

This is the Veil Nebula captured in through narrow band filters by Stevan C Hart in August 2011 using a Takahashi FSQ refractor and QSI 583wsg camera. This image is a mosaic composition.

Because of the COVID-19 crisis and ongoing efforts to reduce exposure to the virus:

- **All in-person club events are cancelled**
- **Use of the Anza site is discouraged**

Please read more about how OC Astronomers has modified its activities on page 2.

### Upcoming Events - free and open to the public

<b>Beginner's class</b>	Friday, 1 July at 7:30 to 9:30 PM The topic this month will be "How to Use Your Telescope"	ONLINE
<b>Club Meeting</b>	Friday, 9 July at 7:30 to 9:30 PM "What's Up?": Dr. Doug Millar from OCA Main speaker: Dr. Armin Rest from Space Telescope Science Institute whose talk will be "Chasing Supernovae Explosions with Kepler"	ONLINE
<b>Open Spiral Bar</b>	Saturday, 10 July at 10:00 to 11:30 PM Want to socialize? Grab your images, experiences, questions, or none and see your fellow Orange County Astronomers face-to-face.	ONLINE

**Please consult the calendar on the OCA website to RSVP (required)**

# Response to COVID-19 Crisis

COVID-19 continues to affect all our activities. All in-person club events remain cancelled through at least the summer of this year. Cancellation periods for specific events are detailed below. Please see the President's Message for additional information.

Any use of the club's Anza site by members is at their own risk as we have no way of cleaning or sanitizing the site to CDC standards. If you must go to the site, be sure to clean and sanitize surfaces you have contact with and make sure it is cleaner when you leave than it was when you arrived. You must bring cleaning supplies and sanitizer with you as it is not provided at the site. Be sure to take any trash that you generate or find on the site out with you, and please maintain social distancing if anyone else is out there.

If you have any questions, feel free to contact board members or post them to the email groups or through social media. We will do our best to respond, but please bear with us if there is a delay as we all have other responsibilities as well.

We hope you and your families and friends all remain safe and healthy, and best wishes to all of you!

## Summary of Cancellations of OCA In-Person Events

Due to the ongoing COVID-19 crisis, all in-person club events are cancelled through at least the following periods:

General Meetings	Cancelled until further notice; please try our virtual meetings instead
Anza Star Parties	Cancelled indefinitely
Orange County Star Party	Cancelled indefinitely, until allowed by Orange County Parks
Outreaches	Cancelled indefinitely
Beginners Astronomy Class	Cancelled indefinitely, please contact Dave Pearson to attend Zoom classes
SIG Meetings	Cancelled indefinitely, depending in part on availability of facilities and when meetings could go forward safely. Some may schedule Zoom events.

Please check the website, email groups and social media for updates.

## From the Editor

### Sirius wants photograph submissions from club members

If you would like your picture on the cover, please send it to me along with a brief description of the subject, where the image was taken, and the equipment used.

### Ideas for Future articles

The newsletter includes articles from members or about subjects suggested by our members. We seek ideas and writers to cover them. To contribute an article or work with the editor to produce one, please contact me at [newsletter@ocastronomers.org](mailto:newsletter@ocastronomers.org).

### Due dates for submission of articles, pictures and advertisements

<u>Issue</u>	<u>Due date</u>
<b>August</b>	22 July < new date
September	21 August
October	18 September
November	23 October

# President's Message

By Barbara Toy

"In Xanadu did Kubla Khan  
A stately pleasure dome decree..."

Whatever the "stately pleasure dome" was that Kubla Khan built in Xanadu, ours of the current day generally consist of stadiums, theaters and casinos, all of which share a love of bright outside lighting. This was brought home to me when we were recently on our way back from Anza earlier in the evening than originally planned and passed the Mission Viejo Company's new development along Ortega Highway between Antonio Parkway and Caspers Park when what looked like a stadium that was part of that development was lit up in all its glory. It was very bright.

I remember hearing about the plans for this development from rangers at Caspers Park several years ago, and their concern about plans for a stadium in particular, as they felt it would seriously degrade the night skies in the park. They were trying to negotiate with the Mission Viejo Company to reduce the impact of the lighting from this new development on Caspers Park, but I don't know how successful they were in getting more night-friendly lighting installed.

