



The Stargazer

May 2005

President: Mark Folkerts (425) 486-9733	folkerts at seanet.com	<i>The Stargazer</i>
VP & Librarian: Mike Locke (425) 259-5995	mlocke at lionmts.com	P.O. Box 12746
Treasurer: Carol Gore (360) 856-5135	janeway7C at aol.com	Everett, WA 98206
Newsletter co-editor: Bill O'Neil (774) 253-0747	wonastrn at seanet.com	
Web assistance: Cody Gibson (425) 348-1608	sircody01 at comcast.net	<i>See EAS website at:</i>
	(change 'at' to @ to send email) http://members.tripod.com/everett_astronomy	

EAS BUSINESS...

NEXT EAS MEETING - SATURDAY MAY 21ST AT 4:00 PM AT THE EVERETT PUBLIC LIBRARY, IN THE AUDITORIUM (DOWNSTAIRS)

★ 'Origins - 14 Billion Years of Cosmic Evolution' by Dr. Neil DeGrasse Tyson

Map to library - <http://www.epls.org/about/mlmap.htm>

2702 Hoyt Avenue
Everett, WA 98201

Directions to library - <http://www.epls.org/about/mldirect.htm>

Scheduled Meeting Dates: (NOTE THAT THEY CHANGE)

May 21 - EAS Meeting - Saturday 4:00 PM at Everett Public Library

Jun 26 - EAS Meeting - SUNDAY 3:00 PM at Everett Public Library
- Jim 'Moondog' Tegerdine - Amateur CCD imaging

Jul 30 - EAS Meeting - SUNDAY 3:00 PM at Everett Public Library

CLUB STAR PARTY INFO

Upcoming star party schedule:

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 Mike Locke at (425) 259-5995 for info or check the EAS website.) Members contact Mike Locke for scope borrowing.

\$\$ - FINANCIAL HEALTH - \$\$

The club maintains a \$500+ balance. We try to keep approximately a \$500 balance to allow for contingencies. Emailing a digital copy of the newsletter has been suggested to reduce printing and postage costs, and speed up delivery, please email Mark if electronic copy would be OK for you.

CLUB SCOPES

SCOPE	LOAN STATUS	WAITING
10-INCH DOBSONIAN	ON LOAN	NO WAIT LIST

EAS members: contact Mike Locke at (425) 259-5995 or 'mlocke at lionmts.com' to borrow a scope.

ASTRO CALENDAR FOR 2005

May 2005

May 21 - EAS MEETING - Saturday 4:00 PM at Everett Public Library
May 26 - 6 pm - Night Sky Network 'Black Holes' teleconference
May 27-29 - Riverside Telescope Makers Conference Astronomy Expo
May 27-29 - Memorial Day Weekend
May 31 - Moon Occults Mars

June 2005

Jun 04 - Potential Saturday EAS star party night, location TBD
Jun 04 - **PLUTO star party night, Sammamish**
Jun 06 - New Moon
Jun 09 - Two moon shadows visible on Jupiter for USA - 10:30 pm
Jun 13 - Pluto at opposition
Jun 16 - Moon occults Jupiter
Jun 17 - Two moon shadows visible on Jupiter for USA - 12:57 am
Jun 21 - Summer Solstice, 06:46 UT - first day of N hemisphere summer
Jun 26 - Mercury passes 1.4 degrees from Saturn
Jun 27 - Mercury passes 0.1 degrees from Venus
Jun 26 - **EAS MEETING - SUNDAY 3:00 PM at Everett Public Library**

July 2005

Jul 02 - Potential Saturday EAS star party night, location TBD
Jul 03 - Venus 0.4 deg. North of M44 Beehive cluster
Jul 04 - Deep Impact, Comet Tempel 1 impact/flyby
Jul 04 - Earth at aphelion (1.017 AU From Sun)
Jul 6-10 - **Mt Bachelor Star Party**
Jul 6-10 - **Shingleton Star Party - Redding California**
Jul 09 - Mercury Greatest Eastern Elongation (26 Degrees)
Jul 09 - Potential Saturday EAS star party night, location TBD
Jul 12 - Asteroid 3259 Brownlee closest approach to Earth (2.19 AU)
Jul 13 - Moon occults Jupiter
Jul 18 - Moon occults Antares from southern US, near for north.
Jul 21 - Largest full moon for 2005
Jul 23 - 10th Anniversary (1995), Discovery of Comet Hale-Bopp
Jul 27-29 - South Delta-Aquarids meteor shower peak
Jul 31 - **EAS MEETING - SUNDAY 3:00 PM at Everett Public Library**
Jul 30-Aug 07 Mt. Kobau Star Party - Osyoos BC

August 2005

Aug 01 - Alpha Capricornids Meteor Shower Peak
Aug 4-6 - **Table Mountain Star Party**
Aug 04 - Furthest lunar apogee of 2005
Aug 05 - Neil Armstrong's 75th birthday (1930)

Aug 06 - Southern Iota Aquarids meteor shower peak
 Aug 08 - Moon 1.0 right of Venus
 Aug 08 - Neptune at opposition – visible all night
 Aug 11 - Perseid meteor watch - Rooster Rock St Park - Columbia Gorge
 Aug 12 - Perseids meteor shower peak
 Aug 24 - Mercury at Greatest Western Elongation (18 degrees from Sun)
 Aug 25 - Northern Iota Aquarids meteor shower peak
Aug 27 - EAS MEETING - Saturday 4:00 PM at Everett Public Library
 Aug 31 - Uranus at opposition – visible all night

