

The Stargazer

April 2008

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		(change 'at' to @ to send email)	http://members.tripod.com/everett_astronomy

EAS BUSINESS...

NEXT EAS MEETING – SATURDAY APRIL 12TH AT 7:00 PM AT AURORA ASTRO PRODUCTS STORE AT SILVER LAKE.

★★ Saturday April 12th 7:00 pm MEETING ★★
 The presentation will be by Paul Rodman, from the Seattle Astronomical Society, and author of AstroPlanner observing session planning and logging software, designed for use by amateur astronomers. Paul will talk about the software and demo the ways planning what to view can enhance your observing sessions. The meeting will be the Aurora Astro Products store in Silver Lake. There will be some refreshments. (It may be helpful for some folks to bring a folding chair to the meeting.) We have the layout a bit, to improve seating, based on the larger crowds we have had at the last few meetings.

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

★ STAR PARTY INFO ★

Next EAS Star Party: Saturday April 12th (after EAS mtg.) at Ron Tam's home.

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.

Upcoming tentative EAS star party schedule: (also see the regional star parties listed in the 'Astro Calendar for 2008') May 3, Jun 7, Jul 5, Aug 23, Sep 20, Oct 4, Nov 1.

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.

DARK MOON PERIODS THIS YEAR

New Moon	1 st Qtr	3 rd Qtr	EAS Star Party at Ron's
Jan 8 th	Jan 15 th	Jan 29 th	--
Feb 6 th	Feb 13 th	Feb 28 th	--
Mar 7 th	Mar 14 th	Mar 29 th	Sat Mar 08, Sat Mar 29
Apr 5 th	Apr 12 th	Apr 28 th	Saturday April 05
May 5 th	May 11 th	May 27 th	Saturday May 03
Jun 3 rd	Jun 10 th	Jun 26 th	Saturday Jun 07
Jul 2 nd	Jul 9 th	Jul 25 th	Saturday Jul 05
Aug 1 st , 30 th	Aug 8 th	Aug 23 rd	Saturday Aug 23
Sep 29 th	Sep 7 th	Sep 21 st	Saturday Sep 20
Oct 28 th	Oct 7 th	Oct 21 st	Saturday Oct 04
Nov 27 th	Nov 5 th	Nov 19 th	Saturday Nov 01
Dec 27 th	Dec 5 th	Dec 19 th	--

Other Western US Star Parties This Season...

Rooster Rock OR State Park 2008 RCA Star parties - 22 miles east of Portland on I-84 (east of Sandy River) at exit 25.

Apr 12 - Planet Parade at Rooster Rock

May 10 - Astronomy Day at Rooster Rock

Jun 14 - Summer Solstice Celebration at Rooster Rock

Jul 12 - Luna Viewing at Rooster Rock

Aug 11 - Perseid Meteor Shower Watch at Rooster Rock

Sep 06 - Autumnal Equinox Celebration at Rooster Rock

(503) 797-4610. <http://www.oms.edu/visit/planetarium/starparties.cfm>

May 02-05 - OAS Camp Delany Star Party - Sun Lakes SP

http://www.olympicastronomicalsociety.com/Documents/SPRING_CAMPDELANY_Sign-UpForm.pdf

May 09/10 – EAS Astronomy Day Star Party - Harborview Park - Everett

http://members.tripod.com/everett_astronomy/astronomy_day.htm

May 23-26 - 40th annual RTMC Astronomy Expo 2008, Riverside, CA -

<http://www.rtmcastronomyexpo.org/>

May 24-26 - Fire in the Sky – Rocket launch and Star party –

Mansfield, WA - <http://www.fireinthesky.org/FITS2008.htm> Tacoma Astronomical Society <http://www.tas-online.org/calendar.php>

Jun 01-08 - Texas Star Party (TSP) 2008- Prude Ranch, Fort Davis, TX -

<http://www.texasstarparty.org/>

Jun 05-07 – Goldendale 2008 NWRAL "First Light" - Skyview Acres -

Goldendale WA <http://klickitatstarparty.net/>

(tbd) - **Mt. St. Helens Star Party** - near Mt. St. Helens Visitors Center

Jun 6-7, Jul 4-5, and Aug 1-2 - Stars Over Yellowstone star parties -

Madison Campground Amphitheater, <http://smasweb.org/>

Jun 21-28 - 2008 Grand Canyon Star Party (GCSP) - On the South Rim -

<http://www.tucsonastronomy.org/gcsp.html>

Jun 30-Jul 07 - Shingletown Star Party 2008 - Shingletown, Mt. Shasta, CA

<http://www.shingletownstarparty.org/>

Jul 02-06 - Golden State Star Party - Frosty Acres Ranch, Adin,

(northern, near Mt. Shasta) CA <http://goldenstatestarparty.blogspot.com/>

Jul 02-06 - The Rocky Mountain Star Stare (RMSS) 2008 - Pike Nat

Forest, Colorado Springs, CO <http://www.rmss.org/>

Jul 31- Aug 02 – Table Mt. Star Party (TMSP) 2008 - Ellensburg WA

<http://www.tmspa.com/>

Jul 31-Aug 02 2008 - 18th Annual Weekend Under the Stars - Foxpark

WY - <http://home.bresnan.net/~curranm/wuts.html>

Aug 01-03 – RCA Trout Lake Star Party 2008 – Trout Lake WA

<http://www.rca-oms.edu/TroutLake2008.pdf>

Aug 01-02 - Lava Hot Springs Star Party, Lava Hot Springs ID

<http://ifaastro.org/web/index.php>

Aug 02-10 - Mt. Kobau Star Party 2008 - Mt. Kobau, near Osoyoos BC

<http://www.mksp.ca/>

Aug 06-10 - Mt Bachelor Star Party (MBSP) 2008 - Mt. Bachelor (Bend)

OR <http://www.mbbsp.org/>

Aug 29-31 - RASCals Star Party 2008 - Victoria Fish & Game Assoc -

Holker Place, Malahat, (Near Victoria) BC, CA

<http://victoria.rasc.ca/events/StarParty/>

Aug 25-31 – Oregon Star Party 2008 (OSP) - Ochocco NF

<http://www.oregonstarparty.org/>

Aug 25-31 (Labor Day)– SAS Brooks Memorial Park Star Party 2008 –

SR 97 near Goldendale <http://www.seattleastro.org/events.shtml>

Aug 30- Sep 07 Merritt Star Quest 2008, Loon Lake Site, near Kelowna

BC <http://www.merrittastronomical.com/index.html>

(tbd) - **Deception Pass Star Party 2008** - Bowman Bay, Deception Pass, WA - <http://www.eastsideastro.org/index.htm>

Sep 05-07 - Idaho Star Party 2008 - Bruneau Dunes State Park

<http://www.boiseastro.org/>

Sep 24-27 - The Enchanted Skies Star Party 2008 - Socorro NM -

<http://www.socorro-nm.com/starparty/>

Sep 25-28 - OAS Camp Delany Star Party - Sun Lakes SP -

<http://www.olympicastronomicalsociety.com/Documents/FALLCAMPDELANYSign-UpForm.pdf>

Sep 25-28 - Alberta Star Party 2008 – Eccles Ranch Obs., Caroline,

Alberta, CA http://calgary.rasc.ca/RASCcalendar.htm#_September

Sep 25-27 - CalStar08 - Lake San Antonio Park CA

<http://www.sjaa.net/calstar/> - <http://www.sjaa.net/>

Sep 26-27 - Orion Nebula 2008 Star Party – Table Mt. (Ellensburg) WA

<http://www.seattleastro.org/orionnebsp.shtml>

Oct 30-Nov 02 - Nightfall 2008 - Palm Canyon Resort, Borrego Springs,

CA <http://www.rtmcastronomyexpo.org/nightfall.htm>

(tbd) - **White Sands Star Party** - Alamogordo/White Sands, NM

<http://www.zianet.com/wssp/>

(tbd) - **Blue Mountain Star Party**, Ukiah, OR

http://www.tri-cityastronomyclub.org/bluemtn_starparty.htm

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

(tbd) **Craters Star Party** - Craters of the Moon National Monument, ID -

<http://www.boiseastro.org/>

EAS MEMBER NEWS

Everett Astronomical Society (EAS) activities for International Astronomy Day 2008 - Friday May 9th, and Saturday May 10th 2008 - International Astronomy Day - Everett area activities

Saturday, May 10th 2008 at Everett Main Library; and Friday and Saturday evenings May 9th and 10th at Harborview Park at dusk, around 8:00 pm (weather permitting). Come see the ringed planet Saturn; detailed views of lunar craters and mountains; sunspots, solar prominences, and star clusters, galaxies, and nebulae with local amateur astronomers! Learn about factors to consider if you are thinking about purchasing a telescope, or how to find objects in the night sky. Watch a NASA video presentation, or look at a meteorite under the microscope. Find out about summer regional 'star party' observing sessions far from city lights. Bring the kids for a chance to look through some seriously powerful telescopes - you will be amazed at how much you can see. Sponsored by: The Everett Astronomical Society, Everett Parks & Recreation, and the Everett Public Library. Contacts: EAS president: Mark Folkerts, phone (425) 486-9733, folkerts@seanet.com - or contact Everett Public Library <http://www.epls.org/> at (425) 257-8010

The Everett Astronomical Society (EAS) will have Astronomy Day presentations and activities at the Everett Public Library on Saturday May 10th, from 10:00 AM until 5:30 PM. All activities are free and open to the public at no charge. These free presentations will include solar viewing, slide shows, telescope displays, computer astronomy, books, photographs, posters, activities, and having amateur astronomers on hand to answer questions. These will be on display in throughout the library and in the library auditorium on Saturday. If sky is clear, we will have solar telescopes to view sun spots and solar prominences from the library steps. Attendees can pick up free copies of detailed sky maps showing the night sky objects for May 2008, and handouts about getting started in astronomy. They can learn

about further sky-gazing and other activities conducted by the Everett Astronomical Society and other astronomy organizations in the northwest throughout the coming year.

