Star Dust

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

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The Role of the Sun in Climate Change and Solar Activity Predictions

by Kenneth H. Schatten

The next meeting of the National Capital Astronomers will be held the second Saturday, May 9 , at 7:30 P.M. in the Lipsett Auditorium of the Clinical Center (Building 10) at the National Institutes of Health (NIH). Our speaker, Kenneth H. Shatten, will be speaking on "The Role of the Sun in Climate Change and Solar Activity Predictions." The meeting in June will be return to it's regular schedule.

Abstract

It is generally accepted that "greenhouse gases," that result from human activity, are causing significant warming of the Earth. Yet another view has also emerged — that the natural changes associated with the Sun's light output could be causing some of the terrestrial warming. Some climatologists have argued that significant changes in the past terrestrial temperatures were associated with variations in solar activity. For example, in the 11th and 12th centuries, solar activity was enhanced and the Earth was significantly warmer, so much so, that the Vikings inhabited Greenland. As solar activity waned, so did the Viking's fortunes. In the late 17th century, during an inactive period of the Sun, called the Maunder minimum, the Earth was in a "little ice age." We discuss historical aspects in attempting to understand the role of the Sun in climate change. We see how many practitioners of the field are convinced by correlations; skeptics, however, cite instances where chance correrations break down in many Sun-Weather effects, and there is a lack of a well established mechanism to understand how the changing solar activity could cause the climate changes observed. Surprisingly though, modern solar variations seem to mimic some of the climate changes, too! Additionally, we will talk briefly about the theory of solar activity forecasting. Any views presented, are naturally the speaker's and not any government agency policy.

Biography

Dr. Kenneth H. Schatten is an astrophysicist whose research focuses upon solar physics including the study of magnetic fields, solar activity, coronal physics, dynamo theory, and the solar wind. His research experience also encompasses solar-terrestrial relations with special emphasis upon climate change, planetary magnetism, and atmospheric dynamics.

Dr. Schatten is currently the program officer running the Solar Terrestrial Research Program for the Atmospheric Division of the National Science Foundation (NSF). To fulfill the duties of this position, Dr. Schatten is on leave from NASA's Goddard Space Flight Center (GSFC) where he has been an astrophysicist in the Laboratory for Terrestrial Physics.

His work experience has also included being a reviewer of proposals for NASA and NSF and a reviewer for the Journal of Geophysical Research, the Astrophysical Journal, Solar Physics, among others. He as organized a NASA conference on sun/climate effects. He was the head of a workshop on solar activity-weather and climate relationships sponsored by National Oceanographic and Atmospheric. He has been a co-investigator for Voyager's GSFC Magnetometer Experiment. He has also served on the GSFC Planning Committee.

Dr. Schatten has published in excess of 120 referenced articles. He is the author of a book with Doug Hoyt, entitled "The Role of the Sun in Climate Change". He has also written numerous articles that have been published in other books.

Dr. Schatten earned his Bachelor of Science in Physics at the Massachusetts Institute of Technology. He later earned a Ph. D. in Space Physics at the University of California, Berkeley. ❍

Elections Are Coming

Here are the slate of candidates for NCA Offices:

Andrew Seacord — President
Nancy Byrd —Vice President
Nancy Roman — Secretary
Jeff Norman — Treasurer
Wayne Warren — Trustee
John Menke —Trustee

Calendar of Monthly Events

The Public is Welcome!

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

Fridays, May 1, 8, 22, and 29, 9:30 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.

Fridays, May 1, 8, 15, 22, and 29, 7:30 PM - Telescope making classes at American University, McKinley Hall Basement. Information: Jerry Schnall, 202/362-8872.

Mondays, May 4, 11, 18, and 25, 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, May 5, 12, 19, and 26, 7:30 PM - Telescope making classes at Chevy Chase Community Center, Connecticut Avenue and McKinley Street, NW. Information: Jerry Schnall, 202/362-8872.

