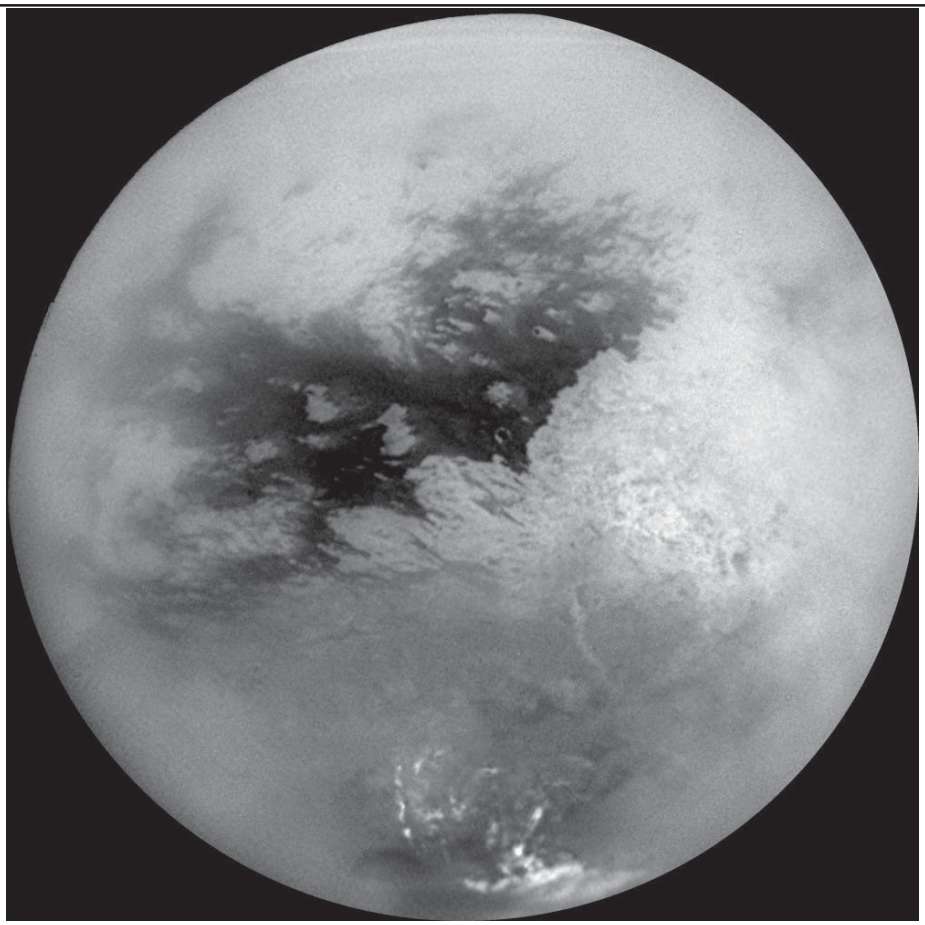
SIRIUS ASTRONOMER

www.ocastronomers.org

The Newsletter of the Orange County Astronomers

December 2004 *Free to members, subscriptions $12 for 12 issues* **Volume 31, Number 12**



A mosaic of nine processed images recently acquired during Cassini's first very close flyby of Saturn's moon Titan on Oct. 26, 2004, constitutes the most detailed full-disc view of the mysterious moon. Titan along with its parent planet is favorably placed for observation throughout December. (NASA/JPL/Space Science Institute)

OCA CLUB MEETING

The free and open club meeting will be held Friday, December 10th at 7:30 PM in the Irvine Lecture Hall of the Hashinger Science Center at Chapman University in Orange. The featured speaker this month is yet to be announced as of press time. See the OCA website for updates!

STAR PARTIES

The Black Star Canyon site will be open this month on December 4th. The Anza site will be open December 11th. Members are encouraged to check the website calendar, for the latest updates on star parties and other events.

Please check the website calendar for the outreach events this month! Volunteers are always welcome!

You are also reminded to check the web site frequently for updates to the calendar of events and other club news.

COMING UP

The next session of the Beginners Class will be held on Friday December 3rd (and next month on January 7th) at the Centennial Heritage Museum (formerly the Discovery Museum of Orange County) at 3101 West Harvard Street in Santa Ana.

GOTO SIG: Jan. 7th (in conjunction w/Beginners Class)

Astro-Imagers SIG: Dec. 21st, Jan. 18th

EOA SIG: Dec. 27th, Jan. 24th

Astrophysics SIG: Dec. 17th, Jan. 21st

President's Message
By Barbara Toy

The year continues speeding along its cycle, and here we are at the Holiday Season – by the time this gets to you, Thanksgiving will be past, and (barring unforeseen delays in delivering the Sirius Astronomer) Christmas, Hanukkah, and the other midwinter holidays will be still to come. As I write this, I know that some of our members have just finished celebrating Ramadan – whatever your particular celebration, best wishes to you and your families, and may the coming year be a truly good one for all of us!

Tributes

Every year it seems that there are a few Board members who leave the Board – while this helps bring in new people every year, which is good for the health of the club, it also means that we lose colleagues we like and respect. Fortunately, they usually remain active in the club, but it is a genuine sorrow to say farewell to them as Board members. As of the time I am writing this, there are three current Board members who have told us that they will be unable to run for the 2005 Board, who are all great losses:

Bruce Crowe

Most unfortunately, Bruce Crowe, who has been the club Secretary since 1999 and was a Trustee before that, is one of those who will not be running for reelection. In the last year, he had a major – and well-earned – promotion at work, which was great for him and his family. It wasn't quite such good news for the club, as he's had less and less time for club matters since then, so his decision to leave the Board is quite understandable, though we sincerely regret it. Besides his extensive knowledge of the club as a long-time active member, Bruce worked a lot in construction, had his own property management business, and is now a lawyer. He's been very generous in sharing his knowledge with the Board, and his contributions of information and advice have been invaluable to us on a lot of different issues – and his energy and enthusiasm have enlivened many meetings over the years!