September 2005

Sep 01 - Uranus at opposition
 Sep 01 - Venus passes 1.2 degrees from Jupiter
 Sep 03 - New Moon
 Sep 03 - Potential Saturday EAS star party night, location TBD
Sep 1-4 - Oregon Star Party
Sep 2-5 - Olympic Astronomy – Dry Falls Star Party
 Sep 05 - Labor Day holiday
 Sep 07 - Moon occults Venus
 Sep 22 - Autumnal Equinox (22:23 UT) – 1st day of autumn N hemisphere
Sep 24 - EAS MEETING - Saturday 4:00 PM at Everett Public Library

October 2005

Oct 01 - Potential Saturday EAS star party night, location TBD
 Oct 03 - New Moon
 Oct 03 - Annular Solar Eclipse, Visible From Africa
 Oct 04 - Moon occults Mercury
 Oct 05 - Mercury passes 1.3 degrees From Jupiter
 Oct 09 - Draconids meteor shower Peak
 Oct 16 - Venus occults PPM 265560 (7.7 Magnitude Star)
 Oct 17 - Partial Lunar eclipse
 Oct 21 - Orionid meteor shower peak
Oct 29 - EAS MEETING - Saturday 4:00 PM at Everett Public Library
 Oct 30 - Daylight Saving - set clock back 1 Hour

November 2005

Nov 01 - New Moon
 Nov 05 - Potential Saturday EAS star party night, location TBD
 Nov 03 - Taurids meteor shower peak
 Nov 03 - Mercury at its Greatest Eastern Elongation (23 Degrees)
 Nov 03 - Venus at its Greatest Eastern Elongation (47 Degrees)
 Nov 07 - Mars at opposition
Nov 19 - EAS MEETING - Saturday 4:00 PM at Everett Public Library

December 2005

Dec 02 - 10th anniversary (1995), SOHO Launch
 Dec 12 - Moon occults Mars
 Dec 12 - Mercury at its Greatest Western Elongation (21 Degrees)
 Dec 13 - Geminids meteor shower peak
 Dec 21 - Winter Solstice, 18:35 UT
 Dec 22 - Ursids meteor shower peak
Dec 10th or 17th – EAS Dinner - Saturday 7:00 PM

UW Astronomy Colloquium Schedule

The Astronomy Department weekly colloquium meets Thursdays at 4:00 pm in PAB A102 (the classroom part of the Physics/Astronomy Building complex).

May 26 - 4:00

Paul Boynton, UW Physics, Astronomy
Discovery of the CMBR: Looking Back 40 Years

June 2 - 4:00

Jim Bell, Cornell University
Spirit and Opportunity on Mars

June 9 - 4:00

Anjum Mukadam, UW Astronomy
Flickering Candles Called ZZ CETI Stars

OVER THE AIRWAVES

“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 LIBRARY – BOOK & VIDEO LIST

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 mlocke at lioninc.com, to borrow or donate any materials.

MEMBERSHIP BENEFITS & INFORMATION

Membership in the **Everett Astronomical Society (EAS)** will give you access to all the material in the lending library. The library, which is maintained by Scott Gibson, consists of several VCR tapes, many books, magazines, and software titles. Membership includes invitations to all of the club meetings and star parties, plus the monthly newsletter, *The Stargazer*. In addition you will be able to subscribe to *Sky and Telescope* for \$7 off the normal subscription rate, contact the treasurer for more information. **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 will renew your *Sky and Telescope* subscription for you. **Astronomy** magazine offers a similar opportunity to club members.

EAS is a member of the **Astronomical League** and you will receive the Astronomical League’s newsletter, *The Reflector*. Being a member also allows you the use of the club’s telescopes, an award winning 10 inch Dobsonian mount reflector, built as a club project or the 60mm refractor. Contact Bob Lyons (425) 337-1510 to borrow a telescope. EAS dues are \$25. Send your annual dues to the **Everett Astronomical Society**, P.O. Box 12746, Everett, WA 98206. Funds obtained from membership dues allows the Society to publish the newsletter, pay Astronomical League dues and maintain our library.

OBSERVER’S INFORMATION...

LUNAR FACTS

May 16	First Quarter Moon
May 23	Full Moon
May 30	Last Quarter Moon
Jun 06	New Moon
Jun 15	First Quarter Moon
Jun 22	Full Moon
Jun 28	Last Quarter Moon
Jul 06	New Moon
Jul 14	First Quarter Moon
Jul 21	Full 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

Jupiter is at opposition on April 3, at its best for the year.

Object	Rises	Transits	Sets	Con	Mag
Sun	5:24 am	13:05	20:47	Tau	-27
Mercury	Daylight	Daylight	Daylight	Ari	+0.3
Venus	Daylight	Daylight	21:58	Tau	-3.9
Mars	2:50 am	Daylight	Daylight	Aqr	+0.4
Jupiter	Daylight	21:45	3:42 am	Vir	-2.5
Saturn	Daylight	18:07	0:41 am	Gem	+0.2
Uranus	2:35 am	Daylight	Daylight	Aqr	+5.9
Neptune	1:41 am	Daylight	Daylight	Cap	+7.9
Pluto	21:48	2:47 am	Daylight	Ser	+13.9

(times local time for Everett PST)

Transit times for Jupiter's Great Red Spot in 2005

http://skyandtelescope.com/observing/objects/planets/article_107_2.asp

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 –

<http://spaceflight.nasa.gov/realdata/sightings/SSApplications/Post/SightingData/Seattle.html> or also see link

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

MEMBER NEWS

Anyone get a hole in the clouds for the aurora ?

