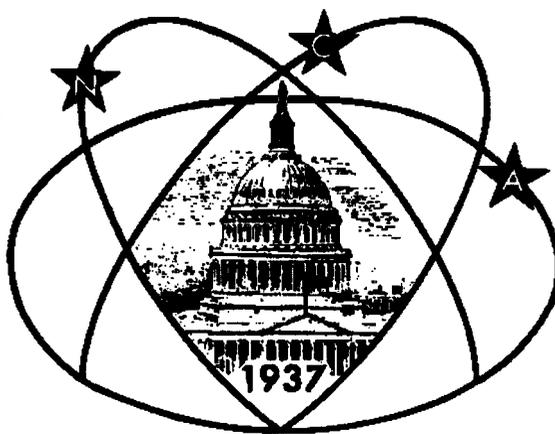


# Star



# Dust

National Capital Astronomers, Inc.

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## Mars Meteorites, Comet Satellites, and Multiple Exploded Planets

*(a talk by Tom Van Flandern to NCA)*

The 1997 February meeting of NCA will be held Saturday, February, at 7:30 PM at the Lipsett Amphitheater in the Clinical Center (Building 10) of the National Institutes of Health (NIH). Our speaker, Tom Van Flandern, provided the abstract for his talk.

Recent astronomical discoveries and space missions in progress will have much to tell us about both favored and alternative hypotheses in the field of astronomy. For example, the exploded planet hypothesis predicted that the Galileo spacecraft would find satellites of asteroids, which it did. The recent discovery, however, of a second asteroid belt beyond Neptune and dating evidence in the geological record, have forced the realization that more than one such planetary explosion event must have occurred. What new evidence favors and disfavors the multiple exploded planet hypothesis? The Near Earth Asteroid Rendezvous mission should provide a host of new data bearing on this. The spacecraft is scheduled to fly by asteroid (253) Mathilde on June 27, 1997, then go into orbit around asteroid (433) Eros in January, 1999. The hypothesis also predicts that comets, too, will be found to have satellites orbiting their nuclei. Comet Shoemaker-Levy 9, for example, may not have "broken apart" from a single nucleus, but rather it may have had its orbiting satellites stripped away by its close passage to Jupiter in 1992. Will approaching

Comet Hale-Bopp be discovered to have satellites orbiting its nucleus? Hubble photos already suggest this possibility.

Turning to Mars, what evidence supports and disfavors a Martian origin for the meteorites containing possible microfossils of primitive life, and what alternative origins exist? The strength of the case for a Martian origin for these meteorites has been exaggerated because alternative possibilities are not yet recognized by mainstream astronomy. Yet, the exploded planet hypothesis suggests an origin that fits the data better, and is easier to reconcile with the dynamic evidence. Moreover, it suggests that intriguing possibility that Mars itself is a former moon of the exploded planet. The Mars Pathfinder mission will explore a small area of the surface of Mars and may help settle these matters. The companion spacecraft, Mars Global Surveyor, should provide high resolution photos of the entire planet. Among many other goals, this spacecraft should be able to settle many controversies and other anomalous features in the Cydonia area of the red planet.

Tom received his Ph.D. degree in Astronomy from Yale University in 1969. He spent 20 years at the U.S. Naval Observatory, where he became the Chief of the Celestial Mechanics Branch. In 1991, Tom formed a Washington, DC based organization, Meta

Research, to foster research into ideas not otherwise supported solely because they conflict with mainstream theories in astronomy. Tom is editor of the *Meta Research Bulletin*, which specializes in reporting anomalies and evidence that does not fit with standard theories in the field. (See the new Web site at <[www.metaresearch.org](http://www.metaresearch.org)>.) He is also a Research Associate at the University of Maryland working on improving the accuracy of the Global Positioning System.

North Atlantic Books is the publisher of Tom's 1993 book, *Dark Matter, Missing Planets and New Comets*. As with his research papers, the book is critical of many standard models in astronomy, such as the Oort Cloud, the Dirty Snowball, and the Big Bang theory. Tom has organized an expedition for 100 people to travel to the Galapagos Islands for viewing the February 26, 1998 total solar eclipse.

During his career as a professional research astronomer, Tom has been honored by a prize from the Gravity Research Foundation; served on the Council of American Astronomical Society's Division on Dynamical Astronomy; taught astronomy at the University of South Florida and to Navy Department employees; been a consultant to NASA's Jet Propulsion Lab; and done several spots for the "Project Universe" series that continues to air occasionally on public TV. ○

## Calendar of Monthly Events

### The Public is Welcome!

NCA Home Page: <http://myhouse.com/NCA/home.htm>

**Saturday, February 1, 5:30 PM**-Dinner with the speaker and other NCA members at O'Donnel's Seafood Restaurant as 8301 Wisconsin Ave., Bethesda, MD. See map and description on back page.

**Saturday, February 1, 7:30 PM**-NCA meeting, will feature Tom Van Flandern. His talk will be "Mars Meteorites, Comet Satellites, and Multiple Explodes Planets." More information on Comet Hale-Bopp will also be provided. For directions, see map and description on back page.

