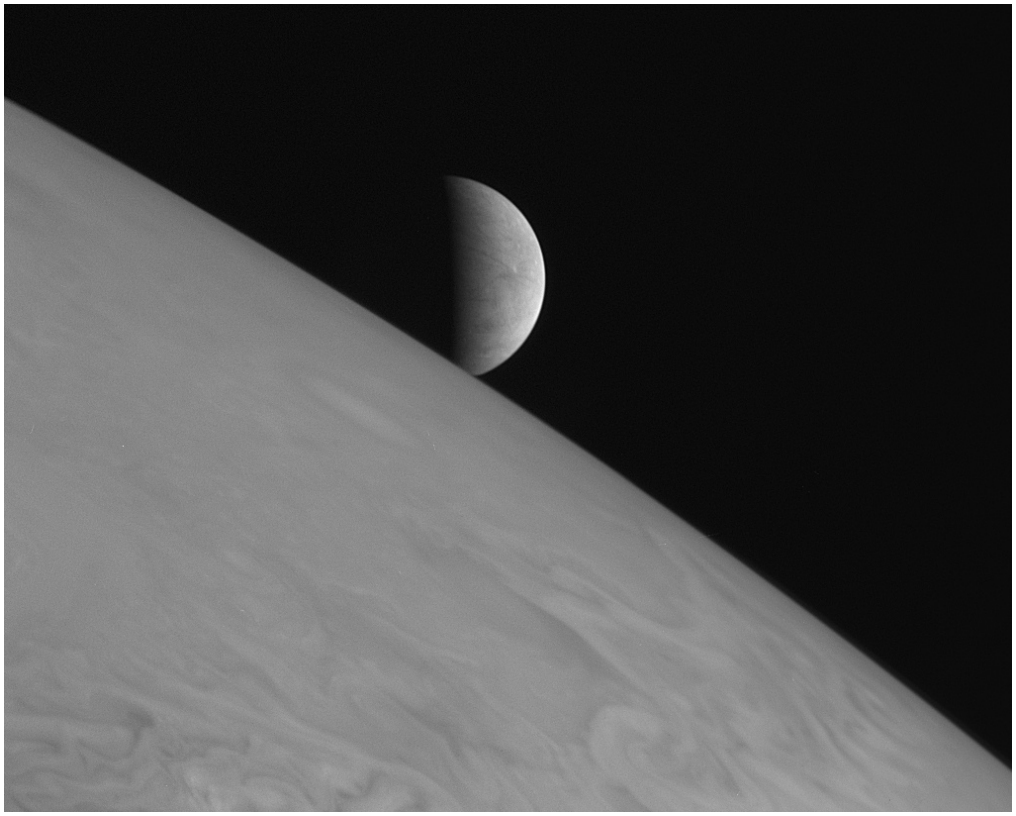
SIRIUS ASTRONOMER

www.ocastronomers.org

The Newsletter of the Orange County Astronomers

June 2007 *Free to members, subscriptions $12 for 12 issues* **Volume 34, Number 6**



Europa is captured rising over the limb of Jupiter by the New Horizons spacecraft six hours after its closest approach to Jupiter on February 28, 2007. New Horizons is currently on its way to Pluto with an arrival date of June 2015. By that time, the next mission to Jupiter, Juno, should be well underway with a projected arrival date of 2016. *Credit: NASA/Johns Hopkins University Applied Physics Laboratory/Southwest Research Institute*

OCA CLUB MEETING

The free and open club meeting will be held Friday, June 8th at 7:30 PM in the Irvine Lecture Hall of the Hashinger Science Center at Chapman University in Orange. The scheduled speaker is yet to be announced as of press time.

Next General Meeting: July 13th

STAR PARTIES

The Anza site will be open this month on June 16th. The Black Star Canyon site will be open this month on June 9th. 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, June 1st (and next month on July 6th) at the Centennial Heritage Museum at 3101 West Harvard Street in Santa Ana.
GOTO SIG: TBA (contact coordinator for details)
Astrophysics SIG: June 15th, July 20th
Astro-Imagers SIG: June 19th, July 17th
EOA SIG: June 27th, July 25th
Dark Sky SIG: TBA (contact coordinator for details)

President's Message

By Barbara Toy

June is the month of the summer solstice, the time of year when the nights are the shortest, and also when the Marine Layer tends to give us overcast skies and fog. Sometimes, when this "June Gloom" stays west of Anza, it shields us from the lights of Temecula and Elsinore, giving us darker skies than usual. Sometimes it will even blot out the lights of coastal Orange County without covering our Black Star Canyon viewing area, leaving it with darker skies. Unfortunately, the more usual result is overcast skies over the entire area, including Anza, and then even short nights of viewing are out. This is supposed to be a problem limited to late spring/early summer, but in a bad year (like last year), "June Gloom" can last all summer – every year is different, though, and we're hoping that the increased fire danger due to the lack of rain this year will be offset by clearer, dryer viewing conditions than we've seen in the last few years.

We had two star parties in May, and the first one was very unusual – the weather forecast was pretty good, especially compared to the last few star parties, the temperatures weren't too cold, there were a lot of great things to look at, but hardly anyone was there. Our operating theory is that this was because Sunday was Mothers' Day, but it was strange to see the Football Field totally empty on a reasonably good star party night. There were more people for the second star party, but still a lot fewer than I expected on a clear, dark, fairly warm night with generally very steady skies.

