SIRIUS ASTRONOMER

www.ocastronomers.org

The Newsletter of the Orange County Astronomers

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Craig Bobchin took this image of star trails at Mount Wilson Observatory during the observatory's Open House on October 19. If you have not been to Mount Wilson, it is well worth the trip!

OCA CLUB MEETING

The free and open club meeting will be held November 11 at 7:30 PM in the Irvine Lecture Hall of the Hashinger Science Center at Chapman University in Orange. This month, Joel K. Harris and Don Sabers discuss The Incredible Indonesian Total Solar Eclipse of March 2016.

NEXT MEETINGS: Dec. 9, Jan. 13

STAR PARTIES

The Black Star Canyon site will open on November 19. The Anza site will be open on November 26. Members are encouraged to check the website calendar for the latest updates on star parties and other events.

Please check the website calendar for the outreach events this month! Volunteers are always welcome!

You are also reminded to check the web site frequently for updates to the calendar of events and other club news.

COMING UP

The next session of the Beginners Class will be held at the Heritage Museum of Orange County at 3101 West Harvard Street in Santa Ana on November 4. The following class will be held December 2.

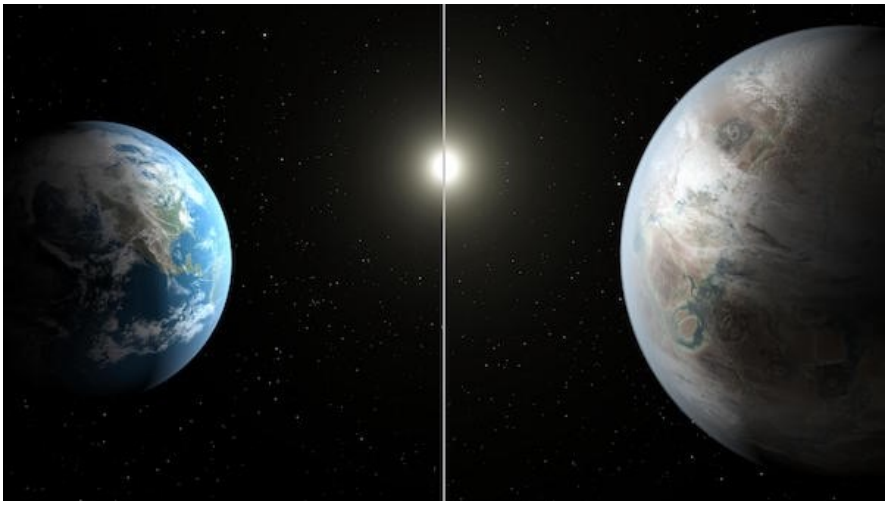
NEW! Youth SIG: contact Doug Millar
Astro-Imagers SIG: Nov. 8, Dec. 13
Remote Telescopes: contact Delmar Christiansen
Astrophysics SIG: Nov. 18, Dec. 16
Dark Sky Group: contact Barbara Toy

Is Proxima Centauri's 'Earth-like' planet actually like Earth at all?

By Ethan Siegel

Just 25 years ago, scientists didn't know if any stars—other than our own sun, of course—had planets orbiting around them. Yet they knew with certainty that gravity from massive planets caused the sun to move around our solar system's center of mass. Therefore, they reasoned that other stars would have periodic changes to their motions if they, too, had planets.

This change in motion first led to the detection of planets around pulsars in 1991, thanks to the change in pulsar timing it caused. Then, finally, in 1995 the first exoplanet around a normal star, 51 Pegasi b, was discovered via the "stellar wobble" of its parent star. Since that time, over 3000 exoplanets have been confirmed, most of which were first discovered by NASA's Kepler mission using the transit method. These transits only work if a solar system is fortuitously aligned to our perspective; nevertheless, we now know that planets—even rocky planets at the right distance for liquid water on their surface—are quite common in the Milky Way.



An artist's conception of the exoplanet Kepler-452b (R), a possible candidate for Earth 2.0, as compared with Earth (L). Image credit: NASA/Ames/JPL-Caltech/T. Pyle.

On August 24, 2016, scientists announced that the stellar wobble of Proxima Centauri, the closest star to our sun, indicated the existence of an exoplanet. At just 4.24 light years away, this planet orbits its red dwarf star in just 11 days, with a lower limit to its mass of just 1.3 Earths. If verified, this would bring the number of Earth-like planets found in their star's habitable zones up to 22, with 'Proxima b' being the closest one. Just based on what we've seen so far, if this planet is real and has 130 percent the mass of Earth, we can already infer the following:

- It receives 70 percent of the sunlight incident on Earth, giving it the right temperature for liquid water on its surface, assuming an Earth-like atmosphere.
- It should have a radius approximately 10 percent larger than our own planet's, assuming it is made of similar elements.
- It is plausible that the planet would be tidally locked to its star, implying a permanent 'light side' and a permanent 'dark side'.
- And if so, then seasons on this world are determined by the orbit's ellipticity, not by axial tilt.

Yet the unknowns are tremendous. Proxima Centauri emits considerably less ultraviolet light than a star like the sun; can life begin without that? Solar flares and winds are much greater around this world; have they stripped away the atmosphere entirely? Is the far side permanently frozen, or do winds allow possible life there? Is the near side baked and barren, leaving only the 'ring' at the edge potentially habitable?

Proxima b is a vastly different world from Earth, and could range anywhere from actually inhabited to completely unsuitable for any form of life. As 30m-class telescopes and the next generation of space observatories come online, we just may find out!

Looking to teach kids about exoplanet discovery? NASA Space Place explains stellar wobble and how this phenomenon can help scientists find exoplanets: http://spaceplace.nasa.gov/barycenter/en/

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!

