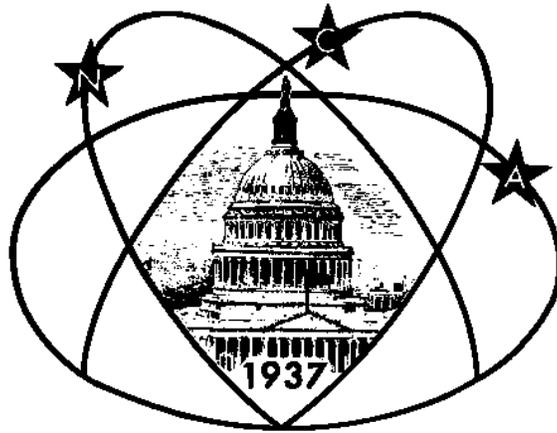


Star



Dust

National Capital Astronomers, Inc.

Volume 58, Number 9

May, 2000

ISSN 0898-7548

Nicholas White to take NCA on a Cosmic Journey to the Edge of Gravity, Space, and Time *submitted by Nancy Byrd*

The next meeting of National Capital Astronomers will be a double header. It will feature Dr. Nicholas White, leader of the X-ray Astrophysics Branch and of the Office for Guest Investigator Programs (OGIP) in the Laboratory for High Energy Astrophysics at NASA Goddard Space Flight Center. Dr. White is also the director and founder of HEASARC, NASA's repository for its high energy data. The colloquium will also honor this year's Washington area science fair winners for their astronomical projects. [See the article about this, inside.] This meeting will begin at 7:30 P.M. on Saturday, May 6, 2000 in the Lipsett Auditorium at the National Institutes of Health.

Dr. White introduces his talk as follows:

"The nature of gravity, in particular its relationship to the other forces and to quantum theory is one of the major challenges facing us as we begin the new century. In order to make progress we must challenge the current theories by observing the effects of gravity under the most extreme conditions possible. Black holes represent one extreme, where the laws of physics as we understand them break down. The Universe as whole is another extreme, where its evolution and fate are dominated by the gravitational influence of dark matter and the nature of the Cosmological constant (or dark energy?)."

His talk will describe NASA's "Cosmic Journeys" program. With this program, NASA will try to observe the extremes of

The President's Corner

The following people have agreed to serve as the nominating committee for selecting the slate of NCA officers for this next year. They are Jay Miller, Michael Brabanski, and John Graham. The slate of officers will be listed in the 2000 June issue of *Star Dust* (and the May issue if the slate has been drawn up in time to appear there).

Andrew W. Seacord, II
President

gravity throughout the Universe, hopefully obtaining an image of an event horizon. The program will study the large scale structure of the Universe in order to constrain the nature of dark matter and dark energy; it will look for the highest energy processes, including processes that might approach those of the early universe.

Judith Lean Talks on How Variations in the Sun's Radiation Contribute to Global Climate Change and Space Weather *by Nancy Byrd*

At the April 1 meeting of National Capital Astronomers, Dr. Judith Lean, research physicist in the Space Sciences Division of the Naval Research Laboratory, reviewed with NCA the current state of knowledge of solar variability, the Sun-Earth climate connection, and solar variability's contribution to space weather. The information density of her talk was immense and can only be touched on here.

Dr. Lean began by noting that there has always been interest in studying the Sun, but that interest in solar variability has heated up in the last decade. Understanding the role of solar variability is important for determining which factors are anthropogenic and which are not. Moreover, we

now have satellites in Earth orbit which can be affected by changes in solar radiation. Thus, these considerations have policy and economic considerations.

Dr. Lean gave an interesting comparison of the two celestial bodies essential for human life: the Sun and the Earth. The sun's photosphere has a black body temperature of about 6000°K, peaking at 500 microns in the visible range; sunspots are visible here. The chromosphere shows not only sunspots but also bright faculae and phages which radiate in the ultraviolet. Still hotter, with temperatures in the millions of degrees, the corona radiates at x-ray wavelengths. Here you can see loops of plasma erupting from its surface.

