SIRIUS ASTRONOMER

www.ocastronomers.org

The Newsletter of the Orange County Astronomers

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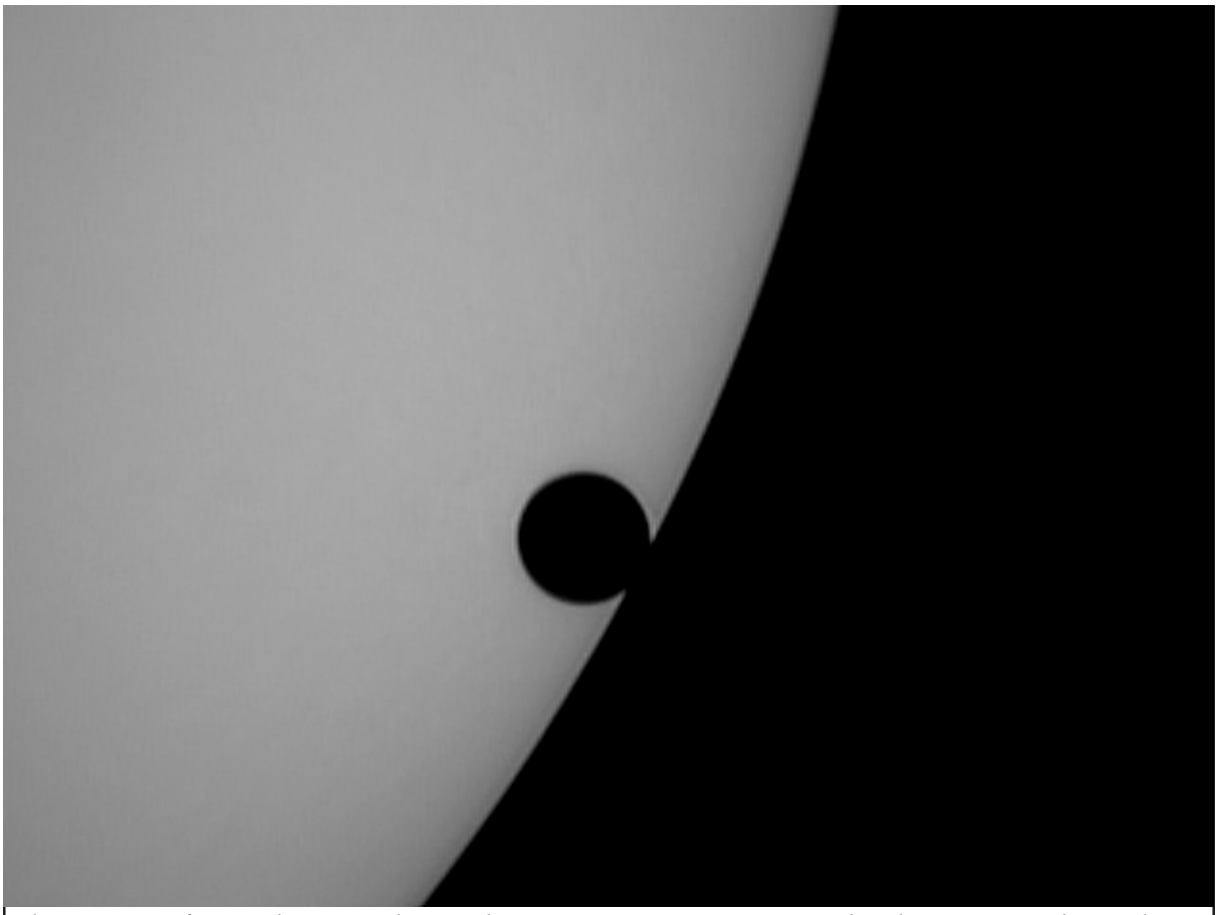


This picture of second contact during the recent Venus transit was taken by OCA member Lubomir Cizek from Mikulcice, Czech Republic using a Meade 8" f/10 LX200 with 15mm Super Plössl eyepiece, and Canon G3 digital camera (1/100s, 5fps, 320X240). (Milan Bohunsky, Lubomir Cizek)

OCA CLUB MEETING

The free and open club meeting will be held Friday, September 10th at 7:30 PM in the Irvine Lecture Hall of the Hashinger Science Center at Chapman University in Orange. The featured speaker this month is OCA's own Larry McDavid, offering a fascinating presentation on sundials.

STAR PARTIES

The Black Star Canyon site will be open this month on September 18th. The Anza site will be open September 11th. Members are encouraged to check the website calendar, for the latest updates on star parties and other events.

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

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

COMING UP

The next session of the Beginners Class will be held on Friday September 3rd (and next month on October 1st) at the Centennial Heritage Museum (formerly the Discovery Museum of Orange County) at 3101 West Harvard Street in Santa Ana.

GOTO SIG: TBA (contact coordinator for details)

Astro-Imagers SIG: Sept. 21st, Oct. 19th

EOA SIG: Sept. 27th, Oct. 25th

Astrophysics SIG: Sept. 17th, Oct. 15th

President's Message
By Barbara Toy

Here it is September already – our very eventful summer's over, a new school year's beginning, the holidays will soon be upon us… Among other changes marking the this transition, Explore the Stars and our other regular summer outreach programs are winding down and our programs with the schools are starting up, the summer constellations are further to the west each night, and the winter constellations are rising earlier. And soon, at least at Anza, very hot days and comfortable nights will give way to more comfortable days and colder nights – so it'll soon be time to break out the layers of warm clothing for nights out under the stars!