In years past, Caspers was one of the locations we tried for the Orange County Star Parties when our original location was closed to restore the habitat and we hadn't yet been able to arrange for access to the site in Black Star Canyon, the location before our current Orange County viewing area. I don't think there is anywhere in Orange County that isn't affected by the county's light dome, but there was one area in Caspers that was about as dark as you could find in the county at that time – just on the other side of the range that separates Caspers from this new development. I haven't tried viewing from Caspers Park for several years now, and don't know what the current night sky conditions actually are from personal observation, but expect that it's much brighter than when we were viewing there about ten years ago.

This tends to be what happens whenever there is development, and we have also seen significant brightening of our skies at Anza from the developments in Temecula, Wildomar, Elsinore and all the surrounding areas to our west over the last 20 years. We also see increasing brightness from San Diego County to our southwest, the Corona area to our north, and Palm Springs/Palm Desert and surrounding areas to our northeast (and that doesn't include folks in the immediate area who put up city-style lighting in the countryside). There is also a potential for significant local brightening of our sky from the Cahuilla Casino between us and the town of Anza, though I don't think we've been directly impacted by that so far (it may be part of the glow to our northeast, but I'm not sure).

In Orange County, it seems that the entire county will soon become as bright as North Orange County has been for decades, making it ever harder for people to see the night sky and perceive the immensity and beauty of the universe beyond our atmosphere.

There, as well as Anza, light pollution has a tremendous effect on our activities as astronomers, and it is in our interest to reduce it in any way we can, even if that's just one light at a time. One place to start is with lighting at our own homes – the goal of good outside lighting is to light up what really needs to be lit and not anything else. Usually that would be walkways, steps and other items below the level of any given light, nothing above it. Ideally, the source of light should not be visible - if you see a bulb you're going to be somewhat blinded by the glare, which becomes even more of a problem as eyes age (speaking in part from personal experience).

That's why indoor lamps regularly have shades, as a bare bulb produces too much glare to be as useful as one whose light has been diffused or redirected by a shade. For some reason, people don't seem to recognize that the same principles apply outside and too often seem to feel that glare outside equates to effective lighting. If you have an outside light where the bulb is visible, you'll find if you put a shield over it that reflects the light downward that it becomes a lot more effective at lighting the area where you really want the light, and that you can see more at the level of the light itself because it isn't hidden by the glare of the bare bulb. This is true even of supposedly decorative bulbs.

If you want to learn more about good outside lighting and why you should care even beyond the effects on astronomy, one of the most informative websites out there is from the International Dark Sky Association (IDA), <https://www.darksky.org/>. Their drop-down menu under “Light Pollution” on their home page has information in a number of categories on the negative effects of light pollution, including health and ecological effects. Their menu under “Lighting” has a lot of information on different aspects of lighting, from general educational information to specifics on finding appropriate fixtures, dealing with problem lighting from neighbors, LED lights, ordinances to help enforce better lighting practices, and so on. The organization itself was a pioneer in this area. They’ve done a lot over the years to combat light pollution and is well worth supporting.

### **Regarding Covid-19...**

California is currently reopening, some sectors more cautiously than others. As of June 15, a lot of restrictions were lifted or modified, but people are still getting the disease and, sadly, there are still people dying from it, though they don’t seem to be getting as much attention as they did a few months ago. While general infection rates in Los Angeles and Orange Counties are currently low, they are higher in Riverside and other counties, another cause of concern, particularly as people are traveling more. And there’s the possibility of infections from new variants developing in areas with high infection rates, such as India, that may be more infectious and cause worse levels of disease than those we’ve been dealing with for more than a year now. So far studies show that the Covid vaccinations protect against the known variants, and we hope it stays that way.

Our Covid response and the effects of the pandemic on the club and its activities was one of our agenda items for our May Board meeting – and has been on all of our meeting agendas since spring of 2020, with a lot of email communication in between, particularly in the early days after the shut-down. We’re all cheered by the dropping infection rates and increasing vaccination rates, but aware that we can’t be sure we’re entirely out of the woods on this yet. As I write this, it’s too soon after the “reopening” to know if we’re going to see another surge in infections, which could cause a reversal in some of those changes loosening restrictions we’ve been operating under during the pandemic. Hopefully we have enough of the population vaccinated to keep that under control.

