SIRIUS ASTRONOMER

www.ocastronomers.org

The Newsletter of the Orange County Astronomers

January 2008 *Free to members, subscriptions $12 for 12 issues* **Volume 35, Number 1**

OCA Board Election This Month! Make Your Vote Count!

Snowfall at Anza on December 8, 2007. Many thanks to Dave Radosevich and his crew for getting the observatory roof (seen in distance) up in time for this special event! (photo credit: Don Lynn)

OCA CLUB MEETING

The free and open club meeting will be held Friday, January 11th at 7:30 PM in the Irvine Lecture Hall of the Hashinger Science Center at Chapman University in Orange. The speaker and topic are yet to be announced as of press time.

Next General Meeting: February 8th

STAR PARTIES

The Anza site will be open this month on January 5th. The Black Star Canyon site will be open again on January 12th. 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, January 4th (with a Basics of Astrophotography class February 1st) at the Centennial Heritage Museum at 3101 West Harvard Street in Santa Ana.
GOTO SIG: TBA (contact coordinator for details)
Astrophysics SIG: Jan. 18th, Feb. 15th
Astro-Imagers SIG: Jan. 15th, Feb. 19th
EOA SIG: Jan. 23rd, Feb. 27th
Dark Sky SIG: TBA (contact coordinator for details)

President's Message
By Barbara Toy

Although different cultures may celebrate the beginning of the new year at different times, in most cultures it seems that the start of each year marks a time of reflection on the year just past and hope for a better year to come. Reflecting on our year just past – 2007 was a great year for OCA, and saw the completion of some important projects that have been hanging over us for a long time. Thanks to the hard work of David Radosevich, Jim Hannum, John Kerns and many others, the roll-off roof on the club Observatory has finally been replaced. Thanks to Gary Schones, who came up with the plan and oversaw the work, the new roof on Anza house was completed before the first major rains in December. And thanks to the persistence and very hard work of Don Lynn over many months, the perimeter fence around our Anza site has also been completed.

For the future, one of our biggest concerns is the development of the "Northwest Territory," the large section in the northwest part of our site that has not yet been graded or otherwise developed. The current round of the planning process has been going on for more than three years now, and is still ongoing. The longest delays in this project been due to the planning process – there's been so much construction in Riverside County in the last few years that finding people to draw the necessary plans and then getting them approved by the County Planning Department has been a much slower process than any of us expected. On the brighter side, with the current downturn in construction, we are hoping that getting plans drawn and approved in the future will be much faster. The grading plans for the initial phase of the development should be finalized and ready for submission to County in the next few months; if they are approved, we would be able to get a permit to begin grading and also get a solid estimate of the cost of the initial phase of the grading.

Another long-standing project that we expect will be fully online in 2008 and ready for more general use is the club's remote-controlled telescope, which is housed in the small clamshell observatory at the west end of Anza House. This should expand our outreach capabilities by allowing us to provide images to classes and groups back in Orange County or even overseas at close to real-time over the Internet. It will also allow people to control the telescope and take images from inside Anza house, either using their own laptops or the club's computer in the control room in Anza house. The EOA, which has been developing this facility, is really looking forward to this phase of the project!

Even though most of our club activities follow regular patterns throughout the years – our monthly general meetings, Beginners Class and SIG meetings, the star parties set by the new moons throughout the year, our winter outreach programs with the schools and the summer programs with various parks, the monthly sessions of Explore the Stars on Palomar Mountain during the summer and fall, and so on – there are always new variations on these activities that keep things interesting. 2008 has every prospect of being another wonderful year for our club – if you haven't yet tried out all of the different activities our club offers, resolve to try at least one new club activity each month, and follow through and do it. It's a great way to find new ways to enjoy our hobby, to get to know more fellow club members, and to get your year off to a truly excellent start!

The December star party
Although we really need the rain, it is very unfortunate that the first major storms of the season landed on the first two weekends in December. As a result, the field trip that Irvine Valley College had scheduled at Anza on the first Saturday in December had to be cancelled, and the September star party, set on the second Saturday of the month, essentially didn't happen.

Alan Smallbone and I tried to go out to Anza on the day of the star party, but we found that the mud on the dirt road to the site was so thick that we fishtailed the entire first quarter mile and decided to turn back at that point because of the serious risk of getting stuck. Alan and Bruce Waddington went back the next day in a four-wheel drive vehicle to check the site, and found it covered with snow. Even though the temperatures remained in the 30s, the snow was entirely gone by the time Dave Kodama got there in the late afternoon. Don Lynn told me later that he, Dave Radosevich and Jim Hannum went out there on Friday and left on Sunday, after doing quite a bit of work but no observing, just before the last storm cell came through. Dan Bonis was also there in his RV with his two children, and there was one other member out there as well – it was a very small star party. This was Don's account of the star party weekend:

> Jim, Dave and I left about 10:00 am Sunday. It had started snowing hard and the road condition was deteriorating (snowy and muddy), so we decided to caravan out before it got worse. We saw only Dan Bonis and his 2 kids there (in their motor home) when we left. He said he intended to leave Sunday afternoon. The 7th person [who was at the star party] introduced himself (Saturday afternoon), but in my usual way I have forgotten his name. Said he had been to the site only a few times, and this was the first time he had looked around (came into the observatory to see the telescope and new roof).
>
> Jim, Dave and I arrived at various times on Friday. I didn't get much done Friday, as it was too rainy. Jim might have got some done before I arrived. Dave had to work, so arrived late. There were a couple of stretches of good weather Saturday (only partly cloudy, little wind and no precipitation), so we took advantage of them. It started raining again in the afternoon, so we got to see where the leaks [in the new observatory roof] were [Note: There was no chance to finish sealing the roof before December storms started]. Evening it snowed. So we watched Die Hard 3 on Dave's widescreen TV.
>
> Sunday morning the sun came out and it looked like the snow would melt and things would clear up. Then the wind picked up from the east and blew in clouds dropping snow. That was when we left. Was a bit slippery in several spots, but not really bad. I've driven the road in a little worse condition, but it was bad enough that I was

a little worried about sticking in the mud. I don't have 4 wheel drive, but Jim and Dave do.

His picture of the snow around the area of the club observatory should be somewhere in this issue *(front page - Ed.)*. We generally don't get a lot of snow at the site, and it seldom lasts long when we do get it, but it adds a bit of fun when it comes, even though it doesn't help the viewing conditions. We're hoping conditions will be much better for the January star party!

