

MESSIER MARATHON MARCH 13TH!!!!



Tom Stokes acquired this image of Moonrise over Santiago Peak from Portola Hills, CA on September 18, 2008 using a Celestron C8 with a Canon XSI imager.

OCA CLUB MEETING

The free and open club meeting will be held March 12th at 7:30 PM in the Irvine Lecture Hall of the Hashinger Science Center at Chapman University in Orange. This month, Ken Crosswell will present 'The Lives of Stars'

NEXT MEETING: April 9th

STAR PARTIES

The Black Star Canyon site will be open on March 6th. The Anza site will be open on March 13th. 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, March 5th at the Centennial Heritage Museum at 3101 West Harvard Street in Santa Ana.

GOTO SIG: TBA

Astro-Imagers SIG: Mar. 16th, Apr. 20th

Remote Telescopes Mar. 24th, Apr. 28th

Astrophysics SIG: Mar. 19th, Apr. 16th

Dark Sky Group: TBA

President's Message

By Craig Bobchin

Well, talk about a baptism by fire, I never expected my first job as OCA president to be to handle a major water crisis at Anza. But due to the quick action by the board we had the situation well handled. Before I give a recap I want to recognize and thank some people who were instrumental in getting this solved.. First I want to thank Rick Wiggins for informing the board of the issue. Also instrumental were Barbara Toy, Alan Smallbone, Don Lynn and Gary Schones. All of these and others were critical in solving the well pump failure.

The good news is that the water is back on and Anza is back to full capacity. So for those that don't know the story, here is a recap of what happened with regard to the Anza water situation. It is based primarily on emails that have been written by various board members and those involved in the events.

Since different people got involved at different times, a bit of a time line on the Anza water situation might be in order; I will not be naming names except for those board members where appropriate.

The situation began on Thursday 2/11/2010: A couple of members arrive at Anza and stay, per their usual practice, at Anza House. They find that there is, at most, a trickle of water at Anza House and no other water on site. They take no action to notify anyone on the Board, or those members that typically do a lot of work out at Anza about this situation. They continued using the toilets, "flushing when they could."

Friday: several other members arrive at the site. Around 3:30pm, a message was posted to the AstroImagers Yahoo group by Rick Wiggins that there isn't any water at Anza, which Alan happened to see on his Blackberry. Again, no attempt was made to contact anyone on the Board directly about this.

Alan called Barbara to let her know about the water problem when he saw the general email that Rick sent . Barbara called me (both of us were on the road before the general meeting). After discussing it, we agreed that the best course at that point was to call off the star party and let people know by all the avenues possible about the problem.

Between then and the meeting, Alan and Barbara made a lot of phone calls to get more information about the situation and possible options. Alan talked to Gary, who said that it appeared that the pump was running all the time but there was very little water coming up, just enough to give Anza House a trickle. The tank at the top of the property is drained, so this problem had been in existence for a while, though we were not aware of it. Gary suggested calling Dave Radosevich to see who they used when they had a well problem.

Barbara called the property Dave has with John and Jim at Anza and talked to John Kerns, who told her what he knew of the situation with the well. Later on, he agreed to post notices at Anza House and the front gate about the water situation and that the site was closed, and said that he'd turned off the breaker for the pump (which was a big relief to Charlie).

After a few attempts Barbara was able to get hold of Dave who gave us the name of the well repair service they use.

Before the meeting the board and I discussed the situation, sometimes in groups of two and sometimes in larger groups with the other board members who were present. Everyone that Barbara and I talked to were in agreement with closing the site, as there were no working toilets and no prospect of getting the well functional in the immediate future. As there were over 6 board members present which represented a quorum the board came to a quick decision on this.

Alan found a listing for the pump company that Dave gave Barbara the referral for, and while Craig and Reza dealt with all of the regular meeting issues, Barbara called the pump company and was able to make arrangements for them to come out to evaluate the situation on Saturday. They were very clear that they wouldn't be able to do any repairs on Saturday, and, we were told they would most probably have to pull the assembly out of the ground to find the problem, which sounded like either a leak in the pipe or a failed pump. The pump is 300 feet below the surface, so this isn't a simple procedure.

In further discussions with Don and Charlie at the end of the meeting, Charlie told us about a big spike in electrical usage at the site over the last month, which Don quickly calculated to be about 1000 Kwatt hours. This could be accounted for by the pump running continuously as it attempted to pump the water for a month or so.

Saturday: Barbara and Alan were able to procure a Port-a-potty and deliver it on Saturday. That arrived around 2:00, and hopefully stopped the people who stayed on site from continuing to use the non-functioning toilets. Since there wasn't even a trickle of water making it to Anza House after the breaker was turned off, there was no flushing possible unless someone

poured water from another source into the toilet tank. Let me be clear the placement of the port-a-potty was not intended to allow us to continue to use the Anza site as usual, since it would be quickly overwhelmed during a star party. It was intended as a stopgap measure and to provide some relief for those who refused to leave the site.

The well repair guy showed up and after they pulled up the assembly, what they found was pretty consistent with a pump, etc., that have been in operation and submerged for over 20 years. The pump was "worn" and had a lot of sand in it and we know that it had been pumping sand for years. the impellers were worn out.

The pump was replaced on Wednesday Feb. 17th and all was back to normal. Now there are a couple of items that we learned from this and Barbara Toy will cover them in her article. I did want to say a couple of things. First and foremost, is that if there is a problem at Anza contact one of the members of the board as soon as it is noticed. Now granted cell phone at the site is spotty, but there are other avenues for contacting us. There are two landline phones at Anza, one in Anza house and one in the Observatory warming room. You can also use the Internet and e-mail us. All the board members' contact information is in the Sirius Astronomer and on the OCA website. We will also be posting the board contact information in Anza house and the warming room in case you don't have the Sirius Astronomer with you.

On another note the recent heavy rains we've had have most probably have played havoc with the roads on the way to Anza. There are probably deep ruts and other problems so take care when you are there and if you see one of our neighbors working on the road stop and say thnaks and maybe offer up some gas money. Those roads are not county maintained and we rely on the kindness of out neighbors in the valley to keep them passable.

Until next month here's hoping you have Clear Dark Skies. ■

Messier Marathon – 2010

By Barbara Toy

A number of years back, some enterprising souls figured out that you can see all 110 Messier objects in one night around the time of the spring equinox, and the idea of the Messier Marathon was born. Although similar conditions exist around the autumnal equinox, it doesn't seem to work as well – spring is the season for these "marathons."

