Star Dust

Newsletter of National Capital Astronomers, Inc.

capitalastronomers.org

January 2015 ***Volume 73, Issue 5***

Next Meeting

When: Sat. Jan.10th, 2015

Time: 7:30 pm

Where: UMD Observatory

Speaker: Gordon Bjoraker

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Directions to Dinner/Meeting

Our time and location for dinner with the speaker before this meeting is 5:30 pm at "The Common," the restaurant in the UMD University College building located at 3501 University Blvd.

The meeting is held at the UMD Astronomy Observatory on Metzerott Rd about halfway between Adelphi Rd and University Blvd.

Need a Ride?

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

Observing after the Meeting

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.

Ten Years Orbiting Saturn:

What have we Learned about its Atmosphere?

Gordon L. Bjoraker, NASA's Goddard Space Flight Center

Abstract: In the 10 years that Cassini has been orbiting Saturn, it has probed a wide range of altitudes in the planet's atmosphere and returned a wealth of observations. The spacecraft has a powerful set of instruments to remotely investigate Saturn's atmosphere at wavelengths in the ultraviolet, visible, near-infrared, thermal-infrared, and microwave. Thermal infrared images, for example, reveal spectacular deep cloud structure that contrasts the visible, muted appearance of Saturn. Together, Cassini's instruments probe the stratosphere, the troposphere where storms originate, and the upper atmosphere where auroras occur.

Courtesy NASA/JPL
Cassini-Huygens Spacecraft

Some of the highlights include:

- The Great Northern Storm of 2010-2011. This planet-encircling storm is believed to have originated in the water cloud. It had dramatic effects on the cloud structure in the upper troposphere and, quite surprisingly, generated localized heated regions in Saturn's stratosphere. Cassini detected a mix of fresh ammonia ice and water ice in the troposphere, as well as enhanced temperatures and hydrocarbons in the stratosphere.

- The detection of hurricane-like features at both the North and South Poles of Saturn. These features exhibit interesting cloud structure and elevated the temperatures at both poles.

- The persistence of the Northern Hexagon. This 6-sided feature was detected by the Voyager spacecraft in 1980, and Cassini continues to observe it today. It is believed to be a wave feature rotating at about the same rate as Saturn's interior.

- Seasonal reversal of colors on Saturn. When Cassini arrived at Saturn, the winter northern hemisphere appeared blue, while

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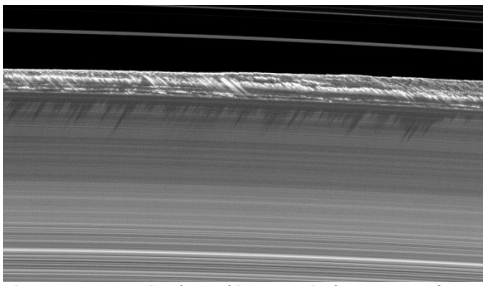
Reminder

After the meeting, everyone is invited to join us at Plato's Diner in College Park. Plato's is located at 7150 Baltimore Ave. (US Rt. 1 at Calvert Rd.), just south of the university's campus. What if it's clear and you want to stick around and observe? No problem -- just come over when you're through. This is very informal, and we fully expect people to wander in and out.

Cosmic Winter Wonderland

The Cassini spacecraft captured an image of 2-mile high mountains (frozen "rubble") as they cast shadows on Saturn's B ring in August 2009. This rare effect is evident during Saturn's equinox, which only occurs every 15 Earth years.



Courtesy NASA/JPL/Space Science Institute
Shadows on Saturn's B ring

On December 24th, Carolyn Porco, team leader for CICLOPS (Cassini Imaging Central Laboratory for Operations), posted a "Captain's Log" blog entry for the mission in which she shared some of the beautiful Cassini images that invoked feelings of winter on Earth (It does look like a solitary portion of our home planet covered in snow, doesn't it?).

