Star Dust

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January Speaker: Dr. James Zimbelman — "Mars Exploration Rovers: Geology on the Move"

Dr. James Zimbelman, Planetary Geologist in the Center for Earth and Planetary Studies at the Smithsonian Institution's National Air and Space Museum, will present the talk "Mars Exploration Rovers: Geology on the Move" at the January 12 meeting of the National Capital Astronomers, 7:30 P.M., at the University of Maryland Observatory in College Park Maryland.

Abstract

Since January of 2004, the twin Mars Exploration Rovers (MERs) *Spirit* and *Opportunity* have provided humanity with the first detailed traverses across the Martian surface. The two rovers are operating on opposite sides of the Red Planet, resulting in nearly continuous operational planning and data analysis by scientists and engineers across the country, and around the world. The primary objective of the MER program was to look for evidence of water in the Martian surface materials; the rovers have returned abundant data that demonstrate that water played an important role in the history of both landing sites. Both MER spacecraft are showing signs of their age, having operated more than ten times longer than the primary mission duration specified by NASA, but both continue to return important new observations and measurements. The lecture will summarize the highlights and main scientific results of the mission as carried out at both landing sites.

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NCA's 70th Anniversary Celebration a Resounding Success

By Wayne H. Warren Jr.

NCA held its 70th anniversary meeting at the University of Maryland Observatory on December 8, 2007 at 7:30 P.M. The celebration consisted of a potluck dinner followed by a series of short presentations related to NCA history and current activities that have been going on for a number of years. NCA President Walt Faust acted as Master of Ceremonies, introducing the speakers and making relevant comments throughout the evening. The presentations were videotaped by Elizabeth Forbes Wallace and NCA member Michael Chesnes for possible broadcast on the Montgomery County Television Network.

The dinner was very enjoyable. Many NCA members contributed homemade hot dishes, fresh salads, appetizers, and desserts. Personally, I thought that the food was very good. The variety of the homemade dishes was such that there was something for just about every taste; there were many more items available than if we had ordered food to be delivered. The dinner was followed by a champagne toast (sparkling cider was available for the teetotalers).

The presentations included a talk by Jeff Norman about longtime NCA member Bob McCracken, who was twice President and

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Dr. David H. DeVorkin — Astronomers' Reaction to Sputnik

Reviewed by Alan Bromborsky

At the October 13, 2007 NCA meeting at the University of Maryland Observatory in College Park, on the 50th anniversary of the launch of the Sputnik satellite, Dr. David H. DeVorkin, National Air and Space Museum, presented the history of astronomers' efforts to transcend the veil of the Earth's atmosphere for the purpose of making astronomical measurements such as the Sun's spectra without atmospheric ultraviolet absorption, cosmic ray counting and spectra, distribution of X-ray sources and their spectra, etc.

The earliest efforts to transcend the atmosphere began with balloonists in the 19th century, who carried spectroscopes, thermometers, and pressure gauges with them to probe the atmosphere. The first successful attempt at remote sensing was a spectroscope package carried in a balloon that would automatically record the Sun's spectra on film. In the early 20th century the Smithsonian Institution (Abbot) sent balloonsondes to 30 km to measure the solar constant. In the 1930s, the Swiss balloonists Auguste Antoine and Jean Felix Piccard (ancestors of Jean-Luc Picard) made the first manned flights into the stratosphere at altitudes up to 72,000 feet (22,000 meters) while gathering data on the upper atmosphere as well as early cos-

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Calendar of Events

The Public is Welcome!

NCA Home Page: http://capitalastronomers.org

NCA Mirror- and Telescope-making Classes: Fridays, January 11, 18, and 25, 6:30 to 9:30 P.M. at the Chevy Chase Community Center, at the northeast corner of the intersection of McKinley Street and Connecticut Avenue, N.W. Contact instructor Guy Brandenburg at 202-635-1860 or email him at gfbrandenburg @yahoo.com. In case there is snow, call (202) 282-2204 to see if the CCCC is open.

