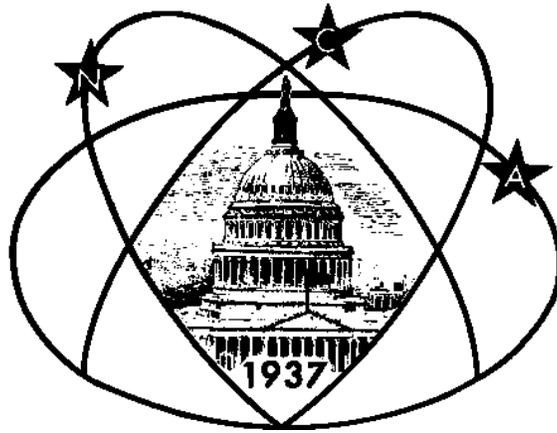


Star



Dust

National Capital Astronomers, Inc.

Volume 60, Number 1

September 2001

ISSN 0898-7548

Lou Mayo to talk about “Titan—Our Second Sister Planet” *submitted by Gary Joaquin*

Lou Mayo will present the featured talk for the September 8 meeting of National Capital Astronomers, “Titan - Our Second Sister Planet”. The meeting will be held in the Lipsett Amphitheater in Building 10 (Clinical Center) of the National Institutes of Health in Bethesda at 7:30 P.M. The synopsis and biography were both written and submitted by the speaker.

Synopsis

Since its discovery by Christian Huygens in 1655, Titan has been one of the most interesting and mysterious objects in our solar system. With the identification of methane (1944) and subsequently nitrogen and numerous species of nitriles and

hydrocarbons from later ground-based and Voyager observations, Titan is truly unique as the only moon in the solar system with a substantial atmosphere. Its surface, hidden visually by a high altitude photochemical haze, can be probed only in a few restricted infrared wavelengths and with active radar measurements.

This talk will provide an overview of our current understandings of the physical properties of Titan highlighting some of the methods and instruments used to obtain them. Details of the Voyager I and 2 flybys as well as more recent HST and ground based observations will be dis-

(Continued on page 2)

New Views of the Sun-Earth System Review of June Lecture by Thomas Moore *By Nancy Byrd*

At the June 2001 NCA meeting, Dr. Thomas E. Moore, head of the Interplanetary Physics Branch of the Laboratory for Extraterrestrial Physics at NASA/Goddard Space Flight Center, presented a talk entitled “Imaging the Plasma Universe”. This talk, using data from the Image Project at NASA, gave many of us an entirely new way of looking at our solar system neighborhood. Dr. Moore, who earned his Ph.D. in astrogeophysics, started his talk by musing that geophysicists had been waiting 20 to 30 years for that which optical astronomers have always had – pictures. But now the Image mission, which Dr. Moore described and whose spacecraft has been in orbit for one year, is giving them (and the rest of

us) exactly that.

He briefly reviewed our changing views of the Earth and environs by showing first a picture from an optical photo of Earth from an Apollo mission. This mission (late 70s and early 80s) also revolutionized our view of Earth by showing Earth as a ball in space. He showed a DE-1 spacecraft picture of Earth’s Aurora (1981) – showing that the aurora is a prominent feature of Earth as seen from space. He then presented two images from Image: one, an image of the Earth’s plasmasphere taken by the Image EUV instrument, and the other, the cover of a recent Science Magazine with another

(Continued on page 3)

The President’s Corner

As your new NCA president, I want to welcome you to another year and to discuss some projects the board of directors would like to institute. I want to start, though, with a good news/bad news note. NIH has turned over the scheduling of events in its auditoria to an outside company. Unfortunately, they now want money and maybe relevance to NIH’s mission in order to use the facilities. Everything is OK for September, but things might change for the October meeting, which is in the next fiscal year. Therefore, you can help us by looking around for potential meeting sites. We require seating for at least 65, both a slide and an overhead projector, a nearby Metro stop, and it would be nice if there were nearby restaurants. If you know of another suitable meeting place, please let me know: contact me at jhmiller@os2bbs.com or 301-530-7942 (H).

We would like to expand NCA beyond just the monthly meetings, get the membership more involved and, maybe, entice more people to join. To foster better communication among the membership we have instituted an email group on Yahoo. To learn more about it go to the web site: [//groups.yahoo.com/group/capitalastronomers](http://groups.yahoo.com/group/capitalastronomers). To send a message to the group address it to: capitalastronomers@yahoo.com. To get more people observing we are also going to start some Special Interest Groups (SIGs). We already have one on telescope making, but we could expand it by having people come to the class site to just discuss telescope making. Since

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NCA Events This Month

The Public is Welcome!

NCA Home Page: <http://capitalastronomers.org>

Fridays, September 7, 14, 21, 28, from 7:00 to 10:00 P.M. Mirror-making classes at American University in Washington, D.C. Classes are very informal, and you can start at any time (see article in this issue). Rooms 9, 13, and/or 14 (basement), McKinley Hall, near the A.U. library, just off Nebraska Avenue near Ward Circle NW. Call or email Guy Brandenburg at 202-635-1860 or gfbranden@earthlink.net for details.

Fridays, September 7, 14, 21, 28. Open nights with NCA's 14-inch telescope at Ridgeview Observatory near Alexandria, Virginia. Observing times vary; see ad below.

