SIRIUS ASTRONOMER

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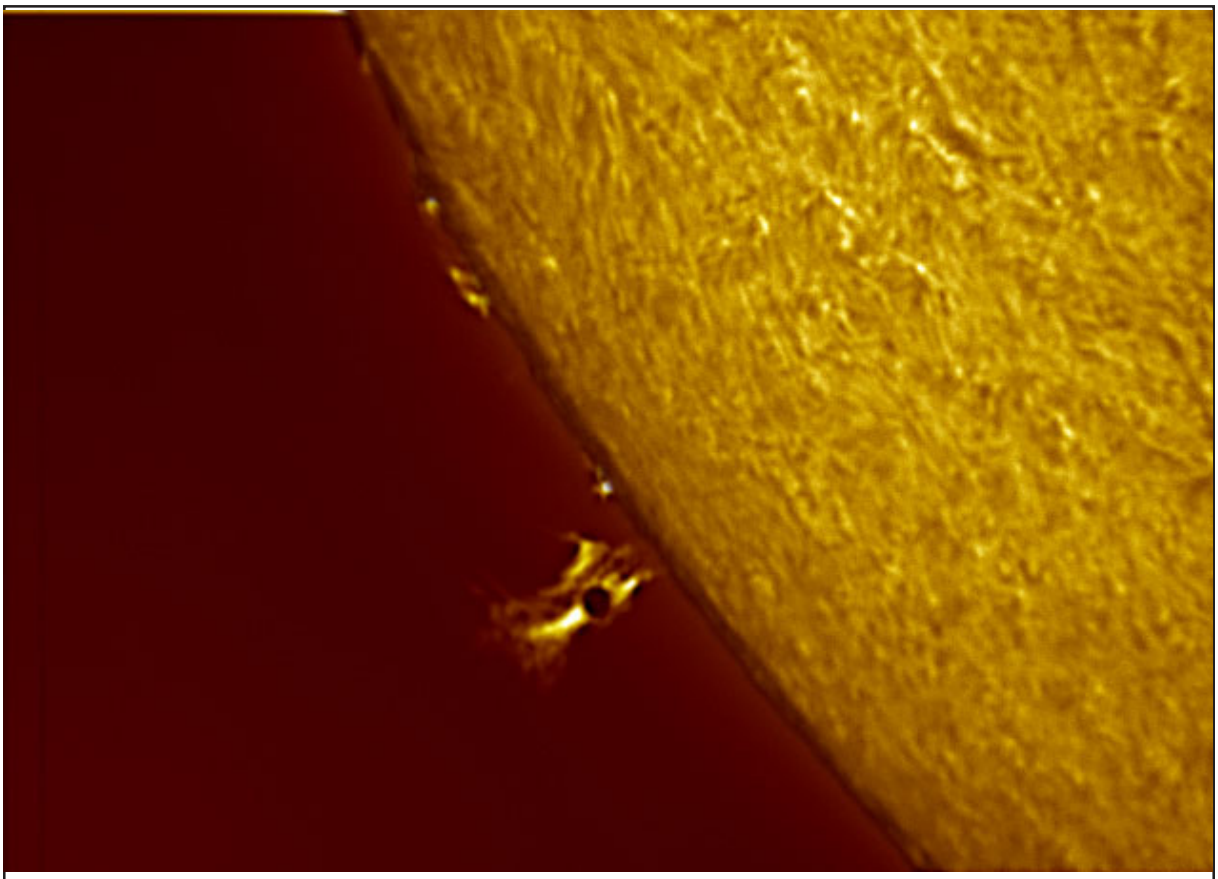

Mercury is captured obscuring a solar prominence about 4 minutes before first contact during its November 8th transit. If you missed this one, you only have to wait until May 2016 for your next opportunity! (photo by Pat Stoker)

OCA CLUB MEETING

The free and open club meeting will be held Friday, December 8th at 7:30 PM in the Irvine Lecture Hall of the Hashinger Science Center at Chapman University in Orange. This month will be our annual Members' Presentation Night. Be sure to hear what your fellow OCA members have been up to!

Next General Meeting: January 12th

STAR PARTIES

The Anza site will be open this month on December 16th. The Black Star Canyon site will be open this month on December 23rd. Members are encouraged to check the website calendar, for the latest updates on star parties and other events.

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

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

COMING UP

The next session of the Beginners Class will be held on Friday, December 1st (and next month on January 5th) at the Centennial Heritage Museum at 3101 West Harvard Street in Santa Ana.
GOTO SIG: TBA (contact coordinator for details)
Astrophysics SIG: Dec. 15th, Jan. TBA
Astro-Imagers SIG: Dec. 19th, Jan. TBA
EOA SIG: Dec. 27th, Jan. TBA
Dark Sky SIG: TBA (contact coordinator for details)

President's Message

By Barbara Toy

Well, it's really winter – as evidenced by the fact that the Winter Solstice is upon us (along with the Holiday Season and all that entails!). I hope all of you have a great time with family and friends for whatever celebrations you indulge in during this time of the year! And, while you're celebrating, please take a few minutes to vote – the OCA elections end with the January general meeting, which is on January 12, 2007. The directions on what to do are on the ballots themselves, so download the ballot from the website (it'll be posted soon after the December general meeting) or get your copy from the January Sirius Astronomer and send it to the address on the ballot or bring it to the January meeting. If all else fails, there will be ballots available at the January meeting, so come to the meeting to vote as well as to enjoy the program!

In keeping with the spirit of the season, here are some recent developments that should bring joy to our astronomical community:

Griffith Observatory Reopens...And LAAS Returns Home!