The weather was more of a gamble for the first star party – during the afternoon, there were a lot of high clouds, and several contrails lingered for hours, so we had some worries about how the night would go. The sky cleared up shortly after it got dark, though, and stayed clear until after midnight. Even though there was a lot of high thin cloud cover after that, and the long-lasting contrails were back, the sky was remarkably steady. Those of us in the club observatory were able to see a lot of detail in Jupiter, though the colors were washed out by the high clouds. Also, thanks to Don Lynn, we were able to confirm that the dot identified by The Sky (the control program for the Kuhn) as Vesta truly was that minor planet (or dwarf planet). He also went to painstaking trouble to help us locate it in the real sky, so we all spent a long time staring up at its general location, trying to determine if we were truly seeing Vesta or if that faint dot was just a figment of our imaginations. At best, it was a very dim object that popped in and out of peripheral vision. With less high-level haze, it ought to be easier to see, and we were all looking forward to trying again. If you haven't tried to see Vesta naked-eye yourself yet, it's in the neighborhood of Jupiter, so you should look for it whenever the planet's in good viewing position – have your finder chart in hand (or find Don Lynn) and give it a try!

If You Come to a Star Party…

…this is a good time of year to remember that both of our observing sites are in rural environments. Rattlesnakes, Black Widow spiders, scorpions, bees, wasps and other creatures that can bite, sting or otherwise take punitive action if disturbed are natural parts of that environment. They've all come out of hibernation (or hatched) and many have set up household in various nooks, crannies and holes – it's a good idea not to put your hands, feet, etc., in any location one of these creatures might call home without checking to be sure there isn't anything there that could bite or sting you.

Besides not reaching or stepping into a hole or crevice that might be inhabited, it's a good idea to stick to the established roads and paths around the sites, especially after dark, and to make enough noise in your movements that any snake or other creature you might not want to meet has warning and can get out of your way. Don't leave bedding or clothing, including shoes, out in the open where a scorpion or the red ants that seem to be all over the place out at Anza could crawl into them. Particularly at Anza, keep food protected from invasion by any of the local residents, including mice and rats – and please take your garbage away with you so it won't be there to attract them!

As far as I know, we've never had a snake bite or other serious injury from the local wildlife at any of our dark sites, and we would all like to keep it that way. And, aside from any other concern, having a serious run-in with one of these creatures would really put a damper on your star party plans!

Groups at Anza

As a reminder if you want to host a group at Anza – any member in good standing is welcome to host or sponsor a group visiting the site, but we do have rules that need to be followed so that groups using the site don't interfere too much with other members who want to use the site when a group is planning to be there. If you want to bring a group of six or more people to Anza, *you need to reserve a date in advance with Charlie Oostdyk*; if you email him about that, please copy me with the email so I can put the date on the website calendar. If you have any question about whether you need to make a reservation, err on the side of caution and call Charlie (714-751-5381). The reason we need you to do this is so we don't wind up with multiple groups attempting to use the site at the same time, which puts too much of a burden on our facilities and interferes with other members who may be there, and also so we can be sure that people don't bring groups out on inappropriate dates – such as star parties.

Our star parties are meant for members and their guests, not for groups of students, scouts, or other groups who might want to take advantage of our dark site, regardless of how well-intentioned they might be. During even a moderately busy star party, the Football Field is generally full, all beds are taken at Anza House, and many of the other pads on our site are in use. Someone who brings a group out to Anza on one of these nights creates serious inconvenience for other members – we had such a group show up at the second May star party, without permission and in spite of being told that the group could not use the facility on a star party weekend. Fortunately, we had a surprisingly small turnout for the star party, as I mentioned above – if it had been a busy star party, that would have caused a major problem, and I would have had to insist that the group leave. Repeated violation of the rules governing groups (or any of the Anza site rules) can result in suspension or revocation of a member's ability to use the Anza site, and I expect the member who was responsible for this situation will be getting a written warning to that effect.

The rules for groups are on our website at http://www.OCAstronomers.org/clubinfo/anzarules.htm, or I would be happy to email you a copy. If you have any questions about groups using the Anza site, please feel free to contact me, Charlie or Bob Buchheim about them.

Changes In The Club Election Schedule

So that you will not be taken entirely by surprise when we start to solicit nominations for the Board of Trustees for 2008, the board has adopted a change in the bylaws that sets a new schedule for the elections. In the past, we took nominations in November and December, and the elections were held at the January meeting (mail-in ballots had to be mailed in before the January meeting). The ballots were finalized after the December meeting, and were mailed out to the membership in the January issue of the Sirius Astronomer. This often presented a problem because the holidays in December and the beginning of January inevitably caused delays in getting the Sirius Astronomer compiled, printed, into the mail and then delivered, so many members did not received their copy until after the January meeting. Although ballots have always been available at the January meeting itself, and have also been available through the club website for the last few years, there still are members who have not been able to vote because they couldn't make it to the January meeting and they couldn't vote by mail because they didn't get their ballot in the Sirius Astronomer in time.

Under our new schedule, the timing of the election itself is unchanged – it is at the general meeting in January (which is the club's annual meeting, per our Articles of Incorporation), and mail-in ballots need to be received by that date, just as before. The big change is in when we will be taking nominations and closing the ballot. ***In the future, formal nominations will be made at the October and November general meetings, instead of November and December.*** You can still make nominations outside of these general meetings by contacting the secretary or president (Bob Buchheim or me this year) with your nominations at any point up to the end of the November meeting, but the ballot will be finalized at the end of the November meeting instead of the end of the December meeting. The finalize ballot will then be sent out with the December issue of the Sirius Astronomer instead of the January issue, so everyone should receive it well before the meeting in January. This will make life a lot easier for members who rely on getting their ballot in the Sirius Astronomer, and will also make December and early January a lot less stressful for Steve Condrey and Charlie Oostdyk, who are responsible between them for getting the Sirius Astronomer together and ultimately mailed out to the membership.