**Mondays, February 3, 10, 17, and 24, 7:30 PM**-Public nights at U.S. Naval Observatory (USNO), in Northwest Washington, D.C. (off Massachusetts Avenue). Includes orientation on USNO's mission, viewing of operating atomic clocks, and glimpses through the finest optical telescopes in the Washington-Baltimore region. Held regardless of cloud cover. Information: USNO Public Affairs Office, 202/762-1438. Home page: <http://www.usno.navy.mil>.

**Tuesdays, February 4, 11, 18, and 25, 7:30 PM**-Telescope making classes at Chevy Chase Community Center, Connecticut Avenue and McKinley Street, NW. Information: Jerry Schnall, 202/362-8872.

**Fridays, February 7, 14, 21, and 28, 7:30 PM**-Telescope making classes at American University, McKinley Hall Basement. Information: Jerry Schnall, 202/362-8872.

**Fridays, February 7 and 28, 8:30 PM**-Open nights with NCA's Celestron-14 telescope at Ridgeview Observatory; near Alexandria, Virginia; 6007 Ridgeview Drive (off Franconia Road between Telegraph Road and Rose Hill Drive). Information: Bob Bolster, 703/960-9126.

See page 8 for more Washington area astronomical events. Other events too numerous to list in *Star Dust* are listed in the publications *Sky & Telescope*, the *Astronomical Calendar 1996*, the *Observer's Handbook 1996*, in numerous software packages, and other links available on the NCA Home Page (see above for address). NCA members can purchase all these (and much more) at a discount. To join NCA, use membership application on page 9.

During questionable weather, call the IOTA Hotline (Phone: 301/474-4945) for NCA meeting status. The absence of a cancellation notice on the Hotline means the meeting will take place.

### A Planetary Society Notice

On December 24, 1996, a letter was sent by Bruce Murray, Vice President of the Planetary Society, to its members regarding Carl Sagan. Memorial services are planned both at Cornell University (Bailey Hall, Cornell University Campus, Ithaca, NY) on February 3 and at the Pasadena Civic Auditorium (300 E. Green Street, Pasadena, CA) on February 17 from 7:00 to 9:00 pm. Both memorial events will be open to all. Carl's family has suggested that donations in his name be directed to the **Carl Sagan Memorial Fund**, The Planetary Society, 65 N. Catalina Avenue, Pasadena, CA, 91106, or to the **The Children's Health Fund**, 317 E. 64th Street, New York, NY, 10021. Informa-

tion about events honoring Carl Sagan can be found at the Society's Web site, <http://planetary.org/tps/>. Members can share their thoughts and memories of Carl on their ongoing "Tribute to Carl Sagan" page. Suggestions are welcome on how the Society might best memorialize him in a significant and lasting way. An upcoming issue of *The Planetary Report* will be devoted to Carl and his accomplishments. (While writing this little piece, I entered the web and went to the site. There are notes and even letters from all over the world and in many languages. It is amazing to learn just how much of an impact this man had on many people's lives. He will be missed greatly. A. J., Ed.)

### Area Science Fairs

The area science fairs are coming up in March and April. NCA gives special awards at these fairs. We need volunteers to spend a couple of hours on one Saturday to judge astronomy projects for NCA. If people live in Virginia they should contact Bob Bolster at 703-960-9126. If they are interested in assisting in DC, PG county or Montgomery county they should contact Jay Miller at 301-530-7942 or [jhmiller@os2bbs.com](mailto:jhmiller@os2bbs.com).



# Automated Telescopes: The Talk and the Future Possibilities

by Harold A. Williams

At our January fourth meeting, in the Lipsett auditorium in the Clinical Building of the National Institutes of Health, Saul Adelman spoke to us on "Small Automated Telescopes: An Assessment." This article will review his talk, and discuss some of the possibilities for NCA to become a leading partner in an automated telescope venture called Washington Astronomical Remote Observatories for Schools (WAROS).

Saul Adelman is currently a professor of physics at the Citadel in Charleston, South Carolina, where he has been involved for several years with the Four College Automated Telescope (FCAT). He grew up in the Washington metro area, where his father, Benjamin Adelman, is a longtime NCA member. Saul told us that the last time he had been to an NCA meeting we were meeting in the Commerce building downtown.

Saul's principle research interest is in strongly magnetic, chemically peculiar stars. These stars can have brightness that vary in time in different spectrally filtered bands. The variability of brightness is not the same in different spectrally filtered bands. For instance there may be one periodicity in one band with different periodicities in other bands or no fluctuation at all in another band. Significant redistribution of mass is taking place in these fascinating stars. Saul showed us several light curves in different spectral bands to show us what this type of telescope, with its photometer, is capable of. He did not tell us much about these interesting stars; perhaps we shall have him talk to us again about the stars, but instead the automated telescope and the organization that is necessary to make such a telescope work was the subject of the talk. The key to doing such research is long-term (years) observation of many program stars over many nights. With the smaller telescopes at Kit Peak being retired for budgetary reasons several years ago, it became apparent to a number of astronomers at smaller institutions that did not own their own observatory that they would soon be frozen out of getting any data to do astronomy.