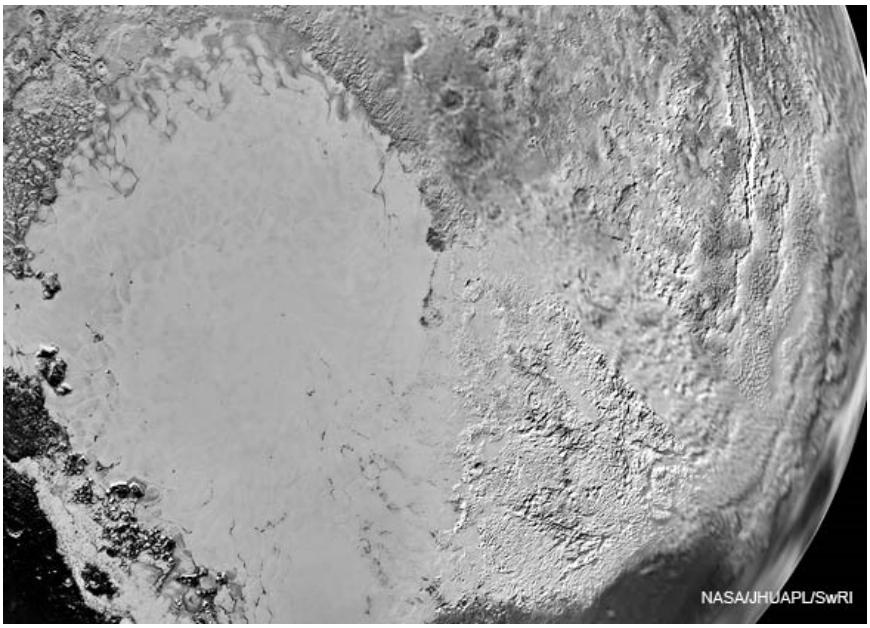
AstroSpace Update

November 2016

Gathered by Don Lynn from NASA and other sources

Dione ocean – Last March it was suggested that Saturn's moon Dione might have a liquid ocean beneath its icy surface. A careful analysis of data now supports this. Tidal forces experienced by the Cassini spacecraft during close flybys of Dione best match a model of the moon with a frozen crust about 60 miles (100km) thick over and ocean 22-59 mi (35-95 km) deep. Applying the same analysis to flybys of nearby moon Enceladus also confirmed the much stronger evidence of a subsurface ocean there. Further previous evidence for the Enceladus ocean was that it wobbles in its rotation (librates) in the manner expected for a body with the crust floating. A search for similar libration of Dione did not find it, but it could easily be too small to detect in the data taken there. Dione visual measurements showed that tidal forces from Saturn have elongated the moon slightly in the direction toward the planet. Such an elongation shows up in gravity data for a solid object, but does not for a floating surface, and the flyby data supported a floating surface. This is probably the 7th world with some evidence for an ocean, besides the world you are likely sitting on as you read this.

Europa geysers – Astronomers using the Hubble Space Telescope have imaged what appears to be water vapor plumes erupting off the surface of Jupiter's moon Europa and reaching heights of 125 miles (200 km). The observations were made while the moon was in front of Jupiter, so the probable plumes showed up by masking light from Jupiter. The astronomers were actually trying to detect a thin atmosphere about Europa, but found the plumes instead. This confirms earlier observations of a different sort by Hubble that were also believed to be water plumes at Europa. This indicates that a spacecraft mission to Europa would not have to land and penetrate the icy shell to sample the ocean beneath, but just fly through the erupting plumes. The eruptions seem to be intermittent, since they were seen only 3 times out of 10 passes in front of Jupiter. Scientists would like to use the James Webb Space Telescope, scheduled for launch in 2018, to confirm that these are water vapor plumes.

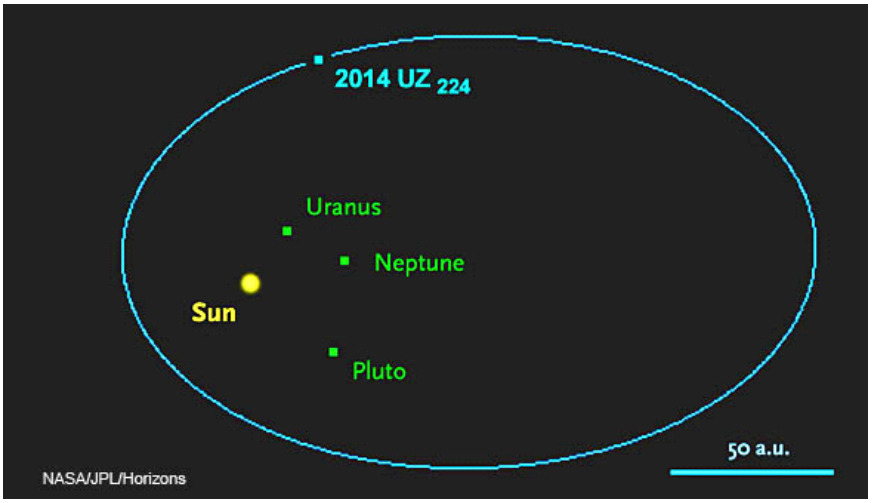


Pluto – A new computer simulation explains how the heart-shaped plane formed on Pluto. It is a basin, lower than surrounding areas. The increased atmospheric pressure at the bottom of the basin allowed nitrogen to more easily freeze out of the atmosphere. This became a colder area from the ice and the sinking of cold atmosphere, so more nitrogen froze out. Nitrogen ice just kept accumulating in the basin until it formed a nearly smooth nitrogen glacier. The computer simulation also showed the observed increase in atmospheric pressure over the last 30 years and the observed formation of methane frosts at the poles during winter. It predicted the polar frost will fade during spring (which on Pluto lasts over 60 Earth years). The glacier plane, though slightly affected by seasons, is predicted to remain largely intact.

