SIRIUS ASTRONOMER

www.ocastronomers.org

The Newsletter of the Orange County Astronomers

May 2017 *Free to members, subscriptions $12 for 12 issues* **Volume 44, Number 5**

The Sun has much to offer as an observing object. It is easy to find; unaffected by light pollution; and does not require you to stay up late at night. It also has a constantly-changing surface that offers a wealth of detail. As a preview for the total eclipse that will be visible in August, here's a picture from the last significant solar eclipse visible from North America. This picture of the May 20, 2012 annular eclipse was taken by Michael Daugherty from Irvine, CA. PROPER FILTERING OR PROJECTION IS ABSOLUTELY NECESSARY FOR SOLAR OBSERVING!

OCA CLUB MEETING

The free and open club meeting will be held May 12 at 7:30 PM in the Irvine Lecture Hall of the Hashinger Science Center at Chapman University in Orange. This month, Dr. Josh Simon of Carnegie Observatories will take us on "A Journey Back In Time To The First Stars"

NEXT MEETINGS: June 9, July 14 (speakers TBA)

STAR PARTIES

The Black Star Canyon site will open on May 20. The Anza site will be open on May 27. 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 sessions of the Beginners Class will be held at the Heritage Museum of Orange County at 3101 West Harvard Street in Santa Ana on May 5 and June 2.

Youth SIG: contact Doug Millar
Astro-Imagers SIG: May 9, June 13
Astrophysics SIG: May 19, June 16
Dark Sky Group: contact Barbara Toy

President's Message

By Barbara Toy

Still Looking for the Next Editor for the Sirius Astronomer…

As I write this, in mid-April, we don't yet have a new editor for the club's newsletter, the Sirius Astronomer, and time is growing short before the sad day (for us) when Steve Condrey and his family will be leaving California. We are hoping that our new editor will be on board before Steve prepares the June issue to take advantage of that training opportunity. Steve tells me that what he does to put the newsletter together isn't really difficult with the computer programs he's been using. He plans to give to the new person the templates and other information to help make the job go smoothly. *(Currently the newsletter is put together with Microsoft Publisher; in the past Adobe Pagemaker has been used as well—Editor)*

The Sirius Astronomer is a vital part of our club, and for many members who aren't able to come to our meetings, star parties or other events very often, it's a particularly important link to the club and our local astronomy world. We've been fortunate to have a series of dedicated editors over the years, and each has added his or her own touches and improvements to the process of putting the newsletter together as well as to layout and content. Back in the early 2000s, when Chris McGill was our editor, the finished issues were hand-delivered to the company that did the printing – I recall her telling me about making mad dashes to the printer to get it there by the deadline, and I think she said she delivered it as a print-ready paper copy, not in electronic form at all. The technology has certainly made things easier since then, and now the newsletter is put together entirely electronically and emailed to the printer when it's finished, which can be done at any time, not just during business hours.

The editor's job is basically to gather the articles, pictures and other things that go into each issue, figure out how that material should be arranged and set it up in final form, then send it to the printer and to others on the emailing list, including our webmaster (Reza AmirArjomand), who posts it on our website. Charlie Oostdyk takes care of mailing the newsletter out to the membership, so once a finished issue is emailed out, the editor's work on it is generally finished.

If you want to make a tangible contribution to the astronomical community as well as the club, editing the Sirius Astronomer is a great way to do that. Our mailing list includes other clubs, organizations and institutions across the country and even overseas. Editing the newsletter also gives a great justification – if you need one – for checking out various astronomical websites and other sources of astronomical information, and a great connection to interesting people in the club. If you like to write, providing editorials is an option – most of our editors have chosen not to include many of their own writings, but I understand that some in the past, such as John Sanford, regularly contributed content to the newsletter. There are lots of ways to be creative in this position, which is another good reason for taking it on.

If you have any interest in becoming our next editor, please contact Steve Condrey, particularly if you have any questions about what is involved (startraveler68@yahoo.com), or me (btoy@cox.net).

A Sad Farewell to Tom Drouet:

For those who knew him and may not have heard yet, long-time member Tom Drouet passed away on April 8, 2017. Tom was an active Outreach volunteer for many years, and that is where I first got to know him. He was a man of many interests, and we were fortunate that astronomy was among those that he devoted himself to in retirement. Birdwatching was another passion of his, and he was also an active member of the Sea and Sage Audobon Society, headquartered at the San Joaquin Wildlife Sanctuary in Irvine. I know there was at least one time he was able to combine those two interests with an astronomy viewing session at the wildlife sanctuary. Another of his passions was music, and he played with many different groups over the years, among them the Los Angeles Police Band, UCLA Alumni Band and Covina Community Band, and he sometimes had to miss a star party or club meeting because of a performance.