Saturday, September 8, 5:30 P.M.
Dinner with the speaker and NCA members at

O'Donnells Restaurant
8301 Wisconsin Ave.
Bethesda, MD

telephone: 301 656-6200
See the map and directions on Page 8.

Saturday, September 8, 7:30 P.M. -
NCA meeting at the Lipsett Amphitheater in Building 10 (Clinical Center) of the National Institutes of Health in Bethesda, Maryland.

Lou Mayo will present the featured talk "Titan - Our Second Sister Planet".

(Continued from page 1)

there are so many different type of objects in the sky we could also have a group devoted to observing techniques. I've thought about having a little session at my house on solar observing since that's what I've been doing for about 20 years. Other possible groups are occultations (which already exists) and outreach, i.e., going to schools, public observing, etc.

For night time observing we need dark sites. For the past several years there has been a group of Montgomery County amateurs that have been meeting at one of the parks in the upper county. I'm also looking into other potential sites. If you know of any sites in the metro area please let us

know. We can put it on the email list and the NCA web site.

Our NCA Science Fair winners did quite well in other events. Sabrina Snell, our winner in the district, won \$5000 from the AAS and the ASP at the International Science and Engineering Fair while Brinda Thomas from Montgomery County was presented with a Meade telescope at the Astronomical League convention in July in Frederick, MD.

Speaking of the Astronomical League, they have suggested to NASA that an amateur telescope be attached to the International Space Station. NASA is enthusiastic about it and the AL is working with NASA and Boeing on a 14-16 inch reflector to go up

Lou Mayo

(Continued from page 1)

cussed. The author will present the findings of his own research into Titan's cloud/precipitation processes and their implications for seasonal variations as well as possibilities for the nature of Titan's surface. In addition he will present a case for identifying Titan as an important addition to NASA's plans to search for life in our solar system.

Biography

Lou Mayo is a planetary scientist working for Raytheon at the NASA/Goddard Space Flight Center. He has over 20 years experience supporting NASA space and Earth science missions including 11 years as a member of the Voyager Infrared team. He has published a number of papers on the atmosphere of Titan focusing on radiative transfer modeling of tropospheric and stratospheric condensates. In addition, he leads the Raytheon ITSS education and public outreach program and is a member of the NASA/OSS Sun-Earth Connection Forum and the DC Space Grant Consortium. He also spends much of his time giving public lectures on planetary science and teaching the wonders of the night (and day!) sky to school children, teachers, and civic groups.

after the ISS is completed.
The AL would operate this ISSAT.

If you want to discuss any of this, you can contact me at jhmiller@os2bbs.com or on the above mentioned NCA email list.

Jay H. Miller

Free Offer

Observing with the NCA C-14

Date
Sept. 7, 14, 21

Prime Object
Mars

Time
8:00 - 9:30 p.m.

Last chance to observe Mars in this opposition.

Sept. 28

Gibbous Moon

8:30 p.m.

At Ridgeview Observatory in Bob Bolster's backyard, 6007 Ridge View Drive, Franconia, Virginia (off Franconia Road between Telegraph Road and Rose Hill Drive).

Call Bob at 703-960-9126 before 6:00 p.m., to let him know you are coming.

Review of June Lecture by Thomas Moore

(Continued from page 1)

Image picture. He next presented a composite picture of the Aurora from the Defense Meteorological Spacecraft Program, which vividly demonstrates that the aurora is really a fluid dynamic phenomenon.

Background

The “magnetosphere” of Earth is the region where the magnetic field of Earth is the dominant field. Dr. Moore explained its structure with a cartoon schematic of the magnetosphere, that showed a great amount of complexity. Starting closest to the Sun is the “bow shock” at about 10 Earth radii from Earth (R_E), which is where the solar wind encounters a pressure buildup from the Earth’s magnetic field, which deflects the plasma (a stream of charged particles) coming from the Sun around the Earth. Behind the bow shock is the “magnetopause,” the boundary of the Earth’s magnetosphere, which is compressed on the day side and greatly drawn out on the night side. Also notable on the day side is the auroral “cusp”, the place where the magnetic field lines converge on the magnetic pole.

The field on the night side is known as the “magnetotail.” This tail may extend as much as 220 R_E . Its structure has two lobes (bundles of nearly parallel field lines), one on the north oriented toward the north pole and one on the south oriented away from the south polar region. Between the lobes is the region known as the plasma sheet. This has a weaker magnetic field and denser plasma than the lobes, which are almost empty. The diagram also showed various currents associated with the field, including the ring current, an equatorial band of current, around the earth, a day side magnetopause current - an equatorial current flowing parallel but in the opposite direction from the ring current, a nighttime magnetopause current which flows in a direction 90° from the day side magnetopause current, around the magnetotail, the cross-tailed current which flows across the tail in the equatorial plane, and others.

The plasma sheet can be a region of considerable turbulence in a magnetic storm or substorm; these eddies can be a source of fresh ions for the plasma sheet and for the aurorae. Dr. Moore presented a movie, simulating what we believe to be the process.

The Image Project Objectives

The Image mission’s objectives are to answer the following questions:

1. What are the dominant mechanisms for injecting plasma into the magnetosphere on substorm/storm time scales?
2. What is the directly driven response of the magnetosphere to changes in the solar wind?
3. How and where are magnetospheric plasmas energized, transported and lost?

