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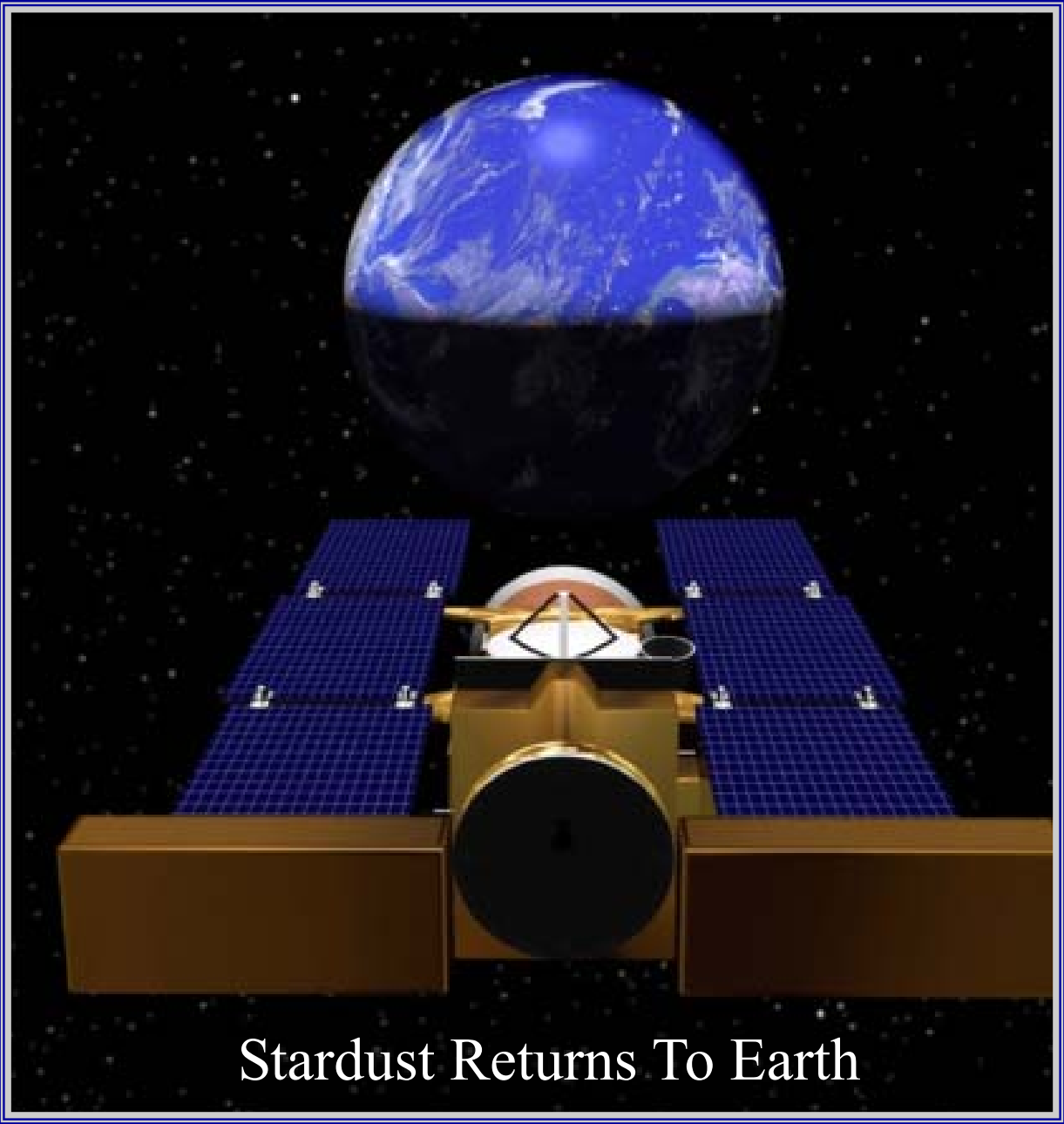

Stardust Returns To Earth

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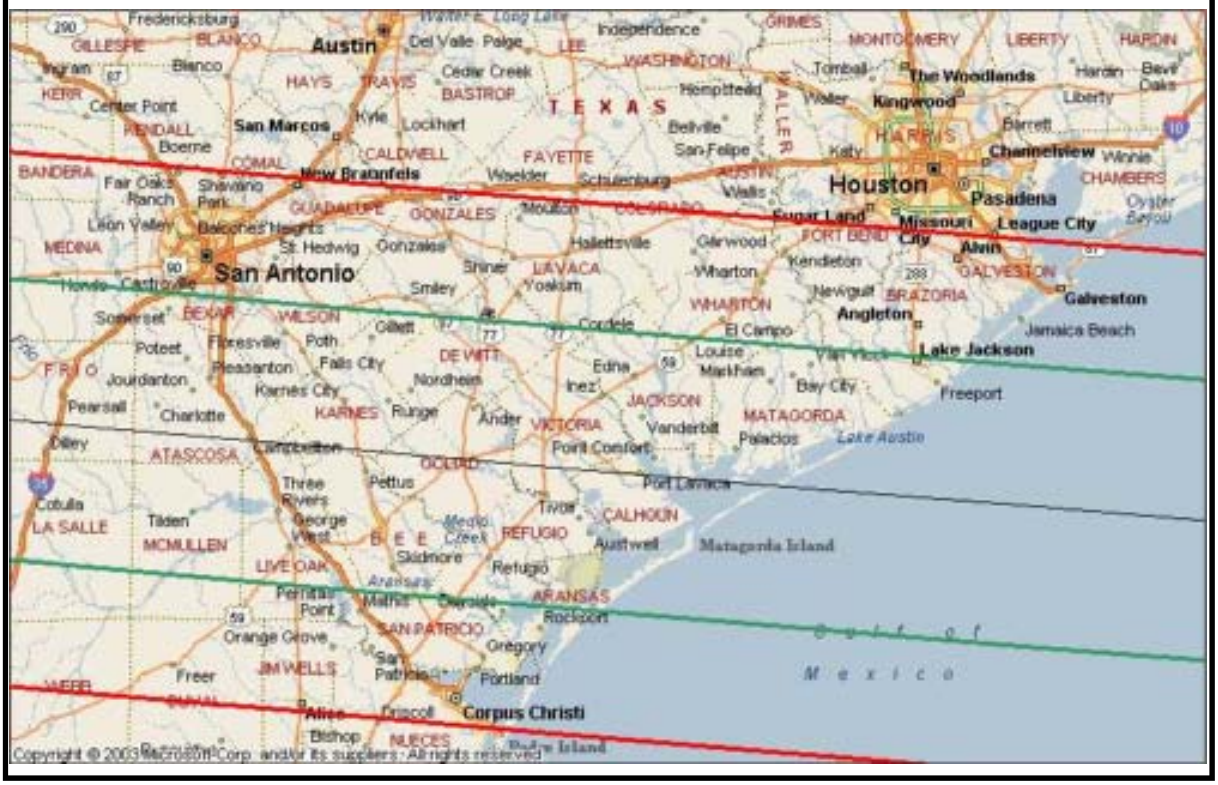
Tisiphone Asteroid Occultation January 5, 2006

Paul Maley

IMPORTANT ALERT! A new orbit assessment, received December 15, has moved this prediction well south of Houston. One theory is that the asteroid suffered orbital perturbations. Recent astrometry has shown that there is something tricky about the orbit fit for (466) Tisiphone yielding an uncertainty that is higher than usual. This is a unique opportunity to learn something useful about orbit fits if we get some data showing observations of the occultation and data from observers who do not see an occultation from their site. Astrometry used to recalculate Tisiphone's orbit after 1980 has now revealed a trend pushing the path more than a full path width toward the south from the original forecast. But this is a star in the Tycho star catalogue and there have been systematic north shifts seen for many of these stars. Though the prediction is now more uncertain than usual we ask that all observers who have already committed to watch from Houston to please continue this effort. See the map below showing the latest path. Observers who want to help study this perturbation are asked to contact me to join a special team who will travel down Hwy 59 along the road to Victoria. We intend to set up stations at 5 mile intervals to cover this new projected pathway.

A 9.2 magnitude star will be occulted for up to 8 seconds by the 72 mile wide asteroid (466) Tisiphone south of Houston and over the southern part of San Antonio. The path error is now considered moderate. There is still the possibility that the astrometry is in error and that the occultation might be seen from Houston, but there is not nearly the confidence that normally accompanies a prediction of this nature.

