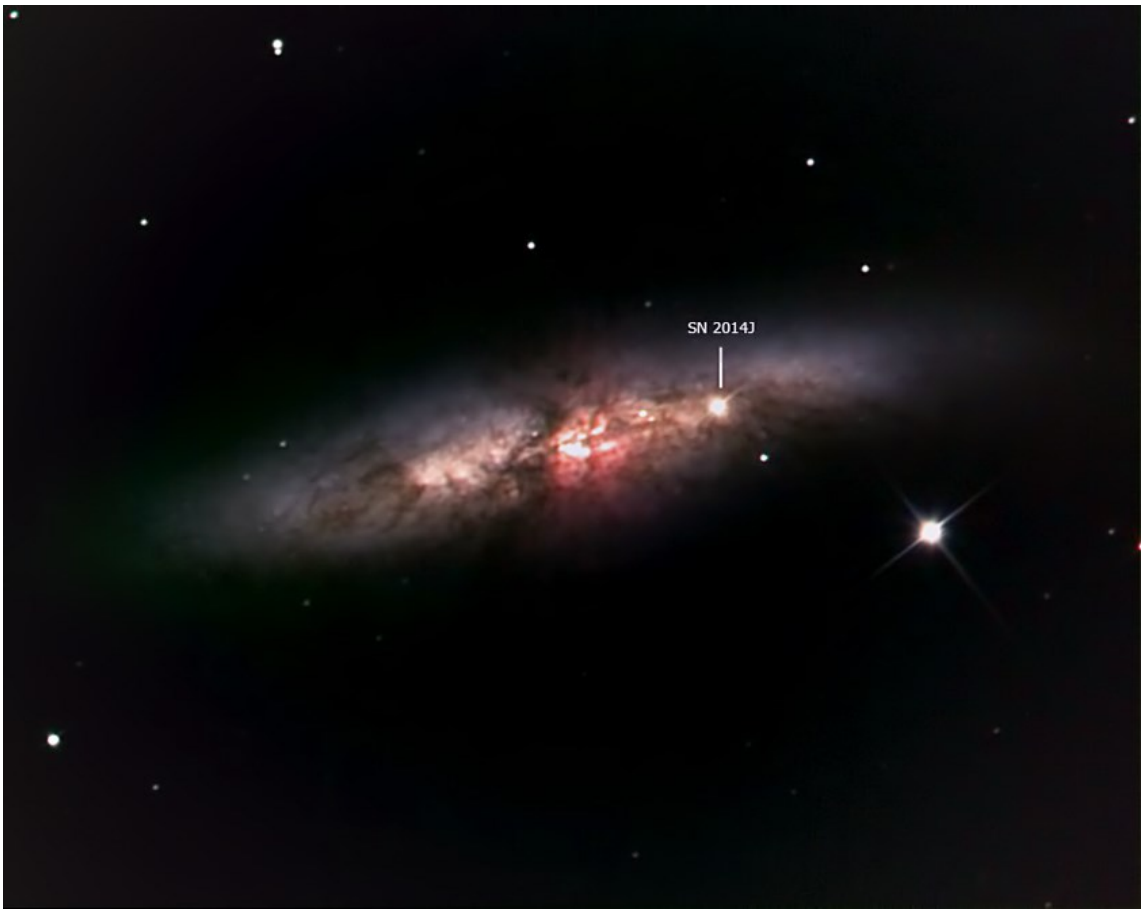
SIRIUS ASTRONOMER

www.ocastronomers.org

The Newsletter of the Orange County Astronomers

February 2014 *Free to members, subscriptions $12 for 12* **Volume 41, Number 2**



Using the Kuhn telescope at our Anza site, Pat Knoll and Terry McGriff successfully imaged Supernova 2014J in M82 on January 25, 2014. A QSI 630 camera with a QSI WSG-8 filter system was used in conjunction with an SX Lodestar connected to an SXV-AO adaptive optics unit for guiding purposes. The result is a composite of 10 60-second 2X2 bin exposures (luminance) and one 60-second 4X4 exposure (RGB).

OCA CLUB MEETING

The free and open club meeting will be held February 14 at 7:30 PM in the Irvine Lecture Hall of the Hashinger Science Center at Chapman University in Orange. This month Dr. Luisa Rebull of Caltech will discuss the past 30 years of space-based infrared astronomy!

NEXT MEETINGS: March 14, April 18

STAR PARTIES

The Black Star Canyon site will open on February 22. The Anza site will be open on February 1. 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

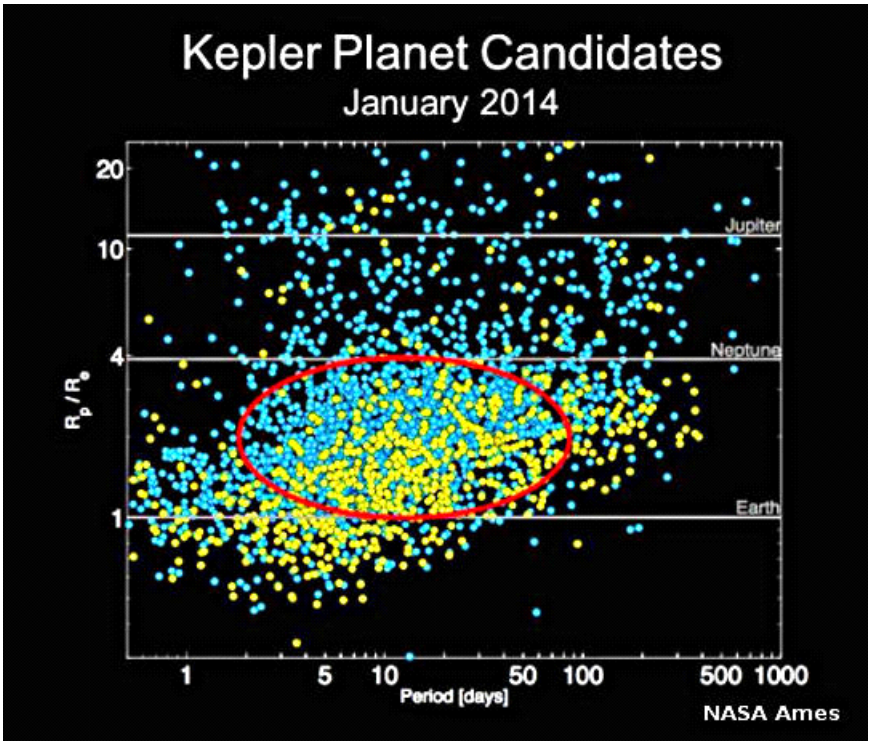
The next session of the Beginners Class will be held at the Heritage Museum of Orange County at 3101 West Harvard Street in Santa Ana on March 7. The following class will be held March 7.

