Star Dust

National Capital Astronomers, Inc. Phone: 301/320-3621

Volume 53, Number 7 March, 1995 ISSN 0898-7548

David Batchelor to Speak on "Observing The Sun From Earth And Space "

by Harold Williams

The next meeting of the National Capital Astronomers will be held on Saturday, March 4, at 7:30 P.M. in the Lippsett Amphitheater, Room 1C114, of the Clinical Center (building 10) at the National Institutes of Health (NIH). David Batchelor, a staff member in the Space Physics Data Facility (Code 632) of the Goddard Space Flight Center (GSFC), will speak on "Observing the Sun from Earth and Space." The speaker sent the following abstract: "Since the Sun is much closer than other stars, a rich variety of structures can be observed in its atmosphere using various wavelengths of the electromagnetic spectrum. The Sun is also the touchstone for understanding other stars, those like it and those which are very different. In this talk, many slides showing ground-based telescopic observations and space-based observations of the Sun will be displayed and discussed. Many of the images are from recent research work and have never been published in popular literature. There will also be a brief video of the Sun as observed in X-rays with the Japanese/US spacecraft "Yohkoh," and opportunities to view 3-D images of the Sun's X-ray corona which the author recently created for the first time."

As we learned in last month's talk by Carol Jo Crannell on "Imaging the Solar Flares in Hard X-Ray and Gamma Rays form Balloon-Borne Platforms," David Batchelor is the originator of the top-down development model for Solar flares and prominences. We will definitely have to get him to explain this to us at the next meeting and to contrast it with the rival model in which the flares and prominences develop from bottom to top.

David received his B.S. in Physics from Massachusetts Institute of Technology in 1977 for work on the flow of the solar wind with Dr. Stanislaw Olbert. He earned his Ph.D. in Physics from the University of North Carolina, Chapel Hill, in 1984 for work on physics of energetic electrons in solar flares at the NASA Goddard Space Flight Center. He analyzed hard X-ray data from the Solar Maximum Mission satellite and ground-based microwave observations of the Sun. He then held a post-doctoral position at The Johns Hopkins University Applied Physics Lab in Columbia, Maryland, for 3 years, working on production and interpretation of X-ray movies of solar flares. Since 1987 he has been with the National Space Science Data Center (NSSDC) at GSFC. He is now a staff member in the new Space Physics Data Facility, a sister branch of NSSDC. He has a strong interest and many years experience in education through teaching university lab courses and mentoring students. He published the first three-dimensional images of the solar X-ray corona obtained by means of solar rotational parallax and presented it in stereographic form. Many details not visible in the separate images are clearly seen when viewed stereographically. Solar-geomagnetic storms could be forecast by using the parallax created by use of a small group of spacecraft.

Bob McCracken Honored with Lifetime NCA Membership

The NCA was proud to bestow a life membership (with accompanying certificate) upon Robert H. McCracken at its February 4, 1995 meeting. Bob has faithfully devoted a considerable amount of time and effort to NCA activities for many years and we hope to enjoy his presence at NCA meetings for a long time to come.

Calendar of Monthly Events

The Public is Welcome!

Wednesday, March 1-"Sky Watch" column by Blaine P. Friedlander, Jr. appears in *The Washington Post* "Style" section. It lists many other events for the month.

Fridays, March 3, 10, 24, and 31 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.

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

Saturday, March 4, 5:30 PM-Dinner with the speaker at the Thai Place Restaurant, 4828 Cordell Avenue Ave., Bethesda, MD., before the monthly meeting. Reservations are for 5:30 p.m., sharp. Refer to map and description on back page.

Saturday, March 4, 7:30 PM-NCA meeting, featuring David Batchelor (Goddard Space Flight Center) speaking about "Observing The Sun From Earth And Space." Meeting will be held in the Lippsett Amphitheater, Room 1C114 of the Clinical Center (building 10) at the National Institutes of Health (NIH). For directions, refer to map and description on back page.

Saturday March 4, Night (After The Meeting)-Waxing crescent Moon provides this month's Saturday night with *longest* deep night period (i.e., continuous time interval with neither daylight, twilight, nor moonlight), although period doesn't begin until after Moon sets early Saturday night. Several relatively dark-sky sites are avilable for NCA members' use. Information: Daniel Costanzo, 703/841-4765.