Anza locks

As an update on the Anza lock situation, Don Lynn found the time while he was at Anza over the star party weekend and summoned the manual dexterity in spite of the extremely chilly conditions there at the time to change the combinations, so, if you are going out to Anza, you will need the new combination to access Anza House and Observatory. If you have not yet received it, please contact Charlie Oostdyk (Charlie@CCCD.edu) or me (btoy@cox.net) for the combination. By the time you see this, all of the observatory holders and pad holders at Anza should have received an email with the new combination. If you are a current pad or observatory holder and didn't receive the email, please check with Charlie to be sure that your contact information is current on his records – as the club treasurer, he's also in charge of keeping the club's membership records current.

As I said when I first mentioned the changing of the combinations at Anza, this is needed as a security measure, and we expect to change the combinations regularly in the future. Unfortunately, there have been instances where people whose memberships have lapsed continue to use the site, because they do have the combination to access the facilities, which is unfair to the rest of the membership. If you know of anyone who is doing this, and who is not there as a guest of a current member, please give me or any other member of the board as much information about him or her as possible, including any information you have about when they have actually been at the property. Membership fees are a significant part of our income in the club and are needed to support these facilities as well as our other club activities, and we all have a stake in making sure that those who take advantage of the benefits the club provides also pay their fair share of the cost of those benefits.

And, as a side note, if you find yourself inconvenienced by the change in the combinations, please don't take your irritation out on Don! We are very grateful for his assistance in making the change, but it was the Board that made the decision to make this change.

Some Good Membership Resolutions:

Along with other good resolutions for the new year, this is also a good time for all of us to think about whether there have been any changes in our mailing addresses, telephone numbers or e-mail addresses that Charlie Oostdyk doesn't have yet, and to give him any changes in that information. This is also a good time to consider whether you are current on your membership fees – Charlie sends out notice when the fees are due, and will send follow-up notices if they are not paid in response to the first notice, but it is an added burden for him to have to send out multiple notices. It will get his year off to a much better start if any of you who are delinquent bring your fees current, and, if you know that your fees are coming due, if you send them in without waiting for a formal notice. If you find it a hassle to pay the fees every year, one way around that is to get a life membership. The cost of a life membership is based on membership for 10 years, so the cost is 10 times the annual rate or $500 currently. This is particularly good for people who know they will be members for a long time, and it's good insurance against any increases in the membership fees in the future, as, once you pay for a life membership, you have it for life without any additional payment.

Basics Of Astrophotography Class

Kyle Coker's class on the basics of astrophotography has become a regular feature of our Beginners Astronomy Class, and will be held on Friday, February 1, 2008, at the Centennial Heritage Museum. This session is the sixth and final session of the current cycle of the Beginners Class, but you don't need to have attended any of the other sessions to attend this one (all of the sessions of the Beginners Class are designed to stand alone, so you don't need to attend them all or to attend them in order).

Kyle is an active member of our AstroImage group, and is a regular imager at Anza. His Basics of Astrophotography class covers the full range of basic information that anyone who has an interest in imaging astronomical objects would want to know about, including the various types of cameras that can be used, telescope considerations, imaging without a telescope, and a bit about processing the images after you've captured the photons. He packs a lot of information into this two hour session, so, if you're interested at all in imaging the night sky, this class is a great way to learn what you need to do to get started or, if you've already tried taking a few images, it's a good way to get a broader prospective on the different types of imaging you could do and to get some ideas on how to improve on what you are doing.

As with all of our Beginner's Classes, this session on the basics of astrophotography is free and open to the public as well as members of the club. It will be held in the meeting room/classroom on the ground floor of the Carriage House, located at the back of the Centennial Heritage Museum complex. The museum is located at 3101 W. Harvard St., Santa Ana. Harvard is about midway between Warner and Edinger, and the museum is about a half block west of Fairview. If you are coming south on Fairview, Harvard is the second signal past Edinger, and you turn right to go to the museum (which would be on your right). If you are coming north on Fairview, Harvard is the first signal past Warner, and you turn left on Harvard. The driveway to get into the museum property is on the western side of the museum; enter through the wrought iron gates and follow the drive around to the back of the museum property, to the parking area.

By the way, if you have visited Anza and noticed those red lights operating off solar batteries that mark several of the stairways, Kyle was the person who obtained them, painted them red, and installed them – very helpful additions to our Anza facility!

AstroSpace Update

January 2008
Gathered by Don Lynn from NASA and other sources

Cosmic ray source – The Auger Cosmic Ray Observatory, still under construction in Argentina, but already taking data, has determined that Active Galactic Nuclei (AGN), galaxies with supermassive black holes currently pulling in substantial matter, are the source of the more powerful of cosmic rays. Cosmic rays are particles, mostly protons, pelting the Earth at extreme energies, very near the speed of light. Statistical analysis of the arrival direction of the 27 most powerful cosmic rays so far detected shows that they correlate with the locations of known AGN relatively near our galaxy (within 180 million light-years). The source of cosmic rays has been a mystery since their discovery in 1938 by Pierre Auger. It is still not known what process can accelerate particles to such high energies. Although low energy cosmic rays are common, high energy ones are fairly rare. The Auger Observatory has detectors spread over 1200 square miles in order to capture even the rare ones. The times of arrival at various detectors allows calculation of the approximate direction of arrival.

Cassini spacecraft has made observations of Saturn's rings that indicate they may have been around since the formation of the planet. Previous studies had concluded that the rings could not last more than 100 million years or so without dissipating, and that ring particles were too bright to be very old. Surfaces in space tend to darken over long time periods due to collection of dust and particles. But new observations showed ring material being recycled: forming into small moonlets, then breaking up into fresh looking ring particles. Also observations showed that ring particles were of different ages, requiring either multiple formation events or recycling. New observations also showed that the mass of the rings is more than predicted, which causes more collisions, exposing more fresh surfaces.