As a lawyer myself, I particularly value his efforts while Secretary to make the club's Minute Book as complete as possible. We have continuous records of Board meetings since he took on the duties of Secretary, which is of tremendous help to us and will make life much easier for his successor, but most of the records from before he took office are still missing in spite of his attempts to locate or reconstruct them. In addition to his regular Board duties, Bruce has been very generous with his time and expertise in tracking down information from various governmental agencies during the time I've been on the Board, and in helping us work out the implications of various decisions we've been faced with over the years.

Bruce – we'll really miss you! Here's hoping your new duties allow you at least some time for viewing!

Joel Harris

Joel Harris served on the Board for several years, then left it due to his many other commitments, and then agreed to come back as Vice President in 2003. Since he lives at the other end of the San Fernando Valley, it has often been very difficult for him to attend meetings here in Orange County. Last year, he decided that he couldn't continue with the duties of Vice President, and I was very pleased when he decided to run for a regular Trustee position, in spite of the distance (and the rising cost of gasoline!). Unfortunately, he has been finding it increasingly difficult to participate in Board matters, as he's in school working on a Masters Degree as well as working full time in his regular job and running his astronomical touring company – *and* he has a family. Although he won't be on the 2005 Board, he has generously agreed to organize the next club Banquet, drawing on his experience in putting together the excellent Banquet we had in late 2003.

Joel – thank you for your efforts on behalf of the club, good luck in your studies, and we're looking forward to the Banquet!

Stephen Eubanks

I first met Stephen Eubanks while I was covering the needs of Anza House while we were looking for a new Anza House Coordinator after Roy Weinberger had to leave that position. After rigorously cross-examining me about what was involved, Steve volunteered to become the new Anza House Coordinator, and I became his main liaison with the Board until he joined the Board himself as a Trustee – so I knew first-hand the enthusiasm he brought to the position of Anza House Coordinator and the energy and imagination he put into various improvements and repairs he made to Anza House. He brought that same enthusiasm

to his position as Trustee, and has often raised issues or provided us with insights from his background building and running his own business. Having your own business is very demanding, and we're lucky indeed that Steve has been able to free up as much time for club affairs as he has over the last few years.

You may recall that Steve through his company, Advanced Telescope Systems, was one of the sponsors of the AstroImage 2004 Conference, and that (as I mentioned in the October President's Message), Steve also helped out with a lot of the physical work we needed to do over the course of the conference, such as (repeatedly) moving tables and equipment – in addition to running his own booth. That's typical of Steve, who's always willing to lend a hand when something needs to be done, and who regularly contributes support for club activities, and who, even though he was exhausted from driving back from Arizona and should have been in bed, made the extra effort to come to the November Board meeting so that we would have a quorum. Even though he won't be on the 2005 Board, I understand that he plans to get out to Anza regularly, and I look forward to seeing him there and at club meetings when he's able to attend.

Steve – thanks again for all you've done for the club – and may your business boom!

OCA Elections

As you can see, there are at least three openings on the 2005 Board for new people – and one of those positions could be filled by you!

In all seriousness, the new people who have come on the Board every year I've been a member have brought us new ideas and expertise and have helped strengthen us as the governing body of the club. That's where you (yes, ***you***!) come in – this is *your* chance to be some of the "new blood" for the 2005 Board! As long as you've been a member for at least a year as of January, 2005, all you need to do to run is to get me your name and I'll add it to the list of candidates. You can even run for the Secretary position with just that qualification – the only positions that require more are President and Vice President. For those, you need to have served a year on the Board before you're eligible to run, but that could be *any* year since the club was incorporated.

In case you were wondering about the duties of the Secretary, the main one is to produce Minutes of each meeting, as a record of decisions that are made and funds that are allocated. The Secretary also is the officer who is responsible to maintain the official Minute Book, which (ideally) should contain all of the records of past Board meetings – in actuality, as mentioned above, the current volumes contain all of the official Minutes for the period that Bruce has been Secretary, and as many of the prior Minutes as he could locate. What the Secretary may do beyond that depends in part on the interests and expertise of the particular Secretary, and (as with Bruce's activities) can be exceedingly helpful to the club, but providing the records of the Board's official acts is the heart of the position and is vital to the club's functions. We most definitely need a club Secretary, now that Bruce has had to give up that position, so, those of you with record-keeping skills – please earn our deepest gratitude by coming forward to run for that position!

Our Fundraising Program continues…

At the November general meeting, we had the initial collection of items to be sold on Ebay as a fundraiser, and I understand that several people have contacted Larry McManus to make arrangements to get donations to him that they can't bring to one of the meetings easily. We'll have further collections at the December and January meetings – please plan to clear out your closets, attics, basements, and storage units and donate those things you hate to throw away but will almost certainly never use. You get some freed-up space and a deduction, and the club gets closer to its goal to pay for the fence and new observatory roof at Anza – a real "win" for all concerned!

If you have questions or want to arrange to have your donation(s) picked up somewhere other than at one of the meetings, please contact Larry McManus at 714/731-5542 or at lmcmanus@clearpointadv.com.

Thanks to all of you who donate for your help!