The map below shows the north and south limits between the green lines and the error bars as red lines. Special line maps have been set up so we can identify observers in the region. Houston area: observe from 4:14 to 4:18am expecting an event around 4:16:47am; San Antonio observers should watch from 4:15 to 4:19am expecting an event around 4:17am. The star is 50 degrees above the West. The moon is out of the way and the magnitude drop is 3.8 magnitudes. (Map by Derek Breit)



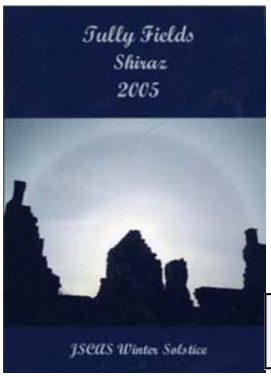
Winter Solstice Party 2005

Ken Lester
Images by Chris Randall

I hope you were able to attend the 2005 Winter Solstice Party. There were the usual munchies, chicken, sandwiches, smokies, nuts, cookies, cakes, dips and chips, and soft drinks to name a few. There was also a special release of adult beverage, a nice Shiraz by Matt Hommel commemorating the party.

For entertainment, Sir Isaac Newton paid us a visit, reading a Christmas Poem written by Susan DeChellis years ago. The part of Isaac Newton was played by Tom Clare who was dressed in the appropriate attire.

Following the reading, Ken Lester entertained the group with a 3D tour of the solar system. Looking around the auditorium with everyone wearing their red/blue glasses brought back visions of the 3D movies of the 50's.



The evening wouldn't have been complete without the door prize drawings. Once again, the generosity of our members in donating prizes allowed everyone to win.

The image used on the wine bottle label was taken at Fort McKavett by Becky Ramotowski

Sir Isaac Newton AKA Tom Clare

Edward Tsang Lu, NASA Astronaut, To Be Guest Speaker at the February Meeting

PERSONAL DATA: Born July 1, 1963, in Springfield, Massachusetts. Considers Honolulu, Hawaii, and Webster, New York, to be his hometowns. Married. He enjoys aerobatic flying, coaching wrestling, piano, tennis, surfing, skiing, and travel. His parents, Charlie and Snowlily Lu, reside in Fremont, California.

EDUCATION: Graduated from R.L. Thomas High School, Webster, New York, in 1980. Bachelor of science degree in electrical engineering from Cornell University, 1984. Doctorate in applied physics from Stanford University, 1989.

ORGANIZATIONS: American Astronomical Society, Aircraft Owners and Pilots Association, Experimental Aircraft Association.

SPECIAL HONORS: Cornell University Presidential Scholar, Hughes Aircraft Company Masters Fellow, NASA Exceptional Service Medal, NASA Distinguished Service Medal, Gagarin Medal, Komorov Medal, Beregovoy Medal.

EXPERIENCE: Since obtaining his Ph.D., Dr. Lu has been a research physicist working in the fields of solar physics and astrophysics. He was a visiting scientist at the High Altitude Observatory in Boulder, Colorado, from 1989 until 1992, the final year holding a joint appointment with the Joint Institute for Laboratory Astrophysics at the University of Colorado. From 1992 until 1995, he was a postdoctoral fellow at the Institute for Astronomy in Honolulu, Hawaii. Dr. Lu has developed a number of new theoretical advances, which have provided for the first time a basic understanding of the underlying physics of solar flares. He has published articles on a wide range of topics including solar flares, cosmology, solar oscillations, statistical mechanics, and plasma physics. He holds a commercial pilot certificate with instrument and multi-engine ratings, and has over 1200 hours of flying time.

Credit: NASA

NASA EXPERIENCE: Selected by NASA in December 1994, Dr. Lu reported to the Johnson Space Center in March 1995, has completed a year of training and evaluation, and is qualified for assignment as a mission specialist. Among technical assignments held since then Dr. Lu has worked in the astronaut office computer support branch, and has served as lead astronaut for Space Station training, and lead astronaut for Shuttle training. Dr. Lu flew as a mission specialist on STS-84 in 1997, was a mission specialist and payload commander on STS-106 in 2000, flight engineer on Soyuz TMA-2 and served as NASA ISS Science Officer and flight engineer on ISS Expedition-7 in 2003. A veteran of three space missions, Dr. Lu has logged over 206 days in space, and an EVA (spacewalk) totaling 6 hours and 14 minutes.

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SPACE FLIGHT EXPERIENCE: STS-84 Atlantis (May 15-24, 1997), was NASA's sixth Shuttle mission to rendezvous and dock with the Russian Space Station Mir. In completing this mission, Dr. Lu traveled 3.6 million miles in 144 orbits of the Earth logging a total of 9 days, 5 hours, 19 minutes, and 55 seconds in space.

STS-106 Atlantis (September 8-20, 2000). During the 12-day mission, the crew successfully prepared the International Space Station for the arrival of the first permanent crew. The five astronauts and two cosmonauts delivered more than 6,600 pounds of supplies and installed batteries, power converters, life support, and exercise equipment on the Space Station. Ed Lu and Yuri Malenchenko performed a 6 hour and 14 minute space walk in order to connect power, data and communications cables to the newly arrived Zvezda Service Module and the Space Station. STS-106 orbited the Earth 185 times, and covered 4.9 million miles in 11 days, 19 hours, and 10 minutes.

ISS Expedition-7 (April 25 to October 27, 2003). Dr. Lu was the first American to launch as the Flight Engineer of a Soyuz spacecraft, and the first American to launch and land on a Soyuz spacecraft (Soyuz TMA-2). As Flight Engineer and NASA ISS Science Officer Dr. Lu spent a successful 6-month tour of duty aboard the International Space Station maintaining ISS systems and overseeing science operations. In completing this mission, Dr. Lu logged 184 days, 21 hours and 47 minutes in space.

Star Party News

Ken Lester

Our first scheduled star party for 2006 isn't until early March. However, discussions are underway about giving a star party at Clear Creek High School and returning to Seabrook Intermediate. We will post more information as it becomes available.

Mark Your Calendars: The table below has all our currently scheduled star parties and the rise and set times of the brighter planets and Moon. Last year's astronomy outreach was very successful. This year should be even better with the elimination of Challenger 7 star parties which continued its decline in attendance and increased light pollution. We have added a third Haak Winery star party. The Haak Winery, located in Santa Fe, has the darkest skies of any of our Houston Area star parties. It is very well attended, even if it's cloudy.

Event	Date	Sun Set	Moon			Jupiter		Saturn		Mars		Venus	
			Illum.	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set
2006													
Moody Gardens	Mar 4	18:20	27%	9:37	23:50	23:15	10:03	15:12	04:53	10:53	00:54	04:10	14:57
Fort McKavett	Mar 30 - Apr 2	18:56	2%	07:11	20:42	21:49	08:34	13:41	03:29	10:23	00:40	04:17	15:19
Haak Winery	Apr 22	19:50	34%	03:32	14:28	20:46	07:39	12:56	02:38	10:36	00:45	04:45	16:23
Texas Star Party	Apr 23 - 30	20:27	23%	04:46	16:12	21:19	08:09	13:25	03:11	11:06	01:22	05:20	16:59
Moody Gardens	Aug26	19:47	7%	09:17	21:18	12:13	23:12	05:40	19:03	08:20	20:45	05:37	19:02
Haak Winery	Sep 23	19:13	1%	08:05	19:48	10:44	21:37	04:05	17:20	07:53	19:45	06:28	18:52
Fort McKavett	Oct 19 - 22	19:02	6%	05:28	17:47	09:48	20:28	02:52	16:08	07:51	19:09	07:35	19:03
Moody Gardens	Oct28	18:35	36%	13:31	23:46	08:59	19:42	02:02	15:12	07:22	18:30	07:30	18:38
Haak Winery	Nov11	17:25	61%	23:17	12:33	07:18	17:54	00:11	13:20	06:12	17:04	06:58	17:38

LPI Reschedules January's Family Space Days

Ken Lester

Each month, the Lunar Planetary Institute presents a program designed for children between the ages of 5 and 8 and their families to explore space science! This free program is usually held between 10:00 am and 1:00 pm on the third Saturday of each month. Because of conference conflicts at the LPI, the date of January's event has been moved to Saturday, January 14th.

Families are encouraged to bring lunch on sunny days and enjoy a picnic on the Lunar and Planetary Institute's grounds. The Institute is located at the USRA Center for Advanced Space Studies (CASS), 3600 Bay Area Boulevard, Houston, Texas 77058.

Events feature hands-on activities and demonstrations which allow the children and their families to explore the theme of the day for themselves. Read stories! Color pictures! Get messy with theme-based crafts!

Upcoming Events in 2006

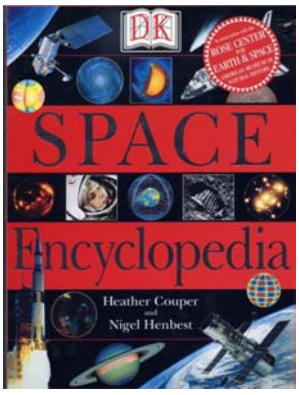
January 14th – Tour stop 3 – Mars
February 18th – Tour stop 4 – The Moon
March 25th – Sun Earth Day/Eclipse

Please note: Each child must be accompanied by a responsible parent or adult.

