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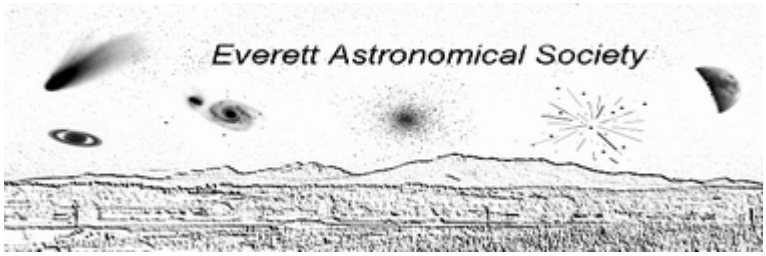

The Stargazer

September 2004

President: Mark Folkerts	(425) 486-9733	folkerts at seanet.com	***The Stargazer***
Vice President: Bob Lyons	(425) 337-1510	bdlyons at verizon.net	**P.O. Box 12746**
Librarian: Mike Locke	(425) 259-5995	mlocke at lioninc.com	**Everett, WA 98206**
Treasurer: Carol Gore	(360) 856-5135	janeway7C at aol.com	
Publicity: Mike Eytcheson*	(206) 364-5115	eytcheson at seanet.com	*See EAS website at:*
Newsletter co-editor Bill O'Neil	(774) 253-0747	wonastrn at seanet.com	http://members.tripod.com/everett_astronomy
Web assistance: Cody Gibson	(425) 348-1608	sircody01 at comcast.net	(change 'at' to @ to send email)

EAS BUSINESS…

NEXT EAS MEETING - SATURDAY SEPTEMBER 25TH 7:00 PM - PROVIDENCE PACIFIC CLINIC (916 PACIFIC AVENUE) IN THE MONTE CRISTO ROOMS ON THE MAIN FLOOR.

Greg Donahue, Celestial North, on the Mars Exploration Rovers mission – current status, scientific results, and the history of the mission so far. Map/directions to the EAS meeting are available at: http://members.tripod.com/everett_astronomy/directions_to_club_meetings.htm

Scheduled Meeting Dates:

Sep 25th – EAS Meeting – 7:00 PM – (Greg Donahue, Celestial North, on the Mars Exploration Rovers mission)
Oct 30th – EAS Meeting – 7:00 PM
Nov 20th – EAS Meeting – 7:00 PM
Dec 11th – EAS Holiday Dinner

RECAP OF THE AUGUST MEETING

Dr. Julie Lutz, UW Astronomy – "**Solar Cookies and Comets on a Stick". Julie showed some hands-on astronomy activities, and explained the information and materials available**

MEMBER NEWS

New EAS T-Shirts available ! See our updated T-shirts, available at this month's meeting. Chose from T, Long-sleeve T, or sweat shirt in a variety of sizes.

Tuesday, October 26, 2004 7:00 PM - **Destination Mars!**

Lecturers: UW Aeronautics and Astronautics Chair Professor Adam Bruckner is joined by UW alum NASA Engineer Rob Grover ('98), current entry/descent/landing systems engineer for the Spirit and Opportunity rovers, to explore the spacecraft design and propulsion systems behind these flights to Mars. Learn about the technology that's helping directly contribute to the success of Mars missions. And, hear stories from the control room on the night of the landings, and view incredible 3-D images of the Red Planet.

Time: Lecture: 7 - 8 p.m. Each lecture is followed by a reception.

Where Lecture: Kane Hall Room 110.
Reception: Walker Ames Room. UW Seattle Campus

Cost: UWAA Member $7; Non-member $10; Student $5

[Register Online]

ANACORTES TELESCOPE & WILD BIRD invites you to attend the **First Annual OPTICS AND IMAGING EXPO** - Saturday, September 25th 2004

An all day/all night Celebration of Sky and Earth, featuring: Manufacturers representatives from both Tele Vue Optics and Meade Instruments. Come join Anacortes, rain or shine…

- Information seminars & guest speakers
- In-store specials
- Nikon Sport optics and digital cameras
- Astro-imaging with Software Bisque and Paramount ME
- Morning and afternoon birding trips
- Learn to 'Digi-scope' (bring your own camera/ scope)
- See portable solar energy power plants & panels
- View with only 29¼" Starmaster Dobsonian in existence
- H-Alpha & white-light solar viewing all day, & stargazing into the night
- Kids activities
- Complimentary famous northwest Bar-B-Q
- And much, much more!

The Anacortes Telescope & Wild Bird Optics and Imaging Expo has something for every enthusiast, whether you're a seasoned observer or brand new to the hobby! Make your plans now! Please call or email for complete information - 800-850-2001 info@buytelescopes.com - www.BuyTelescopes.com

CLUB STAR PARTY INFO

Upcoming star party schedule:

We also try to hold informal close-in star parties each month during the spring and summer months on a weekend near the New moon at a member's property or a local park.

(call Bob Lyon at (425) 337-1510 for info or check the EAS website.) Members contact Bob Lyons 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' STATUS

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

EAS members: contact Bob Lyons (425) 337-1510 or 'bdlyons at verizon.net' to borrow a scope.

ASTRO CALENDAR

September 2004
Sep 08 - Genesis, Return To Earth
Sep 08 - Asteroid 4 Vesta Closest Approach To Earth (1.373 AU)
Sep 10 - Mercury Occults TYC 0833-00847-1 (8.3 Magnitude Star)
Sep 17 - Asteroid 4 Vesta At Opposition (6.1 Magnitude)
Sep 17 - Asteroid 9 Metis At Opposition (9.1 Magnitude)
Sep 20 - Mars Solstice (Beginning of Northern Summer)
Sep 22 - Autumnal Equinox, 16:30 UT
Sep 25 - EAS Meeting – 7:00 PM – Greg Donahue – Celestial North
Sep 27 - Mars Passes 0.2 Degrees From Jupiter
Sep 28 - Venus Occults PPM 126767 (8.7 Magnitude Star)
Sep 29 - Mercury Passes 0.6 Degrees From Jupiter
Sep 29 - Mercury Passes 0.8 Degrees From Mars
Sep 29 - Asteroid 4179 Toutatis Near-Earth Flyby (0.010 AU)

October 2004
Oct 01 - End of Mars Solar Conjunction
Oct 09 - Draconids Meteor Shower Peak
Oct 13 - Moon Occults Mars
Oct 14 - Partial Solar Eclipse, Visible From Russia, Alaska & Pacific Ocean
Oct 14 - Moon Occults Mercury
Oct 14 - Moon Occults Mercury
Oct 16 - Asteroid 40 Harmonia At Opposition (9.4 Magnitude)
Oct 18 - STARDUST at Aphelion
Oct 21 - Orionid Meteor Shower Peak
Oct 25 - Destination Mars at UW
Oct 28 - Lunar Eclipse visible from entire US !
Oct 30 - EAS Meeting – 7:00 PM
Oct 31 - Daylight Saving - Set Clock Back 1 Hour
Oct 31 – Halloween – A good sidewalk astronomy night !!

