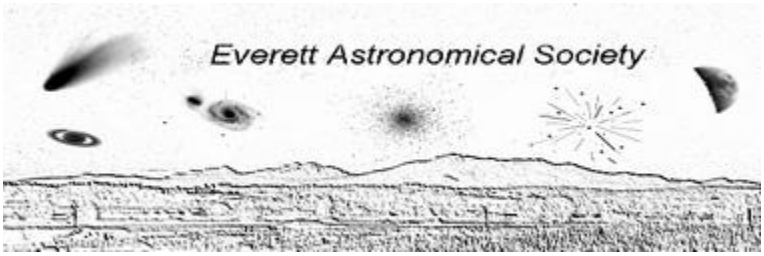
Volume MMVIV. No. 3



The Stargazer

March 2009

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Web assistance: Cody Gibson	(425) 348-1608	sircody01 at comcast.net	*See EAS website at:*
		(change 'at' to @ to send email)	http://everettastro.org

EAS BUSINESS…

NEXT EAS MEETING – MARCH 28TH 7 PM AT AURORA ASTRO PRODUCTS STORE AT SILVER LAKE.

★★ Saturday March 28th 7:00 pm MEETING ★★

This month's program features Jack Barnes, EAS member, who has recently built a substantial home observatory at his home in Edmonds. He will present info about building his 'Possum Works Observatory', as a preview of a possible EAS tour or open house there sometime this spring.

Map/Directions to Aurora Astro Products store location - http://www.skyvalleyscopes.com/aurora_astro_products_silver_lak.htm

Silver Lake Plaza, 11419 19th AVE. SE, Everett, WA 98208

If you are traveling northbound on I-5:

Take exit #186/128th St. and go east - to the right on 128th St. continue until you come to Murphy's Corner/Intersection with Highway 527/19th Ave SE/Old Bothell-Everett Highway (all one in the same) and turn left/north. Follow until you see Silver Lake Plaza (red brick construction) on your right with the lake is on your left.

If you are traveling southbound on I-5:

*Take exit 187/Everett Mall Way and at the top of the exit's hill turn right following signs for Highway 527. At the light turn right following the signs for Highway 527. Then stay on Highway 527/19th Ave SE/Old Bothell-Everett Highway until you have Silver Lake on your right and the Silver Lake Plaza on your left. You may also continue down I-5 until exit 186 and turn left onto 128th then follow previous directions. If you have a problem you **can** always call (425) 337-4384*

* ASTRONOMY SWAP MEET AT AURORA ASTRO *

Free Astronomy Swap Meet – Sunday Mar 29th 10:00 – 4:00

"Clean out the garage get rid of that eyepiece you never use and turn it into cash, or trade it for that other guys treasure, or use your new found wealth to snag that new Ethos eyepiece you always wanted ! Besides swap meet, there will be BBQ with Astro Hot Dogs, drinks, solar viewing, and raffle of Meade 8.8mm UWA eyepiece, a $199 value. I will provide some tables for swap meet and folding chairs. Please email or call if you are going to trade and if you can bring a solar telescope let me know ahead of time.

- *See you there."*

Jim Bielaga-owner
Aurora Astro Products
11419 19th Avenue SE #A102 in Silver Lake Plaza
Everett, WA 98208
425-337-4384
Email infoauroraastro@aol.com

★ STAR PARTY INFO ★

Scheduled EAS Star Parties at Ron Tam's:

Apr 18 (Sat. last Qtr Moon) or Apr 25 (Sat).
May 23 (Sat. Memorial Day weekend)
Jun 20 (Sat.)
Jul 18 (Sat.)
Aug 22 (Sat)
Sep 19 (Sat)
Oct 17 (Sat)
Nov 14 (Sat)

CAMP DELANEY SPRING STAR PARTY:

"The Olympic Astronomical Society will be hosting its 6th annual spring Camp Delany star party at Sun Lakes State Park April 23 - 26, 2009. We have enjoyed having your members join us in the past and I am extending a welcome again this year. The sign up

form will be available on our website soon and can be found at www.olympicastronomicalsociety.com. I hope this note finds your respective clubs doing well. We are very excited about The year of Astronomy as I am sure you are as well."

- Cliff Mygatt, President, Olympic Astronomical Society

EAS member Ron Tam has offered a flexible opportunity to EAS members to come to his home north of Snohomish for observing on clear weekend evenings and for EAS starparties. Anyone wishing to do so needs to contact him in advance and confirm available dates, and let him know if plans change**. "***Our place is open for star parties any Saturday except weekends of the Full Moon. People can call to get weather conditions or to confirm that there is a star party. Our phone number is (360) 568-5152. They can e-mail me too (tam1951@verizon.net) but I don't check my email daily. They can email me for directions if they never have been out here."* Listed below are proposed dates for **planned EAS star parties** at my [Ron Tam's] place, depending upon the weather, of course. Call Ron about spur-of-the-moment observing.

Please also join the EAS mail list, and send mail to the mail list ***everett_astronomy@topica.com*** to coordinate spur-of-the-moment observing get-togethers, on nights when the sky clears. We try to hold informal close-in star parties each month during the spring, summer, and fall months on a weekend near the New moon at a member's property or a local park. (call Jim Bielaga at (425) 337-4384 for info or check the EAS website.) Members contact Jim Bielaga for scope borrowing.

Other Western US Star Parties This Season

MARCH -

Mar 28 2009 - OAS Messier Marathon Star Party, http://www.olympicastronomicalsociety.com/ *

APRIL -

Apr 18 2009 - OMSI-RCA Planet Parade Star Party, Rooster Rock State Park & Stub Stewart State Park, OR http://www.rca-omsi.org/sp/sp_schedule.htm

Apr 19-26 2009- Texas Star Party (TSP) 2009, Prude Ranch, Fort Davis, TX - http://www.texasstarparty.org/

Apr 23-26 2009 - OAS Camp Delany Star Party, Sun Lakes SP - http://www.olympicastronomicalsociety.com/Documents/CAMPDELANY_Spring_2009_Sign-UpForm-new.pdf

MAY -

May 2 2009 - OMSI-RCA Astronomy Day Star Party, Rooster Rock State Park & Stub Stewart State Park, OR http://www.rca-omsi.org/sp/sp_schedule.htm

May 16 2009 - RCA Prineville Reservoir Star Party, Prineville, OR - http://www.rca-omsi.org/sp/sp_schedule.htm

May 22-24 2009 - RCA Maupin Dark Sky Star Party, Maupin, OR - http://www.rca-omsi.org/sp/maupin.htm

May 22-25 2009 (Memorial Day) - Annual RTMC Astronomy Expo 2009, Riverside, CA **-** http://www.rtmcastronomyexpo.org/

May 23-25 2009 - Fire in the Sky – Rocket Launch & Star Party, Mansfield, WA - http://www.fireinthesky.org/ Tacoma Astronomical Society http://www.tas-online.org/calendar.php

JUNE -

Jun 13 2009 - OMSI-RCA Summer Solstice Star Party, Rooster Rock State Park & Stub Stewart State Park, OR http://www.rca-omsi.org/sp/sp_schedule.htm

Jun 13-20 2009 Grand Canyon Star Party (GCSP), On South Rim - http://www.tucsonastronomy.org/gcsp.html

Jun 17-21 2009 - The Rocky Mountain Star Stare (RMSS) 2009, Pike Nat Forest, Colorado Springs, CO http://www.rmss.org/

Jun 17-20 - Bryce Canyon Astronomy Festival, Bryce Canyon Nat. Pk, UT http://www.nps.gov/brca/planyourvisit/astronomyprograms.htm

Jun 18-21 2009 - Goldendale 2009 NWRAL "First Light", Skyview Acres - Goldendale WA http://klickitatstarparty.net/

Jun 19-21 2009 - RCA Maupin Dark Sky Star Party, Maupin, OR - http://www.rca-omsi.org/sp/maupin.htm

Jun 19-20, Jul 24-25, Aug 21-22 2009 - Stars Over Yellowstone Star Parties, Madison Campground Amphitheater, http://smasweb.org/

Jun 20-24 2009 - Golden State Star Party 2009, Frosty Acres Ranch, Adin, CA http://goldenstatestarparty.blogspot.com/

Jun 19-20 2009 Craters of the Moon Star Party 2009, Craters of the Moon Nat. Monument, ID http://ifastro.org/web/index.php http://www.boiseastro.org/

JULY -

Jul 15-19, 2009 - Mt Bachelor Star Party (MBSP) 2009, Mt. Bachelor (Bend) OR http://www.mbsp.org/

Jul 15-19, 2009 - RASCals Vancouver Island Star Party 2009, Victoria Fish & Game Assoc - Holker Place, Malahat, (Near Victoria) BC, CA http://victoria.rasc.ca/events/StarParty/

Jul 18 2009 - OMSI-RCA Summer Night Sky Star Party, Rooster Rock State Park & Stub Stewart State Park, OR http://www.rca-omsi.org/sp/sp_schedule.htm

Jul 20-25 2009 - Table Mt. Star Party (TMSP) 2009, Ellensburg WA http://www.tmspa.com/

Jul 24-25 2009 - Lava Hot Springs Star Party 2009, Lava Hot Springs ID - http://ifastro.org/web/index.php

Jul 24-26 2009 - RCA Trout Lake Star Party Weekend, Trout Lake, WA - http://www.rca-omsi.org/sp/pix/troutlake.pdf

Jul 25 2009 - OAS Hurricane Ridge Star Party, Hurricane Ridge, WA http://www.olympicastronomicalsociety.com/Documents/2009_OAS_calendar.pdf

AUGUST -

Aug 11 2009 - OMSI-RCA Perseid Meteor Shower Star Party, Rooster Rock State Park & Stub Stewart State Park, OR http://www.rca-omsi.org/sp/sp_schedule.htm

