Star Dust

National Capital Astronomers, Inc. Phone: 301/565-3709

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Mars!

by Doug Hamilton

The next meeting of the National Capital Astronomers will be held Saturday, April 4, at 7:30 P.M. in the Lipsett Auditorium of the Clinical Center (Building 10) at the National Institutes of Health (NIH). Our speaker, Doug Hamilton, will be talking about Mars.

Abstract

Mars has captivated the human imagination from the earliest times right up until today's age of modern spacecraft exploration. Of all the planets in the Solar System, Mars is by far the most amenable to eventual human exploration and colonization. But Mars has some secrets that future inhabitants will need to know about. This talk will focus on some fascinating and little known facts about our nearest neighbor, including the mysterious origins and eventual fate of Mars' two small moonlets, Phobos and Deimos, recent results from the ongoing Mars Pathfinder and Mars Global Surveyor missions, and the possibility of — and evidence for — past or present life on the red planet.

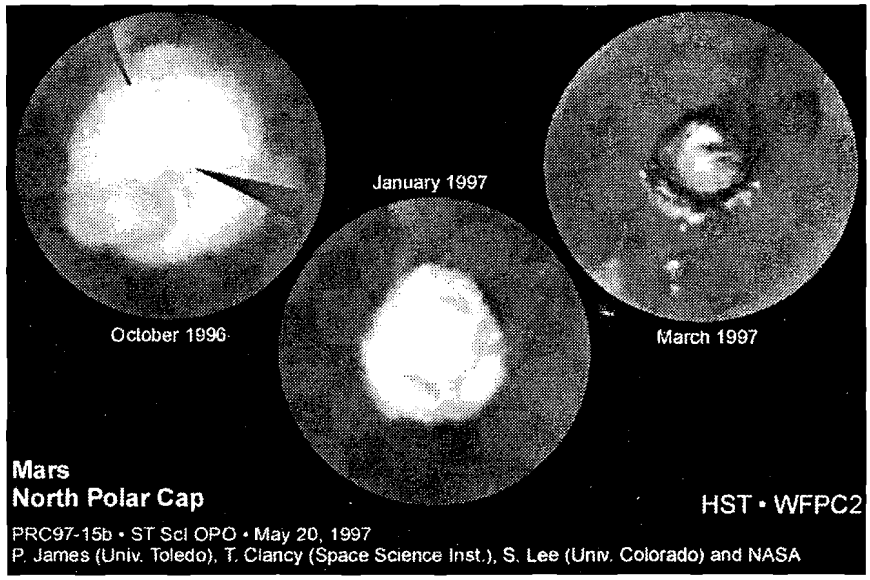
Biography

Dr. Hamilton attended Stanford University where in 1988 he earned a B.S. in Physics with Distinction and Honor. He earned his M.S. (1990) and Ph.D. (1994) in Applied Physics at Cornell University, Ithica, New York. Dr. Hamilton received numerous academic honors and awards, notably the Dean's Award for Excellence in Teaching in 1997.

Dr. Hamilton has worked for the department of astronomy at Cornell University and at the Max Planck Institute in Heidelburg, Germany where he was a post-doctoral research scientist. He is currently an assistant professor in the department of astronomy at the University of Maryland at College park.

His primary areas of interest are in planetary science, including planetary rings, satellites, asteroids, comets, the origin of the solar system and of planetary systems, and dust dynamics. He is also very interested in classical mechanics including celestial mechanics, orbital evolution, resonances, and teaching methods, as well as the electrodynamics of charged particle motion.

Dr. Hamilton's professional activities include being a Co-Investigator on the Galileo Dust Detection System Team. He is also a reviewer for the *Astronomical Journal*, the *Geophysical Research Letters*, *Icarus*, the *Journal of Geophysical Research*, *Nature*, *Planetary and Space Science*, the A.S.P. Conference Series, the *Encylopedia of the Solar System*, NASA, the Planetary Data System, and the University of Arizona Press. Dr. Hamilton has written many publications and is a sought after speaker throughout the DC metro area. ○



Hubble Space Telescope Images of Mars: These images displaying the North Polar Cap were taken during one rotation after Mars' 1997 oppostion.

Calendar of Monthly Events

The Public is Welcome!

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

Fridays, April 3, 10, 17, and 24, 7:30 PM - Telescope making classes at American University, McKinley Hall Basement. Information: Jerry Schnall, 202/362-8872.

Fridays, April 3, 17, and 24, 8:30 PM - Open nights with NCA's Celestron C–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. Call before 6:00 PM.

Saturday, April 4, 5:30 PM-Dinner with the speaker and other NCA members at the Thai Place Restaurant, 4828 Cordell Avenue, Bethesda, MD. *See* map and directions on back page.

