

# Star Dust

National Capital Astronomers, Inc.

January 2011

Volume 69, Issue 5

<http://capitlastronomers.org>

## Next Meeting

**When:** Sat. Jan. 8, 2011  
**Time:** 7:30 pm  
**Where:** UM Observatory  
**Speaker:** Ruben Kier

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## Directions to Dinner/Meeting

Members and guests are invited to join us for dinner at the Garden Restaurant located in the UMUC Inn & Conference Center, 3501 University Blvd E. The meeting is held at the UM Astronomy Observatory on Metzert 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 at the observatory. Please try to let him know in advance by e-mail at [rigel1@starpower.net](mailto: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.

## January 2011: Ruben Kier Best Targets for Winter Astrophotography

**Abstract:** You may have thought that spending all night photographing an obscure celestial object takes you away from the fun of visual astronomy. Well, be prepared for a surprise. Processing and studying your images can enrich your visual experiences. Learn how emission nebula are more extensive that we thought, and why reflection nebula have complex colors. Find out how to see colors in the stars of bright open clusters. Discover why the individual stars that sparkle in a globular cluster are mostly red giants. Understand what makes a supernova glow at the eyepiece....it's not what you may first suspect. Ruben Kier takes you on an exploration of the cosmos through dozens of his own photographs, obtained through popular amateur telescopes that you may already own!



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Thank you!

## 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.

**Biography:** Ruben Kier's photos, articles, and letters have appeared in *Astronomy*, *Sky & Telescope*, and *AstroPhoto Insight* magazines. He serves on the Astronomical Advisory Council of the University of Florida. Last year, Ruben summarized a decade of experience with CCD imaging in his book, *The 100 Best Astrophotography Targets: A Monthly Guide for CCD Imaging with Amateur Telescopes*. His goal has been to show how amateur astronomers, using moderately priced equipment, can obtain excellent images rivaling those obtained with the most costly telescopes. More of Ruben's images are available on his website, <http://www.stardoctor.org>.



December 22, 2010 Lunar Eclipse

*Canon 5D Mark II, 189mm, f5, 4sec, ISO400, White Balance set to Sunlight.*

*Photo Credit: Brian Doty/George Mason University.*

## Science News

*Thank you Nancy Grace Roman for finding these articles.*

### **City Light Pollution Affects Air Pollution**

International Dark Sky Association

Wed, 15 Dec 2010

Excess light at night can contribute to air pollution, according to a study by scientists at the National Oceanic and Atmospheric Administration (NOAA) and the Cooperative Institute for Research in Environmental Sciences (CIRES) at the University of Colorado that uplight from outdoor lighting that contributes to sky glow over cities also interferes with chemical reactions that naturally clean the air during nighttime hours.

Every night, chemicals from vehicle exhaust and other human created sources are broken down and prevented from becoming smog, ozone, or other irritants by a form of nitrogen oxide called the nitrate radical. Sunlight destroys the naturally occurring nitrate radical, so this process occurs only in hours of darkness.

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## Why is the Moon so High in the Sky in Winter?

*And was it in fact directly overhead near the beginning of the Dec. 21 lunar eclipse?*

*Special thanks to Guy Brandenburg for allowing me to adapt the Dec. 22, 2010 entry from his blog: [gbrandenburg.wordpress.com](http://gbrandenburg.wordpress.com)  
 All editorial changes are mine. – Michael Chesnes*

I have from time to time noticed, and marveled at, the fact that during the winter, the Moon at times appears like it's almost directly overhead. Let me emphasize that: to my unaided, subjective vision, without taking the trouble to measure it, during the winter, the Moon sometimes appears to me to be directly overhead (at zenith).

However, everything I know about astronomy of the Solar System tells me that this is probably impossible, simply because we do not live in the Tropics (with a capital T: the zone between the Tropic of Cancer and the Tropic of Capricorn). That's the only part of our planet where the sun is ever directly overhead. (Don't believe me? Use your internet resource skills and look it up.)

If you live in Washington, the Sun will never appear directly over your house, no matter where you live in Washington, DC, and no matter how hot it may feel in the middle of summer.

