec. 28.314	V	7.0	-2.43±0.02	-9.33
Dec. 28.331	R	7.0	-2.92±0.02	-9.82
Dec. 28.342	I	6.9	-2.81±0.02	-9.71
Jan. 5.286	B	5.6	-1.57±0.02	-8.44
Jan. 5.274	V	5.7	-2.50±0.01	-9.37
Jan. 5.244	R	5.7	-3.00±0.02	-9.86
Jan. 5.260	I	5.7	-2.83±0.02	-9.69
Jan. 6.241	B	5.5	-1.55±0.01	-8.41
Jan. 6.221	V	5.5	-2.44±0.02	-9.30
Jan. 15.249	B	3.8	-1.59±0.02	-8.42
Jan. 15.237	V	3.8	-2.53±0.01	-9.36
Jan. 15.210	I	3.8	-2.98±0.02	-9.81
Feb. 11.206	V	1.8	-2.53±0.02	-9.34

Table 11: Polarization Measurements of Jupiter; polarization values are computed in the same way as is described in Dollfus (1961)

Date (2003)	Solar Phase Angle (degrees)	B-filter	V-filter	R-filter	I-filter
Feb. 12.191	2.0	2.5	3.8	---	---
Feb. 19.175	3.5	---	2.9	---	---
Feb. 24.164	4.5	1.1	2.4	---	---
Mar. 31.145	9.5	2.5	0.3	---	---
Apr. 2.145	9.7	---	-0.1	---	---
Apr. 27.125	10.9	0.7	-2.6	-3.4	-3.8

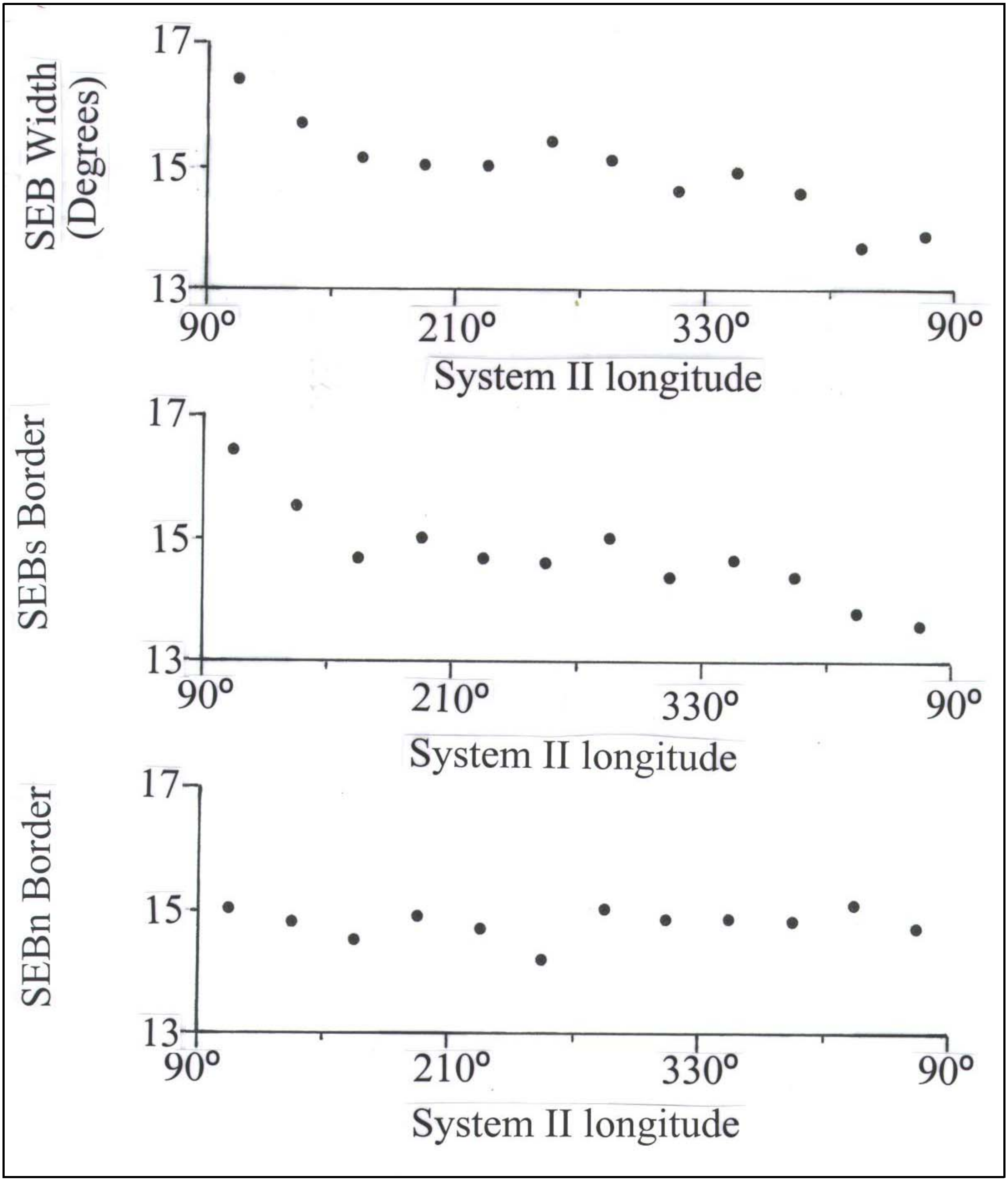

Figure 5: Three graphs showing the width of the SEB in degrees (top), the planetographic latitude of the SEBs (middle) and the planetographic latitude of the SEBn (bottom) at different system II longitudes. All data correspond to the time interval Feb. 1 – Mar. 2, 2003.