November 2004
Nov 03 - Taurids Meteor Shower Peak
Nov 03 - Asteroid 21 Lutetia At Opposition (9.8 Magnitude)
Nov 05 - Venus Passes 0.5 Degrees From Jupiter
Nov 07 - Asteroid 27 Euterpe At Opposition (8.8 Magnitude)
Nov 09 - Moon Occults Jupiter
Nov 10 - Moon Occults Venus
Nov 11 - Moon Occults Mars
Nov 14 - Moon Occults Mercury
Nov 17 - Leonids Meteor Shower Peak
Nov 20 - EAS Meeting – 7:00 PM
Nov 21 - Mercury At Its Greatest Eastern Elongation (22 Degrees)

December 2004
Dec 05 - Venus Passes 1.2 Degrees From Mars
Dec 07 - Moon Occults Jupiter
Dec 11 - EAS Holiday Dinner
Dec 13 - Geminids Meteor Shower Peak
Dec 21 - Winter Solstice, 12:42 UT
Dec 22 - Ursids Meteor Shower Peak
Dec 24 - Cassini, Huygens Probe Release
Dec 25 - Asteroid 192 Nausikaa At Opposition (9.7 Magnitude)
Dec 30 - Mercury At Its Greatest Western Elongation (22 Degrees)

January 2005
Jan 03 - Earth At Perihelion (0.983 AU From Sun)
Jan 03 - Quadrantids Meteor Shower Peak
Jan 04 - Moon Occults Jupiter
Jan 13 - Saturn at Opposition
Jan 13 - Mercury Passes 0.3 Degrees From Venus
Jan 14 - Huygens Probe Lands on Titan
Jan 14 - Cassini, Titan Flyby
Jan 31 - Moon Occults Jupiter

February 2005
Feb 08 - Mercury Passes 2.0 Degrees From Neptune
Feb 09 - Chinese New Year
Feb 15 - Cassini, Titan Flyby
Feb 15 - Venus Passes 0.9 Degrees From Neptune
Feb 27 - Moon Occults Jupiter

March 2005
Mar 03 - Jupiter Occults PPM 196171 (9.4 Magnitude Star)
Mar 04 - Venus Passes 0.7 Degrees From Uranus
Mar 12 - Mercury Greatest Eastern Elongation (18 Degrees)
Mar 20 - Vernal Equinox, 12:33 UT
Mar 22 - Mars Equinox (Beginning of Northern Fall)
Mar 26 - Moon Occults Jupiter
Mar 27 - Easter Sunday

April 2005
Apr 03 - Daylight Saving - Set Clock Ahead 1 Hour (North America)
Apr 03 - Jupiter At Opposition
Apr 08 - Solar Eclipse (Visible From Pacific Ocean, Central America)
Apr 09 - Moon Occults Venus
Apr 09 - Jupiter Occults PPM 195890 (9.0 Magnitude Star)
Apr 22 - Lyrids Meteor Shower Peak
Apr 22 - Moon Occults Jupiter
Apr 24 - Lunar Eclipse
Apr 26 - Mercury at Greatest Western Elongation (27 Degrees)

May 2005
May 05 - Eta Aquarids Meteor Shower Peak
May 19 - Moon Occults Jupiter
May 31 - Moon Occults Mars

OVER THE AIRWAVES

"Our group of radio script writers now consists of EAS and SAS members Jim Ehrmin, Pat Lewis writer emeritus, 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 have a good idea for an astronomy broadcast or would like to try your hand at writing a script, call Pat Lewis at (206) 524-2006 or email to joagreen@aol.com 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 8:58 A.M. and 5:58 P.M. Saturday and Sunday). 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 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

Sep 06	Last Quarter Moon
Sep 14	New Moon
Sep 21	First Quarter Moon
Sep 28	Full Moon
Oct 05	Last Quarter Moon
Oct 13	New Moon
Oct 20	First Quarter Moon
Oct 37	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

Object	Rises	Transits	Sets	Constellation
Sun	**6:59 am**	**13:01**	**19:01**	**Virgo**
Mercury	Daylight	Daylight	Daylight	Virgo
Venus	**3:11 am**	Daylight	Daylight	**Leo**
Mars	Daylight	Daylight	Daylight	Virgo
Jupiter	Daylight	Daylight	Daylight	Virgo
Saturn	**1:02 am**	Daylight	Daylight	**Gemini**
Uranus	Daylight	**23:15**	**4:33am**	**Aquarius**
Neptune	Daylight	**21:53**	**2:41 am**	**Capricornus**
Pluto	Daylight	Daylight	**23:06**	**Ophiuchus**

(times local time for Everett PDT)

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 –
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

CONSTELLATIONS OF THE MONTH - ARIES

ARIES: "The Ram". This zodiacal constellation borders on the constellations of Cetus, Perseus, Pisces, Taurus, and Triangulum. It ranks 53rd in overall brightness among the constellations, and contains 28 stars brighter than magnitude 5.5. Its central point is located at RA=2h35m and Dec.= +20.5 degrees. It is completely visible from latitudes North of -59 degrees, and completely invisible from latitudes South of -80 degrees. This constellation ranks 39th in overall size, taking up 441.39 square degrees, or 1.07% of the sky. Aries has two known meteor showers, (the Daytime Arietids on 7 June, and the delta Arietids on 11 December), but no associated Messier objects; its midnight culmination date is October 30th. It also contains one star asterism known as the "Northern Fly". Also, at about the year 27 BC, the vernal equinox (or "the First Point of Aries") moved from the constellation Aries into that of Pisces. The vernal (spring) equinox marks the position of the Sun on the ecliptic, where it crosses the celestial equator as it heads north to its highest point in the northern sky in June, at the summer solstice.

