# SIRIUS ASTRONOMER

www.ocastronomers.org

The Newsletter of the Orange County Astronomers

**June 2021** Free to members, subscriptions $12 for 12 issues **Volume 48, Number 6**


Coma Berenices Galaxy Cluster imaged by David Fischer from the club's Anza site in April and May 2021. This was captured using an ASI2600 color camera through an AT115 refractor.

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

| | |
|---|---|
| **Beginner's class** | Friday, 4 June at 7:30 to 9:30 PM ONLINE<br>The topic this month will be the science behind the telescope – how our eyes actually perceive objects we see in the telescope. |
| **Club Meeting** | Friday, 11 June at 7:30 to 9:30 PM ONLINE<br>"What's Up?": John Garrett from Temecula Valley Astronomers<br>Main speaker: Lars Bildsten presenting "Hearing the Stars: New Insights into Stellar Interiors" |
| **Open Spiral Bar** | Saturday, 12 June at 10:00 to 11:30 PM ONLINE<br>Want to socialize? Grab your images, experiences, questions, or none and see your fellow Orange County Astronomers face-to-face. |

**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 .

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

| Issue | Due date |
|---|---|
| July | 19 June |
| August | 22 July < new date |
| September | 21 August |
| October | 18 September |

# President's Message

By Barbara Toy

Well, sumer is icumen in[1] – which I always thought meant summer was on its way but Wikipedia informs me means it's already here, at least for those who understand mid-13th century English. Come the Solstice (June 21) it really will be here – at least technically. Hopefully it'll hold off on true summer temperatures for a while…

One thing that isn't holding off is the fire season. As I write this, there's a wildfire burning in Pacific Palisades that was reportedly started by arson, as though natural causes aren't enough to worry about, another in Pinion Hills, also in LA County, and one near the Salton Sea – and I'm writing this in mid-May (and just limiting consideration to Southern California).

Based on a recent visit to Anza, mustard and other weeds are sprouting and need to be cleared to reduce the chance we'll have our own further experience with wildfire on our site. That wasn't any fun the first time we had one, fortunately several years ago now, and a further fire could be even more destructive. I hate to sound like a broken record on this, but if you've ever seen the pictures of the Mount Stromlo Observatory in Canberra, Australia, after a wildfire went through in 2003, you would have an idea of how destructive that can be – Australia lost a third of its astronomy research capacity in that fire. Firefighters can only do so much, and we could lose a lot of what we have out there if we don't take precautions like clearing the weeds and other growth around structures on the site that help make the site defensible.

Formal reminder letters on weed clearance will be going out to pad and observatory holders, if they haven't already by the time you see this, but all members who use the site need to lend a hand as well, particularly around the common-use areas of the site. Weed growth tends to continue through the summer, particularly when we get downpours from thunderstorms coming through, so we need to continue our vigilance even after an initial weed clearance.

**Further Covid Developments…**

As I write this, the May Board meeting hasn't occurred yet, so I can't report on the Board's actions, as we have deadlines to meet for the newsletter. Any significant changes in the club's policies will be announced on the website, social media and the email groups. For now, though, I expect that we will continue to proceed cautiously in resuming formal club activities.

Regarding our general meetings, the club has received notice from Chapman University that, although they are cautiously reopening in some areas as the Covid situation in Orange County improves, they don't expect that public events such as our general meetings will be allowed until fall, at the earliest, which has been our educated guess from monitoring their website. If, as Southern California reopens, there is another spike in infections, we can expect that there would be further delays. It's also possible that, when Chapman allows us to use Chapman Auditorium again, it will want us to limit access to people who are vaccinated for the virus, to reduce the potential exposure to others using those facilities and the need for additional sanitizing.

The Heritage Museum, where our Astrophysics group and Beginners Astronomy Class have met for many years, is also cautiously reopening. It now has "public hours" from 11:00 a.m. to 3:00 p.m. on Sundays, when people can walk around the grounds (though the Nature Area is still closed). The blacksmiths are apparently giving demonstrations again, though their workshop hasn't been rebuilt yet after it burned down before the pandemic, and it looks like the museum is giving some tours of Kellogg House again (it's a real gem, if you haven't seen it). Our Astrophysics group is working with the museum to restart their meetings with appropriate safeguards – unfortunately, because of limitations on using the videos the meetings are planned around, the group wasn't able to hold their regular meetings remotely through the pandemic.

---

[1] The article on "Sumer is icumen in" on Wikipedia is kind of fun, including the parodies, starting with one from Ezra Pound, "Winter is icumen in, Luhde sing Goddamm, Raineth drop and staineth slop, and how the wind doth ram! Sing Goddamm…" I've known winters like that. However, I don't think I've ever heard a cuckoo, referenced in the original, summer or winter.

At this point, I think Dave Pearson is planning to continue holding the Beginners Astronomy Class remotely, as that has been working quite well. Stay tuned for any changes – 2021 continues to be a year in flux.

On our Orange County star parties, Orange County Parks has reopened a lot of its facilities for at least limited use, but does not yet allow group activities like our star parties. We don't yet have an estimated time when they may be willing to allow activities like ours, and any estimate could be off if infections start increasing again.

Any plans we make are still subject to what happens with the pandemic. Things are a lot more promising now than they were a few months ago, and the more people who get vaccinated the less likely it'll be that the infection rate will spike again. It's great that vaccinations are available even for the young now – my nephew celebrated his 18th birthday by getting his first vaccination, he's now had his second one and is looking forward to visiting his grandparents (all in their 90s) without needing a mask. And, as we're all fully vaccinated, I got to hug my mom and stepmom for Mother's Day – a great way to celebrate it!

If you haven't taken that step yet, please do. Do it for yourself, for those you love, for everyone you come in contact with, to do your bit to stop the virus – and for the incredible freedom of not having to be on your guard all the time to avoid becoming infected and not knowing when a tiny breach in your defenses will leave you devastatingly ill. It truly is a horrible disease, often with long-term effects – I still don't have my sense of smell or my full stamina back though it's been six months, and I just had a moderate case. If you're worried about side-effects from the vaccine, I had a bad reaction to both shots, because I'd had Covid and already had a bunch of active antibodies, and I can state unreservedly, based on my own experience, that even the worst effects of the vaccine were nowhere near as bad as having just a moderate case of the disease.