In case the general publicity has somehow passed you by and you missed Chris Butler's impromptu presentation on the subject, the beautiful, venerable and memory-filled Griffith Observatory has finally reopened after its long renovation. Chris has been very much involved in the process, and advised us to wait two or three months for a lot of the furor to die down – as I write this, there have been stories in all of the local papers about the reopening, at least one TV special and a lot of other TV coverage, etc., etc., sparking a tremendous amount of well-deserved and welcome public interest. This means that there are now crowds of people who want to see the expanded and refurbished observatory and museum right away, so reservations are currently needed, and people need to park down the hill from the observatory and take a shuttle up from the parking lot. This fever-pitch of excitement will undoubtedly die down, and those who wait with a bit more patience will be able to see the New Griffith in a lot more leisurely way and without having to plan for it well in advance.

That was my own game-plan, as I don't really enjoy visiting places like the Griffith in a crush of other people, but I was given the opportunity to visit the observatory as a guest of one of the Los Angeles Astronomical Society members who was going to their first meeting at the Griffith since it reopened. LAAS has a long-standing close relationship with the observatory, and the club's monthly meetings have traditionally been held at the observatory – they shifted their meetings to the observatory's temporary quarters after it closed for the renovation, and were understandably eager to return to the observatory proper when it reopened. Monday, November 13th, was the big night, and 80-plus enthusiastic members of the LAAS and their guests convened at the observatory for their first monthly meeting in the Leonard Nimoy Event Horizon Theater. I'm happy to say that the group included several people who are also OCA members – we have quite a few members who also belong to LAAS and other clubs, and we really benefit from the knowledge and experience they gain from their other memberships (I hope this works both ways!).

The observatory is closed to the general public on Mondays, which meant that parking was a lot easier than it would have been otherwise – we parked on the road just below the observatory and walked in. The observatory itself looked spectacular as we approached, in part because it's a beautiful building, and in part because of the dramatic lighting. The first gathering point for our party was off to the side, where there is a set of wide stairs going down the hillside to the new display area below the main observatory and the grounds in front of it. We had the run of that area before the meeting, and a lot of people continued to explore it after the formal meeting was over – it was well worth it!

If you've heard that the display area, along with the gift shop and other facilities, are underground and have concerns about claustrophobia, you can forget them. These may be underground, but you'd never know it from the entrance or from the areas themselves. The entrance is very open, entered through a courtyard at the foot of the outside stairway and flanked by the gift shop and the cafeteria. The display area inside is an immense open space, dominated by a mural that's two stories high and covers the entire back wall, showing a tiny portion of the Virgo galaxy cluster in a way that's reminiscent of the Hubble Deep Field (though not as deep, of course). The upper level of this room has telescopes for viewing portions of the mural more closely, and scale models of the planets (the set includes Pluto) are mounted along the wall below the telescope area, so you can look at them from above and from below. The lower area has numerous stations covering a variety of astronomical phenomena, and there's a screen to one side of the mural that was running a series of images from the Hubble (the theme was "Wonders of the Universe," but that specific display will probably change frequently). To give you a sense of the size of this area, the theater seats about 150 people, and is located to one side of the display area and is completely surrounded by it.

Well, we wandered around before the meeting got started, but in half an hour only had time to skim the surface of all that's there. It's truly impressive, and I'm looking forward to going back when I'll have more time to explore – and when the upper areas of the observatory and the planetarium are open. However, in addition to the pleasure of seeing at least part of what the Griffith crew has created in the long period the observatory has been closed, we also had an interesting and informative talk by Akkana Peck on observing the moon (including different types of features you can see and comparisons with terrestrial analogs), and the pleasure of seeing one of our neighbor clubs return to its traditional home – truly a wonderful evening!

Besides its monthly meetings at the Griffith, LAAS plays an important part in the Griffith's public star parties. If you've been to

any of those star parties in the past, generally all the telescopes you see in front of the observatory are brought by LAAS volunteers. I remember going to the Griffith in 1994, in the period that the pieces of Comet Shoemaker-Levy hit Jupiter – there were crowds of people wanting to see the spectacle, with more arriving all the time I was there. I was impressed by the telescopes set up on the lawn area in front of the observatory, and by the patience and good will of the people running those telescopes – and was even more impressed when I learned that these were all LAAS volunteers who had brought their own telescopes for interested members of the public to view through. This was long before I got my own first serious telescope, and I had no inkling then that one day I would be a volunteer running a telescope at similar events myself. I still remember those volunteers with gratitude, and I'm glad that they're now able to set up their telescopes again for public viewing in front of the observatory and to help the Griffith introduce people to the wonders of the universe around us.

Astronomers without Borders

At our November general meeting, Mike Simmons gave us another interesting talk about his trips to the Middle East to visit the amateur astronomy community in that area. People who attend our meetings regularly may recall his past talk about visiting amateur astronomers in Iran, and the problems Iranian astronomers have had in obtaining equipment, both because of lack of resources and because they have been cut off from the international market for so long. He had another trip to Iran planned after that talk, and, largely because of the response of a number of OCA members to his talk, he was able to collect several pairs of binoculars and other astronomical equipment to take to the astronomy club in Tehran and to a small town that had built its own public observatory as an enthusiastically-supported town project. Liam Kennedy went on that trip as their official videographer, and, in the talk he gave us after he returned, showed us some great footage of the people he met there and the delighted response of the groups who received the equipment that Mike took over for them.

Mike's most recent trip was to Iraqi Kurdistan, which is the home of what was planned to be a world-class observatory and where there is a small but very active group of amateur astronomers, the Amateur Astronomers Association of Kurdistan (AAAK). Just as the astronomers in Iran had problems obtaining decent viewing and imaging equipment, members of the AAAK have very limited access to decent telescopes and other viewing equipment, even when they have the money to pay for equipment. They have been enthusiastic and innovative in their use of what little equipment they have had, however, and have been determined to make astronomy an important part of Kurdish science and education as they rebuild their society. And, though their access to the West has been limited, they have used the Internet to make contact with astronomers outside of Kurdistan, which, among other things, has led to a strong friendship between one of their members, Rodgar Hamid, and one of our astroimagers, Wally Pacholka. Rodgar first contacted Wally by email in 2004 after seeing some of his work on the Internet, and they have been exchanging emails ever since, some of which Wally has generously shared with me and with others who have an interest in that area.