Aug 15-23 2009 - Mt. Kobau Star Party 2009 (MKSP), Mt. Kobau, near Osoyoos BC http://www.mksp.ca/

Aug 19-23 2009 - Oregon Star Party 2009 (OSP), Ochocco NF http://www.oregonstarparty.org/

Aug 20-22 2009 - SAS Brooks Memorial Park Star Party 2009, SR 97 near Goldendale http://www.seattleastro.org/events.shtml

Aug 20-22 2009 - 19th Annual 'Weekend Under the Stars' 2009, Foxpark WY - http://home.bresnan.net/~curranm/wuts.html

Aug 21-23 2009 - Idaho Star Party 2009, Bruneau Dunes State Park - http://ifastro.org/web/index.php (Boise AS) http://www.boiseastro.org/

SEPTEMBER -

Sep 12 2009 - OMSI-RCA Autumnal Equinox Star Party, Rooster Rock State Park & Stub Stewart State Park, OR http://www.rca-omsi.org/sp/sp_schedule.htm

Sep 17-18 2009 - OAS Camp Delany Fall Star Party, Sun Lakes SP - http://www.olympicastronomicalsociety.com/Documents/FALLCAMPDELANYSign-UpForm.pdf

Sep 17-19 2009 - CalStar2009, Lake San Antonio Park CA http://www.sjaa.net/calstar/ - http://www.sjaa.net/

Sep 18-19 2009 - Craters of the Moon Star Party 2009, Craters of the Moon Nat. Monument, ID http://ifastro.org/web/index.php http://www.boiseastro.org/

Sep 19-20-28 2009 - Alberta Star Party 2009, Starland Recreation Area Campground near Drumheller, Alberta, CA http://www.astronomycalgary.com/events/info/155 http://calgary.rasc.ca/asp2009.htm

OCTOBER -

Oct 14-17 2009 - The Enchanted Skies Star Party 2009, Socorro NM - http://enchantedskies.org/

NOVEMBER -

Nov 12-15 2009 - Nightfall 2009, Palm Canyon Resort, Borrego Springs, CA http://www.rtmcastronomyexpo.org/nightfall.htm

Nov 14 2009 - Night Under the Stars 2009, Alamo Lake, AZ - http://azstateparks.com/Parks/ALLA/events.html

OTHER

(tbd Jun) **- Shingletown Star Party,** Shingletown, Mt. Shasta, CA http://www.shingletownstarparty.org/

(tbd Aug) - **Deception Pass Star Party 2009,** Bowman Bay, Deception Pass, WA - http://squakmountain.org/deception_pass_star_party.htm http://squakmountain.org/events.html#upcoming

(tbd Sep) - **Orion Nebula 2009 Star Party,** Table Mt. (Ellensburg) WA http://www.seattleastro.org/orionnebsp.shtml

(tbd Sep) - **White Sands Star Party**, Alamogordo/White Sands, NM http://www.zianet.com/wssp/

(tbd Oct) - **All Arizona Star Party** (near Arizona City, AZ) - http://www.eastvalleyastronomy.org/aasp.htm

(tbd) **- Blue Mountain Star Party,** Ukiah, OR http://www.stargazing.net/tcac/EventsCalendar.htm http://www.stargazing.net/tcac/gmBluMtn.htm

(tbd) - **Montana Starwatch**, Great Falls, MT http://smasweb.org/

Other Star parties: http://www.cloudynights.com/ubbthreads/showflat.php/Cat/0/Number/2858373/Main/2858366

EAS MEMBER NEWS

Publicity / Astronomy-Day coordinator: (**David Brodeur**) – Make reservations for venue (library), notify websites about EAS astronomy day events, create press releases and notify news organizations about EAS events, and promote new membership

Outreach chairperson: (currently **vacant**) - Coordinate requests from public for EAS member volunteers to conduct star parties or presentations at visits to schools, senior centers, scout meetings, etc. We often have requests for members of the EAS to come and help with an 'astronomy night' event from local schools, scout groups, senior homes, or similar groups. Usually this would be in the form of a star party at their gathering, or perhaps a short slide show or night sky talk. Providing education and support to the community about interest astronomy is one of the main missions of the EAS. Please let club president know if you are interested and available to be on list of volunteers to handle these requests, so that we can say YES when people ask. A star party night can be a rewarding event for all involved. **Please email Mark Folkerts with your interest (or suggestions).**

Sidewalk astronomy committee: (currently **vacant**). – Plan and conduct urban/suburban sidewalk astronomy events to allow passers-by to experience astronomy. Needs 2-3 people for each event, and to schedule events. We are looking for volunteers who could do a series of Sidewalk Astronomy sessions this spring and summer, at a local park or public venue. For safety, moral support, and effectiveness, this should be done in teams of at least two people with telescopes. Special events like eclipse or comets especially draw the interest of the public.

Other volunteers? Find a way to help and contribute. Come up with a new idea to promote the EAS and astronomy in your community. Come to Astronomy Day or a star party and share your interest in the sky…

Attention EAS Members – 10% Discount for all Everett Astronomical Society Members at Aurora Astro Products

"Show your club membership card at Jim Bielaga's new astronomy store 'Aurora Astro Products' and receive a 10% discount on all purchases. This is an exclusive discount to E.A.S. members only.

I am proud to be able to offer this discount to Everett club members, and thanks for the support you have shown me on opening my new store. Also I have made great friends and learned a lot being a club member since 1991.

- Clear Skies, Jim Bielaga"

>> Members – please look at your EAS membership card to see when your membership dues are payable. If you are more than three months past due, the club will officially assume that you no longer wish to be a member, and remove you from the membership rolls. <<

Aurora Astro Products
"*Your Northern Light in the Astronomy Business*"
Over 37 product dealerships, and growing

11419 19th Avenue SE #A102
Everett, WA 98208
www.auroraastro.com
425-337-4384
425-337-4758 fax

New hours:
Monday, Thursday, Friday – 9:00 am to 6:00 pm
Tuesday/Wednesday – Noon to 8:00 pm
Saturday – 10:00 am to 5:00 pm

Also, those who have subscriptions to Sky and Telescope can now pay their own subscription as long as they are EAS members in good standing. Members will now be able to renew directly via mail or phone and still obtain the club discount. The subscribers may mail in the renewal notices with their payment, or renew via phone at (800) 253-0245. Payment at the time of renewal is required. Once a year, Sky and Telescope will check with the EAS club treasurer to see that the subscribers are still members in good standing to qualify for the discount. New members will continue to subscribe through the club treasurer.

$$ - Financial Health - $$

The club maintains a $750+ balance. We try to keep approximately a $500 balance to allow for contingencies. .

Club Scopes

Scope	Loan Status
10-inch Ward Dobsonian	Available
10-inch Sonotube Dobsonian	Available
8-inch Dobsonian	Available

EAS members: contact VP James Bielaga at (425) 337-4384 or jamesbielaga at aol.com to borrow a scope.

Does Anyone know about the history of the EAS ???

The Northwest Region of the Astronomical League (NWRAL) is putting together a new website and needs the following information from each club of the NWRAL. The EAS is looking for any information from members about the early history. Please contact Mark Folkerts if you have any info that could be of help. NRWAL would like a brief history of the club

- Club established date (approx 1986 ?)
- Who started the club (Terry Bacon, et. al.)
- When club joined the Astronomical League.

Astro Calendar for 2009

March 2009

Mar 08 - Saturn At Opposition
Mar 20 - Vernal Equinox, 11:44 UT
Mar 28 – EAS Meeting - 7:00 PM - Aurora Astro Products store

April 2009

Apr 02 - 50th Anniversary (1959), Selection Of Mercury 7Astronauts
Apr 02-05 – 100 hours of Astronomy EAS events
Apr 12 - Easter Sunday
Apr 22 - Lyrids Meteor Shower Peak
Apr 23-26 - Camp Delany star party at Sun Lakes State Park
Apr 29-May 03 - Astronomy Week

May 2009

May 02 - Astronomy Day
May 05 - Eta Aquarids Meteor Shower Peak

June 2009

Jun 05 - Venus At Its Greatest Western Elongation (46 Degrees)
Jun 21 - Summer Solstice, 05:45 UTC
Jun 23 - Pluto At Opposition

July 2009

Jul 04 - Earth At Aphelion (1.017 AU From Sun)
Jul 07 - Penumbral Lunar Eclipse
Jul 20 - 40th Anniversary (1969), 1st Man On The Moon (Apollo 11)
Jul 22 - Total Solar Eclipse (China/Pacific)
Jul 29 - South Delta-Aquarids Meteor Shower Peak

August 2009

Aug 01 - Alpha Capricornids Meteor Shower Peak
Aug 06 - Penumbral Lunar Eclipse
Aug 06 - Southern Iota Aquarids Meteor Shower Peak
Aug 12 - Perseids Meteor Shower Peak
Aug 17 - Neptune At Opposition
Aug 24 - Mercury At Its Greatest Eastern Elongation (27 Degrees)
Aug 25 - Northern Iota Aquarids Meteor Shower Peak

September 2009

Sep 04 - Saturn's Rings Edge-on From Earth
Sep 17 - Uranus At Opposition
Sep 22 - Autumnal Equinox (21:18 UT)
Sep 26-27 - Pacific Astronomy & Telescope Show - Pasadena Conv. Ctr.