And I figured that if the Sun and the Earth and the Moon were all aligned with each other, as in last night's lunar eclipse, then the Moon would appear in our sky here in Washington as if it had simply traded places with the Sun for a while, and was at the same elevation. And that elevation isn't all that high.

Or so I thought.

Was I suffering from a version of the famous 'Moon effect'? (Which is a poorly-understood but almost-universal optical illusion about the apparent size of the Moon, a visual hallucination of sorts, caused by some internal human visual processing "bug" inside the various centers responsible for actually interpreting the photons and light waves that enter one's eyes.)

Or is everybody else normal and it's just me? Or was the Moon, in fact, at the zenith? Or just very close to it, but within the theoretical and experimental range of error for this sort of thing?

I am going to try to settle this in two ways. First of all, theoretically.

I used a rather widely-used piece of instructional geometry software called "Geometer's Sketchpad" (version 5 in this case) and a couple of drawing and painting programs. I also used Google Earth to find out where on Earth are the places that are directly south of Washington and are on the Tropic of Cancer or on the Equator, as well as the spot on our planet that is diametrically opposite in position to Washington, DC.

I was rather surprised to find out where those places were. They weren't really where I expected, and I of all people should have known better.

For example, I thought I remembered that Havana, Cuba, was just inside the Tropics, but Miami, Florida, was just north of the Tropic of Cancer.