Gamma Arietis (Mesarthim) was one of the first double stars telescopically detected, and was discovered accidentally by Robert Hooke in 1664, who had been following a comet with his telescope. Each star shines at magnitude 4.8, and the two stars are resolvable in most telescopes, being separated by 7.8". Gamma Arietis is generally considered one of the most beautiful of equal magnitude doubles, each shining with a sparkling blue-white color. This double star system lies abut 50 parsecs away from Earth, and together shine with a luminosity of about 50 suns. Aries also contains many other interesting objects: NGC-772 (magnitude 10.3 spiral galaxy); NGC-770 (blue magnitude 14.1 elliptical galaxy); NGC-821 (bright elliptical 10.8 magnitude galaxy); NGC-803 (magnitude 12.4 Sb-type spiral); NGC-697 (highly inclined barred spiral of photographic magnitude 12.7); NGC-691 (blue magnitude 12.4 spiral galaxy); NGC-976 (12.4 magnitude spiral galaxy); NGC-1156 (interesting irregular galaxy lying within a rich starfield and showing mottling in small scopes); and NGC-972 (an 11th magnitude highly inclined spiral galaxy).

Briefly, the legend of Aries is as follows: Aries, with a coat of golden fleece, was the pet ram of Zeus, the supreme Greek mythological God. One day Zeus looked down on his people on Earth, and noticed that two innocent little children were in danger of being killed. He sent Aries down to save them and, just in the nick of time, the children jumped on the ram's back, and were safely taken away from imminent death. To honor his pet ram, Zeus placed him in the celestial sphere where the ram can freely roam near the winged, flying horse named Pegasus.

YOUNG ASTRONOMER'S CORNER

Q. What is a light year?

A. A light year is a measure of distance. Distances between the stars are so great that astronomers came up with a unit of measurement to measure trillions of miles at a time: the light year. One light year is equal to the distance that light can travel in one year. Scientists believe that nothing can travel faster than light,

which speeds along at 186,000 miles every second!! No wonder when you turn on a light switch at home the light appears instantaneously! Another way of saying this, is that if you lived 186,000 miles (in a straight line, no one lives 186,000 miles from anything on planet Earth(!!), but let's just say this to illustrate the point) from the nearest light house beacon on a beach, once the light turns toward you it would reach your eyes in one second!! So how fast does light travel in one year? There are 60 seconds in a minute, 60 minutes in an hour, 24 hours in a day, and 365 days in a year. Multiply all these together, then multiply that number times the speed of light per second, and you get 5,900,000,000,000 miles per year. So astronomers, instead of writing all those zeros every times they talk about these issues, call this one light year…….again, the distance that light travels in one year. The distances within our solar system and from star to star (interstellar distances) are huge. It takes 8.5 minutes for light to travel from our Sun to the Earth; 5.5 hours from the Sun to Pluto; and 4.2 years from the Sun to our nearest star neighbor: Alpha Centauri.

Q. What is the closest star to Earth?

A. You might think this is easy given the answer above… but the closest star to Earth is actually our own Sun!! Many people often forget that the Sun is also a star, and an average one at that, but even at average, it is immensely powerful and critical for all life to exist as we know it. A better way to ask this question is: what is the closest star to the Sun? (Now you can take the hint from above!!). It is Alpha Centauri, also the brightest star in the southern constellation of Centaurus. It is 40 trillion kilometers (25,000,000,000,000 miles), or 4.2 light-years (see above), away from us. Alpha Centauri lies too far south in the sky for people in Everett (and much of the Northern Hemisphere above the equator) to see it. Alpha Centauri is also a triple star: the two larger stars orbit each other very closely; the third, dimmer star (Proxima Centauri) is actually somewhat closer than the pair to Earth, and itself orbits the brighter pair. As the closest star system to Earth, Alpha Centauri is not however the brightest: two other stars, Sirius and Canopus, are brighter, even though each are farther away.

PLANETARY FOCUS

"Planetary Focus" is published periodically in the EAS "Stargazer". If you have a favorite planet that you would like information and/or statistics on, please contact newsletter co-editor Bill O'Neil. The planetary focus of last month's column was "Saturn"; this column will return in either October or November, with facts and data on another one of our nine solar system planets.

ASTRONOMY & TELESCOPE LINGO

Astronomy Lingo: SOLAR PARALLAX: The angle subtended by the equatorial radius of the Earth at the Sun's center, at a distance of one astronomical unit. It is equal to 8.794 148 arc seconds, as defined by the International Astronomical Union.

Telescope Lingo: SOLAR CELL: A semiconductor device, identical in principal to a photovoltaic detector, by which incident solar radiation is converted directly into electrical energy. It has a p-n junction with a large surface area, and solar radiation falling on or near the junction produces an external voltage. Different semiconductors, dopants, and manufacturing techniques have been used to increase the conversion efficiency and the resultant electrical power; conversion efficiencies can exceed 30%. Solar cells form the main power supply in satellites, space stations, and short-range planetary probes. Solar cells are arranged on flat solar panels outside the spacecraft to receive the maximum amount of radiation from the Sun. For spacecraft traveling beyond the orbit of Mars, the solar radiation flux is insufficient for adequate electrical energy generation: for example, the solar constant at the orbit of Jupiter is only approximately 4% of the value here at Earth's orbit. Power at these greater distances must be obtained from other supply sources, such as nuclear or thermoelectric generators.

ASTRONOMY FUN FACTS

**If you could hold a square mile of sunlight in the palm of your hand, it would weigh three pounds!

** If an advanced galactic civilization responds at the speed of light to Earth's first extraterrestrial message (transmitted in 1974), we'll receive the reply message in about the year 51,974 A.D.!!

**If several Earth-sized planets lined up and waited their turns, the biggest black holes known could devour them up at over three per second per black hole, or about 111 million Earth-sized planets per year!!

** Deep within the Sun's core, nuclear reactions are converting hydrogen into helium, releasing energy in the process. Each second, the Sun loses 4.5 million tons of its mass by converting it into energy; alternatively, every 42 years, the Sun loses the equivalent mass of the planet Earth!!

** If there were enough hydrogen contained within it to fuel it, the Sun would use it all up (i.e., it would consume itself) and disappear in about 14 trillion years. However the Sun does not have enough hydrogen: it is estimated that the Sun will run out of hydrogen in about 3.5 billion years – and then start burning helium for fuel to maintain itself (an eventual losing battle however: as successive fuels run out, the Sun will one day become a red giant, then a white dwarf, and eventually die).

"MIRROR IMAGES"

"MIRROR IMAGES" LAST PUBLISHED IN AUGUST; AS A BI-MONTHLY COLUMN, IT WILL RETURN IN OCTOBER.