Mondays, March 6, 13, 20, and 27, 8:30 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. Information: USNO Public Affairs Office, 202/653-1541.

Tuesdays, March 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, March 11, Night-Waxing gibbous Moon provides this month's Staurday night with *third longest* deep night period, although period doesn't begin until after Moon sets shortly before dawn Sunday morning. *See* March 4 listing.

Monday, March 20, 7:00 PM-"The Rights of Spring: The Vernal Equinox." Montogomery College's Public Planetarium. The planetarium is attached to the Science South building on the ground level and has a conspicuous silver-colored domed roof. Montgomery College Planetarium, Montgomery College, Takoma Avenue and Fenton Street, Takoma Park, MD 20912-4197. Phone: 301/650-1463

Saturday, March 25, Night-Waning crescent Moon provides this month's Saturday night with *second longest* deep night period and this month's *only* Saturday night when Moon is entirely out of the sky between dusk and Midnight EST. *See* March 4 listing.

Saturday, April 1, 7:30 PM-Speaker for the NCA meeting will be announced in the next newsletter.

Wednesday, April 5-"Sky Watch" column appears in *The Washington Post* "Style" section. It lists many other events for the month.

Other events too numerous to mention here are listed in the publications *Sky & Telescope*, the *Astronomical Calendar 1995*, the *Observer's Handbook 1995*, and in numerous software packages. NCA members can purchase all these at a discount. To join NCA, use membership application on page 7.

Imaging Solar Flares in Hard X Rays and Gamma Rays from Balloon-Borne Platforms

Reviewed by Wayne H. Warren Jr.

At their February 4, 1995 meeting, members of the National Capital Astronomers and guests were pleased to hear a talk by Dr. Carol Jo Crannell of NASA Goddard's Laboratory for Astronomy and Solar Physics (LASP) and The Catholic University of America, who described her involvement with research on solar flares and with LASP's HEIDI (High-Energy Imaging Device) balloon-borne experiment. Although a winter storm the previous night and early morning of the meeting gave us a scare about potential cancellation, the weather improved in late morning, so we were fortunate to be able to go ahead as planned, and we had a reasonably good turnout for this exciting lecture.

HEIDI was designed to obtain high-resolution images of hard x-ray emission from solar flares that could be interpreted to provide insight into the physics of the flare phenomenon. An example of a flaring loop was seen in the famous image of the so-called "SKYLAB loop" taken during the flight of that mission in the early 1970s. The desired resolution of 1 second of arc was seen as a rather small area within the loop that corresponds to the distance between Washington DC and Cincinnati OH along the Earth's surface. The imaging was to be done with a newly designed Fourier-transform imaging technique using rotating modulation collimators. The collimators consist of pairs of tungsten grids having slits cut precisely parallel across them. Identical grids mounted on opposite ends of the telescope tube that rotate relative to the image give resolutions in all directions according to the slit widths. The HEIDI instrument had two collimators that gave 25- and 11-arcsecond resolution. Of course, these grids must be in perfect alignment (slits precisely parallel) or only Moir=9B'e patterns are seen. The alignment was demonstrated to be rather challenging when contact prints of grids were passed through the audience and the alignment was tried. (This reviewer could only see the Moir=9B'e patterns and never managed to align the grids perfectly.) Although the alignment is difficult to attain, a major advantage of this technique is that the detectors do not need to be precisely tailored to small spatial resolution as they do for alternative measuring methods that use small apertures to achieve similar resolution. Future grids required to obtain resolutions of 2 seconds of arc will have slits of less than half the width of a human hair. Telescope alignment was achieved by using a set of linear diode arrays as a solar limb detector to allow centroiding of the Sun's image at all times.