The Board decided to continue responding to changing conditions as to the pandemic with a reasonable level of caution. We aren’t going to restart formal star parties at Anza in the immediate future, and there won’t be a Starbecue this year (next year, though, we’re hoping for a really big party!). As to other activities, as I mentioned last month, many are affected by what other entities are doing. Our general meetings won’t be going “in person” until September, at the earliest, as Chapman University won’t be able to make the auditorium available until then. Our access to our Orange County viewing site is dependent on when OC Parks is able to reopen it to us, our meetings at the Heritage Museum are dependent on when those facilities can be available. Everyone wants to reopen, but wants to do it in a way that minimizes the chance that they would have to close down again if infections start going out of control again.

As conditions change, we’ll put notice on the website and on the social media feeds as well as out on the email groups. There’s a possibility that the Astrophysics group may be able to meet at the Heritage Museum in July – if you’re interested in getting notice of when they are actually able to start having in-person meetings again at the museum, please contact the coordinator, Bob Sharshan (rsharshan@aol.com) to be added to his email list.

Thank you all for your patience, understanding and cooperation while we work our way through what we all profoundly hope are the final stages of the pandemic. And may you all stay healthy and enjoy clear skies!

© Barbara Toy, June 2021

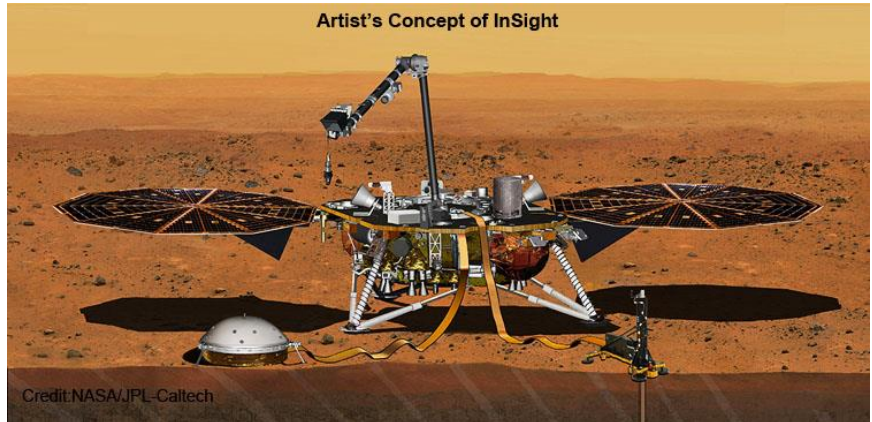
# AstroSpace Update

July 2021

Astronomy and space news summarized by Don Lynn from NASA and other sources

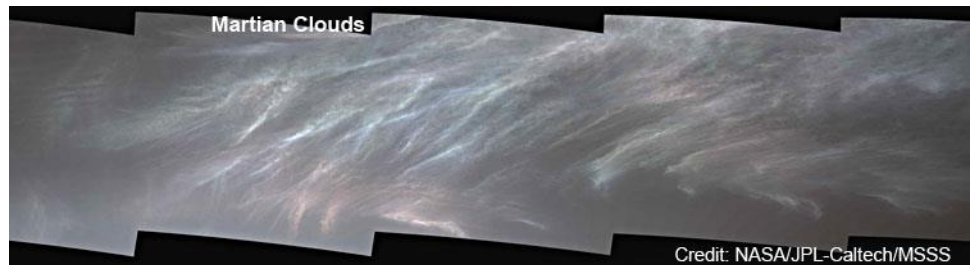
**Ingenuity** – The Mars helicopter Ingenuity made its first 2 flights of its extended mission, the 6<sup>th</sup> and 7<sup>th</sup> flights overall. Flight 6 encountered a glitch in its navigation system, flew the rest of the planned flight while wobbling, and landed gently about 16 feet from the planned site. Craft controllers fixed the glitch, so flight 7 went without any problems. The glitch was that a timing problem lost one of the images taken of the ground under the helicopter. Those images are used to navigate. For the remaining flight after the glitch, the helicopter control software always thought that it was at the location of the latest image at an incorrect time. However, stability software in the copter kept it flying regardless. The landing software does not use the navigation images in the same manner, so landing happened perfectly. Controllers plan to fly Ingenuity about every 2 weeks, testing new capabilities, for a few more months.