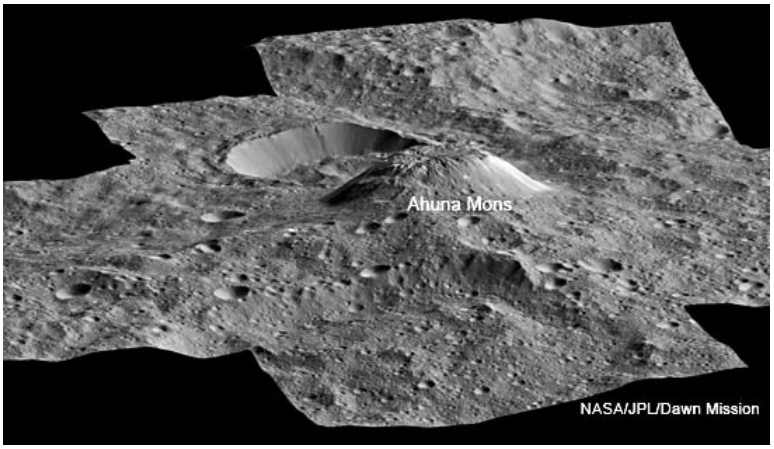
Titan clouds – Observations of Saturn's moon Titan over the years from Voyager to Cassini have sometimes found high in the stratosphere clouds of frozen dicyanoacetylene. But measurements of gaseous dicyanoacetylene and the temperature and pressure there showed that it should not be condensing into clouds. In a new paper, it is shown how frozen dicyanoacetylene can form when ultraviolet light strikes 2 other icy compounds (cyanoacetylene and hydrogen cyanide) that exist in the Titanian atmosphere. A similar process forms certain chlorine compound ice crystals high in the Earth's atmosphere in polar regions. The dicyanoacetylene clouds are rare and seem to be seasonal. Lab experiments are under way to reproduce dicyanoacetylene clouds by the means proposed in the new paper.

Later Martian lakes – Using mostly images from the Mars Reconnaissance Orbiter, a new study found that some lakes and snow-fed streams on Mars formed much later than previously thought, about 2-3 billion years ago. This could be up to a billion years later than previous estimates of the wet Martian period. One lake studied held as much water as Lake Ontario and another as much as Lake Tahoe. The stream beds appeared to have formed from gentle snow melt, not rainfall or flooding, so this wet period could have been fairly cold. Areas similar to the studied area are widespread on Mars, suggesting this was a global wet period, not localized.

The rate at which meteoroids hit the Moon was determined in the 1970s by counting craters of various sizes within craters with known ages from Apollo data. A new way to calculate this rate is to count craters that show up in Lunar Reconnaissance Orbiter images and were not there in a previous image. 222 new craters were found, in the range of 140 down to 33 ft across (43-10 m). The rate found was 33% greater than the old 1970s figure. This is a pretty good agreement, considering one method averaged over millions of years while the other spanned less than 4 years. The new rate also was in fairly good agreement with rates calculated from Earthly meteor data. But the new rate makes a huge difference in how much the top layers of lunar soil are calculated to be churned by the impacts.



Dwarf planet – The Dark Energy Survey (DES) has spent the past 5 years surveying roughly 1/8 of the sky using a monster camera on the Blanco Telescope in Chile to determine the effect of dark energy on the distribution of galaxies. But buried in the data are lots of images of small Solar System objects. So a group of astronomers wrote a computer program to extract moving objects from DES data, and they found dozens of previously unknown objects beyond Neptune, even though only a fraction of DES data has been processed. The largest and most distant of these finds was designated 2014 UZ_{224}. Only Eris and V744104 are known to be farther. Although it is in the Kuiper Belt, it has been classified as a scattered disk object, that is, a body that formed elsewhere but was thrown into the Kuiper Belt by Neptune's gravity. It is somewhere in the range of 250-750 miles across (400-1200 km), depending on reflectivity. Further observations have been made with the ALMA radiotelescope array, which will soon allow astronomers to calculate a more precise reflectivity, and therefore a better size. It is likely large enough to pull itself into a spherical shape, which is the criterion to promote an asteroid to a dwarf planet, so we likely have another of those beasts on our hands. It has a highly elliptical orbit that takes about 1140 years to traverse. It currently shines at magnitude 23.5.



Dawn (asteroid orbiter) – More results from Dawn: The only high mountain (Ahuna Mons, 3 mi = 5 km high) on dwarf planet Ceres is likely volcanic. It probably spewed salty mud – temperature there is too low for molten rock. Ceres may have a weak, temporary atmosphere. This would confirm Herschel Space Telescope detection of water vapor at Ceres 4 years ago. The new detection is weak, and needs confirmation. Exposed water ice is rare on Ceres, but the low density and the existence of the mud volcano suggest that Ceres' crust contains a significant amount of water ice. Impact craters are the most abundant geological feature on Ceres. Craters that are roughly polygonal hint that Ceres' crust is heavily fractured. Also several Cerean craters display fractures on their floors. The ratio of depth-to-diameter of various craters shows that crater relaxation must have occurred as icy walls gradually slump. Ceres' crust appears loaded with clay-forming minerals called phyllosilicates. Their distribution throughout the crust indicates Ceres' surface material has been altered by a global process involving water.