October 2009

Oct 09 - Draconids Meteor Shower Peak
Oct 21 - Orionids Meteor Shower Peak

UW Astronomy Speakers Colloquium Schedule

Astronomy Department weekly colloquium meets Thursdays at 4:00 pm in PAB A102 - the classroom part of the Physics/Astronomy Building complex.
http://www.astro.washington.edu/pages/colloquium.html

On The Airwaves - KSER 90.7 - 'It's Over Your Head'

"Our group of radio script writers now consists of EAS and SAS members Jim Ehrmin, Greg Donohue, and Ted Vosk, who are now regularly writing and helping to produce our **astronomy radio show**, "**It's Over Your Head"** on radio station **KSER, FM 90.7.** The five-minute segment is broadcast **every Wednesday morning at approximately 8:20 A.M.** and gives a weekly look at what's up in the sky over Snohomish County, with other information. If you are a listener to the program, show your support by giving the program director of KSER a call!" Web page with lots of archives and other info is available at http://www.celestialnorth.org/radio/index.php and podcasts at http://www.celestialnorth.org/radio/index.php

KPLU 88.5 FM National Public Radio has daily broadcasts of "Star Date" by the McDonald Observatory of the University of Texas at Austin, Monday through Friday at about 6:05 pm. The short 2 minute radio show deals with current topics of interest in astronomy. The University of Washington TV broadcasts programs from NASA at 12:00 AM Monday through Friday, 12:30 AM Saturday, and 1:30 AM Sunday on the Channel 27 cable station.

EAS Membership Benefits & Information

EAS Benefits -
Membership in the **Everett Astronomical Society** (EAS) includes invitations to all of the club meetings and star parties, plus the monthly newsletter, ***The Stargazer.*** Currently, a 10% discount is also being offered to EAS members for purchases at Aurora Astro Products in Everett

Magazine Discounts –
In addition you will be able subscribe to ***Sky and Telescope*** for $7 off the normal subscription rate, contact the treasurer (Carol Gore) for more information. http://everettastro.org/application.htm (**When renewing your subscription to *Sky & Telescope* you should send your S&T renewal form along with a check made out to Everett Astronomical Society to the EAS address.** The EAS treasurer Carol Gore will renew your *Sky and Telescope* subscription for you. **Astronomy** magazine offers a similar opportunity to club members.)

Membership in the Astronomical League -
EAS is a member of the **Astronomical League** and you will receive the Astronomical League's quarterly newsletter magazine, ***The Reflector***.

EAS Club Telescope Borrowing -
Being a member also allows you the use of the club's telescopes, including an award winning 10 inch Dobsonian mount reflector, a second 10" dob, or and 8" Dobsonian. Contact Jim Bielaga (425) 337-4384 to borrow a telescope.

10% Discount on Purchases at 'Aurora Astro Products' in Everett -
EAS members are currently offered a 10% discount for all purchases of any telescopes, accessories, or other items at Aurora Astro Products, when they show their EAS membership card.

EAS Library -
Membership will give you access to all the material in the lending library. The library, which is maintained by Mike Locke, consists of VCR tapes, DVDs, many books, magazines, and software titles. The EAS has a library of books, videotapes, and software for members to borrow. We always value any items you would like to donate to this library. You can contact a club officer or **Librarian Mike Locke**, phone (425) 259-5995, email lockemi at comcast.net, to borrow or donate any materials. See list here: http://everettastro.org/eas_library.htm

Joining or Renewing with the EAS -

EAS dues are $25 / year per family. Funds obtained from membership dues allows the EAS to publish the Stargazer newsletter, pay Astronomical League dues, pay insurance, host a web site, and maintain our library. If it has been a year since you paid your dues, please re-subscribe to keep the club financially solvent, and to continue to receive membership benefits. http://everettastro.org/application.htm

Send your annual dues renewals to the
Everett Astronomical Society
P.O. Box 12746, Everett, WA 98206.

OBSERVER'S INFORMATION…

LUNAR FACTS

Mar 18	Last Quarter Moon
Mar 26	New Moon
Apr 02	First Quarter Moon
Apr 09	Full Moon
Apr 17	Last Quarter Moon
Apr 25	New Moon
May 01	First Quarter Moon
May 09	Full Moon
May 17	Last Quarter Moon
May 24	New Moon
May 31	First Quarter Moon
Jun 07	Full Moon

UP IN THE SKY -- THE PLANETS (AND PLUTO)

Object	*Rises*	*Sets*	*Con*	*Diam.*	*Mag*
Sun	***06:57 am***	***19:33***	***Psc***	***30'***	***-27.5***
Mercury	07:01 am	19:10	Psc	05"	-1.6
Venus	06:13 am	19:49	Psc	59"	-4.0
Mars	**06:12 am**	**16:59**	**Aqr**	**04"**	**+1.2**
Jupiter	**05:22 am**	**15:02**	**Cap**	**35"**	**-2.0**
Saturn	**00:05 am**	**06:40 am**	**Leo**	**20"**	**+0.6**
Uranus	**06:37 am**	**18:13**	**Aqr**	**03"**	**+5.9**
Neptune	**05:37 am**	**15:42**	**Cap**	**02"**	**+8.0**
Pluto	**02:21 am**	**11:44 am**	**Sag**	**--**	**+14.0**

(times listed are in local time for Everett PDT)

Digital Lunar Orbiter Photographic Atlas of the Moon

The Lunar and Planetary Institute has created a digital version of the Lunar Orbiter Photographic Atlas of the Moon, and Consolidated Lunar Atlas available online at:
http://www.lpi.usra.edu/research/cla/menu.html
http://www.lpi.usra.edu/research/lunar_orbiter

Observing Jupiter's Moons – Java tool
http://skytonight.com/observing/objects/javascript/jupiter

Transit times for Jupiter's Great Red Spot in 2008
http://skytonight.com/observing/objects/planets/3304091.html

NOAA SUN CALCULATOR

Need to know exactly what time the sun will set on Sept. 26, 2065? Or when it rose in 565 BC? How about the length of daylight a week from Tuesday in Albuquerque, N.M.? Just go to NOAA's solar calculator, now available on the Web. http://www.srrb.noaa.gov/highlights/sunrise/gen.html

INTERNATIONAL SPACE STATION – VISIBLE SEATTLE PASSES

ISS Visibility – Heavens Above:

http://www.heavens-above.com/PassSummary.asp?lat=47.979&lng=-122.201&alt=0&loc=Everett&TZ=PST&satid=25544

YOUNG ASTRONOMER'S CORNER, ASTRONOMY AND TELESCOPE "LINGO, ASTRONOMY "FUN FACTS", PLANETARY FOCUS, CONSTELLATIONS OF THE MONTH, AND "MIRROR IMAGES" COLUMNS

Co-editor Bill O'Neil had a conflict with a major activity he was involved with, and was unable to make his usual contribution to StarGazer this month, but looks forward to returning to publish these in upcoming issues.

ASTRONOMICAL NOTES -- ON & OFF THE WEB…

NASA & MICROSOFT TO MAKE UNIVERSE OF DATA AVAILABLE TO THE PUBLIC

NASA and Microsoft announced plans to make additional planetary images and data available via the Internet under a Space Act Agreement. Through this project, NASA and Microsoft jointly will develop the technology and infrastructure necessary to make the most interesting NASA content -- including high-resolution scientific images and data from Mars and the moon -- explorable on the 'WorldWide Telescope', Microsoft's online virtual telescope for exploring the universe.

Under the joint agreement, NASA's Ames Research Center will process and host more than 100 terabytes of data, enough to fill 20,000 DVDs. WorldWide Telescope will incorporate the data later in 2009 and feature imagery from Mars Reconnaissance Orbiter, known as MRO. Launched in August 2005, MRO has been examining Mars with a high-resolution camera and five other instruments since 2006 and has returned more data than all other Mars missions combined.

Also available will be images from a camera aboard NASA's Lunar Reconnaissance Orbiter, or LRO, when publicly released starting this fall. Scheduled to launch this May, LRO will spend at least a year in a low, polar orbit approximately 30 miles above the lunar surface collecting detailed information about the lunar environment.

To further integrate the planetary data into WorldWide Telescope, Ames is developing a suite of planetary data processing tools. These software tools convert historic and current space imagery data into a variety of formats and images of the moon, Mars and other planetary bodies readily available for easy browsing and use by the general public, enabling the creation of enhanced educational tools for students and teachers. "*NASA has a wealth of images and data, from the Apollo and Lunar Orbiter missions to Mars Reconnaissance Orbiter and the Mercury Messenger flybys*," said Chris Kemp, chief information officer at Ames. "*This collaboration makes it possible for NASA to leverage exciting new Microsoft technologies to make NASA's data -- and America's space program -- more accessible to the public*."

"*This collaboration between Microsoft and NASA will enable people around the world to explore new images of the moon and Mars in a rich, interactive environment through the WorldWide Telescope*," said Tony Hey, vice president of Microsoft External Research. "*WorldWide Telescope serves as a powerful tool for computer science researchers, educators and students to explore space and experience the excitement of computer science*." "*Making NASA's scientific and astronomical data more accessible to the public is a high priority for NASA, especially given the new administration's recent emphasis on open government and transparency*," said Ed Weiler, associate administrator for NASA's Science Mission Directorate. "*NASA is excited to collaborate with Microsoft to share its portfolio of planetary images with students and lifelong learners*," said S. Pete Worden, director of Ames. "*This is a compelling astronomical resource and will help inspire our next generation of astronomers*."