Our formal 2010 Messier Marathon will be the Anza star party on March 13 – the Messier Marathon form has been posted on the website, thanks to the fast work of Reza AmirArjomand, and we'll have copies in the club observatory and Anza House. These have the objects arranged in an order that takes their setting and rising times into account, hopefully giving you the best chance possible of finding all 110 objects that night.

If you can't be at Anza that night (or if we get clouded or fogged out, which has happened in other years), you can opt to do it another night – but, to do this fairly, you need to do the Marathon all in one night, not split up between two or more nights. If you can't make it out to Anza for the Marathon, you can do it wherever you are, even from your own back yard (just download the form from the website). And you can even try a partial Marathon from Black Star Canyon the Saturday before the Anza star party; since Black Star Canyon has to be closed around midnight, you wouldn't be able to get objects later than that from there, but you could go for all of the objects that are visible from sunset to the time the site has to close – or you could go home after the party and continue from there; depending on how fast you are at finding things, there's usually a break from sometime after midnight to around 2:00 or so, waiting for new objects to rise, and that time could be spent setting up again in another location to continue the quest.

Using goto scopes and such helpful aids as digital setting circles makes doing the Marathon much easier than the traditional way, which requires that you find things by star hopping and other non-electronic means. Finding the brighter Messier objects, such as the Orion Nebula and the Pleiades, isn't very difficult using traditional means as long as your finder is well aligned with your scope, but working your way through areas like the Virgo cluster and finding really dim objects is an entirely different matter. There are those who don't think it's truly sporting to do the Marathon any other way, though – while I truly admire their knowledge and determination, I can't say that I have any desire to emulate them. By that, I mean that I have no desire to star hop my way through the Messier Marathon, though I'm totally in favor of developing the necessary skills to figure out where your telescope is pointing when your computer systems fail.

When you do your Marathon, whether it's partial or complete – and I really hope you'll do it, wherever you might be at the time – please be sure to fill in the identifying information on the form, put down where and when you did the Marathon, and give it to me at the end of the star party, when you see me at other events, or mail it to the club's mailing address: P.O. Box 1762, Costa Mesa, CA 92628. We plan to give certificates to those that turn in their forms and share their Marathon accomplishments with us – and you wouldn't want to miss your chance of getting a 2010 Messier Marathon certificate! ■

TOP TWENTY THINGS AN ASTRONOMER SHOULD SEE

by Helen Mahoney

#19 Saturn's Rings

Seeing Saturn through a telescope for the first time is what made many an individual get excited about astronomy. It happened to my husband, Doug Millar. He went to an OCA outreach hosted by former OCA president John Sanford. One look at the beautiful rings of Saturn, and Doug was hooked. He bought a telescope and joined OCA—where we met.

I put seeing Saturn's rings at number 19 because it is a relatively easy thing to do. Saturn is so bright that it can be seen even from the city. With a small telescope or large binoculars (such as 20 x 80's), you can tell that Saturn is not just a point source, or even a ball. It has a distinctly elongated shape. Galileo described it as having "ears", and drew pictures of the handle-like projections. When I saw Saturn through a small telescope, it looked to me like an electrical outlet.

Of course, the bigger the telescope, the better the view. The best view I ever had of Saturn was through the Mount Wilson 60 inch telescope. As a wedding present, Doug paid for us to join OCA's trip to the 60 inch. Twenty of us had the whole night on the scope, and our favorite object was Saturn. We actually climbed up onto and straddled the telescope to look through the eyepiece. Saturn was as big as my fist.

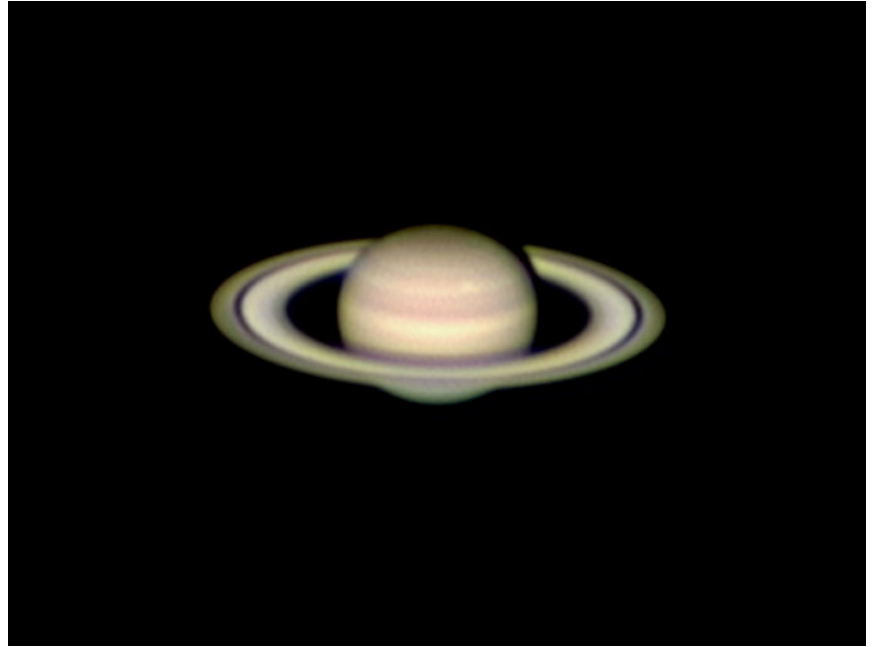
With a large telescope, you can appreciate the bands on the planet, see the Cassini division and possibly the Encke gap, and sometimes see the planet's shadow on the rings. The rings give Saturn a three dimensional appearance that is more obvious than any of the other planets.

If you view Saturn year after year, you will be able to appreciate the fact that the rings tilt back and forth, from their most open angle to edge-on. Galileo was the first person to see and document the disappearance of the rings when the ring plane was edge-on from the earth. This happens about every 15 years, the most recent of which was in September of 2009. Saturn was too close to the sun this time to see it well when it was directly edge-on, but the previous time this occurred, in August of 1995, I got the opportunity to see it from Anza. It was so weird to see Saturn that way—it looked like a smaller Jupiter with fewer bands. Very interesting!