The Image Spacecraft

The Image spacecraft is an observatory with four instruments for observing the Earth’s plasmasphere and magnetic field. It is an octagonal cylinder 2.25 meters in diameter and 1.52 meters in height. The instruments on board are EUV (the extreme ultraviolet imager), FUV (the far ultraviolet imager), RPI (the radio plasma imager), and three neutral atom detectors: HENA (high energy neutral atom detector) which traps atoms with 20 keV to 500 keV, MENA (medium energy neutral atom detector) which traps atoms with 1 keV to 50 keV, and LENA (low energy neutral atom detector) which traps atoms with 10eV to 1 keV energy. The RPI has two 10-meter axial antennae and four radial antennae, each extended to 250 meters in length.

The spacecraft was launched March 25, 2000. Its orbit has an apogee of 7.2 R_E , a perigee of 1000 km, inclination 90°. The major axis, which was inclined 40° to the Earth’s equator initially, has precessed to where it is now parallel to the Earth’s axis of rotation, and will continue precessing until 1 year from now when it will again be at 40° from the equator. Its orbital period is 14.2 hours; its spin period is 2 minutes.

The Results

Dr. Moore then showed some of the excellent images returned to date by the Image observatory. He showed movies of the Bastille day (July 15, 2000) aurora taken with the FUV instrument, and images showing “footprints” of the supra cusp and plasma tail in proton precipitation patterns, several plasmasphere movies (EUV data) illustrating the development of a sunward tail during a magnetic event, and some with a characteristic shoulder opposite the tail. This shoulder, which along

with the tail also appeared in some simulations from Rice University, appears to occur late in a magnetic storm/substorm sequence. The RPI instrument package picked up echoes ducted in a dusty region of a lobe in the plasmasphere.

The ENA instruments all appear to be making significant contributions. These ENAs come from several sources: dust in orbit around the Sun, interstellar gas, and the Earth geocorona, a cloud of neutral hydrogen surrounding the Earth. They may also occur secondarily as products of collision of the energetic solar wind ions with other particles. Such collisions will yield an observable glow. He demonstrated evidence of these in images that he showed. Dr. Moore presented several HENA images with evidence of the ring current, some LENA plots showing the Sun before a coronal mass ejection, after, and its effect on the Earth’s plasmasphere with both northern hemisphere and south-polar views, albeit at different times. He showed a lag in movement of lower energy neutral atoms relative to higher energy neutral atoms during the course of an event and still other examples. He also compared images of the same event taken with different instruments and found good corroboration between them.

Conclusions

Dr. Moore ended his talk by listing the following milestones met by the Image project:

1. Plasmasphere and hot plasma shown to have predicted and surprising structures. Some surprises have been explained.
2. Hot storm plasma shown to be injected over a wide front.
3. Hot plasma inner edge shown to track cold plasma outer edge.
4. Solar wind shown to contain and/or produce fast neutrals, yielding new measurement of solar system dust.
5. Proton aurora reveals multiple day side reconnection sites controlled by interplanetary magnetic field (IMF).
6. Ionosphere plasma outflow shown to track solar wind pressure pulses closely and to be indifferent to IMF.
7. New observation of interstellar atoms and their depletion near the Sun.

This would appear to be a very successful project. NCA thanks Dr. Moore for sharing these results with us.

NCA TREASURER'S REPORT

Jeffrey Norman

July 1, 2000 to June 30, 2001

INCOME

Dues	\$	7614.00
Gifts		718.00
Interest		424.88
Telescope-making Classes and Handbook Sales		243.00
Total Income	\$	8999.88

EXPENSES

IDA Dues	\$	100.00
Miscellaneous		75.57
Secretary		170.29
<i>Sky & Telescope</i> Subscriptions		3234.60
Speakers' Dinners		399.68
<i>Star Dust</i>		4357.56
Total Expenses	\$	8337.70

Balance - July 1, 2000	\$	13141.61
Excess Income over Expenses		662.18
Balance - June 30, 2001	\$	13803.79*

Total number of paying members joining or renewing from 7-1-99 to 6-30-00	174**
Total number of paying members joining or renewing from 7-1-00 to 6-30-01	162**
Decrease in Membership (6.9%)	12

MEMBERSHIP REVIEW

Total Paying Memberships as of 6-30 of Each Fiscal Year	
1992 -	223
1993 -	184
1994 -	163
1995 -	201
1996 -	179
1997 -	194
1998 -	169
1999 -	173
2000 -	174
2001 -	162

* The Balance includes \$5659.55 from the NCA Travel account.

** This does not include life members or science fair winners because they receive free memberships.

NCA BUDGET - FISCAL 2002

<u>Income</u>	
Dues	8200
Gifts	700
Interest	400
Telescope-making Classes and Handbook Sales	200
Total Income	9500
<u>Expenses</u>	
Int. Dark-Sky Assn.	100
Miscellaneous	50
Secretary	200
<i>Sky & Telescope</i> subscriptions	3700
Speakers Dinners	400
<i>Star Dust</i>	4400
Total Expenses	8850
<u>Surplus</u>	650

New NCA E-mail List

by Guy Brandenburg

Until now, NCA has not had an email list that members could use to exchange information quickly and easily. That gap has now been filled, and we have a list at capitalastronomers@yahoo.com.