JSCAS Library

Lisa Lester

Did you know that JSCAS has a library of over 180 books, CDs, videos, star charts, and pamphlets? The picture on the left shows how the library looked in December of 2004. Since that time, the library has grown even bigger, overflowing those 5 shelves.



Our latest acquisition, *Space Encyclopedia*, by Heather Couper and Nigel Henbest, was donated by Drell Setzer. This hardbound book contains 304 pages covering observing, space exploration, the solar system, stars, and galaxies. You can check out this or any other book by contacting Lisa Lester at lesteln@swbell.net.

For a complete list of items in the library, visit the JSCAS library web page at:

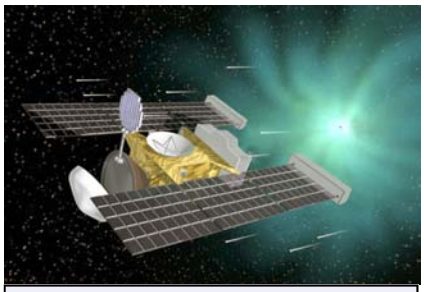
http://www.riverofstars.net/JSCAS/Library/Library.htm

The Fiery Return of NASA's Space Dust Cargo

11.29.05

John Bluck, NASA Ames Research Center

In search of clues about the origin of life on Earth and other secrets, a crew flying on a NASA DC-8 aircraft will study the small, speeding Stardust capsule returning from space early in 2006.



Stardust Encounters Comet Wild 2
Artist rendering credit JPL/NASA

Two years earlier, in January 2004, the Stardust spacecraft flew within 147 miles (236 kilometers) of the comet Wild 2 (VILT-TWO) and survived the high-speed impact of millions of dust particles and small rocks up to nearly two-tenths of an inch (one half centimeter) across. With its tennis-racket-shaped collector extended, Stardust captured thousands of comet particles.

The returning Stardust capsule will strike Earth's atmosphere during the early morning darkness in mid-January 2006, at eight miles (12.8 kilometers) per second – more than 10 times faster than a speeding bullet. That is fast enough to go from San Francisco to Los Angeles in only one minute. The DC-8 crew will face the daunting task of tracking and observing the 101-pound (45.7 kilogram) conical object as it hurtles through the atmosphere and slows before the spacecraft finally parachutes down in a Utah desert.

Scientists aboard the DC-8 also will assess how well the Stardust capsule's heat shield protects its precious cargo of comet dust and interstellar grains.

Though scientists will study this captured space dust for years to come, the separate team of researchers aboard the DC-8 will gather data only during the brief re-entry of the space capsule into Earth's atmosphere.

The mini, Apollo-like capsule will shoot down through the air at the highest spacecraft re-entry speed into Earth's atmosphere ever, generating extremely high temperatures. The capsule's special carbon-based heat shield, developed at NASA Ames Research Center in California's Silicon Valley, will protect the priceless cargo of comet dust and interstellar grains. During this blistering re-entry, the DC-8 crew will take surface-temperature and shock-radiation measurements of the heat shield as part of it burns away. Shock radiation is light emitted from extremely hot air. Scientists will study this light to learn how hot the capsule gets and what chemical reactions are taking place. These chemical reactions will result from of the violent breakup of air molecules that collide with vapor in front of the speeding capsule.

At the same time as the DC-8 crew is flying its mission, amateur astronomers, willing to endure the cold of the bitter winter, may contribute to the study by simply photographing the incoming capsule, noting their global positions and later providing that information to mission scientists.

One of the goals of the researchers aboard the DC-8 is to measure the capsule's re-entry brightness. Scientists expect it to peak at approximately the brilliance of Venus for roughly 90 seconds. The capsule will be brightest 37 miles (60 kilometers) high over the town of Carlin, Nev., as the spacecraft approaches. This will occur in the early morning cold and darkness on Sunday, Jan. 15, 2006, shortly before the spacecraft parachutes to a landing at 3 a.m. MST. The landing zone is a restricted area – the Utah Test and Training Range, located southwest of Salt Lake City.

"As the observer sees the approaching capsule, it will appear as a point of light," said Peter Jen-

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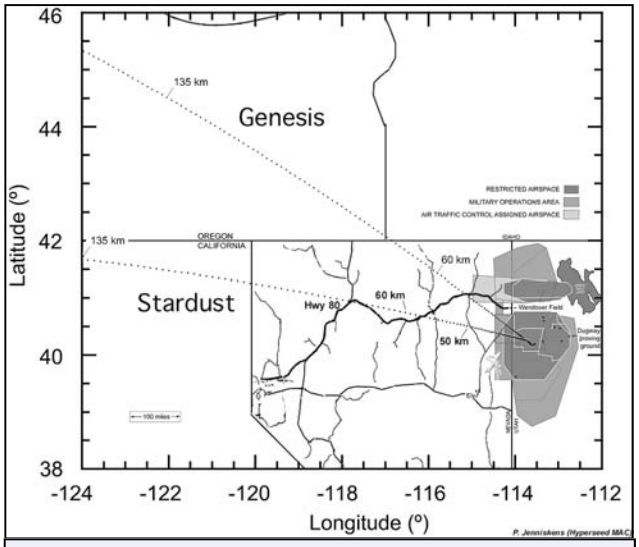
niskens, principal investigator of the Stardust Sample Return Capsule Re-entry Observing Campaign. Jenniskens is a meteor astronomer at the SETI Institute, Mountain View, Calif. "After it passes the observer, the back of the capsule will be less bright, and it will quickly fade. Each observer will have a different experience," Jenniskens added.

The special carbon-based heat shield material designed to protect the Stardust capsule is a candidate for potential inclusion on NASA's next planned spaceship, the Crew Exploration Vehicle (CEV), NASA engineers say. This prospective future use is one reason they plan to study the Stardust capsule as it slams into Earth's atmosphere, and the shield rapidly heats due to friction with the air.

"Our main interest is the performance of the heat shield and the chemistry that takes place in it as it vaporizes and erodes during the descent and re-entry," said Dave Jordan, a NASA Ames engineer and project manager for the capsule observation mission.

The spacecraft will penetrate Earth's atmosphere as if it were a normal meteor, according to Jenniskens.



Stardust flight path

"The capsule will be an artificial meteor that we can study for clues about how life's molecules may have first formed on Earth," Jenniskens said. "The carbon from the heat shield will react in the shockwave, making new molecules that would have seeded Earth at the time of the origin of life. The carbon in comet dust could have done the same," Jenniskens ventured.

After scientists examine the dust carried within the capsule, they may soon learn what carbon compounds are found in comet dust. The spacecraft flew through comet Wild-2's dust cloud and captured some of it in a very light substance, called 'aerogel.'

"It's a little bit like collecting BBs by shooting them into Styrofoam," said Scott Sandford, an astrophysicist at NASA Ames and a Stardust mission co-investigator. "Some of the grains are likely to have exotic isotopic ratios that will give us an indication that we're looking at materials that aren't as old as the solar system, but are, in fact, older than the solar system," Sandford asserted.

Another mission objective was to expose the spacecraft to the interstellar dust stream for 150 days to grab interstellar particles. After collecting the particles, the aerogel collector retracted into the capsule. Stardust will be the first mission to capture and return a substantial sample from outside Earth's Moon system.

Watching the Stardust re-entry

The capsule will approach the landing zone from a westerly direction. The best opportunities for viewing the re-entry will be along Highway 80 between Carlin, Nev., and Elko, Nev., and further east to the Utah border, where the capsule's front side can be observed before it passes over the observer on the ground. The peak brightness will decrease further from Carlin, lessening to about

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the brightness of Venus (+0 magnitude) when seen from Boise, Idaho, and Salt Lake City. Viewing will not be as good at sites east of Carlin where the craft will be seen from behind.

For certain viewing locations just north of the trajectory line, the capsule will appear to pass by the Moon (above it, or below it, depending on the viewer's location). By choosing their positions carefully, some observers will be able to see the capsule pass in front of the Moon. As seen by the naked eye, the capsule will disappear in the glare of moonlight, but by looking through telescopes, observers may see a tiny dot, perhaps trailed by a dark wake of dissipating heat shield material and hot air. The trail may form a thin line behind the capsule, especially near the point of peak brightness where ablation (erosion of the heat shield and dissipation of the heat that results from the friction of the heat shield with the atmosphere) is most intense.

"If somebody could see that line, that would be fantastic, because it would tell us how much carbon is being lost by the heat shield at that moment," observed Jenniskens. "It would be better yet if several observers at different locations were to videotape the entry of the capsule appearing in front of the Moon because then we could trace the ablation of the carbon along the capsule's trajectory, especially at locations between Carlin and Elko," he added. Videographers should fix the focus of their cameras at 'infinity,' because auto focus may be unreliable for nighttime recording, according to mission technicians.