Fire Update:
I'm writing this the day after the August Anza star party, and I'm happy to report that sprouts are starting to come up from the roots of a lot of our burned vegetation. By the time you see this, the area of our Anza site that burned should look a lot greener – living proof that the native plants are adapted to cope with regular fires. Unfortunately, this year seems to be putting a lot more of the local vegetation to the test than usual – and we still have a lot of fire season still to come! Even though, because of our fire, a lot of the fuel that had built up on our site is now gone, we need to be vigilant to minimize the risk of additional fire damage.

To help with this, there are a couple of Anza site rules to remember: No open fires on the site, and no smoking except inside your car (and, of course, all ashes and butts need to be kept inside your car). To help remind people, Matt Ota has generously arranged for some custom signs, which you should see posted at several points around the site in the next few weeks.

Board Concerns:
Our next Board meeting is on September 26 at 5:30 p.m., with our usual potluck starting at 5:00. I have a couple of reasons for bringing this to your attention – one is that, as I told the people present at the August general meeting, we have two major problems out at Anza that we need to take care of, both of them expensive. The fire left two sides of our property open to easy access from almost any point on the adjoining roads, and also made it much easier to see what's on our site from the road. The fencing that was there in the past was in bad shape before the fire, and is now completely gone. Before the fire, the vegetation in that section of the property was quite dense and provided a natural barrier; now that it's gone, we need to fence that part of the property, a project that will cost several thousand dollars. The other big project is the replacement of the roll-off roof on the observatory, which is in extremely poor shape. We are planning to replace it with a metal roof, which would be a lot lighter than the current roof and also more fire-resistant and rodent-resistant, a project that is also expected to cost several thousand dollars.

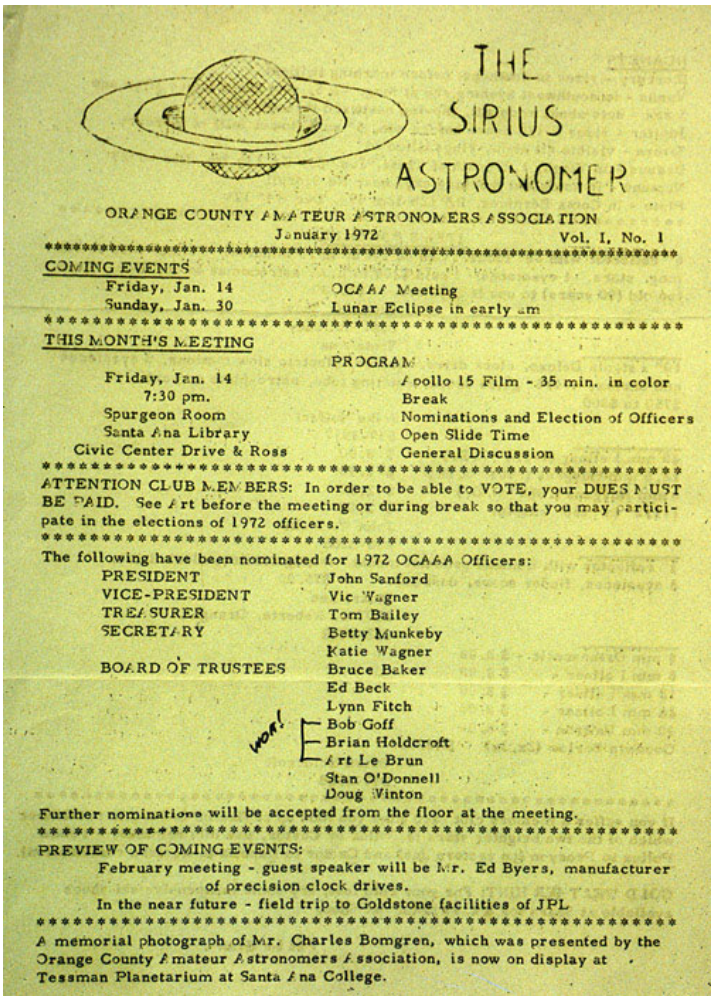
We expect to have more information about both proposals and better cost projections by the time of the September Board meeting. We need to move on both of these quickly, so we need to decide what we're going to do in both of these areas and how we're going to fund what's approved. Obviously, if you have any concerns about this, you should plan on attending the meeting.

The other reason for bringing this to your attention is that this is the last Board meeting before we start the nomination process for the 2005 Board. If you have any concerns about how the club is being run, or if you are thinking even remotely of running for the Board (we welcome more candidates!), you should attend to see first-hand what goes on at the meetings and to voice any concerns you have about anything on the agenda or provide any information you have that might help the Board reach a better, more informed decision.

As I have said repeatedly, all members are welcome to attend these meetings, but you need to let me or Bob Buchheim know in advance that you intend to be there, as Bob's employer, Lockheed Martin, is generously providing us with a conference room for our meetings, and advance notice of who is going to attend is one of the conditions for our use of the facility.