Space Weather News for May 16, 2005 -

"As predicted, a coronal mass ejection swept past Earth on Saturday, May 14th, sparking a strong geomagnetic storm and spectacular auroras. "Northern Lights" were seen in the United States as far south as California and Arizona. Visit <http://spaceweather.com> to browse a growing gallery of photos."

You are invited to Sammamish City Star Party June 4th

The PLUTO group is an independent group, working with the City of Sammamish to create opportunities for people of all ages, knowledge levels and interest to learn and participate in Astronomy. The event will be at Pine Lake Park this Saturday June 4th. If we have overcast skies we have a rain date the following week on Saturday June 11th. The City will be extending the hours of the park to facilitate this event. We will stargaze starting at 9 PM and finish around 11:30 PM.

We will open up a number of large privately owned telescopes brought by our volunteers. The largest telescope will be at least 12 inches in diameter. Larger scopes may be available, depending upon the volunteers that attend. Knowledgeable people will be at each scope to answer questions and share their knowledge. You will have the opportunity to see, first hand, objects such as galaxies, planets, nebulas and much more. If you have your own telescope, please bring it along. The featured planets include Venus, Saturn, Saturn's Moons, Jupiter and Jupiter's moons. To participate, all you need to do is to show up

at the baseball field at Pine Lake Park. Pine Lake Park is located at 228th Avenue and 24th Ave SE in the City of Sammamish. Please bring a light with a red filter and limit the use of white lights to preserve our night vision. This includes dimming your car head lights if you arrive after nightfall.

Directions:

From Issaquah / I-90

- Take exit #15 (Lake Sammamish State Park).
- Turn left and go over the freeway onto the Renton/Issaquah Road, which becomes SE 56th Street.
- Follow past Costco, the Fed Ex depot, and the 76/Brown Bear station.
- At the signal, turn left onto E. Lake Sammamish Parkway. Continue about one mile.
- Turn right onto SE 43rd Way, which becomes SE 228th Ave.
- Continue about 1.5 miles up the hill to SE 24th Street.
- Turn left into entrance of Pine Lake Park, immediately opposite Discovery Elementary School.

From Redmond / SR 520

- Follow Eastbound 520 until you reach the Route 202 Redmond/Fall City Road Exit.
- Turn right at the end of the exit.
- Follow Route 202 for approximately 2.5 miles.
- Turn right onto Sahalee Way at the Gray Barn Nursery.
- Sahalee Way becomes 228th Avenue NE. Continue several miles past Sahalee Golf Course, Sammamish Library, and Skyline High School.
- Turn right at the intersection of SE 24th Street into the Pine Lake Park entrance.

For more information please contact Jim Bachesta at jbachesta@comcast.net.

Oberserving NASA's Deep Impact/Comet 9P/Tempel 1 at Table Mountain – July 4th Weekend

I (Jim Bachesta) am planning to go to Table Mountain to observe the Deep Impact mission for comet 9P/Tempel 1. The event will occur at 6 AM July 4 (GMT) - that's 11 PM on Sunday July 3rd PDT. This is perfect for a weekend trip.

More information on the NASA Deep Impact mission can be found at: <http://deepimpact.jpl.nasa.gov/> Sky and Telescope also has a number of good articles. A useful website oriented at amateur astronomers with CCDs and specific filters is: <http://www.deepimpact.umd.edu/stsp/>

Here's a site for people without CCD's and want to participate with visual observations and sketches. <http://www.deepimpact.umd.edu/amateur/>

This mission has been setup to encourage amateurs to participate in the event by collecting and submitting scientifically useful data.

Let me know if you're interested in going. I can provide additional information regarding directions. You should plan on primitive camping over night. There will not be any rest room facilities. You will also need to get a camping pass from REI or GI Joes.

I will definitely bring my camper. Let me know if you're interested in meeting me on the mountain.

The plan follows:

Saturday July 2

- Leave Sammamish sometime in the afternoon, perhaps 2 PM.
- Spend the evening setting up and testing the equipment and observing.

Sunday July 3

- Observe the deep impact event on Comet 9P/Tempel 1. The magnitude should be 9.7, with an increase to magnitude 6 (and perhaps 5) after the impact at 11 PM (PDT)

Monday July 4

- Return sometime in the mid morning (~ 10 AM) arriving back to Sammamish around noon.

Feel free to pass this on to others who may want to join us on the mountain. - Jim Bachesta j.bachesta@comcast.net.

JPL LIVE WEBCASTS

Jun. 16 & 17 – 7:00 pm

Topic: [Astrobiology in the Arctic](#)

Jul. 21 & 22 – 7:00 pm

Topic: [Comet Exploration and Research](#)

NASA NIGHT SKY NETWORK TELECAST FOR EAS MEMBERS

The Black Hole - additional information to help get your mind bent around these space-warping objects.

May 26th's teleconference features renowned infrared astronomer and cosmologist Dr. Ned Wright. You can share a phone line with him and ask him your questions about black holes. Dr. Wright is the principal investigator for the Wide-field Infrared Survey Explorer (WISE) mission scheduled for launch in 2008. His online tutorials on Cosmology and Relativity are consistently listed by astronomy professors around the country as "go to" reference resources.