Binary star planet – Binary stars are common, but planets known to orbit binary stars are not. Only about 10 are known to orbit both of a pair of stars. It is not clear if they are actually rare or we just haven't found many. Astronomers using the Hubble Space Telescope just found another. 2 red dwarfs just 7 million miles apart have a planet orbiting roughly 300 million miles out (about the distance that the asteroid belt orbits the Sun). The planet's year is about 7 Earth years. The system was discovered in 2007 by a small telescope in Chile that searches for gravitational microlensing effects. It was thought to be a 3-body system, but it took the Hubble to determine it was a planet orbiting the close red dwarf star pair. The system is 8000 light-years away toward the center of our galaxy.

Galaxy count – The standard answer to how many galaxies are in the observable Universe is about 100-200 billion. A new study came at the question from a different approach. How many galaxies WERE there? As we look out at more and more distant galaxies, we are seeing them as they were when the light left there more and more billions of years ago. So what we are seeing is galaxies that were. We know that galaxies merge over billions of years, so there should have been more of them in the past. The new study

says there were at peak about 10 times as many as the old estimate, that is, 1-2 trillion. And that there are substantially less than 1-2 trillion now, due to merging. The study was made using data from the Hubble Deep Field Images and observations by other telescopes. From this, including red shift, the study made a 3-D map of galaxies. Then mathematical models were made to include galaxies too dim and far to show up with current telescopes, and to include how galaxies evolve over time. Future telescopes, such as the James Webb Space Telescope and telescopes in wavelengths other than visible light, will be able to confirm if the mathematical models are correct for galaxies somewhat beyond what we can detect now.

Galaxy cluster transition – Astronomers have caught a galaxy cluster (known as J1001+0220) that appears to be in transition from a youthful star-forming frenzy to maturity (where star-forming is vastly reduced). It is under debate whether falling to the center of a galaxy cluster causes a galaxy to lose its star-forming gas, or being in the center and interacting with other galaxies cause it to lose its gas. The cluster observed is so far that we see it as it was just 2.6 billion years after the Big Bang. It has 11 massive galaxies in the cluster's core, with 7 of them showing rapid star formation. This snapshot supports the theory that the star-forming gas is lost after massive galaxies reach the cluster's core.

A black hole destroying a star releases an enormous amount of energy in an event called a flare. In recent years a few dozen such flares have been discovered, but they are not well understood. 2 new studies have given new insights into these flares by studying how surrounding dust absorbs and re-emits their light, like echoes. The studies used the WISE infrared space telescope. The ultraviolet and X-ray light in the flares destroys dust out to a certain distance. The dust beyond this remains and is heated until it gives of infrared light. The time delay between the flare and the glowing dust tells how far the dust is from the black hole. 5 flares were studied, and 3 produced the infrared echoes. The infrared remained visible up to a year after the flare. The results are consistent with the black hole having a patchy, spherical web of dust located about ½ light-year away.

HUDF in radio – A team of astronomers has used the ALMA radiotelescope array to observe the same area of sky imaged by the Hubble Ultra Deep Field (HUDF) image. The result traces the abundance of star-forming gas in the distant galaxies there. It shows which galaxies are abundantly forming stars. They are not necessarily the brighter galaxies in the Hubble image. ALMA was able to see spectral lines in the gas clouds that allowed redshift and therefore distance to be calculated. A correlation was found with more star-forming gas in more distant galaxies, which are seen as they were earlier in the history of the Universe. So far only about 1/6 of the HUDF has been covered by ALMA, but plans are to finish the area.

Stellar cocoon – Scientists using ALMA observations of the Large Magellanic Cloud, a nearby dwarf galaxy, discovered a hot mass of complex molecules referred to as a stellar cocoon. It is the 1st such found outside the Milky Way. The cocoon has a very different composition than such objects in the Milky Way. Sulfur dioxide, nitric oxide, formaldehyde, methanol and other compounds were found.

Unusual eclipses of a star were observed in 2007, which were theorized 5 years later to be caused by a planet (designated J1407b) with a huge ring system (far larger than Saturn's). Doubts were expressed that such a system would be stable. A new study showed that the planet's orbit and rings could remain intact for over 100,000 years only if the orbit is fairly elliptical and the rings rotate in the opposite direction from the planet's orbital motion (retrograde). More study is needed, since this seems a somewhat contrived explanation of the observed eclipses.

Starspot cycle – A new study of Proxima Centauri (the nearest star to the Sun, and home to a recently discovered Earth-sized planet) found that the star has a starspot cycle somewhat like our Sun. The Sun's spots peak about every 11 years, while those on Proxima peak about every 7 years. However, far more of Proxima is covered by spots during its peak. Typically the Sun peaks at under 1% of its surface spotted, while about 20% of Proxima's is spotted. It was surprising to find this cycle on Proxima because it is so different from the Sun. It is much smaller, dimmer and cooler than the Sun. Only the outer 1/3 of the Sun has convection, where material boils up like water in a hot pot, while it is thought that red dwarf stars such as Proxima have convection all the way from the core to surface. So the same mechanism for the cycle of sunspots should not occur there. The Proxima cycle was discovered by combining ground-based survey data with space-based X-ray observations.

Eta Carinae brightened drastically and threw off 1/10 of its mass in 1843. Later it was found to have a binary companion that orbits every 5.5 years. Astronomers are still trying to explain the outburst. A new study of the motions of material expanding from the star found that another 1 and possibly 2 outbursts must have preceded the 1843 one. The material is traveling at hundreds of miles (km) per second. If the material has not changed speed much since ejection from the star, then outbursts must have occurred in the years 1250 and 1550. The material from 1250 lies entirely on the northeast side of the system, indicating a very asymmetric outburst. The mystery of Eta just keeps getting stranger.