We then saw slides of the HEIDI telescope, the supporting structure, and the integrated payload. The instrument was tested by suspending the payload from a crane to allow free movement, then telling the telescope to acquire and track the Sun. Alignment and calibration of the rotating modulation collimators were achieved by using a theodolite and He-Ne laser system. The balloon is a very large structure having a capacity of about 29 million cubic feet of He and weighing 3629 pounds. The balloon is filled with He at ground level to only 0.33% of its total volume and expands to full volume at its final altitude of 25 km. The payload flew for about 6 hours and the equipment performed satisfactorily except for the pointing control system. No useful scientific data were obtained. However, much was learned about the detector grid rotation mechanism, while the aspect control system turned out to be even better than anybody expected.

It appears at this time that the successor to HEIDI may be a satellite-based imaging instrument with essentially the same configuration except for a shorter telescope, which will require correspondingly finer grids to achieve equivalent resolution. The new instrument is called HESI (High-Energy Solar Imager) and will probably fly in 1999 or 2000 during the next solar maximum, if funds can be obtained to support its construction.

The NCA wishes to thank Dr. Crannell for coming out under less-than-ideal weather conditions and for giving a stimulating lecture, and I would like to thank her personally for perusing a draft of this review and making suggestions to improve its content. We are indebted to Jay Miller for making meeting arrangements at NIH and to NIH for its accommodations.

CORRECTION

Some parts of last month's announcement for the Astronomy O!O!O! course were incorrect. The correct course title is "Astronomy O! O! O!" Its correct subtitle is "You, The Universe & Everything In Between," and the instructor's last name is correctly spelled "Costanzo." We apologize for any inconvenience. —ed.

Volunters Needed In April

Area Science Fairs need volunteers for judging. Each year NCA gives a year's membership in NCA including a subscription to *Sky & Telescope* to the astronomically related projects we feel are the best in each jurisdiction, the District, Virginia, Montogomery County, and Prince George's County. Contact Bob Bolster (for Virginia) 703/960-9126, Jeffery Norman (for DC) 202/966-0739, and Jay Miller (for Maryland) 301/530-7942 for more details.