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AstroSpace Update
June 2007
Gathered by Don Lynn from NASA and other sources

Brightest supernova – Supernova 2006gy, discovered last year (of course) has now been found to be the intrinsically brightest supernova ever observed, giving off about 100 times the energy of a typical supernova. The length of time it has remained bright was also surprising. Observations by Chandra X-ray observatory and various ground-based telescopes have shown that this is the explosion of an extremely massive star, perhaps as much as 150 times the mass of our Sun. The other theory, that it was an ordinary supernova but within dense hydrogen cloud, was ruled out by the X-ray observations. Theory has it that such very massive stars would have formed commonly in the early history of our Universe, but they are now rather rare, apparently due to the changing content of heavy elements as the Universe ages. The star that produced the supernova apparently expelled a large amount of mass before exploding. This mass loss is similar to that seen from the relatively nearby star Eta Carinae, raising the suspicion that it may be poised to explode. 2006gy is located in galaxy NGC 1260, about 240 million light-years away. Supernovas usually occur when massive stars exhaust their fuel and collapse under their own gravity. Astronomers think that 2006gy exploded in a different way, when its core produced so much gamma-ray radiation that some of the radiation converted into particle and anti-particle pairs, resulting in a loss of energy and collapse. This type of collapse would result in runaway nuclear fusion, blowing much of the star into space. This would prevent collapsing to a black hole, as massive stars that undergo ordinary supernovas are believed to do. 2006gy was discovered by Robert Quimby, son of OCA member Helen Mahoney.

Brown dwarf beacons – Brown dwarfs, thought just a few years ago to be incapable of emitting any significant amounts of radio waves, have been discovered, at least in 3 cases, putting out extremely bright "lighthouse beams" of radio waves, much like pulsars. The discoverers concluded that the pulses come from beams emitted from the magnetic poles of the brown dwarfs. Electrons appear to be reacting with the magnetic field to produce radio waves, which are then amplified by naturally occurring masers. This process produces radio waves in the magnetic field of the Earth and other planets. The brown dwarf radio emissions are stronger than those of planets, but weaker than those of pulsars. The brown dwarf pulses are much slower than those of pulsars, because the brown dwarfs observed rotate in a few hours, much slower than pulsars.

Least massive white dwarf has been discovered. It is a Saturn-sized ball of helium containing only about 1/5 the mass of the Sun. The reason for the low mass is that it has a companion star, probably another white dwarf, which is pulling away material by its gravity. The companion has not been seen, but it is confirmed by the wobble in the motion of the star seen. The pair is about 7400 light-years away near the border of the constellations Lynx and Ursa Major. Typical white dwarfs contain about half the mass of the Sun. Though the newly discovered star has little mass, its size is 9 times larger than a typical white dwarf. A star with as little mass as this one would not yet have progressed to the white dwarf stage in its life. So it was more massive when it progressed to white dwarf, and then the mass was stolen later. Probably puffed-up stages in both stars' lives that occur just before the white dwarf stage caused the 2 to move closer in their orbit, and the closeness allowed the more massive of the pair to begin stealing matter. They now orbit every 7.6 hours at a speed of 335,000 mph. Astronomers predict that in another 10 billion years or so, the stars will collide and merge.

Most Earth-like planet has been discovered orbiting a red dwarf star called Gliese 581. It lies about 20 light-years away in the constellation Libra. It is estimated to have 5 times the mass of Earth, a diameter 1.5 times Earth's, and a surface temperature that would allow liquid water. Since red dwarf stars are dim, this new planet orbits 14 times closer to its star than Earth does to its Sun, in order to have roughly the same surface temperature as Earth. Its year is only 13 Earth days. The star was already known to have a planet, one about the mass of Neptune, orbiting closer than the newly found one. There is probably a third planet orbiting farther from the star, but further observations will be needed to confirm this. The star is expected to shine about 13 times longer than the Sun will, or about 130 billion years.

SOHO (solar orbiting observatory) – It has long been theorized that the Sun ought to have what are called g-mode vibrations in its surface, caused by gas churning below the surface plunging deeper and colliding with denser material and sending vibrations up to the surface. However, they are predicted to be only a few yards high, and vibrate with periods of a few hours. Small slow vibrations have escaped our ability to detect them, until now. By analyzing years of data from SOHO, looking for the interaction between overtones of the g-mode, rather than looking for the main vibration itself, scientists have announced detection of the g-mode. Further analysis of other observations will be made to confirm this discovery.

Mercury core – Astronomers using radar with 3 radio telescopes (Goldstone, Green Bank, and Arecibo) have measured the wobble in the planet Mercury's rotation to extreme accuracy. The result is that it wobbles twice as much as a solid planet would, so Mercury must have a liquid core. Calculations have shown that the planet should have cooled enough since its formation to solidify its melted iron core. That means the core must have lighter elements mixed with the iron, possibly sulfur, that reduce its melting point. This will send the planetary formation theorists back to work, since current theory says that no

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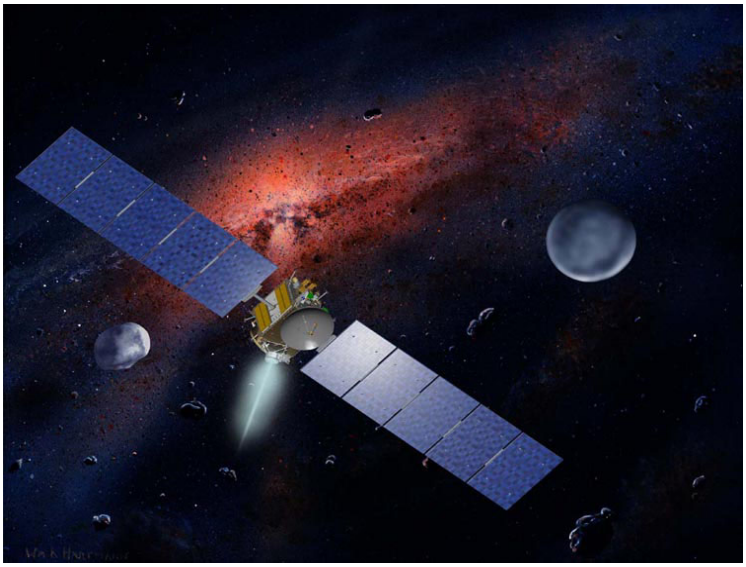
The Ions of Dawn

by Patrick L. Barry

This summer, NASA will launch a probe bound for two unexplored worlds in our solar system's asteroid belt—giant asteroids Ceres and Vesta. The probe, called Dawn, will orbit first one body and then the other in a never-before-attempted maneuver.