As has occurred in the past in astronomy the answer to the professional

astronomical researcher and teacher dilemma is to team up with an amateur astronomer whose professional scientific discipline is other than astronomy. Louis Boyd, a professional Electrical Engineer was such a person. He had already constructed the first fully automated telescope using a personal computer for his own use. Four colleges with their astronomer faculty and several amateur astronomers with their creativity and entrepreneurial abilities produced a 30 inch automated telescope with a photoelectric photometer. With this instrument Saul gets one fourth of the data which is the staggering equivalent of 35 to 40 nights/year of observing. Processing the high quality data into published papers then becomes the problem, and Saul considered himself doing well with having cut the back log of data to just a year. Automated telescopes find objects faster and produce consistent data with all of the atmospheric extinctions necessary for good photometry quicker than any human guided system.

What is the vision for WAROS that NCA might lead in? Our telescopes would not be primarily for cutting edge research to produce journal articles in peer reviewed scientific publications with some possible student involvement. While this is a noble goal for some, it is not a principle NCA activity. We want to understand the universe of STARS (Space Technology, Astronomy, and Related Science) and to share that knowledge and the experience of getting that knowledge with others. NCA already shares knowledge with it monthly lectures at meetings and through its telescope making classes and various other telescope viewing opportunities help people experience the getting and seeing of astronomical knowledge. If we were lead partner in WAROS with an observatory in a quasi dark sky site in Maryland and another in Virginia we could involve the local county school systems and any small colleges like Montgomery College that might wish to join in the Washington Metro area. Our vision would be to offer images of the sky to further the understanding of STARS by students who

could control the telescope to do research. Students would include NCA members as well as students at the schools who would work through their faculty. The telescope would be controlled by software like "The Sky." A student would dial into the observatory with his modem and computer to control the scope and to take data. Fully automated remote computer controlled domes with telescopes and weather monitoring systems are already being installed by Technical Innovations of Barnesville, Maryland (John and Meg Menke's company, long time NCA members).

What do we need to do? Form a committee, get participating local schools to commit some support, write proposals to raise most of the money, build it, and run it and keep it running. Here are some of the things I gathered from Saul's talk which are relevant to WAROS. Remote telescopes still have to be watched even if you don't look through them with your eye directly. Having them in a quasi dark sky site only an hour away from the membership is an advantage. Motors can fail. Mice like electrical cables. The participating schools need to meet corporately at least once a year. With such a program, 70% of the time telescopes will be taking data when it is clear—be prepared for the blizzard of data. The telescope should have one instrument so the design of the telescope can be optimized for that instrument. That one instrument can have filter wheels. Things can be done better now with new technology and the experience that others have already had. Cool the imager thermoetrically. It is easier to raise funds to build something than to repair it and maintain it. 10% of the cost to build something is not an unrealistic estimate for maintenance and gradual improvement. The 10% yearly cost must be looked at very carefully or the project will die with time. It would be nice to endow the 10% maintenance, but that would require raising almost twice as much money as necessary to build with the rest invested. Who is willing to join the committee? Please call Harold Williams 301-650-1463 office or 301-565-3709 home. ○

# The SAROS and Eclipse Recycling

by Leith Holloway

Eclipses of the Sun and Moon recur at a fixed interval called the "saros." That is what enabled ancient astronomers to make accurate predictions of eclipses without modern mathematics and computers.

