



Wally Pacholka captured this image of Scorpius rising over lava flowing into the ocean during the Dark Sky Party at the Visitor Information Center on Mauna Kea, Hawaii, on January 15, 2009. The event was one of several scheduled to commemorate the International Year of Astronomy

## OCA CLUB MEETING

The free and open club meeting will be held Friday, February 13th at 7:30 PM in the Irvine Lecture Hall of the Hashinger Science Center at Chapman University in Orange. This month, Howard Royster and Merrill Butler will be demonstrating the latest version of the unique plate-solving telescope they hope to bring to market!

NEXT MEETING: March 13th

## STAR PARTIES

The Black Star Canyon site will be open on February 28th. The Anza site will be open on February 21st. 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, February 6th at the Centennial Heritage Museum at 3101 West Harvard Street in Santa Ana.

GOTO SIG: TBA

Astro-Imagers SIG: Feb. 17th, Mar. 17th

Remote Telescopes SIG (formerly EOA SIG): Feb. 25th, Mar. 25th

Astrophysics SIG: Feb. 20th, Mar. 20th

Dark Sky Group: TBA

# President's Message

By Barbara Toy

Well, after all that great verbiage last month about going out and observing in winter in spite of cold weather, I have to admit that I didn't quite live up to that over the Christmas break. The December Anza star party was notable for following a storm that dropped several inches of snow on the Anza site, along with all the surrounding countryside, and conditions remained cold enough that there were still some patches of snow more than a week later. On the night of the star party, it was not only miserably cold but there was a stiff wind blowing, which bounced optics around as well as providing a significant wind chill factor. This was not a high turnout star party, though there were a number of determined imagers on-site, and I was recovering from a cold, so the upshot was that, using the wind and bad seeing as primary reasons (some might say "excuses"), I didn't even open the club observatory.

There were a number of us out there the following week for New Year's Eve and the following night. Conditions were much better; it was a bit warmer (high 30s/low 40s instead of 20s/low 30s), and the skies were very clear and very steady. Unfortunately, I was fighting a different bug, and spent both nights chewing Roloids and sleeping, which was a sad waste of good conditions. Though the spirit may be willing, there are times that it just can't overcome the microbes.

Given the realities of the winter flu and cold season, I would augment my previous comments with the observation that, if you are sick, it is probably better for you and everyone around you if you concentrate on getting better rather than heading out for observing or imaging. If you do decide to go even though your health is not at its best, you should be even more careful about keeping yourself warm. Although getting cold may not cause you to catch a cold, at least according to current theory, it can certainly depress the immune system and make a bad situation worse.

## Elections

The results of the election of the 2009 Board are now final, thanks to Bob Evans, who verified that the ballots were from members in good standing and counted them. From his numbers, there were 66 valid ballots that were counted and 3 that could not be validated. He informed us that there were no write-ins, so the 2009 Board is:

President: Barbara Toy

Vice President: Craig Bobchin

Secretary: Bob Buchheim

Treasurer: Charlie Oostdyk

Trustees: Gary Schones, Tom Kucharski, Sheryl Benedict, Alan Smallbone, Steve Short, Shelia Cassidy, and our new member this year, Reza AmirArjomand.

We are very sorry that Steve Condrey wasn't able to continue as a Board member, and wish him the best with his new studies as well as all of the other commitments he's taken on in his busy life. And we are very grateful that he is continuing as the editor of the Sirius Astronomer and that he and his wife, Sandy, with the inquisitive assistance of their young son, Alex, are continuing as our Anza House Coordinators. Please let Steve and Sandy know how much their efforts are appreciated when you see them!

We are delighted to welcome Reza AmirArjomand to the Board this year, and appreciate his willingness to serve as a Trustee as well as his work as our new website editor. I'm looking forward to working with him in both capacities!

## IYA 2009 Is Off To a Great Start!

Bob Buchheim, our esteemed Secretary, kicked off the International Year of Astronomy (IYA 2009) by giving two talks at the "Galileo's Legacy" conference in Hawaii in early January, "The Evidence of Things Not Seen" and "Double Star CCD Measurements at Altamira Observatory." Bob is one of our members who is actively involved in astronomical research, and it's not surprising he would be tapped as a speaker for an event like this, though, with his usual modesty, he didn't mention that he was going to give these talks when he told us that he was going to the conference. In addition to receiving increasing recognition for his research efforts, he has written a book to help other amateur astronomers who want to get involved with research, *The Sky is Your Laboratory, Advanced Astronomy Projects for Amateurs*. If you have any interest in trying your hand at a research project, I'm sure Bob would be delighted to discuss it with you; he can be reached at rbuchheim@earthlink.net.

Another of our members, Wally Pacholka, participated in the Dark Sky Star Party at the Visitor Information Station on Mauna Kea on January 15, which was organized for IYA 2009 by the University of Hawaii Institute of Astronomy. This event included talks on the importance of protecting the night sky in addition to public viewing; for an account of the event, see <http://astroday.net/DSSP.html>. Wally sent me the following account of his experience:

... [T]he 3 talks all promoted the importance of keeping the skies dark. Gary of UH [University of Hawaii] is actively promoting that as Hawaii's lights are growing with some of the top observatories nearby. I was introduced to Audrey of Chicago thru AWB Mike Simmons and Audrey added me to the speaker list here. It was

an extremely fun event with the local astronomy clubs very enthusiastic. The skies from Mauna Kea are needless to say just out of this world.