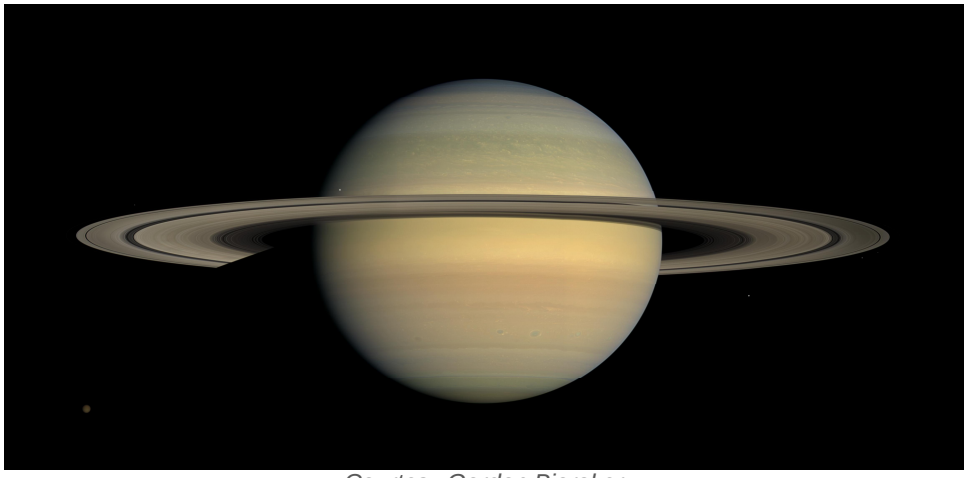
Porco also shared descriptions of what it would be like to personally fly over the image locations in a shuttle to see such sights and was supported by artist Michael Carroll's imagery:

Courtesy Michael Carroll

Orbiting Saturn – continued from page 1

the southern hemisphere exhibited an orange appearance. Shortly after equinox in 2009, the appearance reversed quite abruptly, and today Saturn's southern hemisphere is blue and the north is becoming a smoggy orange color, due to aerosols produced by sunlight breaking up methane to form complex hydrocarbons in the stratosphere.

- Other highlights include: the detection of lightning, studies of the time variation of Saturn's auroras, and measuring the carbon to hydrogen ratio, the latter providing clues as to how Saturn formed.



Courtesy Gordon Bjoraker
Saturn

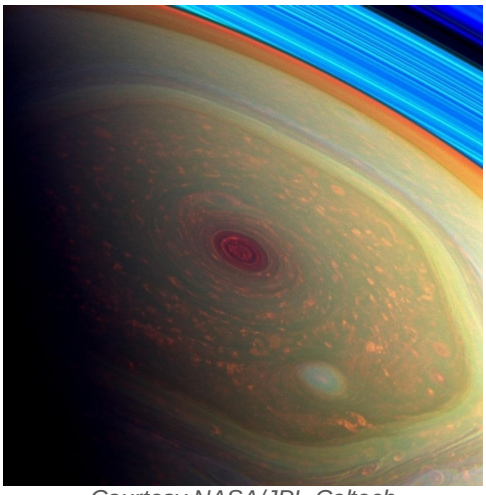
Biographical Sketch:

Gordon Bjoraker is a Planetary Scientist at NASA / Goddard. He is a co-investigator on the Cassini Composite Infrared Spectrometer team (CIRS). CIRS has been measuring the temperature and composition of Saturn, Titan, the rings, and icy satellites for the past ten years. Gordon also uses ground-based telescopes in Hawaii to observe Saturn at the same time as Cassini in addition to observing Jupiter in support of the Juno mission (estimated Jupiter arrival: 2016).

He is especially interested in the water abundance on both Saturn and Jupiter. He had an unusual vantage point to observe the collision of comet Shoemaker-Levy 9 with Jupiter in 1994. His team used the Kuiper Airborne Observatory, flying 41,000 feet over Australia, to detect water vapor on Jupiter produced by the disintegration of the largest pieces of the comet.