The earth has a surface black-body temperature of 255°K. It radiates in the infrared, re-radiating energy derived from the Sun. The temperature of Earth's atmosphere also varies with altitude, depending on where the incident radiation is absorbed. From the Earth's surface, the temperature decreases to about 12 km and then rises. This is the stratosphere where molecular oxygen is broken apart by .2 to .3 micron radiation. This then recombines to form the ozone layer. Above about 50 km, 1000 nm (nanometer) radiation breaks up atomic nitrogen and oxygen into ions, forming the ionosphere. In the thermosphere (about 100 to 500 km), virtually all

(Continued on page 2)

NCA Events This Month

The Public is Welcome!

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

Fridays, May 5, 12, 19, and 26, from 6:45-9:30 P.M. Telescope making and mirror grinding classes at American University, McKinley Hall Basement, Nebraska and Massachusetts Avenues, Washington, D.C. However, on May 5 and 26, if the weather is clear, there might not be a class, because the moon will be near new, and the instructor may be out star-gazing. Call or e-mail to confirm on those dates. Information: Guy Brandenburg, 202-635-1860 or gbranden@earthlink.net.

Friday, May 5, 12, 26, 9:30 P.M. - Open night with NCA's 14-inch telescope at Ridgeview Observatory near Alexandria, Virginia; 6007 Ridge View Drive (off Franconia Road between Telegraph Road and Rose

Hill Drive). Call Bob Bolster, (703) 960-9126 before 6:00 p.m.

Saturday, May 6, 5:30 P.M. - Dinner with the speaker and NCA members at the North China Restaurant 7814 Old Georgetown Road, Bethesda MD. See the map and directions on Page 6.

May 6, 7:30 P.M. - NCA meeting, at Lipsett Auditorium in Building 10 at NIH, will feature Dr. Nicholas White.

Saturday, June 3, 7:30 P.M. Speaker: Dr. David Dunham

See Page 4 for more National Capital area astronomical doings. To join NCA, use the membership application on Page 7.

Meteor Showers May Radiants

Full Moon: May 18

Major Activity

Radiant	Duration	Maximum
Eta Aquarids (ETA)	April 21 - May 12	May 5 at 17:06 UT

Minor Activity

Radiant	Duration	Maximum
Northern May Ophiuchids	April 8 - June 16	May 18/19
Southern May Ophiuchids	April 21 - June 4	May 13 - 18
May Librids	May 1 - 9	May 6/7
Epsilon Aquilidsant	May 4 - 27	May 17/18

Daylight Activity

Radiant	Duration	Maximum
Epsilon Arietids	April 25 - May 27	May 9/10
May Piscids	May 4 - 27	May 12/13
May Arietids	May 4 - June 6	May 16/17
Omicron Cetids	May 7 - June 9	May 14-25

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

Judith Lean, continued

(Continued from page 1)

the wavelengths shorter than 100 nm are absorbed, increasing temperatures dramatically. Most of the Sun's radiation (visible wavelengths) reaches the Earth's surface, where it is absorbed and re-radiated at infrared wavelengths.

Certain gases in the Earth's atmosphere are greenhouse gases; these include water vapor, CO₂, and ozone. These gases are opaque in the infrared and thereby trap this radiation, warming the Earth. Aerosols from volcanoes and coal burning can prevent the Sun's radiation from reaching Earth, cooling it. The Sun's radiation itself varies. These factors are called "forcings", as the balance between them, interacting with feedback mechanisms, determines the equilibrium temperature of the Earth. Feedback mechanisms include the amount of cloud cover, ice cover, snow cover, and vegetation; such factors affect the albedo or reflectivity of the Earth. "Is this temperature," asked Dr. Lean, "changing in ways that we can understand?" The attempt to answer this question drove the rest of the talk.

