STARSCAN

Johnson Space Center Astronomical Society

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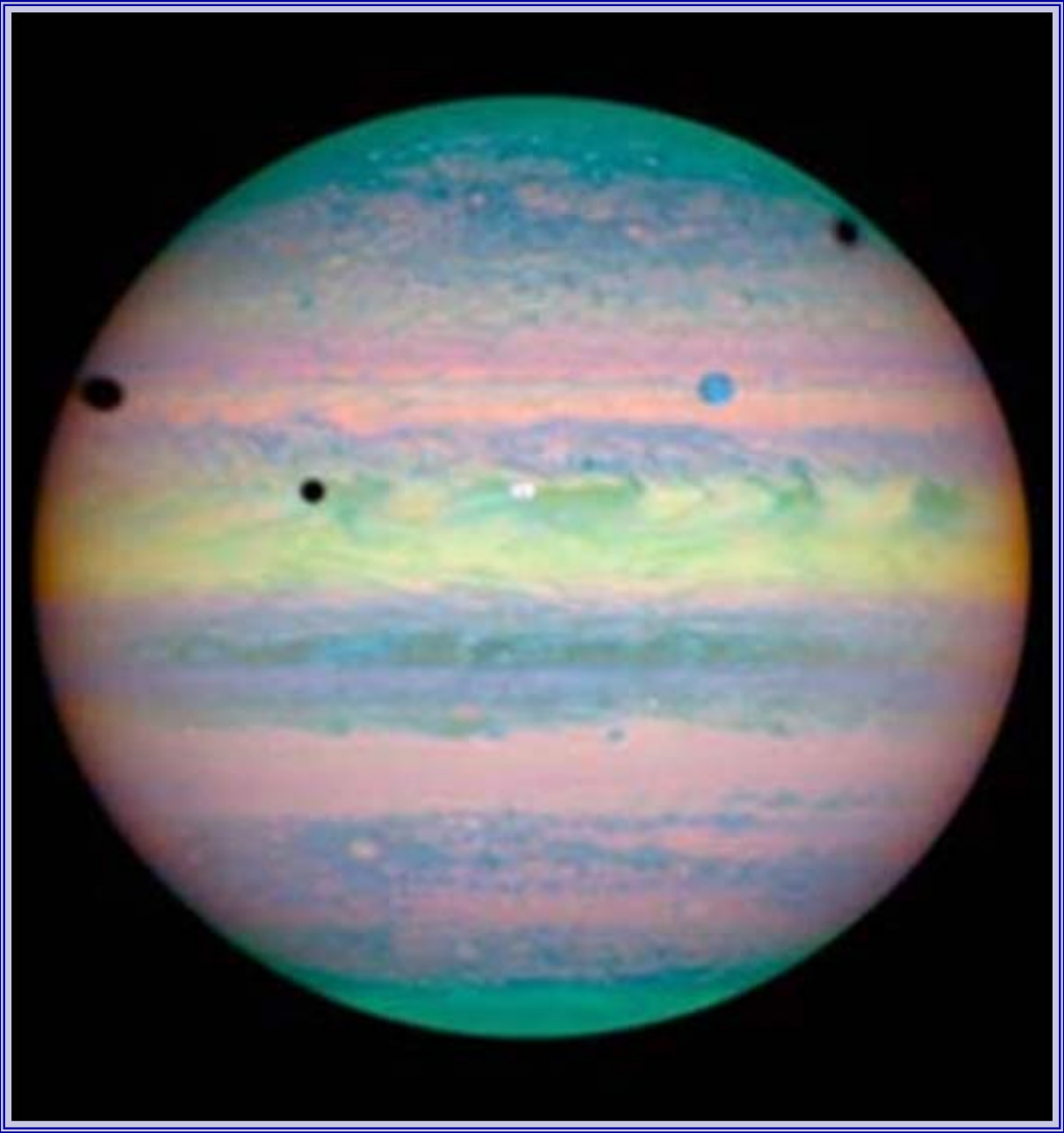


IN THIS ISSUE

NASA News

Special Interest Groups

Club News, Features, and Information

Imaging the Lunar Eclipse

Scott Ewart

This is a sequence of seven images of the lunar eclipse from this past October 27th. It was done on one frame of film (remember film?), not a composite assembled in Photoshop. I wanted to capture the Earth's shadow. It ended up requiring more planning than I thought it would.

I used an Olympus OM1 camera. Since it doesn't have a provision for taking multiple exposures on one frame, I had to lock the shutter open on bulb, and use the lens cap as the shutter. I actually bought a lens with this project in mind. It's a cheap 500mm f/8 mirror lens (a Mak-Cass). Since it can't be stopped down with an iris, I had to make an off-axis mask with a small 7.5mm hole. This brings it to f/80. Without this, there's no way I could have done a manual "hat trick" exposure fast enough for the partial phases. It was removed for the 3 images during totality. While experimenting though, I discovered that this mask caused severe vignetting. A full quarter of the field on the side opposite the hole was completely dark. So I had to plan out where to orient the hole for the beginning and end of the eclipse.

I used Starry Night Pro to help me plan out the framing. I decided to orient the camera equatorially as close as possible. That is, north is up and east is left. The Moon moved through the field from lower right to upper left. I set the field of view in the program to approximate the true field of the camera lens. I even looked at the screen through the camera to see where the first image should start. I had the program run an animation of the event to be sure the whole event would fit in the field of the camera, and to decide at what times I wanted to take the images. I decided on every 36 minutes, centered on mid-eclipse.

(Continued on page 4)

(Continued from page 3)

This animation showed me another challenge. It shows outlines of the Earth's umbra and penumbra. The shadow moves! And not just by the same amount the Sun moves around the ecliptic. It would if we were at the North Pole or at the center of the Earth, but since we're on a surface that moves relative to the Earth-Moon line, the parallax changes. A whole Moon diameter's worth during the 3+ hours of the sequence I shot.

The camera rode piggy-back on my 4 1/2" Newtonian using an Orion EQ3 mount. I used the scope for guiding. But I discovered that I couldn't find a guide star and sit on it all night. If I did that, the picture would come out distorted, with the images pushed together and partial phase images showing curved umbra edges that don't line up on a common circle. The program showed me that during each 36 minute interval, the shadow moves 4.5 arc-minutes West and about 1 arc-minute North. So I had to move the camera and guide scope by the same amount. I have a guiding eyepiece with an illuminated reticule. It's also adjustable so that the reticule can be moved to a guide star instead of having to move the whole guide scope. I used this feature to help move the scope.

Eclipse night was supposed to be a little clearer than it ended up. I went to Batsto, NJ where a few WAS members were headed. I decided on this spot for it's horizons, lack of distractions and based on a satellite image, better weather prospects. It turned out to make a difference since we were right on the edge of the cloud line most of the night. Also, the lack of heavy light pollution didn't hurt.

I got there with about 3 hours to set up. It turned out I needed most of that time. Set up the tripod, assemble the scope and camera, wait for it to get dark to do a polar alignment, wait for clouds to pass, critically focus the camera and tape it down, wait for the guide star to rise and more clouds to clear, orient the camera body, frame the Moon right, re-acquire and center the guide star, eat another donut: it all adds up.

I started by positioning the guide star and reticule all the way over on the west side of it's adjustment, and then centered the star. Just before the first exposure, I moved the scope East and South the required amount, took the first shot, then moved the scope back to center the star in the reticule, and then waited there for the second shot. This saves reticule travel. I figured out that if I turn off the drive and let the stars drift, 4.5 arc-minutes of sky goes by in about 18 seconds. Holding the 2X button on my controller for 18 seconds moved the scope West the right amount, and holding it 4 seconds showed me how far to move it in declination.

I was worried that I might run out of reticule travel before I was done, so I used the Pleiades to guide. I figured that if I did run out of travel, I could just move the reticule to another star. It turns out I had just enough, but I did need the brightness of these stars when the clouds were around. Fortunately they were usually thin. As you can see in the last image, the clouds were thicker and I totally lost the guide star for that one. I just had to trust that it hadn't drifted since I'd moved it after the previous exposure.