The teleconference is scheduled for **Thursday, May 26th at 6 pm Pacific time**. To participate, just dial in anytime to the number below after 5:45 p.m. Pacific Time on Tuesday, May 26th. Please dial in a bit early so we can start on time! Toll-free conference call line at : 1-877-917-1549

- Wait on the line for an operator to answer
- You will be asked for the passcode*: NIGHT SKY NETWORK
- * Do NOT press phone keys to enter this, the operator will ask for this code verbally
- You will be asked for the call leader: MICHAEL GREENE
- You will be asked to give your NAME and the CLUB you belong to.

If you have any questions or are having any difficulties logging into the Night Sky Network, send an email to nightskyinfo@astro society.org

The presentation will be posted at the URLs below
Large (23 MB) PowerPoint version at:

<http://nightsky.jpl.nasa.gov/docs/bh.zip>

Smaller PowerPoint (3 MB - no animation) at:

<http://nightsky.jpl.nasa.gov/docs/blackholesnoanimation.ppt>

Smaller PDF file at:

<http://nightsky.jpl.nasa.gov/docs/blackholes.pdf> Online HTML

presentation at (The week of the teleconference):

<http://www.astro society.org/nsntelecon/may26.htm>

CONSTELLATIONS OF THE MONTH:

Not available this month.

YOUNG ASTRONOMER'S CORNER

Not available this month.

ASTRONOMY AND TELESCOPE LINGO

Not available this month.

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 FUN FACTS

★ The AcrimSat satellite measuring the amount of solar energy reaching the Earth found a drastic drop in solar irradiance levels when Venus transited between the Earth and Sun in June 2004. The decrease was equivalent to all the energy used by humans in 2003.

MIRROR IMAGES

Not available this month.

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

SOLAR SAIL SCHEDULED FOR LAUNCH SOON – SOME NEW AND BRIGHT LIGHT IN THE SKY

In just a few weeks, [The Planetary Society](#) will fly the first solar sail spacecraft. This private venture is sponsored by Cosmos Studios and the Members of The Planetary Society. Light sailing is the technology that may someday take us to the stars, but for now the first attempt by a space-interest organization to fly its own mission will simply use the sail in controlled flight to increase its orbital energy. Planetary Society invites you to be part of [Solar Sail Watch](#). Participation in the program can be for the serious amateurs or for the general public, it can be educational and informative, or just plain fun. The sail launches (on a ballistic missile from a Russian submarine) into an approximately 800-kilometer, nearly circular orbit.

The sails form a 30-meter diameter circular spacecraft of highly reflective material – which when pointed correctly will be as bright as the brightest star in the sky. Because of the near-polar orbit, everyone on Earth should see be able to see it sometime during the mission, although exact conditions for viewing depend on the spacecraft pointing, its position in its orbit, the Earth-Sun geometry, time of day and, of course, local weather conditions. All of the necessary information is described on Planetary Society web site, including a cooperative linkage we have with [Heavens Above](#) for providing viewing information.

Take photographs of Cosmos 1 as it passes overhead! No solar sail spacecraft has ever flown in space. Consequently - no solar sail spacecraft in flight has ever been photographed from the Earth! Take advantage of this opportunity by being one of the first to photograph a solar sail in Earth orbit. Then - submit your image

to Planetary Society Photography Contest. [Click here](#) to find out more. (or find out from H-A when it may be making a bright streak through other astro-photos you are planning...)

Measure the brightness of Cosmos 1. *With its 8 giant shiny blades reflecting the Sunlight, scientists know that Cosmos 1 will appear bright when seen from Earth -- very bright. But how bright exactly is hard to say, since there is no precedent.* No solar sail spacecraft has ever flown in space. As *Cosmos 1* passes overhead, estimate its brightness and enter it into Planetary Society database, along with your coordinates and exact time of observation. [Click here](#) to learn more about how to measure a satellite's brightness, and how to fill out the form that will send your data to the Planetary Society.

FIRE IN THE SKY 2005 REGIONAL ROCKET LAUNCH - MANSFIELD, WA - MEMORIAL DAY WEEKEND, MAY 28-30

The public is cordially invited to the Pacific NW's premiere regional rocketry launch to kick off the rocket flying season during the Memorial Day weekend. Each year rocketeers from around the region and points more distant gather here in Mansfield, WA to fly rockets ranging from model to very large high power rockets. Bring your own rockets to sharpen your flying skills here or simply watch some of the Pacific Northwest's best rocketeers at work flying their rockets up to 17,000 feet above the ground at speeds well over Mach 1!

In addition to individual rocket flying there will be several other activities such as:

- NAR-certified model rocket contests
- Can-loft contest
- Night rocketry launch
- Rocket building workshop for the Douglas County youth
- **Astronomy classes and star gazing with telescopes sponsored by the Tacoma Astronomical Society and taught by Joe Witherspoon**
- BalloonSat/PongSat Workshop: Learn to build and fly a payload via weather balloon to 100,000 feet with recovery sponsored by the Treasure Valley Near Space Program and taught by Paul Verhage
- Raffle prizes

Admission is \$5/day, \$10/weekend (or \$20 per family). Launching of rockets will commence each day at 8:00 AM. On-site dry camping is available (no RV hook-ups). Come on out to Mansfield for a great weekend of rocketry - Fire In The Sky 2005! If you would like additional information, please view the webpage at www.washingtonaerospace.org/fits2005.php.