Saturday, April 4, 7:30 PM-NCA meeting, will feature Dr. Doug Hamilton, University of Maryland, speaking on "Mars." For directions, *see* map and directions on back page.

Mondays, April 6, 13, 20, and 27, 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, April 7, 14, 21, and 28 7:30 PM - Telescope making classes at Chevy Chase Community Center, Connecticut Avenue and McKinley Street, NW. Information: Jerry Schnall, 202/362-8872.

Saturday, April 25, beginning 6:00 PM - Open House at Hopewell Observatory. See article on page 8 for directions.

Saturday, April 25, 8:30 PM - Exploring the Sky. Sessions are held at Rock Creek Park, in the field south of the intersection of Military and Glover Roads, near the Nature Center. Free to the public. Information: 202/426-6829.

See map and directions to the meeting on back page. 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.

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 1998*, the *Observer's Handbook 1998*. NCA members can purchase all these (and much more) at a discount. Information can also be found in numerous software packages, and links available on the NCA Home Page (*see* above for address). To join NCA, use the membership application on page 9.

Eclipse Picture Party

Jeff Norman will host a party for NCA members who wish to show pictures and slides from the recent eclipse trip to Curaçao, on April 11, 1998. from 5-9 PM in the Party Room at The Garfield (5410 Connecticut Ave.). The location is about 5 or 6 blocks south of Chevy Chase Circle and 1 block north of Military Road which has a traffic signal. We would like to include a pot luck supper. If you wish to join us, please call Jeff at 202/966-0739 after 7:30 PM any evening and tell him what food, drink or snack you would like to bring.

Newsletter Deadline for May *Star Dust*, April 15, 1998

Send submissions to Alisa & Gary Joaquin, at 4910 Schuyler Dr., Annandale, VA, 22003-5144. 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 or fax submissions to 703/658-2233.

No submissions will be accepted after the 20th. We need ample time to layout, edit, and mail the newsletter. We would appreciate everyone's help in this matter. Thank you.

Small Bodies in the Early Solar System

Review by Andrew W. Seacord, III

Dr. Tim Mc Coy, the Assistant Curator of Meteorites for the Smithsonian Institution Museum of Natural History, used his presentation on meteorites and their implication on the early solar system to introduce us to the new Janet Annenberg Hooker Hall of Geology, Gems, and Minerals located in the Smithsonian Museum of Natural History. His presentation was accompanied by several slides of the Smithsonian meteorite collection exhibited in the Hall. He noted that the benefactor of the Smithsonian Institution, James Smithson, was a mineralogist.

The Smithsonian has a collection of more than 12,000 meteorites collected from Antarctica alone. Some of these objects have been identified as having originated from the Moon, Mars and asteroids. Antarctica is a good source of meteorites because of the ice dynamics and its dry climate. As ice flows toward the transarctic mountain range, the buried meteorites are pushed to the surface and are easily seen against the blue ice.

A video of clips taken at a 1992 high school football game introduced the Peekskill meteorite. The clips recorded the fireball and ion trail observed from several perspectives. Enough sightings of the fireball and ion trail were made to allow a determination of its trajectory. The trajectory was found to have originated in the main asteroid belt between Mars and Jupiter. The trajectory terminated in the trunk of a car parked in Peekskill. The video also had a clip showing the car with an interview of its owner who expressed concern about paying for the damage to the car. As it turned out, the 12.2 kilogram meteorite and the car were purchased by a museum for a handsome price. Many meteorites, including the well-known Lost City meteorite, are known to have originated in the main asteroid belt. More was said about asteroidal meteorites later.

A major goal of Smithsonian meteorite research and exhibits is to explore the context of meteorites in the evolution of the early solar system. For example, objects that may eventually become planetary impactors (meteorites) can be ejected from the surface of a newly-formed planet. Planets and large asteroids are formed by an accretion process from a disk of gas and dust spun down from the pre-solar nebula. The accreted planet is molten and, while in the molten state, heavy matter migrates toward the center of the planet. The heaviest elements, mostly nickel and iron, migrate to the center, forming the core. Lighter material containing light metals such as magnesium, manganese, and silicon, settle around the core, forming the mantle. The lightest materials remain at the surface and eventually solidify to form the crust. During this process of differentiation, volcanoes erupt from the molten surface with umbrella-like plumes. The volatile (hot gas) component of the eruption forcefully eject material at speeds greater than the escape velocity. The ejected blobs then follow heliocentric (Sun-centered) trajectories, some of which intersect the Earth.