On Friday and Saturday evenings, May 9th and May 10th from dusk (about 8:00 PM) until around 11:30 pm, the Everett Astronomical Society will hold free public observing sessions at Harborview Park, in Everett, (weather permitting) and will have many telescopes of various types set up so that the public can come and explore what can be seen in the sky through a telescope. There will be telescopes ranging in size from 3 inches to 16 inches in diameter, including refractors, Dobsonian reflectors, and Schmidt-Casegrain style telescopes. You can also bring your own binoculars, star chart, or telescope if you like.

Featured will be close up detail views of the crescent moon, and the planet Saturn. Also featured will be selected star clusters, galaxies, and nebulae that are bright enough to be seen from within Everett. This event allows people to learn and get their questions answered about the range of telescopes that are available, how different telescopes compare, and talk with local expert amateur astronomers. The Everett Parks and Recreation class/events listing for this event is '61136 - Night Sky Viewing' <http://signmeup.everettwa.org/Activities/ActivitiesDetails.asp?ProcessWait=N&aid=13865>
<http://signmeup.everettwa.org/Activities/ActivitiesDetails.asp?aid=13865>

Directions to Harborview Park - http://members.tripod.com/everett_astronomy/directions_to_harboview_park.htm

'International Astronomy Day' is an annual free public event held at thousands of locations worldwide, where astronomers, sky lovers, amateur astronomers, and educators conduct activities to contact the public and share information about astronomy and astronomy activities. It is a chance for anyone of any age curious about astronomy to find out what is going on in the community, learn about astronomy, and get involved with this natural outdoor activity. Astronomical League Astronomy Day page - <http://www.astroleague.org/al/astroday/astroday.html>

Astronomy Day 2008 Is Coming Up in just a few weeks - volunteers are needed – May 9/10

We need EAS volunteers for Astronomy Day activities, to assist with open house at library to talk to people and tell them about the EAS and amateur astronomy, and/or to help with star party at Harborview Park on Friday May 9th and Saturday May 10th. This could be bringing a scope, a self-running PowerPoint show, some posters, books, software, or photos, or just talking with visitors. You do not need to be an astronomy expert to be a big help – just someone who is willing to share their interest in astronomy. Please contact Mark if you can help out with this.

Astronomy Monopoly, Anyone ?

Jim Bielaga has proposed holding an all-day astronomy monopoly tournament on a future Saturday. If it were held, would you participate? Let Jim know, by calling or emailing him to sign up – if we get enough folks interested, the event can go ahead.

Sidewalk Astronomy

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.

School and Community Group Astronomy Outreach

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. Recent January cub-scout group visited by Jim Bielaga, Mark Folkerts, Mike Schilling, and Ron Tam for a star party night was a great example of how this can be a rewarding event for all involved.

Possible field Trip to Ritchie Obs. on Bainbridge Island

We are trying to schedule a trip to the Ritchie Observatory. To do this, we need an estimate of how many people would attend. **Please email Mark Folkerts with your interest (or suggestions).**

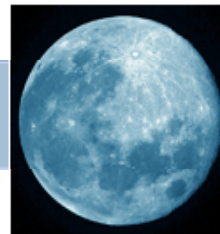
Attention EAS Members – 10% Discount for all Everett Astronomical Society Members at Aurora Astro Products

"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

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"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:

Mon, Thu, Fri – 9:00 am to 6:00 pm

Tues/Weds – Noon to 8:00 pm

Sat – 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

10-INCH WARD DOBSONIAN
10-INCH SONOTUBE DOBSONIAN
8-INCH DOBSONIAN

LOAN STATUS

AVAILABLE
AVAILABLE
AVAILABLE

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

Unsold Seminar Series - Neil deGrasse Tyson in Olympia

Join Dr. Neil deGrasse Tyson - world renowned astrophysicist, bestselling author, and host of the groundbreaking PBS series NOVA scienceNOW - in person for a fascinating journey across the horizons of science, the universe and society. Tuesday, April 29, 2008 at 7:30 p.m. at The Evergreen State College, College Recreation Center (CRC), 2700 Evergreen Parkway, Olympia.

Tickets: Online at www.buyolympia.com/events, by phone at (360) 867-6833 with your Visa or MasterCard, in person at The Evergreen State College Communications Building Box Office (noon to 3p.m. weekdays), the Evergreen Book Store, or Rainy Day Records in downtown Olympia. Prices are \$20 for reserved section seating (advance tickets only, not available at the door), \$10 for adult general admission (\$13 at the door), \$5 for student general admission (\$8 at the door). Student prices apply to youth under age 16 or high school or college students with valid student ID. Parking is free after 5:00 p.m. Use Parking Lot C for best access to the College Recreation Center.

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. NWRAL 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 2008

April 2008

Apr 05 – EAS monthly suburban star party – Ron Tam's place
Apr 16 - Mercury Superior Conjunction
Apr 22 - Lyrids meteor Shower Peak
Apr 12 – EAS Meeting 7:00 pm Aurora Astro Products store

May 2008

May 02 - Space Day
Apr 05 – EAS monthly suburban star party
May 02-05 - OAS Camp Delaney Star Party - Sun Lakes SP
May 05 - Eta Aquarids meteor Shower Peak
May 09 - Astronomy Day Star Party at Harborview Park
May 10 - Astronomy Day at Library and Harborview Park

May 14 - Mercury At Its Greatest Eastern Elongation (22 Degrees)
May 23-26 - RTMC Camp Oakes, CA

May 24 – EAS Meeting 7:00 pm Aurora Astro Products store

June 2008

Jun 05-07 –2008 NWRAL "First Light" Star Party - Goldendale WA
Jun 07 – EAS monthly suburban star party – Ron Tam's place
Jun 07 - Mercury Inferior Conjunction
Jun 15 - Lyrids meteor shower peak
Jun 16 - Prineville Reservoir Star Party (Prineville, OR)
Jun 20 - Summer Solstice, 20:24 UT
Jun 20 - Pluto Opposition - Mag=13.9
Jun 26 - Bootids meteor shower peak
Jun 21 – EAS Meeting 7:00 pm Aurora Astro Products store
Jun 30 - Jul 07 2008 Shingletown Star Party, Shingletown CA

July 2008

Jul 01 - Mercury At Its Greatest Western Elongation (22 Degrees)
Jul 2-6 – Golden State Star Party – Adin CA (Frosty Acres Ranch)
Jul 04 - Earth At Aphelion (1.017 AU From Sun)
Jul 05 – EAS monthly suburban star party – Ron Tam's place
Jul 09 - Jupiter At Opposition
Jul 26 – EAS Meeting 7:00 pm Aurora Astro Products store
Jul 29 - South Delta-Aquarids meteor shower peak
Jul 31-Aug 02 – Table Mt. Star Party

August 2008

Aug 01-03 – RCA Trout Lake Star Party 2008 – Trout Lake WA
Aug 01 - Total Solar Eclipse, Visible in Canada, Greenland
Aug 01 - Alpha Capricornids meteor Shower Peak
Aug 2-10 – Mt Kobau Star Party – Osoyoos BC
Aug 06 - Southern Iota Aquarids meteor Shower peak
Aug 6-10 - Mt. Bachelor Star Party - near Bend, OR
Aug 12 - Perseids meteor shower peak
Aug 15 - Neptune At Opposition
Aug 16 – EAS Meeting 7:00 pm Aurora Astro Products store
Aug 16 - Partial Lunar Eclipse
Aug 17 - kappa-Cygnids meteor shower peak
Aug 19 11:12a Northern Iota-Aquarids meteor shower peak
Aug 23 – EAS monthly suburban star party – Ron Tam's place
Aug 25-31 Oregon Star Party
Aug TBD - Deception Pass Star Party - Bowman Bay, Deception Pass, WA