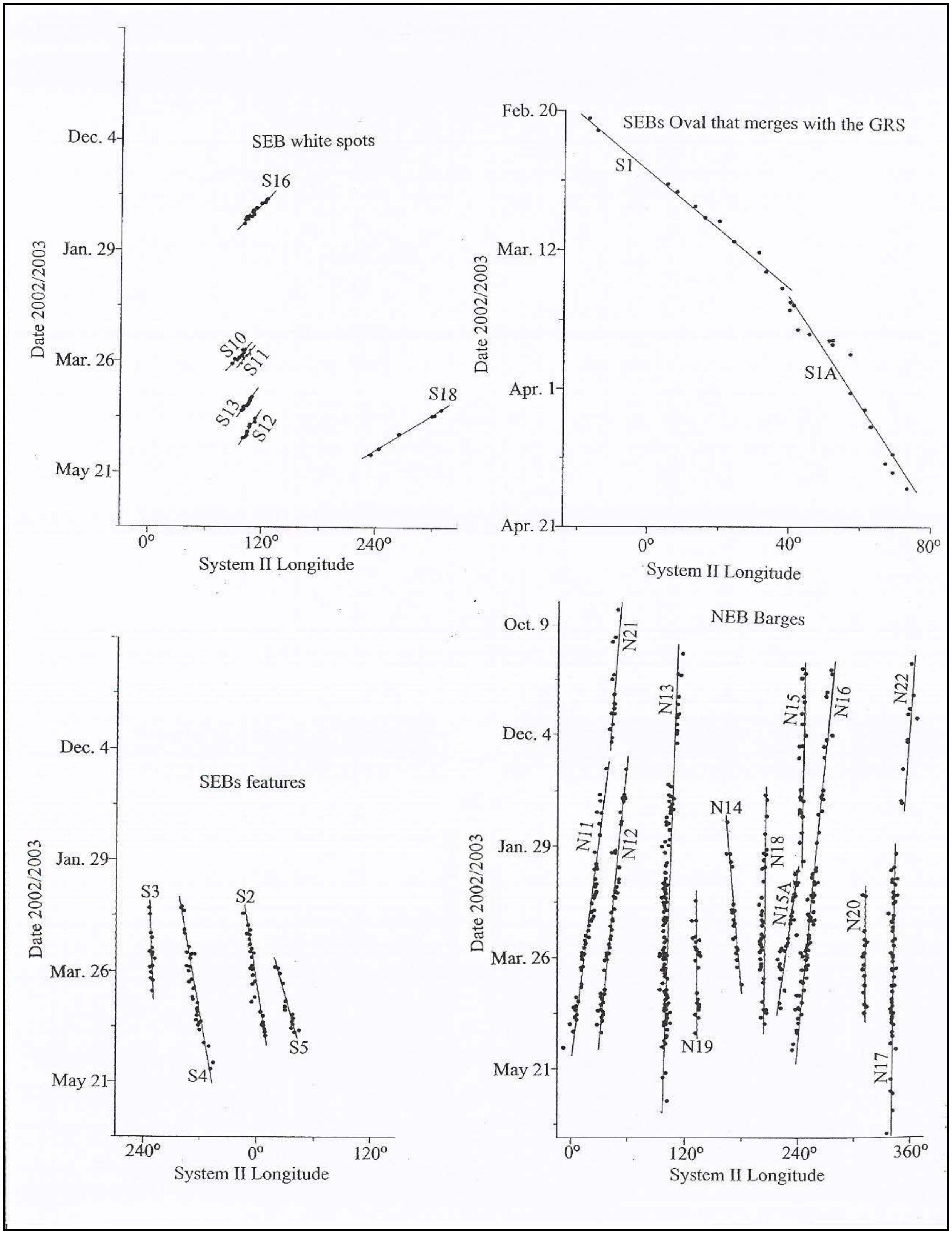

Figure 6: Drift rates of various features in the SEB and NEB. Note that SEBn and SEBs refer to the north and south edges of the SEB; similarly NEBn and NEBs refer to the north and south edges of the NEB. In the case of two belt components, SEBs would refer to the southern edge of the south component and SEBn would refer to the northern edge of the north component.

