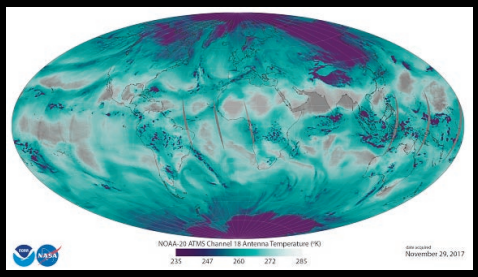
PRIMEFOCUS

Tri-Valley Stargazers



December 2017

Meeting Info
What:
Holiday Potluck Dinner

Who:
Family and Friends

When:
December 15, 2017
Doors open at 6:30 p.m.
Dinner at 7:00 p.m.

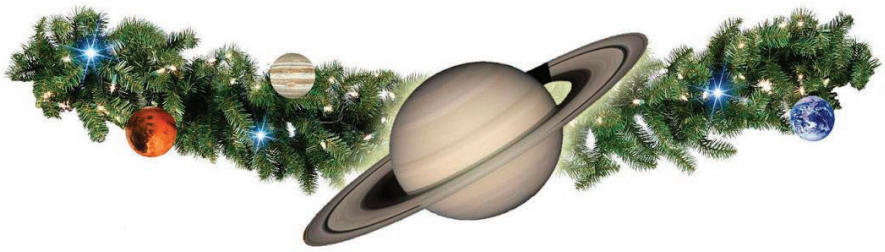
Where:
Unitarian Universalist
Church in Livermore
1893 N. Vasco Road

Inside

December Meeting

Holiday Potluck Dinner

This month is our Holiday dinner. The doors will be opened at 6:30 to set up the tables and chairs, and then the feast will begin at 7pm. TVS will provide the drinks and paper/plasticware. Jill Evanko will prepare the main course that will consist of turkey, tri-tip roast, stuffing, and mash potatoes. Members are asked to bring a side dish to feed about 5-8 people. Use the first letter of your last name to determine which type of dish to bring: A-D Macaroni or Potato Salad; E-J Green or Fruit Salad; K-O Appetizers; P-Z Dessert. If possible, please contact Jill to let her know what you are bringing to ensure a balanced menu (potluck"at"trivalleystargazers.org).



Time to Renew Club Membership for 2018

TVS membership is open to anyone with an interest in astronomy. Amateurs and professionals are equally welcome; skilled amateurs comprise the majority of the membership. You do not have to own a telescope in order to be a member.

Those renewing their club membership are encouraged to do so by using the online application before the end of December. The term of membership is one calendar year - January through December. The regular club membership remains a bargain at $30. Student membership (High School or College) is only $5! Alternatively, Patron Membership, which grants use of the club's 17.5" reflector at H2O, is available at the annual rate of $100.00.

You can join TVS or renew your membership online at:

http://www.trivalleystargazers.org/membership.shtml After filling out the application form you are connected to the PayPal payment form. You do not need to have a PayPal account to pay online, since PayPal will accept credit cards. Everyone is encouraged to use the online application. Alternatively, you can mail in the Membership Application on the last page of this newsletter along with a check to the Tri-Valley Stargazers, P.O. Box 2476, Livermore, CA 94551-2476. Note that TVS will not share your information with anyone. We only use the e-mail address to notify you when the newsletter becomes available.

All members agree to hold the Tri-Valley Stargazers, and any cooperating organizations or landowners, harmless from all claims of liability for any injury or loss sustained at a TVS function.

News & Notes

2017/2018 TVS Meeting Dates

Below are the TVS meeting dates for 2017/2018. The lecture meetings are on the third Friday of the month, with the Board meetings on the Monday following the lecture meeting.