Astronomy Picture of the Day (APOD) has pictures in its archives of Saturn's rings in their various configurations. May 24, 1997 shows a Hubble Space Telescope photo from August 6, 1995 when Saturn's rings were edge-on. To see them the most wide open, look at APOD from April 5, 2003. They also have a very nice animation on April 6, 2007. You can access these pictures at <http://antwrp.gsfc.nasa.gov/apod/ap970524.html>, <http://antwrp.gsfc.nasa.gov/apod/ap030405.html>, and <http://antwrp.gsfc.nasa.gov/apod/ap070406.html>, or go to APOD and look through the archives for these dates.

Another memorable Saturn experience was the night that Saturn and its rings occulted a bright star. We were at Anza watching through our scope when the leading edge of the rings overtook the star. It was amazing to see the actual motion of Saturn against the background star. Then, as it drifted over the star, the star would blink out, and then blink back in when a gap in the ring passed in front of it. All over the site, you could hear echoes of people shouting "It's out...It's back!" for each ring and gap. The display repeated with the rings on the other side of the planet.

If you haven't had a good view of Saturn's rings yet, find someone with a telescope, or show up at an outreach. It may start a lifetime hobby, and perhaps, also a lifetime friendship.



John Castillo used a Meade 12" LX200 GPS w/Phillips ToUcam to capture this image of Saturn from Whittier, CA on 2/19/06. This image consists of approximately 1200 stacked images at f/25 using RegiStax 3.1.23 and Photoshop.

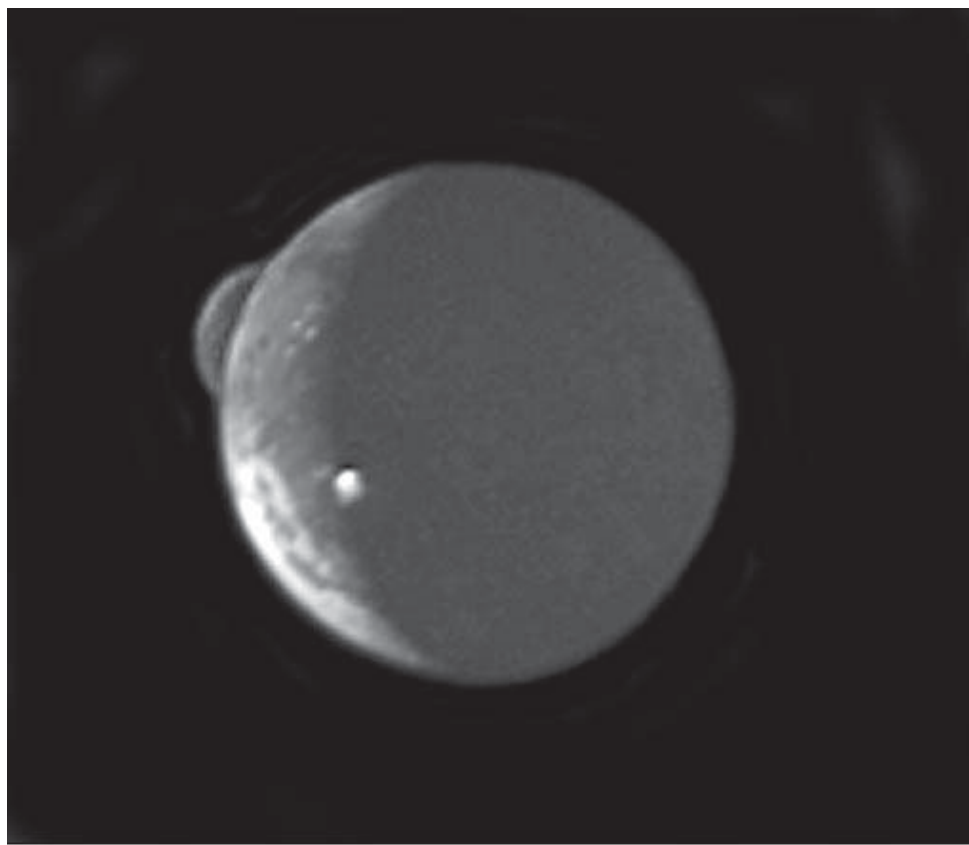
Parallel Universes

by Linda Morabito

On 9 March, 1979, I made the discovery of the volcanic activity on Jupiter's moon Io at the Jet Propulsion Laboratory (JPL) in Pasadena, CA. Today, thirty-one years later, I am inviting the members of the Orange County Astronomers to join me on my website <http://www.lindamorabito.com> and make your views known by leaving a comment there, if a book that I have written would interest you should it be published.

In 1979, what I found in a picture of Io, working as a navigation engineer on NASA's Voyager mission to Jupiter, has been described as the largest discovery of the planetary exploration program. It is now part of a larger picture defining a new category of worlds which may have geologic activity and potentially life, powered by gravitational tidal forces.

I attended the University of Southern California as an undergraduate Astronomy major. My life and career were greatly influenced by a spectacular astronomer named Gibson Reaves. The late former Department Chairman of Astronomy at USC taught me the importance of the history of astronomy. He had a passion for aiding students to reach their goals in astronomy and an appreciation and respect for all aspects of the field, including the great contributions made by the amateur astronomy community.



IO Plume Discovery Image © Copyright Calvin J. Hamilton

Gibson Reaves told me to write down what happened that day in March in 1979 at JPL. He urged me over thirty years ago to write my account of the discovery, somewhere, anywhere besides placing the account in the archives of USC as I did decades ago.

I have now written that history and included a parallel story about my life that I believe will be inspiring and informative to people who have overcome nearly insurmountable adversity in their personal lives. I have written "Parallel Universes, A Memoir from the Edges of Space and Time" under the name Linda Morabito Meyer.

This article may sound like an advertisement to go and get the book, and I wish that were the case. The history of astronomy is exciting and amazing, but if anything it teaches us the uphill battles discoverers face. I am not comparing myself to Galileo, but *National Geographic* magazine did in their January 1980 issue. A common ingredient for discoveries in science is the skepticism when one

goes against the conventional wisdom of the time. It was the conventional wisdom of my time that discoveries were made by members of the Voyager Science Imaging Team and not by astronomers working as Navigation Engineers.

I knew history and worked to make sure that the reporting of this history was accurate at the time. But, now I face an uphill battle to have the actual account of the history in this memoir reach publication. I do not know all the ingredients which will result in that outcome, but your opinion could definitely help.