A Stroll Through Some OCA History…
You may recall that we are now developing an OCA Archive, with Jon Bearscove as our official Archivist. In case you want to contact him about donating records, pictures, or other things that might be appropriate for the Archive, his email address is j.yoon@cox.net. I'm the back-up contact, and, as a result, have had a bunch of ancient club documents turned over to me, especially old issues of the Sirius Astronomer. It would be a pity to be given these things and never look at them – so I did, and found them quite a treasure trove!
I was first struck by the changing face of the newsletter. The earliest version is "Number 1 (August 1970)," and was titled "OCAAA Notices." The club was originally the Orange County Amateur Astronomers Association, and was incorporated as an educational non-profit corporation under that name in 1972. The name was changed to its current form by amendment to the

Articles of Incorporation on November 1, 1974. The logo on the first issue was a hand-drawn stylized drawing of two hills that intersect near the center of the page, with stars drawn in above them. The second issue was called the "OCAAA Newsletter," and that name was generally followed after that. It had a logo of a hand-drawn representation of Saturn with three stars, which was used until April, 1971, when things became a lot more varied – several issues had unique drawings at the top, some had no drawing or logo at all, some returned to the Saturn-and-three-stars logo.



THE SIRIUS ASTRONOMER

ORANGE COUNTY AMATEUR ASTRONOMERS ASSOCIATION
January 1972 Vol. I, No. 1

COMING EVENTS

Friday, Jan. 14	OCAAA Meeting
Sunday, Jan. 30	Lunar Eclipse in early am

THIS MONTH'S MEETING

	PROGRAM
Friday, Jan. 14	Apollo 15 Film - 35 min. in color
7:30 pm.	Break
Spurgeon Room	Nominations and Election of Officers
Santa Ana Library	Open Slide Time
Civic Center Drive & Ross	General Discussion

ATTENTION CLUB MEMBERS: In order to be able to VOTE, your DUES MUST BE PAID. See Art before the meeting or during break so that you may participate in the elections of 1972 officers.

The following have been nominated for 1972 OCAAA Officers:

PRESIDENT	John Sanford
VICE-PRESIDENT	Vic Wagner
TREASURER	Tom Bailey
SECRETARY	Betty Munkeby
	Katie Wagner
BOARD OF TRUSTEES	Bruce Baker
	Ed Beck
	Lynn Fitch
	Bob Goff
	Brian Holdcroft
	Art Le Brun
	Stan O'Donnell
	Doug Vinton

Further nominations will be accepted from the floor at the meeting.

PREVIEW OF COMING EVENTS:
February meeting - guest speaker will be Mr. Ed Byers, manufacturer of precision clock drives.
In the near future - field trip to Goldstone facilities of JPL

A memorial photograph of Mr. Charles Bomgren, which was presented by the Orange County Amateur Astronomers Association, is now on display at Tessman Planetarium at Santa Ana College.

As of December, 1971, the logo settled down to varying renditions (all hand-drawn) of Saturn with the rings partially open. With the January, 1972, issue, the name of the publication changed to The Sirius Astronomer, with the Saturn drawing appearing to the left of the name. Then, with the January, 1974, issue, Saturn migrated to the back of the publication, which was obviously meant to be folded, stapled and mailed – but, unlike the current version, the format was a set of 8½ by 11-inch pages stapled in the left top corner, sometimes single-sided and sometimes double-sided. Then, in March 1974, our familiar stylized galaxy logo began to appear – also on the back of the publication. Finally, in November, 1975, our galaxy logo migrated to the front side, where it appeared between "Sirius" and "Astronomer," which were now usually in typeface instead of being hand-printed. In January, 1978, the newsletter switched to a booklet form, made by folding several 8½ by 14-inch pages in half, and it continued that way until at least November, 1987, the last issue in this collection.

Sometimes the editor is identified, but generally not in the early issues. John Sanford appears repeatedly as a columnist, speaker, seminar or mini-course instructor, editor, and officer (President, Vice President, and many years as Correspondence Secretary). Paul Alexander became the editor in March, 1975, Alfred Lilge became editor in March, 1980, and Phillip Goodwin in January, 1981. John Sanford became editor again in April, 1982, and was still the editor as of the last issue in this set. I don't know if that continued throughout the 90's, but I know he was the editor at the time he retired and headed off into the Sierras to build Starhome, when Chris McGill took over that position.

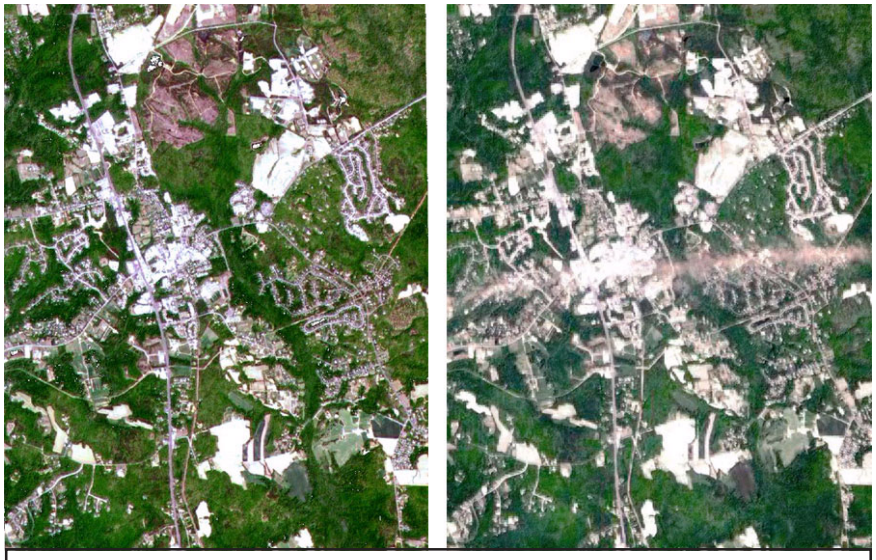
There are many different activities reported in the pages of these early journals, and some we might want to consider doing in the future (I like the idea of the "mini-courses," which seem to have been quite a success – though I don't know if any actually were taught other than John Sanford's photography classes). There were special trips, such as to Mt. Laguna to look for the Guggenshein. There were outreach events at malls, events where people were charged some amount to look through a telescope as a fund-raiser, and, of course, talks, conferences, work parties and star parties.