September 2008

Sep 08 - delta-Aurigids meteor shower peak
Sep 11 - Mercury At Its Greatest Eastern Elongation (27 Degrees)
Sep 13 - Uranus At Opposition
Sep 19 - Piscids meteor shower peak
Sep 20 – EAS Meeting 7:00 pm Aurora Astro Products store
Sep 20 – EAS monthly suburban star party – Ron Tam's place
Sep 22 - Autumnal Equinox (22:16 UT)
Sep 26-28 – Orion Nebula Star Party – Table Mt. WA

October 2008

Oct 04 – EAS monthly suburban star party – Ron Tam's place
Oct 08 - Draconids meteor shower peak
Oct 17 - epsilon-Geminids meteor shower peak
Oct 21 - Orionids Meteor Shower Peak
Oct 25 – EAS Meeting 7:00 pm Aurora Astro Products store
Oct 27 - Asteroid 4 Vesta Closest Approach To Earth (1.539 AU)

November 2008

Nov 01 – EAS monthly suburban star party – Ron Tam's place
Nov 03 - Taurids meteor Shower Peak
Nov 17 - Leonids meteor Shower Peak
Nov 22 – EAS Meeting 7:00 pm Aurora Astro Products store

December 2008

Dec 01 - Conjunction of Moon, Venus, and Jupiter (3 Degree Triangle)
Dec 01 - Moon Occults Venus
Dec 13 - Geminids meteor shower peak
Dec 21 - Winter Solstice, 12:04 UT
Dec 22 - Ursids meteor shower peak
Dec 29 - Moon Occults Jupiter

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 six-minute segment is broadcast every Wednesday morning at approximately 7:20 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.itsoveryourhead.org/>

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 to subscribe to *Sky and Telescope* for \$7 off the normal subscription rate, contact the treasurer (Carol Gore) for more information.

http://members.tripod.com/everett_astronomy/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 lockem1@comcast.net, to borrow or donate any materials. See list here: http://members.tripod.com/everett_astronomy/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

http://members.tripod.com/everett_astronomy/application.htm

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

OBSERVER'S INFORMATION...

LUNAR FACTS

Apr 11	First Quarter Moon
Apr 19	Full Moon
Apr 27	Last Quarter Moon
May 04	New Moon
May 11	First Quarter Moon
May 19	Full Moon
May 27	Last Quarter Moon
Jun 03	New Moon
Jun 09	First Quarter Moon
Jun 17	Full Moon
Jun 26	Last Quarter Moon
Jul 02	New Moon

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

UP IN THE SKY -- THE PLANETS

Object	Rises	Sets	Con	Mag
Sun	06:52 am	19:35	Psc	-27.5
Mercury	06:35 am	18:00	Aqr	+1.3
Venus	06:26 am	17:49	Aqr	-3.9
Mars	11:12 am	03:32 am	Gem	+0.8
Jupiter	03:26 am	12:24	Sag	-2.1
Saturn	16:01	05:59 am	Leo	+0.3
Uranus	06:21 am	17:44	Aqr	+5.9
Neptune	05:23 am	15:21	Cap	+8.0
Pluto	03:47 am	13:15	Sag	+14.0

(times are in local time for Everett PDT)

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.srb.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>

CONSTELLATIONS OF THE MONTH – PYXIS

PYXIS: The (“Compass of Argo Navis”) is a relatively dim constellation bordering on the constellations of Antlia, Hydra, Puppis, and Vela, and ranks 72nd in overall brightness, containing only 12 visible stars brighter than magnitude 5.5. Its central point is located at RA=8h56m and Dec.= -27 degrees. It is completely visible from latitudes South of +53 degrees, and completely invisible from latitudes North of +73 degrees. This constellation ranks 65th in overall size, taking up 220.83 square degrees, or 0.535% of the sky. Pyxis contains no very well known or very bright stars, and contains no Messier objects and no known meteor showers. Its midnight culmination date is February 4th. Pyxis is one of the 14 constellations invented by Lacaille during his travels at the Cape of Good Hope in 1751-52; however, Pyxis is not officially one of the constellations into which Lacaille subdivided the antiquated constellation of Argo Navis (those three are Puppis, Carina, and Vela). Although small, Pyxis does contain some objects of interest to the backyard astronomer. NGC-2818 is an open cluster shining at magnitude 8.2; it contains 40 relatively faint stars (a dim, 13th magnitude planetary nebula lies on the western edge of this cluster, and it may be visible as a gray smudge of light in larger backyard scopes). The spiral galaxy NGC-2613 in northern Pyxis shines at magnitude 10.4 and has dimensions of 7.2' by 2.1'. However, this galaxy would appear even brighter and more impressive if it were not obscured by dust in the plane of the Milky Way. Finally, a very famous object in Pyxis is the variable star known as T-Pyxis; this star is among the most active of all recurring novae. (A recurrent nova is a cataclysmic variable, which undergoes periodic, violent nova-like flare-ups. Like all such variables, it is a binary system with one component being a white dwarf and the other a red giant. Gas is transferred from the latter to the former, until enough (mostly hydrogen) is built up to cause a periodic thermonuclear explosion; i.e., the periodic “flare-up”). This star's magnitude is normally around 14; every 18-24 years (it has a variable period), it brightens to a magnitude of about 6.5, a huge jump in magnitude by any standards.

YOUNG ASTRONOMER'S CORNER

This month, the Yong Astronomer's Corner will talk briefly about the Earth's atmosphere, including what effect the atmosphere has on observing stars with telescopes.

The Earth's atmosphere is composed of many chemicals and other inclusions. The primary elements and molecules are nitrogen, oxygen, argon, neon, helium, hydrogen, xenon, water vapor, carbon-dioxide, methane, nitrous oxide, ozone, particles (such as dust, etc...), and chlorofluorocarbons - byproducts of the use of air conditioners, various sprays, and other industrial processes the world over. Water vapor is highest in tropical areas, where it can be as much as 4% of all atmospheric gases, and is important because it releases large amounts of latent heat, an important source for the transfer of atmospheric energy such as through thunderstorms and hurricanes. Water vapor is also an important greenhouse gas, because it absorbs and re-emits strongly some of the heat (infrared radiation) that leaves the Earth (like a greenhouse works), thus potentially contributing to global warming. Carbon dioxide, another “greenhouse gas” is also an important component of the Earth's atmosphere. Ozone is a component of photochemical (formed by a chemical reaction with sunlight) smog. Saltwater droplets which evaporate and leave microscopic salt particles, dust, soil, and smoke from fires and volcanoes are called aerosols and are suspended in the atmosphere. Most man-made impurities such as nitrous dioxide, carbon monoxide, and hydrocarbons are all emitted by

automobiles, and the burning of oil and coal releases destructive sulfur dioxide into the atmosphere.

What does this mean for astronomers? Simply put, the higher you are above an atmosphere that contains so many useful and not-so-useful chemicals that can interfere with the gathering of light from objects from space, the better you will see these objects. Thus, observing from downtown Seattle for example, one must realize that you are looking through a large portion of atmosphere that potentially contains a lot of dust and other impurities. The troposphere is the bottom layer of the atmosphere (about 11 kilometers thick) that contains most of the impurities that we have talked about, and this layer is also subject to the turbulence caused by rising and descending air currents. Observatories such as Mauna Kea and McDonald Observatory in Texas are placed very high on mountaintops, to help minimize the effects on observing of all these atmospheric inclusions and phenomena. For these reasons, the very best place to observe the heavens is where there is no atmosphere, which is exactly why we have the Hubble Space Telescope above us. Finally, even though they seem to, do stars themselves actually twinkle? The answer is really NO!! The Earth's atmosphere actually causes the light from a star to twinkle because of the turbulent air currents in the atmosphere. So the higher the telescope is above sea level (all the way up to the Hubble Space Telescope!!), the steadier (i.e., less or no “twinkling”) the observing and telescope “seeing” will be!!

ASTRONOMY & TELESCOPE LINGO

Astronomy “Lingo”: **SS CYGNI:** The brightest dwarf nova, a class of cataclysmic variables in which the primary star of a close binary system is a white dwarf. Normally about 12th magnitude, it rises to 8th magnitude approximately every month or thereabouts. Its period varies widely from the mean of 51 days, and the maxima vary in duration, shape, and brightness.

Astronomy “Lingo”: **PORRIMA:** A visual binary (optical double) in the constellation Virgo (gamma Virginis), with cream-colored components; this binary has a very eccentric orbit with a period of 171 years. The stars' separation is decreasing; by the year 2010 the star will appear as a single star except in the very largest of telescopes.

Telescope “Lingo”: **RADIOMETER:** A device that measures the total energy or power received from a body, in the form of radiation (especially infrared). In radio astronomy, a radiometer measures the total received radio noise power.