Dr. Lean then displayed a remarkable composite, time-series plot of total solar irradiance synthesized from various satellite data, now extending for 20 years. These data, for the first time, show unequivocally that the "solar constant" (nominally 1365 watts/m²) is not constant. The most prominent solar variation is the 11-year solar cycle, but superimposed on this is a 27-day variation corresponding to the rotation period of the Sun. These data also suggest additional longer-term variation. From trough to peak in the 11-year cycle, there is a 0.10% increase in total irradiance. Moreover, the variation varies significantly with wavelength. In the visible range (at 500 nm), the variation is 0.10%. This accounts for 99% of the radiation. At 1000 nm, it varies by a factor of 2. At x-ray wavelengths, it varies by an order of magnitude.

Before obtaining the more precise satellite data, Dr. Lean and her colleagues made use of proxy data. Ice cores and tree ring data have been used to estimate solar variations for up to 1000 years. ¹⁴C, found in tree rings and ¹⁰Be, found in ice cores, are cosmogenic isotopes modulated by solar activity, and thus track solar variation. Since we only have 3 solar cycles of information from space, these are still the only means of studying long term climate variation and its relation to solar variation.

Sunspot numbers have been systematically collected for the past 150 years. Sunspot observations began with Galileo in 1610. However, sunspots disappeared in the Maunder Minimum (late 17th century). They reappeared with their now familiar 11-year variation after that, but not until 1843 did the amateur astronomer, Heinrich

(Continued on page 3)

Judith Lean, continued

(Continued from page 2)

Schwabe, report the 11-year cycle of variation.

Combinations of sunspot data, historical records, tree ring data, and other proxies for climate have yielded much information. These data show long-term variations which exceed the 11-year variations, suggesting that the Earth could warm or cool significantly from variations in solar activity. For example, the coldest part of the Little Ice Age coincided with the Maunder Minimum, and our present period of high solar activity may have an analogue in medieval times.

To emphasize the impact of the 11-year solar cycle in Earth environments, Dr. Lean showed numerous data sets exhibiting variability. Among her examples were stratospheric ozone abundance, variations in sea surface temperatures, upper atmospheric densities and deposition in ice cores taken at low latitudes but high altitudes. All of these showed strong 11-year variation.

Variation in upper atmospheric density due to changes in EUV radiation is especially significant to humans now that we have many spacecraft in low earth orbits. Higher density leads to orbital decay, due to drag. Upper atmospheric pressure varies with the Solar Cycle.

Variations in stratospheric ozone abundance due to variations in the Sun will need to be separated from those due to depletion by chlorofluorocarbons in order to do any meaningful evaluation as to whether the Montreal protocols are having a beneficial effect. Stratospheric ozone varies significantly with the 11-year Solar Cycle.

Dr. Lean and her colleagues have attempted to model climate using a standard climate model program by introducing greenhouse gases as an anthropogenic forcing and ignoring solar variation. This does not work. The model shows too little change before the industrial revolution and too much afterward to account for the observed warming. The best fit was obtained by using greenhouse gases, aerosol cooling and solar variation. Dr. Lean writes that "pre-industrial sun-climate associations suggest that some 30% of surface warming in the past century may be solar-related." In addition, anthropogenic forcings may be canceling each other's effects.

Thank you, Dr. Lean, for another excellent talk.

Congratulations to the NCA Science Fair Winners!

We are pleased to announce the winners in the 2000 science fair judging. They are **2000 DC Citywide Mathematics, Science and Technology Fair**

Sabrina C. Snell
Improper Motions
School Without Walls

Fairfax County Regional Science and Engineering Fair

Brittany M. Hertzog
Effects of Light Pollution on the Study of the Stars
Hayfield High School

44th Annual Montgomery Area Science Fair

Elizabeth Epstein
Sensitivity of Gaussian Orbit Reduction to Time Spacing
Montgomery Blair High School

Abigail Fraeman
Twinkle Twinkle Variable Star: Observing Delta Cephei
Takoma Park Middle School

Adam Siegel
Mathematical Moon
Walt Whitman High School

Prince George's Area Science Fair
Darjush M. Badii-Boushehri
Experimental X-Ray Telescope Mirrors
Eleanor Roosevelt High School

Jessica Webbon
Fe Emissions from K-Shell Vacancies
Eleanor Roosevelt High School
Nathan Kelley
Star Cluster and Gas Cloud Interaction
Eleanor Roosevelt High School

These winners will be honored at the May NCA meeting. The science fair winners will bring their projects to the meeting. Each will give a 3 to 5 minute summary of his or her project. The student will be presented with a certificate. The award also includes a one-year membership in NCA with a one-year subscription to *Sky and Telescope*.