For me, there was a special bit of joy in a notice in the January 1974 issue, stating that Bill Hornaday was going to speak on "Building an Observatory"; his observatory is described as having "a 23 foot dome and a 16½" scope." Bill lived across the street from us during the '70's and early '80's , and was the first serious amateur astronomer I ever knew, the first person I knew who had his own observatory, the first person I knew who was excited about getting a mirror blank and grinding his own mirror, the first person I knew who was an eclipse-chaser – we all thought he was crazy. I remember vividly how excited he was when he was hired by JPL to work on what is now the Hubble (he made it clear to us later that he had nothing to do with the optics) – it was the perfect joining of his personal and professional interests. Alas, I never saw his observatory out by Big Bear, nor the telescope he and his friends built with the mirror blank he showed us so proudly. I lost touch with him when he moved out of the area, which was long before I got into observing myself. I expect he would think it remarkably funny if he knew what I've been doing with the club these last few years. If you somehow happen to see this, Bill – thanks for sharing your enthusiasm with us, all those years ago!

The moral of the story is – share your interests! You never know when or how the seeds you plant will bear fruit, but shared enthusiasm can certainly help ignite interest, sometimes in the most surprising people!

Resisting Retirement: Earth Observing 1

by Patrick L. Barry



These images, made from EO-1 data, are of La Plata, Maryland, before and after a tornado swept through May 1, 2002.

The Hubble Space Telescope isn't the only satellite that scientists have fought to keep alive beyond its scheduled retirement. Scientists also went to bat for a satellite called EO-1, short for Earth Observing 1, back in 2001 when the end of its one-year mission was looming.

The motivation in both cases was similar: like Hubble, EO-1 represents a "quantum leap" over its predecessors. Losing EO-1 would have been a great loss for the scientific community. EO-1, which gazes back at Earth's surface instead of out at the stars, provides about 20 times more detail about the spectrum of light reflecting from the landscape below than other Earth-watching satellites, such as Landsat 7.

That spectral information is important, because as sunlight reflects off forests and crops and waterways, the caldron of chemicals within these objects leave their "fingerprints" in the light's spectrum of colors. Analyzing that spectrum is a powerful way for scientists to study the environment and assess its health, whether it's measuring nitrate fertilizers polluting a lake or a calcium deficiency stressing acres of wheat fields.

Landsat 7 measures only 8 points along the spectrum; in contrast, EO-1 measures 220 points (with wavelengths between 0.4 to 2.5 μm) thanks to the prototype Hyperion "hyperspectral" sensor onboard. That means that EO-1 can detect much more subtle fingerprints than Landsat and reveal a more complete picture of the chemicals that comprise the environment.

As a NASA New Millennium Program mission, the original purpose for EO-1 was just to "test drive" this next-generation Hyperion sensor and other cutting-edge satellite technologies, so that future satellites could use the technologies without the risk of flying them for the first time. It was never meant to be a science data-gathering mission.

But it has become one. "We were the only hyperspectral sensor flying in space, so it was advantageous to keep us up there," says Dr. Thomas Brakke, EO-1 Mission Deputy Scientist at NASA's Goddard Space Flight Center.

Now, almost three years after it was scheduled to be de-orbited, EO-1 is still collecting valuable data about our planet's natural ecosystems. Scientists have begun more than a dozen environmental studies to take advantage of EO-1's extended mission. Topics range from mapping harmful invasive plant species to documenting the impacts of cattle grazing in Argentina to monitoring bush fires in Australia.

Not bad for a satellite in retirement.

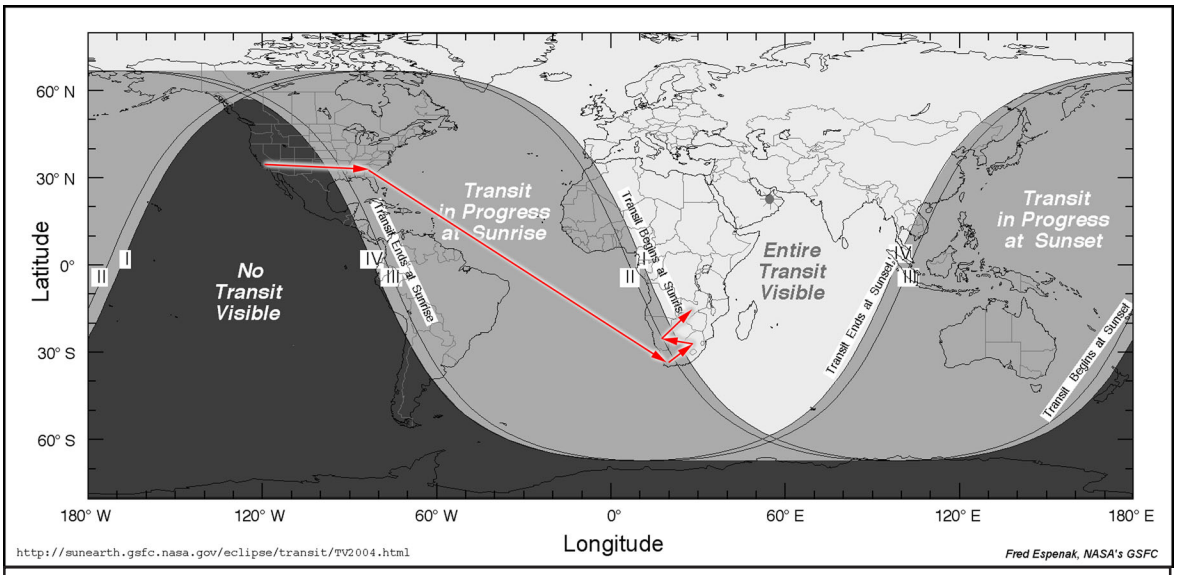
Read about EO1 at eo1.gsfc.nasa.gov. See sample EO-1 images at http://eo1.usgs.gov/samples.php. Budding young astronomers can learn more at spaceplace.nasa.gov/eo1_1.htm.

