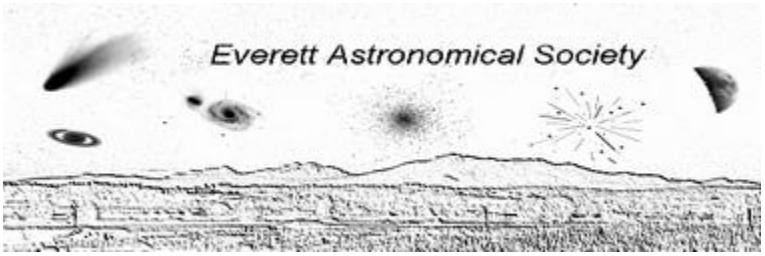
Volume MMVIV. No. 4



The Stargazer

April 2009

President: Mark Folkerts	(425) 486-9733	folkerts at seanet.com	***The Stargazer***
Vice President: James Bielaga	(425) 337-4384	jamesbielaga at aol.com	**P.O. Box 12746**
Librarian: Mike Locke	(425) 259-5995	lockemi at comcast.net	**Everett, WA 98206**
Treasurer: Carol Gore	(360) 856-5135	janeway7C at aol.com	
Newsletter co-editor: Bill O'Neil	(774) 253-0747	wonastrn at netway.com	
Web assistance: Cody Gibson		sircody01 at comcast.net	*See EAS website at:*
		(change 'at' to @ to send email)	http://everettastro.org

EAS BUSINESS…

NEXT EAS MEETING – SAT. APRIL 25TH 7PM AT AURORA ASTRO PRODUCTS STORE AT SILVER LAKE.

★★ Saturday April 25th 7:00 pm Meeting ★★

The program will be the International Year of Astronomy new production **'400 Years of the Telescope'** from the Night Sky Network, covering the telescope and it role in discovery from Galileo's observations in 1609 up through the modern observatories of today.

We will also discuss plans for Astronomy Day coming up May 1 and 2. Attending members will be eligible for drawing for our monthly door prize item.

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 ★

★ Scheduled EAS Star Parties at Ron Tam's: ★

Saturday April 18, or April 25 retry
Saturday May 23 (Memorial Day weekend)
Saturday June 20
Saturday July 18
Saturday August 22
Saturday September 19
Saturday October 17
Saturday November 14

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.

ASTRONOMY DAY STAR PARTIES: (May 1st & 2nd)

The EAS will hold Astronomy Day star parties at Harborview Park on Friday May 1st and Saturday May 2nd, if the weather permits. Please bring your telescope and show the sky to the public !

Please also join the EAS mail list, **and then send mail to the mail list** at ***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

APRIL -

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 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

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

"Mention your EAS club membership at Jim Bielaga's astronomy store 'Aurora Astro Products' and receive a 10% discount on all purchases. This is an exclusive discount to current 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

Hours:
Monday, Thursday, Friday – 9:00 am to 6:00 pm
Tuesday/Wednesday – Noon to 6:00 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.

Astro Calendar for 2009

April 2009

Apr 02 - 50th Anniversary (1959), Selection Of Mercury 7Astronauts
Apr 22 - Lyrids Meteor Shower Peak
Apr 23-26 - Camp Delany star party at Sun Lakes State Park
Apr 25 – EAS Meeting – Aurora Astro Products – 7:00 pm
Apr 25 – EAS Star Party at Ron Tam's place
Apr 29-May 03 - Astronomy Week

May 2009

May 01 - Astronomy Day Star Party at Harborview Park (dusk)
May 02 - Astronomy Day at Future of Flight and Evergreen Branch Library – 10:00 to 5:00
May 02 - Astronomy Day Star Party at Harborview Park (dusk)
May 05 - Eta Aquarids Meteor Shower Peak
May 23 – EAS Star Party at Ron Tam's place
May 30 – EAS Meeting – Aurora Astro Products – 7:00 pm

June 2009

Jun 05 - Venus at its Greatest Western Elongation (46 Degrees)
Jun 20 – EAS Star Party at Ron Tam's place
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 18 – EAS Star Party at Ron Tam's place
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 22 – EAS Star Party at Ron Tam's place
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 19 – EAS Star Party at Ron Tam's place
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 17 – EAS Star Party at Ron Tam's place
Oct 21 - Orionids Meteor Shower Peak

November 2009

Nov 14 – EAS Star Party at Ron Tam's place

December 2009

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, and entitles members to the monthly newsletter, *The Stargazer.* Also, a 10% discount is also being offered to EAS members for purchases at Aurora Astro Products in Everett. Only members may vote in EAS elections, or be eligible for EAS drawings.

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

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
Jun 15	Last Quarter Moon
Mar 22	New Moon
Jun 29	First Quarter Moon
Jul 07	Full Moon

Up In The Sky -- The Planets (and Pluto)

Object	*Rises*	*Sets*	*Con*	*Diam.*	*Mag*
Sun	***06:02 am***	***20:14***	***Ari***	***30'***	***-27.5***
Mercury	**06:37 am**	**22:14**	**Tau**	**08"**	**+0.3**
Venus	**04:38 am**	**17:05**	**Psc**	**42"**	**-4.5**
Mars	05:02 am	17:08	Psc	04"	+1.2
Jupiter	**03:40 am**	**13:55**	**Cap**	**37"**	**-2.2**
Saturn	**15:24**	**04:42 am**	**Leo**	**19"**	**+0.7**
Uranus	**04:46 am**	**16:27**	**Psc**	**03"**	**+5.9**
Neptune	**03:45 am**	**13:52**	**Cap**	**02"**	**+7.9**
Pluto	**00:27 am**	**09:50 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

CONSTELLATIONS OF THE MONTH - ARA

ARA: Ara, "the Altar", is a Southern Hemisphere constellation, and borders on the constellations of Apus, Corona Australis, Norma, Pavo, Scorpius, Telescopium, and Triangulum Australe. There are no established asterisms within its borders, nor is the constellation known for any meteor showers; it also contains no Messier objects. Ara ranks 34th in overall brightness among the constellations, but only 63rd in size: it takes up approximately 237.06 square degrees (0.575%) of the sky. Ara is completely visible from latitudes South of +22 degrees, and completely invisible from latitudes North of +45 degrees. It has 19 stars brighter than magnitude 5.5, and its central point is at RA=17h18m, Dec.= -56.5 degrees. The midnight culmination date of Ara is June 10th, and the solar conjunction date is December 9th.

Some of the nearest stars to our Sun are contained within the borders of this small constellation. These include LFT 1351 (the 30th closest to our Sun; apparent magnitude of 9.4; absolute magnitude of 11.0; light-year distance: 15.09); 41 Ara A-B (103rd closest system: 41 Ara-A: apparent magnitude of 5.5; absolute magnitude of 6.1; light-year distance: 24.89; 41 Ara-B: apparent magnitude of 8.7; absolute magnitude of 9.3; light-year distance: 24.89); and LFT 1297 (167th closest: apparent magnitude of 14.4; absolute magnitude of 14.5; light-year distance of 31.05).