The best way to see the capsule pass in front of the moon would be with a large telescope at high magnification, according to Jenniskens. Due to the long viewing distances, the tiny capsule will appear as a dark dot, only 1-2 arcseconds across, but darker if the capsule is clearly visible. One arcsecond is 1/3600th of a degree.

Moving at many times the speed of sound, the capsule will take only two to three video frames to appear to pass by the Moon.

When the Stardust capsule does not appear to be near the Moon, observers should look for 'chemiluminance,' a faint glow in the wake of the capsule. This glow may be created by chemical reactions between the hot air in the capsule's wake and ozone in the air.

According to scientists, observers using the naked eye will likely see the capsule as a very bright pinpoint of pink-white light. This color is the signature of excited atoms and molecules in the shock wave formed as the capsule strikes the atmosphere, according to George Raiche of NASA Ames.

Light emission is caused by violent breakup of the air molecules that collide with the speeding capsule. For the most part, these molecules are oxygen and nitrogen atoms and ionized nitrogen molecules, Jenniskens noted. Ablation products could cause violet light resulting from chemical reactions between carbon and air.

"What the re-entry of the capsule will tell us is how those carbon compounds might be chemically changed when comet dust enters Earth's atmosphere. Life's molecules need nitrogen and oxygen combined so that they can become useful ingredients for living things," Jenniskens said.

In effect, the capsule will be an artificial meteor that we can study for clues about how life's molecules may have first formed on Earth, according to Jenniskens. "This will be the first time we will have scheduled observation of a manmade object entering the planet's atmosphere at speeds comparable to natural fireballs," he noted.

While most of this chemistry happening at high speed is very quick, complex and elusive, it is possible to recognize the most brightly radiating compounds in this fiery process and to look for

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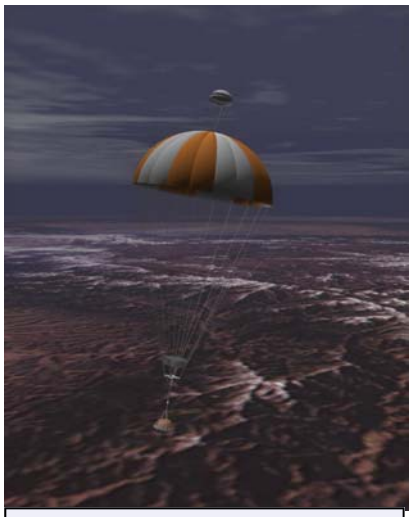
clues about what conditions the molecules must endure.



Stardust Parachutes Down
Artist rendering credit JPL/NASA

Finally, the conical spacecraft will drop straight down over the restricted zone in Utah, floating down by parachute.

Once the capsule has landed in Utah, researchers will collect debris from the surface of the shield and study how much of the heat shield was lost during re-entry. "This is called an ablative heat shield," said Michael J. Wright of NASA Ames, another scientist working on the project. "By vaporizing some of the material from its surface, the heat shield vapor carries some of the heat from friction away from the capsule, keeping the payload cool," Wright explained.

After they recover the capsule and its precious cargo, scientists will transport the space dust to a laboratory at NASA Johnson Space Center, Houston, for analysis.

"The sample(s) brought back from comet Wild-2 will tell us is what carbon compounds are in cometary dust," Jenniskens observed.

"There'll be a small team of us at Johnson Space Center who will assess what we actually got back from the comet so we can verify we did get a useful sample," Sandford said. "A small portion of the samples will then be used to make a preliminary study of the returned material. After the preliminary examination is complete, all the samples will be made available to the general scientific community for more detailed study. My guess is people will be asking for and working on these samples for decades to come."

Besides NASA Ames and the SETI Institute, several other institutions are partners in the NASA DC-8 airborne study: the University of Alaska at Fairbanks; the University of Utah at Logan; Sandia National Laboratories; Los Alamos National Laboratories; the Aerospace Corporation; the U.S. Air Force Academy; Kobe University, Japan; and Stuttgart University, Germany. The University of North Dakota operates the DC-8 aircraft for NASA.

Amateur astronomers who wish to submit photographic, video or other data to Jenniskens will find directions and more information about the airborne campaign at:

http://reentry.arc.nasa.gov

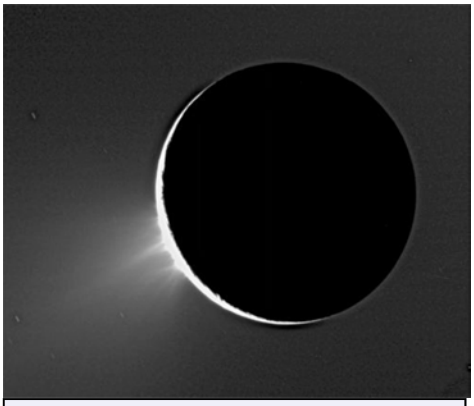
The Stardust spacecraft was launched on Feb. 7, 1999, from Cape Canaveral Air Station, Fla., aboard a Delta II rocket. NASA's Jet Propulsion Laboratory, Pasadena, Calif., manages Stardust, a part of NASA's Discovery Program of low-cost, highly focused science missions. For more information about Stardust and a background audio interview with Sandford, visit:

http://stardust.jpl.nasa.gov

http://www.nasa.gov/centers/ames/multimedia/audio/sdust/sdust.html

NASA's Cassini Images Reveal Spectacular Evidence of an Active Moon

December 6, 2005
(Source: NASA/JPL/Space Science Institute)



Credit: NASA/JPL/Space Science Institute

Jets of fine, icy particles streaming from Saturn's moon Enceladus were captured in recent images from NASA's Cassini spacecraft. The images provide unambiguous visual evidence the moon is geologically active.

"For planetary explorers like us, there is little that can compare to the sighting of activity on another solar system body," said Dr. Carolyn Porco, Cassini imaging team leader at the Space Science Institute in Boulder, Colo. "This has been a heart-stopper, and surely one of our most thrilling results."

The Cassini images clearly show multiple jets emanating from the moon's south polar region. Based on earlier data, scientists strongly suspected these jets arise from warm fractures in the region. The fractures, informally dubbed "tiger stripes," are viewed essentially broadside in the new images.

The fainter, extended plume stretches at least 300 miles above the surface of Enceladus, which is only 300 miles wide. Cassini flew through the plume in July, when it passed a few hundred kilometers above the moon. During that flyby, Cassini's instruments measured the plume's constituent water vapor and icy particles.

Imaging team members analyzed images of Enceladus taken earlier this year at similar viewing angles. It was a rigorous effort to demonstrate earlier apparitions of the plumes, seen as far back as January, were in fact real and not due to imperfections in the camera.

The recent images were part of a sequence planned to confirm the presence of the plumes and examine them in finer detail. Imaging team member Dr. Andrew Ingersoll from the California Institute of Technology in Pasadena, said, "I think what we're seeing are ice particles in jets of water vapor that emanate from pressurized vents. To form the particles and carry them aloft, the vapor must have a certain density, and that implies surprisingly warm temperatures for a cold body like Enceladus."

Imaging scientists are comparing the new images to earlier Cassini data in hopes of arriving at a more detailed, three-dimensional picture of the plumes and understanding how activity has come about on such a small moon. They are not sure about the precise cause of the moon's unexpected geologic vitality.

"In some ways, Enceladus resembles a huge comet," said Dr. Torrence Johnson, imaging team member from NASA's Jet Propulsion Laboratory (JPL) in Pasadena. "Only, in the case of Enceladus, the energy source for the geyser-like activity is believed to be due to internal heating by perhaps radioactivity and tides rather than the sunlight which causes cometary jets." The new data also give yet another indication of how Enceladus keeps supplying material to Saturn's gossamer E ring.

NASA's Mars Rovers Continue to Explore and Amaze

Press Release Date 12.05.05
NASA/JPL

NASA's durable twin Mars rovers have successfully explored the surface of the mysterious red planet for a full Martian year (687 Earth days). Opportunity starts its second Martian year Dec. 11; Spirit started its new year three weeks ago. The rovers' original mission was scheduled for only three months.

"The rovers went through all of the Martian seasons and are back to late summer," said Dr. John Callas of NASA's Jet Propulsion Laboratory, Pasadena, Calif. He is deputy rover project manager. "We're preparing for the challenge of surviving another Martian winter."

Both rovers keep finding new variations of bedrock in areas they are exploring on opposite sides of Mars. The geological information they collect increases evidence about ancient Martian environments including periods of wet, possibly habitable conditions.

Spirit is descending from the top of "Husband Hill" to examine a platform-like structure seen from the summit. It will then hurry south to another hill in time to position itself for maximum solar-cell output during the winter.

Credit: NASA/JPL

"Our speed of travel is driven as much by survival as by discovery, though the geology of Husband Hill continues to fascinate, surprise, puzzle and delight us," said Dr. Steve Squyres of Cornell University, Ithaca, N.Y., principal investigator for the rover's science instruments. "We've got this dramatic topography covered with sand and loose boulders, then, every so often, a little window into the bedrock underneath."