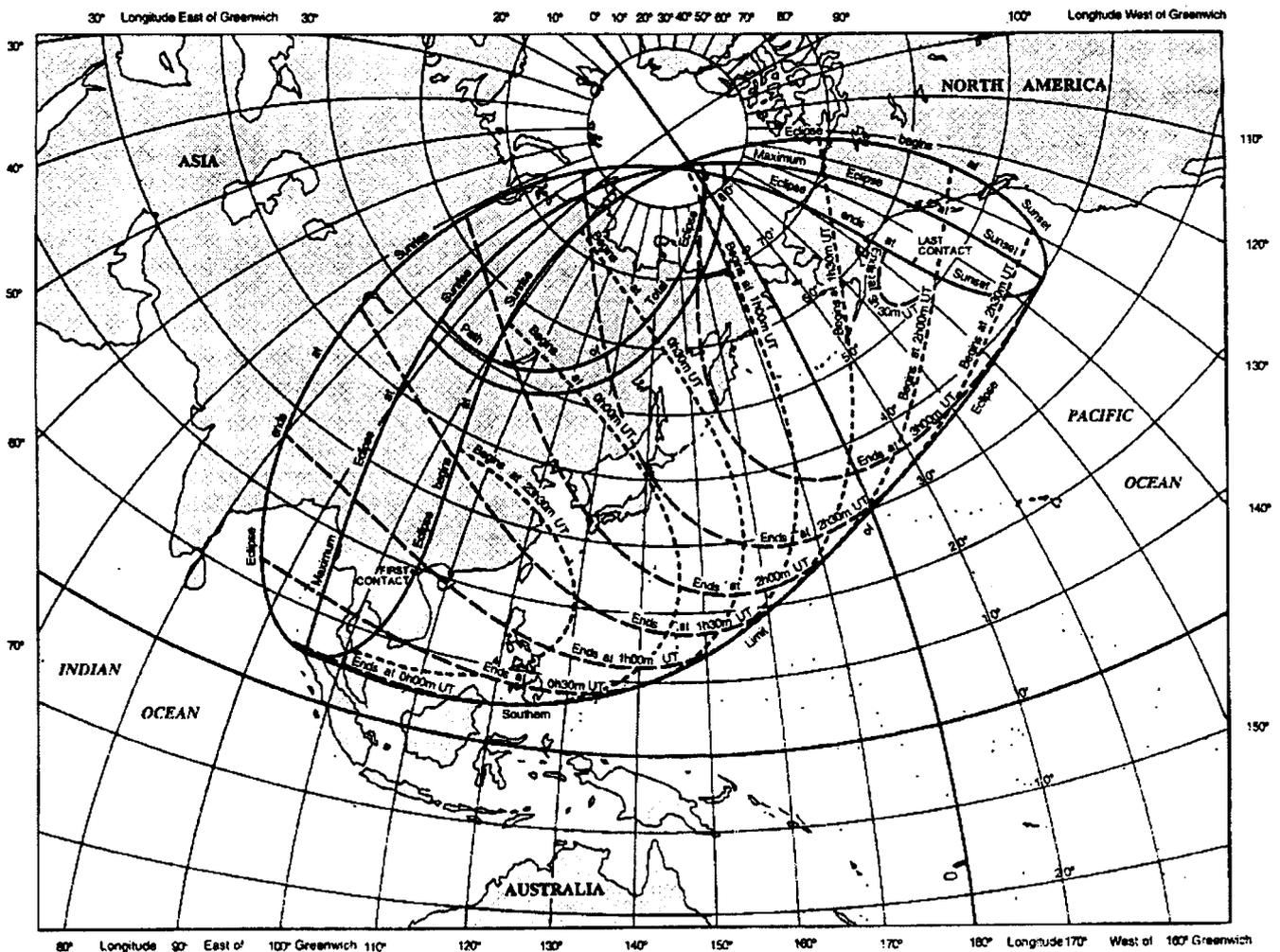
In order for an eclipse to occur, the Moon must be at new or full phase, and the Sun has to be near a node in the Moon's orbit. At other times the Moon passes north or south of the Earth's shadow at full moon phase, or the shadow of the Moon misses the Earth at new moon. The plane of the Moon's orbit is inclined at about five degrees to the ecliptic, which is the mean plane of the Earth's orbit. The two points where the Moon's orbit intersects the ecliptic are called nodes. The node where the Moon crosses the ecliptic headed north-

ward is called the ascending node; the other is the descending node.

The mean interval between a new moon and the next is 29.53059 solar days. This "synodic month" is about two days longer than other lunar months because the Moon must catch up with the Sun, which has traveled 29 degrees eastward since the last new moon. A saros is a period of 223 consecutive synodic months or 6,585.322 solar days. On the other hand, the average time the Moon takes to travel from its ascending node, all around its orbit, to the same node again is called a draconic month; this is 27.21222 solar days. The mean draconic month is 2 hours and 37.6 minutes shorter than the Moon's sidereal period (with respect to the stars) because the nodes retrograde westward nearly a

degree and a half to meet the Moon as it circles its orbit. The gravitational pull of the Sun causes this nodal motion.

The product of 242 and the number of days in a mean draconic month equals 6,585.357 solar days or almost exactly one saros period, which was defined above as a multiple of the synodic month. This coincidence ensures the repetition of an eclipse after a saros has elapsed. Rounded to years, days and a simple fraction, a saros is usually taken to be eighteen years eleven and a third solar days (ten and a third days if there happen to be five February twenty-ninths during this interval). The third of a day in the saros period moves the central geographic longitude of the eclipse westward about 120 degrees.



Total Solar Eclipse of 8-9 March 1997

Furthermore, 239 times the number of solar days in a mean anomalistic month (27.55455 from lunar perigee to the next) is only about five hours longer than the saros. This near agreement ensures that the Moon's distance from the Earth will be almost the same during all eclipses separated by a saros period. This in turn makes the duration and magnitude of eclipses in this "saros series" practically the same, and thus these eclipses are almost carbon copies of each other. The ten (or eleven) and a third-day change in calendar date after each saros period moves the path of totality of a solar eclipse several degrees north or south as a result of the change in the Sun's declination from the previous to the new day of the year.