"The Hexagon"

Cassini's captured images of the northern polar region of Saturn show a perpetual jet stream that appears to have six sides. In the center is a hurricane.



Courtesy NASA/JPL-Caltech

Watch the jet stream and hurricane in motion:

http://youtu.be/8P5gI9JERDs

Bennu's Journey

Courtesy GSFC Conceptual Image Lab
Artist's rendition of a collision in the tumultuous life of asteroid Bennu

NASA's Goddard Space Flight Center has created a short movie preceding the 2016 launch of the OSIRIS-REx mission to the asteroid Bennu. The movie is called "Bennu's Journey" and addresses what is known and unknown about the origin of the Solar System. Watch the movie here:

http://youtu.be/gtUgarROs08

Sky Watchers

Winter Schedule

January

14	3:00 pm **– Planets**, N. Hemisphere. Mercury at greatest eastern elongation (19º)
16	7:00 am **– Planets**, N. Hemisphere. Moon 1.9º north of Saturn
19	4:00 pm – **Planets**, N. Hemisphere. Mars 0.2º south of Neptune
22	12:00 am – **Planets**, N. Hemisphere. Moon 6º north of Venus
25	7:00 am **– Planets**, N. Hemisphere. Moon 0.6º north of Uranus
29	6:00 pm **– Asteroids**, N. Hemisphere. *Juno* (in opposition to Sun)

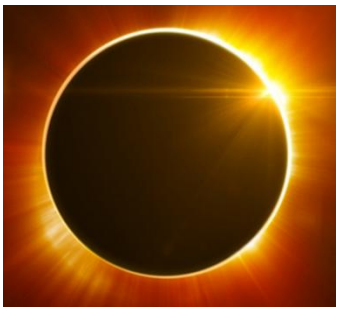
February

6	Evening **– Planets**, N. Hemisphere. Jupiter (in opposition to Sun, closest to Earth at 404 million miles)

Times EST

The Great North American Eclipse of 2017: Part II

Joan Dunham



Courtesy NASA

On August 21, 2017 a solar eclipse will be visible coast-to-coast from the 48 contiguous states. This will be one of the defining events of our lifetime. David and I recently attended two conferences (the *Eclipse Workshop* & *SEC2014*) which brought together amateur and professional eclipse observers and solar astronomers. Following are the last set of summaries from *SEC2014* (see the December 2014 newsletter for the *Eclipse Workshop* and other *SEC2014* summaries):

Nick James described the current state of high resolution video available to the dedicated amateur astronomer with deep pockets. For $20K, the

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Great Eclipse 2017 – continued from page 3

Canon C500 will provide 4K video (horizontal resolution of about 4000 pixels) at 120 fps, definitely out of reach for most. However, given the past rapid change in cameras and sensors, we hope that 4K will be in DSLRs at a more accessible price by 2017. Recording in 4K takes, as might be expected, massive data storage capability.

Shadia Habbal presented work in solar corona analysis, with particular interest in hooks, waves and other features of the corona. For 2017, she and her team hope to measure temporal changes in the corona in white light and coronal emission lines. She is looking for a few more solar eclipse chasers who would be willing to host a camera array to take pictures for her from their observing sites. The photos she presented of post-processed images show beautiful and very finely detailed images of the outer corona.

Ralph Chou informed us of the development of the international standard for eclipse viewers, soon to be issued as EN ISO 12312-2. This is built on the existing European Standard for personal eye equipment (EN 1836:2005 + A1:2007). Eclipse viewers that meet the standard are available through Rainbow Symphony, Great American Eclipse, Total Solar Eclipse 2017, and others.

Michael Zeiler, a cartographer, showed examples of eclipse maps through the ages. He is also one of the principals behind the "Great American Eclipse" and has posters and art work of eclipse maps to offer. As an aside, he also collects old eclipse maps and entertained some of us with them during breaks.

Scott McIntosh described the *Eclipse Megamovie Project*, a citizen participation effort he is organizing. The goal is for a movie to be created from all of the photos submitted by people along the path of totality. The expectation is that 100,000,000 images will be submitted and all will be used. More information is available on Facebook.