Lecture Meeting	**Board Meeting**	Prime Focus **Deadline**
Dec. 15	Dec. 18	
Jan. 19	Jan. 22	Dec 29
Feb. 16	Feb. 19	Jan. 26
Mar. 16	Mar. 19	Feb. 23
Apr. 20	Apr. 23	Mar. 30
May 18	May 21	Apr. 27
Jun. 15	Jun. 18	May 25
Jul. 20	Jul. 23	Jun. 29
Aug. 17	Aug. 20	Jul. 27
Sep. 21	Sep. 24	Aug. 31
Oct. 19	Oct. 22	Sep. 28
Nov. 16	Nov. 19	Oct. 26
Dec. 21	Dec. 17	Nov. 30

TVS Election Results

By acclimation at the November meeting, the outcome of the club elections is as follows:

• President: Rich Combs

• Vice President: Eric Dueltgen

• Treasurer: Roland Albers

• Secretary: Ron Kane

Lance Simms and Tina Chou have agreed to be the Program Director's for TVS. Should you have any suggestions for speaker, please contact them at: programs"at"trivalleystargazers.org. Jim Theberge has volunteered to be the TVS Publicity Coordinator, and Chuck Grant is the new Night Sky Network Coordinator. The TVS-at-large members are Dave Feindel, Ross Gaunt, Gert Gottschalck, and Hilary Jones.

Money Matters

As of the last Treasurer's Report on 11/20/17, our club's checking account balance is $15,701.71. Current club membership is 128!

RASC 2018 Handbooks and Calendars

For those who pre-ordered a RASC Handbook and/or Calendar, Roland will have them available for pick-up at the December 15 meeting.

Calendar of Events

December 13, 11:00pm-3:00am

What: Geminid Meteor Shower
Who: You
Where: Chabot Space and Science Center, 10000 Skyline Blvd., Oakland, CA 94619
Cost: Free

Chabot's observatory deck will be open for the Geminid Meteor shower on Dec. 13th-14th from 11:00pm - 3:00am. Our astronomy experts will be on hand to answer your questions and help you catch a glimpse of the brightest meteors in the night sky.

See http://www.chabotspace.org/events.htm for more information, or call (510) 336-7373.

December 16, 11:00am

What: The Square Kilometer Array (SKA) Telescope in South Africa
Who: Dr. Josh Dillon, UC Berkeley
Where: UC Berkeley, Genetics and Plant Biology Building, Room 100 (northwest corner of campus)
Cost: Free, limited hourly pay parking on/nearby campus. The venue is within walking distance of BART and bus lines.

The last century has seen a revolution in our understanding of the universe and our place in it. We now know that the universe is about 13.8 billion years old and only about 5% normal matter–the stuff we're made up of like protons, neutrons, electrons. Uncovering the nature of the other 95%, the mysterious dark matter and even more mysterious dark energy, is one of the most important questions in fundamental physics today.

Dr. Dillion will talk about a new technique being developed here at Berkeley with collaborators around the world to use radio telescopes to make huge 3D maps of hydrogen, the most abundant element in the universe, to test our cosmological theories. He will explain the observational challenges we're facing and the reason why we're building a giant array of 350 dishes–each one almost 50 feet across–in the middle of the South African desert. Along the way, he will discuss how we know what we know about cosmology today and how we use radio telescopes to map out that ancient hydrogen and see the impact that the very first stars, galaxies, and black holes had on it.

For more information see: http://scienceatcal.berkeley.edu/the-sciencecal-lecture-series/

December 22, 7:00-9:00pm

What: Intro to the Night Sky and In-Town Star Party
Who: Teruo, SJJA Member
Where: Houge Park, 3972 Twilight Dr, San Jose, CA, We will

Header Image: Temperature of the lower atmosphere based on microwave data sent back by JPSS-1, now known as NOAA-20. For more information see: https://www.nesdis.noaa.gov/jpss-1

Calendar of Events (continued)

be in the 1st building, closest to the parking lot and tennis courts.
Cost: Free

At our "Intro to the Night Sky" talk, learn about what's happening in the night sky in the coming month and what you can see from your own backyard in San Jose. Afterward take a walk down telescope row at our In-Town Star Party. The class and the star party are free, no reservations, just show up!