The first evening she & husband Greg & I took a tour of the lava flowing into ocean – truly an experience of a life time. Got some pics of Scorpio over lava flow but the stars will be better next time when the moon is smaller. Movie camera would do more justice.

The picture Wally sent of the lava flowing into the ocean with Scorpio overhead should be in this issue.

If these events are indication of what we can expect for IYA 2009, it's going to be a great year for astronomy!

### **The Local Scene for IYA 2009**

Craig Bobchin, our Vice President, has generously agreed to be the IYA 2009 Coordinator for the club, and will undoubtedly be coordinating with Doug Millar, who is coordinating events for another club he is involved in and has offered to help with OCA's involvement as well. Reza AmirArjomand is working on a page for the website for our IYA 2009 activities, so keep an eye out for that as he gets it launched!

One event that we've been invited to join is being organized by Irvine Valley College as part of the 100 Hours of Astronomy (which runs April 2-5). One of the astronomy professors at IVC, Roy McCord, provided the following information about what they are planning at this point:

The International Year of Astronomy 2009 is an international, year-long celebration of the 400<sup>th</sup> anniversary of Galileo's first use of the telescope for astronomy. Irvine Valley College Astronomy will host public observing sessions in Orange County, CA as an official IYA 2009 event. In collaboration with Astronomy Outreach Network, Astronomers Without Borders and the Orange County Astronomers Club, and using college telescopes, IVC students will host an extended viewing session for the public. In this one day period, we aim to introduce telescope viewing to at least 1000 new citizen astronomers.

The plan is to hold this in a busy public location, such as a shopping center in the Irvine area, as the IVC campus is too quiet on weekends. They plan to advertise the event at local schools and other areas, using student energy and imagination to help foster interest in the event, including acting as "hawkers" during the event to let people know it's going on and encourage them to check out the telescopes.

They want to have solar observing from 12:00 to 3:00 p.m., and lunar observing (it'll be First Quarter moon, so a crescent in good position for viewing in the early evening) from 6:00 to 10:00 p.m., most probably on April 4, the Saturday of the 100 Hours of Astronomy event. They are hoping that, among other support, we can provide volunteers for the solar viewing with H-alpha scopes, as IVC doesn't have any scope with that capability. They think they can supply 5 to 10 observing instruments of their own operated by Honors students, and would welcome additional equipment and volunteers from the club.

As I write this, we are working on the specific location for this event, and we will get that information on the IYA 2009 page on the website when arrangements are final. If you can help out with the viewing, please let Craig or me know. And, of course, please let anyone you know who might be interested in viewing the sun or moon (and other objects) about this event and encourage them to come look through a scope for themselves!

### **Phase Change at the Astrophysics SIG...**

One of the central activities at the monthly meetings of the Astrophysics SIG is viewing lectures from series of interest to the participants. For the last year or so, our lectures of choice have been a series by Sean Carroll at Cal Tech on Dark Energy and Dark Matter, which were very interesting and well-delivered. Alas, they have now come to an end – we saw the last two at the January meeting, followed by a spirited group discussion.

So, we're starting a new sequence with the February meeting, and plan to view the parts of the newest general astronomy series by Alex Filippenko that deal with Relativity and other astrophysical topics, and also a lecture from a different series on superstring theory. If you went to the RTMC Astronomy Expo in 2007, you may recall Dr. Filippenko as the keynote speaker that year – he does an excellent job of presenting complex topics in terms that are understandable to the interested lay person, and we think that pairing it with a lecture from the more specialized series on superstring theory should give us a nice balance and trigger a lot of interesting discussions. The group runs as a democracy, and the decision about what lectures we want to view next was made by the group as a whole at the January meeting after a fruitful discussion of various alternatives.

If you have any interest in why the universe is the way it is, how it developed, the laws that govern it, the various theories out there that attempt to explain all this, and related matters, now is an excellent time to come to one of the Astrophysics meetings, as we start off on this new direction. The meetings are on the third Friday of each month, in the classroom at the Heritage Museum of Orange County (formerly the Centennial Heritage Museum), 3101 W. Harvard, Santa Ana, CA, starting at 7:30 p.m. and generally

*(continued on page 9)*

# AstroSpace Update

February 2009

Gathered by Don Lynn from NASA and other sources

**Black hole mass** – It has been known for quite a few years that the mass of a black hole at the center of any galaxy is about 1/1000 the mass of the central bulge of the galaxy. But no one has been able to prove whether the size of the black hole limits the size of the galaxy, or the size of the galaxy limits the size of the black hole, or whether some factor causes both the black hole and the galaxy's bulge to grow at proportional rates. A new study of very distant galaxies (so we are seeing them as they were billions of years ago when the radio light left them), using the Very Large Array (VLA) in New Mexico and another radiotelescope which is in France, found that the masses of black holes were a larger fraction of the bulge mass in galaxies that existed long ago. This implies that the black holes grow first, and then the galaxy bulge forms later and in proportion to the black hole's mass. Galaxies in the study were seen as far back as only 1 billion years after the Big Bang.

**VLA** has also found 2 protostars (stars in the process of forming) located only 7 - 10 light-years from the black hole at the center of our Milky Way galaxy. Theory had it that the conditions near the black hole are too violent for stars to form – that the collapsing clouds that form stars would be ripped apart. The only way that the clouds could withstand the violence – and the new observations show that they do – is for the matter there to be much denser than thought. This would cause the gravity of the clouds to be stronger and overcome the disrupting forces.