In addition to being known for many multiple and double (such as Gamma Arae) star systems, as well as many variable stars (such as the eclipsing binary R Arae and the long-period variable X Arae), Ara contains two special deep sky objects of note within its confines. Lying at a distance of "only" about 8,400 light years, and with a visual magnitude of 7.5, NGC-6397 is most likely the nearest globular cluster to our solar system. The other object of note, the beautiful diffuse nebula NGC 6188, is located near the central line of the Milky Way Galaxy. NGC-6188 is located about 7 degrees south and west of Zeta Scorpii. The brightest portion of the nebula, discovered by John Herschel in 1836, has an irregular triangular shape. The illumination for the entire nebula is supplied by the massive stars of the galactic star cluster NGC-6193, a grouping itself about 15 light years in diameter (the brightest star in this grouping is the visual double h4876, an O-type giant star with a probable actual luminosity of about 3,000 suns.) The dark areas of this nebula are bordered by brighter rims which appear to reflect the glare of the involved stars, making an entire scene reminiscent of the Horsehead Nebula in Orion. Some experts have proposed that these bright-rim nebulae mark the leading edge of advancing shock waves as the dark cloud expands and sweeps up interstellar gas and dust. First observed by Lacaille in 1755, NGC-6397 is located on the left edge of the Milky Way, about 10.5 degrees south of Theta Scorpii; again, studies indicate that it may be the closest of all globulars to our Solar System. This globular is easily resolved in smaller scopes because of its relatively scattered structure. Burnham states that this lesser known cluster actually resembles the much better-known M4 in Scorpius in structure, brightness, and apparent size. The integrated spectral type of this cluster is F5 and the radial velocity is about 6.5 miles per second in recession. An odd feature of NGC-6397 is the likely absence of short-period pulsating variables which are often found in globulars. For example, Omega Centauri contains over 160, and M3 has almost 200. The brightest members of NGC-6397 are red giants of about 500 times the luminosity of the Sun; the total luminosity of the cluster is about 8,000 times the light of the Sun, and is therefore much fainter than many other globular clusters. The true diameter of the cluster is somewhere around 50 light years.

YOUNG ASTRONOMER'S CORNER

The Young Astronomer's Corner periodically asks some questions that young people may be seeking an answer to. Here are some such questions about astronomy and space exploration:

Q. Why should we build a space station?

A. The simple answer is that if humans are going to explore outer space, we need to know a lot more information about it. Space has no air to breathe and a micro-gravity atmosphere. The space shuttle and space station missions allow astronauts and cosmonauts to conduct many useful experiments in the weightlessness of space; but because shuttle missions are only about 2 weeks in duration, the longer orbiting time for the space station would allow longer time for some important experiments to be conducted. These include the long-term effects of weightlessness on humans, certain medical and laboratory experiments (including crystal, food and plant growth) and the effects of living in close, cramped quarters over long periods of time. By studying issues such as these in space, we can prepare perhaps for a future colony on the Moon and perhaps on another planet, as well as gain a fuller appreciation and knowledge of our life here on Earth.

Q. How long do stars live?

A. When a star is born from a large cloud of gas and dust, its size determines how long it will live. In general, the smaller the star, the longer it will live. Smaller stars with very low mass make helium from hydrogen (also known as fusion) very slowly. These stars tend to be cooler and thus redder in appearance, and burn for trillions(!) of years before they use all of their hydrogen found in the core. Medium sized stars, like our Sun, burn faster however. Because they are larger, there is more pressure from gravity in their cores, which causes nuclear fusion reactions to happen more quickly: they use up their hydrogen fuel more quickly. Stars such as the size of our Sun live for a few billion years. The most massive stars are generally the hottest and most unstable; they 'die' from processes such as a collapse from their own weight to form supernovae, neutron stars, and/or pulsars for example; these largest stars die within 'only' a few million years. In general, when it comes to stars, the bigger you are, the shorter your life.

Q: Which planet has the largest moon?

A: Jupiter. The name of the moon is Ganymede, and it also happens to be the largest moon in the entire solar system. It is 3,166 miles in diameter, and is thus larger than the planets Mercury (2,930 miles diameter) and Pluto (1,380 miles diameter). By comparison, Earth's Moon is 2,086 miles in diameter.

PLANETARY FOCUS

"Planetary Focus" is a periodic column that is published occasionally in the EAS "Stargazer". If you have a favorite planet that you would like similar information and/or statistics on, please contact newsletter co-editor Bill O'Neil. This column will return for the warm-weather months, in time for observing season.

ASTRONOMY AND TELESCOPE "LINGO"

ASTRONOMY LINGO: ***DQ HERCULIS STARS:*** A magnetic cataclysmic variable in which the large magnetic field of the white dwarf affects the rotation of and accretion of material onto that white dwarf star. DQ Herculis stars are also known as intermediate polar systems, in which the spin period of the white dwarf is typically 10 times shorter than the orbital period. Accretion flow is channeled along magnetic field lines directly onto the polar cap of the white dwarf, and an accretion disk may be present in an intermediate polar system (i.e., a DQ Herculis star).

TELESCOPE / EQUIPMENT LINGO: ***MAGNETOMETER:*** Any of a variety of instruments used to measure the strength and direction of a magnetic field.

ASTRONOMY "FUN FACTS"

- ★ T-Tauri stars, named after the first to be discovered in the constellation Taurus, are newly born or created stars, and are always associated with giant gaseous nebulae from which they arise. The luminosities of these stars vary erratically, most probably because they are still growing and accumulating material before they reach the more stable main-sequence state. The prototype star T-Tauri is expected to evolve to main-sequence status about 10 million years from now, at about the same time when a long succession of earthquakes along the California San Andreas fault will have moved Los Angeles essentially to the latitude of San Francisco!!
- ★ Sirius B (a companion of the brightest star in all the sky after the Sun: Sirius) is the first white dwarf to be discovered, and lies at a distance from Earth of about 9 light-years. Even though smaller than Earth, all its matter weighs almost as much as the Sun……as a matter of fact, just a handful of its matter would weigh about 500 tons!
- ★ Any globular cluster that contains 1 million stars would have more stars packed within its volume than anywhere else in the Galaxy except the galactic core. If each star in the cluster could be represented by a 1-inch diameter golf ball, the entire cluster could be contained in a spherical volume with a diameter of 10,000 miles, and the average separation between golf balls could still be 100 miles. Even in the most densely packed globular cluster cores, the golf balls would still have 33 miles separation between them. This is comparable to your next-door neighbor living 40,000 miles away (if the Earth were big enough!!).

"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 the new column, and is not intended to imply that there is optical mirror symmetry between the two objects.***

CLASS OF OBJECT: B-STARS: Massive hot blue ultraviolet stars of spectral type B that have surface temperatures of about 10,000 to 28,000 Kelvin for main-sequence stars and up to 30,000 Kelvin for supergiants. Absorption lines of neutral helium (He-I) dominate the spectrum. Balmer lines of hydrogen intensify from B-0 to B-9, with lines of ionized magnesium and silicon also present. Some B-stars – the B-E stars - have emission lines emanating from a circumstellar shell of gas. B-0, B-1, and B-2 stars are found in OB associations (groups of highly luminous and massive main-sequence stars of spectral types O and B) found in the gas and dust-rich areas of the spiral arms of galaxies.