According to the membership roster, he joined the club about a month before I did, in 2000, though I didn't get to know him until probably a year or two after that. I was a relative newbie to observational astronomy at the time, and he was one of the helpful, knowledgeable Outreach folks who gave me pointers on finding my way around the night sky as well as interesting bits of information about different objects we would be seeing during these events to share with people who would be looking through our scopes. He had spent about 40 years as a math professor, most of it at East Los Angeles Community College, and he never lost his love of teaching, which is a great asset when doing outreach. There were a number of times when he and another friend, Pam Beach, would carpool out to Anza for star parties, and the three of us had some very enjoyable viewing sessions up at the Kuhn telescope, with interesting conversation and fun objects in the eyepiece – and his kind assistance when we had other visitors come up to the observatory.

Unfortunately, Tom had a number of health problems and became rather frail in the last few years, so he was no longer able to come out to Anza or to participate in many other club activities. I think the last club event he attended was the banquet last January, which was after a long absence from club activities, and he seemed to enjoy it. He was 85 when he passed away, though his many interests made him seem much younger, certainly in spirit. He will be very much missed by those of us who knew him.

RTMC:

For long-timers in the Southern California amateur astronomy world, Memorial Day Weekend is pretty much synonymous with RTMC, our local regional star party, held at Camp Oaks on Big Bear Mountain. This started life at the end of the 1960s as the Riverside Telescope Makers' Conference, in a time when building your own telescope was still the most cost-effective way to get one that was of good quality for many people – and, of course, there were always those who took great joy in coming up with innovative designs or building unique telescopes that were as much works of art as tools for viewing.

Well, times and markets change, and by late 1990s when it was occurring to me that it might be fun to actually look at things for myself in the night sky rather than just read about them, more reasonably priced decent telescopes were coming into the market, and that accelerated in the 2000s. With all the good scopes that are available now, there's a lot less incentive for people to build their own. RTMC changed as well, in response to changes in the hobby, and became the RTMC Astronomy Expo,

covering a much wider range of astronomical interests, though telescope making still has a significant place there and, amazingly, people are still building new and unique telescopes to show off to their fellow enthusiasts.

RTMC is a landmark event in our local astronomy world, and if you've never gone, it's well worth checking it out. For directions and other information, their website is: http://rtmcastronomyexpo.org/. As I write this, they are still in the selection process for the various talks that will be given during the day on Saturday and Sunday. The keynote speaker this year is Dr. Fred Espenak, aka "Mr. Eclipse," who will discuss the total solar eclipse that will cross the US on August 21 – definitely a timely topic! They'll also have their usual vendor area, the swap meet (where people bring their own stuff to sell), and, of course, viewing – vendors generally set up equipment in the telescope field, particularly on Saturday night, so you can try it out for yourself, and participants also set up their own equipment for viewing, sharing and even some imaging. And, if it follows the pattern of past years, there will be some very nice items raffled off on both Saturday and Sunday nights….

Well, for those who can't make it to RTMC, our Anza star party is that Saturday night – we won't have vendors, speakers or raffle prizes, but it should still be fun. Wherever you go that weekend, may your skies be dark, clear and steady!

Meade Classic LX200 10" Telescope For Sale. Eyepieces Included (1.25"): Televue Panoptic 22mm; Televue Panoptic 35mm; Televue Nagler Type-2 12mm; Meade Super Plossl 26mm. $1850. Call Chris at 714-296-7683

Astro Physics Mount for Sale

1. **AP 1200 GTO Mount with keypad**
2. **1200 Precision-Adjust Rotating Pier Adapter with Azimuth Bearing (1200RPA) for 10" ATS Pier.**
3. **One 18 pound Counterweight for 1.875" Diameter Shaft**
4. **16" Mounting Plate**
5. **Losmandy Polar Alignment Scope - (PASILL4)**
6. **Polar Alignment Scope Cover - (Q12700)**

$6,500.00

Contact Rick at 310-489-8561

Jason Empire Model 313 "Discoverer" telescope, original packaging, owner believes all parts are present. Contact Annette at 714-872-0508