**Black hole** – Astronomers using the Very Large Telescope in Chile have been examining the Einstein Cross, a quadruple image of a distant black hole created by the gravitational lensing of a foreground galaxy and of the individual stars in the galaxy. Einstein's General Relativity predicted that strong gravity will bend light and form such images. The magnification of the gravitational lens allowed detail to be seen in the material around the black hole with 1000 times the resolution. Without the gravitational lens the object would have been too faint for detailed observations. The material, as predicted, forms a disk as it falls into the black hole, with temperature variations over parts of the disk.

**Black holes** – The shape of material around black holes has been observed for the first time in an analysis of over 200 active galaxies. Regardless of the sizes of the black holes, they were found to have consistent physical structure (donut shaped). The structure was inferred from comparisons of infrared and x-ray light coming from the material falling into the black holes. The black holes ranged from 1 million to 100 million times the mass of the Sun, and were found in all orientations, from edge-on to face-on.

**Rossi** (orbiting X-ray observatory) has monitored a flaring neutron star as it ended its more than 2 years of flaring to see how it returned to normal. Such flaring is caused by material from its binary companion star falling onto the neutron star. The crust is heated by the flaring. It took about 1.5 years to cool, relatively quickly. This could only happen if the surface is a well-ordered lattice with few impurities. The cooling speed allows calculating the surface temperature, which in turn sets limits on how hot the interior must be (which is constantly losing heat through the surface).

**ARCADE** was launched by balloon to near space in 2006 to listen to a part of the radio spectrum where scientists expected to hear the signal from the first generation of stars that formed after the Big Bang. They found a louder signal of a different type covering up that from the first stars. 2 years of analysis has ruled out every proposed explanation for the radio signal found, so its source remains a mystery.

**Hubble Space Telescope** (HST) has discovered 14 runaway stars, which are plowing through interstellar gas at about 110,000 mph. Runaway stars have been known since the 1980s, but the newly discovered ones are all less massive than the previously known ones. The new ones are all less than 8 times the Sun's mass. The new observations have either uncovered a new class of runaway stars or proved that we had only seen the most massive and brightest runaways until now. It is believed that runaway stars are kicked up to their high speeds by either their binary partners going supernova or a star passing through a binary star system and slingshotting one of the pair out. Both of these circumstances should happen occasionally in dense star clusters.

**HST** captured a burst of light February 21, 2006, which brightened and then dimmed over the next 100 days. But the pattern of its brightness changes does not match a nova, supernova, variable star, gamma-ray burst or gravitational lens event. Its distance has not been determined, so it could be either inside our Milky Way galaxy or more distant. HST was observing a distant cluster of galaxies in Bootes when the object suddenly brightened within the field of view. A number of suggestions have been made, including a star colliding with an asteroid or black hole, and the collapse of a carbon star, but none of these seem to explain the pattern seen.

**Recurrent novae** – There are several suggestions for what kind of star becomes a Type Ia supernova (termed progenitor): a binary pair of white dwarf stars, a symbiotic pair, or a recurrent nova (RN). Recurrent novae are binary stars where material from one falls onto the other, until enough accumulates to explode periodically as a nova (which is a much smaller explosion than a supernova). RNs are being studied to determine, among other things, if they could be the Type Ia progenitors. A recent study of RNs, drawing highly from archived images, has come to the following conclusions: The number of RNs is sufficient to support the frequency of Type Ia supernovae; RNs accumulate mass faster than they blow it away, so that within a million years or so they should accumulate enough mass to cause a Type Ia supernova; roughly 1/3 of novae are actually RNs; 96% of novae go undiscovered; the RN U Scorpii is expected to erupt (nova) this year (a collaboration of astronomers has been formed to watch for this). One new RN and 6 unnoticed eruptions were discovered. 2 drops in brightness during eruptions were discovered, with no known cause.

**Distant molecules** – Astronomers using observations from Swift (gamma-ray burst telescope) and the Keck Telescope in Hawaii have for the first time identified gas molecules in the host galaxy of a gamma-ray burst. The molecules were hydrogen and carbon monoxide, which are associated with star-forming regions in our own galaxy. The astronomers believe that the burst exploded behind a thick molecular cloud. Probably only 1% of the burst's light made it through the cloud, so it was seen only because the burst had quite a bright afterglow. This may explain why the afterglow is not found for many bursts – it may be blocked by molecular clouds. The burst and its galaxy are so distant that it took the light 11.5 billion years to reach us.

**Swift** (orbiting gamma-ray burst telescope) in its spare time between bursts is surveying the sky in X-rays. First results of that survey have been announced. Active galactic nuclei, those galaxy centers with material falling into their black hole, show some differences between those close by and those more distant (and therefore seen as they were in the distant past). More than 30% of nearby galaxies appear to be colliding with other galaxies. It is believed that all active galactic nuclei are being seen in this X-ray survey, while surveys in other wavelengths, even longer wavelength X-rays, suffer from thick clouds of dust and gas in the galaxies blocking our view in some cases. Astronomers believe that every large galaxy has a supermassive black hole at its center, but less than 10% currently have enough material falling into the black hole to classify as Active.