GOTO SIG: TBA
Astro-Imagers SIG: Feb. 11, Mar. 11
Remote Telescopes: TBA
Astrophysics SIG: Feb. 21, Mar. 21
Dark Sky Group: TBA

AstroSpace Update

February 2014

Gathered by Don Lynn from NASA and other sources



Kepler (planet finding space telescope) – Mini-Neptunes, planets somewhat larger than Earth and smaller than Neptune, are the dominant size of planets found in Kepler data. Yet no planet in the Solar System falls in this range. There are conflicting observations as to whether these are rocky planets (like Earth) or mainly gas (like Neptune) or even something else, like mainly water. 2 have been recently found to have densities far in excess of rocky, roughly that of lead. The majority of those whose density has been measured are consistent with a lot of gas over a rocky core, but some imply water over a rocky core, and some only rocky composition. It is possible that Earth-size, or even smaller, are the predominant size, rather than mini-Neptunes, but that the Kepler level of technology is not sufficient to detect most smaller planets. The data from mini-Neptunes may also apply to Earth size planets – that is, that they may come in a variety of compositions, not just rocky like Earth. More study is needed to understand mini-Neptunes and Earth-sized planets.

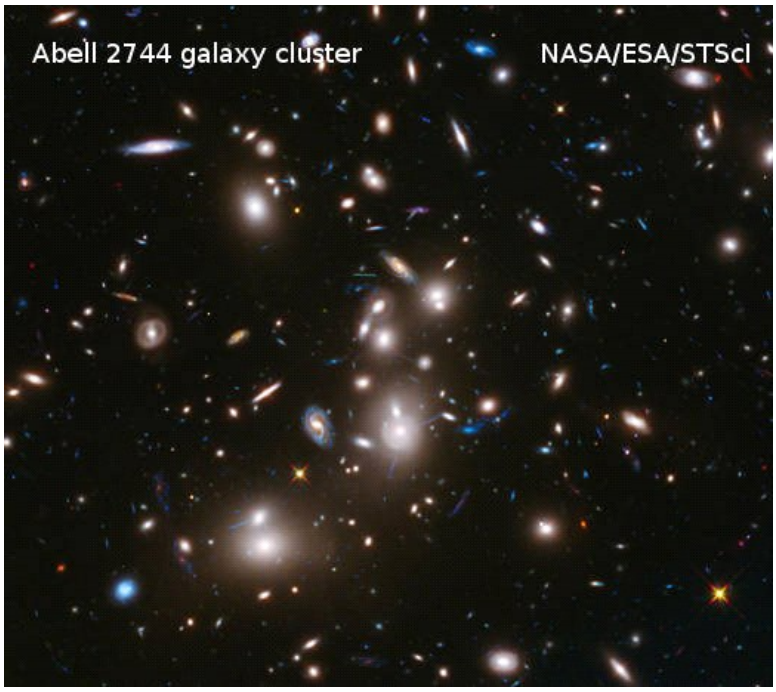
More Kepler – A team of astronomers using Kepler data has discovered the 1st Earth-mass planet that transits (crosses in front of) its star. Designated KOI-314c, it is the least massive planet to have both its mass and diameter measured. Surprisingly, though the planet weighs the same as Earth, it is 60% larger, meaning that it must have a very thick gaseous atmosphere. It shows there is no clear dividing line between rocky worlds and gas giants. It possibly formed as a gas giant, but lost much atmosphere somehow. Finding the mass of such a small planet was a challenge. Instead of using the wobble of its star, the team used timing of the transits of this planet and its neighbor. The gravity of the 2 planets perturb their orbits, making the transits early or late. The 2nd planet in the system is about the same size, but significantly denser, at about 4 times the Earth's mass. The planets orbit in a 5:3 resonance, taking about 13 and 23 Earth days for their orbits. The team was actually looking for exomoons, which should barely show up in transit timings, but found the planet instead.

Exoplanet mass – A new method has been developed to determine the mass of an exoplanet (planet outside our Solar System). It uses the spectrum of the planets atmosphere. An astronomer showed that the surface gravity of the planet makes measurable effects in the atmospheric spectrum. Given the size of the planet, determined from transit observations, the mass can be calculated from the surface gravity. The 1st application of this method came up with the same mass as radial velocity measurements had. The new method may be able to be applied to smaller planets than the radial velocity measurements, particularly when the more sensitive Webb space telescope is launched.

Hubble Space Telescope has observed the atmospheres of 2 mid-sized exoplanets as they transited their stars and found that they are likely blanketed in clouds. The planets are GJ 436b, located 36 light-years away in Leo, and GJ 1214b, 40 light-years away in Ophiuchus. The 1st is a warm Neptune (exoplanet roughly the size of Neptune, but fairly close to its star, making it warm), and the other is a super-Earth (bigger than Earth, but smaller than Neptune). Previous efforts to determine the nature of these atmospheres had eluded definitive characterization. The new observations showed no spectral lines in the wavelengths covered, which either means that high clouds obscure most of the atmosphere, or the atmosphere is transparent and contains no hydrogen, the latter being

considered very unlikely. GJ 1214b's spectrum was definitive enough to not only rule out hydrogen, but also water vapor (except in the form of opaque clouds), methane, nitrogen, carbon monoxide, and carbon dioxide. So it's extremely likely to be high clouds.

Hubble has also taken a very deep (long exposure) image of and through a few massive clusters of galaxies (Abell 2744 and others), using the gravitational lensing of the cluster to magnify and brighten any galaxies that happened to lie behind the cluster. Almost 3000 distant galaxies were found in the Abell 2744 image. Then follow-up observations were made with the Spitzer infrared space telescope to gain more data on these distant galaxies. 4 of them were quite bright. But most were much dimmer and would not have been detectable without the gravitational magnification. The bright galaxies were found to have huge rates of star formation, one of them forming stars 50 times faster than the Milky Way forms stars today. Due to their great distances, light left some of these galaxies over 12 billion years ago, so we are seeing how the early Universe developed. The result is that a few galaxies developed their stars quickly early, but that most stars formed in the huge numbers of dimmer galaxies. Those dimmer early galaxies had been hypothesized, but until this use of gravitational lensing, had generally been beyond our technology to observe.