Telescope “Lingo”: **SEST** (Sweden-ESO Submillimeter Telescope): A 15-meter diameter Cassegrain dish antenna, employed at wavelengths as short as 0.8 millimeters. It is located at the European Southern Observatory in La Silla, Chile. The reflecting surface has 176 panels, each placed to a mean focal accuracy of 65 micrometers.

ASTRONOMY “FUN FACTS”

The following are some Astronomy “Fun Facts” about our nearby “sister” planet Venus:

★★ On Venus, sunrise is in the west, and sunset in the east (opposite to that of Earth). That is, Venus rotates east to west (unlike the other 8 planets (the other odd rotator is Uranus, which is lying on its side(!) compared to the other planets)). This is called retrograde rotation. The rotation of Venus is thus unique in 2 ways: it is extremely slow (it rotates about once every 8 months;

Earth rotates once per 24 hours), and it has retrograde rotation compared to the other planets.

★★ Venus, at its closest to Earth, is still about 106 times further away from Earth than is the Moon. At the average speed of an Apollo mission, it would still take a one-way manned mission about 1.5 years to reach the planet .

★★ Even with a manned mission however, Venus would be a very inhospitable place indeed. The surface temperature of Venus is about 470 degrees Celsius, enough to make lead molten, and more than enough to make steel red hot; the surface temperature of Venus is essentially controlled by a runaway greenhouse effect. The three distinct cloud layers (with very high upper level winds) of Venus are all composed of sulfur and sulfuric acid, and the atmosphere itself is composed of about 96% carbon dioxide. The atmospheric pressure on the surface of Venus is about 90 times that of Earth's surface (about 1,320 pounds per square inch); additionally, Russian and American space probes have detected far, far more lightning strokes per unit area than is found on Earth. Indeed, Venus appears to be the type of other world best left to the research done by mechanical probes!

Here are some other "Fun Facts" you may enjoy:

★★ Escaping solar neutrinos amount to about a 50th of the sun's energy output. Every second billions of them shoot through our bodies without ever interacting with a single cell!

★★ Even though light from the sun only takes eight minutes to reach the earth, this should not imply that this light energy is only eight minutes old. Indeed, it is more like 20,000 years old!!! The original radiation (gamma) that ultimately creates the visible light started out in the core that long ago, and has been bouncing and interacting its way "out" (to form visible light) ever since!!

★★ The force of pressure inside the center of the sun is 450 billion times greater than at the surface of the earth. This pressure is equivalent to 3.3 billion tons per square inch. If an average sized automobile tire (which could bear this pressure!!) was filled via an ordinary auto shop air hose, one would have to hold the hose at the valve of the tire for 400,000 years!!!

PLANETARY FOCUS -

This column last printed in March; it will return in May.

"MIRROR IMAGES"

"MIRROR" IMAGES: Because we live in the Northern Hemisphere, we often tend to focus (in both observing and reading) on celestial objects in this hemisphere. The point of this column is to inform club members about similar objects in the Southern Hemisphere (to the ones we are already familiar with in the Northern Hemisphere). The general class of object will first be defined, and then a representative object from each hemisphere will be described. Note: "MIRROR" IMAGES" is strictly the name of this column, and is not intended to imply that there is optical mirror symmetry between the two objects.

CLASS OF OBJECT: SYMBIOTIC STARS: A variable 'star' whose spectrum demonstrates spectral lines characteristic of gases at two very different temperatures; typically these lines are of an M-star (approx. 3,500 degrees K) and a B-star (approx. 20,000 degrees K) superimposed. A symbiotic 'star' is in fact a semi-detached close binary system. The red giant component produces the low-temperature spectral lines, whereas the higher-temperature spectral lines come from gas streams that are falling on to a companion star, which is usually a white dwarf or a main-

sequence star, but it is suspected that this star may possibly also, with some systems, be a neutron star. Mass loss is due to the red giant's stellar wind, and is thus much slower than the gravitational transfer seen in otherwise similar recurrent novae systems. Symbiotic stars, a form of cataclysmic variable, have smaller and more irregular outbursts than other cataclysmics. An outburst in the R-Aquarii system has been noted to have produced a narrow jet, travelling at about 2,000 kilometers per second and approximately 1,500 AU in length, which is visible in both optical and radio telescopes.

Representative Northern Hemisphere Object: Z-Andromedae

Representative Southern Hemisphere Object: RW Hydrae

ASTRONOMICAL NOTES -- ON & OFF THE WEB...

OLDEST KNOWN ASTEROIDS

Using visible and infrared data collected from telescopes on Hawaii's Mauna Kea, a team of scientists, led by the University of Maryland's Jessica Sunshine, have identified three asteroids that appear to be among our Solar System's oldest objects. Evidence indicates that these ancient asteroids are relatively unchanged since they formed some 4.55 billion years ago and are older than the oldest meteorites ever found on Earth, say Maryland's Sunshine and colleagues. *"We have identified asteroids that are not represented in our meteorite collection and which date from the earliest periods of the Solar System,"* said Sunshine, a senior research scientist. *"These asteroids are prime candidates for future space missions that could collect and return samples to Earth providing a more detailed understanding of the Solar System's first few millions of years."* At the beginning of the Solar System, there was just a disk-shaped cloud of hot gas, the solar nebula. When gasses on the edge of the early nebula began to cool, the first materials to condense into solid particles were rich in the elements calcium and aluminum. As the gasses cooled further, other materials also began to condense. Eventually the different types of solid particles clumped together to form the common building blocks of comets, asteroids, and planets. Astronomers have thought that at least some of the Solar System's oldest asteroids should be more enriched in calcium and aluminum, but, until the current study, none had been identified.

Meteorites found on Earth do contain small amounts of these earliest condensing materials. As seen in meteorites, these bright white ancient materials, the so-called calcium, aluminum-rich inclusions, or CAIs, can be as large as a centimeter in diameter. Scientists, in fact, long have used the age of CAIs to define the age of the Solar System. *"The fall of the Allende meteorite in 1969 initiated a revolution in the study of the early Solar System,"* said Tim McCoy, curator of the national meteorite collection at the Smithsonian's National Museum of Natural History. *"It was at that time scientists first recognized that the remarkable white inclusions -- later called calcium, aluminum-rich inclusions-- which were found in this meteorite, matched many of the properties expected of early Solar System condensates. "I find it amazing that it took us nearly 40 years to collect spectra of these [CAI-rich] objects and that those spectra would now initiate another revolution, pointing us to the asteroids that record this earliest stage in the history of our Solar System,"* said McCoy. Sunshine and McCoy, with colleagues used the SpeX instrument at the NASA Infrared Telescope Facility in Hawaii to look at the surface of asteroids for evidence of the presence of such early bits of high-temperature rock. In particular, they looked for spectral "fingerprints" indicative of the presence of CAIs. Because different minerals have different reflective properties, the spectrum, or color of light reflected from a surface, reveals

information about its composition enabling telescopic compositional analysis.

In their paper, Sunshine and colleagues quantitatively compare the spectral signatures of asteroid surfaces and CAIs in meteorites from the Smithsonian's National Museum of Natural History collection. "Several CAI-rich asteroids have been identified that contain 2-3 times more CAI material than any known meteorite," Sunshine said. "Thus it appears ancient asteroids have indeed survived, and we know where they are."

DISCOVERY OF 10 NEW PLANETS OUTSIDE SOLAR SYSTEM – REVOLUTIONIZES UNDERSTANDING OF EXTRASOLAR PLANETS

An international team of astronomers has found 10 new "extra solar" planets, planets that orbit stars other than our sun. The team used a system of robotic cameras that yield a great deal of information about these other worlds, some of which are quite exotic. The system is expected to revolutionize scientific understanding of how planets form. The new international collaboration is called "SuperWASP," for Wide Area Search for Planets. This technique of locating the planets gives more information about the formation and evolution of the planets than the gravitational technique. Astronomers look for "transits," moments when the planets pass in front of the star, like an eclipse, as viewed from the Earth. In the last six months the SuperWASP team has used two batteries of cameras, one in Spain's Canary Islands and one in South Africa, to discover the 10 new extra solar planets.

With the gravitational technique, scientists have discovered around 270 extra solar planets since the early 1990s. They measured the gravitational pull on the star that is exerted by the orbiting planet. As the planet moves, it pulls on the star, tugging it back and forth. However, making these discoveries depends on looking at each star over a period of weeks or months, so the pace of discovery is slow. The SuperWASP technique involves two sets of cameras to watch for events known as transits, where a planet passes directly in front of a star and blocks out some of the star's light. From the Earth the star temporarily appears a little fainter. The SuperWASP cameras work as robots, surveying a large area of the sky at once. Each night astronomers receive data from millions of stars. They can then check for transits and hence planets. The transit technique also allows scientists to deduce the size and mass of each planet. A team of collaborators around the world follows up each possible planet found by SuperWASP with more detailed observations to confirm or reject the discovery.