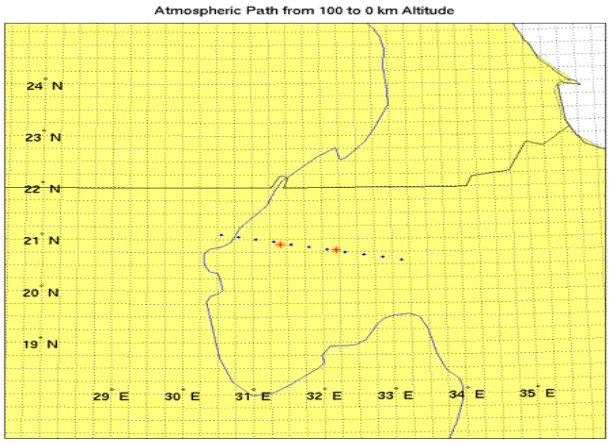
REPRESENTATIVE NORTHERN HEMISPHERE OBJECT: ***BELLATRIX:*** A remote very luminous blue-white giant that is the third brightest star in the constellation of Orion (as we face Orion and he "looks" at Earth, his sword (the Great Orion Nebula) hangs down on his right (our left); Bellatrix is thus the bright star we see in his opposite (to the sword), or left, shoulder (Betelgeuse is thus his *right* shoulder). Bellatrix has a visual magnitude of 1.6; spectral type B-2-III; and a distance of 110 parsecs.

REPRESENTATIVE SOUTHERN HEMISPHERE OBJECT: ***ALPHA CRUCIS:*** The brightest in the constellation Crux, this bright white star is actually a visual binary with a separation of 4"; both components are spectroscopic binaries. The visual magnitude of component A is 1.3; component B is 1.7; together their visual magnitude is 0.76. The spectral type of component A is B-1 (IV) and component B is B-1 (V); the distance to the system is 160 parsecs.

ASTRONOMICAL NOTES -- ON & OFF THE WEB…

WE SAW IT COMING! ASTEROID TRACKED FROM OUTER SPACE TO GROUND IMPACT

Reports by scientists of meteorites striking Earth in the past have resembled police reports of so many muggings -- the offenders came out of nowhere and then disappeared into the crowd, making it difficult to get more than very basic facts. Now an international research team has been able to identify an asteroid in space before it entered Earth's atmosphere, enabling computers to determine its area of origin in the solar system as well as predict the arrival time and location on Earth of its shattered surviving parts.



The predicted path of the asteroid is noted at 10 km intervals from 100 to 0 km altitude, neglecting atmospheric drag. The red dots indicate the

reported instances of atmospheric entry at 65.4 km altitude and for the airburst at 37 km.

"*I would say that this work demonstrates, for the first time, the ability of astronomers to discover and predict the impact of a space object*," says researcher Mark Boslough, a member of the research team. Perhaps more importantly, the event tested the ability of society to respond very quickly to a predicted impact, says Boslough. "*In this case, it was never a threat, so the response was scientific. Had it been deemed a threat -- a larger asteroid that would explode over a populated area -- an alert could have been issued in time that could potentially save lives by evacuating the danger zone or instructing people to take cover*." The profusion of information in this case also helps meteoriticists learn the orbits of parent bodies that yield various types of meteorites. Such knowledge could help future space missions explore or even mine the asteroids in Earth-crossing orbits, Boslough says. The four-meter-diameter asteroid, called 2008 TC3, was initially sighted by the automated Catalina Sky Survey telescope at Mount Lemmon, Ariz., on Oct. 6. Numerous observatories, alerted to the invader, then imaged the object. Computations correctly predicted impact would occur 19 hours after discovery in the Nubian Desert of northern Sudan.

According to the Near Earth Object program, "*A spectacular fireball lit up the predawn sky above Northern Sudan on October 7, 2008*." A wide variety of analyses were performed while the asteroid was en route and after its surviving pieces were located by meteorite hunters in an intense search. Dick Spalding interpreted recorded data about the atmospheric fireball, and Boslough estimated the aerodynamic pressure and strength of the asteroid based on the estimated burst altitude of 36 kilometers.

Searchers have recovered 47 meteorites so far -- offshoots from the disintegrating asteroid, mostly immolated by its encounter with atmospheric friction -- with a total mass of 3.95 kilograms. The analyzed material showed carbon-rich materials not yet represented in meteorite collections, indicating that fragile materials still unknown may account for some asteroid classes. Such meteorites are less likely to survive due to destruction upon entry and weathering once they land on Earth's surface. "*Chunks of iron and hard rock last longer and are easier to find than clumps of soft carbonaceous materials*," says Boslough.

"*We knew that locating an incoming object while still in space could be done, but it had never actually been demonstrated until now*," says Boslough. "*In this post-rational age where scientific explanations and computer models are often derided as 'only theories,' it is nice to have a demonstration like this*."

ASTEROID IMPACT HELPS TRACE METEORITE ORIGINS

The car-sized asteroid 2008 TC3 that exploded above the Nubian Desert last October was small compared to the dinosaur-killing, civilization-ending objects that still orbit the sun. But that didn't stop it from having a huge impact among scientists. This was the first instance of an asteroid spotted in space before falling to Earth. Researchers rushed to collect the resulting meteorite debris, and a new paper reports on this first-ever opportunity to calibrate telescopic observations of a known asteroid with laboratory analyses of its fragments.

"*Any number of meteorites have been observed as fireballs and smoking meteor trails as they come through the atmosphere*," says Douglas Rumble, a co-author of the paper. "*It's been happening for years. But to actually see this object before it gets to the Earth's atmosphere and then to follow it in -- that's the unique thing*."

The chemical compositions of asteroids can be studied from Earth by analyzing the spectra of sunlight reflected from their surfaces. This provides enough information to divide asteroids into broad categories, but does not yield detailed information on their compositions. On the other hand, meteorites recovered on Earth can be analyzed directly for chemical composition, but researchers generally have no direct information on what type of asteroid they came from.

The asteroid, known as 2008 TC3, was first sighted October 6, 2008, by telescopes of the automated Catalina Sky Survey near Tucson Arizona. Numerous observatories followed its trajectory and took spectrographic measurements before it disappeared into the Earth's shadow the following day. A recovery team led by Peter Jenniskens and Muawia Shaddad then searched for meteorites along the projected approach path in northern Sudan. They recovered 47 fragments, one of which was selected for preliminary analysis by laboratories. "*This asteroid was made of a particularly fragile material that caused it to explode at a high 37 kilometer altitude, before it was significantly slowed down, so that the few surviving fragments scattered over a large area*," explains Jenniskens, the lead author of the paper. "*The recovered meteorites were unlike anything in our meteorite collections up to that point*."