And, on the bright side, when everyone in a group is vaccinated, we should all find it a lot easier and safer to indulge in standard star party activities, sharing views, sharing equipment, sharing stories – sharing great times under the stars.

**The Kuhn Telescope**

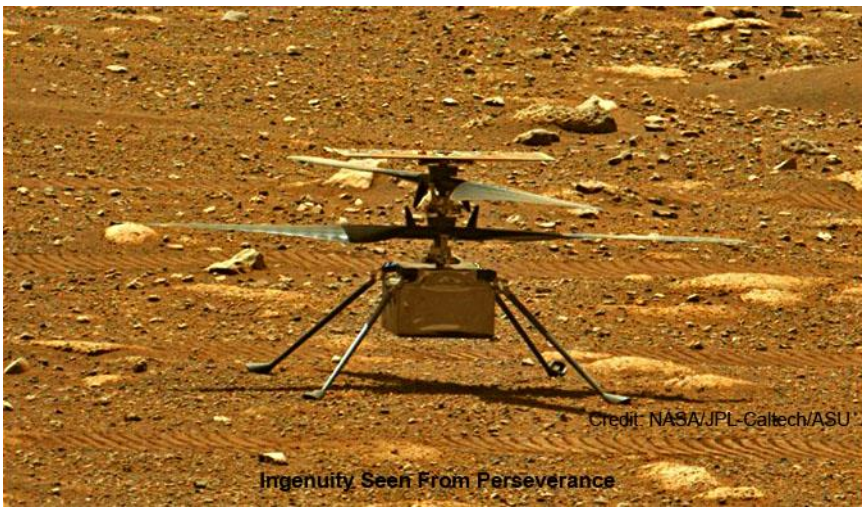
Unfortunately, every time something significant is done to astronomical equipment, there are glitches, a fact of life our AstroImagers deal with regularly. The Kuhn is no different, and the new control system has thrown us a few curves that have taken longer to work out than we'd hoped. However, based on what we've seen when it's been working with the new system, it's going to be really nice when all the glitches have been worked out, and should do well by us for many years to come. So far I'm happy to report that the scope hasn't run away from us, which is what it did periodically as one of the "glitches" when we installed the last operating system around 2004.

For all of you Star Members out there who are hoping to be retrained on the new system and hoping to use the telescope – we're not quite there yet. I'm hoping the latest glitch is the last major problem we have, and that we'll be able to start getting people trained in July. If you're interested in being trained on the new system, please send me an email in late June (btoy@cox.net), so I know who I need to schedule.

Thanks, and I wish you all good health, clear skies and good (safe) company!

# AstroSpace Update

June 2021
Astronomy and space news summarized by Don Lynn from NASA and other sources



Ingenuity Seen From Perseverance

**Ingenuity** – The Mars helicopter Ingenuity completed its planned 5 test flights. The final one of these included landing at a new site that it had not touched before (though it took images of the site during its previous flight) and climbing to an altitude record of 33 feet. Its flights must be within about 3/5 mile of the rover Perseverance, because the tiny radio in the helicopter has only that range to send flight data and images after each flight. The rover then sends the images and data on to Earth, usually via Mars orbiters. New flight plans are sent from Earth through the rover to the helicopter, also due to radio limitations. The entire flight plan has to be aboard the copter's computer, because radio updates from Earth take 17 minutes to reach Mars, traveling at the speed of light (and radio). Ingenuity can fly only about every 3 days because it has to recharge its batteries from its tiny solar panel after every flight. The original plan was to complete just 5 test flights before the rover moved out of range of Ingenuity, in order to pursue the rover mission of finding and analyzing samples of Martian soil and rocks to eventually return to Earth. But the rover's exploring and gathering activities, based on what it is seeing near the landing site, are now scheduled to not leave the helicopter behind for a few more months. So Ingenuity's mission of test flights has been extended for 1-3 more months. It will now run tests, dubbed "operations demonstrations", of how it can map in stereo the terrain ahead of the rover and image places the rover can't reach.

**Chinese Mars Rover** – China became the second country, after the USA, to successfully land a spacecraft on Mars. All the Soviet/Russian landers, two European landers, and a few of the American landers have all failed. 9 USA landers have succeeded, beginning with Viking in 1976. Landing on Mars is a difficult endeavor. The Chinese craft is a combination lander and rover, the latter named Zhurong. A mission of at least 3 months is planned for Zhurong, during which it will search for water and ice using a ground-penetrating radar, zap rocks with a laser to determine their chemistry, measure magnetic field, report the Martian weather, and take pictures. The orbiting part of the mission remains circling above the planet. The mission name is Tianwen-1.

**Chinese Space Station** – In May, China launched the first of 3 planned space station modules. This is that country's third space station. The new module is named Tianhe, meaning Harmony of the Heavens. A 3-month stay at the space station by taikonauts (Chinese term for astronauts) is scheduled to begin in June. The expected life of the station is at least 10 years.

**Exoplanet with Large Orbit** – A team of astronomers has imaged a gas giant planet orbiting a Sun-like star. Most exoplanets are lost in the glare of their star, but this planet is orbiting at 110 times as far from its star as the Earth is from the Sun, allowing it to escape its star's glare. Only about 15 exoplanets have been imaged, out of the more than 4000 that are known. The star, known as YSES 2 (named after the Young Suns Exoplanet Survey that found it), is only 14 million years old. It is 360 light-years away in the constellation Musca. The planet has 6 times the mass of Jupiter. There should not be enough material to form such a big planet this far from its star, so astronomers are trying to figure out how it could have moved into such a distant orbit, particularly since it has had less than 14 million years to move. The image was made using the SPHERE instrument on the Very Large Telescope in Chile.

**Exoplanet Hydroxyl** – For the first time hydroxyl has been detected spectroscopically in the atmosphere of an exoplanet. The planet is known as WASP-33b, which is a gas giant orbiting so close to its star that it reaches a temperature of about 4500°F. It is thought that the heat breaks hydrogen atoms loose from water molecules to leave hydroxyl. Though the planet's atmosphere cannot be resolved from its star's glare, the spectroscopic lines of the atmosphere were distinguished by their Doppler shift due to the planet's orbital motion.