A total of 46 planets have been found to transit their stars. Since they started operation in 2004, the SuperWASP cameras have found 15 of these. SuperWASP is the most successful transit survey in the world. The planets discovered by SuperWASP have masses between a middle weight of half the size of Jupiter to more than eight times the size of Jupiter, the largest planet in our solar system. A number of these new worlds are very exotic. For example, a year, or one orbit, on WASP-12b, is just a bit over one day. This planet is so close to its star that its daytime temperature could reach a searing 2300 degrees Celsius.

Lister and Street from LCOGTN/UCSB are delighted with the results. Street described the discovery as a "very big step forward for the field." Lister said, "The flood of new discoveries from SuperWASP will revolutionize our understanding of how planets form. LCOGTN's flexible global network of telescopes is an indispensable part of the worldwide effort to learn about the new planets." <http://www.ia.ucsb.edu/pa/display.aspx?pkey=1748>

CASSINI FINDS OCEAN MAY EXIST BENEATH TITAN'S CRUST

The Cassini spacecraft has discovered evidence that points to the existence of an underground ocean of water and ammonia on Saturn's moon Titan. "With its organic dunes, lakes, channels and mountains, Titan has one of the most varied, active and Earth-like surfaces in the solar system," said Ralph Lorenz, lead author of the paper and Cassini radar scientist. "Now we see changes in the way Titan rotates, giving us a window into Titan's interior beneath the surface." Members of the mission's science team used Cassini's Synthetic Aperture Radar to collect imaging data during 19 separate passes over Titan between October 2005 and May 2007. The radar can see through Titan's dense, methane-rich atmospheric haze, detailing never-before-seen surface features and establishing their locations on the moon's surface.

Using data from the radar's early observations, the scientists and radar engineers established the locations of 50 unique landmarks on Titan's surface. They then searched for these same lakes, canyons and mountains in the reams of data returned by Cassini in its later flybys of Titan. They found prominent surface features had shifted from their expected positions by up to 19 miles. A systematic displacement of surface features would be difficult to explain unless the moon's icy crust was decoupled from its core by an internal ocean, making it easier for the crust to move. "We believe that about 62 miles beneath the ice and organic-rich surface is an internal ocean of liquid water mixed with ammonia," said Bryan Stiles, a contributing author to the paper.

The study of Titan is a major goal of the Cassini-Huygens mission because it may preserve, in deep-freeze, many of the chemical compounds that preceded life on Earth. Titan is the only moon in the solar system that possesses a dense atmosphere. The moon's atmosphere is 1.5 times denser than Earth's. Titan is the largest of Saturn's moons, bigger than the planet Mercury. "The combination of an organic-rich environment and liquid water is very appealing to astrobiologists," Lorenz said. "Further study of Titan's rotation will let us understand the watery interior better, and because the spin of the crust and the winds in the atmosphere are linked, we might see seasonal variation in the spin in the next few years."

THE PUZZLING 'EYE OF A HURRICANE' ON VENUS

Venus Express has constantly been observing the south pole of Venus and has found it to be surprisingly fickle. An enormous structure with a central part that looks like the eye of a hurricane, morphs and changes shape within a matter of days, leaving scientists puzzled. The eye of the hurricane is at the center of a 2000 km-wide vortex. It was discovered in 1974 by the Mariner 10 spacecraft. There is a similar structure on the planet's north pole, which was observed by the Pioneer Venus mission in 1979.

Venus Express scientists have been studying the structure in the thermal infrared, the wavelength range which reveals the temperature at the cloud-tops. Seen in this wavelength, the core of the vortex appears very bright, probably indicating that a lot of atmospheric gases are moving downward in the region, which creates a depression at the cloud-tops, making the region hotter. "Simply put, the enormous vortex is similar to what you might see in your bathtub once you have pulled out the plug," says Giuseppe Piccioni, co-principal Investigator.

In June 2006, the vortex appeared hourglass-shaped, closely matching observations in the north polar region by Pioneer Venus. Now we know that it changes its shape within a matter of days, from orbit to orbit. The image taken on 26 February 2007 shows the 'classic' dipole shape at the center of the vortex, similar

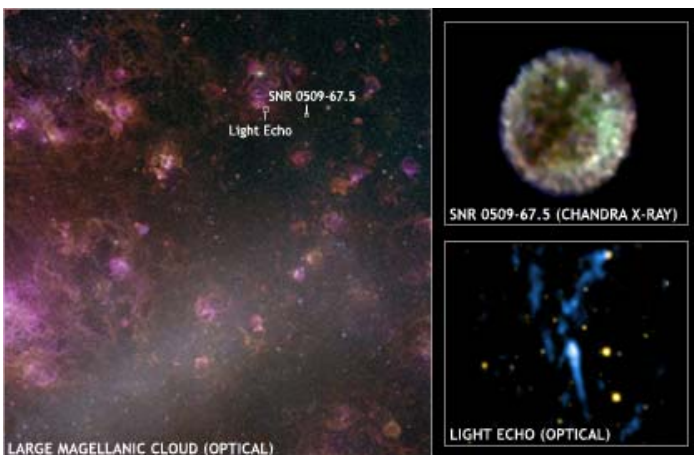
to that which has been observed previously. But an image taken a mere 24 hours earlier shows the centre of the vortex to be almost circular, indicating that the shape of this feature can change very fast. At other times, it is typically oval. The dynamic nature of the vortex can be seen clearly in the video. It shows that the vortex is very complex, with atmospheric gases flowing in different directions at different altitudes.

What creates the puzzle? Scientists are not sure what actually creates the vortex. Colin Wilson says, *"One explanation is that atmospheric gases heated by the Sun at the equator, rise and then move poleward. In the polar regions, they converge and sink again. As the gases move towards the poles, they are deflected sideways because of the planet's rotation."* The dynamic nature of this vortex is similar to behavior observed in other vortices on Earth, including those observed at the centre of hurricanes.

Investigators will keep a close watch on the polar region and its variability, in order to gain a better understanding of how it works. http://www.esa.int/esaCP/SEMIZFM5NDF_index_1.html

ACTION REPLAY OF POWERFUL STELLAR EXPLOSION

Astronomers have made the best ever determination of the power of a supernova explosion that was visible from Earth long ago. By observing the remnant of a supernova and a light echo from the initial outburst, they have established the validity of a powerful new method for studying supernovas. Using data from Chandra X-ray Observatory, XMM-Newton Observatory, and the Gemini Observatory, two teams of researchers studied the supernova remnant and the supernova light echo that are located in the Large Magellanic Cloud (LMC), a small galaxy about 160,000 light years from Earth. They concluded that the supernova occurred about 400 years ago (in Earth's time frame), and was unusually bright and energetic. This result is the first time two methods -- X-ray observations of a supernova remnant and optical observations of the expanding light echoes from the explosion -- have both been used to estimate the energy of a supernova explosion. Up until now, scientists had only made such an estimate using the light seen soon after a star exploded, or using remnants that are several hundred years old, but not from both. *"People didn't have advanced telescopes to study supernovas when they went off hundreds of years ago,"* said Armin Rest, who led the light echo observations using Gemini. *"But we've done the next best thing by looking around the site of the explosion and constructing an action replay of it."*



In 2004, scientists used Chandra to determine that a supernova remnant, known as SNR 0509-67.5 in the LMC, was a so-called Type Ia supernova, caused by a white dwarf star in a binary system that reaches a critical mass and explodes. In the new

optical study, an estimate of the explosion's energy came from studying an echo of the original light of the explosion. Just as sound bounces off walls of a canyon, so too can light waves create an echo by bouncing off dust clouds in space. The light from these echoes travels a longer path than the light that travels straight toward us, and so can be seen hundreds of years after the supernova itself.

First seen by the Cerro-Tololo Inter-American Observatory in Chile, the light echoes were observed in greater detail by Gemini Observatory in Chile. The optical spectra of the light echo were used to confirm that the supernova was a Type Ia and to unambiguously determine the particular class of explosion and therefore its energy. The Chandra data, along with XMM data obtained in 2000, were then independently used to calculate the amount of energy involved in the original explosion, using an analysis of the supernova remnant and state-of-the-art explosion models. Their conclusion confirmed the results from the optical data, namely that the explosion was an especially energetic and bright variety of Type Ia supernova. This agreement provides strong evidence that the detailed explosion models are accurate. *"Having these two methods agree lets us breathe a sigh of relief,"* said Carlos Badenes who led the Chandra and XMM study. *"It looks like we're on the right track with trying to understand these big explosions. Their stellar debris really can retain a memory of what created them hundreds of years earlier."* Both methods estimated a similar time since the explosion of about 400 years. An extra constraint on the age comes from the lack of recorded historical evidence for a recent supernova in the LMC. Because this star appears in the Southern Hemisphere, it likely would have been seen by navigators who noted similarly bright celestial events if it had occurred less than about 400 years ago. Because Type Ia supernovas have nearly uniform intrinsic brightness, they are used as important tools by scientists to study the expansion of the universe and the nature of dark energy. *"It's crucial to know that the basic assumptions about these explosions are correct, so they're not used just as black-boxes to measure distances,"* said Badenes.