Did You Know?

by Elliott Fein

On April 18, *The New York Times* carried an article by John Nobel Wilford, "Astronomers Celebrate A Super Stargazer". That referred to the tenth anniversary of the launching of the Hubble Space Telescope.

There were several beautiful pictures: a field of galaxies, part of the Eagle nebula, a globular cluster, and Saturn with auroras that are visible only in UV.

The article mentioned the gathering of astronomers at the Space Telescope

Science Institute in Baltimore. One of the Hubble achievements that the article mentioned had to do with the ability to see beyond 12 billion light-years: "The survey uncovered 1,000 galaxies in a patch of sky no larger than a grain of sand held at arm's length. By extrapolation, astronomers thus estimated that the observable universe contains at least 120 billion galaxies . . ." Wow!

Nancy Grace Roman Reports

(from the Greenbelt Astronomy Club newsletter)

Bill McNamee has established a Web site devoted to issues of Amateur Urban Astronomy in the Baltimore and D.C. areas. <http://64.224.212.117>.

Most of Washington D.C.'s street lighting fixtures are being converted to FCO. The process is slow (perhaps 20-25 years) but all contracts for upgrading/resurfacing roads include upgrading the fixtures to FCO.

Deadline for June *Star Dust*: May 15



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

Text must be in ASCII, MSWord, or WordPerfect. Graphics submitted must be in BMP, TIFF, GIF, or JPEG; BMP is best. Thank you.

Other National Capital Area Meetings, etc.

U.S. Naval Observatory (USNO) Monday nights at 8:00 p.m., except on Federal holidays: USNO public nights 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.

Open House on Saturday, May 6, from 10:00 a.m. to 4:00 p.m. Information: USNO Public Affairs Office, 202/762-1438. Source: <http://www.usno.navy.mil>.

Department of Terrestrial Magnetism (DTM) Carnegie Institute of Washington 5241 Broad Branch Road, N.W. Washington, D.C. Wednesdays at 11:00 a.m. in the Seminar Room of the Main Building. No info at press time. Call (202) 686 4370 to confirm. Source: <http://www.ciw.edu/DTM-seminars.html>

Goddard Scientific Colloquium — All seminars will be held in GSFC Building 3 Auditorium at 3:30 P.M. Contact Carol Krueger, at (301) 286-6878 to confirm.

May 5 Sidney Perkowitz, Emory University, "Galaxies, Beer, and Baked Alaska: the Science of Foams". May 12 Wojciech Zurek, Los Alamos National Laboratory, "Quantum Computing".

May 19 Pieter Tans, Climate Monitoring and Diagnosis Laboratory, "CO₂ Budget of the Atmosphere Over the Last Decade". May 26 Keith Ogilvie, GSFC, "The Day the Solar Wind Disappeared". Source: <http://lheawww.gsfc.nasa.gov/users/djt/colloq/>

Laboratory for Astronomy and Solar Physics (LASP) — Seminars are on Thursday at 3:30 P.M. in GSFC Bldg. 21, Room 183A. May 4 Lee Armus, SIRTf Science Center/Caltech, "Ultraluminous Infrared Galaxies in the SIRTf Era"

May 11 Sally Heap, GSFC, "The HeII Gunn-Peterson Effect". May 18 Marcia Rieke, University of Arizona, "NICMOS Observations of Starburst Galaxies". Source: http://stars.gsfc.nasa.gov/www/lasp_colloq/index.html

Laboratory for High Energy Astrophysics (LHEA) Tuesday Seminar Series — NASA GSFC Building 2, Ground Floor Conference Room, 3:30 P.M.

May 2 Dr. John F. Krizmanic, USRA and LHEA/GSFC, "Ultra-High Energy Neutrino Astrophysics with OWL".