As a member of the Orange County Astronomers, the largest Astronomy Association in the United States, your interest in astronomy is remarkable. One day soon, I hope to talk to you about how your membership helped made the difference in this memoir reaching publication. I look forward to seeing you at my website and I wish you clear skies!

AstroSpace Update

March 2010

Gathered by Don Lynn from NASA and other sources

Space budget – The U.S. President has announced his budget for NASA and plan for its future, and they have a lot of changes that will affect both the manned (crewed) and robotic space missions. This is still subject to approval or change by Congress. Changes:

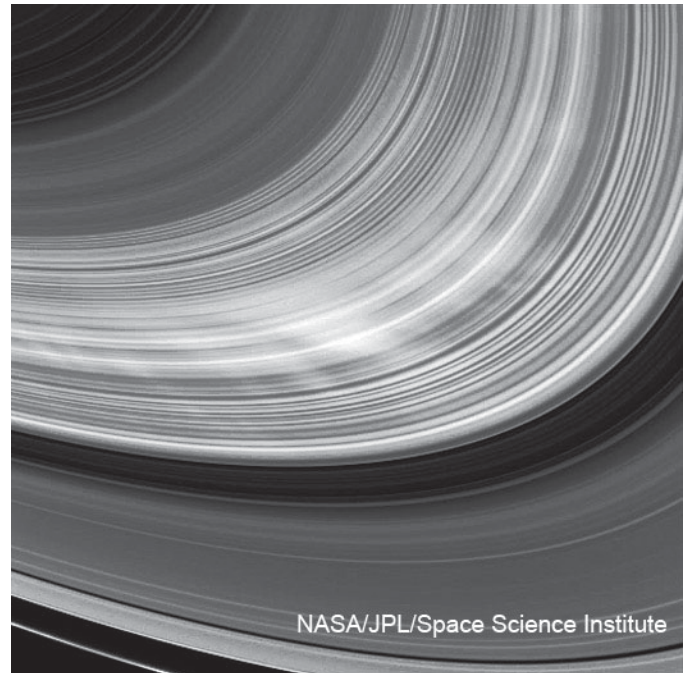
1. The goal of returning people to the Moon has been dropped.
2. The Ares rocket and Orion crew vehicle development will be shut down within a year.
3. The Ares 5, the heavy-lifting version, will be replaced by some rocket (specifics not available) to be developed with international cooperation, largely by private industry rather than space agency; planned flights to begin between 2020 and 2030. This will allow crews to reach beyond low Earth orbit (perhaps Mars or asteroids, but the goal and timetable were not specified).
4. The Ares 1, to be used to take crews into near-Earth space, including to ISS, and the Orion crew capsule will be replaced by rockets to be developed by private industry, perhaps around 2016.
5. The International Space Station (ISS) will be used until at least 2020, an extension past the previously plan of 2016.
6. The NASA budget is being increased a few billion dollars for the next 5 years, much of that to support technology development necessary for Ares replacements; this is in the face of budget freezes or cuts in other government agencies.

Many space experts expect the shift to development by private industry to delay by years the capabilities to put crews in space, and possibly compromise safety. Of existing U.S. rockets, only the Delta 4 and Atlas 5 are capable of lifting the weight of a crew vehicle to orbit, and it is not clear what changes would be necessary to make these safe enough for humans to ride. \$9 billion has been spent already on Ares and Orion development, and shutting down the program will cost \$2.5 billion more. Experts believe much of what this expenditure bought will be lost when development of the replacements is started.

The decision to retire the space shuttles this year remains unchanged. Robotic missions will continue to be supported, apparently without much change. However the purpose of these missions will now include development of technologies to be used in crewed missions, which may dilute the scientific purposes that are now the goals of these robotic missions. The budget includes funds to replace the Orbiting Carbon Observatory which failed during launch last year. Its goal is to study where carbon dioxide is produced and consumed on Earth. Also included is a mission to fly through the outer atmosphere of the Sun, and support for detection of asteroids that may someday collide with Earth.

Cassini (Saturn mission) has been extended until 2017 in order to document a nearly full change of seasons from summer to winter (which takes over 14 Earth years). Cassini has surprising scientific results and eye-popping images since its arrival at Saturn in 2004. It has made 125 revolutions around the planet and taken 210,000 images; the extension will make an additional 155 orbits, and will include 54 flybys of Titan and 11 of Enceladus. The extension is being called the Cassini Solstice Mission. Periodic reviews will be made during the extension to verify that the science being done is worth the expense. The outlook is for continued great science as long as the health of the spacecraft remains good.

New measurements by the infrared spectrometer on Cassini show that the **spokes** are composed entirely of water ice. What causes the spokes to form is still not entirely understood, though they have been observed occasionally since 1980, and possibly before. They appear as bright streaks across the rings, rotate about the rings at the speed that the magnetic field turns, fading away within hours. The new measurements showed that there is a wide distribution in particle size within the spokes, ranging to several micrometers. This is larger than had been estimated previously. The larger size means more energy is involved to raise the particles out of the ring than previously calculated.



Melted moon – A new study of Jupiter's moons Ganymede and Callisto shows why they are so different. During their formation about 4.5 billion years ago, and afterward for several 100 million years, they were bombarded by planetesimals that were falling in toward the massive Jupiter. Ganymede, being in a closer orbit to the planet, was hit by more material, and that material had fallen farther toward Jupiter, resulting in it moving faster at impact. The new study showed that difference was enough to entirely melt Ganymede from those impacts, but not Callisto. So Ganymede's heavier material sank to the core, leaving the lightest material floating on the surface. This explains the differences we see today on the surfaces of the 2 moons.

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Flipping the Lights on Cosmic Darkness

Exploring the universe is a bit like groping around a dark room. Aside from the occasional pinprick of starlight, most objects lurk in pitch darkness. But with the recent launch of the largest-ever infrared space telescope, it's like someone walked into the room and flipped on the lights.

Suddenly, those dark spaces between stars don't appear quite so empty. Reflected in the Herschel Space Observatory's 3.5-meter primary mirror, astronomers can now see colder, darker celestial objects than ever before—from the faint outer arms of distant galaxies to the stealthy "dark asteroids" of our own solar system.