To subscribe to the list, simply send a message to:
capitalastronomers-subscribe@yahoo.com
 You will then receive a confirmation.

To post a message for all members to read, post it to:
capitalastronomers@yahoo.com

Your list moderator is Guy Brandenburg. A notice about this new list-serve was sent to every NCA member who gave an email address to NCA, but that was only about 1/3 of the membership.

Presentation by Science Fair Winner

by Nancy Grace Roman

Sabrina Snell was a NCA Science Fair Winner for 1999 and 2000. She recently received 4th place in the Intel International Science Fair and received the Priscilla and Bart Bok Award from the American Astronomical Society. She described her project, "The Optical Divide", at the June NCA meeting.

The USNO uses the Tycho 2 catalog for navigation. Sabrina used wide double stars listed in the Washington Double Star catalog (WDS) to compare Tycho 2 with Hipparcos. She filtered the WDS to select only stars with separations $\geq 20''$, $V < 7$, and $B < 9$. 144 stars met these criteria. Of the 66 stars in Hipparcos, 28 are in the main catalog as single stars.

Tycho 2, that compares 1800 positions with recent positions, agreed better with the WDS than with Hipparcos. Sabrina also projected the positions in the two catalogs to the epochs of the positions in the WDS. For three-quarters of the stars, the three positions do not line up, indicating errors in the catalogs. Tycho 2 compares Tycho with many ground-based catalogs. The short baseline of the observations employed in Tycho 2 did not provide the accuracy in the proper motions included in Tycho 2 even though the modern positions are as good or better.

Mirror Making

by Guy Brandenburg

This article is for those who were wondering just what it is that we do at the NCA mirror and telescope making class held on Friday evenings from 7 to 10:30 p.m. at the American University's McKinley Hall, rooms 9 or 13 (basement). We have had these notices in Star Dust for some time, and I thought it might be a good idea to explain a little bit about what we do, and why.

One of the best ways to learn about astronomy is to use a telescope and to observe light from planets, galaxies, nebulae, and clusters of stars for yourself. You can certainly purchase a telescope, but you should also consider the idea of MAKING one yourself.

A home-made reflecting telescope is actually not all that hard to make, and, frankly, it gives brighter and more accurate images than the average Schmidt-Cassegrain or Maksutov that costs 10 to 20 times as much for the same aperture. A home-made telescope on an alt-azimuth, or "Dobsonian", mount, is also far easier to use than an equatorially-mounted refractor. (And you cannot afford a 6-inch diameter refractor unless you have tens of thousands of dollars in disposable income!) If you only have a few hundred dollars, and you go and buy a department-store or nature-store scope for that price, you will in all likelihood be sorely disappointed, because the mount will probably be very wobbly, the optics may be not very good at all, and the field of view will be so narrow that you can't find any of the objects you try to find, other than the Moon.

It is a simple fact that you can, for the money, make a better telescope than you can buy. Not only that, but in the NCA mirror-making class you can actually grind, polish, and figure the mirror with your own hands, using only simple hand tools. You can make the mirror accurate to a few millionths of an inch, literally a few atoms' thickness, and create a surface so accurate that light that traveled for literally millions of years can reflect off your parabolic mirror and come to a focus in your eye.

If you construct your own telescope, and especially if you grind and polish your own mirror, you will also learn a lot about how telescopes actually work. (You will also uncover a few secrets about those mysterious 80- and 120-grit sandpapers you find in

hardware stores!)

If this sounds interesting, there are a few things you can do. First, go to a library and check out one or more books on telescope making. I recommend some of the more recent titles, such as Richard Berry's *Build Your Own Telescope* or Robert Miller and Kenneth Wilson's *Making & Enjoying Telescopes* or *The Dobsonian Telescope* by David Kriege and Richard Berry. If you want to delve further, you can also read *How to Make a Telescope* by Jean Texereau, although some of his ideas are a bit dated.

Secondly, you need to decide how good you think you are with your hands, what you want to observe, and how much disposable income and time you have. If you have no time at all, then you may as well save your money and just read *Astronomy* or *Sky & Telescope*, because astronomy takes time. If you feel that you are a complete and absolute klutz, but you have some time and lots of money, then you may want to get one of those computerized telescopes that do everything for you. But they really do cost a LOT, and the views are, frankly, not very good.

On the other hand, if you are not a complete klutz (i.e., you have done a few small home improvement projects and you didn't completely screw them up), and you have only a moderate amount of money (\$100-\$400, say), and you have some time, then you can make a telescope.

Deciding what you want to look at will also help. If you only want to look at the Moon and planets, then you will want a long focal length on your scope. This has the advantage of making the optics easy to fabricate, but it has the disadvantage that the scope will be rather long (thus hard to carry around), and objects in the sky will be relatively faint and hard to find if you ever change your mind and decide you want to find "deep-sky" objects such as star clusters or galaxies. If you want NEVER to look at the moon or planets, then you can make a "rich-field" scope, which has the advantages of having a short tube that is easy to carry about, and images will be relatively bright, objects are easy to find, and you can view large extended objects such as the Veil or Orion nebulae in their entirety. The disadvantage is that figuring the optics gets a little more time-consuming and difficult.