David Dunham, Serge Koutchmy, and ***Jean-Pierre Barriot*** each gave presentations on determining the solar diameter from eclipse observations. David discussed the IOTA plans for the 2017 eclipse: making observations that will allow comparison of previously used techniques with modern ones as well as calibrating observation results with the Picard satellite data. A website for interested observers will be provided in the future.

Several presentations were given on different aspects of teaching K-12 students about eclipses, or on preparing classroom materials for students. ***Terry Cuttle*** distributed materials he prepared for the November 2012 total eclipse in Australia. He is making this material available to those preparing to the 2017 eclipse. His 28 page booklet on eclipses with emphasis on the one in 2012 is particularly impressive. ***Charles Fulco*** is preparing STEM lesson plans integrating

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Editor: CA Brooks

Editorial Advisors:

- Michael Chesnes
- John D. Gaffey, Jr.
- Alex Klein
- Jeffrey Norman
- Elizabeth Warner
- Wayne Warren
- Marjorie Weissberg
- Harold Williams

PDF Distributor: Jay Miller

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Thank you!

Asteroid Day

Held the same day as the 1908 Tunguska Event, June 30 has been selected for annual asteroid awareness.

Courtesy NASA/JPL-Caltech

http://www.asteroidday.org/

June 30th 2015

Occultation Notes

- 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.
- Some stars in Flamsteed's catalog are in the wrong constellation, according to the official IAU constellation boundaries that were established well after Flamsteed's catalog was published. In these cases, Flamsteed's constellation is in parentheses and the actual constellation is given in the notes following a /.
- 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 the main IOTA Web site.
- Sp. is the star's spectral type (color), O,B,blue; A,F,white; G,yellow; K,orange; M,N,S,C red.
- Also in the notes, information about double stars is often given. "Close double" with no other information usually means nearly equal components with a separation less than 0.2". "mg2" or "m2" means the magnitude of the secondary component, followed by its separation in arc seconds ("), and sometimes its PA from the primary. If there is a 3rd component (for a triple star), it might be indicated with "mg3" or "m3". Double is sometime abbreviated "dbl".
- Sometimes the Watts angle (WA) is given; it is aligned with the Moon's rotation axis and can be used to estimate where a star will reappear relative to lunar features. The selenographic latitude is WA -270. For example, WA 305 - 310 is near Mare Crisium.

Mid-Atlantic Occultations

David Dunham

Asteroidal and Planetary Occultations

2015							dur.	Ap.	
Date	Day	EST	Star	Mag	Asteroid	dmag	s	"	Location, Notes
Jan 9	Fri	19:38	2UC29025706	12.0	Comacina	2.7	4	9	WV,nVA,DC,MD,NJ
Jan 10	Sat	6:17	TYC19650338	10.9	Bredichina	2.7	10	6	cNC,cVA,eWV,wPA
Jan 11	Sun	3:05	TYC14080096	9.9	Cevenola	4.8	2	4	neGA,swSC,wNC,TN
Jan 11	Sun	19:13	2UC38730734	12.0	Marlu	3.6	4	8	TN,VA,sMD;DE,DC?
Jan 12	Mon	3:30	2UC43776788	12.5	Leontina	2.1	3	8	cVA,cWV,s&wOhio
Jan 19	Mon	20:25	4U640018501	13.8	Patroclus	1.9	17	11	ES,eUSA,TX,nMX
Jan 20	Tue	2:26	2UC36295554	13.4	Roberta	0.7	8	10	e&nVA,WV,OH;DC?
Jan 20	Tue	6:41	SAO 158675	8.5	Lydia	4.9	4	3	wNY,PA,NJ;Sun -8
Feb 2	Mon	23:04	TYC14011074	11.9	Yamamoto	3.8	3	7	sNJ,s&wPA,nMD,OH
Feb 3	Tue	1:23	TYC01691192	11.7	Marbachia	2.2	4	7	MD,DC,nVA,swPA
Feb 7	Sat	3:53	TYC02530434	10.0	2000 TV29	6.5	1	5	NJ,sPA,MD,WV;DC?
Feb 7	Sat	20:40	TYC08350265	9.6	Koskenniem	5.9	1	4	LI,nNJ,sPA;nMD?