Many celestial objects are too cold to emit visible light, but they do shine at much longer infrared wavelengths. And Herschel can observe much longer infrared wavelengths than any space telescope before (up to 672 microns). Herschel also has 16 times the collecting area, and hence 16 times better resolution, than previous infrared space telescopes. That lets it resolve details with unprecedented clarity. Together, these abilities open a new window onto the universe.

"The sky looks much more crowded when you look in infrared wavelengths," says George Helou, director of the NASA Herschel Science Center at Caltech. "We can't observe the infrared universe from the ground because our atmosphere blocks infrared light, and emits infrared itself. Once you get above the atmosphere, all of this goes away and suddenly you can look without obstruction."

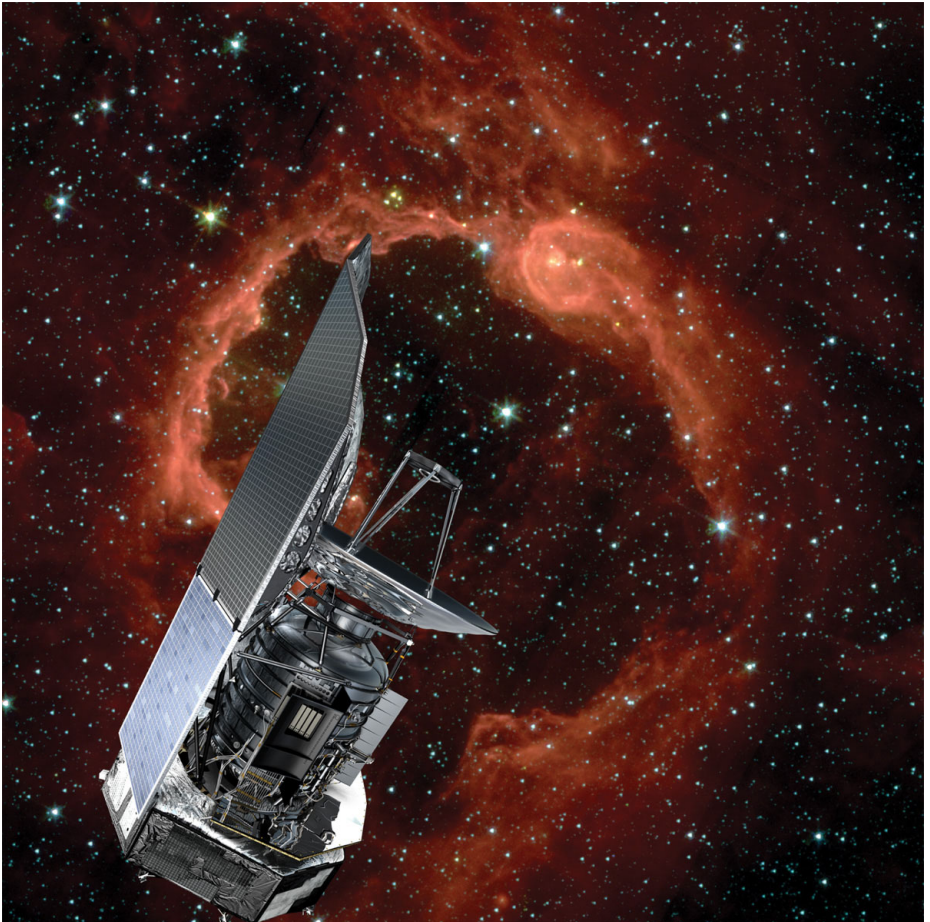
Herschel launched in May from the Guiana Space Centre in French Guiana aboard a European Space Agency Ariane 5 rocket. Since then, it has expanded the number of distant galaxies observed at far infrared wavelengths from a few hundred to more than 28,000. And with the instrument testing and system check-out phases finally completed, the discoveries are only now beginning.

Beyond simply imaging these dark objects, Herschel can identify the presence of chemicals such as carbon monoxide and water based on their spectral fingerprints. "We will be able to decipher the chemistry of what's going on during the beginnings of star formation, in the discs of dust and gas that form planets, and in the lingering aftermath of stellar explosions," Helou says.

And those are just the expected things. Who knows what *unexpected* discoveries may come from "flipping on the lights?" Helou says "we can't wait to find out."

Herschel is a European Space Agency mission, with science instruments provided by a consortium of European-led institutes and with important participation by NASA. See the ESA Herschel site at sci.esa.int/science-e/www/area/index.cfm?fareaid=16. Also, see the NASA sites at herschel.jpl.nasa.gov, www.herschel.caltech.edu, and www.nasa.gov/mission_pages/herschel. Kids can learn about infrared light by browsing through the Infrared Photo Album at The Space Place, spaceplace.nasa.gov/en/kids/sirtf1/sirtf_action.shtml.

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



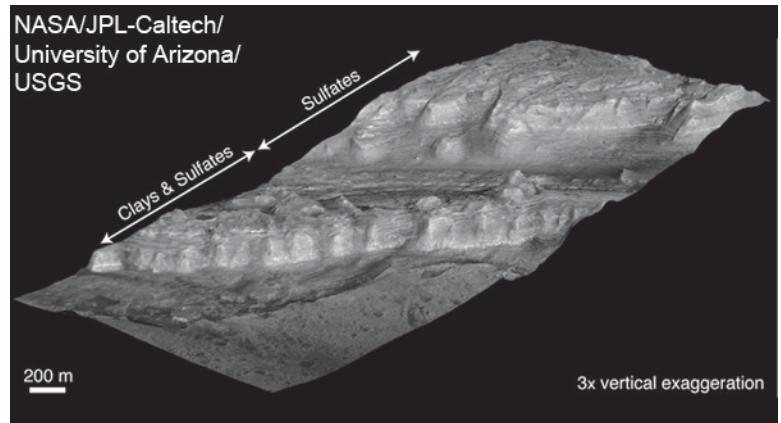
The Herschel Space Observatory has a 3.5-meter primary mirror, allowing astronomers to see colder, darker celestial objects than ever before.