**Fermi** (gamma-ray space telescope) has found 12 pulsars that pulse only in gamma-rays, and so were not found previously. Most pulsars have been found pulsing in radio light. Fermi also found 18 known pulsars because they pulse in gamma-rays in addition to the other wavelengths with which they were discovered. 7 of the pulsars examined were millisecond ones, those which spin so fast (over 100 times per second) that their pulses are seen every few milliseconds. The observations showed that the source of the gamma rays is not on the surface of the neutron star, but a few hundred miles above it. The radio emissions from pulsars are believed to originate near the surface where the magnetic field protrudes from within. 10% or more of the total power emitted from a pulsar is in the form of gamma rays, while only a few millionths of the power is in radio waves.

**VLBA** (intercontinental radiotelescope array) has been surveying cosmic masers in our Milky Way galaxy, sort of natural lasers that give off radio instead of visible light, and are often found in star-forming regions. The VLBA gets such precise resolution that it can measure parallax and motion of objects even across the galaxy. So this survey is resulting in the most precise 3-dimensional positions and velocities ever made of all parts of our galaxy. The biggest surprise found is that the galaxy is rotating about 100,000 mph faster than previously thought (600,000 mph, not 500,000, at the location of the solar system). This implies that the total mass of the galaxy is about 50% larger than thought. So we are pretty much the twin of the Andromeda galaxy, not its littler sister. This means that we are more likely to collide with Andromeda, and sooner (fewer billions of years). Most of the masers were found to be in more elliptical orbits about the galaxy, rather than nearly circular, as had been assumed. It is believed that this is an effect of the shock waves that travel around the spiral arms of the galaxy. The new data clearly shows that the Milky Way has 4 spiral arms, at least for the star forming regions. A recent study in infrared showed that the old red stars of the Milky Way are grouped mainly in 2 arms rather than 4, leaving us with the mystery of why old stars are not found in large numbers in all 4 arms.

**Dark energy** – More than a decade ago the expansion of the Universe was found to be accelerating. Some astronomers who didn't believe this could be the case developed an alternate theory that if our local area of the Universe happened to have less material than average, we would see an illusion of acceleration in the observations made, without need of the accelerating force that we have come to call dark energy. A new analysis of the cosmic microwave background observations made by the WMAP satellite has shown that we are not located in a region of relative void. So dark energy is supported.

**More dark energy** – The expansion rate of the Universe affects the size of galaxy clusters that form. A new study of the sizes of galaxy clusters over time shows that the expansion rate has changed over billions of years, consistent with dark energy, that is, that the expansion rate is accelerating. The observations were made with the Chandra x-ray space telescope. It is able to detect the hot gas found in galaxy clusters. The new method is completely independent of other methods of detecting dark energy. The results were consistent with the supernova method, and support that dark energy is a constant (the "cosmological constant" theory of dark energy), not variable.

**Planet formation** – Previous studies have shown that the cloud of material about a newly formed star, out of which gas giant planets form, dissipates in about 10 million years. So astronomers concluded that gas giants must form within the 10 million years after a star forms. A new study of a cluster only 5 million years old (NGC 2362), using the Spitzer infrared space telescope, concludes that the cloud usually dissipates in under 5 million years, particularly for stars more massive than the Sun. So the newest estimate is that Jupiter took only 2 or 3 million years to form. The study found material from which rocky planets form remaining about many stars, so apparently those planets can take longer to form than gas giants.



*SWIFT Mission Logo (credit: NASA)*

*(continued on page 8)*



Shown here is M33 as imaged by Bob Bryant from our Anza site on October 10, 2004. If you'd like to start learning how to create striking images such as these, be sure to attend our Beginners Class this month!

**Announcing the OCA AstroSoftware Online SIG!  
by Steve Condrey**

**For those of you who may not be aware, there has been an astronomy software special interest group under the auspices of OCA for some time now. Unfortunately the previous coordinator, Matthew Ota, was forced by family circumstances to move to the East Coast and effectively terminate his active participation in the club. In order to keep the group going, I've taken over as moderator.**

**The SIG as it stands now does not really have a lot of activity, and does not meet regularly; however, in keeping with the spirit of online astronomy, it seems appropriate to maintain the group as an online entity. Those of us with busy schedules or commutes that prohibit meeting regularly can in this way participate fully in the group.**

**In the coming issues, I hope to bring you a variety of useful weblinks and reviews, by myself and others, to aid you in selecting astronomy software. Additionally, there are a number of research activities run by professionals who regularly solicit the assistance of amateurs and their computers in reducing data. Most if not all of you are familiar with SETI@Home and GalaxyZoo; there are others available as well.**

**If you're interested, look for OCAAstroSoftware on Yahoo Groups and request membership. The key to any group is to stay active, so be sure to send us your links and software reviews! Just because you're clouded out doesn't mean you can't continue to do valuable astronomy or just browse informative websites on astronomy, space exploration, and the history of science.**