**Star Growth Rate** – The Hubble Space Telescope has observed in ultraviolet the gas falling onto a planet still forming, known as PDS 70b. This is the first time observations have shown the rate at which material is being added to a forming planet. The current rate is 1/100 Jupiter mass per million years. Yet the average over the planet's entire life so far of 5 million years is about one Jupiter mass per million years. Clearly the rate of growth has dropped drastically, indicating that the planet is nearing the end of its formation period. The planet and its star are 370 light-years away in Centaurus. Its orbit about its orange dwarf star is about the size of Uranus's orbit.

**Galaxy Wake** – New observations show that there is a pile-up of stars in 2 areas near the disk of our Milky Way galaxy. This matches computer simulations of the effects of the past motion of the satellite galaxy known as the Large Magellanic Cloud (LMC) as it falls toward the Milky Way. The simulation showed that dark matter bunches up gravitationally as the LMC falls, and then stars pile up in the dark matter concentrations. One of these areas is a sort of wake behind the motion of the LMC, and the other is a zone just above the central bulge of the Milky Way. The piled-up stars were found in data from the Gaia and WISE space telescopes.

**Venus Rotation** – 15 years of radar observations of Venus have been analyzed to determine the sidereal rotation rate of that planet. Past work on that rotation rate, based on spacecraft data and radar, has resulted in differing values. Sidereal rotation is measured in relation to the fixed stars, and normally changes extremely slowly. For example, Earth's sidereal rotation period varies by only about 1/1000 second over many years, primarily due to weather effects. The new study concluded that Venus's rotation changes by as much as 20 minutes. This presents a problem for future spacecraft missions that wish to land at a particular place on Venus, as that place may have rotated miles away due to changes in the rotation period. The extremely thick Venusian atmosphere and extremely high winds can probably account for the changes in the planet's rotation. Also, 20 minutes as a percentage of the length of a Venusian day (which is about 243 Earth days) is smaller than you might think at first. The same radar data allowed calculation of the tilt of the Venusian rotation axis, the period of precession of the axis, and roughly the size of the planet's core. Resulting numbers are 243.0226 Earth days per sidereal rotation, 2.6392 degrees tilt, 29,000 Earth years precession period, and somewhat under 2200 miles core diameter. The data was insufficient to determine if the core is solid or liquid however.

**Venus Ionosphere** – The Parker Solar Probe has a trajectory designed to flyby Venus every year or so in order to use gravity slingshots to successively bend its orbit closer and closer to the Sun. The Venus flyby several months ago was the closest yet to the planet, such that the spacecraft flew through the planet's ionosphere for 7 minutes. Radio data taken allowed calculation of the density of the charged particles in that ionosphere. As expected, since the Sun is near the low point in its 11-year activity cycle, the charged particle density is much lower than previous measures made many years ago by Venus orbiter spacecraft near a peak of solar activity.

**Asteroid Sample** – The OSIRIS-REx spacecraft successfully fired its rocket engine for 7 minutes to leave orbit about the asteroid Bennu and head on a trajectory that will bring it back to Earth. It will parachute a container holding a sample of asteroid dirt and rock into a desolate stretch of Utah desert on September 24, 2023. The sample is estimated to be about 9 ounces; the sample retrieval was considered a success if anything over 2 ounces was achieved. NASA is considering whether to extend OSIRIS-REx's mission beyond the Earth flyby in order to visit another near-Earth object.

**Space Tourism** – Blue Origin, the space flight company founded by Jeff Bezos, the owner of Amazon, has scheduled their first flight of tourists to space by July 20. It will launch from west Texas. The last of the 6 seats was auctioned off. The New Shepard spacecraft (named after astronaut Alan Shepard) launches and lands vertically and barely exceeds the altitude of 62 miles that is considered by many to be the edge of outer space. The flight will last about 11 minutes, with a few of those minutes experiencing weightlessness.


**Michael Collins** – The country, and indeed the world, has lost a space hero with the death of Michael Collins at age 90. He was the crew member who remained in orbit about the Moon on the Apollo 11 mission, while Armstrong and Aldrin became the first humans to set foot on the Moon. His other spaceflight was Gemini 10, during which docking and other abilities were developed to be used on Moon missions. He was the fourth human to perform a spacewalk. After retiring as an astronaut, he headed the National Air and Space Museum. His autobiography, *Carrying the Fire*, is considered by many to be the best book by any astronaut.


**NASA Administrator** – The Administrator (head) of NASA changes whenever the US President changes. It's considered a political appointment position. The new administrator is Bill Nelson. He has served as a member of both the US House of Representatives and Senate, representing Florida, where much of NASA's launches take place. In 1986 he was a payload specialist astronaut on a Space Shuttle mission, though it was a "congress courtesy" flight, apparently as a reward for his support of NASA in Congress. He received a very strong confirmation vote from both parties in the Senate, which bodes well toward cooperation between NASA and Congress, which controls NASA's budget. Nelson has expressed strong support for putting astronauts back on the Moon with the Artemis program, and for continued use by NASA of commercially developed rockets, including those of SpaceX and Blue Origin. I would love to live in a world where science drives space exploration, but we are forced to deal with the fact that politics is the strongest force behind such exploration.

**Comet Nickel** – A pair of astronomers found nickel in the ultraviolet spectrum of the interstellar comet Borisov. An independent group of astronomers studying comet spectra found nickel, as well as iron, in about 20 comets. Finding nickel in comets before this had been fairly rare. Some of these comets were quite far from the Sun at the time the nickel appeared, so there could not be much heat involved in freeing the nickel from the comet nucleus. The best theory is that the nickel existed in the nuclei as a constituent in compounds that have very low vaporizing temperatures. More work is needed to fully explain this nickel.

# We Made It Ourselves - Image Planning Database Tool

Created by: David Pearson Written by: David Fischer

This is an Excel spreadsheet and associated object database. The spreadsheet is designed to filter the database to provide a list of candidate targets for astro-imaging sessions.