(continued from page 6)

Spirit (Mars rover) – Rover controllers ran out of time (since Martian winter is approaching) to continue efforts to free Spirit from the soft spot, where it has been stuck since last April. In past winters, Spirit has been parked on slopes so that its solar panels tilt toward the low winter Sun in order to increase electrical generation to a level sufficient to run the heaters that keep rover instruments from freezing. So the controllers tried to dig one end of the rover deeper to tilt northward toward the Sun. Efforts made only a little progress, and it looks like Spirit will spend the Martian winter in its current position, which is tilted 9 degrees southward. Its survival will depend on weather and the amount of dust on the solar panels. All unnecessary equipment will be turned off when power levels drop, including the radio to communicate with Earth. Spirit may be out of contact for as much as 6 months, even if it does survive the cold. The rover team has planned a lot of science for Spirit to do after the winter blackout without moving from its current spot. In fact some science requires the rover to remain still, such as tracking the slight wobble in Mars's rotation. So let's hope Spirit survives winter.

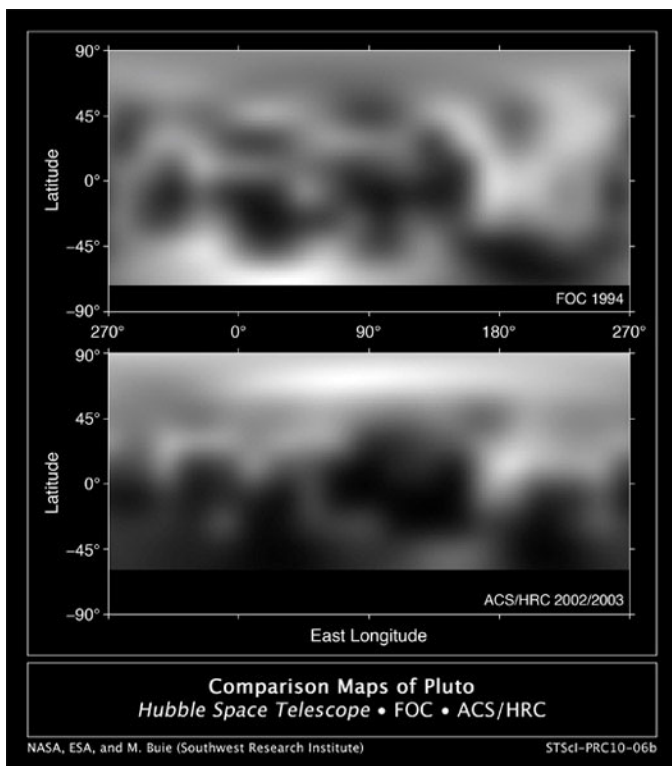
Opportunity (the other Mars rover) determined that the rock named Marquette Island was thrown from a distant impact crater when that crater formed. It came from deep under the surface, as indicated by the coarse crystals in it, which form only deep underground. Thus the analysis done by the rover's instruments provides information on the nature of rock far below the surface of Mars. Only one other rock examined by Opportunity in the last 6 years has been found to be ejected material from a crater. Opportunity traveled 3.3 miles during 2009, a new record for a rover.

Mars Reconnaissance Orbiter (MRO) has imaged in detail a stack as tall as the Rocky Mountains, consisting of hundreds of rock layers exposed within Gale Crater. This reveals the geological history of the planet during the time when it was changing from a wet rainy planet with lakes and rivers to its present dry state. This change occurred billions of years ago. Clay layers, which form under very wet conditions, are concentrated near the bottom. Above that, sulfate minerals are intermixed with the clays. Sulfates form in wet conditions and can be deposited when the water in which they are dissolved evaporates. Higher still are sulfate-containing layers without detectable clays. On top is a thick formation bearing no detectable water-related minerals. This one stack confirms for the first time in a single record the history of Mars that had been put together from pieces of geological evidence scattered over the planet. 3 instruments on MRO, the high-resolution imager, the context camera (wide angle, low resolution), and the imaging spectrometer have been used to study the stack. Gale Crater is one of the 4 finalist sites for landing the Mars Science Lab rover, scheduled to launch in 2011.



Hubble Space Telescope (HST) took images of Saturn during the recent period when its rings were edge-on to us, taking advantage of this rare opportunity to observe both the north and south polar areas of that planet simultaneously. This allowed seeing the differences and similarities of the northern and southern aurora at Saturn. The northern aurora oval is slightly smaller and more intense than the southern one, implying that the magnetic field is not distributed equally across the planet. The greater intensity implies that electrically charged particles are accelerated to higher energies in the north.

Pluto – HST took images of Pluto frequently during 2002 and 2003. A new technique for combining multiple images to get better resolution than the telescope is theoretically capable of was used on these Pluto images. It took 4 years with 20 computers to process them. The surprising result is that the surface of Pluto experienced large-scale changes in less than 2 years. Comparison with images from 1994 showed huge changes. It became redder and nitrogen-ice covered areas moved. It is thought that seasonal temperature changes cause the ice to form in different areas. At first it was suspected that the reddening was some imaging or processing error, but the same images included the moon Charon, which did not change color while Pluto did. Red material is usually associated with carbon compounds, so they may cause the reddening. Seasons on Pluto are affected primarily by its orbit being highly elliptical, more so than by its tilt. Earth's seasons are almost entirely due to tilt, since it has a much more circular orbit. Perhaps this difference explains how what appear to be seasonal changes on Pluto could occur so



fast. The length of Pluto's year (248 Earth years) would argue toward extremely slow seasonal changes. The newly processed images will be used to plan imaging of Pluto by New Horizons, which will flyby in 2015. The new images are too coarse for understanding surface geology, but they do show the world to be complex with white, dark-orange and charcoal-black terrain. The overall color is believed to be a result of ultraviolet radiation breaking up methane, leaving behind dark residues.

Asteroids – It is known that space weathering turns the surface of asteroids dark within a million years or so. But a few asteroids are bright, not showing the space weathering. Most meteorites have been found to have a spectrum that matches the unweathered asteroids. A new study has determined a high correlation between being non-weathered and having approached the Earth closely (within roughly 60,000 miles) during the last ½ million years. This implies that tidal effects shake fresh material to the surface during a flyby of Earth.