May 9 Prof. Lars Hernquist, Harvard-Smithsonian, "An Accretion Model for Anomalous X-Ray Pulsars". May 16 10:30 A.M. Dr. Glenn Starkman, Case Western Res. U., Special Seminar "High Resolution X-Ray Astronomy with an Occulting Satellite and a Conventional

X-Ray Telescope". May 16 Dr. Steve Ritz, LHEA/GSFC, "The Gamma-Ray Large Area Space Telescope". May 23 Dr. Kathryn Flanagan, MIT, "High Resolution Spectroscopy of E0102-72 with Chandra".

May 25 11:00 A.M. Dr. Jordan Camp, CalTech, Special Seminar "Science and Technology of Gravitational Wave Astronomy".

May 30 Dr. Neil Gehrels, LHEA/GSFC, "The Mystery of the EGRET Unidentified Sources". Source: <http://lheawww.gsfc.nasa.gov/docs/lhea/TuesSeminar/Seminar.html>

LASP Stellar & Extra-Galactic Astronomy Lunch — Talks are Wednesdays at 12:00 Noon in Room 242 of Building 21.

May 3 Harvey Moseley, GSFC, "Far-Infrared Imaging with SOFIA".

May 10 Eleni Chatzichristou, GSFC/NRC, "Evolution vs. Orientation in Seyfert Galaxies". May 17 Don Carson, GSFC (860), Spartan Project. May 24 Lee Feinberg, GSFC, (AETD)

"Instrument Technology for Future Space Telescopes: Detectors, MEMS, Coolers, Optics, and Interferometry". Tuesday, May 30 Rene Walterbos, NMSU, Baltimore-Washington Starburst Seminar. Source: <http://hires.gsfc.nasa.gov/~gardner/seal/>

Montgomery College's Planetarium Fenton St. in Takoma Park. Saturday, May 13 at 7:00 P.M. "The Search for Extraterrestrial Intelligence". 301-650-1463. Source: <http://www.mc.cc.md.us/Departments/planet/>

University of Maryland College Park Astronomy Department Colloquia All Astronomy Colloquia are held in room CSS 2400 at 16:00-17:00 (4:00-5:00 pm) unless otherwise noted.

May 3 Dr. Rocky Kolb, University of Chicago/FNAL, "Seeds of Cosmic Structure: Quantum Fluctuations in the Primordial Soup". May 10 Dr. Lars Hernquist, Harvard-Smithsonian Center for Astrophysics, TBA (301) 405-3001. Source: <http://www.astro.umd.edu/colloquia/>

Northern Virginia Astronomy Club (NOVAC) meets the second Sunday of each month at Lecture Hall 1 on the Fairfax campus of George Mason University. The Lecture Hall is next to Fenwick Library, on the North side of campus across Patriot Circle from the parking lots G and F. Parking in these lots is free on Sundays. Meetings start at 6:00 p.m. May 14, NOVAC members: astronomy software demonstrations. 703 803-3153. Source: <http://astro.gmu.edu/~novac>

University of Maryland Observatory on Metzert Road. Open house on 5 and

20 of each month. May 5 Two shows, 8:30 and 9:00, Dr. Sylvain Veilleux, "Monsters in the Sky: Quasars and Supermassive Black Holes". May 20 9:00 p.m., Kartik Sheth "Gas in Galaxies" Info: (301) 405-3001 Source: <http://www.astro.umd.edu/openhouse/>
Greenbelt Astronomy Club meets on the last Thursday of each month (except holidays) at 7:30 p.m. at the Howard B. Owens Science Center, 9601 Greenbelt Road, Lanham, MD 20706. (Call the Science Center at 301-918-8750 or (301) 441-4605 to confirm meeting dates). Club meetings are open to the general public. Source: lheawww.gsfc.nasa.gov/docs/outreach/gac/GAC.html

National Air & Space Museum — Free lectures at the Einstein Planetarium and other daily events. 202-357-1550, 202-357-1686, or 202-357-1505 (TTY) Source: <http://www.nasm.edu>.