Open house talks and observing at the University of Maryland Observatory in College Park on the 5th and 20th of every month at 8:00 P.M. (Nov.-Apr.) or 9:00 P.M. (May-Oct.). The talks are non-technical. There is telescope viewing afterward if the sky is clear.

Dinner with NCA members and speaker: Saturday, January 12 at 5:30 P.M., preceding the meeting, at the Garden Restaurant in the University of Maryland University College Inn and Conference Center. See map and directions on Page 6.

Upcoming NCA Meetings at the University of Maryland Observatory in College Park, Maryland

Saturdays

January 12, 2008,
Dr. James Zimbelman, from the National Air and Space Museum, will present the talk "Mars Exploration Rovers: Geology on the Move".

February 9, 2008,
Dr. Rhonda Stroud from the Naval Research Laboratory will speak about the Stardust Mission

March 8, 2008,
Dr. Drake Deming, GSFC/NASA, "Infrared Light From Extrasolar Planets."

April 12, 2008,
TBA

May 10, 2008,
TBA

June 14, 2008,
Dr. Harold Williams from Montgomery College.

Dr. James Zimbelman — "Mars Exploration Rovers: Geology on the Move"

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Biography

James Zimbelman is a Planetary Geologist at the Center for Earth and Planetary Studies (CEPS) at the Smithsonian Institution's National Air and Space Museum. He has been at the Smithsonian since 1988, where he has been involved in the analysis of high-resolution spacecraft imaging and geophysical data of the Earth and terrestrial planets, geologic mapping of portions of Mars and Venus, investigation of the emplacement of lava flows on planetary surfaces, field studies of shoreline deposits around glacial lakes in Nevada and Oregon as analogs for features on Mars, and studies of sand transport in the western United States and on Mars. He served as the Chairman of CEPS from 2002 to 2006. He has more than fifty-five technical papers and maps published in various peer-reviewed scientific journals and books, and he was Co-Editor of the book "Environmental Effects on Volcanic Eruptions: From Deep Oceans to Deep Space," published by Kluwer Academic/Plenum Publishers in 2000. As part of the Smithsonian's public outreach effort, he gives lectures about recent results obtained from spacecraft exploration throughout the solar system.

Prior to joining the Smithsonian, Dr. Zimbelman was a member of the science flight team working on the Infrared Thermal Mapper experiment on the Viking Orbiter missions to Mars. After receiving his Ph.D., he joined the Lunar and Planetary Institute in Houston, Texas, first as a visiting post-doctoral fellow and then as a staff scientist working in planetary geology. Dr. Zimbelman received his B.A. in 1976 in Physics and Mathematics at Northwest Nazarene College (now University) in Nampa, Idaho, and his M.S. in 1978 in Geophysics and Space Physics at the University of California at Los Angeles. He earned his Ph.D. in Geology at Arizona State University in 1984.

Please Get *Star Dust* Only Electronically

National Capital Astronomer members able to receive *Star Dust,* the newsletter of the NCA via e-mail as a PDF file attachment, instead of hardcopy via U.S. Mail, can save NCA a considerable amount of money on the printing and postage in the production of Star Dust (the NCA's single largest expense) and also save some trees. If you can switch from paper to PDF please contact Michael L. Brabanski, the NCA Secretary-Treasurer, at mlbrabanski@verizon.net or 301-649-4328 (home). Thank you.

The deadline for the February Star Dust is January 23. Please send your material to Elliott Fein by that date to ensure inclusion.

Send submissions to Elliott Fein at elliott.fein @verizon.net.

Articles submitted may be edited to fit the space available.

If a reviewer wants to have the speaker review the review, any corrections therefrom must be completed when the review is sent to me by the deadline. I need to have a final version by the stated deadline. Also, if a reviewer sends me a review before the deadline (which is great!) and says that it is "final", I will not accept changes to it after I receive it.