Andrew Steele studied the meteorite's carbon content, which showed signs that at some point in its past the meteorite had been subjected to very high temperatures. "*Without a doubt, of all the meteorites that we've ever studied, the carbon in this one has been cooked to the greatest extent*," says Steele. "*Very cooked, graphite-like carbon is the main constituent of the carbon in this meteorite*." Another form of carbon Steele found in the meteorite, nanodiamonds, may give clues as to whether the heating was caused by impacts on the parent asteroid, or by some other process. Oxygen isotopes in the meteorite give other information about its parent body. Each source of meteorites in the solar system, including planets such as Mars, has a distinctive signature of the three isotopes 16O, 17O, and 18O. This signature can be recognized even when other variables, such as chemical composition or rock type, differ. "*Oxygen isotopes represent the single most decisive measurement in determining the parental or family groupings of meteorites*," says Rumble who performed the analysis. According to Rumble's analysis, 2008 TC3 falls into a category of very rare meteorites called ureilites, all of which may have originally come from the same parent body. "*Where that is, we don't know*," says Rumble. But because astronomers took spectral measurements of 2008 TC3 before it hit the Earth, and can compare those measurements with the laboratory analyses, scientists will be better able to recognize ureilite asteroids in space. One known asteroid with a similar spectrum, the 2.6 kilometer-sized asteroid 1998 KU2, has already been identified by researchers as a possible source for 2008 TC3. http://www.ciw.edu/sites/www.ciw.edu/files/news/PRRumbleSteeleAsteroid-ImageAMedforWeb.jpg

TEAM FINDS RICHES IN 2008TC3 METEORITE TREASURE HUNT

Just before dawn on Oct. 7, 2008, an SUV-sized asteroid entered Earth's atmosphere and exploded harmlessly over the Nubian Desert of northern Sudan. Scientists expected the asteroid, called 2008 TC3, had blown to dust in the resulting high-altitude fireball. What happened next excited the scientific community. Peter Jenniskens, a meteor astronomer with the SETI Institute, joined Muawia Shaddad in Sudan to search for possible extraterrestrial remnants from the asteroid. Now, for the first time, scientists are studying recovered celestial meteorites that have a definitive link with an asteroid from space. This presents the science community an unprecedented opportunity to interpret asteroid

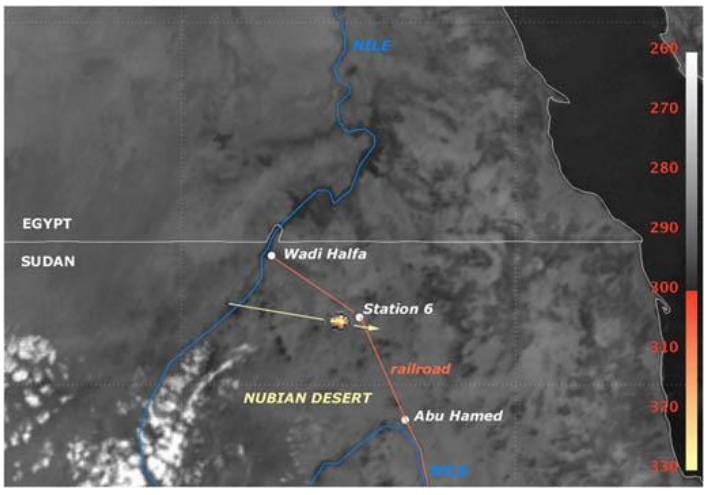
data and learn more about the origins and differentiations between asteroids and may provide better answers about the formation of our solar system.

Image taken by a cell phone of the contrail left by 2008 TC3 during its decent. Image courtesy: Shaddad
http://jpl.nasa.gov/images/asteroid/20090325/apod-browse.jpg

The asteroid was discovered by a telescope of the Catalina Sky Survey. Astronomers and scientists around the world tracked and scanned TC3 for 20 hours prior to its demise. This marked the first time a celestial object was located prior to entering Earth's atmosphere. The asteroid had a velocity of 27,700 miles per hour when it entered the atmosphere. It created a fiery trail 51 miles long before exploding 121,000 feet from the ground.

"*When Dr. Shaddad and I first arrived and started interviewing eyewitnesses, things looked very bleak*," said Jenniskens. "*They all described an immense explosion in the sky, but none had seen any material flying out of the fireball*." The location and subsequent recovery was like searching for a needle in a haystack. Scientists used what they referred to as a treasure map to locate the meteorites.

JPL produced a chart that gave the recovery team its search grid and specific target area. "*My work usually begins and ends with trajectories of objects in space*," said Steve Chesley, a scientist at JPL. "*We had accurately predicted when and where TC3 would enter over the Sudan. Jenniskens was asking for a map of where any surviving fireball fragments could have landed. That was a first for the Near-Earth Object Program Office."*

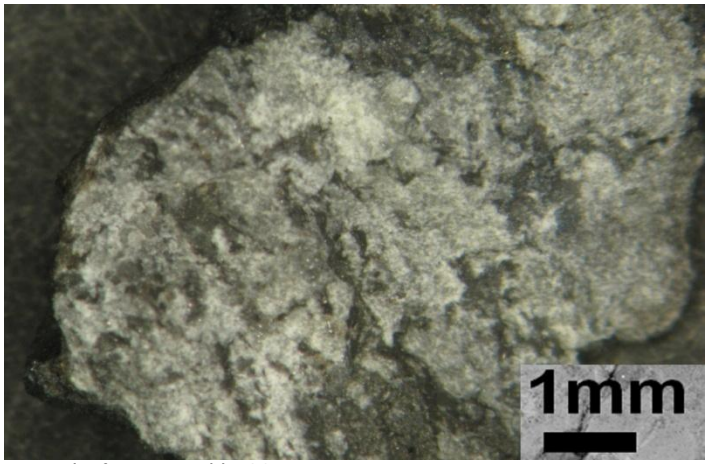


Infrared image taken by the Meteosat 8 satellite of asteroid 2008 TC3 exploding. Image courtesy: EUMESTAT

Armed with the treasure map, Jenniskens, Shaddad and students and staff from the University of Khartoum began their trek in the afternoon of Dec. 6, 2008. After a three-day search, the team had scoured 18 miles along Chesley's asteroid path and recovered 15 samples with a total mass 1.24 pounds. Scientists observed the meteorites to be porous, rocky material, rounded like a pebble, with a broken face, and very black in color.

University of Khartoum students and staff prepare to search for meteorite remnants

Jenniskens and the Khartoum team visited the site on two more occasions and collected 280 meteorites with a total mass of approximately 11 pounds. Samples were sent for analysis to Ames, Johnson Space Center, the Carnegie Institution, and Fordham University.



Meteorite from asteroid TC3.
http://www.jpl.nasa.gov/images/asteroid/20090325/tc3.jpg

"*We certainly found a treasure*," said Michael Zolensky, a cosmic mineralogist at Johnson. "*We have never seen a meteorite on Earth exactly like this one because they are so fragile that they explode high in the atmosphere. The samples appear to have originated from the surface of the original asteroid, making them especially valuable to planetologists explaining the geological history of primitive bodies and planning spacecraft missions to asteroids*." By measuring how asteroid 2008TC3 reflected sunlight in space and comparing it to how the meteorites found on the ground reflected sunlight, the team concluded that the

meteorites came from the surface of an F-class asteroid in our solar system's asteroid belt. Furthermore, the team determined that the meteorite was what astronomers refer to as a polymic ureilite, in other words, a very rare and unusually fragile, dark rock.