AstroSpace Update

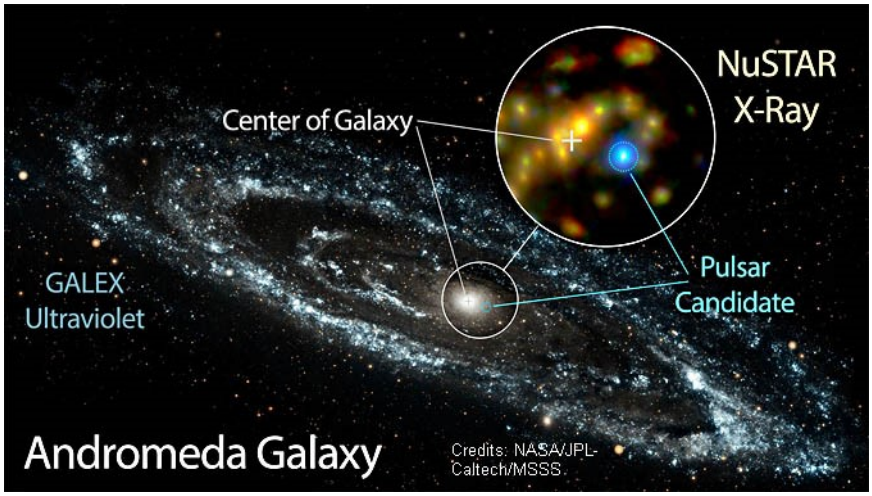
May 2017

Gathered by Don Lynn from NASA and other sources

Exoplanet atmosphere – Astronomers have detected an atmosphere around an exoplanet only 1.4 times the diameter of the Earth. This is the smallest exoplanet, and therefore most Earth-like, with a detected atmosphere. The observation was made by a telescope in Chile that watched in many wavelengths as the planet transited (passed in front of) its star. At one infrared wavelength, the planet was substantially larger than other wavelengths, indicating an atmosphere that blocks that infrared wavelength. The particular wavelength is consistent with an atmosphere rich in water and methane. The planet is designated GJ 1132b and orbits a red dwarf star in Vela, 39 light-years away. Some astronomers feared that flare activity usually found on young red dwarf stars would blow away atmospheres of planets near them, but this discovery shows that atmospheres can persist there. The smallest exoplanet previously known to have an atmosphere has a mass of 8 times the Earth's, so is probably a gas giant, unlike GJ 1132b which is likely rocky.

Second Venus – An exoplanet dubbed Kepler-1649b has been discovered that is the most like Venus of any known. It is about the same diameter and mass, and has a very hot atmosphere, receiving about the same amount of light from its star as Venus does from the Sun. Because it orbits a dim star, it is much closer to its star than Venus is to the Sun. Its year is only 9 Earth days. It differs from Venus in that it is likely tidally locked, that is, it keeps one side always toward its sun. Venus rotates very slowly, so may not be all that different from Kepler-1649b not rotating at all with respect to its sun. It is 219 light-years away.

X-ray flare – Chandra (X-ray space telescope) every so often takes images of the area where the Hubble Space Telescope took its famous Deep Field South image, and then those X-ray images are stacked to make a really long exposure (over 2 months cumulatively) of the area. During one such session, some object flared in X-rays at least 1000 times as bright as before and then faded in about a day. Hubble and Spitzer images of the area show a small galaxy at the flare location that is so distant that its light took 10.7 billion years to reach us. Astronomers are proposing theories of what could cause such an X-ray flare, such as a gamma-ray burst or a black hole shredding a white dwarf star, but the observations do not fit well anything ever seen before.



X-ray source – Andromeda, our neighboring galaxy, has for some time been known to harbor a very bright source of high energy X-rays, but the cause was not known. A new study by NuSTAR (high energy X-ray space telescope) shows its spectrum is it quite likely that of a binary star, one of whose components is a neutron star. The companion star is dumping (due to gravity) material onto the neutron star. The material gets extremely hot while falling in, and emits high-energy X-rays. Sources of high-energy X-rays in other galaxies are usually black holes, so the neutron star is a surprise.

Distant galaxies – A study was made of 6 very distant star-forming galaxies, so far away that we are seeing them as they were 2.5-8 billion years after the Big Bang. All were at least the size of the Milky Way. The speeds of hydrogen gas clouds near them were measured to determine their masses (including dark matter). Surprisingly, there was less dark matter than would be the case for similar sized galaxies today. This gives scientists insight into how dark matter halos gravitationally collapse in relation to galaxy formation. It is not known if the less-dark-matter finding applies to all early galaxies, or only this type (large and star forming). More study is needed.

Dark-matter filaments – It has been predicted that there should be filaments of dark matter bridging between the halos of dark matter that surround galaxies, but such filaments have never been observed … until now. It had been calculated that such filaments will gravitationally lens objects behind the filaments, but too weakly to measure. So a couple of astronomers used 23,000 images of close pairs of galaxies, each at a distance of about 4.5 billion light-years, stacked them all together, and analyzed the result to see if gravitational lensing was then strong enough to detect, and it was. Previous methods have found dark-matter filaments connecting whole clusters of galaxies, but not individual galaxies.