It has never been attempted, in part, because this mission would be virtually impossible with conventional propulsion. "Even if we were just going to go to Vesta, we would need one of the largest rockets that the U.S. has to carry all that propellant," says Marc Rayman, Project System Engineer for Dawn at JPL. Traveling to both worlds in one mission would require an even bigger rocket.

This is a trip that calls for the *un*conventional. "We're using ion propulsion," says Rayman. The ion engines for the Dawn spacecraft proved themselves aboard an earlier, experimental mission known as Deep Space 1 (DS1). Because ion propulsion is a relatively new technology that's very different from conventional rockets, it was a perfect candidate for DS1, a part of NASA's New Millennium Program, which flight-tests new technologies so that missions such as Dawn can use those technologies reliably.



Artist's rendering of Dawn spacecraft, with asteroids. Largest are Vesta and Ceres. Credits: Dawn spacecraft—Orbital Sciences Corporation; background art—William K. Hartmann, courtesy UCLA.

"The fact that those same engines are now making the Dawn mission possible shows that New Millennium accomplished what it set out to," Rayman says.

Ion engines work on a principle different from conventional rockets. A normal rocket engine burns a chemical fuel to produce thrust. An ion engine doesn't burn anything; a strong electric field in the engine propels charged atoms such as xenon to very high speed. The thrust produced is tiny—roughly equivalent to the weight of a piece of paper—but over time, it can generate as much speed as a conventional rocket while using only about 1/10 as much propellant.

And Dawn will need lots of propulsion. It must first climb into Vesta's orbit, which is tilted about 7 degrees from the plane of the solar system. After studying Vesta, it will have to escape its gravity and maneuver to insert itself in an orbit around Ceres—the first spacecraft to orbit two distant bodies. Dawn's up-close views of these worlds will help scientists understand the early solar system.

"They're remnants from the time the planets were being formed," Rayman says. "They have preserved a record of the conditions at the dawn of the solar system."

Find out about other New Millennium Program validated technologies and how they are being used in science missions at http://nmp/TECHNOLOGY/infusion.html . While you're there, you can also download "Professor Starr's Dream Trip," a storybook for grown-ups about how ion propulsion enabled a scientist's dream of visiting the asteroids come true. A simpler children's version is available at http://spaceplace.nasa.gov/en/kids/nmp/starr.

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

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substantial sulfur should have formed at Mercury's distance from the Sun. This finally explains the finding by the Mariner 10 spacecraft in 1974 that Mercury has a magnetic field, since such is most easily generated by circulation of a melted iron core.

Gravity Probe B – Preliminary results of analyzing this spacecraft's data have been released. The purpose of the mission was to precisely measure 2 effects of General Relativity: geodetic effect (in which the Earth's gravity warps space-time), and frame dragging effect (in which the Earth's rotation drags space-time). The spacecraft contained 4 gyroscopes about a million times more precise than the best navigation gyroscopes. It was launched in April 2004 and collected data for about a year, until the liquid helium ran out in the cooling system. During a year, the geodetic effect was calculated to cause 6.606 arc seconds of motion in the gyroscopes, and frame dragging 0.039 arc seconds. The just-announced results are that the geodetic effect is confirmed within 1% and that the frame dragging appears to be detected. The reason that precise results are not yet available is that new effects in gyroscopes were discovered (these are the first gyroscopes able to find these effects), and these are being investigated and accounted for to see how much motion remains to be attributed to Relativity. More precise results, accurate to 0.005 arc seconds per year, are expected at the end of this year. The gyroscope effects discovered are that patches of electrical charge on metal surfaces can torque the gyroscopes and can dampen other known effects. Gravity Probe B was conceived in 1959, received first funding from NASA in 1964, and required decades of development of the precision technologies necessary to measure such small effects. These technologies included drag-free gyro suspension, gyro readout system, ultra-precise star telescope, advanced liquid helium dewar, micro thrusters, and orbit determination by GPS. It is the longest-running physics research project at both NASA and Stanford University.

Dark matter ring – Astronomers using the Hubble space telescope have discovered a ring of dark matter that formed long ago during the collision between 2 galaxy clusters. This is the first time that a structure has been found in dark matter that does not match the structure of the galaxies and gas in clusters of galaxies. The ring measures 2.6 million light-years across and is located 5 billion light-years away. It was found while mapping dark matter by its gravitational effect, which bends light passing through from more distant sources. Previous research had shown that the galaxy cluster being observed was the result of 2 earlier clusters colliding 1-2 billion years ago. Computer simulations show that such a collision could create such a ring in the dark matter that normally surrounds galaxy clusters. The dark matter falls to the center of the collision by gravity, then sloshes back into a ring.

Old star – A team of astronomers has found a star in our Milky Way galaxy with measurable amounts of radioactive uranium and thorium, along with related elements europium, osmium, and iridium, allowing radioactive dating of the star's formation, which is believed quite accurate. The result is 13.2 billion years, amazingly close to the best estimates of the age of the Universe (since the Big Bang) made by completely independent means. This implies the particular star formed only a half billion years after the Big Bang.