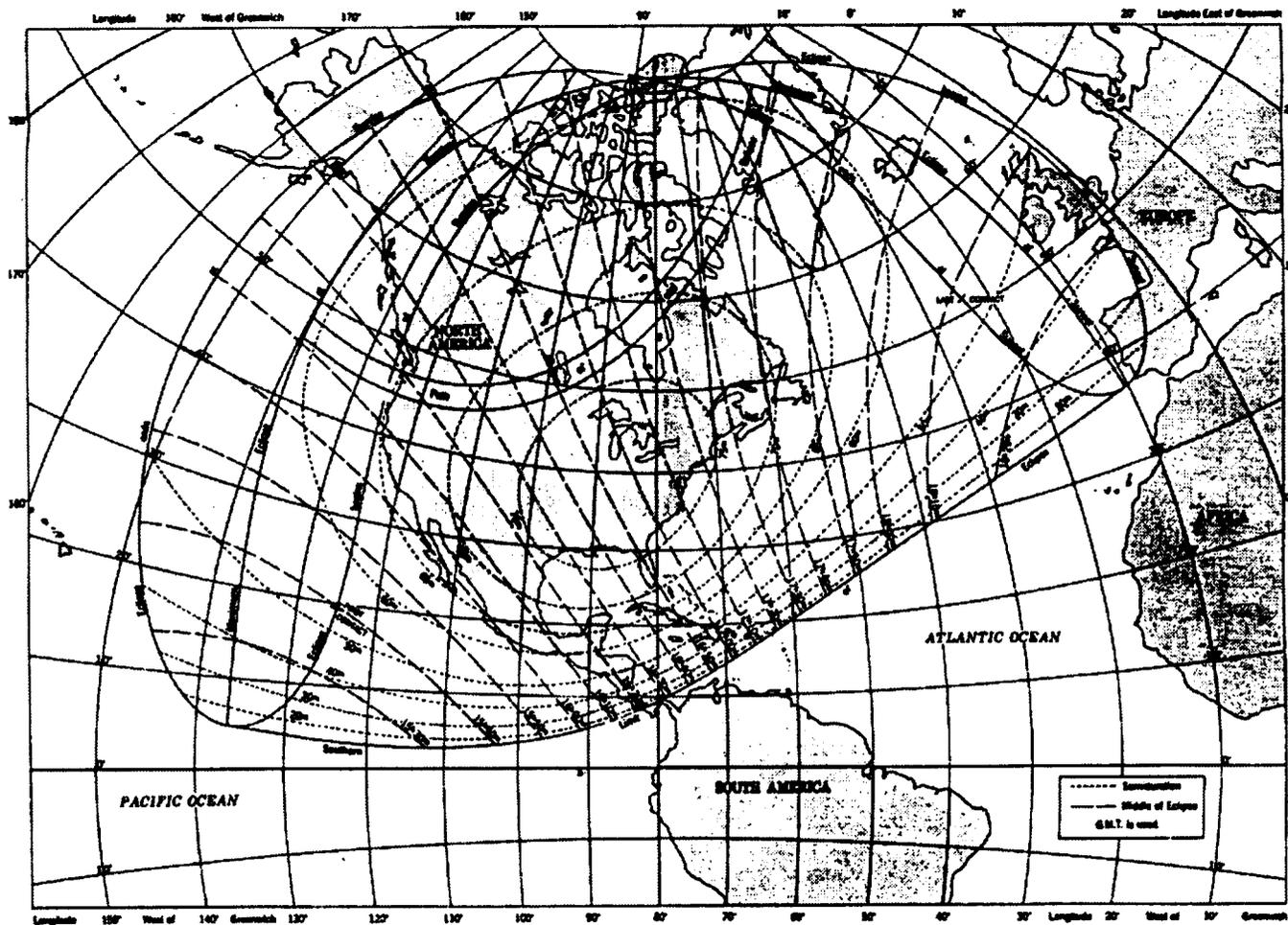
The two solar eclipse maps shown below illustrate the westward and, in this case, the northward shift of eclipse paths on the Earth. The first map shows the path of this year's total eclipse of the Sun on March 9th in Mongolia and Sibe-

ria, and the second map is for the total solar eclipse that occurred one saros earlier on February 26, 1979 in Canada and the northwestern United States. The similarity of the shapes and widths of these two paths of totality is obvious. The total solar eclipse, that the NCA expedition hopes to observe on February 26, 1998 in Curacao, is the sequel to the eclipse that took place one saros earlier in central Africa and southern Asia on February 16, 1980.

After a period of three saroses (54 years and 32 or 33 solar days), eclipses will return to about the same longitude and can be seen at the same site where they were observed previously. After more than a half century, however, the path of a total eclipse of the Sun may be shifted enough to change a total into a partial eclipse or vice versa at a particular site. On August 16, 1989 I observed the same total eclipse of the Moon that I observed on July 15, 1935 when I was 7 years old. As I said in my article in the

December 1995 issue of *Star Dust*, this was the eclipse that sparked my interest in astronomy.