I had to increase some exposure times to compensate for thin clouds. I just had to guess, but it didn't hurt having Jerry Lodriguss set up right next to me shooting digital. He was able to show me instant results from bracketed exposures to give me an idea. Exposure times ended up as follows. 1/10 sec. at f/80, 1/2 sec. at f/80, 8 sec. at f/8 through thin clouds, 35 sec. at f/8 through thicker clouds, 3 sec. at f/8, 1/2 sec. at f/80 through thin clouds, and 1/4 sec. at f/80 through broken thick clouds. I used a table done by Fred Espenak as a guide to plan exposure times, but I had to be flexible.

I was amazed it came out as good as it did. We've been lucky to have 2 total Lunar Eclipses in the

(Continued on page 5)

(Continued from page 4)
last 2 years visible in their entirety above our horizon. I'm glad I got something good out of it. At first that final image bothered me, but now I think I like it. It adds realism and serves as a reminder of what it took to get the shot and how close I came to missing it. Just after that last shot, we lost the Moon completely to the clouds for the next couple hours.

Maybe I'll just sit back and watch the next one.

Star Party News

Moody Gardens Star Party

Our last visit to Moody Gardens in 2004 was a big success. All day long the weather was gorgeous and it continued as the Sun set! The temperature was cool enough to get rid of the mosquitoes but not too cold for the observers. We had a good number of JSCAS members show up with their scopes and binoculars to share their love of the sky with the public. Ken and I counted 100 people viewing at our two scopes. Some of these people came back repeatedly! As the skies darkened and more objects were visible a variety of items were being observed. The list includes the Andromeda Galaxy, the ET cluster, the Ring Nebula, the Double Cluster in Cassiopeia, and the Orion Nebula. As Orion climbed about the trees the dew settled on our eyepieces and spotter scopes. Luckily, it was about 10:30 and time to wrap up the star party anyway. We had visitors from as far away as Chicago and Pennsylvania. Our Texas visitors came from as far away as San Antonio and Katy!

We did have a little trouble as the electricians couldn't seem to locate the proper switch to get rid of some of the sidewalk lights but black garbage bags and tape solved the problem for this star party! Johanna Goforth, Director of the Discovery Pyramid, and our event coordinator assures me that the switch will be identified before our first star party in 2005! I will be setting the 2005 star party dates in the next week or so & they will be published in the next issue of the Starscan.

Wine and Stars

Our winter Haak Winery star party was held November 13th at the Haak Vineyards in Santa Fe, Texas. Unfortunately, the event was clouded out and fairly cold. There weren't even any sucker holes to be found. A small delegation of astronomers still showed up to talk to any public that might have ventured out. The JSCAS attendees were Bob and Karen Taylor, Triple and Karen Nickel, Randy and Dolly Brewer, Chris Randall, and myself.

As it turns out, the Haaks had booked three other groups to enjoy the wine and stars. There was a University of Houston CL Alumni group, a birthday party, and a wine club. Bob Taylor gave a talk to one of the groups down in the wine cellar which I understand was very well received.

Hopefully next year's Wine and Stars party will have clear skies.

Armand Bayou Nature Center Star Party

Armand Bayou Nature Center (ABNC) scheduled a public star party and scout program for the night of November 6th. These star parties are held at the Krauss Observatory at ABNC and are hosted by JSCAS volunteer, Ron Rosenwald.

Unfortunately, on the day of the star party, Ron experienced automobile problems which he had to

(Continued on page 6)

address to keep his family mobile. A desperate cry for help went out on the list server. Now it just so happens that the Moody Gardens Star Party was being held the same evening, so able-bodied astronomers that could help ABNC were in short supply. One of our beloved club elders, Al Kelly, volunteered to fill in for Ron.

Al reports: "The ABNC venture went just fine. I took my bino-chair, 15x70 binos, and green laser. A lady from the ABNC (a non-astronomy volunteer) and I entertained about 20 girl scouts (with 5-6 parents) from 5 to 6 p.m.; addressing their planned subject areas (What are constellations? What are meteors? etc.), answering real-time questions, and letting them try out the bino chair. After 6 p.m. there was an advertised public star party that attracted about 4 or 5 families, maybe 15 people. It was dark enough by then to use the green laser to point out some constellations and the locations of specific objects (M31, Albireo, the Ring Nebula, etc.). The bino chair went to good use in this session and the folks all seemed to enjoy themselves. It all broke up about 7:30 or so. Since I had planned to just show up and help, it's a good thing that I had long ago learned how to throw down salt and dance!"

Our thanks to Al Kelly for stepping up to the plate!

Request for photographs

Work on the memorial to Dave Brown and the rest of the crew of STS-107 is progressing slowly. Our goal is to complete the display as part of our March 2005 trip to Fort McKavett. In order for this to be possible, Karen Nickel and I need your help! If you could find the time during this busy season to go through old photographs, we would appreciate if you could bring us any pictures of Dave Brown taken at the fort. Any pictures used in the memorial display will be credited to the photographer. Please bring the photographs to the December Solstice Party or to the January meeting. If you have any questions please call me: Lisa Lester at 281-479-1102.

Charlie's Last Challenge

Charles Hudson

LAST MONTH'S CHALLENGE

I recently attended a seminar in which the scientist described some experiments he had done determining the temperature dependence of some properties of a sub-cellular organelle. He had to use a microscope for this, and he said the experiments were "extremely difficult to perform", because as he raised the temperature of the Petri dish, water condensed on the objective lens of his microscope.

Science Stumper #68: What advice can you offer the scientist?

Answer to SciSt68: The amateur astronomer will advise the scientist to heat his optics to avoid condensation. My recommendation was to wrap the objective lens of his microscope with a heating tape. The people in the club will all hit on the same basic idea, but may differ in the way they suggest the heat be applied.

This will be the last Charlie's Challenge for a while. If the membership wants it back, perhaps it can be resurrected in the future. But I will be unable to generate them in the immediate future.

— Charlie Hudson

November Family Space Day at LPI

Text and Images by Matt Hommel

Attendance for this particular Family Space Day was a bit lower than in the past. The drop in attendance was likely due to the poor weather outside. Still, there were easily 50 people that came that day.

The kids got to build a model of their favorite planet and a mobile of the entire solar system. There was a question and answer activity giving interesting facts about each planet. The kids also got to tour a scale model of the solar system.

Everyone was impressed when the youngest JSCAS member built a model of Pluto, WITH CHARON! When asked what she was attaching to Pluto she answered, “it’s Charon, Pluto’s moon”. Priceless.

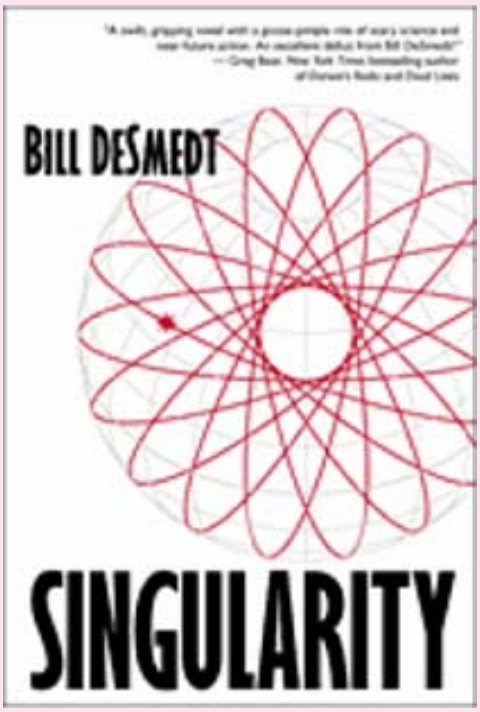
A great time was had by all.