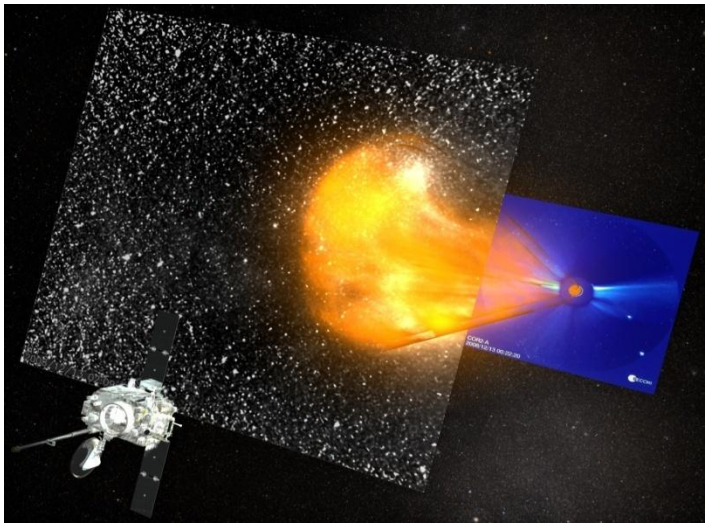
NASA detects and tracks asteroids and comets passing close to Earth through a program commonly called Spaceguard. Asteroid 2008TC3 was relatively small to most objects detected and tracked by Spaceguard. Scientists estimate asteroids of its size enter Earth's atmosphere approximately once a year, but meteorites rarely survive once they land because of weather and water damage as well as human disturbance. Scientists are astounded at the good luck that not only did the meteorites land in a part of the world with ideal conditions to preserve such cosmic artifacts, but the observatories on the ground were able to detect and track the asteroid's entry. Near-Earth Object office,: http://neo.jpl.nasa.gov 2008TC4 detection and recovery effort,: http://www.nasa.gov/topics/solarsystem/tc3/

STEREO SPACECRAFT SHOW 3-D ANATOMY OF SOLAR STORM

Twin spacecraft have provided scientists with their first view of the speed, trajectory, and three-dimensional shape of powerful explosions from the sun known as coronal mass ejections, or CMEs. This new capability will dramatically enhance scientists' ability to predict if and how these solar tsunamis could affect Earth. When directed toward our planet, these ejections can be breathtakingly beautiful and yet potentially cause damaging effects worldwide. The brightly colored phenomena known as auroras -- more commonly called Northern or Southern Lights -- are examples of Earth's upper atmosphere harmlessly being disturbed by a CME. However, ejections can produce a form of solar cosmic rays that can be hazardous to spacecraft, astronauts and technology on Earth. Space weather produces disturbances in electromagnetic fields on Earth that can induce extreme currents in wires, disrupting power lines and causing wide-spread blackouts. These sun storms can interfere with communications between ground controllers and satellites and with airplane pilots flying near Earth's poles. Radio noise from the storm also can disrupt cell phone service. Space weather has been recognized as causing problems with new technology since the invention of the telegraph in the 19th century.

The twin Solar Terrestrial Relations Observatory, or STEREO, spacecraft are providing the unique scientific tool to study these ejections as never before. Launched in October 2006, STEREO's nearly identical observatories can make simultaneous observations of these ejections of plasma and magnetic energy that originate from the sun's outer atmosphere, or corona. The spacecraft are stationed at different vantage points. One leads Earth in its orbit around the sun, while the other trails the planet. Using three-dimensional observations, solar physicists can examine a CME's structure, velocity, mass, and direction in the corona while tracking it through interplanetary space. These measurements can help determine when a CME will reach Earth and predict how much energy it will deliver to our magnetosphere, which is Earth's protective magnetic shield. "*Before this unique mission, measurements and the subsequent data of a CME observed near the sun had to wait until the ejections arrived at Earth three to seven days later*," said Angelos Vourlidas, a solar physicist. Vourlidas is a project scientist for the Sun Earth Connection Coronal and Heliospheric Investigation, STEREO's key science instrument suite. "*Now we can see a CME from the time it leaves the solar surface until it reaches Earth, and we can reconstruct the event in 3D directly from the images*."

These ejections carry billions of tons of plasma into space at thousands of miles per hour. This plasma, which carries with it some of the magnetic field from the corona, can create a large, moving disturbance in space that produces a shock wave. The wave can accelerate some of the surrounding particles to high energies that can produce a form of solar cosmic rays. This process also can create disruptive space weather during and following the CME's interaction with Earth's magnetosphere and upper atmosphere.



Credit: Walt Feimer, NASA's Goddard Spaceflight Center

"*The new vantage point of these spacecraft has revolutionized the study of solar physics*," said Madhulika Guhathakurta, STEREO program scientist. "*We can better determine the impact of CME effects on Earth because of our new ability to observe in 3D*." STEREO mission page: http://www.nasa.gov/stereo

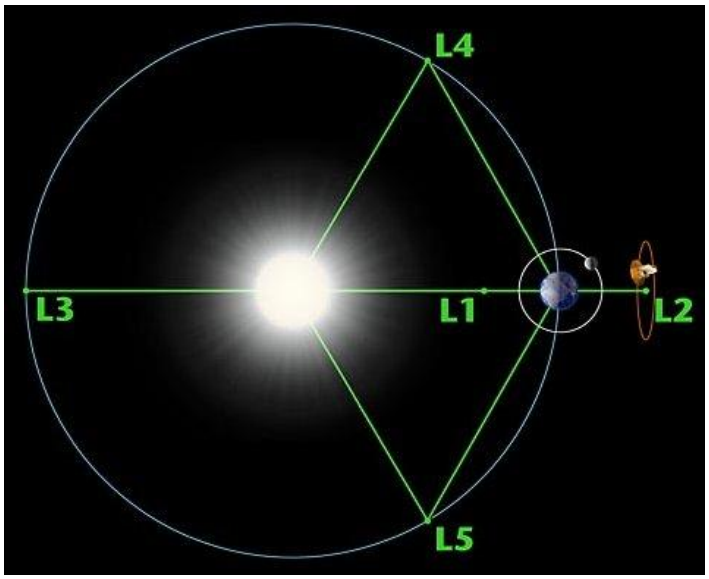
HUNTING FOR REMAINS OF AN ANCIENT PLANET NEAR EARTH

The twin STEREO space probes are entering a mysterious region of space to look for remains of an ancient planet which once orbited the Sun not far from Earth. If they find anything, it could solve a major puzzle--the origin of the Moon. "*The name of the planet is Theia*," says Mike Kaiser, STEREO project scientist. "*It's a hypothetical world. We've never actually seen it, but some researchers believe it existed 4.5 billion years ago - and that it collided with Earth to form the Moon*." The "Theia hypothesis" is a brainchild of theorists Edward Belbruno and Richard Gott. It starts with the popular Great Impact theory of the Moon's origin. Many astronomers hold that in the formative years of the solar system, a Mars-sized protoplanet crashed into Earth. Debris from the collision, a mixture of material from both bodies, spun out into Earth orbit and coalesced into the Moon. This scenario explains many aspects of lunar geology including the size of the Moon's core and the density and isotopic composition of moon rocks.

It's a good theory, but it leaves one awkward question unanswered: Where did the enormous protoplanet come from? Belbruno and Gott believe it came from a Sun-Earth Lagrange point. Sun-Earth Lagrange points are regions of space where the pull of the Sun and Earth combine to form a "gravitational well." The flotsam of space tends to gather there much as water gathers at the bottom of a well on Earth. 18th-century mathematician Josef Lagrange proved that there are five such wells in the Sun-Earth system: L1, L2, L3, L4 and L5 located as shown in the diagram below.