Meteorites have been classified in thirteen distinct classes. Each class represents a "world" from which the meteorite originated. Four meteorite classes were discussed: eucrites, palacites, nickel-irons, and chondrites. Eucrites have the same reflection spectrum as does the asteroid Vesta. Palacite meteorites contain olivine, iron, and nickel, a composition that is to be expected of material at the core-mantle boundary of a differentiated object.

Meteorites that are predominately nickel and iron have an interesting property. If one of these is cut and the newly-exposed surface is polished and etched with nitric acid, a lattice-like pattern appears. This pattern, called a Widmansatten pattern, could only occur if the metal were once molten and cooled at a rate of a few degrees per million years. These meteorites, therefore, must have come from the core of a differentiated body that cooled slowly over a billion years. It was noted that nickel-iron meteorites are natural stainless steel. They are rarely found in Europe today because they were recovered by early residents of the region and turned into "stainless steel" implements.

Chondrites form a class of stony meteorites containing blobs of glassy material about the size of a small pea, known as chondrules, imbedded in silicate rock. The chondrules were once molten objects in the pre-solar nebula which also consisted of gas and dust. Some dust grains stuck together to form larger grains which, in turn, stuck together to form still larger pieces. This accretion process continued to form the planets and large asteroids.

Most solid surfaces in the solar system contain at least a few craters caused by the impact of an object. Mercury and the Earth's Moon are heavily cratered. The collision of Comet Shoemaker-Levy-9 with Jupiter is testimony to the fact that collisions in the solar system still occur, although at a much smaller rate than during the first billion years. Dr. Mc Coy briefly discussed the effects of impacts on terrestrial biology. To illustrate these effects, he showed a video of an artist's conception of the impact of the 10 – 14-km diameter asteroid that occurred about 65 million years ago. This time coincides with the boundary end of the Mesozoic era when about 70 percent of plant and animal species became extinct. The impact crater, having a diameter of at least 170 km, is located at the northern part of the Yucatan Peninsula and neighboring Gulf of Mexico. Drill cores removed from the crater have a clay layer with microtektites imbedded in it. Tektites are globules of glass made molten by the impact.

Collisions of this kind lead to the current theory on the origin of the Moon. An impactor about the size of Mars struck the Earth sometime between 4.5 and 4.0 billion years ago. During the collision, the mantles of Earth and the impactor mixed and some of the mixture was ejected into a belt of debris orbiting

SMALL BODIES, continued on page 4

SMALL BODIES, continued from page 3

the Earth. This material eventually accreted to form the Moon. At the end of the accretion process, the Moon was molten with solid rock floating on the surface, a magma ocean with rockbergs. As the Moon cooled, its surface solidified, forming the lunar crust. Between about 4.0 and 3.8 billion years ago, the Moon suffered many impacts, leaving a heavily cratered surface. Following the original onslaught, several very large impactors created large basins which became partially filled by a massive outpouring of lava from the lunar mantle, forming the maria.

The final topic of Dr. McCoy's presentation was the future exploration of space dust. Some near-future missions, the Mars Sample Return, and Genesis missions, were discussed. The Genesis mission will employ a spacecraft to orbit the L1 Lagrangian (or libration) point for two years and collect particles from the solar wind. After the data collection is over, the spacecraft will be brought back to Earth. The sample container will enter the atmosphere and descend on a parachute. The SOHO and ACE spacecraft currently orbit the L1 point.

Following his formal presentation, Dr. Mc Coy answered some interesting questions. One question concerned the minimum size an asteroid must have in order for it to be differentiated and have a core. In order for differentiation to occur, the body must be molten to allow the denser material to migrate toward the center. He stated that a body may not have to be more than 10 km in diameter for the process to take place. Some heating would have occurred from the radioactive decay of short half-life radioisotopes and it seems likely that the magnetic field in the solar nebula would have been strong enough to provide electromagnetic induction heating.

Twelve thousand meteorites have been collected form Antarctica. Why so many? The answer is that they are looking for unusual objects representing new worlds such as Mercury and Io. So, how would you recognize a Mercurian meteorite? The answer was that its composition would be reduced basalt; that is, it would contain no iron oxide. The reflection spectra of the meteorite and Mercury would have to be the same; that is, have no iron oxide band. Because Mercury has an enormous core, is it reasonable to assume that all iron would have migrated to the core during the differentiation process, leaving little or none in the crust from which Earth meteorites would come.

Another good question was: "Are meteorites found in Greenland?" The answer was no because the ice dynamics there do not work for pushing the meteorites to the surface where they can be found. As an additional comment, Dr. McCoy mentioned that originally, the National Science Foundation would not fund meteorite collection in Antarctica. However, after Japanese glaciologists found many of them, NSF changed its mind.

The final question was "Are there any new results from the study of the Martian meteorite ALH84001? The answer was no because the microscopic technology needed to study the microtubes is not currently available.