The Kuhn

I haven't said much recently about the Kuhn telescope itself. It's running well and is a pleasure to use (though it still makes little "jumps" now and then, a problem we're hoping to solve with installation of a new chip we have on order from Comsoft), but I notice from the log entries that I am still the person using it the most…not that I'm complaining about being able to use it, but I know that there are a lot of other Star Members out there who should be enjoying it as well!

For new Star Members and for existing Star Members who haven't been trained yet on the new system (or who might want a refresher course), I'll be happy to set up a training session before any of the Anza star parties or on other nights when I'm

NASA's Space Place

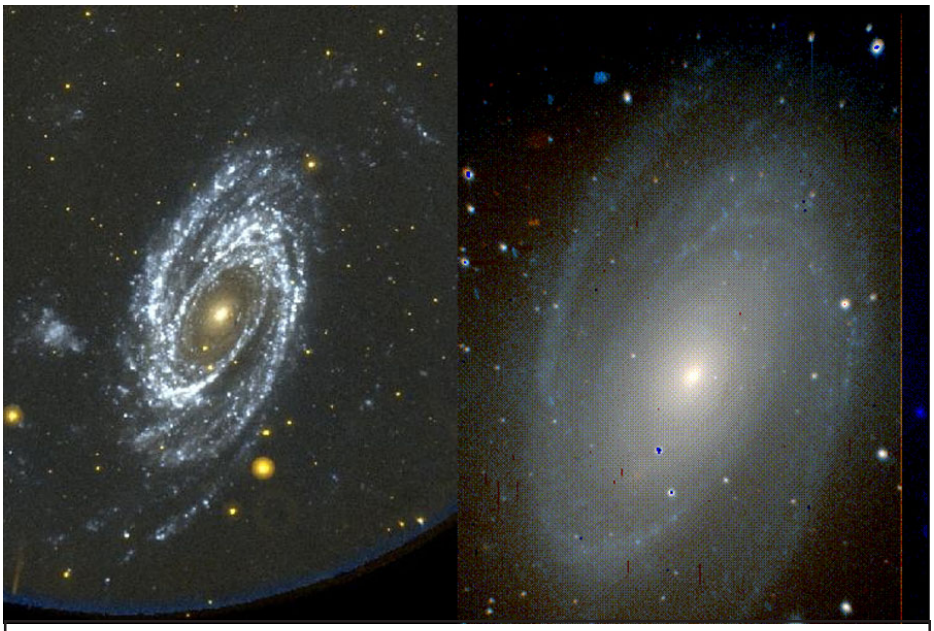
Galactic Surprise

by Patrick L. Barry and Dr. Tony Phillips

Open an old astronomy textbook. The basic sketch you'll find there of galaxy formation is fairly simple: a vast cloud of diffuse hydrogen and helium gas condenses under gravity, and dense spots in the cloud collapse to form stars. Voila! A galaxy.

But real galaxies are much more complex than that. A galaxy is a swirling "soup" of billions of stars and roaming black holes, scattered clouds of gas and dust, random flashes of star birth and exploding supernovas, and an unseen and mysterious substance called "dark matter." Over time, all these ingredients mix and interact—pulling and compressing and colliding—and somehow that interplay leads to the galaxies we see today. No wonder it's such a hard problem to solve!

Just over one year into its three-year mission, GALEX is already shedding some new light on the problem.



M81 is 10 million light years away. The image on the left was made from GALEX data and shows UV light from hot, new stars. These star forming regions are not detectable in the visible light image on the right (McGraw-Hill Observatory, Kitt Peak, Arizona, Greg Bothum, Univ. of Oregon.)

"Some of the discoveries GALEX has made will change our understanding of how galaxies develop and when, where, and why stars form in galaxies," says Peter Friedman, a researcher at Caltech and Project Scientist for GALEX.

This small space telescope, called the Galaxy Evolution Explorer (GALEX for short), makes its discoveries by taking pictures of millions of galaxies scattered over the whole sky. Some of these galaxies are close by (at least by astronomical standards of "close"), while others are as much as 10 billion light-years away. Because light takes time to travel through space, we see these distant galaxies as they appeared billions of years ago. Comparing young galaxies from the distant past with older, modern galaxies will teach scientists about how galaxies change over time.

Looking at these pictures, scientists were surprised to find many newborn stars in the outer parts of old, mature galaxies. Scientists had assumed that as a galaxy ages, the clouds of gas needed to form new stars in these outer reaches either got used up or blown away. Finding so many new stars in these regions of old galaxies (such as Centaurus A, Messier 101, and Messier 81) shows that, apparently, they were wrong.

Friedman says that astronomers don't know yet how to explain these new findings. Rethinking and improving theories to explain unexpected discoveries has always been the way science makes progress—and GALEX is certainly making progress. One thing is certain: It's time to re-write some old textbooks.

For more information, see http://www.galex.caltech.edu/ . Kids can do a galaxy art project and learn more about galaxies and GALEX at http://spaceplace.nasa.gov/en/kids/galex/art.shtml .

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

scheduled to be out there. If you want to go through the training, please contact me and we'll set up a specific date.

Thanks to Matt Ota and Craig Bobchin, who spent the evening of the November star party helping out in the observatory, we now have updated comet and asteroid information on the version of TheSky that runs the Kuhn, and the program itself has been updated. This was a bit of a challenge, as the Kuhn's Internet link is still out, but, with some ingenuity and patience, they managed to do it, and the system was easily able to find the only one of the comets we looked for – a nice fuzzy ball in the eyepiece, still too far away from the sun to have even the start of a tail. That's a nice addition to the Kuhn's capabilities!