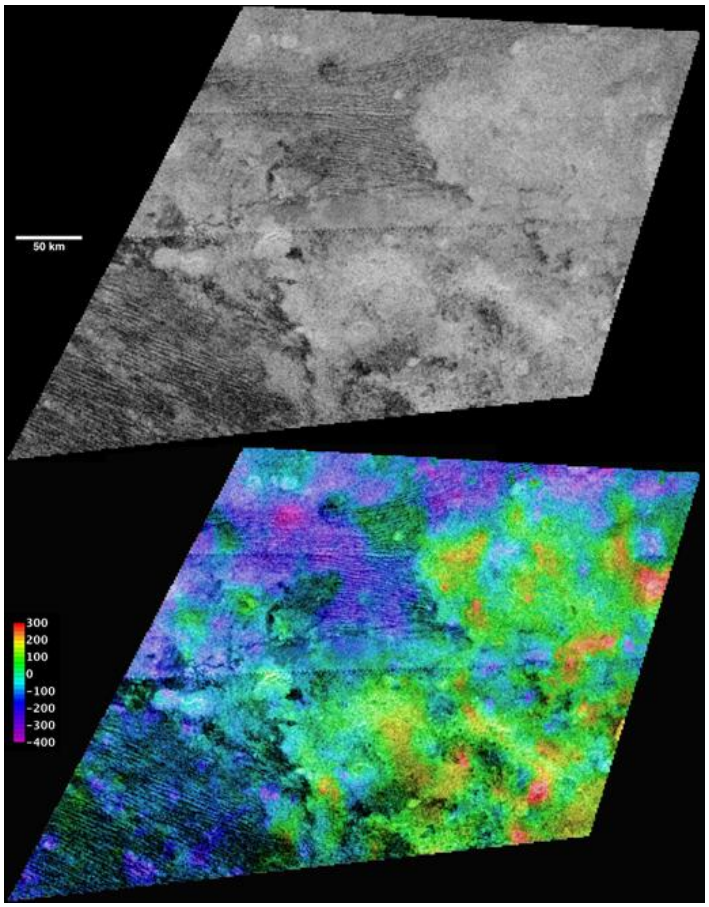
This agreement builds on a prior collaboration with Microsoft that enabled NASA to develop 3-D interactive Microsoft Photosynth collections of the space shuttle launch pad and other facilities at NASA's Kennedy Space Center in Florida. The images featured on Microsoft's WorldWide Telescope will supplement existing imagery and data available on NASA's Web site, the Planetary Data System and other sources.

The WorldWide Telescope is a Web 2.0 visualization environment that functions as a virtual telescope, bringing together imagery from ground- and space-based telescopes for a seamless, rich media guided exploration of the universe. Through WorldWide Telescope and Microsoft technology, people will be able to pan and zoom in on these images and the most interesting locations on Mars and the moon without distorted views at the poles. Attracting millions of users since its release last spring, WorldWide Telescope provides a base for teaching astronomy, scientific discovery and computational science. Tours with narration, music, text and graphics create interactive learning experiences that allow people to search, explore and discover the universe in a new and unique manner. Additional information and a free download of WorldWide Telescope can be found at: http://www.worldwidetelescope.org Microsoft Research collaborates openly with colleges and universities worldwide to enhance the teaching and learning experience, inspire technological innovation, and broadly advance the field of computer science. More information can be found at: http://research.microsoft.com

CASSINI'S VIRTUAL FLYOVER OF SATURN'S MOON TITAN

"Fly me to the moon" - to Saturn's moon Titan, that is. New Titan movies and images are providing a bird's-eye view of the moon's Earth-like landscapes. The new flyover maps show, for the first time, the 3-D topography and height of the 1,200-meter (4,000-foot) mountain tops, the north polar lake country, the vast dunes more than 100 meters (300 feet) high that crisscross the moon, and the thick flows that may have oozed from possible ice volcanoes. The topographic maps were made from stereo pairs of radar images. They are available at: http://saturn.jpl.nasa.gov and http://www.nasa.gov/cassini

Cassini radar team member Randy Kirk with the Astrogeology Science Center at the USGS in Flagstaff, created the maps. He used some of the 20 or so areas where two or more overlapping radar measurements were obtained during 19 Titan flybys. These stereo overlaps cover close to two percent of Titan's surface. The process of making topographic maps from them is just beginning, but the results already reveal some of the diversity of Titan's geologic features. "*These flyovers let you take in the bird's-eye sweeping views of Titan, the next best thing to being there*," said Kirk. "*We've mapped many kinds of features, and some of them remind me of Earth. Big seas, small lakes, rivers, dry river channels, mountains and sand dunes with hills poking out of them, lava flows*." High and low features are shown in unprecedented detail at about 2.4-kilometer (1.5-mile) resolution. The maps show some features that may be volcanic flows. These flows meander across a shallow basin in the mountains. One area suspected to be an ice volcano, Ganesa Macula, does not appear to be a volcanic dome. It may still have originated as a volcano, but it's too soon to know for sure. "*It could be a volcanic feature, a crater, or something else that has just been heavily eroded*," added Kirk.

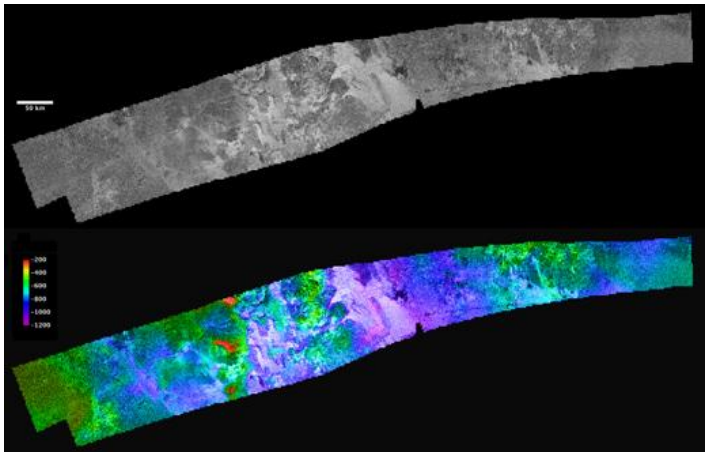


These topographic maps show the equatorial "sand sea" called Belet, and include both dark dunes and lighter, dune-free areas. Individual dunes are not resolved but the largest can be measured and have a height of 100 to 150 meters (300 to 500 feet), consistent with past estimates. The light

areas are elevated, and it appears that about 200 meters (600 feet) of relief-slightly more than the height of the dunes themselves-is sufficient to stop or divert the dunes. The region shown here is centered near 9 degrees south latitude, 290 degrees west longitude, and is about 450 kilometers (280 miles) across. The maps are in equirectangular projection with north at the top. The images used for mapping were acquired during flybys on Oct. 28, 2005, and Dec. 12, 2006 (known as T8 and T21). The T8 image is shown in black and white at the top. It has a pixel spacing of 351 meters (about 1,200 feet). Below, the same image is shown with color coding to indicate elevations, as shown by the color bar at left. The total range of relief from purple (low) to red (high) is 700 meters (about 2,300 feet). Zero elevation corresponds to a distance of 2,575 kilometers (1,600 miles) from the center of Titan, which is approximately the average radius of the satellite.

Cassini's radar mapper has obtained stereo views of close to 2 percent of Titan's surface during 19 flybys over the last five years. The process of making topographic maps from images is just getting started, but the results already reveal some of the diversity of Titan's geologic features.

The stereo coverage includes a large portion of Titan's north polar lakes of liquid ethane and methane. Based on these topographical models, scientists are better able to determine the depth of lakes. The highest areas surrounding the lakes are some 1,200 meters (about 4,000 feet) above the shoreline. By comparing terrain around Earth to the Titan lakes, scientists estimate their depth is likely about 100 meters (300 feet) or less. More 3-D mapping of these lakes will help refine these depth estimates and determine the volume of liquid hydrocarbons that exist on Titan. This information is important because these liquids evaporate and create Titan's atmosphere. Understanding this methane cycle can provide clues to Titan's weather and climate.



The prominent, roughly circular feature in the western part of this image is an area known as Ganesa Macula. This 180-kilometer-(110-mile)-wide feature crudely resembles steep-sided volcanic domes on Venus that were imaged with the Magellan spacecraft in the 1990s. It was therefore hypothesized initially to be a cryovolcanic feature. The topographic map derived from radar stereo shows that Ganesa as a whole is not elevated, as would be expected for a volcano. Instead, it is tilted (low in the west, high along the eastern margin). Other high and low areas with north-south trending margins alternate to the east of Ganesa. Low areas are consistently filled by radar-bright (rough) channels and flow deposits. The largest of these, in the center of the map with two bright channels leading to triangular fan structures on its western margin, is known as Leliah Fluctus. Although Ganesa Macula could have originated as a cryovolcanic feature (or perhaps as an impact crater, either of which would account for its distinct circular outline), it appears to have been extensively modified by both tectonic (faulting) and fluvial (erosion by fluids derived from rainfall) processes. The region shown here is centered near 50 degrees north latitude, 80 degrees west longitude, and is about 1,480 kilometers (920 miles) across. The maps are shown with north at the top. The images used for mapping were acquired during flybys on Oct. 26, 2004, and Jan. 13, 2007 (known as Ta and T23). The Ta image is shown in black and white at the top. It has a pixel spacing of 351 meters (about 1,200 feet). Below, the same image is shown with color coding to indicate elevations, as shown by the color bar at left. The total range of relief from purple (low) to red (high) is 1,000 meters (about 3,300 feet).

Launched in 1997, Cassini completed its primary four-year mission in 2008 and is now in extended mission operations, which run through September 2010. Over the course of the mission, Cassini plans to map more than three percent of Titan's surface in 3-D. About 38 percent of Titan's surface has been mapped with radar so far. On March 27, Cassini will complete its 52nd targeted flyby of Titan.

SCIENTISTS FIND ASTEROIDS ARE MISSING, & POSSIBLY WHY

Scientists have uncovered a curious case of missing asteroids. The main asteroid belt is a zone containing millions of rocky objects between the orbits of Mars and Jupiter. The scientists find that there ought to be more asteroids there than researchers observe. The missing asteroids may be evidence of an event that took place about 4 billion years ago, when the solar system's giant planets migrated to their present locations. Planetary sciences graduate student David A. Minton and planetary sciences professor Renu Malhotra say missing asteroids is an important piece of evidence to support an idea that the early solar system underwent a violent episode of giant planet migration that might possibly be responsible for a heavy asteroidal bombardment of the inner planets.