Continued on Page 4

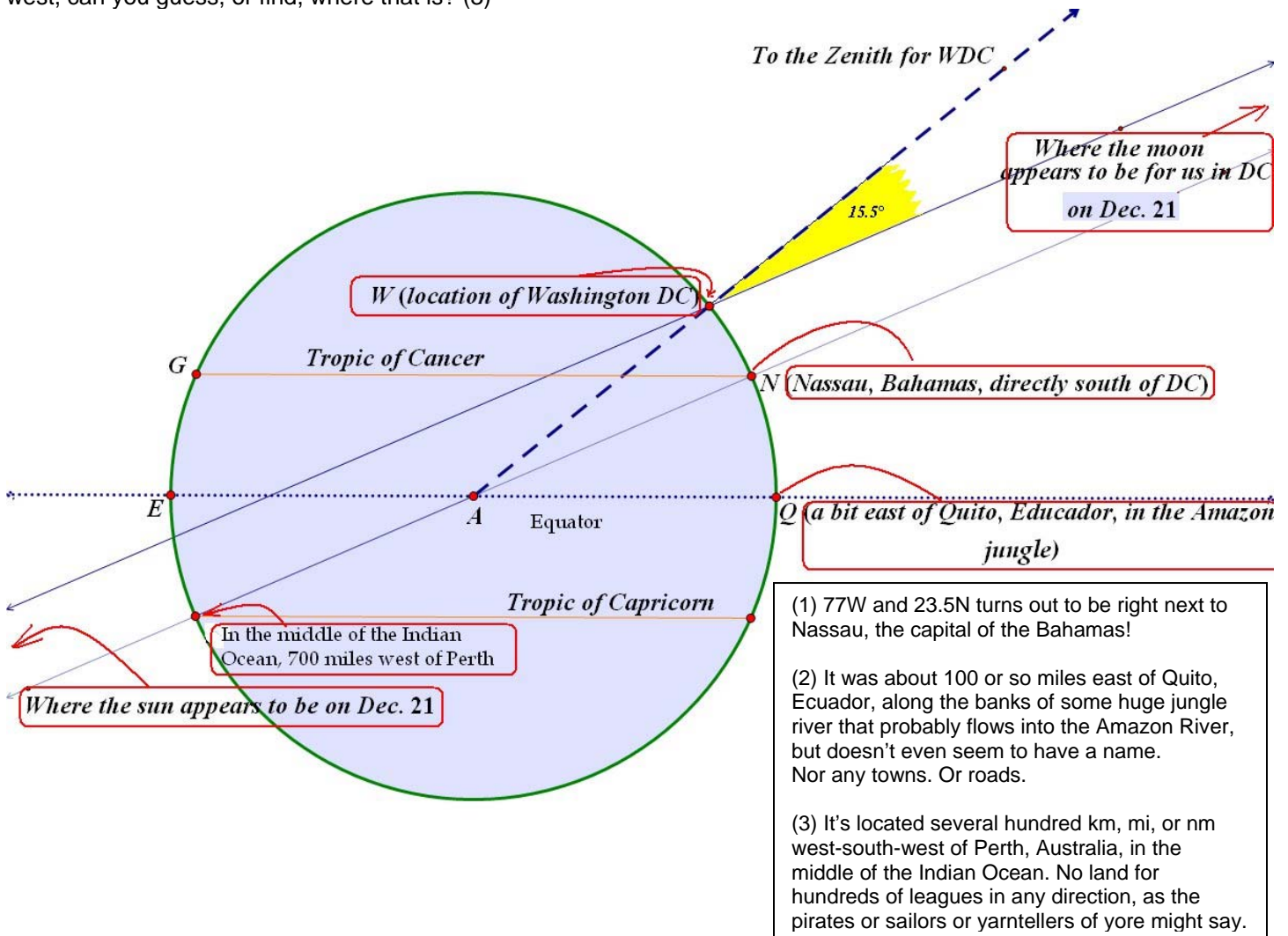


Continued from Page 3

And I also remembered having been to some places in Florida that were south of DC. So I figured that the Tropic of Cancer would intersect our DC line of longitude (about 77 degrees west) somewhere in the water between Havana and Miami. Surprise: not very close. Just for fun, try guessing or figuring out the answer yourself. The answer is next to the diagram below, at (1).

And directly south of DC, on the equator? I always figured it would be somewhere in Brazil. No surprise this time, I was wrong again. When I looked carefully, I discovered that 77 W and 0 degrees N or S is located... (2).

How about the point diametrically opposite to Washington, on the exact other side of the globe? Well, on this one I was fairly close. But calculating where this is, is a bit tricky. The latitude is OK. Any point at X degrees north is directly opposite some point that is X degrees south. So wherever it is, it's at 39 degrees south. But the longitude is harder, because for most locations, Y degrees west is not opposite Y degrees east. What you have to do is change your latitude by exactly 180 degrees. Now here, you can either add or subtract. I would prefer to subtract, here. So 180 minus 77 gives us 103. (Of, if you prefer, 77 minus 180 gives -103.) And the way I interpret that 103, or -103, is to consider that as being 103 degrees east longitude. Now knowing that DC's literal antipode is roughly located at 39 degrees south and 103 degrees west, can you guess, or find, where that is? (3)



Bottom Line: if my diagram is correct, the full Moon last night, at its greatest elevation or altitude last night, should have been about 15.5 degrees from the vertical (or 74.5 degrees from the horizontal). And that angular distance from the zenith should have been clearly and plainly obvious. But it wasn't, to me. Now that's just last night. Is it possible for the Moon to be inclined a bit to the apparent orbit of the sun – that is – when the Moon is not undergoing an eclipse? And can that cause the Moon to be even higher in the sky than it was during last night's eclipse? Answer: YES. The Moon's orbit around the Earth is inclined by just about 5 degrees from the Sun's apparent orbit. Thus, in different years and months, the Moon might be as high as 10.5 from the vertical (79.5 degrees from the horizontal).