For more information see: https://www.meetup.com/SJ-Astronomy/events/238350687/

December 29 (5:00pm)-December 30 (10:00am)

What: Slumber with the Stars, A Family Night at the Museum
Who: You
Where: Chabot Space and Science Center, 10000 Skyline Blvd., Oakland, CA 94619
Cost: $85 (includes dinner and breakfast with vegetarian options available). Member Discount: $10 off per member. Get tickets at: https://tinyurl.com/y9ogeqlp

This Sleepover will transform from Pajama Party to a Night of Discovery where famous scientists related to Chabot Space & Science Center's history come to life. Admission includes:

•Flashlight tours to meet costumed historical characters who influenced modern Astronomy
•Dinner and Breakfast buffet
•Night at the Museum Movie
•Planetarium Show
•Exhibits
•Telescope viewing (weather permitting)

Sleeping areas include the exhibit halls, meeting rooms, and the Pleiades courtyard (weather permitting) for those who wish to bring tents. Bring: sleeping bags, mats, toiletries, jacket, medications.

See http://www.chabotspace.org/events.htm for more information, or call (510) 336-7329.

January 24, 7:00pm

What: Cosmic Gold: Neutron Star Mergers, Gravitational Waves, and the Origin of the Heavy Elements
Who: Prof. Eliot Quataert, UC Berkeley
Where: Smithwick Theatre, 12345 El Monte Road, Los Altos Hills, CA 94022
Cost: Free, $3 parking (Credit Cards or $1 dollar bills)

No details available.

For more information see: https://foothill.edu/astronomy/ or phone 650-949-7888.

Journal Club By Ken Sperber

The Geminids and Asteroid 3200 Phaethon

The Geminid meteor shower is due to peak on the night of December 13 to the morning of December 14. With the Moon approaching new, and rising at about 4am, the astronomical conditions for observing meteors are nearly perfect! The radiant of the Geminids is near the star Castor, and it rises just after 6pm. Thus, reasonable meteor counts can be expected in the evening, improving into the late night, with the radiant transiting at about 2am. The Zenith Hourly Rate (ZHR) for the Geminids is about 120. This exceeds the Perseid ZHR, which is

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Member Astrophoto

Image Caption: Hilary Jones took this image of NGC891 using his PlaneWave CDK 12.5" telescope and an ST-10XME camera. The image took 6.5 hours to acquire (3.3 hours for L plus 1.1 hours for each of RGB).

Journal Club (continued)

about 90-100.

The source of the Geminids is Asteroid 3200 Phaethon, which orbits the Sun with a period of 524 days. At perihelion it is closer to the Sun than Mercury, with its surface temperature peaking near 1200ºF! This year, 3200 Phaethon passes closest to the Earth on December 16, which is just a few days after the peak of the Geminid meteor shower on the evening/night of December 13-14. This makes me wonder if the Geminids will show increased activity this year.

Typically, comets are the parent bodies of meteor showers. In the case of comets, heating from the Sun causes gases to vaporize and carry dust off of the surface of the comet. When the dust impacts the Earth's atmosphere it vaporizes in the flash of light that belies a meteor. But 3200 Phaethon is categorized as an asteroid that is depleted in volatile ices, as it is frequently baked by the Sun. As described in an online Sky & Telescope article (www.skyandtelescope.com/observing/3200-phaethon/), the hypothesis is that the extreme heating of the asteroid surface causes the surface rocks to shatter, releasing dust, which is then "carried away by the radiation pressure of sunlight."

If you are interested in observing Asteroid 3200 Phaethon, see the afore-mentioned Sky & Telescope article, which has extensive finder charts, given that 3200 Phaethon passes from Auriga to Capricorn during the period December 5-26. At closet approach to Earth, on December 16, it is expected to reach 10.7mag, being seen in the constellation Andromeda. The article also has many more details about 3200 Phaethon.