Minton and Malhotra began by looking at the distribution of asteroids in the main asteroid belt. Astronomers first discovered a series of gaps in the asteroid belt, now called the Kirkwood gaps, back in the 1860s when only a handful of asteroids were known. The gaps occur at distinct regions of the asteroid belt where Jupiter's and Saturn's gravity strongly perturbs and ejects asteroids. The present-day orbits of Jupiter and Saturn explain why these unstable regions are devoid of asteroids. "*What we wanted to know was, how much of the structure of the asteroid belt could be explained simply by the gravitational effects of the giant planets, as are the Kirkwood gaps*," Minton said. Minton and Malhotra looked at the distribution of all asteroids with diameters greater than 50 kilometers, or about 30 miles. All asteroids of this size have been found, giving the researchers an observationally complete set for their study. Also, almost all asteroids this large have remained intact since the asteroid belt formed more than 4 billion years ago, a time record spanning all but the very beginning of solar system history.

"*We ran massive sets of simulations with computer planets where we filled up the asteroid belt region with a uniform distribution of computer asteroids*," Minton said. The scientists then had the computers simulate the billions of years of solar system history. Their simulations ultimately ended with far more asteroids remaining than are actually observed in the asteroid belt. When the simulated asteroid belt was compared with the actual asteroid belt, they discovered a peculiar pattern in the differences. The simulated asteroid belt matched the real asteroid belt quite well on the sunward-facing sides of the Kirkwood gaps, but the real asteroid belt seemed to be depleted in asteroids on the Jupiter-facing sides. "*Then we simulated the migration of the giant planets*," Minton said. "*The perturbing effects of the migrating planets sculpted our simulated asteroid belt. After the migration was over, our simulated asteroid belt looked much more like the observed asteroid belt*." "*Our interpretation is that as Jupiter and Saturn migrated, their orbital resonances swept through the asteroid belt, ejecting many more asteroids than is possible with the planets in their current orbits*," Malhotra said. "*And the particular pattern of missing asteroids is characteristic of the pattern of Jupiter's and Saturn's migration*."

"*Our work explains why there are fewer asteroids on the Jupiter-facing side of the Kirkwood gaps compared to the sun-facing side*," Minton said. "*The patterns of depletion are like the footprints of wandering giant planets preserved in the asteroid belt*." Their results corroborate other lines of evidence indicating that the giant planets - Jupiter, Saturn, Uranus and Neptune - formed in a more tightly compacted configuration, and then Jupiter moved slightly closer to the sun, while the other giant planets moved farther apart from each other and farther away from the sun.

Minton and Malhotra say that their result has implications for how far and how fast the planets migrated early in solar system history, and the possibility that planet migration perturbed asteroids that may have contributed to a heavy bombardment of the inner solar system. "*Our result doesn't directly answer the question of whether the timing of this can be tied to inner solar system heavy bombardment - that's open for debate*," Minton said. "*But what it does say is that there was an event that destabilized asteroids over a relatively short period of time*. "

"*All the asteroids being kicked out of the asteroid belt had to go somewhere*," he added. "*The implication of this is that when all those asteroids were getting kicked out of the main belt, they could have become projectiles impacting the Earth and the moon, Mars, Venus and Mercury*."

CARBON- AND OXYGEN-RICH STARDUST SHEDS NEW LIGHT ON ORIGIN OF ELEMENTS OF LIFE

Using the Spitzer Telescope, an international research team has found evidence that some stars in the center of the Milky Way galaxy have both carbon and oxygen in the dust that surrounds them, a rare combination in galactic dust.

"*Scientists have long expected to find carbon-rich stars in our galaxy because we know that significant quantities of carbon must be created in many such stars, but carbon had not previously shown up in the clouds of gas around these stars*," said Matthew Bobrowsky, an astrophysicist and one of the authors of a paper about the discovery.

"*Based on our findings, this is because medium-sized stars rich in carbon sometimes keep that carbon hidden until very near the end of their stellar lives, releasing it only with their final 'exhalations'*," explained Bobrowsky, who noted that previously scientists hadn't looked for carbon around stars that were so near the end of their active lives.

As a star burns hotter and hotter, the hydrogen gas that originally made up almost all of its mass is converted, through nuclear fusion, first to helium, and then to progressively heavier elements. The hottest region in the core fuses together the heaviest elements. And these can reach the surface of the star only when its life is almost over.

"*The Big Bang produced only hydrogen and helium*," Bobrowsky said. "*Heavier elements like carbon and oxygen only come from getting 'cooked up' in stars. Nuclear reactions in stars created the heavier elements found in 'life as we know it'*."

In the last 50,000 years of their 10 billion-year lives, sun-sized stars expel carbon atoms along with hydrogen and helium to form a surrounding cloud of gas that soon disperses into space, perhaps to eventually become the stuff of new stars, solar systems, or perhaps even life on some earth-like planet. Much larger stars expel their heavier matter in massive explosions called supernovae.

"*All the heavy elements [which astronomers call 'metals,' and include all elements heavier than hydrogen and helium] on Earth were created by nuclear fusion reactions in previous generations of stars*," said Bobrowsky. "*Those earlier stars expelled those elements into space and then our solar system formed out of that gas containing all the heavy elements that we now find in Earth and in life on Earth*."

The team of scientists used the Spitzer Space Telescope to view each star and its surrounding clouds of dust and particles, called a planetary nebulae. The researchers measured the light emitted by the stars and the surrounding dust and were able to identify carbon compounds based on the wavelengths of light emitted by the stars. Looking in an area at the center of the Milky Way called the "Galactic Bulge," the team observed 26 stars and their planetary nebulae and found 21 with carbon "signatures."

But the scientists did not just find carbon around these stars; they also found oxygen in these 21 dust clouds, revealing a surprising mixture of ingredients for space dust. They report in their paper that this is likely due to a thermal pulse where a wave of high-pressure gas mixes layers of elements like carbon and oxygen and spews them out into the surrounding cloud.

The finding of carbon and oxygen in the dust clouds surrounding stars suggests a recent change of chemistry in this population of stars, according to the authors.

"*Stars in the center of the Milky Way are old and 'metal-rich' with a high abundance of heavy elements*," Bobrowsky said. They are different in chemical composition than those found in the disc, farther out from the center.

Studying the chemistry of these stars helps scientists learn how the matter that makes up our earth and other planets in our galaxy left its stellar birthplaces long ago.

"*If we want to understand how our galaxy, and the stars, planets and life in it, came to be the way they are, we need to understand the creation of the chemical elements of which they are composed*," Bobrowsky said. http://www.newsdesk.umd.edu/scitech/release.cfm?ArticleID=1843

FINDING TWIN EARTHS: HARDER THAN WE THOUGHT!

Does a twin Earth exist somewhere in our galaxy? Astronomers are getting closer and closer to finding an Earth-sized planet in an Earth-like orbit. The Kepler spacecraft just launched to find such worlds. Once the search succeeds, the next questions driving research will be: Is that planet habitable? Does it have an Earth-like atmosphere? Answering those questions will not be easy.

Due to its large mirror and location in outer space, the James Webb Space Telescope (scheduled for launch in 2013) will offer astronomers the first real possibility of finding those answers. In a new study, Lisa Kaltenegger and Wesley Traub examined the ability of JWST to characterize the atmospheres of hypothetical Earth-like planets during a transit, when part of the light of the star gets filtered through the planet's atmosphere. They found that JWST would be able to detect certain gases called biomarkers, such as ozone and methane, only for the closest Earth-size worlds.

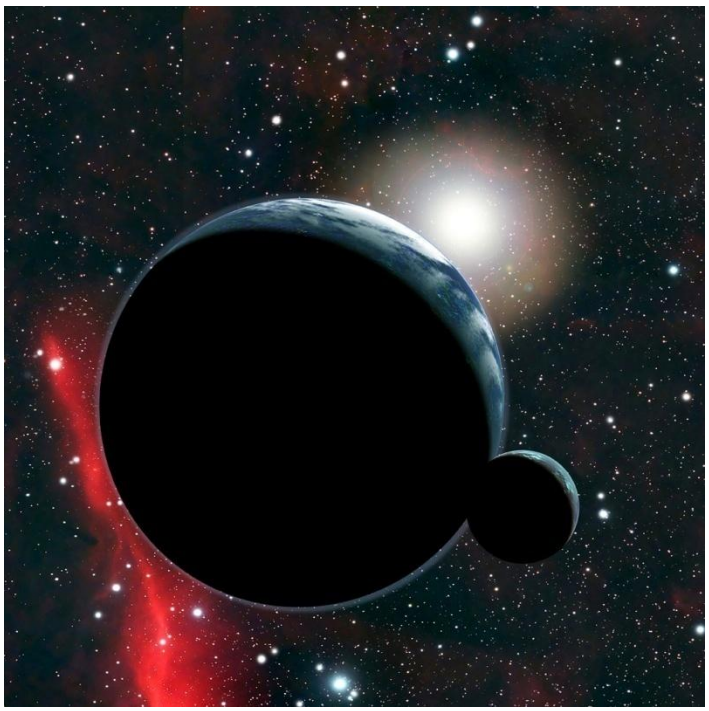
"*We'll have to be really lucky to decipher an Earth-like planet's atmosphere during a transit event so that we can tell it is Earth-like*," said Kaltenegger. "*We will need to add up many transits to do so - hundreds of them, even for stars as close as 20 light-years away*." "*Even though it's hard, it will be an incredibly exciting endeavor to characterize a distant planet's atmosphere*," she added.

In a transit event, a distant, extrasolar planet crosses in front of its star as seen from Earth. As the planet transits, gases in its atmosphere absorb a tiny fraction of the star's light, leaving fingerprints specific to each gas. By splitting the star's light into a rainbow of colors or spectrum, astronomers can look for those fingerprints. Kaltenegger and Traub studied whether those fingerprints would be detectable by JWST.

The transit technique is very challenging. If Earth were the size of a basketball, the atmosphere would be as thin as a sheet of paper, so the resulting signal is incredibly tiny. Moreover, this method only works when the planet is in front of its star, and each transit lasts for a few hours at most.