You can also compromise and have a moderate focal length, which gives you some of both sets of good qualities, without too many disadvantages at all.

For a first telescope, a good place to start is with either a 6" diameter f/8 telescope mirror, which means that the tube is going to be about 48 inches long, or an 8" f/6 scope, which has the same length tube. Either way, making the mirror itself takes somewhere between 30 and 70 hours of work, depending on your work habits and your luck in the final figuring process, as well as on how accurate you want the finished product to be. We have all the materials on hand at the class, though we sometimes have to order new Pyrex blanks if we run out.

What does one actually do when making a mirror? With supervision and guidance, you would:

- * decide what diameter and focal length telescope to make;
 - * begin to grind one piece of glass against another with a slurry of very coarse abrasive and water in between, to form your glass blank into a rough concave shape, using a particular type of stroke;
 - * after the correct depth of glass is ground out of the center of your blank, then you switch to a different stroke and begin to use carefully graded sequence of finer and finer grits, getting rid of the larger holes left by the previous grit;
 - * you continue this until you get to a point where grinding glass against glass cannot get any smoother;
 - * then you will make or use what jewelers and opticians call a "pitch lap" (involves melting and forming the pitch from pine trees) to begin the polishing process, using cerium oxide and/or jeweler's rouge;
 - * at this point you generally have created a section of a sphere, which must now be converted to a section of a paraboloid for perfect optics (unless you don't care about having perfect optics);
 - * this section of the work is known as "figuring" and involves simple optical tests named after the optical workers Foucault, Couder, and Ronchi, and slight variations on the strokes you learned before.
- Once the optics are as perfect as you want them to be, then the mirror needs to be alu-

(Continued on page 6)

Mirror Making

(Continued from page 5)

minized -- which means, putting a very thin layer of aluminum on it, in a vacuum chamber (which we have), so that the light from those stars can bounce off the aluminum and come to a focus in your eyeball. The purpose of all of that work on the glass was to make it so that the aluminum is in the proper shape so that the images are not blurry.

How much does all of this cost? Not much, really. Our current fees for a Pyrex blank, use of a tool, abrasives, pitch, testing, and advice is only about \$75 for a 6-inch diameter mirror, and about \$125 for an 8-inch diameter mirror. If you want, you can purchase all the materials from one of several mail-order places, but you will actually pay more. The aluminizing is extra.

This is not the entire cost for the telescope, mind you. You will need to make or purchase several other items: eyepieces, focuser, finder scope(s), diagonal mirror, diagonal mirror holder/spider, primary mirror mount, optical tube, and overall mount for the optical tube. But that would be the subject of another article!

If you are interested, please contact Guy Brandenburg at gbranden@earthlink.net or 202-635-1860 for more information.

Deadline for October Star Dust: September 15

Please send submissions to Elliott Fein at elliott.fein@erols.com.

Text must be in ASCII, MS Word, or WordPerfect.

Thanks.

Other National Capital Area Meetings

Northern Virginia Astronomy Club (NOVAC) meets 7:00 p.m. on the second Sunday of every month. Meeting Site Change: Our regular meeting hall (Lecture Hall 1) will be under renovation for the next few months. The new meeting site is Enterprise Hall, Room 80 on the Fairfax campus of George Mason University. 703 803-3153. Source: <http://novac.com>

Greenbelt Astronomy Club

The Greenbelt Astronomy Club meets at 7:30 p.m. on the last Thursday of each month (except when it falls on a holiday) at the H.B. Owens Science Center on Greenbelt Road east of Greenbelt, Maryland.

September 20 Club Meeting

Attention: note meeting date change! Main Presentation: Russ Waugh, H.B. Owens Planetarium Director, "Star Chart Practicum". Russ will present a

brief talk on the history of constellations to be followed by an extended period of practice using star charts under the planetarium sky. Members are encouraged to bring their own planispheres or star charts. Free charts will be provided to anyone who needs one. Please bring a flashlight covered with red paper or cellophane. Source: heawww.gsfc.nasa.gov/docs/outreach/gac/GAC.html

Stellar & Extragalactic Astronomy Lunch

Talks are Wednesdays at 12:00 Noon in Room 242 of Building 21, GSFC Sept. 12 Sally Heap, GSFC, "A Database for the NVO". For more information, contact Jonathan P. Gardner, email gardner@harmony.gsfc.nasa.gov. Source: <http://hires.gsfc.nasa.gov/~gardner/seal>

Meteor Showers

September Radiants

Full Moon: September 2

Major Activity – None

Minor Activity		
Radiant	Duration	Maximum
Gamma Aquarids	September 1-14	September 7/8
Alpha Triangulids	September 5?-15?	September 11/12
Alpha Aurigids (AUR)	August 25-September 6	September 1/2
Eta Draconids	August 28-September 23	September 12/13
Gamma Piscids	August 26-October 22	September 23/24
Southern Piscids (SPI)	August 12-October 7	September 11-20

Source: <http://comets.amsmeteors.org/meteors>

Come See the Stars!

by Joe Morris

Exploring the Sky 2001 Schedule

Date	Time	Notes
9/22	8:00 P.M. (EDT)	Fall equinox
10/13	7:30 P.M. (EDT)	Mars bright in the constellation Sagittarius
11/10	7:00 P.M. (EST)	Leonids peak 11/18

Exploring the Sky is an informal program that for nearly fifty years has offered monthly opportunities for anyone in the Washington area to see the stars and planets through telescopes from a location within the District of Columbia.