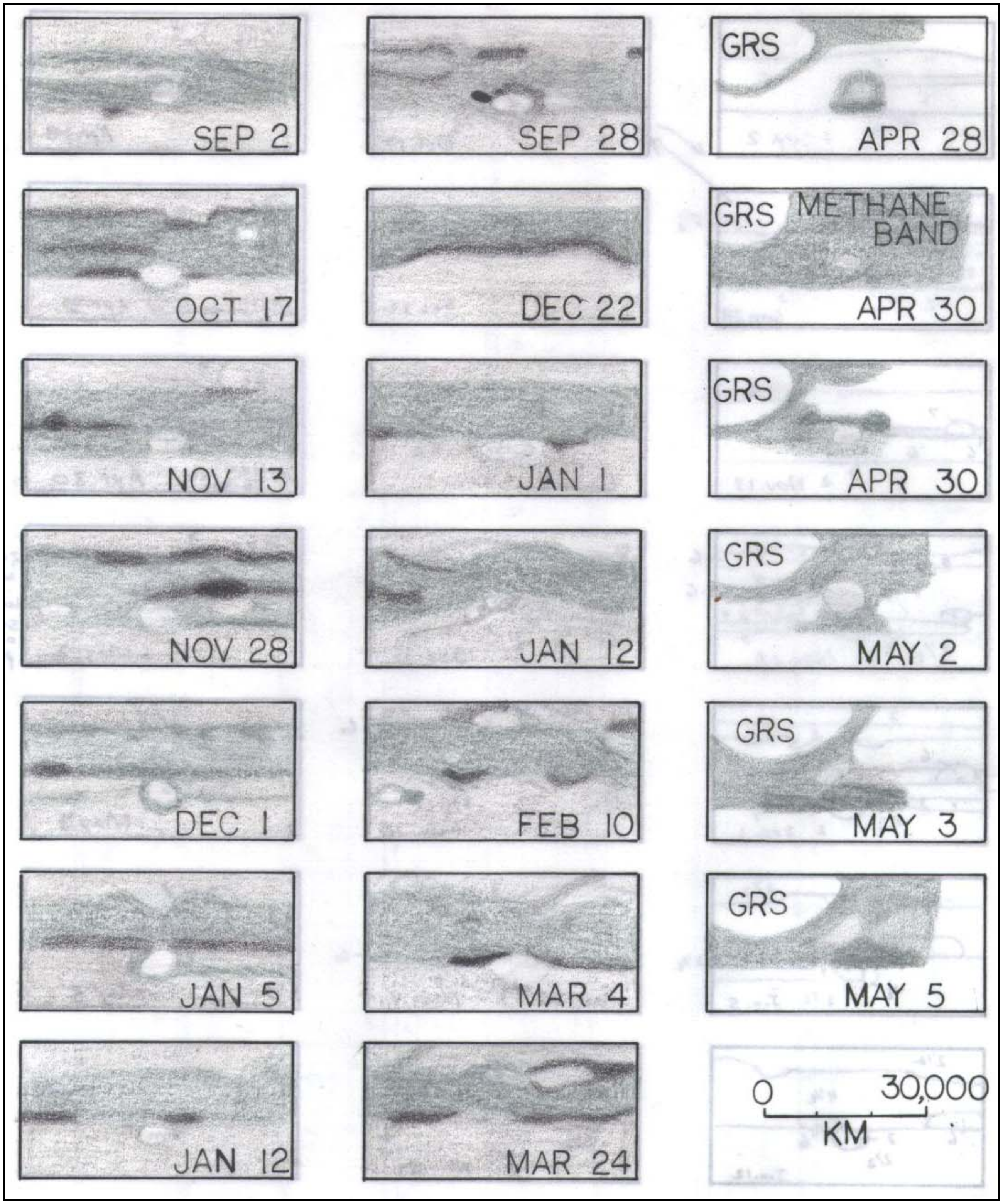

Figure 7: Drawings of features N7 (left), N23 (center) and S13 (right). South is at the top in all images and longitude increases as one goes to the right.