Plaque presented to OCA by the Amateur Astronomers Associaton of Kurdistan

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AstroSpace Update

December 2006
Gathered by Don Lynn from NASA and other sources

No Lunar Ice – Radio data taken since 1996 has detected high levels of hydrogen at the poles of the Moon. Many astronomers believed this was caused by permanent ice deposits in polar lunar craters, deep enough that Sunlight never hits there. A new radio imaging of the south polar area of the Moon accomplished by transmitting from the Arecibo Telescope in Puerto Rico and receiving at the Byrd Telescope in Green Bank West Virginia, has mapped the suspected hydrogen deposits with greater resolution than before. What was actually detected was polarization in the radio signal that is likely caused by hydrogen. The suspected hydrogen-rich regions do not match up with the shadowed areas, so they are very unlikely to be ice. They do match up with rocky blocky areas around young impact craters. The best theory is that they are some mineral or texture that is created or exposed by impacts. This is bad news for those who wanted to use the ice as a water source for future manned missions to the Moon.

Hubble Space Telescope (HST) – It has long been believed that frequent close encounters between stars will occur in globular clusters, because of the density of stars in them. More massive stars should on average lose speed, and less massive stars gain speed during such encounters. This causes more massive stars to end up orbiting close to the center of the cluster, and less massive stars in the outer regions. In images taken over 7 years, HST was able for the first time to measure movements of stars in a globular cluster (47 Tucanae). New computer analysis techniques had to be developed to measure subpixel movements. Accurate speeds were obtained for 15,000 stars. Of these, 23 were found to be blue stragglers, stars with about twice the mass they should have for their age, which indicates they formed from merging of 2 stars. Statistically the blue stragglers moved more slowly than comparable non-straggler stars (which have half the mass), yielding the first direct observational proof that this sort-by-mass process is actually taking place. The star speeds were also analyzed to see if they indicated a large mass (black hole) might be located at the center of the globular, but the results were negative.

Speaking of HST, NASA announced that a Space Shuttle mission to **service HST** is being planned for mid 2008. A study of the mission concluded that it could be accomplished within safety parameters set after the Columbia disaster. This reverses the decision by the previous head of NASA. The Shuttle crew of 7 has been chosen, and it includes 3 astronauts who have worked on HST before, so they are quite experienced. 5 spacewalks are planned over an 11-day mission. Without the service mission, it is expected that HST will become unusable in a couple of years or so. With the service mission, HST should last until at least 2013, and will have better instruments. This service mission will attempt to repair the broken ultraviolet spectrograph, and add a new spectrograph and camera with capabilities better than those of past instruments. This is in addition to replacing worn out parts such as the gyros, batteries, and one guidance sensor. This decision was a great step forward for science. HST has produced more great astronomy than any other telescope, with the possible exception of Galileo's telescope.

Asteroids and dinosaurs – Paleontologist Gerta Keller and her colleagues studied layers of microfossils and came up with this sequence of events at the end of the Age of Dinosaurs, 65 million years ago: The Deccan volcanism in what is now India added greenhouse gases to the Earth's atmosphere, warming the ocean 3-4 degrees and the land 7-8 degrees. Many marine species adapted by dwarfing, growing less than half their normal size, but mass extinctions did not occur yet. During this warm period the Chicxulub asteroid impact occurred, but mass extinctions still did not occur. Another impact occurred about 300,000 years later, larger than Chicxulub, and that did coincide with mass extinctions. Their conclusion, based on this timeline, is that the Chicxulub impact did not, by itself, cause the mass extinctions that included the dinosaurs. The scientists were not able to locate where the larger and later impact occurred, but they stated there is a little evidence it may have been in India.

M87 gamma rays – Astrophysicists using the HESS gamma-ray telescope in Namibia have discovered highly variable very high energy (VHE) gamma rays coming from the giant galaxy M87. The galaxy has long been known to have a black hole of mass 3 billion times that of the Sun, with jets ejecting particles. Objects known as Blazars are known to emit VHE gamma rays, but that only happens when a jet is aimed at us. The jets in M87 are known to be aimed 30 degrees away from us. So the M87 VHE gamma rays represent a new type of gamma-ray source. The gamma-ray emission is fairly weak, which explains why this type has not been seen before. Other galaxies are smaller or more distant than M87, so such emission would probably be too weak to detect. The variability over days implies that the source in M87 is smaller than our solar system. Anything larger would take longer for light to reach us from all parts of the source, and so could not vary so fast. This size is not much larger than the event horizon of the black hole there. So the source is most likely at the accretion disk surrounding the black hole. The jets themselves, or even features within them, are too large to be the source. The mechanism for the disk or its surroundings to create VHE gamma rays is not known. In case you were wondering how a gamma-ray telescope functions on the surface of the Earth, when our atmosphere absorbs gamma rays, this telescope uses the atmosphere itself as the gamma-ray detector.

Spitzer (infrared space telescope) has imaged 2 quasars, that is, supermassive black holes at the centers galaxies that are consuming great quantities of matter. The true brightness of the 2 quasars is hidden by large amounts of dust in visible light, but the brightness can be measured in infrared and X-rays (using Chandra observations). Both quasars were found to be giving off so much energy from the material falling in that they should blow the rest of the dust away soon (cosmically soon). Each is consuming more than the Sun's mass every week. They are among the most dust-obscured black holes known.