Saturday, May 9, 5:30 PM-Dinner with the speaker and other NCA members at O'Donnel's Seafood Restaurant at 8301 Wisconsin Ave., Bethesda, MD. *See* map and directions on back page.

Saturday, May 9, 7:30 PM-NCA meeting, will feature Kenneth H. Schatten, NASA/Goddard Space Flight Center, speaking on "The Role of the Sun in Climate Change and Solar Activity Predictions." For directions, *see* map and directions on back page.

Saturday, May 23, 9:00 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 6 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 7.

From the Secretary: You Really Ought to Read This!!

by Leath Holloway

It may come as a great surprise and disappointment to you, but I have decided not to run for reelection to the office of Secretary of the NCA this year. I have been NCA Secretary now for seven years, and I think it is time to step down and give another member a chance to experience the joys and challenges of holding this office.

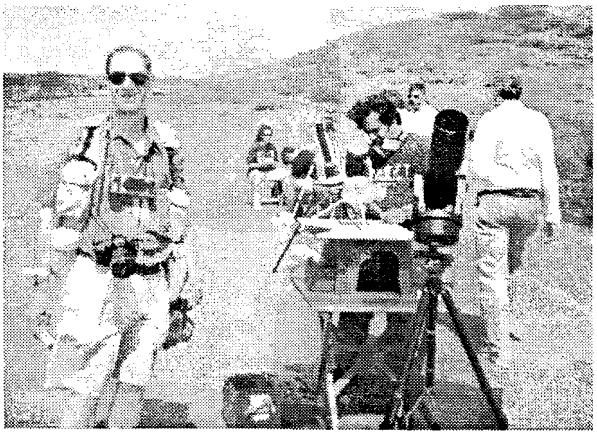
After doing this job for seven years, I have become bored with the routine chores associated with being NCA Secretary. The work is no longer fun. It is probably a case of burnout. Furthermore, I have other things I would like to do with the time I spend on these secretarial duties

I do, however, wish to continue being the Director of the NCA Junior Division. I enjoy helping kids learn about astronomy. I am also willing to continue receiving telephone calls from people who hear about us from *Sky & Telescope*'s web page or by other means. Finally, I will, of course, be happy to help the new secretary get started in this job. ❍

The Review on "Mars" was not available and will appear in the June issue of *Star Dust*.

Totality — And Planning For It

by Jim Roy, APSA



All photos are provided by Jim Roy.

We had a total solar eclipse of the Sun on February 26, 1998 — at least if you went to the right place. A total solar eclipse is the one astronomical phenomenon that is almost impossible to miss. There is nothing else like totality on this Earth, but since land space and reservation times are often limited, it is wise to plan well in advance. For this 3-1/2 minute of totality, the planning began about two years ago, as Sue Bassett and Alisa Joaquin of the National Capital Astronomers looked for a good place to observe with the objectives of good weather, safety, airline access, convenience, and price. They settled on Curaçao, which had pretty much all of these good points, plus a Mardi Gras type Carnaval. A good part of NCA signed on right away, fully a year and a half early, and we ended up with 108 people. Many were NCA members, but some were relatives or friends of NCA members. Few were serious astrophotographers, though nearly all tried to take a few pictures. I have suitable admiration for those who made drawings or wrote poetry during totality, since it is very difficult to concentrate then.

There was also the factor of one of the greatest excuses in history for leaving the East Coast Winter in February. This made it mandatory for me, especially since my last total solar eclipse pictures were taken in Mexico on July 11, 1991. Further, I was invited by NCA Treasurer Jeff Norman and former President Wayne Warren, both science professionals, to address the group the night before the eclipse on how to photograph it.

My presentation consisted chiefly of slides of the 1991 total solar and 1994 annular eclipses, with explanations of the fairly simple elements of eclipse photography. These are:

1. A full aperture solar filter for your long lens to prevent frying your telescope, camera, or retina, during partial phases.