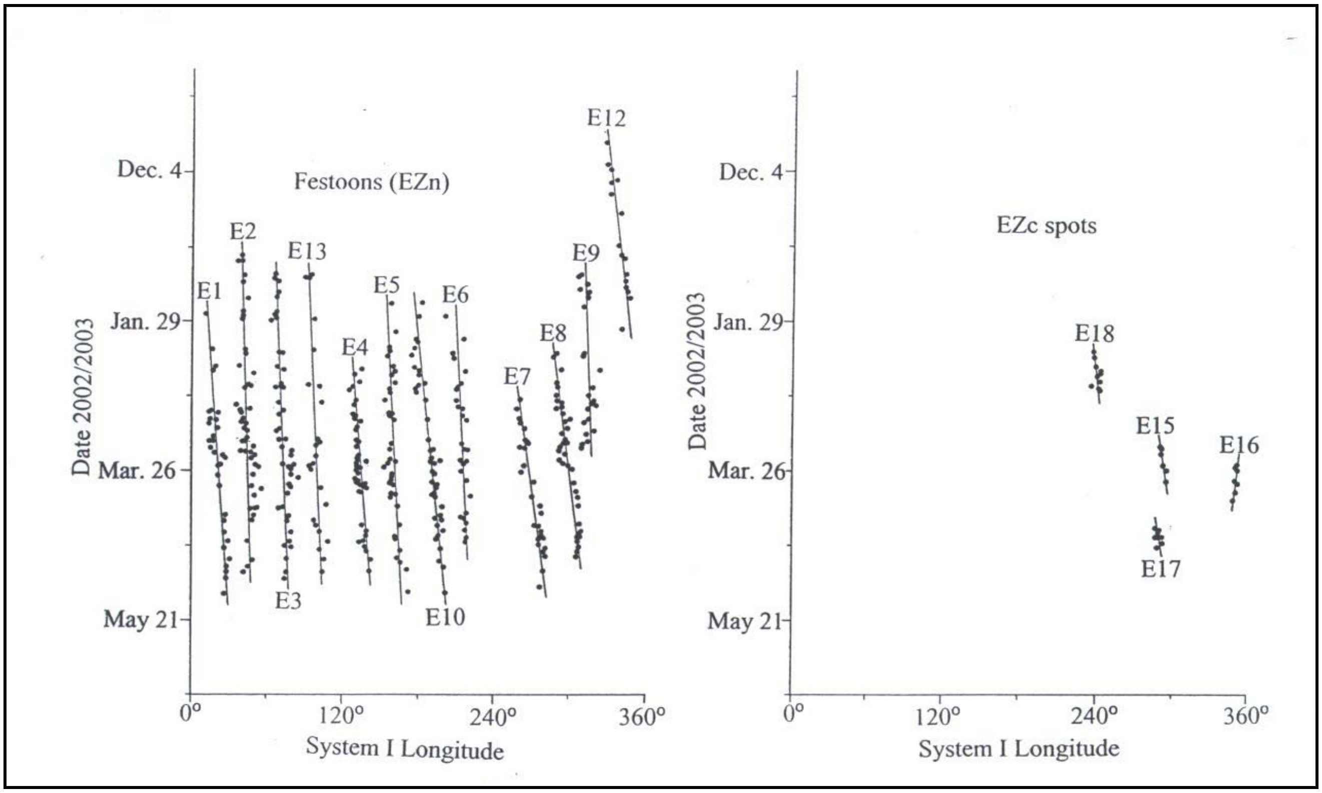

Figure 8: Drift rates of various features in the EZ.

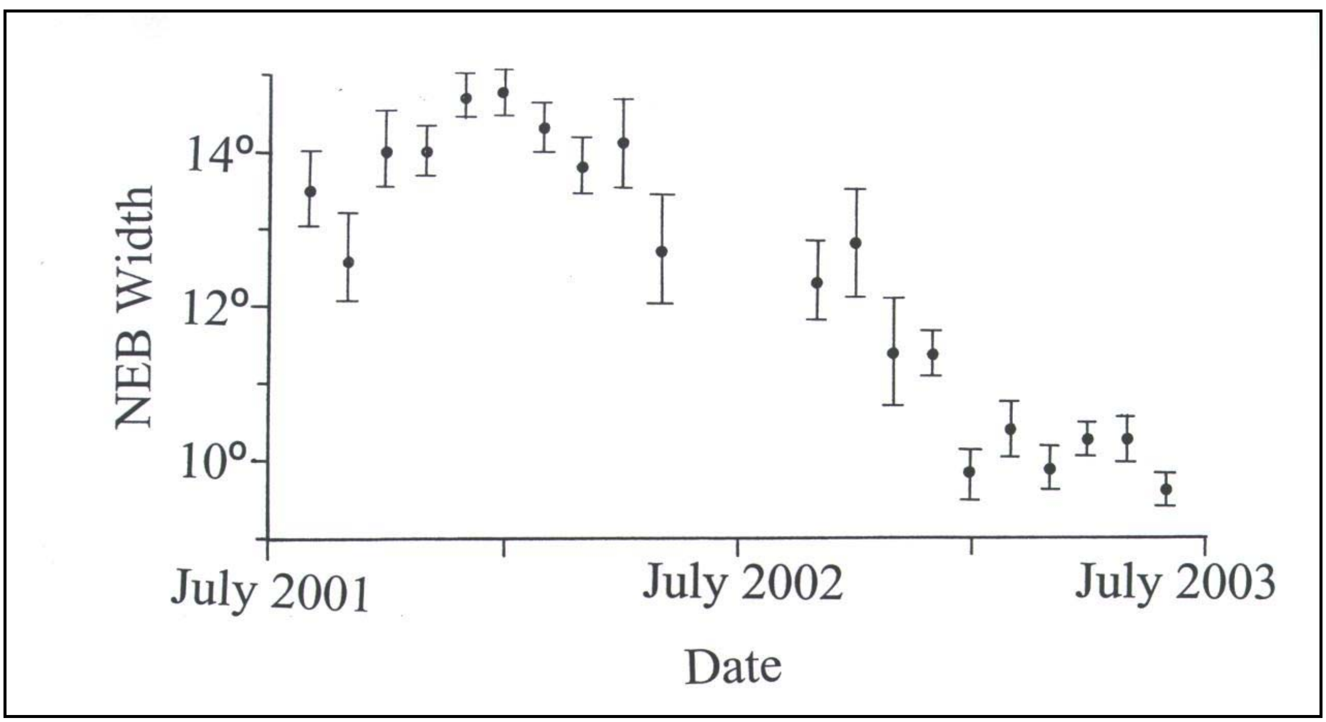

Figure 9: Average width of the NEB in degrees of latitude plotted against the date. Error bars are the standard deviation divided by the square root of n where n is the number of measurements. The value of n was usually six.