## 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 and Expeditions

David Dunham

### Asteroidal Occultations

Date	Day	EDT	Star	Mag.	Asteroid	dmag	s	"	dur.	Ap.	Location	
Jan 8	Sat	4:30	TYC18610345	11.1	May	2.5	8	7	e&nNC	swVA	eKY	
Jan 9	Sun	2:51	SAO 57731	9.3	Felix	5.3	5	4	neNC	s.cen.VA	WV	
Jan 12	Wed	3:36	SAO 80669	8.3	Sundmania	6.2	6	2	neAL	n&eGA;sSC?		
Jan 12	Wed	20:24	TYC07432324	10.4	Heinlein	5.3	1	5	sMD?	VA,WV	sOhio	
Jan 12	Wed	20:35	TYC01791656	11.5	Ekard	2.5	6	7	NJ	sPA	nMD,OH	
Jan 16	Sun	3:52	SAO 79763	8.7	Maja	3.6	7	3	LI	swCT	sNY,SON	
Jan 16	Sun	20:54	SAO 76765	8.2	Refugium	7.2	5	2	wNC	w&nVA	MD,ePA	
Jan 22	Sat	4:19	PPM 156211	10.4	Vundtia	3.5	9	5	SC	GA	TN,AL	
Jan 23	Sun	23:15	SAO 80827	9.1	Una	3.8	7	3	MA	sNY	SON,sMI	
Jan 25	Tue	6:25	TYC02391756	11.1	Croatia	2.8	7	7	DE	NJ,MD	PA;nVA?	
Jan 26	Wed	6:30	PPM 196460	10.6	Parthenope	1.3	16	6	centX	sLA	cen.FL	
Feb 2	Wed	2:18	ZUC39664907	13.8	2001 YH140	7.3	11	10	TNO		Americas?	
Feb 2	Wed	2:43	SAO 94620	8.8	Aurelia	5.0	22	3	e&nVA	DC?	WV,OH	
Feb 3	Thu	1:46	TYC18890202	11.7	Coelestina	2.4	6	7	eNC	swVA	sWV,SOH	
Feb 3	Thu	21:53	TYC23561711	11.2	1941 UN	4.3	2	7	TN	sNC	nSC	
Feb 4	Fri	0:08	SAO 59192	9.4	Irmintraud	4.7	9	4	cen	Fla.	;	Mexico
Feb 8	Tue	23:19	SAO 55385	9.8	Bruna	5.4	1	4	eOH	nWV	cen&seVA	
Feb 14	Mon	4:23	SAO 98687	6.7	Inna	9.2	1	2	s&wNC	neTN	sckKY	

### Lunar Grazing Occultations (\*, Dunham plans no expedition)

Date	Day	EDT	Star	Mag.	% alt	CA	Location
Jan 6	Thu	18:07	SAO 164138	8.1	6+	14	7S Charltsv&Woodbrg,VA;Clintn,MD
Jan 8	Sat	20:45	ZC 3326	6.4	19+	9	2S Jacksonville & Surf City, NC
Feb 6	Sun	19:41	SAO 128424	6.8	13+	17	4N BulRnPk&Alxndra,VA;BrockHalMD
Feb 11	Fri	17:42	ZC 566	6.1	56+	71	12S Trappe,MD(Sn-2);ArgosCornerDE

### Total Lunar Occultations

DATE	Day	EDT	Ph	Star	Mag.	% alt	CA	Sp.	Notes
Jan 8	Sat	20:21	D	ZC 3326	6.4	19+	12	46S F6	Az.255, close double
Jan 15	Sat	22:08	D	SAO 76555	7.2	83+	67	67N G5	
Jan 16	Sun	21:03	D	ZC 789	6.9	90+	73	79N K0	
Jan 17	Mon	17:56	D	SAO 78094	7.2	95+	30	50N M2	Sun -9, close double?
Jan 17	Mon	18:02	D	BU Gem	6.5	95+	31	62S M1	Sun-10, ZC 942
Jan 18	Tue	0:13	D	mu Gem =	2.9	96+	65	26S M3	ZC 976, Term.Dist. 14"
Jan 18	Tue	1:03	R	Tejat	2.9	96+	56	-56S M3	AA 235, ZC 976
Jan 18	Tue	22:40	D	56 Gem	5.1	99+	68	76N M0	ZC 1113, Term.Dist. 12"
Jan 20	Thu	22:55	R	ZC 1381	6.4	97-	47	82S A2	AA 275 deg.
Jan 22	Sat	6:35	R	RX Sex	6.7	91-	24	78N A3	Sun alt. -9, ZC 1528
Jan 23	Sun	2:56	R	ZC 1629	6.6	84-	50	86S K0	
Jan 24	Mon	1:37	R	RW Vir	7.1	74-	33	54N M5	ZC 1745
Jan 24	Mon	4:03	R	II Vir	6.6	74-	43	28S A0	ZC 1752
Jan 27	Thu	4:22	R	KX Librae	5.9	40-	22	73S K4	ZC2134,mg2 sep27",PA306
Jan 31	Mon	6:40	R	SAO 187331	7.2	6-	10	86N G5	Sun alt. -7, Az. 131
Feb 5	Sat	18:50	D	ZC 3397	7.1	7+	16	58N K0	
Feb 5	Sat	18:55	D	SAO 146526	7.4	7+	15	59S F5	Azimuth 257 deg.
Feb 9	Wed	19:13	D	ZC 317	6.4	37+	54	74S F5	
Feb 11	Fri	0:39	D	ZC 459	6.4	49+	4	80N K2	Az. 293; close double?
Feb 11	Fri	17:32	D	ZC 566	6.1	56+	69	17S B8	Sun +1; Delmarva graze
Feb 11	Fri	18:42	D	SAO 76283	7.6	57+	74	78N G0	Close double?
Feb 11	Fri	21:30	D	SAO 76334	7.8	57+	50	77S G0	
Feb 11	Fri	22:00	D	32 Tauri	5.6	58+	44	24S F2	ZC 582
Feb 12	Sat	22:11	D	SAO 76814	7.4	68+	53	49S K0	dbl?+mg3=11,sep5",PA62
Feb 13	Sun	21:46	D	ZC 887	7.0	77+	67	80S K5	Close double?
Feb 14	Mon	2:10	D	140 Tauri	7.0	79+	18	76S A2	ZC 907, close double?