ASTRONOMICAL NOTES -- ON & OFF THE NET…

ROVER RENEWED AS MARS EMERGES FROM BEHIND SUN

As Spirit and Opportunity resumed reliable contact with Earth, after a period when Mars passed nearly behind the sun, the space agency extended funding for an additional six months of rover operations, as long as they keep working. Both rovers successfully completed their primary three-month missions on the surface of Mars in April and have already added about five months of bonus exploration during the first extension of their missions. "*Spirit and Opportunity appear ready to continue their remarkable adventures*," said Andrew Dantzler, solar system division director. "*We're taking advantage of that good news by adding more support for the teamwork here on Earth that's necessary for operating the rovers*." Neither rover drove during a 12-day period this month, while radio transmissions were unreliable because of the sun's position between the two planets. "*It is a relief to get past this past couple of weeks*," said Jim Erickson, project manager for both rovers at JPL. "*Not only were communications disrupted, but the rovers were also going through the worst part of Mars southern-hemisphere winter from a solar-energy standpoint*." "*Although Spirit and Opportunity are well past warranty, they are showing few signs of wearing out*," Erickson said. "*We really don't know how long they will keep working, whether days or months. We will do our best to continue getting the maximum possible benefit from these great national*

resources." Rovers' science team members will spend less time at JPL during the second mission extension. They are able to attend daily planning meetings by teleconferencing from their home institutions in several states and in Europe. "*All 150 science team members and collaborators have been provided the tools to be able to participate remotely*," said JPL's Dr. John Callas, science manager for the rover project. Workstations researchers used at JPL are at their home institutions. Planning tools include video feeds, workstation display remote viewing, and audio conferencing. Besides reducing costs, remote operations allow scientists to spend more time at home. "*We get back to more normal lives, back to our families, and we still get to explore Mars every day*," said Dr. Steve Squyres of Cornell, principal investigator. Another change in operations is a shift from seven days per week to five days per week from October through December. This accommodates a temporary trim of about 20 percent in the project's engineering team to about 100 members. The rovers' reduced energy supply, during the rest of the Martian winter, makes the inactive days valuable for recharging batteries. By January, the energy situation will have improved for the solar-powered rovers, provided they are still operating. The team size will rebound to support daily operations. As Mars emerges from behind the sun, Spirit is partway up the west spur of highlands called the "Columbia Hills," a drive of more than 3 kilometers (2 miles) from its landing site. Opportunity is inside stadium-size "Endurance Crater," headed toward the base of a stack of exposed rock layers in "Burns Cliff," and a potential exit route on the crater's south side. Images and additional information about the project are available on the Web at: http://marsrovers.jpl.nasa.gov

WATER & METHANE MAPS OVERLAP ON MARS: A NEW CLUE?

Recent analyses of ESA's Mars Express data reveal that concentrations of water vapor and methane in the atmosphere of Mars significantly overlap. This result, from data obtained by the Planetary Fourier Spectrometer (PFS), gives a boost to understanding of geological and atmospheric processes on Mars, and provides important new hints to evaluate the hypothesis of life present on the Red Planet. PFS observed that, at 10-15 kilometers above the surface, water vapor is well mixed and uniform in the atmosphere. However, it found that, close to the surface, water vapor is more concentrated in three broad equatorial regions: Arabia Terra, Elysium Planum and Arcadia-Memnonia. Here, the concentration is two to three times higher than in other regions observed. These areas of water vapor concentration also correspond to the areas where Odyssey spacecraft has observed a water ice layer a few tens of centimeters below the surface, as Dr Vittorio Formisano, PFS principal investigator, reports. New in-depth analysis of PFS data also confirms that methane is not uniform in the atmosphere, but concentrated in some areas. The PFS team observed that the areas of highest concentration of methane overlap with the areas where water vapor and underground water ice are also concentrated. This spatial correlation between water vapor and methane seems to point to a common underground source. Initial speculation has taken the underground ice layer into account. This could be explained by the 'ice table' concept, in which geothermal heat from below the surface makes water and other material move towards the surface. It would then freeze before getting there, due to the very low surface temperature (many tens of degrees Celsius below zero). Further investigations are needed to fully understand the correlation between the ice table and the presence and distribution of water vapor and methane in the atmosphere. In other words, can the geothermal processes which 'feed' the ice table also bring water vapor and other gases, like methane, to the surface? Can there be liquid water below the ice table? Can forms of bacterial life exist in the water below the ice table, producing methane and other gases and releasing them to the surface and then to the atmosphere? The PFS instrument has also detected traces of other gases in the Martian atmosphere. A report on these is currently under peer review. Further studies will address whether these gases can be linked to water and methane and help answer the unresolved questions. In-situ observations by future lander missions to Mars may provide a more exhaustive solution to the puzzle.

GENESIS SCIENTISTS BOUNCING BACK FROM HARD LANDING

Scientists, who conducted the preliminary assessment of the Genesis canister, are encouraged by what they see. They believe it may be possible to achieve the most important portions of their science objectives. "*We are bouncing back from a hard landing, and spirits are picking up again*," said Orlando Figueroa, Deputy Associate Administrator for Programs for the Science Mission Directorate. "*This may result in snatching victory from the jaws of defeat*," added Dr. Roger Wiens of Los Alamos, a member of the Genesis science team. "*We are very encouraged*." Based on initial inspection, it is possible a repository of solar wind materials may have survived that will keep the science community busy for some time. "*We are pleased and encouraged by the preliminary inspection*," said NASA Administrator Sean O'Keefe. "*The outstanding design and sturdy construction of Genesis may yield the important scientific results we hoped for from the mission*," he said. "*I want to emphasize the excellent work by the navigation team to bring the capsule back exactly on target was key in our ability to recover the science*," said Andrew Dantzler, Director of the Solar System Division. "*In addition, the robustness of the design of the spacecraft was the reason it could take such a hard landing and still give us a chance to recover the samples*," he said. The mission's main priority is to measure oxygen isotopes to determine which of several theories is correct regarding the role of oxygen in the formation of the solar system. Scientists hope to determine this with isotopes collected in the four target segments of the solar wind concentrator carried by the Genesis spacecraft. "*From our initial look, we can see that two of the four concentrator segments are in place, and all four may be intact*," Wiens said. The mission's second priority is to analyze nitrogen isotopes that will help understand how the atmospheres of the planets in our solar system evolved. "*These isotopes will be analyzed using gold foil, which we have also found intact*," Wiens said. Other samples of solar winds are contained on hexagonal wafers. It appears these are all or nearly all broken, but sizable pieces will be recovered, and some are still mounted in their holders. "*We won't really know how many can be recovered for some time, but we are far more hopeful important science can be conducted than we were on Wednesday*," Wiens said. Another type of collector material, foils contained on the canister's lid, were designed to collect other isotopes in the solar wind. It appears approximately three-fourths of these are recoverable, according to Dr. Dave Lindstrom, Mission Program Scientist. However, these foils have been exposed to elements of the Utah desert. The Genesis sample return capsule landed well within the projected ellipse path in the Utah Test & Training Range on Sept. 8, but its parachutes did not open. It impacted the ground at nearly 200 mph. News and information about Genesis is available on the Internet, at: www.nasa.gov/genesis