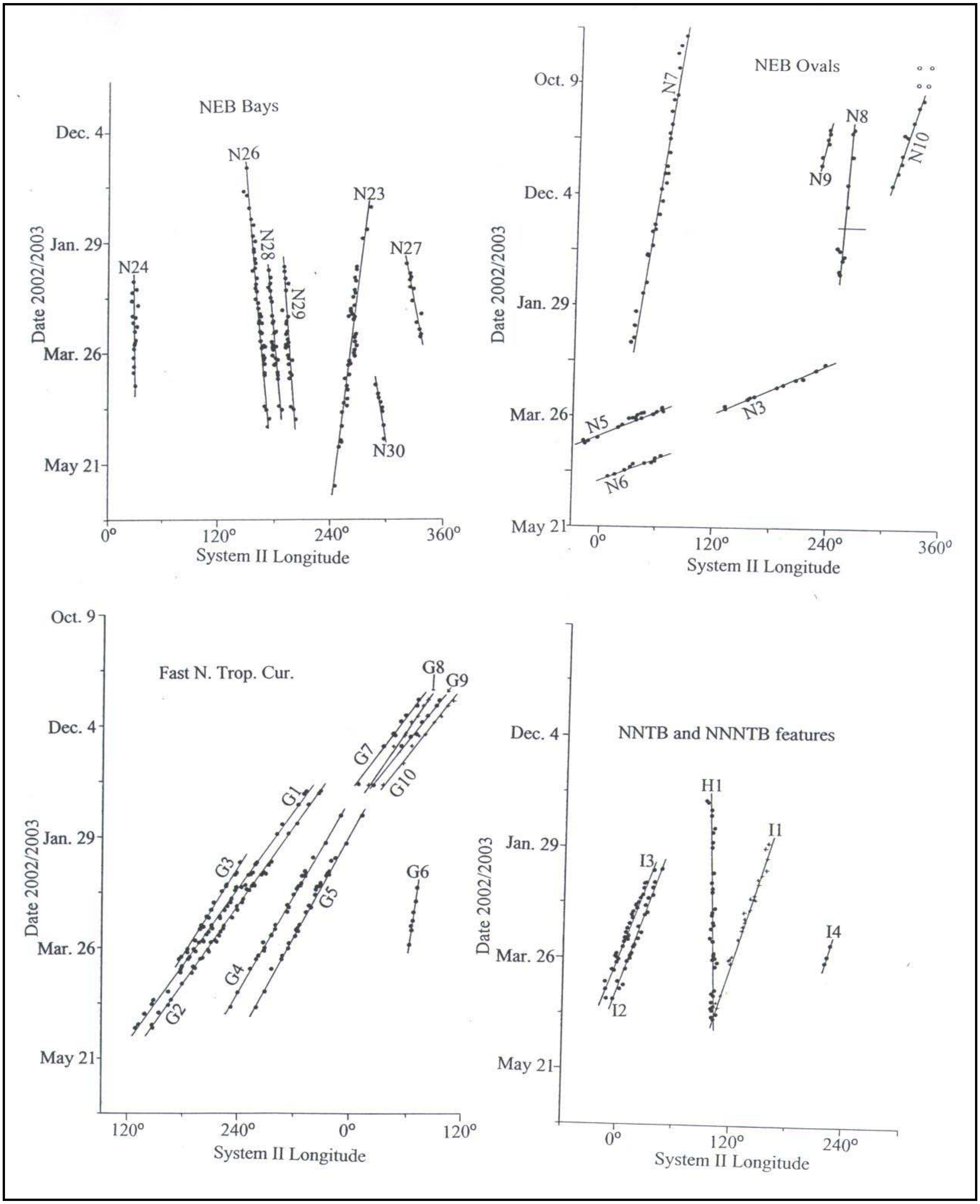

Figure 10: Drift rates of various features in the northern hemisphere of Jupiter. Lines are approximate longitudes measured from drawings.