Lunar Grazing Occultations

2015							
Date	Day	EST	Star	Mag	% alt	CA	Location & Remarks
Jan 9	Fri	23:04	58 Leonis	4.8	78- 16	5N	Brookv,Watsntwn,EStroudsbg,PA
Jan 22	Thu	19:07	SAO 146098	9.5	8+ 11	-3S	Fairfax,VA;DC;sBowie,Parol,MD
Feb 15	Sun	5:43	U Sgr	6.6	17- 17	1S	Clvrtn,Qntco,VA;Nwbg,Crsfd,MD
Feb 15	Sun	5:53	SAO 161576	7.4	17- 18	1S	*Syria,sFredrksbrg,FtAPHil,VA

Interactive detailed maps at http://www.timerson.net/IOTA/
*, no expedition planned from DC area

Total Lunar Occultations

2015									
Date	Day	EST	Ph	Star	Mag	%	alt	CA	Sp. Notes
Jan 10	Sat	23:22	R	SAO 138388	7.3	70-	9	35S	K0 Azimuth 98 degrees
Jan 11	Sun	6:54	R	SAO 138476	7.6	68-	39*	80N	G5 Sun altitude -6 degrees
Jan 13	Tue	4:58	R	ZC 1926	8.0	50-	40	64S	A2
Jan 14	Wed	2:56	R	SAO 158405	7.5	40-	16	43S	K0
Jan 14	Wed	4:19	R	ZC 2036	7.0	40-	29	48N	G5
Jan 14	Wed	5:54	R	SAO 158449	8.0	39-	37	84S	A5
Jan 14	Wed	6:10	R	SAO 158454	8.0	39-	38	74N	M0
Jan 15	Thu	4:33	R	SAO 159008	7.9	30-	22	84S	F0
Jan 15	Thu	6:13	R	SAO 159034	7.8	30-	32	41S	F2
Jan 16	Fri	3:59	R	SAO 159605	7.8	21-	7	59N	F6 Azimuth 118 degrees
Jan 17	Sat	6:48	R	SAO 160222	8.4	12-	22	38S	M1 Sun altitude -7 degrees
Jan 24	Sat	20:46	D	ZC 47	7.7	26+	19	89S	F0
Jan 25	Sun	19:07	D	88 Piscium	6.0	36+	48	37N	G6 ZC 184; NY graze
Jan 25	Sun	19:20	D	SAO 109761	7.7	36+	46	68N	K2
Jan 25	Sun	23:07	D	AR Piscium	7.3	38+	5	87S	G5 Azimuth 275 deg.,ZC 204
Jan 27	Tue	19:32	D	SAO 93261	7.4	59+	63	58S	G8
Jan 29	Thu	0:49	D	ZC 609	7.6	70+	21	88N	B9
Jan 30	Fri	20:45	D	SAO 94874	7.3	86+	68	83N	F2
Jan 30	Fri	22:08	D	SAO 94903	7.7	86+	67	48S	B9 close double??
Jan 30	Fri	23:57	D	SAO 94961	7.6	87+	50	86N	F5 close double?
Jan 31	Sat	21:20	D	26 Gem	5.2	92+	67	73S	A2 ZC1029, spec. binary
Feb 4	Wed	21:43	R	ZC 1465	6.1	99-	35	52S	K3 AA 246,dbl 0,TmD 16"
Feb 4	Wed	23:11	R	Yu Neu	4.7	98-	50	32S	M2 AA226,ZC1468=piLeo,TmD8"
Feb 5	Thu	21:08	R	35 Sex	6.2	96-	19	26S	K3 AA211,ZC1565,TrmDist17"
35 Sextantis is triple: mg2 7.1 7",PA240,dT -26s;mg3 8.1 333", PA 210									
Feb 11	Wed	6:37	R	mu Libr	5.3	57-	35	76S	A* Sun -6,ZC2114,close dbl
Feb 12	Thu	2:43	R	SAO 159375	8.2	48-	16	40N	K0
Feb 13	Fri	2:29	R	SAO 159935	7.2	37-	4	81S	A0 Azimuth 117 degrees
Feb 15	Sun	5:22	R	ZC 2680	5.6	17-	13	63N	K0 Az.128, close double?
Feb 15	Sun	5:52	R	U Sgr	6.6	17-	17	15S	G1 ZC2687,mg9 stars 66"
Feb 15	Sun	5:54	R	SAO 161570	8.1	17-	18	33S	B9
Feb 15	Sun	6:00	R	ZC 2685	6.8	17-	19	80S	K1 Sun altitude -12 deg.
Feb 15	Sun	6:04	R	SAO 161576	7.4	17-	19	17S	K0 Sun altitude -11 deg.
Feb 15	Sun	6:36	R	SAO 161582	7.0	17-	23	67S	G3 Sun altitude -5 deg.