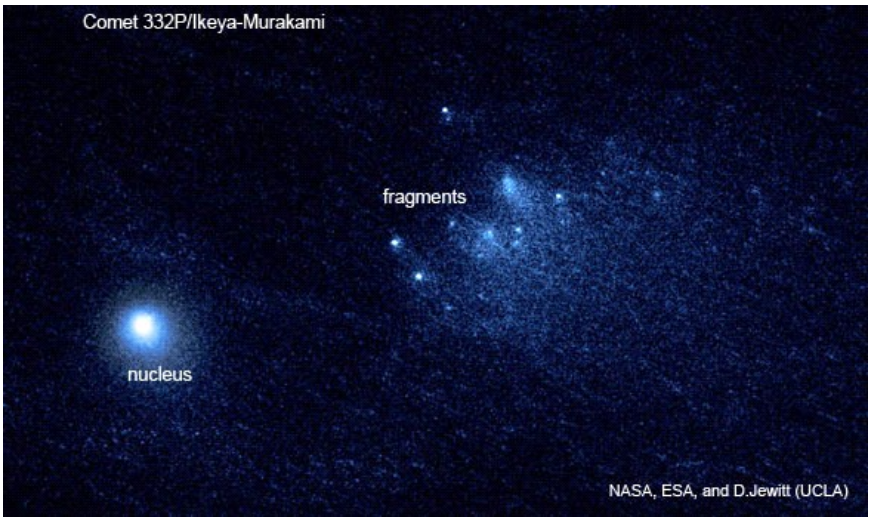
Failed supernova – A team of scientists may have observed for the 1st time a failed supernova, and witnessed the birth of a black hole. A failed supernova is a massive star that dies without the typical spectacular supernova explosion. It happened in the galaxy NGC 6946. A star flared up and then faded and vanished, but the flare was not bright enough to be a supernova. It left a faint trace in infrared that is consistent with the glow of matter falling into a black hole. Theoretically, it has been predicted for some time that some stars at the end of their lives are too massive to explode, but just collapse to a black hole. This appears to be the 1st time that process has been observed. The scientists used observations from the Hubble and Spitzer space telescopes to rule out the possibility that dust was hiding the star rather than it disappeared when it became a black hole. X-ray observations are being made to confirm that a black hole exists there now.

Building blocks of life, that is, simple carbon compounds, have long been observed in space, in particular in star-forming regions. The popular theory of how they were formed is that shock events cause simpler molecules to combine. A new study of the Orion Nebula using the Herschel Space Telescope to observe in far infrared showed that the chemical reactions to form these building blocks likely were caused by ultraviolet light, not shock events. The ultraviolet comes from hot young stars.

ExoMars – As I write this, ExoMars 2016, which consists of an orbiter named Trace Gas Orbiter (TGO) and a lander named Schiaparelli, are preparing to orbit and land (what else would they do?) Schiaparelli is sort of a test lander, to see if the European Space Agency has mastered landing, expected to report engineering data and a little science from the surface for just a few days. It does not have solar panels, just batteries that will run down soon. The landing area is in Meridiani Planum, not far from the rover Opportunity. The lander was named after the astronomer who discovered channels on Mars, which were mistranslated to "canals". It seems to me that the naming choice begs for the lander to be misunderstood. NASA has landed 7 successful missions on Mars, and crashed a few, but no other space agency has succeeded in landing on the Red Planet, if we discount the Soviet Mars 3, which operated almost 15 seconds before failing. It looks like the dust storms now are not bad enough to interfere with landing, even though this is major dust storm season on Mars. TGO will go into orbit (or has by the time you read this), but not its final observing orbit, which will take over a year to reach, mostly spent in aerobraking (barely dipping into the top of the atmosphere to change its orbit). Then 5-7 years of observing are planned, measuring methane, water vapor and other gasses in the Martian atmosphere. Methane seems to come and go, according to measurements from several previous missions, and astronomers would really like to know where it comes from. On Earth, most methane comes from bacteria, but there are other possibilities that do not involve life. ExoMars 2016 is the only mission that was launched to Mars this season (Mars launch seasons occur every 26 months). Assuming Schiaparelli succeeds, the ExoMars program will send a rover in 2020.

Instant AstroSpace Updates

The Hubble Space Telescope has captured one of the most detailed observations of a **comet** (332P/Ikeya-Murakami) **breaking apart**, into 25 building-sized blocks of ice and dust, drifting away at a walking speed from the nucleus. The comet may have been spinning fast enough to break off these pieces.