This work is also being extended to other supernova remnants and light echoes. *"This is the first case where the conclusions that are drawn from the supernova remnant about the original explosion can be directly tested by looking at the original event itself,"* said Rest. *"We'll be able to learn a lot about supernovas in our own galaxy by using this technique."* <http://chandra.harvard.edu/photo/2008/snr0509/>

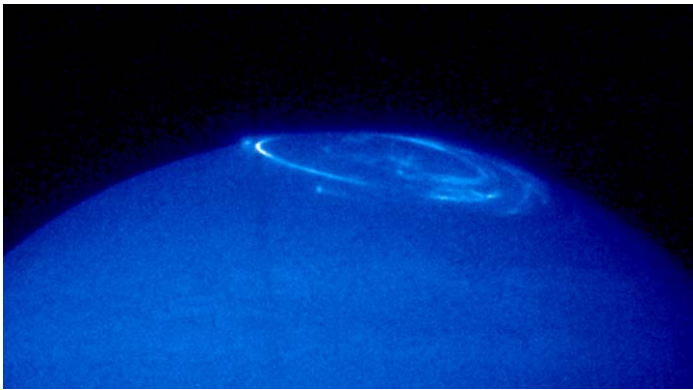
NOVEL LUMINOUS SPOTS FOUND ON JUPITER

Scientists have observed unexpected luminous spots on Jupiter caused by its moon Io. Besides displaying the most spectacular volcanic activity in the solar system, Io causes auroras on its mother planet that are similar to the northern lights on Earth. The auroral emissions linked to the volcanic moon are called the Io footprint. From previous studies, researchers had found the Io footprint to be a bright spot that is often followed by other auroral spots. Those spots are typically located downstream relative to a flow of charged particles around the giant planet. Now, a team of planetologists from Belgium and Germany have discovered that Io's footprint can include a faint spot unexpectedly upstream of the main spot. Each appearance of such a "leading spot" occurs in a distinctive pattern, the scientists say: When the main footprint is preceded by a leading spot in the northern or southern hemisphere of Jupiter, it is also followed by downstream spots in the opposite hemisphere.

"Previously, we only observed downstream spots, but only half of the configurations of Io in the Jovian magnetic field had been

studied," says Bertrand Bonfond, who is a member of the team that found the new type of spot. "Now we have the complete picture. The results are surprising because no theory predicted upstream spots." Like a rock in a stream, Io obstructs the flow of charged particles, or plasma, around Jupiter. As the moon disrupts the flow, it generates powerful plasma waves that blast electrons into Jupiter's atmosphere, creating the auroral spots.

The finding of the leading spot puts all the previous models of the Io footprint into question, Bonfond says. He and his colleagues propose a new interpretation in which beams of electrons travel from one Jovian hemisphere to the other. For this latest Io-footprint analysis, Bonfond and his colleagues at Liege and used the HST to observe Jupiter in ultraviolet wavelengths. New insights regarding Io-Jupiter interactions could apply to other situations in which an electrically conductive body -- in this case, Io -- orbits near a magnetized body, Bonfond says.



Such configurations could be very common in the universe. For example, some of the recently discovered exoplanets that orbit stars other than the Sun are thought to be in such configurations with their parent stars. Our Moon does not create a footprint on Earth because the Moon is not conductive and is also too far from the Earth, Bonfond notes. In order to test their new theory of how leading and downstream spots form, Bonfond and his colleagues plan further observations of Io's footprint after August 2008. That's when repairs and improvements to the HST are scheduled to occur. High-resolution, digital images related to the leading spot and a text file providing captions and credit information are available at http://lpap.astro.ulg.ac.be/~bonfond/IFP_Bonfond_images.zip

SEEING THROUGH THE DARK - MAPPING THE INTERIOR OF INTERSTELLAR CLOUDS IN GREAT DETAIL

Astronomers have measured the distribution of mass inside a dark filament in a molecular cloud with an amazing level of detail and to great depth. The measurement is based on a new method that looks at the scattered near-infrared light or 'cloudshine' and was made with the New Technology Telescope. Associated with the forthcoming VISTA telescope, this new technique will allow astronomers to better understand the cradles of newborn stars.

The vast expanses between stars are permeated with giant complexes of cold gas and dust opaque to visible light. Yet these are the future nurseries of stars to be. "One would like to have a detailed knowledge of the interiors of these dark clouds to better understand where and when new stars will appear," says Mika Juvela, lead author of the paper in which these results are reported. Because the dust in these clouds blocks the visible light, the distribution of matter within interstellar clouds can be examined only indirectly. One method is based on measurements of the light from stars that are located behind the cloud. "This

method, albeit quite useful, is limited by the fact that the level of details one can obtain depends on the distribution of background stars," says co-author Paolo Padoan.

In 2006, astronomers Padoan, Juvela, and colleague Veli-Matti Pelkonen, proposed that maps of scattered light could be used as another tracer of the cloud's inner structure, a method that should yield more advantages. The idea is to estimate the amount of dust located along the line of sight by measuring the intensity of the scattered light. Dark clouds are feebly illuminated by nearby stars. This light is scattered by the dust contained in the clouds, an effect dubbed 'cloudshine' by astronomers Alyssa Goodman and Jonathan Foster. This effect is well known to sky lovers, as they create in visible light wonderful pieces of art called 'reflection nebulae'. The Chameleon I complex nebula is one beautiful example.

When making observations in the near-infrared, art becomes science. Near-infrared radiation can indeed propagate much farther into the cloud than visible light and the maps of scattered light can be used to measure the mass of the material inside the cloud. To put this method to the test and use it for the first time for a quantitative estimation of the distribution of mass within a cloud, the astronomers who made the original suggestion, together with Kalevi Mattila, made observations in the near-infrared of a filament in the Corona Australis cloud. The observations were made in August 2006 with the SOFI instrument on New Technology Telescope at La Silla, in the Chilean Atacama Desert. The filament was observed for about 21 hours. Their observations confirm that the scattering method is providing results that are as reliable as the use of background stars while providing much more detail.



A Dark Filament in Scattered Light
(NTT/SOFI)

ESO Press Photo 06/08 (7 March 2008)

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When the light from the background stars passes through the cloud, it is absorbed and scattered, resulting in the background stars appearing redder than they really are. The effect is proportional to the amount of obscuring material and is therefore largest for stars that are situated behind the cloud's densest parts. By measuring the degree of this 'reddening' experienced by stars seen through different areas of the cloud, it is thus possible to chart the distribution of dust in the cloud. The finer the net of background stars is, the more detailed this map will be and the better the information about the internal structure of the cloud. And that is exactly the problem. Even small clouds are so opaque that very few background stars can be seen through them. Only large telescopes and extremely sensitive instruments are able to observe a sufficient number of stars in order to produce significant results.

"We can now obtain very high resolution images of dark clouds and so better study their internal structure and dynamics," says Juvela. "Not only is the level of details in the resulting map no longer dependent on the distribution of background stars, but we have also shown that where the density of the cloud becomes too high to be able to see any background stars, the new method can still be applied." "The presented method and the confirmation of its feasibility will enable a wide range of studies into the interstellar medium and star formation within the Milky Way and even other galaxies," says co-author Mattila. Located in the constellation of the same name ('Southern Crown'), the Corona Australis molecular cloud is shaped like a 45 light year long cigar. Located about 500 light years away, it contains the equivalent of about 7000 Suns. On the sky, the dark cloud is surrounded by many beautiful 'reflection nebulae'. "This is an important result because, with current and planned near-infrared instruments, large cloud areas can be mapped with high resolution," adds Pelkonen. "For example, the VIRCAM instrument on the soon-to-come VISTA telescope has a field of view hundreds of times larger than SOFI. Using our method, it will prove amazingly powerful for the study of stellar nurseries." <http://www.eso.org/public/outreach/press-rel/pr-2008/pr-06-08.html>

BRITAIN'S BIGGEST METEORITE IMPACT FOUND

Evidence of the biggest meteorite ever to hit the British Isles has been found by scientists, who believe that a large meteorite hit northwest Scotland about 1.2 billion years ago near the Scottish town of Ullapool. Previously it was thought that unusual rock formations in the area had been formed by volcanic activity. But, the team report in the journal *Geology* that they found evidence buried in a layer of rock which they now believe is the ejected material thrown out during the formation of a meteorite crater. Ejected material from the huge meteorite strike is scattered over an area about 50 kilometers across, roughly centered on the northern town of Ullapool. Ken Amor, co-author on the paper, said: "Chemical testing of the rocks found the characteristic signature of meteoritic material, which has high levels of the key element iridium, normally only found in low concentrations in surface rocks on Earth. We found more evidence when we examined the rocks under a microscope; tell-tale microscopic parallel fractures that also imply a meteorite strike."