2. A long lens, 500-2000 mm, for imaging the Sun in partial and total phases. A clock drive to keep the lens pointed is a time saver, but not always required. My gear, which was typical, was based on a Meade ETX, a 90 mm aperture telescope costing about $600.00 which is a knock-off of the $4000 Questar. Both have specifications of about 1250 mm focal length at f/13.8, with a clock drive, and weight about 9-12 pounds. A small scope like this is easily carried aboard an airliner, unlike larger instruments.

3. A study tripod, with a solid head and weight to hold it down, if you have a serious wind as does Curaçao (20-30 knots). Once I got there and noticed the wind, I bought a length of wire to secure a large rock under my center column.

4. A single lens reflex (SLR) camera with a T-Mount for the telescope, preferably with mirror lockup, a cable release, and a spare cable release. My spare is held with rubber bands along my tripod's center column, since a cable release is often the "most losable" accessory.

5. A second SLR for backup and pictures of the strange colors and surroundings, with a fast (f/1.4 to f/2) normal or wide angle lens mounted. The fast lens is needed because it gets pretty dark during totality and there is little time to change lenses or drag out a flash.

6. Medium to high speed film. I started with Ekta 125 in Mexico in 1991 and have gone to Fujicolor 200 because I want both slides and color negatives, and maximum latitude without too much grain to make 16 x 20s.

7. A hat, sunblock, and suitable clothing. In Curaçao the weather was cooperative, about 80° but windy. In 1997 in Mongolia at the total eclipse there, the only heat at the site involved getting close to an odoriferous and dyspeptic 2-hump Bactrian camel, according to those who attended both eclipses.

The actual photography was fairly simple, mainly requiring planning more than last minute effort. Thanks to Sue and Alisa, who made a scouting trip visiting several sites on the island, we had rooms in 2 hotels (modest and a bit fancier), 2 buses and a van (for the bulkiest gear), a reservation in quiet Christoffel National Park, a little food and a lot of water, soft drinks, shade, a few chairs and tables in the shade, and clean reserved privies. We left early enough to avoid the heavy traffic sure to come, and were set up almost an hour before First Contact (when the Moon first covers a bit of the Sun). I first set up on an exposed ridge with a view of the sea, but when the wind blew my camera strap almost horizontal I moved below the ridge, in plenty of time. The observers were at least as interesting as the eclipse itself. As strange colors and a slow darkening herald totality the watchers acted with increasing excitement and a genuine sense of wonder.

At Second Contact (the full coverage of the Sun and start of totality) there was an organized frenzy of taking off the solar filters and bracketing shutter

PHOTO, continued on page 4

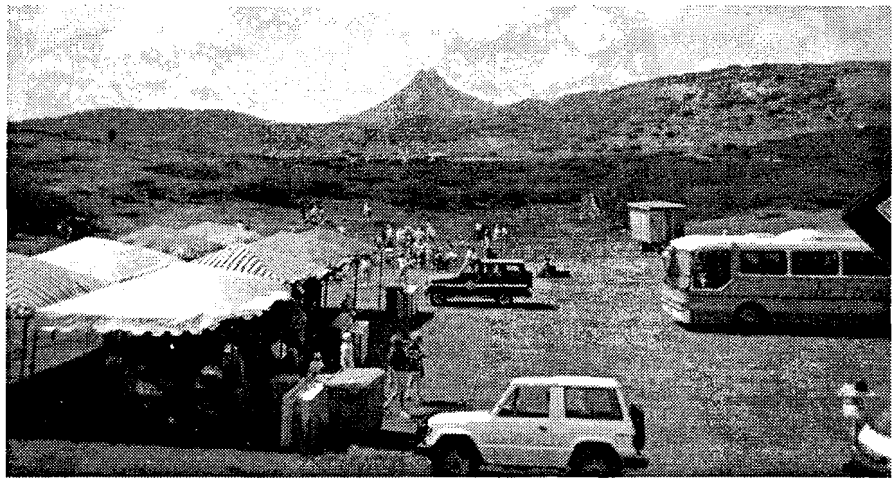
PHOTO, continued from page 3

speeds heavily to get good pictures of the corona, prominences, planets, and stars. Of course some people just stare or babble incessantly, but you should make an effort to record how dark it gets and to actually stare without any gear whatever. This is one time when the unaided eye is the best instrument, and no film can handle the range of light. Mercury and Jupiter were close to the Eclipsed Sun, (within 5°) and Venus a bit farther away.