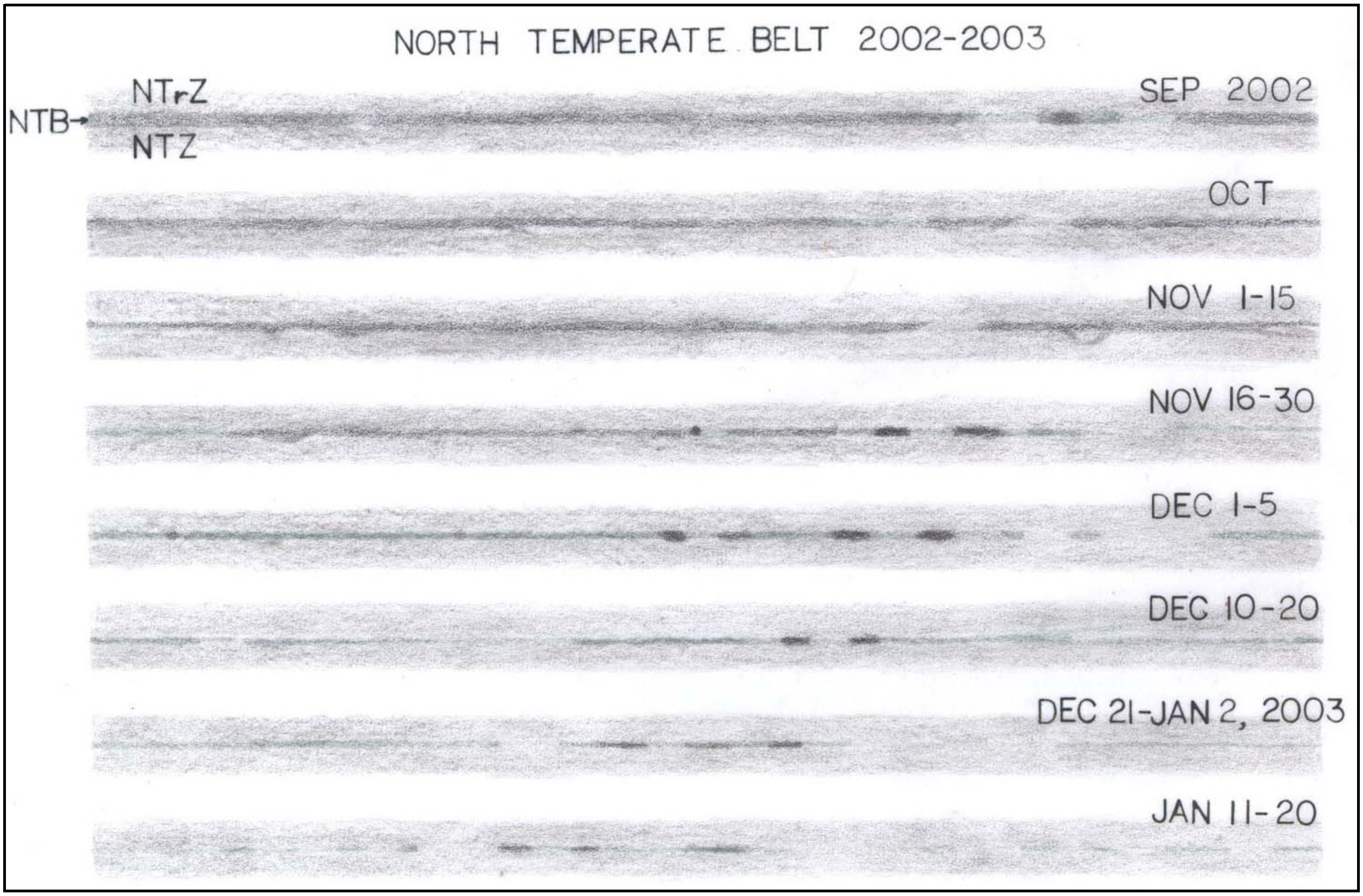

Figure 11: Maps of the NTB made by the writer from CCD/video images. Note that the NTB became both narrow and faint by the end of 2002. The far left in all drawings is at a system III longitude of 0º and the far right in all drawings is at a system III longitude of 360º.