Gravitational lens – A team of astronomers, using the Fermi gamma-ray space telescope, has made the 1st ever gamma-ray measurements of a gravitational lens. This accomplishment opens new avenues for research, including a novel way to probe emission regions near supermassive black holes. It may even be possible to find previously unknown gravitational lenses with Fermi. There is not sufficient resolution in gamma rays to distinguish the multiple images produced by a gravitational lens, but the difference in arrival times of flares can be used to distinguish those multiple images. The observations were made of a blazar known as B0218+357, whose light happens to travel through a face-on spiral galaxy, whose gravity lensed the blazar light. 3 episodes of flaring were found to produce images 11.46 days apart. Intriguingly, this is about a day longer delay than seen in radio observations. The different time delay implies that the gamma rays take slightly different paths in relation to the intervening galaxy than do radio waves. Also, the delayed image is about the same brightness in gamma rays, but one radio image is much brighter than the other. The amount of brightening during a flare event is much larger in gamma rays than in visible light or radio. This implies that the area producing gamma rays is much smaller than the area producing visible light and radio.

Superluminous supernova – Astronomers have discovered 2 of the brightest and most distant supernovas ever recorded, 10 billion light-years away and 100 times more luminous than a normal supernova. These supernovas are puzzling because the mechanism that powers most supernovas, the collapse of a giant star to a black hole or neutron star, cannot explain their extreme luminosity. They were discovered in 2006 and 2007, but at first they could not be identified as supernovas. The latest study of them suggests that they were supernovas that produced magnetars rather than ordinary neutron stars. Magnetars are neutron stars with extraordinary magnetic fields. A handful of such superluminous supernovas have been seen in the last few years, but these 2 are unusual in that they show no hydrogen in their spectra. It appears that the stars shed their outer layers of hydrogen before exploding. The supernovas are so far away the the ultraviolet (UV) light emitted was stretched out by the expansion of the Universe until it was redshifted into visible light. Astronomers had never observed a supernova in far UV, and this made it difficult to initially identify these objects as supernovas. Superluminous supernovas are rare, occurring perhaps once every 10,000 supernovas. They seem to explode preferentially in more primitive galaxies, which were more common in the early Universe.

Galactic distances – Researchers from the Baryon Oscillation Spectroscopic Survey (BOSS), a part of the Sloan Digital Sky Survey III, have announced that they have measured the distance to galaxies more than 6 billion light-years away to unprecedented accuracy of just 1%. They did this by measuring the baryon acoustic oscillations, subtle periodic ripples in the distribution of galaxies in the

cosmos. These ripples are imprints of pressure waves that moved through the early universe. The original size of these ripples is known, and their size today can be measured by mapping galaxies. Making these measurements required mapping the locations of 1.2 million galaxies, using a specialized instrument that can measure 1000 galaxies at a time. The result is consistent with a form of dark energy that stays constant through the history of the Universe, that is, a cosmological constant.

Spitzer (infrared space telescope) has made observations that suggest that most brown dwarfs have 1 or more giant storms akin to Jupiter's Great Red Spot. Periodic brightness changes seen as the brown dwarfs spin support this. But the subjects studied are too hot for water clouds, so the clouds are probably made of molten sand, iron or salts. About half of the 44 subjects studied were seen to have these periodic brightness variations. But since many could be oriented such that a giant storm would always or never be seen, the implication is that nearly all brown dwarfs have this behavior. Another surprise was that some of the brown dwarfs rotated much more slowly than any previously measured. Astronomers had thought that brown dwarfs sped up to very fast rotations when they formed, and that this rotation did not wind down with age. This implies that some brown dwarfs form with slow spin, or else something previously not accounted for slows them down. Researchers hope this study will also help understand exoplanet weather, since brown dwarfs and exoplanets should share some weather behavior.

Brown dwarf planet – Precise measurements of the closest known pair of brown dwarfs suggest that the system harbors a 3rd object, which has planetary mass. The pair was discovered last year and is only 6.6 light-years away. The brown dwarfs each have masses of about 30-50 Jupiter masses. They are separated by 3 times the Earth's separation from the Sun. But because they have so little mass (compared to a star), they take about 20 years to complete each orbit. Tiny displacements in their orbits indicated a 3rd body was present, orbiting in several months. Further observations will be made to confirm that it is a planet.

ALMA (radiotelescope array) was used to survey the cores of some of the darkest, coldest, and densest clouds in our galaxy to search for signs of star formation. One image showed a particularly bright core that appears it is forming a massive, single star, while another showed a core that was distorted and fragmented, probably leading to formation of multiple lower-mass stars. Fragmentation happens more often, which is why very few quite massive stars form. The cloud cores observed are about 10,000 light-years away in Aquila and Scutum. The cloud cores are massive and dense enough that they should already have collapsed in the star forming process, and since they have not, the implication is that some force not yet accounted for is supporting the clouds. Pressure from an already formed star was ruled out, since new stars destroy deuterium (hydrogen with an extra neutron), yet the ALMA observations found deuterium. One possible explanation is magnetic forces supporting the clouds.

ALMA also observed the remnant from the supernova seen in the Large Magellanic Cloud (a neighboring small galaxy) in 1987 (dubbed SN 1987A). It was found to be brimming with cold dust. Theoretically supernovas should create huge amounts of dust, but previous infrared observations of SN 1987A, which are sensitive only to warm dust, had found little. Something is creating and distributing the huge amounts of dust seen in every spiral galaxy, and supernovas are the prime suspect. This observation is good confirmation of this belief. It now remains to be seen if the dust survives the shock waves from the supernova, which could destroy dust, and if the dust distributes throughout much of the galaxy.