Proposed 1995 Schedule for Exploring the Sky

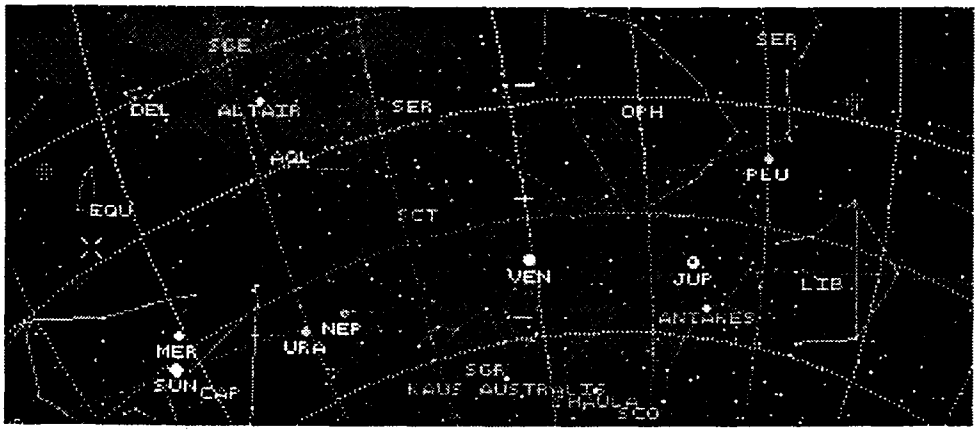
by John Lohman

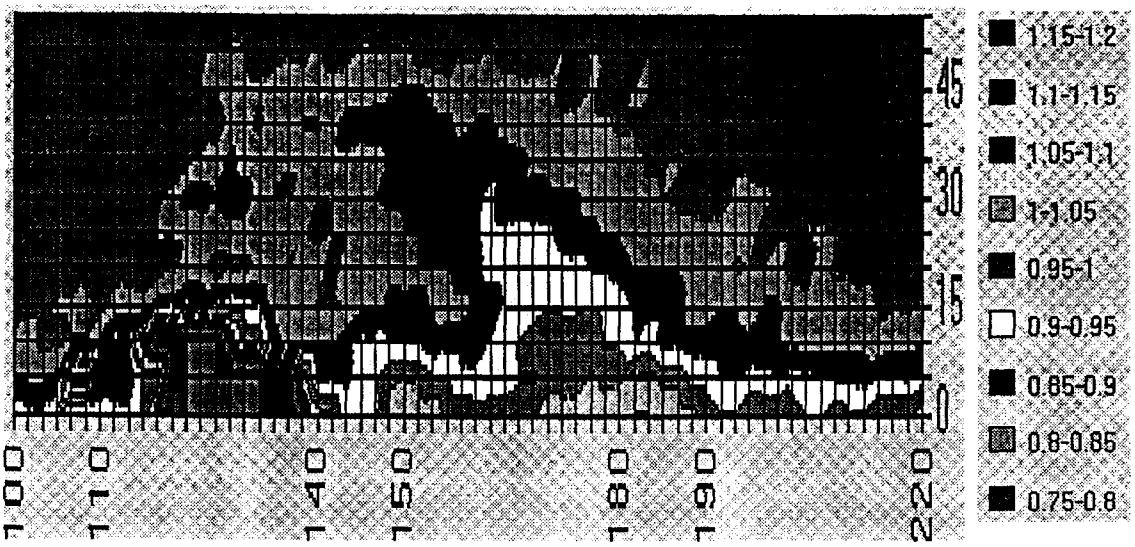
Time	Date	Conditions
9:00 PM*	Saturday 22 April:	No Moon
9:00 PM	Saturday 20 May:	No Moon
9:00 PM	Saturday 17 June:	No Moon
9:00 PM	Saturday 15 July:	No Moon
9:00 PM	Saturday 12 August:	Moonrise 9:06**
8:30 PM	Saturday 16 September:	No Moon
8:00 PM	Saturday 21 October:	No Moon
7:30 PM	Saturday 11 November:	Moonrise 8:24 PM

*All times shown are Eastern Daylight Time.
**Persieds meteor shower.

I do not know of any NCA or Park Service conflicts with this schedule. The August date offers a chance of seeing a few Perseid meteors. I shall prepare charts of Jupiter and its Galilean satellites for whenever they are in the evening sky. I hope we can also offer the corresponding Saturn charts. It would help if people could produce a chart of the brightest stars, say to magitude 3, plus the visible planets, for each date. Any offers?

Could we offer one afternoon date, to view the sun? I would welcome any other suggestions of contributions for the programs. Statistics I have seen indicate a 45% chance of clear skies throughout the year. We use the Rock Creek Park Planetarium when evenings are cloudy; in case of precipitation, the program is cancelled. (For more information, John Lohman can be reached at 703/820-4194)





Radio Map of the Sun and SGR at 432.15 Mhz with only 4 Yagi antennas and 130 K preamplifier. Date: Feb. 5, 1995, 07:14-07:27 UTC. Antenna: 4 Yagis, only 2.6 meters long. Noise figure is abt. 1.5 db (130K). Receiver: AR 8000 with no modification (AGC active) in SSB mode. Audio output was measured with digital voltmeter and recorded with computer. Azimuth and elevation are indicated by the numbers, signal intensity is in different colors (greys). It is very surprising that it is possible to see the milky way with this small amateur radio telescope, with an integration time of 0.5 seconds. Measurements taken at corresponding movements with the azimuth rotor at differenct elevations. Author: Werfried Kuneth, SARA member.

107th Annual Meeting of the Astronomical Society of the Pacific to meet this summer in College Park, Maryland

Reported by Harold Williams

Don't be part of the missing mass when the Astronomical Society of the Pacific (ASP) has their 107th annual meeting in College Park at the University of Maryland this June 22 through 28. The ASP is the largest organization of amateur and professional astronomers united to advance the science of astronomy and to diffuse information concerning it. The ASP has the best catalogue of astronomical gifts, software, and educational materials around. Their address is 390 Ashton Avenue, San Francisco, CA 94112, catalogue sales [800]-335-2624, customer service [415]-337-2136, and internet address asp@stars.sfsu.edu.