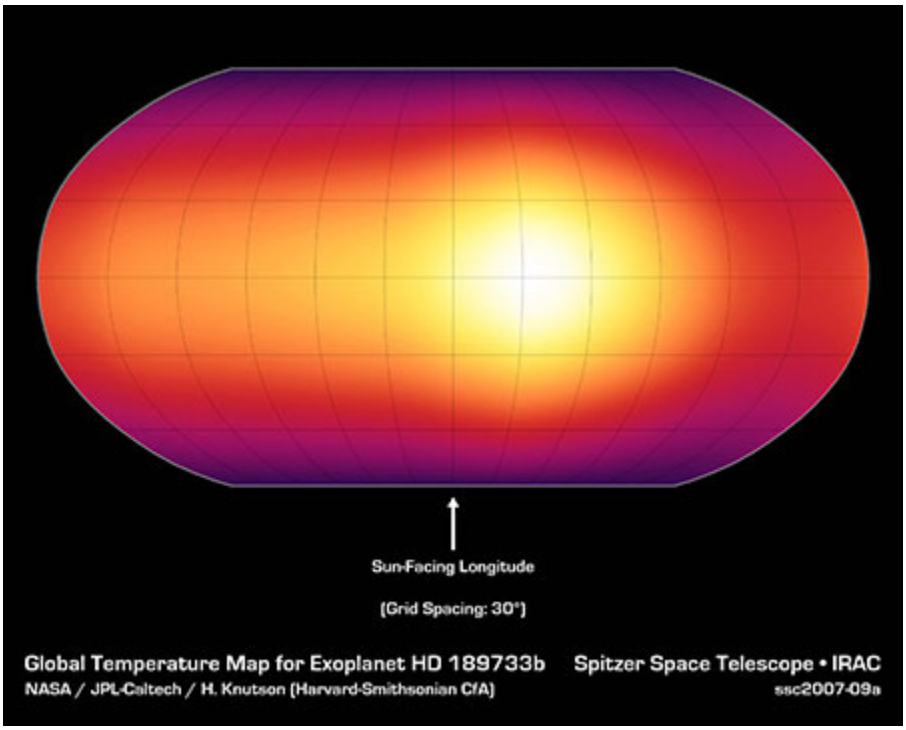
Planetary danger zone – It has been known that any very hot star will blow away planet-forming materials from nearby stars before planets can form. Now the Spitzer infrared space telescope has measured how large that danger zone is. Cooler stars appear to keep their disks of planet-forming materials as long as they remain more than 1.6 light-years from a hot star. The conclusion is based on Spitzer observations of about 1000 stars in the Rosette Nebula, a star-forming region. The study also showed that the closer a star passed to a hot star, the faster it lost its disk, in as little as 100,000 years.

M106 (galaxy) has long been known to have 2 spiral arms in visible light, but 4 arms in radio and X-ray images. Data from the Chandra X-ray, XMM-Newton X-ray, Spitzer Infrared, and Hubble space telescopes has apparently solved this mystery. The extra arms are regions of gas that are being violently heated by shock waves caused by jets shooting out from the galaxy core. These regions do not contain large numbers of stars, so do not show up in visible light. Other explanations of the extra arms were ruled out by the observations in infrared and X-rays.

Deep Impact (comet impact mission) – Since the impact with comet Tempel 1 in July 2005, the non-impacting portion of the Deep Impact spacecraft has been in excellent operating condition, so NASA accepted proposals of what to do next with it. Deep Impact has a visible light telescope and an infrared spectrometer. The winning proposals are to visit comet Boethin and to observe a few planets orbiting other stars that are known to pass in front of (transit) or behind (eclipsed by) their stars. The telescope on Deep Impact cannot resolve such planets from their stars, but can measure the changes in light during transits and eclipses, in effect separating the light from the star and planet. The observations could discover further planets, since they could disturb the timing of transits of the known planets. A number of features found on Tempel 1 were found surprising, and scientists are anxious to see if they are found at Boethin. These features include evidence that the nucleus was made from several pieces that came together, that water vapor was vented all over the nucleus, but carbon dioxide vented from only a few areas, that dust came only from carbon dioxide vents, that the nucleus had several unexplained smooth areas, and that there appeared to be impact craters on the nucleus. A final decision of whether to fund this further mission for Deep Impact will be made late this year.

Hottest planet – A team of astronomers has, using the Spitzer infrared space telescope, measured the temperature of a planet at 3700 degrees F, the hottest known. A similar technique was used (during eclipses of the planet) as proposed with Deep Impact to separate the light of the planet from its star. Not only the temperature was measured from the planet's light, but also it was found that the planet is a bit smaller than Saturn in diameter, the smallest exoplanet yet measured, but is more massive than Saturn. To be this massive, it must contain more heavy elements than exist in our entire solar system (exclusive of the Sun), and have a core about 70-90 times the mass of the Earth. The planet has to keep one face always toward its star, and must appear black in its starlight, that is absorbing essentially all the light from its star that falls on the daylight side. This is required in order to reach such a high temperature. The planet orbits the star HD 149026, which is 279 light-years away in Hercules. It is quite close to its star, and completes its year in only 2.9 Earth days.

Exoplanet mapped – For the first time astronomers have created a rough map of an exoplanet (one orbiting another star), using the Spitzer infrared space telescope. The planet is known to be a gas giant, so it is a map of the cloud top features. The map was created by measuring the changes in infrared light that occur as the planet rotates. There is a hot spot (1700 degrees F.) offset by 30 degrees of longitude from the substellar point (where it is noon), where heating should be greatest. This offset is probably caused by high winds moving the heated spot. This would require winds of 5-6 thousand mph. The night side is only 500 degrees cooler than the hot spot, again evidence of high winds moving heat around the planet. It orbits HD 189733, a star slightly cooler and less massive than our Sun, about 60 light-years away. The planet is slightly more massive and of slightly larger diameter than Jupiter. It orbits 30 times closer to its star than the Earth is to the Sun, and completes its year in 2.2 Earth days.