Cassini has also been studying the **small moons** orbiting near Saturn's outer bright rings (the A and F rings). It has long been suspected that the rings formed from the shards of one or more disintegrated moons. The disintegration could have been caused by impact or by tidal forces. The small moons in the new study were believed to be leftover pieces from this disintegration. The new observations show that the moons have very low density, half that of ice. This means that they are heaps of particles (mostly ice) with void spaces between. The problem was explaining how moons formed there with such low density. The best theory now is that the disintegration at ring formation time probably created chunks with higher density, but then each chunk accumulated tiny pieces of ice by gravity and collision, which stacked up full of voids. 2 of the near-ring moons, Pan and Atlas, were found to have prominent equatorial ridges that make them look like flying saucers. A new theory says that those moons accumulated their low-density coating after the rings had flattened into their current shape, while other more spherical moons in this region accumulated their coating when the rings were thicker, during ring formation. The rings are so thin that their thickness is difficult to measure. The latest estimates are that they are about 20 yards thick.

Cassini has got the best look ever at the energetic charged particles, called a **ring current**, which are trapped in Saturn's huge magnetic field. It is persistently asymmetric and more dynamic than the particles around the Earth. Saturn's ring current is shaped like a warped disk that is deflected out of the equatorial plane on the planet's night side, and much thicker on the day side. The source of particles for Saturn's ring current is material vented by geysers on the moon Enceladus. The Earth's ring current particles come from the Sun, but Saturn's ring current is only weakly affected by particles from the Sun.

Since we can't see the solid interior of gas giant planets, determining their periods of rotation (day) has been a problem. Different cloud layers rotate in different time periods. With Jupiter it was found that timing the rotation of the magnetic field gave us the rotation period of the interior. With Saturn, every time the **rotation period** has been measured by the magnetic field we get a different answer. I reported last May that it had been discovered that the material thrown off by the moon Enceladus's geysers was dragging the magnetic field into slower rotation than the planet's interior. Cassini data now show that the rotation speed changes in tune with the 25 day period of variation of the solar wind speed (caused by the Sun's rotation). Apparently the solar wind is also dragging the magnetic field of Saturn. More work will be done to try to calculate these effects on the magnetic field, and then figure out Saturn's real rotation speed.

Venus Express has observed the solar wind, a stream of electrically charged particles emitted by the Sun, stripping away particles from the top of Venus's atmosphere. This has been predicted because the planet lacks a magnetic field that protects the atmosphere from solar wind, but the extent and composition of this stripping was unknown until now. The stripped material was found to be mostly hydrogen, helium, and oxygen. Twice as many hydrogen atoms as oxygen were found, which indicates that it was originally water (H_2O). This process going on for billions of years explains why there is little water in Venus's atmosphere today. Other measurements showed that the interplanetary magnetic field, carried along with the solar wind, piles up at the planet and forms a weak magnetic field about the atmosphere, slowing the stripping process. The plasma around the planet was observed, and found to be quite different from that found by previous spacecraft. The difference is apparently because the Sun is at a minimum in activity this year, as part of its 11-year cycle.

Venus Express using its magnetometer found **lightning** at the planet. Before this only Earth, Jupiter and Saturn were known to generate lightning in their atmospheres. Unlike those planets, where lightning occurs in water clouds, lightning on Venus is formed by clouds of sulfuric acid. Future missions to Venus that enter the atmosphere may have to guard against lightning damage.

(continued on page 8)

The Big Bang, the Fabric of Space and the Apple

First of a three-part series

By William K. Vogeler

The Big Bang shook Newton's Apple from the tree.

When the first particles of matter combined in the cataclysmic release of energy called the Big Bang, the early universe expanded outward in a symphony of motion that affects all things. In the beginning, matter rolled forward into atoms, gaining mass and complexity as diverse as galaxies, stars, planets — and apples.

Like an expanding balloon, this evolving matter pushed out against the Fabric of Space and created the boundaries of existence. The universe was curved on the outside edges, but also inside pockets of four-dimensional space as exploding matter replicated in smaller versions of the Big Bang.

These swirling, spinning galaxies, solar systems and planets carried with them the inertia of creation, manifest in the force of gravity. In the mix of matter curving and bending space, gravity is the apparent effect of matter slowing down due to resistance in space. It is like a man descending in an elevator. He pushes a button and begins moving, but he senses gravity only as the elevator slows him down. Likewise, the Big Bang set all matter in motion but gravity becomes apparent only as something slows the matter down.

On the cosmic scale, this dynamic explains the apparent acceleration of the expanding universe. Matter on the fringes of the universe appears to be accelerating, but it is due to the diminishing resistance of the Fabric of Space. Space is wearing thin there, so matter is accelerating and gravity is disappearing.

On the galactic scale, this phenomenon may be evident in black holes. This dense matter has effectively torn through the Fabric of Space, drawing all matter in the galaxy towards the singularity and out of existence. It is funneling somewhere beyond gravity, space and time.

On the solar system scale, stars curve space and draw planets toward them. But each planet moves around the star, balanced on the bends of space created by a parent galaxy.

And on the planetary scale, objects on the surface of a planet are also moving from the force of the Big Bang. They appear to be moving toward the planet as they fall, but they are actually caught in the turbulence of curved space as all matter continues on its path in the expanding universe.

In all cases, gravity is the apparent effect of matter launched at the creation of the universe. So the Big Bang, in effect, is knocking apples off the trees.

FOR SALE: Meade 10" LX 200 Schmidt Cassegrain with SBIG ST-8 CCD Digital for computer Imaging. Tele Vue Lens 31mm Nagler, 35mm and 22mm Panoptic, 14mm and 8mm Radian, 2x Celestroin Barlow,12mm Meade Illuminated Reticle. Pelican 1500 Hare case, one portable stand and one bolt-down stand. Over $12000,00 in equipment. **Asking $4500.00**

RayVega (661) 264-6627

FOR SALE: 8 inch Celestron NexStar. Brand new - never used. $900.00 Contact: Ken Duvall (714) 240-2993

2-inch new (not used) eyepiece from Surplus Shed, 10 mm focal length,$40. Also selling new (in box) green laser pointer with a momentary switch (release and it goes off) for $80. Can be adjusted to be 4 times as bright as the pointers commonly seen for $25 but clearly visible in the dark as is. Contact Glenn Hand at (909) 861-6461 or email scopeguy20@gmail.com

---

FOR SALE: Celestron CR 150hd Dual Axis Drive CG5 Mount. New motors and hand controller; roll-about hard case. Nice condition. $750.00
Meade LXD55 8 inch Schmidt Newtonion. Recent complete service by Meade, new Autostar, etc. Roll-about hard case. Nice condition. $800.00
Contact Steve Bird 562 234-2157