SCIENTISTS DISCOVER PLUTO KIN IS A MEMBER OF SATURN FAMILY

Saturn's battered little moon Phoebe is an interloper to the Saturn system from the deep outer solar system, scientists have concluded. "Phoebe was left behind from the solar nebula, the cloud of interstellar gas and dust from which the planets formed," said Dr. Torrence Johnson, Cassini imaging team member at JPL. "It did not form at Saturn. It was captured by Saturn's gravitational field and has been waiting eons for Cassini to come along."

Cassini flew by Phoebe on its way to Saturn on June 11, 2004. Little was known about Phoebe at that time. During the encounter, scientists got the first detailed look at Phoebe, which allowed them to determine its makeup and mass. With the new information they have concluded that it has an outer solar system origin, akin to Pluto and other members of the Kuiper Belt.

"Cassini is showing us that Phoebe is quite different from Saturn's other icy satellites, not just in its orbit but in the relative proportions of rock and ice. It resembles Pluto in this regard much more than it does the other Saturnian satellites," said Dr. Jonathan Lunine, Cassini interdisciplinary scientist from the University of Arizona, Tucson.

Phoebe has a density consistent with that of the only Kuiper Belt objects for which densities are known. Phoebe's mass, combined with an accurate volume estimate from images, yields a density of about 1.6 grams per cubic centimeter (100 pounds per cubic foot), much lighter than most rocks but heavier than pure ice, which is about 0.93 grams per cubic centimeter (58 pounds per cubic foot). This suggests a composition of ice and rock similar to that of Pluto and Neptune's moon Triton. Whether the dark material on other moons of Saturn is the same primordial material as on Phoebe remains to be seen.

CHANDRA OBSERVATORY CATCHES X-RAY SUPER-FLARES

New results from NASA's Chandra X-ray Observatory about the Orion Nebula imply super-flares torched our young solar system. Such X-ray flares likely affected the planet-forming disk around the early sun, and may have enhanced the survival chances of Earth.

By focusing on the Orion Nebula almost continuously for 13 days, a team of scientists used Chandra to obtain the deepest X-ray observations ever taken of any star cluster. The Orion Nebula is the nearest rich stellar nursery, located just 1,500 light years away from Earth.

The Orion Nebula provides an unparalleled view of 1,400 young stars, 30 of which are prototypes of the early sun. Scientists have discovered these young stars erupt in enormous flares that dwarf, in energy, size and frequency, anything seen from our sun today.

"We don't have a time machine to see how the young sun behaved, but the next best thing is to observe sun-like stars in Orion," said Scott Wolk. "We are getting a unique look at stars between one and 10 million years old - a time when planets form."

A key finding is the more violent stars produce flares one hundred times as energetic as the more docile ones. This difference may specifically affect the fate of planets that are relatively small and rocky, like the Earth.

"Big X-ray flares could lead to planetary systems like ours, where Earth is a safe distance from the sun," said Eric Feigelson. He is the principal investigator for the international Chandra Orion Ultradeep Project. "Stars with smaller flares, on the other hand, might end up with Earth-like planets plummeting into the star."

According to recent theoretical work, X-ray flares can create turbulence when they strike planet-forming disks, and this affects the position of rocky planets as they form. Specifically, this turbulence can help prevent planets from rapidly migrating towards the young star.

"Although these flares may be creating havoc in the disks, they ultimately could do more good than harm," said Feigelson. "These flares may be acting like a planetary protection program."

About half of the young suns in Orion show evidence of planet-forming disks including four lying at the center of protoplanetary disks imaged by NASA's Hubble Space Telescope. X-ray flares bombard these disks, likely giving them an electric charge. This charge, combined with motion of the disk and the effects of magnetic fields, should create turbulence in the disk.

NATURE STUDY EXPLAINS MYSTERY OF MARS ICECAPS

Corvallis - An interdisciplinary team of scientists thinks it has an answer to a long-standing mystery of why the permanent icecap on Mars' South Pole is offset from the pole itself. Simply put, it's colder and stormier in that hemisphere.

But that is only part of the equation, scientists say, and new understanding about Mars' climate and its polar regions may suggest clues to finding water in the planet's equatorial zone - where it would be easier to land a spacecraft - and opening the door to future exploration and the search for life.

Jeffrey Barnes, a professor of atmospheric sciences at Oregon State University and one of the authors of the study, said the permanent icecaps on Mars' poles are quite different. The icecap on the northern pole is much larger - about the size of Greenland - and comprised primarily of water ice.

"The South Pole, however, is a strange animal," Barnes said. "The cap is made up mostly of carbon dioxide ice - or dry ice - which is the main component of the Martian atmosphere. The southern icecap is much smaller, about a 10th the size of that at the northern pole, and it is all on one side of the pole. The other side of the pole contains a much larger area known as 'the Cryptic Region,' which is made up of seasonal ice in the winter but has low albedo, or reflectivity."

"And no one has been able to figure out why there is this peculiar distribution of ice deposits." The scientists were able to use images from the Mars Global Surveyor, temperature information, and climate models to develop a new theory.

"We basically think the Cryptic Region is a sheet of incredibly clear ice," Barnes said. "The reason for the low reflectivity is that the ground beneath the ice shows up right through it."

The southern pole's permanent icecap is in the western hemisphere, which is stormy during Martian winters and receives a lot of snowfall that comes in the form of carbon dioxide (CO₂) particles. These are very bright and highly reflective, creating a visible permanent icecap as well as much more extensive seasonal deposits.

The eastern hemisphere is comparatively warmer and rarely has storms. The scientists believe that instead of falling in the form of snow, the CO₂ from the Mars atmosphere condenses right on the ground and forms slab ice, which is clear. They think the slab is about one meter deep.