WMAP (cosmic microwave background [CMB] space observatory) scientists re-analyze the continuing data from the spacecraft every 2 years, and they have just released the 7-year analysis. Of course the earlier results were confirmed, but even more precise numbers were yielded: the age of the Universe is 13.75 (± [plus or minus] 0.11) billion years, dark energy comprises 72.8% (±1.5) of the Universe's mass and energy, baryons (protons and neutrons) comprise 4.56% (±0.16), non-baryonic dark matter is 22.7% (±1.4). Some variations of Inflation Theory have been ruled out by new numbers, but several variations could still be true. The data continues to strongly support that some form of Inflation occurred. Tighter limits have been calculated for the mass of the neutrinos, the axion dark matter theory, and parity violation theory. Temperature and polarization maps agree with the theory that the hot and cold spots in the CMB are due to sound waves in matter that froze when the Universe cooled enough to become transparent, and light stopped interacting so heavily with matter. The data supports the theory that dark energy is unchanging over time (the cosmological constant theory). The Sunyaev-Zeldovich effect has now been detected in the CMB data: that the CMB is changed slightly when it passes through a rich galaxy cluster. It was particularly well seen from the Coma galaxy cluster. The WMAP data agrees well with x-ray observations of the S-Z effect, but disagrees with theoretical predictions.

Binary quasar – Teamwork between x-ray and optical astronomers has led to the discovery of a binary quasar. Two galaxies, each with its own quasar, were caught in the act of colliding to form the binary. This is the first clear case of merging galaxies each with a quasar, though other suspects have been seen. A quasar is the bright light given off when huge amounts of material fall into a supermassive black hole at the center of a galaxy.

Black holes – It has long been a mystery why some supermassive black holes in the centers of galaxies have 2 jets of material spewing out, while others have no jets. A new paper suggests that the black holes with jets are spinning in the opposite direction to their accretion disks. An accretion disk is where material falling into the black hole goes into orbit. Eventually friction in the disk causes the material to fall from the disk to the black hole. Observations in x-rays showed that supermassive black holes with jets have a larger gap between the inside of the accretion disk and the outside of the black hole. The paper authors believe that the gap is caused by effects of general relativity as a result of the hole and disk rotating oppositely. Then the magnetic field bunches up in the gap, and the magnetic field provides the force that forms the jets.

Unusual supernovas – Study of 2 unusual supernovas (2007gr & 2009bb) shows that they have some, but not all, of the characteristics of a gamma-ray burst (GRB). In particular, they have jets, but not quite as fast (and powerful) as GRBs. But they did not emit detectable gamma rays. The best explanation is that these supernovas probably produced black holes as remnants, but were either not powerful enough or not oriented right to be GRBs.

Chandra (orbiting x-ray observatory) has found a star formation region that is well away from any galaxy, which is quite unexpected. The x-ray image shows 2 long tails of gas, containing forming stars, more than 200,000 light-years long, within a cluster of galaxies called Abell 3627, but outside any of the galaxies. Astronomers are baffled as to how these tails formed where they did.

Galaxy shape – A study of shapes of galaxies nearby and those so far that they are seen as they were 6 billion years ago has determined that there were more peculiar (irregularly shaped) galaxies in the past and more spiral galaxies now. The numbers imply that many peculiar galaxies transformed into spirals. The study team believes that mergers of galaxies that are rich in gas can produce spirals. Previous theory held that mergers should produce elliptical galaxies, but this new study did not find a trend toward increasing numbers of ellipticals. The study supported that galaxy mergers were frequent up until about 4 billion years ago, more recently than many astronomers believed. *(continued on page 10)*

For Sale: Meade ETX 125 PE Astro with Meade 5000 eyepiece kit. Barely used, must sell! \$500. Contact Mark Hunter at 949-370-9300 or mrplant2000@yahoo.com.

Wanted: Old style 84-key AT keyboard for DOS/Windows PC (the kind with the function keys on the left instead of above the other keys). Tim Hogle timhogle@aol.com, (626) 357-7770.

For Sale: Celestron C8-SGT 8" Advanced Series Telescope (the C8 has XLT optics) with the latest version of hand control computer and includes a Telrad and the Celestron Auxiliary Port Accessory for firmware upgrades. \$975. Contact: Vance Tyree at 626-355-7210 or tyree@isi.edu

Observing Pad Lease for Sale! Location: Easternmost pad on top tier of Mars Hill. Largest Observing Pad at Anza, electricity, polar aligned pier, 2 work tables, adjacent parking, good neighbors. Contact: Tom Kucharski Cell: 949-683-8356

(continued from page 9)

Uncomet – The LINEAR sky survey discovered a comet (again), which has been named P/2010 A2 (LINEAR). But its orbit looks like that of an asteroid, not a comet. It's right in the asteroid belt. Images made with HST show that the comet nucleus is outside the comet head, which never happens. It also has a bright X-shape of material in it, again without precedent. Spectra from ground-based telescopes failed to find gas, and comets always emit gas. Conclusion: it's probably not a comet, but instead debris from a collision between 2 asteroids. The pressure of sunlight is pushing the debris into a tail, like it does to gas and dust emitted by comets. There is ample evidence that collisions occur between asteroids, but this is the first time they have been caught in the act.

WISE (orbiting infrared observatory) has discovered its first comet, which has been named P/2010 B2 (WISE), and its first near-Earth asteroid, now designated 2010 AB78. During its ongoing survey of the whole sky, WISE is expected to discover dozens of new comets and hundreds of thousands of new asteroids, hundreds of which will be near-Earth, that is, closer to us than the asteroid belt. A thorough search like that of WISE is expected to give accurate statistics on how common are near-Earth comets and asteroids of various sizes. Infrared brightness is well correlated with diameter, while visible light brightness is not well correlated. So WISE should provide good diameter estimates of all the asteroids that it observes. All asteroids, except those that come extremely close, appear too small to measure diameter directly, even with the largest telescopes. The new Comet WISE takes 4.7 years to orbit the Sun. It is actively shedding material to form its comet head. However, the spacecraft can detect even dead comets, which are not shedding material, since a comet nucleus can be seen easily in infrared light. WISE was launched in mid December and began operations in January.

Solar Dynamics Observatory (SDO) was launched February 11. It is the most technologically advanced spacecraft to study the Sun, imaging it more than once per second, and in high resolution every 10 seconds. It covers multiple wavelengths of light, concentrating on ultraviolet. Much of the Sun's variability in brightness, not yet well understood, occurs in ultraviolet. SDO will effectively look inside the Sun by analyzing the seismic waves on the surface (like analyzing earthquakes to learn of the Earth's interior).