Sessions are held in Rock Creek Park once each month on a Saturday night from April through November, in the field south of the intersection of Military and Glover Roads, near the Nature Center.

Beginners (including children) and experienced stargazers are all welcome - and it's free!

Questions? Call the Nature Center at (202) 426-6829 or check the Internet sites: <http://www.nps.gov/rocr/planetarium> or <http://www.capitalastronomers.org>

Star Dust Is Now Available Electronically

Any member wishing to receive *Star Dust*, the newsletter of the National Capital Astronomers, via e-mail as a PDF file attachment, instead

of hardcopy via U.S. Mail, should contact Nancy Grace Roman, the NCA Secretary, at ngroman@erols.com, or via telephone at 301-656-6092 (home)

Mid-Atlantic Occultations and Expeditions for September

by David Dunham

Asteroidal Occultations

DATE	Day	EDT	Star	Mag	Asteroid	dmag	Dur	Ap.	Location
							s	in	
Sep 7	Fri	22:02	ZC 3167	7.2	Titania*	6.4	76	1	Venezuela
Sep 9	Sun	0:16	SAO 165635	8.4	Antigone	2.7	9	2	Iowa & El Paso
Sep 14	Fri	4:10	TYC18451458	11.2	Delia	4.7	4	7	Quebec
Sep 18	Tue	0:35	TYC63031511	11.0	Maria	3.2	12	7	Ohio
Sep 19	Wed	23:20	SAO 110328A	7.4	Lucia	1.4	6	1	Florida
Sep 24	Tue	0:32	TAC-3 17274	11.6	Mathilde	1.1	10	8	s.e. Calif.; PDT
Oct 3	Wed	3:21	TYC19220485	11.8	Fidelio	2.9	3	8	w. Pennsylvania
Oct 4	Thu	1:13	SAO 191094	9.3	Aeternitas	3.6	7	3	Texas

*Titania is a satellite of Uranus, not an asteroid.

Lunar Grazing Occultations and a Grazing Annular Solar Eclipse

DATE	Day	EDT	Star	Mag	% alt	CA	Location
Sep 9	Sun	5:36	ZC 0577	6.0	65-69	14N	La Plata, MD & Fredericksburg, VA
Sep 11	Tue	3:53	SAO 077418	7.7	44-42	5N	Lexington Park, MD
Sep 12	Wed	6:00	SAO 078733	7.8	33-58	12N	Clinton & Nags Head, NC
Sep 13	Thu	2:54	SAO 079621	7.4	23-9	13N	Pea Island, NC
Oct 7	Sun	2:14	epsilon Tau	3.5	80-54	17S	Greenbelt, MD; DC; Arlington, VA
Dec 14	Fri	17:30	The Sun	-27	0	13	N Liberia, Costa Rica; eclipse*

* For more, see <http://iota.jhuapl.edu>

Total Lunar Occultations

DATE	Day	EDT	Star	Mag	% alt	CA	Sp.	Notes
Sep 9	Sun	2:56	R SAO 093615	7.2	65-47	63S	F5	
Sep 10	Mon	9:17	D Saturn	0.0	53-52	-71N		Disk duration 47s; Sun +29
Sep 10	Mon	10:29	R Saturn	0.0	53-39	74N		Disk duration 42s; Sun +41
Sep 11	Tue	1:41	R ZC 0843	6.9	45-17	84N	F8	mag2 7.8, sep. 3.9", PA 277d
Sep 12	Wed	1:58	R ZC 1014	7.0	34-10	81N	A0	Azimuth 69 deg.
Sep 12	Wed	6:18	R ZC 1036	6.5	32-58	86S	G8	Sun alt. -6 deg.
Sep 13	Thu	3:41	R ZC 1167	6.3	23-18	22S	K0	
Sep 14	Fri	4:05	R ZC 1315	7.1	13-10	80N	A2	Azimuth 71 deg.
Sep 14	Fri	4:07	R SAO 80413	8.2	13-10	57S	F8	Azimuth 72 deg.
Sep 19	Wed	20:07	D 94 Vir	6.5	9+8	43N	A0;	ZC 2020; Az. 252; double?
Sep 19	Wed	20:27	D 95 Vir	5.5	9+4	53S	F2;	ZC 2022; Azimuth 255 deg.
Sep 22	Sat	20:15	D V2106 Oph	7.4	36+20	54S	M2	mag. at min. 7.5
Sep 23	Sun	19:50	D SAO 185674	7.3	46+25	80N	F0	Sun alt. -10 deg.
Sep 26	Wed	23:12	D ZC 2991	6.1	75+23	71N	K5	
Sep 27	Thu	22:17	D ZC 3116	6.6	82+31	30S	K0	
Oct 6	Sat	5:52	R ZC 0527	6.2	86-55	62N	K0	
Oct 6	Sat	22:38	R ZC 0639	6.1	80-14	86N	F3	Az. 77 deg.; after NCA mtg.
Oct 7	Sun	0:52	R ZC 0654	6.0	79-39	65S	F4	
Oct 7	Sun	2:14	G epsilon Tau	3.5	79-54	-17S	K0	ZC 0668; bright side graze
Oct 7	Sun	4:21	R SAO 93973	7.1	79-71	59N	F6	