Singularity

A Review by Ken Lester

I guess I'm a sucker for anything to do with the 1908 Tunguska Event in Siberia. When I read the Starscan write up by author Bill DeSmedt concerning the topic of his presentation at the November JSCAS meeting, I couldn't wait to hear him reading from his novel, *Singularity,* and the presentation by his guest, Albert Jackson, co-author of the Jackson-Ryan hypothesis.

Although the reading of the Introduction by Bill DeSmedt was eloquently done and the surprise appearance of Michael Ryan (the other author of the Jackson-Ryan hypothesis) was a treat, I left the meeting disappointed that I had learned very little new about Tunguska.



Hoping to learn more, I purchased a copy of his book and set aside some time to actually read it. I knew in advance that this was a science-fiction novel, but hoped it would shed more light on the Tunguska Event.

Sci-fi was right. It was almost up there with Buck Rogers, with people running around in full body armor, shooting "spider web" guns, and using made up words in just the first chapter. I came close to setting aside this book several times within the first 4 or 5 chapters.

It took awhile, but the multi-faceted story line finally started to gel about half-way through the book. The make believe words were finally explained and the theory of a Primordial Black Hole at Tungusta was presented and woven into the story. Although the story was fairly predictable, the remainder of the book held my interest. Overall, I enjoyed the time I spent reading it.

If you like science fiction, go ahead and give this book a try. Through a generous donation by our president, Bob Taylor, S*ingularity* is now in the JSCAS library. Check it out soon.

2005 Texas Star Party Registration

The great tradition of dark sky observing continues with the 27th Annual Texas Star Party, May 1 - 8, 2005. Once again, attendance is limited. If you plan to attend be sure to register before January 17, 2005. This will provide you the highest possible chance of being selected as one of the 700 people who will be able to attend TSP this year. TSP will **not** be mailing out a flyer this year! To register on-line visit http://www.texasstarparty.org/draw.html or fill out the Request Form immediately at: http://www.alphadata.net/cgi-bin/forms/forms.cgi?form=3. Drawing will be held January 22nd.

Spirit Adds Clues About History of Rocks in Martian Hills

News Release: 2004-269 November 4, 2004

All the scientific tools on NASA's two Mars Exploration Rovers are still working well, a full 10 months after Spirit's dramatic landing.

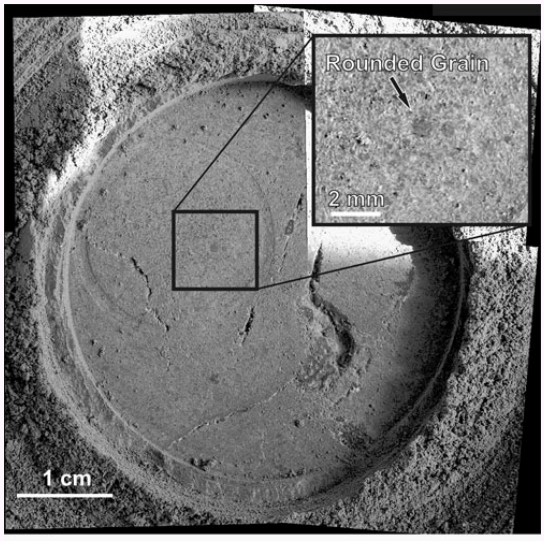
The ones on Spirit are adding fresh evidence about the history of layered bedrock in a hill the rover is climbing.

"Our leading hypothesis is that these rocks originated as volcanic ash that fell from the air or moved in ground-hugging ash flows, and that minerals in them were altered by water," said Dr. Ray Arvidson of Washington University, St. Louis, deputy principal investigator for the mission.

"This is still a working hypothesis, not a firm conclusion, but all the instruments have contributed clues that fit," he said. "However, it is important to point out that we have just begun to characterize the textures, mineralogy and chemistry of these layered rocks. Other hypotheses for their origin focus on the role of transport and deposition by water. In fact, it may turn out that volcanism, water and wind have produced the rocks that Spirit is examining. We are just beginning to put together the big picture."

Both rovers completed three-month primary missions in April. NASA has extended their missions twice because they have remained productive longer than anticipated.

"We're still making good progress even though Spirit has two types of problems with its wheels," said Jim Erickson, rover project manager at NASA's Jet Propulsion Laboratory, Pasadena, Calif. "We are working around those problems successfully, but they might be a sign of things to come, as mechanical parts wear out during our exploration of Mars."



This view covers a circular hole ground into a target spot called "Koolik" on Uchben by the rover's rock abrasion tool. The circle is 4.5 centimeters (1.8 inches) in diameter. Particles in the rock vary in shape from angular to round, and range in size from about 0.5 millimeter (0.2 inch) and below.

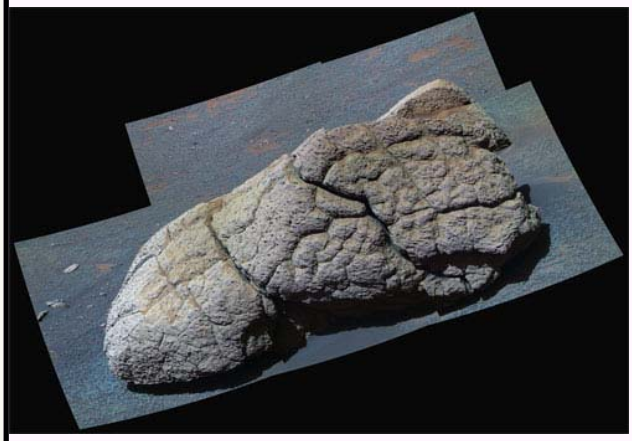
One question for continuing investigations as Spirit heads for rocks higher in the "Columbia Hills," is what the environment was like when water altered the minerals. Possibilities include water in the volcanic magma mixture before the ash erupted, surface water transporting the ash while it was still loose after the eruption, and ground water soaking through the rocks that solidified from the accumulated ash.

Some clues for a volcanic-ash origin come from a layered rock dubbed "Uchben." Researchers pointed Spirit's microscopic imager at a spot on Uchben scoured with the rock abrasion tool. The images reveal sand-size particles, many of them sharply angular in shape and some quite rounded. The angularity is consistent with transport by an eruption. Particles carried across the surface by wind or water usually tumble together and become more rounded. Uchben's rounded particles may be volcanic clumps, may be concretions similar to what Opportunity has found, or may be particles tumbled in a water environment.

(Continued on page 10)

(Continued from page 9)
Evidence for alteration by water comes mainly from identification of minerals and elements in the rocks by the rover's Moessbauer spectrometer and alpha particle X-ray spectrometer.

The rovers' principal investigator, Dr. Steve Squyres of Cornell University, Ithaca, N.Y., said, "We have really made headway just in the last several weeks in understanding these rocks. The most likely origin is debris that blasted out of a volcano, was transported by air or water to its present location, and settled out in layers."



NASA's Mars Exploration Rover Opportunity examined a boulder called "Wopmay" before heading further east inside "Endurance Crater." The frames combined into this false-color view were taken by Opportunity's panoramic camera during the rover's 251st Martian day (Oct. 7, 2004).

Opportunity, meanwhile, examined a lumpy boulder called "Wopmay" inside "Endurance Crater." The slope of the ground and loose surface material around the rock prevented Opportunity from getting firm enough footing to use its rock abrasion tool. Evidence from the spectrometers and microscopic imager is consistent with scientists' earlier hypothesis that rocks near the bottom of the crater were affected by water both before and after the crater formed. The evidence is still not conclusive, Squyres said.

Opportunity is heading toward the base of "Burns Cliff," a tall exposure of layered rock in the wall of the crater. However, if the rover encounters more of the poor traction found around Wopmay, planners may change course and drive up out of the crater.

JPL, a division of the California Institute of Technology in Pasadena, manages the Mars Exploration Rover project for NASA's Science Mission Directorate, Washington. Images and additional information about the project are available from JPL at http://marsrovers.jpl.nasa.gov and from Cornell University at http://athena.cornell.edu .