Dr. Mc Coy pointed out that scientific research is a slow process that proceeds generation after generation. His parting comment was: "Science advances by one funeral at a time".

Welcome to the NASA Academy

(www.nasa-academy.nasa.gov)

The NASA Academy was introduced in 1993 at the Goddard Space Flight Center in Greenbelt, Maryland and is also active at Ames Research Center and Dryden Flight Research Center.

The Academy consists of competitively selected university level students from all 50 states, the District of Columbia, and Puerto Rico. These students work on research projects at one of the three participating centers. The intent of the program is to give the selected students a working knowledge of NASA and its programs. Students interested in the space sciences, are college level, and maintain at least a 3.0 average may apply. To know more about what the Academy offers and to place an application for those interested, check out their website at the above web address.

Welcome New NCA Members

Jose L. Acosta
1005 Nelson Street
Rockville, MD 20850-2029

Kate Castell
2404 Dexter Avenue
Silver Spring, MD 20902

Nicholas Eftimiades
11707 Lovejoy Street
Silver Spring, MD 20902

John J. Kasianowicz
14701 Lancraft Court
Darnestown, MD 20874

Julie McCall
739 Rock Creek Church Road, NW
Washington, DC 20010

Vincent McCullough
13899 Ferrara Court
Chantilly, VA 20151

Noah J. Mitchel
6060 California Circle #203
Rockville, MD 20852-4835

Carol Lynn Mummart
2802 North George Street
York, PA 17402

Norman C. Peterson
17732 Caddy Drive
Derwood, MD 20855

Frank & Florence Rosenthal
1048 Bellview Road
McLean, VA 22102

Roberta Stewart
1812 Monroe Street, NW
Washington, DC 20010-1015

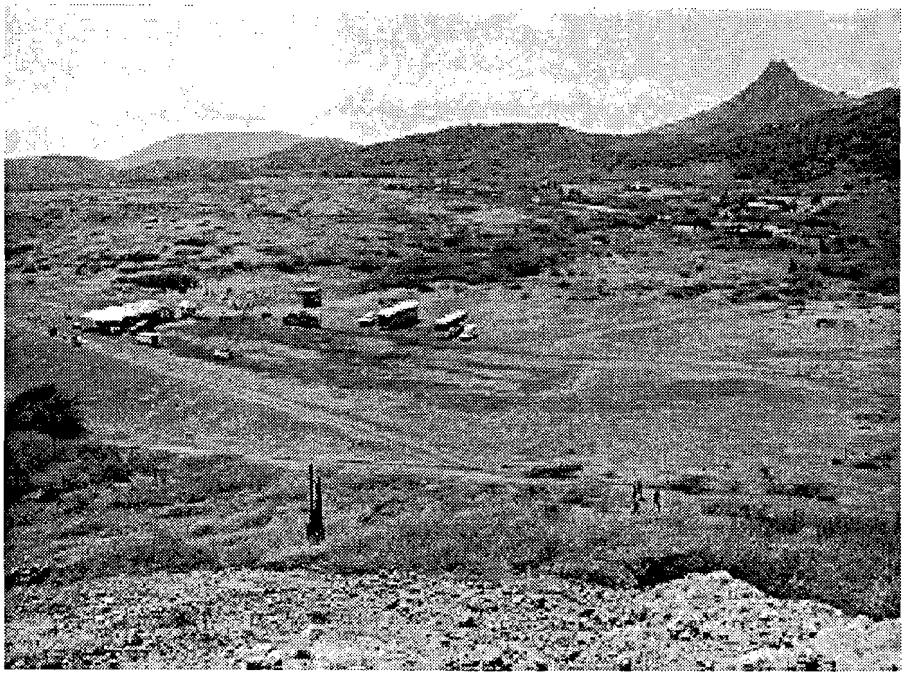
Bill Voss
7071 Wolftree Lane
Rockville, MD 20852