Massive exoplanet – Astronomers announced that they have found the most massive known exoplanet that transits its star. It is 8.2 times Jupiter's mass, but only 1.18 times the diameter of Jupiter. This makes it as dense as Earth, even though it is made mostly of hydrogen. It is in an extremely elliptical orbit, swinging 3 times farther at its far point than at its near point. Heat from its star makes the planet a very hot place at closest approach. All other known transiting planets have essentially circular orbits. Likely another planet has perturbed its orbit into eccentricity, though no other planet has been found yet. Its year is only 5.63 Earth days, though this is the longest period known for a planet that transits its star. The planet was discovered using a network of small automated telescopes known as HATnet.

COROT (European planet finder and stellar vibration mission) has found its first exoplanet since launch last December. It was detected by monitoring many stars to see if any dropped in brightness due to a planet passing in front of it. Initial test show that the instruments on COROT are operating well beyond the design specifications, so it should be capable of seeing planets even as small as the Earth passing in front of nearby stars. It should also be able to detect starlight reflected from a planet and analyze it to determine the planet's surface composition. The new planet has been named COROT-Exo-1b. It is a gas giant, with a radius 1.78 times that of Jupiter, a mass 1.3 times that of Jupiter, and is hot from its closeness to its star, a yellow dwarf similar to our Sun. Its year is 1.5 Earth days. It is 1500 light-years away in Monoceros.

Hayabusa (Japanese asteroid mission) has started one of its ion engines to return to Earth, leaving the asteroid Itokawa, where it has been stranded for over a year since multiple spacecraft failures. It will take about 3 years to return if all works well this time. Spacecraft controllers had been waiting for another alignment of planets that would allow a return. The originally planned return was missed due to a communications failure, which recovered after the alignment was gone. The spacecraft has some engines damaged, 2 failed reaction wheels, a damaged battery, ran out of fuel for its chemical rockets (due to a leak), and may or may not have grabbed a sample of the asteroid material when it landed. The Japanese space

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So, you need to be thinking about your nominations for Board positions a month earlier than in years past, and this is also a good time for you to be thinking about running for office yourself. If you've been a member of the club for at least a year, you would be qualified to run for a Trustee position, as long as you remain a member in good standing. You could also run for the positions of Secretary or Treasurer. You need to have served on the Board for at least a year (any year) to qualify to run for President or Vice President. We've had excellent Boards in the years I've been a member of the club, partly because we've had a regular influx of new people as well as a number of people who have served on the Board for several years – the mix gives us the benefits of continuity as well as new energy and different perspectives, but we do need new people to get involved each year to keep this up. Try it – you'll find that the people serving on the Board are a wonderful bunch, interesting, dedicated and fun to work with, and that you can get a real sense of satisfaction by helping the club out this way. So – do throw your hat in the ring for a Board position come November!

As a side note, you may have seen notices in April and early May about a recent survey of women in amateur astronomy. One of the questions on the survey was whether our club presented any barriers to women who were interested in taking a more active part in the leadership of the club. I had to laugh when I read this – I can assure all of you women out there from my own experience over the last seven years that there are no such barriers in our club, and you will be made very welcome if you want to volunteer to take on club-related responsibilities, whether as a Board member or in any other capacity. Of course (and I hope this is merely stating the obvious), this is true for men in our club, as well. If any of you see that the club has a need that you can help us with, don't be shy about stepping forward to help fill that gap – that will help us grow as a club and improve what we do and how we do it, and will also give you an amazing amount of pleasure and satisfaction.

In Conclusion – Our Starbecue…

Summer is almost here, which means that our annual Starbecue is coming up. That's planned for the July star party at Anza, July 14, 2007. We'll start setting up around 5:00 behind the observatory (to take advantage of the shade), fire up the barbecue around 5:30, with serious eating and socializing starting around 6:00. Bring a dish or something to grill for 8 to 10 people for the potluck, along with your appetite and a chair, and come on out for the party! And please feel free to pitch in to help set things up – and to help clean things up after the party's over and people head off to do their other star party activities!

FOR SALE: Meade 8-inch LX200 GPS w/all factory accessories; aluminum channel tripod w/pneumatic tires. Contact Bob Krause at 949-248-3111

HOME WITH OBSERVATORY FOR SALE by former OCA member. 2700 square feet, 5 acres fenced for horses or livestock with barn, spa, pool and storage space. For more information, go to http://www.cfsmithrealty.com (reference 'Tule Oak Property') or contact Billie Chandler at 555-539-0900/

FOR SALE: Coulter Odyssey 13.1" f/4.5 Dobsonian w/Telrad. Very good condition. $450. Contact Steve Bird at 562-234-2157

What have you been doing in the Dark?

Have you been doing a project that other OCA members would be interested in learning about? Have you participated in an astronomical activity that would entertain the other OCA'ers? For example, perhaps you have:

- Taken an astronomically-oriented expedition (stargazing at Lake Titicaca?)
- Made a telescope or an optical instrument (a handicap-friendly telescope?)
- Conducted a research project or astronomical investigation (photometry? double-stars? spectroscopy?)
- Exposed the stars at a unique "outreach" venue
- Made an unusual observation (anyone discover a supernova or asteroid?)
- Participated in a special activity by one of our Special Interest Groups (visited a major observatory? Used a remotely-operated telescope?)

If you have, then it's time to start thinking about your presentation for the "Member's Night" December OCA Meeting. Don't keep it to yourself: Inquiring minds will want to know what you've been doing in the dark!