Black hole formation – Exactly how supermassive black holes can have developed such huge masses very early in the history of the Universe has long been a subject of debate. A new computer simulation appears to have discovered a way in which huge clouds can collapse directly into a supermassive black hole, thereby avoiding the predicted billions of years to grow to supermassive by accreting matter. If two forming galaxies are quite close (less than 1000 light-years) and one undergoes massive star formation (called a starburst) just before the other galaxy begins forming stars, it can heat its neighbor and cause a gas cloud in it to collapse directly to a black hole. It is hoped that the James Webb Space Telescope (to be launched next year) will be able to observe this process to prove the validity of the simulation.

Unexpectedly large black hole – NuSTAR (high-energy X-ray space telescope) observations show that a dwarf galaxy designated Was 49b has a black hole at its center that is hundreds of times larger than those in similar-sized galaxies. Was 49b is merging with the much larger galaxy Was 49a. Normally the black hole in the larger galaxy of a merger pulls in much gas and dust and develops an active brilliant accretion disk. But in this case, it is the larger black hole located in the smaller galaxy that has become active. Scientists are trying to understand how the black hole got so large. It will probably take hundreds of millions of years before the two black holes merge.

Rampant black hole – New Hubble Space Telescope images of quasar 3C 186 show that its supermassive black hole is offset from the center of its galaxy by about 35,000 light-years, and that it is traveling away from the galaxy center at tremendous speed (4.8 million mph = 7.7 million km/h). The best theory to explain this is that about a billion years ago, the galaxy collided with another, and the central black holes of the two merged while giving off huge amounts of gravitational waves. As long as the 2 merging black holes were of substantially different masses, the gravitational waves would be asymmetric, pushing the merged black hole to high speed away from the center of the galaxy. To rule out other possibilities, further observations will be made.

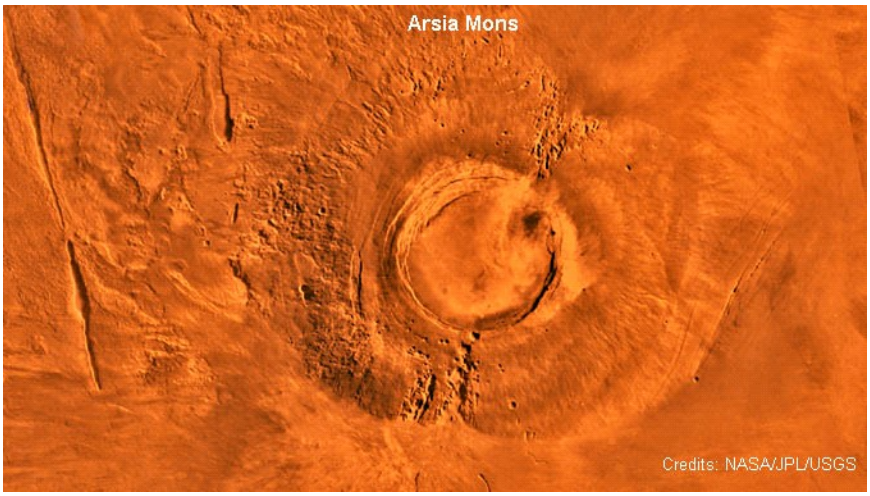
Star formation in galaxy outflow – Astronomers using the Very Large Telescope in Chile have observed stars forming within the powerful outflow thrown out of a galaxy by the black hole at its center. The black hole is actively consuming material due to merging with another galaxy, but such activity also throws a huge outflow out of the galaxy. Theorists have predicted such outflows should trigger star formation, but this is the first time such star formation has been observed to definitely occur within the outflow. The galaxy collision is designated IRAS F23128-5919 and lies about 600 million light-years away.

Enceladan hydrogen – Cassini (Saturn orbiter) made a particularly close pass by the moon Enceladus in October, and analysis of the observations made then showed that the plume from the Enceladan geysers contains about 1% hydrogen. It was already known such plumes are 98% water. The hydrogen is important because theory had predicted that chemical reactions at the bottom of the ocean on Enceladus should produce hydrogen, so this observation is confirmation of that prediction. This shows that chemical energy is available at the bottom of the ocean, so that might be an ideal place for life to have developed.

Ceres' transient atmosphere – Observations made to detect an atmosphere about asteroid Ceres have only sometimes found any. So emission of gas from Ceres must be creating such atmosphere occasionally, only to have it leak off into space. A new study of when atmosphere was detected shows that the emissions occur when the Sun throws off energetic particles. It had been theorized that the asteroid should emit gas when it is nearest the Sun, and therefore warmest, but this does not seem to be the case.