Astronomers define an "eclipse year" as the time it takes the Sun to return to the ascending node of the Moon's orbit. An eclipse year is 346.62 solar days long. There are two month-long "seasons" during an eclipse year when eclipses are possible due to the Sun's proximity to one of the nodes. The motion of the Moon's nodes makes these eclipse seasons come about 19 days earlier each successive year. For example, all four eclipses this year occur in March or September. The four eclipses in 1996 occurred in April, late September or mid-October. There can be as many as seven eclipses in a calendar year and as few as two, not counting inconspicuous penumbral eclipses of the Moon. When there are only two eclipses, they are both solar. Eclipses of the Sun outnumber lunar eclipses three to two. ○



*Total Solar Eclipse of 26 February 1979*

## National Capital Area Astronomical Events

Free Lectures at the Einstein Planetarium and Other Daily Events  
National Air & Space Museum

202/357-1550, 202/357-1686, or 202/357-1505 (TTY)

Home page: <http://www.nasm.edu>

### Other Area Astronomical Events

**January 31-February 23, Friday & Saturday 7:30 PM; Sunday Matinees 1:30 and 3:00 PM**-Arlington Planetarium (Arlington, VA) lecture, "Follow The Drinking Gourd." In honor of Black History Month. Details & Cost: 703/358-6070 or 6019.

**February 7, Friday 3:30 PM**-"Refined Results from the Galileo Probe" by Rich Young, at Goddard Space Flight Center (GSFC—Greenbelt, MD). Details: 301/286-6878.

**February 7, Friday 6:30-6:00 PM**-"Stars of Love" at Historic Bladensburg Waterfront Visitors Center. Details: 301/927-2163. (Se Habla Español.)

**February 15, Saturday 7:00 PM**-"African Skies" Montgomery College's Planetarium, Takoma Park, MD. Information: 301/650-1463.

**February 18, Tuesday 7:30 PM**-"Next Generation Infrared Imaging Systems" by Dr. James D. Howe (NVEDS) at National Capital Sec-

tion of the Optical Society of America. Details: 303/767-0766.

**Mondays Through Saturdays, 11:30 AM & 2:30 PM; 1st & 3rd Sundays of Month, 11:00 AM**-GSFC (Greenbelt, MD) guided walking tours of Hubble Space Telescope Control Center and NASA Communications Center. Start at Visitors Center.

**Mondays Through Fridays, 10:00 Saturdays and Sundays, 10:00 AM and 1:00 PM**-Paul E. Garber Preservation, Restoration, and Storage Facility, NASM. Take a tour of this facility where they preserve and restore aircraft as well as spacecraft, engines, propellers, models, and other flight-related objects. Guide conducted tours including the workshops. Individuals and groups are welcome. Reservations must be made two weeks in advance. No heating or air conditioning so dress accordingly. Details: 202/357-1400, or write to ATTN: Reservation Office, Education Services Division, MRC-305, NASM, Washington, DC 20560.

### For Sale

Celestron C5+ 2 years old, excellent condition. Tiffin tripod, carrying case, piggyback camera mount, 25 mm Killner, TeleVue 1.8x barlow, SkyGlow broadband light pollution filter. Package price: \$1,000. Call Marge Weissberg, 301/565-2303.

### Curacao Eclipse Trip

Don't forget! First payments should be in and second payments will be due in just THREE short months! Don't be left behind. Make your payment soon.

### VOLUNTEER WANTED

**Calendar Coordinator:** Must be willing to go out on a limb and get as much information as possible on astronomical events in the DC area. No experience necessary. Must Meet Deadlines!! Call Alisa & Gary Joaquin at 703/750-1636.

## Correction to New Members List

Paul S. Algire  
13405 Kiama Court  
Laurel, MD 20708

His name was incorrectly spelled -in last month's issue. We apologize for the error.—Ed.

### "Observer's Handbooks"

Copies of the *Observer's Handbook* for 1997, published by the Royal Astronomical Society of Canada, will be on sale for \$12 apiece at the February NCA monthly meeting and at all subsequent meetings until they are sold out. Please bring a check made out to "National Capital Astronomers" rather than cash. If you wish to buy a copy but cannot attend the meeting, call Jeff Norman at 202/966-0739 to make arrangements for pickup. Thanks.

### FREE To a Good Home

30+ years of *Sky & Telescope*, May 1965 through December 1996 in file boxes. Will deliver in Washington, DC Metropolitan Area. Call Chuck Baker at (301) 762-8413 days or evenings. (Would be a good addition to any school library, high school or university—Ed.)

### Newsletter Deadline for March *Star Dust* February 15, 1996

\*\*\*DO NOT BE LATE!!!\*\*\*

Send submissions to Alisa & Gary Joaquin, at 7821 Winona Ct., Annandale, VA, 22003, Leave a message on voice mail 703/750-1636. Text files or graphic files in .GIF or .TIFF may be sent via E-Mail to [ajglj@erols.com](mailto:ajglj@erols.com) or fax submissions to 703/658-2233. **No submissions will be accepted after the 20th.** There will be no exceptions. We need a reasonable amount of time to design, edit, and review this newsletter. We would appreciate everyone's help in this matter. Thank you.

# National Capital Astronomers, Inc.

## SERVING SCIENCE & SOCIETY SINCE 1937

NCA is a non-profit, membership supported, volunteer run, public-service corporation dedicated to advancing space technology, astronomy, 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. For information: 301/320-3621 or 703/841-4765.