**InSight** – All solar panels sent to the surface of Mars have eventually collected enough dust to seriously degrade the power generated. Sometimes a windstorm or dust devil will happen and clean much of the dust off, restoring power. Unfortunately, nature has not cleaned the solar panels on the InSight lander, and spacecraft controllers are planning to turn off instruments, including the seismograph, during the Martian season of least available sunlight, leaving only heaters and other necessary equipment turned on. They would like to delay this stoppage of science as long as possible, so in labs here on Earth spacecraft engineers have been trying everything they can think of to clean InSight's solar panels. What worked best was dribbling coarse-grained sand onto the solar panels on a windy day. The blowing sand scrapes off some of the dust. So spacecraft controllers tried this on the real InSight on Mars, and it worked. Solar panel power is up by 30 watt-hours per Martian day, and the instruments can be left on awhile longer.



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**Martian Clouds** are fairly rare but do occur more often during the coldest part of the Martian year. Scientists working with the Curiosity rover made a special effort to image the clouds this season. They captured wispy clouds, filled with ice crystals, some of them showing iridescent color. The first clouds of the season were found to be at higher altitude than the later ones. Typical clouds are up to 37 miles high and are water ice. The early clouds are higher than that and likely carbon dioxide ice (dry ice). Some of these clouds qualify as noctilucent clouds, as they are lighted much of the nighttime due to their altitude.



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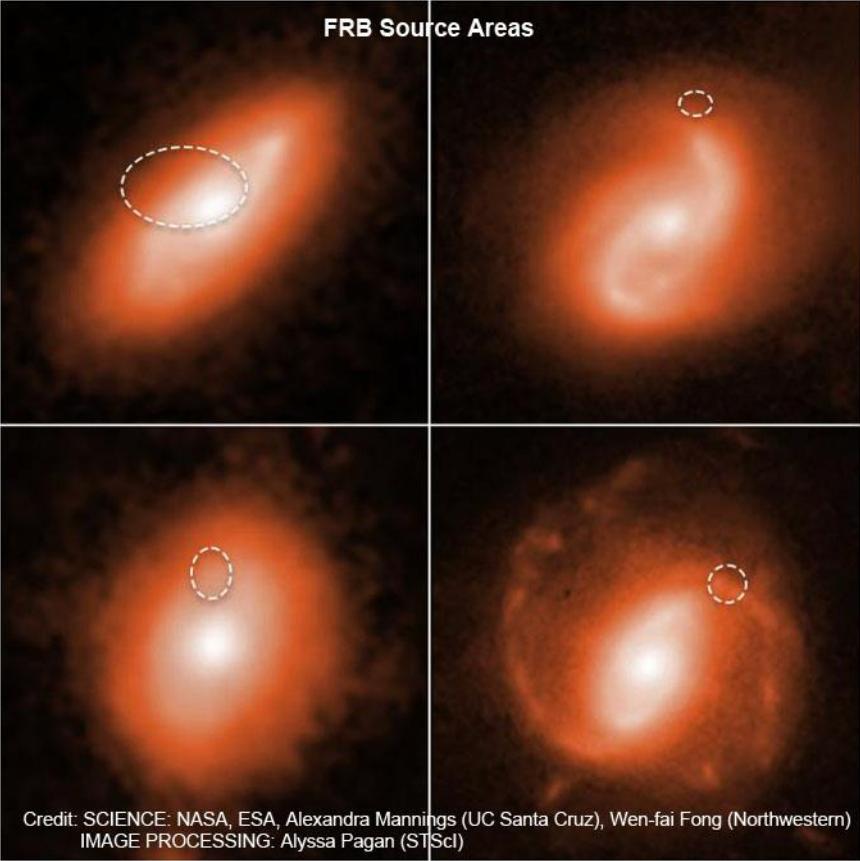
**Solar Discoveries** – A team of astronomers who have taken spectroscopic measurements of the Sun's corona during more than a decade of total solar eclipses has announced some new discoveries. The temperature of the corona does not change much with the 11-year cycle of sunspots and other activity on the Sun. Both the slow and fast portions of the solar wind appear to be originating from corona material at about the same temperature. Probably that speed depends on magnetic fields, not temperature. Coronal mass ejections and dynamic solar wind appear to originate in hot sheaths around prominences. The team used not only their observations, but also ones made by ACE, a solar space telescope.