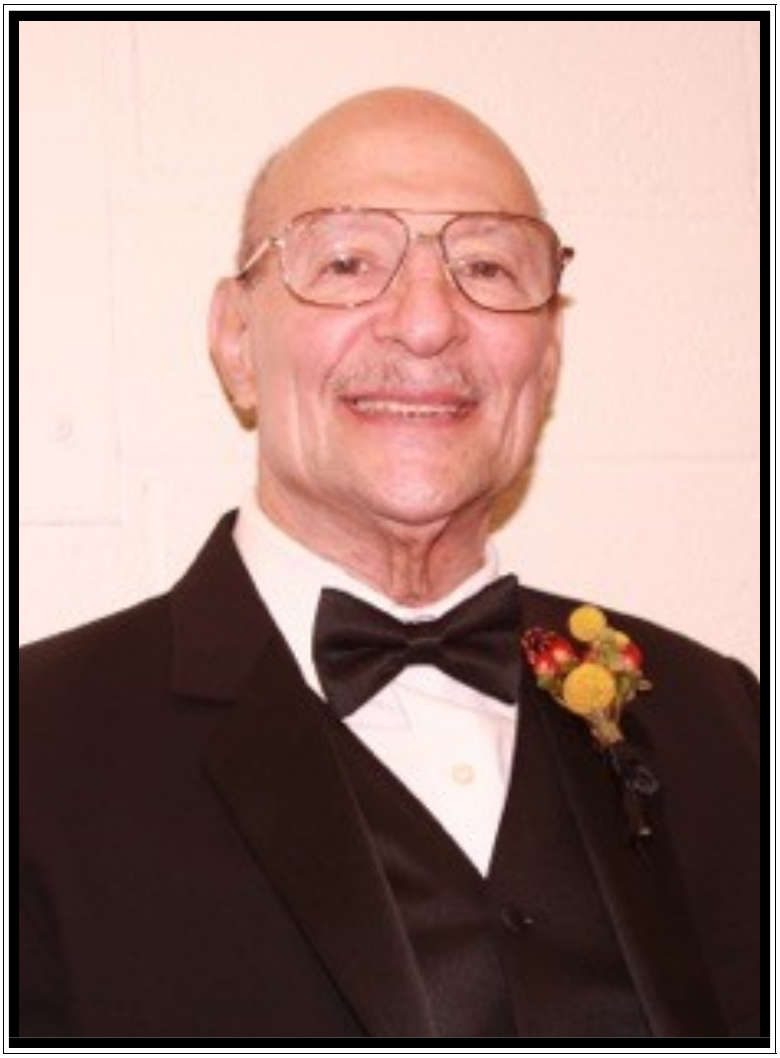
Mars rover **Opportunity** has been scheduled during its 2-year mission extension to descend a side canyon into the 14 mile (22 km) wide Endeavour Crater to sample rocks inside the crater and to examine a gully that was carved by running water. The rover recently exceeded by 50 times its planned mission of 90 Martian days.

A new study of past **Martian dust storms** came up with a new theory, based on perturbations from other planets, on how to predict when such dust storms will expand to engulf the entire planet (which has happened 9 times since 1924). It predicts a global storm in the next few months.

Observations made during the 2012 transit of **Venus** in front of the Sun showed that the night side of the planet is emitting **X-rays**, apparently from high up in the magnetotail. Previous work showed that the day side emits X-rays too.

Kepler (planet-finding space telescope) was used to observe **Comet 67P** shortly before the Rosetta spacecraft completed its mission at that comet. The Kepler observations give greater context for the Rosetta observations, and will allow calculating the rate of mass loss from the comet.

The **Antares** rocket, with its engines that exploded last launch attempt 2 years ago replaced with newer models, is scheduled for its return to flight October 16, taking off with a load of cargo for the International Space Station.



ROY JACK WEINBERGER (75) passed away from Alzheimer's Disease on October 21, 2016. He was born on December 11,1940 in Chicago, Illinois and grew up in the Chicago suburb of Elgin. In 1953 his family moved to Southern California and he graduated from Riverside Polytechnic High School in 1957. He obtained a Bachelor's Degree in Computer Science. His early career was in the new field of computer programming and he worked for major corporations in the defense and food industries. After obtaining his Master's Degree in Counseling Psychology from Pepperdine University, he became a Children's Social Worker in Los Angeles and retired as a Supervisor in 2006.

He married Catherine Bailey in 1992 and together they raised a daughter Marina, who now is in college at the University of Chicago. Roy was a longtime member of the Orange County Astronomers and enjoyed participating in star parties, community outreach, and serving as host for Anza House. He was an avid astrophotographer and enjoyed using his astronomy pad at Anza and his permanent mount in the back garden of his home in Mission Viejo.

He is survived by his wife of 24 years, Catherine; his 19 year old daughter Marina, and his sisters Marilyn and Ethe. He will be deeply missed. There will be a Celebration of Life for him in Laguna Beach on November 12. If you would like to attend, please request details and directions via email: oneleaf1@cox.net.

Jupiter Ridge #4 Pad for sale: This pad includes a good steel pier and a table that's in good condition. As with all Jupiter Ridge pads, the parking is excellent. $1,500. Either see me at JR#7 (the warming hut), or call or text me at 951-225-5920. Ray Stann

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

Black Star Canyon Star Party Recap
Saturday, October 22nd, 2016

Steve and Bonnie Short

The sky was warm & fairly clear throughout Orange County so when we arrived at the gate about 5:30 pm and we were not surprised to see there were at least 7 OCA Member cars waiting at the gate. But we were surprised to see that there were Nature Conservancy people already on site and telling me they had an event scheduled that evening. They checked the calendar and saw our star party was scheduled so they moved their event to another location.

After the Nature Conservancy people left the BSC site, we were able to bring the OCA cars into the site and set up telescopes. We had 22 cars come in by 6:30 pm and by the end of the night, we had counted a total of 25 cars and about 45 people that had come to the BSC star party.

The first object that became visible after the Sun set was Venus high on the western horizon. Later Mars & Saturn became visible behind the Scorpion's 3-star head. By the end of the evening, some of us even viewed Uranus & Neptune so we got to see 5 planets once again. We had Cesar & Simon out taking video of the star party that will be edited and put on the OCA website. This was their first star party and they had fun looking at objects through the telescopes.