For more information on the Geminid meteor shower, see: http://www.skyandtelescope.com/observing/geminid-shower-2017/

Imaging Vandenberg Launches By Ken Sperber

Image Caption: Ken Sperber combined 20 ten-second exposures of the launch of the NOAA/NASA Joint Polar Satellite System-1 (JPSS-1) that was launched on a Delta II with 9 strap-on solid rocket boosters. The launch occurred on November 18, 2017 at 1:47am from Vandenberg Air Force Base. For more information about JPSS, see: http://www.jpss.noaa.gov/launch.html; https://www.nesdis.noaa.gov/jpss-1

Much to my delight and excitement, rocket launches from Vandenberg Air Force Base, located 250 miles south of the Bay area, are easily visible from our local when launches occur at night. Since February 2016, I have seen 4 launches, including 3 since this past September. Two of the launches have been National Reconnaissance Office launches, one was a SpaceX launch of 10 next generation Iridium satellites, with the most recent, seen above, being the launch of the NOAA/NASA Joint Polar Satellite System-1 (JPSS-1) weather satellite. Given that my day-job is studying weather and climate variability, the launch of JPSS-1 held special interest for me, as in my studies it is likely that I will one day use JPSS-1 data and/or products derived from its observations.

The four launches I have seen each used different boosters, including a Delta IV, Atlas V, SpaceX Falcon 9, and a Delta II. The Delta II is being retired, with only one more launch scheduled. To me, the most interesting launch was that of the SpaceX Falcon 9, since one could also see the boost-back burn and the entry burn of the first stage in preparation for its landing on a barge at sea.

My basic exposure settings are 10 seconds, at ISO-400, with my lens set to f/4. For the first 3 launches I used a zoom lens set to 24mm (on a full-frame chip camera), but for the JPSS-1 launch I set the zoom lens to 50mm, as I gained some confidence about the field of view that the launch would cover.

For the field of view, an important consideration is the inclination of the orbit into which the satellite is launching. For launches the inclination angle is given with respect to the equator. The JPSS-1 satellite was launched at an inclination of 98º, which means it is actually in a retrograde near-polar orbit. As astronomers, we more typically express angles in terms of azimuth, which is defined relative to true north. Thus, an inclination of 98º corresponds to an azimuth of 188º. From the Marin Headlands, my favorite spot to image launches, the azimuth of Vandenberg Air Force Base is approximately 153º. Thus, with JPSS-1 launching to an azimuth of 188º, it moved to the west across my line of sight (see image above).

On December 22 at 5:26pm, a SpaceX Falcon 9 is scheduled to launch Iridium Satellites 31-40 from Vandenberg Air Force Base. The Iridium satellites typically launch into an orbit of

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What's Up By Ken Sperber (adapted from S&T and The Year in Space)

All times are Pacific Standard Time

December

13-14	Wed	Geminids peak on this night. The peak is forecast to occur at 10:30pm-look for Earth-grazing meteors. The Zenith Hourly rate is about 120.
13	Wed	Waning crescent Moon about 5º above Mars, low in the east-southeast (Dawn)
14	Thu	Thin crescent Moon about 9º below Mars, low in the east-southeast (Dawn)
16	Sat	Asteroid 3200 Phaethon, at about 10.7mag, passes within 10.3 million km of Earth, moving at about 15º/day! See: http://www.skyandtelescope.com/observing/3200-phaethon/
17	Sun	New Moon (10:30pm)
17	Sun	Algol at minimum brightness for 2 hours centered on 11:22pm
20	Wed	Jupiter rising in the southeast less than 1º away from Alpha Librae (Dawn)
20	Wed	Algol at minimum brightness for 2 hours centered on 8:11pm
21	Thu	Winter Solstice-longest night of the year in the Northern Hemisphere
26	Tue	First-Quarter Moon (1:02am)
30	Sat	The Moon is less than 0.5º from Aldebaran

January

1	Mon	Mercury in the southeast, at greatest western elongation. (Predawn)
1	Mon	Full Moon coincides with its closest perigee of the year (6:24pm)
4	Thu	The Moon passes close to Regulus in Leo
6	Sat	Mars and Jupiter are less than 1/3º from each other in the constellation Libra (Dawn)
8	Mon	Last-Quarter Moon (2:25pm)
11	Thu	Jupiter and Mars joined by the crescent Moon (Dawn)
12	Fri	Algol at minimum brightness for 2 hours centered on 6:45pm
13	Sat	Mercury and Saturn are less than 0.5º apart, with the Moon 6º to the upper-right of Saturn (Dawn)
15	Mon	Very thin crescent Moon, Saturn, and Mercury form a compact triangle (Dawn)
16	Tue	New Moon (6:17pm)