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

Astronomy To Go:
African Adventure – A Venus Transit Report
by Dave Kodama

It had been 46 very long hours since we left our last hotel, and finally we were home! The final long leg had been a long succession of airplanes and airports, but now my wife and I could finally reflect on a 3-week trip to the southern part of Africa.

The trip had been intended primarily as a chance to view the June 8th transit of Venus, which really gave us a choice of viewing site that included a rather large part of the world (see map below). A conventional choice would have perhaps been somewhere in Europe or the Mediterranean. But given the expense and effort of going so far away, we decided to extend the trip and go to southern Africa to see a part of the world we had not seen before. Of course, since we would



Getting to the transit viewing site involved going through Atlanta, Cape Town and Johannesburg, South Africa, Windhoek, Namibia, and Lusaka, Zambia, with conventional sightseeing along the way, of course. The return trip included an additional stop in the Cape Verde Islands for refueling.

already be taking scopes and cameras, I also couldn't pass up the opportunity for really doing some night-time astronomy from the southern hemisphere.

So our trip evolved into a 3-part adventure. For part 1, we traveled in South Africa and Namibia, taking in the conventional sights such as the great African scenery and wildlife you see in travel magazines. Part 2 was the viewing of the transit itself from Zambia, where the entire transit would be visible. Part 3 was an extended stay in Namibia for night-sky viewing. For this trip we traveled with Twilight Tours (OCA member Joel Harris' group) because of its comfortably small size and previous experience at the observing site in Zambia, where the group had been in 2001 to see a solar eclipse. As a bonus, it turned out that Dr. Ed Krupp from the Griffith Planetarium was on the trip. Dr. Krupp provided a wealth of amusing background commentary during the trip! A second bonus to us came in the form of Greg and Vicki Buchwald, who are experienced eclipse chasers and regular visitors to the Namibian observing site, insuring smooth sailing during the 3rd part of the trip.

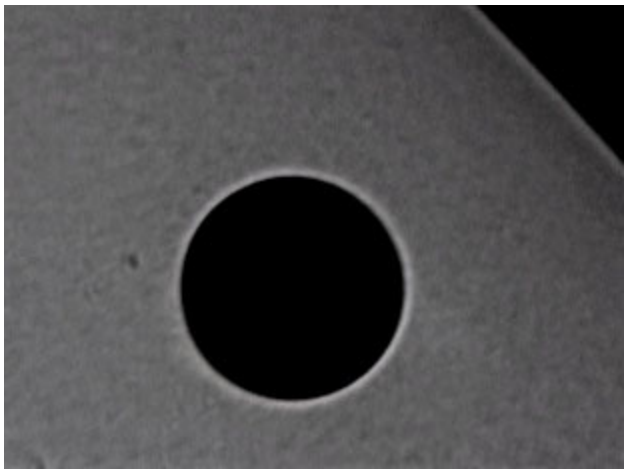
Packing for the trip was primarily, and not unexpectedly, the challenging task of trying to stuff 100 lbs of luggage into a 10 pound sack. Aside from normal travel items, we needed to pack astronomical equipment (telescopes, mounts, cameras) as well as cold weather clothing as it was nearly winter in the southern hemisphere. The inventory of astronomy-related equipment included:
(continued on page 7)

Spectacular Indian Cove sky on night of meteor shower Aug 11, 2004 showing Milky Way mixed with clouds (Wally Pacholka)

About Our Speaker

Larry McDavid has long been interested in the history and design of sundials and is an active member of the North American Sundial Society. He is also a deep sky observer and maintains a permanent telescope pad at the Orange County Astronomers dark sky site at Anza. Larry chases eclipses and has traveled to distant locations to observe six solar eclipses.

Larry is a mechanical engineer and worked as Engineering Manager for Beckman Instruments, TRW and Molex for over 30 years. Larry has managed the development of Martian life detection instruments, Earth-orbiting instruments that detected the arctic ozone hole and medical monitors that enhanced the survival rate for very premature babies. Larry currently manages engineering for automotive airbag crash sensors and other position sensors and holds seven patents for sensor devices.