Martian Trojans – Trojans are asteroids that share the same orbit as a planet, but lie near the L4 or L5 Lagrange Points, the stable areas 60 degrees ahead or behind the planet. The first ones discovered were sharing Jupiter's orbit, and happened to get named after the heroes of the ancient Trojan War; hence the name. Now there are thousands of known Jupiter Trojans, and about 30 Trojans scattered among other planets. Mars has 9 of them. A new study of the Martian ones using the Very Large Telescope in Chile found that 7 of the 9 have the same composition and so are likely broken pieces of the same original body. The breakup could have been caused by a collision or over-speed rotation. The spectra show they are chiefly composed of olivine, a mineral that typically forms in the mantle of larger bodies. The largest of these 7 is named Eureka, so they are being called the Eureka family. There are many other families of asteroids that appear to be products of breakups, both in the main asteroid belt and the Jupiter Trojans, but none of the other families is dominated by olivine.

Martian volcano – A new study mapped all the visible lava flows from the giant Martian volcano Arsia Mons. Then the flows were dated by counting impact craters in them. This found that the most recent flow was 50 million years ago, or possibly less, and the peak of lava flow was about 150 million years ago. This peak amounted to ¼-2 cubic miles (1-8 cubic km) of lava every million years. A new lava flow occurred every 1-3 million years. The oldest flows still visible took place about 200 million years ago, though it had to take billions of years for the volcano to build up to its huge size. It is about 270 mi across (435 km) and is 5.6 mi (9 km) higher than the surrounding plains. It has about 30 times the volume of the largest volcano on Earth, and has erupted for far longer than any Earthly volcano.



Martian dark streaks – The debate continues over whether Recurring Slope Linae (RSLs) seen on Mars are flows of salty water or something else. They are dark streaks that appear in warm seasons, then fade the rest of the Martian year. Spectra of them indicated salty water, but it is hard to explain where

such water would come from. A new theory, supported by computer simulations, has been proposed: temperature variations in soil can result in rarefied gas pumping up through the soil, creating tiny avalanches, resulting in dark streaks, without using any water (and without dry ice, another RSL theory). The process was successfully produced in a lab.

Ceres ice – Researchers have calculated that the spin axis of the asteroid Ceres wobbles about with a period of 24,500 years. The axial tilt ranges from about 2 to 20 degrees during this cycle. Even with this variation, some locations in craters get little or no sunlight throughout this wobble, allowing water ice to survive for billions of years. In fact ice has been found in such places by the Dawn mission. It is not known whether this ice came from within Ceres or was deposited by bodies impacting the asteroid.

Fast Radio Bursts (FRBs) – It was discovered last year that the only FRB source that is known to repeat was found to be likely in a galaxy billions of light-years away. A search with the Molonglo radiotelescope found 3 more FRBs (none repeating, at least not yet), and showed that they were from space, not any source on Earth. The exact locations of all the FRBs except the repeater are still unknown, as is the physical process that generates them. FRBs last only milliseconds, and only a couple of dozen of them have been observed.

Lost cover – Much of the International Space Station is wrapped in blanket-like covers designed to shield the station from excessive heat and from strikes by micrometeoroids. During a recent spacewalk to install such covers over a newly added unit, one of the covers became unattached and drifted away. Ground controllers found a surplus used cover that would fit, and had the spacewalkers use it to substitute for the lost cover. In previous years, spacewalkers have lost screws, tools and even a whole tool bag.

Instant AstroSpace Updates

Images of the wheels of Mars rover **Curiosity** show 2 raised treads on one wheel have broken off, but tests of the wheels on Earth show it has about 40% of its life left, enough to reach all planned destinations for the mission.

SpaceX has reflown (and relanded) the 1st stage of a Falcon 9 rocket, delivering its 2nd satellite to orbit, calling it a "flight-proven" rocket, not "used". This may drastically reduce the costs to launch spacecraft.

Observations of **TRAPPIST-1**, the star recently found to have 7 planets orbiting it that are likely rocky, show that the star flares so often and strongly in ultraviolet and X-rays that it likely is destroying the stability of any planetary atmospheres that might exist. This should make the planets uninhabitable for even the simplest life.

Peggy Whitson, already aboard the International Space Station since November, was told she can extend her mission there by 3 months, now to return in September. During this stay, she is setting records for longest lifetime total in space for an American, the most spacewalks by a female, and others.

The most precise atomic clock, known as the **Deep Space Atomic Clock**, is being readied for launch later this year. Such a clock should allow more precise tracking of spacecraft, particularly for missions to measure gravity fields.

A study was released of changes seen in the surface of **Comet 67P** during the recently concluded Rosetta mission. Fractures grew, cliffs collapsed, the spin rate increased, and boulders larger than trucks moved up to 460 feet (140 m).

The Large Hadron Collider, located on the France-Switzerland border, has detected 5 **new subatomic particles**; they were all found to be high-energy states of the already known Omega-c-zero particle, a baryon made up of 1 charm and 2 strange quarks. They decay quickly into a proton, a pion, and kaons.