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

ARIZUNI ASTRO ROAD TRIP

by John Sanford

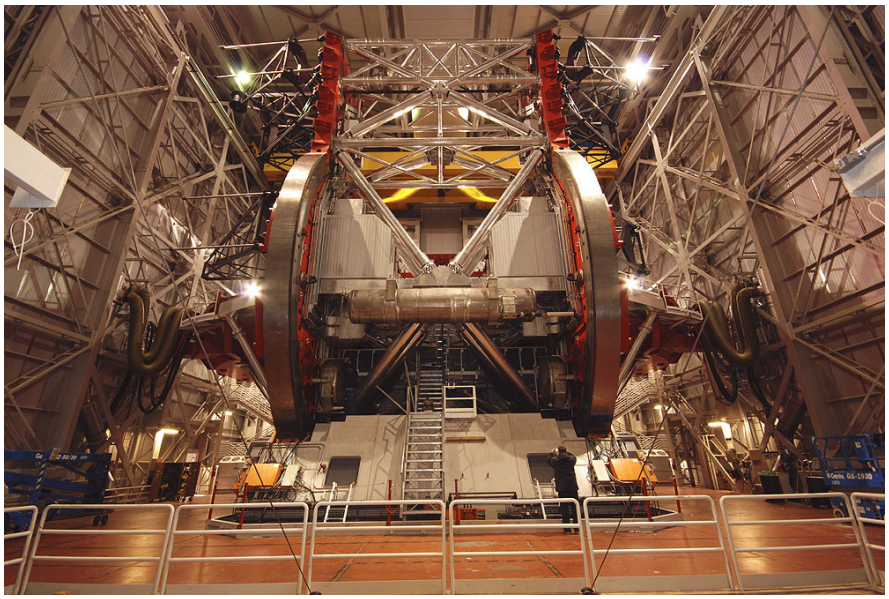
Just before Thanksgiving, I drove to Arizona to visit some old friends and a major telescope project. First I went to Sedona, where OCA member Verryl Fosnight has built an incredible house. It has been under construction for about 3 years and is finally 99% completed. The large house (~20 rooms) has a great sky and is located about 3 miles south of the village of Sedona itself. Verryl has built an observatory patio right outside his bedroom, and on it there is his 16 inch reflector mounted in a domed observatory. The telescope can also be run from a control-room-library just off the patio. Verryl has a nice pair of 100mm Border Hawk binoculars and we had a good view of Comet Holmes in them even with a sizable Moon in the sky.

The next day I drove the Scion 281 miles to Safford, Arizona, site of the offices of the University of Arizona for the construction of the Large Binocular Telescope project. There I met old friend Wayne Johnson, former OCA President. We obtained a necessary "Squirrel permit" to go up Mt. Graham where the new observatory is located. There is a very good but windy road to the 10,500 foot summit where the LBT, Vatican Observatory 1.8 meter, and large (10m) submillimeter wave telescope are all located. The LBT is a two 8.4 meter mirror instrument on an alt-azimuthal mounting. In fact, the whole building turns in azimuth and the two mirrors tilt up to provide access to the whole sky. The huge mirrors are optimized for blue (visual) light and infrared respectively. Eventually their beams will be combined, giving the resolving power of a 22.8m telescope.

The observatory is operated by a large consortium of universities from the U.S. (Ohio State and the Research Corporation, 5 universities from Germany and 13 observatories in Italy. The construction and operation is under the University of Arizona's Steward Observatory, based in Tucson where the two mirrors were spun cast at the U of A's Optical Sciences Center. Both mirrors are now aluminized and some preliminary observations have been made, but both telescopes await the completion of their 1.5m gregorian secondaries. The massive metalwork was done in Italy, assembled to test and then broken down and shipped to Arizona. The building, which is 16 stories tall, is especially designed to channel the winds at the summit constructively across the telescope apertures in a laminar flow to maximize seeing conditions. Naturally both monster telescopes will benefit from active adaptive optics when they image.

Wayne and I were given a nice tour through the building and then turned loose to photograph wherever we wanted to go.
The next day I drove to see a grade-school classmate I hadn't seen in 40 years, down in Sierra Vista, where he is a reporter-editor for the local daily newspaper. After a nice breakfast and tour of the paper, I bid him adieu and drove to Tucson, where I met Dr. Peter Wehinger, a friend since high school. Peter is a telescope designer and currently works with the Director of Steward Observatory facilitating cooperation between the Mirror Lab, Steward Observatory, and its "customers". Peter and I used to compete in science congresses and lived about 22 miles apart in Orange County New York where we grew up. He has had a distinguished career in research astronomy and is married to a spectroscopist, Susan Wycoff. He showed me through the Mirror Lab where they are making the secondaries for the LBT and also beginning polishing work on another large telescope, the 8.4m Large Synoptic Survey Telescope. This telescope will be capable of surveying the entire sky visible from Chile about once every 10 days (assuming clear weather) and it will have a 3.2 gigapixel CCD camera. It's data will be instantly available to any researcher in the world through the Internet, and it is expected to discover millions of asteroids and NEOs once operational in 2012 and beyond.

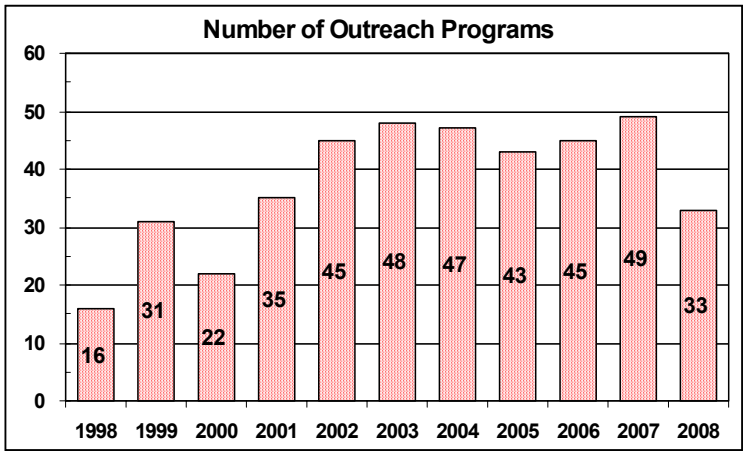
That visit completed the astronomical part of my visiting on the road trip. I drove on to San Diego to spend Thanksgiving with my daughter Sharon and 3 grandchildren.