**Juno** – The Juno spacecraft has completed its primary mission of studying Jupiter and is beginning its extended mission, which includes flybys of some of Jupiter’s moons. The first of these, a pass by Ganymede, occurred June 7. The Jovian moons have not been seen close-up since the Galileo mission about 20 years ago. Juno’s flybys will afford an opportunity to see if anything has changed in the intervening years. Ganymede is the largest moon in our Solar System, even larger than the planet Mercury. Juno’s pictures from this flyby are spectacular.



**Resonant Planets’ Future** – About 13 years ago, a system of 4 exoplanets was found orbiting the star HR 8799 in resonance with each other, such that the lengths of the years of the planets were in the ratios 1:2:4:8. Astronomers wondered how long this system would remain stable, so recently a computer simulation of these planets was run. It found that they should remain in their same orbits until their star swells into a red giant in about 3 billion years. At that time their orbits will become chaotic, with many possible outcomes, including ejecting some planets out of the system and sizes of the orbits changing or exchanging. The system now has a dust disk inside the planets’ orbits and another disk outside. These disks will be greatly disturbed when the planets go chaotic, with much disk material thrown into the star.

**FRBs** – The Hubble Space Telescope took images of a number of locations where radiotelescopes had detected Fast Radio Bursts (FRBs) and found that 5 of these bursts definitely originated in the outer arms of distant spiral galaxies. The new observations were made in ultraviolet and infrared light. All the 5 galaxies are so distant that the light took about half the age of the Universe to reach us. There are several theories as to what causes FRBs, and these new observations are most consistent with the theory that magnetars (extremely magnetic neutron stars) emit FRBs.



**More FRBs** – How do astronomers find FRBs if they last only milliseconds? Radiotelescopes rarely are pointed just the correct location when an FRB occurs. The answer is the CHIME radiotelescope. It consists of 4 large half-cylindrical antennas firmly anchored to the ground in Canada. It detects radio from all directions above ground. A supercomputer sorts out from what direction each radio signal came by analyzing the timing at which each signal reached the various parts of the antenna. CHIME has detected 535 FRBs in its first year of operation. Only 18 of those have been found to be repeaters, that is, emitted more than one FRB from the same location in the sky. All the others have failed to repeat, at least during CHIME operation so far. The repeaters and one-timers were found to have slightly different frequency and timing characteristics. This implies there are likely 2 different mechanisms producing FRBs. From the rate at which CHIME is finding FRBs, scientists estimate that there are about 800 FRBs per day in the visible Universe.

**Exoplanet Ideal For Atmospheric Observations** – A team of astronomers has discovered an exoplanet whose properties make it an excellent candidate for studying its atmosphere. It is somewhat smaller than Neptune, and about the same density, so is likely an ice giant with a deep hydrogen-helium atmosphere. It is orbiting a red dwarf star. Its year is 24 Earth days. It has a fairly high orbital velocity. It transits its star. Its temperature is only a bit hotter than Earth. It is only 90 light-years away. Every one of these features makes it easier than typical to get spectra of the planet's atmosphere. The planet was discovered in data from the TESS planet-finding space telescope and is known as TOI-1231 b. Observations with the Hubble Space Telescope are already scheduled, and it is hoped to observe the planet with the James Webb Space Telescope when it is operational.

**White Dwarf Core Density** – The core density of a white dwarf at the time of its explosion as a Type Ia has been measured for the first time. This was accomplished by measuring the ratios of isotopes of titanium and chromium, through their X-ray spectrum, in the cloud of debris left after the explosion. Computer simulation of Type Ia supernovas shows that those isotope ratios are quite sensitive to the density of the core of the white dwarf before it explodes. The density of this particular white dwarf was found to be about 3 times higher than is typical for a white dwarf. The supernova remnant is known as 3C 397, a radio source designation, since it was first discovered by radio astronomy. It is important to understand how Type Ia supernovas work, since they are used as "standard candles" to determine distances to distant galaxies.