CO₂ ice requires much colder temperatures - down to minus-125 degrees centigrade - than does the water ice at the northern pole.

Snow falling in just one hemisphere of the southern pole can be explained by Mars' asymmetrical climate in the south, Barnes said. The planet's topography is severe, and the different features strongly affect climate just as they do on Earth.

Mars has the highest volcano system in the solar system - the 85,000-foot high Olympus Mons and others of nearly that height. The southern hemisphere also is home to the Valles Marineris Canyon, which is six to seven kilometers deep and the length of the United States. The Hellas Basin is even deeper, at 10 kilometers, or more than six miles.

"The planet has huge volcanoes and mountains that extend from well north of the equator to the southern hemisphere, and two gigantic basins in the south," Barnes said. "The wind blowing over these topographic features sets up large-scale patterns that have a profound impact on the climate. Mars has weather

systems much like the Earth, with traveling high- and low-pressure systems, and warm and cold fronts."

Barnes said there is evidence that the CO₂ ice in the permanent south cap is eroding, raising the possibility of global climate change. The area of the icecap has not shrunk, but features within it are diminishing and the depth may be decreasing as well, he said. Disappearance of the southern CO₂ icecap could indicate a very significant change in Mars' climate, pointed out Barnes, whose research specialty is the Martian atmosphere. Scientists think the icecaps are relatively young because they lack craters. They also say that Mars probably has a volatile climatic history, triggered by changes in the tilt of its axis and its pattern of orbit around the sun.

"Scientists think that the ice ages on Earth were triggered by small changes in the tilt of the Earth's axis and its orbit - over tens and hundreds of thousands of years," Barnes said. "Mars has undergone similar changes, but much, much larger. Earth tilts at about 23 degrees and Mars has about a 25-degree tilt. But in its past, Mars has tilted as much as 60 degrees and as little as zero degrees. "Its orbital pattern changed dramatically, too," he added. "That would have a major impact on temperatures, climate, and icecaps."

During these major changes, Mars may have had enormous seasonal icecaps that extended nearly to its equator - or the permanent polar icecaps may have completely melted away. Learning more about the pattern of ice formation and melting may lead scientists to find deposits of water ice close to the equator, where it is easier to land and operate spacecraft than in the forbidding polar zones.

Water, of course, is the most essential ingredient for life, Barnes pointed out.

"Some of the biggest deposits of water ice may actually be in lower latitudes, close to the surface, covered in dust," he said. "We've taken a step toward a better understanding of where the water may be through learning more about the polar icecaps and the climate system. But there is a great deal that we don't know about the polar icecaps and climate changes on Mars. We have a lot of work yet to do, much of which will need to be highly interdisciplinary in nature, as this study was." <http://oregonstate.edu/dept/nc-s/newsarch/2005/May05/marsmyst-ery.htm>

TITAN'S ATMOSPHERE REVEALED BY NEW OBSERVATION

Titan's atmospheric winds, temperature and mixing have been revealed by new observations from the Cassini spacecraft. The thick atmosphere of Saturn's giant moon is rich in organic compounds, whose chemistry may be similar to that which occurred on Earth before the emergence of life.

"Titan is not just a dot in the sky; these new observations show that Titan is a rich, complex world much like the Earth in some ways," said Dr. Michael Flasar, the Composite Infrared Spectrometer instrument (CIRS) principal investigator. The CIRS science team found evidence for an isolated polar vortex similar to one that occurs on Earth. CIRS' observations indicated that strong winds circulating around Titan's north pole isolate the atmosphere there during the polar night. Mixing of the polar region with the lower latitude regions of the atmosphere is inhibited during this time. On Earth, the south polar atmosphere is isolated for months during the long Antarctic winter allowing the formation of polar stratospheric clouds. Normally inert chlorine compounds (such as chlorine nitrate) undergo chemical reactions on the cloud crystals that free molecular chlorine. In the spring,

sunlight decomposes the molecular chlorine, leading to the famous annual Antarctic "ozone hole". Titan's atmosphere contains no ozone; however CIRS results show that a large part of its atmosphere is isolated during the polar night, and could allow unusual and complex chemistry to occur.

Like Earth, Titan's axis of rotation is tilted, so its poles also experience a long night during winter. The polar winter on Titan is many Earth years long, because Saturn orbits the sun once in almost 30 years. Currently it is early winter in Titan's northern hemisphere. The CIRS team found significant temperature differences between Titan's north pole and the equator. The team used this observation to derive the speed of circumpolar winds around the north pole. The team believes these winds are isolating the atmosphere around Titan's north pole because the CIRS data showed that the concentration of several heavy organic (carbon-containing) molecules is highest there.

Heavy organic molecules form naturally in Titan's atmosphere, blanketing the moon with an orange haze. Titan's atmosphere consists of about 98 percent nitrogen with most of the remainder being methane. When these molecules rise to the upper atmosphere, they are broken apart by sunlight and the fragments form heavier organic molecules like propane, ethane, acetylene, hydrogen cyanide, and even more complex molecules. Because the stratospheric air over the winter pole is cold, it sinks and brings down the heavy organic compounds that formed higher up. If the air over Titan's north pole is isolated during the winter, the heavy organics should build up in the stratosphere over the season. This is just what the CIRS team is seeing.