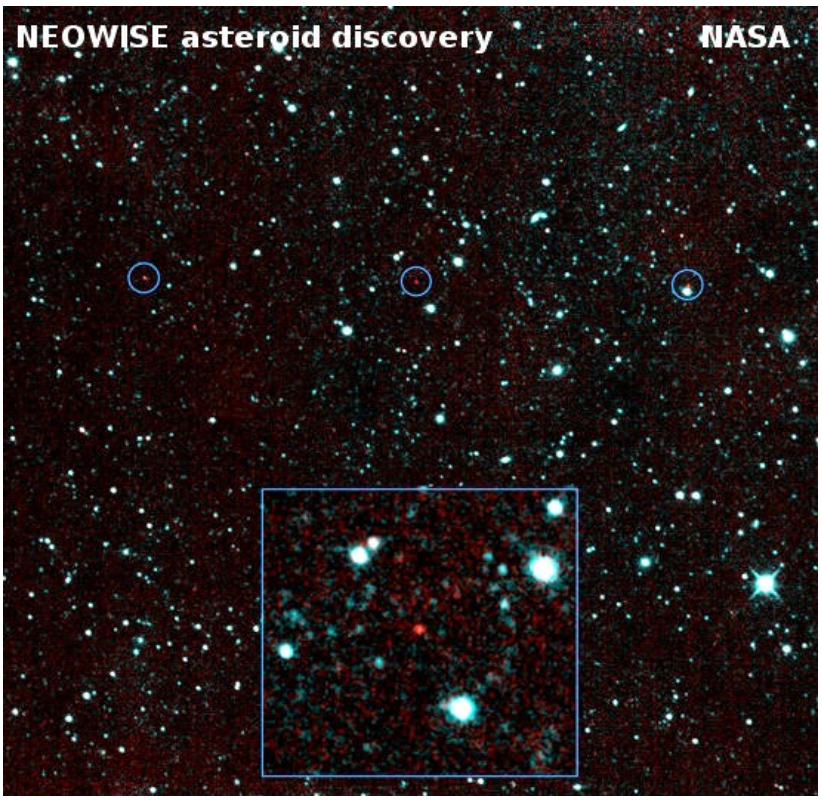
Pulsar system – Observations by several radiotelescopes have found a triple star system consisting of 2 white dwarf stars and a pulsar. This is the 1st known pulsar orbiting 2 white dwarfs. It has somehow remained with stable orbits through the 3 mass transfer stages and 1 supernova that mark the formation of white dwarfs and pulsars in close multiple systems. The pulsar is spinning 366 times per second, qualifying it as a millisecond pulsar. The whole system occupies less space than the size of the Earth's orbit. It lies 4200 light-years away. The extreme conditions in this system should show measurable effects from General Relativity, so monitoring of the orbits to detect such effects has already begun.

Chandra (X-ray space telescope) has imaged a star being torn to shreds by an intermediate-size black hole in the heart of a dwarf galaxy. Although other instances of stars being torn apart have been caught, this is the 1st by an intermediate-size black hole. It was found in archived Chandra images, and took place from 1999-2005. The dwarf galaxy is in the Abell 1795 cluster, which is about 800 million light-years distant in Bootes. It is probably smaller than our neighboring dwarf galaxy the Large Magellanic Cloud. It is one of the smallest galaxies ever observed to contain a black hole. Intermediate-size black holes are defined as having 100 to 1 million times

the mass of our Sun, and therefore lie in mass between stellar black holes, formed by a star collapsing, and supermassive black holes found at the centers of most galaxies. Intermediate-size black holes have been notoriously difficult to find. Further search of archived Chandra data will be made to see if more of these events have been recorded.

Lunar impact – The brightest meteoroid impact ever seen by the Lunar Impact Monitoring Program occurred last March, about as bright as a 4th magnitude star, but lasting only a second. Lunar Reconnaissance Orbiter (LRO) later imaged the area and found a new impact crater 59 ft (18 m) across, complete with a bunch of bright rays. The meteoroid was calculated to be in the range of 1-1.5 ft (.3-.4 m) across, hitting at 56,000 mph (90,000 km/h), resulting in an explosion equivalent to 5 tons of TNT. In the past 8 years of monitoring, over 300 impacts have been observed. LRO has also found a number of other craters that are new since a previous image of the area.

WISE (infrared wide-field space telescope) was turned back on to continue its search for near-Earth objects (NEOs). During 2009-2011 WISE completed its original mission of surveying the entire sky in infrared, and an extension mission to search for NEOs, and then was turned off for budget reasons. The new mission will concentrate on finding potentially hazardous objects (asteroids and comets). WISE was found to be in excellent condition, and the 1st new images have been released, including those of a newly discovered NEO. The spacecraft uses a 16-inch (40 cm) telescope and infrared cameras to search for NEOs and characterize their size, reflectivity, and thermal properties. Some of the objects about which WISE (or NEOWISE, as it is being renamed) is collecting data could become candidates for NASA's announced astronaut asteroid mission planned for 2025.



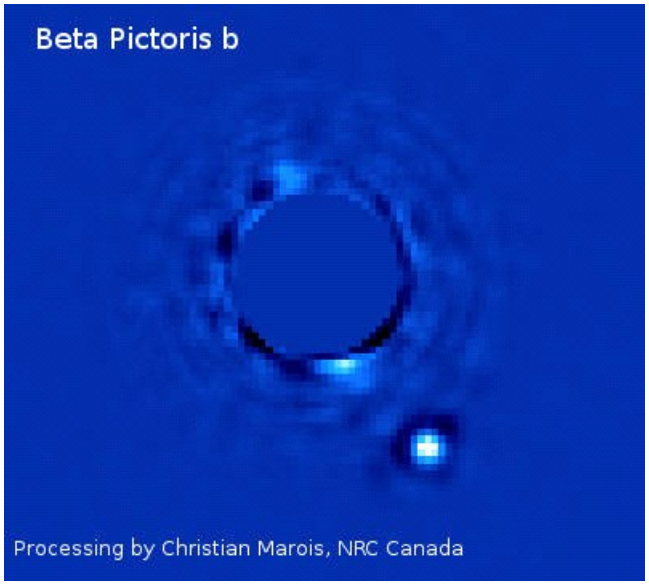
Gaia was launched in December to begin (after commissioning activities) its 5-year mission to find the precise positions and motions of a billion stars within our Milky Way galaxy. Gaia is a project of the European Space Agency. It will orbit about the L2 Lagrange point, a gravitationally stable point in space about 900,000 miles (1.5 million km) farther from the Sun than Earth. Gaia will build on the successful Hipparcos mission, launched in 1989, which measured positions and motions of 100,000 stars to high precision and 2 million to lower precision. Gaia's precision is 40 times higher than Hipparcos's, and so will measure distances by parallax about 40 times farther. It will observe each of the billion stars an average of 70 times. The motions determined can be used to fast forward to where the stars will go, and used in rewind to determine where stars came from. In addition to stars, Gaia will observe asteroids (expect to find 100s of thousands), brown dwarfs (expect to find 10s of thousands), exoplanets, and half a million quasars, and will search for supernova explosions (expect to find 10s of thousands) and conduct tests of Einstein's General Relativity. The spacecraft's camera has about a billion pixels. Gaia was launched on a Russian Soyuz rocket that was operated by the French rocket company Arianespace.