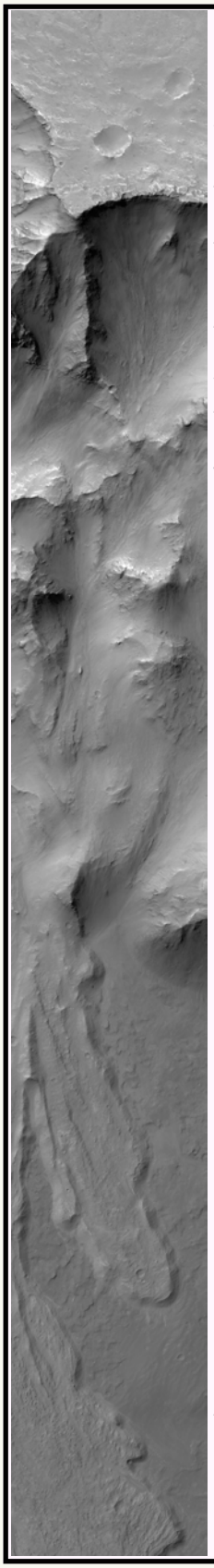
Text and Images courtesy of NASA/JPL/Cornell/USGS.

For Sale

8" Dobsonian (Celestron Star Hopper), bought new in 1999. In good shape, with original 25mm eyepiece, plus a Telrad that came with the scope. Price is $400.00 OBO.

Also available: Sky & Telescope and Astronomy magazines from 1997-2003. Some years are not complete. Price negotiable.

Ken Steele
281-478-0237 (H)

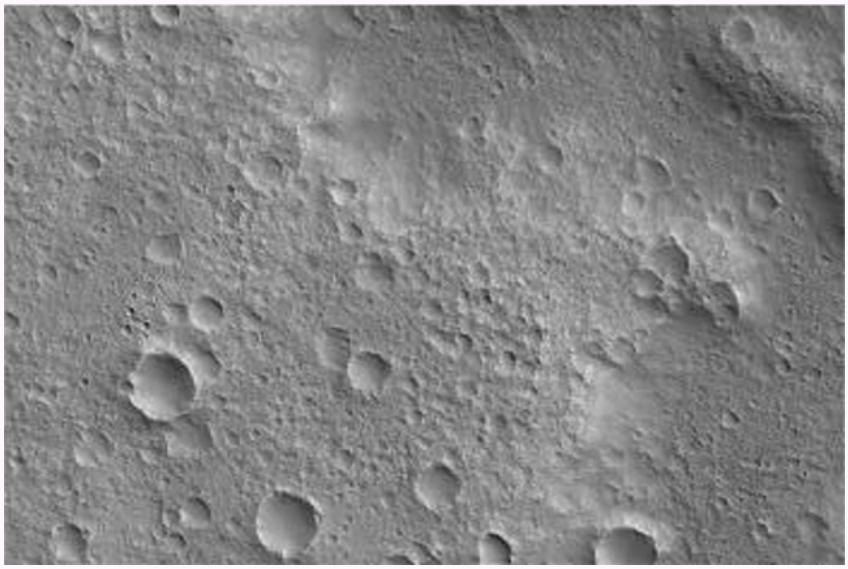


Images from the Mars Global Surveyor

Text and Images Courtesy of NASA/JPL/Malin Space Science Systems

This Mars Global Surveyor (MGS) Mars Orbiter Camera (MOC) image (left) shows part of a large landslide complex off the north wall of Coprates Chasma in the Valles Marineris trough complex. The wall of Coprates Chasma occupies much of the upper and middle portions of the image; the landslide lobes are on the trough floor in the bottom half of the image. Large boulders the size of houses can be seen on these landslide surfaces. This image is located near 13.9°S, 56.7°W. The picture covers an area about 3 km (1.9 mi) wide. Sunlight illuminates the scene from the upper left.

When it comes to planetary surfaces, the more craters there are, the older the terrain is believed to be. However, because the Martian surface has experienced considerable episodes of erosion as well as burial of craters, a surface covered with many small craters on Mars is often one that is more resistant to erosion, not necessarily one that is older than a less-cratered surface. This Mars Global Surveyor (MGS) Mars Orbiter Camera (MOC) image (below) shows an example of an extremely cratered surface. This can be contrasted with nearly any of the exposures of Martian sedimentary rock, which are very old but do not retain as many craters because they are more easily eroded. This image is located near 33.6°S, 204.7°W. The picture covers an area about 3 km (1.9 mi) wide. Sunlight illuminates the scene from the upper left.



NASA's Mars Odyssey orbiter began working overtime on August 25th after completing its prime mission that discovered vast supplies of frozen water, ran a safety check for future astronauts, and mapped surface textures and minerals all over Mars, among other feats.

"Odyssey has accomplished all of its mission-success criteria," said Dr. Philip Varghese, project manager for Odyssey at NASA's Jet Propulsion Laboratory, Pasadena, Calif. The spacecraft has been examining Mars in detail since February 2002, more than a full Mars year of about 23 Earth months. NASA has

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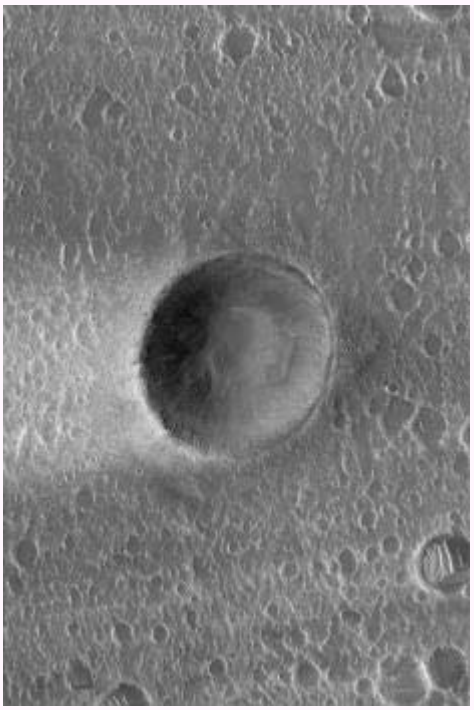
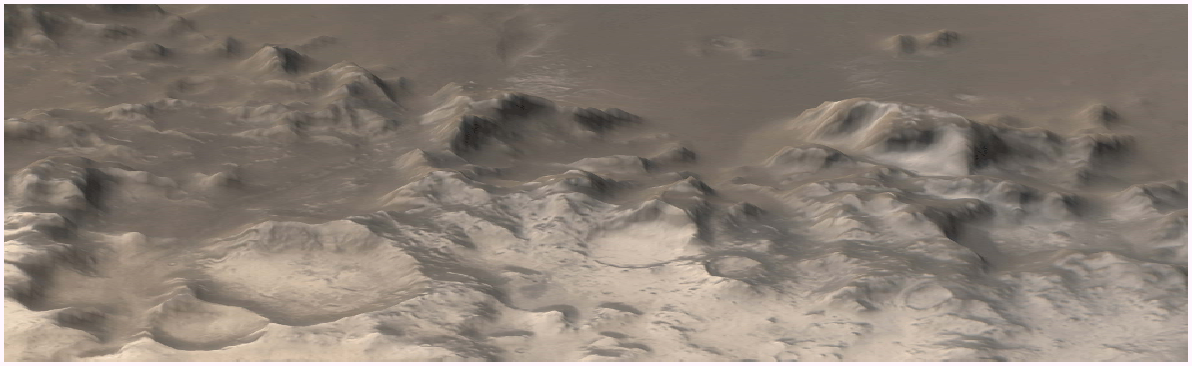
approved an extended mission through September 2006.