Zacharias P. Walters, Jr
3605 Astoria Road
Kensington, MD 20895-1404

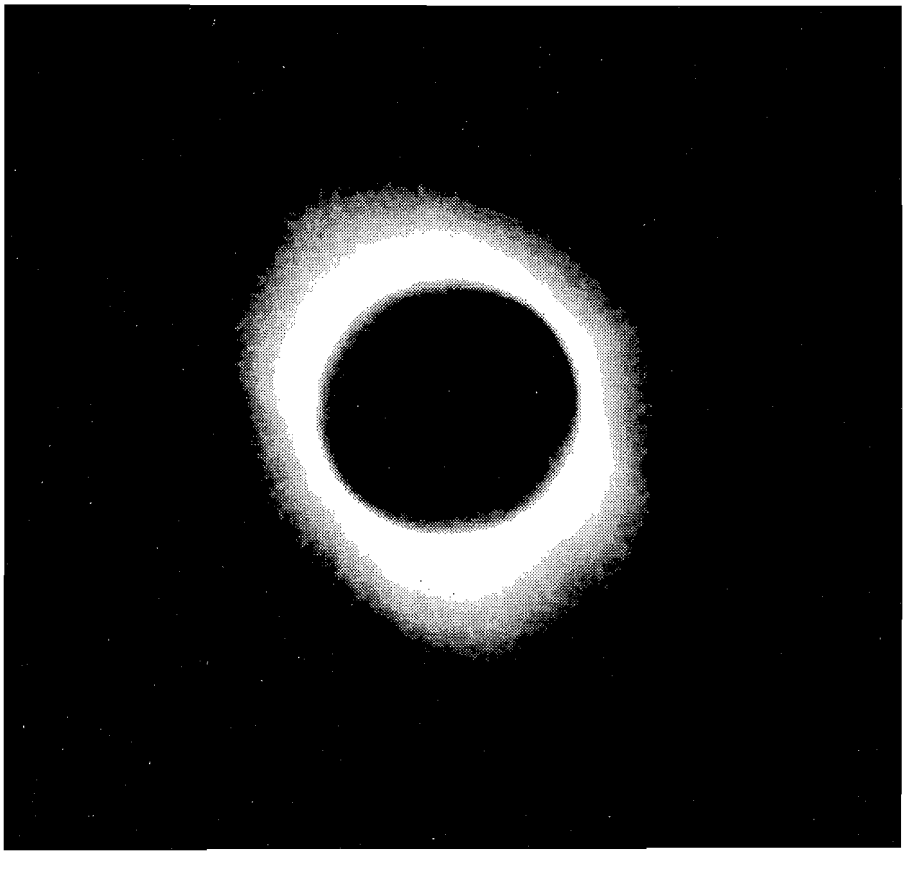
John & Abigail Ward
5511 39th Street, NW
Washington, DC 20015

Curaçao Imagery

Images and Reflections from the Total Solar Eclipse Trip of 1998



February 26, 1998: The day started out cloudy but as it progressed, the sky became clearer. The site that Sue and I picked would prove to be the best. The park personnel cleared out the brush for us and set up tents to protect us from the sun (left center). They later provided us with water, other drinks, and a box lunch. A large hill provided a means to survey the site, which included a wonderful view of Mount Christoffel seen in the upper right. People arrived at the site about 10:30 in the morning. Some mingled while others found the place they wanted to be and began setting up. Others explored the area just to see what they could see.



As we were having lunch, Harold Williams shouted, "First Contact!!" (about 12:40 local time) and the event began. Everyone scrambled to their scopes to verify and to see the first minutes of the eclipse. Gradually the light changed. It would not be long when totality would be upon us. As soon as it hit, all eyes were turn skyward or peering through eyepieces. You could hear the sound of shutters going off and people shouting their enthusiasm. This was our first time taking such photos. To see such a phenomena was awe inspiring. All people should witness such an event at least once in their lives. Hopefully, there will be a next time. — Images and reflections provided by Alisa Joaquin, Editor.

Eclipse '99 in Turkey

4000 Years of History — 2 Minutes of Totality

Join Greenbelt Empress Travel and the National Capital Astronomers in touring what has been called "The world's largest open-air museum" and view a total eclipse of the sun on August 11, 1999. All iteneraries are prelinimary.

Short Trip

One Week August 8-13, 1999—$1995 per person dbl

Fly to Istanbul
Istanbul — Topkapi Palace, St. Sophia, Blue Mosue, Bazaar
Ankara — Museum of Antolian Civilization (Hittite Museum)
Eclipse viewing —From a desert site on the centerline
Fly home from Ankara

Extended Trip

Two Weeks—$2890 per person dbl

After viewing the eclipse, continue touring Turkey
Cappadocia — Underground cities
Pamukkale — "Cotton Castel" mineral springs formation
Ephesus — Best preserved city from Greek and Roman times
Pergamum — Acropolis, Alter of Zues
Troy — Yes, there's a wooden horse; no it isn't the original
Gallipoli — Anzac Cove, Lone Pine Cmemtery
Fly home from Istanbul