Greetings from Palmia Observatory

Well this week has been busy trying to do better alignments and taking a shipboard tour, more about that in a minute, but first we should look at some other astronomical news. I saw this interesting video of the recent LA meteor, which was posted by OCA Astroimager, Dave Kodama. He was lucky enough to capture the recent meteor on his dash cam. Hey, this is something I could do too; just drive around and wait for something to show up! Seriously, though, he caught this short 30 second video, while driving around in LA. Check it out at: https://www.youtube.com/watch?feature=youtu.be&v=Y-JEoZEQVBI&app=desktop. Thanks for that, Dave, that is really neat!

This resident astronomer and physicist wannabe also took time off from the weekly physics colloquium to attend a ship tour of the USS Zumwalt. In my previous life, I spent over ten years working on electric and hybrid power propulsion systems, and wanted to see how it all finally came together in what was at the time considered to be "the all electric ship". Well it is finally here and thanks to a tour, courtesy of SNAME and the BAE Systems Shipyard in San Diego, I finally got a chance to see most of what goes inside this ship. I would like to talk about the ... or the ..., but really can't, but can say I had a great time and was able to see a big part of the electric propulsion system and machinery.

"An All Electric Ship", USS *Zumwalt* (Source: SNAME tour flyer)

In addition, as we toured the ship, in the wardroom, we found various souvenir items for sale, so I walked out with this commemorative hat. It'll remind me of my previous life before becoming an astronomer and physicist wannabe. Thanks to BAE Systems and SNAME for coordinating the tour and ships officers for showing us around!

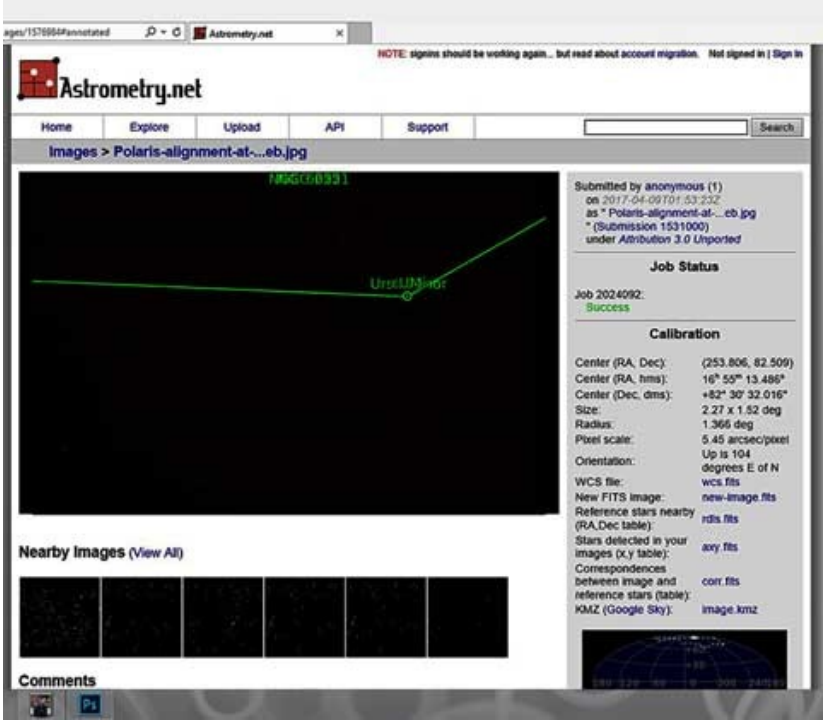
Ok, back to amateur astronomy and this week's learning opportunity involves how to get better polar alignments with the new Ioptron mount. Last post I talked about using a bubble level to get the mount initially tuned up so that the zero position pretty much lines up the scope optical axis and the right ascension axis. When I practice here at the observatory, the city lights affect the nighttime observing and make it difficult to see the North Star, Polaris. But I found that if I used the camera Lievview screen, I could scan across the location where Polaris could be and then see it on the Livewiew, without having to have my eyeball glued to the eyepiece, and tell when the scope was aligned with Polaris. Then, what I would do is to offset Polaris from camera center of frame to account for Polaris being away from the north celestial pole by about 1/2 degree and the direction of the offset is determined by the time of observation.

But at this night's observing session it was not possible to find Polaris by this method. I found later by walking to a more dark location that there were some high clouds that were not visible or blocking my overhead view, but were blocking my view of Polaris. But at the time I did not know tist and kept slewing back and forth and increasing and decreasing the altitude adjustment knob but with little success. Finally, I did spot a dim star in the camera and snapped a picture of it and then used it for alignment. Well the alignment was way off. What had happened? I tried slewing the scope in right ascension only and hoped to see the "Polaris" star just rotate in an arc around my assumed north celestial pole. But it did not do that. It moved mostly straight up in a slightly curved arc. Something

was wrong! It turns out my "Polaris" was not the real Polaris, so I just gave up and slewed the scope to the Moon and took one picture and gave up for the night.