WHAT GENESIS SOLAR PARTICLES CAN TELL US

The recent crash of NASA's Genesis space probe may have looked like bad news for scientists, but its cargo of particles captured from the sun should still yield useful information, according to Qing-Zhu Yin, a planetary scientist at UC Davis. Yin, who is not directly affiliated with the Genesis mission, studies the

composition of meteorites to learn about the formation of the solar system. Like the Genesis capsule, meteorites have a hard landing on the Earth, but can still yield useful information, he said. By looking at the ratio of oxygen-16, -17 and -18 isotopes in the solar particles, scientists should be able to test theories about how the sun and planets formed. Oxygen-16 is by far the most common. The Earth, moon, Mars and some meteorites all have slightly different ratios of the three isotopes. The oxygen makeup of the sun, which contains about 99.9 percent of all the mass in the solar system, is much harder to measure. The Genesis spacecraft was built to answer that question by collecting particles blown out from the sun. In a "Perspectives" article in the Sept. 17 issue of the journal Science, Yin describes new theories about local variations in oxygen isotopes in the vast dust and gas cloud around the young sun. Free oxygen was released when ultraviolet light hit carbon monoxide gas. Because oxygen-16 was so abundant, it was released mostly near the surface of the cloud, but breakdown of carbon monoxide containing less abundant oxygen-17 or -18 continued deeper into the cloud. Free oxygen and hydrogen formed water that froze onto dust grains and eventually formed into planets, preserving the oxygen-17 and -18 signature, Yin said. The models predict that the Sun itself should have a much lower ratio of oxygen-17 and -18 to oxygen-16 than the rocky planets, a prediction that can be tested by Genesis and future missions.

URANIUM/LEAD DATING PROVIDES MOST ACCURATE DATE YET FOR EARTH'S LARGEST EXTINCTION

A new study by geologists at the Berkeley Geochronology Center (BGC), improves upon a widely used dating technique, opening the possibility of a vastly more accurate time scale for major geologic events in Earth's history. Geochemist Roland Mundil and his colleagues at BGC report that uranium/lead (U/Pb) dating can be extremely accurate - to within 250,000 years - but only if the zircons from volcanic ash used in the analysis are specially treated. To date, zircons - known to many as a semiprecious stone and December's birthstone - have often produced confusing and inaccurate results. "*Zircons have produced complicated data that are hard to interpret, though people have pulled dates out*," said Mundil, a former UC Berkeley postdoctoral fellow now at the BGC, a non-profit scientific research institute dedicated to perfecting dating techniques for establishing the history of Earth and life on Earth. "*Many of these studies will now have to be redone*." The U/Pb isotopic dating technique has been critical in dating geologic events more than 100 million years old, including volcanic eruptions, continental movements and mass extinctions. "*The beauty of this new technique is that we now can analyze samples we previously could not get an accurate date for*," Mundil said. "*This will have a big impact on radio-isotopic dating in general*." Mundil and his colleagues, including BGC director Paul Renne, used this improved U/Pb technique to establish a more accurate date for the end of the Permian period and the beginning of the Triassic period - 252.6 million years ago, plus or minus 200,000 years. This boundary coincides with the largest extinction of life on Earth, when most marine invertebrates died out, including the well-known flat, segmented trilobites. Based on the improved U/Pb technique, the team also established that the argon/argon (Ar/Ar) isotopic dating technique that Renne employed for an earlier study of the Permian-Triassic boundary consistently gives younger dates, by about 1 percent. Renne ascribes this to a lack of a precise measurement of the decay constant of potassium. The technique is based on the fact that the naturally occurring isotope potassium-40 decays to argon-40 with a 1.25 billion year half-life. Comparison of the amount of argon-39 produced in a nuclear reactor to the amount of argon-40 gives a measure of the age of the rocks. Uranium, on the other hand, is so well studied that its decay constant is much better known, making the U/Pb dating technique more accurate, Mundil noted. U/Pb dating relies upon the decay of naturally occurring uranium and different isotopes of lead. "*Further application of Mundil's approach will make the geologic time scale more accurate, letting us calibrate extinctions and important events in Earth's history, ranging from 100 million to several billion years ago, with unparalleled accuracy*," Renne added. The new U/Pb date, though about 2.5 million years older than Renne reported nine years ago based on Ar/Ar dating, nevertheless confirms his conclusion that the Permian extinction occurred at the same time as a major series of volcanic eruptions in Siberia. This is strong evidence that these eruptions caused, at least in part, the global die-off, which some scientists have ascribed to a meteor impact. Mundil noted that in 1998, one group used U/Pb dating to assign a date of 251.4 million years ago for the main pulse of the Permian extinction, in apparent conflict with the new U/Pb age. That 'age,' however, "*is based on interpretation of a very complicated data set*," Mundil said. Mundil and his colleagues set out to resolve the issue, using a new zircon pretreatment invented by isotope geologist James M. Mattinson. The problem with using microscopic zircons, which are prevalent in volcanic ash, is that the decay of uranium to lead is so energetic that the lead atoms smash through and destroy the zircon crystal structure, which apparently allows some lead to leak out of the crystal, throwing off the analysis. Geologists have tried various zircon treatments, including abrading the outer surfaces of the crystals, which are typically a tenth of a millimeter across, or leaching the crystals with strong acid. Despite these treatments, the U/Pb method still produced a wide range of dates for zircons from the same layer of ash. Mattinson's idea was to first heat or anneal the zircons, sealing off the least damaged areas of the crystal, then using a strong reagent, hydrofluoric acid, to eat away the heavily damaged areas. When Mundil used this treatment, the zircon dates were much more consistent, requiring no selective interpretation of the data. The calculated uncertainty is about a quarter of a million years, which means the extinction took place over a very short time, the researchers concluded. The zircons were obtained from ash layers located in central and southeastern China. The Meishan section in the latter region is accepted as the type locality for the Permian/Triassic boundary. Whereas the U/Pb method yields ages which are more accurate, "*Ar/Ar is still king in dating rocks younger than 100 million years and is about as precise as U/Pb methods, though we need to get better data for the decay constants to establish an absolute calibration*," Renne said. "*As soon as that calibration is put in place, the Ar/Ar method could become as accurate as U/Pb*."