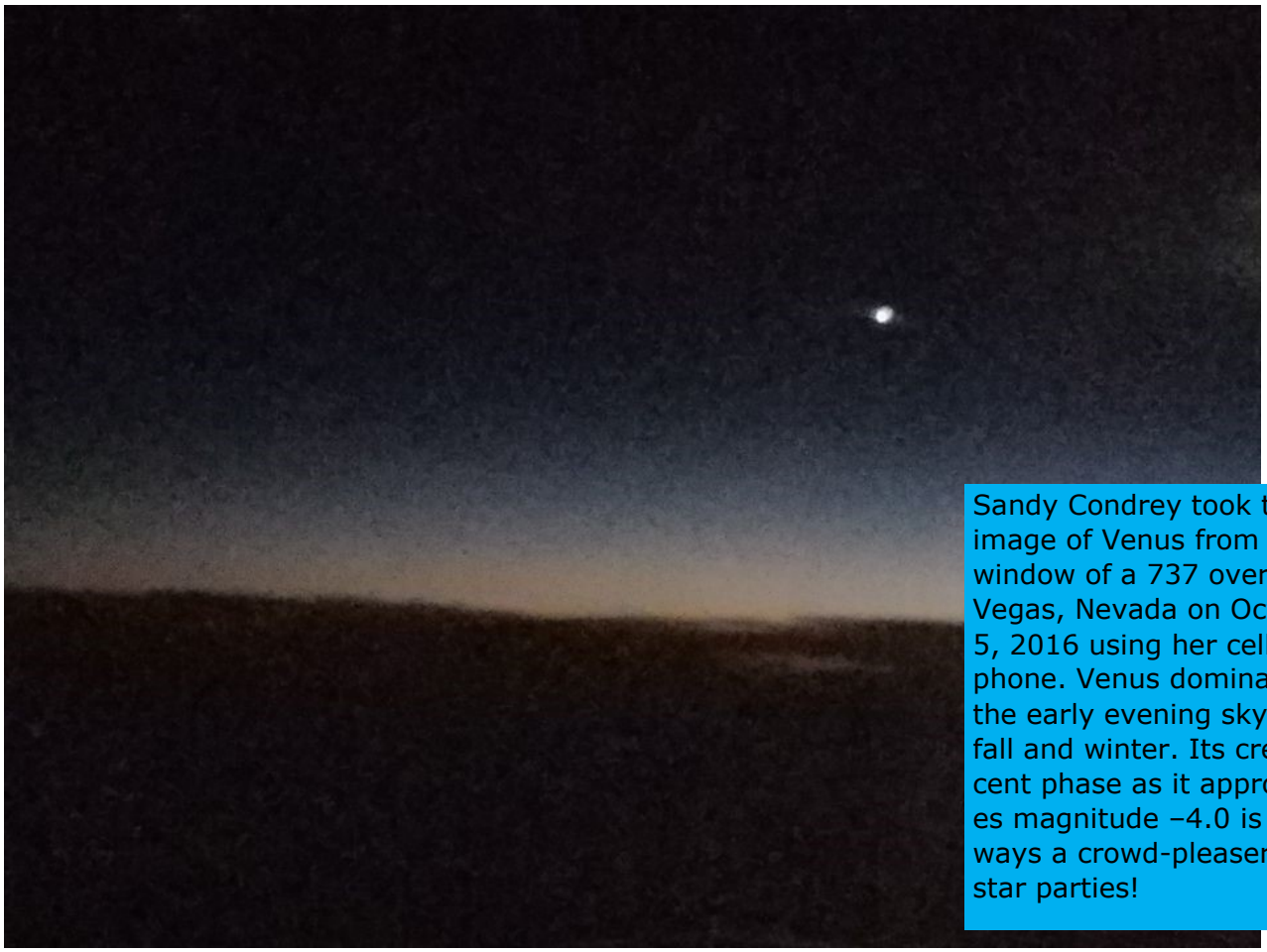
We set up in the usual spot by the middle picnic table and shared views of Venus, Mars, Saturn and even Uranus along with Alberio, M31 & M36. Sam set up next to us by the 3rd table and was quick to view Venus, then later shared views of Saturn & M31 to his guests Emily, Cam & Issac and others. A bit further away, Kelly set up her scope and showed her guests David White & Cathy Saturn and Alberio. Larry set up his 9.25 Celestron on the other side of us and shared views of many objects including the Double Double star near Vega and the best view of Neptune's small disc I saw all night. Near Larry was Dave Murphy who shared views of M6, M8, M22, NGC 869 & 884 (the Dbl Cluster).

We had many people set up scopes across the way including Val Akins nearest the parking area who shared nice views of Alberio, Uranus, some red variable stars and others through his classic 6” Celestron scope. Roger Cotton was set up next to Val and showed me a shimmering view of Mars in his big Celestron scope. Robert Cunningham set up a bit farther along with his guest David Kim. Nearby, Matthew Dahms set up his 18” DOBS and shared views of many objects including M110 & Saturn. Eric Burgdorf had a nice view of the Ring Nebula.

Ves Snelson was the only one to set up in the area beyond the 2nd gate. But his 8” Meade LS was giving him mechanical trouble with his 2” diagonal so he left early. Bill Johnson brought his new big Orion 16” DOBS” in his “Best A/C & Heating” truck parked just before the first turning circle.

Also attending was Marcelo Reginato and 8 year old Helena. New member Dana Burr was out for the first time and brought his son Luke. Also new member John Collett attended with his wife Beckie and they had a great time. Others that came without a scope were John Creigh, Dave Leggett and his guest Barret Schmelz, Bruno, his wife Audrey and daughter Andrea, Greg & Denice Spalter and our guest Doris.

Please forgive us if I missed anyone or we got your names spelled wrong. Bonnie tries hard to log in everyone and get your names right. We closed the gate at 11:30 pm after the last person shut down and left.



Sandy Condrey took this image of Venus from the window of a 737 over Las Vegas, Nevada on October 5, 2016 using her cell phone. Venus dominates the early evening sky this fall and winter. Its crescent phase as it approaches magnitude –4.0 is always a crowd-pleaser at star parties!

OCA 2017 Banquet
Date: January 14 2017 (Saturday night)
Theme: 2017 Solar Eclipse
Time: 7:00 PM - 9:30 PM
Place: BJ Schmid's, Anaheim
2610 E. Katella Ave, Anaheim, CA 92806

Cost: Free entry, but you must pay for the meals & drinks you order. Dinner menu ranges from $12 salads, $15 hamburgers to more expensive full dinner meals.