**Why make instead of buy**

Dave started with commercial product Astroplanner which had comprehensive inclusion of astronomical catalogs. This turned out to generate too many potential targets even when given fairly exacting specifications. Dave would be presented with lists of thousands of potential targets which he would have to sift through manually to select ones he would image. Besides being tedious, this would take hours of planning for each imaging session.

**How it was made**

He built an object database from selected portions of the catalogs that have objects of the types that he most often wanted to image. This database includes the planets, Messier, Caldwell, and a subset of the NGC, IC, Abell, Arp, Barnard, Hickson, LBN, LDN, Cr, Mel, Sh2, UGC, Tr, Simeis, VdB, VV, DSH, DMSH catalogs which he edited down to about 1100 objects.

The user sets parameters for site location and date. The spreadsheet furnishes some basic planning information for effects of Sun and Moon (Sunrise, Sunset, limits of astronomical twilight, Moonrise, Moonset, Moon illumination). The spreadsheet has utility functions for selection of available optics and cameras to compute Field of View and image scale. The program also includes Internet access of ClearDarkSky site for Anza sky forecast.

From the data bases entries are extracted (or calculated) for:

- Object name
- Constellation type
- Size
- Magnitude
- Best time to observe or image
- RA/DEC coordinates (both J now and J 2000 basis)
- Times for object Rise/Transit/Set and crossing of 30, 40, 50, 60 deg altitudes
- Max altitude
- Moon separation angle

Entries are sortable by object's ID, size, type, constellation, best date for imaging, and time of best visibility. There are also statistical support functions which can display a count of how many objects of each category meet selection criteria for a designated imaging setup for each month of the year. These distributions of available targets can be categorized by the type of object, its dimensions, or whether images of it satisfy a specified portion of the imager's field of view.

The spreadsheet utilizes Excel's built-in Visual Basic interface to implement some of these functions efficiently.

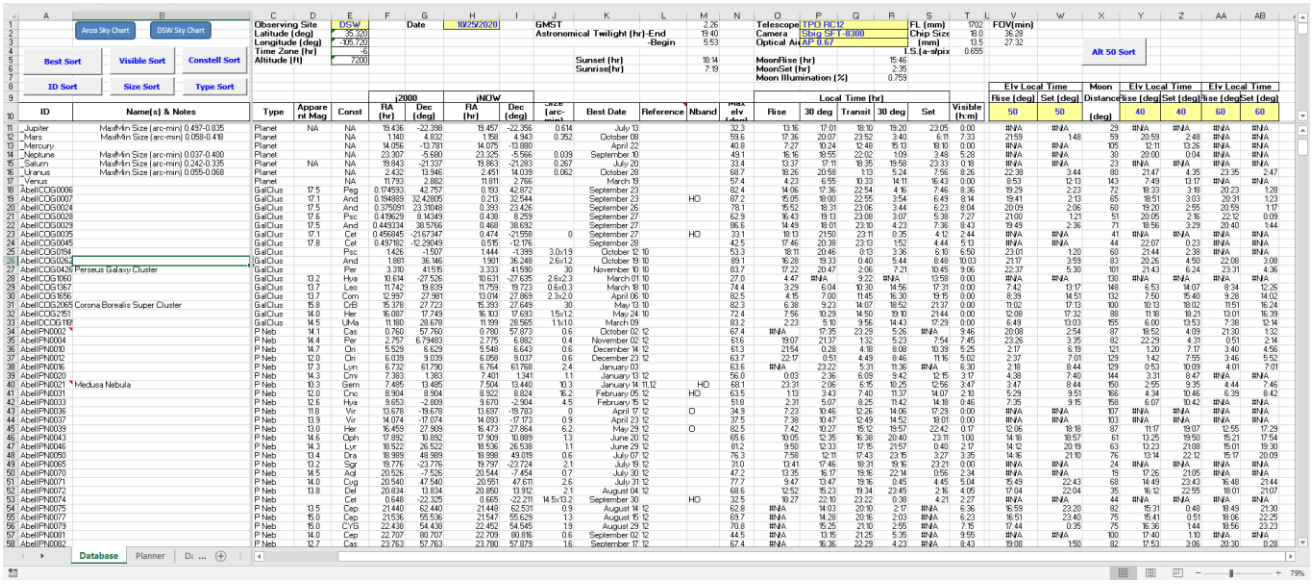
**How well does (did) it work ?**

The spreadsheet has been effective when used to plan multi-day imaging trips to Anza. Typical monthly planning time was reduced to 30-40 minutes. The observation databased is still in use in conjunction with an automated planner and scheduler to do unattended imaging at a remote site in New Mexico.

**Is the Imaging Planning Database Tool sharable ?**

David is willing to share the spreadsheet with others who are interested. It uses 110MB of storage and runs under Microsoft Excel 2019 with macros enabled.