Here is what they are planning. Thursday June 22 and Friday June 23, a teacher workshop **"Universe in the Classroom."** This workshop is designed for teachers in grades 3-12 and will have separate sessions for teachers who have a limited or no background in astronomy and another for seasoned science teachers. The sessions will include hands-on activities, useful resources for **teaching astronomy, and nontechnical** talks. A wide range of handouts and resource sheets is included in the registration fee which is $70 for ASP members and $80 for non-APS members, and this includes admission to **Universe '95** on the weekend and a Saturday night star party. The workshop sessions will include a grand tour of the solar system; teaching the phases of the moon; collisions in the solar system; black holes: with space warps, time machines, and the death of stars; constructing our own star finder; making a comet in the classroom; the cosmos on computer software; and much more. One CEU (Continuing Education Unit) per 10 hours of course work from the UMCP can be earned by writing a paper describing how the information and material will be used in the classroom. Attendance is limited. Applications will be accepted on a first-come, first-served basis.

Saturday, June 24 and Sunday June 25 **Universe '95**, a National Astronomy Festival, will be cosponsored by Astronomy magazine with 50+ exhibitors of books, astronomy software, and telescopes. This weekend program will feature a "stellar" lineup of lively, nontechnical talks for amateur astronomers, armchair astronomers, and teachers. Some of the speaks will be Teresa Brainerd (large scale structure), Laura Danly (galaxies), Eric Feigelson (the young Sun), Margaret Geller (search for structure in the Universe), Neil Gehrels (the gamma ray sky), Jeff Goldstein (search for extraterrestrial civilizations), Heidi Hammel (Comet Shoemaker-Levy 9), David Helfand (supernova), Anne Kinney (active galaxies), Charles Lada (star formation), Stephen Maran (results from the Hubble Space Telescope), Lucy-Ann McFadden (comets and asteroids), Robert O'Connell (galaxies), Carl Pilcher (future of the space program), Michael Richard (Sloan Digital Sky Survey), Vera Rubin (expansion of the Universe), Harry Shipman (stellar evolution), Stephen Strom (formation of stars and planetary systems), and William Waller (ultraviolet astronomy). Naturally speakers and topics are subject to change. There will be door prizes. A star party will be held Saturday evening (weather permitting) for which NCA members with telescopes are desperately needed. The cost of this weekend extravaganza is $30, or for one day just $20, with senior and students paying only $25 or $15. Register before May 15 or pay an extra $10. I am bringing my whole family to this and I expect it to be more fun for less money than Disney World — I like Disney World in Florida.

Two other ASP events are planned that will interest a smaller number of NCA members. Saturday, June 24 and Sunday, June 25 **Astronomy Education Symposium: Current Developments, Future Coordination** will bring together astronomy educators most active and knowledgeable to review, through oral presentations, the major topics and issues in astronomy education; to publicize, through posters and displays, both local and national; through small-group discussion, to address major problems, develop solutions, and plan for the future; to create an effective network of astronomy education resources — people and material; and to disseminate the results of the symposium through a high quality conference proceedings. Cosponsored by American Association of Physics Teachers, American Astronomical Society, American Association of Variable Star Observers, and Royal Astronomical Society of Canada. Contact: John R. Percy, percy@astro.utoronto.ca, Erindale Campus, University of Toronto, Mississauga, Ontario, Canada L5L 1C6, phone: 905/828-5351, and fax: 905/828-5328. This event is more expensive then the previous events: $100 for ASP members, $125 for nonmembers, and $50 for college students with a $30 late fee after May 15.

Monday, June 26 through Wednesday, June 28 **Clusters, Lensing, and the Future of the Universe** scientific symposium with focus on three closely related aspects of the formation and evolution of large scale structure. The matter in our universe is highly structured into clusters and superclusters of galaxies, with giant voids between them, in a sponge-like structure with walls and filaments. It could be argued that understanding how these enormous variations in density arose with the corresponding fluctuations on the 3K microwave background radiation, which is very smooth indeed, is the most important unsolved problems in modern astrophysics. The symposium will offer invited, contributed papers, and poster sessions.

The registration fee for this conference is $150 for ASP members, $185 for non-ASP members, and $50 for college students and will include a copy of the conference proceedings for all except the college students. Virginia Trimble is the organizer of this conference.