This frenzy ends with the Third Contact, in which the "diamond ring" signals the end of totality. I dared 2 pictures, then swiftly taped the solar filter back in place. Most people packed up quickly. Only a few waited until Fourth Contact, when the Sun was entirely uncovered.

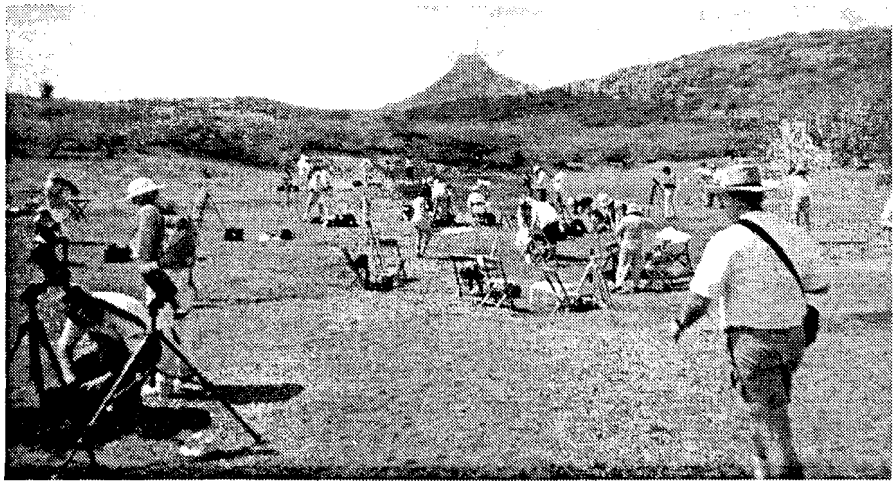
Usually I bracketed 2 stops (1/30, 1/125, 1/500) during the partial phases because I was worried about the wind shake, and bracketed by whole stops during totality, because of the difference in exposures between corona and prominences, at least 3 stops. I wanted to be sure of printable negatives of both major features of totality. A clock drive helped here because there is just not much time to repoint the telescope during totality.

After flying home to Virginia on February 27, I mixed a batch of E-6 chemistry and developed 6 rolls of 35 mm slides and 2 of 120 superslides (of the whole 5 day trip, not including 7 rolls of Realist format stereo pairs and 15 feet of 70 mm VPS), on 4 consecutive nights. The pictures of Carnaval (a night parade) and the island scenery came out fine, but the main interest was of the day of totality. Some of the pictures were of partial phases, taken through a 500 mm mirror lens, hand-held, with a mylar improvised solar filter. My main 36 exposure roll of Fujicolor 200, taken through the ETX, went to Dale Laboratories in Hollywood, Florida for 2 prints and 2 slides from each frame. The best of the second set of slides went to the Einstein Planetarium at the National Air and Space Museum, where I am a volunteer.



The site in Christoffel Park with Mount Christoffel in the background. The park sevice provided tents for shad. The small wagon behind the bus contained privies.

It is not difficult to photograph eclipses of the Sun. The main factors are the right place and time, and clear weather. Next comes the big European Total Solar Eclipse of August 11, 1999, which has at least 2 minutes of totality through Cornwall and Devon in England, just north of Paris, Stuttgart, and Munich, Germany, Austria, Hungary, Romania, Bulgaria, Turkey, and a bit less in Iraq, Iran, Pakistan, and India. Weather prospects are best in Turkey, Irac,and Iran since the monsoon should be on in India and Pakistan, while Cornwall and the French coast are not known for clear summer weather. We will not have an easily reachable total eclipse through North America until 2017. Alisa Joaquin also reminds us to make sure to have an updated passport, since that cannot be improvised. She and Sue Bassett will again lead an expedition, this time to rural Turkey, but it will be quite a bit more expensive due to the longer travel time, lack of discount airlines, and longer time out of the United States. ❍



People setting up their equipment and getting ready for the main event.