From the composition and texture of more than six different types of rock inspected, scientists deduced what this part of Mars was like long ago. "It was a hot, violent place with volcanic explosions and impacts," Squyres said. "Water was around, perhaps localized hot springs in some cases and trace amounts of water in other cases.

Aided by a good power supply from Spirit's solar cells, researchers have been using the rover at night for astronomical observations. One experiment watched the sky during a meteor shower as Mars passed through the debris trail left by a passage of Halley's comet. "We're taking advantage of a unique opportunity to do some bonus science we never anticipated we would be able to do," said Cornell's Dr. Jim Bell, lead scientist for the rovers' panoramic cameras

Opportunity is examining bedrock exposures along a route between Endurance and Victoria craters. It recently reached what appears to be a younger layer of bedrock than examined inside Endurance. In Endurance, the lowest layers of bedrock were deposited as windblown dunes. Some of the upper layers were deposited as underwater sediments, indicating a change from drier to wetter conditions

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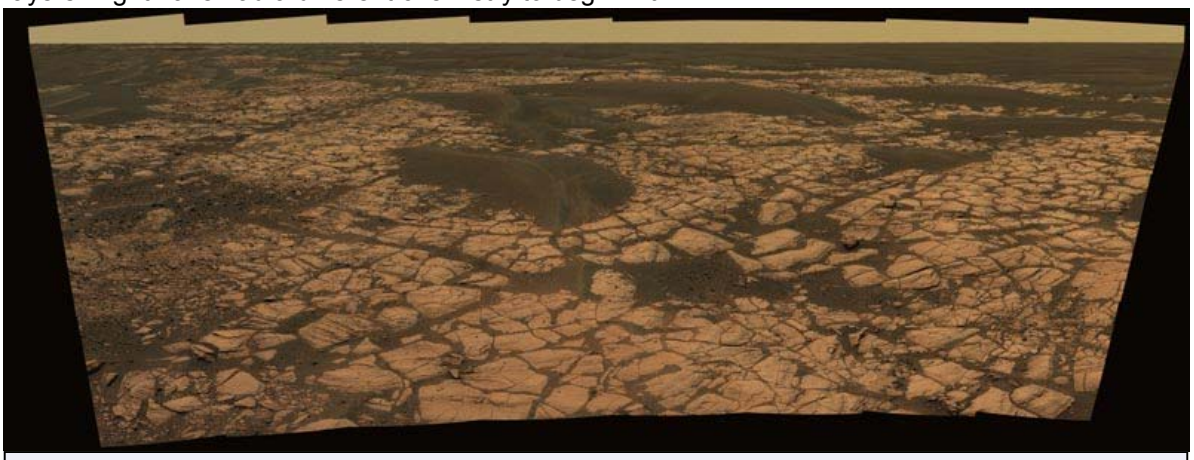
over time.

The bedrock Opportunity began seeing about two-thirds of the way to Victoria appears to lie higher than the upper layers at Endurance, but its texture is more like the lowest layer, petrified sand dunes. This suggests the change from drier to wetter environmental conditions may have been cyclical.

Iron-rich granules are abundant in all the layers at Endurance but are much smaller in the younger bedrock. These granules were formed by effects of water soaking the rocks. One possibility for why they are smaller is these layers might have spent less time wet. Another is the material in these layers might have had a different chemistry to begin with.



This view from the panoramic camera on NASA's Mars Exploration Rover Opportunity shows an outcrop called "Olympia" along the northwestern margin of "Erebus" crater.
Image credit: NASA/JPL-Caltech/Cornell

Paving The Way For Women To Mars: The Last WISE Volunteers Back On Their Feet

ESA Press Release: 8 December 2005

When the first women astronauts set foot on Mars, they may spare a thought for the 24 women who paved the way for lengthy space trips by giving three months of their lives to space science, two months of which involved staying in bed.

From March to May and from September to November, two different groups of 12 volunteers from eight European countries - the Czech Republic, Finland, France, Germany, the Netherlands, Poland, Switzerland, and the United Kingdom - took part in the Women International Space Simulation for Exploration (WISE) campaign on behalf of the European Space Agency (ESA), the French space agency (CNES), the Canadian Space Agency (CSA) and the US National Aeronautics and Space Administration (NASA). They gathered at the MEDES Space Clinic in Rangueil Hospital in Toulouse, France, to take up an extraordinary challenge: a 60-day campaign of female bed rest. For two months, they had to lie down and undertake all daily activities in beds tilted at an angle of 6º below horizontal, so that their heads were slightly lower than their feet. This unusual position induces physiological changes similar to those experienced by astronauts in weightlessness.

The last volunteers of the second WISE campaign got up on 30 November, and are now undergoing

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rehabilitation and medical tests lasting until 20 December. Similar tests were conducted in the pre-bed rest period for comparison.

A volunteer of the WISE campaign of female bed rest is undergoing an examination of her bone structure. The Beamscanner equipment uses ultrasounds to gather data on the bone microstructure.

MEDES, the French Institute for Space Medicine and Physiology, organized the selection of the volunteers and provided medical, paramedical and technical staff to support the extensive science experiments.

The main objective of the WISE campaign has been to assess the roles of nutrition and physical exercise with adapted equipment in countering the adverse effects of prolonged microgravity conditions, in order to develop the counter-measures that will be required when future astronauts venture beyond the Earth orbit to explore other worlds.

The data collected by the international science teams during the WISE study will improve our knowledge of muscle condition, blood parameters, cardiovascular condition, coordination of movements, changes in endocrine and immune systems, metabolism, bone status, as well as psychological wellbeing. This will serve not only the future of human spaceflight, but our everyday lives on Earth too, by providing clues as to how to deal with osteoporosis, fight the "metabolic syndrome", which affects millions of sedentary workers who take insufficient physical exercise, assist recovery of bedridden patients, or prevent some cardiovascular conditions.

Twelve scientific teams from 11 countries - Belgium, Canada, Denmark, France, Germany, Italy, the Netherlands, Sweden, Switzerland, the United Kingdom and the United States - are involved in the study. It will take them several months to analyze their data and start publishing their findings. In order to answer certain scientific questions, a follow-up of the volunteers will continue for three more years.

"The WISE campaign has now come to a successful conclusion and I look forward to further campaigns in the future where there is this degree of international involvement and complexity", said Didier Schmitt, Head of the Life Sciences Unit in ESA's Directorate of Human Spaceflight, Microgravity and Exploration. "Planning for future research is already under way with a program of bed rest campaigns being prepared, covering the next three years. This will be a combination of short-term, intermediate and long-term bed rest studies, lasting 5, 21 and 60 days, respectively. A research announcement covering this period is due to be released in the near future as part of the European program for Life and Physical Sciences and Applications using the ISS (ELIPS). A further two bed rest studies are planned, one in Berlin and the other at the DLR in Cologne and they have already been selected as part of the ESA Microgravity Applications Program (MAP). These studies are currently awaiting the necessary funding, also from the ELIPS Program."

WISE bed rest participant Dorota undergoes a balance test following 8 weeks in bed. Credits: CNES/ Stéphane LEVIN

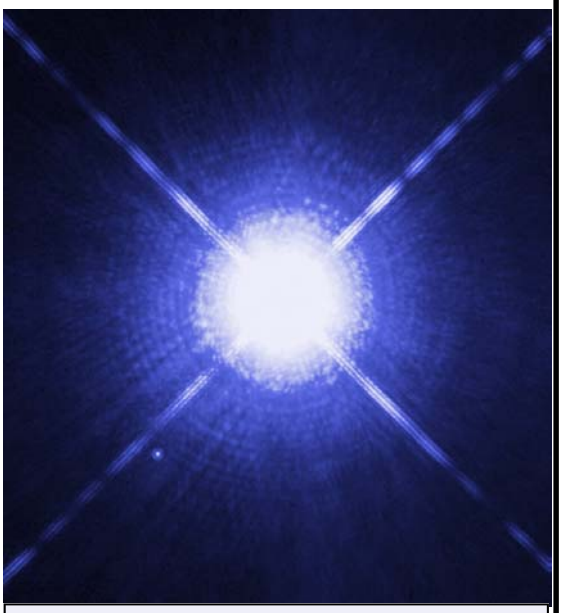
For additional information, visit the WISE study at: http://www.spaceflight.esa.int/wise .

Astronomers Use Hubble to 'Weigh' Dog Star's Companion

Press Release: STScI-2005-36, December 13, 2005
Space Telescope Science Institute

For astronomers, it's always been a source of frustration that the nearest white-dwarf star is buried in the glow of the brightest star in the nighttime sky. This burned-out stellar remnant is a faint companion of the brilliant blue-white Dog Star, Sirius, located in the winter constellation Canis Major.