**Hope to see you there!**



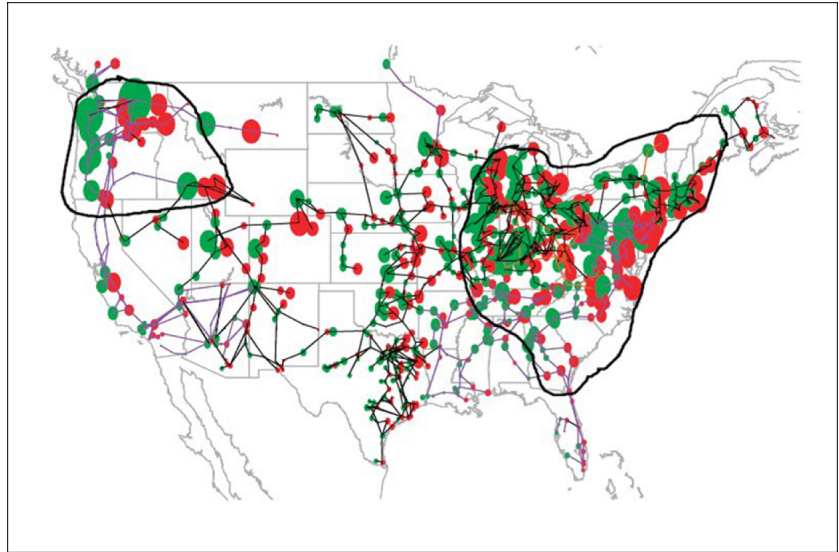
## Severe Space Weather

by Dr. Tony Phillips

Did you know a solar flare can make your toilet stop working?

That's the surprising conclusion of a NASA-funded study by the National Academy of Sciences entitled *Severe Space Weather Events—Understanding Societal and Economic Impacts*. In the 132-page report, experts detailed what might happen to our modern, high-tech society in the event of a "super solar flare" followed by an extreme geomagnetic storm. They found that almost nothing is immune from space weather—not even the water in your bathroom.

The problem begins with the electric power grid. Ground currents induced during an extreme geomagnetic storm can melt the copper windings of huge, multi-ton transformers at the heart of power distribution systems. Because modern power grids are interconnected, a cascade of failures could sweep across the country, rapidly cutting power to tens or even hundreds of millions of people. According to the report, this loss of electricity would have a ripple effect with "water distribution affected within several hours; perishable foods and medications lost in 12-24 hours; loss of heating/air conditioning, sewage disposal, phone service, fuel re-supply and so on."



*On this power-grid map of the United States, the black-circled areas are regions especially vulnerable to collapse during an extreme geomagnetic storm. Inside those boundaries are more than 130 million people. Credit: National Academy of Sciences report on severe space weather.*

"The concept of interdependency," the report notes, "is evident in the unavailability of water due to long-term outage of electric power—and the inability to restart an electric generator without water on site."

It takes a very strong geomagnetic storm to cause problems on this scale—the type of storm that comes along only every century or so. A point of reference is the "Carrington Event" of August-September 1859, named after British amateur astronomer Richard Carrington who witnessed the instigating solar flare with his unaided eye while he was projecting an image of the Sun on a white screen. Geomagnetic storms triggered by the flare electrified telegraph lines, shocking technicians and setting their telegraph papers on fire; Northern Lights spread as far south as Cuba and Hawaii; auroras over the Rocky Mountains were so bright, the glow woke campers who began preparing breakfast because they thought it was morning!

"A contemporary repetition of the Carrington Event would cause ... extensive social and economic disruptions," the report warns. Widespread failures could include telecommunications, GPS navigation, banking and finance, and transportation. The total economic impact in the first year alone could reach \$2 trillion (some 20 times greater than the costs of Hurricane Katrina). The report concluded with a call for infrastructure designed to better withstand geomagnetic disturbances and improvements in space weather forecasting. Indeed, no one knows when the next super solar storm will erupt. It could be 100 years away or just 100 days. It's something to think about ... the next time you flush.

One of the jobs of the Geostationary Operational Environmental Satellites (GOES) and the Polar-orbiting Operational Environmental Satellites (POES) operated by NOAA is to keep an eye on space weather and provide early warning of solar events that could cause trouble for Earth. You can keep an eye on space weather yourself at the National Weather Service's Space Weather Prediction Center, [www.swpc.noaa.gov](http://www.swpc.noaa.gov). And for young people, space weather is explained and illustrated simply and clearly at the SciJinks Weather Laboratory, [scijinks.gov/weather/howwhy/spaceweather](http://scijinks.gov/weather/howwhy/spaceweather).

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

*(continued from page 5)*

**Asteroid destruction** – Spitzer has found the remains of shredded asteroids orbiting around 6 white dwarf stars. This tells us that such stars have asteroids, and likely rocky planets too, since asteroids and rocky planets are believed to form similarly. It is believed that wandering too close to a white dwarf star would cause tidal forces to shred an asteroid. The amount of material found at each of the stars is probably the result of just one asteroid, up to 120 miles across, meeting its demise this way.

**Cassini** (Saturn mission) – The most recent flybys of Saturn’s moon Enceladus have showed changes in the surface and surroundings over time. The cloud of vapor and particles fed by the jets changes with time and has a far-reaching effect on Saturn’s magnetosphere. It loads ionized gas into the huge magnetosphere, where Saturn’s magnetic field spins the material up from Enceladus’s orbiting speed to the speed of the planet’s magnetic field rotation. The surface of Enceladus has spreading of the crust. Material wells up out of the interior and pushes the existing crust away. Unlike most (but not all) spreading on Earth, the Enceladus spreading pushes out only in one direction, not both ways. It appears that condensation from the jets erupting from the surface creates ice plugs the close off old vents and force new vents to open.

Cassini data from recent flybys of Saturn’s moon Titan has supported the theory that the moon has active **cryovolcanoes** spewing super-chilled liquid into the atmosphere. Haze hovering over flow-like formations supports this. Other evidence includes changes in brightness at 2 regions, and evidence of ammonia frost at one of those sites. Methane should be destroyed in Titan’s atmosphere in a matter of years, yet methane remains. It is thought that it is being replenished as part of the cryovolcanic fluid as fast as it is destroyed. More observations are needed, since most of these are open to interpretations different than cryovolcanoes as the cause.