The proposed volcanic origin for the rock formations has always been a puzzle as there are no volcanic vents or other volcanic sediments nearby. Scientists took samples from the formations during fieldwork in 2006 and have just had their findings published. John Parnell, a co-author on the paper, said: "These rocks are superbly displayed on the west coast of Scotland, and visited by numerous student parties each year. We're very lucky to have them available for study, as they can tell us much about how planetary surfaces, including Mars, become modified by large meteorite strikes. Building up the evidence has been painstaking, but has resulted in proof of the largest meteorite strike known in the British Isles". Scott Thackrey, also co-author of the paper, added: "The type of ejected deposit discovered in North West Scotland is only observed on planets and satellites that possess a volatile rich subsurface, for example, Venus, Mars and Earth. Due to the rare nature of these deposits, each new discovery provides revelations in terms of the atmospheric and surface processes that occur round craters just after impact."

"If there had been human observers in Scotland 1.2 billion years ago they would have seen quite a show," continued Ken Amor. "The massive impact would have melted rocks and thrown up an enormous cloud of vapor that scattered material over a large part of the region around Ullapool. The crater was rapidly buried by sandstone which helped to preserve the evidence." Since the

formation of the solar system leftover space material has collided regularly with the Earth and other planets. Some of these impacts are large enough to leave craters, and there are about 174 known craters or their remnants on Earth. Ken Amor added: "This is the most spectacular evidence for a meteorite impact within the British Isles found to date, and what we have discovered about this meteorite strike could help us to understand the ancient impacts that shaped the surface of other planets, such as Mars."

STARS BURST INTO LIFE IN THE EARLY UNIVERSE

New measurements from some of the most distant galaxies bolster the evidence that the strongest burst of star formation in the history of the Universe occurred about two billion years after the Big Bang. An international team of astronomers from the UK, France, Germany and the USA have found evidence for a dramatic surge in star birth in a newly discovered population of massive galaxies in the early Universe. Team member Dr Scott Chapman presented observations of five of these galaxies that are forming stars at a tremendous rate and have large reservoirs of gas that will power the star formation for hundreds of millions of years. Dr Chapman's work is supported by a parallel study made by student Caitlin Casey, who finds that the star formation in the new galaxies is distributed over a vast area.

The galaxies are so distant that the light we detect from them has been travelling for more than 10 billion years. This means that we see them as they were about a three billion years after the Big Bang. The recent discovery of a new type of extremely luminous galaxy in this epoch -- one that is very faint in visible light, but much brighter at longer, radio wavelengths -- is the key to the new results. A related type of galaxy was first found in 1997 (but not well understood until 2003) using a new and much more sensitive camera that detects radiation emitted at sub-millimeter wavelengths (longer than the wavelengths of visible light that we see with but somewhat shorter than radio waves). The camera, called 'SCUBA' was attached to the James Clerk Maxwell Telescope (JCMT), on Mauna Kea.

In 2004 the team of astronomers proposed that these distant "submillimeter-galaxies" might only represent half of the picture of rapid star formation in the early universe, as SCUBA is biased towards colder objects. They suggested that a population of similar galaxies with slightly hotter temperatures could exist but have gone largely unnoticed. The team of scientists searched for the missing galaxies using observatories around the world: the MERLIN array in the UK, the Very Large Array (VLA) in the US (both radio observatories), the Keck optical telescope on Hawaii and the Plateau de Bure submillimeter observatory in France. The instruments found and pinpointed the galaxies, measured their distances and then confirmed their star forming nature through the detection of the vastly extended gas and dust.

The new galaxies have prodigious rates of star formation, far higher than anything seen in the present-day Universe. They probably developed after the first stars and galaxies had already formed in what would have been a perfectly smooth Universe. None the less, studying these new objects gives astronomers an insight into the earliest epochs of star formation after the Big Bang. With the new discovery, the astronomers have provided a much more accurate census of some of the most extreme galaxies in the Universe at the peak of their activity. Future observations will investigate the details of the galaxies' power source and try to establish how they will develop once their intense bursts of activity come to an end. Images and movie <http://www.ast.cam.ac.uk/~ccasey/sfrg.html>

DIRTY SPACE AND SUPERNOVAE

Interstellar space may be strewn with tiny whiskers of carbon, dimming the light of far-away objects. This discovery by scientists at the Carnegie Institution may have implications for the "dark energy" hypothesis, proposed a decade ago in part to explain the unexpected dimness of certain stellar explosions called Type 1a supernovae. Type 1a supernovae are among the brightest objects in the universe. Astronomers use them as "standard candles" to gauge cosmological distances: brighter-appearing supernovae are closer, dimmer ones are farther away. In the late 1990s some astronomers noticed that some seemed too dim -- too far away -- to be explained by conventional theories of the universe's expansion. This led to the hypothesis that the expansion was accelerating, pushed along by an unknown form of energy -- dark energy.

In the current study, Andrew Steele and Marc Fries report the discovery of an unusual new form of carbon in minerals within meteorites dating from the formation of the solar system. These "graphite whiskers" were likely produced from carbon-rich gas at high temperatures and were found within features called calcium-aluminum inclusions, which at around 4.5 billion years old are the oldest known solids in our solar system. *"During this time when the sun was young, the solar wind was very strong,"* says Fries. *"So graphite whiskers formed near the sun could have been blown into interstellar space. The same thing may have happened around other young stars as well."* Graphite whiskers might also be produced and dispersed into space by supernovae explosions. A thin interstellar haze of graphite whiskers spewed from stars and supernovae would affect how different wavelengths of light pass through space. It has been postulated that wavelengths in the near infrared would be particularly affected. It is the dimming of light from Type 1a supernovae at these wavelengths that first led researchers to think that the universe's expansion was accelerating and that therefore a hitherto unknown force "dark energy" must exist. However, since the 1970s it has been postulated that graphite or other whisker-like materials could explain the observations. The presence of graphite whiskers in space has never been confirmed until this study.

With the discovery of graphite whiskers in the meteorite, researchers can test their properties against the cosmological models and astronomical observations. *"If graphite whiskers in space are absorbing supernovae's light,"* says Steele, *"then this could affect measurements of the rate of the universe's expansion. While we cannot comment further on the effects of whiskers on the dark energy hypothesis it is important to study the characteristics of this form of carbon carefully so we can understand its impact on dark energy models. We'll then feed this data forward to the upcoming NASA and ESA missions that will look for the effects of dark energy."*

METEORITES ARE RICH SOURCE FOR PRIMORDIAL SOUP

The organic soup that spawned life on Earth may have gotten generous helpings from outer space, according to a new study. Scientists have discovered concentrations of amino acids in two meteorites that are more than ten times higher than levels previously measured in other similar meteorites. This result suggests that the early solar system was far richer in the organic building blocks of life than scientists had thought, and that fallout from space may have spiked Earth's primordial broth. The study by Conel Alexander, and colleagues, is being published in 'Meteoritics and Planetary Science'.

Amino acids are organic molecules that form the backbone of proteins, which in turn build many of the structures and drive many of the chemical reactions inside living cells. The production of proteins is believed to constitute one of the first steps in the

emergence of life. Scientists have determined that amino acids could also have formed in some environments on the early Earth, but the presence of these compounds in certain meteorites has led many researchers to look to space as a source. The meteorites used for the study were collected in Antarctica in 1992 and 1995 and held in the meteorite collection at the Johnson Space Center. Antarctica is the world's richest hunting ground for meteorites, which are naturally concentrated in so-called blue ice regions and held in cold storage by the ice.