Another recent improvement is the addition of a star diagonal to the 4-inch refractor that is the largest of the finder scopes on the Kuhn. This is a fine instrument in its own right, especially with a good eyepiece in it – I've been using it with the Meade 40mm Ultrawide eyepiece from the club's eyepiece collection, and getting some excellent views, especially of objects like the double cluster in Perseus, the "E.T. Cluster" and the Pleiades, and on planets and other objects with higher magnifications. The addition of the diagonal makes it easier to focus as well as easier to look at things close to zenith, and, since I added it, visitors to the observatory have been spending almost as much time looking through the 4-inch as through the Kuhn itself. I've also been working on the other two finders (both are 3-inch refractors) to make them more functional – one needs a 1 ¼-inch focuser, so if anyone out there has one they'd like to donate to the cause, or at least to try out in the finder, I'd be delighted to hear from you.

If you're out at Anza for one of the star parties and haven't yet seen the Kuhn in action, please make it a point to come up to the club observatory and do some viewing through it yourself. And, if you'd like to see how one of your favorite eyepieces works in the Kuhn, please bring it with you – it's fun to experiment!

In Closing…

I'm afraid it's definitely cold these nights out at Anza, especially if there's any wind. The winter constellations are worth a bit of cold, though – within reason, of course! May your viewing nights be comfortable and your skies clear, dark and steady as we head out of 2004 and into 2005!

The Orion Nebula (M42) taken from Anza on 11/15/04 (Bob Bryant)

The Andromeda Galaxy (M31) taken from Sunglow Ranch, Arizona on 12/28/02 (Bill Patterson)

MEMBERS ASSISTING THE LIBRARY

The OCA library would like to thank the following members for their contribution:

Robert Shier donated a signed copy of his book "Our Regenerating Universe", which will be in the library beginning next month.

Gus and Freda Kinoshita donated 113 paperback Sci-Fi books, which we turned into $25.00 through a sale on eBay.

Thanks Everyone!

PADFOR SALE: Anza site, 10 Pad Alley, second pad from west. Contact James Tarleton at 951-314-9217

For Sale: 2 Discovery mirrors, 6" F/5 (new coating) and 6" F/8 (coated last year). Unblemished, in excellent condition, aluminized and quartz overcoated. $40 each. Contact Bill Hepner at 714-447-8566 or billhepner@yahoo.com

Mars from Mystic Oaks Observatory 8/31/03 (Ken Adler)

ASTROSPACE UPDATE
December 2004
Gathered by Don Lynn from NASA and other sources

To find out more on these topics, or those of past months' columns, through the World Wide Web, send your Web browser to our OCA Web site (http://www.ocastronomers.org), select Space Update Online, and the topics are there to click on.

Cassini (Saturn mission) made its first close (745 miles) pass by the moon Titan in late October, the closest that any spacecraft has ever come to Titan. The imaging radar was used for the first time, mapping a small slice of Titan's surface through the clouds. This is the only moon in the solar system with an appreciable atmosphere. The area chosen for mapping included the landing target for the Huygens spacecraft. A wide variety of geologic terrain types were seen. The radar will be used on all close passes (more than 40 of them) by Titan over the next few years, eventually building up a map of a substantial fraction of the surface. Measurements of Titan's atmosphere, movies of its clouds, and infrared images were also made (infrared partially penetrates the clouds), totaling more than 500 images. No magnetic field of Titan was found during this flyby, but future closer ones may still find a field too weak to be detected at this distance.

Measurement of the isotopes of nitrogen in Titan's atmosphere shows that it does not match the ratio of nitrogen isotopes in any other dense atmosphere in the solar system. It does match what would be expected if most of the original **atmosphere** had been **lost** to space over a long period, since such processes favor losing lighter isotopes. Haze layers were seen as high as 310 miles above the surface, far higher than any kind of haze forms in Earth's atmosphere.

Titan's surface appears to have sharply edged light and dark areas, possibly covered with a thin layer of translucent material (may be some form of frost). This (translucent coat) would explain the surprising observation by the spectrometer that the composition of both light and dark areas is quite similar. There are some smooth areas that may be lakes of liquid hydrocarbons, but this has not yet been firmly established. They could also be areas where in the past heated liquid from the interior welled up, spread out, and froze. Very few impact craters are seen, which means that Titan gets resurfaced by tectonic, volcanic or deposit processes frequently enough to obliterate craters. No shadows were seen, indicating no steep terrain. Stereo images and radar should be more sensitive than shadows in determining how much elevation difference exists. Titan's atmosphere was found to super-rotate; that is, winds at high altitude rotate faster than the surface. Venus also does this. Linear streaks are seen on the surface, but it is not yet known if these are caused by wind, tectonic movement, liquid movement, or other causes.

Cassini is preparing to release the probe **Huygens** December 24, toward a landing on the moon Titan January 14. It has been calculated that the glow of the spacecraft heated by entry into Titan's atmosphere may barely be visible in very large Earth-based telescopes. It will take over 2 hours to descend through the thick Titan atmosphere, taking science measurements and pictures all the way. Measurements will include temperature, pressure, and the speed of sound. One of the instruments on Huygens is a microphone, which is capable of hearing thunder (among other sounds) if it occurs there. It has been predicted that Titan should have methane (rather than water) clouds and rainstorms. With luck the spacecraft will survive landing and continue to relay data until the batteries run down about 45 minutes later.

The plasma (charged matter) spectrograph on Cassini has been returning data on the **magnetosphere** of the planet. The particles in the outer parts of the magnetosphere came from the solar wind, but those in the inner part came from the rings or inner moons. The spectrograph also discovered a cloud of plasma trapped in the magnetic field lines that pass through the Cassini Division, the space between the A and B ring.