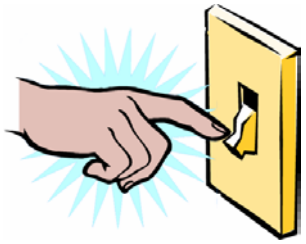
This Mars Global Surveyor (MGS) Mars Orbiter Camera (MOC) image (left) shows a small meteor impact crater (approximately the size of the famous Meteor Crater in northern Arizona) with a bright wind streak on its west (left) side. Generally, winds blowing from the east (right) have stripped away bright dust everywhere but in the lee of the crater. These landforms are located in eastern Kasei Valles near 25.1°N, 60.8°W. The picture covers an area about 3 km (1.9 mi) wide. Sunlight illuminates the scene from the left/lower left.

Below is a perspective view of the Charitum Montes, the mountain range that bounds southern Argyre Planitia, created by combining red and blue Mars Global Surveyor (MGS) Mars Orbiter Camera (MOC) wide angle images with topography from the MGS Mars Orbiter Laser Altimeter (MOLA). Carbon dioxide frost coats some of the hills, craters, and mountainsides in this southern springtime image. The picture is located near 57°S, 43°W. North is toward the top, south toward the bottom. Sunlight illuminates the scene from the upper left. The area shown is about 355 km (220 miles) wide.



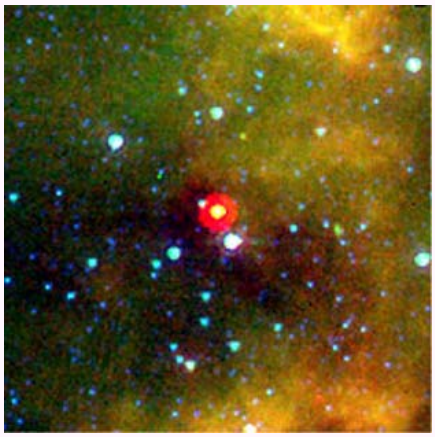
Help turn off the lights...

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."



Spitzer Sees Ice and Warm Glows in Dark and Dusty Places

For Release: November 9, 2004



Two new results from NASA's Spitzer Space Telescope released today are helping astronomers better understand how stars form out of thick clouds of gas and dust, and how the molecules in those clouds ultimately become planets.

Two discoveries -- the detection of an oddly dim object inside what was thought to be an empty cloud, and the discovery of icy planetary building blocks in a system believed to resemble our own solar system in its infancy -- were presented today at the first Spitzer science conference in Pasadena, Calif. Since Spitzer science observations began less than one year ago, the infrared capabilities of the space observatory have unveiled hundreds of space objects too dim, cool or distant to be seen with other telescopes.

In one discovery, astronomers have detected a faint, star-like object in the least expected of places -- a "starless core." Named for their apparent lack of stars, starless cores are dense knots of gas and dust that should eventually form individual newborn stars. Using Spitzer's infrared eyes, a team of astronomers led by Dr. Neal Evans of the University of Texas at Austin probed dozens of these dusty cores to gain insight into conditions that are needed for stars to form.

Starless cores are fascinating to study because they tell us what conditions exist in the instants before a star forms. Understanding this environment is key to improving our theories of star formation, said Evans.

But when they looked into one core, called L1014, they found a surprise -- a warm glow coming from a star-like object. The object defies all models of star formation; it is fainter than would be expected for a young star. Astronomers theorize that the mystery object is one of three possibilities: the youngest "failed star," or brown dwarf ever detected; a newborn star caught in a very early stage of development; or something else entirely.

This object might represent a different way of forming stars or brown dwarfs. Objects like this are so dim that previous studies would have missed them. It might be like a stealth version of star formation, Evans said. The new object is located 600 light-years away in the constellation Cygnus.

In another discovery, Spitzer's infrared eyes have peered into the place where planets are born -- the center of a dusty disc surrounding an infant star -- and spied the icy ingredients of planets and comets. This is the first definitive detection of ices in planet-forming discs.

This disc resembles closely how we imagine our own solar system looked when it was only a few hundred thousand years old. It has the right size, and the central star is small and probably stable enough to support a water-rich planetary system for billions of years into the future, said Dr. Klaus Pontoppidan of Leiden Observatory in the Netherlands, who led the team that made this discovery.

Previously, astronomers had seen ices, or ice-coated dust particles, in the large cocoons of gas and dust that envelop young stars. But they were not able to distinguish these ices from those in the inner planet-forming portion of a star's disc. Using Spitzer's ultra-sensitive infrared vision and a clever trick, Pontoppidan and his colleagues were able to overcome this challenge.

(Continued on page 14)

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Their trick was to view a young star and its dusty disc at "dawn." Discs can be viewed from a variety of angles, ranging from the side or edge-on, where the discs appear as dark bars, to face-on, where the discs become washed out by the light of the central star. They found that if they observed a disc at a 20-degree angle, at a position where the star peeks out like our Sun at dawn, they could see the ices.

"We hit the sweet spot," said Pontoppidan. "Our models predicted that the search for ices in discs is a problem of finding an object with just the right viewing angle, and Spitzer confirmed that model."

In this system, astronomers found ammonium ions as well as components of water and carbon dioxide ice.

The Spitzer science conference, "The Spitzer Space Telescope: New Views of the Cosmos," is being held at the Sheraton Pasadena hotel.

Member Recognition

Randy Brewer had two images of last month's Lunar Eclipse posted on www.spaceweather.com.

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

Sky & Telescope and now Astronomy Magazine Subscriptions – Don't Forget about the Club Discount!

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. I need **four** more people to sign up. 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!

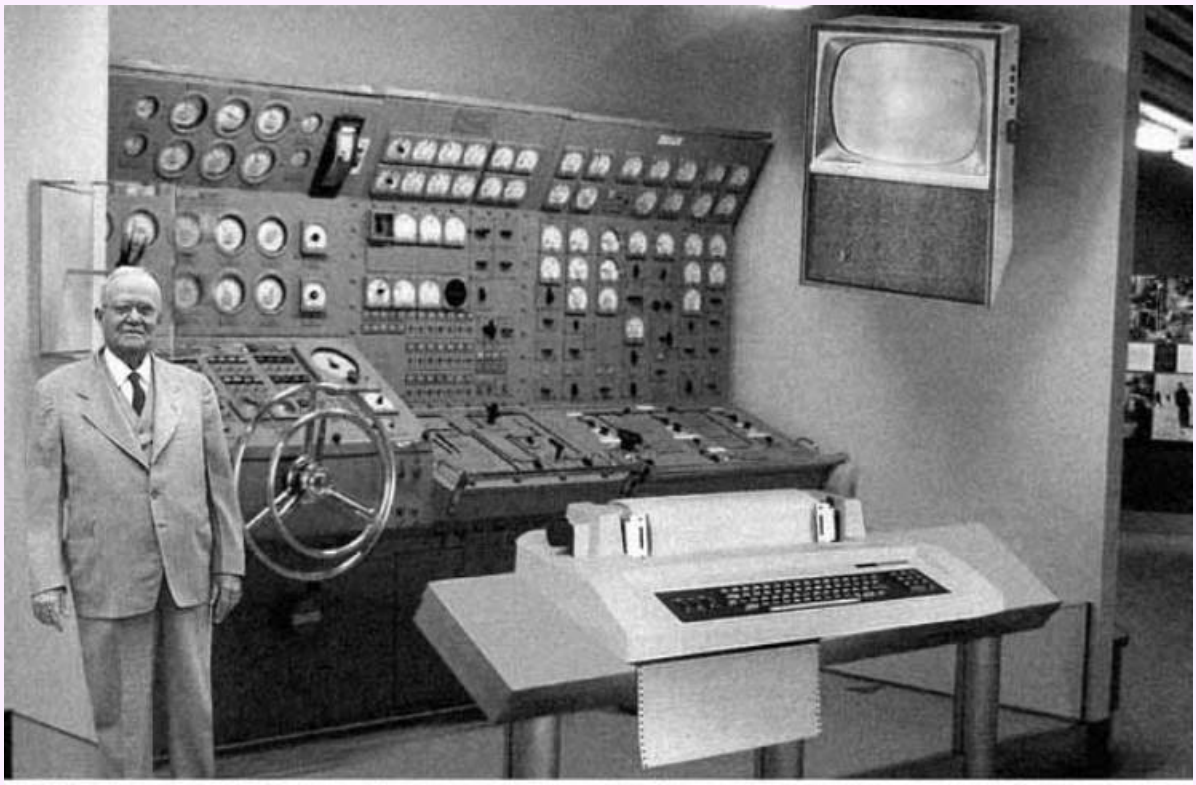
Contact me by the email listed on the JSCAS web site, catch me at a meeting, or send your check and renewal form to my home address: 2407 Elkton Ct., Pearland, TX, 77584. I'll put your renewal in the mail within 48 hours after I receive it.