Kaltenegger and Traub first considered an Earth-like world orbiting a Sun-like star. To get a detectable signal from a single transit, the star and planet would have to be extremely close to Earth. The only Sun-like star close enough is Alpha Centauri A. No such world has been found yet, but technology is only now becoming capable of detecting Earth-sized worlds.

The study also considered planets orbiting red dwarf stars. Such stars, called type M, are the most abundant in the Milky Way - far more common than yellow, type G stars like the Sun. They are also cooler and dimmer than the Sun, as well as smaller, which makes finding an Earth-like planet transiting an M star easier.



Credit: David A. Aguilar (CfA)

An Earth-like world would have to orbit close to a red dwarf to be warm enough for liquid water. As a result, the planet would orbit more quickly and each transit would last a couple of hours to mere minutes. But it would undergo more transits in a given amount of time. Astronomers could improve their chances of detecting the atmosphere by adding the signal from several transits, making red dwarf stars appealing targets because of their more frequent transits. An Earth-like world orbiting a star like the Sun would undergo a 10- hour transit once every year. Accumulating 100 hours of transit observations would take 10 years. In contrast, an Earth orbiting a mid-sized red dwarf star would undergo a one-hour transit once every 10 days. Accumulating 100 hours of transit observations would take less than three years. "*Nearby red dwarf stars offer the best possibility of detecting biomarkers in a transiting Earth's atmosphere*," said Kaltenegger.

"*Ultimately, direct imaging - studying photons of light from the planet itself - may prove a more powerful method of characterizing the atmosphere of Earth-like worlds than the transit technique*," said Traub.

Both Spitzer and Hubble Space Telescopes have studied the atmospheric compositions of extremely hot, gas-giant extrasolar planets. The characterization of a "pale blue dot" is the next step from there, whether by adding up hundreds of transits of one planet or by blocking out the starlight and analyzing the planet's light directly.

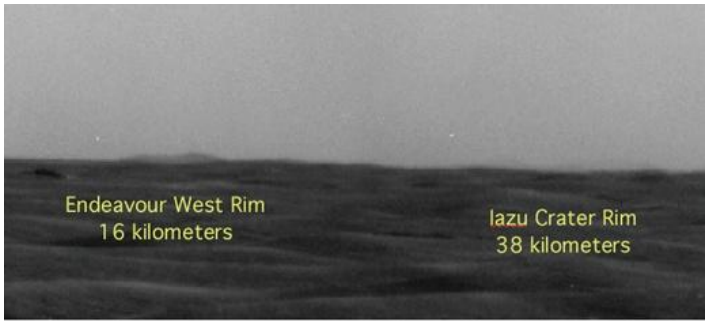
In a best-case scenario, Alpha Centauri A may turn out to have a transiting Earth-like planet that no one has spotted yet. Then, astronomers would need only a handful of transits to decipher that planet's atmosphere and possibly confirm the existence of the first twin Earth.

OPPORTUNITY MARS ROVER SEES A DISTANT GOAL; SPRIT ROVER TAKES A NEW ROUTE

On a plain that stretches for miles in every direction, the panoramic camera on Mars rover Opportunity has caught a first glimpse on the horizon of the uplifted rim of the big crater that has been Opportunity's long-term destination for six months.

Endeavour Crater, 22 kilometers (14 miles) in diameter, is still 12 kilometers (7 miles) away from Opportunity as the crow flies, and at least 30 percent farther away on routes mapped for evading hazards on the plain. Opportunity has already driven about 3.2 kilometers (2 miles) since it climbed out of Victoria Crater last August after two years of studying Victoria, which is less than one-twentieth the size of Endeavour.

"*It's exciting to see our destination, even if we can't be certain whether we'll ever get all the way there*," said John Callas, project manager for the twin Mars rovers, Opportunity and Spirit. "*At the pace we've made since leaving Victoria, the rest of the trek will take more than a Martian year*." A Martian year lasts about 23 months.



The image with portions of Endeavour's rim faintly visible can be seen at http://www.nasa.gov/mission_pages/mer/images/mer20090318.html

Steve Squyres, principal investigator for the rovers' science instruments, said, "*We can now see our landfall on the horizon. It's far away, but we can anticipate seeing it gradually look larger and larger as we get closer to Endeavour. We had a similar experience during the early months of the mission watching the Columbia Hills get bigger in the images from Spirit as Spirit drove toward them*."

Both rovers landed on Mars in January 2004 to begin missions designed to last for three months. Both are still active after more than five years.

For the next several days, the rover team plans to have Opportunity use the tools on its robotic arm to examine soil and rock at an outcrop along the route the rover is taking toward Endeavour. "*We're stopping to taste the terrain at intervals along our route so that we can watch for trends in the composition of the soil and bedrock*," Squyres said. "*It's part of systematic exploration*."

The pause for using the tools on the arm also provides two other benefits. Opportunity's right-front wheel has been drawing more electric current than usual, an indication of friction within the wheel. Resting the wheel for a few days is one strategy that has in the past helped reduce the amount of current drawn by the motor. Also, on March 7, the rover did not complete the backwards-driving portion of its commanded drive due to unanticipated interaction between the day's driving commands and onboard testing of capabilities for a future drive. The team is analyzing that interaction before it will resume use of Opportunity's autonomous-driving capabilities.

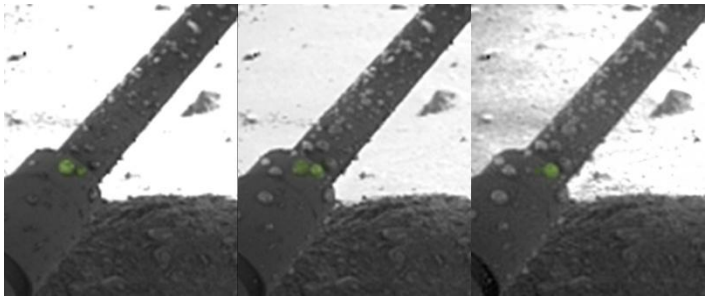
Meanwhile, on March 10, the rover team decided to end efforts to drive Spirit around the northeastern corner of a low plateau called "Home Plate" in the inner basin of the Columbia Hills, on the other side of Mars from Opportunity.

Opportunity's twin, Spirit, also has a challenging destination, and last week switched to a different route for making progress.

Spirit has had the use of only five wheels since its right-front wheel stopped working in 2006. Consequently, it usually drives backwards, dragging that wheel, so it can no longer climb steep slopes. Callas said, "*After several attempts to drive up-slope in loose material to get around the northeast corner of Home Plate, the team judged that route to be impassable*." The new route to get toward science targets south of Home Plate is to go around the west side of the plateau. Squyres said, "*The western route is by no means a slam dunk. It is unexplored territory. There are no rover tracks on that side of Home Plate like there are on the eastern side. But that also makes it an appealing place to explore. Every time we've gone someplace new with Spirit since we got into the hills, we've found surprises*."

LIQUID SALTWATER IS LIKELY PRESENT ON MARS

Salty, liquid water has been detected on a leg of the Mars Phoenix Lander and therefore could be present at other locations on the planet, according to analysis by a group of mission scientists led by a University of Michigan professor. This is the first time liquid water has been detected and photographed outside the Earth.



http://umich.edu/news/Releases/2009/Mar09/mars/MarsWater.jpg
Droplets on a leg of the Mars Phoenix lander are seen to darken and coalesce. Nilton Renno says this is evidence that they are made of liquid water. Credit: NASA/JPL-Caltech/University of Arizona/Max Planck Institute

"*A large number of independent physical and thermodynamical evidence shows that saline water may actually be common on Mars*," said Nilton Renno, a co-investigator on the Phoenix mission. "*Liquid water is an essential ingredient for life. This discovery has important implications to many areas of planetary exploration, including the habitability of Mars*." Previously, scientists believed that water existed on Mars only as ice or water vapor because of the planet's low temperature and atmospheric pressure. They thought that ice in the Red Planet's current climate could sublimate, or vaporize, but they didn't think it could melt.

This analysis shows how that assumption may be incorrect. Temperature fluctuation in the arctic region of Mars where Phoenix landed and salts in the soil could create pockets of water too salty to freeze in the climate of the landing site, Renno says. Photos of one of the lander's legs show droplets that grew during the polar summer. Based on the temperature of the leg and the presence of large amounts of "perchlorate" salts detected in the soil, scientists believe the droplets were most likely salty liquid water and mud that splashed on the spacecraft when it touched down. The lander was guided down by rockets whose exhaust melted the top layer of ice below a thin sheet of soil. Some of the mud droplets that splashed on the lander's leg appear to have grown by absorbing water from the atmosphere, Renno says. Images suggest that some of the droplets darkened, then moved and merged - physical evidence that they were liquid.

The wet chemistry lab on Phoenix found evidence of perchlorate salts, which likely include magnesium and calcium perchlorate hydrates. These compounds have freezing temperatures of about -90 and -105 Fahrenheit respectively. The temperature at the landing site ranged from approximately -5 to -140 Fahrenheit, with a median temperature around -75 Fahrenheit. Temperatures at the landing site were mostly warmer than this during the first months of the mission. Thermodynamic calculations offer additional evidence that salty liquid water can exist where Phoenix landed and elsewhere on Mars. The calculations also predicts a droplet growth rate that is consistent with what was observed. And they show that it is impossible for ice to sublimate from the cold ground just under the strut of the lander's leg and be deposited on a warmer strut, a hypothesis that has been suggested. Certain bacteria on Earth can exist in extremely salty and cold conditions.