The OCA is filled with inventive people doing new, intriguing, and wonderful things. We'd be delighted if you would present a 10-15 minute description of one of your astronomical activities at the December OCA meeting. To add your name to the presenter's list, please contact Craig Bobchin by e-mail at ETX_Astro_Boy@sbcglobal.net

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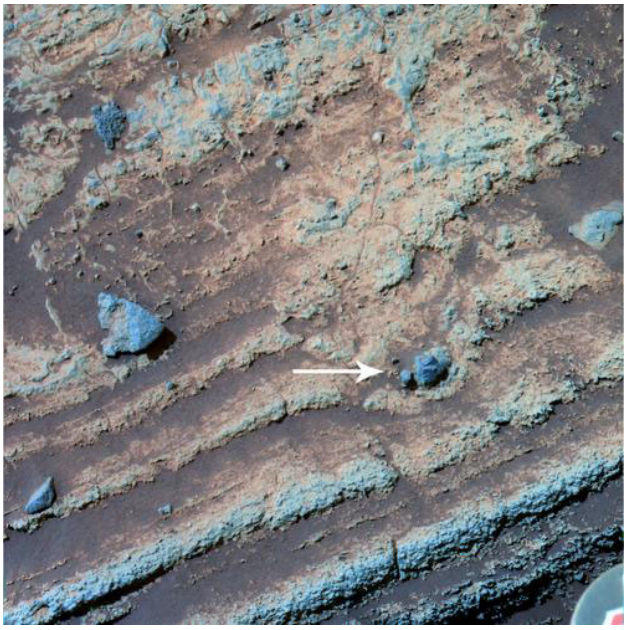
agency just released much of the data collected by Hayabusa, including 1600 images, 135,000 spectra, and 1.7 million laser rangefinder points.

Mars rover Spirit has discovered evidence of an ancient volcanic explosion at "Home Plate", a plateau of layered bedrock about 6 feet height. This is the first explosive volcanic deposit firmly identified by either rover. The evidence includes a "bomb sag", or spot where rocks ejected by a volcanic explosion fall into soft deposits and deform them. There are hints, such as chlorine content of rocks, that the explosion involved lava hitting briny water, resulting in a steam explosion.



"Bomb sag" (arrow) discovered by Spirit (NASA/JPL)

Mars Global Surveyor (Martian orbiter) – The final report was released on the probable causes of the failure of Mars Global Surveyor last November. The error-handling "safe" procedure in the spacecraft's onboard computer never took into account that the 2 batteries that run the spacecraft cannot be exposed to direct sunlight for extended periods of time without overheating and eventually failing. So when a major spacecraft error occurred in November, and the safe position assumed happened to have one battery in direct sunlight, the spacecraft was doomed. The major error need never have happened, except that an updated spacecraft parameter had been placed into the wrong computer location 5 months before, and the mistake was never noticed until the failure investigation. The parameter that was incorrectly overwritten was one used to determine how far the solar panels could be rotated. A routine adjustment of the solar panels happened to turn them so far they hit the end of rotation, so the onboard computer mistook this for a failure in the panel rotating system, and that was what started the fatal sequence. Failure of the battery system was hastened by an assumption that had been made in the error-handling procedures that the cause for a battery to overheat would be that it was being overcharged. So the computer turned off the charging system on the overheated battery. Compounding the problem was that the parameter that had not been updated was a number used to determine how to point the main spacecraft antenna at Earth. Of course one of the first things that the safe procedure did was to point the antenna at Earth and radio that there was a serious problem that needed intervention from the spacecraft controllers. But Earth never received the call, because the spacecraft's antenna was pointed somewhere else. The investigation concluded that no team members had violated defined processes, but those processes did not catch the erroneous parameter storage, nor the potential for disaster in the computer's error-handling procedures. Recommendations made for future spacecraft included more consistent training of new controller team members,

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more thorough reviews of changes to spacecraft parameters, better safe procedures, and (although this probably did not contribute to this failure) more attention to maintaining adequate staff for missions that have been extended long beyond the original period. When it failed, Mars Global Surveyor had operated longer than any other Mars spacecraft, and for more than 4 times its originally planned life.

Mars Odyssey (orbiter) has discovered that water ice lies at variable depths over small-scale patches on Mars. Rocky soil seems to favor deeper ice and sandy soil favors shallow ice, as little as an inch below the surface. It is believed that heat insulation properties of sandy soil cause this. The discovery was made from infrared images showing how fast the ground temperature changes with season. Ice near the surface slows temperature change. This gives much better resolution in area and depth than the gamma-ray spectrometer methods that found subsurface ice on Mars 5 years ago. When Mars Phoenix mission lands in 2008 and digs trenches in the soil, it could well find ice depth varying just a few feet apart.

Cassini (Saturn mission) – Scientists have long known that the lower atmosphere of Saturn's moon Titan contains organic aerosols (called tholins) formed from simple organic molecules, such as methane and nitrogen. The tholins were believed to form at altitudes of a few hundred miles, but particle spectrometers aboard Cassini show that tholin formation happens at altitudes greater than 600 miles, and that they form differently than thought. Large negative ions were found, which were not predicted by the theory of how the tholins formed. Benzene was found, which is believed involved in forming hydrocarbon compounds.

New research using Cassini observations shows that the energy from the giant rotating storms in Saturn's atmosphere is injected into the **jet streams**, winds circling the planet in bands. This was determined by tracking movements of cloud features. The opposite had been believed, that energy from the jet streams powered the rotating storms. The same reversal of roles was found recently for Jupiter in data taken by Cassini when it flew by Jupiter on the way to Saturn. This also reverses the thinking about air rising in the bands. With this new Saturn data, air must rise in dark bands, and sink in bright cloud bands. This finally explains why thunderstorms on Saturn are found in the dark bands, not the light bands, since rising air creates thunderstorms.

New Horizons (Pluto mission) has produced stunning views of Jupiter and its moons taken during its recent gravity slingshot flyby of the giant planet. Images included volcanic eruptions on the moon Io, nighttime auroras, nighttime lava glowing on Io, the best images ever of the Little Red Spot, arcs and clumps of dust indicating a recent impact occurred in the ring, the curved troughs in the icy moon Europa, and the small moons Adrastea and Metis herding material in Jupiter's faint rings. The number of observations of Jupiter was twice that planned for Pluto in 2015.