**The star is in the Kepler 2 exoplanet search program so lightcurves of the occultation are desired to check for close stellar duplicity.*

Explanations & more information is at http://iota.jhuapl.edu/exped.htm.
David Dunham, dunham@starpower.net, phone 301-526-5590

2014-2015 Officers

Great Eclipse 2017 – continued from page 4

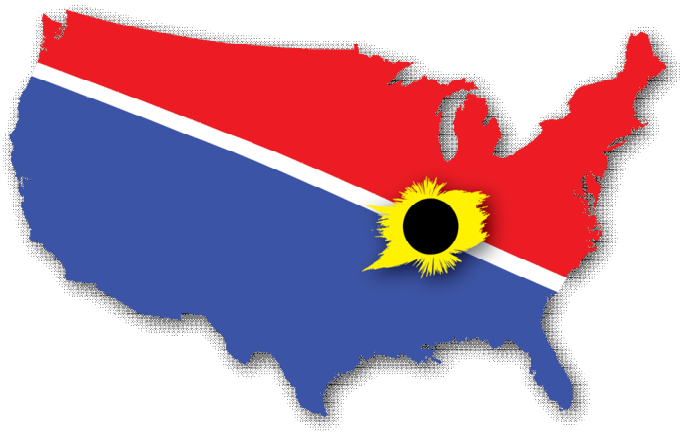
Common Core Standards for teachers. Several people mentioned that lesson plans that fit into the curriculum teachers are required to follow are much more likely to be used than materials teachers must adapt themselves. ***Roger Kennedy*** also spoke on bringing science to students and the general public.

Other presentations given included ***Ray Brooks*** explaining saros mathematics, ***Jay Pasachoff*** describing science results from recent eclipse expeditions, ***Voyto Rusin*** on observations of the solar corona, ***Bill Kramer*** on how eclipse contact timing is affected by the lunar profile, ***Forrest Mims*** on several topics including Thomas Jefferson's interest in the eclipse of 1811. ***Nelson Quan*** is making a movie about the eclipse chaser, Jeff Sims, and showed some of what has been produced so far.

International solar eclipse conferences are held in years when there are no total eclipses. The next one, SEC2018, will be held in Tenerife in 2018.