## 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 as skilled observers frequently deploying to many parts of the National Capital region, and beyond, on campaigns and expeditions collecting vital scientific data for astronomy and related sciences. They also serve locally by assisting with scientific conferences, judging science fairs, and interpreting astronomy and related subjects during public programs.

**Discussion Groups** exchange information, ideas, and questions on preselected topics, moderated by an NCA member or guest expert.

**Publications** received by members include the monthly newsletter of NCA, *Star Dust*, and an optional discount subscription to *Sky & Telescope* magazine.

**NCA Information Service** answers a wide variety of inquiries about space technology, astronomy, and related subjects from the public, the media, and other organizations.

**Consumer Clinics** on selection, use, and care of binoculars and telescopes, provide myth-breaking information, guidance, and demonstrations for those contemplating acquiring their first astronomical instrument.

**Dark-Sky Protection Efforts** educate society at large about the serious environmental threat of light pollution, plus seek ways and means of light pollution avoidance and abatement. NCA is an organizational member of the International Dark-Sky Association (IDA), and the National Capital region's IDA representative.

**Classes** teach about subjects ranging from basic astronomy to hand-making a fine astronomical telescope. NCA's instructors also train educators in how to better teach astronomy and related subjects.

**Tours** travel to dark-sky sites, observatories, laboratories, museums, and other points of interest around the National Capital region, the Nation, and the World.

**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, the Smithsonian Institution, the U.S. Naval Observatory, and others.

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

**Fine Quality Telescopes** up to 36-cm (14-inch) aperture are available free for member's use. NCA also has access to several relatively dark-sky sites in Maryland, Virginia, and West Virginia.

## YES! I'D LIKE TO JOIN THE NATIONAL CAPITAL ASTRONOMERS

Enclosed is my payment for the following membership category:

Regular

*Sky & Telescope* and *Star Dust*. (\$51 per year)

*Star Dust* only (\$24 per year)

Junior (Only open to those under age 18) Date of birth: \_\_\_\_\_

Junior members pay a reduced rate.

*Sky & Telescope* and *Star Dust*. (\$42 per year)

*Star Dust* only (\$15 per year)

_____	_____	_____	_____
First name	Middle	Last name	Telephone
_____	_____	_____	_____
Street or Box	Apartment	City	State Zip

If family membership, list names of additional participating immediate family members in same household, with birthdates of all those under 18 years old: \_\_\_\_\_

**Note:** If you already subscribe to *Sky & Telescope*, please attach a recent mailing label. You may renew this subscription through NCA for \$22 when it expires.

Make check payable to: **National Capital Astronomers, Inc.**, and send with this form to:

**NCA c/o Jeffrey B. Norman, 5410 Connecticut Avenue, NW, Apt. #717, Washington, D.C. 20015-2837.**

The following information is optional. Please indicate briefly any special interests, skills, education, experience, or other resources which you might contribute to NCA. **Thank you, and welcome to NCA!**

# Best North American Occultations by Minor Planets and Hale-Bopp

*by David Dunham*

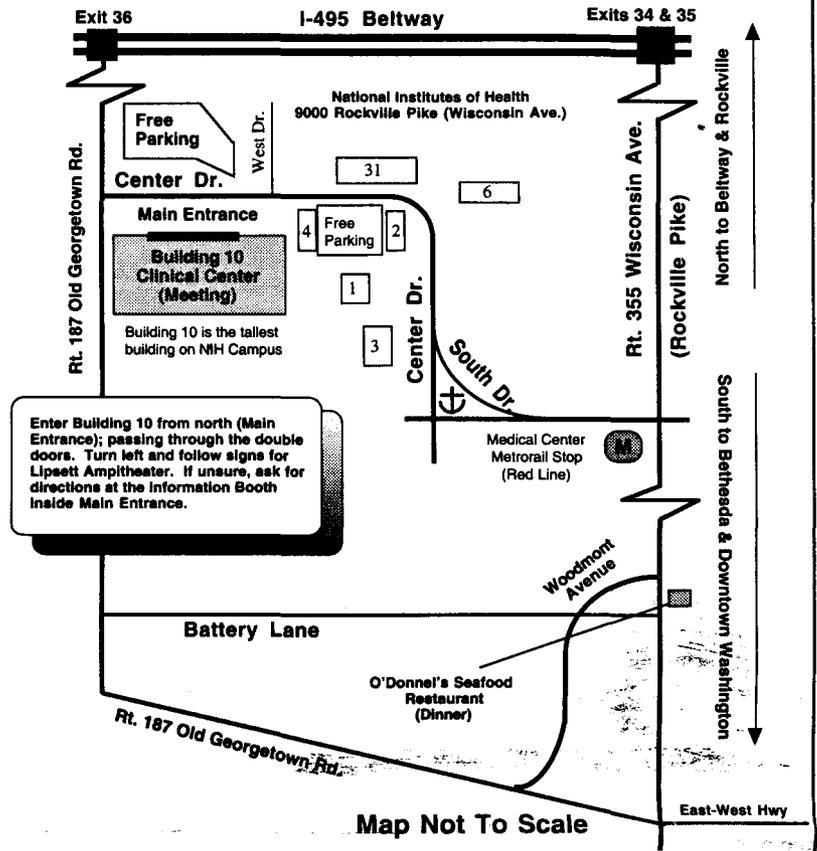
A list of good asteroidal occultations in North America during 1997, for which astrometric updates are requested, is given below. It is a subset of the one published on p. 73 of the February 1997 issue of *Sky & Telescope*, with some of the less promising events removed. For more information and event coordination, please contact David Dunham at 301/474-4722. You may also obtain the latest corrections to the time and path of these events from the International Occultation Timing Association's (IOTA) recorded message at 301/474-4945 or via their Web site at <http://www.anomalies/iota/splash.htm>. Good luck with your observations.