The ultraviolet imaging spectrograph on Cassini was used to track the fluctuations of starlight passing through Saturn's **rings**, producing a map of their structure in very fine detail. Density waves were found that are caused by the gravity of Janus and other moons. A density wave is a group of ringlets that are relatively widespread on one side and get closer and closer together as you look farther from the planet. Some ringlet edges were found to be surprisingly sharp. Since the natural tendency from collisions is to spread the material evenly, the sharp edges have to be caused by an external force, such as the gravity of moons. Sharp edges were found especially evident in the C ring and in the Cassini Division.

Spitzer (infrared space telescope) has found surprisingly large dust clouds around several stars, apparently formed from collisions during planet building. This shows that collisions continue longer after the planets have initially formed than previously thought. The study found 71 dust disks in the 266 stars surveyed. Some of the dust disks were hundreds of millions of years old. Spitzer also found a faint **star-like object** in what was thought to be a starless core, dense knots of gas and dust before they form into newborn stars. The new object does not fit any known classification. It might be a brown dwarf or a forming star in a stage never seen before. The new object is 600 light-years away in Cygnus. Spitzer has been observing in far infrared wavelengths Kuiper Belt Objects (**KBOs**), those icy asteroids found beyond Neptune. One of the largest KBOs (2002 AW197) has been found to have a diameter of about 430 miles and reflect 18% of the light that falls on it. Previously it had been thought that this, and all KBOs, would reflect the same amount of light as comets do, which is about 4%. The diameters of all KBOs are calculated from their apparent brightnesses, using this assumption of 4% reflectance. This means all KBO diameters (calculated) are probably much bigger than reality, so the recent reports of finding several KBOs nearly as large as Pluto is probably wrong. The astronomers who measured 2002 AW197 are working on many more KBOs, and expect to see within the next year if this high reflectance is common. Spitzer has detected **water ice** and other ices in the dusty disk about a star where planets are probably forming.

Mars Rovers Opportunity recently found the mineral jarosite on Mars' surface. A study of how minerals react in Martian conditions shows: 1) the jarosite likely formed from a reaction of basalt rocks with liquid water, and 2) the mineral would have decomposed if it had continued to be exposed to liquid water for geologically long periods of time. The conclusion is that liquid water on Mars dried up shortly after the jarosite formed, and remained that way.
The solar panels powering Opportunity experienced about a 20% jump in power generated in early September. This allows more science time per day, and less idle time recharging batteries. Of course the rover controllers are not content to just accept the gift, but are trying to explain it. Possible theories are that wind, a dust devil or frost cleared some of the dust coating known to be clinging to the solar panels. Opportunity continues to explore inside Endurance crater, and has reached the last planned area to examine, Burns Cliff. Due to slippage of the wheels in soft sand, the rover will not be sent to the end of the Cliff that was originally targeted, but will examine safer areas of it. Then the rover will proceed out of the crater, but not by the exit nearest its present position. Terrain there is too similar to areas where great slippage has occurred. Experiments have shown that the rover can easily travel a path at a 45-degree angle to directly uphill in the steeper spots, even when the slope is so steep that no progress at all can be made directly up the slope. So the exit of the crater will probably take a 45-degree path.

Mars Rover Spirit has continued to experience occasional failures of 2 of its steering motors, but this has barely slowed its continuing to climb the Columbia Hills. Since the problem began occurring, much of the rover's movement has used tank-like steering; that is, whenever the rover is to turn, it just stops rotating the wheels on one side. This avoids using the steering motors. Just as this goes to press, rover controllers have reported that the steering motor detector is apparently broken, and the motors themselves are working fine. Normal steering is resuming.

Together, the rovers have returned 50,000 images since landing in January. There were fewer than 24,000 taken on the surface of Mars by the 3 successful previous landers combined. The 50,000th picture was of the color calibration target (it is the most photographed object on Mars – be sure and take a shot of it if you visit the planet). The stereo narrow-field high-resolution cameras have taken the most images (about 2/3), with the front hazard cameras next, and then the wide-angle navigation cameras. The rear hazard cameras have hardly been used (about 2%). I guess the rovers don't back up much. The landing cameras took only .01%, but their only use was to take pictures used to stabilize the spacecraft in high winds just before the air bags inflated.

Black holes – For several years it has been known that a black hole at the center of a galaxy seems to correspond in size with the bulge of stars about the center. That is, the bigger the bulge of stars, the bigger the black hole. There are 3 possibilities: the black hole forms and causes the bulge, the bulge forms and causes the black hole, or the bulge and black hole grow together. There has been no evidence which of these is true until now. Observations of the most distant known quasar with the Very Large Array (VLA) radiotelescope shows that it has a supermassive black hole (its mass 10 billion times the Sun) but no bulge of stars, in fact very few stars at all. The quasar is so far that the light from it left there 12.8 billion years ago, when the Universe was less than 1 billion years old. More studies of distant quasars are needed to see if "black hole first" is always true.

Relativity confirmed – One of the predictions of Einstein's General Relativity is that a spinning massive object will drag space and time in the direction of spin, a phenomenon known as frame dragging. Gravity Probe B was recently launched to measure this and another Relativistic effect, but before it produced any results, another team figured out how to process tracking data on the 2 LAGEOS satellites to measure frame dragging. What made this new measurement possible was extremely accurate measurement by the GRACE satellite of all the non-spherical mass of the Earth, which slightly perturbs all satellites' orbits. When these were accounted for, it revealed a remaining 6 feet per year of drift of the LAGEOS satellites caused by frame dragging. The result is 99% of that predicted by General Relativity, with a probable error of plus or minus 5%. This is the first accurate direct measurement of the phenomenon, though Gravity Probe B data will be at least 5 times better.