Plenty of free parking in the Artic Transportation lot A behind BJ Schmid's.

Speaker: Joel Harris, Solar Eclipse Expert

Will raffle off a few prizes, including an Anza Pad paid for 1 year along with a few restrictions.

Seating will be limited so please email Steve Short to reserve the number of people in your party. (nightskytours@hotmail.com)

WINTER OVRO TRIP PLANNED FOR DEC. 16-17

I am planning a winter trip to Owens Valley Radio Observatory facility this December on Dec.16 -17.

The trip is for young and old. We would like people to bring their telescopes and help us with observing. The winter skies up there are excellent.

We will have a great warming room. We will have the usual fun activities like a tour of the facilities and experiments with liquid nitrogen, snow play and great pizza.

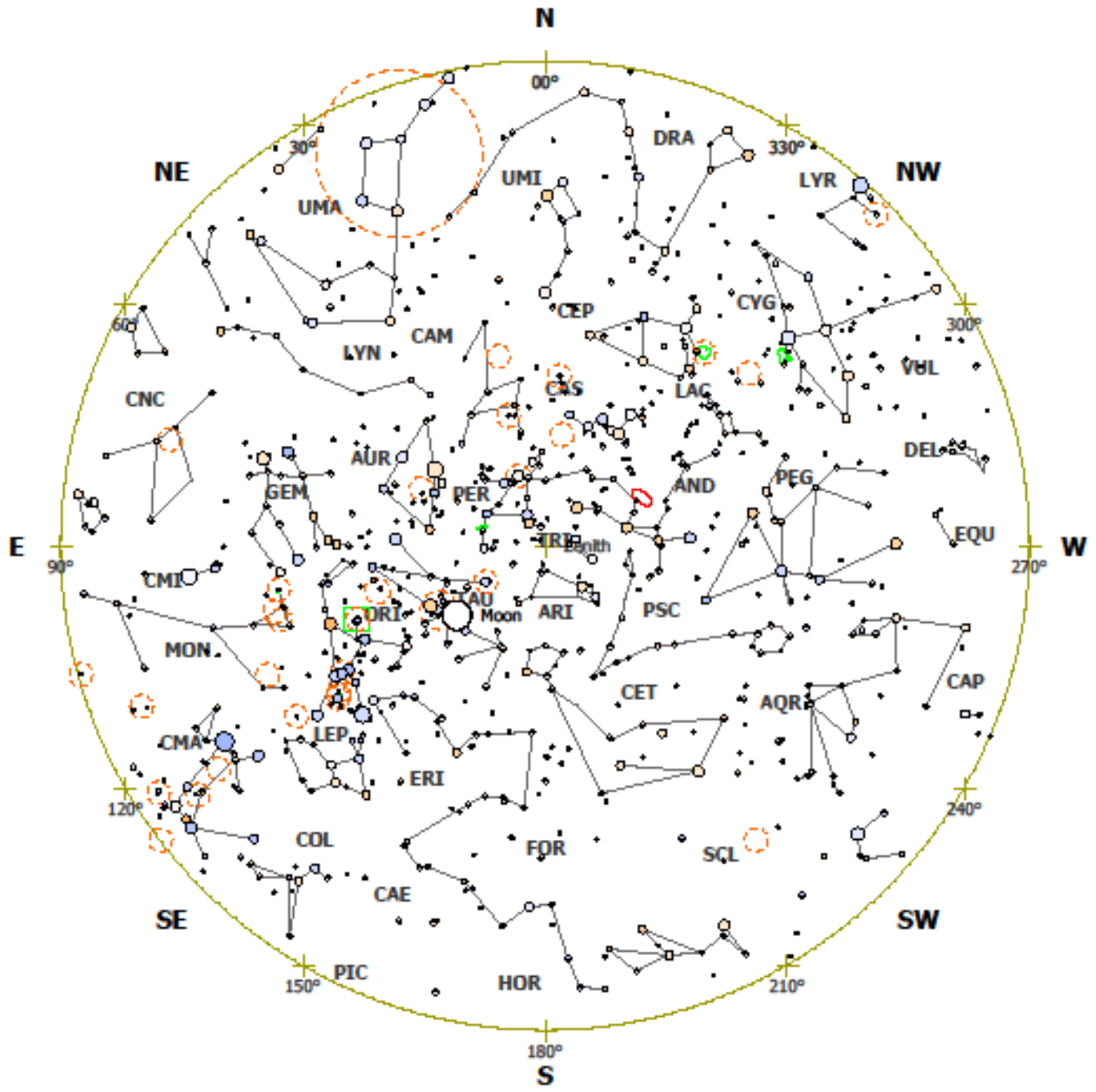
There is no cost involved, but you need to arrange your own transportation, lodging and meals. The observatory is a few miles East and North from Big Pine, Ca. along Highway 395.

Please let me know if you would like to go via email or phone, and I will send you more details.

Hope you can join us,

Dr.Doug Millar EdD.
K6JEY
drzarkof56@yahoo.com
562 810 3989 cell/text

Whole Sky Chart - November 2015



Symbols

Galaxy	Bright nebula	Antisolar point
Quasar	Dark nebula	Asteroid
Globular cluster	Planetary nebula	Comet
Open cluster	Supernova remnant	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: 2016-11-15 00:00:00
Universal time: 2016-11-15 07:00:00
Julian date: 2457707.79167
Sidereal time: 02h 46m 26s

View

Field of view: 200° 00′ 00″
RA: 02h 46m 26.31s, Dec: +33° 46′ 01.0″
Azi: 180° 00′ 00.0″, Alt: +90° 00′ 00.0″
Constellation: Triangulum

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