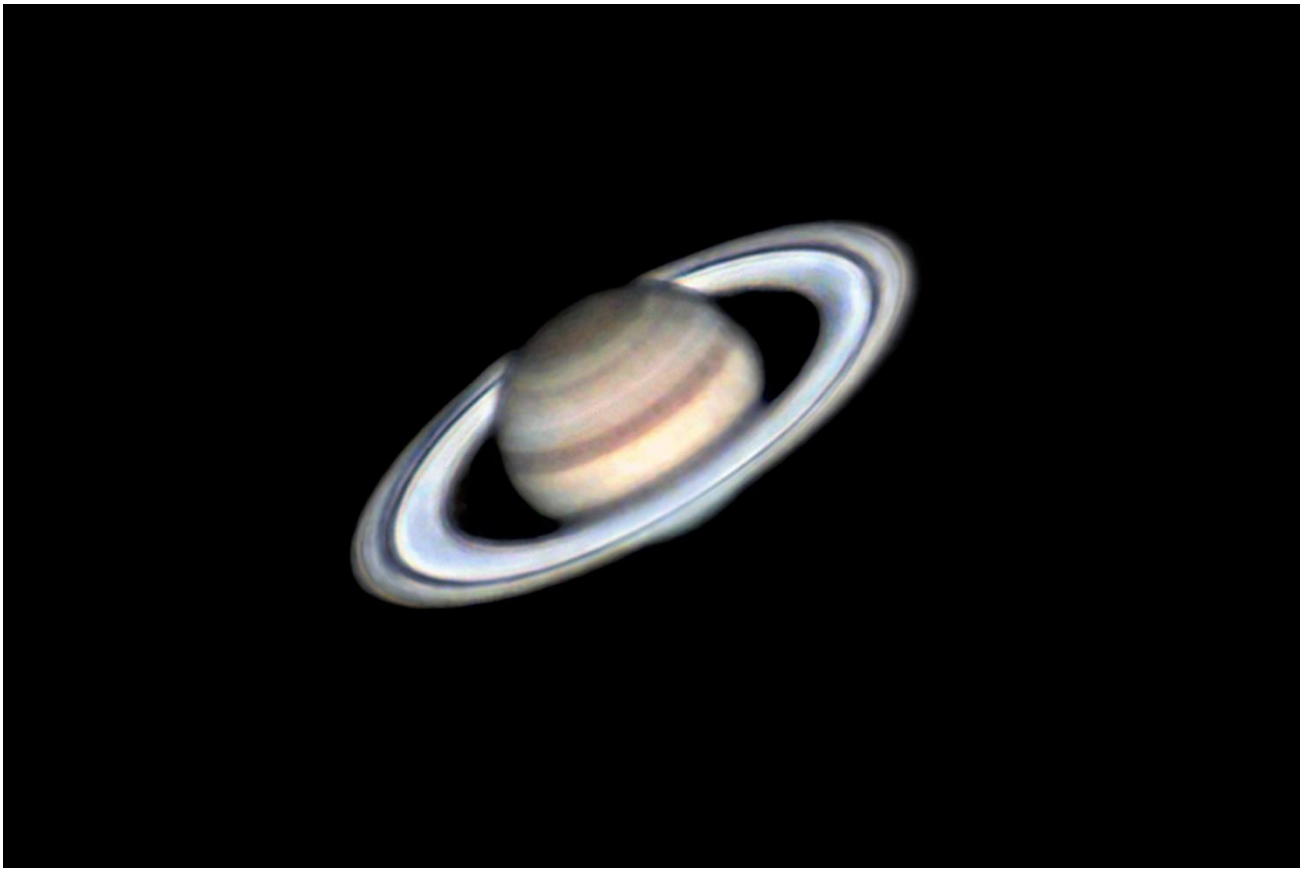
Here is an image of the first page of the EXCEL Imaging Database spreadsheet:



| ID | Name(s) & Notes | Type | Apparent Mag | Const | J2000 RA (hr) | J2000 Dec (deg) | JNOW RA (hr) | JNOW Dec (deg) | Size [arc-min] | Best Date | Reference | Nband | Max elv [deg] | Rise | 30 deg | Transit | 30 deg | Set | Visible (h:m) | Elv Local Time Rise [deg] | Elv Local Time Set [deg] | Moon Distance [deg] | Elv Local Time Rise [deg] | Elv Local Time Set [deg] | Elv Local Time Rise [deg] | Elv Local Time Set [deg] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Local Time (hr) | | | | | | 50 | 50 | | 40 | 40 | 60 | 60 |
| Jupiter | Mas/Min Size (arc-min) 0.497-0.835 | Planet | NA | NA | 19.436 | -22.398 | 19.457 | -22.356 | 0.614 | July 13 | | | 32.3 | 13:16 | 17:01 | 18:10 | 19:20 | 23:05 | 0:00 | #NA | #NA | 29 | #NA | #NA | #NA | #NA |
| Mars | Mas/Min Size (arc-min) 0.058-0.418 | Planet | | NA | 1.140 | 4.832 | 1.159 | 4.943 | 0.352 | October 08 | | | 59.6 | 17:36 | 20:07 | 23:52 | 3:40 | 6:11 | 7:33 | 21:59 | 1:48 | 59 | 20:59 | 2:48 | #NA | #NA |
| Mercury | | Planet | | NA | 14.056 | -13.791 | 14.075 | -13.880 | | April 22 | | | 40.8 | 7:27 | 10:24 | 12:46 | 15:13 | 18:10 | 0:00 | #NA | #NA | 105 | 12:11 | 13:26 | #NA | #NA |
| Neptune | Mas/Min Size (arc-min) 0.037-0.400 | Planet | | NA | 23.307 | -5.680 | 23.325 | -5.566 | 0.039 | September 10 | | | 49.1 | 16:16 | 18:55 | 22:02 | 1:09 | 3:48 | 5:28 | #NA | #NA | 38 | 20:00 | 0:04 | #NA | #NA |
| Saturn | Mas/Min Size (arc-min) 0.242-0.335 | Planet | NA | NA | 19.843 | -21.337 | 19.863 | -21.283 | 0.267 | July 20 | | | 33.4 | 13:37 | 17:11 | 18:35 | 19:58 | 23:33 | 0:18 | #NA | #NA | 23 | #NA | #NA | #NA | #NA |
| Uranus | Mas/Min Size (arc-min) 0.055-0.068 | Planet | | NA | 2.432 | 13.946 | 2.451 | 14.039 | 0.062 | October 28 | | | 68.7 | 19:26 | 20:58 | 1:13 | 5:24 | 7:56 | 8:26 | 22:38 | 3:44 | 80 | 21:47 | 4:35 | 23:35 | 2:47 |
| Venus | | Planet | | NA | 11.793 | 2.882 | 11.811 | 2.766 | | March 19 | | | 57.4 | 4:23 | 6:55 | 10:33 | 14:11 | 16:43 | 0:00 | 8:53 | 12:13 | 143 | 7:49 | 13:17 | #NA | #NA |
| AbellCOG0006 | | GalClus | 17.5 | Peg | 0.174593 | 42.757 | 0.193 | 42.872 | | September 23 | | | 82.4 | 14:06 | 17:36 | 22:54 | 4:16 | 7:46 | 8:36 | 19:29 | 2:23 | 72 | 19:33 | 3:18 | 20:23 | 1:28 |
| AbellCOG0007 | | GalClus | 17.1 | And | 0.184889 | 32.42605 | 0.203 | 32.544 | | September 23 | | HO | 87.2 | 15:05 | 18:00 | 22:55 | 3:54 | 6:49 | 8:14 | 19:41 | 2:13 | 65 | 18:51 | 3:03 | 20:31 | 1:23 |
| AbellCOG0024 | | GalClus | 17.5 | And | 0.375091 | 23.39048 | 0.393 | 23.426 | | September 26 | | | 78.1 | 15:52 | 18:31 | 23:06 | 3:44 | 6:23 | 8:04 | 20:09 | 2:06 | 69 | 19:20 | 2:55 | 20:58 | 1:17 |
| AbellCOG0028 | | GalClus | 17.6 | Psc | 0.419629 | 8.14349 | 0.438 | 8.259 | | September 27 | | | 62.9 | 16:43 | 19:13 | 23:08 | 3:07 | 5:38 | 7:27 | 21:00 | 1:21 | 51 | 20:05 | 2:16 | 22:12 | 0:09 |
| AbellCOG0029 | | GalClus | 17.5 | And | 0.449334 | 38.5766 | 0.468 | 38.692 | | September 27 | | | 86.6 | 14:49 | 18:01 | 23:10 | 4:23 | 7:36 | 8:43 | 19:49 | 2:36 | 71 | 18:56 | 3:29 | 20:40 | 1:44 |
| AbellCOG0035 | | GalClus | 17.1 | Cet | 0.456845 | -2.67347 | 0.474 | -2.1558 | 0 | September 27 | | HO | 33.1 | 18:13 | 21:50 | 23:11 | 0:35 | 4:12 | 2:44 | #NA | #NA | 41 | #NA | #NA | #NA | #NA |
| AbellCOG0045 | | GalClus | 17.8 | Cet | 0.497182 | -12.29049 | 0.515 | -12.176 | | September 28 | | | 42.5 | 17:46 | 20:38 | 23:13 | 1:52 | 4:44 | 5:13 | #NA | #NA | 44 | 22:07 | 0:23 | #NA | #NA |
| AbellCOG0194 | | GalClus | | Psc | 1.426 | -1.1507 | 1.444 | -1.399 | 3.0x1.9 | October 12 10 | | | 53.3 | 18:11 | 20:46 | 0:13 | 3:36 | 6:10 | 6:50 | 23:01 | 1:20 | 60 | 21:44 | 2:38 | #NA | #NA |
| AbellCOG0262 | | GalClus | | And | 1.881 | 36.146 | 1.901 | 36.248 | 2.6x1.2 | October 19 10 | | | 89.1 | 16:28 | 19:33 | 0:40 | 5:44 | 8:48 | 10:03 | 21:17 | 3:59 | 83 | 20:26 | 4:50 | 22:08 | 3:08 |
| AbellCOG0426 | Perseus Galaxy Cluster | GalClus | | Per | 3.310 | 41.516 | 3.333 | 41.590 | 30 | November 10 10 | | | 83.7 | 17:22 | 20:47 | 2:06 | 7:21 | 10:45 | 9:06 | 22:37 | 5:30 | 101 | 21:43 | 6:24 | 23:31 | 4:36 |
| AbellCOG1060 | | GalClus | 13.2 | Hya | 10.614 | -27.526 | 10.631 | -27.635 | 2.6x2.3 | March 01 10 | | | 27.0 | 4:47 | #NA | 9:22 | #NA | 13:58 | 0:00 | #NA | #NA | 130 | #NA | #NA | #NA | #NA |
| AbellCOG1367 | | GalClus | 13.7 | Leo | 11.742 | 19.839 | 11.759 | 19.723 | 0.6x0.3 | March 18 10 | | | 74.4 | 3:29 | 6:04 | 10:30 | 14:56 | 17:31 | 0:00 | 7:42 | 13:17 | 148 | 6:53 | 14:07 | 8:34 | 12:26 |
| AbellCOG1656 | | GalClus | 13.7 | Com | 12.997 | 27.981 | 13.014 | 27.869 | 2.3x2.0 | April 06 10 | | | 82.5 | 4:15 | 7:00 | 11:45 | 16:30 | 19:15 | 0:00 | 8:39 | 14:51 | 122 | 7:50 | 15:40 | 9:28 | 14:02 |
| AbellCOG2065 | Corona Borealis Super Cluster | GalClus | 15.8 | CrB | 15.378 | 27.723 | 15.393 | 27.649 | 30 | May 13 10 | | | 82.3 | 6:38 | 9:23 | 14:07 | 18:52 | 21:37 | 0:00 | 11:02 | 17:13 | 100 | 10:13 | 18:02 | 11:51 | 16:24 |
| AbellCOG2151 | | GalClus | 14.0 | Her | 16.087 | 17.749 | 16.103 | 17.693 | 1.5x1.2 | May 24 10 | | | 72.4 | 7:56 | 10:29 | 14:50 | 19:10 | 21:44 | 0:00 | 12:08 | 17:32 | 88 | 11:18 | 18:21 | 13:01 | 16:39 |