May 24, "Lunar Samples and the Story of the Moon", Graham Ryder, staff scientist at the Lunar and Planetary Institute in Houston, Texas, will discuss what the carefully preserved lunar samples still teach us about the Moon. June 14 "Back to the Moon: The Lunar Prospector Mission". Alan Binder, Principal Investigator for Lunar Prospector, offers a first-hand account of the mission: its goals and results, and what its findings mean for the future.

All lectures are free and no tickets or reservations are required. The lectures, which are in the Einstein Planetarium, begin at 7:30 P.M.; doors open 15 minutes prior to the lecture. For more information: 202-357-2700 or www.nasm.si.edu. Source: Leith Holloway
NASA/GSFC LEP Seminar Laboratory for Extraterrestrial Physics Brown Bag Seminar. The Laboratory for Extraterrestrial Physics (LEP) at NASA's Goddard Space Flight Center conducts weekly science seminars Fridays at noon in Room 8 in Building 2 at Goddard. Since the seminar is conducted during the lunch hour, the audience often brings their lunch.

May 5 Dr. Pontus Brandt, IRF, Sweden, TBD. May 12 Dr. James Chen, NRL, Washington, D.C., "CME - Magnetic Cloud Theory and Comparison with SOHO/LASCO and EIT Measurements" (tentative title). May 19 Dr. Michael Wiltberger, Dartmouth College, TBD. May 26 AGU Practice Talks, various Source: http://lepjas.gsfc.nasa.gov/~seminar/lep_seminar.html

Mid-Atlantic Occultations and Expeditions, May / Early June, 2000

by David Dunham

Asteroidal Occultations

DATE	Day	EDT	Star	Mag	Asteroid	dmag	Dur Ap.		Location
							s	in.	
May 23	Tue	21:59	TAC-10 4663	10.8	Vibilia	2.0	15	8	s.N.Y., Conn.
May 24	Wed	2:57	SAO 184281	9.0	Germania	2.9	13	4	Md., Va., DC

Grazing Occultations

DATE	Day	EDT	Star	Mag	% alt	CA	Location
May 8	Mon	20:28	SAO 079670	8.2	29+ 50	3N	Keller, VA (Delmarva; Sun -5.2)
May 8	Mon	20:38	79 Gem	6.5	30+ 49	-2S	Doswell, VA (Sun alt. -6 deg.) & Cheriton, VA (Sun alt. -8)

Total Lunar Occultations

The better total lunar occultations through early June visible from throughout the Washington-Baltimore greater metropolitan area are listed below. Many can be accurately timed by aiming a camcorder into a low-power eyepiece of your telescope and recording WWV with the audio.

DATE	Day	EDT	Star	Mag	% alt	CA	Notes
May 6	Sat	20:56	D SAO 77395	8.1	11+ 22	50S	Sun alt. -10; Sp. K5
May 7	Sun	21:20	D SAO 78698	7.2	20+ 29	35S	Sp. type F8
May 8	Mon	20:24	D 79 Gem	6.5	29+ 51	19S	ZC 1171; Sp.A1; Sun alt. -4deg.
May 9	Tue	0:41	D 85 Gem	5.4	31+ 3	59S	ZC 1193; Sp. A0; Az. 293 deg.
May 9	Tue	22:54	D ZC 1321	6.7	42+ 33	30S	Sp. G5; close double, 0.2"
May 9	Tue	23:24	D SAO 98190	7.2	42+ 27	72N	Sp. F0
May 12	Fri	2:18	D 53 Leonis	5.3	65+ 10	47N	ZC 1576; Sp. A2; Az. 276 deg.
May 13	Sat	0:28	D ZC 1684	6.8	74+ 36	48S	Sp. K0
May 13	Sat	0:32	D SAO 118952	7.1	74+ 36	79N	Sp. A2
May 13	Sat	1:34	D SAO 118971	7.6	75+ 24	77N	Sp. G5
May 18	Thu	23:20	R chi Oph	4.2	99- 23	57N	ZC 2361, 11" from terminator
May 20	Sat	1:37	R xi Oph	4.4	96- 29	56S	ZC 2498; Sp. F2
May 22	Mon	3:55	R ZC 2785	6.9	86- 29	75S	Sp. G8
May 25	Thu	3:30	R SAO 164534	7.3	61- 20	63N	Sp. K3
May 27	Sat	5:48	R psi 3 Aqr	5.0	41- 32	85N	Sp. A0, Sunrise (Sun alt. 0)
May 31	Wed	5:49	D mu Ceti	4.3	6- 13	-57N	Sp. F1, Sunrise (Sun alt. 0)
Jun 4	Sun	21:43	D SAO 79392	8.1	9+ 12	38N	Sp. M0
Jun 5	Mon	22:14	D SAO 97869	7.4	18+ 16	50S	Sp. A3
Jun 5	Mon	22:26	D ZC 1276	6.5	18+ 14	65S	Sp. K0