International Space Station (ISS) – I reported here last month on the cooling system failure aboard ISS (1 of 2 such systems), which prompted non-essential systems to be been shut down. Within a couple of weeks, 2 spacewalks were planned and performed to replace a broken pump, and normal ISS operations were resumed. Actually 3 spacewalks were planned, but the repairs were made

ahead of schedule. These were the 1st spacewalks made in US spacesuits since the serious water leak inside a suit occurred last July. Precautions were taken against another leak, but no leakage problems occurred.

Instant AstroSpace Updates

The **Gemini Planet Imager**, which was specifically designed to image exoplanets in infrared on the Gemini Telescope in Chile, has seen 1st light, and has imaged known exoplanets and planet-forming rings in the best detail ever. An observing project is planned with it to image 600 nearby young stars in search of planets.



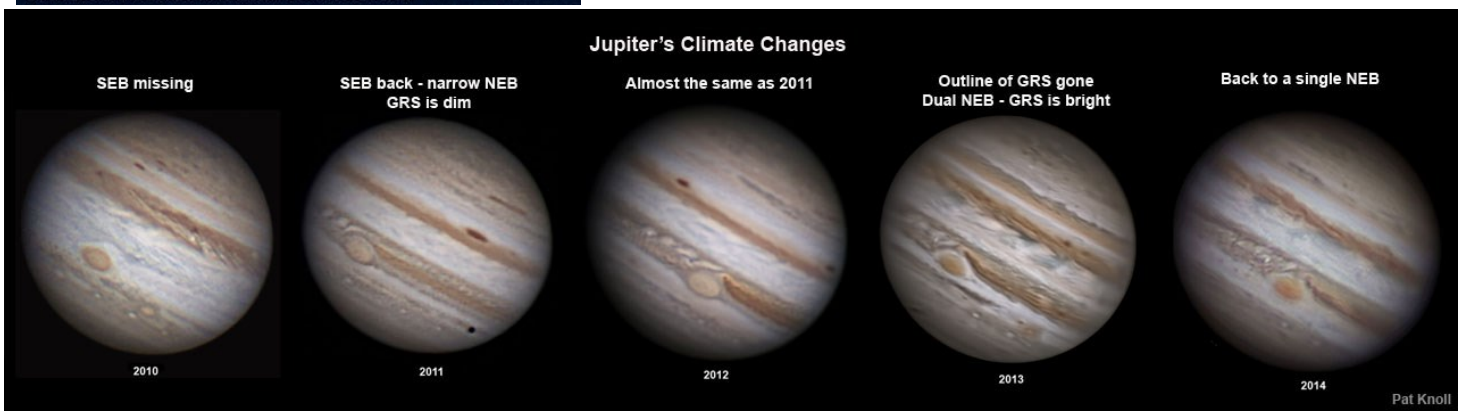
For the 1st time an independent method, in this case radial velocity wobbles, has been used to **confirm an exoplanet** that was implied only by variations in the timing of transits of a neighboring planet in the system. The observations were made at Observatoire de Haute-Provence in France.

An **asteroid** estimated at 10 ft across (3 m) was discovered in early January and was predicted to barely miss Earth the next day, but it had disappeared by the time it was to leave Earth's vicinity, so it must have broken up in the atmosphere over the Atlantic Ocean.

The Hubble Space Telescope has imaged a giant star with a ring-shaped nebula caused by it throwing off its outer layers. It resembles what the star looked like that later exploded as **supernova** SN 1987A, so this object will probably also explode, but it is not known when. At 20,000 light-years away, it will be spectacular, but safe.

The astronauts aboard ISS are studying in microgravity (among 100s of experiments) **supercritical water**, a form water takes on at high pressure and temperature. Supercritical water will oxidize organic material cleanly, usually without a flame, and may be used extensively in the future in waste cleanup systems.

Virgin Galactic in January completed another successful test of their **SpaceShipTwo**, reaching 71,000 ft (21.6 km) altitude and mach 1.4 (40% over the speed of sound). Taking the 1st passengers to reach suborbital space is planned for this year.



Pat Knoll documented the seasonal changes in Jupiter's atmosphere over a five-year period (roughly 42% of the Jovian year). NEB = North Equatorial Belt; SEB = South Equatorial Belt; GRS = Great Red Spot. Despite Jupiter's almost negligible axial tilt (around three degrees) the seasonal variations are quite striking.

The Bishop Observatory—Some History (Part 3 of a series; Parts 1 and 2 may be found in the June and December 2013 issues)
By Larry Adkins
Rancho Santiago College District
Santa Ana, California (reprinted from OCA Website)

Observatory under construction at Santa Ana High (August, 1940)

Why was the telescope, always the property of Santa Ana College, installed at Santa Ana High School? The answer lies in the fact that the high school and the junior college shared the same campus from the college's founding early in the century into the 1930s. Most of the college functions were forced to move to new quarters some blocks away after the earthquake of 1933, but this was a quite small campus and always considered an intermediate step in relocating to a larger, permanent site. The requirement to move the observatory from Lemon Heights within six months in 1940 clearly called for an immediate temporary solution, and the logical place was the high school with its more expansive grounds. Needless to say, the onset of World War II put all other plans on hold. After the war, the college moved to its present location, and the intention was to transfer the observatory there as soon as feasible. As it happened, the telescope remained at the high school until 1955.