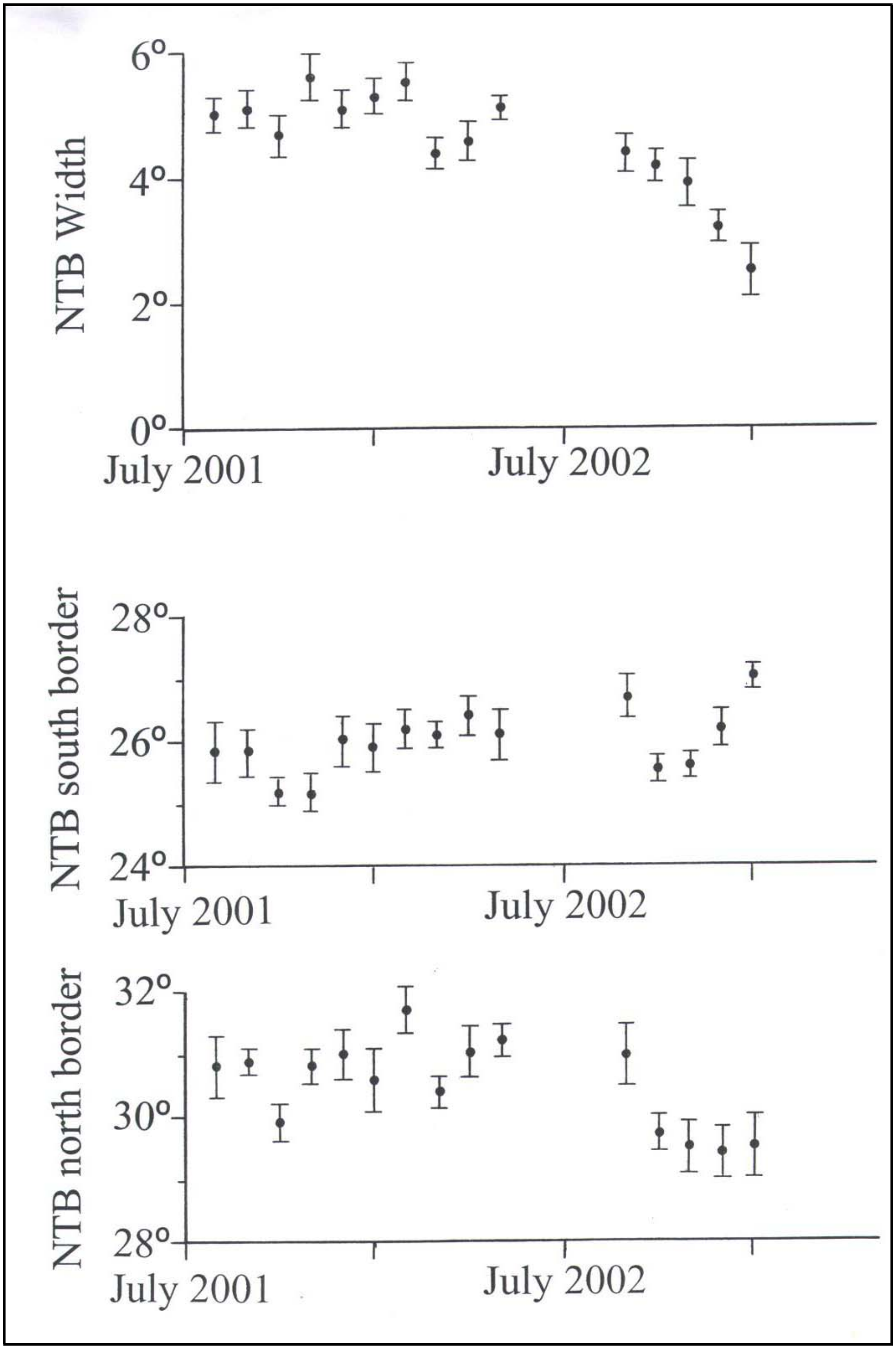

Figure 12: Graphs of the width of the NTB (top), the planetographic latitude of the NTBs (middle) and the planetographic latitude of the NTBn (bottom) versus the date. Note that the NTB became both narrow and faint by the end of 2002.

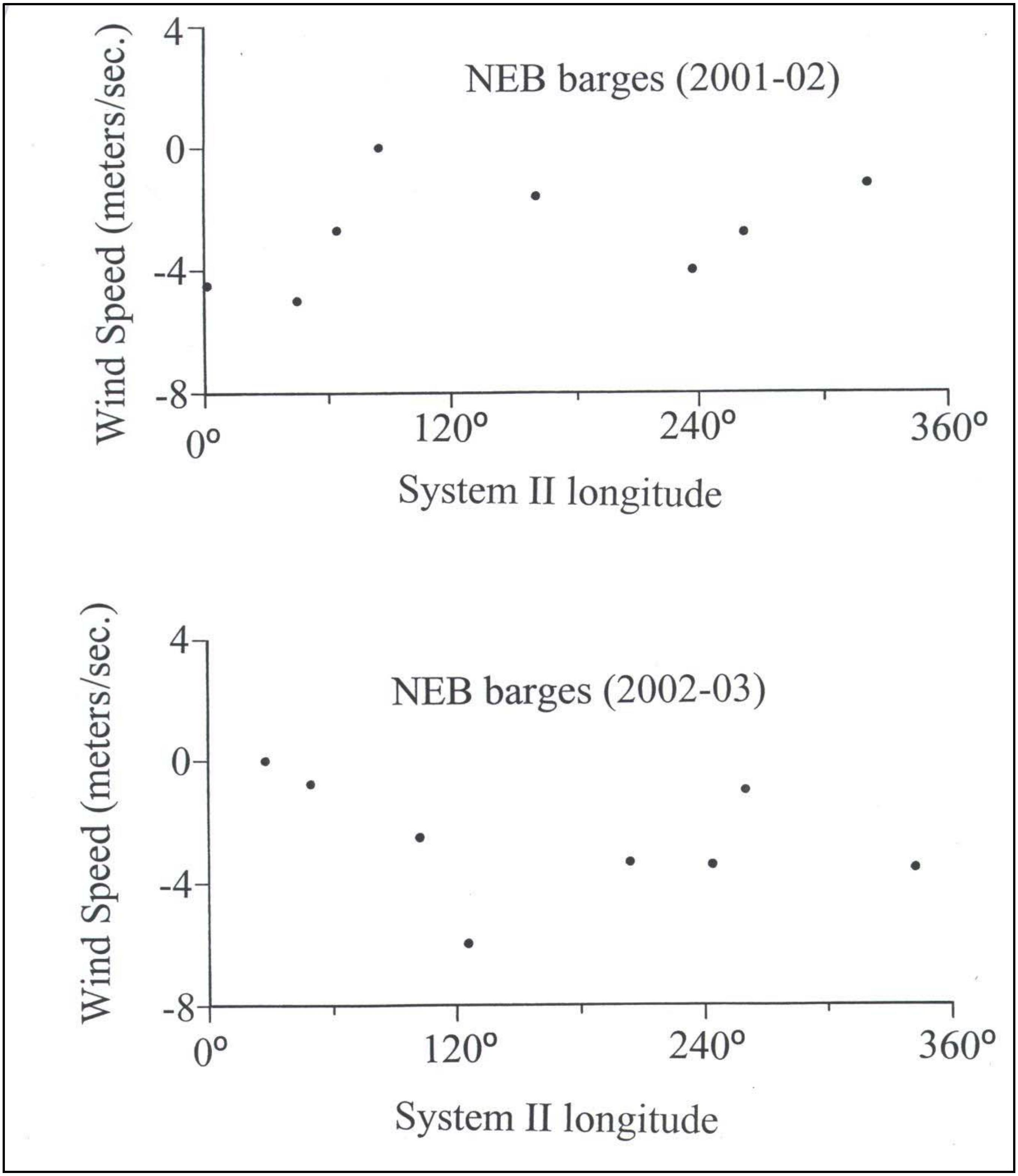

Figure 13: Graphs of wind speed versus the system II longitudes for the NEB barges during the previous apparition (top) and the current apparition (bottom). Error bars are the standard deviation divided by the square root of n where n is the number of features measured.