Spitzer was able to determine the mass and rough age of 2 **extremely distant galaxies** first seen in the Hubble Ultra Deep Field image. The (infrared) light left the galaxies when the Universe was only 700 million years old (5% of its current age), and are the most distant for which detailed physical characteristics have been measured. They were between 50 and 300 million years old

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Radio Astronomy

By Doug Millar, EdD

Solar Observing

One of the differences between radio and optical astronomy is that in radio astronomy one observes changes in level, essentially. One looks for signals emitted by objects and then either records the level or, by scanning the object with the antenna, builds up a picture, much like a TV set does. While that may sound boring compared to the splendor of visual astronomy, it can still be a challenge and provide good information.

When doing solar observing in hydrogen alpha, we usually have a web site open on current solar activity. That is because we also monitor changes in the ionosphere at 60khz. When there is a coronal mass ejection (CME) it effects the ionosphere and the low frequency signals that use it. So it is a useful adjunct. The main website for activity is the following: http://www.lmsal.com/solarsoft/latest_events/ Solar Soft shows the output of a number of solar observatories. It also runs a tape of the level of current and recent activity solar. It looks like CME's happen rhythmically and several smaller ones usually precede larger ones. So it is worth keeping an eye on the site. In addition it gives a standard value to the disturbances which allows you to quantify your data. Unlike much of astronomy, solar activity is constantly changing and constantly interesting.

Here is a picture of my current 60khz solar radio telescope and clock. Its loop antenna and preamp are outside. Probably half of what it does is also done in an "Atomic" wristwatch. That is, one of the results of the two lower boxes is a six digit display of the current time! However the receiver's frequency is 10,000 times more accurate.

The top white box is a wide range receiver in the very low frequency spectrum (0-60khz). The second box from the top is a digital clock that reads the time from the bottom box. The bottom is a Spectracom frequency comparator with an internal frequency standard. The paper tape coming out on the right side records the difference between the radio's received frequency and the internal standard. When the ionosphere is disturbed, that disturbance in the comparison shows up quite clearly. Of course the time is also recorded so that the event can be tracked. I have also hooked up an automatic data acquisition recorder made by DATAQ in place of the paper tape "display" to record the comparison disturbances. They are only $50 or so and convert the analogue signal from the radio to a digital format and present it on the computer in a moving chart format. Files can be saved and analyzed later. Not only don't you have to buy rolls of paper, you can leave the computer on and only save the interesting parts. Dataq's are at: http://www.dataq.com/products/startkit/di148.htm . They are very handy for lots of uses. It is basically a little two by two inch box with screw terminals on one side and a USB connector on the other. They supply an excellent and complete display and analysis program that will work on most computers. It is inexpensive, versatile and easy to use. You can also use the box to record the output of weather instruments.

If want further information, or if you have questions, feel free to email me at dmillar@moonlink.net.

Next month: Listening to Jupiter and the earth.

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then, and had masses only about 1% of what our Milky Way has today. Calculations were made to see if such galaxies were energetic enough to ionize the hydrogen of the Universe, but they are insufficient. Essentially all the hydrogen in the Universe was known to have become ionized about this time. One possibility is that the combined glow of smaller galaxies, those too dim to be imaged in the Hubble Ultra Deep Field, could be sufficiently energetic to have caused the ionization.

Layered supernova – It has long been theorized that supernova explosions should blow off individually the various layers of the exploding star. These layers each consist of a different element that resulted from the nuclear fusion occurring in the central densest part of the star, which in time proceeds through consuming hydrogen, then helium, etc. Some of the layers have been found in previous observations of the remnants surrounding supernovas, but the failure to find all layers cast some doubt on the theory. New observations of the supernova remnant Cassiopeia A using Spitzer have found the remaining layers. The problem was that each layer is ejected with a different speed, so some layers collide, which makes them glow brightly and so are easily found, but other layers do not collide and are much cooler. Using infrared the cooler layers were found.

Hole in a circumstellar disk – Using adaptive infrared optics on the Subaru Telescope in Hawaii, astronomers imaged the disk about a young star 320 light-years away and found that it has a hole in the center about the size of Saturn's orbit. Theoretically, after planets form in a disk about a young star, the center of the disk should clear out. The problem is that there are 3 competing theories to explain this clearing. Only one of the theories can produce a hole the size of the one imaged. That theory is that light from the star ionizes the disk material, which then escapes. This observation is the first clear evidence for that theory, and against the other 2 theories: that the disk is cleared by the star's magnetosphere or by sublimation.

Mars rover Spirit celebrated its 1000th Mars day (1027th Earth day) on the planet in late October, far exceeding its planned mission of 90 Mars days. All parts are working well except one wheel that won't turn, but dragging it has been working for months. It leaves funny tracks, though. It is still parked on a Sun-facing slope to prevent generating too little solar power to sustain operations during the winter. It is planned to resume driving soon as the Sun moves higher with approaching spring. Spirit recently completed its most detailed image yet – a stereo 360-degree panorama taken with every filter on board with the highest resolution cameras.

Messenger (Mercury mission) made a flyby of Venus in late October, which changed its orbit to get closer to that of Mercury. Because Venus was behind the Sun as seen from Earth, interfering with radio transmission, no observations of Venus were made by the spacecraft. But observations will be made next June on the next flyby. The first Mercury flyby will be January 2008, but it will not go into orbit about the planet until the approach of March 2011. 3 flybys of Mercury are needed to change the spacecraft's orbit such that it will approach the planet at a velocity within the range of the orbit rocket engine. The mission will image the entire planet and collect detailed information on the composition of its crust, its geologic history, its very thin atmosphere and magnetosphere, and the makeup of its core and polar materials. Only one spacecraft has ever visited Mercury, and it saw only half of the planet.

WISE (Infrared space telescope) was given the go-ahead by NASA to be constructed, for launch in 2009. It will survey the entire sky over 7 months, with 500 times the sensitivity of the previous all-sky infrared survey made in 1983. It is expected to locate many nearby brown dwarfs (stars without enough mass to sustain nuclear fusion) and extremely distant galaxies, both of which are best seen in infrared. Quite likely a lot of surprises will be found too.