International Space Station (ISS) – Space shuttle Endeavour visited ISS during February to deliver the 15-ton Tranquility module, the last major part of ISS. The module was attached during the 110th spacewalk that has been made from ISS. The cupola, a projection with 7 windows for a panoramic view, was attached to Tranquility. The weight of ISS (including Endeavour) exceeded 1 million pounds for the first time. Tranquility will house many of the critical life support systems for ISS, freeing up lab space that has been temporarily used. Only 4 missions remain, all to supply ISS, before the space shuttles are retired.

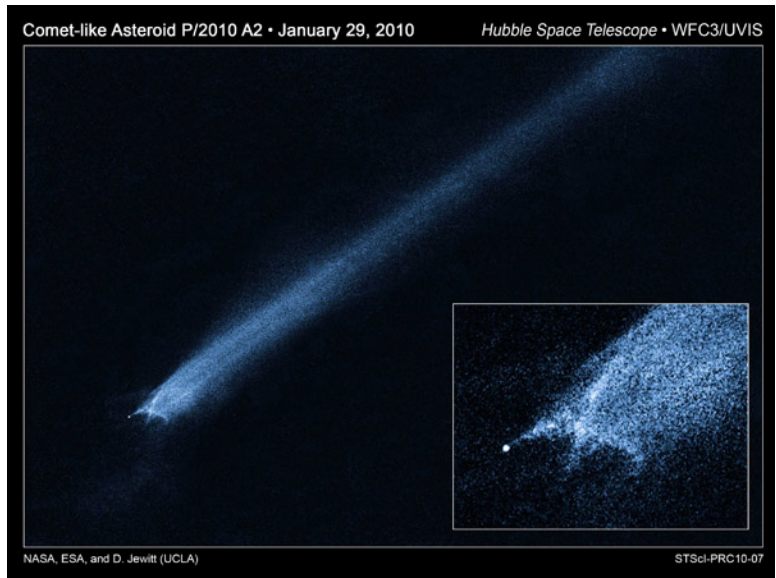
Planet collision – Astronomers announced that they have found warm dust, evidence for the collision of rocky planets, around a star called HD 131488. But the composition of the dust differs from the composition of rocky bodies in any other known system. Typically dust debris around stars is of olivine, pyroxene or silica, minerals commonly found on Earth. The dusty region is close enough to its star to have temperatures near that on Earth. The star also has a 2nd dusty region much farther from the star, comparable to our Kuiper Belt.

Dark matter – A project known as the Cryogenic Dark Matter Search has been attempting to detect WIMPs (weakly interacting massive particles) that are theoretically believed to constitute the non-baryonic dark matter of the Universe. The experiment is a 1/2 mile underground in Minnesota to shield it from cosmic rays. The latest analysis of 2 years of data, after weeding out other causes for effects seen in the detector, leaves 2 events that are likely dark matter. However, statistically, they would like to see at least 5 events before they have enough evidence to convincingly claim they have found dark matter. Stay tuned for a few more years.

Algol – Using a collection of radiotelescopes, astronomers have found a giant magnetic loop stretching outward from one of the stars in the binary system Algol. The system consists of a star about 3 times as massive as our Sun and a less-massive companion orbiting it only about 6 million miles away. The magnetic loop emerges from the poles of the less-massive star and stretches toward the primary star. The side of the secondary star with the magnetic loop always faces the primary as it orbits.

Instant AstroSpace Updates

Using new techniques to remove the effects of the Earth's atmosphere, astronomers using the 3-meter Infrared Telescope in Hawaii have detected constituents (carbon dioxide and methane) in the atmosphere of an **exoplanet** (one orbiting another star [HD189733]). This feat had been performed only with space telescopes before.



Teams of astronomers have discovered 2 more **tidal streams** in the Andromeda Galaxy, which are shards of dwarf galaxies that have been ripped apart. They were found by distinguishing red giants with particular velocities from apparently surrounding stars.

A new technique of **predicting solar flares** has been able to warn 2 to 3 days in advance when and where one will occur, better than any existing prediction method. It looks for breaking of magnetic loops inside the Sun by its effects on sound waves on the surface in sunspot regions.

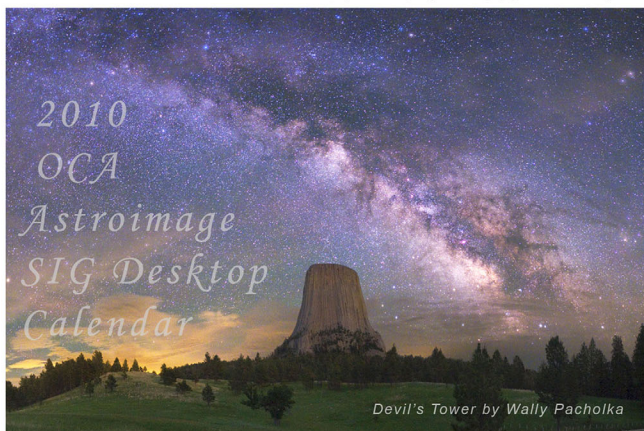
Amateur astronomers in Florida detected an outburst of the recurrent nova **U Scorpii**, an event that hasn't happened since 1999. There are only 10 known recurrent novae.

Astronomers have discovered the second most massive stellar-mass black hole, above 15 times the Sun's mass, in galaxy NGC 300. This is the **farthest stellar-mass black hole** known.

New analysis of the **Murchison meteorite** that landed in Australia over 40 years ago, using high-resolution structural spectroscopy, found the signatures of more than 14,000 different compositions, including 70 amino acids. Given the ways in which such molecules can be arranged, the meteorite should contain several million different organic chemicals.

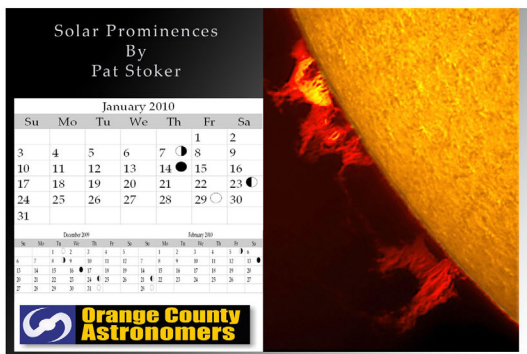
High pressure experiments with carbon, which is thought to be plentiful in the **cores of Uranus and Neptune**, show that those planets may contain liquid carbon seas with diamonds floating on them. This appears consistent with the strangely oriented magnetic fields that those planets exhibit.

2010 OCA Astroimage SIG Desktop Calendar - Now Available!



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