Dr. David H. DeVorkin — Astronomers' Reaction to Sputnik

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mic ray data. The first successful measurement of the solar ultraviolet spectrum was carried out by Eric Regener using an unmanned balloon and automatic spectrograph. Regener's work came to the attention of Wernher von Braun who convinced the authorities that test flights of the V2 rockets should be instrumented for measuring atmospheric parameters (for the purpose of calculating accurate ballistic trajectories).

The acquisition of V2 rockets by the United States as spoils of war marked the beginning of the use of rocketry to measure the properties of the upper atmosphere and space beyond for both military and scientific purposes. The fact that the military could/would be a patron of science for Upper Atmospheric Research (UAR) was something new and would change the way science did business from then on. The army requested research topics (scientists such as Harlow Shapley, Rudolf Ladenburg, Fred Whipple, Lyman Spitzer, and J. Allen Hynek contributed topics) that could be addressed by the newly available rocket technology. In addition to atmospheric research topics that related to the exploitation of space for military purposes, the study group proposed to study topics such as cosmic rays and the solar ultraviolet spectrum. Additionally, many of the military topics proposed for study (rocket guidance, telemetry, tracking, platform stabilization, etc.) would be required later for the exploitation of space for scientific purposes.

Originally, the instrument packages for the V2s were developed by organizations such as APL (Ernst Krause and Herbert Friedman, and James Van Allen). By 1946, the V2 program had allowed measurement of the Sun's UV spectra at various altitudes up to 55 km. This allowed measurement of the atmospheric density using the effect of ozone absorption on the Sun's UV spectra. Note that none of these measurements was made via an instrumented radio link (that was still several years in the future). The film in the spectrographs had to be recovered intact from rockets ballistically contacting the ground. While NRL was performing spectrographic measurements, APL (James Van Allen) was concentrating on cosmic rays. The advantage of cosmic ray experiments over UV spectrographic experiments was that the data collected could be transmitted via radio link. The instrument package did not have to survive.

As the unreliable V2 rockets were used up, smaller, cheaper, and more reliable scientific rockets were developed such as the Aerobee and Viking rockets. With this generation of rockets, a new generation of instrumentation specifically designed for rocket-borne experiments was developed. By the 1950's, stabilized platforms for rockets were being developed so that spatially resolved UV spectral and X-ray measurements could be attempted. After leaving APL for the University of Iowa, James Van Allen developed the rockoon, a small rocket suspended from a balloon, that could map the radiation and magnetic environment in the lower reaches of Earth's magnetosphere. The first instance of putting a telescope above most of the atmosphere for the purpose of observing solar granularity was Project Stratoscope in 1957, developed by Martin Schwarzchild (Princeton University) that placed a 12-inch balloon-borne telescope at 70,000 feet.

During the 1950s, most mainstream American astronomers were not interested in making observations from space and a few of those thought it was impossible. In 1954 the Hoover panel forwarded an Army proposal (by von Braun) to launch a satellite (Project Orbiter) for the IGY (International Geophysical Year). This proposal lost out to the Navy for political reasons (the Army launch vehicle was a weapon system rather than one developed purely for scientific purposes). The astronomers still involved in these and similar projects were Fred Whipple, Gerald Clemence, and Gerard de Vaucouleurs (thanks to Victor Slabinski for getting the last two names correct). In 1955, Whipple became director of the SAO (Smithsonian Astrophysical Observatory) when it was taken over by Harvard. As director, Whipple used the independent funding line status of the SAO in the Congress to advance the cause of rocket-based astronomy.

One of the first projects of the SAO, with major public recognition, was Project Moonwatch which started in 1956. This project was to use amateur volunteer groups of observers to obtain good enough tracking data of artificial satellites to be launched during the IGY, so that the few worldwide professional tracking stations with Baker Super-Schmidt or Baker-Nunn cameras could acquire the satellite and make the precision tracking measurements needed for geodetic mapping of Earth's gravitational field.