When the solar system was young, Lagrange points were populated mainly by planetesimals, the asteroid-sized building blocks of planets. Belbruno and Gott suggest that in one of the

Lagrange points, L4 or L5, the planetesimals assembled themselves into Theia, nicknamed after the mythological Greek Titan who gave birth to the Moon goddess Selene.



Above: Sun-Earth Lagrange points. The STEREO probes are about to pass through L4 and L5. Solar observatories often park themselves at L1 while deep space observatories prefer L2.

"*Their computer models show that Theia could have grown large enough to produce the Moon if it formed in the L4 or L5 regions, where the balance of forces allowed enough material to accumulate*," says Kaiser. "*Later, Theia would have been nudged out of L4 or L5 by the increasing gravity of other developing planets like Venus and sent on a collision course with Earth*." If this idea is correct, Theia itself is long gone, but some of the ancient planetesimals that failed to join Theia may still be lingering at L4 or L5. "*The STEREO probes are entering these regions of space now*," says Kaiser. "*This puts us in a good position to search for Theia's asteroid-sized leftovers*." Just call them "Theiasteroids."

Astronomers have looked for Theiasteroids before using telescopes on Earth, and found nothing, but their results only rule out kilometer-sized objects. By actually entering L4 and L5, STEREO will be able to hunt for much smaller bodies at relatively close range. "*The search actually began last month when both spacecraft rolled 180 degrees so that they could take a series of 2-hour exposures of the general L4/L5 areas. In the first sets of images, amateur astronomers found some known asteroids and new comet Itagaki was imaged just a couple of days after the announcement of its discovery. No Theiasteroids however*."

Hunting for Theiasteroids is not STEREO's primary mission, he points out. "*STEREO is a solar observatory. The two probes are flanking the sun on opposite sides to gain a 3D view of solar activity. We just happen to be passing through the L4 and L5 Lagrange points en route. This is purely bonus science*." "*We might not see anything*," he continues, "*but if we discover lots of asteroids around L4 or L5, it could lead to a mission to analyze the composition of these asteroids in detail. If that mission discovers the asteroids have the same composition as the Earth and Moon, it will support Belbruno and Gott's version of the giant impact theory*." The search will continue for many months to come. Lagrange points are not infinitesimal points in space; they are broad regions 50 million kilometers wide. The STEREO probes are only in the outskirts now. Closest approach to the bottoms of the gravitational wells comes in Sept-Oct. 2009. "*We have a lot of observing ahead of us*," notes Kaiser.

Readers, you may be able to help. The STEREO team is inviting the public to participate in the search by scrutinizing photos as they come in from the spacecraft. If you see a dot of light moving with respect to the stars, you may have found a Theiasteroid. Links to the data and further instructions may be found at http://sungrazer.nrl.navy.mil . Let the hunt begin!

COOL STARS HAVE DIFFERENT MIX OF PRE- LIFE CHEMICALS

Life on Earth is thought to have arisen from a hot soup of chemicals. Does this same soup exist on planets around other stars? A new study from the Spitzer Space Telescope hints that planets around stars cooler than our sun might possess a different mix of potentially life-forming, or "prebiotic," chemicals. Astronomers used Spitzer to look for a prebiotic chemical, called hydrogen cyanide, in the planet-forming material swirling around different types of stars. Hydrogen cyanide is a component of adenine, which is a basic element of DNA. DNA can be found in every living organism on Earth.

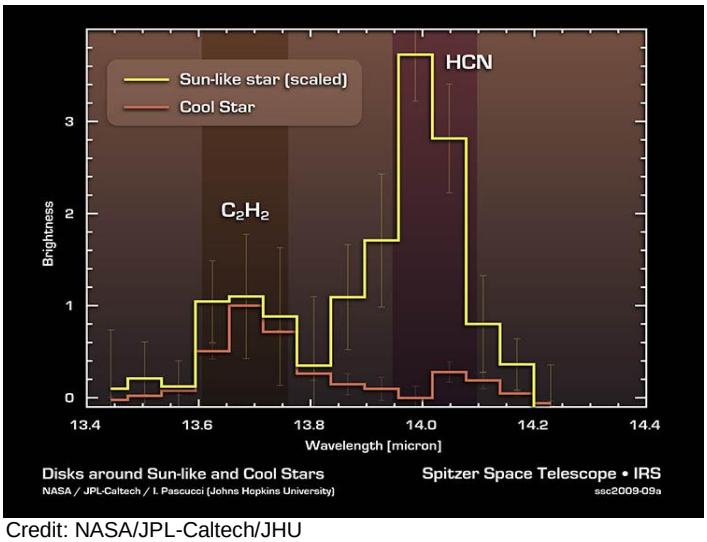
The researchers detected hydrogen cyanide molecules in disks circling yellow stars like our sun -- but found none around cooler and smaller stars, such as the reddish-colored "M-dwarfs" and "brown dwarfs" common throughout the universe. "*Prebiotic chemistry may unfold differently on planets around cool stars*," said Ilaria Pascucci, lead author of the study.

Young stars are born inside cocoons of dust and gas, which eventually flatten to disks. Dust and gas in the disks provide the raw material from which planets form. Scientists think the molecules making up the primordial ooze of life on Earth might have formed in such a disk. Prebiotic molecules, such as adenine, are thought to have rained down to our young planet via meteorites that crashed on the surface. "*It is plausible that life on Earth was kick-started by a rich supply of molecules delivered from space*," said Pascucci.

Credit: NASA/JPL-Caltech/JHU

Could the same life-generating steps take place around other stars? Pascucci and her colleagues addressed this question by examining the planet-forming disks around 17 cool and 44 sun-like stars using Spitzer's infrared spectrograph, an instrument that breaks light apart, revealing signatures of chemicals. The stars are all about one to three million years old, an age when planets

are thought to be growing. The astronomers specifically looked for ratios of hydrogen cyanide to a baseline molecule, acetylene.



Credit: NASA/JPL-Caltech/JHU

They found that the cool stars, both the M-dwarf stars and brown dwarfs, showed no hydrogen cyanide at all, while 30 percent of the sun-like stars did. "*Perhaps ultraviolet light, which is much stronger around the sun-like stars, may drive a higher production of the hydrogen cyanide*," said Pascucci.

The team did detect their baseline molecule, acetylene, around the cool stars, demonstrating that the experiment worked. This is the first time that any kind of molecule has been spotted in the disks around cool stars.

The findings have implications for planets that have recently been discovered around M-dwarf stars. Some of these planets are thought to be large versions of Earth, the so-called super Earths, but so far none of them are believed to orbit in the habitable zone, where water would be liquid. If such a planet is discovered, could it sustain life? Astronomers aren't sure. M-dwarfs have extreme magnetic outbursts that could be disruptive to developing life. But, with the new Spitzer results, they have another piece of data to consider: these planets might be deficient in hydrogen cyanide, a molecule thought to have eventually become a part of us. Said Douglas Hudgins, the Spitzer program scientist, "*Although scientists have long been aware that the tumultuous nature of many cool stars might present a significant challenge for the development of life, this result begs an even more fundamental question: Do cool star systems even contain the necessary ingredients for the formation of life? If the answer is no then questions about life around cool stars become moot*." Spitzer: http://www.spitzer.caltech.edu/spitzer/ http://www.nasa.gov/spitzer/ .