Discovery missions – NASA has approved concept studies for the following missions in its Discovery series. It is planned to approve one or more of these missions to be built after a year of studies. OSIRIS would survey an asteroid and return a sample from its surface. Vesper would study Venus's atmospheric composition and dynamics. GRAIL would gravity map the Moon to determine its interior structure.

Extended missions – NASA has approved an extended mission for Deep Impact. The flyby portion of the spacecraft will be sent to another comet (Boethin) to image its nucleus. The impacter portion of Deep Impact was destroyed (intentionally) upon hitting Comet Tempel 1. Astronomers have been surprised at the differences between the few comets seen closely, and are anxious to see more comets to scope how much variety exists. NASA is studying 2 other extended missions, which may be approved soon: Using the Deep Impact camera to search for planets orbiting other stars; using the Stardust spacecraft (which has also finished its mission) to visit Comet Tempel 1 to see if it changed any since Deep Impact flew by.

COROT, a European spacecraft, is scheduled to launch in December. It has a camera that is extremely sensitive to changes in light level. It has dual functions, one optimized to detect a planet transiting (moving in front of) its star, the other to measure sound waves in the surface of a star. COROT has a dual mission: to search for extra-solar planets, and to perform astroseismology on a variety of sizes and types of stars. Astroseismology has allowed us to determine internal structure and motions of the Sun. COROT should allow us to do the same for stars. In its role as planet finder, it should be so sensitive that it can detect planets even smaller than the Earth. The transit method of finding planets, as performed by previous equipment, has never been so sensitive to small changes in light, and so has not been able to find planets smaller than about Jupiter sized. The COROT telescope is only 12 inches in diameter, but has what may be the best baffle system ever made. COROT stands for COnvection ROtation and Transit.

Bacteria have been discovered deep in a gold mine in South Africa that live on hydrogen and sulfur generated by radioactive decay of Uranium and other elements. They are living in a salty sulfury hot high-pressure aquifer that apparently has been out of contact with the surface of the Earth for several million years. They would probably thrive in salty aquifers believed to lie beneath the

surface of Mars. A small laboratory is being built 2.3 miles below the surface to learn more about the bacteria. What is learned should help our search for life on Mars.

Helium mystery solved – Scientists running 3-D simulations of evolving stars on supercomputers have solved a long-standing mystery. It was long ago calculated how much ^{3}He (the light isotope of helium) was created in the minutes after the Big Bang. Measurements of ^{3}He in space agreed well with that number. The problem is that stars should be creating ^{3}He, which is spewed out into space during the red giant phase of the star's life, adding an easily measurable increase to the Big Bang amount. The new supercomputer simulation showed that during the time a star is creating ^{3}He, bubbles poor in ^{3}He float to the surface of a star, allowing ^{3}He to sink lower within the star, where it is fused to other products. Thus most is destroyed and not added to the interstellar space.

Instant AstroSpace Updates

Spitzer (infrared space telescope) has discovered a new dust ring deep within the Andromeda galaxy, which appears to be a product of M32 (a small satellite galaxy) crashing through Andromeda about 210 million years ago. The collision caused only a couple of ripples in the larger galaxy, but must have stripped about half the mass out of the smaller one.

A researcher has found that water solutions of Epsom salts, which are known to freeze at much lower temperatures than water, when thawed create channels and **gullies** similar to those seen on Mars. This could explain how such gullies could form on Mars in geologically recent times, even though water appears to have been scarce on Mars for a very long time.

The **STEREO** mission, a pair of spacecraft to study the Sun in 3-D, particularly coronal mass ejections, using 16 instruments each, was launched in late October on a single Delta rocket. The pair will individually slingshot by the Moon to attain positions ahead and behind the Earth in its orbit about the Sun.

Call for Observations: **Dec 13/14 Geminid meteor impacts on the lunar surface**

by Bob Buchheim

The annual Geminid meteor shower peaks on the night of December 13/14. The Geminids are one of the year's most reliable meteor showers, presenting up to 60 meteors/hour if you are observing under a dark, clear sky.

As most of you already know, a meteor is a tiny grain of interplanetary debris. When it collides with our atmosphere (at hypervelocity), the resulting air drag and heating vaporizes the little dust-mote or sand-grain, and creates a thin tube of ionized gas in the upper atmosphere. It is the glow of this ionized gas that we see as the flash of a "shooting star" in the sky overhead. We earthbound astronomers see meteors because we are protected by our atmosphere. Now, suppose that you were on the Moon: what would happen during a meteor shower? There's no atmosphere, so there would be no "shooting stars" in the night sky. The particles wouldn't be visible until they slammed into the lunar surface. That they do, indeed, hit the Moon is attested by the evidence from the Apollo lunar seismic stations, which recorded about one sizable impact per day. So, what would we expect to see if we stood on the Moon? The (typical) smaller meteoroids would presumably cause little puffs in the surface dust when they hit. The (occasional) larger ones might make "micro-craters". Even a pebble-size impactor carries an impressive load of kinetic energy when it's traveling at 70 km/sec (the relative velocity of the Geminid stream). It is reasonable to guess that when such an object hits the lunar surface, some of its energy will be converted to radiation, and that some of that radiation will fall in the visible spectrum. That is, meteor impacts on the Moon ought to make little "flashes". Such flashes have, indeed, been observed from Earth, both visually and on video recordings. In order to better understand their statistics, more observations are needed. It turns out that this year's Geminid meteor shower offers an excellent opportunity to monitor the lunar surface for impact flashes. In the predawn hours, the "dark side" of the rising crescent Moon will be facing toward the Geminid meteor stream.