October 4, 1957 arrived with Moonwatch in place, but with no U.S. satellites having been launched, when the USSR announced the launch of Sputnik. The Moonwatch observers were the first to provide the necessary data for the accurate tracking of Sputnik. In addition to the publicity generated for the exploration of space, Sputnik had immediate substantive effects on the U.S. space program. The first was that military rockets and other hardware were no longer off limits for the scientific space program, which was evidenced by the quick launch of the Explorer I satellite on a Redstone rocket. The second effect was that orbiting a satellite over the USSR was no longer off limits. If they could do it to us, we could do it to them. In a relatively short time the satellites launched by the U.S. were doing real cutting edge science, such as the mapping of the Van Allen belts by Explorer III and early Pioneer satellites.

The early scientific exploitation of space using satellites was mainly concerned with upper atmosphere physics, such as magnetic field and charged particle measurements, but not what most people would consider to be astronomy. The coming of age of scientific satellites made the astronomy community realize that they were no longer limited to observing the sky in the optical and radio regions. Satellite astronomy would eventually allow directional observations in the infrared, ultraviolet, X-ray, γ-ray, and cosmic-ray regimes.

After Sputnik, several planning groups were convened to explore what could be expected in the next few years with re-

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Dr. David H. DeVorkin - Astronomers' Reaction to Sputnik

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gard to the capabilities of "space science" (see the book "Science With a Vengeance" by David H. DeVorkin). The conclusion of the Kellogg panel (RAND Corporation 1957) was to continue the IGY balloon experiments while preparing for satellite experiments in the range of 50-75 lbs. within a year, and 100-500 lbs. with 2- and 3-axis stabilization, within five years. The conclusion of the Space Science Board of the National Academy of Sciences in 1958 (Herbert F. York, ARPA) was that by the late 1960s orbital payloads of 50 tons would be possible (planning for the Saturn rocket had started). These boards surveyed the scientific community to determine what research they would do with such capabilities.

When the call went out for proposals for satellite-based astronomy, the leading proposer was Fred Whipple of the Smithsonian Astrophysical Observatory. (Sputnik probably saved the SAO from extinction.) Whipple also testified to congress on what the nature of the future space research should be. He outlined an agency (NASA) that would coordinate, but not dictate scientific space research. The direction of the research would come from proposals from the academic community and government research laboratories. Launch capabilities would be provided by the military and/or NASA eventually.

By February of 1958, scientific groups had been set up to explore the following problem areas in space astronomy:

- Space Telescope — Gaposchkin, Whitney, Hynek, and Davis
- Spectroscopy ($\lambda > 100$ Å) — Gaposchkin and Hynek
- Corpuscular — Fireman and Krook
- Cosmic Rays — Fireman
- Planetary Atmospheres — Menzel
- Spectroscopy ($\lambda < 100$ Å) — Krook
- Radio (1 to 10 MHz) — Krook
- The Moon — Schilling and Rinehard
- Magnetic Fields — Krook, Schilling, and Layzer
- Space Navigation — Steme
- Outer Atmosphere — Hynek and Layzer
- Image Tubes — Hynek
- Meteorites — Rinehart

The study groups decided that the topic that should be concentrated on was the "Space Telescope."

The objective of the first space telescope was to determine the ultraviolet magnitudes of all the stars in the sky within the telescope's aperture limitations.

At this point in time, NASA was founded, and solicited proposals for the telescope. Five proposals were submitted, leading NASA to begin development of a universal stabilized platform for such devices and the NASA worldwide satellite tracking network.

The first space telescope was realized as four 12-inch telescopes, each with a vidicon (television camera) tube sensitized to a different region of the UV-spectrum; it orbited in 1972. It took a long time to accomplish the first optical space telescope and it was not particularly successful due to technology limitations during its development. The satellite programs that were very successful during this period actually embodied the current NASA philosophy of "Smaller, Faster, Cheaper" and were: Explorers; Vanguard; Pioneers; SOLRADS; OGOs; and OSOs.