**Mars Reconnaissance Orbiter** (MRO) has found carbonate minerals in areas on the Martian surface. This had been sought after to show that neutral or alkaline liquid water once existed on the planet. Acid destroys carbonates. Carbonates are common on Earth, such as limestone and chalk. Earth originally had a much thicker carbon dioxide atmosphere, but most of that gas became tied up chemically in carbonate rocks. The amount of carbonate found by MRO, only in certain regions, is not sufficient to have tied up most of the carbon dioxide thought to have been originally in Mars’s atmosphere. So Mars likely lost much more carbon dioxide to space than Earth did. Some of the areas found to have carbonates in the new observations lie around a crater believed to be about 3.6 billion years old, so the watery period that formed the carbonates existed before that time.

**Mars rovers** Spirit and Opportunity during January reached their five-year anniversaries exploring Mars. They were designed for 3 months of activity. Spirit barely survived this past Martian winter, as it has a heavier coating of dust blocking its solar panels, and had a lower sun angle from its location. Both rovers have all instruments working, and have only minor failures, such as a stuck wheel. The rovers have made important discoveries about wet and violent environments on ancient Mars. They have returned a quarter-million images, driven more than 13 miles, climbed a mountain, descended into craters (and climbed out), struggled with sand traps, and survived dust storms. Spirit is scheduled to explore 2 interesting geological features within 200 yards of where it wintered. Opportunity has driven more than a mile toward its next major target, Endeavour Crater, which is about 6 miles away, stopping to examine interesting rocks along the way.

**Phoenix** (Mars arctic lander) – The clumpiness of the soil found by the Phoenix lander is being touted as evidence that Mars’s arctic region goes through wet and dry cycles and is now in a dry cycle. A wet cycle in the past would have wet the soil near the surface. This would either cement the particles or mobilize salts that cement them. In either case, the soil remains clumpy during the later dry cycle. Mars is thought to change its rotational axis tilt over hundreds of thousands of years, and this could cause wet and dry cycles in the arctic.

**Rock varnish** – Scientists have found bacteria that live in rock varnish, a coating of clay and iron and manganese oxides, which slowly grows on rocks in arid deserts on Earth. The varnish protects the bacteria from ultraviolet light. This suggests that astronomers should look for bacteria in the rock varnish that coats Martian rocks. Images taken by every Mars lander have shown dark material on rocks that appears to be rock varnish.

**Venus Express** has detected the signature of hydrogen (probably from water) being stripped from the day side of the planet. Previous observations saw this on the night side. The solar wind, undeflected by Venus because it has no magnetic field, impinges on the upper atmosphere and carries off particles into space. Because Venus is about the same size as Earth and formed at the same time, it should have about the same amount of water as Earth. But it has 100,000 times less. Likely the newly observed processes stripped most of the water over billions of years.

**THEMIS** (5 spacecraft that study aurora substorms) have discovered a breach in Earth’s magnetic field 10 times larger than anything previously seen. Solar wind flowed through the breach and loaded up the magnetosphere with charged particles. It was even more surprising that the magnetic field bundled in the solar wind that caused the breach was aligned the same as the Earth’s magnetic field, and so should have been repelled. It was thought that only magnetic field in the solar wind that is opposite to the Earth’s field would break open a breach.

**STEREO** (twin solar spacecraft) – Solar flares are the most powerful explosions in the solar system and were believed to destroy everything in their vicinity. However, the STEREO spacecraft have detected intact hydrogen atoms shooting out of a powerful solar flare, which should have been broken up into protons and electrons. The hydrogen atoms were followed about a half hour later by

*(continued on page 10)*



(continued from page 3)

running to around 9:30 p.m. If you have any questions about the group, please feel free to contact Chris Buchen, Lorna Pecoraro, Terry Kirschner or me – or any of the other regulars, such as Don Lynn.

I look forward to seeing you at one of our meetings!

### **New AstroImage SIG Website**

A while back, the members of the OCA AstroImage SIG decided that they needed a separate website to meet the group's needs. Bruce Waddington and Kevin Nelson designed the site and have it up and running and you can find it at <http://www.oc-aisig.org/>.

The aspect of the site that is most used and most visited is the images section, which was probably the most important feature driving development of the new site. The Image Gallery on the OCA website does a good job of showing the imaging talents in our club, but it is limited in the size of files that can be uploaded, which limits the display resolution. The images our imagers are producing have been growing in size and sophistication due to such things as use of cameras with larger chips that produce more data, longer collection times to capture fainter details, and development of mosaics and other techniques for combining images, and they need to be displayed at much higher resolution than can be done on the main OCA website to be fully appreciated.

As you explore the AI SIG site, you'll notice that there's a lot more there than pictures. Some of the other features include providing an easy way to post tutorials and files needed for tutorial sessions for members to download, along with documentation from various presentations at the SIG meetings, a location for people to get comments or advice on problems they were having with a particular image, and a way to share information related to imaging beyond what is done in the AstroImagers@yahoogroups.com email group. The new site does all of these things and more, including agendas for upcoming AI meetings, which are posted about a week before each meeting. For a full description of its features, go to the Using the SIG web site link on the homepage.