CASSINI DISCOVERS RING, AND ONE - POSSIBLY TWO, OBJECTS AT SATURN

Scientists examining Saturn's contorted F ring, which has baffled them since its discovery, have found one small body, possibly two, orbiting in the F ring region, and a ring of material associated with Saturn's moon Atlas. A small object was discovered moving near the outside edge of the F ring, interior to the orbit of Saturn's moon Pandora. The object was seen by Dr. Carl Murray, imaging team member, in images taken on June 21, 2004, just days before Cassini arrived at Saturn. "*I noticed this barely detectable object skirting the outer part of the F ring. It was an incredible privilege to be the first person to spot it*," he said. Murray's group then calculated an orbit for the object. Scientists cannot yet definitively say if the object is a moon or a temporary clump. If it is a moon, its diameter is estimated at four to five kilometers (two to three miles) and it is located 1,000 kilometers (620 miles) from the F ring, Saturn's outmost ring. It is at a distance of approximately 141,000 kilometers (86,000 miles) from the center of Saturn and

within 300 kilometers (190 miles) of the orbit of the moon Pandora. The object has been provisionally named S/2004 S3. Scientists are not sure if the object is alone. This is because of results from a search through other images that might capture the object to pin down its orbit. The search by Dr. Joseph Spitale, a planetary scientist working with team leader Dr. Carolyn Porco, revealed something strange. Spitale said, "*When I went to look for additional images of this object to refine its orbit, I found that about five hours after first being sighted, it seemed to be orbiting interior to the F ring*," said Spitale. "*If this is the same object then it has an orbit that crosses the F ring, which makes it a strange object*." Because of the puzzling dynamical implications of having a body that crosses the ring, the inner object sighted by Spitale is presently considered a separate object with the temporary designation S/2004 S 4. S4 is roughly the same size as S3. In the process of examining the F ring region, Murray also detected a previously unknown ring, S/2004 1R, associated with Saturn's moon, Atlas. "*We knew from Voyager that the region between the main rings and the F ring is dusty, but the role of the moons in this region was a mystery*," said Murray. "*It was while studying the F ring in these images that I discovered the faint ring of material. My immediate hunch was that it might be associated with the orbit of one of Saturn's moons, and after some calculation I identified Atlas as the prime suspect*." The ring is located 138,000 kilometers (86,000 miles) from the center of Saturn in the orbit of the moon Atlas, between the A ring and the F ring. The width of the ring is estimated at 300 kilometers (190 miles). The ring was first spotted in images taken after orbit insertion on July 1, 2004. There is no way of knowing yet if it extends all the way around the planet. "*We have planned many images to search the region between the A and F rings for diffuse material and new moons, which we have long expected to be there on the basis of the peculiar behavior of the F ring*," said Porco. "*Now we have found something but, as is usual for the F ring, what we see is perplexing*." Searches will continue for further detections of the newfound body or bodies seen in association with the F ring. If the two objects indeed turn out to be a single moon, it will bring the Saturn moon count to 34. The newfound ring adds to the growing number of narrow ringlets around Saturn. http://jpl.convio.net/site/R?i=ZIrZXDO6XMFO-3BCLCXxIg.. and http://www.nasa.gov/cassini

Well-Preserved Layer of Material Ejected From Chesapeake Bay Meteorite Strike Is Discovered

People in Georgia's Dodge and Bleckley counties have for years picked up small pieces of natural glass called "Georgiaites," which were produced by an unknown asteroid or comet impact millions of years ago. Just where these small, translucent green objects came from, however, was unclear. Now researchers studying a kaolin mine in Warren County, have found a layer of tiny grains, which indicate that the grains and the Georgiaites were products of a recently discovered impact that left a huge crater beneath the waters of the Chesapeake Bay. "*We knew we had these tektites here, but we'd never found them in place*," said Michael Roden, a geologist and part of the research team. "*We believe this layer is further evidence that the Chesapeake Bay impact was an enormous event with widespread consequences*." Tektites are brown to green glassy objects, generally small and rounded, and thought to be of extraterrestrial origin. The only other state in the United States where tektites have been found in abundance is Texas. Some 1,700 have been found in Georgia to date, and potassium-argon geochronology has dated them to around 35 million years of age. The Chesapeake Bay impact crater was only discovered about a decade ago, but before the current discovery, there was no known deposition layer from it extant, and it was unclear whether Georgiaites were the result of the cataclysmic collision of the Chesapeake Bay bolide with the Earth. ("Bolide" is a generic term for an impacting body.) The now-unused kaolin mine in Warren County where the discovery was made was near the sea's edge in ancient times. This former shore, now across the central part of Georgia, is more or less coincident with the Fall Line, and marks the place where ancient seas lapped the land. The impact in the Chesapeake Bay clearly caused a huge amount of material, both from the Earth and the asteroid, to become airborne, and the layer - discovered at a depth of 25 feet in the kaolin mine - was probably laid down by the event. It was an active time: In the period between 34 million and 37 million years ago, at least five comets and/or asteroids collided with the Earth. Since some of the events may have caused climate alterations and caused at least regional disruptions of ecosystems, knowing more about the ejecta from the impacts is important. The layer is perhaps the most easily accessible, undisturbed layer of materials that probably came from the Chesapeake Bay impact and can therefore add knowledge about that event. The search for the layer, led by Harris, led to the discovery of so-called shocked quartz - grains whose physical "thumbprint" mark them as having originated from the extremely high pressures characteristic of an impact event. Just how big the explosion was when this celestial visitor hit the Earth is unclear, but Roden said it was many times bigger than such events as the explosions of Mt. St. Helen's or even Krakatoa.