Observatory near the track and field facilities of Santa High School

Several interesting observations with the Clark refractor were reported in ***El Don*** during its stay at Santa Ana High. On November 11, 1940 the telescope was used to observe the transit of Mercury across the face of the sun, no doubt using the Herschel wedge still in the accessory box today. This is a relatively rare event, the next such transit visible from Santa Ana after 1940 was in 1973 and the most recent occurred in 1999. The 1940 event was planned as more than a casual observing session. The November 8, 1940 issue of ***El Don***[21], reported that a student, Bruce Ragan, with assistance from Mrs. Tessmann and Walter Ferris, was intending to time the transit and report the results to the Naval Observatory in Washington. According to this article, instructions had been received from the observatory on the proper procedures required to produce meaningful results. I was not able to find a follow up article, so we can only speculate on the success of the operation. The following year (October, 1941) the public was invited to view Mars, then experiencing one of its closest oppositions. El Don reported that over 400 people lined up to see the red planet through the Clark refractor[22]. That's quite a crowd, especially when you consider that the population of Orange County in 1940 was less than 5% of what it is today. The article implies that some in this enthusiastic audience attempted to see "the peculiar 'canals' or dark lines running from each of the pole caps of the body to a slightly greenish belt girding the equatorial region". No reports of success here, either.

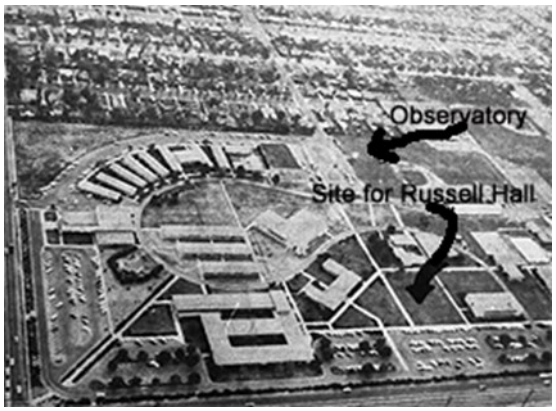
Student Diana Edwards observing with the telescope in 1954

A brief article in 1941 addresses the issue of "how far can you see?" with the 8" telescope[23]. The author reports that the instrument is " capable of bringing to observation the nebula Canis Vanatican (sic), which is 1,100,000 light years distant. This nebula is about the farthest object in space observable with the telescope". This is surely a reference to the Whirlpool galaxy (M51) in Canes Venatici. The stated distance is much shorter than the current estimate, but the most interesting point to note here is that a galaxy is still being referred to as a "nebula". By 1930 Edwin Hubble had pretty much established a consensus among astronomers that spiral nebulae were external galaxies. It is interesting to see here that some ten years later the new terminology had not yet taken hold.

Jennie Tessmann retired from teaching in 1946. The picture on the left shows her at the telescope sometime during that same year. As far as I can determine this is the last photograph of her at the college. The caption along side the picture states again that the telescope is equipped with a spectroscope and camera. As stated above, the spectroscope and camera holder have since been lost, and I have been unable to locate any photograph attributed to being taken with the telescope.

17th and Bristol 1955 - 1967

In the fall of 1947 Santa Ana College was formally relocated to a large tract of land on the corner of 17th and Bristol streets, then a semi-rural intersection in the citrus groves west of downtown. An aerial photograph from that year shows a collection of war surplus barracks and a few recently constructed flat roof structures flanked on three sides by orderly rows of orange and lemon trees. The buildings were situated around the periphery of a circular drive surrounding a citrus filled park.

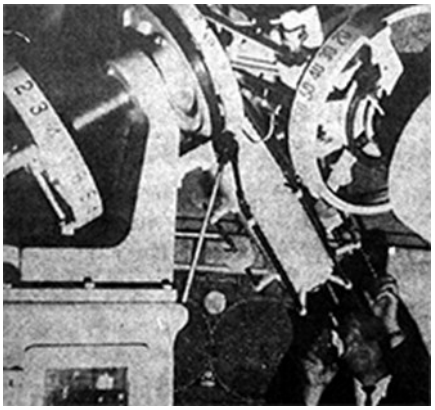


Observatory on new SAC campus. By this time the central park of orange trees had been replaced with buildings.

The observatory was moved to the new campus in 1955 and located in an undeveloped area south of the snack bar. At first this was considered quite a satisfactory site, but the situation soon changed. By 1961 instructor David Hartman was complaining in ***El Don*** about the flood of light generated by the recently constructed Horner Plaza shopping center directly across 17th street from the campus[24]. Even so, that same article reports that the observatory was heavily used in astronomy classes and that every semester each astronomy student spent two hours using the telescope. The article goes on to describe how instructor Walter Brooks and some of his students opened the observatory at 4:30 in the morning on March 9, 1961 to observe the close conjunction of Jupiter and Saturn.

Observatory close up (1960)

In 1963 Dr. Brooks was still regularly using the telescope in his classes and observing special events like a near conjunction of Venus with the moon[25]. However, during this period the urbanization of Orange County was rapidly accelerating, and Santa Ana College was experiencing an explosive enrollment increase, along with the accompanying need for new classroom and laboratory facilities. "Undeveloped" areas of the campus were quickly becoming "developed" and the observatory soon found itself surrounded by buildings, parking lots and lights which were never extinguished. Change was in the air, and plans were already underway for a new science building with the telescope perched on the roof.



Instructor David Hartman at the controls in 1961

In 1963 Dr. Brooks was still regularly using the telescope in his classes and observing special events like a near conjunction of Venus with the moon[25]. However, during this period the urbanization of Orange County was rapidly accelerating, and Santa Ana College was experiencing an explosive enrollment increase, along with the accompanying need for new classroom and laboratory facilities. "Undeveloped" areas of the campus were quickly becoming "developed" and the observatory soon found itself surrounded by buildings, parking lots and lights which were never extinguished. Change was in the air, and plans were already underway for a new science building with the telescope perched on the roof.

Dr. Walter G. Brooks observing in 1963

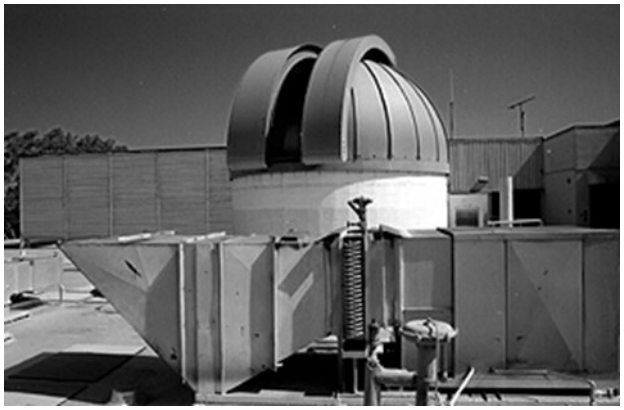
The Roof of Russell Hall 1967 - 1999

On March 12, 1967 Santa Ana College held an open house for the public to show off its brand new science complex. The three story main building containing classrooms and laboratories was named Russell Hall for H. O. Russell, former physics instructor at the college. Along side Russell Hall was a smaller building housing a planetarium with a state of the art Spitz projector. The planetarium was named for Jennie Tessmann who had died eight years earlier in 1959. The Bishop observatory, fitted with a new dome by AstroTech, now graced the roof of Russell Hall and, in the words of the promotional announcement, was expected to have "a commanding view of the stars"[26].