Some of the most successful of these were:

- SOLRAD 1, which monitored the intensity of many different types of solar radiation and was also a cover for a Navy ELINT program that monitored Russian radio communications.
- Explorer 11, which used Cerenkov detectors to do the first > 50 MeV γ-ray astronomy over the entire sky.
- OSO 1, which was the first 2-axis stabilized satellite and performed solar astronomy (Nancy Grace Roman was the program manager).

In his talk, Dr. DeVorkin covered the scientific aspects of the early space program and how the coming of Sputnik changed the way that space science was done.

NCA's 70th Anniversary Celebration a Resounding Success

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edited Star Dust for several decades. I then gave a talk about scientists (mostly astronomers) well-known at the time, or to become famous later, who gave talks to the NCA in the years 1943 to 1960. These included such dignitaries as Philip Keenan of MK spectral classification fame, Harlow Shapley, Cecelia Payne-Gaposchkin, Dorrit Hoffleit, James Van Allen, J. Allen Hynek, Charlotte Moore Sitterly, Ernst J. Öpik, and our own Nancy Grace Roman, who first talked at an NCA meeting in 1960. Other talks included Guy Brandenburg on the NCA telescope making classes and equipment, Joseph Morris on the Exploring the Sky program, and Victor Slabinski on NCA participation in the Moonwatch

satellite observation program in the 1960s. Numerous slides of NCA activities were shown by Sue Bassett, who, with the assistance of Norm Peterson, had assembled images taken by herself and Jeff Guerber. Jim Roy also showed slides that he has taken over the years.

NCA would like to express appreciation to all those who contributed time and effort to make the anniversary celebration a success. We would especially like to thank Elizabeth Warner, the Director of the University of Maryland Observatory, for making the observatory available for the occasion and for setting up the meeting room, including the procurement of tables and chairs, and general site configuration. Jane Kuehn made a wonderful birthday cake that was simply delicious. Of course, Jane just happens to be in the cake business, so she knew very well how to make and decorate the *perfect* cake. Coordination efforts were mostly the work of Elizabeth Warner with the assistance of NCA Vice President Jack Gaffey. Finally, we would like to thank all those members who contributed equipment and those wonderful food items that made the celebration a success.

I thank Walt Faust and Jack Gaffey for their comments and suggestions.

Mid-Atlantic Occultations and Expeditions

by Dr. David Dunham

Asteroidal Occultations

2008 Date	Day	EST	Star	Mag	Planet or Asteroid	dmag	dur. s	Ap. in.	Location
Jan 11	Fri	2:48	TYC29441269	12.3	Oppavia	1.9	5	9	DE,neMD,PA
Jan 12	Sat	0:04	TYC25010817	11.1	Panopaea	2.0	10	6	N.Car.,swVA
Jan 13	Sun	21:44	TYC18080641	11.4	Sicilia	4.3	9	7	wNY,wPA,WV,wVA
Jan 14	Mon	4:09	TYC50410769	10.4	Winchester	5.5	4	6	NC,sVA
Jan 14	Mon	6:09	2UC28028786	13.5	Roberta	1.0	3	13	OH,VA,MD,DE
Jan 14	Mon	21:13	TYC53943285	11.5	Phocaea	1.4	5	7	DE,MD,nVA,Ohio
Jan 24	Thu	23:39	2UC28731270	11.7	Bathilde	1.7	18	8	ePA,MD,eVA,eNC
Jan 30	Wed	4:31	2UC36644004	12.7	Mandeville	0.3	8	11	DE,eMD,ePA,NY

Lunar Grazing Occultations

DATE	Day	EST	Star	Mag	%	alt	CA	Location
Jan 11	Fri	17:48	SAO 164947	8.9	12+	26	16S	Sun-9; Savage,VA; Marston,MD
Jan 18	Fri	2:30	Taygeta	4.3	76+	10	-5S	Haymrkt&Woodbrdg,VA;LaPlta,MD
Feb 1	Fri	5:14	SAO 184233	8.4	30-	16	14S	Fredericksburg &Eastville, VA