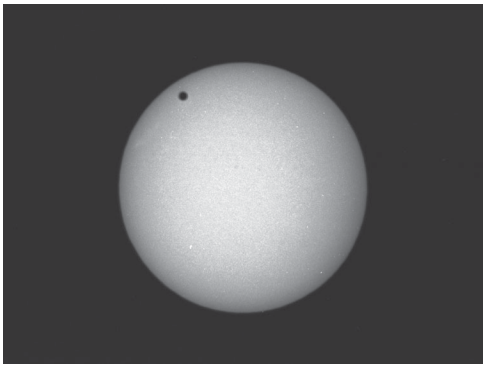
Another picture of Venus by Lubomir Cizek. The granulation seen in the solar disk is real but the atmosphere effect observed around Venus' disk is in question. Taken from Mikulcice, Czech Republic with Meade 8" f/10 LX200, 9.7mm Super Plössl eyepiece, and Canon G3 digital camera (1/1000s, 5fps, 320X240). (Milan Bohunsky, Lubomir Cizek)

(continued from page 5)

- 4" Borg refractor with f/4 focal reducer
- 3" Borg refractor
- 45mm Borg refractor
- Hutech alt-az mount with electric slow motion controls
- Equatorial camera tracker (Kenko Sky Memo)
- 2 Nikon 35mm film camera backs
- 35-50mm and 50-210mm Nikon zoom lenses
- 2x teleconverter
- Sony D8 format digital video camera
- Sony 5-megapixel pocket camera
- 20 GB hard disk storage unit for digital photos
- Planet town 6x7cm vacuum camera with vacuum pump
- Pentax 105mm medium format lens
- SBIG STV autoguider

Not shown in the photo are cameras, mounts, tripods, cold-weather clothing, film, and many other items! I estimate that the total weight was 90-100 lbs, including our normal travel items. Greg Buchwald saved me a probable additional 100 lbs by allowing me to use his Losmandy G11 mount and 220VAC power supply, which he had taken to the Namibian observing site on previous trips!

Why so much equipment? The short answer was my desire to not just view, but to also do photography during our trip. The solar (Venus transit) observing necessitated some special items such as the smallest Borg scope, used in combination with the video camera. Night-sky astrophotography required other special items such as the medium format vacuum camera and autoguider. But in most cases, each item did double-duty during at least two of the three parts of our trip. In addition, the use of light-weight scopes and other equipment that could be disassembled into small sections helped greatly in our packing.



So how did the trip go? We had good weather, with pleasant temperatures (and no bugs!) for a great trip for the regular tourist activities in South Africa and Namibia. The night-sky observing adventure is the subject of another write-up, but in short, astronomically, all went just about as well as I had hoped. We viewed the transit of Venus successfully except for a few minutes of clouds in the middle and very end of the transit (we did not see contact IV).

Visually, Venus was barely visible to the unaided (but filtered) eye. Seeing was not at its best, but I think this might have enhanced the black drop effect in magnified views. I can certainly now understand why accurate timings of the contacts could not be done on previous transit expeditions. Magnified views of Venus were subject to so much seeing distortion that I couldn't be sure of the contact times to less than 10 seconds. Photographically, the transit was not interesting in an aesthetic sense, but I was happy to be able to capture it nonetheless and it was exciting to watch it in person.

For more photos from the trip, see my web page at http://www.eanet.com/kodama/astro/2004/africa/ and stay tuned for a report of night-sky observing from Namibia.

ASTROSPACE UPDATE

September 2004
Gathered by Don Lynn from NASA and other sources

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

Cassini (Saturn mission) has continued its study of the Saturn system. The radio and plasma experiments detected lightning dramatically different from the lightning found by the Voyager spacecraft about 20 years ago. Now the lightning varies greatly from day to day, suggesting short storms, in the mid to high latitudes. That of 20 years ago came from storms lasting months at low latitudes. The difference is probably due to temperature changes caused by the different location of the shadow on the planet of the rings. The magnetospheric imaging instrument discovered a new radiation belt just above Saturn's cloud tops, extending up to the inner edge of the D-ring. Theory had predicted that the rings should prevent radiation from moving into this position. The infrared mapping spectrometer captured a rather strong glow from methane and carbon monoxide on both the day and night side of Titan. Only the daytime emission had been expected. Cassini has taken images of moons Hyperion, Titan, Rhea, Iapetus, Dione, Mimas and Tethys, the structure of clouds on the planet.

Sloan Digital Sky Survey has analyzed the spectra of 3000 distant quasars to determine how much hydrogen gas lies along each line of sight, and at what distance the clouds of hydrogen are found. The distribution of hydrogen is affected by many of the cosmological properties, so these can be calculated from this analysis. The results are that 1) Inflation theory is strongly supported, though some competing theories are not eliminated, 2) the mass of the lightest neutrino is less than twice the difference in mass of the various types of neutrinos, 3) there is no second massive family of neutrinos, as some theories suggest, 4) dark energy (the theorized cause of the acceleration of the expansion of the Universe) exists, and has not changed measurably over time.

Integral (European gamma-ray observatory) and **XMM-Newton** (European X-ray observatory) were used to observe the black hole at the center of a Seyfert galaxy in various wavelengths. The results match a theory that says that black holes in the centers of galaxies each have a doughnut of material around them, outside the accretion disk. This doughnut explains why the accretion disk just outside some black holes seem to emit much more radiation than others do, since the doughnut can obscure this radiation if it is oriented along our line of sight.