Tycho's supernova – More than 400 years after Tycho Brahe found a supernova, astronomers have finally found the second of the 2 stars that were involved in that explosion. Type Ia supernovas are believed, from much evidence, to be caused when an ordinary star loses material to a very close companion white dwarf star until the mass of the white dwarf exceeds the strength of ordinary matter (protons and neutrons), causing the star to collapse and then explode. The only major piece of missing evidence in this theory was that no ordinary companion star had ever been found in the aftermath of a type Ia supernova, until now. That ordinary companion star, now speeding away from the scene of the explosion, was found for Tycho's supernova. It was first spotted several years ago, capturing astronomers' attention because it was moving faster than the stars around it. Extensive studies of its spectrum and motion show that it is indeed the sought-after companion in the Tycho explosion.

Cosmic rays – Astronomers using HESS, an array of 4 gamma ray telescopes in Namibia, have produced the first image of any astronomical object in gamma rays. It is of the expanding shell of debris left by a supernova that exploded about 1000 years ago. The image shows that the shock wave is acting like a giant particle accelerator, and this may prove that supernovas are the long sought-after source of cosmic rays.

Very Large Array is making a complete survey in low-frequency (74 MHz) radio waves of all the sky visible from New Mexico, and the first half of the images have been released. Only in the last few years have astronomers overcome the difficulties of observing in this frequency range through the interference of the ionosphere, so this represents a completely new view of the sky. Astronomers expect to find very distant radio galaxies, galaxy halos, galaxy collision relics, pulsars, and possibly exoplanets (ones outside our solar system). But exploring a new range of frequencies usually brings unexpected discoveries also.

The VLA also has captured the faintest details yet seen in the plasma jets emerging from the **microquasar** SS 433. This has changed scientists' understanding of the jets and settled the controversy over its distance. SS 433 is a neutron star with a normal companion star orbiting it, which loses material into an accretion disk about the neutron star. The accretion disk loses much matter onto the neutron star, but shoots some matter out as polar jets. The disk wobbles a complete cycle every 162 days, and so causes the jets to trace a corkscrew pattern. Study of the new images showed that the speed of the jets varies from 24 to 28% of the speed of light, and the speed of both jets changes simultaneously. The changes in speed seem to be caused by changes in the rate that material is dropped into the accretion disk. Knowing the distance accurately (it's nearly 18,000 light-years away) allows scientists to determine the age of the shell of debris thrown out when a supernova explosion created the neutron star, and determine the brightnesses of the components.

Sloan Digital Sky Survey (SDSS) has found a clump of stars that appears to be a dwarf galaxy in the halo of our Milky Way, but is 200 times less bright than any galaxy previously seen. It has been named Willman 1. It is believed to be a dwarf galaxy that has been shredded to just a ghost of its former self by the gravity of the Milky Way. But it could be a form of globular cluster, but it is about as dim as globulars can possibly be, and much less compact than any known globulars. Further studies are needed to see if there is dark matter associated with it, since galaxies generally are surrounded by dark matter, while globulars are not. When we understand what Willman 1 is, it should help astronomers understand how galaxies and their halos form.

2nd black hole – Astronomers using infrared, x-ray, visible light and radio observations have discovered an intermediate-mass black hole (1300 times that Sun's mass) near, but distinct from, the supermassive black hole at the center of our Milky Way galaxy. It is in the center of a cluster of massive stars. The black hole's mass was calculated from the motions of the stars of the cluster. Other (previously known) massive stars nearby are now thought to have been stripped out of this cluster by gravitational interaction with the supermassive black hole.

Virgo galaxy cluster – A team of astronomers using the Very Large Telescope in Chile has measured quite precisely the motion of 40 planetary nebula found in the spaces between galaxies in the Virgo galaxy cluster. These motions were used to trace the distribution of mass within the cluster. The Virgo cluster was found to be quite non-uniform, and so is probably still forming galaxies from the dense regions. The study also showed that M87, a galaxy in that cluster, has a huge halo of stars reaching over 210,000 light-years. Several hundred stars were found, by virtue of their surrounding planetary nebulas, that appeared to be wandering through the galaxy cluster without belonging to any one galaxy. By knowing the fraction of stars that display planetary nebula at any given time (about 1 in 8 billion), the total number of stars in between the galaxies of the Virgo cluster was calculated, and it was about equal to all the stars in the galaxies of the cluster. The number of stars between the galaxies was not know previously because nearly all of those stars are too dim to detect with any current telescope at the distance of the Virgo cluster, which is the nearest galaxy cluster. Planetary nebula, however, are easy to spot with the sensitive spectrograph on the Very Large Telescope, because their distinctive spectra stand out even at that distance. It is believed that the stars now between galaxies were formed inside the galaxies, but were later kicked out by gravitational forces during a collision of galaxies.

Chandra (X-ray observatory) has measured a hot cloud of gas around the galaxy NGC 4555, a large elliptical galaxy that is not part of a galaxy cluster. Astronomers calculated that it would require a halo of dark matter around the gas cloud 10 times that mass of all the galaxy's stars to gravitationally prevent the cloud from dissipating. The problem is that visual light observations of the motions of stars in similar isolated galaxies show that none of them have dark matter halos. Further study is needed. Chandra and **XMM-Newton** have observed Proxima Centauri, the Sun's nearest neighbor star, and found its surface is in constant turmoil, producing flares almost continually. Proxima is a red dwarf star, the most common type of star. However red dwarfs are not as well studied as less common types because they are so small (only 8 to 50% the mass of the Sun) and dim. They do last longer though, so Proxima will shine for trillions of years. The constant flaring is believed caused by this process: stars with less mass are not as dense and hot, and so the nuclear reactions proceed more slowly. This allows turbulent convection (swirling hot material rising from the center to the surface) to build up, which tangles the magnetic field lines, which then release their energy as flares at the surface.