Solar cycle – A panel of solar experts has predicted the next solar cycle will most likely start next March. The solar cycle averages 11 years, but varies considerably, and is marked by a peak in numbers of sunspots. During the previous cycle, it had been predicted that the new cycle would begin last fall, but it hasn't yet. The experts could not agree on the intensity or timing of the peak, however. One group predicted about 140 sunspots peaking in October 2011, while the other faction predicted 90 sunspots peaking in August 2012.

Wally Schirra, one of the original 7 astronauts, has died of natural causes at age 84. He was the only one of the original 7 to fly in the Mercury, Gemini, and Apollo programs. His first flight was in the Mercury capsule named Sigma 7 on October 3, 1962. His second flight was the Gemini 6 and 7 rendezvous. It had been planned for Gemini 6 to prove rendezvous techniques with an unmanned rocket, but the unmanned rocket failed. Rendezvous of spacecraft was required for the upcoming Apollo missions, so this was an important step in the race to the Moon. Schirra's final mission was the first Apollo craft to Earth orbit. All 3 of the crew came down with colds, and Schirra was accused of being testy with ground controllers who wished to add tasks to the planned schedule. He later became a spokesman for the cold medicine he used in space, as well as a consultant on the space program for television news. He was respected for commanding highly successful space missions, and was known for his sense of humor. Of the original 7, only John Glenn and Scott Carpenter remain.

Wally Schirra (1923-2007) (NASA/Schirra estate)

Instant AstroSpace Updates

Plasma cloud – Combining observations made by radiotelescopes in British Columbia and Puerto Rico, researchers discovered a new giant cloud of plasma (electrically charged gas) stretching more than 6 million light-years. It is not known what mechanism could create a cloud of such enormous size that does not coincide with any galaxy or galaxy cluster.

NASA satellite data have shown that an **earthquake** can cause increased activity about 3 days later, for another 9 days, in already erupting **volcanoes** up to about 200 miles away.

SOFIA (98-inch infrared telescope mounted in a 747 jet plane) has completed the first of several planned checkout test flights, with science operations to begin in 2009 or 2010. The program had previously been canceled near completion, but budget was restored.

New research based on observations by XMM-Newton X-ray orbiting observatory shows that the supermassive **black holes** at the centers of galaxies can spew heavier elements, those necessary for planets and life, to great distances, where they may participate in later star formation. In one case, the material thrown out was found to be 2-5% of the material that began falling toward the black hole.

The **STEREO** twin solar observatories, now orbiting the Sun ahead and behind the Earth, have made the first 3-dimensional views of the Sun and eruptions in its atmosphere. ■

A Boeing 767 cuts a path between Venus and the Moon over Tyrone, NM on May 20th (photo credit: Gary Emerson)

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CLUB OFFICERS			
President	Barbara Toy	btoy@cox.net	714-606-1825
Vice-President	Craig Bobchin	ETX_Astro_Boy@sbcglobal.net	714-721-3273
Treasurer	Charlie Oostdyk	charlie@cccd.edu	714-751-5381
Secretary	Bob Buchheim	rbuchheim@earthlink.net	949-459-7622
Trustee	Sheila Cassidy	rivme@pacbell.net	951-360-1199
Trustee	Steve Condrey	SiriusAstronomer@OCAstronomers.org	951-678-0189
Trustee	Bill Hepner	billhepner@yahoo.com	714-447-8566
Trustee	Tom Kucharski	TomRigel@aol.com	949-348-0230
Trustee	Gary Schones	gary378@pacbell.net	714-556-8729
Trustee	Steve Short	steves@inductor.com	714-771-2624
Trustee	Alan Smallbone	asmallbone@earthlink.net	818-237-6293
COMMITTEES, SUBGROUPS, AND OTHER CLUB VOLUNTEERS			
Press Contact	Russell Sipe	russell@sipe.com	714-281-0651
Sirius Astronomer Editor	Steve Condrey	SiriusAstronomer@OCAstronomers.org	951-678-0189
Website Editor	Hassi Norlen	hassi@norlens.net	714-710-9444
Website Coordinator	Rob Carr	RCCarr@excite.com	909-606-1241
Beginner's Astronomy Class	David Pearson	astrodwp@dslextreme.com	949-492-5342
Observatory Custodian/Trainer/ Member Liaison/Dark Sky SIG	Barbara Toy	btoy@cox.net	714-606-1825
Astrophysics SIG	Chris Buchen	buchen@cox.net	949-854-3089
AstroImagers SIG	Bill Patterson	bill@laastro.com	714-578-2419
GoTo SIG	Mike Bertin	MCB1@aol.com	949-786-9450
EOA Liaison	Del Christiansen	DelmarChris@earthlink.net	714-895-2215
Anza Site Maintenance	Don Lynn	donald.lynn@alumni.usc.edu	714-775-7238
Librarian	Karen Schnabel	karen@schnabel.net	949-887-9517
Membership, Pad Coordinator	Charlie Oostdyk	charlie@cccd.edu	714-751-5381
Explore the Stars OCA Contact	Richard Cranston	rcransto@ix.netcom.com	714-893-8659
Black Star Canyon Star Parties	Steve Short	steves@inductor.com	714-771-2624
OCA Outreach Coordinator	Jim Benet	jimbenet@pacbell.net	714-693-1639
Telescope Loaner Program	Mike Myers	loanerscopes@twow.com	714-240-8458
Anza House Coordinators	Steve and Sandy Condrey	AnzaHouseIssues@yahoo.com	951-678-0189
WAA Representative	Tim Hogle	TimHogle@aol.com	626-357-7770

OCA Website: http://www.ocastronomers.org **STARLINE 24-hr recording: 714-751-6867** **ANZA OBSERVATORY: 951-763-5152**