Newsletter Deadline for June *Star Dust*, May 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.

Stellar Imagery Part 3

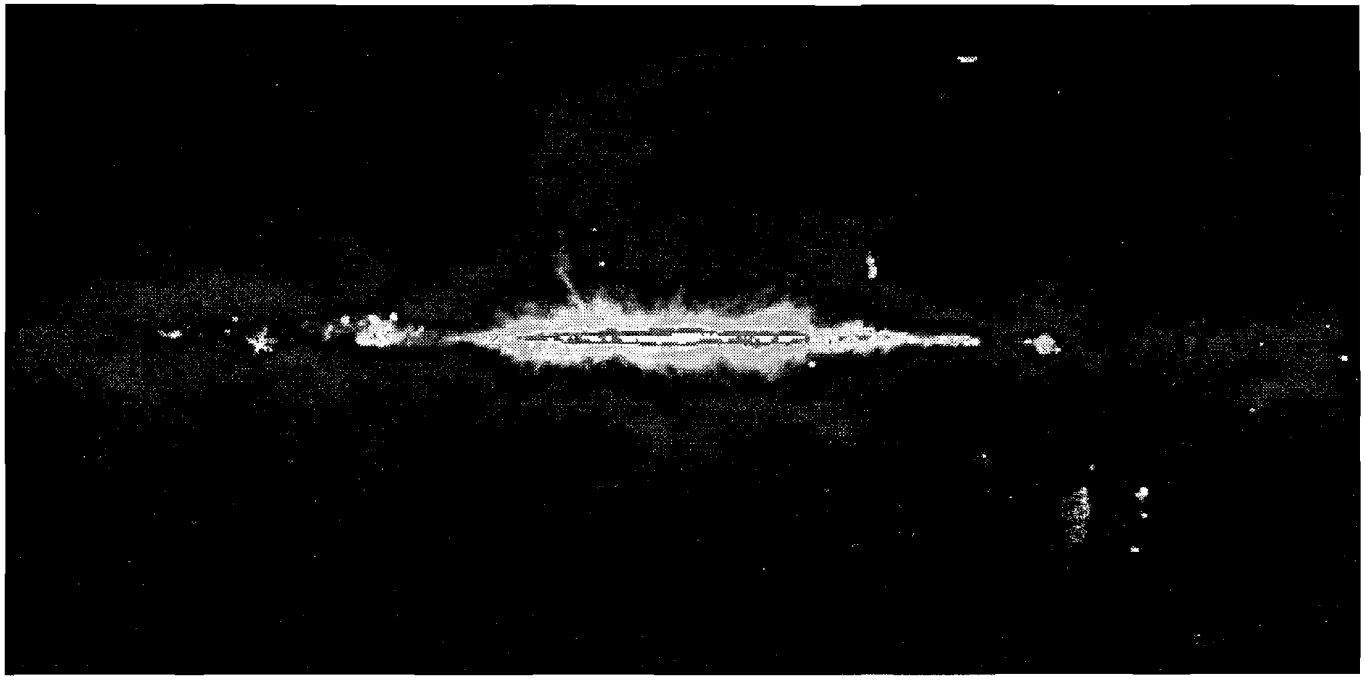
by Gary L Joaquin

Five years ago an astronomer and friend, Ray McKinley, asked me to substitute for him and lead a star gazing event at an annual retreat. At that time the images that I shared with you (February and March issues of *Star Dust*) were not yet a part of me. The night before my presentation I was almost in a state of panic. I was totally lost in the evening sky; there were so many stars on that brilliant clear night in Buckeystown, Maryland that I couldn't find a familiar reference point. I didn't regain my bearings until Orion rose after midnight on that autumn evening.