Newsletter Deadline for April *Star Dust*

March 15, 1995

Send Submissions to Gary & Alisa Joaquin, at 7821 Winona Ct., Annandale, VA, 22003, or send an ASCII file via E-Mail at 71561.1747 @compuserve.com or fax to 703/658-2233. Submissions must be on time or they may not get in. Wishing everyone a Happy St. Patrick's Day.

NCA Welcomes These New Members

John A. Carr
227 62nd St., NE
Washington, DC 20019

Duane S. Cooley
4503 Libbey Dr.
Fairfax, VA 22032-2017

David Neil Keller
Brittany Keller (Junior)
4824 Wakefield Chapel Rd.
Annandale, VA 22003-4466

David J. Marcus
7920 Lakenheath Way
Potomac, MD 20854

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10232 Capitol View Ave.
Silver Spring, MD 20910

Charles M. Mele
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Springfield, VA 22153-3538

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Washington, DC 20009

Steve Winegardner
1221 Massachusetts Ave., N.W., #810
Washington, DC 20005-5322

Jan Wisniewski
13202 Twinbrook Pky. Apt. 301
Rockville, MD 20851-2056

Important Information Numbers

Smithsonian Sky Watchers' Report: Non-technical information recording on astronomical events, objects, and phenomena in the Washington, D.C. region's sky. Updated weekly. 202/357-2000

***Sky & Telescope* "Skyline"**: Moderately technical information recording on latest in space technology, astronomy, and related sciences. Updated weekly, or sooner if necessary. 617/497-4168

McDonald Observatory "Star Date": Non-technical information on space technology, astronomy, and related subjects. Broadcast weeknights, around 8:00 PM, by listener-supported public radio station WAMU FM 88.5

Accurate Time Services (via phone line): Eastern Time (in 24 hour mode) and Universal Time given via the U.S. Naval Observatory and the National Institute of Standards and Technology. Excellent for synchronizing clocks and watches. (Voice Recordings) 202/653-1800, 900/410-TIME, and 303/499-7111; (Modem Time Service) 202/653-0351

"Space Weather" Indices: Highly technical, but quite useful voice recording on Solar activity and its effect on Planet Earth, given via the National Oceanic and Atmospheric Administration. Updated every three hours. 303/497-3235 (anytime) or WWV at 2.5, 5, 10, 15, and 20 MHz (at 18 minutes after every hour)

Local Weather, Sunrise/Sunset, and UV Index: Recording of latest weather forecast out to five days, plus Sunrise/Sunset times, and forecasted Solar ultraviolet radiation index. Covers Washington, DC and vicinity. 703/260-0307

NCA Artificial Satellite Prediction Service: Free customized prediction of viewing opportunities. Satellites frequently are clearly visible to unaided eyes or binoculars, even from heavily light polluted areas. Contact Walter I. Nissen, Jr., (voice phone) 216/243-4980, (e-mail) dk058@cleveland.freenet.edu

NCA Jupiter Galilean Moon Prediction Service: Free customized prediction of viewing opportunities for Jupiter's four Galilean moons. They are clearly visible in small telescopes and binoculars, even from heavily light-polluted areas. Contact John Lohman (voicephone) 703/820-4194 at least one week prior to anticipated viewing.

Occultation Line: Highly technical, but quite useful voice recording with latest updates on occultations and grazings of stars by the Moon, planets, and asteroids; from the International Occultation Timing Association. Many of these events are visible with the unaided eye, binoculars, and small telescopes. 301/474-4945

Other Free Public Science & Technology Lectures: National Air and Space Museum (NASM): 202/357-1552 (ask to receive NASM bimonthly calendar by mail); University of Maryland (Astronomy Department): 301/405-3001; Goddard Space Flight Center (Goddard Visitor Center): 301/286-8981; Carnegie Institution of Washington: 202/328-6988 or 202/265-2752

Science & Technology Public Radio Programs: Quality, informative, and educational radio programs featuring space technology, astronomy, and realated sciences are presented at irregular intervals on **WAMU-FM 88.5**. For program listing, call WAMU Public Radio Listener Talk Show Hotline: 202/885-1200 and Press 3.