The best way to conduct this observation is with a video camera connected to your telescope (the sort of small video camera that some of you use for monitoring occultations will work perfectly, as will a web-cam). Point your setup so that you can record the "dark side" of the Moon, with no interference from the brightly-lit portions. You want to be able to detect earthshine-lit features on the Moon's dark side, so that you'll be able to identify the location of any flashes that you record. If your camera has an AGC, turn it off (you want maximum sensitivity). If you have a shortwave radio, tune it to WWV (10, 15 or 20 Mhz) and record the time ticks onto the audio channel of your video recorder. If you don't have a shortwave receiver, cobble up some other way to put accurate time markers onto the video record – even if it's as low-tech as accurately setting a digital clock, and then saying precise times into your microphone every few minutes. In order to correlate your observations with those of other observers, your need to be able to report the time of any suspected flashes to within a few seconds.

Evaluating your videotaped record will be a meticulous effort – the typical impact flash is about 5th magnitude (or fainter), and it lasts for only a couple of video frames. It may be best to digitize the video so that you can play it back at very slow speed, and then do a frame-by-frame evaluation of suspected flashes. The reason that it is important to have many observers in a project like this is that there are quite a few common sources of "false alarms": cosmic rays, satellite glints, sporadic meteors in our own atmosphere, etc. If two or more observers record a "flash" at the same time, at the same location on the lunar surface, then most sources of false alarm can be ruled out, and the flash is declared to be a "confirmed" event.You'll probably be up watching the meteors anyway, so how about contributing to a unique science project, by pressing your video camera and telescope into service as well? The Association of Lunar and Planetary Observers (ALPO) coordinates amateur observations of lunar impact flashes. You can get more information, and see examples of video recordings of lunar impact flashes at *http://www.lpl.arizona.edu/alpo/*.

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Mike was originally going to Kurdistan last spring, and the main official reason for the trip was to do an article on what has happened to the Iraqi National Observatory, which was nearing completion when construction stopped during the Iran-Iraq war (as he showed us, the dome has been seriously damaged by a couple of missile strikes, but the concrete structure is intact, though stripped of anything usable. The hope is to refurbish it and obtain a new telescope instead of trying to use the one originally ordered for that observatory). His trip had to be postponed several times, but he finally was able to go in October. From what he saw while there, Kurdistan is an island of peace in war-torn Iraq, with its own government and security forces. Since he was able to fly directly to Kurdistan without stopping elsewhere in Iraq, he reported that he did not feel he was in any particular danger during his trip, in spite of the war and sectarian violence affecting major portions of Iraq.

When his trip was set up in the spring, members of the AAAK managed to raise about $800, and asked Mike if he could buy them a telescope with these funds. When Mike put the word out to the local astronomy community, he was delighted when several people came forward with offers of telescopes as well as other equipment, more than he could use on this trip because of the limits on what he could take with him. The response to his request for help was so positive that Mike decided to move ahead with a project he had been thinking about since his last trip to Iran – an organization that would collect astronomical equipment and other donations to help astronomers in areas that don't have access to the telescopes and other equipment we are used to here and in the other more developed parts of the world.

This organization is "Astronomers Without Borders," and he has started the process to have it incorporated. I am not sure whether it will be a charitable nonprofit or educational nonprofit, but any donations will be tax deductible. From Mike's experience traveling in different countries in the Middle East, the experiences of those, such as Liam Kennedy, who have traveled with him, and the experiences of others traveling in other parts of the world, astronomy truly is a universal interest, crossing all cultures. As has been said before, we all share the same sky – in the Middle East, this is literally true, as we are located at about the same latitude – and helping our fellow astronomers in other countries can truly help build bridges between different cultures in a contentious world. When you moved on to other interests within our hobby or upgrade your equipment, wouldn't it be nice to know that equipment that is no longer useful to you can help other, less fortunate astronomers in other parts of the world to explore the sky and inspire interest in a subject we all enjoy? Astronomers Without Borders can help us all achieve that.

For more information about Astronomers Without Borders, including information about making donations or otherwise helping out with this exciting project, please email Mike Simmons at msimm@ucla.edu. And at the next general meeting you attend, please be sure to look at the beautiful "thank you" plaque that Mike presented to OCA on behalf of the Amateur Astronomers Association of Kurdistan for the assistance our members have given them – the picture doesn't really do it justice!

In Closing …

Some other positive developments I should mention are that things are moving forward on the new development at Anza (though more slowly than we were hoping), with the observatory roof project, and with fine-tuning the Kuhn, among other things – more details will be coming. We're looking forward to a busy and exciting year in 2007 – which just happens to mark the 40th anniversary of when our club got started. We're open to suggestions on ways to celebrate this milestone, so let me know what ideas you have (email them to btoy@cox.net). And, to help give us the resources we need to continue with all of our programs and to improve on them, remember that the fundraising program through eBay is still going on – so, as you clean things out to start the new year off right or look for possible tax deductions for 2006, please think about what you can turn over to Larry McManus that he might be able to sell to raise funds for the club.

Best holiday wishes to all of you and your loved ones!

FOR SALE: Meade 5" f9.3 refractor with a Celestron CG-5 computerized mount. Includes: polar finderscope, 2" dielectric diagonal; 2" 26mm wide angle eyepiece; 8X50 finder, all rings and mounting hardware with counterweights and case; MV-20 11/4" filter; Cheshire eyepiece and soft case for tube assembly included. All in excellent condition. Contact Val Akins (949) 855-9018 Asking price; $775

ASSISTANCE NEEDED in tracking down telescope donated to OCA in the 1980's by Josephine Webster. The telescope was built by George Webster and is a refractor with hand-ground lenses. If anyone has any information on the condition or wherabouts of this instrument, please contact Donna Zernick at dzernick@thuntek.net

PAD LICENSE FOR SALE: 10 Pad alley, 2nd pad from the East, in a low traffic spot - ideal for astroimaging. Includes shelter wall, shelf, and storage cabinets. Excellent custom made 10" SocalAstro aluminum pier, powdercoated white, electrical outlets. Pier is set up to accept any mount with appropriate adapter plate. I am asking for what I paid for it. Please call Ashton at 714-904-9212 or 714-281-8076