Meteorites May Have Supplied Earth Life with Phosphorus

Scientists have discovered that meteorites, particularly iron meteorites, may have been critical to the evolution of life on Earth. Their research shows that meteorites easily could have provided more phosphorus than naturally occurs on Earth -- enough phosphorus to give rise to biomolecules which eventually assembled into living, replicating organisms. Phosphorus is central to life. It forms the backbone of DNA and RNA because it connects these molecules' genetic bases into long chains. It is vital to metabolism because it is linked with life's fundamental fuel, adenosine triphosphate (ATP), the energy that powers growth and movement. And phosphorus is part of living architecture; it is in the phospholipids that make up cell walls and in the bones of vertebrates. "*In terms of mass, phosphorus is the fifth most important biologic element, after carbon, hydrogen, oxygen, and nitrogen*," said Matthew A. Pasek, a doctoral candidate in planetary sciences. But where terrestrial life got its phosphorus has been a mystery, he added. Phosphorus is much rarer in nature than are hydrogen, oxygen, carbon, and nitrogen. Pasek cites recent studies that show there's approximately one phosphorus atom for every 2.8 million hydrogen atoms in the cosmos, every 49 million hydrogen atoms in the oceans, and every 203 hydrogen atoms in bacteria. Similarly, there's a single phosphorus atom for every 1,400 oxygen atoms in the cosmos, every 25 million oxygen atoms in the oceans, and 72 oxygen atoms in bacteria. The numbers for carbon atoms and nitrogen atoms, respectively, per single phosphorus atom are 680 and 230 in the cosmos, 974 and 633 in the oceans, and 116 and 15 in bacteria. "*Because phosphorus is much rarer in the environment than in life, understanding the behavior of phosphorus on the early Earth gives clues to life's origin*," Pasek said. The most common terrestrial form of the element is a mineral called apatite. When mixed with water, apatite releases only very small amounts of phosphate. Scientists have tried heating apatite to high temperatures, combining it with various strange, super-energetic compounds, even experimenting with phosphorous compounds unknown on Earth. This research hasn't explained where life's phosphorus comes from, Pasek noted. Pasek began working with Dante Lauretta on the idea that meteorites are the source of living

Earth's phosphorus. The work was inspired by Lauretta's earlier experiments that showed that phosphorus became concentrated at metal surfaces that corroded in the early solar system. "*This natural mechanism of phosphorus concentration in the presence of a known organic catalyst (such as iron-based metal) made me think that aqueous corrosion of meteoritic minerals could lead to the formation of important phosphorus-bearing biomolecules*," Lauretta said. "*Meteorites have several different minerals that contain phosphorus*," Pasek said. "*The most important one, which we've worked with most recently, is iron-nickel phosphide, known as schreibersite."* Schreibersite is a metallic compound that is extremely rare on Earth. But it is ubiquitous in meteorites, especially iron meteorites, which are peppered with schreibersite grains or slivered with pinkish-colored schreibersite veins. Last April, Pasek, Virginia Smith, and Lauretta mixed schriebersite with room-temperature, fresh, de-ionized water. They then analyzed the liquid mixture using NMR, nuclear magnetic resonance. "*We saw a whole slew of different phosphorus compounds being formed*," Pasek said. "*One of the most interesting ones we found was P_2-O_7 (two phorphorus atoms with seven oxygen atoms), one of the more biochemically useful forms of phosphate, similar to what's found in ATP*." Previous experiments have formed P_2-0_7, but at high temperature or under other extreme conditions, not by simply dissolving a mineral in room-temperature water, Pasek said. "*This allows us to somewhat constrain where the origins of life may have occurred*," he said. "*If you are going to have phosphate-based life, it likely would have had to occur near a freshwater region where a meteorite had recently fallen. We can go so far, maybe, as to say it was an iron meteorite. Iron meteorites have from about 10 to 100 times as much schreibersite as do other meteorites. "I think meteorites were critical for the evolution of life because of some of the minerals, especially the P2-07 compound, which is used in ATP, in photosynthesis, in forming new phosphate bonds with organics (carbon-containing compounds), and in a variety of other biochemical processes*," Pasek said. "*I think one of the most exciting aspects of this discovery is the fact that iron meteorites form by the process of planetesimal differentiation*," Lauretta said. That is, the building-blocks of planets, called planestesmals, form both a metallic core and a silicate mantle. Iron meteorites represent the metallic core, and other types of meteorites, called achondrites, represent the mantle. "*No one ever realized that such a critical stage in planetary evolution could be coupled to the origin of life*," he added. "*This result constrains where, in our solar system and others, life could originate. It requires an asteroid belt where planetesimals can grow to a critical size around 500 kilometers in diameter and a mechanism to disrupt these bodies and deliver them to the inner solar system*." Jupiter drives the delivery of planetesimals to our inner solar system, Lauretta said, thereby limiting the chances that outer solar system planets and moons will be supplied with the reactive forms of phosphorus used by biomolecules essential to terrestrial life. Solar systems that lack a Jupiter-sized object that can perturb mineral-rich asteroids inward toward terrestrial planets also have dim prospects for developing life, Lauretta added.
http://uanews.org/silk/downloads/pasek.jpg
http://uanews.org/silk/downloads/schreibersite.jpg