D following the time denotes a disappearance, while R indicates that the event is a reappearance. When a power (x; actually, zoom factor) is given in the Notes, the event can probably be recorded directly with a camcorder of that power with no telescope needed. The times are for Greenbelt, MD, and will be good to within +/-1 min. for other locations in the Washington-Baltimore metropolitan areas unless the cusp angle (CA) is less than 30 deg., in which case, it might be as much as 5 minutes different for other locations across the region. Mag is the star's magnitude. % is the percent of the Moon's visible disk that is sunlit, followed by a + indicating that the Moon is waxing and - showing that it is waning. So 0 is new moon, 50+ is first quarter, 100+ or - is full moon, and 50- is last quarter. The Moon is crescent if % is less than 50 and is gibbous if it is more than 50. Cusp Angle is described more fully at <http://www.lunar-occultations.com/iota>. Sp. is spectral type-color, O,B,blue; A,F,white; G,yellow; K,orange; M,N,S,C red

Check IOTA's Web sites at <http://www.lunar-occultations.com/iota> or at <http://iota.jhuapl.edu> for weather go/cancel decisions, and other updates. David Dunham, dunham@erols.com or 301-474-4722; car 301-526-5590.

Getting to the NCA Monthly Meeting

Saturday, September 8

5:30 P.M. - Dinner with the speakers and NCA members at

O'Donnells Restaurant
8301 Wisconsin Ave.
Bethesda, MD
301 656-6200

7:30 P.M. - NCA Meeting at Lipsett Auditorium in Building 10 at NIH. Lou Mayo will present the featured talk, "Titan - Our Second Sister Planet".

Directions to the Meeting Place

From Rockville Pike (Wisconsin Ave., Rt. 355), to get to the parking lot at the South entrance (this will be the entrance for the next three years or so until they finish the new wing) from Rockville Pike, enter NIH at the Metro Entrance: South Drive (traffic light). Go straight ahead. At the third stop sign you will be at the parking lot, but you will have to make a left turn, and then a right turn to get to the entrance to the lot. Make a right turn into the lot. Building 10 is just north of the parking lot. Enter the building and follow the signs to the Lipsett Auditorium.

From Old Georgetown Rd., enter at Lincoln Drive (traffic light nearest to Suburban Hospital). Go straight ahead. The second stop sign is at a T. Go left and left again, and the lot will be on the right. Make a right turn into the lot.

Metrorail Riders - From Medical Center Metro Station: Walk down the hill, past the bus stops. Continue straight past the anchor. At the second stop sign after the anchor, bear right up the incline into the entrance of Building 10, the tallest building on campus (walking time less than 10 minutes).

Taking the J2 or J3 buses from Silver Spring, get off at the Metro stop and follow the directions given for motorists from that point. If coming from Montgomery Mall, get off at the first stop in NIH, before the Clinical Center. There are signs near the ramp for the garage directing you into the side entrance. Walk straight through the building to the Lipsett amphitheater.