David Haviland
Vice-president and Secretary

Personal Computers

Contributed by Shane Ramotowski

The photograph below predicted what a home computer would look like in 2004. It appeared in a 1954 issue of Popular Mechanics Magazine.



Scientists from the RAND Corporation have created this model to illustrate how a "home computer" could look like in the year 2004. However the needed technology will not be economically feasible for the average home. Also the scientists readily admit that the computer will require not yet invented technology to actually work, but 50 years from now scientific progress is expected to solve these problems. With teletype interface and the Fortran language, the computer will be easy to use.

Astronomy 101: Star Colors

Geared for the Novice Astronomer

Ken Lester

One of my favorite objects to show at our public star parties is the double star Albireo. It is located at the foot of the Northern Cross in the constellation Cygnus. Even the most indifferent of our star party guests instantly notices the contrast in colors between the two stars. One star is golden-yellow the other is blue.

There are other stars whose color makes them standout among the myriad of background points of light. Aldebaran is a ruddy orange. Betelgeuse and Antares appear orange-red. Spica and Rigel are bluish while Sirius and Altair are blue-white. Harder to find but very impressive are Hind's Crimson Star (red) in Lepus and Herschel's Garnet Star (orange-red) in Cepheus.

It isn't long after showing stars of extraordinary color that I get asked, "What makes stars different colors?". Astronomers now know that variations in stellar color correspond to variations in surface temperature.

Charles Pickering

The spectra of stars show dark absorption lines and bright emission lines over a continuum of red, orange, yellow, green, blue, indigo, and violet. The spectra of reddish stars are more intense in the red end of the spectrum and the spectra of blue stars are more intense in the blue end of the spectra.

In the late 19th century E.C. Pickering classified stellar spectra in sixteen types based upon observed features. Under Pickering, was a group of woman that historians of science have dubbed "Pickering's Women". The group included Williamina Fleming, Antonia Maury and Annie Jump Cannon. These women reduced data and carried out astronomical calculations.

Williamina Fleming examined the spectra of more than 10,000 stars and developed a classification system containing 22 classes. The work was carried further by Antonia Maury, who developed her own classification system. The system was cumbersome by comparison with Fleming's, and Pickering could not sympathize with Maury's insistence on theoretical (what we would today call astrophysical) concerns that underlay her scheme.

Annie Jump Cannon

It was left to Annie Jump Cannon to continue, beginning with an examination of bright southern hemisphere stars. To these she applied yet a third scheme, derived from Fleming's and Maury's, an "arbitrary" division of stars into the spectral classes O, B, A, F, G, K, M, and so on. It was as "theory-laden" as Maury's ordering, but greatly simplified. "Oh, Be A Fine Girl--Kiss Me!" This phrase has helped several generations of astronomers to learn the spectral classifications of stars. It was derived from Cannon's classification of stellar spectra. Since then, more spectral types have been added to the scheme.

(Continued on page 17)

(Continued from page 16)
The following chart of spectral types relates surface temperatures to stellar color.

Stellar Spectral Types

Type	Temperature (°K)	Color	Example
WN, WC	Above 50,000	Bluish	Gamma Velorum
O	Over 25,000	Bluish	Zeta Puppis, Iota Orionis
B	11,000 to 25,000	Bluish	Spica, Rigel
A	7,600 to 11,000	Blue-white to white	Sirius, Altair
F	6,000 to 7,600	Yellowish-white	Canopus, Procyon
G	4,500 to 6,000	Yellow	Sun, Capella
K	3,200 to 5,100	Orange	Arcturus, Aldebraran
M	< 3,700	Orange-red	Antares, Betelgeuse, Mira
C	Same as K & M	Red	19 Pse, Y CVn
S	Same as K & M	Orange-red	——-

References:
http://www.sdsc.edu/ScienceWomen/cannon.html
The Night Sky Observer's Guide, Volume 1. George Kepple and Glen Sanner

Shuttle Simulator

For all those would be astronauts out there, there is a space shuttle simulator available on the Internet to test your piloting skills.

ORBITER is a free flight simulator that goes beyond the confines of Earth's atmosphere. Launch the Space Shuttle from Kennedy Space Center to deploy a satellite, rendezvous with the International Space Station or take the futuristic Delta-glider for a tour through the solar system - the choice is yours. But make no mistake - ORBITER is not a space shooter. The emphasis is firmly on realism, and the learning curve can be steep. Be prepared to invest some time and effort to brush up on your orbital mechanics background. A good starting point is JPL's Space Flight Learners' Workbook - or you could tap into the accumulated knowledge base of the Orbiter community to get advice. You can find it at: http://www.medphys.ucl.ac.uk/~martins/orbit/orbit.html

Upcoming Events

There will be a Lunar Occultation of Jupiter on Tuesday, December 7th, in the morning. Jupiter disappears at 3:05:38 AM CST, and reappears at 3:29:18 AM CST for Houston.

For more information visit Sky & Telescope's web site:
http://skyandtelescope.com/observing/objects/occultations/article_1380_1.asp

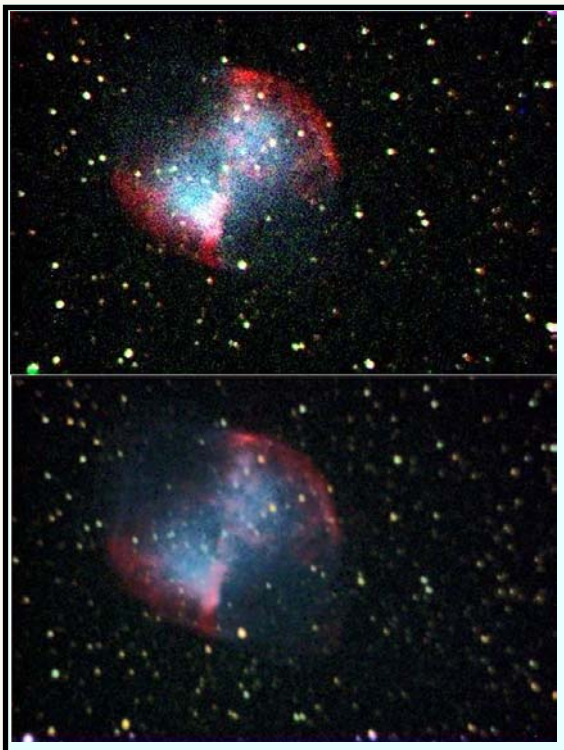
MEMBER'S GALLERY

NGC 1514
©Al Kelly

L/RGB processing of POSS2 DSS plates of planetary NGC 1514 made with AIP4WIN and Photoshop. These plates push it a bit toward the blue, but it does fairly represent the high OII/OIII density.

M20 & M8
©Shane Ramotowski

The Lagoon and Trifid Nebulas taken May 22, 2004 from Fort Davis, Texas at the 2004 Texas Star Party. The image was taken with a Takahashi FS 128 with focal reducer giving an effective focal length of 768 mm. Exposure time was 45 minutes on Fuji Provia 400 slide film using a medium format 645 camera. Processing consisted of auto-levels and auto-color in Photoshop.