Interior of the Large Binocular Telescope. The two mirrors tilt upwards with the huge altitude bearing shown and the entire building rotates to provide all-sky access.

OCA Outreach Programs

By Jim Benet



Last year the OCA conducted 49 Outreach programs, which was a record for the club. This year we expect to do even more programs as we already have 33 programs scheduled. These programs could not have been conducted without the help from the volunteers listed below. We are extremely grateful. I am sorry if I missed anyone. I am particularly grateful to four volunteers who participated in over 20 programs, Vittal Badithe, Craig Bobchin, Tom Drouet, and Paul Krietz.

OCA Outreach Volunteers

Doug Acrea	Val Akins	Giolli Attilio	**Vittal Badithe**
Sheryl Benedict	**Jim Benet**	Maury Bennett	Mike Bertin
Craig Bobchin	Chris Brown	Chris Buchen	**Tom Drouet**
Joe Ewach	Sam Fahmie	Jim Fitz	Jamie Flores
Bill Gabris	Larry Gershon	Bill Hepner	Keith Hoffman
Dan Iler	Liam Kennedy	**Paul Krietz**	Donald Lynn
Donald McClelland	Larry McManus	Dennis Moonitz	Dick Nordrum
Matt Ota	Chuck Oviedo	Rick Rios	Bob Shanta
Steve Short	Ray Stann	Richard Stember	Ippei Tanaka
Roy Weinberger	John Wohlfeil		

Bold = Participated in 20 or more Outreach programs during the year.

During the year we covered 30 schools, 3 public parks (Riley Wilderness Park, San Mateo State Park, and Upper Newport Bay), 1 library (Aliso Viejo), 2 astronomy clubs (Laguna Woods Village and Leisure World), and UCI Observatory. The schools we went to are listed below.

School Outreach Programs

Ball Junior High	Barcelona Hills Elementary	Bathgate Elem.	Beatty Elem.
Biola University	Bommer Canyon	Bonita Canyon Elem.	Bryant Ranch Elem.
Calvary Chapel Elementary	Dale Junior High	DePortola Elementary	Eastbluff Elementary
Emerson Parkside Academy	George White Elementary	Lake View Elem.	Loara Elem.
Lomarena Elementary	Los Alamitos Elementary	Maxwell Elementary	McPherson Magnet
Northwood Elementary	Northwood High	Oka Elementary	Page Private
South Junior High	Thomas Paine Elementary	University Park Elementary	Waldorf Elementaray
Warren Elementary	Westpark Elementary		

Our busiest time is from the first week in January until the first week in March. During this 8-week period, we do most of the schools. We cannot do programs at the elementary schools after the start of Daylight Savings Time as it keeps the students up too late at night. During this period, we could really use additional help. If you could help out, please contact Jim Benet, (714) 693-1639 or jimbenet@pacbell.net). I wish to thank all volunteers and wish them a Happy New Year.

(continued from page 4)
Chandra (orbiting X-ray observatory) has discovered one of the fastest moving stars ever seen. Its speed exceeds what theory explains. It is the neutron star created when the Puppis A supernova occurred about 3700 years ago. It is moving away from the supernova remnant at 3 million mph, fast enough to eventually escape the Milky Way galaxy. 2 explanations exist for fast moving (hypervelocity) stars: a gravity slingshot encounter with a supermassive black hole, or an off-center supernova explosion blowing away the remaining neutron star. And in this case, it is not near a supermassive black hole, so only the second can apply. But either explanation should result in only about 1 million mph. Further theoretical work is obviously needed.

Carbon atmospheres – Astronomers have discovered white dwarf stars with pure carbon atmospheres. A study was made of data from the Sloan Digital Sky Survey to find all the white dwarf stars, and 10,000 new ones were discovered, far more than previously known. About 200 of these appeared to have some carbon in their spectra, along with helium, as predicted by theory for white dwarfs with a great deal of churning, which brings carbon up to the surface from the core where it was produced. But 8 of these had unusual spectra, which could only be made by a pure carbon atmosphere. The surface temperature of each lies between 18,000 and 22,000 degrees C, which is quite hot for a star. The question is how a star like this could form. The best theory put forth so far is that stars with a borderline mass between those that form ordinary white dwarfs and those so massive that they collapse and explode as supernova, might form carbon atmosphere stars. Some computer simulations show these stars throwing off all their hydrogen and helium, and then having the oxygen and heavier elements sink, leaving pure carbon outside.

White dwarfs – A study of the distribution of white dwarf stars in a globular cluster has shown statistically that they must usually be given a kick of 7 to 11 thousand mph at the time of becoming a white dwarf. This caused new white dwarfs stars to more often occur in the outer parts of the cluster. The kick is apparently a result of throwing off material unequally in different directions during the red giant phase of the star that occurs just before it becomes a white dwarf. Other types of stars, including old white dwarfs, are distributed with the heaviest stars in the center and the least massive ones at the outsides. This effect was explained some time ago when it was found that each close encounter between stars more often gravitationally throws the less massive star away from the center of the cluster.

Voyager 2 (outer planet mission) – NASA announced that last August Voyager 2 detected the termination shock, the shell around the solar system where the solar wind slows as it hits interstellar matter. This was almost exactly 30 years after launch. The termination shock fluctuates over time depending on solar activity, so the spacecraft actually crossed it at least 5 times in 2 days. Voyager 1 crossed the shock in December 2004, the first spacecraft to do so. Voyager 2 was 1 billion miles closer to the Sun than Voyager 1 was at its crossing, showing that the termination shock is not spherical, but probably flattened, or at least dented. Voyager 2 got better data on the crossing, since it has more operating instruments than Voyager 1. Voyager 2 found that the temperature beyond the shock was much lower than predicted. This probably indicates that energy is being transferred to cosmic ray particles. In the summer of 2008 the Interstellar Boundary Explorer will be launched, which will be able for the first time to remotely image particle interactions in the area of the termination shock.