Possible Alternative Trips

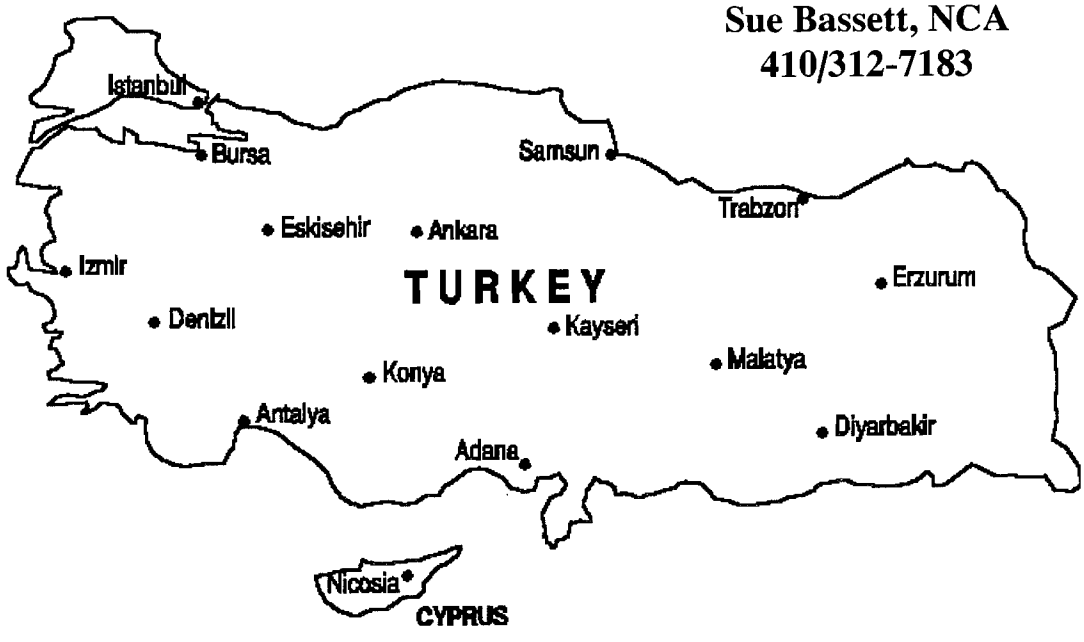
prices on request

After viewing the Eclipse, spend a week touring one of the following:

Egypt and Nile Cruise
Israel
Aegean Isles Cruise

For more information call:

Greenbelt Empress Travel
302/474-1300 or 800/695-0317
or
Sue Bassett, NCA
410/312-7183



Grazing Occultations, 1998 April-May

DATE	Day	EST/EDT	Star	Mag	%	alt	CA	Location
Apr 2	Thu	22:39	SAO 95484	8.1	42+	23	4N	Carmel Church, VA
*** Dates and times above are EST, those below are EDT ***								
Apr 28	Tue	20:18	SAO 94138	7.4	9+	23	3S	Exmore, VA (Sun alt. -5 deg.)
May 3	Sun	1:08	SAO 98096	8.0	47+	10	1N	Piscataway,MD; Springfield, VA

On April 2nd, two good total occultations of close double stars will occur, with 5.7-mag. ZC 944 disappearing at 21:20 EST at a cusp angle of 8S and 6.8-mag. ZC 951 disappearing at 21:32 EST at cusp angle 57N (times and circumstances for Washington, DC). ZC 944 will disappear at 21:16 in Baltimore and will not be occulted at Carmel Church. "%" is the percent of the Moon's disk that is sunlit, with - indicating waning phase, + waxing. When the Moon is waxing, the star approaches the Moon from the dark side, and when it is waning, it approaches from the bright side, passing over the cusp just before the graze begins for events near the cusp on the dark side, as most of the grazes are. "alt" is the altitude of the star above the horizon in degrees at the time of the graze, and "CA" is the cusp angle CA is the cusp angle of the event, the angle from the nearest lunar cusp to the star at the time of central graze, or closest approach of the Moon's center and the star. The nearest cusp is identified by letter as the north (N) or south (S) cusp. Cusp angle is positive on the dark limb and negative on the bright limb.

Asteroidal Appulses, 1998 April

DATE	Day	EST/EDT	Star	Mag	Asteroid	dmag	dur	ap.	Location
						s	in.		
Apr 4	Sat	21:10	T+31d 1855	10.6	Thalia	1.2	4	8	Maine
*** Dates and times above are EST, those below are EDT ***									
Apr 28	Tue	4:55	SAO 162175	8.1	Pamela	6.9	9	2	Indiana
Apr 28	Tue	22:36	SAO 95322	8.9	Kolga	6.0	3	3	s.Tex., Cuba
Apr 30	Thu	4:23	GSC56961723	11.3	Kleopatra	1.5	16	8	New England

"Mag" is the magnitude of the occulted star. "dmag" is the drop in brightness of the merged star and asteroid if the star disappears behind the asteroid. "dur." is the expected duration of a central occultation in seconds. "ap. in." is the minimum aperature that I believe is needed to detect the occultation. All events can be observed visually. The location is only approximate, and for each of these events, there is a chance that an occultation will be visible from your location. For some events, astrometric updates will refine the paths 3 weeks to 3 hours before the events.