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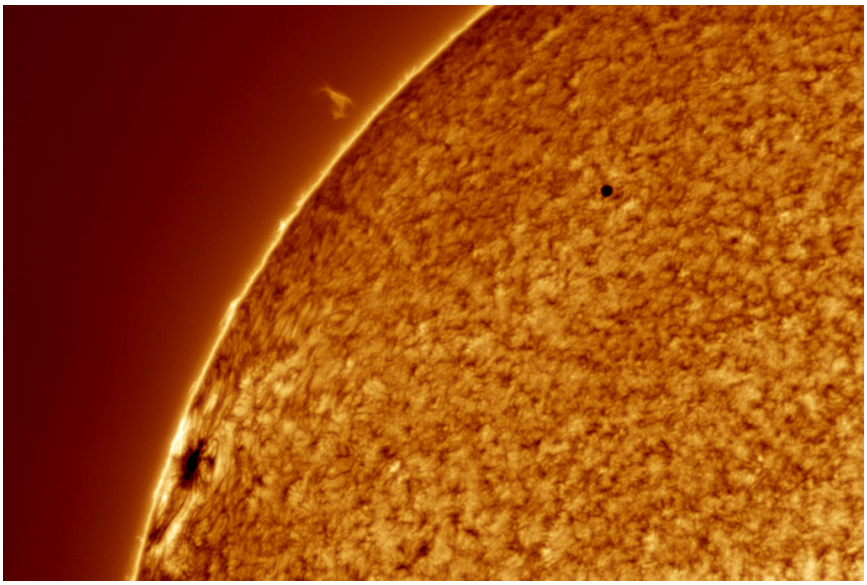
OCA Views of the Mercury Transit (11/8/06):

Mercury's orbit took it across the face of the sun as seen from our area on Earth on Wednesday, November 8, 2006 – a fairly rare event, but it happens more often than with Venus. Many of our members viewed this transit, several imaged it (or tried to), and several shared their experiences by email. The following exchange is from our AstroImagers email list (AstroImagers@yahoogroups.com):

Pat Stoker: I hope that many of you were able to image the Mercury transit today. I'm looking forward to seeing the images. I managed to shoot quite a few myself, but I think the most unusual is this one. It shows Mercury transiting a prominence on the southeastern limb about 4-5 minutes before making 1st contact with the limb. http://www.ocastronomers.org/astroimages/album.asp?ID=4308 [*Editor's note: Pat's picture is this month's cover photo*]

Alan Smallbone: Awesome image, Pat. I took half a day off of work, got home, setup the solar scope, looked at the transit, setup for imaging and the fog rolled in so fast it was not funny, and then it cleared up shortly after the transit was over. Oh well, at least I got to view some of it.

Cameran Ashraf: Well I hope that many of you got a chance to observe the transit of Mercury the other day! It was really a spectacular event and I was glued to the eyepiece. I had taken the day off work and skipped class (promised my professor I'd send him a picture) so here it is: http://www.heliographic.net/html/sun/110806/110806_merctransit.htm. The seeing was rough where I was but I think the image came out ok.



Cameran Ashraf's Mercury transit photo

Kyle Coker: Cameran and Pat, you both scored big on those shots. I may have to get into this Ha sport someday. Let's see, solar vs. nebulae: don't get tired, don't get cold, don't have to wait for a dark moon, don't have to leave my back yard, don't have to ask who I'm talking to in the dark, don't need a cooled camera, don't need dark frames, … Maybe I'm just slow. [Editor's Note: "Ha" refers to hydrogen alpha, a specific wavelength; both Pat and Cameran took their images through hydrogen alpha filters.]

Pat Stoker: Kyle, I think you pretty much summed up the attraction of Ha Solar imaging. A couple of other things worth mentioning, no need for a large scope or apo refractor. I feel a 4" f/9 refractor is ideal for the type of seeing we usually have in our area. The subject you are imaging changes daily, sometimes within minutes. It seems there is always something new to image. And best of all, no need for long drives to try and get away from the light pollution.

This account was from one of our outreach volunteers:

Don McClelland: Just wanted to share with you the exciting time I had at the Biola University recently. A couple of weeks ago I e-mailed Dr. Bloom of their Science Dept. and notified him of the upcoming Mercury transit of the Sun and offered to bring my telescopes (Questar, PST). Of course he was delighted and I showed up on campus Wednesday Nov. 8th and what a turnout. Literally hundreds of people showed up to see the transit and Dr. Bloom assisted with the huge crowd. It was one of the longest outreaches I ever did and I enjoyed every minute of it. I was there from 11am to 4pm.

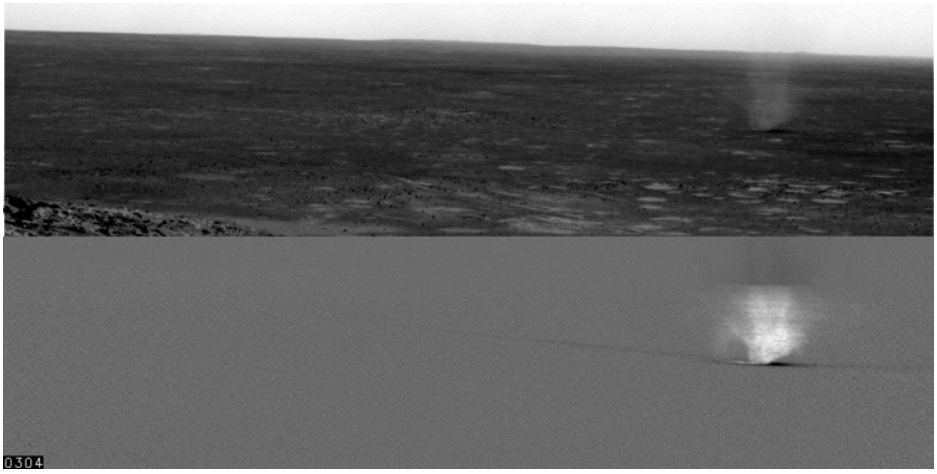
And Tom Drouet, who is a member of LAAS as well as OCA, participated in the LAAS outreach in front of the Griffith Observatory for the transit, and was shown on the coverage of the transit on Channels 2, 9 and 11.