Total Lunar Occultations

DATE	Day	EST	Ph	Star	Mag	%	alt	CA	Sp.	Notes
Jan 12	Sat	18:08	D	ZC 3385	6.7	20+	35	79S	F8	
Jan 12	Sat	18:08	D	ZC 3385	6.7	20+	35	79S	F8	
Jan 13	Sun	19:09	D	25 Piscium	6.3	30+	38	39N	A1	ZC 3515; spec. binary
Jan 15	Tue	19:32	D	101 Psc	6.2	52+	59	56N	B9	ZC 233; close double?
Jan 16	Wed	18:47	D	26 Arietis	6.1	63+	71	70N	A9	ZC 370; close double?
Jan 16	Wed	22:56	D	ZC 387	6.9	64+	37	66N	G5	probably close double
Jan 17	Thu	21:01	D	7 Tauri	6.0	75+	70	71N	A3	ZC518;mg2 6.7,".7,PA351
Jan 18	Fri	2:07	D	18 Tauri	5.7	76+	15	73N	B8	ZC 538; Az290;spec.bin.
Jan 18	Fri	2:24	D	Taygeta	4.3	76+	11	7S	B6	ZC539;close dbl.,graze
Jan 18	Fri	2:27	D	Asterope	5.8	76+	11	40S	B8	ZC542=21Tau; Pleiades
Jan 18	Fri	2:33	D	ZC 543	6.4	77+	10	31S	A0	Az 294; close double?
Jan 18	Fri	20:54	D	ZC 701	6.6	84+	78	78S	F2	=mg 4", mg3 9 6",PA 175
Jan 19	Sat	20:40	D	ZC 868	7.5	92+	70	89S	A0	mag2 10, sep. 9",PA 254
Jan 19	Sat	23:38	D	SAO 77604	7.0	92+	67	60S	K0	
Jan 20	Sun	1:21	D	136 Tauri	4.6	93+	48	78N	A0	ZC 890;mg2 6,".05,PA270
Jan 20	Sun	4:09	D	ZC 906	6.6	93+	17	84N	K1	probably close double
Jan 21	Mon	1:26	D	39 Gem	6.2	98+	58	83N	F8	ZC 1061; close double?
Jan 21	Mon	1:52	D	40 Gem	6.4	98+	53	74S	B8	ZC 1062: close double?
Jan 23	Wed	2:33	R	ZC 1340	6.6	99-	61	53N	A0	Terminator distance 8"
Jan 23	Wed	3:10	R	FZ Cancri	6.3	99-	55	61N	M4	ZC 1343; Term.dist. 10"
Jan 23	Wed	21:16	R	psi Leonis	5.4	97-	27	49N	M2	ZC 1434; Watts ang. 312
Jan 24	Thu	1:53	R	23 Leonis	6.5	96-	64	25N	M0	ZC1449;WA338;trm.dt.13"
Jan 26	Sat	0:09	R	79 Leonis	5.4	85-	34	67N	G8	ZC 1652; WA 297
Jan 27	Sun	4:44	R	FG Vir	6.6	76-	44	79N	A	ZC 1759; close double?
Jan 27	Sun	5:12	R	T Virginis	9.0	76-	42	51S	M6	SAO 138666;will be max.
Jan 29	Tue	4:08	R	83 Vir	5.6	58-	28	83S	G1	ZC 1967
Jan 30	Wed	4:18	R	ZC 2076	7.1	48-	26	64N	K0	
Jan 31	Thu	3:50	R	ZC 2188	7.5	39-	15	72N	A2	Az139;mg2 8.6, 2",PA163
Jan 31	Thu	4:06	R	SAO 183377	7.4	39-	16	60N	F2	mag2 8.2,sep ".6,PA 263
Feb 1	Fri	3:43	R	V0952 Sco	6.6	30-	5	86N	A	Azimuth 131 deg.
Feb 1	Fri	4:28	R	ZC 2320	7.0	29-	11	64S	B9	Azimuth 139 deg.
Feb 1	Fri	6:52	R	ZC 2334	7.5	29-	23	58N	G1	Sun alt. -5 deg.
Feb 9	Sat	19:11	D	ZC 3489	7.4	9+	16	87N	K3	mag2 10, sep 3", PA 166
Feb 10	Sun	20:13	D	51 Piscium	5.8	17+	17	38S	B9	ZC 68;mag2 8 sep. ".2