Since that time, with study, and with the support of my wife, my universe has grown. My unfamiliarity with the sky and my perceptions of space as a very static place have since fallen away and been replaced by very different images: the fireballs that rose from the surface of the planet Jupiter as the comet Shoemaker-Levy 9's fragments plunged into its atmosphere; Earth whizzing about the Sun in a wake of trailing dust and gas particles; small meteorites striking our upper atmosphere with explosions the size of nuclear bombs; solar flares disrupting communication and power across vast reaches of our planet; a solar neighborhood where the reach of our sun's wind is just being reached by spacecraft — well beyond the distant obit of the planet Pluto; a cocoon of debris surrounding this neighborhood, containing untold numbers of asteroids, any of which can be dislodged into a collision course with our Earthly home; new planets revolving around distant suns with the promise of new life; the possibility of microbial life just next door in the rocks of the planet Mars; the spiral arms of our Milky way galaxy and the smaller galactic suburb in which we reside; the great starless voids that exist between our galaxy and the seemingly infinite number of galaxies that abound; and an awareness of the incredible violence that occurs in these distant reaches and even nearby within the core of our own galaxy.

The universe has become a more exciting place in which to live, a much more organic and complex place than I had ever believed possible. As I travel with my eyes and with my mind, a deeper appreciation of our Earth as a fragile place worthy of being protected has emerged. The missions of Apollo brought us this perspective, one of living in tenuous balance in a ridiculously thin zone of life on our planet's surface shielded from the infinitely hostile environment of space.

Should we discover another Earth-like planet tomorrow, discovering the means to cross the void that separates us is a problem that will probably not be solved within the lifetimes of our present living generations. Thus it becomes much clearer to me that it is imperative that we take better care of this fragile place that we call Earth, to enable ourselves, our descendants, and the other species with which we share this world, to experience more of the wonder of this universe and perhaps to learn how to take better care of the new homes revolving around distant suns that await us. ❍



408 Mhz all-sky map of our galaxy. Authors: C.G.T. Haslam, C.J. Salter, H. Stoffel, and W.E. Wilson. Telescope: Jodrell Bank MKI, Effelsberg 100M, Parkes 64M, Jodrell Bank MKIA. From the National Center for Supercomputing Applicaitons' Astronomy Digital Image Library.

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

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. Call 703/228-6070 or 228-6019. The Planetarium will be closing in June and will reopen in the fall.

Capital Science Lectures Carnegie Institution — Lectures begin at 6:30 PM. Due to renovation, lectures will be held at the District of Columbia Jewish Community Center, 1529 16th Street, NW, Washington, DC.

"Diamond Windows on a New Chemistry" speaker Russell J. Hemley, Geophysical Laboratory, May 12.

Maryland Space Grant Observatory — Open House every Friday evening (weather permitting), Bloomberg Center of Physics and Astronomy, Johns Hopkins University, Baltimore, MD. Information: 401/516-6525 or check their web site at www.pha.jhu.edu/facilities/observatory/telescope.html

Montgomery College Planetarium — "The Search for Extraterrestrial Intelligence", Takoma Park, MD, May 16, 7:00 PM. (*See* their web site at http://myhouse.com/mc/planet.htm.)

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 3:30 PM.

"Toward Understanding Chromosphere and Coronal Activity in Cool Stars," speaker: Zdzislaw Musielak, U. of Alabama, May 7.

"Cosmology from High Redshift Supernovae." speaker, Peter Garnavich, CIA, May 14.

"Formation of the Helium 304 Line on the Sun." speaker, Stuart Jordan, GSFC, May 21.

"TBA." , May 28.

Public Lecture at Space Telescope Science Institute (STScI) — First Tuesday of every month at 8:00 PM in the STScI Auditorium of the campus of The Johns Hopkins University.

"The Big Gulp: X-Ray Signals of Matter Falling into a Black Hole," Speaker Julian Krolik, The Johns Hopkins University, May 5.

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

"Recent Developments in Gamma Ray Bursts," speaker: Jan van Paradijs, U. of Alabama. May 8.

"Magnetic Mars," speaker: Mario Acuna, GSFC. May 15.