Phone the IOTA occultation line, 301-474-4945, for updates and details; for asteroidal occultations, these and finder charts can be found on IOTA's Web site at http://www.anomalies.com/iota/splash.htm.

Open House at Hopewell Observatory

NCA members, families, and guests are invited to view the spring sky at Hopewell Observatory on Saturday evening April 25. Sunset will be at 7:57 pm, astronomical twilight ends at 9:36. If you wish, come any time after 6:00 pm and bring your prepared picnic dinner. Coffee, tea, and cocoa will be provided by the Hopewell Corporation.

Directions:
(1) From the Beltway (I-495), go west on I-66 25 miles to Exit 40 at Haymarket onto U.S. 15. (2) Turn left on U.S. 15 at the end of the exit ramp. (3) Go 0.3 miles to traffic light, turn right onto Va. 55. (4) Go 0.8 miles to Antioch Rd. and turn right. (5) Go 3.2 miles to the end of Antioch Rd and turn left onto Waterfall Road (Rt. 601). (6) Go one mile and bear right onto Bull Run Mountain Road (Rt. 629). (7) Go 0.9 mile on 629 to narrow paved road at right with an orange pipe gate (Directly across from an entrance gate with stone fencing). (8) Turn right through pipe gates, go 0.3 mile to top of ridge, and around the microwave station. (9) Continue on dirt road through the white gate and woods a few hundred feet to the observatory. Park along road short of the buildings. If it is cloudy, the event will be postponed until Sunday, May 24. For further information, call 703/960-9126. *(If parking becomes too tight, park down by the tower and walk in. — ed.)*

Meteor Shower Events

Shower	Duration	Maximum	R.A.	Dec.	ZHR
Virginids	March-April	April 12	14h 04m	-09	5
Lyrids	April 19-25	April 21	18h 08m	+32	10
Eta Aquarids	April 24-May 20	May 5	22h 20m	-01	35
Alpha Scorpiids	April 20-May 19	April 28	16h 32m	-24	5

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

Other Planetariums, Observatories, and Science Centers in the Area

Montgomery College Planetarium — "Black Holes, Gravity to the Max", Takoma Park, MD, April 18, 7:00 PM. (*See* their web site at http://myhouse.com/mc/planet.htm.)

Scientific Colloquia, Goddard Space Flight Center — All colloquia will be held in the Building 3 auditorium at 3:30 PM.

"Superstrings: Why Einstein Would Love Spaghetti in Fundamental Physics," speaker: James Gates, U. of Maryland. April 10.

Arlington Schools Planetarium — "Springtime of the Universe". March 20-May 3, Friday and Saturday evenings 7:30 and Sunday matinees 1:30 and 3:00 PM. Admission $2.50 for adults and $1.50 for children. Sorry, no admittance after program begins. Call 703/228-6070 or 228-6019.

Department of Terestrial Magnetism (DTM) Seminar Schedule — All seminars are at 11:00 AM and are generally held on Wednesdays (unless otherwise noted by **) in the Seminar Room of the Main Building located on 32nd Street, one block south intersecting with Military Rd.

"Galaxy Mergers and the Origin of Radio Galaxies," speaker: Andrew Wilson, U. of Maryland. April 1.

"Groping Toward Reality—A new Way to Look at Runaway Growth of Panetesimals," speaker: George Wetherill, DTM, April 8.

NASA/Goddard Space Flight Center, Laboratory for Astronomy and Solar Physics (LASP) Seminar — All seminars will take place in Bldg. 21, Room 183A and will begin at 12:00 Noon.

"Post-Asymptotic Giant Branch Stars in Local Group Galaxy Halos," speaker: Laura Fulton, STScI, Rescheduled to April 2.

"TBA." speaker, George Sonneborn (GSFC), April 9, 1998

FYI

These articles of interest have appeared in *Bob Ryan's Almanac*:

"Storms in Space," by Ramon E. Lopez, Dept. of Astronomy, U. of Maryland. The aricle discusses how there is weather in space and how it affects the Earth.

"From Mars to You... How Did They Do That?" by Dave Jones, Meteorologist, NBC 4. This article is a commetary on Mars, how information is obtained, and how long that information takes to get to Earth.

"Comets Unlock Secrets of the Solar System!" by Fred Espenak, NASA/Goddard Space Flight Center. This article discusses the two comets, Hale-Bopp and Hyakutake and what kinds of information can be obtained by studying these unique visitors.