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Ken Poshedly. Send ALL papers, submissions, etc., to 1741 Bruckner Ct., Snellville, GA 30078-2784; e-mail poshedly@bellsouth.net

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- Assistant Coordinator & Scientific Advisor; Sanjay Limaye, University of Wisconsin, Space Science and Engineering Center, Atmospheric Oceanic and Space Science Bldg. 1017, 1225 W. Dayton St., Madison, WI 53706
- Assistant Coordinator, Transit Timings; John McAnally, 2124 Wooded Acres, Waco, TX 76710
- Assistant Coordinator, Newsletter; Craig MacDougal, 821 Settlers Road, Tampa, FL 33613
- Assistant Coordinator, Galilean Satellites; John E. Westfall, P.O. Box 2447, Antioch, CA 94531-2447
- Scientific Advisor; Prof. A. Sanchez-Lavega, Dpto. Fisica Aplicada I, E.T.S. Ingenieros, Alda. Urquijo s/n, 48013, Bilbao, Spain wupsalaa@bicc00.bi.ehu.es

Saturn Section

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

Remote Planets Section

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

Comets Section

- Acting Coordinator; Gary Kronk, 132 Jessica Dr, St. Jacob, IL 62281-1246
- Assistant Coordinator; James V. Scotti, Lunar and Planetary Lab, University of Arizona, Tucson, AZ 85721

Meteors Section

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

Meteorites Section

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

Eclipse Section

Coordinator; Michael D. Reynolds, associate dean, Math & Science, Florida Community College, 3939 Roosevelt Blvd, E-345, Jacksonville, FL 32205

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Benton, J.L.	jlbaina@msn.com
Brasch, K.R.	m_brasch@earthlink.net
Baum, R.	richardbaum@julianbaum.co.uk
Cook, A.	acc@cs.nott.ac.uk
Cudnik, B.	cudnik@sbcglobal.net
Darling, D.O.	DOD121252@aol.com
Dembowski, W.	dembowski@zone-vx.com
Dobbins, Tom	r&d@organictech.com
Douglass, E.	ejdftd@mindspring.com
Garfinkle, R.A.	ragarf@earthlink.net
Garrett, L.S.	atticaowl@yahoo.com
Gossett, R.	rick2d2@sbcglobal.net
Grafton, E.	egrafton@ghg.net
Gray, R.	sevenvalleysent@yahoo.com
Haas, W.H.	haasw@zianet.com
Hay, K.	kim@starlightcascade.ca
Hill, D.	dhill@lpl.arizona.edu
Hill, R.	rhill@lpl.arizona.edu
Hines, D.	cmpterdevil@hotmail.com
Huddleston, M.W.	kc5lei@sbcglobal.net
Jenkins, J.	jenkinsjl@yahoo.com
Joyce, D.	djoyce@triton.edu
Kronk, G	kronk@cometography.com
Lamm, J.S.	jlspacerox@aol.com
Larson, S.	slarson@lpl.arizona.edu
Limaye, S.	sanjayl@ssec.wisc.edu
Lunsford, R.D.	lunro.imo.usa@cox.net
MacDougal, C.	macdouc@verizon.net
McAnally, J.	CPAJohnM@aol.com
Melillo, F.	frankj12@aol.com
Minton, R.B.	(inactive)
Parker, D.C.	park3232@bellsouth.net
Pilcher, F.	pilcher@hilltop.ic.edu
Poshedly, K.	poshedly@bellsouth.net
Reynolds, M.	Astrogator90@comcast.net
Robertson, T.J.	cometman@cometman.net
Sanchez-Lavega, A.	wupsalaa@bicc00.bi.ehu.es
Sanford, J.	starhome@springvillewireless.com
Santacana, G.E.	laffitte@prtc.net
Schmude, R.W.	schmude@gdn.edu
Scotti, J.V.	jscotti@lpl.arizona.edu
Slaton, J.D.	jd@justfurfun.org
Timerson, B.	btimerson@rochester.rr.com
Troiani, D.M.	dtroiani@triton.edu
Ulrich, R.K.	rulrich@uark.edu
Venable, R.J.	rjvmd@knology.net
Wessling, R.J.	pinesop@aol.com
Westfall, J.E.	johnwestfall@comcast.net
Will, M.	will008@attglobal.net

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- **Monograph Number 9**. *Does Anything Ever Happen on the Moon?* By Walter H. Haas. Reprint of 1942 article. 54 pages.Download pdf from *http://www.alpo-astronomy.org* (no charge); or order hard copy from *The Strolling Astronomer* Science Editor, $6 for the United States, Canada, and Mexico; $8 elsewhere.

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- **Lunar & Planetary Training Program:** *The Novice Observers Handbook* $15. An introductory text to the training program. Includes directions for recording lunar and planetary observations, useful exercises for determining observational parameters, and observing forms. Send check or money order payable to Timothy J. Robertson, 2010 Hillgate Way #L, Simi Valley, CA 93065.

- **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.

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

- **Venus (Benton):** (1) *ALPO Venus Observing Kit,* $17.50; includes introductory description of ALPO Venus observing programs for beginners, a full set of observing forms, and a copy of *The Venus Handbook.* (2) *Observing Forms,* free at *http://www.lpl.arizona.edu/~rhill/alpo/venustuff/venusfrms.html* 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.

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

- **Lunar**: *The Lunar Observer*, official newsletter of the ALPO Lunar Section, published monthly. Free at *http://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

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

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- **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 8564l-2309.

- **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 MacDougal. (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 the 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 to *The Saturn Handbook* in early 2006. (2) *Saturn Observing Forms*, free at http:www.lpl.arizona.edu/~rhill/alpo/satstuff/satfrms.html 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.

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