Explanations & more information are at <http://iota.jhuapl.edu/exped.htm>.

David Dunham, [dunham@starpower.net](mailto:dunham@starpower.net)

Phones: home 301-220-0415; cell 301-526-5590

Timing equipment and even telescopes can be loaned for most expeditions that we actually undertake; we are always shortest of observers who can fit these events into their schedules, so we hope that you might be able to.

Information on timing occultations is at: <http://iota.jhuapl.edu/timg920.htm>.

Good luck with your observations.

## ***NASA Spacecraft Sees Cosmic Snow Storm During Comet Encounter***

NASA News

WASHINGTON -- The EPOXI mission's recent encounter with comet Hartley 2 provided the first images clear enough for scientists to link jets of dust and gas with specific surface features. NASA and other scientists have begun to analyze the images.

The EPOXI spacecraft revealed a cometary snow storm created by carbon dioxide jets spewing out tons of golf-ball to basketball-sized fluffy ice particles from the peanut-shaped comet's rocky ends. At the same time, a different process was causing water vapor to escape from the comet's smooth mid-section. This information sheds new light on the nature of comets and even planets.

"This is the first time we've ever seen individual chunks of ice in the cloud around a comet or jets definitively powered by carbon dioxide gas," said Michael A'Hearn, principal investigator for the spacecraft at the University of Maryland. "We looked for, but didn't see, such ice particles around comet Tempel 1."

The new findings show Hartley 2 acts differently than Tempel 1 or the three other comets with nuclei imaged by spacecraft. Carbon dioxide appears to be a key to understanding Hartley 2 and explains why the smooth and rough areas scientists saw respond differently to solar heating, and have different mechanisms by which water escapes from the comet's interior. Data show the smooth area of comet Hartley 2 looks and behaves like most of the surface of comet Tempel 1, with water evaporating below the surface and percolating out through the dust. However, the rough areas of Hartley 2, with carbon dioxide jets spraying out ice particles, are very different.

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Measurements taken over Los Angeles by aircraft show that light pollution from cities is suppressing the radical. Though the lights are 10,000 dimmer than the Sun, the study's first results indicate that city lights can slow down the nighttime cleansing by up to 7% and they can increase the starting chemicals for ozone pollution the next day by up to 5%.

As many cities are close to their limits of allowable ozone levels, this news is expected to generate immediate interest in light pollution reduction as a way to improve air quality.

## **APS Mid-Atlantic Senior Physicists Group January 2011 Event**

<http://www.aps.org/units/maspg/>

Date: January 19, 2011 -- Wednesday

Speaker: Eugenia Kalnay, Distinguished University Professor, Department of Atmospheric and Oceanic Science, Univ. of Maryland, College Park, MD

Topic: In the Midst of Chaos, Good Predictions: How we Exploit Chaos to Improve Weather Forecasts

Time and Location: 1:00 PM, with Q&A to follow; in a 1st floor conference room at the American Center for Physics, 1 Physics Ellipse, College Park, MD-- off River Rd., between Kenilworth Ave. and Paint Branch Parkway.