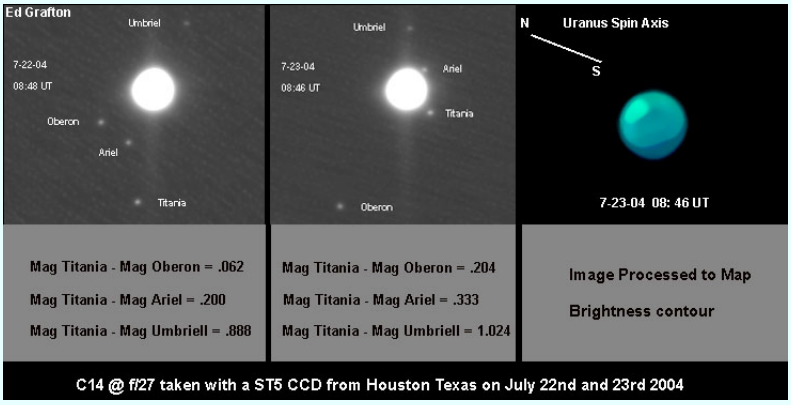
M27
©Chris Wells

Last month, Chris Wells' image of M27 (upper left) appeared in the Member's Gallery. Processing was limited to manual alignment of RGB images and dark frame subtraction.

Since then, Al Kelly has given Chris some image processing pointers resulting in a much improved image (lower left).

The image was taken October 11, 2004 in League City, Texas with an 12" LX200 @ F6 using a Meade 416XTE CCD camera. L/RGB processing from two 10 second clear filtered, two 15 second broadband filter averaged images, four 15 second images for each RGB channel.

Uranus and It's Moons
©Ed Grafton



NGC 7008
©Al Kelly

L/RGB image of planetary Nebula NGC 7008 in Cygnus, made from images taken with a Starlight Express MX916 and a 17.5" Newtonian on 10/15/04 from Friendswood, Texas, using Schuler RGcBc filters. Seven 120-second unfiltered sub-exposures, five 120-second sub-exposures in red, four 120-second sub-exposures in green, and five 120-second sub-exposures in blue were self-guided in Astroart and processed in AIP4WIN and Photoshop.

Visual Observing for December 2004

Chris Randall

★**SSO**: (Solar System Objects) Summary for 15 December 2004

Object	Const	Mag	% Ill	Rise Time	Transit	Set Time
Sun	Oph	-26.7	100	07:08	12:15	17:22
Moon	Cap	----	22	10:50	16:13	21:36
Mercury	Oph	1.6	13	06:09	11:25	16:41
Venus	Lib	-4.0	91	05:13	10:13	15:48
Mars	Lib	1.6	97	04:48	10:06	15:25
Jupiter	Vir	-1.9	99	01:50	07:41	13:31
Saturn	Gem	0.4	100	19:43	02:35	09:27
Uranus	Aqr	5.9	100	11:26	17:03	22:43
Neptune	Cap	8.0	100	10:22	15:44	21:10
Pluto	Ser	14.0	99	06:43	12:09	17:35
2004 Q2 Machholz	Eri	5.1	93	17:45	23:12	04:35

Highlighted times denote daylight events.

★**BSO**: (Bright Sky Objects)

Stock 23 – Open Cluster in Camelopardails, Magnitude 6.2, Size 15', Stars 25.
Kemble 1 – Open Cluster in Camelopardails, Magnitude 4, Size 180', (3 deg chain of stars).
M45 – Open cluster in Taurus, Magnitude 1.2, Size 110', Stars 100 (Pleiades).

★**DSO**: (Dark Sky Objects)

IC 1848 – Open cluster in Cassiopeia, Magnitude 6.5, Size 12', Stars 10. Look for nebula (LBN 667) in the background.
Abel 426 – Globular cluster in Perseus, Magnitude 12, Size 50' x 70'.

★**CDMP:** (Chris' Don't Miss Pick)

NGC 2264 – Christmas Tree Cluster and Cone Nebula — Open Cluster in Monoceros, Magnitude 3.9, Size 20', Stars 40. Also known as: Cr 112, Mel 49, H V.27 + H VIII.5, Nebulas region SH2-273.

The Cone Nebula and the Christmas Tree Cluster were discovered by William Herschel, who assigned them the numbers H V.27 and H VIII.5. The nebula belongs to a much larger complex, which is currently an active star forming region. The cluster was discovered in 1784 and the nebula in 1785.

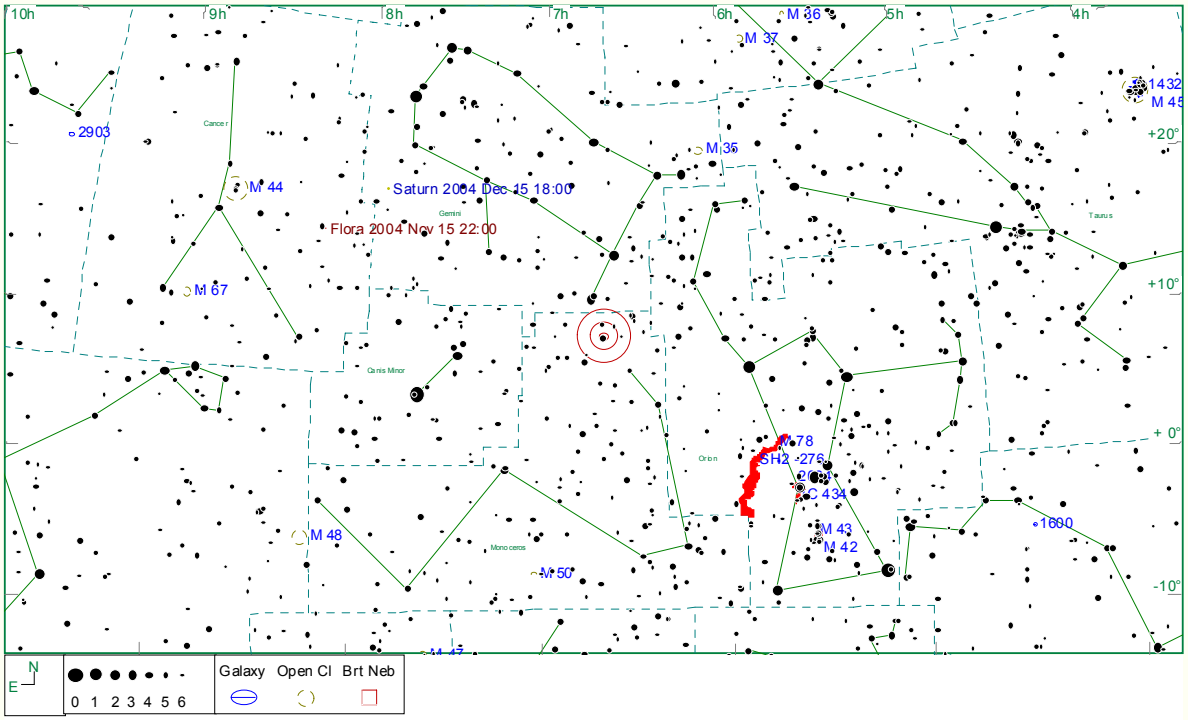
The nebula surrounding bright star S Mon is filled with dark dust and glowing gas. The strange shapes that haunt this star-forming region originate from fine interstellar dust reacting in complex ways to the energetic light and hot gas being expelled by the young stars. The blue glow directly surrounding S Mon results from reflection, where neighboring dust reflects light from the bright star. A more diffuse red glow results from emission, where