SMALLEST EVER EXTRA-SOLAR PLANET – 14X THE EARTH

A team of astronomers has discovered the lightest known planet orbiting a star other than the sun (an "exoplanet"). The new exoplanet orbits the bright star mu Arae located in the southern constellation of the Altar. It is the second planet discovered around this star and completes a full revolution in 9.5 days. With a mass of only 14 times the mass of the Earth, the new planet lies at the threshold of the largest possible rocky planets, making it a possible super Earth-like object. Uranus, the smallest of the giant planets of the Solar System has a similar mass. However Uranus and the new exoplanet differ so much by their distance from the host star that their formation and structure are likely to be very different. This discovery was made possible by the accuracy of the HARPS spectrograph on ESO's 3.6-m telescope at La Silla, which allows radial velocities to be measured with a precision better than 1 m/s. Since the first detection in 1995 of a planet around the star 51 Peg by Michel Mayor and Didier Queloz astronomers have learned that our Solar System is not unique, as more than 120 giant planets orbiting other stars were discovered mostly by radial-velocity surveys. This fundamental observational method is based on the detection of variations in the velocity of the central star, due to the changing direction of the gravitational pull from an (unseen) exoplanet as it orbits the star. The evaluation of the measured velocity variations allows to deduce the planet's orbit, in particular the period and the distance from the star, as well as a minimum mass. The continued quest for exoplanets requires better and better instrumentation. The star mu Arae is about 50 light years away. This solar-like star is located in the southern constellation Ara (the Altar) and is bright enough (5th magnitude) to be observed with the unaided eye. Mu Arae was already known to harbor a Jupiter-sized planet with a 650 days orbital period. Previous observations also hinted at the presence of another companion (a planet or a star) much further away. The new measurements obtained by the astronomers on this object, combined with other data confirm this picture. But as François Bouchy, member of the team, states: "*Not only did the new measurements confirm what we previously believed to know about this star but they also showed that an additional planet on short orbit was present. And this new planet appears to be the smallest yet discovered around a star other than the sun. This makes mu Arae a very exciting planetary system*." During 8 nights in June 2004, mu Arae was repeatedly observed and its radial velocity measured to obtain information on the interior of the star. This so-called Astro-seismology technique studies the small acoustic waves which make the surface of the star periodically pulsate in and out. By knowing the internal structure of the star, the astronomers aimed at understanding the origin of the unusual amount of heavy elements observed in its stellar atmosphere. This unusual chemical composition could provide unique information to the planet formation history. Says Nuno Santos, another member of the team: "*To our surprise, the analysis of the new measurements revealed a radial velocity variation with a period of 9.5 days on top of the acoustic oscillation signal!"* This discovery has been made possible thanks to the large number of measurements obtained during the astero-seimology campaign. From this date, the star, that was also part of the consortium survey program, was regularly monitored with a careful observation strategy to reduce the "seismic noise" of the star. These new data confirmed both the amplitude and the periodicity of the radial velocity variations found during the 8 nights in June. The astronomers were left with only one convincing explanation to this periodic signal: a second planet orbits mu Arae and accomplishes a full revolution in 9.5 days. But this was not the only surprise: from the radial velocity amplitude, that is the size of the wobble induced by the gravitational pull of the planet on the star, the astronomers derived a mass for the planet of only 14 times the mass of the Earth! This is about the mass of Uranus, the smallest of the giant planets in the solar system. The newly found exoplanet therefore sets a new record in the smallest planet discovered around a solar type star. The mass of this planet places it at the boundary between the very large earth-like (rocky) planets and giant planets. As current planetary formation models are still far from being able to account for all the amazing diversity observed

amongst the extrasolar planets discovered, astronomers can only speculate on the true nature of the present object. In the current paradigm of giant planet formation, a core is formed first through the accretion of solid "planetesimals". Once this core reaches a critical mass, gas accumulates in a "runaway" fashion and the mass of the planet increases rapidly. In the present case, this later phase is unlikely to have happened for otherwise the planet would have become much more massive. Furthermore, recent models having shown that migration shortens the formation time, it is unlikely that the present object has migrated over large distances and remained of such small mass. This object is therefore likely to be a planet with a rocky (not an icy) core surrounded by a small (of the order of a tenth of the total mass) gaseous envelope and would therefore qualify as a "super-Earth". The consortium has been granted 100 observing nights per year during a 5-year period at the 3.6-m telescope to perform one of the most ambitious systematic searches for exoplanets so far implemented worldwide. To this aim, they repeatedly measure velocities of hundreds of stars that may harbor planetary systems. The detection of this new light planet after less than 1 year of operation demonstrates the outstanding potential for detecting rocky planets on short orbits. HARPS makes possible the detection of big "telluric" planets with only a few times the mass of the Earth. http://www.oal.ul.pt/~nuno/

A BRIGHT SUPERNOVA IN THE NEARBY GALAXY NGC 2403

The explosion of a massive star blazes with the light of 200 million Suns a new NASA Hubble Space Telescope image. The supernova, called SN 2004dj, resides far beyond our galaxy. Its home is in the outskirts of NGC 2403, a galaxy located 11 million light-years from Earth. Although the supernova is far from Earth, it is the closest stellar explosion discovered in more than a decade. The Hubble image was taken on Aug. 17, two weeks after an amateur astronomer discovered the supernova. To see and read more, please visit: http://hubblesite.org/news/2004/23

LARGE SEA NEAR ROVER LANDING SITE

Spacecraft observations of the landing area for one of NASA's two Mars rovers now indicate there likely was an enormous sea or lake covering the region in the past, according to a new study. Brian Hynek said data from the Mars Global Surveyor and Mars Odyssey spacecraft now show that the region surrounding the Opportunity rover's landing site probably had a body of water at least 330,000 square kilometers, or 127,000 square miles. That would make the ancient sea larger in surface area than all the Great Lakes combined, or comparable to Europe's Baltic Sea. In March, Opportunity instruments scanning the Meridiani Planum landing region confirmed that rock outcrops there, rich in the iron oxide mineral hematite, also contained the types of sulfate that only could have been created by interactions of water with Martian rock. Hynek used thermal emission data and camera images from the orbiting spacecraft to show such bedrock outcrops extend outward for many miles north, east and west. "*If the outcrops are a result of sea deposition, the amount of water once present must have been comparable to the Baltic Sea or all of the Great Lakes combined*," he said. Hynek speculated that future studies may show that the ancient sea was even larger. The thermal emission imaging system, or THEMIS, aboard Mars Odyssey is used to infer the particle size of rocks near or on the surface of Mars, he said. High thermal inertia measurements indicate a prevalence of larger chunks of rock, which heat up more slowly in daylight and cool more slowly in evenings. Low thermal inertia measurements are from fine-grained particles that heat and cool more quickly. The thermal maps of Mars developed by Hynek indicate the rocky outcrops associated with ancient water extend far outside the boundaries of the landing area. "*The thermal inertia for this area is relatively high, an indication the region contains substantial bedrock*," he said. Hynek speculated that if the outcrops at the landing site are the result of sea deposition, as believed, the body of water must have been deep enough and persisted long enough to build up sediments roughly one-third of a mile deep. "*For this to occur, the ancient global climate of Mars must have been different from its present climate and have lasted for an extended period*," Hynek wrote in the Nature paper. "*I believe new findings showing evidence of large amounts of water on Mars over long periods of time could increase the science potential for those seeking evidence of past or present life on Mars*," said Hynek. Hematite deposits on Earth come primarily from the presence of long-standing water or groundwater systems, Hynek said. Many scientists believe the requirement for primitive life forms, at least on Earth, include water or some other liquid, a source of energy and access to elements to construct complex molecules. "*It is important to understand how extensive these water-rich environments were and how long they persisted, because life required at least some degree of environmental stability in order to begin and to evolve*," said astrobiologist David Des Marais regarding Hynek's study. "*Orbital observations and future landed missions will provide crucial details about the long-term legacy of liquid water on Mars, and whether life ever became a part of that legacy*," said Des Marais, a member of the Mars rover science team.

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 September's Stargazer:

The next EAS Meeting is 7:00 P.M. Saturday, September 25th at the Providence Pacific Clinic – 916 Pacific Avenue in Everett.