The new website is a great addition to the resources available to OCA members, and Bruce and Kevin did a wonderful job in putting it all together. It's well worth visiting regularly, even if you aren't an imager yourself, if only to see the images produced by our imagers in their full glory. I hope you'll visit it often and enjoy it thoroughly! And, if it inspires you with a desire to get involved more with the AI group, that's wonderful too, and you'll be most welcome! ■



*Twin images of Venus obtained on May 31, 2004 by Marc Huber from Oceanside, CA. Marc used an LX10 OTA at f/18 with a Philips TouCam to obtain the image, which was generated by stacking the best 200 of 1200 frames at 30 frames per second. the image on the left is with colors aligned; the image on the right is uncorrected. Venus will present a very similar phase near the end of this month, so be sure to look for it!*

---

**FOR SALE:** brand-new items - 8" F/6 Discovery Optics 1.5" Pyrex Mirror cell; 8" University Optics Alum Mirror Cell; Vega-HP1-1.25" Focuser (Japan Made); Vega-3 Low Profile Helical 2" Focuser; 48 Rini2 Eyepiece in Bolt Case (this item not new but seems to be in good condition. Will sell these items separately for lowest price or as a package for \$200 o/b/o. Contact Doug 562-598-6103

*(continued from page 8)*

the expected broken particles. The best explanation is that the hydrogen was indeed broken up, but the protons recaptured electrons to become hydrogen atoms. Neutral hydrogen atoms can escape the Sun's magnetic field, while the particles that remain broken (and therefore electrically charged) are delayed by the magnetic field, so arrive later at Earth. The questions now are whether the burst of hydrogen atoms is common, and if so, why hasn't it been noticed before? Further observations will be made of powerful solar flares to resolve these.

**Columbia** - NASA released a detailed study of the lessons learned about astronaut survival based on the 2003 Columbia disaster. It includes 30 recommendations for improving crew safety on future flights of the Shuttle and other spacecraft. All the recommendations still would not have made the Columbia disaster survivable, but would do so for lesser space disasters. Recommendations include changes in seat harnesses, helmets, pressure suits, procedures, and structure of space vehicles.

### **Instant AstroSpace Updates**

**Stardust**, having completed its particle sample mission long ago, flew by the Earth January 14, which slingshotted it toward Comet Tempel 1, to further image the damage done to the comet by the Deep Impact mission.

An Air Force satellite monitoring the ionosphere has found that the top of the Earth's **atmosphere** is at the lowest point it has been since the space age began. This is probably a result of being in the quietest period of sunspot activity since more than 50 years ago.

Scientists have detected hydrocarbons called **PAHs** in the cold dust between stars. Previously PAHs have been found near stars.

Astronomers have found the **most distant water** yet seen, in a galaxy so distant that it took 11 billion years for the light to reach us. Observations were made with VLA and a radiotelescope in Germany, and were aided by the gravitational lens of an intervening galaxy, which amplifies the radio light.

Astronomers have obtained **spectra of exoplanets** (including their atmospheres) for the first time from ground-based telescopes (previously only done from space). 2 separate teams accomplished this simultaneously, with different planets, using different telescopes (Herschel in the Canary Islands, UKIRT in Hawaii, and Very Large Telescope in Chile).

Astronauts aboard the International Space Station (ISS) have, during a spacewalk, installed a probe to measure static problems believed to have caused the failures during descent of 2 **Soyuz** vehicles to separate properly from the non-reentry part. Those failures resulted in rough rides that landed far from their targets.

Astronauts aboard ISS celebrated in late December the 40th anniversary of mankind's first trip around the Moon (but without landing), **Apollo 8**.

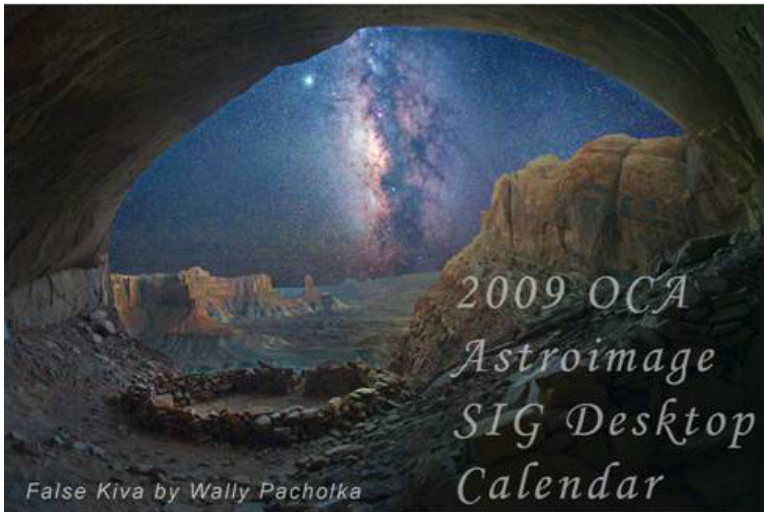
NASA has awarded 2 contracts, to Orbital Sciences and SpaceX, to provide rockets to **resupply** cargo to **ISS** through 2016, beginning next year when the Shuttles no longer fly.

Because the Mars Science Lab was recently postponed 2 years, an Atlas 5 rocket became available, and it will be used to launch **Solar Dynamics Observatory** (SDO), which had been unable to secure a launch within a year after it was to be ready. SDO will continue and improve solar measurements currently being made by SOHO and TRACE, both more than 10 years old.