Streams of stars – Analysis of the motions of nearby stars found in the Hipparcos (orbiting star position telescope) data combined with ground-based Doppler measurements, shows that about 20% of the stars within 1000 light-years of us do not share the normal orbital motion about the Milky Way galaxy. A normal orbit is a nearly circular orbit within the plane of the galaxy's disk. The unusual ones consist of several streams of stars crossing the normal orbits at various angles. Most of the streams are moving generally toward or away from the center of the Milky Way. The stars within each stream have different ages, so they cannot have formed together. The best explanation is that the density waves that form the spiral arms of our galaxy sometimes kick the stars they encounter, as a group, into new orbits. The Gaia mission, scheduled to launch in 2011, will measure star positions and motions to far greater distances than Hipparcos. Results from Gaia should show if these streams of stars are typical over the whole Milky Way. Gaia will also make Doppler measurements, which Hipparcos did not, so the additional groundwork will not be necessary then.

Solar activity – Scientists measuring the radioactive elements in wood of known age have reconstructed the level of solar activity (sunspots, flares and eruptions) year by year back to 11,400 years ago. Solar activity does not directly cause the radioactive elements, but the accompanying solar magnetic field causes more or fewer cosmic rays to penetrate the solar system. These cosmic rays hit the Earth's upper atmosphere and cause radioactive elements to form, which are then absorbed by growing trees. This method of measuring solar activity was checked against the already established method of measuring solar activity by beryllium isotopes in glaciers. The new method extends farther back in time than the glacier method. On average the solar activity for the past 60 years is stronger than it has been since a time 8,000 years ago. Based on past times of high activity, the current period of high activity should last only a few more decades. It is known that the Sun is slightly brighter when solar activity is high. It is not

known yet whether the past 60 years of quite high solar activity caused enough extra brightness to contribute substantially to the global warming that took place during this time. Further study is needed.

Uranus - All 11 of the known rings of Uranus have now been imaged from Earth, though they were originally seen only by spacecraft (Voyager 2). This was accomplished by improved adaptive infrared optics on the Keck Telescope in Hawaii, combined with the planet tipping so that it rings are close to edge-on to us, which brightens them. The observations also measured the thickness of the rings and found they are only one particle thick, though the average particle size was measured as "large boulder". The cloud activity is picking up, due to the change of seasons. When the first good images of Uranus were made by Voyager in 1986, it was (southern) summer on the planet, and now it is almost fall. A year on Uranus is 84 of our years. So we are still learning how the seasons affect the planet.

Genesis (solar wind sample) – The investigation into why Genesis crashed upon return to Earth showed that the gravity switches were installed upside down. The switches are intended to detect when the spacecraft hits the Earth's atmosphere and start the timers that deploy parachutes. The investigation continues in order to establish if this was the full cause of the crash.

Venus transit results – The European Southern Observatory decided to reenact the measurement of the Solar system during the transit of Venus across the Sun last June, similar to what was done in the 1700s and 1800s. They signed up a few thousand members of the public from all over the world to time when Venus entered and left the face of the Sun. This gives a parallax effect that can be used to determine the distances of Venus and the Sun. This was the most accurate method of measuring the size of the Solar system in those past centuries, even though the ones done in the 1700s were fraught with errors, but today the best measurements are made by radaring the planets. More than 4500 Venus timings were reported from over 1500 observers, including many young students. Analysis of the timings was just completed, resulting in a measure of the Astronomical Unit (the average distance to the Sun) that is surprisingly accurate. Result: 149,608,708 km, in error from the radar value by about .007%. If only the astronomers in 1761 could have been assisted by 1000 school kids with GPS receivers and video cameras, reporting their results over the Internet, they might have calculated an accurate value back then. Legentil would have loved it*.

*For those of you unfamiliar, Legentil made the most disastrous expedition in the history of astronomy to observe the 1761 Venus transit.

Instant AstroSpace Updates:

SMART-1 (European lunar mission) has fired its ion engine to allow the Moon's gravity to capture it on November 13 into lunar orbit. It will use the engine to lower its orbit until mid January, when it will begin a 6-month study of the elements on the lunar surface.

Strings of depressions called **pit chains** found on Mars have been shown to be caused by fault activity (marsquakes), and to be geologically quite young. So Mars is not dead in terms of fault movements.

NASA has funded a study to determine if magnetized **plasma** can be **beamed** from a power source to propel a distant spacecraft. Theoretically this could drastically reduce flight times around the solar system.

There were absolutely no sunspots on October 11 and 12, the 2nd and 3rd day that this has happened during this sunspot cycle. A new study of the timing of spotless days and the minimum of solar activity showed that the next minimum should happen in late 2006, sooner than expected.

Deep Impact is scheduled to launch December 30, to impact comet Tempel 1 next July 4 at 23,000 mph, creating a crater a few hundred feet across, so that the material thrown out can be analyzed by the part of the spacecraft that separates from the impacter and by Earth-based observations.

The **Mt. Stromlo observatory** in Australia has reopened now that some of the buildings and telescopes have been rebuilt since it was devastated by wildfire in January 2003. It will take several more years to complete rebuilding, even if the insurers settle soon. Donations from the public are being used to build telescopes open to the public.

A launch date of approximately March 1 has been set for the Cosmos 1 spacecraft, built by the Planetary Society (no NASA funds). It will be powered by **solar sail**, which accelerates from the pressure of sunlight.