Observatory dome being hoisted to the roof of Russell Hall 1966

The Tessmann planetarium was an immediate success, instructing and entertaining college classes, visiting students from other schools in the area, and the general public. The fate of the Bishop observatory and the Clark refractor was less happy. The roof top of Russell Hall proved to be a most unsatisfactory location. It was always understood that the lights from by now thoroughly urban Orange County would limit the telescope's usefulness to the observation of bright objects like the moon and planets. However, unlike its original site at the Bishop home, no pier to isolate the mounting from the building was provided. Under the best of circumstances the vibrations generated in a three story building would have greatly reduced the telescope's effectiveness, but compounding the problem was the fact that the observatory was surrounded by the building's air conditioning system which was active at all times. For most purposes the telescope was now useless.

My personal involvement with the Bishop observatory began in 1979 when I was hired as a part time lab instructor at the college. Once a semester I used to take students to the roof to show them what a classic refracting telescope looked like. If the weather conditions were right we attempted to look at the moon or an available planet. At some point the eyepiece holder had been modified to accept modern oculars, and occasionally, when the air conditioning unit was recycling, a reasonably steady image could be seen. There was a bit of chromatic aberration, something I have observed even with more notable Clark refractors such as the 24" at Lowell Observatory, but even so, these momentary lulls in vibration gave an indication of the sharp, high contrast imaging capabilities of the instrument.



Abandoned observatory July 2002

There was an attempt to damp out the vibrations by placing hard rubber "shock absorbers" under the pier, but this produced no noticeable improvement. To be honest, at this time there was not a great deal of interest in upgrading the observatory by any of us, because by the late seventies it seemed that technology had rendered the Clark refractor irrelevant. Several times in articles published during the preceding fifty years, writers had expressed pride and even awe at the fact that Santa Ana College possessed such a fine instrument. For instance in 1941 the Clark was described as "the second best college-owned instrument of its type in California, and surpasses even those

Yet in appearance the Clark was most people's image of what a telescope should be, with its long cannon barrel of a tube, its massive counterweighted German equatorial mount, its temple-like dome. And then there was the history associated with Alvan Clark & Sons, a name evocative of the heroic era of American technology, master opticians, makers of the world's largest lenses. Therefore, in the 1990s two attempts were made at relocating and rehabilitating the observatory as a public facility. The first proposal in 1992 was to create a public astronomy center in the middle of Mile Square Park, part of the Orange County regional park system. The telescope would be donated by the college, the building would be erected by the county, and the staffing would be provided on a volunteer basis by the Orange County Astronomers, one of the largest amateur astronomy organizations in the United States. This fell through when Orange County went bankrupt in 1994, terminating all funding for such projects. The second attempt involved moving the telescope to the Discovery Center, a hands-on science museum in Santa Ana aimed at young people. The college officially transferred ownership to the museum, and in 1999 telescope maker Dave Radosevich dismantled the Clark in preparation for a complete refurbishing. However, this plan, too, was abandoned when the directors at the Discovery Center concluded that the antique telescope was not suitable for the purpose they had in mind, a learning facility with a robust instrument which could be operated by their youthful patrons with minimal supervision. Ownership of the telescope was returned to Santa Ana College.

Into the 21st Century

In 1998 Mary Halverson (Dean of Science and Technology), Dr. Steve Eastman (planetarium director) and Don Prescott (planetarium program director) prepared a preliminary three part plan to modernize and extend the functions of the Tessmann planetarium, now thirty years old and showing its age[28]. The plan called for a new projection system and new seating configuration in the theater, followed by a remodeling of the planetarium building to house a space science education center. The project was formally launched with the approval of Peter Bostic, Santa Ana College Foundation director, and the Foundation's other board members. With the telescope back at the college, the current plan is to integrate the observatory into the new complex, and to place it in a visually prominent location near the planetarium building to serve as an immediately recognizable symbol of the Space Science Education Center. As of September 2002, funding is available for phase I of the master plan, the projector upgrade, and is scheduled to be completed within the next year. The telescope remains disassembled and in storage, awaiting its rebirth.

Epilogue: One Special Observing Session

In the last week of April,1986 Dave Radosevich, Steve Kysor and I went to the roof of Russell Hall to make a special observation with the 8" Clark. Dave and Steve had been students of mine but were now skilled telescope makers with several awards between them. As I recall, the night was not particularly good, rather smoggy, and the telescope was full of the jitters as always. However, we saw what we came to see: Halley's comet. Ever since Edmond Halley determined its period to be 75 years, an average human life span, each return of his comet has served as a celestial milepost on which to reflect both on humanity's connection with the cosmos and on one's own mortality as well. Unaware at that time of our telescope's history, we thought for the sake of cosmic continuity we should make at least this one observation just in case it had been used to view the comet during its previous apparition in 1910. It is now clear that this telescope missed the earlier date by a little over a decade, but I am still glad we went up there that night. Of what value is an antique telescope? A bridge to the past, certainly - the skill of the craftsmen who made it, the aspirations of its many users. But a bridge to the future as well. No, the 8" Clark didn't see Halley's comet in 1910, but it did in 1986. In 2061 when Halley's comet is once again in the skies over California, I'd like to think that someone will be at the eyepiece of Mr. Bishop's telescope.