"Experimental Chaos Control," speaker: William Ditto, Georgia Tech. May 22.

"Supercomputer Simulations of Gas Flows in Binary Star Systems" speaker John Blondin, North Carolina State University, May 29.

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.

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 $170.

University of Maryland Department of Astronomy Campus Observatory, College Park, MD — "The Orion Nebula", , May 5, 9:00 PM, speaker Dr. Jim Stone. (*See* their web site at http://www.astro.umd.edu)

"Update on Planetary Missions Results", speaker Grace Deming. May 20, 9:00 PM.

U.S. Naval Observatory Colloquia — "All colloquia will be held in the Building 52, Room 30 and will begin at 10:30 AM.

"New Satellites of Uranus," speaker: Dr. Kaare Aksnes, University of Oslo. May 15.

Meteor Shower Events

Shower	Duration	Maximum	R.A.	Dec.	ZHR
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 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.

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*. ($54 per year)
- [ ] Star Dust only ($27 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)
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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 $27 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!**

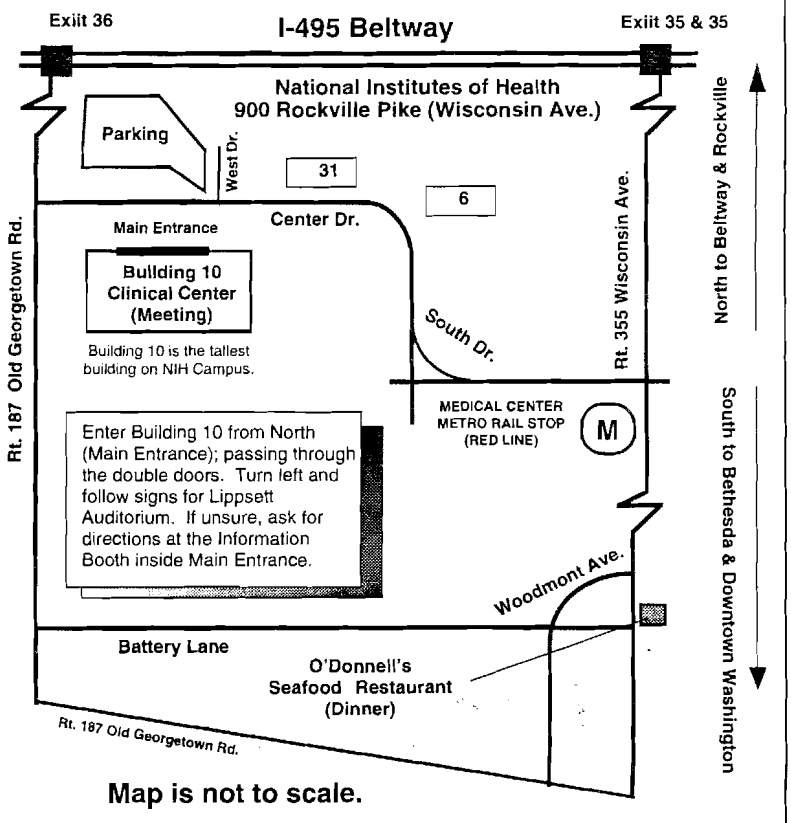
_____

_____

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 O'Donnell's Seafood Resaurant- From 495, take Wisconsin Avenue south past Woodmont Avenue toward Battery Lane. It is located on the corner of Rosedale and Wisconsin Avenue on the east side of the street There is free parking parking across the street on Rosedale. The address is 8301 Wisconsin Ave., Bethesda, MD. Seats are not guaranteed after 5:00 PM.



Star Dust **is published ten times yearly (September through June) by the National Capital Astronomers, Inc. (NCA), a nonprofit, 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. President: Harold Williams, 301/565-3709. Deadline for *Star Dust* is the 15th of the preceding month. Editors: Alisa & Gary Joaquin, 4910 Schuyler Dr., Annandale, VA 22003, 703/750-1636, E-mail: ajglj@erols.com. Editoral Advisor: Nancy Byrd**

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