| AbellCOG2189 | | GalClus | 14.5 | UMa | 11.180 | 28.678 | 11.199 | 28.565 | 1.1x1.0 | March 09 | | | 83.2 | 2:23 | 5:10 | 9:56 | 14:43 | 17:29 | 0:00 | 6:49 | 13:03 | 155 | 6:00 | 13:53 | 7:38 | 12:14 |
| AbellPN0002 | | P Neb | 14.1 | Cas | 0.760 | 57.760 | 0.780 | 57.873 | 0.6 | October 02 12 | | | 67.4 | #NA | 17:35 | 23:29 | 5:26 | #NA | 9:46 | 20:08 | 2:54 | 87 | 18:52 | 4:09 | 21:30 | 1:32 |
| AbellPN0004 | | P Neb | 14.4 | Per | 2.757 | 6.79483 | 2.775 | 6.882 | 0.4 | November 02 12 | | | 61.6 | 19:07 | 21:37 | 1:32 | 5:23 | 7:54 | 7:45 | 23:26 | 3:35 | 82 | 22:29 | 4:31 | 0:51 | 2:14 |
| AbellPN0010 | | P Neb | 14.7 | Ori | 5.529 | 6.629 | 5.548 | 6.643 | 0.6 | December 14 12 | | | 61.3 | 21:54 | 0:28 | 4:18 | 8:08 | 10:39 | 5:25 | 2:17 | 6:19 | 121 | 1:20 | 7:17 | 3:40 | 4:56 |
| AbellPN0012 | | P Neb | 12.0 | Ori | 6.039 | 9.039 | 6.058 | 9.037 | 0.6 | December 23 12 | | | 63.7 | 22:17 | 0:51 | 4:49 | 8:46 | 11:16 | 5:02 | 2:37 | 7:01 | 129 | 1:42 | 7:55 | 3:46 | 5:52 |
| AbellPN0016 | | P Neb | 17.3 | Lyn | 6.732 | 61.790 | 6.764 | 61.768 | 2.4 | January 03 | | | 63.6 | #NA | 23:22 | 5:31 | 11:36 | #NA | 6:30 | 2:18 | 8:44 | 129 | 0:53 | 10:09 | 4:01 | 7:01 |
| AbellPN0020 | | P Neb | 14.3 | Cmi | 7.383 | 1.383 | 7.401 | 1.341 | 1.1 | January 13 12 | | | 56.0 | 0:03 | 2:36 | 6:09 | 9:42 | 12:15 | 3:17 | 4:38 | 7:40 | 144 | 3:31 | 8:47 | #NA | #NA |
| AbellPN0021 | Medusa Nebula | P Neb | 10.3 | Gem | 7.485 | 13.485 | 7.504 | 13.440 | 10.3 | January 14 11 12 | | HO | 68.1 | 23:31 | 2:06 | 6:15 | 10:25 | 12:56 | 3:47 | 3:47 | 8:44 | 150 | 2:55 | 9:35 | 4:44 | 7:46 |
| AbellPN0031 | | P Neb | 12.0 | Cnc | 8.904 | 8.904 | 8.922 | 8.824 | 16.2 | February 05 12 | | HO | 63.5 | 1:13 | 3:43 | 7:40 | 11:37 | 14:07 | 2:30 | 5:29 | 9:51 | 166 | 4:34 | 10:46 | 6:38 | 8:42 |
| AbellPN0033 | | P Neb | 12.6 | Hya | 9.653 | -2.809 | 9.670 | -2.904 | 4.5 | February 15 12 | | | 51.8 | 2:31 | 5:07 | 8:25 | 11:42 | 14:18 | 0:46 | 7:35 | 9:15 | 158 | 6:07 | 10:42 | #NA | #NA |
| AbellPN0036 | | P Neb | 11.8 | Vir | 13.678 | -19.678 | 13.697 | -19.783 | 0 | April 17 12 | | O | 34.9 | 7:23 | 10:46 | 12:26 | 14:06 | 17:29 | 0:00 | #NA | #NA | 107 | #NA | #NA | #NA | #NA |
| AbellPN0037 | | P Neb | 13.9 | Vir | 14.074 | -17.074 | 14.093 | -17.173 | 0.9 | April 23 12 | | | 37.5 | 7:38 | 10:47 | 12:49 | 14:52 | 18:01 | 0:00 | #NA | #NA | 103 | #NA | #NA | #NA | #NA |
| AbellPN0039 | | P Neb | 13.0 | Her | 16.459 | 27.909 | 16.473 | 27.864 | 6.2 | May 29 12 | | O | 82.5 | 7:42 | 10:27 | 15:12 | 19:57 | 22:42 | 0:17 | 12:06 | 18:18 | 87 | 11:17 | 19:07 | 12:55 | 17:29 |
| AbellPN0043 | | P Neb | 14.6 | Oph | 17.892 | 10.892 | 17.909 | 10.889 | 1.3 | June 20 12 | | | 65.6 | 10:05 | 12:35 | 16:38 | 20:40 | 23:11 | 1:00 | 14:18 | 19:57 | 61 | 13:25 | 19:50 | 15:21 | 17:54 |
| AbellPN0046 | | P Neb | 14.3 | Lyr | 18.522 | 26.522 | 18.536 | 26.538 | 1.1 | June 29 12 | | | 81.2 | 9:50 | 12:33 | 17:15 | 21:57 | 0:40 | 2:17 | 14:12 | 20:19 | 63 | 13:23 | 21:08 | 15:01 | 19:30 |
| AbellPN0050 | | P Neb | 13.4 | Dra | 18.989 | 48.989 | 18.998 | 49.019 | 0.6 | July 07 12 | | | 76.3 | 7:58 | 12:11 | 17:43 | 23:15 | 3:27 | 3:35 | 14:16 | 21:10 | 76 | 13:14 | 22:12 | 15:17 | 20:09 |
| AbellPN0065 | | P Neb | 13.2 | Sgr | 19.776 | -23.776 | 19.797 | -23.724 | 2.1 | July 19 12 | | | 31.0 | 13:41 | 17:46 | 18:31 | 19:16 | 23:21 | 0:00 | #NA | #NA | 24 | #NA | #NA | #NA | #NA |
| AbellPN0070 | | P Neb | 14.5 | Aql | 20.526 | -7.526 | 20.544 | -7.454 | 0.7 | July 30 12 | | | 47.2 | 13:35 | 16:17 | 19:16 | 22:14 | 0:56 | 2:34 | #NA | #NA | 15 | 17:26 | 21:05 | #NA | #NA |
| AbellPN0071 | | P Neb | 14.0 | Cyg | 20.540 | 47.540 | 20.551 | 47.611 | 2.6 | July 31 12 | | | 77.7 | 9:47 | 13:47 | 19:16 | 0:45 | 4:45 | 5:04 | 15:49 | 22:43 | 68 | 14:49 | 23:43 | 16:48 | 21:44 |
| AbellPN0072 | | P Neb | 13.8 | Del | 20.834 | 13.834 | 20.850 | 13.912 | 2.1 | August 04 12 | | | 68.6 | 12:52 | 15:23 | 19:34 | 23:45 | 2:16 | 4:05 | 17:04 | 22:04 | 35 | 16:12 | 22:55 | 18:01 | 21:07 |
| AbellPN0074 | | P Neb | | Cet | 0.648 | -22.325 | 0.665 | -22.211 | 14.5x13.2 | September 30 | | HO | 32.5 | 18:27 | 22:10 | 23:22 | 0:38 | 4:21 | 2:27 | #NA | #NA | 44 | #NA | #NA | #NA | #NA |
| AbellPN0075 | | P Neb | 13.5 | Cep | 21.440 | 62.440 | 21.448 | 62.531 | 0.9 | August 14 12 | | | 62.8 | #NA | 14:03 | 20:10 | 2:17 | #NA | 6:36 | 16:59 | 23:20 | 82 | 15:31 | 0:48 | 18:49 | 21:30 |
| AbellPN0077 | | P Neb | 15.0 | Cep | 21.536 | 55.536 | 21.547 | 55.629 | 1.3 | August 15 12 | | | 69.7 | #NA | 14:28 | 20:16 | 2:03 | #NA | 6:23 | 16:51 | 23:40 | 75 | 15:41 | 0:51 | 18:06 | 22:25 |
| AbellPN0079 | | P Neb | 15.0 | CYG | 22.438 | 54.438 | 22.452 | 54.545 | 1.9 | August 29 12 | | | 70.8 | #NA | 15:25 | 21:10 | 2:55 | #NA | 7:15 | 17:44 | 0:35 | 75 | 16:36 | 1:44 | 18:56 | 23:23 |
| AbellPN0081 | | P Neb | 14.0 | Cep | 22.707 | 80.707 | 22.709 | 80.816 | 0.6 | September 02 12 | | | 44.5 | #NA | 13:15 | 21:25 | 5:35 | #NA | 9:55 | #NA | 1:00 | 100 | 17:40 | 1:10 | #NA | #NA |
| AbellPN0082 | | P Neb | 12.7 | Cas | 23.763 | 57.763 | 23.780 | 57.879 | 1.6 | September 17 12 | | | 67.4 | #NA | 16:36 | 22:29 | 4:23 | #NA | 8:43 | 19:08 | 1:50 | 82 | 17:53 | 3:06 | 20:30 | 0:28 |