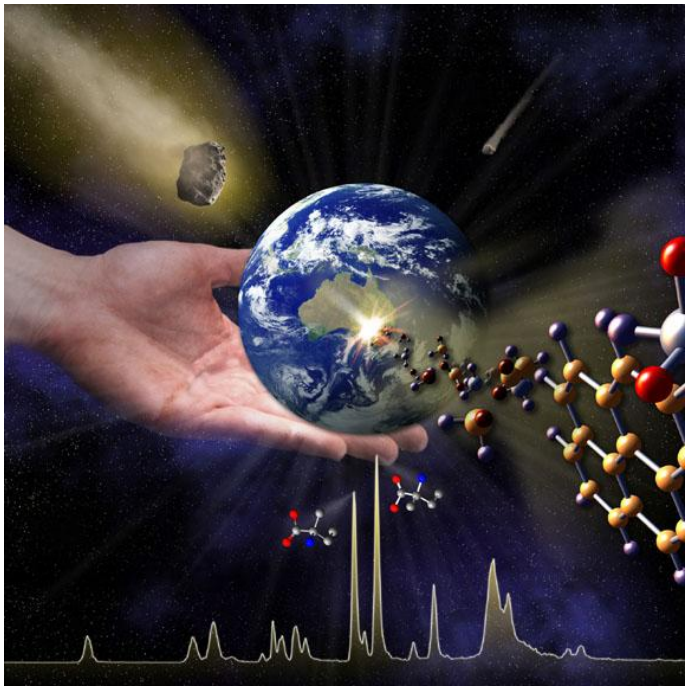
"*This discovery is the result of the talent and dedication of the entire Phoenix team, and NASA, whose strategy for Mars exploration and the Phoenix mission is "follow the water*," Renno said.

Phoenix landed on Mars on May 25, 2008 and transmitted data back to Earth until Nov. 10. Scientists are still analyzing the information Phoenix gathered. Among its preliminary findings, Phoenix verified that water ice exists in the just beneath the surface of Mars. It sent back more than 25,000 photos and deployed the first atomic force microscope ever used outside Earth. The lander was the first Martian spacecraft to document a mildly alkaline soil and perchlorate salts. It also observed snow falling from clouds on the Red Planet.

SCIENTISTS FIND CLUES TO A SECRET OF LIFE

Scientists analyzing the dust of meteorites have discovered new clues to a long-standing mystery about how life works on its most basic, molecular level. "*We found more support for the idea that biological molecules, like amino acids, created in space and brought to Earth by meteorite impacts help explain why life is left-handed*," said Dr. Daniel Glavin. "*By that I mean why all known life uses only left-handed versions of amino acids to build proteins*." Glavin is lead author of a paper on this research.

Proteins are the workhorse molecules of life, used in everything from structures like hair to enzymes, the catalysts that speed up or regulate chemical reactions. Just as the 26 letters of the alphabet are arranged in limitless combinations to make words, life uses 20 different amino acids in a huge variety of arrangements to build millions of different proteins. Amino acid molecules can be built in two ways that are mirror images of each other, like your hands. Although life based on right-handed amino acids would presumably work fine, "*you can't mix them*," says Dr. Jason Dworkin, co-author of the study. "*If you do, life turns to something resembling scrambled eggs -- it's a mess. Since life doesn't work with a mixture of left-handed and right-handed amino acids, the mystery is: how did life decide -- what made life choose left-handed amino acids over right-handed ones?"*



This is an artist's concept of asteroids delivering amino acids to Earth. The jagged white line at the bottom of the image is the actual data from the analysis of the Murchison meteorite. The two largest peaks are the amounts of right-handed and left-handed versions of the amino acid isovaline. Note that the highest of these two peaks is the amount of left-handed isovaline, revealing an excess of the left-handed variety in the meteorite. Credit: NASA/Mary Pat Hrybyk-Keith

Over the last four years, the team carefully analyzed samples of meteorites with an abundance of carbon, called carbonaceous chondrites. The researchers looked for the amino acid isovaline and discovered that three types of carbonaceous meteorites had more of the left-handed version than the right-handed variety â as much as a record 18 percent more in the often-studied Murchison meteorite. "*Finding more left- handed isovaline in a variety of meteorites supports the theory that amino acids brought to the early Earth by asteroids and comets contributed to the origin of only left-handed based protein life on Earth*," said Glavin. All amino acids can switch from left-handed to right, or the reverse, by chemical reactions energized with radiation or temperature, according to the team. The scientists looked for isovaline because it has the ability to preserve its handedness for billions of years, and it is extremely rarely used by life, so its presence in meteorites is unlikely to be from contamination by terrestrial life. "*The meteorites we studied are from before Earth formed, over 4.5 billion years ago*," said Glavin. "*We believe the same process that created extra left-handed isovaline would have created more left-handed versions of the other amino acids found in these meteorites, but the bias toward left-handed versions has been mostly erased after all this time*."

The team's discovery validates and extends the research first reported a decade ago by Drs. John Cronin and Sandra Pizzarello, who were first to discover excess isovaline in the Murchison meteorite, believed to be a piece of an asteroid. "*We used a different technique to find the excess, and discovered it for the first time in the Orgueil meteorite, which belongs to another meteorite group believed to be from an extinct comet*," said Glavin.

This artist's concept uses hands to illustrate the left and right-handed versions of the amino acid isovaline. Credit: NASA/Mary Pat Hrybyk-Keith

The team also found a pattern to the excess. Different types of meteorites had different amounts of water, as determined by the clays and water-bearing minerals found in the meteorites. The team discovered meteorites with more water also had greater amounts of left-handed isovaline. "*This gives us a hint that the creation of extra left- handed amino acids had something to do with alteration by water*," said Dworkin. "*Since there are many ways to make extra left-handed amino acids, this discovery considerably narrows down the search*."

If the bias toward left-handedness originated in space, it makes the search for extraterrestrial life in our solar system more difficult, while also making its origin a bit more likely, according to the team. "*If we find life anywhere else in our solar system, it will probably be microscopic, since microbes can survive in extreme environments*," said Dworkin. "*One of the biggest problems in determining if microscopic life is truly extra-terrestrial is making sure the sample wasn't contaminated by microbes brought from Earth. If we find the life is based on right-handed amino acids, then we know for sure it isn't from Earth. However, if the bias toward left-handed amino acids began in space, it likely extends across the solar system, so any life we may find on Mars, for example, will also be left-handed. On the other hand, if there is a mechanism to choose handedness before life emerges, it is one less problem prebiotic chemistry has to solve before making life. If it was solved for Earth, it probably has been solved for the other places in our solar system where the recipe for life might exist,*

such as beneath the surface of Mars, or in potential oceans under the icy crust of Europa and Enceladus, or on Titan."

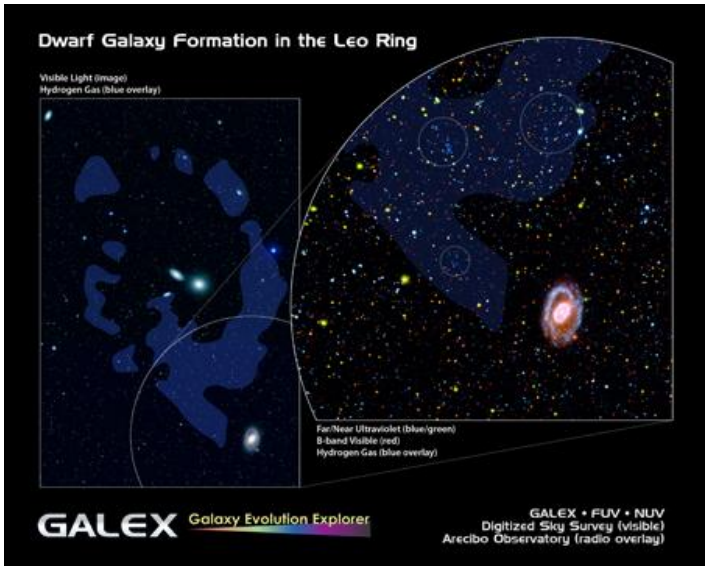
NEW RECIPE FOR DWARF GALAXIES: START WITH LEFTOVER GAS

There is more than one way to make a dwarf galaxy, and the Galaxy Evolution Explorer has found a new recipe. It has, for the first time, identified dwarf galaxies forming out of nothing more than pristine gas likely leftover from the early universe. Dwarf galaxies are relatively small collections of stars that often orbit around larger galaxies like our Milky Way.

The findings surprised astronomers because most galaxies form in association with a mysterious substance called dark matter or out of gas containing metals. The infant galaxies spotted by the Galaxy Evolution Explorer are springing up out of gas that lacks both dark matter and metals. Though never seen before, this new type of dwarf galaxy may be common throughout the more distant and early universe, when pristine gas was more pervasive.

Led by David Thilker, a team of astronomers spotted the unexpected new galaxies forming inside the Leo Ring, a huge cloud of hydrogen and helium that traces a ragged path around two massive galaxies in the constellation Leo. The cloud is thought likely to be a primordial object, an ancient remnant of material that has remained relatively unchanged since the very earliest days of the universe. Identified about 25 years ago by radio waves, the ring cannot be seen in visible light.

"*This intriguing object has been studied for decades with world-class telescopes operating at radio and optical wavelengths*," said Thilker, a research scientist. "*Despite such effort, nothing except the gas was detected. No stars at all, young or old, were found. But when we looked at the ring with the Galaxy Evolution Explorer, which is remarkably sensitive to ultraviolet light, we saw telltale evidence of recent massive star formation. It was really unexpected. We are witnessing galaxies forming out of a cloud of primordial gas*."



In a recent study, Thilker and his team found the ultraviolet signature of young stars emanating from several clumps of gas within the Leo Ring. "*We speculate that these young stellar complexes are dwarf galaxies, although, as previously shown by radio astronomers, the gaseous clumps forming these galaxies lack dark matter*," he said. "*Almost all other galaxies we know are dominated by dark matter, which acted as a seed for the collection of their luminous components -- stars, gas, and dust. What we see occurring in the Leo Ring is a new mode for the formation of dwarf galaxies in material remaining from the much earlier assembly of this galaxy group*."