For Sale: Canon EOS Rebel G, Excellent condition only a few years old. Camera body only. - $100 o.b.o., Please call Bill Johnson at 714-553-5793 or e-mail at home@byjohnson.com

For Sale: Meade 8" SCT; includes GPS and $1000 in extras. Make a reasonable offer. Gerald Strong 714-538-2517

For Sale: Takahashi Epsilon Series E-160 Hyperbolic Astrograph Tube Assembly only. Included are eyepiece and camera adapters, finder scope and mounting rings. Please see http://www.lsstnr.com/E160.htm for specifications and pictures if not familiar with this great wide field instrument. $1500.00. Email for pictures. Carl Blue, carlblue@earthlink.net, evenings or message 562 597-4035

Don't Forget !
Bring In Your Items for the OCA Auction!

Everyone in the club has some unwanted items that they don't use at home or at the office that are too valuable to throw away, so they just get stored forever!

We are asking you to clean out your closets, dust off these items and donate them to OCA .

We will turn these items into cash by putting them in eBay auctions. There are over 800 members in OCA. Our goal is to just get one good item to auction from each member. If you would like to donate more, that,s wonderful!

We need your help!

The key to the OCA auction is the quality of the items you donate. You get a tax deduction on anything you donate to OCA. The more the item is worth the better the deduction you get and the more money OCA gets for the needed ANZA repairs

Some Suggested Types Of Items

Antiques • Business & Industrial Equipment • Cameras & Accessories • Cars & Accessories
Clothing, Shoes & Accessories • Collectibles • Computers & Networking • Electronics
Jewelry • Memorabilia • Musical Instruments • Sporting Goods • Sports Memorabilia
Hobbies • Video Games • Astronomy

We will collect your items at the general meetings. If you can't come to the meetings or if you have trouble getting your items here because they are too large you can make arrangements to have them picked up.

If you have any questions concerning this OCA eBay fundraiser we ask that you email
Wendy Adams at wadams@clearpointadv.com
Please putOCA eBay in the subject line.

To setup a pickup time call Larry McManus at Clearpoint.

714 731 5542

SIRIUS ASTRONOMER
www.ocastronomers.org
The Newsletter of the Orange County Astronomers

Nonprofit Organization
U.S. Postage
PAID
Santa Ana, CA
Permit No. 1468

NEWSLETTER OF THE
ORANGE COUNTY ASTRONOMERS
P.O. BOX 1762
COSTA MESA, CA 92628

RETURN SERVICE REQUESTED

DATED MATERIAL
DELIVER PROMPTLY

HANDY CONTACT LIST

CLUB OFFICERS			
President	Barbara Toy	btoy@cox.net	714-606-1825
Vice-President	David Radosevich	Dave.Radosevich@ngc.com	310-813-9021
Treasurer	Charlie Oostdyk	charlie@cccd.edu	714-751-5381
Secretary	Bruce Crowe	bcrowe12@pacbell.net	714-971-8427
Trustee	Bob Buchheim	rbuchheim@compuserve.com	949-459-7622
Trustee	Craig Bobchin	ETX_Astro_Boy@sbcglobal.net	714-374-7054
Trustee	Stephen Eubanks	SSEubanks@earthlink.net	714-776-6361
Trustee	Joel Harris	eclipse125@earthlink.net	818-575-9580
Trustee	Tom Kucharski	TomRigel@aol.com	949-348-0230
Trustee	Tony Obra	tonykathyodieseldr@comcast.net	714-952-8779
Trustee	Gary Schones	gary378@pacbell.net	714-556-8729
COMMITTEES, SUBGROUPS, AND OTHER CLUB VOLUNTEERS			
Press Contact	Russell Sipe	russell@sipe.com	714-281-0651
Sirius Astronomer Editor	Steve Condrey	SiriusAstronomer@OCAstronomers.org	562-983-8894
Observatory Custodian	John Hoot	jhoot@ssccorp.com	949-498-5784
Anza Site Maintenance	Don Lynn	donald.lynn@office.xerox.com	714-775-7238
Astrophysics SIG	Chris Buchen	buchen@cox.net	949-854-3089
Librarian	Karen Schnabel	karen@schnabel.net	949-887-9517
Membership, Pad Coordinator	Charlie Oostdyk	charlie@cccd.edu	714-751-5381
Beginner's Astronomy Class	Antonio Miro	tycmiro@aol.com	714-898-9677
AstroImagers SIG (co-chair)	Leon Aslan	laslan@earthlink.net	562-433-2922
	Bill Patterson	bill@laastro.com	714-578-2419
Explore the Stars Coordinator	Richard Cranston	rcransto@ix.netcom.com	714-893-8659
Silverado Star Parties	Bob Buchheim	rbuchheim@compuserve.com	949-459-7622
Star Member Training	Barbara Toy	btoy@cox.net	714-606-1825
OCA Outreach Coordinator	Jim Benet	jimbenet@pacbell.net	714-693-1639
Telescope Loaner Program	Bob Bell	liamcelt@earthlink.net	714-808-9233
EOA Liaison	Del Christiansen	DelmarChris@earthlink.net	714-895-2215
Anza House Coordinator	Larry Carr	LarryCarr@sbcglobal.net	714-306-6584
GoTo SIG (formerly ETX SIG)	Mike Bertin	MCB1@aol.com	949-786-9450
WAA Representative	Tim Hogle	Tim.Hogle@jpl.nasa.gov	626-357-7770
Web Management Team	Hassi Norlén	hassi@norlens.net	714-710-9440
	Hari Dudani	hdudani@cox.net	949-495-9129

OCA WEBSITE: http://www.ocastronomers.org **STARLINE 24-HR. Recording: 714-751-6867** **ANZA OBSERVATORY: 951-763-5152**