Speaking of Voyager 2, scientists have computer sharpened the images which that spacecraft took in 1989 of **Triton**, Neptune's giant moon, and made improved counts of impact craters. Triton is locked gravitationally to Neptune, so one side of Triton always faces forward in its orbital motion. The new crater count showed that every identifiable crater is on the forward side. So its cratering is due to sweeping up material in its orbit, not due to asteroids crossing its orbit, as are the craters on our Moon and essentially all other solar system objects. By making estimates of the amount of material that could be swept up by Triton, scientists were able to estimate roughly the age of the surface. Triton has been resurfaced in at most the last 50 million years, and possibly as recently as a few million years ago. The cantaloupe terrain (so called because it looks like cantaloupe rind) is even less cratered than the rest, so was resurfaced more recently. Triton is the only large moon in the solar system that orbits its planet retrograde, that is clockwise when seen from north, so it is believed that Triton did not form where it is now, but was captured by Neptune, probably billions of years ago. That causes it to plow through at tremendous speed any material orbiting Neptune in the usual direction. This would contribute to limiting craters to the leading side.

Warm-Hot Intergalactic Medium (WHIM) – A new computer simulation of the formation of the Universe has indicated that much of the gaseous mass is bound up in the WHIM, a tangled web of filaments stretching hundreds of millions of light-years. The latest interpretation of observations indicates that about 40% of the baryon mass (ordinary matter) in the Universe has not yet been seen. Many astrophysicists believe that the WHIM may account for the unfound baryons. The WHIM is being searched for by the South Pole Telescope and the Atacama Telescope, both of which see submillimeter light, which lies between radio waves and infrared. It is predicted that the WHIM has a measurable effect on the Cosmic Microwave Background as it passes through the WHIM.

Spitzer (infrared space telescope) has produced an image of a developing star in a flattening envelope of material with huge jets being thrown out. This is the first time this early stage has been caught. It has been predicted by theory to occur after an envelope of material begins to collapse, and before a disk forms about the developing star. The region where this occurs is dusty and dark to visible light, but infrared penetrates. The jets are each about 3/4 light year long. The flattened envelope is much smaller, but still far larger than our solar system is today. The object is only about 10,000 years old and will take another million years before it is a fully functioning star. It is about 800 light-years away in Cepheus.

Spitzer has also observed a young star with a potentially planet-forming disk about it and found that there is a clear ring within the disk. Previous observations of similar stars have sometimes found the center of the disk (the part closest to the star) to be missing,

(continued on page 10)

New Products Review

by Bill Hepner

Product: "The Cube" by Ioptron

What it is : The Cube is an small GoTo mount for small telescopes weighing less than 11 lbs. The mount itself weighs in at about 3 lbs. In spite of the lightness of the mount it is very robust with small scopes. It comes in many colors and in 3 configurations: an alt/az, an alt/az with a GPS unit and one with a tripod having a wedge much like that of the Meade design. They also sell the mount with telescopes. The straight alt/az model comes with handbox that is not upgradeable or able to connect to a planetarium program such as THE SKY or SKY MAP PRO. The other models come with a handbox that is upgradeable and will connect to your laptop or desktop. The mount itself has two inputs for the handbox and computer/guider. The telescope is attached by a vixen style dovetail clamp. The model that I purchased was the alt/az with the non upgradeable handbox. I was one of the first to order this mount. The reason that I purchased it was that the mounts that I had were converted Meade units that just would not provide me to balance the telescope correctly to provide a stable mount, plus they where not all that easy to set up by me and used with my disabilities. Did the "Cube" solve that problem? In one word, YES. I have used the mount with the following telescopes, Celestron 80WF, Meade ETX 90RA, Orion StarBlast. With this mount I can reach all areas of the sky including the zenith.

Mount Quality: The motors are robust and move with little noise. The mount is all metal except the battery cover. The tripod is small and light weight and requires a little shimming to have the spreader to seat up to the legs tight. Speaking about the tripod, the alt/az model is made with 1" diameter chromed steel. The wedge model uses 2" diameter chromed steel legs. The mount attaches with a 10mm center bolt.

The Handbox: The handbox comes with the following databases:
Named Deep Sky Objects
Messier Catalog : All 110 Messier objects by Messier Number.
Comets : 16 objects identified as periodic comet.
Asteroids : 16 objects
Named Stars : 189 stars by index and alphabet
Constellations
Double Stars : 40 objects identified by SAO number
SAO Bright Stars : 3218 objects by index number and SAO number.

Mount Operation: At startup of the system the handbox screen shows Park Position with the local sidereal time and the latitude of where the mount was last used. The next line shows starting position of the telescope which must be facing due south and vertical.

The mount has a circular bubble level build in, however it has been noted that it is sometimes off a little. By watch the bubble level as you spin the mount on its azimuths axis you can determine if it is indeed level. The bubble level can be pried out and reset if needed. The top of the mount is slightly curved but I place a bubble level purchased from Ace hardware to level the mount. Alignment of the mount is simple, it offers one-star and two-star options. Unlike other GoTo systems it selects the alignment stars for you. Center the stars and press enter. Where I live, I do not have a complete 360 view of the sky. Thus leveling of the mount comes into play if you want goto accuracy. Leveling of the mount is not all that important when doing two star alignments. I have found that if the one star that the alignment process selects is not visible GoTo operation is still reasonable by telling the handbox where the telescope is pointed, an option in the menu. You'll need access to a planetarium program to give you the objects alt/az position. The handbox also shows you the local time. There must be an internal clock in the handbox as it keeps time even when no power is to the handbox. The clock is not accurate so go through the site set up and enter the time there.

Goto accuracy and tracking: The goto accuracy is reasonable in that one can find the object within the view of a 40mm eyepiece when using a 1200mm focal length telescope, of course this depends on how you aligned the mount. If using the one star method and the mount is not a 100% level, when going to a new position over 90 degrees away it may not fall into view. Tracking is very good. I've had objects in view for over 15 minutes at 100X.

Summary: This mount is a good competitor for Meade and Celestron department store offerings. In spite of its handbox objects identification being only SAO or ID numbers. (The old Magellan system used by Meade was once the same way.) It offers the small telescope user a lightweight grab-n-go system that opens the heavens to the viewer. The company is new but they are really trying to compete with the big boys. Their customer service is new and they will work with you to provide you with a satisfactory system. There is a yahoo group for the users of the mount, "SSMounts"
I've added some files there to make it a little more easier to identify some objects in the handbox. And OPT now offers their products.

Do I recommend it? For the kid, perhaps not, but for the Astronomer who doesn't mind a poor manual, a little learning of SAO identifications, for the ones who like to use small scopes, can handle lots of weight….go for it I say!