Imaging Launches (continued)

89.4º inclination (179.4º azimuth). With a smaller inclination than JPSS-1, the Iridium launch will not track as far west as JPSS-1 (see image on p. 5). So, a 50mm lens would be a conservative choice. I might go as high as 70mm with my zoom lens for a sequence of still frames. I also want to try to video the launch with my 600mm zoom lens. Previously, I have watched the launches through my 12 x 36 image stabilized binoculars, during which I have seen lots of structure in the rocket plume.

The launch of NROL-47 on a Delta IV from Vandenbeg Air Force Base is scheduled for no sooner than January 10, 2018, with no indication of the time of day given at present. For such clandestine launches, the time of launch is typically not specified until a few days before the launch. According to spaceflightnow.com for NROL-47 "It will be the last launch of a medium-lift, single-core version of the Delta 4 rocket from Vandenberg Air Force Base. ULA is retiring the "single-stick" Delta 4 family in favor of the less expensive Atlas 5, before eventually replacing both rockets with the next-generation Vulcan launcher."

For the latest launch information see: https://spaceflightnow.com/launch-schedule/

Studying Storms from the Sky

By Teagan Wall

The United States had a rough hurricane season this year. Scientists collect information before and during hurricanes to understand the storms and help people stay safe. However, collecting information during a violent storm is very difficult.

Hurricanes are constantly changing. This means that we need a lot of really precise data about the storm. It's pretty hard to learn about hurricanes while inside the storm, and instruments on the ground can be broken by high winds and flooding. One solution is to study hurricanes from above. NASA and NOAA can use satellites to keep an eye on storms that are difficult to study on the ground.

In Puerto Rico, Hurricane Maria was so strong that it knocked out radar before it even hit land. Radar can be used to predict a storm's path and intensity—and without radar, it is difficult to tell how intense a storm will be. Luckily, scientists were able to use information from a weather satellite called GOES-16, short for Geostationary Operational Environmental Satellite – 16.

The "G" in GOES-16 stands for geostationary. This means that the satellite is always above the same place on the Earth, so during Hurricane Maria, it never lost sight of the storm. GOES-16's job as a weather satellite hasn't officially started yet, but it was collecting information and was able to help.

From 22,000 miles above Earth, GOES-16 watched Hurricane Maria, and kept scientists on the ground up to date. Knowing where a storm is—and what it's doing—can help keep people safe, and get help to the people that need it.

Hurricanes can also have a huge impact on the environment—even after they're gone. To learn about how Hurricane Irma affected the Florida coast, scientists used images from an environmental satellite called Suomi National Polar-orbiting Partnership, or Suomi-NPP. One of the instruments on this satellite, called VIIRS (Visible Infrared Imaging Radiometer Suite), took pictures of Florida before and after the Hurricane.

Hurricane Irma was so big and powerful, that it moved massive amounts of dirt, water and pollution. The information captured by VIIRS can tell scientists how and where these particles are moving in the water. This can help with recovery efforts, and help us design better ways to prepare for hurricanes in the future.

By using satellites like GOES-16 and Suomi-NPP to observe severe storms, researchers and experts stay up to date in a safe and fast way. The more we know about hurricanes, the more effectively we can protect people and the environment from them in the future.

To learn more about hurricanes, check out NASA Space Place: https://spaceplace.nasa.gov/hurricanes/