TITAN MAY HAVE SUBSURFACE OCEAN OF HYDROCARBONS

Saturn's largest moon, Titan, may have a subterranean ocean of hydrocarbons and some topsy-turvy topography in which the summits of its mountains lie lower than its average surface elevation, according to new research. Titan is also more squashed in its overall shape - like a rubber ball pressed down by a foot - than researchers had expected, said Howard Zebker, a geophysicist and electrical engineer involved in the work. The new findings may help explain the presence of large lakes of hydrocarbons at both of Titan's poles, which have been puzzling researchers since being discovered in 2007. "*Since the poles are squished in with respect to the equator, if there is a hydrocarbon 'water table' that is more or less spherical in shape, then the poles would be closer down to that water table and depressions at the poles would fill up with liquid*," Zebker said. The shape of the water table would be controlled by the gravitational field of Titan, which is still not fully understood.

Hydrocarbons are the only materials on Titan's surface that would remain liquid at minus 180 degrees Celsius, the average temperature of the moon's surface. Any water would be frozen, making it plausible that instead of groundwater, Titan would have the equivalent in hydrocarbons.

Zebker, and a group of colleagues have been making radar measurements of Titan's surface over the last four years using an instrument aboard the Cassini spacecraft, which is orbiting Saturn. Whenever Cassini passes close enough, they sweep beams of cloud-penetrating radar through Titan's thick atmosphere and across the surface. Using the radar data, they can calculate the surface elevations along the tracks of the sweep. Combining more than 40 tracks across the surface, the researchers were able to calculate the three-dimensional shape of Titan. Zebker said that there were theoretical reasons to expect that Titan was not a perfect sphere, but instead probably slightly oblate, or flattened, due to the centrifugal force from its rotation while orbiting Saturn. But the degree to which Titan is flattened exceeds what would be expected, based upon how close it is to Saturn and its roughly 16-day orbit. It also turns out that Titan is not flattened uniformly. By way of analogy, if you were to put your foot on a rubber ball and press down, the ball would bulge out equally on all sides in the directions perpendicular to the downward force from your foot. But the bulge of Titan is asymmetrical. The longest axis is oriented so that it points toward Saturn, a result of tidal forces from the planet. The shortest axis runs through the poles. And the other axis, oriented in the direction in which Titan orbits Saturn, is intermediate in length. "*While some asymmetry is expected from Saturn's gravitational pull, there is obviously something going on that causes Titan to have a different shape than expected*," Zebker said. There are several possible explanations for Titan's deformity. It might be that when the shape of the moon was determined, it was in an orbit closer to Saturn. "*Another is that there are active geophysical processes occurring inside Titan that further distort the shape*," Zebker said. "*There are probably many other explanations as well, but we don't have enough information from this one experiment to be able to distinguish those*."

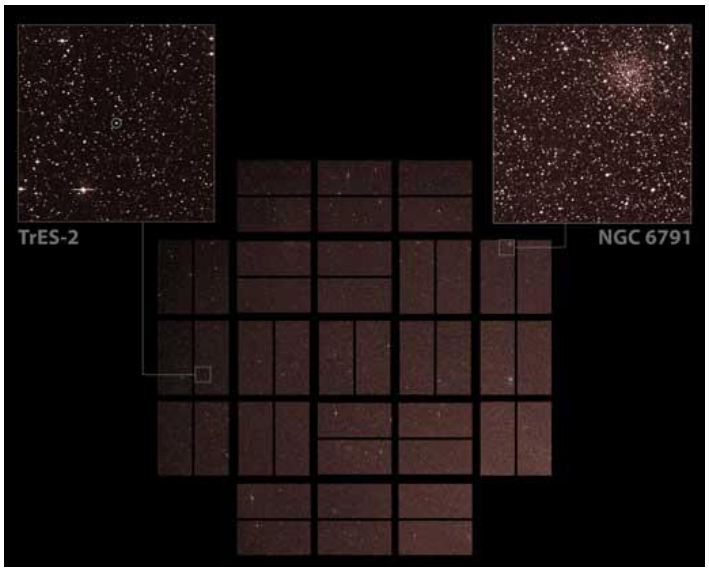
Active geophysical processes might help account for another of Titan's oddities. Zebker said that if you look at images of the surface of Titan, you see surface features that look every bit like mountains on Earth but don't have the high elevations compared to the plains stretching out around them. "*One of the really surprising finds that we have from this, is that the largest apparent continent is lower than the average elevation on Titan, as opposed to higher than the average elevation, as we have on the Earth*," Zebker said. "*My favorite explanation is that the material that forms the mountains is simply more dense than the material surrounding them*," he said. That would result in the mountains pushing down the surrounding crust, effectively putting the mountains in a basin of their own creation.

On Earth, the situation is the reverse: The crust that lies under the oceans is denser than the material that makes up the continental crust, where mountain ranges are built up. "*The things that we would expect to exist on the surface of Titan would either be solid hydrocarbon materials, essentially frozen ethane and methane, and that is fairly light, and then frozen water ice, which is denser*," Zebker said. "*If the mountains are composed of water ice and the plain features in between are composed of these solid hydrocarbons, that could lead to this kind of a situation*."

Zebker said that research currently being conducted by other scientists to decipher the gravity field of Titan should help resolve some of the questions raised by his team's latest work. But he's holding off making any predictions. "*All of it surprises me because you never know what you are going to see*," he said.

KEPLER CAPTURES FIRST VIEWS OF PLANET-HUNTING AREA

The Kepler mission has taken its first images of the star-rich sky where it will soon begin hunting for planets like Earth. The new "first light" images show the mission's target patch of sky, a vast starry field in the Cygnus-Lyra region of our Milky Way galaxy. One image shows millions of stars in Kepler's full field of view, while two others zoom in on portions of the larger region. One new image from Kepler shows its entire field of view -- a 100-square-degree portion of the sky, equivalent to two side-by-side dips of the Big Dipper. The regions contain an estimated 14 million stars, more than 100,000 of which were selected as ideal candidates for planet hunting. Two other views focus on just one-thousandth of the full field of view. In one image, a cluster of stars located about 13,000 light-years from Earth, called NGC 6791, can be seen in the lower left corner. The other image zooms in on a region containing a star, called Tres-2, with a known Jupiter-like planet orbiting every 2.5 days.



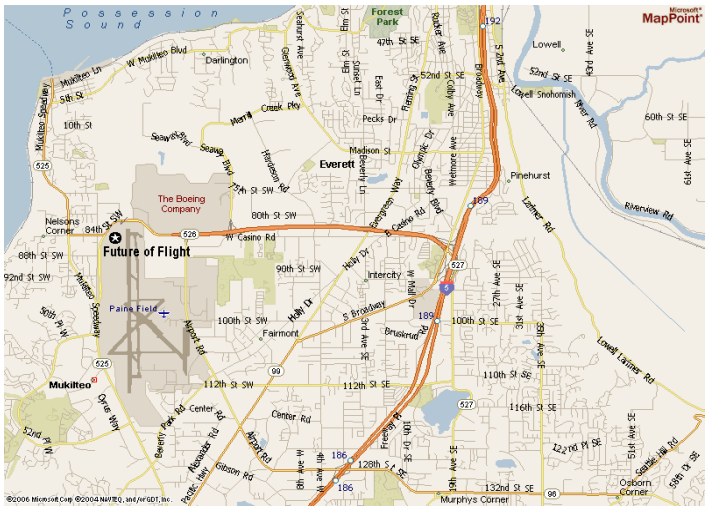
The images can be seen online at:
http://www.nasa.gov/mission_pages/kepler/multimedia/20090416.html

"*It's thrilling to see this treasure-trove of stars*," said William Borucki, science principal investigator for Kepler. "*We expect to find hundreds of planets circling those stars, and for the first time, we can look for Earth-size planets in the habitable zones around other stars like the sun*."