Current Status of the Bishop Observatory and Clark Refractor

I would like to express my appreciation to Orange County historian Mr. Jim Sleeper who steered me toward a number of fruitful references, to Mr. Victor Alleman who was kind enough to share with me some of his reminiscences and inscriptions from his yearbooks, to Sue Lindstedt, current owner of the Bishop property, who graciously gave me a tour of the house, and to Keith Parker, a former owner, who filled me in on the early history of the house and assisted me in obtaining early photographs. Also to Trudy Bell and Robert Ariail for their assistance in assessing the age of the Clark telescope. Both are associated

with the ***Antique Telescope Society***, an invaluable resource for this kind of investigation. Special thanks to Michael Saladyga, librarian for the AAVSO for finding the observing records of Walter J. Ferris. Thanks also to John Grula, librarian for the Carnegie Observatories in Pasadena for finding a copy of Jennie Lasby's 1911 publication with Walter Adams. Finally, my heart felt appreciation to the most helpful staff of the Santa Ana History Room of the Santa Ana Public Library.

Photographs are from ***El Don***, ***Del Ano***, and ***El Vivaz*** (SAC student publications), ***Ariel*** (Santa Ana High School yearbook), ***The Santa Ana Register***, ***Western Woman***, ***The Tustin Historical Society, Historical Panoramics of Orange County,*** and Larry Adkins

REFERENCES

21. "Astronomers View Rare Transit", El Don, November 8, 1940
22. "Observatory Opens to View Mars", El Don, October 3, 1941.
23. ref. 10.
24. Jim Fabian, "Astronomers Make Good Use of SAC Refractor Telescope", El Don, March 10, 1961.
25. Mike Grimshaw, "Man in Moon Has a Friend", El Don, February 1, 1963.
26. "$1.8 Million Building Set for Opening", El Vivaz (*SAC* student magazine), Fall 1966.
27. ref. 21.
28. "Bridge to the Universe" http://www.sac.edu/faculty_staff/academic_progs/math/planetarium/

Larry Ray Adkins

Adkins, Larry Ray, of Tustin, CA, died December 7th of complications from multiple myeloma. He was 74. Larry grew up in Texas and received a PhD in physics from the U. of Texas at Austin. He worked for Rockwell International in Anaheim and taught astronomy at Cerritos College. Larry was an avid traveler, an award-winning amateur photographer, and an archaeoastronomer involved with the discovery of Temple of the Fox in Peru. He is survived by his wife, Lorna; his son, Kevin Adkins of Jersey City, NJ; his son, "Greg Adkins" and wife Rebecca of Altadena, CA; his sister, Joyce Brooks of Great Bend, KS; a niece, Karen Clark of Great Bend; a nephew, Ray Brooks of Brownfield, TX; and two honorary grandchildren, Jessamine and Conlan McLarty-Schroeder, and their parents, Steve and Janet of Anaheim, CA.

A memorial service will be held at 2 p.m. on Saturday December 14th at the Episcopal Church of the Messiah, 614 N. Bush St., Santa Ana, CA. **Brown Colonial Mortuary**

Published in Orange County Register on Dec. 14, 2013

EDITOR'S NOTE: I was informed of the death of Dr. Adkins shortly after the January issue of the *Sirius Astronomer* went to print. Because I had already been presented with the obituary for Alika Herring and did not wish to either overburden the issue with obituaries or detract from Mr. Herring's loss, I elected to post Larry's obituary in this issue, along with the remainder of his article on the Alvan Clark telescope. It is only fitting that the man's work stand as a testimony to his life and to his many contributions to the club.

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

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

RETURN SERVICE REQUESTED

DATED MATERIAL
DELIVER PROMPTLY

HANDY CONTACT LIST

CLUB OFFICERS (to contact the entire board at once, send an email to board@ocastronomers.org)			
President	Greg Schedcik	gregsched@verizon.net	714-322-5202
Vice-President	Reza AmirArjomand	reza@ocastronomers.org	646-494-9570
Treasurer	Charlie Oostdyk	charlie@cccd.edu	714-751-5381
Secretary	Bob Buchheim	Bob@RKBuchheim.org	949-459-7622
Trustee	Kyle Coker	kcoker@cox.net	949-643-9116
Trustee	Sheila Cassidy	rivme@pacbell.net	951-360-1199
Trustee	Sam Saeed	sam@isismagna.com	714-310-5001
Trustee	Gary Schones	gary378@pacbell.net	951-687-7905
Trustee	Steve Short	nightskytours@hotmail.com	714-771-2624
Trustee	Alan Smallbone	asmallbone@earthlink.net	818-237-6293
Trustee	Barbara Toy	btoy@cox.net	714-606-1825
COMMITTEES, SUBGROUPS, AND OTHER CLUB VOLUNTEERS			
Anza House Coordinator	Doug Acrea	dougcarola@att.net	949-770-2373
Anza Site Maintenance	Don Lynn	donald.lynn@alumni.usc.edu	714-775-7238
Beginner's Astronomy Class	David Pearson	astrodwp@dslextreme.com	949-492-5342
Black Star Canyon Star Parties	Steve Short	nightskytours@hotmail.com	714-771-2624
Explore the Stars OCA Contact	Bob Nanz	bob@nanzscience.com	760-751-3992
Librarian	Karen Schnabel	karen@schnabel.net	949-887-9517
Membership, Pad Coordinator	Charlie Oostdyk	charlie@cccd.edu	714-751-5381
Observatory Custodian/ Trainer/Member Liaison	Barbara Toy	btoy@cox.net	714-606-1825
OCA Outreach Coordinator	Jim Benet	jimbenet@pacbell.net	714-693-1639
Sirius Astronomer Editor	Steve Condrey	startraveler68@yahoo.com	714-699-1243
Telescope Loaner Program	Don Stoutenger	dstouten@yahoo.com	714-271-2646
WAA Representative	Tim Hogle	TimHogle@aol.com	626-357-7770
Webmaster	Reza AmirArjomand	reza@ocastronomers.org	646-494-9570
SPECIAL INTEREST GROUPS (SIG's)			
AstroImagers SIG	Alan Smallbone	asmallbone@earthlink.net	818-237-6293
Astrophysics SIG	Bob Sharshan	RSharshan@aol.com	714-845-6573
Dark Sky SIG	Barbara Toy	btoy@cox.net	714-606-1825
Remote Telescopes	Del Christiansen	DelmarChris@earthlink.net	714-895-2215
GoTo SIG	Mike Bertin	MCB1@aol.com	949-786-9450

OCA WEBSITE: http://www.ocastronomers.org STARLINE 24-HR. Recording: 714-751-6867 ANZA OBSERVATORY: 951-763-5152