Now, an international team of astronomers has used the keen eye of NASA's Hubble Space Telescope to isolate the light from the white dwarf, called Sirius B. The new results allow them to measure precisely the white dwarf's mass based on how its intense gravitational field alters the wavelengths of light emitted by the star. Such spectroscopic measurements of Sirius B taken with a telescope looking through the Earth's atmosphere have been severely contaminated by scattered light from the very bright Sirius.



Credit: NASA, H.E. Bond and E. Nelan
(Space Telescope Science Institute, Baltimore, Md.);
M. Barstow and M. Burleigh (University of Leicester, U.K.); and
J.B. Holberg (University of Arizona)

"Studying Sirius B has challenged astronomers for more than 140 years," said Martin Barstow of the University of Leicester, U.K., who is the leader of the observing team. "Only with Hubble have we at last been able to obtain the observations we need, uncontaminated by the light from Sirius, in order to measure its change in wavelengths."

"Accurately determining the masses of white dwarfs is fundamentally important to understanding stellar evolution. Our Sun will eventually become a white dwarf. White dwarfs are also the source of Type Ia supernova explosions that are used to measure cosmological distances and the expansion rate of the universe. Measurements based on Type Ia supernovae are fundamental to understanding 'dark energy,' a dominant repulsive force stretching the universe apart. Also, the method used to determine the white dwarf's mass relies on one of the key predictions of Einstein's theory of General Relativity; that light loses energy when it attempts to escape the gravity of a compact star."

Sirius B has a diameter of 7,500 miles (12,000 kilometers), less than the size of Earth, but is much denser. Its powerful gravitational field is 350,000 times greater than Earth's, meaning that a 150-pound person would weigh 50 million pounds standing on its surface. Light from the surface of the hot white dwarf has to climb out of this gravitational field and is stretched to longer, redder wavelengths of light in the process. This effect, predicted by Einstein's theory of General Relativity in 1916, is called gravitational redshift, and is most easily seen in dense, massive, and hence compact objects whose intense gravitational fields warp space near their surfaces.

Based on the Hubble measurements of the redshift, made with the Space Telescope Imaging Spectrograph, the team found that Sirius B has a mass that is 98 percent that of our own Sun. Sirius itself has a mass of two times that of the Sun and a diameter of 1.5 million miles (2.4 million kilometers).

White dwarfs are the leftover remnants of stars similar to our Sun. They have exhausted their nuclear fuel sources and have collapsed down to a very small size. Sirius B is about 10,000 times

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fainter than Sirius itself, making it difficult to study with telescopes on the Earth's surface because its light is swamped in the glare of its brighter companion. Astronomers have long relied on a fundamental theoretical relationship between the mass of a white dwarf and its diameter. The theory predicts that the more massive a white dwarf, the smaller its diameter. The precise measurement of Sirius B's gravitational redshift allows an important observational test of this key relationship.

The Hubble observations have also refined the measurement of Sirius B's surface temperature to be 44,900 degrees Fahrenheit, or 25,200 degrees Kelvin. Sirius itself has a surface temperature of 18,000 degrees Fahrenheit (10,500 degrees Kelvin).

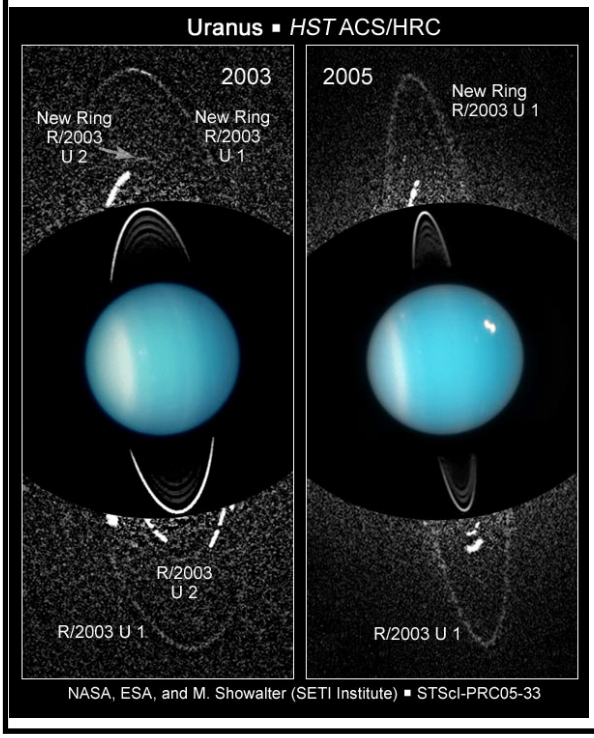
At 8.6 light-years away, Sirius is one of the nearest known stars to Earth. Stargazers have watched Sirius since antiquity. Its diminutive companion, however, was not discovered until 1862, when it was first glimpsed by astronomers examining Sirius through one of the most powerful telescopes of that time.

Details of the work were reported in the October 2005 issue of the Monthly Notices of the Royal Astronomical Society. Other participants on the team include Howard Bond of the Space Telescope Science Institute, Baltimore, Md.; Matt Burleigh of the University of Leicester; Jay Holberg and Ivan Hubeny of the University of Arizona; and Detlev Koester of the University of Kiel, Germany.

Newly Discovered Moon and Rings of Uranus

STScI-PRC2005-33

These composite images from several observations by NASA's Hubble Space Telescope reveal a pair of newly discovered rings encircling the planet Uranus. Hubble also spied two small satellites, named Mab and Cupid. The left composite image is made from Hubble data taken in 2003. The new dusty rings are extremely faint and required long exposures to capture their image. The background speckle pattern is noise in the image. The outermost ring (R/2003 U 1) is likely replenished by dust blasted off the newly discovered satellite Mab, embedded in the ring and visible as a bright streak at the top of the outer ring. The new outermost ring is twice the radius of the previously known ring system around Uranus, as seen near image center. (The inner rings are much brighter, so no noise is visible in the background). Approximately halfway between the outermost ring and inner ring system is a second newly discovered ring (R/2003 U2). Only a faint segment of it appears at the 12:00 o'clock position. Because of the long exposures, the moons are smeared out and appear as arcs within the ring system.



In the image at right, taken two years later, the rings appear more oblique because Uranus has moved along its solar orbit. The planet Uranus itself is approaching spring equinox, when the Sun will be directly shining over the planet's equator in 2007. Cloud bands and storms are becoming more pronounced in the atmosphere. A bright storm appears at northern latitudes in the 2005 images. The images were taken with the Advanced Camera for Surveys, using a clear filter.

Member Recognition

The January issue of Astronomy features an image of M14 taken by **Al Kelly**. The image can be found on page 119 in the "*Reader gallery*" section.

Becky Ramotowski, daytime planet observer extraordinaire, was one of several contributors to Stephen O'Meara's *Great Jupiter's "Ghost"* article found on page 79 of the January issue of Sky & Telescope.

Upcoming Events

Deep South Texas Stargaze 2006 will be held at the Escondido Ranch, which is nine miles west of Freer, Texas, from February 22nd through the 26th. This ranch is located in one of the darkest skies in the country and provides the optimal environment for deep sky observing. It is recommended that you book early. Currently all family rooms are booked. There are bunk rooms, RV sites and camp sites available. For more information visit http://raychamp1.tripod.com/DSTS2006/dsts2006.html.

****

Registration for the **2006 Texas Star Party** has begun. Visit http://www.texasstarparty.org/ to register on-line.

Dick Miller will be coordinating bunkhouse reservations again this year. The following is a quote from the TSP web site:

"(If you) want to be in the same bunkhouse with other members of your group... each member of the group may submit a form, but all forms must have the same information for (a) number of people, (b) dates, and (c) the other members names listed in the "Other Info" area."

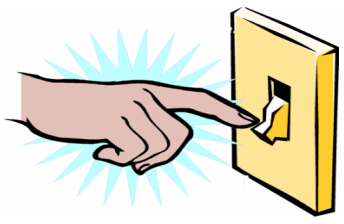
Dick requests: "... if all of you who think you might want to stay in a bunkhouse will send me your names and dates, I'll put out a list you can copy into your registration form to meet this requirement. Meanwhile, I'll do some more checking on the date part, because the quote above makes it sound like all members must sign up for the same dates. I know some of you usually have to arrive late or leave early. But don't worry about that yet -- just tell me when you would like to be there."

****

Dates for the **23rd Annual Okie-Tex Star Party** have been announced. Astronomers will return to Camp Billy Joe on September 16th through 23rd. For more information visit http://www.okie-tex.com/.

Help turn off the lights...

Join the
International Dark-Sky Association (IDA)
http://www.darksky.org
"To preserve and protect the nighttime environment and
our heritage of dark skies through quality outdoor lighting."



Visit http://www.texasida.org/ the web site for the Texas IDA affiliate of the International Dark-Sky Association.