Websites

The papers from the SEC2014 are going to be posted to the web site:
http://www.eclipse-chases.com/article/SEC2014.html. (not available yet)
Jay Anderson's site: http://www.eclipser.ca
Fred Espenak's sites: www.MrEclipse.com, www.eclipsewise.com,
http://eclipse.gsfc.nasa.gov/eclipse.html
Bill Kramer's site: www.eclipse-chasers.com/Map.html
Site with multiple links to other sites: www.eclipse2017.org
IAU site on eclipses: www.eclipses.info, which maps to:
http://sites.williams.edu/iau-eclipses/
Commercial sites selling eclipse glasses that meet the new standards:
www.rainbowsymphony.com/soleclipse.html
www.greatamericaneclipse.com
www.eclipse2017.org/glasses_order.htm
Bill Kramer's collection of historical maps can be viewed at:
http://eclipse-maps.com/Eclipse-Maps/Welcome.html
Information on the eclipse megamovie is available through:
www.facebook.com/EclipseMegamovie



http://www.greatamericaneclipse.com/

On the Way to Marathon Valley…

Courtesy NASA/JPL-Caltech/L.Crumpler
Cape Tribulation

Eleven-year-old Mars Exploration Rover Opportunity, the eldest active rover on the red planet, prepares for her ascent of Cape Tribulation, part of the Endeavor Crater's western rim. The stratification in this area may reveal much more information about the history of Mars. This will also be the highest elevation that Opportunity will likely achieve and promises great panoramic views!

The submission deadline for the February issue of Star Dust is *Jan. 25th*.

Clear Skies!

Calendar of Events

NCA Mirror- or Telescope-making Classes: Tuesdays and Fridays, from 6:30 to 9:45 pm at the Chevy Chase Community Center (intersection of McKinley Street and Connecticut Avenue, N.W.) Contact instructor Guy Brandenburg at 202-635-1860 or email him at gfbrandenburg@yahoo.com.

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 pm (Nov.-Apr.) or 9:00 pm (May-Oct.). Details: www.astro.umd.edu/openhouse

Phoebe Waterman Haas Public Observatory at the National Air & Space Museum, Solar viewing, Wed. – Sun., 12 – 3 pm (weather permitting).

Owens Science Center Planetarium: "Venus & Mars – Meet Me at Sunset," Fri. Jan. 9, 7:30 pm; $5/adult; $3/students/senior/teachers/military; children under 3 free. www1.pgcps.org/howardbowens

Mid-Atlantic Senior Physicists Group: "Sloan Digital Sky Survey" with Alex Szalay (Johns Hopkins University), Wed. Jan. 21, at 1 pm at the American Center for Physics (1st floor conference room). http://www.aps.org/units/maspg/

New Telescope Owners Nights: Wednesday, Jan. 28 or Saturday, Jan. 31, from 6:00 pm to 9:00 pm (30-minute time slots). Registration required. www.astro.umd.edu/openhouse/2programs/new-telescope-owners-nights.html

Upcoming NCA Meetings at the University of Maryland Observatory:
14 Feb: John Keller (GSFC), "The Lunar Reconnaissance Orbiter (LRO)."

National Capital Astronomers Membership Form

Name: _____ **Date:** ___/___/___

Address: _____ **ZIP Code:** _____

Home Phone: ____-____-_____ **E-mail:** _____ **Print / E-mail Star Dust (circle one)**

Membership (circle one): Student….. $ 5; Individual / Family…..$10; Optional Contribution…..$__

Please indicate which activities interest you:

- Attending monthly scientific lectures on some aspect of astronomy ____
- Making scientific astronomical observations ____
- Observing astronomical objects for personal pleasure at relatively dark sites ____
- Attending large regional star parties ____
- Doing outreach events to educate the public, such as Exploring the Sky ____
- Building or modifying telescopes ____
- Participating in travel/expeditions to view eclipses or occultations ____
- Combating light pollution ____

Do you have any special skills, such as videography, graphic arts, science education, electronics, machining, etc.?

Are you interested in volunteering for: Telescope making, Exploring the Sky, Star Dust, NCA Officer, etc.?

Please mail this form with check payable to ***National Capital Astronomers*** to:
Henry Bofinger, NCA Treasurer; 727 Massachusetts Ave. NE, Washington, DC 20002-6007

National Capital Astronomers, Inc.

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First Class
Dated Material

Next NCA Meeting:

2015 January 10th
7:30 pm
@ UMD Observatory

Gordon Bjoraker

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