D following the time denotes a disappearance, while **R** indicates that the event is a reappearance. When a power (x; actually, zoom factor) is given in the Notes, the event can probably be recorded directly with a camcorder of that power with no telescope needed. The times are for Greenbelt, MD, and will be good to within +/-1 min. for other locations in the Washington-Baltimore metropolitan areas unless the cusp angle (CA) is less than 30 deg., in which case, it might be as much as 5 minutes different for other locations across the region.

Mag is the star's magnitude. **%** is the percent of the Moon's visible disk that is sunlit, followed by a + indicating that the Moon is waxing and - showing that it is waning. So 0 is new moon, 50+ is first quarter, 100+ or - is full moon, and 50- is last quarter. The Moon is crescent if % is less than 50 and is gibbous if it is more than 50. **Cusp Angle** is described more fully at <http://www.lunar-occultations.com/iota>. **Sp.** is spectral type-color, **O, B,** blue; **A, F,** white; **G,** yellow; **K,** orange; **M, N, S, C** red.

Phone the IOTA occultation line, 301-474-4945, for updates and details, or check IOTA's Web site at <http://www.lunar-occultations.com/iota> which now has an asteroidal occultation section with finder charts and updated path maps. Good luck with your observations.

David Dunham, 2000 April 16

Phone: home 301-474-4722; office 240-228-5609; car 301-526-5590 dunham@erols.com

Getting to the NCA Monthly Meeting

Saturday, May 6

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

North China Restaurant
7814 Old Georgetown Road (near Cordell)
Bethesda MD
301-656-7922

7:30 P.M. - NCA Meeting at Lipsett Auditorium in Building 10 at NIH. Guest speaker: Nicholas White to take NCA on a "Cosmic Journey to the Edge of Gravity, Space and Time".

Directions to the Meeting Place

From Rockville Pike (Wisconsin Ave., Rt. 355)

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

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

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

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

Directions to the Restaurant

Dinner before the meeting will be at 5:30 P.M. at
North China Restaurant
7814 Old Georgetown Road (near Cordell)
Bethesda MD
301-656-7922