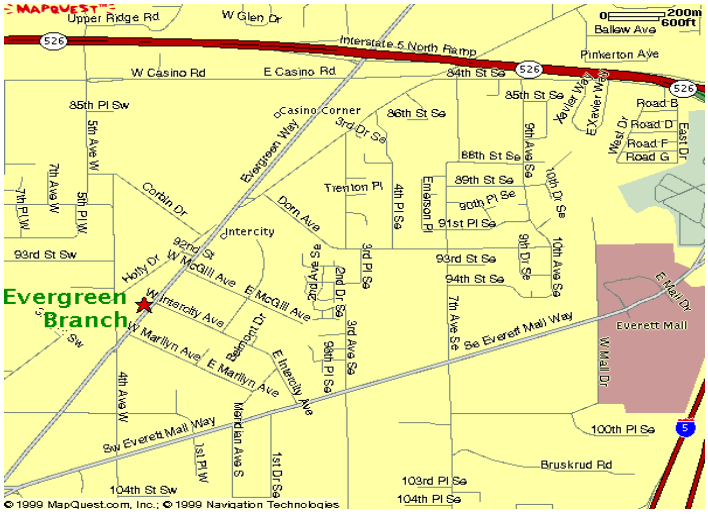
Kepler will spend the next three-and-a-half years searching more than 100,000 pre-selected stars for signs of planets. It is expected to find a variety of worlds, from large, gaseous ones, to rocky ones as small as Earth. The mission is the first with the ability to find planets like ours -- small, rocky planets orbiting sun-like stars in the habitable zone, where temperatures are right for possible lakes and oceans of water. To find the planets, Kepler will stare at one large expanse of sky for the duration of its lifetime, looking for periodic dips in starlight that occur as planets circle in front of their stars and partially block the light. Its 95-megapixel camera, the largest ever launched into space, can detect tiny changes in a star's brightness of only 20 parts per million. Images from the camera are intentionally blurred to minimize the number of bright stars that saturate the detectors. While some of the slightly saturated stars are candidates for planet searches, heavily saturated stars are not. "*Everything about Kepler has been optimized to find Earth-size planets*," said James Fanson, Kepler's project manager. "*Our images are road maps that will allow us, in a few years, to point to a star and say a world like ours is there*."

Scientists and engineers will spend the next few weeks calibrating Kepler's science instrument, the photometer, and adjusting the telescope's alignment to achieve the best focus. Once these steps are complete, the planet hunt will begin. http://www.nasa.gov/kepler

Future of Flight Aviation Center – Astronomy Day Site Map – May 2nd



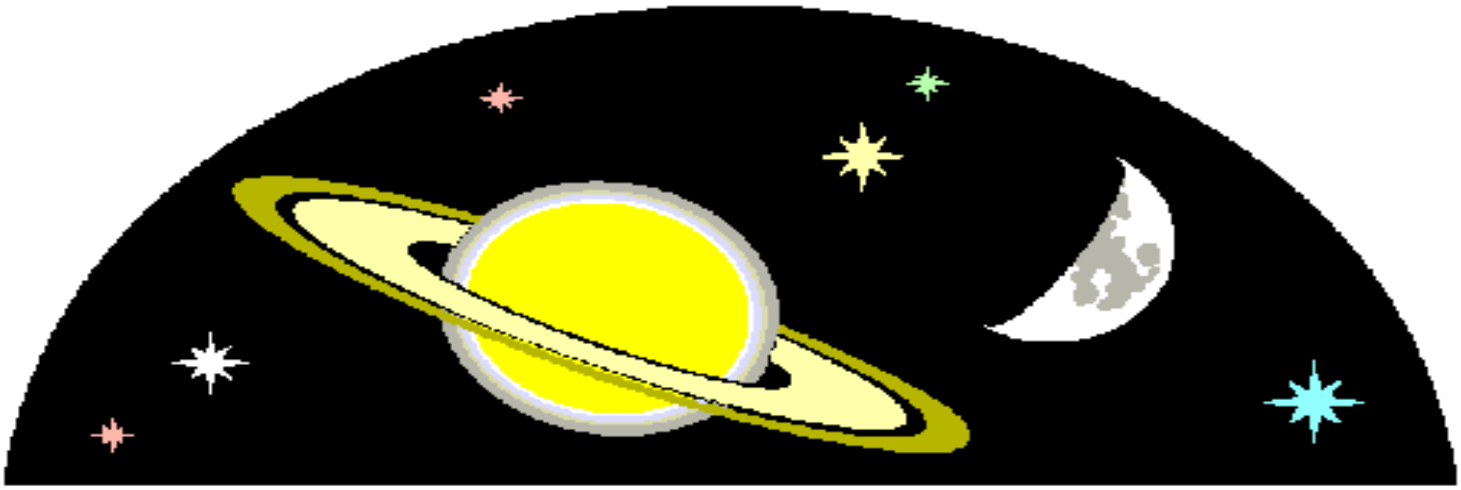
Evergreen Branch Everett Public Library – Astronomy Day Site Map



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.



Saturday May 2, 2009

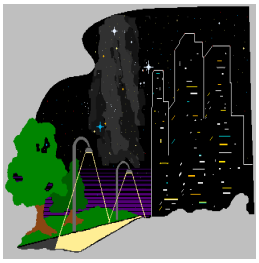
Astronomy Day 2009

Evergreen Branch of Everett Public Library , &

Future of Flight Aviation Center - 10:00 AM - 5:00 PM

& at Harboview Park Friday & Saturday May 1st & 2nd

8:00 to 11:00PM (weather permitting)



* FREE to PUBLIC *

Astro exhibits, Solar prominence viewing,
Astro Telescopes, CCD-digital imaging, Video/Slide-shows,
Meteorites, Talk to amateur astronomers -
Bring your Questions

For More Information, Call the Everett Public Library Evergreen Branch - 9512 Evergreen Way, (425) 257-8250
Future of Flight Aviation Center & Boeing Tour center - 8415 Paine Field Blvd., Mukilteo, 425-438-8100
or the Everett Astronomical Society at (425) 486-9733 - http://everettastro.org - folkerts@seanet.com
Sponsored by: Everett Astronomical Society, the Everett Public Library, Everett Parks & Recreation,
the Astronomical League, and the International Dark-Sky Association

The Star Gazer
P.O. Box 12746
Everett, WA 98206

In April's StarGazer:

The next EAS Meeting is 7:00 P.M. Saturday April 25th at the 'Aurora Astro Products' store location at Silver Lake.