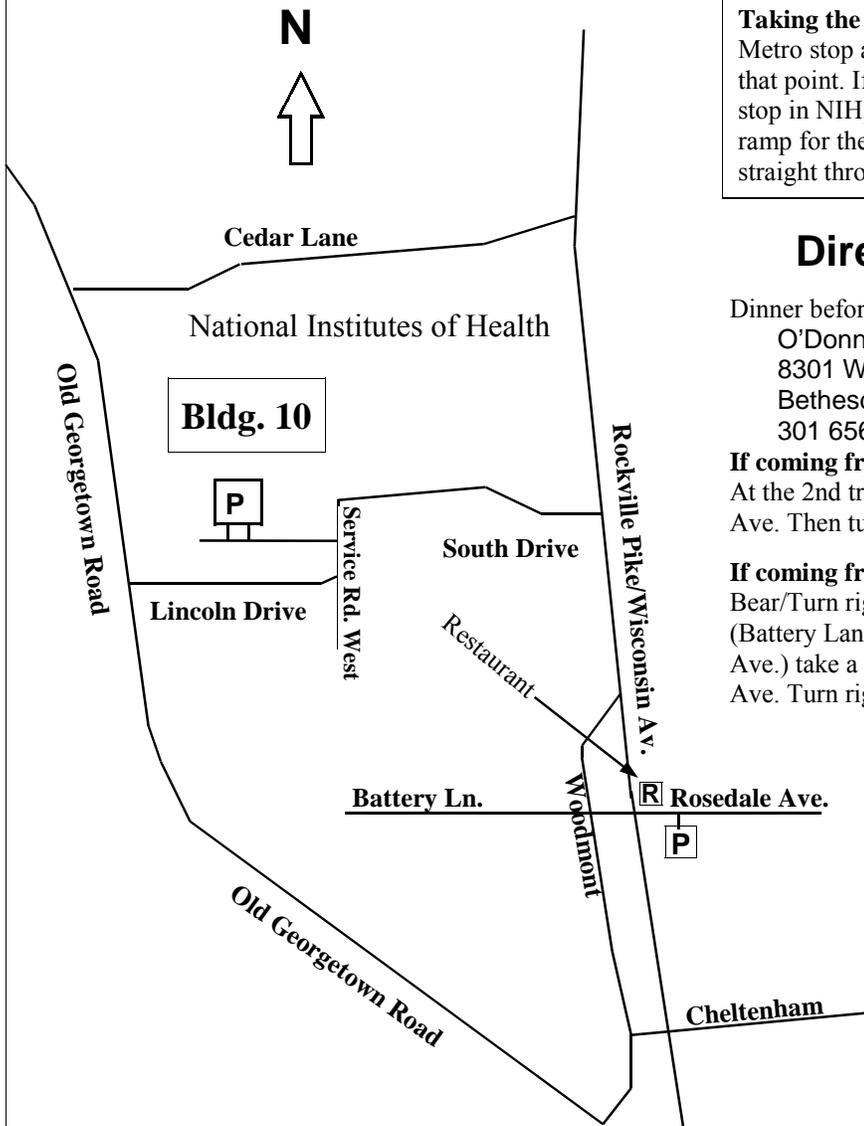
Directions to the Restaurant

Dinner before the meeting will be at 5:30 P.M. at
O'Donnells Restaurant
8301 Wisconsin Ave.
Bethesda, MD
301 656-6200

If coming from south of Bethesda, go north on Wisconsin Ave. At the 2nd traffic light after Cheltenham, turn right onto Rosedale Ave. Then turn right into the restaurant's parking lot.

If coming from north of Bethesda, go south on Rockville Pike. Bear/Turn right onto Woodmont Ave. At the next traffic light (Battery Lane), turn left. At the next intersection (Wisconsin Ave.) take a slight dogleg to cross Wisconsin and enter Rosedale Ave. Turn right into the restaurant's parking lot.

After dinner, turn left out of the restaurant parking lot. At the end of the block, turn right onto Wisconsin Ave. Go north on Wisconsin Ave. (Rockville Pike). Turn left and enter NIH at the Metro Entrance: South Drive (traffic light). Go straight ahead. At the third stop sign you will be at the parking lot, but you will have to make a left turn, and then a right turn to get to the entrance to the lot. Make a right turn into the lot. Building 10 is just north of the parking lot. Enter the building and follow the signs to the Lipsett Auditorium.



Star Dust is published ten times yearly, September through June, by the National Capital Astronomers, Inc. (NCA).
Editor: Elliott Fein, Co-editor: Adele Fein, Editorial Advisor: Nancy Byrd.
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SERVING SCIENCE & SOCIETY SINCE 1937

NCA is a nonprofit, membership-supported, volunteer-run, public-service corporation dedicated to advancing astronomy, space technology, and related sciences through information, participation, and inspiration, via research, lectures, presentations, publications, expeditions, tours, public interpretation, and education. NCA is the astronomy affiliate of the Washington Academy of Sciences. All are welcome to join NCA.

SERVICES & ACTIVITIES:

Monthly Meetings feature presentations of current work by researchers at the horizons of their fields. All are welcome; there is no charge. See monthly *Star Dust* for time and location.

NCA Volunteers serve in a number of capacities. Many members serve as teachers, clinicians, and science fair judges. Some members observe total or graze occultations of stars occulted by the Moon or asteroids. Most of these NCA members are also members of the International Occultation Timing Association (IOTA).

Publications received by members include the

monthly newsletter of NCA, *Star Dust*, and an optional discount subscription to *Sky & Telescope* magazine.

Consumer Clinics: Some members serve as clinicians and provide advice for the selection, use, and care of binoculars and telescopes and their accessories. One such clinic is the semiannual event held at the Smithsonian Institution National Air and Space Museum.

Fighting Light Pollution: NCA is concerned about light pollution and is interested in the technology for reducing or eliminating it. To that purpose, NCA is an Organization Member of the International Dark Sky Association (IDA). Some NCA members are also individual members of IDA.

Classes: Some NCA members are available for educational programs for schools and other organizations. The instruction settings include star parties, classroom instruction, and schoolteacher training programs that provide techniques for teaching astronomy. NCA sponsors a telescope-making class, which is described in the *Star Dust*

“Calendar of Monthly Events”.

Tours: On several occasions, NCA has sponsored tours of astronomical interest, mainly to observatories (such as the National Radio Astronomy Observatory) and to the solar eclipses of 1998 and 1999. Contact: Sue Bassett wb3enm@amsat.org

Discounts are available to members on many publications, products, and services, including *Sky & Telescope* magazine.

Public Sky Viewing Programs are offered jointly with the National Park Service, and others. Contact: Joe Morris. joemorris@erols.com or (703) 620-0996.

Members-Only Viewing Programs periodically, at a dark-sky site.

NCA Juniors Program fosters children’s and young adults’ interest in astronomy, space technology, and related sciences through discounted memberships, mentoring from dedicated members, and NCA’s annual Science Fair Awards.

Fine Quality Telescope, 14-inch aperture, see “Calendar of Monthly Events”.

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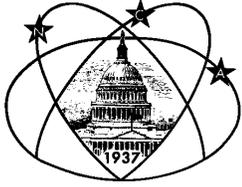
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