For the amino acid study, the researchers took small samples from three meteorites of a rare type called CR chondrites, thought to contain the oldest and the most primitive organic materials found in meteorites. CR chondrites date from the time of the solar system's formation. During an early phase of their history the meteorites were part of a larger "parent body," such as an asteroid, which later was shattered by impacts. The analysis revealed that while one sample showed a relatively low abundance of amino acids, the other two meteorites had the highest ever seen in primitive meteorites -- 180 and 249 ppm (parts per million). Other primitive meteorites that have been studied generally have amino acid concentrations of 15 ppm or less. Because organic molecules from extra-terrestrial sources have ratios of carbon isotopes different from those of Earthly biological sources, the researchers were able to rule out contamination as a factor in their result. *"The amino acids probably formed within the parent body before it broke up,"* says Alexander. *"For instance ammonia and other chemical precursors from the solar nebula, or even the interstellar medium, could have combined in the presence of water to make the amino acids. Then, after the break up, some of the fragments could have showered down onto the Earth and the other terrestrial planets. These same precursors are likely to have been present in other primitive bodies, such as comets, that were also raining material onto the early Earth."*

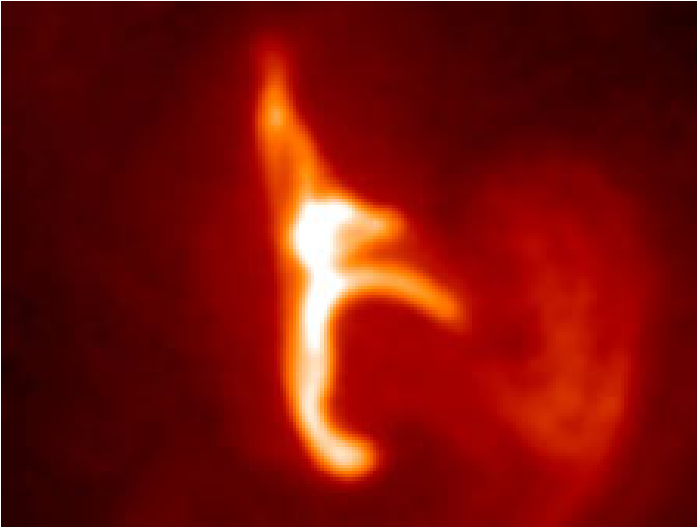
"FOCUSED" SOLAR EXPLOSIONS GET HOTTER

A researcher has discovered that solar flares -- explosions in the atmosphere of the sun -- get much hotter when they stay "focused". *"A flare typically divides its energy between directly heating the solar atmosphere and accelerating particles,"* said Dr. Ryan Milligan. *"This flare seemed to focus on one task, devoting all its energy to heating, allowing it to become millions of degrees hotter than its multi-tasking cousins."* Solar flares are caused by the sudden release of magnetic energy. The largest can release as much energy as a billion one-megaton nuclear bombs. However, the flare observed in this study was a less powerful "micro" flare. Researchers want to understand flares because they generate radiation that can be hazardous to unprotected astronauts, like those walking on the surface of the moon.

Flares normally occur above loops of electrically conducting gas, called plasma, in the sun's atmosphere. When a typical flare goes off, it heats the plasma and sends beams of electrons racing down the sides of the loops. The electron beams evaporate more plasma from the sun's visible surface, which expands back up the loops. *"This evaporated plasma has traditionally been believed to be the source of the hottest temperatures seen in solar flares,"* said Milligan. *"However, the flare in this new observation reached a temperature of almost 27 million degrees Fahrenheit -- some nine million degrees hotter than expected for a flare of this size -- without any evidence for beams of accelerated electrons."*

Milligan used the Reuven Ramaty High Energy Solar Spectroscopic Imager (RHESSI) and Hinode spacecraft to make his observation of the microflare on June 7, 2007. RHESSI revealed that the flare had a peak temperature of 27 million

degrees, and also that the flare showed no evidence for high-energy electrons.



Hinode was able to show the effects of the energy released at various layers in the solar atmosphere. In particular, the Extreme-ultraviolet Imaging Spectrometer instrument was used to detect signatures of plasma evaporation from the sun's surface through Doppler shifts of emission lines. The low-velocities observed confirmed the RHESSI observation that high-energy electrons were not present. *"If our assumption is correct, then this result tells us that the energy released during a solar flare is more efficient at achieving a higher temperature if the energy is used to directly heat the plasma in the sun's atmosphere, instead of being divided between heating and particle acceleration. This very effect has recently been shown in computer simulations of energy release during microflares,"* said Milligan. http://www.nasa.gov/centers/goddard/news/topstory/2008/focused_flares.html

LIQUID WATER FOUND FLOWING ON MARS? NOT YET

Liquid water has not been found on the Martian surface within the last decade after all, according to new research. The finding casts doubt on the 2006 report that the bright spots in some Martian gullies indicate that liquid water flowed down those gullies sometime since 1999. *"It rules out pure liquid water,"* said lead author Jon D. Pelletier. Pelletier and his colleagues used topographic data derived from images of Mars from the High Resolution Imaging Science Experiment (HiRISE) camera on Mars Reconnaissance Orbiter. Since 2006, HiRISE has been providing the most detailed images of Mars ever taken from orbit.

The researchers applied the basic physics of how fluid flows under Martian conditions to determine how a flow of pure liquid water would look on the HiRISE images versus how an avalanche of dry granular debris such as sand and gravel would look. *"The dry granular case was the winner,"* said Pelletier, a associate professor of geosciences. *"I was surprised. I started off thinking we were going to prove it's liquid water."* Finding liquid water on the surface of Mars would indicate the best places to look for current life on Mars, said co-author Alfred S. McEwen. *"What we'd hoped to do was rule out the dry flow model -- but that didn't happen,"* said McEwen, the HiRISE principal investigator. An

avalanche of dry debris is a much better match for their calculations and also what their computer model predicts, said Pelletier and McEwen. Pelletier said, *"Right now the balance of evidence suggests that the dry granular case is the most probable."* They added that their research does not rule out the possibility that the images show flows of very thick mud containing about 50 percent to 60 percent sediment. Such mud would have a consistency similar to molasses or hot lava. From orbit, the resulting deposit would look similar to that from a dry avalanche.

In December 2006, Michael Malin and his colleagues published an article suggesting the bright streaks that formed in two Martian gullies since 1999 *"suggest that liquid water flowed on the surface of Mars during the past decade."* Malin's team used images taken by the Mars Global Surveyor Mars Orbital Camera (MOC) of gullies that had formed before 1999. Repeat images taken of the gullies in 2006 showed bright streaks that had not been there in the earlier images. Subsequently, Pelletier and McEwen were at a scientific meeting and began chatting about the astonishing new finding. They discussed how the much more detailed images from HiRISE might be used to flesh out the Malin team's findings. Pelletier had experience in using the stereoscopic computer-generated topographic maps known as digital elevation models (DEMs) to figure out how particular landscape features form. DEMs are made using images of the landscape taken from two different angles. The Mars Reconnaissance Orbiter spacecraft is designed to regularly point at targets, enabling high-resolution stereo images, McEwen said.

Kirk made a DEM of the crater in the Centauri Montes region where the Malin team found a new bright streak in a gully. Once the DEM was constructed, Pelletier used the topographic information along with a commercially available numerical computer model to predict how deposits in that particular gully would appear if left by a pure water flood versus how the deposits would appear if left by a dry avalanche. The model also predicted specific conditions needed to create each type of debris flow. *"This is the first time that anyone has applied numerical computer models to the bright deposits in gullies on Mars or to DEMs produced from HiRISE images,"* Pelletier said. When he compared the actual conditions of the bright deposit and its HiRISE image to the predictions made by the model, the dry avalanche model was a better fit. *"The dry granular case is both simpler and more closely matches the observations,"* Pelletier said. *"It's just a test,"* he said. *"It's either more like A or more like B. We were surprised that it was more like B."* Pelletier said these new findings indicate, *"There are other ways of getting deposits that look just like this one that do not require water."* One of the team's next steps is using HiRISE images to examine similar bright deposits on less-steep slopes to sort out what processes might have formed those deposits.

FROM THE EDITOR'S TERMINAL

The Stargazer is your 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.

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In April's StarGazer:

- **** **ASTRO CALENDAR - UPCOMING ASTRONOMY EVENTS FOR 2008**
- **** **OBSERVER'S INFORMATION - SUN, MOON, AND PLANET VISIBILITY**
- **** **STAR PARTY CALENDAR FOR 2008**
- **** **CONSTELLATIONS OF THE MONTH – PYXIS**
- **** **YOUNG ASTRONOMER'S CORNER**
- **** **ASTRONOMY & TELESCOPE LINGO**
- **** **ASTRONOMY "FUN FACTS"**
- **** **OLDEST KNOWN ASTEROIDS**
- **** **DISCOVERY OF 10 NEW PLANETS– REVOLUTIONIZES UNDERSTANDING OF EXTRASOLAR PLANETS**
- **** **CASSINI FINDS OCEAN MAY EXIST BENEATH TITAN'S CRUST**
- **** **PUZZLING 'EYE OF A HURRICANE' ON VENUS**
- **** **ACTION REPLAY OF POWERFUL STELLAR EXPLOSION**
- **** **NOVEL SPOTS FOUND ON JUPITER**
- **** **SEEING THROUGH THE DARK - MAPPING THE INTERIOR OF INTERSTELLAR CLOUDS IN DETAIL**
- **** **BRITAIN'S BIGGEST METEORITE IMPACT FOUND**
- **** **STARS BURST INTO LIFE IN THE EARLY UNIVERSE**
- **** **DIRTY SPACE AND SUPERNOVAE**
- **** **METEORITES ARE RICH SOURCE FOR PRIMORDIAL SOUP**
- **** **"FOCUSED" SOLAR EXPLOSIONS GET HOTTER**
- **** **LIQUID WATER FOUND FLOWING ON MARS? - NOT YET**

<p>The next EAS Meeting is 7:00 P.M. Saturday April 12th at the 'Aurora Astro Products' store location at Silver Lake.</p>
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