Cluster (4 magnetosphere spacecraft) has discovered how solar particles penetrate the Earth's magnetosphere. The spacecraft discovered large vortices at the edges of the magnetosphere that trap particles from the Sun and drive them through the Earth's magnetic field. It had been a mystery how particles tunneled down to Earth during the half of the solar sunspot cycle when the Sun's and Earth's magnetic fields are the same direction. The vortices are believed to form when flows of particles slide past each other at different speeds.

Spicules, those supersonic jets that dart across the low atmosphere of the Sun, have apparently been explained finally. They have been observed since 1877, and there are over 100,000 of them visible at any time. A computer simulation of the surface of the Sun has produced results that match high-resolution images of spicules taken by the Swedish 1-meter Solar Telescope and SOHO (orbiting solar observatory). Spicules were found to be often periodic, reoccurring about every 5 minutes. Sound waves at the surface of the Sun have about this same period. These sound waves are usually damped by the layer above where they form, but sometimes the sound waves manage to penetrate the damping layer, and that is when spicules form.

Integral (European gamma-ray observatory) discovered last December the closest gamma-ray burst that has yet been measured, only 1.3 billion light-years away. Even though it was much closer, it did not appear brighter than more distant ones, so the latest analysis is that it represents a new class of less energetic gamma-ray bursts. Now astronomers are asking if this new class of burst could possibly be as common as the others, but go unnoticed because they are too weak to be detected at greater distances.

Antimatter - Experiments at the Stanford Linear Accelerator have shown that the anti-B meson decays faster than the B meson. Differences in the behavior of subatomic particles and their antiparticles are extremely rare. It has long been theorized that such differences must explain why the Universe is principally made of matter, not anti-matter, even though the Big Bang should have created equal amounts of matter and anti-matter. But the known differences in anti-matter behavior were too small to explain the amount of matter existing in our Universe.

Star Mass – Astronomers have directly measured the mass of a single star (not multiple) for the first time, other than our Sun. The method was to analyze the color, brightness and timing of gravitational lensing as the star passed in front of a more distant star. Since the distance, brightness and color of the star affect the lensing, these had to be determined separately (by Hubble Space Telescope observations) and entered into the analysis. The result is that the star is about 1 tenth the mass of our Sun. The Space Interferometry Mission scheduled to launch in 2009 should be able to use the same technique on more than 200 stars.

Dust Disk - A dust disk has been discovered, using adaptive optics on the Keck Telescopes in Hawaii, around the star AU Microscopii, only 33 light years away, the nearest dust disk outside the Solar system. Since it is closest, we are able to get more detailed images than other dust disks, and so may find more about how these form and evolve. The disk is unusual because it is around a young star (only about 12 million years old), and it has uneven lumpy areas, which probably indicate the star has planets that stir up the dust. Those planets could still be in the process of formation, since the star is so young.

Mars Rover Opportunity has descended deeper into the crater Endurance, since safe paths nearer the bottom have been found. Engineers believe they can safely visit the edges of a dune field at the bottom, boulders, and the base of a cliff. Several deeper layers of rock have been analyzed, representing older geological history, and differences have been found. The deeper layers have more chlorine in them. Opportunity investigated a row of sharp teeth-like features dubbed "Razorback".

Mars Rover Spirit has climbed partway up the Columbia Hills. Both rovers have lasted more than double their original designed mission of 90 Martian days. Spirit has had some problems commanding the spectrometers, and Opportunity problems with the microscopic camera, and engineers are working on plans to get them operating correctly again. Spirit has been using a combination of running backwards on 5 wheels, but using 6 on the steepest spots, to deal with its sticky wheel problem. Heating the wheel, trying to redistribute the lubricant and resting the wheel did not improve its stickiness. Spirit has traveled over 2.2 miles, about 6 times what it was designed for.

Spitzer (infrared) **Space Telescope** has resolved clusters of very distant galaxies, seeing them as they were when the light left them early in the history of the Universe. The clusters were discovered with the Maxwell submillimeter telescope in Hawaii in 1995, but it was unable to resolve the various galaxies, and measure which were distant and which were foreground objects. Efforts since then in other wavelengths of light had been hampered by dust obscuring the view, but infrared was found to penetrate this. Radio telescopes penetrated the dust, but had insufficient sensitivity to observe the distant galaxies. Spitzer was able to detect most of the galaxies in only 10-minute exposures.

Globular Clusters - A study of 14 large globular clusters orbiting the galaxy Centaurus A has shown that they more closely resemble the nucleus of a dwarf galaxy than they do a star cluster. This has prompted a new theory that globulars might form, not as star clusters, but as dwarf galaxies, then later have their outer stars stripped away during encounters with more massive galaxies, leaving only the nucleus. This theory is also supported by the recent discovery of a black hole at the center of a large globular orbiting the Andromeda Galaxy. That black hole matches the characteristics of those found at the centers of galaxies.

Genesis is scheduled to land September 8 with its sample of particles of solar wind. Helicopters with hooks are to snag its parachute in midair over Utah to prevent a hard landing. This is the first sample from beyond Earth to be returned since the Soviet lunar samples in the 1970s.

Dwarf Galaxies - Astronomers using the Japanese Subaru Telescope located in Hawaii have discovered that the dwarf irregular galaxy Leo A has a definite disk structure and an extended halo of stars with a sharp cutoff. It had been thought that such characteristics were limited to larger galaxies, and were the result of galaxy growth by accumulating smaller galaxies. Dwarf irregulars were thought to have formed with less structure, and remained relatively unchanged since the first galaxies formed early in the history of the Universe. This discovery will cause theorists to rethink galaxy formation.