■

(continued from page 10)
but this is the first where a ring farther out is missing. When the center is missing, there are 2 explanations: one or more **planets are forming** and swept up the material, or the light from the star is evaporating the dust. This new observation supports the forming-planet theory, since the material inside the clear ring was not evaporated. The star is a million years old and is about 450 light-years away in Taurus. The clear ring, if placed in our solar system, would stretch from Mercury to Saturn.

Moon is uncommon – Spitzer studied 400 stars, each about 30 million years old. It is believed that the Earth's Moon formed when our Sun was about this age, when a planet about the size of Mars collided with Earth. Material was blasted into orbit, some of which coalesced into the Moon. Such a collision should produce huge amounts of dust around the star. But only 1 of the 400 stars studied had a huge amount of dust. Using theory to estimate how long such dust persists allowed the scientists to calculate that only 5 to 10% of all stars could any time during their life have such a moon forming collision; otherwise the study would have seen more dusty stars. So moons like ours are unusual. All the other large moons in our solar system formed by a different process: they coalesced out of material orbiting about the planets as the planets formed. The same study also concluded that none of the 400 stars was still making planets. This limit on how long it takes to make planets is lower than many believed.

Planets forming – A study of Spitzer images, followed up by observations with the Gemini North telescope in Hawaii, has found dust of the sort produced by rocky planets forming around one star of the Pleiades star cluster. Such dust is the result of planetary embryos colliding. This is the first evidence of planet formation in the cluster.

EPOXI - I reported here in June that the Deep Impact spacecraft, having completed its mission, was approved by NASA for reuse to flyby Comet Boethin. The bad news is that Comet Boethin is missing. Attempts to image it have come up empty. Probably it broke up into pieces too small to detect. The good news is that scientists had a backup comet, namely Hartley 2, and the spacecraft engines have been fired to deflect it toward the newly approved comet. The sort-of-bad news is that reaching Hartley 2 requires 3 gravity slingshot flybys of Earth, the first while you are at New Years Eve parties, which takes 2 years longer to reach than the disappearing Boethin. The spacecraft has been renamed EPOXI, a mishmash of 2 acronyms. It will also study transiting exoplanets (planets outside the solar system) while on the way to the comet.

IceCube (neutrino detector) is under construction at the South Pole, and has been taking data with some detectors for a year now. It is expected that half the detectors will be running by February. It is being built to detect neutrinos from space, but a new paper says that it will be the first neutrino detector sensitive enough to map the core of the Earth from its effect on neutrinos passing through it. The map should be more accurate than seismic methods used now. Neutrinos are particles with very small mass that hardly ever interact with ordinary matter. So to detect neutrinos you need a lot of them and a very large detector. IceCube spans 8000 feet deep into the polar ice, the largest detector yet. The supply of detectable neutrinos is expected from cosmic rays, black holes, gamma-ray bursts and supernovas.

THEMIS (fleet of 5 spacecraft studying Aurora substorms) have made several discoveries since their launch in February. Magnetic ropes, twisted bundles of magnetic fields, have been found connecting the Sun to the Earth's upper atmosphere. Some are as wide as the Earth. They can unravel in minutes, but form frequently. Relatively small explosions, termed hot flow anomalies (HFAs), have been found in the Earth's bow shock, the region where the solar wind impinges on Earth's magnetic field. The HFAs occur where knots of magnetism in the solar wind hit the bow shock. They can boost the temperature of particles in the solar wind ten-fold and can briefly stop the solar wind in the area. They have been seen about once a day. Auroras have been seen to move twice as fast as previously known, up to 15 degrees of longitude in a minute. Outbursts in the aurora, usually lasting about 10 minutes, were surprisingly frequent.

Hinode (Japanese orbiting solar observatory) have discovered that the Sun is bristling with powerful X-ray jets. They have been seen since the 1970s, but never in such abundance. They spray out of the surface hundreds of times a day, launching blobs of hot gas as wide as North America at speeds up to 2 million mph. These jets add significant mass (probably 10 to 25%) to the solar wind and may help explain how the Sun's corona gets so hot, though it appears that the X-ray jets are only part of the heat source for the corona. Each jet is triggered by a magnetic eruption or magnetic reconnection event. Each X-ray jet has energy about a thousand times smaller than a typical solar flare, but there are many more X-ray jets. Hinode has also been observing magnetic waves called Alfvén waves with the most clarity ever. Swedish physicist Hannes Alfvén won a Nobel Prize in 1970 for his theory of these waves. Mostly the waves are found in the layer of the Sun's atmosphere called the chromosphere. Most of the waves were found to have periods of several minutes, longer than predicted.

Red dwarf star – Observations made of a red dwarf star have shown that it is far more magnetic than theory predicted, and has a huge hot spot covering about half its surface. Flares lasting a minute were seen, which are caused by collisions of magnetic fields in the corona of the star. In addition to a simple north/south magnetic field, a smaller-scale field was found with loops and arcs in random places. The magnetic activity could be caused by unexpected motions within the star or by an as yet unseen companion star. More observations are needed to distinguish these. The observations were made with both Earth- and space-based telescopes in radio, visible light, ultraviolet and X-rays. The star is about 35 light-years away in Bootes. Like other M-type red dwarfs, it has a surface temperature of less than 2400 degrees K and a mass of only 8 to 10% that of our Sun.

Mars Reconnaissance Orbiter (MRO) has been imaging the so-called cryptic terrain of the planet in stereo to determine the elevation of the features. One finding was that many channels there widen as they run uphill. This means that they were formed by expanding gas, not by liquid flow. Previous studies of the cryptic terrain had found fan-shaped blotches that appear seasonally, some dark, some bright. The dark fans were already theorized to have formed by dust blowing out of vents where gas escapes, and then falling downwind as the fan shapes. The new observations have explained the bright fans. Spectra show they are dry ice.

So the venting is carbon dioxide, which cools as it expands, forming dry ice snow that falls downwind of the vents. The new observations have shown fans developing in as little as 5 days. The vents are believed to form when the ground warms in spring under a layer of winter dry ice, and the dry ice sublimes into carbon dioxide gas from the bottom side. Eventually gas pressure breaks a hole up through the overlying dry ice, becoming one of these fan-producing vents.

Spirit (Mars rover) has much more dust on its panels as Martian southern-hemisphere winter approaches than it has in past years. Last winter Spirit had to be parked for about 7 Earth months due to low power levels while the Sun was at its winter low angle to the solar panels, which reduces power generated. The extra dust will probably require a longer park. Controllers have selected an area sloping 25 degrees toward the winter Sun as the location for the winter park, and as I write this, the rover has driven to edge of the area and is taking pictures of it to find the best spot. Opportunity, the other rover, has less dust on its panels and is farther north, so there is little need for winter survival techniques. It continues to explore the rock layers inside Victoria Crater.