**Cosmic Web** – There have been only a few detections of the cosmic web, the thin gas filaments that connect galaxies. This web is very difficult to detect, and in fact all of such detections have been in very distant locations. A new study mapped the dark matter more locally and found that it shows much the same cosmic web structure that distant thin ordinary matter exhibits. This was expected, because simulations of the Universe developing show the cosmic web forming as dark matter, followed by ordinary matter falling in. The method used to map the dark matter was to train a computer program to recognize dark matter about ordinary matter, using areas where previous work had shown dark matter exists, then the trained program was fed a comprehensive map of all the relatively nearby galaxies, and that produced the dark matter map.

**Venus Missions** – NASA announced the next 2 missions in its Discovery series, a class of relatively inexpensive spacecraft. Both will fly to Venus. A craft named DAVINCI+ will orbit that planet to study its atmosphere and will drop a probe into the atmosphere. A craft named VERITAS from orbit will map the planet's surface using infrared and radar, with particular attention to its geology. NASA hasn't sent a spacecraft to Venus since Magellan, whose mission ended in 1994. The European Space Agency is also planning a Venus probe, named EnVision, equipped with capabilities to observe the atmosphere, surface, and underground. Unfortunately there was not enough NASA money in this round of mission selection for 2 other highly regarded proposals: a spacecraft to Io and a mission to Triton. Maybe next time. Two previously approved Discovery missions are under construction for launch this year: Lucy to explore Trojan asteroids, which share Jupiter's orbit; and Psyche to explore the asteroid Psyche.

**New Space Telescope** – NASA announced that work is beginning on designing an infrared space telescope to find and track potentially hazardous asteroids and comets. Its name is NEO Surveyor, and it will observe from beyond the Moon's orbit. Even dark objects, and many asteroids are dark, show up well in infrared. Also a fairly accurate size can be calculated from infrared data, but not from visible light data, when the object is too small to resolve, as is the case with most near-Earth objects. The goal is to complete within about a decade the task begun in 2010 of finding most of the potentially hazardous objects over about 460 ft across, since those could cause serious damage if they collide with Earth. The University of Arizona will lead the project.

**Tiangong Crew** – The Chinese space agency sent a crew of 3 to their recently launched space station Tiangong. Their stay is planned to be about 3 months, which will be by far the longest mission for Chinese astronauts. This is the first Chinese space mission with crew in about 5 years.

**SLS** – The first SLS rocket had its solid rocket boosters bolted to the main stage. Its launch on a flight without crew around the Moon is expected late this year or early next. SLS is NASA's most powerful rocket, exceeding the Saturn V of the Apollo era.

**JWST** – The latest estimate is that the James Webb Space Telescope (JWST) will likely be launching in November this year, rather than October, even though the telescope is on schedule, because the rocket is not. An Ariane 5 rocket will launch JWST, and two recent Ariane 5 launches have had anomalous performance at the time of shedding the fairing (payload cover). JWST engineers wish to have analyses of these problems finished and want to closely watch the performance of the next 2 Ariane 5 launches, which are scheduled for June and August, before committing to the JWST launch.

# OWENS VALLEY RADIO OBSERVATORY TRIP

SCIENCE BEYOND THE BOOK

July 31, 2021

With Dr. Mark Hodges and Dr. Doug Millar

Please join with us on the above date for an extraordinary adventure in science education at the Owens Valley Radio Observatory outside of Big Pine, CA. Included are science activities at the 40m antenna and a tour, walking a scale model of the distances of the planets, solar astronomy and night time astronomy. We will also make ice cream with liquid nitrogen. All the above is free and courtesy of Dr. Mark Hodges, OVRO and Cal Tech. This trip is open to teachers and their families, members of local astronomy clubs and radio hams. You must RSVP to go on the trip to Dr. Millar so that we know how many to expect. Please also forward your cell phone number.

The observatory asks that anyone who is not vaccinated against COVID-19 wear a mask while on site.

This is not a school sponsored field trip. Each participant is on their own to arrive at the observatory. Please try to arrive at OVRO about 1:00pm on Saturday. There are several motels in Big Pine to stay at. Some have multi-family rooms. Please make your own reservations. We usually eat at the Country Kitchen in Big Pine or the Pizza Factory pizza in Bishop. You can also camp out both at the dish or in Big Pine in either tents or campers. The weather will be warm and dry. If you would like to bring your own telescope, please do.