More information is at http://iota.jhuapl.edu/exped.htm .
David Dunham, dunham@starpower.net, phone 301-474-4722

Getting to the NCA Monthly Meeting and the Dinner Before the Meeting

The NCA Meeting
NCA meetings are now held at 7:30 p.m. at the University of Maryland Observatory, in College Park. The observatory is located on Metzerott Road between Adelphi Road and University Blvd. in College Park. From the beltway (I-495):

• if on the Inner Loop, take Exit 28B toward Takoma Park, which puts you on New Hampshire Ave. (MD-650) south, turn left at the second light onto Adelphi Road, two more lights, turn left onto Metzerott Road, and proceed 0.6 miles to the observatory entrance (on your right);

• if on the Outer Loop, take the College Park/Route 1 exit. Head south on Route 1 for about a mile until you see a sign for 193 West. Get on 193 West. The first traffic light is at Metzerott Road. Take a right onto Metzerott Road. Once on Metzerott Rd., continue past a traffic light at St. Andrews Place. The observatory entrance is about a quarter of a mile on the left side of the road after that. The observatory entrance is slightly hidden, so slow down to turn left as soon as you pass a large "System Administration" sign. The observatory entrance is almost directly across the street from the UM System Administration sign (3300 Metzerott Rd.).

Getting to the NCA Meeting
Star=Observatory R=Restaurant P=Parking

The Dinner before the Meeting
At 5:30 p.m., before the meeting, please join us for dinner at the Garden Restaurant in the UMD University College Inn and Conference Center, 3501 University Blvd. East at Adelphi Rd. From the Beltway, either take New Hampshire Ave. south, turn left at the second traffic light onto Adelphi Rd., and at the third light (passing Metzerott) turn left onto University then immediately right into the garage; or, take US-1 south, turn right onto University Blvd. west, and take it to the intersection with Adelphi Road. Park either in the garage (costs), or in Lot 1 nearby (free). To get to the observatory, exit to the right onto University Blvd. (MD-193) east, and at the second light turn left onto Metzerott Road. Once on Metzerott Rd., continue past a traffic light at St. Andrews Place. The observatory entrance is about a quarter of a mile on the left side of the road after that. The observatory entrance is slightly hidden, so slow down to turn left as soon as you pass a large "System Administration" sign. The observatory entrance is almost directly across the street from the UM System Administration Sign (3300 Metzerott Rd.).

Do You Need a Ride?

Please contact Jay Miller, 240-401-8693, if you need a ride from the metro to dinner or to the meeting at the observatory. (Please try to let him know in advance by e-mail at rigel1@starpower.net.)

Observing after the Meeting

Elizabeth Warner

Following the meeting, members and guests are welcome to tour through the Observatory. Weather permitting, several of the telescopes will also be set up for viewing.

Support the IDA

Join the International Dark-Sky Association

3225 N. First Avenue Tucson, AZ 85719-2103

www.darksky.org

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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. NCA is an IRS Section 501(c)(3) tax-deductible organization. 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.

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.

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).

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 sponsored 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, and others. Contact: Joe Morris, joemorris@erols.com or (703) 620-0996.

Members-Only Viewing Programs periodically, at a dark-sky site.

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.

✂

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All members receive Star Dust, *the monthly newsletter announcing NCA activities. As an added optional benefit to extend your knowledge of astronomy, you may also choose* Sky and Telescope *magazine at the discounted rate of $33.*

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NCA Will Meet on January 12!

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