# Bonus Pictures

Ryan Bohner contributed this close up image of a lunar crater taken from his back yard in Orange County in August 2019 using a Celestron C8 SCT and QHY178C camera.



Sam Pitts took this image of Saturn from the OCA Anza site in July 2020 using a C14 SCT telescope, 2X barlow, and ZWO120mc planetary camera.  This image was distilled from 9000 original frames.

This image of Jupiter was produced by Pat Knoll.  Taken June 2018 at Kearny Mesa, CA using a Meade 10 inch LX200 with 2X barlow.

# 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 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 david_hobbs714@yahoo.com

- 20" F5 Research grade early Coulter mirror and secondary mirror $2800
- Primary mirror is 2 ¾" thick, Secondary is 4" x 5 5/8"

For Sale contact Ron Choi rongrace2@cox.net

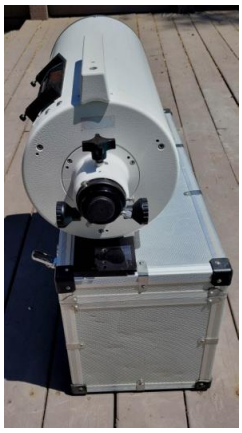
- Orion StarShoot AutoGuider reduced price $ 220
- Orion Mini 50mm Guide Scope reduced price $ 50

For Sale contact Steve Borgens steveborgens@yahoo.com

- Vixen VC200L 8 inch R/C telescope $500.00

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

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

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

**NEWSLETTER OF THE**
**ORANGE COUNTY ASTRONOMERS**
**P.O. BOX 1762**
**COSTA MESA, CA 92628**

**DATED MATERIAL**
**DELIVER PROMPTLY**

**RETURN SERVICE REQUESTED**

## CONTACT LIST

WEBSITE: https://ocastronomers.org Phone 949-266-9777 Starline 24-Hr. Recording: 714-751-6867 Anza Observatory: 951-763-5152

## BOARD OF DIRECTORS

| | | |
|---|---|---|
| | | board@ocastronomers.org |
| President | Barbara Toy | btoy@cox.net |
| Vice President | Reza AmirArjomand | reza@ocastronomers.org |
| Treasurer | Charlie Oostdyk | charlie@ocastronomers.org |
| Secretary | Alan Smallbone | alan@ocastronomers.org |
| Trustee | David Searle | dwsearle@gmail.com |
| Trustee | Cecilia Caballero | ceci@ocastronomers.org |
| Trustee | Doug Millar | doug@ocastronomers.org |
| Trustee | Sam Saeed | sam@ocastronomers.org |
| Trustee | Helen Mahoney | helen@ocastronomers.org |
| Trustee | Gary Schones | gary378@pacbell.net |
| Trustee | John Hoot | jhoot@ssccorp.com |

## COORDINATORS

| | | |
|---|---|---|
| Anza House Coordinator | Manuel Baeza | manugb33@yahoo.com |
| Anza Site Maintenance | Don Lynn | dlynn@ieee.org |
| Beginner's Class | David Pearson | p.davidw@yahoo.com |
| Orange County Star Parties | Steve Mizera | mizeras@cox.net |
| Mount Wilson Star Parties | Bob Nanz | bob@nanzscience.com |
| Librarian | Karen Schnable | karen@schnabel.net |
| Membership / Anza Pads | Charlie Oostdyk | charlie@ocastronomers.org |
| Mount Wilson Trips | Michele Dadighat | mmpkb8@gmail.com |
| Observatory Custodian / Trainer / Member Liaison | Barbara Toy | btoy@cox.net |
| Outreach | Cecilia Caballero | outreach@ocastronomers.org |
| Sirius Astronomer Editor | David Fischer | newsletter@ocastronomers.org |
| Telescope Loaner Program | John Hoot | scopes@ssccorp.com |
| WAA Representative | Cecilia Caballero | ceci@ocastronomers.org |
| Webmaster | Reza AmirArjomand | webmaster@ocastronomers.org |

## SPECIAL INTEREST GROUPS (SIGs)

| | | |
|---|---|---|
| AstroImagers SIG | Alan Smallbone | alan@ocastronomers.org |
| Astrophysics SIG | Bob Sharshan | rsharshan@aol.com |
| Dark Sky SIG | Barbara Toy | btoy@cox.net |
| Youth SIG | Doug Millar | doug@ocastronomers.org |