*Artist's concept of Solar Dynamics Observatory (credit: NASA)*

# 2009 OCA Astroimage SIG Desktop Calendar - Now Available!



With Images by John Sanford, Ray Stann, Larry Gershon, John Castillo, Craig Bobchin, Bruce Waddington, Pat Stoker, Don Lynn, Gary Schones, Dave Snope, Jim Windlinger, Dave Kodama, Bill Patterson, Alan Smallbone and Wally Pacholka!

15 months of images by OCA members to enjoy!



## ONLY \$10!!!

See Charlie Oostdyk at the general meetings, or contact Barbara Toy or Alan Smallbone for information about ordering and picking up at other OCA meetings! Great Gift Idea!



*Snowfall at Anza, December 20, 2008 (Leon Aslan)*

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

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

**RETURN SERVICE REQUESTED**

**DATED MATERIAL  
 DELIVER PROMPTLY**

**HANDY CONTACT LIST**

**CLUB OFFICERS**

President	Barbara Toy	<a href="mailto:btoy@cox.net">btoy@cox.net</a>	714-606-1825
Vice-President	Craig Bobchin	<a href="mailto:ETX_Astro_Boy@sbcglobal.net">ETX_Astro_Boy@sbcglobal.net</a>	714-721-3273
Treasurer	Charlie Oostdyk	<a href="mailto:charlie@ccd.edu">charlie@ccd.edu</a>	714-751-5381
Secretary	Bob Buchheim	<a href="mailto:rbuchheim@earthlink.net">rbuchheim@earthlink.net</a>	949-459-7622
Trustee	Reza AmirArjomand	<a href="mailto:rza@me.com">rza@me.com</a>	949-212-3862
Trustee	Sheryl Benedict	<a href="mailto:Sheryl_Benedict@yahoo.com">Sheryl_Benedict@yahoo.com</a>	714-726-6971
Trustee	Sheila Cassidy	<a href="mailto:rivme@pacbell.net">rivme@pacbell.net</a>	951-360-1199
Trustee	Tom Kucharski	<a href="mailto:TomRigel@aol.com">TomRigel@aol.com</a>	949-348-0230
Trustee	Gary Schones	<a href="mailto:gary378@pacbell.net">gary378@pacbell.net</a>	714-556-8729
Trustee	Steve Short	<a href="mailto:nightskytours@hotmail.com">nightskytours@hotmail.com</a>	714-771-2624
Trustee	Alan Smallbone	<a href="mailto:asmallbone@earthlink.net">asmallbone@earthlink.net</a>	818-237-6293

**COMMITTEES, SUBGROUPS, AND OTHER CLUB VOLUNTEERS**

Anza House Coordinator	Steve/Sandy Condrey	<a href="mailto:OCAAnzaHouse@yahoo.com">OCAAnzaHouse@yahoo.com</a>	951-678-0189
Anza Site Maintenance	Don Lynn	<a href="mailto:donald.lynn@alumni.usc.edu">donald.lynn@alumni.usc.edu</a>	714-775-7238
Beginner's Astronomy Class	David Pearson	<a href="mailto:astrodwp@dslextreme.com">astrodwp@dslextreme.com</a>	949-492-5342
Black Star Canyon Star Parties	Steve Short	<a href="mailto:nightskytours@hotmail.com">nightskytours@hotmail.com</a>	714-771-2624
Explore the Stars - OCA Contact Librarian	Richard Cranston	<a href="mailto:rcransto@ix.netcom.com">rcransto@ix.netcom.com</a>	714-893-8659
Membership, Pad Coordinator	Karen Schnabel	<a href="mailto:karen@schnabel.net">karen@schnabel.net</a>	949-887-9517
Observatory Custodian/Trainer/Member Liaison	Charlie Oostdyk	<a href="mailto:charlie@ccd.edu">charlie@ccd.edu</a>	714-751-5381
OCA Outreach Coordinator	Barbara Toy	<a href="mailto:btoy@cox.net">btoy@cox.net</a>	714-606-1825
Sirius Astronomer Editor	Jim Benet	<a href="mailto:jimbenet@pacbell.net">jimbenet@pacbell.net</a>	714-693-1639
Telescope Loaner Program	Steve Condrey	<a href="mailto:stevecondrey@verizon.net">stevecondrey@verizon.net</a>	951-678-0189
WAA Representative	Mike Myers	<a href="mailto:loanerscopes@twow.com">loanerscopes@twow.com</a>	714-240-8458
Website Coordinator	Tim Hogle	<a href="mailto:TimHogle@aol.com">TimHogle@aol.com</a>	626-357-7770
Website Editor	Rob Carr	<a href="mailto:RCCarr1@excite.com">RCCarr1@excite.com</a>	909-606-1241
	Reza AmirArjomand	<a href="mailto:rza@me.com">rza@me.com</a>	949-212-3862

**SPECIAL INTEREST GROUPS (SIG's)**

Astrolmagers SIG	Alan Smallbone	<a href="mailto:asmallbone@earthlink.net">asmallbone@earthlink.net</a>	818-237-6293
Astrophysics SIG	Chris Buchen	<a href="mailto:buchen@cox.net">buchen@cox.net</a>	949-854-3089
Dark Sky SIG	Barbara Toy	<a href="mailto:btoy@cox.net">btoy@cox.net</a>	714-606-1825
Remote Telescopes	Del Christiansen	<a href="mailto:DelmarChris@earthlink.net">DelmarChris@earthlink.net</a>	714-895-2215
GoTo SIG	Mike Bertin	<a href="mailto:MCB1@aol.com">MCB1@aol.com</a>	949-786-9450