Our local universe contains two large galaxies, the Milky Way and the Andromeda galaxy, each with hundreds of billions of stars, and the Triangulum galaxy, with several tens of billions of stars. It also holds more than 40 much smaller dwarf galaxies, which have only a few billion stars. Invisible dark matter, detected by its gravitational influence, is a major component of both giant and dwarf galaxies with one exception -- tidal dwarf galaxies. Tidal dwarf galaxies condense out of gas recycled from other galaxies and have been separated from most of the dark matter with which they were originally associated. They are produced when galaxies collide and their gravitational masses interact. In the violence of the encounter, streamers of galactic material are pulled out away from the parent galaxies and the halos of dark matter that surround them.

Because they lack dark matter, the new galaxies observed in the Leo Ring resemble tidal dwarf galaxies, but they differ in a fundamental way. The gaseous material making up tidal dwarfs has already been cycled through a galaxy. It has been enriched with metals--elements heavier than helium--produced as stars evolve. "*Leo Ring dwarfs are made of much more pristine material without metals*," said Thilker. "*This discovery allows us to study the star formation process in gas that has not yet been enriched.*" Large, pristine clouds similar to the Leo Ring may have been more common throughout the early universe, Thilker said, and consequently may have produced many dark-matter-lacking, dwarf galaxies yet to be discovered. http://www.nasa.gov/centers/jpl/missions/galex.html

FERMI SEES MOST EXTREME GAMMA-RAY BLAST YET

The first gamma-ray burst to be seen in high-resolution from Fermi Gamma-ray Space Telescope is one for the record books. The blast had the greatest total energy, the fastest motions and the highest-energy initial emissions ever seen. "*We were waiting for this one*," said Peter Michelson, the principal investigator on Fermi's Large Area Telescope. "*Burst emissions at these energies are still poorly understood, and Fermi is giving us the tools to understand them*."

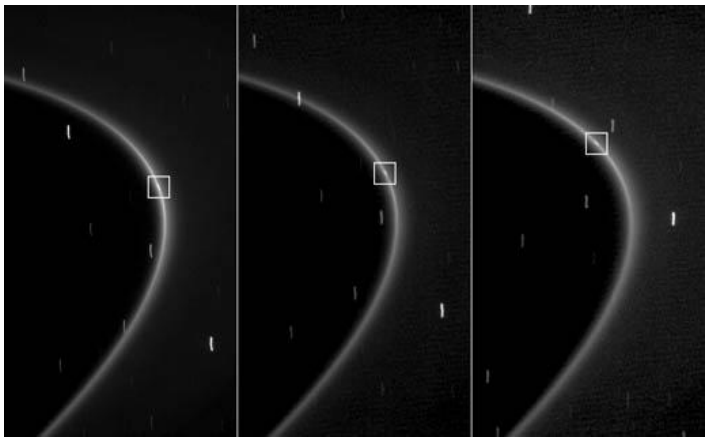
Gamma-ray bursts are the universe's most luminous explosions. Astronomers believe most occur when exotic massive stars run out of nuclear fuel. As a star's core collapses into a black hole, jets of material -- powered by processes not yet fully understood -- blast outward at nearly the speed of light. The jets bore all the way through the collapsing star and continue into space, where they interact with gas previously shed by the star and generate bright afterglows that fade with time. This explosion, designated GRB 080916C, occurred at 7:13 p.m. EDT on Sept. 15, in the constellation Carina. Fermi's other instrument, the Gamma-ray Burst Monitor, simultaneously recorded the event. Together, the two instruments provide a view of the blast's initial, or prompt, gamma-ray emission from energies between 3,000 to more than 5 billion times that of visible light. Nearly 32 hours after the blast, Jochen Greiner, led a group that searched for the explosion's fading afterglow. The team simultaneously captured the field in seven wavelengths using the Gamma-Ray Burst Optical/Near-Infrared Detector, or GROND, on the 2.2-meter telescope at the European Southern Observatory in La Silla, Chile. In certain colors, the brightness of a distant object shows a characteristic drop-off caused by intervening gas clouds. The farther away the object is, the redder the wavelength where this fade-out occurs. This gives astronomers a quick estimate of the object's distance. The team's follow-up observations established that the explosion

took place 12.2 billion light-years away. "*Already, this was an exciting burst*," said Julie McEnery, a Fermi deputy project scientist. "*But with the GROND team's distance, it went from exciting to extraordinary*." With the distance in hand, Fermi team members showed that the blast exceeded the power of approximately 9,000 ordinary supernovae, if the energy was emitted equally in all directions. This is a standard way for astronomers to compare events even though gamma-ray bursts emit most of their energy in tight jets.

Coupled with the Fermi measurements, the distance also helps astronomers determine the slowest speeds possible for material emitting the prompt gamma rays. Within the jet of this burst, gas bullets must have moved at 99.9999 percent the speed of light. This burst's tremendous power and speed make it the most extreme recorded to date. One curious aspect of the burst is a five-second delay separating the highest-energy emissions from the lowest. Such a time lag has been seen clearly in only one earlier burst. "*It may mean that the highest-energy emissions are coming from different parts of the jet or created through a different mechanism*," Michelson said.

NEWFOUND MOON MAY BE SOURCE OF OUTER SATURN RING

Cassini spacecraft has found within Saturn's G ring an embedded moonlet that appears as a faint, moving pinprick of light. Scientists believe it is a main source of the G ring and its single ring arc. Cassini imaging scientists analyzing images acquired over the course of about 600 days found the tiny moonlet, half a kilometer (about a third of a mile) across, embedded within a partial ring, or ring arc, previously found by Cassini in Saturn's tenuous G ring.



This sequence of three images, obtained by Cassini spacecraft over the course of about 10 minutes, shows the path of a newly found moonlet in a bright arc of Saturn's faint G ring.

In each image, a small streak of light within the ring is visible. Unlike the streaks in the background, which are distant stars smeared by the camera's long exposure time of 46 seconds, this streak is aligned with the G ring and moves along the ring as expected for an object embedded in the ring. Cassini scientists interpret the moving streak to be reflected light from a tiny moon half a kilometer (a third of mile) wide that is likely a major source of material in the arc and the rest of the G ring. Debris knocked off this moon forms a relatively bright arc of material near the inner edge of the G ring, the most visible part of the ring in these images. That arc, in turn, leaks material to form the entire ring. These images were captured by Cassini's narrow-angle camera on Oct. 27, 2008. The first image (left) was taken in visible light, the second image (middle) was taken in red light, and the third image (right) in near-infrared light centered at a wavelength of 750 nanometers. Image scale for the first image is 7 kilometers (4 miles) per pixel. The second and third images were taken at reduced resolution. These spatially compressed images were captured at 14 kilometers (9 miles) per pixel and then displayed at a size equal to the first image. This view looks toward the un-illuminated side of the rings from about 5 degrees above the ringplane. The view was acquired at a distance of approximately 1.2 million kilometers (751,000 miles) from Saturn and at a sun-Saturn-spacecraft, or phase, angle of 23 degrees.

"*Before Cassini, the G ring was the only dusty ring that was not clearly associated with a known moon, which made it odd*," said Matthew Hedman, a Cassini imaging team associate. "*The discovery of this moonlet, together with other Cassini data, should help us make sense of this previously mysterious ring*." Saturn's rings were named in the order they were discovered. Working outward they are: D, C, B, A, F, G and E. The G ring is one of the outer diffuse rings. Within the faint G ring there is a relatively bright and narrow, 250-kilometer-wide (150-miles) arc of ring material, which extends 150,000 kilometers (90,000 miles), or one-sixth of the way around the ring's circumference. The moonlet moves within this ring arc. Previous Cassini plasma and dust measurements indicated that this partial ring may be produced from relatively large, icy particles embedded within the arc, such as this moonlet.

Scientists imaged the moonlet on Aug. 15, 2008, and then they confirmed its presence by finding it in two earlier images. They have since seen the moonlet on multiple occasions, most recently on Feb. 20, 2009. The moonlet is too small to be resolved by Cassini's cameras, so its size cannot be measured directly. However, Cassini scientists estimated the moonlet's size by comparing its brightness to another small Saturnian moon, Pallene. Hedman and his collaborators also have found that the moonlet's orbit is being disturbed by the larger, nearby moon Mimas, which is responsible for keeping the ring arc together.

This brings the number of Saturnian ring arcs with embedded moonlets found by Cassini to three. The new moonlet may not be alone in the G ring arc. Previous measurements with other Cassini instruments implied the existence of a population of particles, possibly ranging in size from 1 to 100 meters (about three to several hundred feet) across. "*Meteoroid impacts into, and collisions among, these bodies and the moonlet could liberate dust to form the arc*," said Hedman.

Carl Murray, a Cassini imaging team member said, "*The moon's discovery and the disturbance of its trajectory by the neighboring moon Mimas highlight the close association between moons and rings that we see throughout the Saturn system. Hopefully, we will learn in the future more about how such arcs form and interact with their parent bodies*." Early next year, Cassini's camera will take a closer look at the arc and the moonlet. The Cassini Equinox mission, an extension of the original four-year mission, is expected to continue until fall of 2010.

FROM THE EDITOR'S TERMINAL

The Stargazer is <u>your</u> newsletter and therefore it should be a cooperative project. Ads, announcements, suggestions, and literary works should be received by the editor at least two weeks prior to the next upcoming scheduled EAS meeting.

If you wish to contribute an article or suggestions to ***The Stargazer*** please contact Mark Folkerts by email or by telephone (425) 486-9733 or co-editor Bill O'Neil, at (774) 253-0747.

The Star Gazer
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Everett, WA 98206

In March's StarGazer:

The next EAS Meeting is 7:00 P.M. Saturday March 28th at the 'Aurora Astro Products' store location at Silver Lake.