Visual Observing January 2006

Chris Randall

★**SSO**: (Solar System Objects) Summary for 15 January 06

Object	Const	Mag	% Ill	Rise Time	Transient	Set Time
Sun	Sgr	-26.7	100	07:16	12:29	17:42
Moon	Cnc	----	100	19:00	01:14	08:21
Mercury	Sgr	-0.8	98	06:59	12:03	17:07
Venus	Sgr	-4.1	1	06:48	12:13	17:38
Mars	Ari	-0.2	90	12:45	19:33	02:18
Jupiter	Lib	-1.9	99	02:08	07:34	13:00
Saturn	Cnc	0.4	100	18:41	01:27	08:13
Uranus	Aqr	5.9	100	09:40	15:21	21:05
Neptune	Cap	8.0	100	08:31	13:56	19:24
Pluto	Ser	14.0	99	04:57	10:21	15:46
C/2005 E2 McNaught	Aqr	9.3	95	09:22	15:08	20:58

Highlighted times denote daylight events.

Lunar phases for January 06

First	Full	Third	New
6th 12:56	14th 03:48	22nd 09:14	29th 08:15

Central Standard time

★**BSO**: (Bright Sky Objects)

NGC 1980 – Open Cluster in Orion, Magnitude 2.5, Size 15', Stars 30.
NGC 1976 (M-42 LBN 974) – Bright Nebulae in Orion, Magnitude 3.0, Size 60'.
NGC 1981 (Cr-73) – Open Cluster in Orion, Magnitude 4.2, Size 24', Stars 20.
NGC 1960 (M-36, Cr-71) – Open Cluster in Auriga, Magnitude 6.0, Size 12', Stars 60.

★**DSO**: (Dark Sky Objects)

NGC 1912 (M 38, Cr-67) – Open Cluster in Auriga, Magnitude 6.4, Size 21', Stars 100.
NGC 1851 – Globular Cluster in Columba, Magnitude 7.1, Size 12'
NGC 1893 (Cr-63, Mel 33) – Open Cluster in Auriga, Magnitude 7.5, Size11', Stars 60. Look for nebulosity in region (IC410).
Arp 20 – Interacting Galaxies in Taurus, Magnitude 14.4, Size 1.1'x0.6'.

★**CDMP:** (Chris' Don't Miss Pick)

NGC 1432/5 (IC 349) + M45 – Bright Nebula + Open Cluster in Taurus. Open cluster Magnitude 1.2, Size 110', Stars 100.

Don't look at just the Seven Sisters. Look around the stars for more wonder, especially if you are in

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a dark location.

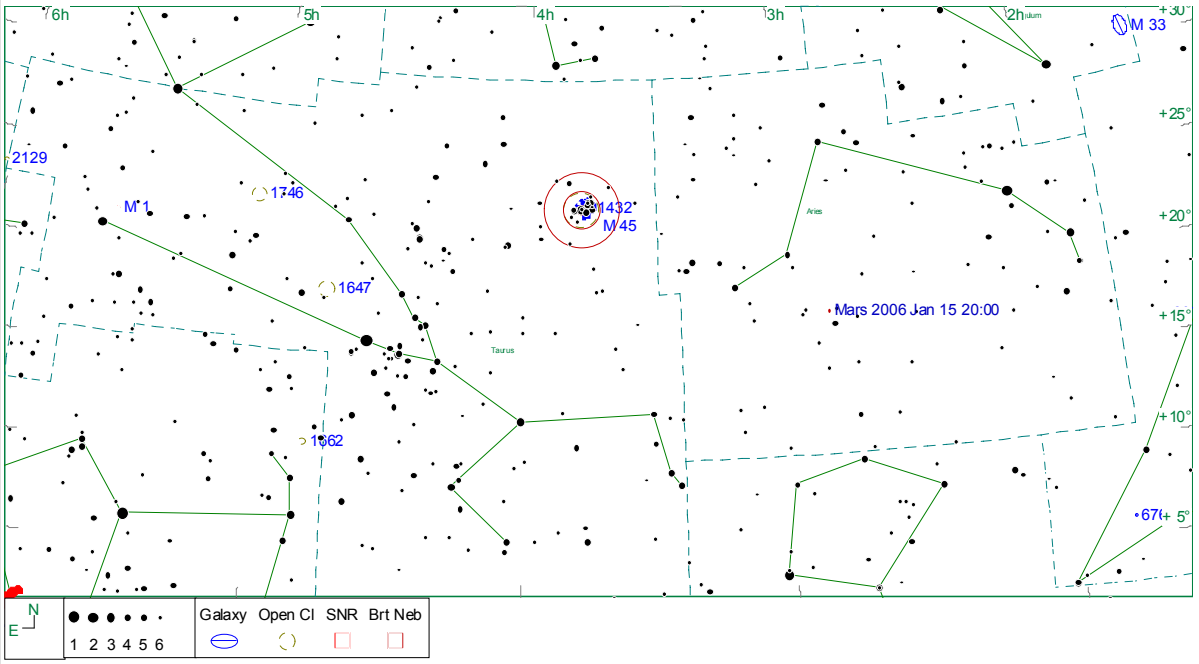
The most conspicuous of the Pleiades reflection nebulae is NGC 1435 around Merope, also called "Tempel's Nebula". This is the only one which was known to John Herschel when he compiled his General Catalog (GC) in 1864, and has been assigned the number GC 768. It has a faint extension, IC 349, which is very small and 36" southeast of Merope.

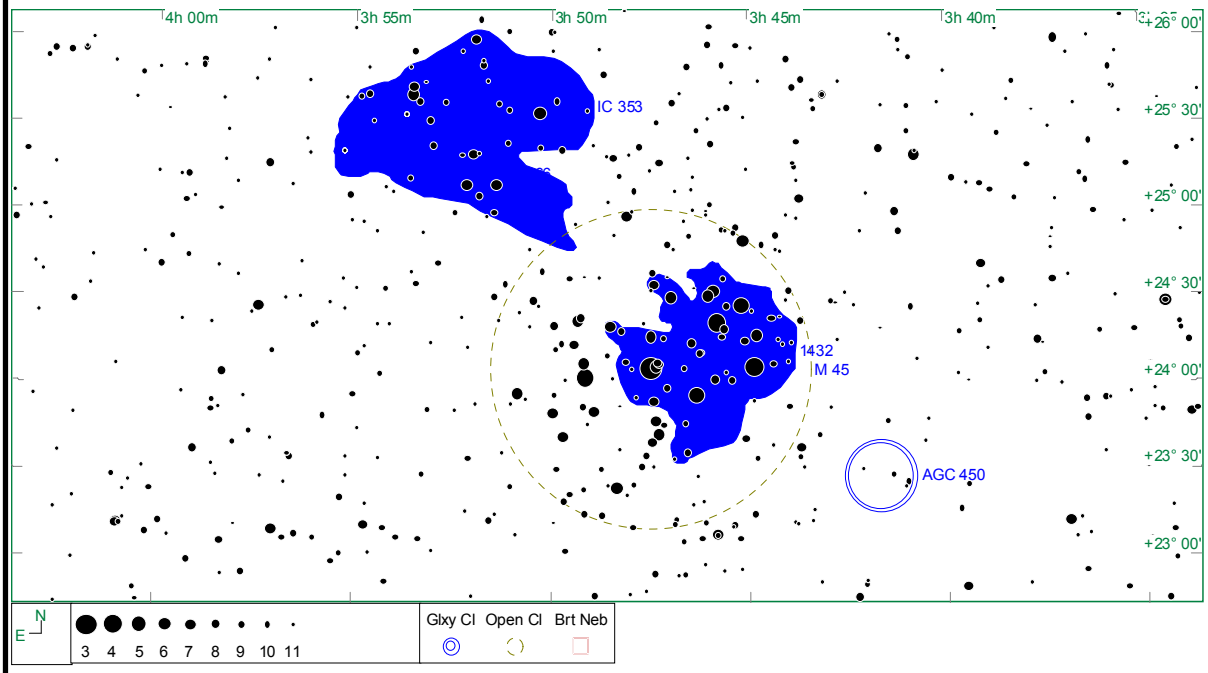
The star Maia (20 Tauri) was subject to speculation when Otto Struve brought up the hypothesis that it might be a representation of a new type of variable of spectral type B7-A3 near-main sequence stars. However, various photometric investigations have proven that Maia (and other suspected "Maia Variables" such as Gamma UMa) is of constant brightness.