Black Holes - For about 30 years Stephen Hawking, along with many other physicists, has believed that matter falling into a black hole loses all its properties except for mass, charge and spin. In a reversal, he has now announced that the particles that leak out of black holes, through a quantum process, may retain other properties of the material that previously fell into the black hole.

XMM-Newton (European X-ray observatory) has detected a small (70 yards across) bright spot on the surface of the neutron star called Geminga, 500 light-years away. Geminga is about 13 miles across, has 1.5 times the mass of the Sun, and is spinning 4 times per second. It was already known to throw particles out into space, forming tails that stream behind it. The newly discovered hot spot is believed to be where some of the thrown particles fall back onto the surface, heating it to about 2 million degrees, much hotter than the normal half a million degrees.

Brown Dwarfs – The first pair of widely separated brown dwarfs orbiting each other has been discovered, using the 6.5 meter Magellan Telescopes in Chile. All previously known brown dwarf pairs have been quite close. The new pair could not have undergone a gravity slingshot from encountering a massive star without breaking up the pair. One of the leading theories of brown dwarf formation is that they undergo a gravity slingshot out of their formation area before they acquire enough mass to become a full-fledged star. This theory loses a lot of credence with the new discovery.

Solar System formation - Study of the properties of the known systems of planets (over 100 planets) shows that none of them have these characteristics that our Solar System has: most planets' orbits quite circular, giant planets at considerable distance from their star. Theorists are considering that this may mean that all of the extrasolar planets we have found formed in a different way than the Solar System. This could mean that Earth-like planets, which might support life, could be quite rare. It is also possible that our methods of discovering extrasolar planets may simply not be sensitive enough to detect systems like our Solar System, so further study with more sensitive instruments is needed.

Galileo (Jupiter mission) - Analysis of Galileo data continues long after the spacecraft dove into the planet. The latest discovery is that the path Galileo took when encountering the moon Ganymede indicates that it has a lumpy interior, probably rocks mixed in with the ice layers. There are no surface features visible at the locations of higher gravity, so it is known that the lumps of higher density are in the interior, but it is not known how deep. This is the first discovery of higher density areas in a moon since the mass concentrations found on our own Moon by the Lunar Orbiter back in the 1960s.

Hubble Space Telescope (HST) - The imaging spectrograph on HST has stopped working. It was originally designed to last at least 5 years, and has operated for 7. It is believed a servicing mission (which was cancelled) could get the spectrograph working again by replacing its power supply. The infrared spectrometer and 2 cameras are working fine. Major discoveries that have been made with the imaging spectrograph include: 1) independent confirmation of the age of the universe by finding the coolest and hence oldest white dwarf stars that exist in our galaxy; 2) an efficient census of galaxies to catalog supermassive black holes. The fraction of galaxies that prove to contain a central massive black hole has proven to be surprisingly large; 3) made the first-ever measurements of the chemical composition of the atmosphere of an extrasolar planet; 4) Saw the magnetic "footprints" of the Jovian satellites in Jupiter aurora, and made clear images of Saturn's aurora; 5) studied the dynamics of circumstellar disks, the region around young stars where planets may form; 6) found the first evidence of the high-speed collision of gas in the recent supernova remnant SN1987A.

NASA head O'Keefe is seriously considering a **robotic repair mission** to replace failed and aging parts on HST, including its rechargeable batteries and gyroscopes. He is asking Congress for up to $1.6 billion to finance developing and flying the mission. There is some skepticism whether robotic techniques can be advanced quickly enough to perform the precisions tasks needed to replace these parts before HST fails from old age, predicted to happen about 2007-2008.

Instant AstroSpace Updates:

NASA has invited the public to inspect its archives of the Martian surface and suggest targets for high-resolution images to be taken by the **Mars Reconnaissance Orbiter**, to be launched next year.

NASA has tested in vacuum chambers the deployment of 2 test models of **solar sails**, one with a coiled-up boom, the other an inflatable boom. NASA has ignored solar sail technology until recently, since a sail mission in the 1980s was canceled.

NASA has reduced to 9 the candidates for the next **Origins Program** missions. They include a survey of a billion stars in the Milky Way, measuring the distribution of distant galaxies, study dust and gas between galaxies, and an optical/ultraviolet space telescope to replace the Hubble.

The Very Large Telescope in Chile, while taking a spectrum of a distant supernova, captured a **meteor** in the field of view, resulting in probably the best spectrum ever taken of a meteor. The meteor is noticeably out of focus because it was only 60 miles away, not at infinity, for which the telescope was focused.

For the first time a pair of **stars** moving fast has been tracked back to the cluster that it was **ejected** from by the explosion of a supernova. The pair consists of an ordinary star orbiting either a neutron star or black hole, and left cluster IC 1805 about 1.7 million years ago.

The European Space Agency is considering a mission, to be called **Don Quijote**, which would try to alter an asteroid's orbit by smashing a mass into it, so we would know how to do that in the event that some future asteroid is found to be on collision course with Earth.

NASA has narrowed the field of proposed new missions for the **New Frontiers Program** to these: 2 robotic landers targeted at our Moon's south pole, with samples returned to Earth, and a polar orbiter for Jupiter, to study atmosphere, magnetic field, and the planet's interior.

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The publishers will send expiration notices to all current club subscribers about November 1st even if you renew through the club. It takes the publishers a few weeks to process renewals.

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

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

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

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

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