All in all, it was a great event – we hope you had a chance to see it at least part of it for yourself!

Martian Devils

by Dr. Tony Phillips

Admit it. Whenever you see a new picture of Mars beamed back by Spirit or Opportunity, you scan the rocks to check for things peeking out of the shadows. A pair of quivering green antennas, perhaps, or a little furry creature crouched on five legs…? Looking for Martians is such a guilty pleasure. Well, you can imagine the thrill in 2004 when scientists were checking some of those pictures and they *did* see something leap out. It skittered across the rocky floor of Gusev Crater and quickly disappeared. But it wasn't a Martian; Spirit had photographed a dust devil!



The top half of this image is part of a series of images of a passing dust devil on Mars caught by Spirit. In the bottom half, the image has been filtered to remove everything that did not change from one image to the other. Notice the faint track left by the dust devil. Credit NASA/JPL/Mark T. Lemmon, Univ. of Arizona Lunar and Planetary Laboratory.

Dust devils are tornadoes of dust. On a planet like Mars which is literally covered with dust, and where it never rains, dust devils are an important form of weather. Some Martian dust devils grow almost as tall as Mt. Everest, and researchers suspect they're crackling with static electricity—a form of "Martian lightning."

NASA is keen to learn more. How strong are the winds? Do dust devils carry a charge? When does "devil season" begin—and end? Astronauts are going to want to know the answers before they set foot on the red planet. The problem is, these dusty twisters can be devilishly difficult to catch. Most images of Martian dust devils have been taken by accident, while the rovers were looking for other things. This catch-as-catch-can approach limits what researchers can learn. No more! The two rovers have just gotten a boost of artificial intelligence to help them recognize and photograph dust devils. It comes in the form of new software, uploaded in July and activated in September 2006.

"This software is based on techniques developed and tested as part of the NASA New Millennium Program's Space Technology 6 project. Testing was done in Earth orbit onboard the EO-1 (Earth Observing-1) satellite," says Steve Chien, supervisor of JPL's Artificial Intelligence Group. Scientists using EO-1 data were especially interested in dynamic events such as volcanoes erupting or sea ice breaking apart. So Chien and colleagues programmed the satellite to notice change. It worked beautifully: "We measured a 100-fold increase in science results for transient events."

Now that the techniques have been tested in Earth orbit, they are ready to help Spirit and Opportunity catch dust devils—or anything else that moves—on Mars. "If we saw Martians, that would be great," laughs Chien. Even scientists have their guilty pleasures. Find out more about the Space Technology 6 "Autonomous Sciencecraft" technology experiment at nmp.nasa.gov/st6/TECHNOLOGY/sciencecraft_tech.html, and the use of the technology on the Mars Rovers at nmp.nasa.gov/TECHNOLOGY/infusion.html. Kids can visit spaceplace.nasa.gov/en/kids/nmp_action.shtml and do a New Millennium Program-like test at home to see if a familiar material would work well in space.

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

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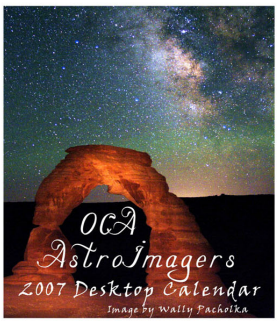

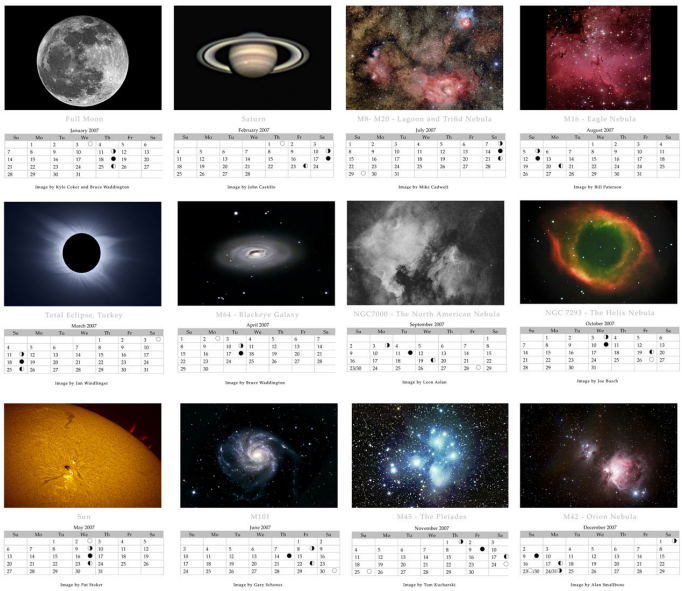

Images by Wally Pacholka, Kyle Coker , Bruce Waddington, John Castillo, Jim Windlinger, Pat Stoker, Gary Schones, Mike Cadwell, Bill Patterson, Leon Aslan, Joe Busch, Tom Kucharski, and Alan Smallbone.

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Trustee	Leon Aslan	leon@socalastro.com	562-305-6455
Trustee	Steve Condrey	SiriusAstronomer@OCAstronomers.org	951-471-0153
COMMITTEES, SUBGROUPS, AND OTHER CLUB VOLUNTEERS			
Press Contact	Russell Sipe	russell@sipe.com	714-281-0651
Sirius Astronomer Editor	Steve Condrey	SiriusAstronomer@OCAstronomers.org	951-471-0153
Web Management Team	Hassi Norlen	hassi@norlens.net	714-710-9444
	Hari Dudani	hdudani@cox.net	949-495-9129
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