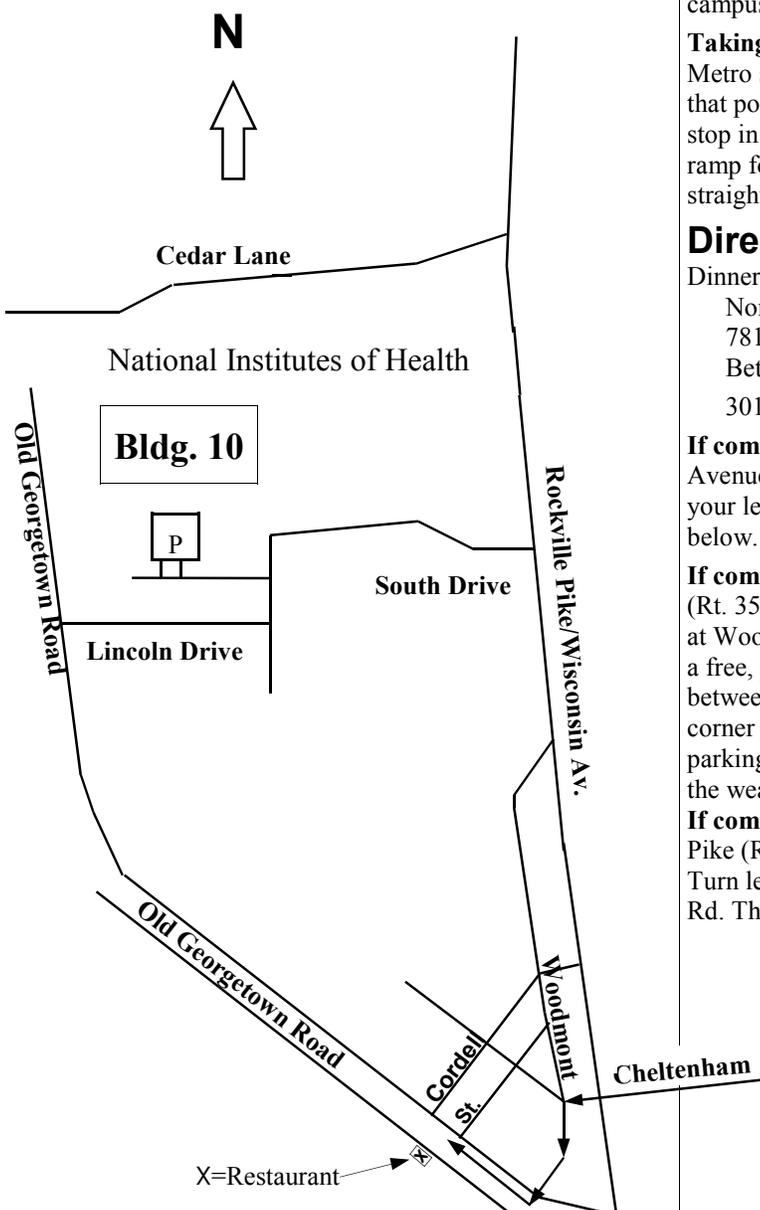
If coming from the District, when going north on Wisconsin Avenue, ignore all signs until you pass Old Georgetown Road on your left. Once past Old Georgetown Rd., follow the directions below.

If coming from south of Bethesda, go north on Wisconsin Ave. (Rt. 355), turn left onto Cheltenham Dr. (traffic light). Turn left at Woodmont Ave. Turn right onto Old Georgetown Rd. There is a free, public parking garage very close to Old Georgetown Road between Cordell and St. Elmo. The restaurant is almost on the corner of Cordell and Old Georgetown Road. Best to get to the parking garage by 5:30 because it becomes full soon thereafter if the weather is good.

If coming from north of Bethesda, go south on the Rockville Pike (Rt. 355). Turn right onto Cheltenham Dr. (traffic light). Turn left at Woodmont Ave. Turn right onto Old Georgetown Rd. The restaurant is a few doors from the corner of Cordell.

After dinner,

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



Star Dust is published ten times yearly, September through June, by the National Capital Astronomers, Inc. (NCA).

Editor: Elliott Fein, Editorial Advisor: Nancy Byrd, Artistic Advisor: Adele Fein.

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National Capital Astronomers, Inc.

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

SERVING SCIENCE & SOCIETY SINCE 1937

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

SERVICES & ACTIVITIES:

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

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

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

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

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

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

Tours: On several occasions, NCA has spon-

sored tours of astronomical interest, mainly to observatories (such as the National Radio Astronomy Observatory) and to the solar eclipses of 1998 and 1999.

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 astronomy, space technology, and related sciences through discounted memberships, mentoring from dedicated members, and NCA's annual Science Fair Awards.

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

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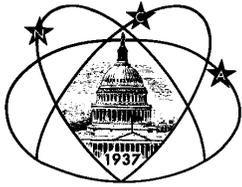
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- Review of Judith Lean’s talk on How Variations in the Sun’s Radiation Contribute to Global Climate Change and Space Weather.
- NCA Science Fair Winners!