"Is the Sky Falling? A Guide to Annual Meteor Showers.", by Geoff Chester, U.S. Naval Observatory. Contains a comprehensive look at meteor showers and where they originate. Pick one up and see what you can learn.

Future Events

29th Meeting of the Division of Dynamical Astronomy of the American Astronomical Society (DDA) — To be held at the University of Virginia in Charlottesville, April 1-3, 1998. Currently, the following speakers (with topics) have been invited to participate.:

"Barred Galaxies and Dynamical Modeling," speaker: P.J. Teuben

"Binary Star Research with the HST Fine Guidance Sensors," speaker: O.G. Franz

"True Airspeed: Spacecraft Aerobraking Orbit Determination and Dynamics at Venus and Mars," speaker: Georgini

"HIPPARCOS," speaker: F. Mignard

"Brouwer Award: Resonant Relaxation," speaker: S. Tremaine

"The Schwarzschild Method for Building Galaxy Models (lead for special session in honor of Martin Schwarzschild)," speaker: T. de Zeeuw

To register and review updates, please go to DDA's web site at http://proxima.astro.virginia.edu/~dda/Cville_meet./index.html.

Space Telescope Science Institute May 1998 Symposium — The topic will be "Unsolved Problems in Stellar Evolution". All aspects of stellar evolution, from birth to death will be discussed. The deadline for registration is April 1, 1998.

People interested in participating can register electronically or contact Sheryl Schmidt at STScI by mail (STScI, 3700 San Martin Drive, Baltimore, MD 21218, U.S.), e-mail (schmidt@stsci.edu), or phone (410/338-4404). The registration fee is $150 before April 1, $170 thereafter.

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.

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.

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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!**

_____

_____

Getting to the NCA Monthly Meeting

Metrorail Riders - From Medical Center Metro Station: Walk down the hill, pass the bus stops and turn right at the anchor onto Center Drive. Continue uphill to Building 10, the tallest building on campus (walking time about 10 minutes). 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 Thai Place Resaurant- Take Wisconsin Avenue toward Bethesda and head right onto Woodmont Follow Woodmont to Cordell Avenue (2 blocks south of Battery). The Thai Place Restaurant is on the corner of Cordell Avenue and Woodmont (4828 Cordell Avenue). There should be adequate parking on the street outside the restaurant. Seats are not guaranteed after 5:30 PM.

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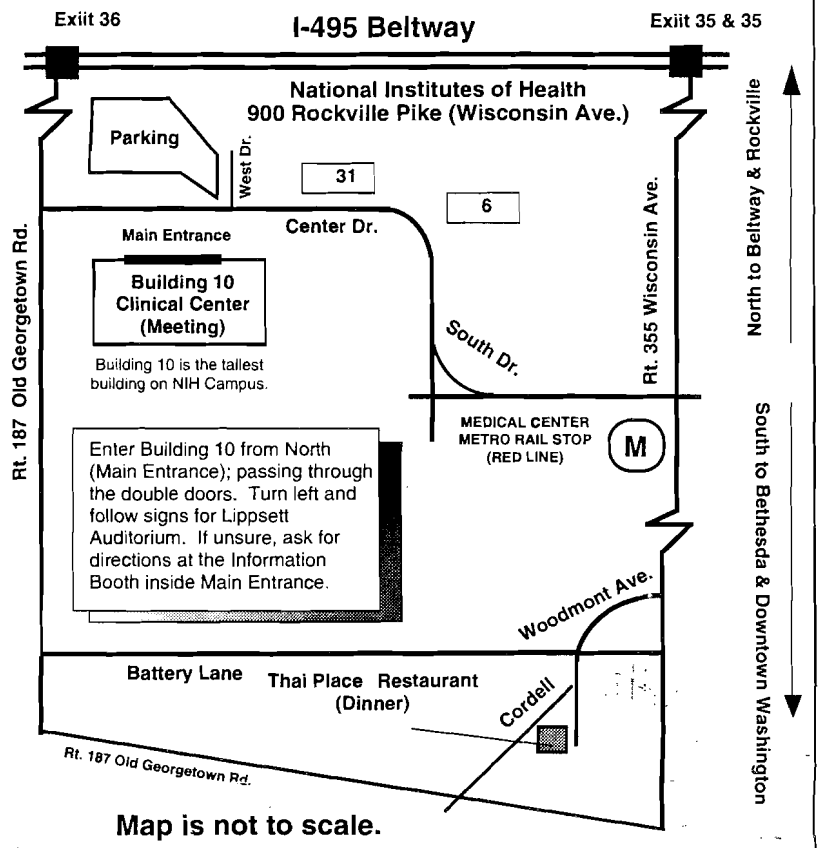

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