"We don't know if there are even more similarities to Earth's ozone hole process, like polar clouds that react with molecules in the atmosphere, simply because we haven't seen them yet," said Flasar. *"But we wouldn't be surprised to discover them, nor would we be surprised to find that Titan has some unique twists of its own. This is what makes science so exciting. Nature is too rich for us to predict exactly what we will find when we go exploring."*

Titan is the only moon in the solar system with a substantial atmosphere. Like Earth, Titan's atmosphere is primarily composed of nitrogen, but unlike Earth, one of the most abundant constituents is methane (CH₄). Data from the European Space Agency's Huygens probe, which parachuted through Titan's murky atmosphere in January, will determine if the abundance of argon exceeds that of methane. Methane, the main component in natural gas, plays a key role in the makeup of atmospheric conditions on Titan. The organic chemistry that occurs in Titan's atmosphere is an analog of the processes that may have been present in the early terrestrial atmosphere.

Edward Wishnow participated in the research by measuring the spectrum of methane in the laboratory at temperatures and densities similar to Titan's - about 113 Kelvin (-256 F) and about one atmosphere pressure. The measurements were performed with a unique spectrometer and cryogenic gas absorption cell in collaboration with H. Gush and I. Ozier at the University of British

Columbia and G. Orton at JPL. *"Titan's spectrum shows sharp emission lines that arise due to methane in the stratosphere that is warmer than the underlying denser atmospheric layers,"* Wishnow said. The correspondence between the lab and Titan spectra is obvious and the strength of the laboratory lines is used to determine the abundance of methane in Titan's upper atmosphere, he said.

The CIRS is an infrared instrument that measures the intensity of far-infrared radiation - light with wavelengths between those of radar and near-infrared light. These wavelengths are associated

with radiation emission by the constituent gases of Titan's atmosphere.

Other researchers on the project discovered that Titan exhibits seasonal changes in its stratospheric temperatures and winds that are similar to Earth's. *"Part of the exhilaration of our scientific exploration comes from understanding how Titan is similar to Earth as well as how it differs,"* said CIRS principal investigator F. Michael Flasar. *The CIRS observations of Titan's stratosphere indicate that its winter (northern) pole has many properties in common with Earth's: cold temperatures, strong circumpolar winds and anomalous concentrations of several compounds (on Titan, organic molecules) that are reminiscent of conditions within the winter polar regions on Earth, the so-called ozone holes. In both cases the essential ingredient is the strong winds, which isolate the polar air and inhibit mixing with that at lower latitudes."*
<http://www.sciencemag.org/cgi/-content/abstract/308/5724/975>

http://www.nasa.gov/vision/uni-verse/solarsystem/Titan_Ozone_Hole.html

SCIENTISTS CATCH UNIQUE GAMMA-RAY BURST

NASA scientists have, for the first time, detected and pinned down the location of a short gamma-ray burst, lasting only 50 milliseconds.

The burst marks the birth of a black hole. The astronomy community is speculating on what may have caused the burst; perhaps a collision of two older black holes or two neutron stars.

Gamma-ray bursts are the most powerful explosions in the universe. Bursts lasting more than two seconds have been observed by NASA satellites such as Swift, built to detect and quickly locate the flashes. Short bursts had remained elusive until May 9, when Swift detected the recent flash called GRB 050509B. Swift autonomously locked onto the location, and the satellite focused its onboard telescopes in less than a minute to capture the burst afterglow.

"Seeing the afterglow from a short gamma-ray burst was a major goal for Swift, and we hit it just a few months after launch," said Dr. Neil Gehrels.

He is the Swift project scientist at NASA's Goddard Space Flight Center (GSFC). *"For the first time, we have real data to figure out what these things are,"* he added.

The afterglow contains information about what caused the burst. Most scientists are convinced short and long bursts arise from two different catastrophic origins. The longer bursts appear to be from massive star explosions in very distant galaxies. The shorter ones, less than two seconds and often just a few milliseconds, are the deeper mystery, because they have been too fast for detailed observation.

Swift's X-ray telescope detected a weak afterglow that faded away after about five minutes. Swift's Ultraviolet/Optical Telescope did not see an afterglow. Ground-based telescopes have not definitely detected an afterglow. In contrast, afterglows from long bursts linger from days to weeks.

All of this fits the pattern of a collision between some combination of black holes or neutron stars, both of which are created during the deaths of massive stars. Neutron stars are dense spheres about 20 miles across. Black holes have no surface and are regions in space of infinite density. Theories predict these collisions wouldn't produce a long afterglow, since there isn't much fuel, such as dust and gas, from the objects or the region to sustain one.

The burst appears to have occurred near a galaxy that has old stars and is relatively nearby, about 2.7 billion light years away from Earth. This is consistent with the theory that short bursts come from older, evolved neutron stars and black holes. In contrast, longer gamma-ray bursts tend to be in young, distant galaxies filled with young, massive stars, remnants of the early universe.

"We are combing the region around the burst with the Keck Telescope in Hawaii for clues about this burst or its host galaxy," said Shri Kulkarni. Kulkarni is a gamma-ray burst expert. "What we are seeing so far is what proponents of the merger theory have been saying all along," Kulkarni added.

Additional observations are planned for NASA's Hubble Space Telescope and Chandra X-ray Observatory.

For more information about Swift, visit: <http://swift.gsfc.nasa.gov>
For more information about this and other Swift-detected bursts, visit: <http://grb.sonoma.edu>

DEEP ROOTS OF SOLAR WIND HELP PREDICT SPACE WEATHER ACROSS THE SOLAR SYSTEM

A layer deep in the solar atmosphere can be used to estimate the speed of the solar wind, a stream of electrified gas that constantly blows from the Sun. Estimating the speed of the solar wind will improve space weather forecasts, enhancing our ability to protect communications, navigation, and other satellites from the effects of solar storms. We will also be able to warn human explorers on their way to the planets of the severity of those storms.