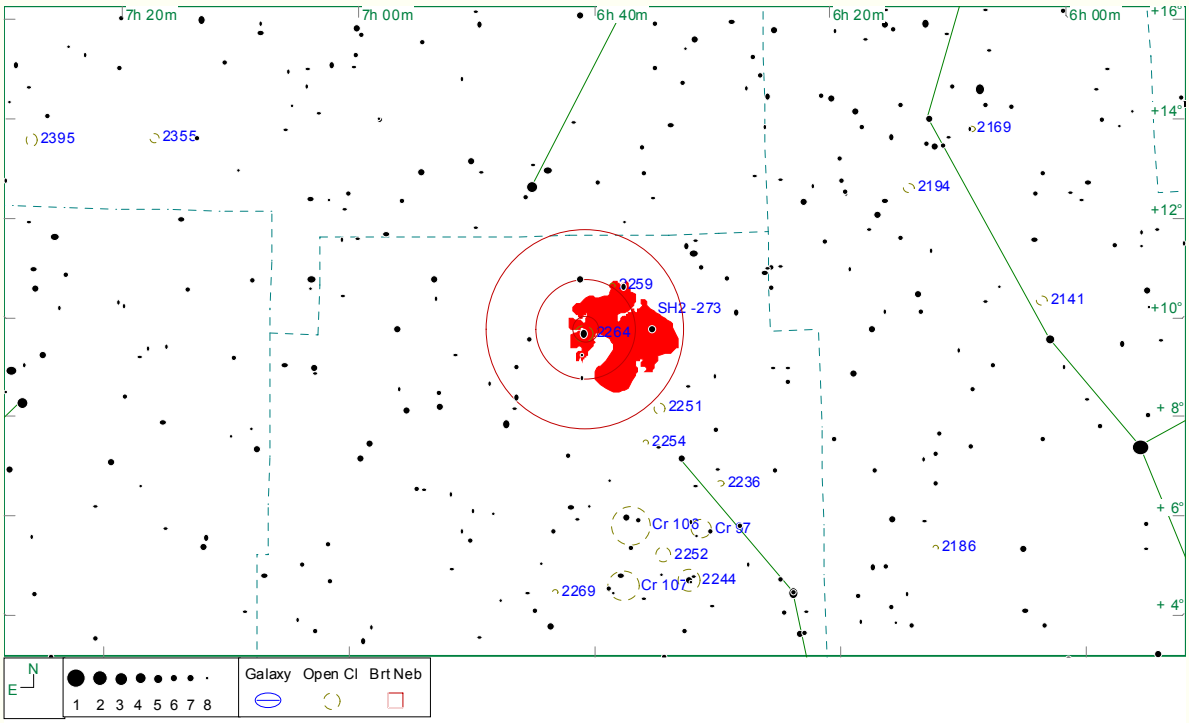
(Continued on page 21)

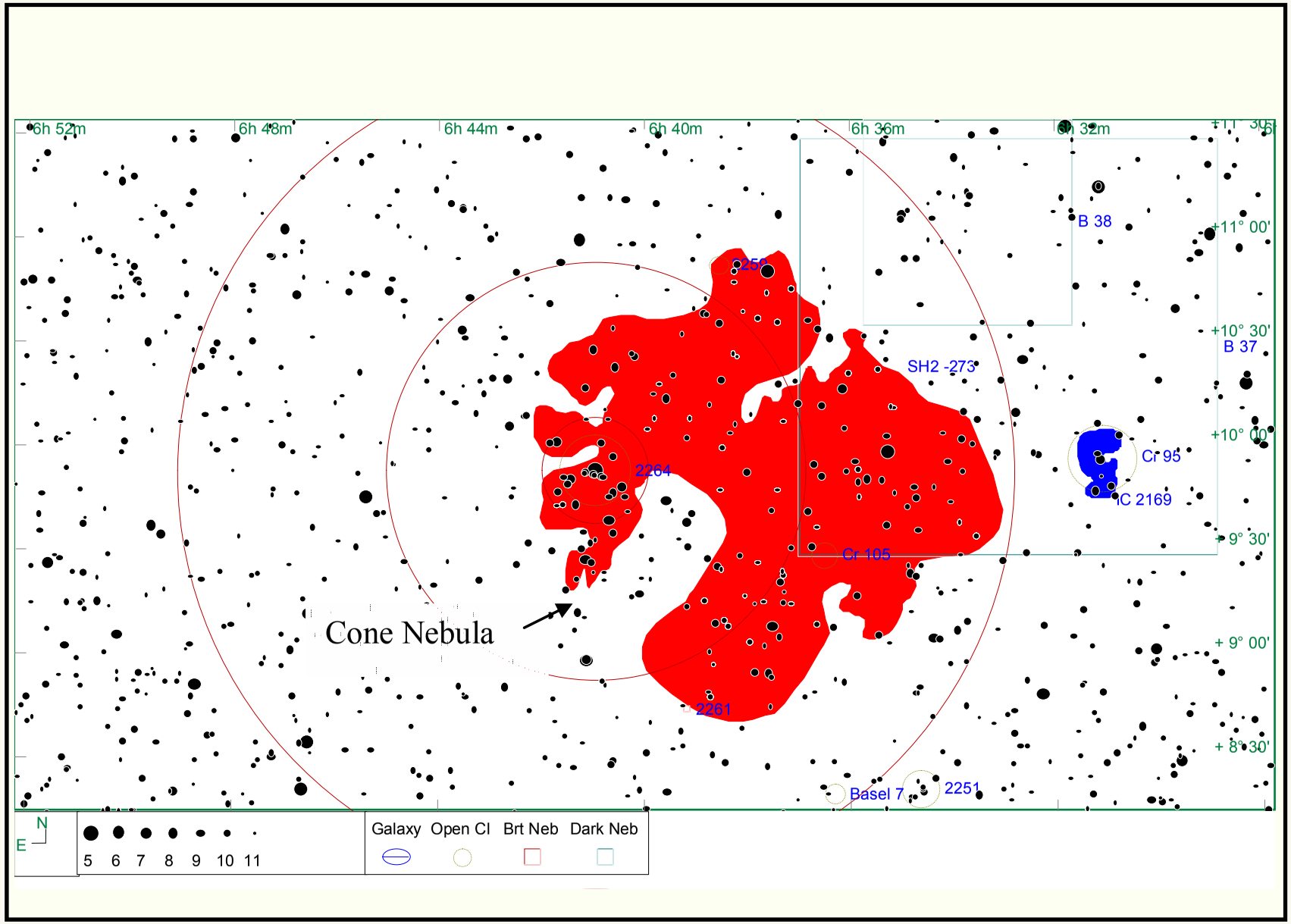
(Continued from page 20)

starlight ionizes hydrogen gas. Pink areas are lit by a combination of the two processes. A small group of stars surrounds S Mon, a star visible with the naked eye toward the constellation of Monoceros.

For More information go to http://www.seds.org/messier/xtra/ngc/n2264.html



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December Meeting Agenda

December 10th — Center for Advanced Space Studies/Lunar Planetary Institute, 3600 Bay Area Blvd. (at Middlebrook Drive).

Winter Solstice Party

Join us for an evening of fun as we celebrate another great year of astronomy. This year we will have door prizes, munchies, door prizes, award presentations, door prizes, socializing and did I mention? door prizes.

Bring some goodies to share. The fun starts at 7:30 P.M.

Starscan Submission Procedures

Original articles of astronomical interest will be accepted up to 6 P.M. December 28th.

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.

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Cover Image
NASA, ESA, and E. Karkoschka (University of Arizona)

At first glance, Jupiter looks like it has a mild case of the measles. Five spots – one colored white, one blue, and three black – are scattered across the upper half of the planet. Closer inspection by NASA's Hubble Space Telescope reveals that these spots are actually a rare alignment of three of Jupiter's largest moons – Io, Ganymede, and Callisto – across the planet's face. In this image, the telltale signatures of this alignment are the shadows [the three black circles] cast by the moons. Io's shadow is located just above center and to the left; Ganymede's on the planet's left edge; and Callisto's near the right edge. Only two of the moons, however, are visible in this image. Io is the white circle in the center of the image, and Ganymede is the blue circle at upper right. Callisto is out of the image and to the right.