Martian atmosphere – Study of isotopes in meteorites that came from Mars has firmly dated when the crust of Mars solidified from the molten state after the planet's formation. It took 100 million years to solidify, longer than many estimates. The solidification could have taken that long only if there were a thick insulating atmosphere at that time. This adds to the evidence that Mars had much more atmosphere in the past, but lost most of it. The Martian meteorites, of which there are a few dozen known, were part of the surface of Mars until an asteroid impacted and splattered some material into space, a little of which eventually encountered Earth.

Instant AstroSpace Updates

Comparison of the famous **Martian meteorite**, which some scientists say contains bacteria fossils, to rocks found at Norwegian volcanoes shows many similarities. This indicates that much of the chemistry in the meteorite claimed to be results of bacteria was probably formed instead by a Martian volcano erupting in freezing conditions.

Further study of the patch of silica found on Mars by the rover **Spirit** has found an enhanced level of titanium. This supports the theory that the silica was produced by acidic steam venting from volcanic activity, since such vents on Earth can concentrate silica and raise titanium levels.

A new analysis of Galileo spacecraft magnetic and plasma data from when it flew by Jupiter's moon **Europa** says that the electrical conductivity of the liquid ocean that is believed to lie beneath the icy surface is much higher than previously thought. Conductivity affects the calculation of the ocean depth, so the new estimate is the ocean is 15 to 60 miles deep.

$200 million from the Moore Foundation (Moore is the founder of Intel) has been committed to build the **Thirty Meter Telescope**, about 3 times the diameter of the currently largest visible-light or infrared telescope. The primary mirror will consist of 492 individual pieces, and is scheduled to begin science operations in late 2016.

Venus Express just completed its primary mission, and has been approved for an extended mission for 2 more days (which is 234 Earth days). One objective for the extended mission is to look for hot spots due to lava, to try to prove that volcanic activity still occurs on Venus.

GRAIL (lunar gravity mission) has been chosen by NASA from among competing mission proposals, and is planned to launch in 2011. Twin spacecraft flying in formation will precisely measure the effects of denser regions of the Moon upon their orbital paths. This will be the equivalent of being able to X-ray the lunar interior.

Space shuttle Atlantis's mission to the International Space Station (ISS) was postponed until at earliest January 10 due to problems with fuel sensors. The 11-day mission is to install the European Space Agency's Columbus laboratory, greatly expanding the science (biology, physiology, material science, fluid physics, life science, education, space science and Earth observation) capabilities of ISS.

An Earth-grazing asteroid was discovered, designated 2007 VN84, and reported to all astronomers in October, only to find out it was the **Rosetta** spacecraft doing a gravity slingshot by the Earth on November 13, on its way to Comet Churyumov-Gerasimenko in 2014.

NASA scientists are planning how to make a **Venus rover** that could withstand the heat, pressure and acid found on that planet. It would have to be nuclear powered, with a cooled compartment for electronics, and a Stirling engine, rather than electric motors, to turn the wheels.

The first detection of the atmosphere of an **exoplanet**, done by measuring the change in spectrum during its passage in front of its star, has been made with the Hobby-Eberly 9-meter telescope in Texas. The only previous such detection was made with the Hubble Space Telescope.

SIRIUS ASTRONOMER
www.ocastronomers.org
The Newsletter of the Orange County Astronomers

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	btoy@cox.net	714-606-1825
Vice-President	Craig Bobchin	ETX_Astro_Boy@sbcglobal.net	714-721-3273
Treasurer	Charlie Oostdyk	charlie@cccd.edu	714-751-5381
Secretary	Bob Buchheim	rbuchheim@earthlink.net	949-459-7622
Trustee	Sheila Cassidy	rivme@pacbell.net	951-360-1199
Trustee	Steve Condrey	stevecondrey@verizon.net	951-678-0189
Trustee	Bill Hepner	billhepner@yahoo.com	714-447-8566
Trustee	Tom Kucharski	TomRigel@aol.com	949-348-0230
Trustee	Gary Schones	gary378@pacbell.net	714-556-8729
Trustee	Steve Short	nightskytours@hotmail.com	714-771-2624
Trustee	Alan Smallbone	asmallbone@earthlink.net	818-237-6293
COMMITTEES, SUBGROUPS, AND OTHER CLUB VOLUNTEERS			
Press Contact	Russell Sipe	russell@sipe.com	714-281-0651
Sirius Astronomer Editor	Steve Condrey	stevecondrey@verizon.net	951-678-0189
Website Editor	Hassi Norlen	hassi@norlens.net	714-710-9444
Website Coordinator	Rob Carr	RCCarr1@excite.com	909-606-1241
Beginner's Astronomy Class	David Pearson	astrodwp@dslextreme.com	949-492-5342
Observatory Custodian/Trainer/ Member Liaison/Dark Sky SIG	Barbara Toy	btoy@cox.net	714-606-1825
Astrophysics SIG	Chris Buchen	buchen@cox.net	949-854-3089
AstroImagers SIG	Tom Kucharski	TomRigel@aol.com	949-348-0230
GoTo SIG	Mike Bertin	MCB1@aol.com	949-786-9450
EOA Liaison	Del Christiansen	DelmarChris@earthlink.net	714-895-2215
Anza Site Maintenance	Don Lynn	donald.lynn@alumni.usc.edu	714-775-7238
Librarian	Karen Schnabel	karen@schnabel.net	949-887-9517
Membership, Pad Coordinator	Charlie Oostdyk	charlie@cccd.edu	714-751-5381
Explore the Stars OCA Contact	Richard Cranston	rcransto@ix.netcom.com	714-893-8659
Black Star Canyon Star Parties	Steve Short	nightskytours@hotmail.com	714-771-2624
OCA Outreach Coordinator	Jim Benet	jimbenet@pacbell.net	714-693-1639
Telescope Loaner Program	Mike Myers	loanerscopes@twow.com	714-240-8458
Anza House Coordinators	Steve and Sandy Condrey	AnzaHouseIssues@yahoo.com	951-678-0189
WAA Representative	Tim Hogle	TimHogle@aol.com	626-357-7770

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