Date	Ut h	m	Occulting Body	Diam. (km)	Star Name	R.A. Dec (J2000)				Star mag.	dm	Max dur.
						h	m	o	'			
Feb	10	10.5	451 Patientia	230	GSC 2471 1267	7	48.2	+33	29	9.8	2.0	24s
Mar	14	13.1	Hale-Bopp	200	PPM 63645	22	58.1	+42	44	10.9	0.0	3s
Mar	21	8.3	377 Campania	94	SAO 138801	12	28.0	-7	34	8.4	4.4	7s
Apr	16	0.4	324 Bamberga	228	SAO 79765	7	52.8	+23	30	9.3	3.7	14s
May	2	9.1	185 Eunike	165	SAO 122258	17	18.3	+9	31	8.1	4.4	16s
May	22	3.5	354 Eleonora	162	PPM 163336	16	58.8	+4	14	9.8	1.2	14s
June	10	9.4	170 Maria	46	SAO 164249	21	15.1	-17	21	6.2	7.8	12s
June	30	15.4	87 Sylvia	271	SAO 189520	20	38.8	-29	16	8.9	2.7	26s
July	17	3.9	1994JR1	180	PPM 231740	16	28.8	-17	59	7.7	15.3	12s
July	21	5.6	9 Metis	190	PPM 118511	2	45.3	+11	19	9.1	1.6	7s
July	25	10.5	80 Sappho	81	26 Arietis	2	30.6	+19	51	6.2	5.7	3s
Aug	4	4.3	2 Pallas	533	SAO 104597	19	12.5	+18	00	7.5	2.3	31s
Aug	6	5.1	335 Roberta	93	SAO 128727	0	22.9	+0	11	9.1	3.3	40s
Aug	14	8.6	423 Diotima	217	SAO 213195	21	40.8	-30	40	9.2	2.5	18s
Sep	16	6.1	906 Repsolda	42	SAO 76505	4	12.9	+22	25	5.6	9.0	5s
Sep	18	23.3	532 Herculia	217	SAO 187475	18	56.5	-27	30	9.4	1.8	26s
Sep	19	5.5	536 Merapi	158	SAO 214169	22	53.8	-35	59	9.2	4.0	14s
Oct	2	9.0	77 Frigga	71	SAO 145387	22	55.2	-7	32	8.1	4.1	9s
Oct	4	8.0	88 Thisbe	232	GSC 0818 0534	9	11.3	+14	16	9.6	4.1	7s
Oct	8	11.2	790 Pretoria	176	21 Persei	2	57.3	+31	56	5.1	8.4	17s
Nov	9	11.1	10 Hygiea	429	GSC 1852 0469	5	34.1	+25	48	10.3	1.8	46s
Dec	3	23.0	532 Herculia	217	SAO 189113	20	18.1	-26	14	9.0	2.8	6s
Dec	4	12.1	105 Artemis	123	SAO 134036	7	00.4	-8	24	6.0	7.1	11s
Dec	4	14.2	74 Galatea	123	GSC 1334 0104	6	44.6	+16	57	9.7	3.2	14s
Dec	8	2.4	776 Berbericia	183	PPM 274531	23	02.5	-25	58	9.8	2.7	7s
Dec	27	6.8	Nipponia	37	44 Eridani	4	28.5	+1	23	5.6	7.5	4s

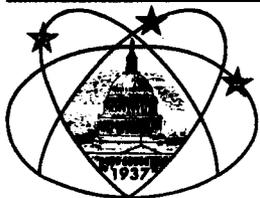
# Getting to the NCA Monthly Meeting

**Metrorail Riders** - From Medical Center Metro Stop: Walk down the hill, pass the bus stops and turn right at the anchor onto Center Drive. Continue uphill to Building 10 (walking time about 10 minutes), the tallest building on campus. Also, the J2 bus line connects the Bethesda (7:16 PM) and NIH (7:23 PM) Metro stops with Building 10 (7:25 PM).

**To O'Donnel's Seafood Restaurant** - Take Wisconsin Avenue past Woodmont Ave. toward Battery Lane. It is located on the corner of Rosedale and Wisconsin Ave., on the left side of the street. There is free parking across the street on Rosedale. The address is 8301 Wisconsin Ave., Bethesda, MD.



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*February 1997*

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