Audio/Visual Engineer Wanted

A volunteer is needed to assist with A/V responsibilities during NCA meetings and to look after our A/V equipment. This job consists mainly of tape recording lectures and looking after slide projection. Someone who can attend most or all NCA monthly meetings is desirable. If you are interested in helping the NCA in this way, please contact Wayne Warren at 301-474-0814. We are indebted to Jeff Guerber for doing this job for some years now and for continuing as we search for someone to take over.

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, judge 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 Workshops 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 JOINT THE NATIONAL CAPITAL ASTRONOMERS

Enclosed is my payment for the following membership category:

[ ] Regular
- [ ] *Sky & Telescope* and *Star Dust.* ($46 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.
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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!**

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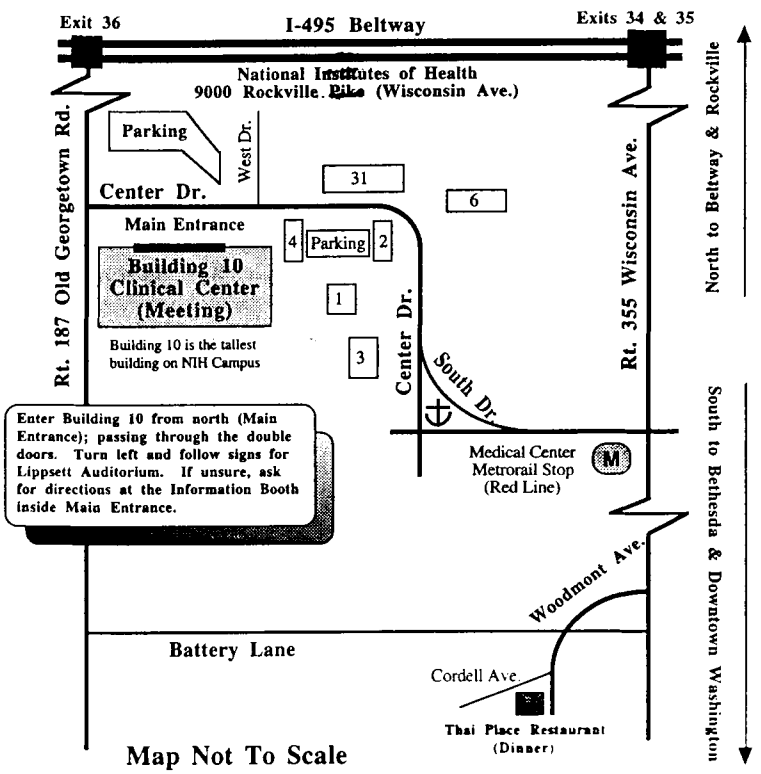
Getting to the NCA Monthly Meeting

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).

Thai Place Restaurant - Take Wisconsin Avenue toward Bethesda and bear right onto Woodmont Avenue (or take the next right onto Battery Lane). Follow Woodmont to Cordell Avenue (2 blocks south of Battery). The Thai Place Restaurant is on the corner of Cordell Avenue and Woodmont Avenue (4828 Cordell Avenue). There should be adequate parking on the street outside the restaurant. Seats are not guaranteed after 5:30 PM.



Star Dust **is published ten times yearly (September through June) by the National Capital Astronomers, Inc. (NCA), a non-profit, astronomical organization serving the entire National Capital region, and beyond. NCA is the astronomy affiliate of the Washington Academy of Sciences and the National Capital region's representative of the International Dark-Sky Association. NCA's Phone Numbers: 301/320-3621 or 703/841-4765. President, Wayne H. Warren, Jr., 301/474-0814. Deadline for *Star Dust* is the 15th of the preceding month. Editors Alisa & Gary Joaquin, 7821 Winona Ct., Annandale, VA 22003, 703/750-1636/71561.1747@compuserve.com.** ***Star Dust*** **© 1995 may be reproduced with credit to National Capital Astronomers, Inc.**

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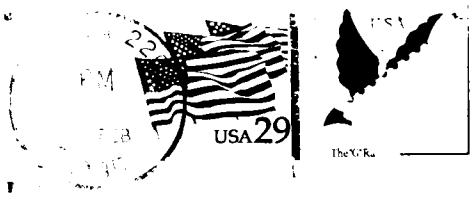

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