We should arrive in the early afternoon on Saturday, you may want to stay over and go back on Sunday afternoon. Some of us will arrive on Friday and enjoy some nighttime astronomy at the OVRO site. If you would like to bring your own telescope, please do. Anyone is welcome to join us on Friday night for visual astronomy. Let me know if you would like to come then as well. Please call Dr. Millar on the day of the trip and let him know when you are starting out and where you are about 1pm.

Schedule:

## **Friday-**

Setup outside the main office building for astronomy by sunset. 110vac, bathroom and coffee and water available.

## **Saturday**

1:00pm arrive at OVRO 40m dish

5pm check in at your Motel and go to dinner in Bishop.

Evening- Astronomy at the site

## **Sunday**

Breakfast 9:30am at Country Kitchen

Leave whenever you like. Check websites about the area and the Highway 395 for sightseeing opportunities.

The directions from the LA area are: Drive north on the I5/14 through Palmdale and Mojave. Continue through Inyokern and join US395. Continue on 395 North through Little Lake and Lone Pine. Continue up to Big Pine. Just as you get to the end of town turn right towards the Westgard Pass. Go out about 2 miles and after Zurich, turn left onto the observatory road. You should be able to see the dish in the distance, but it is 4 miles away! Continue onto the property and go to the large dish. We will be at the base or inside of it.

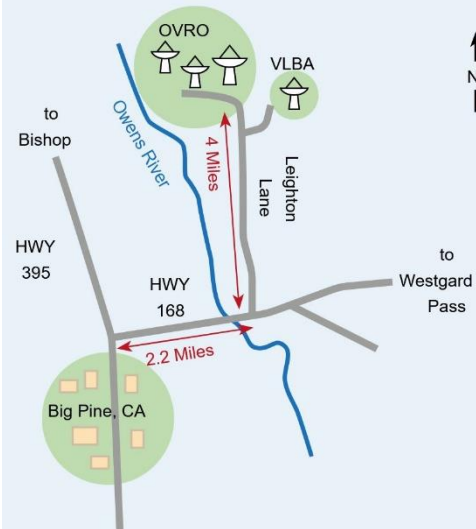
Owens Valley Radio Observatory: <http://www.ovro.caltech.edu/>

For any questions and RSVP's my contact information is: Dr. Doug Millar Cell- 562-810-3989 and email is drzarkof56@yahoo.com

**Thank you and I hope to see you on the trip! -- Dr. Millar**



## Directions to OVRO



Located southeast of Bishop, the Owens Valley Radio Observatory is 6 miles from the town of Big Pine. The only public access road to OVRO is via Highway 168, which begins at the northern end of Big Pine, by a large pine tree. Turn east onto Highway 168. After approximately 2 miles you will cross the Owens River Bridge. 1/4 mile past the bridge, turn left on a paved road, Leighton Lane.

Here are some pictures from past visits.



Astronomers setting up.



Ex Carma Array dishes at the site.



Our main dish to explore is the middle one at 40m in diameter.



Experimenting with liquid nitrogen. Dr. Mark Hodges from OVRO and Dr. Millar

# Advertisements

Buy, Sell or Trade some of your gear? This is where club members can place advertisements. Please contact the editor at [newsletter@ocastronomers.org](mailto:newsletter@ocastronomers.org) to place an advertisement or to learn more about placing one. There is no cost to club members for non-commercial advertisements in the newsletter.

For Sale	contact	David Hobbs	<a href="mailto:david_hobbs714@yahoo.com">david_hobbs714@yahoo.com</a>	
•		20" F5 Research grade early Coulter mirror and secondary mirror		\$2800
•		Primary mirror is 2 3/4" thick, Secondary is 4" x 5 5/8"		

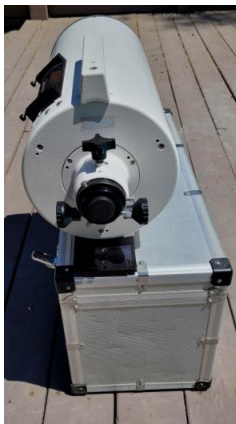
For Sale	contact	Ron Choi	<a href="mailto:rongrace2@cox.net">rongrace2@cox.net</a>	
•		Orion StarShoot AutoGuider		\$ 200

For Sale      contact      Steve Borgens      [steveborgens@yahoo.com](mailto:steveborgens@yahoo.com)      \$ 500

- Vixen VC200L 8 inch R/C telescope

I am selling my Vixen VC200L R/C telescope to upgrade to a larger telescope. This is an f9 -200mm primary at 1800mm focal length and includes metal carrying case, Telrad mounting bracket, and full length Vixen type dovetail. I am asking \$500.00 firm. Buyer pays shipping or I can deliver to OCA site Anza.