The solar wind flows from the Sun's hot, thin, outer atmosphere, the "corona". The researchers were surprised to discover that the structure of the Sun's cooler, dense lower atmosphere, called the chromosphere, could be used to estimate the speed of the solar wind.

This was unexpected because the solar wind originates in the corona, and the chromosphere is much deeper: it lies just above the Sun's visible surface. "It's like discovering that the source of the river Nile is another 500 miles inland," said Dr. Scott McIntosh of the Southwest Research Institute, lead author of a paper on this research published May 10 in the *Astrophysical Journal*.

The new work promises to increase the accuracy of space radiation forecasts. The Sun occasionally launches billion-ton blasts of electrified gas, called coronal mass ejections (CMEs), into space at millions of miles (kilometers) per hour. If a fast CME is plowing through slow solar wind, a shock builds up in front of the CME that accelerates the electrically charged solar wind particles. These fast particles can disrupt satellites and are hazardous to unprotected astronauts.

"Just as knowing more details about the atmosphere helps to predict the intensity of a hurricane, knowing the speed of the solar wind helps to determine the intensity of space radiation storms from CMEs," said co-author Dr. Robert Leamon of L-3 Government Services at NASA's Goddard Space Flight Center.

Like wind on Earth, the solar wind is gusty, ranging in speed from about 750,000 miles per hour (approximately 350 km/second) to 1.5 million miles per hour (700 km/second). Since the solar wind is made up of electrically-charged particles, it responds to magnetic fields that permeate the solar atmosphere. Solar wind particles flow along invisible lines of magnetic force like cars on a highway. When the magnetic field lines bend straight out into space, as they do in "coronal hole" regions, the solar wind acts

like cars on a drag strip, racing along at high speed. When the magnetic field lines bend sharply back to the solar surface, like the pattern of iron filings around a bar magnet, the solar wind acts like cars in city traffic and emerges relatively slowly. Scientists have known this for over thirty years and used it to give a crude estimate for the speed of the solar wind -- either fast or slow.

In the new work, the team has tied the speed of the solar wind as it blows past Earth to variations deeper in the solar atmosphere than had previously been detected (or even expected). By measuring the time taken for a sound wave to travel between two heights in the chromosphere, they were able to determine that the chromosphere is effectively "stretched thin" below coronal holes with their open magnetic fields, but compressed below magnetically closed regions.

The team used the observation to derive a continuous range of solar wind speeds from the structure of the chromosphere. The wider the chromospheric layer is, the more it is being allowed to expand by open magnetic fields and the faster the solar wind will blow. This new method is more precise than the old "fast or slow" estimate.

NASA's Transition Region and Coronal Explorer (TRACE) spacecraft was used to measure the speed of sound waves in the chromosphere, and NASA's Advanced Composition Explorer (ACE) spacecraft was used to take measurements of the solar wind speed as it blew by the Earth. Comparing the data from the two spacecraft gave the connection.

"Prior to this discovery, we could only determine solar wind speed from spacecraft that were roughly in line between the Earth and the Sun, like ACE, WIND, and the Solar and Heliospheric Observatory. This spacecraft fleet was placed along the Earth-Sun line because we need to know about the space weather coming our way. However, compared to the size of our solar system, this is a very narrow range; it's like looking through a soda straw. With this discovery, we can use TRACE to build up images that can predict the solar wind speed throughout half the solar system," said Dr. Joe Gurman, a solar researcher at NASA Goddard. For images and more information, refer to: http://www.nasa.gov/vision/uni-verse/solarsystem/solar_wind_s-peed.html

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 before the 1st of the month of publication, for example, material for May's newsletter should be received May 1st. If you wish to contribute an article or suggestions to *The Stargazer* please contact Mark Folkerts by email or by telephone (425) 486-9733 or co-editor Bill O'Neil, at (774) 253-0747.

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

In May's Stargazer:

- **** **OBSERVER'S INFORMATION**
- **** **ASTRO CALENDAR**
- **** **CONSTELLATIONS OF THE MONTH:**
- **** **ASTRONOMY FUN FACTS**
- **** **YOUNG ASTRONOMER'S CORNER**
- **** **ASTRONOMY AND TELESCOPE LINGO**
- **** **SOLAR SAIL SCHEDULED FOR LAUNCH SOON – SOME NEW AND BRIGHT LIGHT IN THE SKY**
- **** **FIRE IN THE SKY 2005 REGIONAL ROCKET LAUNCH - MEMORIAL DAY WEEKEND**
- **** **SCIENTISTS DISCOVER PLUTO KIN IS A MEMBER OF SATURN FAMILY**
- **** **CHANDRA OBSERVATORY CATCHES X-RAY SUPER-FLARES**
- **** **NATURE STUDY EXPLAINS MYSTERY OF MARS ICECAPS**
- **** **TITAN'S ATMOSPHERE REVEALED BY NEW OBSERVATION**
- **** **SCIENTISTS CATCH UNIQUE GAMMA-RAY BURST**
- **** **DEEP ROOTS OF SOLAR WIND HELP PREDICT SPACE WEATHER ACROSS THE SOLAR SYSTEM**

**The next EAS Meeting is 4:00 P.M. Saturday, May 21st
at the Everett Public Library Auditorium.**