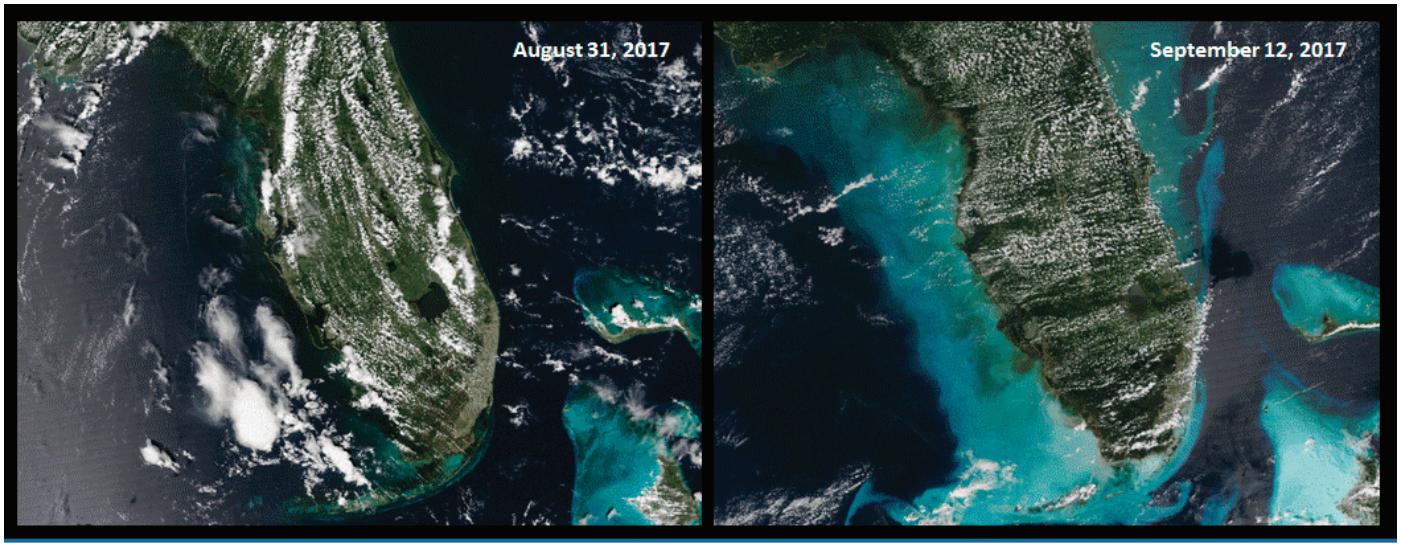

Image Caption: These images of Florida and the Bahamas were captured by a satellite called Suomi-NPP. The image on the left was taken before Hurricane Irma and the image on the right was taken after the hurricane. The light color along the coast is dirt, sand and garbage brought up by the storm. Image credit: NASA/NOAA

Tri-Valley Stargazers
P. O. Box 2476
Livermore, CA 94551
www.trivalleystargazers.org

Tri-Valley Stargazers Membership Application

(or apply for membership online: *www.trivalleystargazers.org/membership.shtml)*

Contact information:

Name: _____ Phone: _____

Street Address: _____

City, State, Zip: _____

Email Address: _____

Status (select one): _____ New member _____ Renewing or returning member

Membership category (select one): Membership term is for one calendar year, January through December.

_____ Student member ($5). Must be a full-time high-school or college student.

_____ Regular member ($30).

_____ Patron member ($100). Patron membership grants use of the club's 17.5" reflector at H2O. You must be a member in good standing for at least one year, hold a key to H2O, and receive board approval.

Hidden Hill Observatory Access (optional):

_____ One-time key deposit ($20). This is a refundable deposit for a key to H2O. New key holders must first hear an orientation lecture and sign a usage agreement form before using the observing site.

_____ Annual access fee ($10). You must also be a key holder to access the site.

Magazine Subscriptions (optional): Discounted subscriptions are available only to new subscribers. All subsequent renewals are handled directly with the magazine publishers.

_____ One-year subscription to Sky & Telescope magazine ($32.95).

_____ One-year subscription to Astronomy magazine ($34).

Donation (optional):

_____ Tax-deductible contribution to Tri-Valley Stargazers

Total enclosed: $ _____

Member agrees to hold Tri-Valley Stargazers, and any cooperating organizations or landowners, harmless from all claims of liability for any injury or loss sustained at a TVS function. TVS will not share information with anyone other than other club members and the Astronomical League without your express permission.

Mail this completed form along with a check to: Tri-Valley Stargazers, P.O. Box 2476, Livermore, CA 94551.