Later, when I came back inside, I uploaded the image of "Polaris" to Astrometry.net and yes, you guessed it, the little dim star was not Polaris and in fact was way off by about 7 degrees from Polaris. Talk about working in the dark (no pun intended)! No wonder the alignment did not work out. I should have recognized my error earlier when I spied the dim star, since I had seen Polaris many time before in the Liveview screen and knew it was much brighter than that little dim star. Oh well, another lesson learned on this astronomy journey.

Couldn't find Polaris for alignment, so just slewed to the near full moon (Source: Palmia Observatory). 80mm refractor, 560mm focal length, 1/500 second exposure



No wonder the alignment is off; that star is not Polaris

Not finding Polaris was kind of frustrating and then picking the wrong star on top of that is especially frustrating. What are we going to do in these bright night skies and where Polaris can get easily clouded out? So, to release all of that frustration, Resident Astronomer Peggy and I showed up for our community center sponsored wine club class. Now, finally, this is something I can do, even though I have no sense of smell for this stuff. Our instructor, Al Glasky, could smell (and taste) "hints of oak, and a whiff of plum, and ..." Oh well, it was a lot of fun and the tasting lessons helped make up for the observing lessons and frustrations. Finally, homework I can get excited about!

If you are interested in things astronomical or in astrophysics and cosmology, check out my blog at www.palmiaobservatory.com

Until next time,

George Robison

After observing sun and stars day and night, finally time off for wine club class; just waiting for the food to come!

NOAA's Joint Polar Satellite System (JPSS) to monitor Earth as never before

By Ethan Siegel

Later this year, an ambitious new Earth-monitoring satellite will launch into a polar orbit around our planet. The new satellite—called JPSS-1—is a collaboration between NASA and NOAA. It is part of a mission called the Joint Polar Satellite System, or JPSS.

At a destination altitude of only 824 km, it will complete an orbit around Earth in just 101 minutes, collecting extraordinarily high-resolution imagery of our surface, oceans and atmosphere. It will obtain full-planet coverage every 12 hours using five separate, independent instruments. This approach enables near-continuous monitoring of a huge variety of weather and climate phenomena.

JPSS-1 will improve the prediction of severe weather events and will help advance early warning systems. It will also be indispensable for long-term climate monitoring, as it will track global rainfall, drought conditions and ocean properties.

Ball and Raytheon technicians integrate the VIIRS Optical and Electrical Modules onto the JPSS-1 spacecraft in 2015. The spacecraft will be ready for launch later this year. Image Credit: Ball Aerospace & Technologies Corp.

The five independent instruments on board are the main assets of this mission:

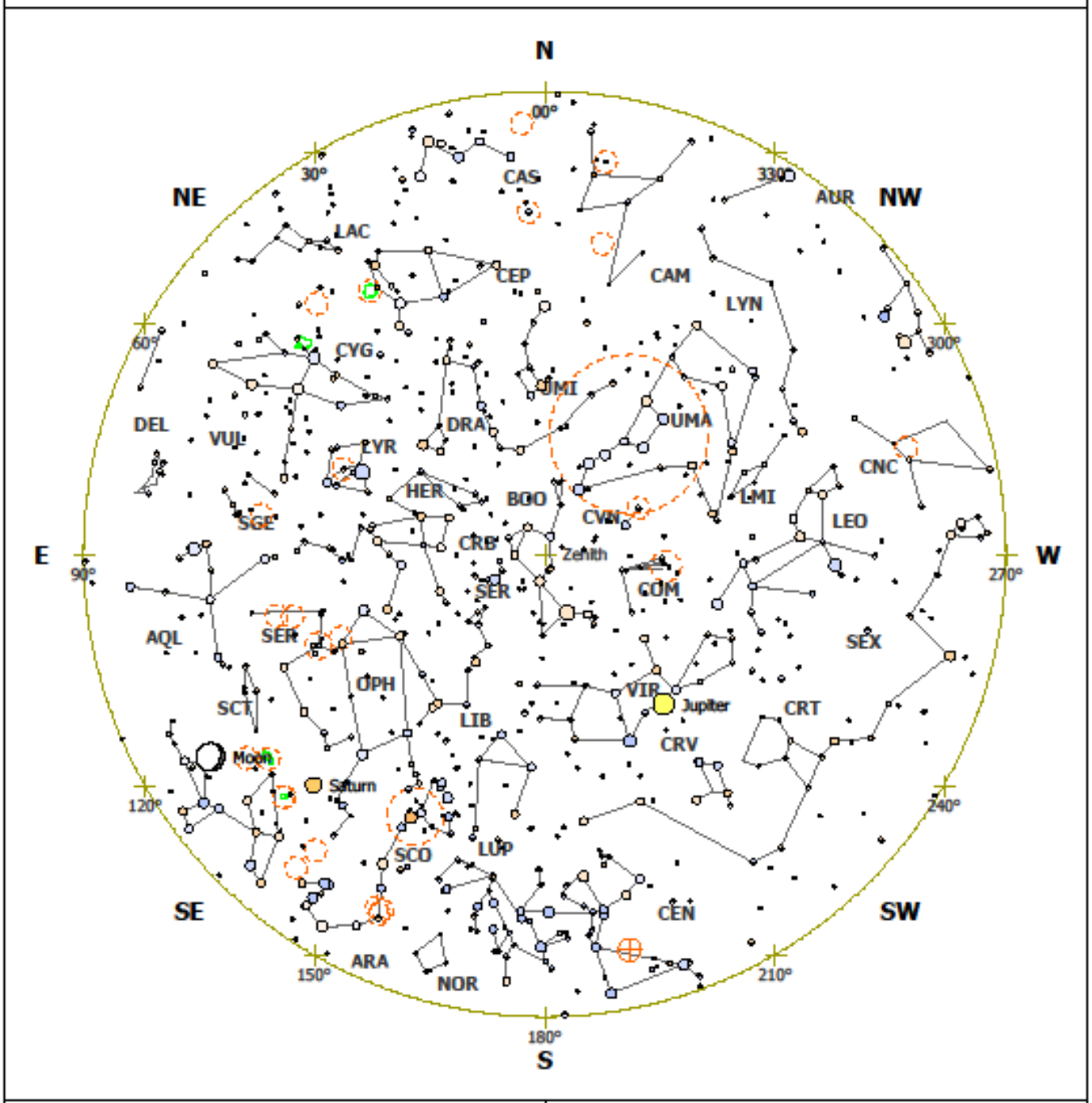
- The Cross-track Infrared Sounder (CrIS) will detail the atmosphere's 3D structure, measuring water vapor and temperature in over 1,000 infrared spectral channels. It will enable accurate weather forecasting up to seven days in advance of any major weather events.
- The Advanced Technology Microwave Sounder (ATMS) adds 22 microwave channels to CrIS's measurements, improving temperature and moisture readings.
- Taking visible and infrared images of Earth's surface at 750 meter resolution, the Visible Infrared Imaging Radiometer Suite (VIIRS) instrument will enable monitoring of weather patterns, fires, sea temperatures, light pollution, and ocean color observations at unprecedented resolutions.
- The Ozone Mapping and Profiler Suite (OMPS) will measure how ozone concentration varies with altitude and in time over every location on Earth's surface. This can help us understand how UV light penetrates the various layers of Earth's atmosphere.
- The Clouds and the Earth's Radiant System (CERES) instrument will quantify the effect of clouds on Earth's energy balance, measuring solar reflectance and Earth's radiance. It will greatly reduce one of the largest sources of uncertainty in climate modeling.

The information from this satellite will be important for emergency responders, airline pilots, cargo ships, farmers and coastal residents, and many others. Long and short term weather monitoring will be greatly enhanced by JPSS-1 and the rest of the upcoming satellites in the JPSS system.

Want to teach kids about polar and geostationary orbits? Go to the NASA Space Place: https://spaceplace.nasa.gov/geo-orbits/

This article is provided by NASA Space Place. With articles, activities, crafts, games, and lesson plans, NASA Space Place encourages everyone to get excited about science and technology. Visit spaceplace.nasa.gov to explore space and Earth science!

May 2017 Whole Sky Chart



Symbols

- Galaxy
- Quasar
- Globular cluster
- Open cluster
- Bright nebula
- Dark nebula
- Planetary nebula
- Supernova remnant
- Antisolar point
- Asteroid
- Comet
- Meteor shower

Magnitudes and temperatures (× 1000 K)

-6	-5	-4	-3	-2	-1	0	1	2	3	4	5
40	25	20	15	10	8	7	6	5	4	3	2

Location

United States, CA, Long Beach
Lon: 118° 11′ 18″ W, Lat: 33° 46′ 01″ N
Time zone: GMT-08:00
Elevation: 29 feet above sea level

Time

Local time: 2017-05-15 00:00:00
Universal time: 2017-05-15 07:00:00
Julian date: 2457888.79167
Sidereal time: 14h 40m 03s

View

Field of view: 200° 00′ 00″
RA: 14h 40m 02.70s, Dec: +33° 46′ 01.0″
Azl: 180° 00′ 00.0″, Alt: +90° 00′ 00.0″
Constellation: Bootes

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

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ORANGE COUNTY ASTRONOMERS
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