Abstract: Proceeding from basic concepts of chaos, techniques will be described that actually take advantage of chaos to improve weather forecasts. One example is Breeding of Instabilities in which we estimate the fastest growing instabilities. This enables prediction of the next regime change, when and of what duration-- in the famous Lorenz (1963) "unpredictable chaotic model" that surprised Lorenz himself. These techniques could be applied to any dynamic chaotic system.

Biography: Following her Licencia en Meteorologia in 1965 from the University of Buenos Aires, Prof. Kalnay came to MIT, where she earned her Ph.D. in Meteorology in 1971 (Jule G. Charney, Advisor). After becoming a Branch Head at NASA Goddard and the Director of the Environmental Modeling Center at the National Centers for Environmental Prediction, she was appointed Lowry Chair Professor at the School of Meteorology, Univ. of Oklahoma. In 1999 she became Professor and Chair of the Department of Atmospheric and Oceanic Science, Univ. of Maryland, College Park, MD; and in 2002 she was named Distinguished University Professor.

Prof. Kalnay is a Fellow of the American Association for the Advancement of Science, of the American Geophysical Union, and of the American Meteorological Society. She is a member of national academies in the USA, in Europe, and in Argentina. Her numerous honors and awards include: The World Meteorological Organization top world-wide award, the IMO Prize for 2009; The American Meteorological Society Jule G. Charney Award for 1995; Department of Commerce gold (1993, 1997) and silver (1990) medals; and many others.

She is an expert in Atmospheric Modeling, Data Assimilation and Predictability; her book on these subjects (Cambridge University Press, 2003) has been reprinted many times and translated into Chinese in 2005. She is working on coupling Earth System models with Human models, as a follow-up of her talk "Population and Climate Change: A proposal" at the NAS when she received the WMO/IMO Prize.

## Star Dust Speaker Reviews

*Michael Chesnes*

I warmly encourage NCA members to write reviews for the talks at our meetings, so that they can be published in Star Dust. We have an excellent lineup of speakers every year, and our reviews are both a valuable historical record of our activities and a way to recognize our speakers.

## Calendar of Events

**NCA Mirror- and Telescope-making Classes:** Tuesdays Jan. 4, 11, 18, 25, and Fridays, Jan. 7, 14, 21, 28, 6:30 to 9:30 pm 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 [gbrandenburg@yahoo.com](mailto:gbrandenburg@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 pm (Nov-Apr) or 9:00 pm (May-Oct). There is telescope viewing afterward if the sky is clear.

**Dinner:** Saturday, Jan. 8 at 5:30 pm, preceding the meeting, at the [Garden Restaurant](#) in the University of Maryland University College Inn and Conference Center.

**APS Mid Atlantic Senior Physicists Group:** Wednesday, January 19, 2011 at 1:00 pm, American Physical Society, College Park.

**Upcoming NCA Meetings** at the University of Maryland Observatory

Jan 8, 2011 **Ruben Kier** - *Best Targets for Winter Astrophotography*

Feb 12, 2011 **Brian Jackson** (GSFC) - *From Extrasolar Gas Giant to Hot, Rocky Planet*

Mar 12, 2011 **John Debes** (GSFC) - *A Stellar Debris Disk Flapping in the Interstellar Wind*

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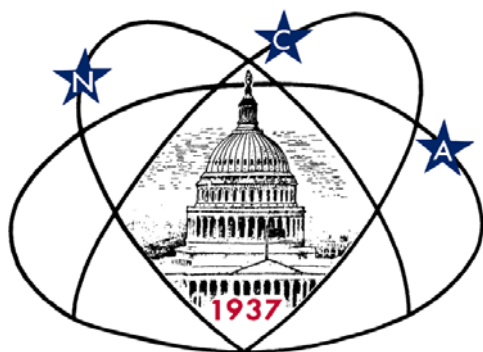
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**First Class**

**Dated Material**



Next NCA Mtg:

**Jan. 8**

**7:30 pm**

**@ UM Obs**

**Ruben Kier**

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