In the region of the sky around the Pleiades, a number of more diffuse nebulae can be found, many of them discovered by Barnard (1894) who referred to them as the "exterior nebulosities of the Pleiades." The following table lists the NGC and IC nebulae (and suspected nebulae) in the wider field around the Pleiades:

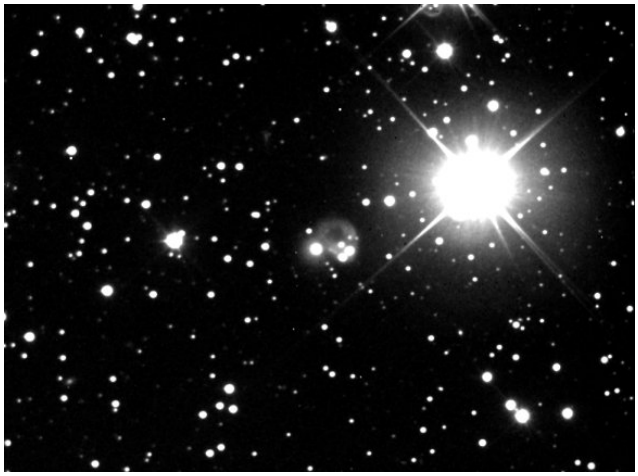
Nebula		RA (2000.0)	Dec	Type	Cross References, Discoverer
IC 1941		03:32.2	+24:26	3St	D.S. 202
IC 336		03:38.2	+23:28	Neb	Barnard (AN 3253)
IC 341		03:41.2	+21:57	Neb	Barnard (AN 3253)
NGC 1432	P	03:45.8	+24:22	Neb	Maia Neb, in M45; Henry
NGC 1435	P	03:46.1	+23:47	Neb	in M45; Tempel (1859 Oct 19), Tempel's Neb, Merope Neb, GC 768
IC 349	P	03:46.3	+23:56	Neb	in M45; Barnard's Merope N, Barnard (AN 3018)
M 45	P	03:47.0	+24:07	OC	Pleiades
IC 1990		03:47.5	+24:37	Neb	Stratonoff (AN 3366)
NGC 1456		03:48.2	+22:34	DSt	J G Lohse
IC 1995		03:50.3	+25:35	Neb	Barnard
IC 354		03:53.3	+23:25	Neb	Barnard (AN 3253)
IC 353		03:55.0	+25:29	Neb	Barnard (AN 3253)
IC 360		04:13.0	+25:38	Neb	Barnard (AN 3253)

A "P" is marking objects situated within the boundaries of the Pleiades cluster. "Type": "Neb," Nebula; "OC," Open Cluster; "DSt," Double Star; "3St," Three Stars. The diffuse nebulae IC 353, IC 354 and IC 360 are about 1 degree north following of the Pleiades.


6h
5h
4h
3h
2h
M 33
+25°
+20°
+15°
+10°
+ 5°
2129
M 1
1746
1432
M 45
1647
Aries
Taurus
Mars 2006 Jan 15 20:00
1662
67(
N
E
1 2 3 4 5 6
Galaxy
Open Cl
SNR
Brt Neb


4h 00m
3h 55m
3h 50m
3h 45m
3h 40m
+26° 00'
+25° 30'
+25° 00'
+24° 30'
+24° 00'
+23° 30'
+23° 00'
IC 353
1432
M 45
AGC 450
N
E
3 4 5 6 7 8 9 10 11
Glxy Cl
Open Cl
Brt Neb

MEMBER'S GALLERY

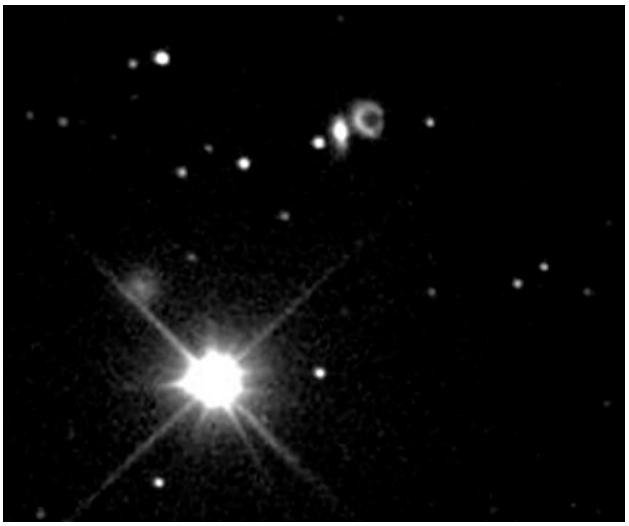


◄ Arp 145
©Dick Miller

Imaged with a 10" Newtonian and MX716 camera. Total exposure time was 30 minutes. Your first reaction on looking at this image will be that the ring sitting on the bright galaxy, but slightly offset, is a artifact from the very bright star in the field. That was Dick's reaction when the first exposure flashed up on the screen. He immediately headed for his internet-connected computer to check Arp's image. In fact, the ring is not an artifact -- the galaxies actually look like this!

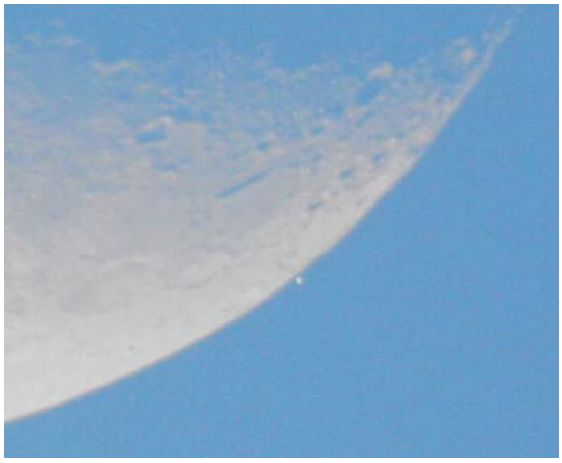
Arp 147 ►
©Dick Miller

Arp 273 was imaged with a 10" Newtonian and MX716 camera. Total exposure time was 25 minutes.



◄ Arp 147
©Dick Miller

This is a detailed image of Arp 147 re-sampled to 150%. It is a tiny object. It was imaged with a 10" Newtonian and MX716 camera. Total exposure time was 25 minutes.



◄ Spica Occultation by the Moon
©Chris Randall

The occultation of Spica by the waning Moon on December 25, 2005. Prime focus 10" f6.3 using a Cannon 20D. The image is cropped about 1/4 frame.

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Sky & Telescope offers a "Club Discount" on subscriptions. You can subscribe to Sky and Telescope for $10 off the normal price ($32.95 with the club discount). Astronomy magazine is also offering a club discount. JSCAS members can subscribe to Astronomy for $29 a year. We need to have a minimum of five subscribers to take advantage of the discount. If you are a current subscriber, *please* contact me so I can put you on the list for the club discount when your subscription is due for renewal!

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David Haviland
Vice-president and Secretary

Houston Area Astronomy Clubs

Brazosport Astronomy Club
Meets the Third Tuesday of the month, 7:45 p.m.
At the Planetarium
400 College Drive
Clute, Texas
For more information, contact Judi James at the Planetarium
979-265-3376

Fort Bend Astronomy Club http://www.fbac.org/
Meets the third Friday of the month, 7:00 p.m.
First Colony Conference Center
3232 Austin Pkwy
Sugar Land, Texas

Houston Astronomical Society http://spacibm.rice.edu/~has/
Meets the first Friday of the month, 8:00 p.m.
University of Houston, University Park
Science and Research Building, room 117

North Houston Astronomy Club http://www.astronomyclub.org/
Meets the fourth Friday of the month, 7:30 p.m.
In the Teaching Theater at Kingwood College
20000 Kingwood Drive
Kingwood, Texas

Johnson Space Center Astronomical Society

An association of amateur astronomers dedicated to the study and enjoyment of astronomy. Membership is open to anyone wishing to learn about astronomy.

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SIGS

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Telescope Making
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January Meeting Agenda

January 13th, 7:30 p.m., Center for Advanced Space Studies/ Lunar Planetary Institute, 3600 Bay Area Blvd. (at Middlebrook Drive).

- Welcome!!!
- Guest Speaker: To Be Announced
- Break
- SIG reports, Star Party News
- Astronomical Oddities — Hernan Contreras
- Last Words, Door Prizes

Any unfinished discussions can be continued over food and beverages at a location to be announced at the end of the meeting.

Starscan Submission Procedures

Original articles of astronomical interest will be accepted up to 6 P.M. January 25th.

The most convenient way to submit articles or a Calendar of Events is by electronic mail, however computer diskettes or CDs will also be accepted. All articles should include author's name and phone number. Also include any picture credits. The recommended format is Microsoft Word. Text files will also be accepted.

Submitter bears all responsibility for the publishing of any e-mail addresses in the article on the World Wide Web.

Editor's electronic address is: lesteke@swbell.net. Be sure to include the word Starscan in the subject line for proper routing of your message.

Starscan Staff

Editor Ken Lester
Associate Editors Sheila Steele
Ken Steele

Cover Image
Stardust Returns to Earth
Credit: NASA/JPL

Artist rendering of Stardust approaching Earth after encountering Comet Wild 2 and capturing cometary dust for return to Earth.