- |  |   |   |   |                                       |
|--|---|---|---|---------------------------------------|
| • Optical Design:                                      | . | . | . | VISAC Aspherical Mirror Reflector     |
| • Aperture:  | . | . | . | 200mm                                 |
| • Focal Length:  | . | . | . | 1800mm                                |
| • Focal Ratio:   | . | . | . | f/9.0                                 |
| • Back Focus (from rear edge of focuser body):         | . | . | . | 149.0mm                               |
| • Back Focus with Reducer (from rear edge of reducer): | . | . | . | 63.5mm                                |
| • Coating:   | . | . | . | Multi Coated                          |
| • Resolving Power:                                     | . | . | . | 0.58 arc sec                          |
| • Theoretical Resolution:                              | . | . | . | 0.63"                                 |
| • Limiting Magnitude:                                  | . | . | . | 13.3                                  |
| • Light Gathering Power:                               | . | . | . | 816x                                  |
| • Adapter Thread:                                      | . | . | . | 60mm/50.8mm                           |
| • Astrophotography:                                    | . | . | . | Prime Focus                           |
| • Visual Back:   | . | . | . | Compression Ring                      |
| • Tube Length:   | . | . | . | 23.6" (600mm)                         |
| • Optical Tube Diameter:                               | . | . | . | 9.1" (232mm)                          |
| • Optical Tube Weight:                                 | . | . | . | 13.2 lb                               |
| • Accessories:   | . | . | . | Dove Tail Mounting Rail, Carry Handle |



M51 at Prime Focus using a QSI683 camera

# We Made It Ourselves - Pier Collision Protection

Created by: David Pearson

Written by: David Pham

During an imaging session, one large concern that an Astro-photographer may have would be the camera hitting the pier while the telescope does its tracking. This generally can happen if the telescope is left unattended over an extended period of time or if an individual forgets to park the mount/turn off tracking after they have finished imaging.

A few solutions to prevent this issue would be to purchase a mount with 360-degree right ascension tracking, avoid declination angles that intersect with the pier, use mount driver software that enforces user defined horizon limits, or just be present to intervene if needed.

When setting up his telescope at a remote site, Dave wanted to minimize the chance of damage from a pier collision by adding additional protection. Since his observatory is remote, he can't be there to watch over it and since the mount and optics are already determined and he images in areas of the sky which put the telescope on a path through the mount, his primary tool for prevention of pier collisions is in the mount control software.

He uses a program called APCC (Astro-Physics Command Center) which interfaces between the imaging control program and the mount's software drivers and can be programmed with a set of limits on mount position to prevent it from hitting the pier (or other physically undesirable objects) by stopping its movement. Usually this would be sufficient but sometimes the unexpected happens such as a computer crash which kills the program. In the absence of computer commands, the mount just keeps on moving in RA and will eventually either reach the limits of its mechanical capability or hit something first.

This little creation's purpose is to mitigate any damage if a collision occurs despite the software.

In addition to the inner tubing, Dave also selects a park position for the mount which allows for approximately nine hours of tracking before the possibility of pier collision (allowing for plenty of extra time to observe and stop tracking).

## How it was made

Dave came up with three different ideas to reinforce his setup: wrap the entire pier with a soft material, attach a crushable box to the pier, and/or install tire inner tubes on the pier. He decided that option three would be the easiest to implement and would provide adequate resistance should the camera come into contact with the pier.

## How well does it work?

Dave says that the software limits have done their job well for the last two years with the exception of one incident when a software issue (unexpected reboot of the PC) arose that prevented the mount driver's horizon limits from activating. This was a unique scenario where the imaging script had stopped but the telescope's tracking did not. Dave noticed the malfunction the next morning and had to manually stop the tracking before the camera collided with the pier. So far the tube cushion has not undergone a real-world test but its ready and waiting.



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